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DECEMBER 2022

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announcements

DECEMBER

ARCHBOLD, OHIO — The Fulton County Amateur Radio Club will hold **Winterfest 2022** from 8-11 a.m., Saturday, December 3 at the Ruihley Park Pavilion, 320 W. Holland Street. Contact: Bryan Patterson, KB8ELG, (419) 250-6694. Email: <kb8elg@hotmail.com>. Website: <http://k8bxq.org>. Talk-in 147.195+.

OCALA, FLORIDA — The Silver Springs Radio Club will hold its **2022 Hamfest** beginning 7:30 a.m., Saturday, December 3 at the First Christian Church, 1908 East Fort King Street. Website: <www.k4gso.us/hamfest>. Talk-in 146.610 (PL 123). VE exams.

VERO BEACH, FLORIDA — The Vero Beach Amateur Radio Club will hold the **Treasure Coast Hamfest** from 7:30 a.m. to 4:30 p.m., Saturday, December 3 at the Indian River County Fairgrounds, 7955 58th Avenue. Email: <tresurecoasthamfest@gmail.com>. Website: <http://treasurecoasthamfest.com>. Talk-in 146.640. VE exams.

TROY, MICHIGAN — The L'anse Creuse Amateur Radio Club will hold its **49th Annual Swap & Shop** from 8 a.m. to noon, Sunday, December 4 at the Balkan American Community Center, 1451 E. Big Beaver Road. Contact: Russ Price, N8HAR, <n8har1977@gmail.com>. Website: <www.n8lc.org>. VE exams.

PLANT CITY, FLORIDA — The Florida Gulf Coast Amateur Radio Council will hold the **47th Annual Tampa Bay Hamfest** and the **2022 ARRL West Central Florida Section Convention** from 1-6 p.m., Friday, December 9 and from 8 a.m. to 4 p.m., Saturday, December 10 at the Strawberry Festival Grounds-Expo Building, 301 N. Lemon Street. Website: <www.tampabayhamfest.org>. Talk-in 147.165+ (PL 136.5). VE and commercial exams, DXCC / WAS / IARU / VUCC card checking.

MINDEN, LOUISIANA — The Minden Amateur Radio Association will hold the **MARA Christmas Hamfest** from 8 a.m. to 2 p.m., Saturday, December 17 at the Minden Civic Center, 520 Broadway. Website: <http://n5rd.org>. Talk-in 147.300. VE exams.

JANUARY 2023

LOCUST FORK, ALABAMA — The Blount County Amateur Radio Club will hold **Freezefest 2023** from 8 a.m. to noon, Saturday, January 7 at the Locust Fork High School Cafeteria, 155 School Road. Website: <http://w4blt.org>. Talk-in 146.700- (PL 91.5). VE exams. Contact: Jack (407) 443-1963.

GLENDALE, ARIZONA — The Thunderbird Amateur Radio Club will hold the 2023 **TBARC Hamfest** from 8 a.m. to noon, Saturday, January 14 at the Haven Church, 5902 W. Cactus Road. Website: <http://tbirdfest.org>. Talk-in 147.040+ (PL 162.2).

GREENWOOD, SOUTH CAROLINA — The Greenwood Amateur Radio Society will hold the **Greenwood South Carolina Indoor Hamfest** beginning 9 a.m., Saturday, January 14 at the Piedmont Technical College-James Medford Family Event Center. Contact: Tedd Davison, AI4WN, <w4gwd@arrl.net> or <w4dew@arrl.net>. Website: <www.w4gwd.org>. Talk-in 147.165+ (PL 107.2) or 443.900+ (PL 107.2). VE exams

HARRISBURG, PENNSYLVANIA — The Harrisburg Radio Amateurs' Club will hold its **WINTERFEST Electronics Expo and Hamfest** from 7-11 a.m., Saturday, January 14 at the Vietnam Veterans of America, 8000 Derry Street. Contact Bab Saber, K3RTS, (717) 574-2608. Email: <k3rts@w3uu.org>. Website: <www.w3uu.org>. DXCC / WAS /VUCC card checking.

LAWRENCEVILLE, GEORGIA — The Gwinnet Amateur Radio Society will hold **TechFest** from 9 a.m. to 3 p.m., Saturday, January 14 at the Gwinnett County Fairgrounds Expo Center Building, 2405 Sugarloaf Parkway. Website: <www.techfest.info>. VE exams

ORLANDO, FLORIDA — The K4KDI Winter Tailgate 2023 will be held on 6 a.m. to noon, Saturday, January 14 at the South Conway Road Baptist Church, 6099 S. Conway Road. Website: <https://k4kdi.square.site>.

PONCHATOULA, LOUISIANA — The Southeast Louisiana Amateur Radio Club will hold the **SELARC 41st Annual Hammond HamFest** from 8 a.m. to 4 p.m., Saturday, January 21 at the Ponchatoula Community Center, 300 N. 5th Street. Contact: Tyrone Burns, N5XES, (985) 687-2139. Email: <wb5net@arrl.net>. Website: <www.selarc.org>. Talk-in 147.000- (PL 107.2). VE exams.

QUARTZSITE, ARIZONA — Quartzfest 2023 will be held from Sunday, January 22 through Saturday, January 28 at Bureau of Land Management property outside Quartzsite. Contact Kristyn Weed, KR1SS, <KristynWeed@gmail.com>. Website: <www.quartzfest.org>.

ROYAL OAK, MICHIGAN — The Hazel Park Amateur Radio Club will hold its **55th Annual Swap & Shop** from 8 a.m. to noon, Sunday, January 22 at the Royal Oak Farmers Market, 316 E. Eleven Mile Road. Email: <hazelparkswap@gmail.com>. Website: <www.hparc.org>. Talk-in 146.640 (PL 100).

JACKSON, MISSISSIPPI — The Jackson Amateur Radio Club will hold the Jackson MS Capital City Hamfest 2023 from 5-8 p.m., Friday, January 27 and from 8 a.m. to 3 p.m., Saturday, January 28 at the Trademart on the Fairgrounds, 1200 Mississippi Street. Email: <hamfest@msham.org>. Website: <hamfest.msham.org>. VE exams.

COLINSVILLE, ILLINOIS — The Saint Louis & Suburban Radio Club will hold **Winterfest 2023** from 8 a.m. to 1 p.m., Saturday, January 28 at the Gateway Convention Center, One Gateway Drive. Website: <http://winterfest.slsrc.org>.

FEBRUARY

ORLANDO, FLORIDA — The Orlando Amateur Radio Club will hold **HamCation 2023** and the **2023 ARRL Southeastern Division Convention** from 9 a.m. to 5 p.m., Friday, February 10; 9 a.m. to 5 p.m., Saturday, February 11; and 9 a.m. to 1 p.m., Sunday, February 12 at the Central Florida Fairgrounds and Expo Park, 4603 West Colonial Drive. Phone: (407) 841-0874. Email:

(Continued on page 104)

ham radio news

FCC Plans to Establish Space Bureau

FCC Chairwoman Jessica Rosenworcel announced plans in early November to reorganize the commission's structure to create a new Space Bureau to consolidate all activities related to satellites. Under the plan, the International Bureau will have its satellite-related responsibilities transferred to the new Space Bureau and will be reconfigured as a standalone Office of International Affairs, modeled after the current Office of Engineering and Technology (OET) and Office of General Counsel. The Space Bureau will also deal with domestic satellite matters. It is unclear how or whether this change in FCC bureau structure will impact the Amateur Satellite Service. The FCC did not release a timetable for making these changes.

IARU Holds Virtual General Assembly

For the first time in its history, Region 2 of the International Amateur Radio Union (IARU), comprised of national amateur radio societies in the Americas, held its triennial General Assembly online rather than in person in early November. According to the *ARRL Letter*, continuing concerns about Covid and international travel issues prompted the decision, which appears to have had some unintended benefits. "Having a virtual conference has allowed many of our societies with limited means to participate in the triennial governance process of IARU Region 2 for the first time," said Region 2 Secretary George Gorsline, VE3YV / K8HI, noting that "26 member societies are represented with 117 registered attendees from across Region 2" as well as representatives from the other two IARU regions and the organization's international officers. The General Assembly is the group's formal decision-making body. Details of its actions were not available as of press time.

We Know How You Feel…

What's a more remote and isolated place than Antarctica? Earth orbit aboard the International Space Station. *Newsline* reports that ISS astronaut Kjell Lindgren, KO5MOS, got a chance to compare notes with students living on the Esperanza Antarctic base, an Argentine research station. The base has a school for researchers' family members, with two teachers and 16 students, ranging in age from 3 to 21. The ARISS (Amateur Radio on the International Space Station) contact was coordinated by AMSAT Belgium, which set up a telebridge for the contact. A recording of the QSO may be found on YouTube at <https://tinyurl.com/vk4sy46n>.

Downtown Dayton Hotel Closes

The Radisson Hotel in downtown Dayton, Ohio — formerly the Crowne Plaza — has closed "for the foreseeable future," according to local news reports. For many years, the hotel hosted DX and contest dinners and hospitality suites during the Dayton Hamvention®. According to the Dayton Daily News, the hotel was sold to a Florida-based company last year and the Downtown Dayton Partnership had been working closely with hotel management for over a year "to develop a strategy to 'reposition' the property," but that neither the business group nor the city had been given any additional information. Both the contest and DX dinners had previously relocated.

Tesla's Wardenclyffe Lab Gets Restoration Grant

Restoration efforts for inventor Nikola Tesla's Wardenclyffe laboratory in Shoreham, New York, recently got a major boost with a $500,000 grant from the National Park Service and the National Endowment for the Arts. *Newsline* reports that the funding will help pay for turning the long-abandoned lab site into a museum and science education center. According to the Tesla Science Center organization <www.teslasciencecenter.org>, the Save America's Treasures grant will help stabilize the exterior of the main laboratory building that was constructed in 1901. Amateur radio groups are heavily involved in the restoration effort.

Tennessee Club Gets Two Educational Grants

The Andrew Johnson Amateur Radio Club in Greeneville, Tennessee, is putting a pair of grants to work to increase exposure to amateur radio and to use ham radio as a tool in teaching science, technology, engineering, and math (STEM). The *ARRL Letter* reports that the club received more than $5,500 from the ARRL Foundation Club Grant Program, which it is using to create the "Youth STEM Through Amateur Radio Project" in conjunction with the Greene County Makers and a homeschool group. The second grant, of $500 from Walmart's Volunteerism Always Pays program, was used to purchase up-to-date books on amateur radio for the local public library.

NOAA Issues Regional Winter Forecasts

If you're wondering about the best times to do antenna work this winter, the National Oceanic and Atmospheric Administration (NOAA) has some guidance for you. According to the winter outlook from the Climate Prediction Center, we should expect warmer-than-average temperatures in the Southwest and along the Gulf Coast and eastern seaboard. Below normal temperatures are anticipated from the Pacific Northwest to the western Great Lakes.

Drought conditions are likely to persist in the southwest and western Great Plains, possibly spreading to the Gulf Coast. On the other hand, higher-than-average precipitation is forecast for the Pacific Northwest, northern Rockies, Great Lakes, and Ohio Valley. The rest of the country is a toss-up in terms of rain or snowfall this winter.

Milestones: W1YL, K7XC, G4TUT Silent Keys

Several well-known amateurs have become Silent Keys in the past month. Among them …

… CQ Amateur Radio Hall of Fame member Ellen White, W1YL, passed away in early November at age 95. Known as the "grand dame of DXing," White spent many years working on the ARRL staff, where she rose to the position of Deputy Communications Manager and served as *QST* magazine's DX Editor. According to longtime friend Chip Margelli, K7JA, White "learned Morse Code in high school in the 1940s as a 'war course' in service to her country, and (with the encouragement of her husband Bob, with whom she eloped in 1945), she went on to become a professional radio engineer, in a field utterly dominated by men." White was also a major figure in contesting, instrumental in the founding of Murphy's Marauders (the predecessor of today's Yankee Clipper Contest Club) and the Florida Contest Group.

… Former *CQ VHF* Contributing Editor Tim Marek, K7XC, became a Silent Key in late October. Tim was an avid VHFer and particularly enjoyed contesting as a rover. According to his brother, Scott, Tim was recovering from a moderate stroke last year that took him off the air when he suffered a second, major stroke in October, succumbing to cardiac and respiratory complications. He was 63.

… Richard Brunton, G4TUT, longtime editor of Southgate Amateur Radio News in the UK, passed away in late October at age 77, as the result of a fall. According to *Newsline*, Brunton not only compiled the daily news reports for Southgate but also, "encouraged non-commercial podcasts and blogs to promote ham radio opinion and stimulate debate on the essential subjects of the day. He also compiled the 'CQ Serenade' weekly program which was broadcast throughout Europe on <Shortwaveradio.de>," and other media outlets.

contents

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features

TECHNOLOGY SPECIAL: Technology has always been at the forefront of amateur radio and many hams have been a part of moving the world forward with that technology. This month, CQ celebrates technology and its impact on ham radio over the last century with stories on pages 16, 18, 23, 24, 26, 29, 32, 46, 54, 58, 63, 68, and 70. Plus, we bring you some new products with a first look at the Yaesu FT-710 and others on pages 43, 47, and 110. *Seasons' Greetings!*

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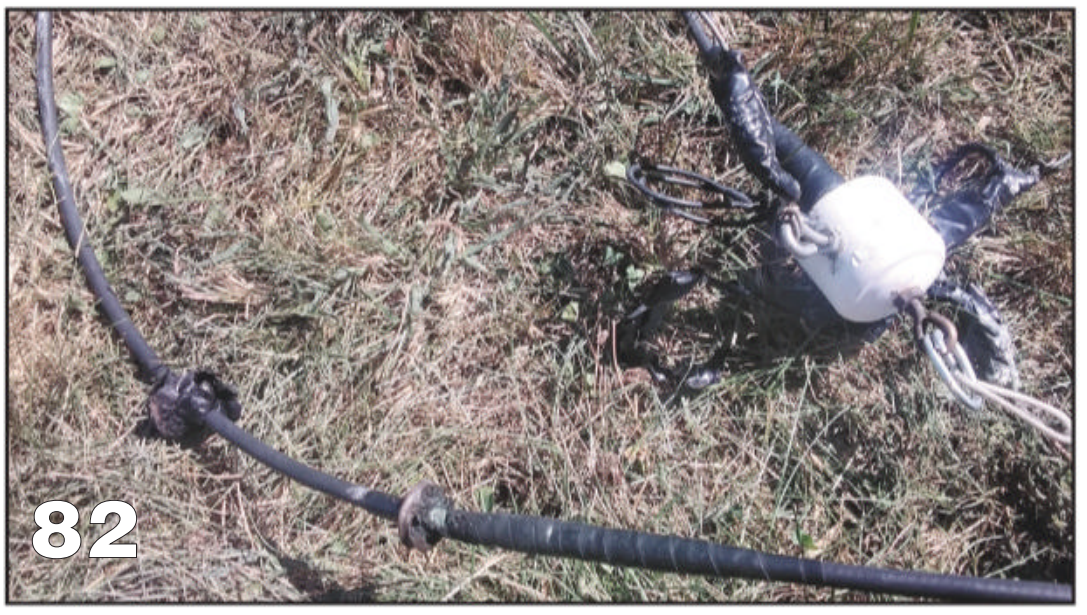

zero bias: a cq editorial

BY RICH MOSESON,* W2VU

5-9-14 … 10!

Football call? Nope. Winning Powerball numbers? I wish … Contest exchange? Yes, and one that made me very happy to hear. When I turned my rig on around noon on Saturday of the CQWW DX Contest SSB weekend, I was greeted by dozens of stations reporting "5-9, 14," meaning (for non-contesters) that I had a strong signal (5-by-9) into Western Europe (CQ Zone 14).

Now, there's generally nothing especially unusual about that. In fact, if you look at last month's Contesting column, you'll see that Tim, N3QE, has determined that Zone 14 is the most commonly reported zone in the CQWW. In addition, contacts between Zone 14 and Zone 5 (my zone) were the second-most commonly reported.

So what made these Zone 14 stations special? They were on 10 meters, which has been a dead zone for east-west propagation during the past several years of solar minimum. And it's not just me. N3QE notes in his column this month that in last year's ARRL 10-Meter Contest, he had no contacts with Europe. None. Zip. Zero. All the propagation was north-south. But now, the 10-meter band was filled with European stations, from the bottom of the phone band at 28,300 kHz to well above 28,600 kHz. Ten meters lives! Solar Cycle 25 is a'rising!

In fact, all indications are that Cycle 25 is rising more quickly and more sharply than predicted — except for a team led by Dr. Scott McIntosh of the National Center for Atmospheric Research, which believes this could be one of the strongest cycles on record. Their prediction is based on 22-year magnetic cycles (vs. the more commonly studied 11-year sunspot cycles) and something called the *terminator event*.[1] If the trends continue on their current course, Dr. McIntosh and his team just might be right. We all can certainly hope so! Meanwhile, try to find some time to get on the upper HF bands — 10 meters in particular (the ARRL 10-Meter Contest is this month) — and enjoy some of the best DX the ionosphere has had to offer in years! And if you're new enough to ham radio to think that DX only happens with an FT8 keyboard (nothing against FT8 here), signals right now are strong enough to hear through your speaker or headphones, and not just see on a waterfall display. This means that if you switch over to SSB or CW, you'll have the opportunity to have an actual conversation with another ham in someplace far away. But whatever mode you use, get on the air and *communicate*. It's half of what our hobby and this magazine are all about.

Technology Special

The other half is *technology* (it says so right on our cover), and while every issue of *CQ* includes technical articles, this one is our annual Technology Special. More than a dozen articles in this issue fall under that umbrella, from KBØVKS's "Build Your Own Low-Voltage Transformer" and K3MT's "S Parameters Made Easy" (do you even know what an S parameter *is*?) to Emergency Communications Editor K3PFW asking, "Is Technology Your Friend or Your Downfall?"

In between, we cover proper band-pass filter settings on your rig for getting the most out of FT8, a QRPp QSO made using test equipment (!), a tiny QRP wattmeter and "Sherlock Investigates" temperature-related failures of the venerable 2N2222A transistor. Among our tech-focused columns (in addition to EmComm as noted above), we look at the new T41 SDR transceiver kit, a couple of different antennas and bridge circuits.

Of course, we have several operating-focused articles as well, including tips on planning a DXpedition, a report on a DXpedition to Svalbard (JWØ) and a CQ Classic on a DXpedition to Christmas Island (it *is* December, after all). Both our Ham Radio Explorer and Contesting editors key in on operating CW as well as improving band conditions, and the Sun takes center stage in both Learning Curve ("Space Weather and DX") and Propagation ("The Coronal Veil"). Plus, we have our annual Periodic Table of Contests, in which Contesting Editor N3QE builds a chart you can pull out and hang on your wall of major and/or fun contests on nearly every weekend of 2023.

Ho, Ho, Ho!

Finally, VHF-Plus Editor N4DTF offers "A VHFer's Holiday Gift List" (KØNEB got ahead of the game last month with his kit-builder's gift list), and of course, our wonderful advertisers have all sorts of holiday goodies for you to salivate over (and maybe slip under someone's pillow with a sticky note attached to an appropriate page!). Please patronize our advertisers and tell them you saw their products here in *CQ*.

From all of us to each of you, all the best wishes for a Merry Christmas, Happy Hanukkah, Happy Kwanzaa or whatever else you may celebrate to bring a little more light into the darkest time of the year (and remember, long hours of darkness make for great DX on 160, 80, and 40!). As CBS's Charles Osgood used to say, "I'll see you on the radio."

73, Rich, W2VU

Note:

1. See Sept. 2020 *CQ*, "Zero Bias," p. 8 and "News Bytes," p. 9

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

news bytes

Ohio-Penn DX Bulletin QRT After Three Decades

An institution among DXers has been shut down after nearly 32 years. Ohio-Penn DX Bulletin founder and editor / publisher Tedd Mirgliotta, KB8NW, announced his retirement in the October 31st (and final) edition of the bulletin. Since 1991, the OPDX Bulletin has been providing DXers with regular updates on DXpeditions, planned activations by operators in rare locations, and other news of interest to DXers. The bulletin was always offered at no cost to the reader.

In his retirement message, Mirgliotta noted that he had actually been providing DX information to hams for over 40 years, pioneering the use of computer communication and packet radio to do so, "starting on a local RTTY BBS, Packet Radio BBS and an online dial-up BBS called BARF80 (which received global phone calls before adding the internet to it)."

John Papay, K8YSE, who has hosted the OPDX Bulletin on his website for many years, recalled that its audience often went beyond the ham radio DX community. "I checked my personal email from work one Monday morning," he wrote, "and was a little concerned when I noticed there was one from someone at fcc.gov. My first thought was that I had violated some rule. But when I read the email, the question was, 'Where is yesterday's OPDX Bulletin? It is not on your website!' I don't remember why that was the case but as we exchanged emails, the sender told me that the first thing they did every Monday morning was to read the OPDX Bulletin while having their first cup. Part of their job was to field complaints about problems on the ham bands (you know what can happen when rare DX shows up), and the OPDX let them know what would be going on with various operations, when they would start and end, frequencies used etc. They could use this information to respond to the complaints in a meaningful way. When you put stuff on the web you just never know who might read it and how it might be used!"

While the weekly bulletins have now ended, Mirgliotta noted that "The OPDX Mailing List will still be active to provide upcoming DXpedition announcements and special press releases." However, he added, "They will not be in bulletin format."

OPDX Bulletin archives (back to 1999) will continue to be available online at <http://w.papays.com/opdx.html>.

Hurricane Ian Ham Stories

Hurricane Ian slammed into the west coast of Florida in late September and left behind a trail of death and destruction second only to Hurricane Katrina in 2005. The ham radio response during and immediately after the storm was covered in our November news column. But recovery takes a much longer time and hams continue to play a role (although not always with their radios). We share two stories with you here, one of a group of hams from the Miami area helping fellow hams in Fort Myers, and a first-person story by a member of the CQ "family" about getting back on the air after the storm destroyed most of his antennas. – W2VU

Hams Helping Hams

BY PETE VAROUNIS,* NL7XM

Members of QCWA Chapter 147 with one of the trucks in the 4-vehicle caravan delivering fresh water to hams cut off by Hurricane Ian in the Fort Myers area, 200 miles away. (Photos courtesy of NL7XM and QCWA Chapter 147)

Some of the 58 cases of bottled water transported across the state of Florida for delivery to hams and their neighbors in Fort Myers and Cape Coral.

Several members of QCWA (Quarter Century Wireless Association) Chapter 147 in the Florida Keys purchased many, many cases of water and loaded them into a caravan of vehicles to deliver to hams in hurricane-affected Ft. Myers / Cape Coral all at their own expense and mileage. On Sunday, October 2nd, the group — which included chapter President Luis Cruz, KJ4RCD; Secretary-Treasurer Alex Valladares, W7HU, and members Carlos Calzada Montero, KJ4NQA; and Dany Mejias, KM4DY, loaded 58 cases of water into four vehicles and drove 200 miles coast-to-coast from Miami to Fort Myers and Cape Coral. Each driver had Red Cross credentials, so they

Some of the damage observed by the visiting hams. →

* Email: <PVarounis@aol.com

were allowed into restricted areas, delivering water to hams and their neighbors.

Understandably, the amateurs on the receiving end were very moved and grateful, having no fresh water available. No announcements were made ahead of time. They did it spontaneously and surprised them on the west coast.

The accompanying photos provide a glimpse of the damage and the effort by the Miami-area hams to provide at least a little bit of relief. A video of the operation is available on YouTube at <https://youtu.be/atz30vK3B6M>. It is partially in English and partially in Spanish, as the members of QCWA Chapter 147 are predominantly Spanish-speaking Cuban immigrants.

Utility crews work to restore power to storm-ravaged areas on Florida's west coast.

Recipients of the donated water cases head for their homes (or what was left of them).

Back On the Air After Hurricane Ian Destroyed My Antennas

BY DENNIS LAZAR,# W4DNN

I am writing this article 14 days after surviving the "storm of the century" in southwest Florida. On Tuesday, September 27th, word from the National Hurricane Center was that Hurricane Ian was aiming its wrath at our hometown of Port Charlotte. The storm would come ashore as a category 4, bordering on 5!

"Oh my God! We are at ground zero!" I told my XYL, Ruthie, K4KLQ. "They are predicting a 16-foot storm surge." Our home is on a waterway just off Charlotte Harbor and with only 8 feet of elevation above the water, we just knew that we would be doomed. Our home and all our possessions would be underwater. Evacuation was mandatory.

We immediately got into the car and, with our pre-packed suitcase and a box of important papers, we fled across the state to a hotel in West Palm Beach on Florida's east coast. Wednesday night, September 28th was a nailbiter. With Ian's eye bearing down on our home, we went to bed certain that in the morning we would be homeless. But at 7 a.m. the next day, a neighbor [the only one brave (*or foolish? – ed.*) enough to ride out the storm in a second-floor bedroom] called to tell us the good news. The storm had veered slightly to the south and had inundated Fort Myers. Our town went through the northern eyewall and so suffered damaging winds but no storm surge flooding. Thank the Lord, our home was saved.

 # Former CQ QRP Editor
Email: <w4dnnradio@gmail.com>

Photo A. Ian's 150-mile-per-hour winds knocked this large avocado tree into my satellite antenna. (Photos courtesy of W4DNN)

Surveying the Damage

Our house was the only one in the neighborhood to have a relatively intact roof (it had been damaged by a tornado in 2002 and replaced with a hurricane-resistant one). In the house next door, for instance, a bedroom and the living room became open to the sky and flooded by the torrential downpour. We did not escape Ian's wrath unscathed, however. A huge tree fell on one side of the roof (*Photo A*), taking down a tower (*Photo B*) and my satellite antenna and rotor. In the backyard, my Gap Titan DX vertical was reduced to a pile of aluminum trash (*Photo C*). Only my "stealth" rooftop wire antenna survived.

Every night, I like to listen to 40 meters in bed with the music of CW or an SSB QSO lulling me to sleep through earphones so as not to disturb Ruthie. To do this, I had installed a random end-fed long wire. Lying flat on our cement tile roof, it served not only for nighttime SWLing but as an alternate antenna that is not prone to lightning strikes during Florida's famous afternoon thunder boomers. The wire survived the storm, only pulling loose from the unun[1] at one end. I reattached it to the terminal and restrung it across the roof. I was able to be back on the air.

How I Built a Stealth Long Wire

Since I first constructed this antenna several years ago for a magazine article about designing stealth antennas to circumvent homeowners' association restrictions, many Florida hams have copied the design.

It is important for a stealth antenna to be constructed using a wire that blends with the color of the roof. In addition, to have it lying flat on the roof depends on having concrete tile that is non-conductive. A metal roof is a non-starter and a shingle roof is prone to holding moisture so, in that case, the antenna should ideally be suspended a little above the shingles. I think, however, that since the wire is insulated, perhaps it would not be affected by this moisture. I didn't try it.

Putting It All Together

My tile roof is terra cotta orange. Because I do not live in an HOA community, I was safe in using some black-jacketed

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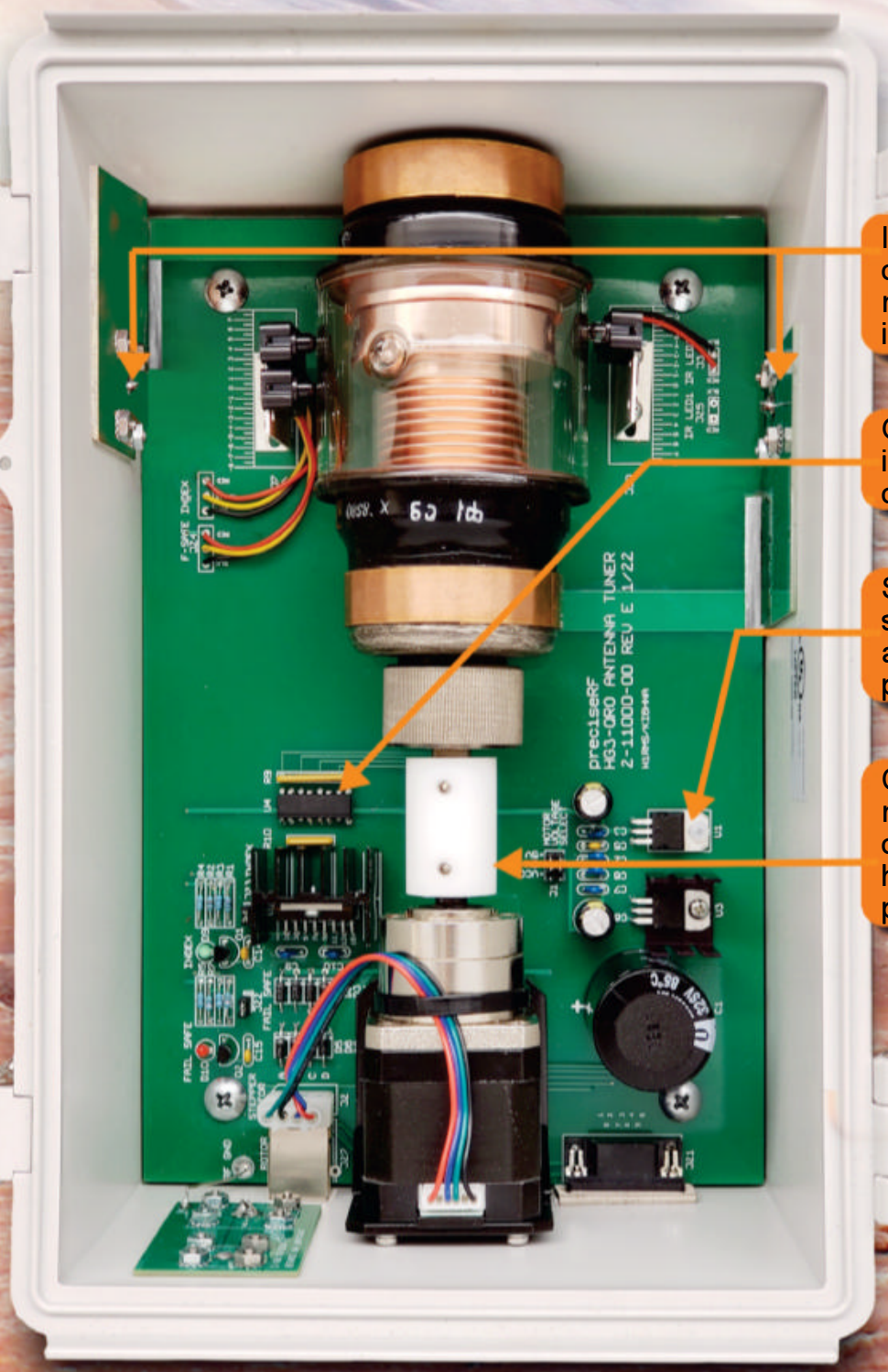

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Photo B. I think the rotor survived but my beams are missing multiple elements.

14-gauge stranded wire left over from an old dipole. Length of the wire depends on the size of the roof and on the optimal length for a random end-fed that is far from being resonant on any of the ham frequencies. You can find optimal lengths at many websites including <https://tinyurl.com/2tv2yndh>. This antenna, with a tuner, will be usable on all bands. RG-58U coax feeds the antenna through a 9:1 unun. The distance from the unun end of the wire to my shack is only about 25 feet so I did not use heavier coax. I clamped five ferrites to the coax below the roofline to keep possible RF off the outer braid and out of the shack.

I attached the unun to my tower at one end of the house using black Dacron® rope (*Photo D*). After draping the wire across the roof, I secured the other end to an insulator and with Dacron rope to a hook in the soffit at the far end of the house. The antenna is only 12 feet above ground.

From the unun, I attached an approximately 30-foot counterpoise wire and ran it down to the ground and along the foundation. This also helps keep RF off the coax braid. Once the coax was run through a hole in the concrete wall and into the shack, it was time to experiment.

I tuned the IC-7300 to a 20-meter CW frequency and

Photo C. The remains of my Gap Titan DX vertical are destined for the trash.

Photo D. The 9:1 unun is attached to my tower with Dacron® rope and the wire lies on the roof.

Figure 1. Wow, this random wire end-fed rooftop antenna really works. The map shows spots of my CQs from the Reverse Beacon Network <www.reversebeacon.net>.

pressed the "tune" button. Wow, the 7300 was able to tune the wire without using an external tuner. I accessed the Reverse Beacon Network on my computer and sent a string of CQs. The results (*Figure 1*) were fantastic. I was putting a strong signal into Costa Rica and northern Canada as well as many northern U.S. states. The antenna is oriented with my east-west roof, so the pattern should be best north and south.

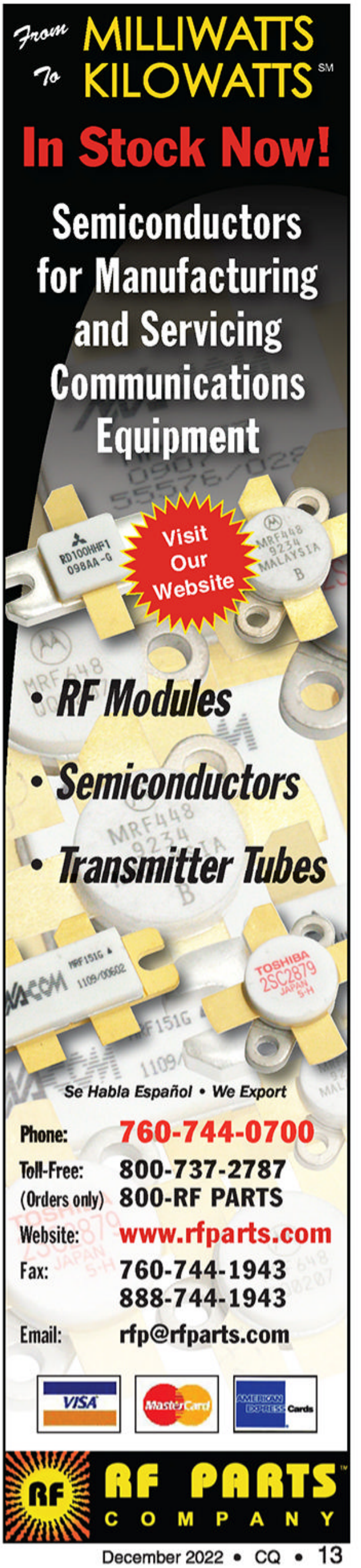
In the next few days, I worked into Europe with an average S7 signal and into Texas and even California at S3 to S5 despite these being off the end of the antenna pattern.

Antennas or Couch?

The question today, post-hurricane, is "do I really need to replace my high-priced antennas?" Ruthie doesn't think so. She thinks we could better use the money for a new fridge or maybe to reupholster the couch. We will have to discuss that further, HI HI.

Note:

1. An "unun" is a transmission line transformer with an unbalanced feed / load on both sides (such as coaxial cable feeding an end-fed wire antenna). If one side is balanced, such as a dipole, whose two legs are of equal length, the transformer would be called a "balun" (balanced-to-unbalanced). The transformers are used to match feedlines and antennas of different impedances. To learn more, we recommend CQ's *Understanding, Building and Using Baluns and Ununs*, by the late Jerry Sevick, W2FMI.



Ukrainian Hams Back on the Air

PHOTO ESSAY BY
PAVLO TARASOVYCH,* UT1KY

While most of the pictures we see on the news from Ukraine are of cities bombed by Russia, people in other parts of the country are trying their best to keep their daily lives somewhat normal. This includes children going to school and radio amateurs returning to the air after a government-ordered shutdown in the early days of the war.

Pavlo Tarasovych, UT1KY, a teacher and chief of school radio club station UT1KWA, shared these photos with us of the "radio team" at his school in Rivne, about 200 miles (325 kilometers) west of Kyiv, visiting the club station and listening to the ham bands. Thank you, Pavlo, and we salute the bravery of the Ukrainian people!

* Email: <ut1ky@ukr.net>

Teacher Pavlo Tarasovych, UT1KY, and students at the UT1KWA club station at their school in Rivne, Ukraine. (Photos courtesy of UT1KY)

A radio "team" member tuning the HF transceiver at the UT1KWA club station.

UT1KY at the radio while team members listen.

Several of Pavlo's students hoping for (your choice) peace, victory or both.

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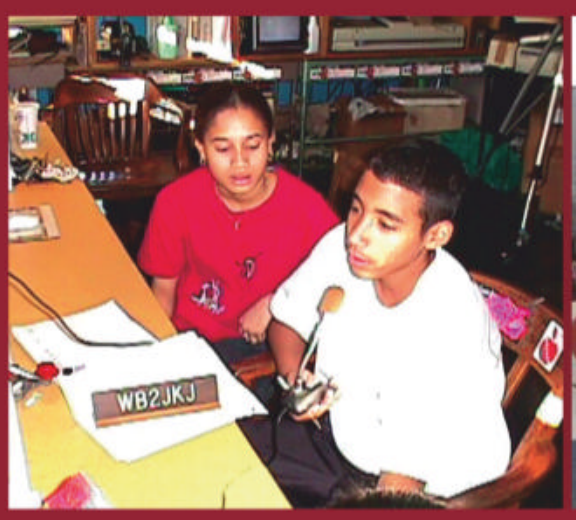

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Technology Special:

Are you giving yourself the opportunity to make as many QSOs as possible when operating FT8? K4VBM points out an often-ignored setting on your radio that might help broaden your horizons.

Do you Have Blinders On? Getting More From FT8

BY BOB HENSEY, K4VBM

Many people operate the FT8 digital mode. It has its detractors and a few negative aspects, but it does quite well during poor propagation and band conditions. Unfortunately, many FT8 operators are not getting the best FT8 experience because they have blinders on. I believe this to be a widespread problem. What do I mean by that? Let me explain.

Most radios today have a 3-kilohertz passband capability. The passband is the range of frequencies that can pass through a filter. The passband is basically the spectrum coming into your radio from your antenna that you can actually hear when you are tuned to a particular frequency. So, if your radio is set for a 3-kHz passband and tuned to 21200 kHz, you are actually hearing everything between 21198.5 and 21201.5 kHz.

Now, many times it is a good idea to limit the passband based upon what you are doing with your radio. For example, for CW, you might only want the passband to be 500 Hz, or even 100 Hz, to mute other CW signals that would interfere with your ability to copy the station with which you want to QSO. Most current transceivers have multiple filters that allow you to limit the passband of your radio for these very reasons.

Now, in the case of FT8, the passband from your radio is being sent to your computing device as audio. The WSJT-X program decodes the entire passband that it receives, and displays the decoded messages as well as the signals themselves in its waterfall window. You might notice that you can stretch the WSJT-X waterfall window out as wide as 3,000 Hz (3 kHz). Well, that's because most radios can pass that much, so it made sense to the WSJT-X authors to decode that much. That's why you are able to see signal traces from 0 through 3,000 in that waterfall window.

I say are able because, in my experience, many FT8 ops have their radios' passbands configured improperly for FT8 mode, and they don't hear/see the entire 3 kHz of spectrum, but instead only a fraction of it on either side of their red transmit cursor. How can that be? Well, it's because many radios come from the factory with a filter setting that reduces the 3-kHz passband to something much less. I am constantly saying out loud to myself, "there's another ham who has his FT8 blinders on!"

I know this because I transmit a lot from the edges of the passband where there is less QRM, and I call people who have these blinders on and they are "deaf" to my signal until I move my TX signal closer to or on top of theirs, whereupon magically they hear me. I see this many times a day, so I decided to write this article to make people aware of this "blinders" phenomenon and learn how to correct it.

To illustrate what this looks like, I set a filter on my radio to allow the frequencies between 1,000 and 2,000 Hz in the passband to pass through, but filter 0-1,000 and 2,000-3,000. *Figure 1* shows what you see on the WSJT-X waterfall. You will never see / decode a signal to the left of 1,000 or the right of 2,000, even though they are there.

Do you see something like this when you operate FT8? If you do, you are really missing out. It is because your radio has a narrowing filter in

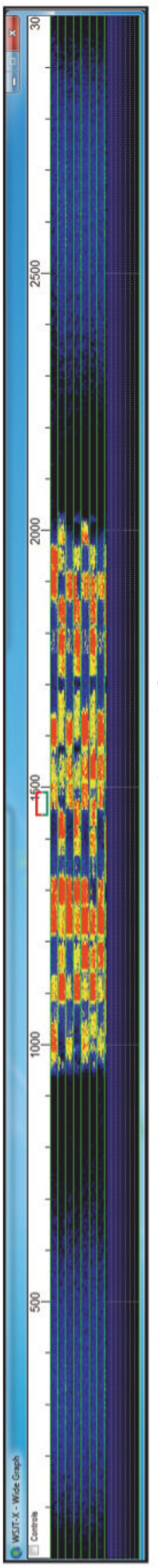

Figure 1. FT8 waterfall with passband filter on the radio set to 1,000 Hz (1 kHz). Signals between 0 and 1,000 and 2,000-3,000 Hz on the display are filtered out, limiting the number of signals you can possibly decode.

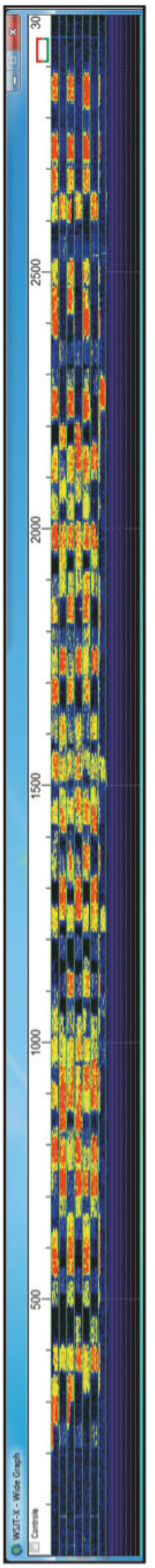

Figure 2. FT8 waterfall with "blinders" off and the full 3-kHz passband available for display and decoding by the WSJT-X software. Quite a difference!

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action. *Figure 2* shows the difference in what you will see with the radio's passband filter set to the full 3 kHz that the FT8 software can decode. So much better, and you will make so many more QSOs if you have your radio's filter set properly when you operate FT8 digital mode.

Every radio is different, and you will need to read your radio's manual to find out what its passband is, and what the default setting is for its default filter, along with the procedure for broadening the passband or selecting a broader filter.

I will also pass on from experience that both the Icom IC-7100 and Yaesu FT-891 radios have a default filter width less than 3,000 Hz. When I helped a friend set a proper width for Filter 1 on his IC-7100, he was amazed at what he had been missing. The same for the friend with the FT-891. There are good reasons for the narrower default passbands and don't speak poorly for these radios. It's just something you need to be aware of and know how to adjust in order to get the most from your rig in this mode. So, read your radio's manual and make sure you don't have "blinders" on when you are operating FT8.

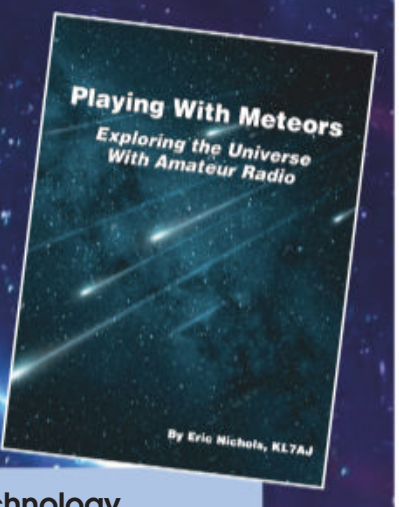
73 and good DX!

CQ

Playing With Meteors

Exploring the Universe With Amateur Radio

By Eric Nichols KL7AJ



Wouldn't it be a blast to be a master of technology rather than to be at its mercy? Or better yet, to actually create the next new thing? While it's true that a lot of what we consider high-tech involves computer technology, an equal or greater part of the next new thing is going to involve wireless, also known as radio. In fact, our entire universe is connected by radio, and the entire universe is the radio amateur's sandbox.

In *Playing With Meteors*, author Eric Nichols takes you on a tour of the opportunities that amateur radio can bring you, and how you can leverage the knowledge you gain in "hobby radio" to a career in hi-tech, or just to being smarter than your "smart devices" (and maybe even some of your friends).

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Technology Special:

Could your test bench use a low-voltage power source? KBØVKS shows us how you can "roll your own" using a surplus transformer that might already be in your junk box.

Build Your Own Low-Voltage Transformer, Part 1

BY DAN SWENSON,* KBØVKS

Does your shack inventory contain unknown power transformers? Here is a homemade tool to make identification of unknown power transformers easier and safer. It will also give you a low-voltage power source for various projects. The transformer needed to make the tool might already be in your shack inventory.

The main advantage of this tool is that it uses quite low AC voltages for testing. The AC outputs of this tool, called excitation voltages, typically range from a fraction of a volt up to a couple volts. Some operators might be tempted to use a Variac® for this purpose. Bear in mind that common Variacs are not isolated from the power line; this is a safety concern. The end result of this construction project is a low-voltage transformer with several output taps, all of which are isolated from the power line (*Photo A*).

This project involves the partial disassembly of an existing power transformer, one that might already be in your junk box. One of the more attractive aspects of this construction project is that only the existing secondary winding needs to be removed. The primary (line) winding, laminations, bobbin, and frame remain undisturbed. Note to educators: This low-voltage transformer can also be used as a teaching tool.

Safety Considerations

As in all projects that involve the power line, there is danger of electric shock, fire, and death. If you are a beginner, you would do well to involve an experienced radio amateur, or a licensed electrician, as a mentor throughout this project. Safety and liability are your responsibilities. You are the responsible party, no one else. If you have concerns, seek qualified help. When it comes to safety, there is no such thing as 100% safe. Realistically, it might be more accurate to speak in terms of more or less danger.

Locate Candidate Transformer

Many power transformers have E&I (voltage and current) laminations; transformers with tape-wound laminations can also be used. It does not matter if the candidate is step-up or step-down. Size should be somewhere in the 40- to 100-watt category, weighing about 1.2 to 2.2 pounds. The cross-sectional area of an E&I central core, or of tape-wound laminations, should be about 0.7 to 1.5 square inches. The above numbers are not critical; if your candidate is somewhere in this neighborhood, it will work in this application. Transformers smaller than this range may be difficult to work with because of their small "windows." The windows are the spaces containing the windings. Units larger than 200 watts have more power capability than you will likely ever need. The candidate I used in this project was toward the small side of the above ranges: E&I laminations with a central core about 0.8 square inches, about 1.3 pounds total, and about 50 watts output. The exterior dimensions of the lamination

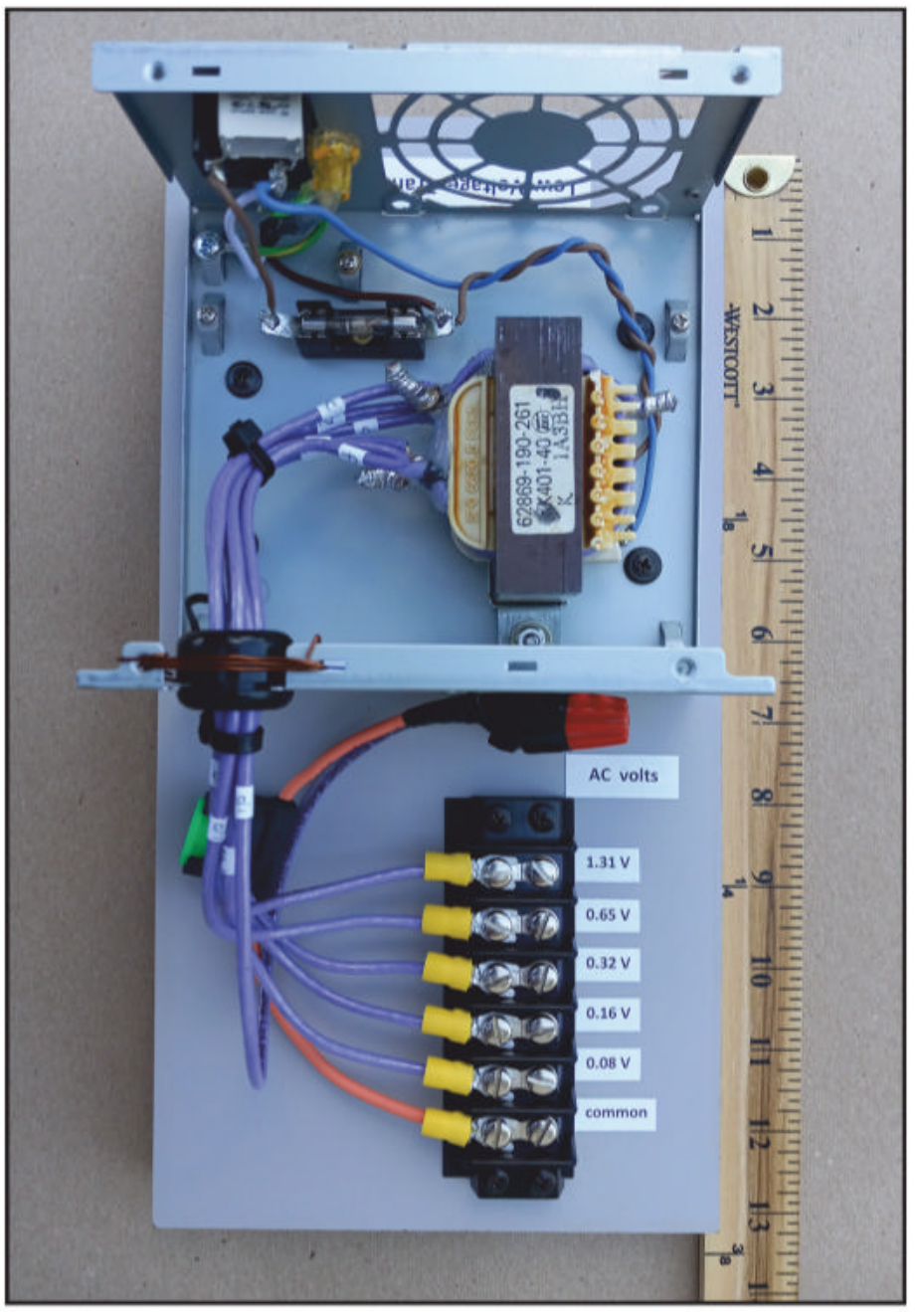

Photo A. The low-voltage transformer project, with five outputs. On the author's unit, voltages ranged from 0.08- to 1.31-volts AC. Yours will likely differ.

* Email: <kb0vks@gmail.com>

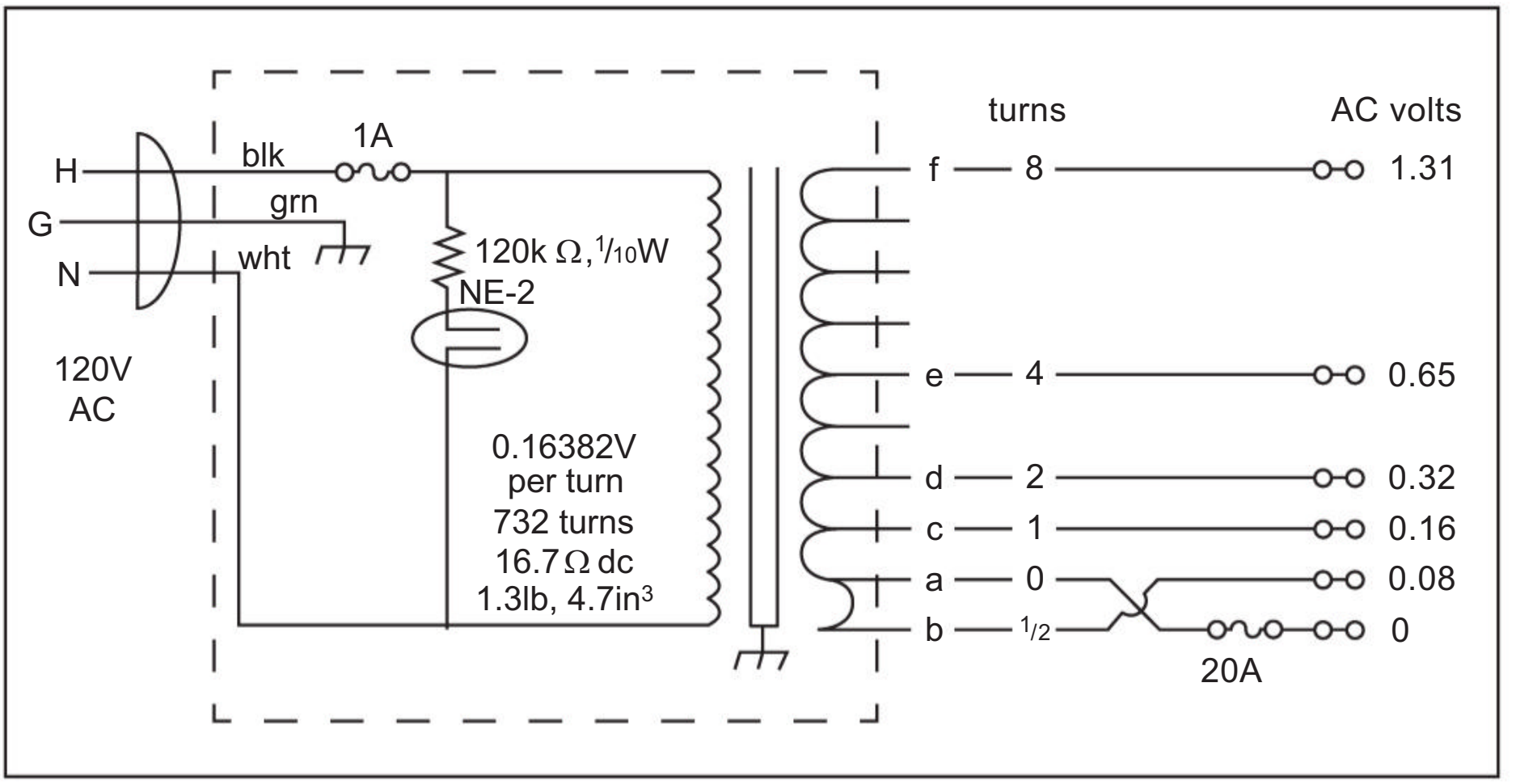

Figure 1. Schematic of the low-voltage transformer with the author's measured voltages. Your figures may vary, depending on the transformer you start with, so be sure to make your own measurements and note them in your schematic. (Drawings by Emily Leary)

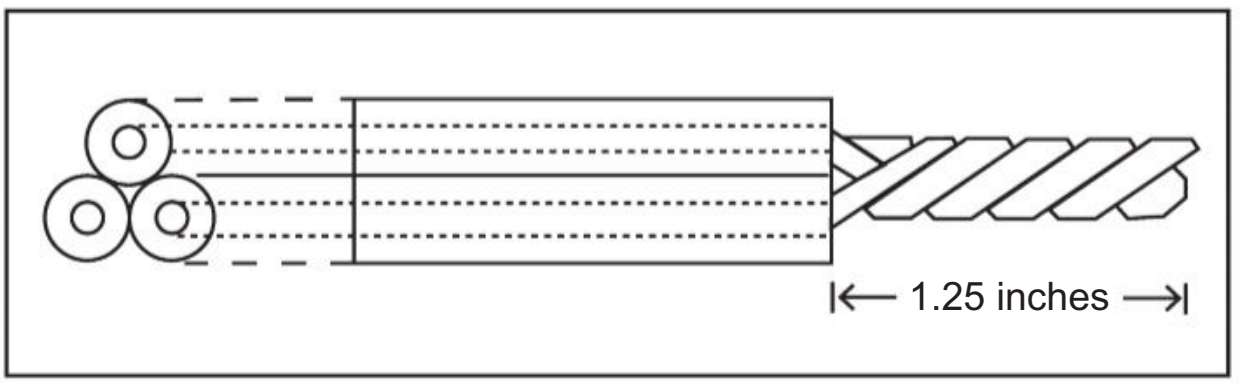

Figure 2. Suggested spiral before soldering

stack are 2.2 inches tall x 2.6 inches wide x 0.8 inches thick. The transformer I selected happened to be a step-down unit with four secondary windings. I suggest you select a transformer that is about 2 pounds; it will be easier to work with than a smaller unit.

Getting Started

Using a continuity tester, verify that the primary has continuity, and that there is no continuity from the primary to the laminations or the secondary. Before proceeding, it is *imperative* that the primary (line) winding be correctly identified. If you have doubts, seek help. Do not guess. It is also important that the candidate transformer has a secondary (output) winding that can be removed without disturbing the primary. There are two popular methods that manufacturers use to put windings and laminations together: *Inside-outside* or *side-by-side*. If your candidate is of the inside-outside type, then the secondary must be on the outside of the primary in order to be used in this project. If your candidate is of the side-by-side type, it can readily be used in this project. My candidate was an inside-outside type, with all four secondary windings on the outside of the primary (line) winding. If the unit you are considering happens to be potted, find a different candidate that is not potted.

Remove Old Secondary

For this step, I recommend wearing leather or cut-resistant gloves and eye protection. If the candidate has front and back covers, a static shield under or over the secondary, or several secondary windings, all of these structures should be removed and recycled. Removing these materials will create space for the new secondary to be added. Do not remove paper and tape which protect the primary. Be careful not to nick the primary while removing material. I suggest using a small side-cutter, a small pair of needle-nose pliers, and large amounts of patience. Outside the windows, use the side-cutter as much as possible. I cannot recommend the use of knives because of lack of control. A Dremel® tool, with a small diameter abrasive cutting wheel, is also useful. Cut and remove only one layer of windings at a time. Inside the windows, a hand-powered drill or small power drill, with a 0.125-inch bit, can be beneficial. Start near the outside of the secondary, near the legs of the laminations. Try not to damage the laminations inside the windows. Drill several very shallow overlapping holes into the wires. Remove fragments with the needle-nose pliers. Only on a side-by-side type, a mini-hacksaw can be used. The outer portions of the secondary bobbin can be removed; the inner portions of the bobbin should not be disturbed. Once you get the first few turns removed from the windows, the going usually gets easier. By no means should large forces be used in this process. Slow and steady is the best way. On units with heavy varnish, I have had to remove only one turn at a time. Remove all of the secondary; do not disturb the primary. E&I transformers have two windows, one on each side of the central

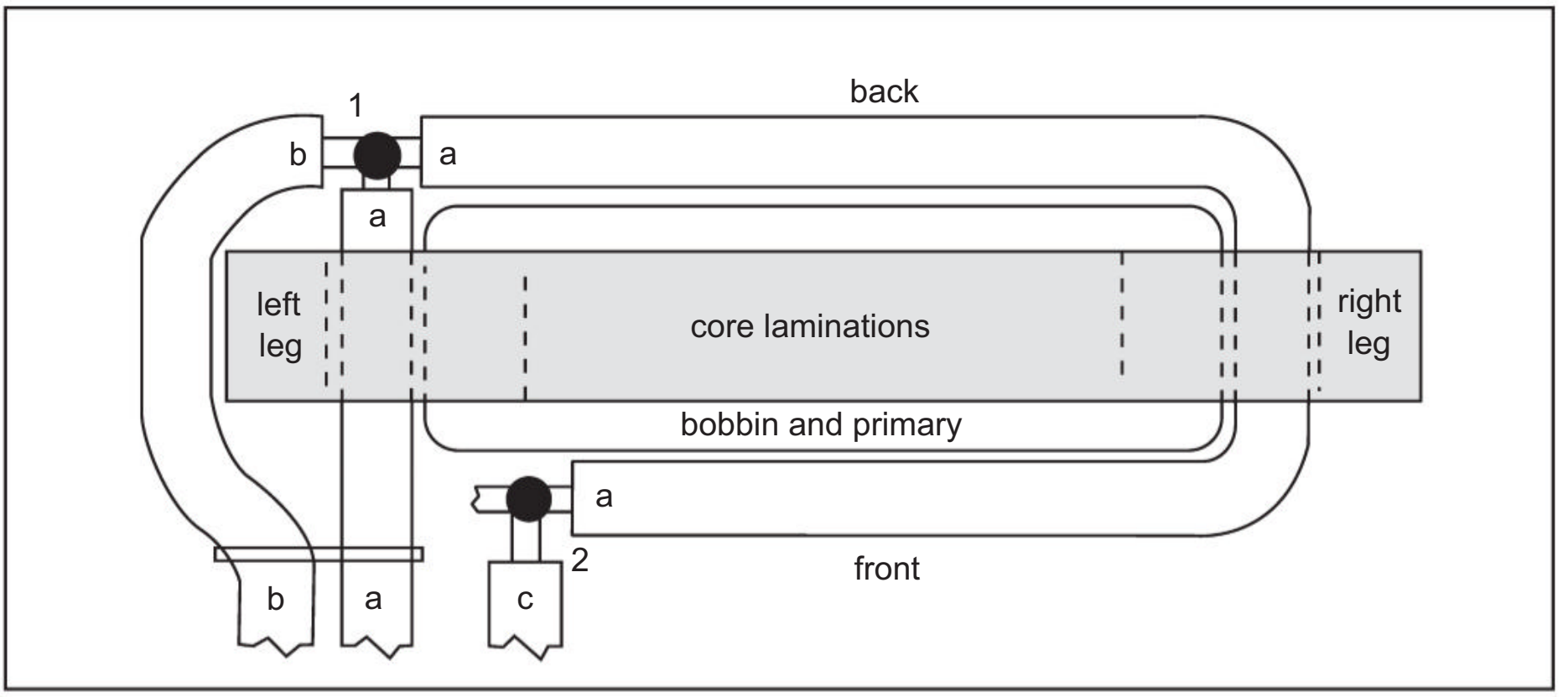

Figure 3. Top view of modified transformer

core. Many tape-wound transformers have only one window, in the middle of the lamination loop. The magnetic path of some tape-wound transformers resembles an E&I transformer, with two windows.

Determine Volts-Per-Turn

Volts-per-turn is an important operating parameter of all transformers. Those readers with a background in the electric power industry may be more accustomed to seeing this parameter expressed as turns-per-volt. Both expressions are correct; one is the inverse of the other. I elected to use volts-per-turn since there will be only a small number of turns on the new secondary, usually eight turns.

In an E&I transformer, all magnetic flux flows through the central core, half flowing through the left leg, and the other half flowing through the right leg. A wire which encircles the core, called a full turn, receives the full available volts-per-turn. Similarly, a wire which encircles just one leg, called a half turn, receives only half the voltage. Said differently, a wire which passes through both windows is called a full turn, and a wire which passes through only one window is called a half turn. This project will use one half turn and eight full turns; this will be the new secondary. The half turn is electrically out of phase with the full turns; this will not affect the outcome of this project. If using a tape-wound transformer, note that many of them cannot have half turns, only full turns.

Winding Your New Secondary

Using a length of small-diameter insulated hookup wire, or enameled wire with no scuffs, put five full turns onto the core as a temporary test secondary. An easy way to count the turns accurately is to look at the back side of the transformer where there are no loose ends. Connect the test secondary to a digital AC voltmeter. Carefully connect the primary to the line. Read and record the voltage at the test secondary. Also read and record the line voltage. **Unplug from the line**. Remove the test secondary. Divide the test secondary voltage by five to obtain the volts-per-turn. If the line is not 120-volt AC, normalize for a 120-volt line. My transformer had the following results: 0.815V/5 turns = 0.163V/turn, with a 119.4-volt line voltage. Normalize for a 120-volt line: 120/119.4 = 1.005. 1.005 x 0.163 = 0.1638 volts-per-turn, normalized for a 120-volt line. Once you determine your normalized volts-per-turn number, put it on a label, and affix the label to the lamination stack. Also put your volts-per-turn number onto your schematic (*Figure 1*).

Choose Wire Gauge

One of the objectives in making the new secondary is to keep its resistance low. This will be accomplished by using wire that has a large diameter conductor. Solid wire is too stiff for this application; so use stranded wire. Visit an electrician friend to see if eight turns of AWG 12 stranded, with THHN or other thin insulation, will fit in the windows. If this is not possible, change to AWG 14 or 16 stranded. My transformer had room for eight turns of AWG 12 stranded, with thin THHN insulation. AWG 12 proved to be difficult to work with, but still possible. For less difficulty, I suggest you use AWG 14 stranded. Get 15 feet of stranded wire for this project.

Install New Secondary

Read all instructions in this paragraph before beginning the build. Because the half turn is a bit unique, I will lead us through construction of the half turn and the first full turn in heavy detail. After that point, instructions will be less detailed. Again, for beginners, your best asset may be your mentor. Rosin-core solder should be used in electrical work; do not use acid-core solder. I suggest the soldering method shown in *Figure 2*. Other experienced builders may have their own preferred methods.

Continuing in the objective of low resistance, the suggested solder joints involve large surface areas. That is the reason for the long joints. There are two important points for this build: 1) keep some distance between bare conductors and laminations, and 2) keep some distance between individual solder joints. To prepare the first solder joint, cut three pieces of wire 20 inches long each. Strip away insulation on one end of each piece for a distance of 1.5 inches. Spiral the conductors into a smooth compact joint about 1.25 inches long, as shown in *Figure 2*. Using a large soldering gun, flow adequate amounts of solder throughout the joint. Do not disturb assembly while it cools. Refer to *Figure 3*. Insert the wire

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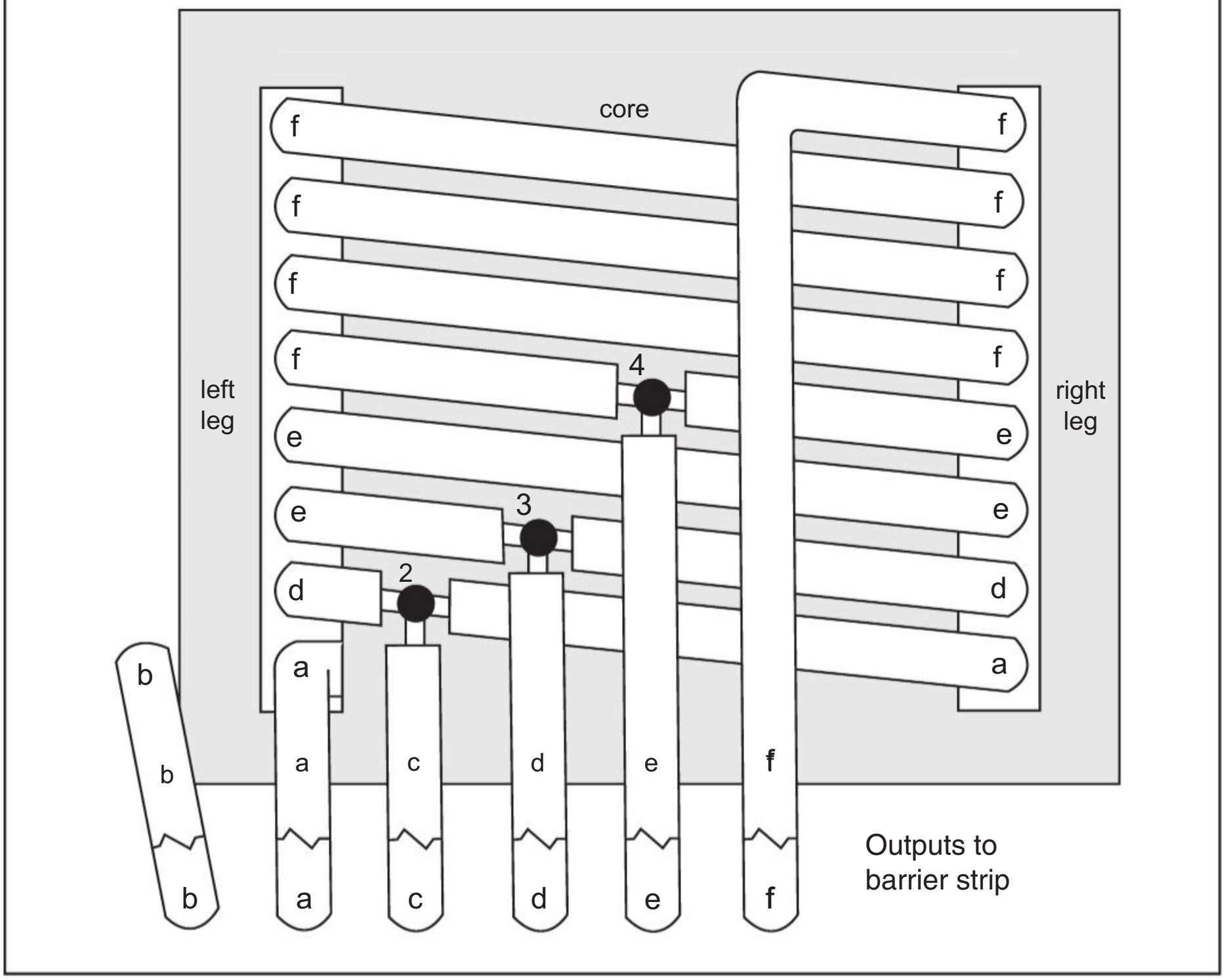


Figure 4. Front view of modified transformer

assembly into both windows from back side of transformer. Form wires near solder joint 1 to get assembly into proper position at the bottom of both windows. On front side of transformer, secure wire "b" to wire "a" with heavy string. To avoid confusion, wires "d, e, and f" are not shown in *Figure 3*. Using *Figure 4* as a guide, continue making turns and soldering joints 2, 3, and 4 in sequence. The bobbin and primary are not shown on *Figure 4*. The six output wires, leading away from the front of the transformer, need to be 15 inches long or more. Do not shorten these wires at this time; the long length will be needed later in the project. Label output wires "a" through "f" near the transformer, and again near the free ends. Form wires near each solder joint so that solder joints point away from the body of the transformer. Inspect that all solder joints are not touching each other or laminations. Secure all windings to the laminations and bobbin with hot glue. Secure windings make for a quieter transformer. Using a pincer, remove the frayed tip of each solder joint, leaving the remaining solder joint about 1 inch long or more. Double check that all solder joints are not touching each other or laminations.

Verify New Secondary

Strip 0.25 inches of insulation from the free ends of all six output wires. Tape the far end of each output wire, individually and in alphabetical order, to the surface of your insulated workbench. Using a continuity tester, verify that there is no continuity from the primary to the new secondary, from the primary to the laminations, or from the new secondary to the laminations. Carefully connect the primary to the line. Output "a" is the zero-reference point, often called the common. Measure and record the AC output voltage from wire "a" to each of the other five output wires. Check the line voltage and normalize if you need to. **Unplug from the line.** Wire "b" is the half turn; its voltage should be about half the voltage previously recorded on the transformer label. Wire "c" is the first full turn; its voltage should be about the same as the label. Wire "d" is two turns; its voltage should be about twice the label. Wire "e" is four turns; its voltage should be about four times the label. Wire "f" is eight turns; its voltage should be about eight times the label. Record the five normalized AC output voltages, to the second decimal point, onto your schematic. Results from my transformer were: b = 0.08V, c = 0.16V, d = 0.32V, e = 0.65V, f = 1.31V. Your

results will likely be different. However, your results should conform reasonably well to multiples of the volts-per-turn label on your transformer.

Metal Project Box

For safety reasons, use a metal project box. I suggest a power supply box salvaged from a discarded computer tower. Remove and recycle the circuit board, switches, and fan. Do not remove the power cord or its socket. Save the output wiring harness for later use. Reattach the fan guard, so there are no large openings in the box. I also advocate removing the switches; this encourages the operator to unplug from the line, an added safety feature. Reattach the green ground wire.

Route the six long output wires from the new secondary through the existing output opening in the box; use a grommet. Mount the transformer securely inside the box. Complete wiring to line fuse, primary, and neon pilot light. Use zip ties inside and outside the box to keep the six output wires in an orderly bundle through the wall of the box. Mount a clamp inside the box to hold your schematic.

Breadboard

Mount the box and a six-position barrier strip to a finished plywood board. Align the barrier strip so that the zero-reference screw (common) is closest to the operator. Label each of the six positions, in ascending order, with its corresponding voltage. Refer to *Photo A*, showing the entire unit, with the cover removed to show the interior. Put a 10- to 20-amp automotive fuse in series with wire "a." Leave a bit of slack in each output wire, cut and strip, crimp and solder a spade or ring terminal, then connect to the barrier strip in proper sequence.

For safety, with the unit disconnected from the line, perform the continuity tests again; be certain there is no continuity from primary to box, from secondary to box, or from primary to secondary. Also, verify that there is continuity from the ground prong of the power plug to the box and to the laminations. Visually verify that no secondary solder joint touches another solder joint or laminations or the box. Carefully plug into the line. Verify that the five output voltages agree with your earlier determinations. **Unplug from the line.** Install cover. This completes the build.

In Part 2, we will show how to use this tool. In the meantime, I'd be curious to hear from you about the weight, cross-sectional core area, and volts-per-turn.

Technology Special:

Many hams are still using old 2N2222A transistors in various shack projects. They are popular and still common but subject to cold-temperature failures. Sherlock investigates …

Sherlock Investigates: Failures of the 2N2222A Transistor

BY "SHERLOCK"*

Cold temperature failures of the older 2N2222A and 2N2907A transistors led to the discovery of a major manufacturing defect. Some manufacturers were connecting the collector wire with a point contact in the TO-18 headers. The connection would be held in place by filling the bottom of the header with a glass sealing powder.

The collector lead connection to the header, and thus the connection to the transistor die, was a pressure point contact (see *Photos A & B*) that was held fast by the contraction of the sealing glass during formation of the seal. The failure was seen after hours of cold soaking the equipment without power and then applying power at low temperature. Open collector circuits were found causing catastrophic failure.

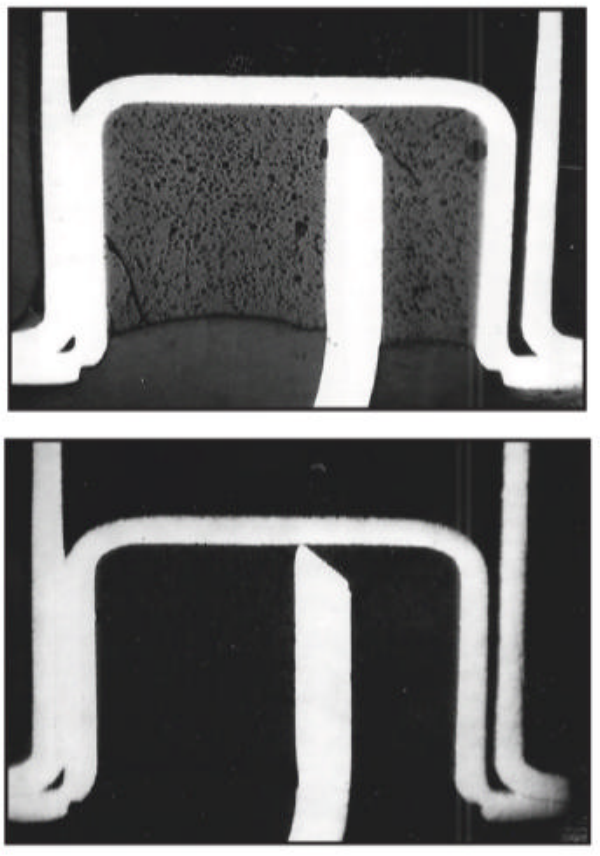
The construction design of some other manufacturers had a silver pellet on the tip of the collector wire (*Photo C*) while others it made a more reliable metallurgical 'nail head' weld to the header (*Photo D*).

This problem was also found on many other transistor types in TO-18 and TO-5 cases.

A nationwide alert had to be sent out to notify other users of this defect.

You may have some of these transistors (date codes 1975-1985) in your junk box. You can check the transistors by crushing the header in a vise and examining the connection of the collector wire. Of course, they won't be of much use after that! But that might be better than having it fail in a cold-temperature application. *– Sherlock*

** c/o CQ magazine*



Photos A and B. Two views of the collector pressure point contact inside a 2N2222A transistor. The first one has failed; the second still has an intact connection. (Photos courtesy of the author)

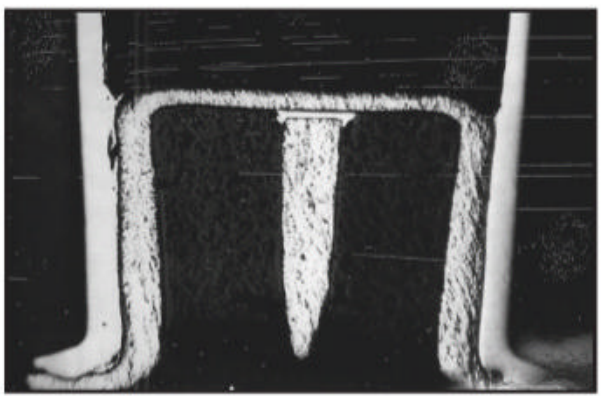


Photo C. A sturdier design used by some manufacturers included adding a silver pellet between the collector wire and the transistor's header.

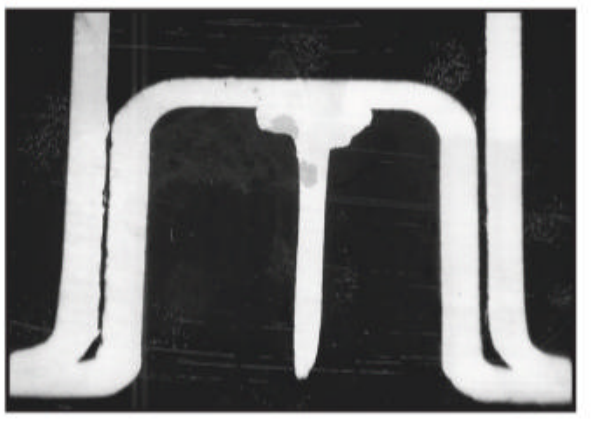


Photo D. The most reliable construction method used metallurgical "nail head" weld to the header.

Technology Special:

You don't always need a transmitter to make on-air contacts. Huh? Sometimes, as K8BYP demonstrates, the minimal power output from certain test equipment is sometimes good enough to get a message through!

How Low Can You Go? K8BYP's Test Equipment QSO

BY DAVID CAMPBELL,* K8BYP

Times of poor propagation are ideal for antenna optimization and testing. My 40-meter dipole has been working DX on 0.75 of a watt and less on a fairly regular basis during the recent solar minimum, but for fun, a ham friend and I decided to see how low we could go. A band with an S-0 noise level and only local propagation is great for extremely low power testing. My Yaesu FT-857 can go down to less than a watt, but that was bringing too many 5-9 reports and the power isn't accurately adjustable.

This test used a Rigol Arbitrary Waveform Generator (AWG), an extremely precise RF source which can be keyed. Its output at 7-MHz ranges from 10 volts peak-to-peak (P-P) down to the microvolt level. With the RF voltage accurately known, RF power can be accurately calculated.

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The Test Equipment Test

The Yaesu 857 speaker sidetone was stripped of its tone by a homebrew active detector circuit that outputs the original

The author's Rigol Arbitrary Waveform Generator (AWG) in the center of the photo was able to produce copyable signals 150 miles away on 40 meters with a power output of 1 milliwatt. The Yaesu FT-857 (control head above the antenna switch on top of the AWG) was used as the receiver and a keying source for the generator. (Photo courtesy K8BYP)

The testing was done with Pete Rhodes, K4EWG, in Georgia, ... who used a home-brew vacuum tube receiver.

keying waveform which, when input to the AWG, causes its output to be a keyed 7 MHz RF signal to the antenna.

The antenna system was a coax switch to select the AWG in transmit or the Yaesu receiver. A 50- to 75-ohm L-network matches the 50-ohm transmitters to the LMR-400 75-ohm low-loss coax, two-wavelengths long. The antenna is a 40-meter dipole of eight-gauge stranded wire at about 30 feet, facing east/west.

The testing was done with Pete Rhodes, K4EWG, in Georgia, about 150 miles straight line distance from my QTH in Tennessee, who used a home-brew vacuum tube receiver. The test was to first establish communication with the Yaesu, then switch to the AWG at a maximum of 10 volts P-P output, which is 406 milliwatts into 50 ohms, and then reduce power even further. I transmitted the P-P voltage levels and Pete replied with S-meter readings.

At 10 volts P-P, the received signal was S-9 with fading. The power was then reduced in 1-volt increments to one volt, 4.06 milliwatts, at an S-3 reading. Still too strong!

Then the voltage was reduced from 1 volt to 100 millivolts in 100-millivolt increments. A voltage of 0.500-volts P-P, 1.01 milliwatt[1], at S-0 was readable; 400 millivolts and below was copyable but not readable in the noise. There's little point in testing below that level; a milliwatt is on the order of the power from an oscillator and far below what most wattmeters can read.

Very carefully designed and matched antennas are required for such testing. My 40-meter dipole, with very low loss coax and designed based on transmission line principles, has a 1:1 SWR across the band with a 3:1 SWR bandwidth of about 1.5 MHz. The receive antenna must also be very efficient to receive small signal levels. My antenna is at 800 feet above sea level, but also "down in a hole" and emitting through tree leaves, which causes some attenuation.

A video of the QSO is on YouTube at <https://tinyurl.com/4rwskx9t>.

Note:

1. P-P voltage level of 0.5-VPP verified on a Tektronix 50-ohm scope. With an estimated 0.5-dB transmission line loss (Times doesn't give an exact spec on loss), that might leave 950 microwatts at the antenna feedpoint.

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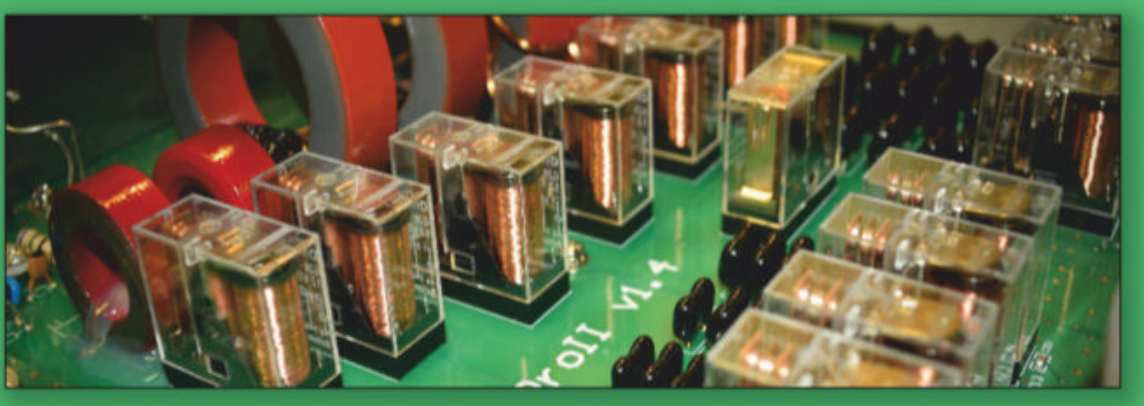

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Technology Special:

We measure S-units on our radios' S-meters. But "S parameters" are different, and particularly important to understand when a signal is going to more than one place. K3MT explains.

S Parameters Made Easy

BY MICHAEL TOIA,* K3MT

Consider this: A 17-meter full-wave loop, fed by 75-ohm coax threaded through a balun of several ferrite beads, produced a 4:1 SWR, and the rig could not drive full power into it. It needed a tuner of some sort. The SWR is just a clue: It doesn't give enough data to do much. We need the *S parameter*, S_{11}, of the coax. Why? Read on …

So what is an S parameter, and how many are there? They're *scattering* parameters of a network. Let's demonstrate with a cable TV 1-to-4-way splitter that *scatters* cable TV signals to four rooms of a house. It's five type *F* coax connectors (*Figure 1*) show why it's called a five-port network. They're labeled ports 1 to 5, and a 75-ohm load, the video system Zo, is connected to the output ports 2 to 5. Then port 1 presents 75 ohms to a signal generator.

The generator drives a voltage into port 1, $V_{in\ 1}$. This signal scatters about, some lost to heat, and the remainder going out the four remaining ports as voltages $V_{out\ 2}$, $V_{out\ 3}$, $V_{out\ 4}$, and $V_{out\ 5}$. These are usually not in phase with the input, because of a time delay in traversing the network.

The ratio $V_{out\ 2}$ / $V_{in\ 1}$ is called S_{21}. S_{31}, S_{41}, and S_{51} are similarly defined. The first subscript refers to the output port, the second to the input port. These four are just ratios of two voltages which can differ in phase, so are complex numbers with a magnitude and a phase delay. Since the output power can't exceed the input power, V_{out} is never greater than V_{in}. An S parameter is never greater than 1.

If the signal generator is connected differently, such as to port 2 (as shown in *Figure 2*), the same measurements yield more S parameters, S_{12}, S_{32}, S_{42}, and S_{52}. By moving the generator to any of the five ports, you obtain the splitter's 20 S parameters. It has five more.

A directional coupler connected between the generator and port 1 (*Figure 3*) finds the signal reflected back out of the port, $V_{out\ 1}$, across its load resistor. The ratio $V_{out\ 1}$ / $V_{in\ 1}$ is the famous S_{11}. Similarly, you may measure S_{22}, S_{33}, S_{44}, and S_{55} by moving the generator and loads about. These are the splitter's five *reflection coefficients*. So this five-port network has 25 S parameters: a network with *N* ports has N^2 S parameters.

Back to Our Loop Antenna

The loop antenna has only one port, and a single S parameter, S_{11}. If it's zero, the reflected voltage is zero. All the input is lost in the antenna, some as

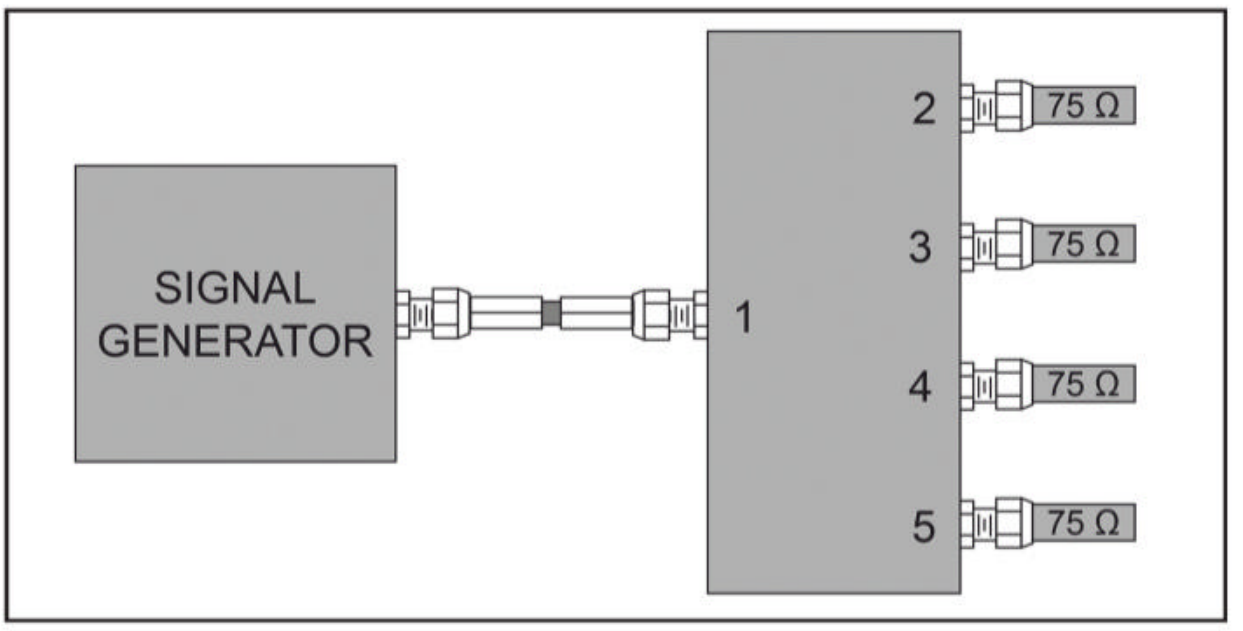

Figure 1. Five-port (4-way) cable TV signal splitter with a signal generator connected to the input (Port 1).

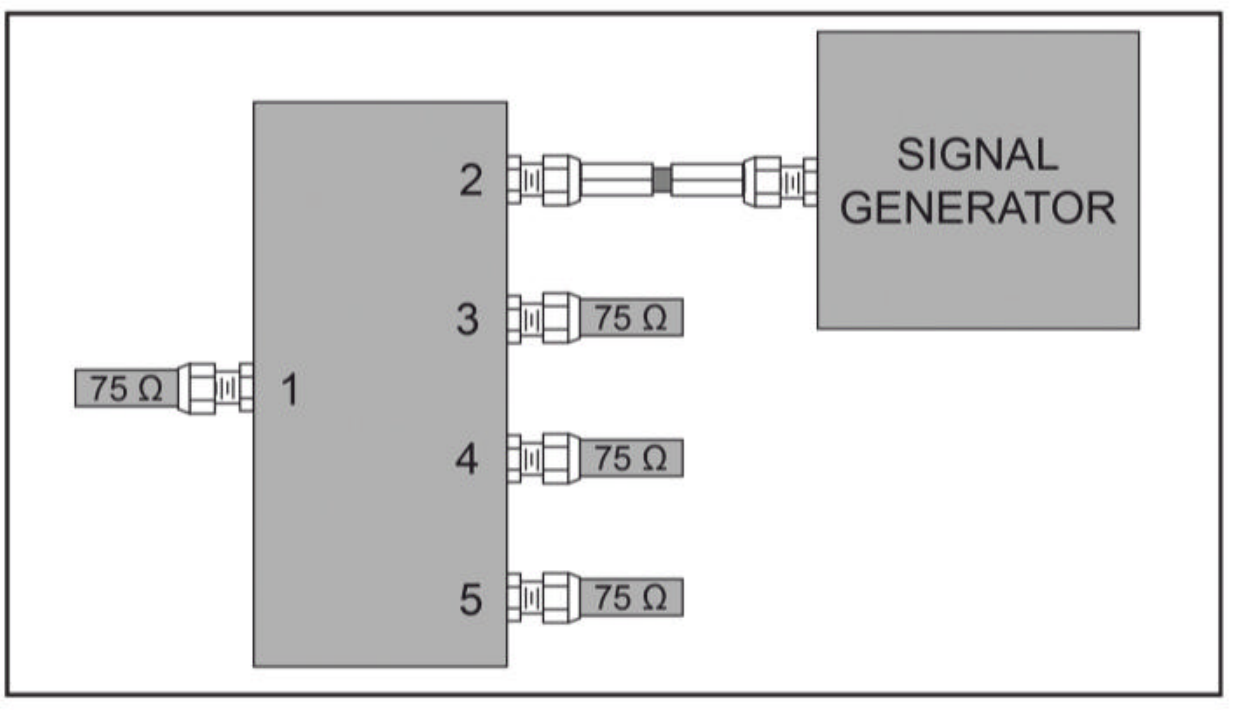

Figure 2. The same splitter with the signal generator connected to one of the output ports (see text for discussion).

* <k3mt@jokalympress.com>
<www.jokalympress.com>

heat in resistive losses, the rest to radiation into the Aether. The antenna is perfectly matched.

The coax has two ends, its *ports*: it's a two-port network. If you know S_{11}, you can calculate SWR, *and* design a tuning system, using a Smith chart, a result of plotting S_{11} on a graph as a vector with magnitude and phase angle (*Figure 4*).

We calculate the standing wave ratio, SWR, from the magnitude of S_{11} like this:

$$SWR = [\ 1 + |S_{11}|\ ] / [\ 1 - |S_{11}|\ ]$$

If S_{11} = +1.0, the output voltage equals the input voltage. All input is reflected back, and all applied power heats the coupler's load resistance. None actually enters the antenna. The antenna fitting is an open circuit. Similarly, if S_{11} = -1, all input voltage is again reflected, 180° out of phase, and all applied power is soaked up in the coupler's load. The antenna fitting is shorted.

There are standing waves of both voltage and current on the coax. Too many hams insist on calling this ratio "VSWR." Please … it is simply "SWR."

A Few More Examples

How about a few more examples? An attenuator is a two-port network. S_{11} indicates the signal reflected to the coupler's load resistor, and S_{21}, the signal into the output load. A proper attenuator is matched in impedance, with S_{11} = 0.

S_{21} is its voltage attenuation. Attenuators are almost always bilateral, where $S_{11} = S_{22}$ and $S_{12} = S_{21}$. That is, "you can

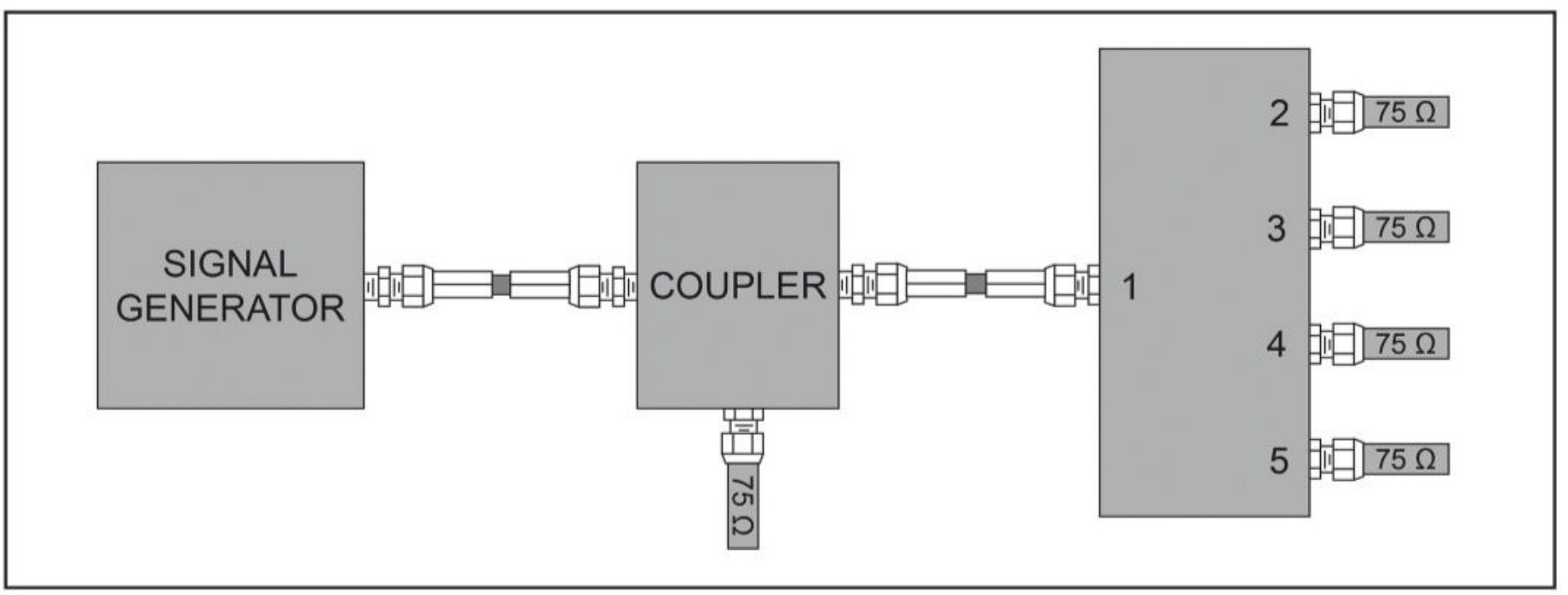

Figure 3. Adding a three-way coupler to the network.

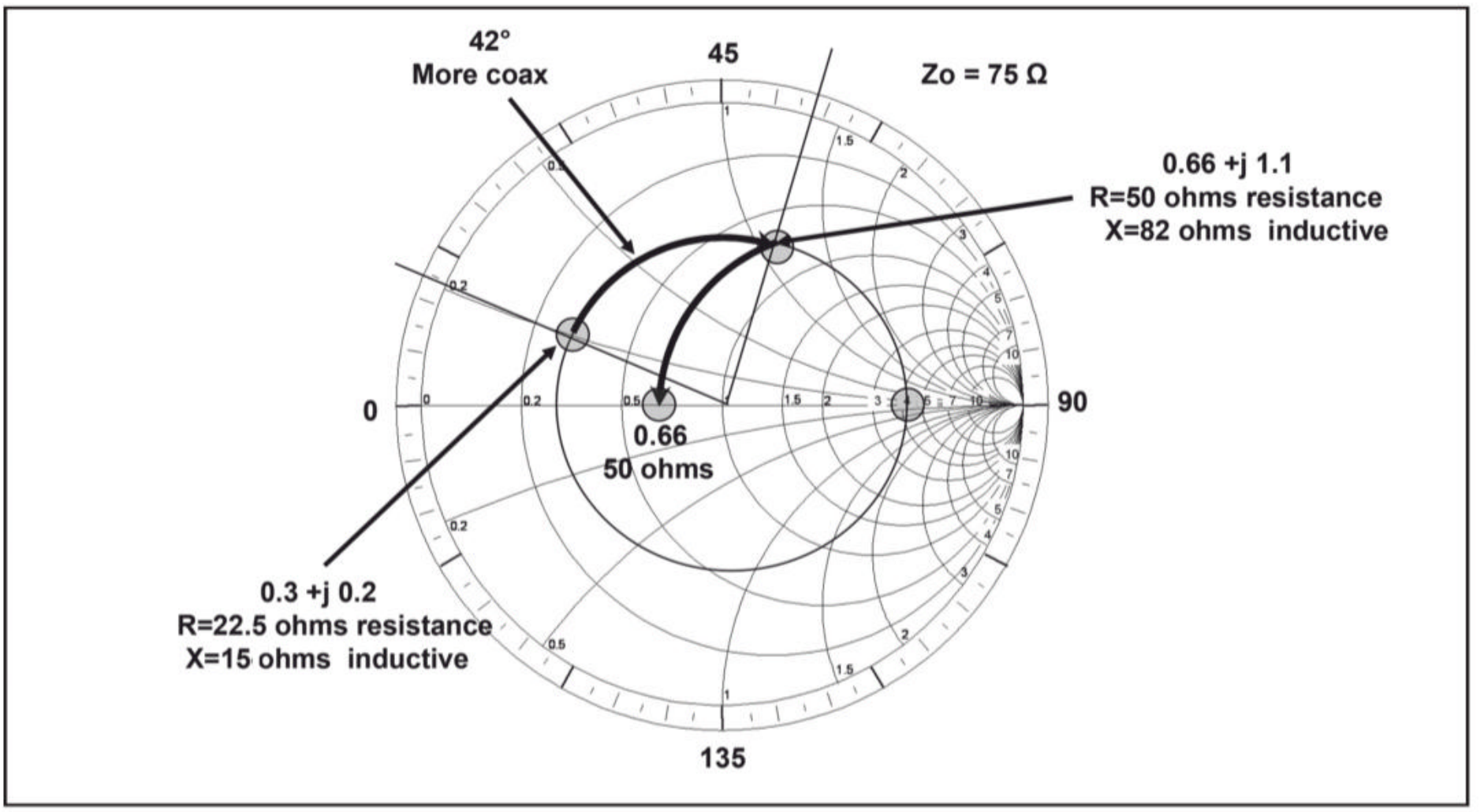

Figure 4. A Smith chart showing S_{11} on a graph as a vector with magnitude and phase angle.

Announcing:

2023 Nominations Open for the *CQ* Amateur Radio, DX, and Contest Halls of Fame

Each year *CQ* recognizes those who have made significant contributions to amateur radio in general, and to DXing and contesting in particular, creating three categories of awards. Nominations for all three Halls of Fame open on January 1, 2023 and will close on March 1, 2023.

CQ Amateur Radio Hall of Fame

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The *CQ* Amateur Radio Hall of Fame honors those whose technical or other accomplishments have helped propel amateur radio forward, or whose achievements in other areas of life have helped improve ham radio's reputation simply through association. Nominees for the *CQ* Amateur Radio Hall of Fame will be judged on the basis of qualifying in one of two broad areas: Those individuals — whether licensed amateurs or not — who have made significant contributions to the amateur radio hobby; and those radio amateurs who have made significant contributions to society in general. Nominees must have made *significant* contributions of nationwide or worldwide impact.

Nominations for the Amateur Radio Hall of Fame may be made by clubs, organizations, or individuals. State your candidate's name, where to contact him/her if still living, for which category you are nominating him/her, and a brief one- to two-paragraph description of this person's accomplishments. Please include your name and contact information as well. Email to <hall-of-fame@cq-amateur-radio.com> or mail to *CQ* Amateur Radio Hall of Fame, P.O. Box 1206, Sayville, NY, 11782. The official nomination form is on the *CQ* website <www.cq-amateur-radio.com>. *Please indicate in your email subject line for which hall of fame the nomination is being submitted.*

CQ DX and Contest Halls of Fame

Nominations for the CQ DX Hall of Fame and the CQ Contest Hall of Fame recognize those amateurs who have made major contributions to DXing and contesting, respectively. The activities and accomplishments that qualify one for membership in these elite groups involve considerable personal sacrifice and can usually be described by the phrase "above and beyond the call of duty." Nominations for the Contest and DX Halls of Fame may be made by clubs, organizations, or individuals, and must be submitted by March 1 of each year to be considered.

A maximum of two (2) people may be inducted into each hall of fame (DX and Contest) each year. Nominations for the CQ Contest and DX Halls of Fame should be directed to CQ DX Hall of Fame or CQ Contest Hall of Fame, P.O. Box 1206, Sayville, NY 11801; or via email to <hall-of-fame@cq-amateur-radio.com>. *Please indicate in your email subject line for which hall of fame the nomination is being submitted.*

If you feel someone has earned this recognition, please submit a nomination. Please *don't* assume that someone else will nominate the person you may have in mind. Nominations from past years will *not* automatically be carried over.

We plan to announce this year's selections in May. Please help us recognize these "ham radio heroes" whose contributions have helped shape our hobby, our nation, or our world. Remember, the nomination deadline for all three CQ Halls of Fame is **March 1, 2023**.

light either end." But take care with power attenuators. Often, the input can dissipate far more power than the output. Connecting them backward lets all the magic smoke get out, and it quits working.

Some power heats the attenuator and is lost. For example, when $S_{21} = 0.5$ with a phase angle of 45°, the attenuation is 6 dB and there is a phase delay through the device, almost always ignored.

But … Suppose a hypothetical piece of coax has an electrical length of 1-1/4 ⍰ and a loss of 6 dB. It's an attenuator. When driven at port 1, half the input voltage, one-quarter of the power, appears in the load at port 2. The remaining three-quarters heats the coax.

Here the ratio of output to input voltage, $S_{21} = 1/2$. But it has a phase delay of 1-1/4 wavelengths — one cycle plus 90°. Thus $S_{21} = 0.5$ at -90°. This can be important when designing phased arrays or the like, where the total amplitude and phase of the output is critical.

What can be done about the loop's mismatch? Let's use the Smith chart (*Figure 4*). Plot a SWR = 4:1 circle through +4 on the horizontal (real) axis. At the shack, measure the coax impedance Z with an antenna analyzer or Vector Network Analyzer (VNA). Suppose it comes out at Z = 22.5 +j 15 ohms. Dividing each by Zo gives us the *normalized* impedance 0.3 +j 0.2, as plotted. This point will always be on the 4:1 SWR circle.

All we need is a bit more coax — 42 electrical degrees — to get R to be 50 ohms, the 2/3 resistance circle. The inductance will be 1.2 x 75, or 82 ohms. Then put a variable capacitor in series with the center conductor, adjusted for X = -82 ohms, and presto! Done! There are, of course, many, many other ways to achieve the same result, most a good deal better. But no matter *where* the measured impedance falls, a bit more coax will bring it to the 2/3 + j 1.2 point.

Although 75-ohm coax was actually used, the transmitter load impedance came to 50 ohms. Interesting …

In summa: to obtain S parameters:

1 Terminate all ports but one in the system load resistance R = Zo.

2 Drive the remaining port through a directional coupler.

3 Measure the voltage out of each port, and that received back from the coupler.

4 Divide each by the voltage driven from the coupler into the input port. Don't forget the phase delays.

These ratios are the network's S parameters. They vary with frequency. It's really quite that simple.

Technology Special:

Measuring QRP and QRPp power levels on traditional wattmeters can be difficult. But WA9PYH tells us about a tiny meter that measures tiny power levels at a tiny price.

A Tiny QRPp Wattmeter

BY JIM KOCSIS,* WA9PYH

A ham radio friend told me about a very small RF power meter. The price? A very affordable $30. I couldn't pass it up so I bought one (*Photo A*). The unit is tiny — approximately 2 inches square and 0.75 inches high. Power (5-volt DC) is via a micro-USB connector and the supplied power cable. Signal input is via an SMA connector. It mounts via four standoffs on the bottom. Setup is via five pushbuttons that are used to enter the frequency of the signal you're measuring and the attenuation if used. My $30 unit goes to 500 MHz but there are many others available that go higher in frequency at higher prices. To locate the others, just enter "tiny RF power meter" into the search bar on eBay. (*It is the nature of eBay that available items come and go, so it's possible that you won't find Jim's exact unit when you search. There are plenty of other similar meters listed, however. – ed.*)

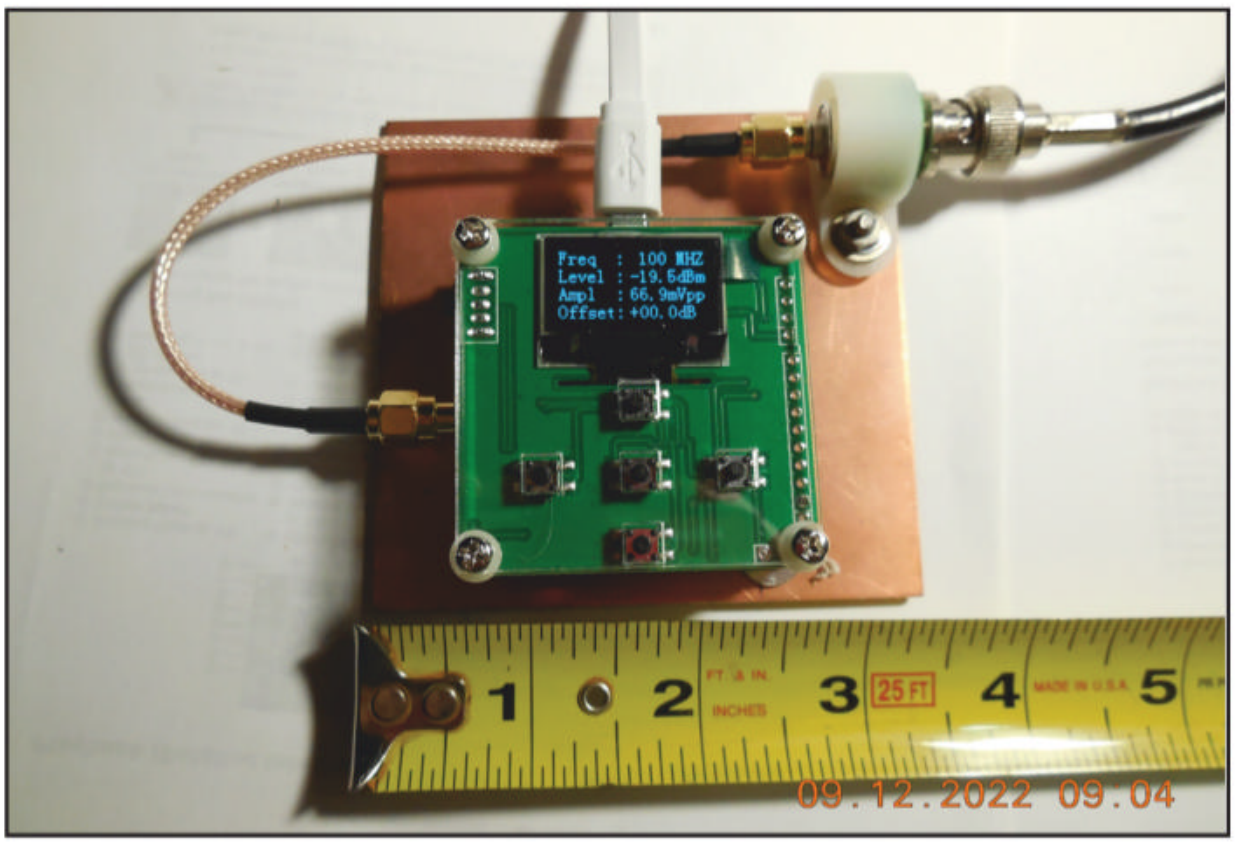

Photo A. The QRPp power meter in action. Maximum input power is 10 milliwatts, so be sure to use an attenuator if your transmitter puts out more than that.

What You'll See

The meter displays the power level in dBm and volts peak-to-peak (see *Table 1* for some dBm-to-milliwatt conversions). For testing, I used a lab-grade RF signal generator (Fluke) whose output level and frequency are very accurate.

The reason for entering the frequency is that the meter's IC does not output the same DC voltage with the same actual level input over the entire frequency range. The circuitry compensates for these offsets of true level vs. what it outputs in DC voltage. The circuitry corrects the reading as the frequency changes.

I couldn't determine what IC is used but it is likely in the Analog Devices AD83XX series.[1] There is an A/D converter and software to perform the calculations and corrections and run the display.

Interfacing to a PC

Alternatively, you can power the meter from a USB port on a PC. The power meter outputs a continuous stream of data at 9600 baud. Free software called "PuTTY" will read and display the data sent by the power meter. The best place to get it is: <https://tinyurl.com/yc3krb4w>. (Other sites also offer it but I found them very confusing since they offered many other downloads. It was not clear what I would be downloading! Use the site shown above and you will be safe.)

Click on the 64-bit x86 version for Windows. The download is approximately 3.7 MB. Look for it in your downloads, double click to install it. After it's installed, you should see an icon on your desktop consisting of two computer

dBm	mW
-30	0.001
-20	0.01
-10	0.1
0	1
1	1.26
2	1.58
3	1.99
4	2.51
5	3.16
6	3.98
7	5.01
8	6.31
9	7.94
10	10
20	100
30	1000 (1 watt)

Table 1. Common dBm values converted to milliwatts. A precise dBm-mW calculator can be found on many websites, including <https://tinyurl.com/5ex66azd>.

** 53180 Flicker Lane*
South Bend, IN 46637
Email: <wa9pyh@arrl.net>

	Generator level→	-50 dBm	-20 dBm	0 dBm	10 dBm
MHz	Generator level→	2 mV p-p	63.2 mV p-p	.632 V p-p	2V p-p
1		-48.10	-18.10	1.80	11.90
50		-49.00	-19.30	0.70	10.60
100		-49.40	-19.60	0.40	10.60
150		-49.20	-19.90	0.10	10.70
200		-49.80	-20.10	0.00	10.40
250		-49.20	-19.70	0.20	10.60
300		-49.70	-20.00	0.10	10.20
350		-49.10	-20.10	0.20	10.80
400		-50.10	-20.10	-0.20	9.70
450		-50.20	-20.50	-0.10	9.60
500		-51.30	-21.10	-0.40	9.50

Table 2. Power readings in dBm at various input levels and different frequencies.

MHz	-50 dBm	-20 dBm	0 dBm	10 dBm
1.00	-1.90	-1.90	1.80	1.90
50.00	-1.00	-0.70	0.70	0.60
100.00	-0.60	-0.40	0.40	0.60
150.00	-0.80	-0.10	0.10	0.70
200.00	-0.20	0.10	0.00	0.40
250.00	-0.80	-0.30	0.20	0.60
300.00	-0.30	0.00	0.10	0.20
350.00	-0.90	0.10	0.20	0.80
400.00	0.10	0.10	-0.20	-0.30
450.00	0.20	0.50	-0.10	-0.40
500.00	1.30	1.10	-0.40	-0.50

Table 3. Error levels (in dBm) measured at various frequencies. The meter is most accurate at 200 and 300 MHz, and least accurate at 1 MHz and 500 MHz.

monitors with a lightning bolt between them. Connect the power meter to any USB port and turn on the power using the small slide switch on the side of the meter. The power meter will light up. Push the middle button so it begins measuring a level. Now you must determine the USB (COM) port number. Go to Device Manager by right clicking the lower left corner Windows symbol. Open up “Ports (COM & LPT).” My meter showed up on my PC as “USB -SERIAL CH340 (COM5).” Note the COM port number. Start PuTTY and select the “Serial” button for connection type. Then enter the port number (COM5 for me) into the “Serial line” window. Click “Open” and a window should open with the data scrolling across the screen.

I didn’t bother trying to format the data on the screen. Perhaps someone more knowledgeable can provide information on how to do this. It’s neat to see this communication between a PC and the power meter but it has no practical application for me. You can “straighten” the columns of data by opening the window a bit at a time.

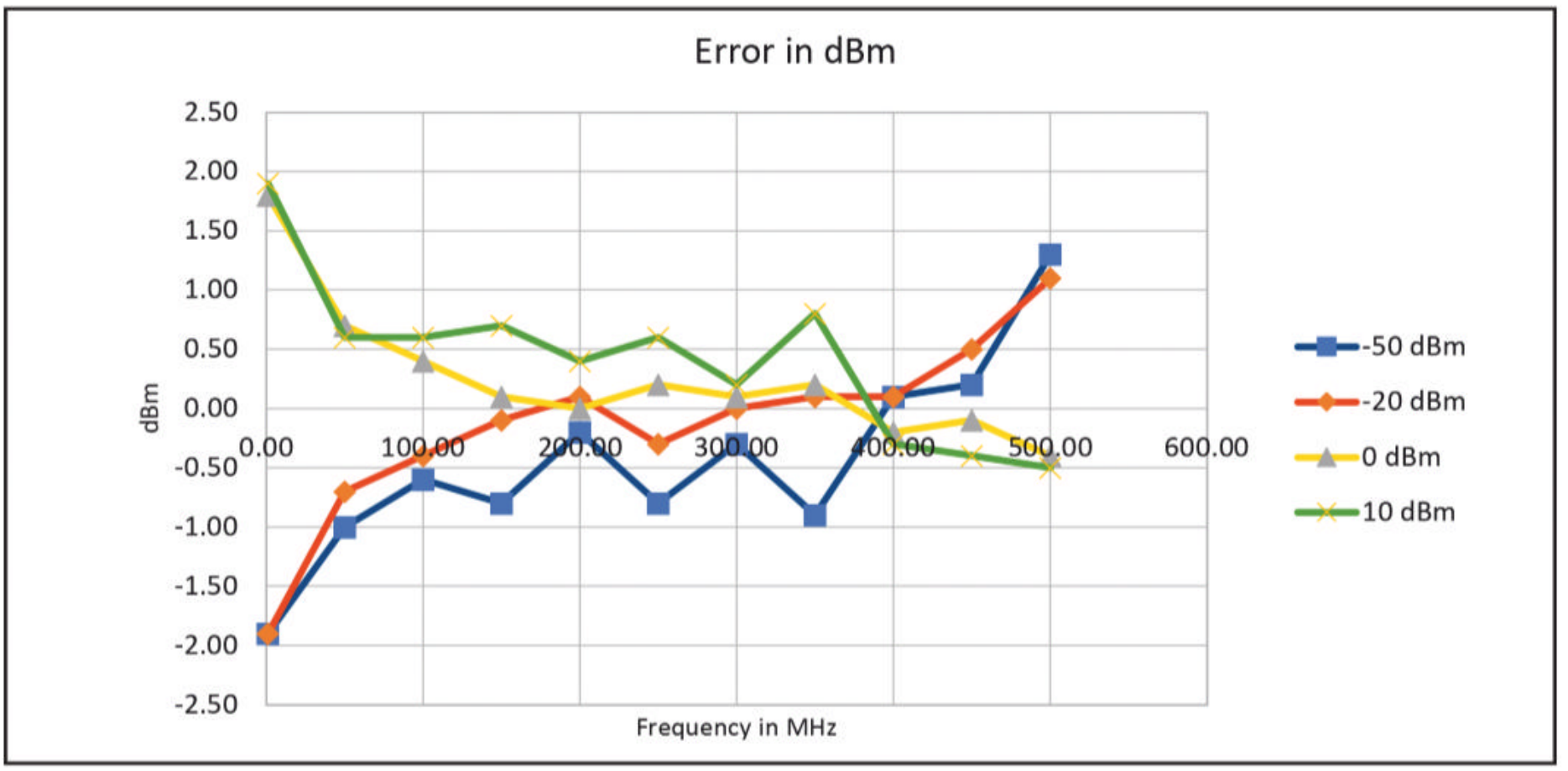

Figure 1. Measurement and error data from Tables 2 and 3 presented in graphical format. This particular meter is most accurate at VHF and low UHF frequencies.

How to Use the Power Meter

Rather than composing a long, wordy write-up on how to use the unit, please watch this YouTube video: <https://tinyurl.com/ye2v2f2u>. I don't know who he is but he's done an excellent job of explaining it all. Please click "like" after watching it, the author will appreciate it!

Operation is simple: Enter the frequency, connect the signal, and read the level. NOTE: you must ensure the input signal level does not exceed 10 dBm (see below) or else the meter can be damaged. If you don't know even the approximate level it's best to start low by attaching an attenuator at the input (for example 20 dB or even 30 dB). Enter the attenuator value. If there is no change when you connect the signal, remove the attenuator, set the attenuation value to zero and reattach the signal.

Safe Power Levels

How much is 10 dBm? Not much! 10 dBm is 10 milliwatts or 2 Vp-p. If you're testing a device with a much higher level, ensure the attenuator input can handle the higher power level! *Table 1* shows some representative dBm levels converted to milliwatts. *Table 2* shows voltage levels vs. dBm measured at various frequencies. Those are some very small voltages!

How Accurate is the Power Meter?

Table 3 shows some spot frequencies and power levels. The worst error I saw was 1.9 dB while most readings were much more accurate. I plotted the data in *Figure 1*. The best accuracy is at 200 and 300 MHz, the worst at 1 MHz. It's not a laboratory grade meter but perfectly good for ham radio projects. I feel I got much more than $30 worth of test equipment and had a lot of fun just working (*playing*) with it.

Protecting the Meter

I mounted the meter on a small piece of copperclad board to keep it from traveling across my workbench. I also used an SMA-to-BNC adapter (see *Photo A* and *Figure 2*) to provide a "safe" connection to the meter. The SMA is mounted on the circuit board and with just a little strain could be broken off. Now the SMA connector is protected. (See my article in *CQ* magazine, September 2022, page 33 where I used the same construction method).

Notes:

1. Here's a link to a YouTube video telling about the Analog Devices AD8318: <https://tinyurl.com/yck8whe5>

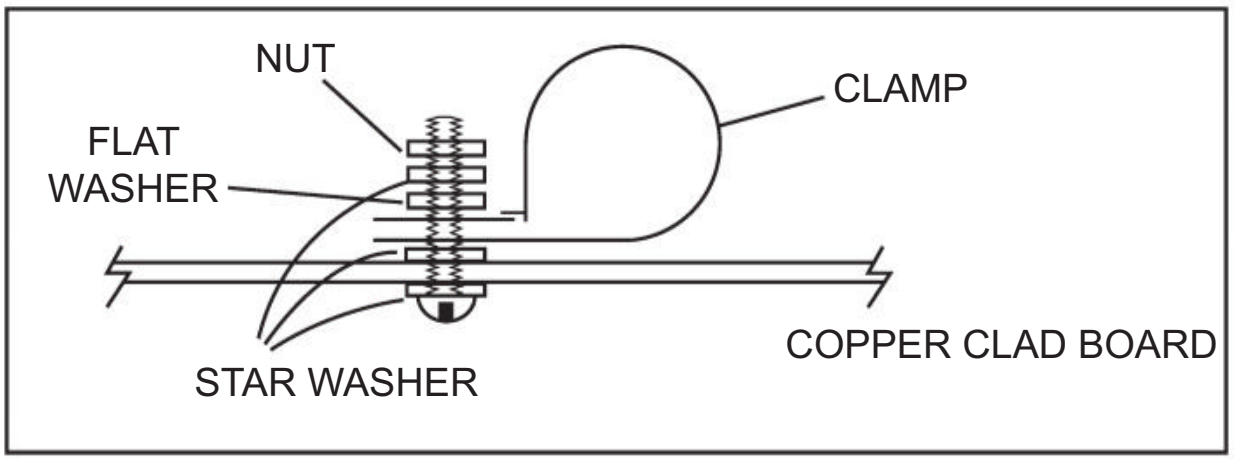

Figure 2. Detail of the clamps used to hold the BNC-to-SMA connector. (Illustration by Emily Leary)

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QCWA

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For more information please contact
om@qcwa.org

Technology Special:

A favorite made-in-America amplifier brand gets a new lease on life from a new owner.

Henry Radio Amplifiers to Remain on the Market Under New Ownership

Henry Radio's amplifier line (*Photo A*) will remain available to the amateur and commercial markets following a sale of that portion of the company following the retirement at the end of September of longtime owner Ted Henry, W6YEY. The new owner is Bob Burchett, WB6SLC (*Photo B*), owner of Torrance, California-based NovexComm, a manufacturer of radio rack mounts for amateur and government users (*Photo C*).

Henry Radio was founded in Missouri in 1927 as a ham radio dealership and stayed in the family for three genera-

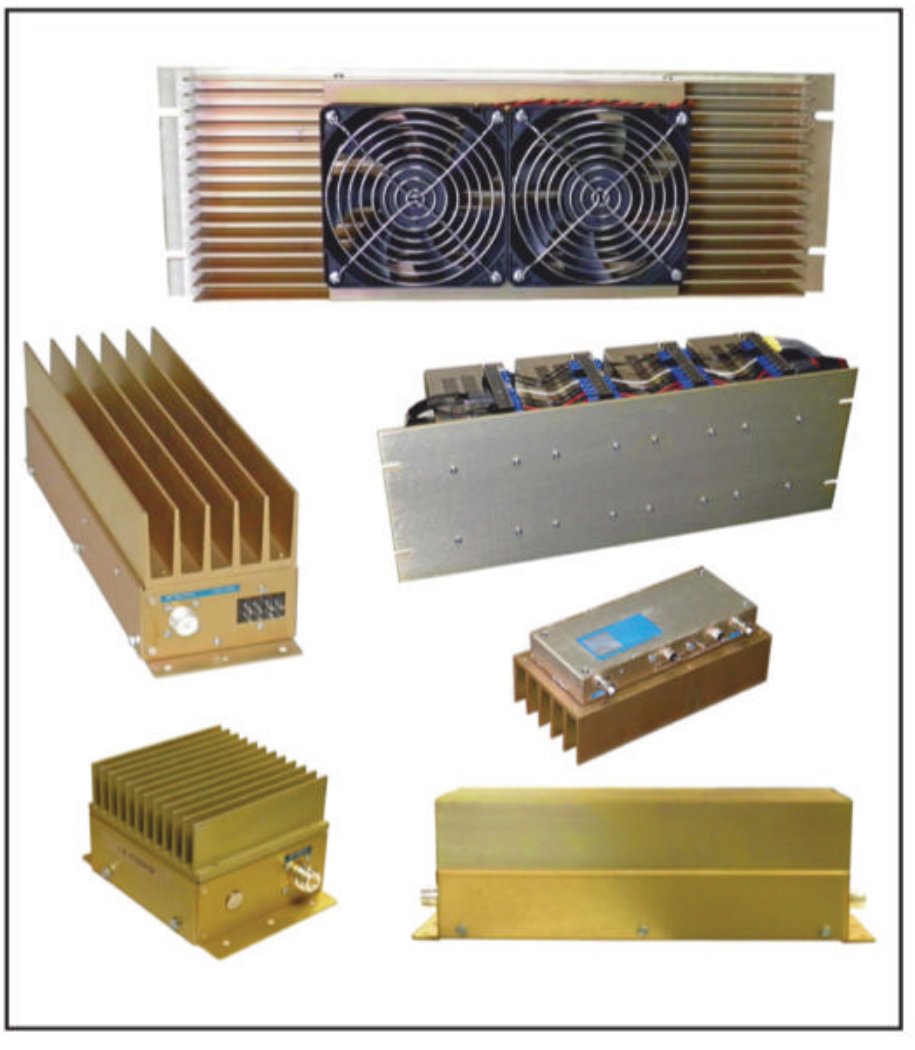

Photo A. A sampling of the Henry Radio amplifier line currently available from the brand's new owner. A high-power solid-state HF amplifier is in the works. (Henry Radio Amplifiers website photo)

Photo B. Bob Burchett, WB6SLC, is the new owner of Henry Radio Amplifiers. (Photo from WB6SLC page on QRZ.com)

Photo C. NovexComm rack mounts on display at a hamfest. (NovexComm website photo)

Photo D. The Henry Radio store at Olympic and Bundy in Los Angeles is now closed. Amplifier sales and service are now based out of the NovexComm facility in Torrance, California; and Ted Henry, W6YEY, continues to sell some non-amplifier products online from his retirement home in Colorado. (Henry Radio website photo)

tions, expanding to California and later consolidating operations in the Los Angeles area (*Photo D*). The company began making vacuum tube RF amplifiers in the 1960s.

Burchett announced the transition to the amateur community in early November: "After 50+ years working, with 40+ years of it in the family business as Henry Radio, Inc., Ted Henry has retired (over my protests I want you to know) and is now happily living in Colorado but still maintaining his eBay store and distributing Tohtsu relays and Bird RF products," he wrote. "The good news is that after years of working with him, we made a deal and I have taken up the reins of the amplifier business to ensure continuity of the product line ... It is nice to say 'Made in the USA' and we intend to keep it going and improving the product line started by Ted and his dad with tube-type amps, sintering RF sources and even 5K & 8K transmitters; many still in full-time service."

Burchett also recalled the earlier days of Henry Radio's amplifier business and his own longtime links. "Early on they made a deal with my long-time friend Gene Proctor, W6TFS, who used to bag the 'floor sweepings,' as he called them, out of the TRW transistor labs located nearby to make amplifiers for us hams starting in the 1980s. Gene lived near my house and I was a frequent visitor; I even bought all of his equipment when he retired which is now in our NovexComm machine shop making rack mounts and more. Gene engineered most of the current amplifier designs still in use to this day, and my friend Jay Procenko worked for Ted for years and helped rework the designs to improve stability, resulting in a very reliable product line Ted continued to make until the end of September when he closed the doors on the building at Olympic and Bundy in Los Angeles."

Burchett continued, "Last month (October), we moved the company lock, stock and barrel to our offices in Torrance, California, and with the help of two of the long-time Henry Radio employees who assemble, test, and repair the solid-state amplifiers, we were drowned in orders the day it opened up for business," adding that hams comprise about 40% of the company's customers, (see *Photos E* and *F*).

Henry Radio stopped making its tube-type amplifiers in 2005, according to the company website, even though many of them are still in service today. The company's solid-state amplifier line currently focuses on VHF and UHF products, with only two low-powered HF amps. But Burchett told *CQ* he plans to introduce a solid-state high-power HF amplifier in 2023.

The company's new contact information is: Henry Radio Amplifiers, 22826 Mariposa Ave., Torrance, CA 90502; Phone: (310) 534-4456; Website: <www.HenryRadioAmplifiers.com>.

Photo E. Part of the new Henry Radio Amplifiers crew in the assembly and manufacturing side of the new facility in Torrance, California. (Photo courtesy Henry Radio Amplifiers)

Photo F. The staff on the engineering/test/repair side of the new Henry Radio Amplifiers facility. (Photo courtesy Henry Radio Amplifiers)

Small-scale "holiday-style" DXpeditions are growing in popularity, but they still require a lot of advance planning and preparation. WB2REM and K5PA offer a roadmap…

So You Want to Go on a DXpedition?

Let's Plan Your Adventure

BY JIM MILLNER, * WB2REM AND GENE HINKLE, # K5PA

Have you ever thought about going on a DXpedition to an exotic or remote part of the world but did not know what to do first? Do you have the calling for working big pileups? Are you a technical person who enjoys setting up equipment and antennas from scratch, solving problems on the spot, and creating a working amateur radio station where there is nothing in place? If your answer is yes, then this article is for you.

Arranging a DXpedition from scratch can be a complex endeavor that includes securing transportation and lodging, choosing team members, and transporting radios, antennas, computers, generators, and fuel. This article will concentrate on DXpeditions that the regular ham radio operator can experience. One warning: Do not do what WB2REM did and bring the radio on your honeymoon! He is still hearing about it 41 years later.

* <wb2rem@verizon.net>
# <k5pa@arrl.net>

Why Do Hams Go On DXpeditions?

On top of my list is to provide the opportunity for others to contact a new country. The harder it is to go to a place, the greater the need for that entity. A prime example is North Korea, where political barriers make it impossible to get licensed and operate. Club Log keeps a list of the most want-

Photo A. There are many reasons to enjoy a DXpedition. In these photos, Mark Bevan, WY1G, is visiting Cuba. (WB2REM photo)

Photo B. Hard case luggage protects the critical radio gear during travel. (K5PA photos)

ed DX entities.[1] The most-wanted DXCC list has North Korea as the most wanted entity and the U.S. as the least. In general, the rarer the country, the bigger the pileups you will experience on both ends of the contact.

The DXpeditions that intrigue us include those where you can explore the environment around you (*Photo A*). There is a way to mix the fun of operating a DXpedition with the pleasure of relaxing during your off-hours. On previous DXpeditions, WB2REM climbed a volcano, swam with sharks, sea lions, and marine iguanas, snorkeled and scuba-dived, and drank his fair share of local beverages.

What Kind of DXpedition Will You Go On?

We divide DXpeditions into three groups. The first type is the holiday style, which may include one or more operators. Holiday-style DXpeditions involve traveling to easily reached places where people normally go on their vacation. Traveling from the U.S., these include places like the Bahamas, Jamaica, Hawaii, or similar locations. These DXpeditions may also involve bringing a spouse and/or children, and radio operations may occur on a limited schedule as time permits. There are already existing holiday locations with fully equipped ham shacks, which just require getting a local ham license prior to radio operation.[2]

The second type of DXpedition is the single or multi-operator(s) who travel to semi-rare locations, such as Easter, Canary, or Galapagos Islands and operate with the sole purpose of logging as many contacts as possible. In most cases, this involves a small group of hams who operate the radio stations over the full operating period, both day and night.

The third type is major DXpeditions involving multiple operators who travel to difficult and rare DX entities and require a year or more of planning. These major DXpeditions are very expensive and may be self-funded with additional support from commercial sponsors, DX clubs, and private ham radio operators. They are difficult to organize, time-consuming, extremely expensive, and require highly skilled operators with extensive equipment, training, and support. We will not consider this type for your first DXpedition.

Planning Your DXpedition

To help with DXpedition planning, *DX University* and *INDEXA* produced an excellent video called "DXpedition Planning," which gives three steps in the planning process.[3] The steps are: Selecting a location based on multiple factors, looking at the supporting infrastructure, and selecting your team. *Table 1* gives many of the steps to help with the planning.

First, study the Club Log DXCC list and search for locations that might be of interest. What becomes apparent is that countries ranked from 1 to 100 are extremely difficult to reach. Surprisingly, number 132, the British Virgin Islands (BVI), is relatively rare. The British Virgin Islands are approximately 1,100 miles from Miami, Florida and 1,600 miles from New York City. Given this relatively short distance, the islands' sizeable population and tourist trade, one would expect it would be easy to reach by airline. So, let us consider BVI as your destination for the following discussions.

As locations are considered, determine what the propagation might be like during your trip. If it is the top of the sunspot cycle, conditions may be good all year round. If operating north or south of the equator, VHF and HF conditions may vary. For BVI, the Caribbean tends to be a suitable location for holiday-style DXpeditions because it is easy to reach and has relatively good radio propagation year-round.

For the British Virgin Islands, check on the difficulty of obtaining a radio operator's license and if there is a reciprocal licensing agreement. Is it possible to obtain a VP2V callsign, or do you have to operate portable using your own home call? The authors have a personal preference to operate using the country-issued callsign to readily identify the country by the callsign and shorten the characters in the call, which

PHASE	TOPIC	COMMENTS
Pre-trip	Where to go	DXCC list, ease of traveling
	When to go	Time of year, propagation, low-season saves money
	Licensing	Reciprocal licensing vs. country assigned callsign
	Infrastructure	Transportation, suitable lodging, equipment, access
	Travel/medical insurance	Protect your financial investment; canceling
	Select leader and team	Can lead decision making, team player, all team players
	Team attributes	Skill levels to perform tasks
	Announcements, QSL ordering, Club Log	Let ham community know your plans, sponsors
During	Execute your plan	Getting there, operating, enjoy the adventure
Returning	Confirming Contacts	Send QSL cards and confirmations promptly
	Good and the Bad	Group discussion to learn from the adventure

Table 1. Developing your plan (Table by K5PA)

is important for CW, SSB voice, and data modes. But policies vary from country to country.

The U.S. does have reciprocal licensing with the BVI through its bilateral treaty with the United Kingdom, which extends to BVI. After researching their licensing agency for this article, a reference was found to the Telecommunications Regulatory Commission, specifically to Mr. Darren Woodley <dwoodley@trc.vg>. We emailed him, and he was extremely helpful in providing additional licensing information. However, the contact information was different than that listed in the ARRL reciprocal licensing page. Therefore, it is necessary to verify the information since contact and agency information can rapidly change in different countries.

A helpful hint is to search the web for other hams who have visited the country under consideration and email them to see how they secured their licenses. Once the licensing agency is located, request their procedures to obtain a license. In the case of the British Virgin Islands, they emailed an application in PDF format. Usually, the licensing agencies require a copy of your "home" amateur radio license, passport, and application fee. In addition, the British Virgin Islands will only issue a VP2V+2 letters callsign (ex., VP2VAA) to be used in contests and special events. Otherwise, you must use VP2V/your-home-callsign (e.g., VP2V/K5PA).

Determine the Infrastructure

Look at the available infrastructure needed to complete the expedition. The infrastructure consists of transportation, mobilization of equipment and antennas, availability of housing, food, and access to supplies when on location.

It is prudent to consider high and low seasons when considering a resort island to find the best accommodations at the lowest prices. But, of course, there are many other constraints, such as the personal interests of team members, work conflicts, and family considerations.

June is a good month to travel to the Caribbean. This is just before the hurricane season and a time of lower tourist accommodations and travel rates. Therefore, a choice might be to go to Virgin Gorda (a small island near the main island of Tortola, BVI) because of its low population density, beautiful scenery, and picturesque beaches. Both the HF bands and 6 meters can be operated with the possibility of participating in the ARRL June VHF contest. This is not in the main international contesting periods, so it may offer a more relaxing, holiday-style ham adventure.

In researching the travel itinerary, it is easiest and most economical route is to fly to St. Thomas in the U.S. Virgin Islands. There are many flights, including non-stops or transfers to St. Thomas from both New York and Miami. It's imperative to have direct flights, when possible, to avoid the transfer of luggage and equipment for connections. However, in the case of the British Virgin Islands, we will also have to obtain transportation to the seaport and take a ferry boat to Virgin Gorda.

In the British Virgin Islands, all equipment taken into the country must clear their customs. Therefore, it is essential to make an itemized list of the gear brought into the country. This list should include the make, model, serial number, and value of each piece of electronics. Equipment brought into the country must be taken out at the end of the DXpedition. Custom officers will review the gear being brought out against the manifest they retained when you entered the country and will charge an import tax fee for missing gear.

A decision needs to be made on how many people can be accommodated at a potential DXpedition location. One of the easiest ways of locating accommodation is to go to the Airbnb site.[4] There, you will find many one-to-four-bedroom homes, some located on the water and others in the hills and valleys. Whichever you choose, it is necessary to make sure your host understands the purpose of the trip and the need to set up antennas and radio equipment. We prefer to allow one bedroom per operator, although this is a personal preference. When choosing the house, carefully pick one that could be beneficial to the direction of the radio transmissions that are desired. Make sure that nothing obstructs the transmissions, such as mountains, hills, or manmade structures. For the purposes of discussion, let's assume that a four-bedroom house has been chosen that is located on a beach. The number of days of operation needs to be determined and availability of the house confirmed.

Another important component of traveling is to protect your financial investment. There are insurance companies that offer "cancel for any reason" travel insurance. They will usually refund 75% of the non-refundable costs for "any reason" and 100% of the amount you insured if there's sickness of even just one team member of the group listed on the policy. It also pays for the insured to be airlifted out of the country for medical reasons. Some countries may even require that you have travel insurance before entering. We have used Seven Corners Insurance.[5] Another travel insurance resource for "cancel for any reason" insurance companies

can be found in the referenced "Forbes" magazine article.[6]

The weight of the equipment must also be considered. Most airlines allow for one carry-on suitcase, a personal bag placed under the seat, and one to two checked luggage with a limit of 52 lbs. each (this may vary between airlines). It is advantageous to purchase an SBG airline cabin-approved hard-shell case with padding, or similar, to carry the radio and power supply on the plane. *Photo B* shows how to use the SBG airline luggage to your advantage for transporting the radio equipment. An antenna such as a portable hex beam can be stowed in the plane using an SBG hard shell golf case or equivalent. Most of the time, this incurs an additional payment. Medicine, a laptop and other fragile gear can be placed under the seat in the carry-on bag.

The electrical system used in the destination country needs to be investigated and appropriate adapters purchased. Fortunately for us, the British Virgin Islands uses the same electrical system convention as the U.S.

Selecting Your Team

If more than one operator will be making the trip, a team leader needs to be chosen and DX team members selected. The selection of the team should be based on the skill level of operators, such as the ability to operate high-speed CW (25-35 WPM), rapid-rate SSB operation, specific technical skills (set up equipment, antennas, software), problem solving, and prior DXpedition experience. Operators also need to display the ability to get along with each other. It does not hurt to have a least one team member who is a good cook!

There needs to be a discussion about where the team will meet and/or proceed individually to the destination. Much of the pre-DXpedition meetings can be arranged through virtual meetings (e.g., Zoom) and spreadsheets created and shared to track the equipment and expenses. The team needs to settle on what logging software will be used and to ensure all the team members are familiar with it prior to the DXpedition. Also, the logging programs may need to be networked or used stand-alone. In this case, it is helpful to have one of the members familiar with networking and servicing computers.

Now that the DXCC entity, team, equipment, and operational dates have been chosen, it is important to determine who will transport each piece of apparatus. It is vital that no one person carries more equipment than another.

It's Contest Season!

Years running 10
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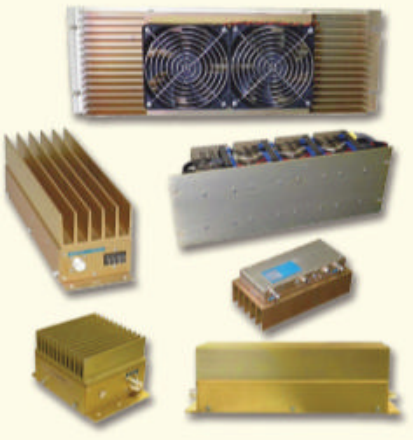

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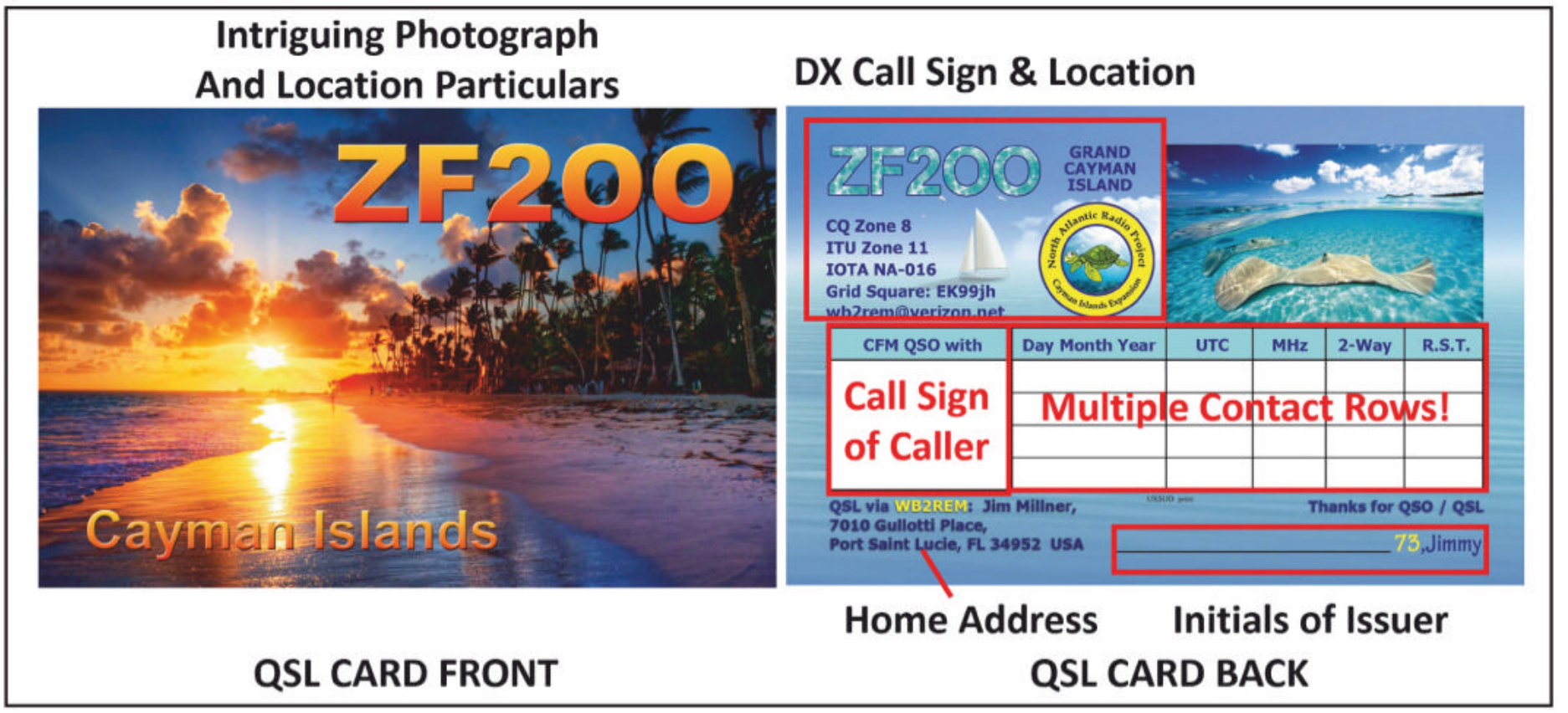


Photo C. An attractive QSL design is critical for confirming the contact. (K5PA photo)

Once the actual costs of lodging, food, transportation, and equipment are calculated, the expenses should be split prior to the DXpedition.

Notifying the Ham Community Prior to the DXpedition

One of the most important tasks is to notify the amateur community of the upcoming DXpedition. This will let the hams know about the DXpedition well in advance of the operation. Included in the notification should be the location of the DXpedition, dates, operational frequencies, modes, and QSL route. A notice should be generated with the above information and sent to some of the following sources: DX News, Daily DX, DX World, OPDX Bulletin, and the ARRL DX Bulletin .[7-11]

We advise getting your QSL cards printed in advance of the DXpedition, so there is little delay and backlog in responding to requests. When selecting the graphics for your card, there are many stock pictures available online of the DXpedition location that can be used with the permission of the photographer or representing agency. *Photo C* shows some of the important features to consider as you design your card. One of the best and most economical QSL card printers is Gennady, UX5UO QSL service.[12]

Next, the DXpedition QRZ page needs to be set up. It should list the DXpedition mission, operating frequencies, team members, and QSL information. It is advisable to apply for Logbook of the World (LoTW) certification and a Club Log account prior to the DXpedition so that QSL cards can be requested online as the operation progresses. This will also give the stations working the DXpedition the ability to check the log for QSOs. Some logging software will automatically upload the contacts to the different sites if you have good internet connectivity.

It is also advisable to assign a ham who is not going on the DXpedition the task of responding to all emails sent during the operation. A log should periodically be uploaded to him/her, so he/she can answer QSO-related questions.

Finally, look for sponsors who might help provide equipment support in return for listing them on your QRZ page, DXpedition webpage, or your personal website. The more important the DXpedition, the more exposure the sponsors will get for their product. It is not uncommon to have transceivers, amplifiers, and antennas loaned to the DXpedition in return for exposure.

After the DXpedition

During the DXpedition or after the event, ensure that all logs are submitted to Club Log, QRZ, and LoTW. The QSL manager should promptly respond to QSO inquiries and answer QSL cards that have been received. The DXpedition team should schedule a meeting after the DXpedition to review what went right and wrong and suggest how things can be improved for the next DXpedition.

Summary

Whether you are going on a holiday (vacation) style operation or very rare major DXCC DXpedition, it takes considerable planning, time, and financial investment. It requires studying propagation, investigating where to go, how to get there, obtaining a license, and more. Choosing a cohesive team with varied skills must thoughtfully be done with many things to consider. Mobilizing equipment, determining transportation routes, lodging, and food can be complicated and costly. After all is said and done, when you have accomplished all the above and sit down to your first huge pileup, you will know that it was all worth it!

Notes:

1. <https://clublog.org/mostwanted.php>
2. <www.dxzone.com/catalog/DX_Resources/Shack_Rental>
3. <https://tinyurl.com/3jnv3ehv>
4. <www.airbnb.com>
5. <www.sevencorners.com>
6. <https://tinyurl.com/3wuumxyu>
7. <www.dxnews.com>
8. <www.dailydx.com>
9. <www.dx-world.net>
10. <www.papays.com/opdx.html>
11. <w1aw@arrl.org (submit DXpedition)>
12. <www.ux5uoqsl.com>

CQ CLASSIC

A Visit to Christmas Island

Since it's December, we thought it would be fun to share an article from our May 1977 issue on a DXpedition to Christmas Island in the Indian Ocean. The visit actually took place in the spring of 1976 and ironically, included Easter … which the author tells us — at least back then — was the favorite holiday of the year for the locals! Enjoy…

This story picks up where Bill left off in our September issue. Bill operated as ZK2AQ and A35NN from Tonga and Niue Islands then set sail for Xmas Island in the Indian Ocean.

VK9XX DXPEDITION TO CHRISTMAS ISLAND

BY BILL RINDONE*, WB7ABK

Enroute from Niue to Western Samoa, I reflected on the ZK2AQ operation and decided to take a critical look at the expeditions beam antenna.

Don Schliesser, W6MAV, president of the Northern California DX Foundation had contacted me at ZK2 and advised that the foundation was interested in our propagation research. The NCDXF has been instrumental in aiding several DX oriented radio expeditions and their participation was certainly welcome at a critical point in time. By agreement the foundation was going to ship a linear to Singapore and if other equipment was to be needed or replaced this was definitely the time to find out.

Phil Williams, 5W1AU, along with Pete 5W1AZ, met me at the airport in Apia and by the time we arrived at Phil's home the gray of evening had set in. Determined to check out the beam, we assembled it in the dark and then climbed the tower with the antenna cradled between Phil and I, finally securing it at the forty foot mark. The project consumed the better part of the evening, providing me with sufficient confidence in the array and supplying the islands mosquito population with a fine three course banquet. At one point a fight developed between a few of the more aggressive dive bombers over who had the landing rights at the forty foot mark. Phil settled the argument by momentarily slipping, seeing that we were

Flying Fish Cove. Here's a view of "downtown Xmas Island" as seen from near VK9XI, the islands club station.

also capable of flight in at least one direction, the mosquitoes retreated to a lower level to regroup.

After completing the task at hand we sat around and sipped Cointreau over ice, while thanking Lee, KH6BZF, for the Macadamia nuts. Not bad for a Pacific pacifier. A good nights sleep under netting, with the gentle tradewinds blowing, made me feel like a new man and ready to tackle the noon flight to Sidney.

Three days with Les, VK2AFG, resulted in the issuance of VK9XX and we were again airborne headed for Singapore and a rendezvous with the once a month charter flight down to Xmas Island.

Presently there are two Christmas Islands in the world. One lying in the Line Islands of the Eastern Pacific, approximately 1200 miles south of Hawaii, and used extensively during the Pacific A-Bomb tests. The Christmas Island of our story lies 250 miles south of Java in the Indian Ocean and was first sighted during the early 1600's, most notably on Christmas Day 1643 by Capt. Mynors of the British East India Company. The first recorded landing was made in 1688 by William Dampier. In 1886 Capt. MacLean of the H.M.S. Flying Fish visited the island and discovered the anchorage which today is known as Flying Fish Cove. One year later a landing was made by H.M.S. Egeria and samples of rock were removed which proved to be pure lime phosphate. This important economic discovery resulted in the annexing of the island by Britain in 1888.

The first settlement was established shortly afterwards by George Clunes-Ross who had originally settled 530 miles to the west on Cocos-Keeling Island. During World War II the island was evacuated except for a small detachment of soldiers, who built a mock wooden aircraft to help dissuade the Japanese from an invasion. Ironically this act probably precipitated the bombing which came two days prior to the Japanese landing. At the time of the bombing, Mathew, ZC3AC, was in the radio shack handling traffic. Upon hearing the whistling, of what proved to be a direct hit, he lunged out the door and dove into the adjacent swimming pool. Narrowly escaping the subsequent explosion.

Following WWII, Britain resumed control of the island and from January 1, 1958 it was administered as a separate crown colony. On Oct. 1st, some nine months later, it became an Australian Overseas Territory leased to the British Phosphate Commission.

Giving you the islands history is one thing, getting there proved to be another.

To gain access to the island you need a special visa issued by the Australian High Commission. To obtain this visa you have to submit an affidavit from one of the 300 European residents on the island stating that they are extending a personal invitation to you for a visit, and that during your stay they will be totally responsible for your shelter, sustenance, and actions. There are no hotels or other lodging available and visits are only permitted to relatives and close personal friends. At long last, I had found an inhabited island which had yet to see its first tourist!

Not knowing anyone on the island, I contacted an old friend, Jim Rumble, VK6RU. Jim maintains a weekly schedule with VK9XI, the club station on the island, and has been its patron for a good many years. He advised that there were two licensed amateurs currently on the island and that he would mention my desire on his next sked.

It was further suggested that I write Craig Woodford, VK9XW, a personal letter and outline my reasons for wanting to visit Christmas Is. Murphy took over at this point and the once a month mail flight failed to deliver my letter. It arrived

The VK9XX operating position with the author at the ready.

on a slow freighter, months too late for its intended purpose. In the meantime, thru the efforts of Jim, Craig and Don Hall, 9V1SH, amateur radio was to succeed where the mails had failed.

Arriving in Singapore, I learned that the anticipated charter flight was carrying workers who were returning to Xmas and that a pecking order existed for any available seats. First crack went to management and visiting dignitaries. Second choice would be given to returning or newly hired Malaysian workers. Next came dependents—the wives and children of those already mentioned. Then space was to be allotted to visiting clergy, etc. Should there be any remaining space it would fall to freight, and then—you guessed it—any visitor crazy enough to want it, provided they had managed to meet all the requirements previously mentioned. The flight could carry 86 passengers and with three days to lift off, there were 85 on the list! The charter agent in Singapore was shrewd and after a few minutes a meeting of the minds had been reached. There would be no 86th passenger on the list, only 200 pounds of freight . . . me! The fare was soon paid and the bargain was sealed. My trutsty TS-520 was still in its carrying case and ready to go.

Having met with apparent success on the charter matter, I then approached the Australian High Commission and presented my documents. The clerk advised that they would be submitted and a "decision" regarding the visa made. It was recommended that I return the next day at 1:00 p.m., at which time I was advised to return at 4:00 p.m., at which time I was told to wait.

During my "wait" a young chap, dressed in Levi's and sporting a beard, wandered in carrying a coil of RG-8U slung over his shoulder. The story unfolded that he had been installing an amateur station aboard a yacht in the harbor. I naturally inquired as to whether I could be of any help. It seems they had just installed a vertical antenna with forty radials and they were getting ready to fibre glass them to the deck. Their real concern was as to whether the ends of all the radials had to be draging in the water! Now I was sure that I was a long way from home. I explained the lack of necessity in his monumental project and then he confided in me that they had a few additional problems. No one on board had a license or call sign, nor had any of them ever been on the air. CQ was an alien term and none of them knew how to establish a contact.

He explained that they were sailing thru the Anambas Islands and then over to the Spratly Group, so I suggested they borrow the 1S2A call sign and stop long enough in the

Spratlys to make a few contacts. I was to hear them a few weeks later signing 1S2A! It's a long way from Sardinia to the Spratlys, and when they heard the pile up that followed their CQ, I am sure they desired a more obscure call sign than either IS or 1S.

Finally the High Commission approved my request and I was all set to go. The following day found us slowly winging south over the Molucca Strait, with its thousands of islands which help comprise the country of Indonesia. Java Head soon passed to starboard and a short time later we circled the cloud enshrouded, lush green landscape of Xmas Island. It was evident, from the air, that the steep cliffs ringing the island continued to drop straight away underwater and unlike the coral islands of the Pacific, there was neither a reef nor any apparent shallow water. Suddenly, through the clouds, the air strip burst into a view as we banked sharply and dove for the deck. This flight commenced a new air charter contract and neither the plane nor the pilot had ever been here before. This became more apparent as we slammed into the uphill strip. Both the passengers and the spectators were pleasantly surprised when we failed to blow the tires out. I had watched the spare aircraft tires being loaded at Singapore with the destinctive “Xmas Island” written on the sides. In retrospect, I wondered if they had known something that I hadn't.

Soon after “landing,” we were directed to the flight apron and instructed to shut down by the paddle waving controller. This was to be my introduction to Craig Woodford, VK9XW, who, aside from his normal island duties, is responsible for directing incoming and outgoing flights from the ground. I was definitely surprised when the first person up the boarding stairs asked for me by name.

The small building which served as an airport was packed with those awaiting relatives and in the ensuing moments, Craig explained that the passenger list had been flashed ahead and that my name had not been on it. With a month between flights he had concluded that I had either been unable to make connections, or, as was more likely, failed to obtain space on the flight. I never did fully explain the arrangement made with the flight broker!

Craigs lovely wife, Lois, and their two children, Joyce and Jeffrey, escorted me to Flying Fish Cove, while Craig wrapped up the flight details and sent the charter plane on its return run. The cove seemed idyllic in nature and with Craigs arrival we were soon in the midst of a Malaysian meal, which still only qualifies as indescribable.

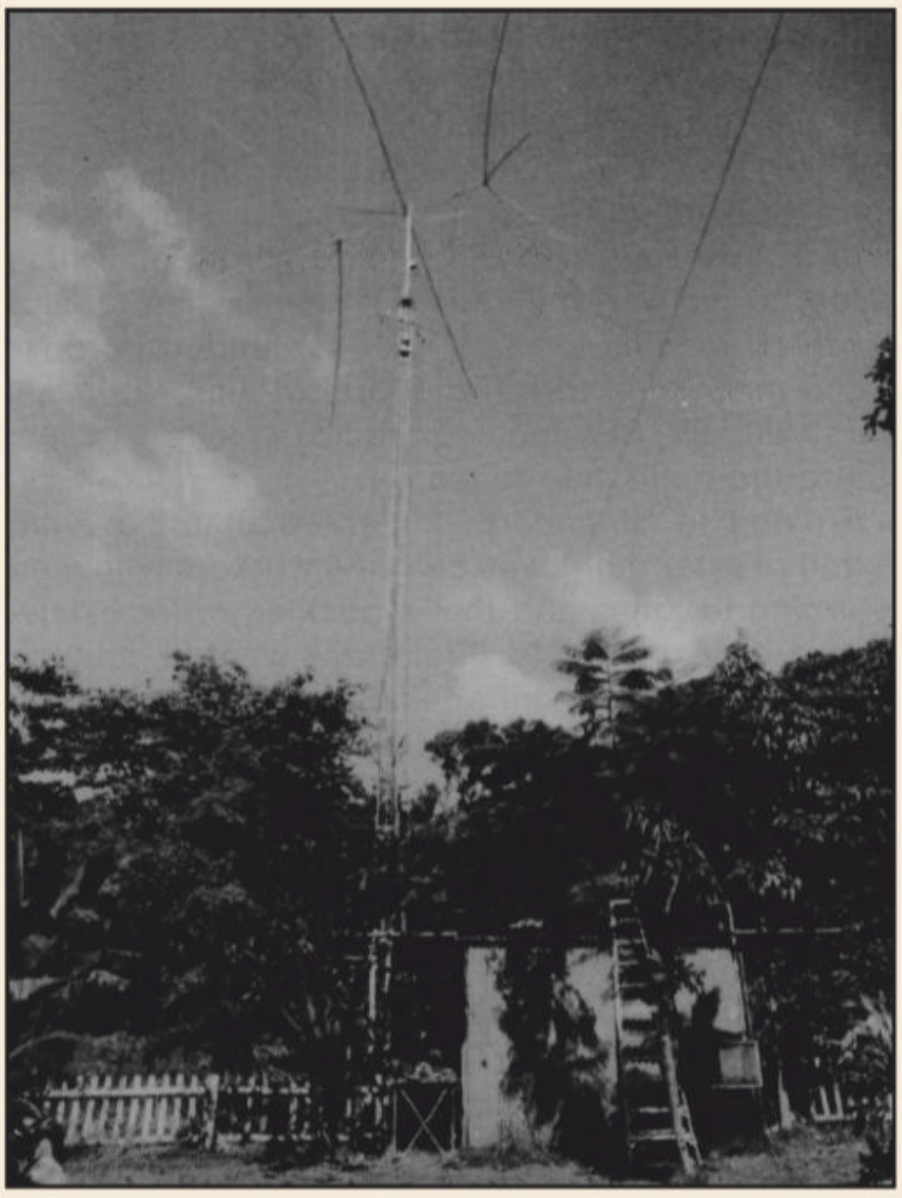
The biggest surprise waiting for me was to be the sixty foot high, four element cubical quad. It really packed a signal and was certainly responsible for getting us into some of the tougher propagational areas. As a confirmed DX-nut, I politely excused myself and set about installing the station in a small galvanized shed which was normally used as Craig's workshop.

At 16:16 zulu on April 8th, 1976 VK9XX was activated. At a little past 3:00 a.m. I shut down for a quick forty winks. Dawn found us again active and durinng the ensuing days over 5400 contacts in 121 countries were established. The openings and paths were quite interesting from a propagational viewpoint and bear looking at:

Local Time	G.M.T.	MHz	
11:45- 2:00 p.m.	04:45-07:00	14	YV/HK to YS
2:00- 6:45 p.m.	07:00-11:45	28	Eu.-Asia-Africa
2:00- 6:45 p.m.	07:00-11:45	21	Eu.-Asia-Africa
6:45- 7:00 p.m.	11:45-12:00	3.5	JA
7:00- 8:30 p.m.	12:00-13:30	14	Eastern U.S.A.
8:30- 8:45 p.m.	13:30-13:45	3.5	W6-W7
8:45- 9:15 p.m.	13:45-14:15	7	W6-W7
9:15-11:30 p.m.	14:15-16:30	14	W6-W7
11:30-12:00 p.m.	16:30-17:00	14	Europe
12:00-12:30 a.m.	17:00-17:30	3.5/7	JA
12:30- 1:00 a.m.	17:30-18:00	14	Europe
1:00- 1:45 a.m.	18:00-18:45	21	KP4to HK
1:45- 5:00 a.m.	18:45-22:00	14	Europe
5:00- 6:00 a.m.	22:00-23:00	3.5/7	Europe

With its equatorial position at 12° south, I experienced superb seasonal openings on the high bands due to trans-equatorial propagation. In case you think 10 Meters is dead everywhere during the low of the sunspot cycle, the following stations were worked during a two hour period; FR7BB, UL7PBY, 9X5PT, VK6CF, 9V1SH, ZE8JL, OE6DK/YK, JY9CS, UH8HAS, UD6DKY, RH8EAE, 4Z4PX, UI8ADN, 5Z4QQ, 9H4H, several ZE/ZS, VK's, JA’s UA/RA, and twenty different, common, european countries. Conditions were, needless to say, superb and greatly added to our enjoyment of the operation.

At ZK2AQ we had the performing ants—at Xmas it was to be the Geckos. Geckos are small territorial lizards about 6 inches long, which inhabit most of the islands of the world. In the “shack” there was one window about three foot square located next to the operating position. The window had been territorially divided eight ways by the Geckos, who resided in the shack. At night the operating light would attract moths and the sight of eight Geckos stationed at their positions awaiting the evening meal was a sight to behold, especially since they were all on the outside, which gave me a view from their bottom side! Occasionally a moth would strike the center of the window and all of my friends would snap to attention, patiently waiting to see which direction it would move.



The VK9XX "shack" and 4 element cubical quad.

The moth, in time, would move from the disputed area and as soon as it was clearly in some ones territory, the owner would dart forward at lightning speed and devour his tidy morsel. As chief provider I felt compelled to operate until all hands were satisfactorily full. My friends exhibited their accord in a rather strange manner, as upon returning each morning, I would have to dust their droppings off of the operating position. I guess they felt the need to return what I had given them, even if it was in a different form. I had always wondered how government beaureaucrats first came up with the same idea!

During my stay, Craig erected a delta loop for 80 Meters and we managed QSO's as far east as W5 land. A number of W6's and W7's also made the grade on both c.w. and s.s.b. At 1:00 a.m. local time we regularly experienced a wild, over the pole opening on 21 MHz which allowed us to continue our practice of working stateside Novice stations. “First VK”, was the usual comment and I often wondered what their reaction was when they checked and found that they had worked something rarer than “VK.” Occasionally, on this opening, I would only find ragchewing KP4's on s.s.b. which we would attempt to break for a contact. One YL, KP4, read us the riot act for breaking inon her contact with another YL, that is after she QRX'd us for ten minutes. Rarity and desirability is truly, only in the eye of the beholder.

On Easter morning I arrived at the operating position to find that I had been preceded by a three inch elf, who was sporting a chocolate Easter egg. The Easter Bunny does indeed range far and wide, certainly adding a bit of nostalgia to my day. Easter, surprisingly, is the biggest holiday celebrated on the island, and this one proved no exception. Amongst the festivities were sail boat races and a childrens fishing derby. Some of the fish were bigger than the contestants, others so small that you wondered whether they really swallowed the hook. So the morning went, and by afternoon I was back at the same old 20 meter stand.

That evening, Phil, W7SGN, was waiting on schedule with my XYL in his shack. It was Easter morning at home and this was the first conversation I had had with my wife since leaving home, six weeks earlier. Afterwards, with my spirits buoyed, I returned to the pile. A buzz-saw out of Asia had come on. Building into a frenzy, it soon covered 200 kilocycles at up to 40db over S-9! If you have never experienced this, on a first hand basis, it is almost beyond comprehension. It certainly felt strange to sit on 14.200 and take calls on 14.325, however, it was the closest frequency that was anywhere near clean.

All the statistics indicated that the greatest need for VK9X lay in the W123 and 8 districts, so I concentrated first and foremost on those areas. Propagation wise, the W4's lasted the longest on our east coast opening. Correspondingly, I held them at bay until as many of the others as possible were in the log. At times the 4's wanted to shoot me when I called first for W1, then W2 and W3, and then skipped by the 4's. Upon returning stateside the word was even out in some quarters that I didn't like W4 stations and wouldn't work them unless there was nothing else on, and then only as a last resort! However, by using this technique, I managed to get the contacts into the areas where they were most needed and satisfy the desire for Xmas, even in W4 land. In order to work the eastern U.S.A., I had to beam straight through Europe. Getting them to hold their fire, when I was "forty over nine" in Europe, was no mean feat.

One thing became evident during the expedition regarding the chaps on the other end. Most were courteous and respectful, amongst the most exemplary were the JA’s, VK's and

A close-up view of the shack. Note the air conditioning unit which made long hours of operation possible.

Europeans. While they stood quietly by, we pulled out 989 east coast W contacts. During that span of time I can only hope that no one recorded the comments made on s.s.b. between the W's on the other end. If it were played for the 79 WARC it could only result in disdain from other nations attending. Obviously, most were gentlemen, however, the percentage of mouthy caustic remarks between operators slurred before the ears of the world made me reticent to admit my own nationality. It is particularly regretful that we must rank so far down amongst the operators of the world. It is interesting that this applied to s.s.b. only, and that the c.w. operators from the states were near the top in courtesy.

Regarding some of the more interesting contacts, I would have to mention JT1AT, JT1BB and JT0UEF all calling at the same time in my first Mongolian pileup.

As time to leave drew near, we tallied the countries at 121 worked and we were pleased that many who needed the contacts had made it through. Among the more jubilant were W1DAL, who had been trying schedules with Craig for several months, and W3HNK who registered his #300 on the “last plateau.” Although we tried hard to accommodate, some did not make it. Hal, PY1ZAE and friends tried for eleven days, and although we listened many times, the path was not there. It opened only once to PY, for a period of twenty minutes at 2:00 a.m. Brazilian time, PY2OB and PY2GYQ were there waiting.

Finally it was time to pull the station down and depart. Having cleaned the band we were chatting with an old friend, Dick Shanks, W6BZE. Having an idiosyncrasy regarding last contacts, we were pleased to close out with Dick and duly announced that we were permanently closing down. We did continue to listen on the frequency for about two minutes, when a VE commented to his friend that he had “overslept and just missed” me. His friend tried to console him with the thought that "there will always be another one." Unconsoled, he alluded to the fact that it would “be a long time till then.” We cracked the mike and, having eavesdropped, addressed him by name. “Good morning, John. How goes it with you?” “Just fine, and with you?”, came the reply. "Not too bad. My you have a nice signal," said I. At this point his curiosity peaked, "who is this?" "Bill, BAKER-ITEM-LOVE-LOVE, and you're five by nine in the log. VE7BQ from VK9XX." So it was that we concluded our operation from Christmas Island.

Kuala Lumpur was an overnighter and the following day found me with Udo, HS1ALB in Bangkok, Thailand. . . . Ah, but, that’s another story.

what's new

First Look: Yaesu FT-710 HF Transceiver

Yaesu has introduced the new FT-710, a compact high-frequency (HF) plus 50 MHz transceiver that will slip into the entry-level spot vacated by the FT-991. Pumping out a maximum 100 watts of power, the Yaesu FT-710's software-defined receiver (SDR) is actually the star of the show.

The FT-710 is equipped with the same high-resolution analog-to-digital (A/D) converter and Field Programmable Gate Array (FPGA) used in the Yaesu's high-er-end transceivers. The twin A/D converter circuit configuration performs digital conversions, then the digital signal is combined by the FPGA to reduce overload and overflow of the A/D converters and improve blocking characteristics. Random noise is then added to the analog signal before digital conversion, which is suppressed by minimizing the quantification error during conversion by the A/D converter and a dithering technology that improves intermodulation characteristics.

Following the conversion, the signal is then fed into band-pass filters in the amateur bands for the RF amplifier, which offers improved intermodulation characteristics. A low-noise figure is adopted in the RF front-end. Additionally, a high-resolution 250-MHz HRDSS (high-resolution direct digital synthesizer) circuit configuration is used to supply a high-quality sampling clock signal with C/N characteristics to the A/D converter. On the transmit side, the HRDSS phase-noise characteristics achieve -143 dBc/Hz at 2 kHz separation.

Adding to QRM rejection is a dual-core, 32-bit, high-speed, floating decimal point Digital-Signal Processor (DSP). The DSP also helps power Yaesu's Interference Reduction Systems: SHIFT / WIDTH / NOTCH/ CONTOUR / APF (audio peak filter) / digital noise reduction (DNR) / and noise blanking (NB). Users can access the interference functions from the DSP dial and the filter display shows passband AF spectrum information as well as the operation status of the interference-reduction functions. In addition, the DSP generates Yaesu's Acoustic Enhancement Speaker System (AESS) by using mid-low frequency enhancement in which the main speaker and the side speaker are combined to create the overall audio frequency response and high-fidelity audio output.

Turning outward, the front panel of the FT-710 is dominated by the large 4.3-inch full color touch panel TFT display which allows users to manage operating frequencies, meters, and main function settings. The real-time spectrum scope display adopts the FTDX series SDR 3-D scope (3DSS) to visualize changes in signal strength. The scope offers 30 FPS sweep speed, a display range of 100 dB, and a span-width of 1-1,000 kHz. In addition, the screen offers a wide variety of colors to make the scope stand out.

There are multiple functions that can be displayed on the screen such as an oscilloscope and the AF-FFT audio scope that can be displayed simultaneously in addition to the RF spectrum scope. The 3DSS real-time spectrum scope presents the constantly changing band conditions in three dimensions. The signal strength flows in time to the rear of the screen so the operator can view the constant changes in signal strength. The more traditional waterfall display can also be expanded by simply touching the screen. The touch screen will also allow users to directly input frequencies by using the keypad or by touching the peak of the desired signal.

To the right of the screen, a large VFO knob is bookended by LED indicators that show the current operating mode: VFO-A, VFO-B, Memory mode, and split operation by changing color from blue to green, white, and red. The VFO knob is surrounded by four additional knobs: Step, AF Gain, RF Gain/Squelch, and Function.

The function dial will let you select items in the setting menu to change setting values. Users can press the knob to quickly select an item and then adjust the setting values or levels with one knob. Functions or settings may be assigned so it can be quickly accessed by turning the knob.

Above the knobs on the front panel is a row of buttons that access frequency tuning functions and a QMB (Quick Memory Bank) function that stores dedicated memory channels that can be recalled with one touch. Users can store frequencies, modes, transmit / receive settings, filters, and other parameters into the 10 memory channels available.

Other features include:

- A built-in high-speed automatic antenna tuner featuring 100-channel memory
- CW operation (CW zero-in display; CW auto zero-in; CW reverse; CW keying signal form shaping, Contest memory keyer, supported CW operation by remote control keypad FH-2)
- Three-stage parametric equalizer
- Intercept Point Optimization
- Automatic Gain Control
- Band stack function
- Compatible active tuning antenna
- CAT (3-system)

On the rear panel there is a tuner connection that supports FC-40 auto antenna that can match a wire 20 meters or more in length to the amateur bands and features 200 memory slots, making tune-up quick. Two USB slots (USB-A and USB-B) are available to connect a keyboard and support CAT operation audio input / output and transmission control. An SD card slot can accommodate all commercially available SD cards so users can store memory contents, transceiver settings, screen capture images, and recordings. A DVI-D port allows an external monitor to be plugged directly into the FT-710. Other connections on the rear panel include a Type-M antenna terminal, cooling fan, 13.8-volt DC input, RTTY / data terminal, CW key jack, remote control keypad FH-c connection terminal, mono external speaker jack, and ground terminal.

The Yaesu FT-710 is available now with a suggested retail price of $1,299.95. For more information, visit <www.yaesu.com>.

Announcing:

2023 CQ World Wide WPX RTTY Contest

February 11-12, 2023
Starts 0000 UTC Saturday; Ends 2359 UTC Sunday

Log Deadline: 2359 UTC February 17, 2022

Thrill in the chase for over 2,300 unique callsign prefixes from 200+ DX entities in the world's largest everyone-works-everyone RTTY contest.

The CQ World Wide WPX RTTY Contest is an immensely popular operating activity that enjoys broad participation by amateurs around the globe. The event attracts amateurs at all levels of proficiency from beginner to world champion and are rich hunting grounds for bagging callsign prefixes in pursuit of the coveted CQ WPX Awards Program endorsements. WPX features a diversity of categories for single operator and multi-operator stations, including the newly added Youth Category for entrants 25 years of age or younger, so please come and join the fun!

Contest Basics

The contest event runs from 0000 UTC Saturday until 2359 UTC Sunday on the second full weekend in February.

Amateurs worldwide try to contact as many amateurs and prefixes as possible during the period of operation. Single Operator stations are scored on the first 30 hours of their total operating time within the 48-hour period and off times must be a minimum of 60 minutes during which no QSO is logged. Multi-operator stations are scored for the full 48 hours.

Contacts are valid on the 3.5-, 7-, 14-, 21-, and 28-MHz bands (no WARC bands). Exchange an RS(T) report plus a progressive contact serial number starting with 001 for the first contact. Note: Multi-Two, Multi-Unlimited, and Multi-Transmitter Distributed entrants use separate serial number sequences on each band.

Scoring

The final score is the result of the total QSO points multiplied by the number of different prefixes worked. A station may be worked once on each band for QSO point credit, prefix multipliers only count once.

Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7 and 3.5 MHz.

Contacts between stations on the same continent, but different countries, are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7 and 3.5 MHz.

Contacts between stations in the same country are worth one (1) point on 28, 21, and 14 MHz and two (2) points on 7 and 3.5 MHz.

The prefix multiplier is the number of valid prefixes worked. Each prefix is counted only once regardless of the band or number of times the same prefix is worked. Special event, commemorative, and other unique prefix stations are encouraged to participate. A station operating from a DXCC entity different from that indicated by its callsign is required to sign portable. Prefixes must be issued or permitted by the licensing authority of the country of operation. See the full rules for a description of what constitutes a prefix.

Entry Categories

The competition is divided into Single Operator and Multi-Operator categories. Single Operator categories also offer four Overlay categories which may be entered IN ADDITION TO the normal Single Operator category. All entry categories may use QSO finding assistance except for the Classic Overlay.

Single Operator (all bands or any single band): Only one operator finds, makes, and logs all contacts.

- High power: Up to 1,500 watts
- Low power: 100 watts or less
- QRP: 5 watts or less

Single Operator Overlay Categories: Entrants in Single Operator categories may also submit their log for one of the overlay categories shown below. Overlay entries are grouped into all band, high power, or low power (includes QRP) in the results.

Tribander / Single-Element Overlay – Allows the use of a multi-band, multi-element antenna with one feedline for the 14-, 21-, and 28-MHz bands, plus a single-element antenna for each of the 3.5- and 7-MHz bands. One example is a 3-element tri-band antenna for 14, 21, and 28 MHz plus an inverted-V wire dipole for 3.5 MHz and another one for 7 MHz. Another example is a single-element, multi-band vertical antenna for all five bands or a fan dipole of single element dipoles for each band using a single feedline.

Rookie Overlay – Open to operators who were first licensed as radio amateurs less than three (3) years before the date of the contest. You will be asked to indicate the year you were first licensed when submitting your log.

Youth Overlay– Open to all operators who are 25 years old or younger on the dates of the contest. You will be asked to indicate your birthday when submitting your log.

Classic Overlay – Allows only one radio, no receiving during transmitting, QSO finding assistance is NOT allowed and only the first 24 hours of operation count for the Classic Overlay score.

Multi-Operator Categories (All Band only): More than one person can contribute to the final score during the official contest period.

Single-Transmitter – Only one transmitted signal is permitted at any time. The station may change bands up to 10 times per hour. This category has specific restrictions on band changes so please read the full rules carefully.

- High power: Up to 1,500 watts
- Low power: 100 watts or less

Two-Transmitter – Two bands may be transmitted on simultaneously. Each station may change bands up to 8 times an hour.

Multi-Transmitter (Unlimited) – One transmitted signal is allowed on each of the six contest bands.

Multi-Transmitter Distributed – A maximum of six transmitted signals, one per band at any one time, from stations in different locations. All equipment (transmitters, receivers, amplifiers, antennas, etc.) must be located in same DXCC entity and CQ Zone, including remotely controlled equipment. Six bands may be activated simultaneously.

Checklog: Entry submitted to assist with the log checking. The entry will not have a score in the results and the log will not be made public.

Awards

Electronic certificates will be made available for download for everyone who submits an on-time entry. Plaques are awarded to recognize top performance in a number of categories. The current list of plaques and sponsors is at <www.cqwpxrtty.com/plaques.htm>.

Club Competition

Many clubs around the world compete vigorously for the plaque awarded to the club making the highest total combined score of their members.

Submitting Your Log

Electronic logs should be in the Cabrillo format. Upload your log on the web at <www.cqwpxrtty.com/logcheck>. Uploading logs via the Web is the only approved method for submitting a log; paper logs are not accepted.

All entries must be emailed WITHIN FIVE (5) DAYS after the end of the contest, no later than **2359 UTC 17 February 2023**. Logs may be resubmitted any number of times and only the last log submitted is used in log checking. Resubmitting an entry after the deadline will result in it being considered as a late log.

Full Rules Online

Complete rules are available in several languages at <www.cqwpxrtty.com/rules.htm> and in English only on *CQ* magazine's website <www.cq-amateur-radio.com>.

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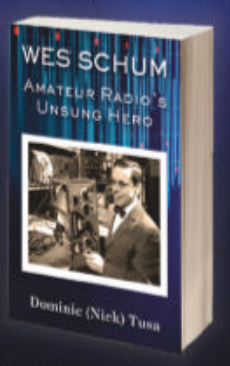

On Thanksgiving Day 1961, Wes Schum was unstoppable. His Central Electronics Company had produced the world's most advanced single-sideband transmitter, setting the amateur radio world ablaze. Three months later, it was all over, 60 year's later, learn why and what could have been.
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Technology Special:

math's notes

BY IRWIN MATH,* WA2NDM

Suggestions for Future Experimentation

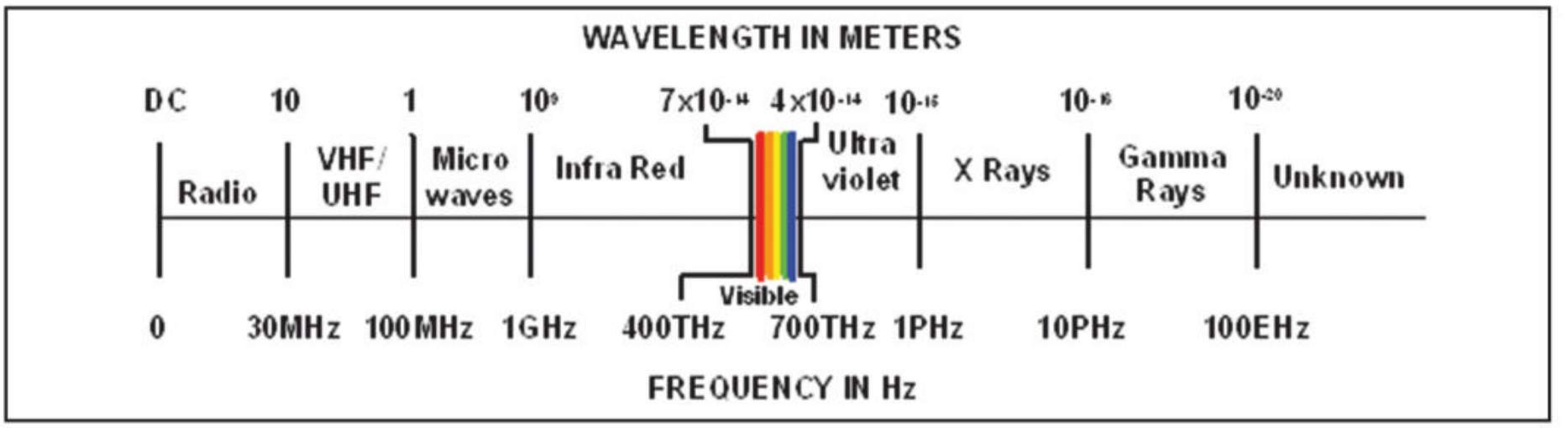

Figure 1. The basic electromagnetic spectrum as we know it today.

At this point in time, 2022 is coming to a close and the new year is about to be born. I typically use this time to think about where we have been and where we may go in the future. This month, however, I would also like to explore the future but in a somewhat different way. This is by suggesting what avenues of exploration the experimenters among us might wish to consider.

Figure 1 is a rough representation of the electromagnetic spectrum as we know it at present. As amateurs, most of us are certainly familiar with the spectrum from DC up through radio and into the microwave region and can actually see the visible portion of the spectrum (note that the uncommon extremely high frequency designations on the graph are abbreviated "PHz" = petahertz and "EHz" = exahertz.) However, if you look at the spectrum from the infrared portion and beyond you will see that the frequencies are so high that if one were to just use 10- or 20-kHz-wide bandwidth portions for a signal (AM?), then thousands, if not millions, of such channels are potentially available. The trick is to determine how to use these narrow portions easily. That is where experimenters can certainly look. Although some efforts have been made in the optical portion of the spectrum, narrow bandwidth selective portions are basically limited to optical filters, which while effective to some degree, are still very wide band. In the days of the spark coil, very large portions of the spectrum were also modulated (on and off) for CW operation and rudimentary voice transmissions were experimented with but were severely limited although some work was attempted even then. Frequencies much higher than 1.5 MHz (200 meters) were considered unusable and as a result they were "given" to amateurs and experimenters. As time progressed, however, we eventually came up with AM, FM, and then all sorts of digital techniques that we have today but this is where it seems to have stopped. Why not try to come up with very simple methods of dividing up portions of the UV and higher wavelengths and — not just with optical filters (that do exist) but with novel new approaches?

Speaking of high frequencies, it is a fact that as far as we know the entire electromagnetic spectrum may actually extend indefinitely. In the early days, the range of wireless transmissions was basically limited to a few hundred miles with kilowatt spark transmitters. When the "HF" region was finally beginning to be explored by amateurs as well as "professionals", it was found that a few watts with a little more advanced technology enabled worldwide communications. As we moved into the microwave (GHz) region, the "no distance limit" transmission range achievable became virtually line-of-sight and, in the optical region, even a simple sheet of paper could effectively block transmissions. These are all certainly facts but I wonder what happens if you go still higher. Does propagation change again? We know X-rays pass through solid material (talk to a doctor) and gamma rays may or may not actually pass through the earth itself so what happens as you continue to go higher (are they still electromagnetic?). There is even some research being done with what is referred to as the "triboelectric effect" (look it up on the internet), which is basically related to static electricity but still involves the movement of electrons. And when electrons move, don't they produce an electromagnetic field of some sort? As a result, I personally wonder if there really is a true upper limit as some suggest, or if there are surprises in store. Initially, "thinking out of the box" experimenters will probably have a good chance of finding out.

I know that many will immediately say, "but I don't have the means, finances, or exotic equipment to research all of this," but don't forget to consider what "exotic" equipment Hertz and others soon after him had to study their thresholds. All they had at their time (compared to us today) were some mathematical formulas from Maxwell (which few understood) and whatever they could construct with their own hands from readily available common materials and their imaginations. Think about it!

In the days of spark, sophisticated communications equipment consisted of natural minerals such as galena and silicon (the first solid-state devices?), coils of wire, all sorts of spark gaps and long elaborate antennas. It took years to invent the simple vacuum tube, although Thomas

*c/o CQ magazine

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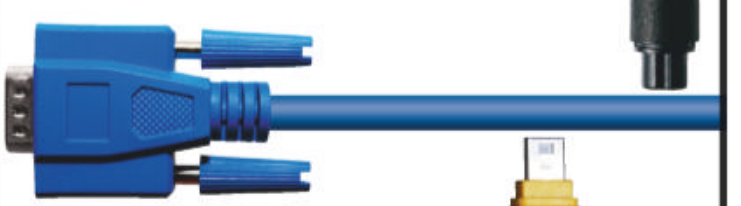

It's All Good on Our Ends!

Edison actually made a diode by enclosing a metal plate into one of his new lamps to try to solve a darkening problem (which it didn't). He even found that current would flow in only one direction (from the filament to the plate), but since it did not do what he wanted he dismissed it, recorded his findings and named it the "Edison Effect." It took Alexander Fleming and then Lee de Forrest to actually develop the practical vacuum tube. Years later, the transistor made its appearance and changed the future of the entire electronics industry, but at this point in time it seems that even this device is approaching its upper frequency limit. Is there something else on the horizon to be discovered? Is there an "effect" of some sort that was noted but not explored? Who knows?

Finally, is there another totally different method of communication that is not electromagnetic in nature? I know this is a big "stretch" of the imagination but remember that scientists before the 1800s could not even imagine electricity or should I say "electronics" as we know it, although lightning was of course clearly visible to everyone.

I hope you have gotten the point of all of this. My conclusion is that I believe there are many things out there that do not necessarily require exotic equipment and ultra-educated individuals to discover. It only requires careful research by people with a great deal of imagination to try to see what there is, sometimes from a completely different point of view. Maybe one of the members of our hobby can find out. I can't wait to hear what that will be!

Season's Greetings to all of my readers and to paraphrase my usual end-of-the-year comment, "may the coming year bring you all that your heart desires."

– 73, Irwin, WA2NDM

what's new

WXWarn 2.0 Now Available From N3FJP Software

Prompted by Hurricane Ian's recent landfall in Florida, N3FJP Amateur Radio Software has released WXWarn, which taps into the National Weather Service (NWS) real-time weather data feed, constantly monitoring NWS weather updates and displaying just the alerts that are important to you as they are issued.

Whether you simply want a "heads up" to unfolding forecast weather conditions in your own county, or you would like statewide, region wide, or severe weather alerts for the entire U.S., you can configure WXWarn to display just the information that you are looking for.

WXWarn 2.0 is a complete re-creation from N3FJP's previous version 1.8, is operating system agnostic and will run entirely in your browser. There is nothing to install and it will even work on your phone. Use Chrome or Firefox for best results. You can begin using the latest version of WXWarn by visiting <https://wxwarn.affirmatech.com>.

N3FJP's Software package includes more than 100 programs for contesting, net management and general logging amateur radio applications, as well as the WX Warn weather software. In addition to full use of all these programs, registered package customers are also entitled to receive free passwords for any new software added to the package and free upgrades to existing programs. There are no annual maintenance costs of any kind. Register once and you are set with N3FJP Software for life.

For more information, contact: G. Scott Davis, 118 Glenwood Road, Bel Air, MD 21014-5533 or visit <www.n3fjp.com>.

the listening post

BY GERRY DEXTER

South Pacific Stations Having Troubles

~ Radio Vanuatu is currently absent from its home on 7260 kHz, and so are its harmonics. Especially the fourth on 11835 kHz.

~ Also in shaky shape is the Solomon Islands Broadcasting Corp. (SIBC) on 5020 kHz. It's particularly distressing when both stations (SIBC and Radio Vanuatu) seem troubled, since all that's left is Radio New Zealand, (especially with Radio Tahiti long gone). One can't really include Hawaii's WWVH (with its time ticks) or a part-time religious broadcaster, which wouldn't air island music in any case.

~ Some comings and goings: Cuba's Radio Rebelde on 5025 kHz has been spotty lately, leaving the frequency open for the Peruvian Radio Quillabamba from the town of the same name.

~ Last month's headline reads: "WRTH Continues!" A further email clarifies things. The rights to *World Radio TV Handbook* (WRTH) have been transferred to Radio Data Center GmbH (which is German for company). RDC published the FM List in 1986 and later the MW List which included shortwave listings. It is also known for its European Radio Guidebooks. So, it looks as if we're safe and secure, information-wise, at least for the time being. RDC was founded by Gunter Lorenz in 2012, who still serves as CEO, and is based in Freising, Germany.

Instant replay: The World Radio TV Handbook (WRTH) will keep going in both print and digital editions.

Listener Logs

Your shortwave broadcast station logs are always welcome. But please be sure to double or triple space between the items, list each logging according to the station's home country and include your last name and state abbreviation after each. Also needed are spare QSLs, station schedules, brochures, pennants, station photos, and anything else you think would be of interest. The same holds for you amateur radio operators who also listen to shortwave broadcasts ... come on ... I know you're out there! You, too, are also most welcome to contribute.

Here are this month's logs. All times are in UTC. If no language is mentioned English is assumed.

ALASKA—KNLS via Anchor Point on 9580 at 1407 beginning Bible stories with a station ID at 1409. (Sellers, BC)

ALGERIA—Radio Algerienne on 9585 via France at 2138, with drumming, man speaking, and announcements at 1600, then woman talking; at 2200 with discussion in Arabic by a woman, later nice Arabic vocals; on 17600 via Bechar at 1543 with man and Arabic group vocals, lyrics, drumming, announcements at 1600. (Taylor, WI) At 1650 with two women having a discussion in Arabic, announcements at 1655, time pips at 1700, then man reading the news and remotes. (D'Angelo, PA) On 11985 in Arabic at 1916. (Brossell, WI)

AUSTRALIA—Reach Beyond on 9610 via Kununurra at 1325 with preacher speaking in Urdu, closing announcements about the next day's broadcast from 1327-1329, then off at 1330; on 9720 opening in English at 1330, station ID at 1331 into a Christian message. (Sellers, BC) On 11825 in Burmese at 1511. (Brossell, WI)

AUSTRIA—Radio Austria Intl. on 6155 via Moosbrunn at 0501 with man and woman reading the news in German, followed by various talk features. (D'Angelo, PA)

Adventist World Radio on 17570 at 1738-1759* with man speaking in Maasai, religious vocals at 1754, man talking over instrumental music, station ID, closing announcements, animal noises up to going off. (D'Angelo, PA) At 1701 in Swahili, instrumental music, woman announcer. (Taylor, WI)

BOTSWANA—Voice of America (VOA) Relay on 5925 via Mopeng Hill at 0343 with various announcers, English news, nice station ID at 0355, then woman talking, eventually off at carrier cut. (D'Angelo, PA) On 15580 at 2013 with hi-life and Afropop music. (Brossell, WI))

BRAZIL— (*All in Portuguese –GLD*)

Radio Clube do Para via Belem on 4885 at 0352 with nice Brazilian pop music, numerous vocals, male host, good formal station ID at 0402. (D'Angelo, PA)

Voz Missionaria via Camboriu on 9655 at 0014 with "Hallelujah" sung by a woman. (Taylor, WI) On 2256 with talks, woman giving the station ID at 0001. (D'Angelo, PA)

Radio Brazil Central via Camboriu on 11815 at 2344 with man talking, several men singing, and a nice station ID. (D'Angelo, PA)

Radio Inconfidencia via Belo Horizonte on 15190 with live sports coverage at 2242. (Brossell, WI)

CANADA—CFVP via Calgary on 6030 with woman comic at 2345. (Sellers, BC) At 1227 with comedian before live audience. (Taylor, WI)

Bible Voice on 15310 via Nauen in Oromo at 1609. (Brossell, WI)

CHINA—China Radio Intl. on 11635 with magazine program at 1030; on 13645 via Mali opening in Swahili just past 1700.

**c/o CQ magazine*

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(Barton, AZ) On 11640 via Mali at 2124-2130* with man and woman talking about the spirit of the Chinese people, which ended that series, off at 2230. (D'Angelo, PA) On 11875 via Urumqi in Russian at 1621; on 12070 via Xian at 1153 in Tagalog; on 13685 via Mali in Arabic at 1918. (Brossell, WI)

Voice of the Strait on 4895 via Fuzhou at 1153 with light instrumental music, man and woman talking alternately in Mandarin. (Taylor, WI) At 1245 with Chinese music at poor level, second harmonic on 4940 very poor. (Sellers, BC)

Yunnan Radio Intl. on 6035 via Lantao in Mandarin at 1231 with female DJ with Chinese ballads. (Taylor, WI)

PBS via Xiziang (Tibet) Baiding on 6200 in Thai at 1150 with woman talking then into longer talk by a man, gone by 1203. (Taylor, WI)

Nei Menggu PBS on 9420 via Hohhot in Mandarin at 1255, ads or announcements at 1258, station ID sequence at 1300. (Taylor, WI)

Voice of Jinling possibly via Nanjing in Mandarin at 1238 with light instrumental music. (Taylor, WI)

PBS Sichuan 2 on 6060 via Nanjing in Tibetan at 1227 with Chinese contemporary dance music. (Taylor, WI)

China Huay Broadcasting Corp. on 6185 via Fuzhou at 1138 with man and woman talking alternately. (Taylor, WI)

PBS on 12055 via Lingshi in Kazakh at 1149. (Brossell, WI)

ECUADOR—HCJB on 6050 via Pinchincha at 0443 with long religious talk by man in an unidentified language, eventually cut off at 0448 broadcast termination. (D'Angelo, PA)

EGYPT—Radio Cairo on 9440 in English at 2148 with Middle Eastern music, female announcer with short Arabic bridges. (Taylor, WI)

ENGLAND—BBC on 9915 via Madagascar at 0404 with news, station ID, features. (D'Angelo, PA) At 0442. (Taylor, WI)

GERMANY—Deutsche Welle on 15275 via France in Amharic at 1602. (Brossell, WI)

GUAM—Trans World Radio on 9920 in Korean at 1340 with hymn-like music, woman talking between numbers. (Taylor, WI) On 11590 via Merzio at 1355 with IS, woman opening in Uighur. (Barton, AZ) On 12040 in Korean at 1230. (Brossell, WI)

Adventist World Radio on 15320 via Agat at 2252 with woman giving a Christian message in Javanse, brief music before closing announcements, contact information and off at 2259. (Sellers, BC)

INDIA—All India Radio on 7380 via Bengaluru at 0058 in Sinhala with Southeast Asian singer, seeming station ID by man, back to Southeast Asian music. (Taylor, WI) On 15039 via Bengaluru in Swahili at 1235. (Brossell, WI)

JAPAN—Radio Japan on 9615 at 0833 with man and woman engaging in a lively dialogue in Japanese; on 11815 at 1415 with Japanese language lesson. (Barton, AZ) On 13600 at 0000 with woman signing on in Indonesian followed by news. (Sellers, BC) At 1218 with multi-person discussions in Japanese. (Brossell, WI)

MALAYSIA—RTM Sarawak on 9835 via Kajang at 1159 with man speaking in Malay, quick station ID, more talk. (Taylor, WI)

MEXICO—Radio Educacion via Mexico D.F. on 6185 with a jazz trio and woman hosting in Spanish. (Barton, AZ)

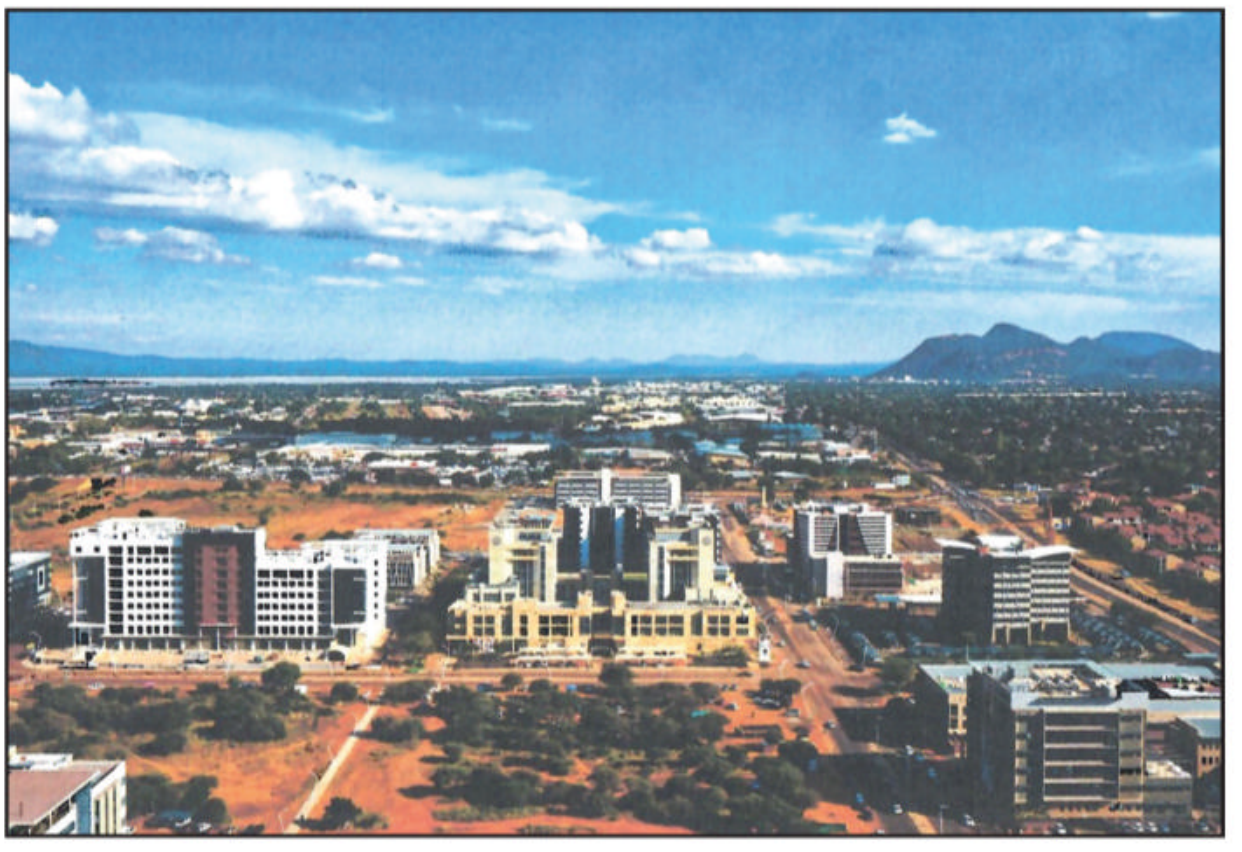
MYANMAR—Myanmar Radio on 5915 at 1223 with woman then man speaking in Burmese, slow moving signal that started on 5914, then twice dropped to 5912. (Taylor, WI)

NEW ZEALAND—RNZ Pacific on 7245 via Rangitaiki at 1257 with this day in history, closing announcements at 1259, and station ID. (Sellers, BC)

NORTH KOREA—KCBS on 15180 in Korean at 1247. (Brossell, WI)

OPPOSITION—Echo of Reunification (North Korea to South) on 5905 at 1202 with woman talking, musical bridges into North Korean-style vocal. (Taylor, WI)

A discussion in progress at Radio Inconfidencia broadcast from Belo Horizonte, Brazil.



Gaberones, capitol of Botswana, also home to a Voice of America (VOA) relay at Mopeng Hill.

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Echo of Hope (South Korea to North) at 1150 in Korean with man and woman DJs. (Taylor, WI)

Voice of Freedom (South Korea to North) on 6045 at 1124 in Korean with man and woman and lively K-pop music. (Taylor, WI)

Omromia Media Network on 15400 via Romania in Oromo at 1500 with brief bits of HOA music, then woman talking, and man with interview. (Taylor, WI)

Radioyouni Dirree Shaggar (via France to Somalia) at 1622 with non-stop HOA music, man talking in Somali, off at 1659. (D'Angelo, PA)

Dimtse Woyane (via France to Eritrea) on 11570 at 1819 in Oromo with HOA vocals. (D'Angelo, PA)

National Unity Broadcasting (via Taiwan to North Korea) on 7200 in Korean at 1201. (Brossell, WI)

Sound of Hope (via Taiwan to China) on 15470 in Mandarin at 1300. (Brossell, WI)

Republic of Yemen Radio (Saudi Arabia to Yemen) on 11860 at 0007 with Arabic singing. (Sellers, BC) Heard at 2234. (Brossell, WI)

PHILIPPINES—FEBC on 12055 via Bocaue with repeated IS to 2330 sign on in Palaung-pale with a hymn, male speaker. (Sellers, BC)

FEBA / Radio Sama on 15510 via Woofferton in Tigrinya at 1737. (Brossell, WI)

PIRATES—Sprokets on 6880 at 2325 but could barely hear music under the mud. **WENO** on 6888 upper sideband (u) at 0136 with electronic music. **Radio Station EXP** on 6820u at 0045 with Jimi Hendrix music. **Thunder Chicken Radio** on 4185u at 0040 with electric guitar, some slow-scan TV (SSTV) / FAX. (Hassig, IL). **WWWW** on 6925u at 0021 with wide variety of songs from Elton John

The China Huay Broadcasting Corp., part of the Broadcasting Corp. of China, on 6185 kHz.

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Looking Ahead

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

- A Billion-Year-Old Radio Signal
- The First YL to Operate from the Vatican in 20 Years
- A Leyden-Jar Magnetic Loop Antenna

Plus…

- Results: 2022 CQWW VHF Contest
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Upcoming Special Issues

February: QRP (Looking for stories now!)

June: Take it to the Field

October: Emergency Communications

December: Technology

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to Led Zeppelin, miscellaneous rock, station ID at 0310. **Alabama Public Radio Relay** on 6925 at 0036 on wide variety of things, occasional sound effects, station ID, 2-minute pause, SSTV, another pause, then off. **Radio 48** on 6950u at 0027 with current rock, interrupted by several station IDs. **Underdog** on 6935u at 0042 with country, several SSTVs, off at 0125. **Cave Man Radio** on 6931.5 at 0046 but poor in noise, identified from HFU. **Russian Retard Radio** on 6932 at 0032 with several IDs, parody songs, some in Russian or Ukrainian. **WJAN** on 6920u at 0046 with DJ with station ID, progressive rock. (Taylor, WI)

PREVIOUSLY REPORTED: Chill Radio, **Ball Smacker Radio**, **Yeah Man Radio**, **Radio Free Whatever**, **Wolverine Radio**, **WDOG**, **Sycko Radio**, **Damn Skippy**, **WANK**, **WHIZ**, **Outhouse Radio**, **Thunder Chicken**, **WTF Radio**.

ROMANIA—Radio Romania Intl. on 11650 via Tiganesti at 2134-2157 with man with Spanish features, nice station ID at 2138, brief instrumental music at 2150, station ID at 2154, then off. (D'Angelo, PA)

SÃO TOMÉ—VOA Relay on 11900 via Pinhera at 2310 ending in French and into Bambara without Yankee Doodle IS. (Taylor, WI)

SAUDI ARABIA—Al-Azm Radio on 11745 via Jeddah at 0030 with woman possibly reading the news in Arabic followed by man leading a discussion. (D'Angelo, PA)

SOLOMAN ISLANDS—SIBC on 5020 via Honoria at 1158 with what appeared to be a religious program. (Taylor, WI)

SOUTH KOREA—KBS World Radio on 9640 at 1539 with man and woman co-hosting pop music program in Vietnamese. (Barton, AZ) On 15575 via Kimjae at 1257 with chimes, station ID in Korean, news in English at 1300. (Brossell. WI)

KBS Hamninjok on 6015 in Korean with domestic pop at 1122. (Taylor, WI)

SPAIN—Radio Exterior España on 15520 via Noblejas in English (on Monday, Wednesday, and Fridays) with woman reading the news at 2201; second harmonic on 17855 was best; on 11940 and 11670 were very poor. (Sellers, BC)

SRI LANKA—Sri Lanka Broadcasting Corp. on 11905 via Trincomalee at 0030-0057 with O/C, group vocals, woman giving the station ID then into Hindi, mostly talks with some instrumental music. (D'Angelo, PA) Heard at 0055. (Taylor, WI)

TAIWAN—RTI on 6180 at 1205 in Mandarin, soft, lively music with distinctive voiced woman, some jamming from CNR-1. (Taylor, WI)

THAILAND—Voice of Thailand on 9390 via Ban Dung in Thai at 1412, off abruptly just before 1415. (Sellers, BC) On 15580 via Udon Thani at 2337-0029 with time pips, opening in English with announcements and woman reading the news headlines and weather. (D'Angelo, PA)

TURKEY—Voice of Turkey on 9830 via Emirler at 2243-2303 with woman hosting English feature, station ID, man giving another station ID, Turkish instrumental music, then something else either opened or VOT continued in another language. (D'Angelo, PA) On 15350 in Greek at 1156. (Brossell, WI)

UNITED STATES—VOA on 12080 via Philippines at 1223 in Korean. (Brossell, WI)

RFE / R. Liberty on 9580 via Taiwan in Korean at 1229. (Brossell, WI) On 9840 via Biblis at 0412 with woman talking at length in Pashto; on 15310 via Woofferton, abruptly cut in mid-sentence at 1459. (Taylor, WI)

Radio Free Asia on 9355 via the Northern Marianas relay on suddenly in Khmer at 1430 with male and female announcers. (Sellers, BC)

Radio Marshall on 15365 via Thailand in Pashto at 1254. (Brossell, WI)

Trans World Radio on 13690 via Armenia at 1337 in Maghi with male preacher. (Taylor, WI)

Adventist World Radio on 15430 via Sri Lanka at 1234 in Meithel. (Brossell, WI)

VATICAN—Vatican Radio on 17615 via S.M. Galeria at 1634-1647 in English, perhaps a Latin religious service, then woman giving the station ID and closing announcements. (D'Angelo, PA)

VIETNAM—Voice of Vietnam on 12020 via Sontay in Japanese at 1223. (Brossell, WI)

As Time Goes By

~ **Radio Armistad** via San Pedro Laguna, Guatemala, on 4700 kHz with its 5-kilowatt domestic service in Spanish at 0128 on November 28, 2001.

Just Sayin'

Something I've never understood — why did the once energetic interest in having one's shack photo published wither away and suddenly vanish? Used to be you got a certain "kick" out of seeing your shack photo published, but now it's more like finding a stain on your t-shirt; almost an embarrassment — certainly nothing to be proud of. I gave up the appeal months ago.

Thank You, Thank You

A big heap of thank yous go to William Hassig, Mt. Pleasant, IL; Rich D'Angelo, Wyomissing, PA; Harold Sellers, Vernon, BC; Mark Taylor, Madison, WI; Rick Barton, El Mirage, AZ; and Bob Brossell, Pewaukee, WI.

Thank you again and until next month, remember to keep on keepin' on and ... **Celebrate Shortwave!**

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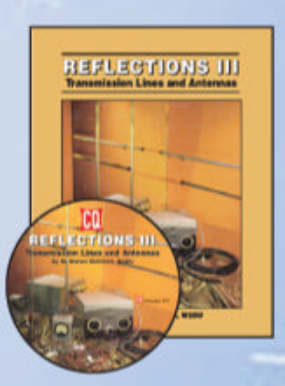
by Walt Maxwell, W2DU



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Technology Special:

emergency communications

BY JOHN FERGUSON,* K3PFW

Is Technology Your Friend or Your Downfall?

There is no doubt that we have become a society addicted to technology and what it can do for us. OK, so the automotive era beats the horse and buggy era in terms of convenience, but it was simpler and cheaper when the motive power (horse) for your vehicle (buggy) refueled itself in the pasture, and its exhaust (manure) helped fertilize the grass it fed it. However inane the above argument is, I must admit, yes, I like the creature comforts, environmental conditioning, baggage capacity, towing ability, and speed of my Grand Cherokee. It is a convenience and fits the lifestyle in the society in which I reside and work.

However, not too far from my residence is an Amish community. The people there live an almost technology-free way of life, most of them happily and productively. And, interestingly enough, with less heart disease. They work their fields with horses, and their horse-drawn buggies are found hitched in front of some of the local markets. They do, however, adapt some "technology" to their way of life as it might be a required necessity. Technology is not really a necessity in some communities.

Licensed in the early '60s, I was in the discussions that resulted from the introduction of SSB, referred to as "Scientific SetBack" by those of us who were accused of wallowing in AM, which in turn was referred to by the practitioners of SSB as "Ancient Modulation." This was when "real radios glowed on the dark!" Now we have not only a marketplace dominated by solid-state radios, but a veritable cornucopia of modulation techniques and modes to the point that, now, with FT8, we can complete a QSO and never, ever, really "hear" the other station with our ears. Time marches on.

Graduating with my bachelor's degree in 1969, I was in the last class of what is now Millersville University that studied vacuum tubes. Yes, we were introduced to transistors, but in our lofty knowledge and experience as lab assistants, we tried to convince each other that they wouldn't amount to much. Ah, the wonderful ingenuous minds of youth. About 13 months later, I was introducing second-year undergraduates to solid-state junction technology that was "going to revolutionize the electronics industry."

Change and progress are inevitable. Unfortunately, the technology that is developed is not always used appropriately. Man's inhumanity to man, design flaws, greed and avarice can distort the good in an emerging technology. As we face a possible "Armageddon," we can certainly ask whether atomic energy is a blessing or a curse. But how many lives of American service men and women would have been lost if "we" hadn't used "the bomb" to end World War II? On the other hand, engineering and equipment failures have resulted in disasters at the Three Mile Island (Pennsylvania) and Chernobyl (then-Soviet Ukraine) nuclear power plants. And was Mother Nature trying to tell us something with the Fukushima nuclear power plant disaster in Japan?

No, I'm not some crazy modern Luddite trying to discredit technological progress. I like what I have in the support and service from the technology in my daily life: Car, cell phone, computer, internet, credit cards, television, and, yes, the fantastically flexible, frequency agile, conveniently portable, powerful, amateur radios with sensitivity and features that I could not even have dreamed of when I thought "the only real radios glow in the dark."

My area of interest in the hobby, as you might gather, is the public service aspect when applied to the disasters that tend to disrupt our modern way of life as power failures put us in the dark and Mother Nature disrupts our transportation. Here is where technology, appropriately applied, can make the process of supplying auxiliary communications reasonably easy. However, if we are to be the backup system,

** 20116 Donovans Rd., Georgetown, DE 19947*
Email: <K3PFW@cq-amateur-radio.com>

dependability and reliability must be our primary design criteria, and unfortunately, across the country that ain't necessarily so.

Hams are hams, and as such they tend to try things to see if they can get them to work. That is our nature, and that is what has pushed the technology of the hobby forward. We cannot but stand in awe of what Bob Bruninga, WB4APR (SK), did in the development of APRS (Automatic Packet Reporting System). I had the privilege of being at an amateur radio conference sponsored by the Cooper Medical Center in New Jersey for his presentation of "Power for the Amateur." Wow, simple straightforward application of Ohm's Law in solving practical power problems, and creative adaptation of common things for emergency power were among the items in his presentation.

Another growing application of technology being driven by hams is the Amateur Radio Emergency Data Network (AREDN) <www.arednmesh.org>. This technology is deployed across the country by local groups serving a range of functions. Most notable is some of the coverage of the fires raging in California, and support to the Forest Service. A spinoff from this is that the Forest Service is beginning to see the value of amateur radio support, and that may have an impact on the rental fee discussions of mountaintop repeater locations.

One use of technology with which we are all familiar is the ubiquitous amateur radio repeater. They are strung across this country and around the world from 10 meters into the microwaves. I'm sure almost all of us have used one or more multiple times. Then there are the "linked repeater networks" through which you can talk across multiple machines over a wider area than a single, even well-sited one, can cover. Their popularity has created a mega industry of multiple manufacturers producing portable and mobile radios of all types, sizes, and complexity. The repeaters, the HTs and the mobile rigs have become the workhorses of disaster and emergency communication for the amateur community. This is where the questions of reliability and dependability are most often revisited.

I've had the privilege of working with the staff at the Sussex County Delaware Emergency Operations Center <https://tinyurl.com/fytheum3>, starting a few years after the first dedicated center was built back in the '80s. We are now going through our third major building and renovation phase. The Cold War Era was still very much alive when the first center was designed. It was literally built in a bunker, walls 2-feet thick, blast shields in front of doors, and no windows. The technology of the day. The communications center itself was enclosed in a Faraday cage, to prevent, they hoped, damage from an EMP (electromagnetic pulse) incident or something similar. That was the technology of the day.

The local ham club had tried for several years to be allowed to get radios inside, but was thwarted in its attempts. A major hurricane was coming up the coast and shelters were going to be opened. I was working with the ARRL Section Manager at the time trying to get hams organized for disaster service and had spoken with the county Emergency Operations Director suggesting that hams be out in the shelters, and a station be set up at the center. His reply was much the same as previous, "can't be accommodated."

"Well, how about a demonstration?" I asked. "I'll set up a station in the kitchen, and will talk to a couple of mobiles out in the county through our local repeater." The "station" was a mobile rig, power supply and a 5/8ths-wave magmount antenna on a filing cabinet. Why the kitchen? That's where the coffee was. The demonstration worked. He was amazed and said OK to the hams in the shelters.

The hurricane hits, the hams are in the shelters, and there's a question of when the people in the shelters will be allowed to leave. The County Administrator asked if there was any way he could address the populations in the shelters. Back then, since this was sort of a last-minute plan and operation, the hams were in the general population of the shelters. That is not generally the case today, when our operators usually are separated from the general population and behind locked doors! I informed the administrator that we could do that. I called the net, told them what was coming, and handed the microphone to him. (Note: do not hand a live mic to a politician to address his constituents and expect him to stay within the 10-minute ID rule!) The administrator's only comment to the director when he finished was, "Figure out how these guys can be in here permanently." We were, and still are.

So, in this Technology Special, what is the value of the previous anecdote? Ham ingenuity and simple technology (mag-mount antenna) solved a problem that everyone had thought required a more complex solution. A permanent solution for antennas took a while and we did two more storms with the "mag-mount on the filing cabinet."

As always, my intent is to get you, the readers, to think and develop your own solutions to the issues that you run into.

– 73, John, K3PFW

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For the love

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2023

Start Day (UTC) → 1 | 2 ← End Day (UTC)
Start Time (UTC) → 0000Z | 2359Z ← End Time (UTC)
Contest Name
Select Contest of weekend as chosen by N3QE

Multimode	CW	Digital
off-the-air	SSB	VHF/UHF

Jan	Feb	Mar	Apr
1 0000Z – 1 2359Z Straight Key Night	4 2300Z – 5 0300Z NA Sprint CW	4 0000Z – 5 2400Z ARRL DX SSB	1 1500Z – 2 1500Z SP Polish DX
7 1800Z – 8 2400Z ARRL RTTY Roundup	11 0000Z – 12 2400Z CQ WPX RTTY	12 0000Z – 12 0400Z NA Sprint RTTY	8 0700Z – 9 1300Z JIDX CW
14 1800Z – 15 0559Z NAQP CW	18 0000Z – 19 2400Z ARRL DX CW	18 0200Z – 20 1200Z BARTG HF RTTY	15 0900Z – 16 2359Z CQMM DX
21 1800Z – 22 0559Z NAQP SSB	24 2200Z – 26 2159Z CQ 160 SSB	25 0000Z – 26 2400Z CQ WPX SSB	22 1200Z – 23 1200Z SP DX RTTY
27 2200Z – 29 2159Z CQ 160 CW			29 1600Z – 30 2159Z Florida QSO Party

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May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6 varies – 7 varies 7QP/IN/DE/ New England QSO Parties	3 1800Z – 4 2400Z ARRL Inter. Digital	1 1400Z – 2 1400Z Marconi Memorial HF	5 1800Z – 6 0600Z NAQP CW	3 0000Z – 3 2359Z CWOps CW Open	30 – 1	4 2100Z – 6 0300Z ARRL SS CW	1 2200Z – 3 1600Z ARRL 160
13 1200Z – 14 2359Z Volta WW RTTY	10 1800Z – 12 0300Z ARRL June VHF	8 1200Z – 9 1200Z IARU HF WRTC	12 0000Z – 13 2359Z WAE CW	9 0000Z – 10 2359Z WAE SSB	7 1600Z – 8 2159Z California QSO Party	11 0000Z – 12 2359Z WAE RTTY	9 0000Z – 10 2359Z ARRL 10
18 1100Z – 21 1700Z Contest University Dayton Hamvention	17 0000Z – 18 2400Z All Asian CW	15 1800Z – 16 2100Z CQ WW VHF	19 1800Z – 20 0600Z NAQP SSB	16 varies – 17 varies WA/NJ/NH/TX QSO Parties	14 0000Z – 15 1559Z Makrothen RTTY	18 2100Z – 20 0300Z ARRL SS SSB	16 1400Z – 17 1400Z Croatian CW
27 0000Z – 28 2400Z CQ WPX CW	24 1800Z – 25 2100Z ARRL Field Day	22 – 23	26 1200Z – 27 1200Z WW Digi	23 0000Z – 24 2400Z CQ WW RTTY	21 1500Z – 22 1459Z Worked All Germany	25 0000Z – 26 2400Z CQ WW CW	23 – 24 Happy Holidays
		29 1200Z – 30 1200Z RSGB IOTA			27 0000Z – 28 2400Z CQ WW SSB		30 0000Z – 30 2359Z RAC Winter

Technology Special:

analog adventures

BY ERIC P. NICHOLS,* KL7AJ

Bridging the Gap

I have always been a fanatic about old / vintage / ancient / prehistoric electrical instruments. After our recent QSY (the physical type, not the frequency type), I "inherited" yet another huge collection of semi-vintage Hewlett-Packard test devices. It will be one of my dark winter projects to restore some of these gems to their former functionality, if not their former glory. I have some friends who are FAR more skilled at cosmetic restoration of boat anchors and such than I will ever be.

One of my recent non-HP hamfest acquisitions is this nice Heathkit RLC bridge (*Photo A*), not necessarily a precision instrument, but very useful, nonetheless. I can never resist adopting anything Heathkit.

Now a large percentage of electrical and electronic instruments incorporate some sort of *bridge* circuit. The classic *Wheatstone bridge* has countless varieties and variations, but they all perform the same basic function: Comparing the voltages between two different points in a circuit. The RLC bridge in *Photo A* is no exception in this regard. In my June 2022 Analog Adventure column, "Using Vitamin K," I presented a simple bridge circuit as well as a challenge to solve a bridge that wasn't really a bridge. Here is a nice note (in part) I got from Rick Peterson, WA6NUT:

...You mentioned that you'd like to see some solutions to the problem (finding the voltage across R3 in Figure 2*). So here's mine.*
Back in the day, it seemed like I could always analyze a circuit using Thevenin equivalents. So that's how I analyzed the bridge circuit in Figure 2*. R1 and R5 become a 750-ohm resistor from a 9-volt source, and R2 and R4 become a 1.333K-ohm resistor from an 8-volt source. Both resistors feed the 5K-ohm resistor. With 0.1411765 mA of current flow, the voltage across R3 is easily calculated to be 0.70588 volts.*
I've been retired over 25 years, so I was surprised that I could still remember how to do Thevenin equivalents!

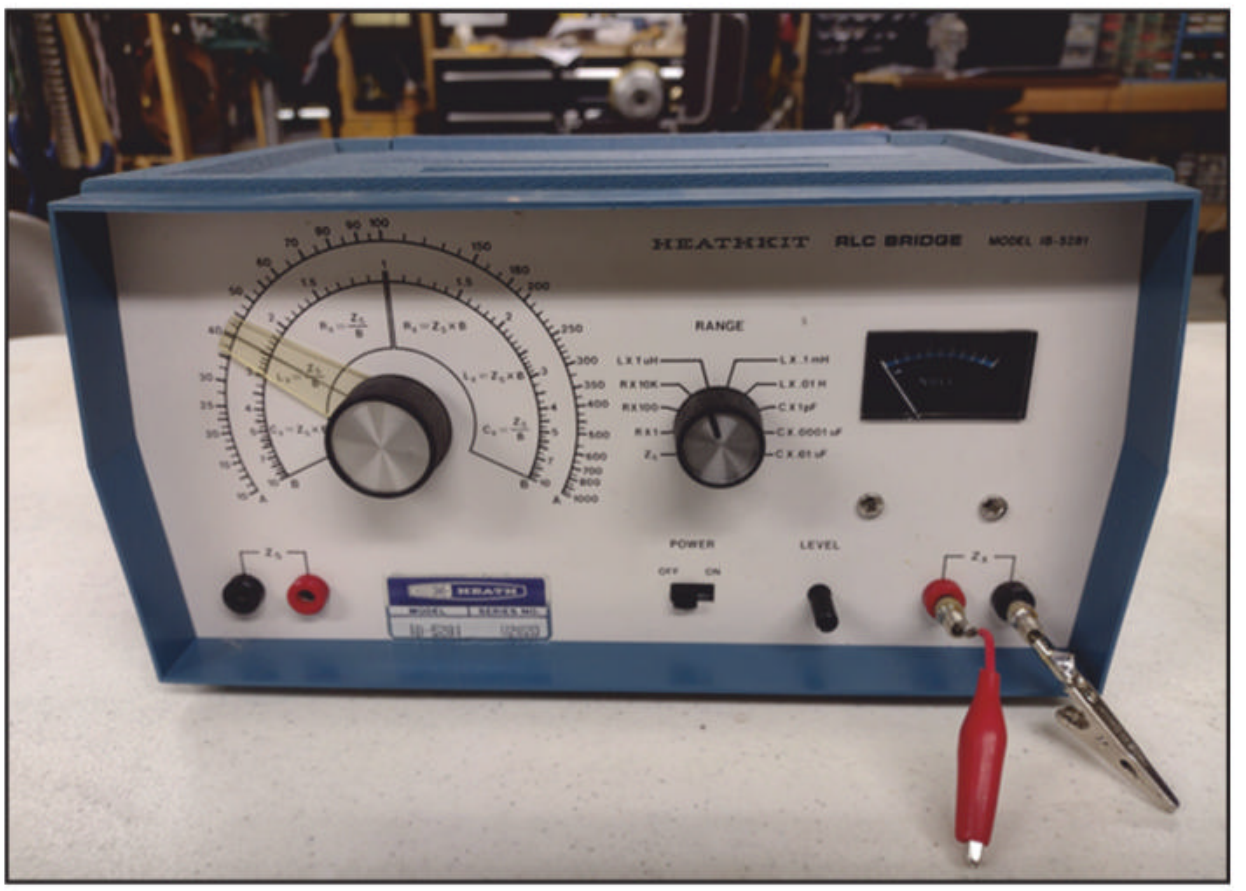

Photo A. One of Eric's most recent additions is this Heathkit RLC bridge, which he picked up at hamfest. (Photo by KL7AJ)

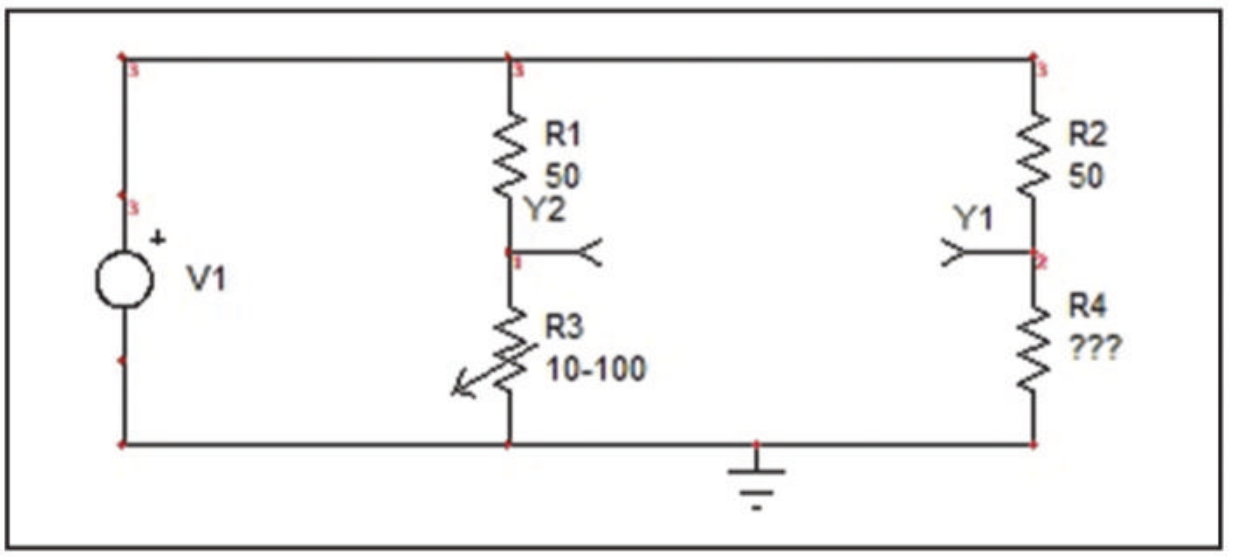

Figure 1. A simple circuit to measure radiation resistance. (Image by KL7AJ)

Thanks to Rick for the nice comments, and he indeed came up with the right answer.

Of course, as often happens, reader comments suggest ideas for subsequent Analog Adventures, and this is certainly no exception; we will need to explore Thevenin (and Norton) Equivalents in a near-future piece. This is far too rich a topic to cover in the remaining space this month.

Now if you haven't worked with a bridge before, one obvious question is, "why would I use a bridge when a simple ohmmeter will do the job?"

This is best answered by giving a common example of when a simple ohmmeter will not do the job: When we need to measure the value of a resistor that is not a resistor. We're talking about that mysterious entity known as radia-

** 138 Shenandoah Drive*
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email:
<KL7AJ@cq-amateur-radio.com>

tion resistance. You just can't stick an ohmmeter across the feedpoint of an antenna and measure radiation resistance. Nor can you measure inductance or capacitance with such a simple device, but for now we'll stick with radiation resistance because it's so interesting.

Figure 1 shows about the simplest method of measuring radiation resistance. (Note: this won't tell you anything about reactance or resonance; for that we need a more elaborate bridge). V1 is an RF generator, operating at the frequency of interest. R4 is our unknown radiation resistance. R3 is a potentiometer that covers (hopefully) the range of the anticipated radiation resistance. And finally, we need an RF voltage detector between Y1 and Y2. This can be a simple RF voltmeter, or, more elaborately, a receiver with an S-meter.

To use this bridge, connect the antenna to the R4 position, a generator as shown at the frequency of resonance of the antenna, and a detector between Y1 and Y2. Adjust R3 to get a null. When a null is achieved, R3 is the same as the radiation resistance. Of course, it's convenient if R3 has an actual calibrated dial, but if not, the value of R3 can be measured after the fact with an ohmmeter.

Pretty slick, eh? Well, I think so, but then again, I'm easily impressed.

Now, here's a challenging homework problem. If the antenna is NOT precisely at resonance, will this bridge still tell you the correct radiation resistance? Why or why not? Like many such problems, the answer can be deceptively elusive. Don't answer hastily. P.S: It's not cheating to actually build the circuit and see.

If you go back through ancient electrical engineering literature, you will find virtual libraries of complex bridge equations; this was one of the most advanced topics in the fledgling field of radio technology. And unfortunately, a lot of this ancient lore has been lost. Of course, with modern devices like really cheap and plentiful VNAs you don't have to know all the math, but you should be aware that even the most advanced such instruments are bridges at their core.

Revisiting our beloved Heathkit RLC bridge ... there were a number of similar devices available; one of the more precise (and pricey) instruments of the ilk was made by Leader. These RLC bridges are not actual RF bridges; they have internal oscillators operating at a couple of kilohertz. They are fine for determining component values at moderate frequencies, but if you work with mainly radio frequencies, you will want something like a noise bridge, at the very least, and sometimes a little something more.

Which brings us to another interesting topic. How do you accurately measure extremely low resistances, say, on the order of 0.001 ohms? You certainly can't do this with your average digital multimeter (DMM), or even an above average DMM. The answer, not too surprisingly, is another bridge, in this case a Kelvin double bridge. We'll go into the Kelvin double bridge in some detail in a future article.

Just Compensation

Aside from the bridge's ability to measure quantities that just can't be measured any other way, the bridge can make *better* measurements of quantities that *can* be measured by simpler methods. One of the inherent properties of a bridge is that it can *cancel out* certain errors. For instance, we know that many circuits can be temperature sensitive, which is not generally a good thing (unless we're specifically attempting to measure temperature). However, a bridge circuit can be used to perform *temperature compensation* in a number of interesting circuits, which we will explore in detail before too long. Notice that those digital folks don't think about these things very much.

Neutrality

Most of us hams of a certain vintage have had to deal with neutralizing RF amplifiers. Neutralization is generally *less* of an issue in solid-state amplifiers, but is not entirely non-existent. The neutralizing circuit of a vacuum tube RF amplifier is actually a bridge. It may take a bit of redrawing the schematic to recognize it as such, but it is one, nonetheless.

And More

We should close by mentioning just a few more applications of bridges in passing. One of my favorite bridges is the noise cancelling antenna box, which has become increasingly popular in recent years. Fortunately, I live in a very quiet environment, but I have built a few of these in the past, particularly for nulling out certain AM broadcast stations. Another common bridge is the Wien bridge, used in just about every true sine-wave oscillator. Hewlett-Packard's very first instrument was actually a Wien bridge, using a small incandescent lamp as a controlled current source. Needless to say, the rest is history; this was the genesis of Silicon Valley ... or rather, Vacuum Tube Valley, at the time.

One of the most interesting ... and ancient ... bridges is the Varley bridge, used by phone companies to determine the distance to a telephone line fault with a surprising level of accuracy. On a telephone line a couple of hundred miles long, the Varley bridge could narrow down a short to within three or four standard spaced telephone poles. Nowadays, time-domain-reflectometry, TDM, is used to perform such tasks.

Coming up next ... I will show you some of my restoration projects in progress ... so many boat anchors ... so little time!

Until then, keep those soldering irons hot! *– 73, Eric*

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TC-20 - 18.6 ohm
TC-22 - 21.7 ohm
TC-24 - 26.8 ohm
SM250-50 50 ohm

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Technology Special:

kit building

BY JOE EISENBERG,* K0NEB

The T41: A New Kit Building Endeavor

In the march to new technologies, amateur radio has gone from spark to tubes to transistors to ICs, followed by microprocessors and the latest technology, software defined radio, or SDR. The QRP Labs QDX digital modes transceiver is a great example of how far we have come in kits, having a pocket-sized SDR. With that leap in technology comes a tradeoff. The surface-mount components necessary to perform SDR tasks do not lend themselves to easy construction by the average kit builder.

In the Penntek TR-35 4-band CW transceiver kit, a lot of surface-mount parts are already installed as well as in the Four State QRP Group's Nouveau-75 75-meter AM transceiver. The QDX would be nearly impossible to construct at home if it wasn't for having the surface-mount parts already installed. There are still a number of through-hole parts that need to be installed in all of these kits, and the new, yet-to-be-released, T41 kit is a great example. This is a full-featured 20-watt SDR based transceiver with a color display and was designed by *CQ* Microcontrollers Editor Jack Purdum, W8TEE, and Al Peter, AC8GY. The Four State QRP Group, led by David Cripe, NMØS, is making this innovative radio available in kit form with all the surface-mount parts pre-mounted. Like my previous series of columns on updating the SB-200 amplifier kit, this kit will be deserving of more than one column devoted to it. It isn't often we hams are treated to such a high technology and feature-filled kit.

The T41 SDT (software-defined transceiver) kit is composed of seven boards assembled and installed as modules. The reason for this architecture is to add the ability to modify or upgrade each different section of the radio, including the firmware / software, without having to change a single main board. This process also breaks down the assembly process into stages and modules.

T41 SDT prototype as shown at the 2022 Dayton Hamvention.

Unlike many SDR transceivers, the T41 does not require a PC. As you can tell by this point, this kit is NOT intended as a beginner's kit or for somebody new to amateur radio. Nor will it be very inexpensive. This kit entails a lot of detailed work as well as a large number of interconnecting ribbon and RF cables to preserve the ability to make changes to the radio by modules. This radio is intended to become an "experimenter's radio," one that the end user — if so inclined — can make into a continual project. The software will be open source and there will be more than enough spare room on the CPU module for changes and additional features to be added by those familiar with coding. The T41 is based on the Teensy 4.1 processor to perform both the FPGA (field programmable gate array) and control functions of the SDT.

A groups.io page has been set up to exchange information on construction of the T41 as well as user and designer-based updates and changes and software. It is at <https://4sqrp.groups.io/g/T41>. Because of supply chain issues and ongoing development, it may take a few months for this kit to be completely available and able to be ordered from the Four State QRP webpage. Meanwhile, the creators of the T41 have a book available through Amazon that thoroughly details the design and construction and operation of this radio. The book details how the radio was developed and covers how the software was developed as well. Search on Amazon for the T41-ep book to order it. Keep in mind that there will be some changes and updates from what is in the book as improvements are made in the kit to be distributed by the Four State QRP Group.

As I work my way through the beta test building process of this kit, I will present this work in these pages to cover this exciting new kit. I'll show each module and give my hints and tips I discover along the way. The case was originally designed around using 3-D printed segments to form the case and has now been updated to using PC board mate-

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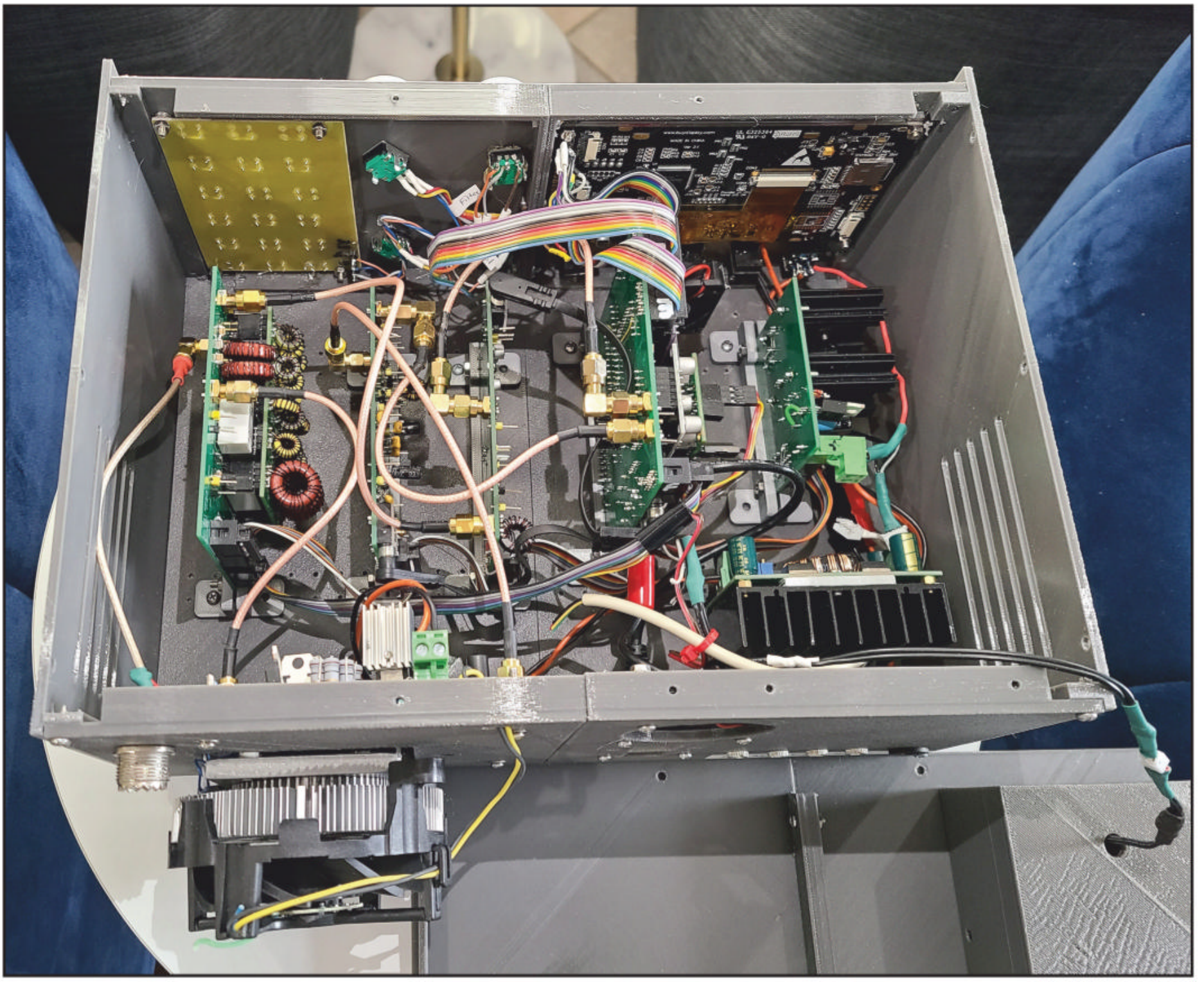

A look inside a prototype of the T41. This test version used all 3-D printed pieces to form the case. The T41 kit in progress uses PC boards to make up the case.

rial as is done on many other kits, especially many Four State kits. I'm going to start out by assembling the pushbutton matrix control panel used to perform a lot of functions without having to go through menus. Some of the photos in this month's column were taken of the original prototype T41, which utilized 3-D printed case parts. I will show the newer PCB based case parts as I assemble the kit in future columns.

Getting Started

The first board I assembled is the switch matrix board. This board holds 18 pushbuttons and is used to select most often used functions like bands, etc., quickly without using a menu system. This is probably the easiest board to assemble, but I'll see as I progress through the kit. I put them in a row at a time to minimize the chances of any getting put out of position while soldering. Each row of three buttons totals 12 connections to solder. The main thing I noticed is that you need to ensure that the buttons are inserted fully and flat against the board to ensure the plastic stems all face perpendicular, making sure the supplied

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behind the bylines...

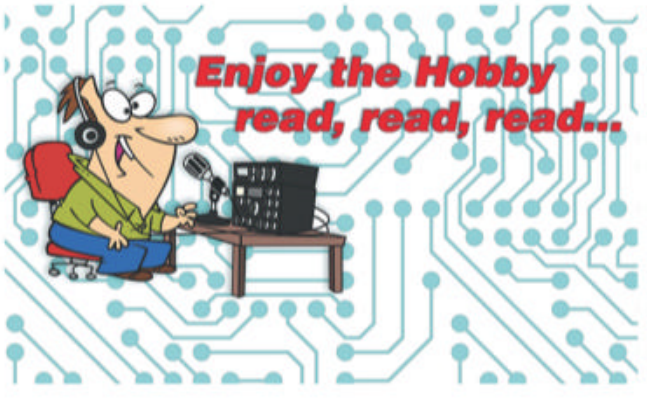
... a little bit about some of the authors whose articles appear in this issue.

Pete Varounis, NL7XM ("Hams Helping Hams," p. 8), is a longtime director of the Quarter Century Wireless Association (QCWA) and works tirelessly to spread the word about the activities of its chapters and members (such as by writing this article!). He is also a callsign historian with Callbooks going back to the earliest days of amateur licensing.

Dennis Lazar, W4DNN ("Back on the Air After Hurricane Ian Destroyed My Antennas," p. 10), is a past QRP Editor of *CQ* and ongoing contributor. A retired physician specializing in pain management, Dennis is (obviously) a QRP enthusiast and has been writing for amateur radio magazines since the late 1960s. He lives in Port Charlotte, Florida, with his wife, Ruthie, K4KLQ.

Bob Hensey, K4VBM ("Do You Have Blinders On?" p. 16), is a digital modes enthusiast who also enjoys chasing DX (215 countries confirmed at last count) and special event stations. He's also been a special event station operator and Parks on the Air activator.

Dan Swenson, KBØVKS ("Build Your Own Low-Voltage Transformer," p. 18), says he grew up on a farm, miles away from his radio mentor and from a public library, so much of his early radio knowledge was self-taught. One thing he didn't have, and didn't have the knowledge to build for himself, was a low-voltage AC power source. This article is intended to make sure others don't share that problem!



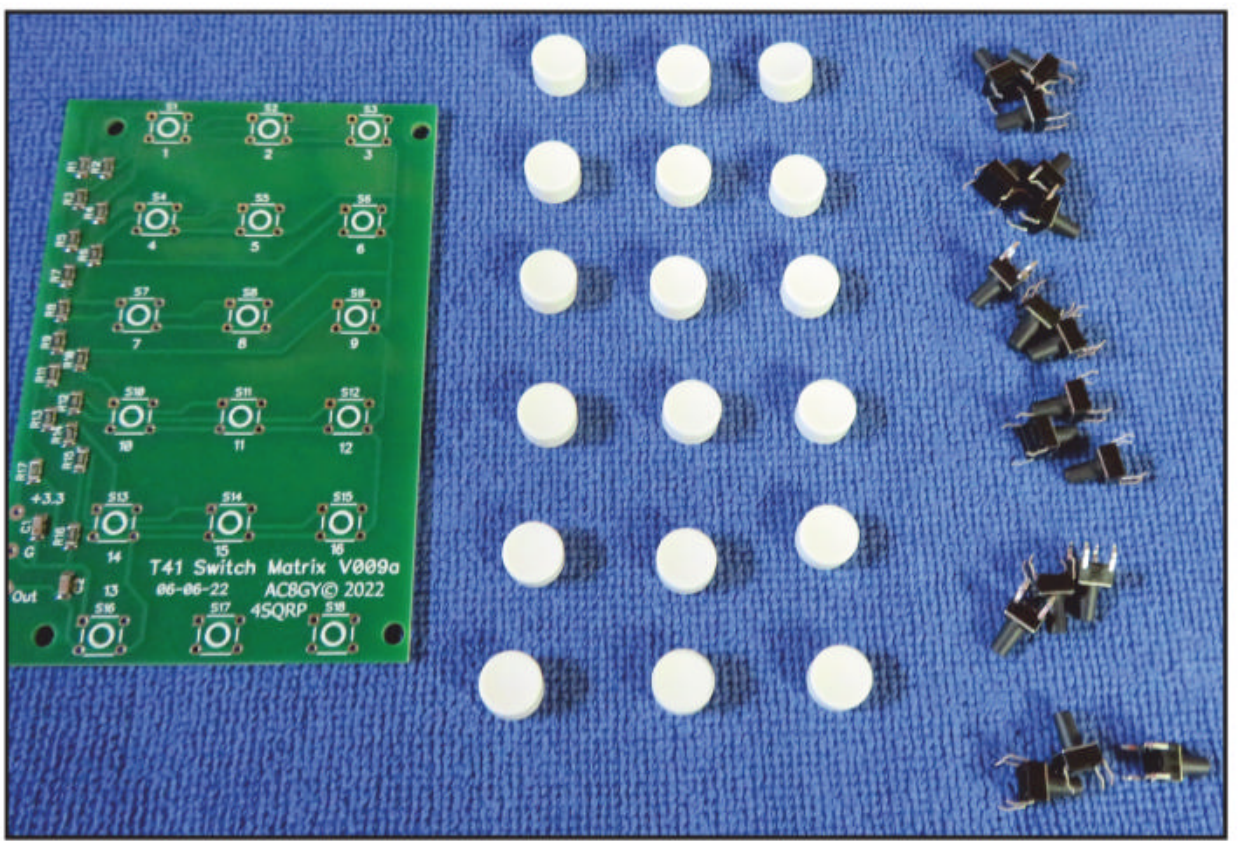
plastic button caps then can align with the holes in the front panel. As with all the other boards, the surface-mount components are already mounted.

Looking Ahead

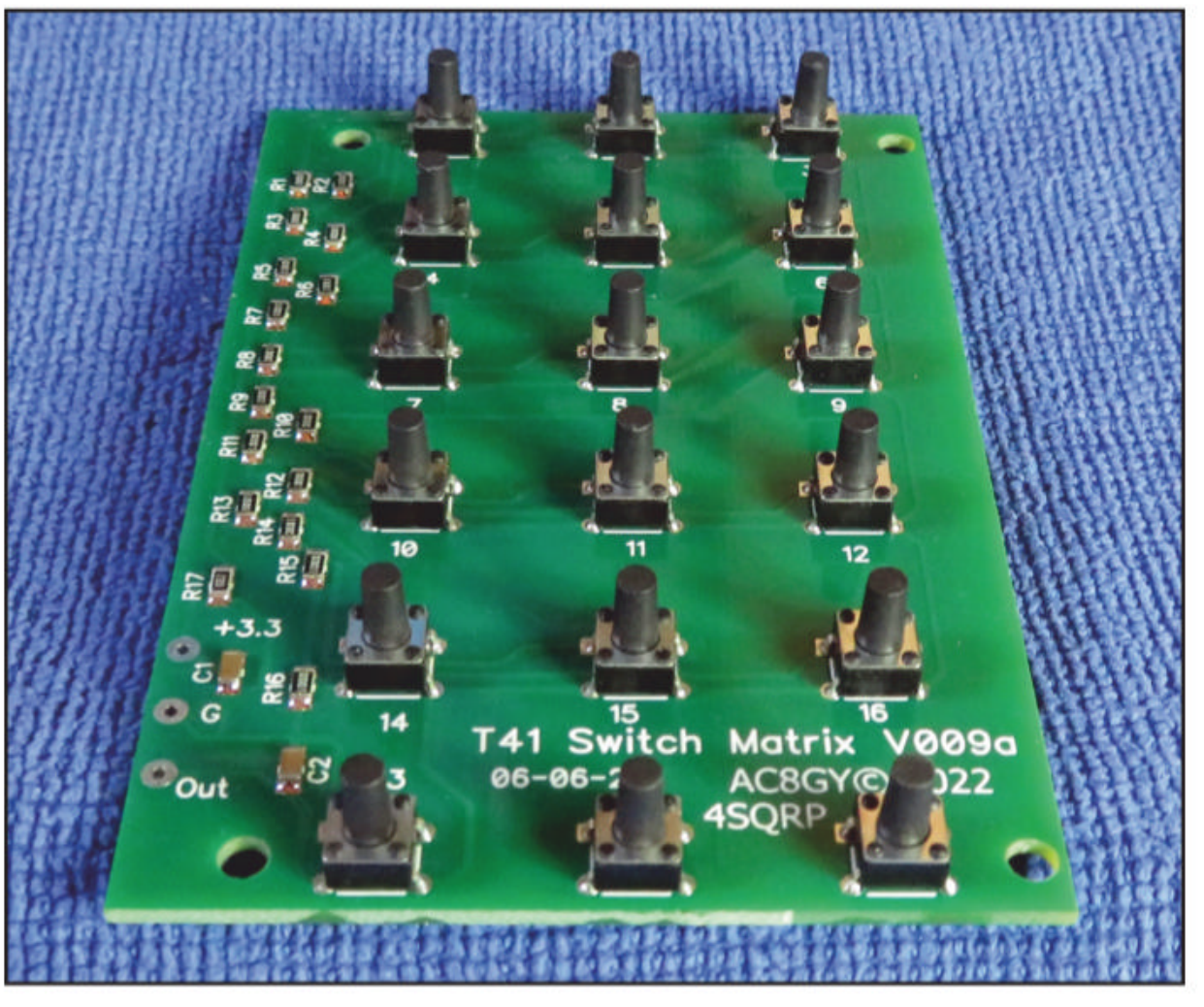
The next board I'll begin assembling is the filter board. This one will take some time to assemble as there are many toroids to wind. I'll cover that in an upcoming column. Just be patient and follow the directions as you wind each one. The website for this kit is <www.4sqrp.com/T41main.php>. Be sure to check that web page for information regarding kit development progress and availability. The price and availability shown are tentative, and supply issues and parts availability will impact the final cost.

I look forward to seeing everyone at the upcoming Orlando Hamcation and many other hamfests as we move into 2023!

– Until next time, 73 de KØNEB



Parts and board for the front panel switch matrix.



Finished switch matrix board ready for placement on the front panel.

Technology Special:

qrp: low-power communications

BY R. SCOTT ROUGHT,* KA8SMA

Fishing for a Portable QRP Antenna

Photo A. Materials for building a portable Inverted Delta Loop.

In the October column, I highlighted my 2022 Parks on the Air (POTA) Plaque Event adventure. During the 48-hour event, I participated in the Rover category (the art of "rapid deployment"), activating 43 entities (designated parks or other locations) and made over 500 contacts. Aside from having some fun, I wanted to find out how a well-equipped QRP station would compete against portable / mobile stations likely operating with more power. This month, I share how I fared against other rovers, highlight a couple of suggestions I made to the POTA program for future Plaque Events, and the construction of a portable antenna to give my pipsqueak QRP signal a boost that resulted in an unexpected twist.

In mid-August, I received the results for the POTA Rover category. I placed fifth with 43 entities to my credit. Fourth place activated 49 entities, third and second place both activated 54 and the first-place entrant activated 65 entities within the 48-hour period of the contest. Activating 65 different entities in 48 hours seems a bit mind-boggling; however, under POTA rules it is possible to claim credit for more than one entity if they have overlapping boundaries. For example, if a station is set up along a designated historic trail in a state park, and the state park is inside the boundaries of a national forest, this single mobilization counts as three entities. While most locations are counted as a single entity, I have seen claims of 10 or more entities from a single location. Since it is unrealistic to travel to and make 10 contacts (10 contacts need to be made from an entity for it to be considered "activated") from 65 different locations within 48 hours, it can be concluded that the top finishers activated locations that counted as multiple entities. Although I physically visited 39 locations, I had two "two-fers" (two entities from one location) and one "three-fer" which counted toward my total of 43 entities.

In my opinion, the Rover category should be about practicing the art of rapid deployment and physically activating as many entities (single locations) as possible rather than identifying and activating those locations that offer multiple credits. Since many parts of the country do not have locations that count as multiple entities, I suggested to POTA's Plaque Event Committee that for this event, each location activated be counted as one entity regardless of whether it qualifies for multiple entities. My suggestion may receive a lot of reader mail (good or bad); however, I believe more hams would partake in the Rover category, meaning more parks on the air during this event, if everyone knew they were on the same playing field. I also suggested a QRP category be considered as is done in most contests. I received a response from POTA indicating

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

my suggestions had been received and would be reviewed by the Plaque Event Committee in upcoming months. I will provide an update if I learn of any changes.

Whether or not my suggestions are taken in earnest, this event was a lot of fun and I am already making plans for next year's Rover adventure. Most importantly, I proved to myself that QRP power (5-watts SSB) and a simple end-fed antenna can get the job done under a rapid deployment scenario and does well against others using much more power.

A Better Portable Antenna?

POTA's Plaque Event started me thinking about portable antenna improvements for my QRP outings. I wanted to have something in my arsenal other than an inverted-V dipole and an end-fed half-wave (EFHW) antenna that could be set up quickly, did not need to rely on trees or other tall objects for support, and could fit inside a large go bag when disassembled. Most importantly, it had to be lightweight so it could be mounted in a ground tripod, clamped to the end of a picnic table, or sit inside a mast pounded into the ground.

Initially I thought about building a Moxon antenna for 20 meters. The Moxon is a rectangular shaped two-element wire beam with folded elements (a driven element and reflector), making it approximately 70% the length of a standard Yagi. I planned on using collapsible fishing rods for the antenna's skeleton since they could be broken down to 2-foot lengths and could support 22-gauge insulated wire for the elements with no stress on the rods. After mulling over this antenna a little more and thinking through each step for setup and takedown, I decided the Moxon was more than I wanted to deal with for a portable antenna and abandoned this idea.

My second thought was an Inverted Delta Loop. This antenna looks like an inverted triangle and is supported by two legs that form the letter "V" at its base. Delta loops are generally quiet (low noise) on receive with a bi-directional radiation pattern that is broadside to the antenna (radiation pattern is through the center of the "V"). These antennas have better gain (claimed to be about 2 dB) than a dipole and are a full wavelength, making their size more attractive for portable use on the higher HF bands (10-20 meters) than the lower ones. I should note the Delta Loop is a great antenna for use on the lower HF bands at your home QTH but you will need some tall trees or structures to support the configuration.

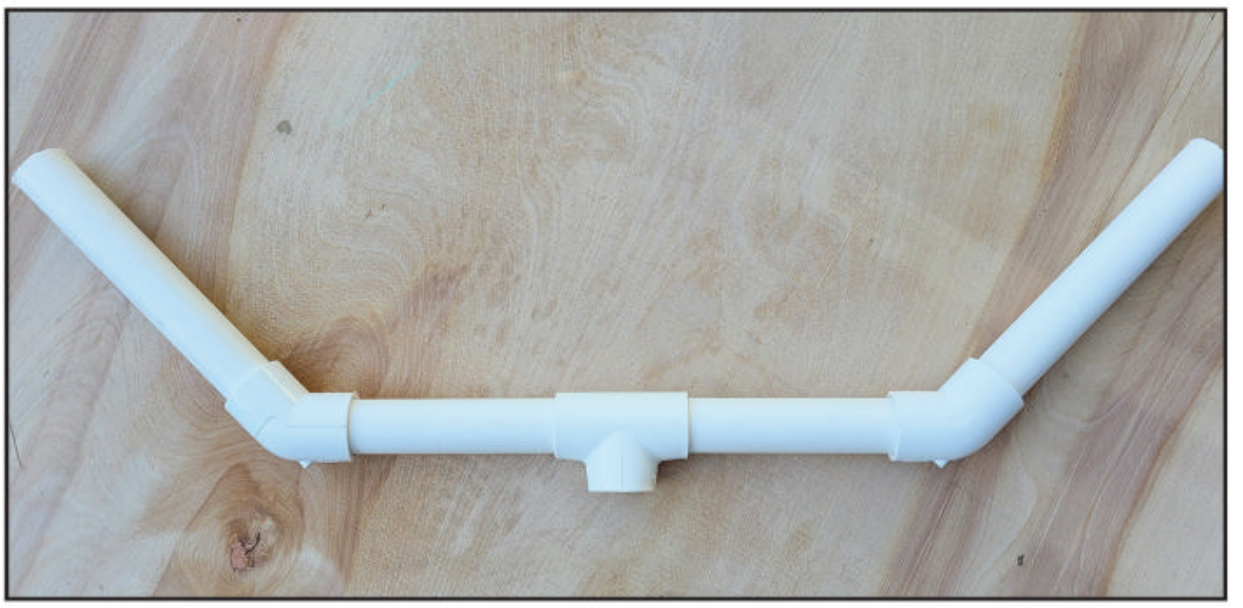


Photo B. The assembled boom.

Photo C. Rod Handles – note the thread has been removed from the handle on the bottom rod.

Like the Moxon antenna, I envisioned using collapsible fishing rods for the two legs that support the wire loop. My design incorporated a boom constructed of 1-inch diameter schedule 40 PVC pipe, one T-connector, and two 45° elbows. Other items needed for the antenna were two collapsible fishing rods, 22-gauge wire, zip ties (for fastening the wire to the legs) and a 10-foot-long piece of 1-inch diameter PVC pipe to raise the Delta Loop above the ground (*Photo A*).

Construction

The Delta Loop is a quick build. Measuring and cutting the wire for the loop, assembling the boom, and erecting the antenna took less than an hour. I used the formula *1005/frequency (MHz)* to determine the length of the wire loop. Since I was designing the antenna for use primarily on 20 meters, I chose a frequency of 14.2 MHz for calculating the length of the wire, which equated to 70.8 feet.

The boom serves as the base of the antenna supporting its legs (collapsible fishing rods) and mast and is the point where the feedline attaches to the wire loop. I used a hacksaw to cut two 6-inch and two 8-inch lengths of PVC pipe and then constructed the boom with a T-connector and two 45° elbows. The two 6-inch lengths of pipe slip into each side of the T-connector (forming the base of the boom) and the 8-inch pieces of PVC rest inside each 45° elbow for supporting the fishing rods (*Photo B*). After piecing the boom together, I realized it would be stouter if I cemented all the pieces together to form a single unit (about 18 inches in length) and prevent the connections from twisting or working loose.

I purchased two telescopic fishing rods (manufactured by Goture) from Amazon.com (also available from other online retailers). The rods are constructed from bamboo and are rein-

forced with carbon fiber for added strength. They have also been coated with a lacquer or similar finish for protection against the elements. Each rod has 13 telescoping sections and when collapsed is just over 2 feet in length. When fully extended, each rod is 23 feet long and weighs just 10 ounces. Like my SotaBeam mast, each section of the rod is locked in place by twisting each section after being extended. The rod is collapsed by untwisting each section. The rod handles are beefy and are finished with multiple layers of thread. Fitting each handle inside the 8-inch piece of 1-inch diameter PVC required removing the thread from each handle with a razor blade (*Photo C*) and wrapping a few layers of electrical tape around the handle to create a snug fit.

Zip ties were used to secure the wire to each fishing rod and the boom. I started the wire at the center of the T-connector (bottom of the antenna) and worked in a clockwise manner, strapping the wire to the boom then along the fishing rod (extended) until I reached the end of the first rod. At that point I started the other end of the wire at the T-connector and worked in the opposite direction (counter-clockwise), fastening it to the boom and the rod in the same manner as the other side. When I finished securing the wire to the tip of the second rod, both tips were bent inward (like they had a fish on the line). It is important to note that I extended only 12 of the rod's 13 sections and did not extend that last section as this section appeared too flimsy (in my opinion) and may break during windy conditions.

I chose to feed the antenna with 450-ohm window line in concert with an antenna tuner (equipped with a balun) at the transceiver so I could use it as a multiband HF antenna for 10-20 meters. The antenna can also be fed directly with 50-ohm coax; however, a 4:1 balun is recommended at the feed point. To allow for quick setup and takedown in the field, I used banana plug connectors on the ends of the wire loop and window line. If using coax, an SO-239 chassis connector soldered to the ends of the wire loop and attached to the boom can be used with a PL-259 connector (coaxial end) for quick assembly and disassembly.

Firing Up the Monster

My initial test of the Inverted Delta Loop was in my front yard (*Photo D*). I attached a 10-foot long, 1-inch diameter PVC pipe into the bottom of the boom (T-connector) and slipped the PVC pipe into a 4-foot-long section of

Photo D. Initial testing in the front yard. Look closely and you will see the wire stretching across the top.

Photo E. Winter home for the "V" – KA8SMA calling 3YØJ … do you copy?

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1.5-inch diameter electrical conduit that I pounded partially into the ground. This made the base of the antenna stand approximately 10 feet above ground with the top of the antenna just over 30 feet. Based on its size and shape, I call it the "V".

Initial tests identified low noise on receive (as expected) and tune-up on 10, 12, 15, 17, and 20 meters was a cinch with my MFJ-971 portable antenna tuner. My first contact (SSB) was a POTA station in Georgia who gave me a true 57 signal report. My second contact was with a station in Texas who provided a 55-signal report. Rotating the "V" during my QSO with the Texan identified some directionality and my signal peaked at 58 on his S-meter when I gave the antenna a little more twist in his direction. The directionality of this antenna was a bit surprising (to me) considering its low height.

An Unexpected Twist

After fiddling with the "V" in my front yard for nearly a week, I was so impressed with its performance that I decided to install it in my roof mounted tripod (*Photo E*) to further evaluate its performance and find out if it could survive a northern Michigan winter. Since the antenna is a quick build, I decided I would build another one in the spring for portable use. I think it will work great when I am out hunting POTA, but it probably won't be fast enough to deploy for Roving during the next Plaque Event.

To prepare the "V" for its new home, I removed the wire loop and spray painted the PVC boom and fishing rods to provide protection against ultraviolet radiation and super glued each telescopic section in place so they would not collapse during storms, high winds, etc. To date the antenna has survived a few windy nights with wind gusts of 30-40 miles per hour and a couple of heavy rain events. The true test will come after it has battled harsh winter storms. If it is as durable as I believe, this antenna may be around awhile. I will provide periodic welfare reports to keep interested readers updated.

Since mounting it atop the roof, I have had several solid contacts and it is very bi-directional. The boom of the antenna currently sits at 36 feet with the top of the "V" at approximately 55 feet. I have not yet had a chance to truly test its DX performance, but I have set a goal to work 3YØJ (Bouvet Island DXpedition) in January with this antenna (QRP, of course). With a little help from Solar Cycle 25, this may be doable!

– Until February, 73

Holiday Gift Ideas for the Hams in Your Life...

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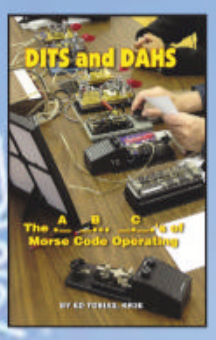
by Ed Tobias, KR3E



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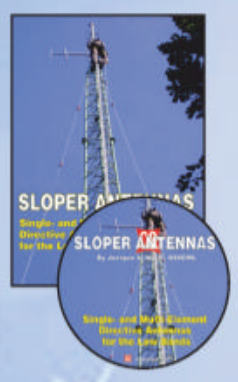

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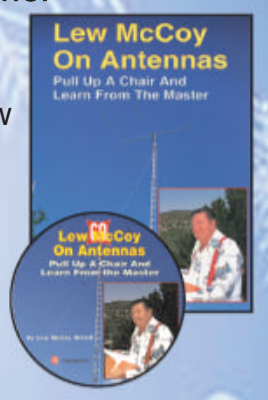

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Technology Special:

antennas

BY KENT BRITAIN, WA5VJB

Slot Antennas

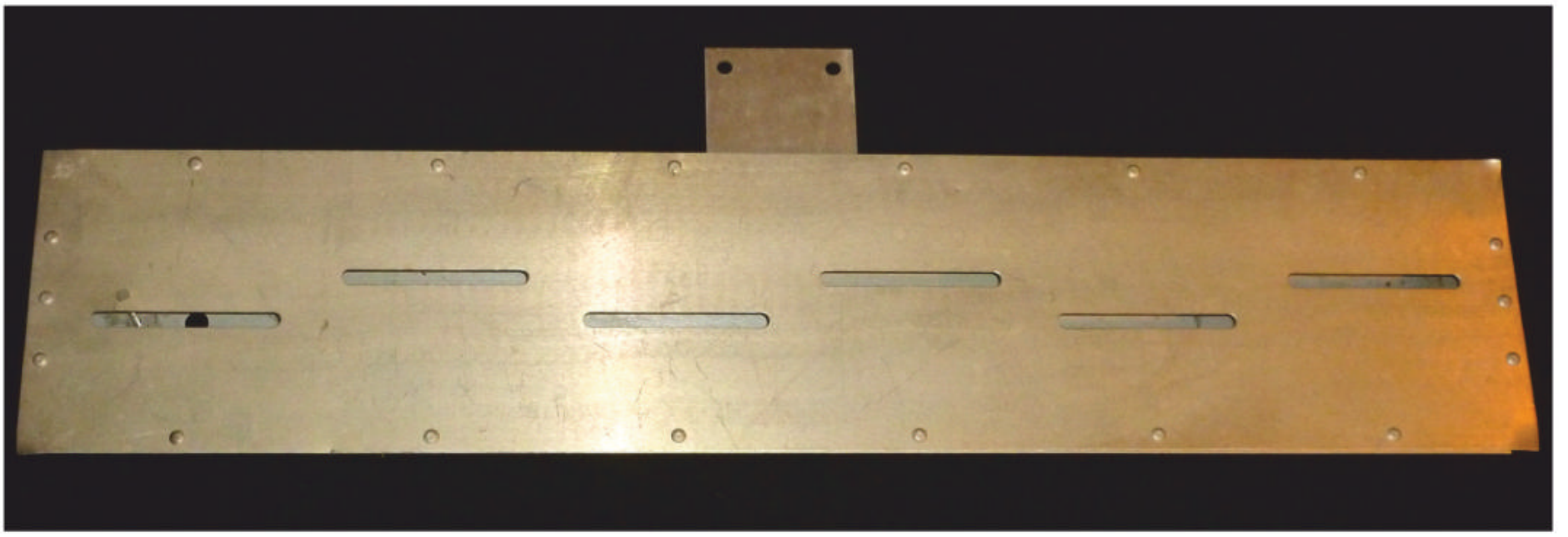

Photo A. 2.4-GHz slot antenna

In many ways a slot antenna is the exact opposite of what most hams think of as an antenna. With a dipole, you have a half wave of metal surrounded by a lot of insulator. With a slot, you have a half wave of insulator surrounded by a lot of metal!

And even polarization is the opposite. Generally speaking, a vertical antenna puts out a vertically polarized radio wave. A horizontal slot also puts out a vertically polarized radio wave.

In *Photo A*, we have a 2.4-GHz slot antenna. As shown, it is vertically polarized and has a pattern similar to a 6-element collinear antenna.

In *Photos B1* and *B2*, we have crossed slots which behave much like crossed dipoles or a turnstile antenna. On the back side you can see the two PCB traces that excite the slots. Note that one trace is a bit longer, a quarter wave longer to be precise. This gives the 90° phase shift needed for the slots to put out a circularly polarized wave.

With a center-fed dipole, the impedance is 72 ohms. (To defend myself before getting a full mailbox, yes, 72 ohms when the wire is very thin and the antenna is in free space.) Now, as many HF antenna builders have learned in recent years, that 72 ohms is when the dipole is fed in the middle, but if you slide the feed off to the side a bit, the impedance goes up, and up, and up, approaching infinite impedance as you reach one end of that dipole. Well, a similar situation occurs with slot antennas. But again, in the reverse. If that line feeding the slot is near one end, the impedance is very low. The PCB versions can be fed in the middle with a 50-ohm trace, but the length sticking out the other side can be important.

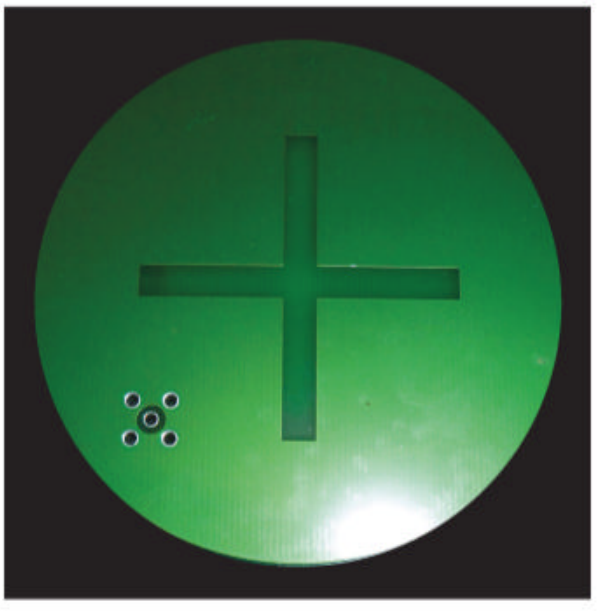

Photo B1. Circularly polarized PCB slot antenna, front view

Photo B2. Circularly polarized slot antenna, rear view

Unintentional Slot Antennas

In *Photo C*, we show the back of a typical desktop computer. Dozens of slot antennas back there. Some years back, I would do an EMI demonstration with a computer case. Inside the case I had a broadband antenna to which I would connect the tracking generator port from a spectrum analyzer. Then with another broadband antenna connected to the spectrum analyzer's RF port, I would move it around the outside of the computer. Wow, some of those slots would become amazingly efficient antennas. If the computer just happened to have a clock oscillator on that frequency, it could badly flunk FCC testing.

Now you understand why commercial RF modules have so many screws. In *Photo D*, you can see a module from a mobile phone cell site. Lots of screws ensure that any slots are too high in fre-

Email: <wa5vjb@cq-amateur-radio.com>

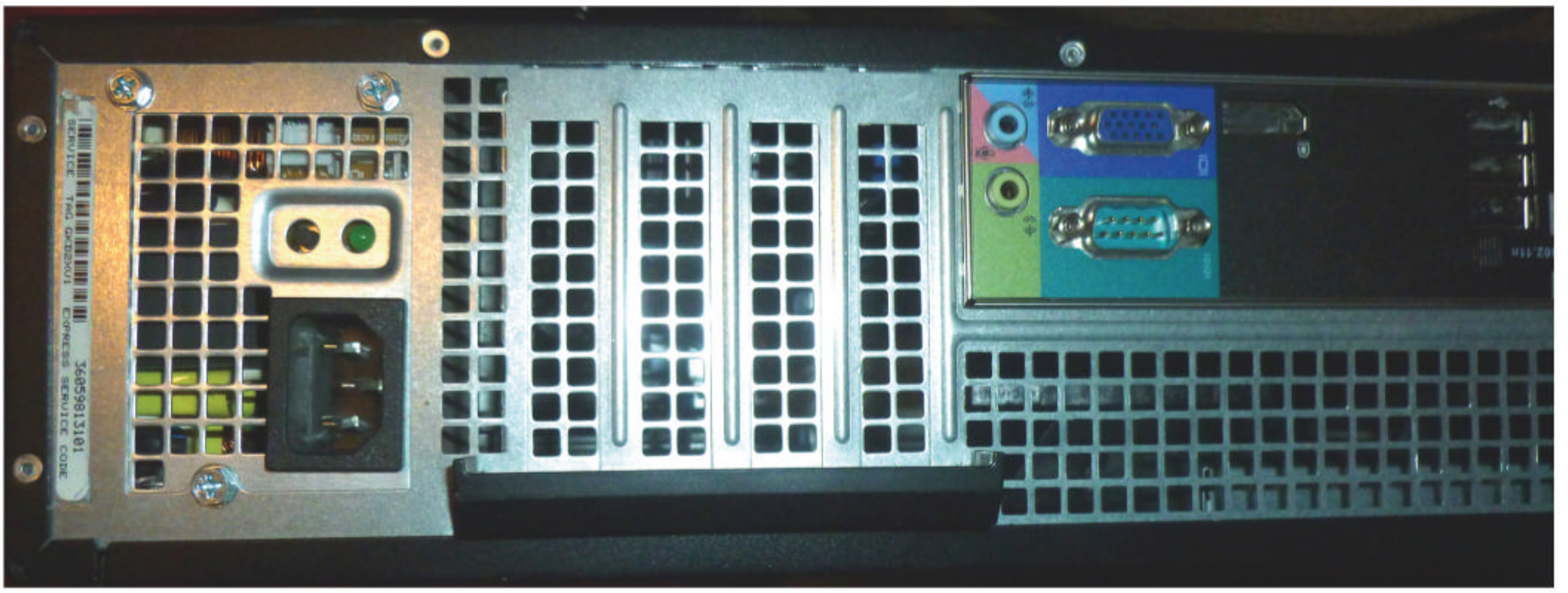

Photo C. Lots of slot antennas

quency for any oscillators inside the box to think it's an antenna.

Slot or Dish

Let's see if I can keep this part fairly simple since there are tons of material as possible feeds for a dish antenna. But in simple terms, it is hard to get the aperture efficiency to a prime focus dish better than 40% or so. The feed tends to send more of the signal into the center of the dish. Also, the center of the dish is much closer to the feed and the edge of the dish. Again, the center of the dish is RF hot and the edges of the dish barely used. In *Photo E*, you see the slot array from an aircraft nose radar. Lots of evenly-spaced slots with a low-loss waveguide power divider on the back of the antenna. These antennas are evenly distributing the RF energy over most of the surface of this antenna. Aperture efficiencies approaching 90% are possible. Oh, do the aerodynamic guys like these! Now that nose cone of their supersonic airplane can have about half the aerodynamic drag of a nose cone hiding a dish. Again, trying to get ahead of all those emails, yes, an offset feed dish like the one in *Photo F* can also approach 90% aperture efficiency, but let's see you squeeze the dish and feed in *Photo F* into the nose of an F-16.

Quack!

Not sure exactly what we will talk about next time, but the subject of rubber duck antennas keeps coming up. I really have trouble thinking of a few inches of rubber being a proper antenna, but it may be more like "how to make the best of a bad situation."

If you have any antenna question or a possible column topic, you can use snail mail to my QRZ.COM address. For email use <wa5vjb@cq-amateur-radio.com>. For many additional antenna projects have a look at <www.wa5vjb.com>.

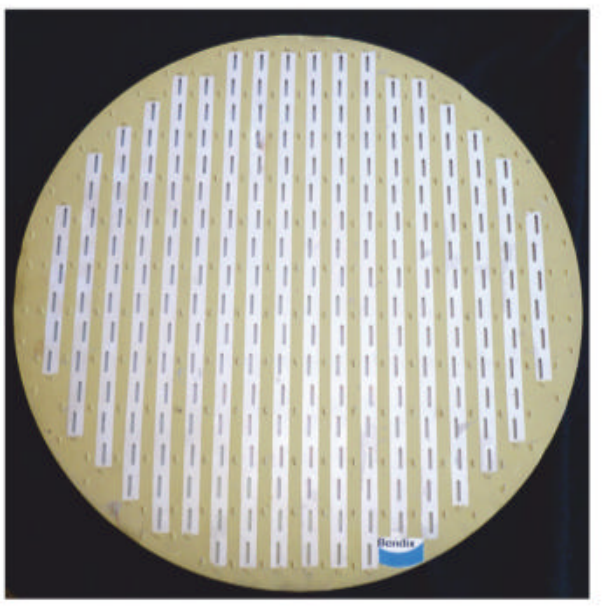

Photo E. Aircraft radar slot array

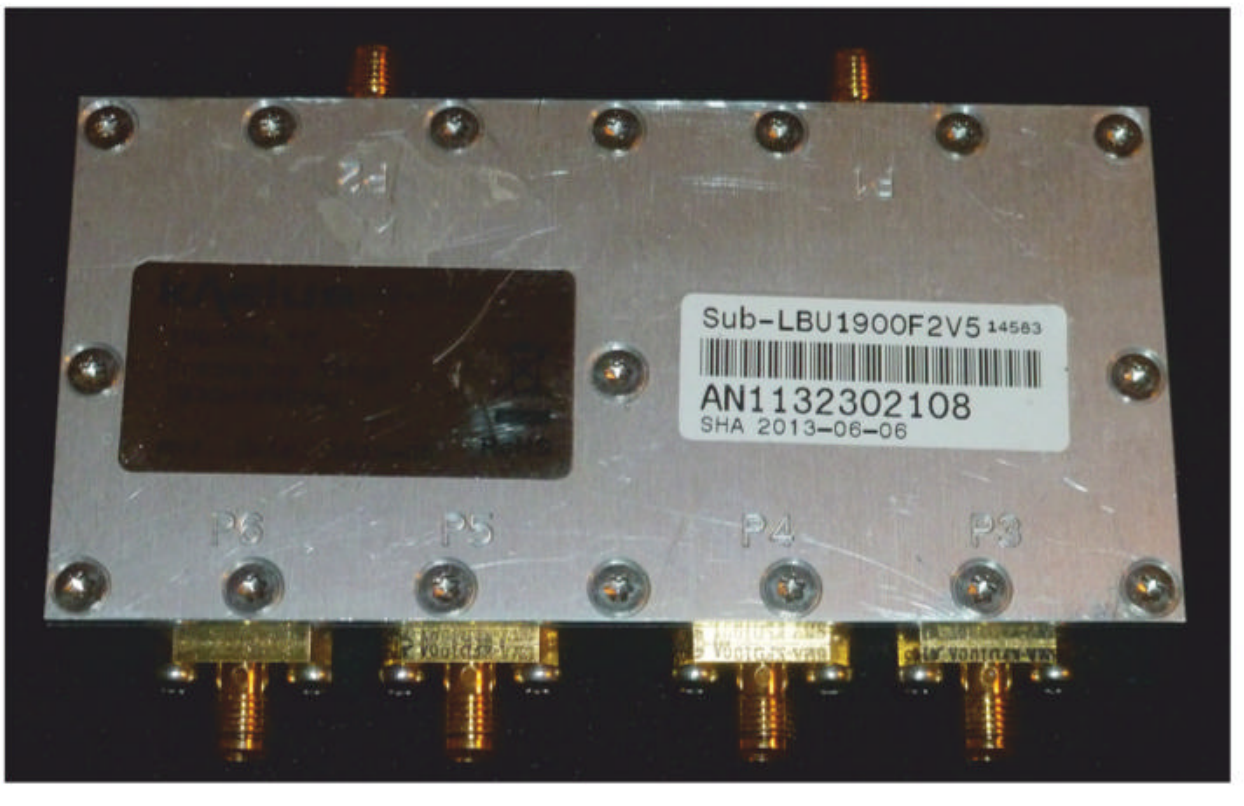

Photo D. Closely spaced screws break up possible accidental slots

Photo F. Offset feed dish

Technology Special:

vhf plus

BY TRENT FLEMING,* N4DTF

A VHFer's Holiday Gift List

Plus … An Antenna Project for 1296 MHz

The year draws to a close, and I would like to wish all of you a very Merry Christmas, Happy Hanukkah, Happy New Year's, and any other holidays you observe. My best to you for the coming year as well. It continues to be my pleasure to curate this column. Please continue to participate through sending activity reports, project updates, comments, or critiques on my columns, and suggestions for future columns.

This month is one of my favorite issues, the Technology Special issue. So, I thought I'd offer some comments (and maybe some Christmas wishlist suggestions for you) about handy tools or components that I have found useful. After a particularly helpful presentation at the Huntsville Hamfest in 2021, I resolved to focus on learning to use my NanoVNA in as many situations as possible. This includes standing wave ratio (SWR) measurements, calculations involving failures in cabling, and testing antennas that you are designing and modeling. I also found that the Pelican 1040 Microcase is a good fit for my NanoVNA and accessories.

My Fluke 17B+ digital multimeter is never far from my hand when I'm working on a project. The ability to measure a wide range of voltages, plus capacitance, resistance, and even diode quality means I can get a lot done with a single device. At the same time, my old Radio Shack analog VOM remains handy, as a swinging needle sometimes provides a better indication of activity than digits on a screen. Just a couple of things to remind you that the right tool can go a long way in making a project or repair job easier.

In August 2022, I wrote about the bands above 1 GHz, particularly mentioning that many newer rigs, including the very popular IC-9700, include 1.2 GHz as a standard feature. The 1.2-GHz band (or 23-centimeter band if you prefer) is a great starting point to learn about the microwave portion of the spectrum. One major advantage is that antenna size goes down as frequency goes up ... so antenna construction and placement are easier than ever. I reached out to "Mr. Gigahertz" himself, Paul Wade, W1GHZ, for permission to reprint his article on building a simple 1296-MHz antenna to get you started (see sidebar).

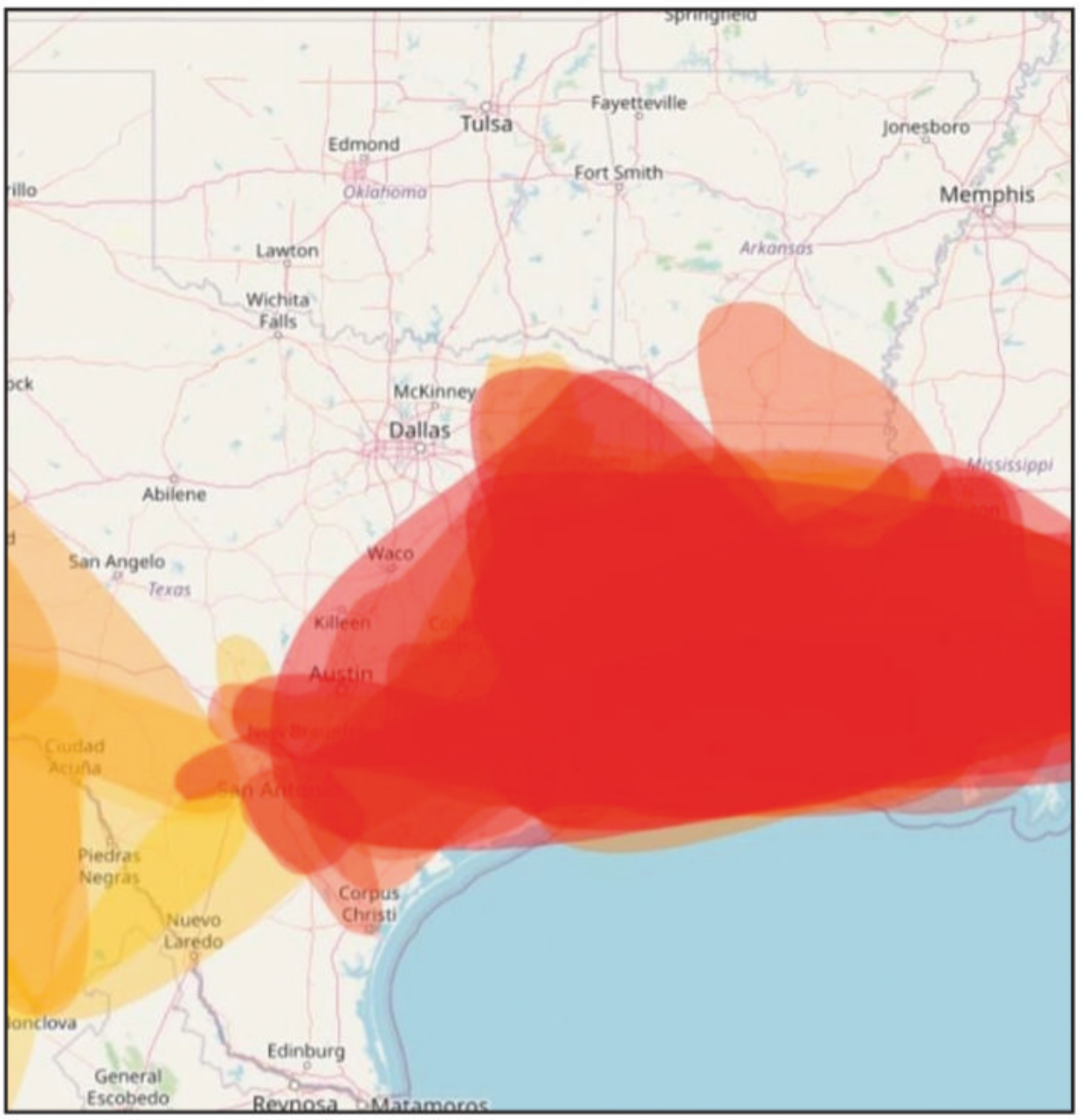

Photo A. A tropospheric duct opened over the Gulf states in early October, producing excellent propagation on 2 meters.

Paul cautions that, "you should warn them that it will take a better antenna and good coax to work DX." However, this will certainly get you started. As with any of the higher bands, you should also find a buddy to work with, because you don't want to get a new band on the air and then have no one to contact. Please let me know if you try this project, and how it worked for you. My thanks to W1GHZ for his willingness to share his ideas and expertise with us.

On the Air

This month, we do have some activity reports for 6 meters and higher bands, including trans-equatorial propagation (TEP) openings, and some Gulf Coast tropospheric ducting.

2-Meter Tropo

On Saturday morning, October 15th, our friend David Thier, WA3GWK, was operating in EM60 and made the fol-

* <n4dtf@cq-amateur-radio.com>

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lowing contacts (*Photo A*): KB5WB (EM02), KC5AD (EM40), K5LLL (EM10), WD5DJT (EM12), K5HCS (EM20), W5FLY (EL49), WB5HIL (EM43), W5EME (EM32), K5CNU (EM30).

From EM82, Greg, N3BYR, reports the following activity that same morning:

Bands and path were great to the south this morning from EM82. Managed several daily contacts into Florida with great enhancement (most were 20 over that are typically at 5x3ish on 432 and 222 MHz). Also managed 303 miles on SSB on 1296.100 MHz this morning, also on a small 14-element looper Yagi running on 15 watts.
Finally, beginning Monday, October 10th, we saw several days of TEP activity from the Gulf Coast and the Caribbean into South America. A few stations across the mid-South, including Steve, W4DTA, linked to the TEP via tropo or Sporadic-E (E_s) and also worked South American stations, including HC5VF on 50.115-MHz single-sideband (SSB).

As always, I welcome your reports of operating activity That's it for this month. See you next year!

Quick and Cheap Omni Antenna for 1296 MHz

BY PAUL WADE,* W1GHZ

Recently, I was browsing through the latest *IEEE Antennas and Propagation* magazine, in which they publish papers without enough divergences, curls, or triple integrals for the regular *Transactions*. In one article on crossed dipole antennas[1], I came across a sketch of an antenna simple enough that it could be easily built. Details were limited, since it was taken from another paper[2] in a journal to which I don't have access, but I could build one and try it. I left the magazine on my bench, open to that page, and it occasionally re-emerged as a reminder until I finally decided to build one.

The antenna, shown in the sketch in *Figure 1*, has two crossed dipoles of unequal length. The longer one, shown in blue, is specified as ~0.527-wavelength long, while the shorter one, shown in red, is ~0.42-wavelength long. They are fed by coax, with a 1⁄4-wavelength balun shown in green. The idea is that the longer dipole has an inductive reactance, while the shorter one has a capacitive reactance to compensate. The antenna is claimed to radiate circular polarization in the boresight direction.

The sketch in the article has dimensions for 1.7 GHz and uses 0.086-inch semi-rigid coax. I scaled the dimensions to 1296 MHz and found a piece of 0.141-inch semi-rigid coax with an SMA connector on one end. The wire size was the first spool I found on the workbench, and the whole thing was soldered together in a few minutes, resulting in the precision assembly shown in *Figure 2*.

I then plugged the SMA connector into my miniVNA Tiny <miniradiosolutions.com> to sweep the return loss. With the initial dimensions, best return loss was at 1.14 GHz, so I pruned the dipoles proportionally to move it up to 1296 MHz. As can be seen in *Figure 3*, I trimmed a bit too much, so it ended up tuned to 1340 MHz, but the return loss is still a very good 22 dB at 1296 MHz. I couldn't find my tool for putting stuff back on, so I figured this is good enough. The dimensions for 1296-MHz are 55 millimeters for each side of the long dipole, 45 millimeters for each side of the short dipole, and 57.5 millimeters for the length of the balun — but leave a little extra on the dipoles for trimming.

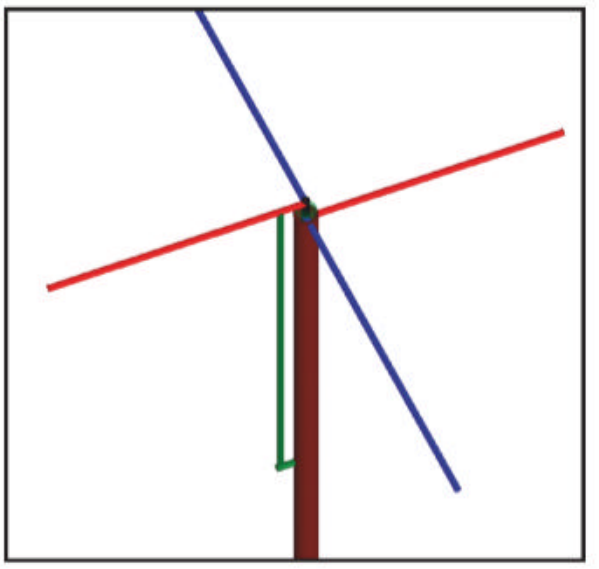

Figure 1. Crossed Dipole Antenna

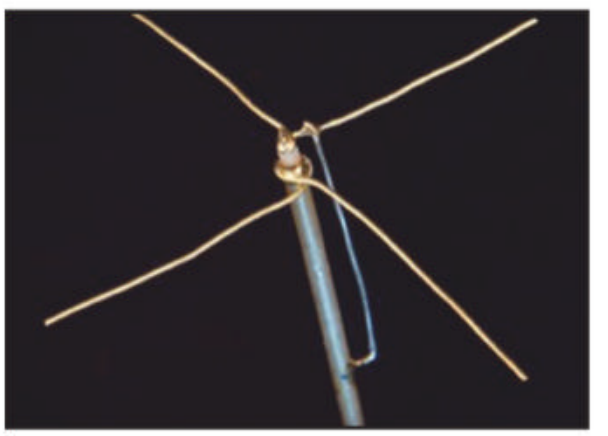

Figure 2. 1296 MHz by W1GHZ

So how does it work? A quick test with both dipoles horizontal shows that the radiation favors the longer dipole, and the polarization is mostly linear and horizontal. However, radiation in the boresight direction, along the coax axis, has less variation with polarization, and may be more circular. Better evaluation will require an antenna range better than my shack.

But whether this is a great antenna or not, it is really simple to build, costs nothing, and is handy for a test source for local beacon or whatever you fancy. And it can be scaled to whatever frequency you might need.

References:

1. Son Xuat Ta, Imko Park, and Richard W. Ziolkowski, "Crossed Dipole Antennas, A Review," *IEEE Antennas & Propagation* magazine, October 2015, pp. 107-122 (Fig. 9).

2. B. Y. Toh, R. Cahill, and V.F. Fusco, "Understanding and Measuring Circular Polarization," *IEEE Trans. Educ.*, Aug. 2003, pp. 313-318.

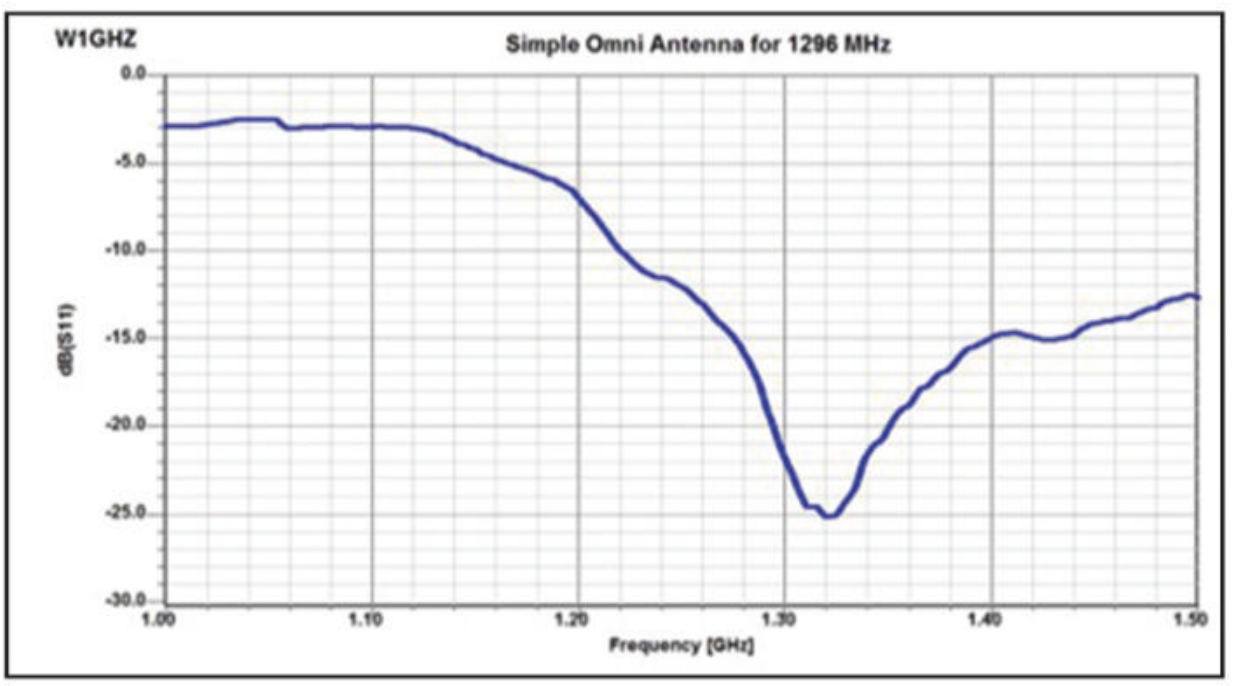

Figure 3. Return loss of 1296-MHz antenna

* *Email: <w1ghz@arrl.net>*

learning curve

BY RON OCHU, KOØZ

Space Weather and DX

Although this article is appearing in December, it is being written in October. There is a definite chill in the air and leaves are beginning to change colors. It doesn't take much to imagine falling leaves soon being replaced with falling snow. Falling outside temperatures serve to remind me that winter is almost upon us in the northern hemisphere. Colder months and inclement weather translate into more indoor time for ham radio and for DXing (long distance communication).

High-frequency (HF) communication is influenced by several space weather factors. A great, one stop DX propagation website to view the influence of space weather on propagation is <https://dx.qsl.net/propagation> (*or our own Propagation columnist's website <www.sunspotwatch.com> –ed*). Last month, we looked at great circle bearings and auroral impacts on HF propagation. This month, let's look at a few more influencing factors.

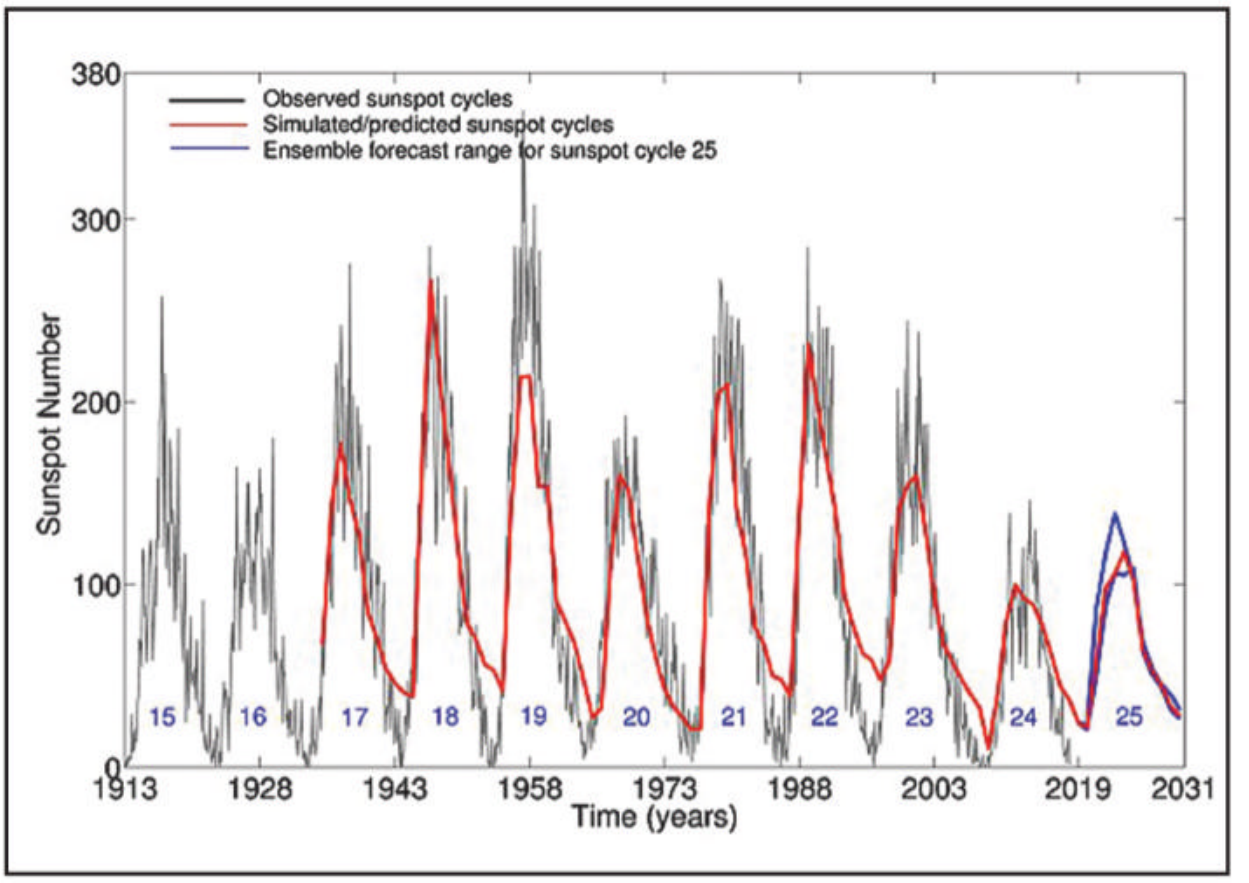

Photo A. A graph of successive solar cycles. A solar cycle is typically 11 years long. We are currently in Solar Cycle 25. (All photos are public domain, unless noted)

Solar Cycle 25

You may recall solar cycles last about 11 years (*Photo A*). We are currently "ramping-up" to the solar maximum stage of Solar Cycle 25. By most accounts, Cycle 25 began in December 2019 and is expected to reach maximum in 2025 and minimum in 2030. Sometimes a solar maximum point turns out to be bimodal (*Photo B*), meaning that there are two successive high points. Solar maximum is defined as the greatest number of sunspots in each solar cycle (*Photo C*). Sunspots are temporary, cooler, dark spots in the sun's photosphere. They are one indicator of the Sun's activity, which in turn affects Earth's ionosphere and HF radio propagation.

Solar Flares & Radio Blackouts

As our Sun becomes more active with sunspots, solar flares (*Photo D*) tend to increase in both frequency and intensity. A solar flare is a burst of electromagnetic radiation speeding away from the Sun at the speed of light. An Earth-directed solar flare can reach the

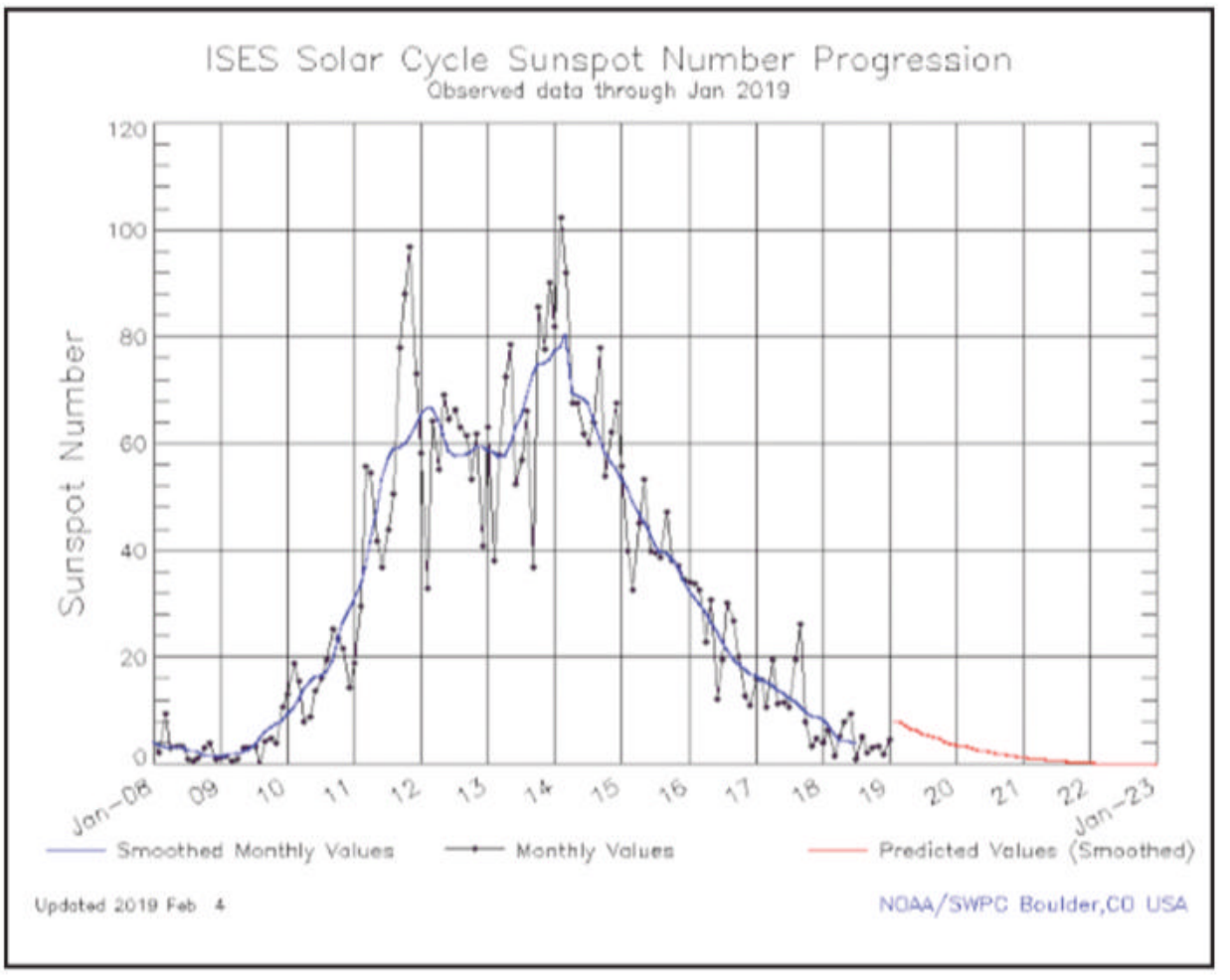

Photo B. Recent solar cycles have bimodal peaks as seen in Cycle 24. The peaks result from the effects of the Sun's northern and southern hemispheres peaking at different times. Will Cycle 25 have a bimodal peak?

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

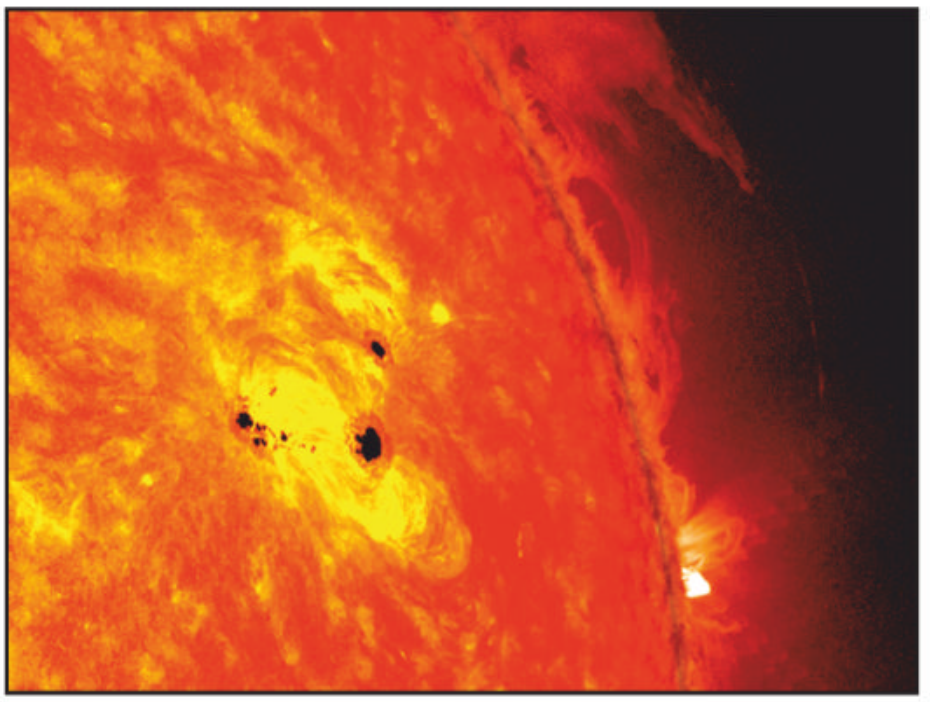

Photo C. Sunspots are a good indicator of our Sun's radiation activity. Numerous sunspots indicate more activity.

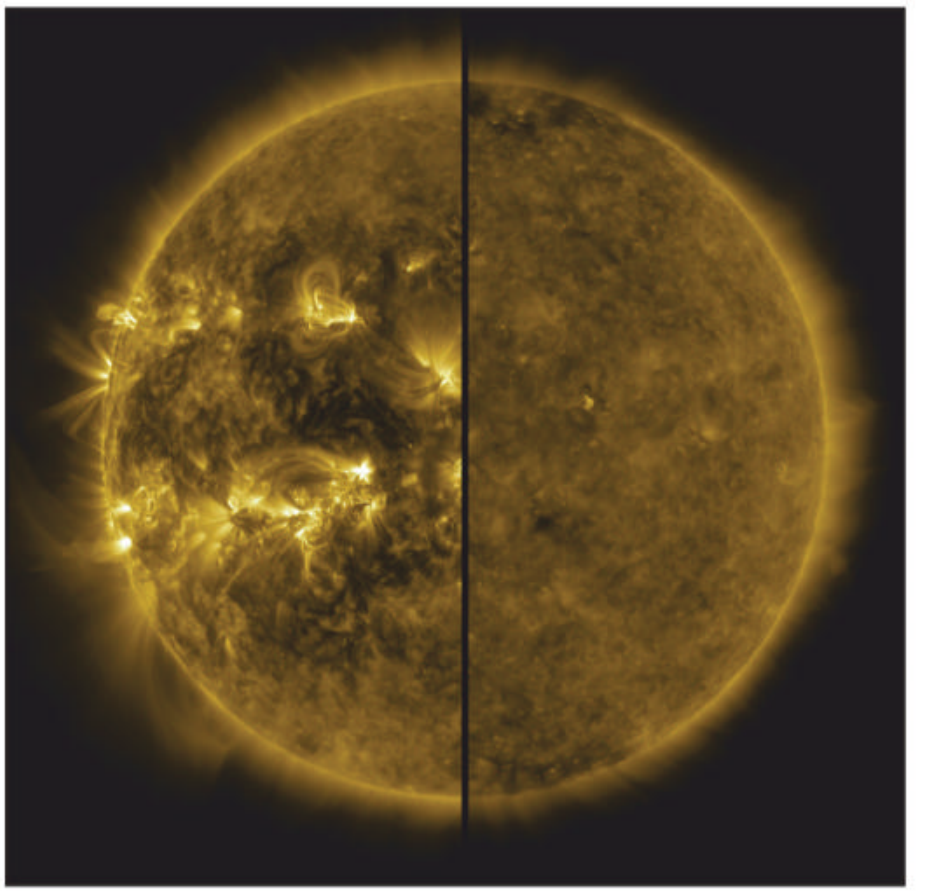

Photo D. Solar flares are evident in the left half of the photo; the right half of the picture reveals a much quieter sun at solar minimum.

Earth's atmosphere in just eight minutes. Depending on the radiation's intensity, it can have a huge impact on Earth, disrupting HF communication and, in extreme cases, electric power grids. Solar flares are responsible for sudden ionospheric disturbances (SIDs) and radio blackouts (*Photo E*) in the sunlit region of Earth and these disturbances can last several minutes to several hours.

According to National Oceanic and Atmospheric Administration's (NOAA's) Space Weather Prediction Center (SWPC), radio blackouts are caused by bursts of X-ray and extreme ultraviolet radiation emitted from solar flares. Radio blackouts primarily affect HF (3-30 MHz) communication, although fading and diminished reception may spill over to Very High Frequency (VHF) (30-300 MHz) and higher frequencies. Someday, if you are having a 10-meter QSO (conversation) with someone and suddenly the band drops out and becomes quite noisy, then there's a good chance you (and others) are experiencing a SID.

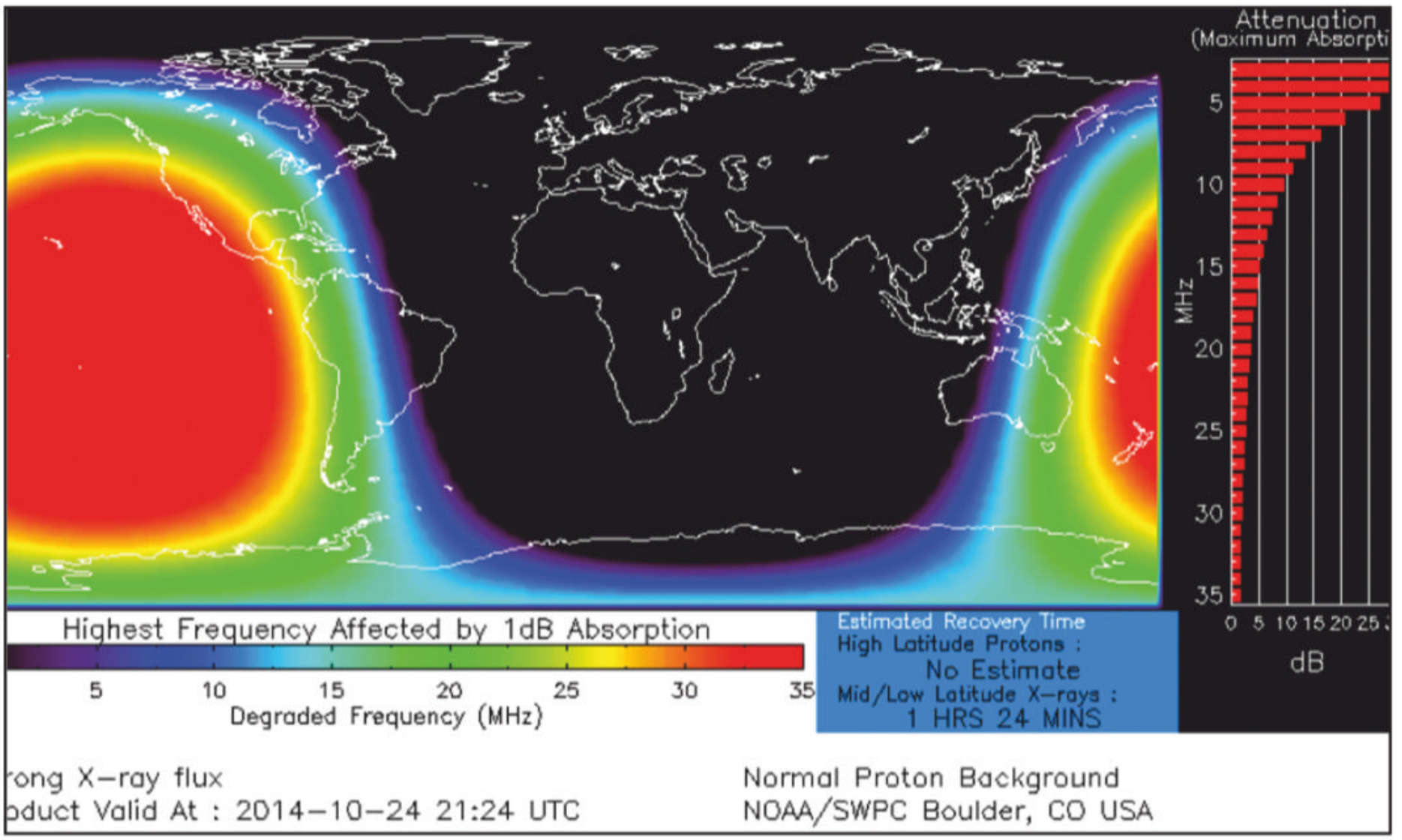

Photo E. The western U.S. and most of the Pacific Ocean region experiencing a temporary radio blackout.

NOAA Space Weather Scales

Category		Effect	Physical measure	Average Frequency (1 cycle = 11 years)
Scale	Descriptor	Duration of event will influence severity of effects		
Radio Blackouts			GOES X-ray peak brightness by class and by flux*	Number of events when flux level was met; (number of storm days)
R 5	Extreme	HF Radio: Complete HF (high frequency**) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 ($2x10^{-3}$)	Fewer than 1 per cycle
R 4	Severe	HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	HF Radio: Limited blackout of HF radio communication on sunlit side of the Earth, loss of radio contact for tens of minutes. Navigation: Degradation of low-frequency navigation signals for tens of minutes.	M5 ($5x10^{-5}$)	350 per cycle (300 days per cycle)
R 1	Minor	HF Radio: Weak or minor degradation of HF radio communication on sunlit side of the Earth, occasional loss of radio contact. Navigation: Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

* Flux, measured in the 0.1-0.8 nm range, in W/m^2. Based on this measure, but other physical measures are also considered.
** Other frequencies may also be affected by these conditions.
URL: *www.swpc.noaa.gov/NOAAscales* April 7, 2011

Table 1. NOAA's RF Blackout Scale. RF blackouts tend to last for a few minutes to a few hours. (Tables courtesy National Oceanic and Atmospheric Administration)

Solar flares are rated according to intensity, with "A" being the lowest and "X" the highest. On November 4, 2003, an X28 flare erupted from the Sun (*Photo F*) and is the most intense flare measured so far. NOAA also publishes a radio blackout scale ranging from R1 (minor) to R5 (extreme) (*Table 1*). X-class solar flares are dramatic, but so are CMEs.

CME

Coronal mass ejections (CMEs) are solar explosions of plasma and magnetic particles (*Photo G*) that propel huge amounts of solar material away from the Sun into space, sometimes toward the Earth. Generally, it takes a few days for the material to travel the 92.6 million miles to reach Earth. When it does, our Earth's magnetic field is affected.

According to NASA's Goddard Space Flight Center, "Coronal mass ejections are more likely to have a significant effect on our activities than flares because they carry more material into a larger volume of interplanetary space, increasing the likelihood that they will interact with the Earth. While a flare alone produces high-energy particles near the Sun, some of which escape into interplanetary space, a CME drives a shockwave which can continuously produce energetic particles as it propagates through interplanetary space. When a CME reaches the Earth, its impact disturbs the Earth's magnetosphere, setting off a geomagnetic storm. A CME typically takes 3 to 5 days to reach the Earth after it leaves the Sun; therefore observing the associated solar flare or the ejection of CMEs from the Sun provides an early warning of geomagnetic storms."

Geomagnetic Storms

Many of us regard geomagnetic storms as causing auroras (*Photo H*). That's true, but are you aware that during geomagnetic storms, some radio frequencies are absorbed while others are reflected, leading to rapidly fluctuating signals and unexpected propagation paths (reproducing or multiplying in unplanned directions)? Public service radio and amateur radio can be disrupted. The SWPC defines a geomagnetic storm as "a major disturbance of Earth's magnetosphere that occurs when there is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth. These storms result from variations in the solar wind that produce major changes in the currents, plasmas, and fields in Earth's magnetosphere. The solar wind conditions that are effective for creating geomagnetic storms are sustained (for several to many hours) periods of high-speed solar wind, and most importantly, a southward directed solar wind magnetic

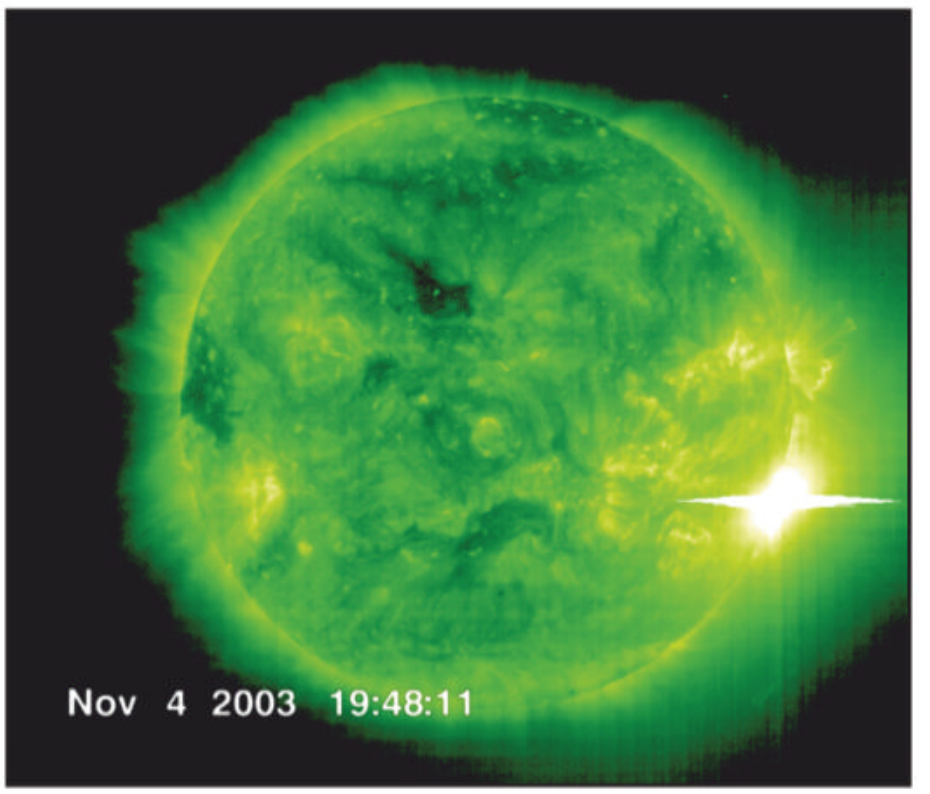

Photo F. The most intense solar flare ever recorded occurred on November 4, 2003. It was designated as an X28 flare. Fortunately, this solar flare was not Earth bound.

field (opposite the direction of Earth's field) at the dayside of the magnetosphere. This condition is effective for transferring energy from the solar wind into Earth's magnetosphere."

"The largest storms that result from these conditions are associated with solar CMEs where a billion tons or so of plasma from the sun, with its embedded magnetic field, arrives at Earth. CMEs typically take several days to arrive at Earth, but have been observed, for some of the most intense storms, to arrive in as short as 18 hours. Another solar wind disturbance that creates con-

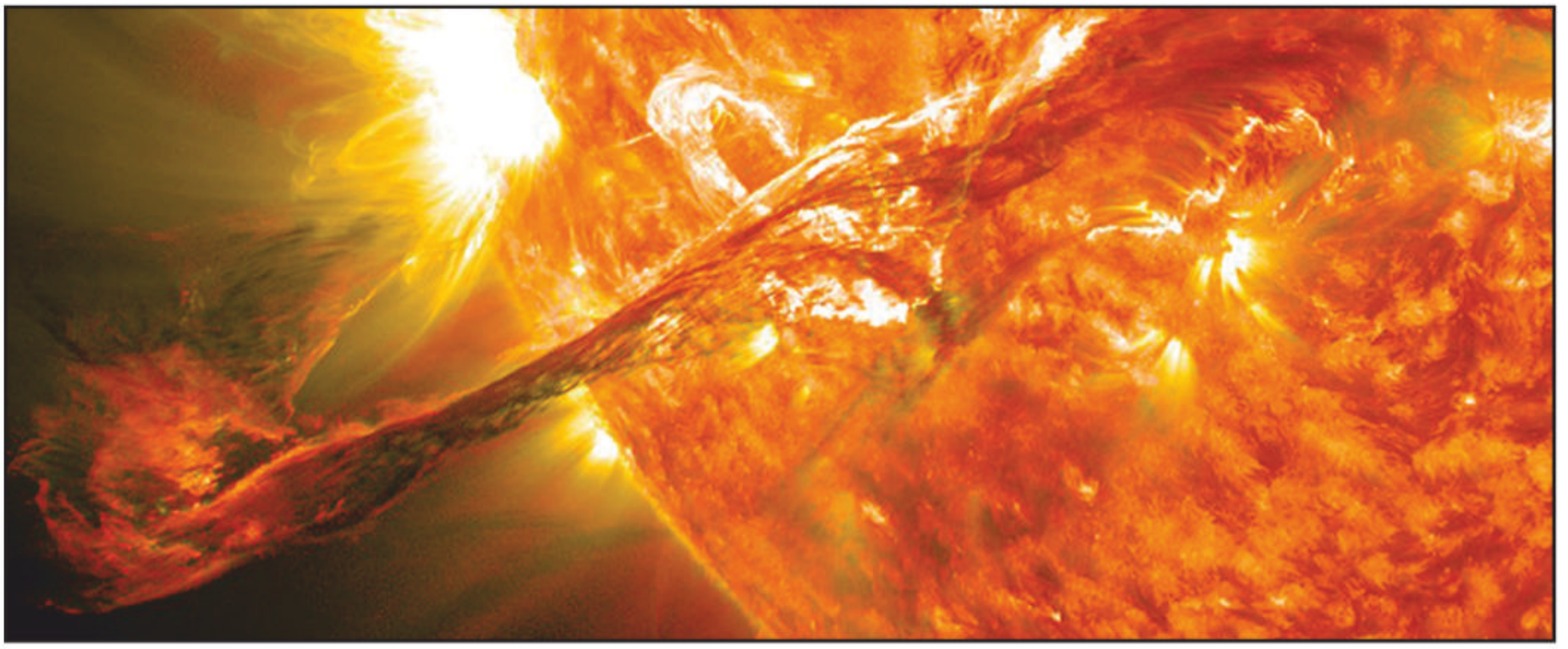

Photo G. If Earth directed, coronal mass ejections (CME) take a while to reach our planet. They can create geomagnetic storms and play havoc with DX propagation.

NOAA Space Weather Scales

Category		Effect	Physical measure	Average Frequency (1 cycle = 11 years)
Scale	Descriptor	Duration of event will influence severity of effects		
Geomagnetic Storms			Kp values* determined every 3 hours	Number of storm events when Kp level was met; (number of storm days)
G 5	Extreme	Power systems: widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. Spacecraft operations: may experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. Other systems: pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).**	Kp=9	4 per cycle (4 days per cycle)
G 4	Severe	Power systems: possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. Spacecraft operations: may experience surface charging and tracking problems, corrections may be needed for orientation problems. Other systems: induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).**	Kp=8	100 per cycle (60 days per cycle)
G 3	Strong	Power systems: voltage corrections may be required, false alarms triggered on some protection devices. Spacecraft operations: surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. Other systems: intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).**	Kp=7	200 per cycle (130 days per cycle)
G 2	Moderate	Power systems: high-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. Spacecraft operations: corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).**	Kp=6	600 per cycle (360 days per cycle)
G 1	Minor	Power systems: weak power grid fluctuations can occur. Spacecraft operations: minor impact on satellite operations possible. Other systems: migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).**	Kp=5	1700 per cycle (900 days per cycle)

* Based on this measure, but other physical measures are also considered.
** For specific locations around the globe, use geomagnetic latitude to determine likely sightings (see www.swpc.noaa.gov/Aurora)

Table 2. NOAA's Geomagnetic Storm Scale. Geomagnetic storms can have propagation impacts that can last 2 to 8 hours in the main phase. The recovery phase can last 8 hours to 7 days.

Photo H. Space weather interacts with Earth's magnetic field, and it can create awe inspiring auroras.

ditions favorable to geomagnetic storms is a high-speed solar wind stream (HSS). HSSs plow into the slower solar wind in front and create co-rotating interaction regions, or CIRs. These regions are often related to geomagnetic storms that, while less intense than CME storms, often can deposit more energy in Earth's magnetosphere over a longer interval." NOAA

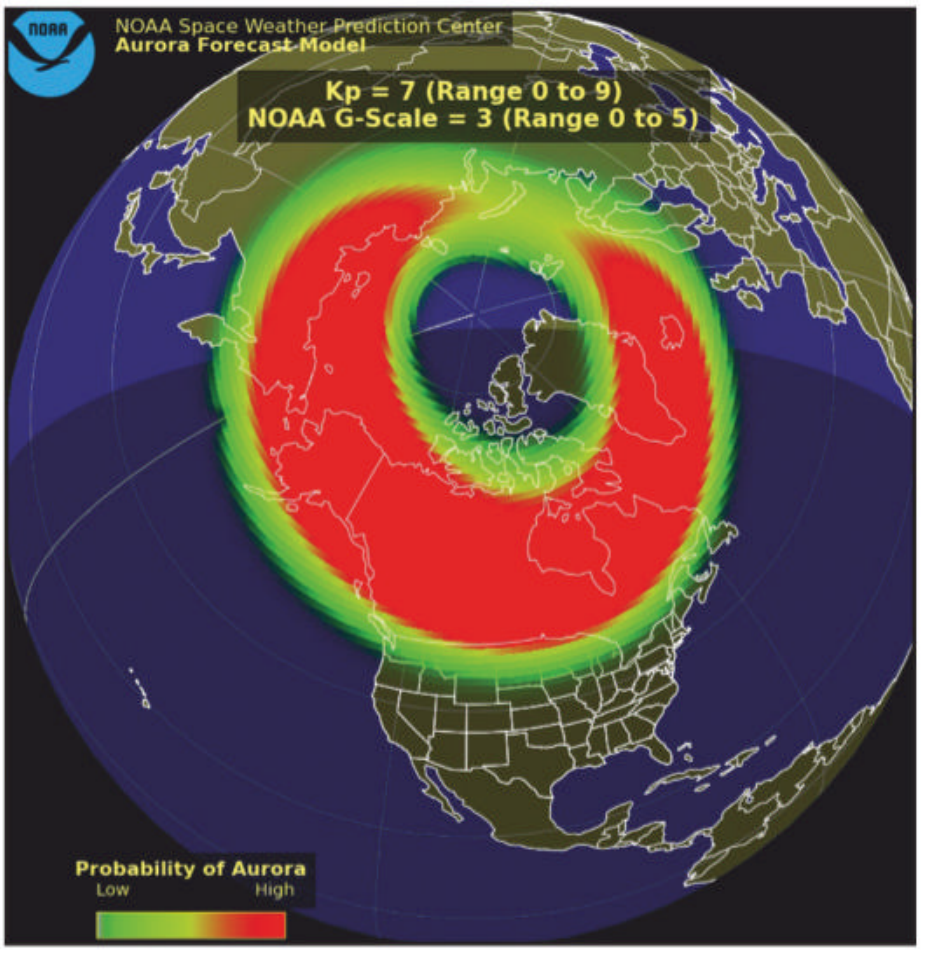

Photo I. An example of an auroral oval forecast. When it is red, DX paths over the poles may be useless for HF, but for VHF signals, exciting aurora propagation may be in the offing.

Photo J. DX Net's propagation website offers a 24-hour space weather storm forecast in addition to many other DX propagation aides.

NOAA Space Weather Scales

Category		Effect	Physical measure	Average Frequency (1 cycle = 11 years)
Scale	Descriptor	Duration of event will influence severity of effects		
Solar Radiation Storms			Flux level of ≥ 10 MeV particles (ions)*	Number of events when flux level was met**
S 5	Extreme	Biological: unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. *** Satellite operations: satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. Other systems: complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	Biological: unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: may experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. Other systems: blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle
S 3	Strong	Biological: radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. Other systems: degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	Biological: passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.*** Satellite operations: infrequent single-event upsets possible. Other systems: effects on HF propagation through the polar regions, and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S1	Minor	Biological: none. Satellite operations: none. Other systems: minor impacts on HF radio in the polar regions.	10	50 per cycle

* Flux levels are 5 minute averages. Flux in particles-s^{-1}-$ster^{-1}$-cm^{-2} Based on this measure, but other physical measures are also considered.
** These events can last more than one day.
*** High energy particle (>100 MeV) are a better indicator of radiation risk to passenger and crews. Pregnant women are particularly susceptible.

Table 3. NOAA's Solar Radiation Storm Scale. Solar radiation storms tend to last a few hours up to a few days.

publishes a geomagnetic storm scale ranging from G1 (minor) to G5 (extreme) (*Table 2*).

Solar Radiation Storms

Closely related to solar flares, radio blackouts, CMEs and geomagnetic storms is the solar radiation storm. The National Weather Service defines a solar radiation storm as, "when large quantities of charged particles, protons and electrons, are accelerated by processes at or near the Sun. When these processes occur, the near-Earth satellite environment is bathed with high-energy particles."

"Earth's magnetic field and atmosphere offer some protection from this radiation, but the amount of protection is a function of altitude, latitude, and magnetic field strength. The polar regions are most affected by energetic particles because the magnetic field lines at the poles extend vertically downwards, allowing the particles to spiral down the field lines and penetrate into the atmosphere, increasing ionization."

"Energetic protons reach Earth a half hour to several hours after a solar eruption. Solar radiation storms can last from a few hours to days, depending on the magnitude of the eruption. Solar radiation storms can occur at any time during the solar cycle but tend to be most common around solar maximum."

"Solar radiation storm impacts include loss of HF radio communications through the polar regions, navigation position errors, elevated radiation exposure to astronauts, and to passengers and crew in aircraft at high altitudes and latitudes, and damage to satellite systems." Similar to the geomagnetic storms and RF blackout scales, NOAA publishes a Solar Radiation Storm Scale ranging from S1 (minor) to S5 (severe) (*Table 3*). DX Net's propagation website, <https://dx.qsl.net/propagation>, includes a space storm 24-hour forecast (*Photo J*).

There is a Bright Side

For sure, geomagnetic storms affecting HF propagation can be very annoying to radio amateurs. Simply put, propagation stinks during a storm. Fortunately, geomagnetic storms are temporary, and I've found that after the storm subsides, HF propagation can be enhanced. Whenever there is a strong geomagnetic storm and long-distance HF is rendered almost useless, I check for aurora propagation on the 6- or 2-meter bands. It's not necessary to actually see an aurora in order to propagate VHF signals. Check out the auroral oval propagation on the DX Net website <https://dx.qsl.net/propagation>. When the oval is red near the northern U.S. border, there is a high probability the aurora will be able to support VHF propagation (*Photo I*).

If you haven't experienced it, auroral propagation is exciting. Suddenly there is propagation on 10, 6, and even 2 meters. There is a buzz associated with this propagation. Voices sound distorted, almost void of tone. CW (Morse code) sounds more like a buzz. I remember an aurora opening about four years ago while living in central Illinois. I turned my 6-meter Yagi to the northeast and I was working stations in Canada, the U.S. East Coast, and everywhere in between.

The opening lasted for about two hours, and towards the end of opening, a relatively newly minted ham gave me a call on 6 meters. He lived about 30 miles south of my QTH (location). He called me because he was sure his new Kenwood transceiver wasn't working properly on 6 meters. All of his received signals were distorted and he couldn't quite tune them in correctly. I was the only station on the band who

DITS and DAHS

The ._ _... _._.'s of Morse Code Operating

BY ED TOBIAS, KR3E

This small but solid guide is the perfect read for those interested in learning or improving CW operating techniques!

Within its pages you'll find:

- The secret of becoming a proficient CW Operator
- Where and how to practice, practice, practice.
- Straight Key or Paddle?
- Adjusting your Straight Key or Paddle
- Keyers, Iambic Keying and Bugs
- Contests & Events, DXing
- Operating QSK
- CW Filters
- Signs, Signals and Procedures
- Tips on Taking CW On the Road . . . ***and much, much more!***

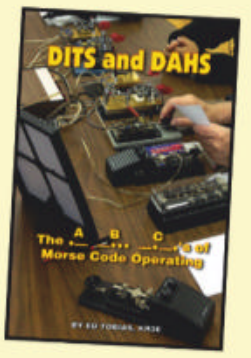

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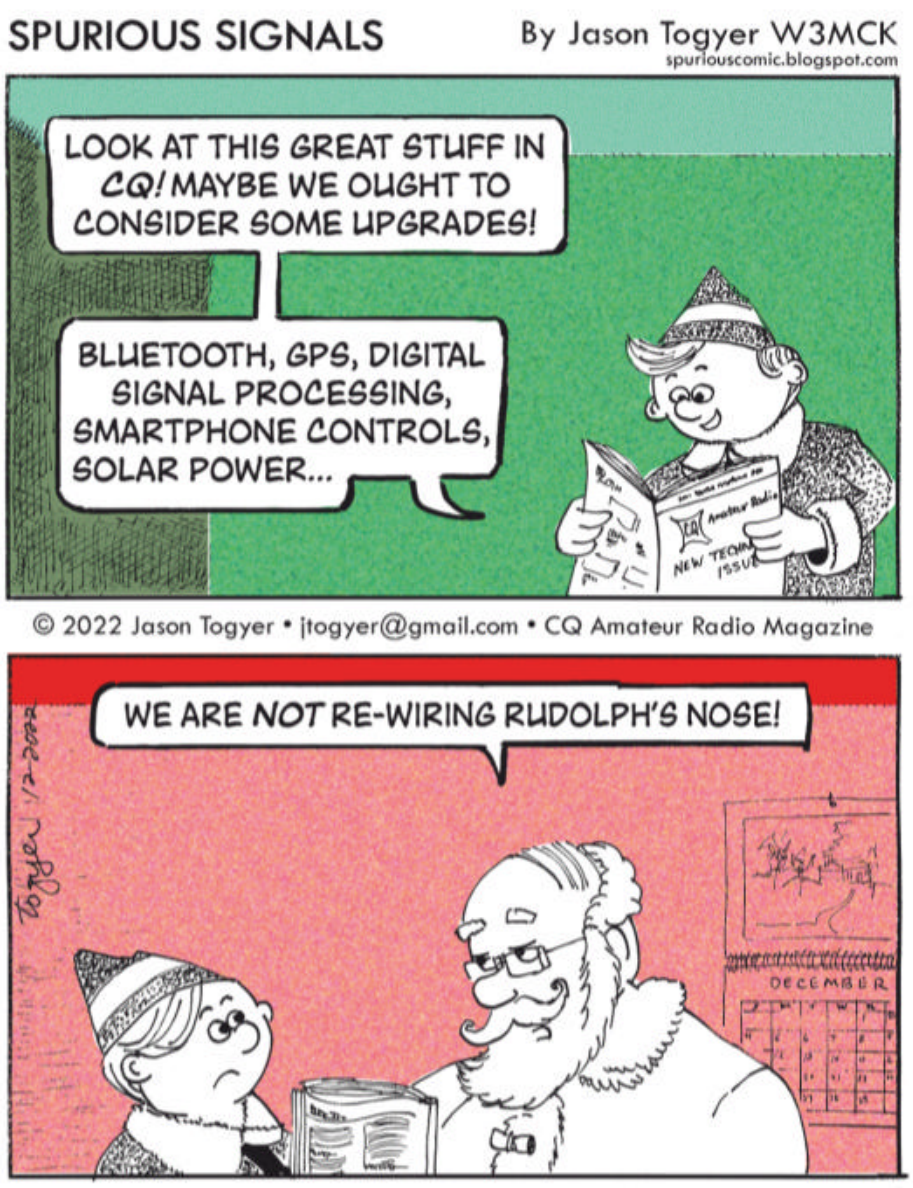
Photo K. Dr. Tamitha Skov, WX6SWW, Space Weather Woman (left), kindly taking time out for a photo with Debbie, KC9ULA, and Ron, KOØZ, at the Dayton Hamvention. (Photo by KOØZ)



sounded "normal." When I told him what he was experiencing, we both had a good chuckle. He was also relieved there was nothing wrong with his transceiver. Not all geomagnetic storms produce aurora propagation, but it is always worth checking.

Space Weather Woman

As we've seen, space weather impacts our planet in several ways. A tremendous and entertaining resource is Dr. Tamitha Skov, WX6SWW. Dr. Skov is an avid solar physicist and she creates a space weather forecast video which can be found on her website, <www.spaceweather-woman.com>. She is known as the "Space Weather Woman," and both my wife and I heard her speak at the Dayton Hamvention® a few years back (*Photo K*). She is a gifted speaker, and her forecast is worth watching and I highly recommend it to you.

Space Weather & DX

Hopefully, I haven't bored you this month by going a bit deeper into the "propagation weeds." Space weather and its impact on DXing is fascinating. It's nice to offer an educated guess as to why DX is to be found one day and just a day later the band seems to have "died." Next month, we'll go into planetary indices such as SFI, A and K values. Thank you for reading *CQ*. I hope to hear you on the bands, space weather permitting.

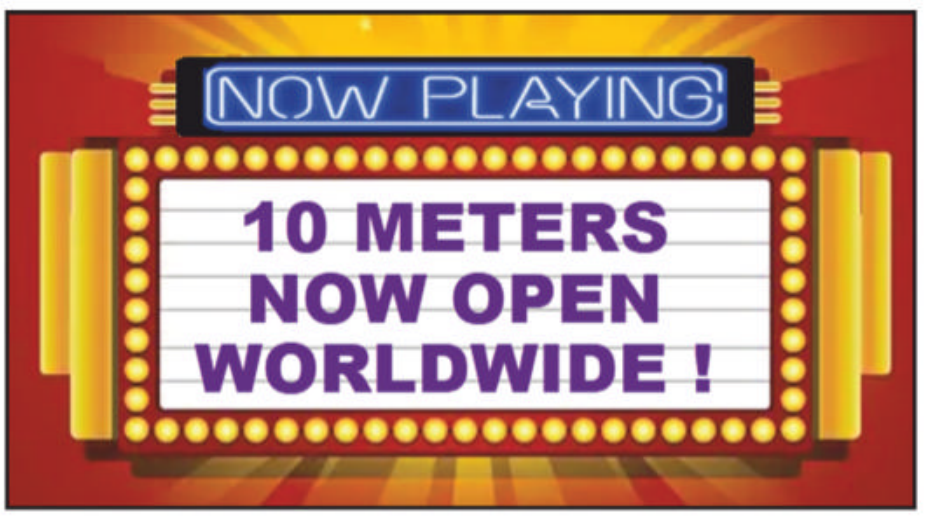
– 73, Ron, KOØZ

ham radio explorer

BY ANTHONY A. LUSCRE*, K8ZT

Ten Meters is Open!

Plus, Resources for Learning Morse Code



In the March 2022 edition of this column, I talked about two ways for Technician Class licensees to get involved with HF (High-Frequency radio waves between 3 and 30 MHz), which opens up the possibility of long-distance amateur radio contacts. There are two options for Techs on HF: CW only on 80, 40, 15, and 10 meters (*Photo A*), or CW / SSB / digital on portions of 10 meters. See *Figure 1* for a chart of Tech HF CW privileges.

In March, I focused on 10-meter activities, including voice (SSB) and digital (FT8, RTTY, etc.). This month, we will focus on CW operations for Technicians and all license classes. But before we start, just a heads up that sitting in my shack in October 2022, 10 meters is full of SSB signals from around the world. So, get on the air NOW and don't miss 10-meter openings over the next few years.

Morse Code, a.k.a. CW

For those who have been around amateur radio for a few decades, you may wonder why I would be bringing up CW in a column about exploring new activities in amateur radio. Before 1990, all amateur radio licenses required at least some code knowledge. Until 2007, code proficiency was required in order to have most HF radio voice privileges. Morse code was something you had to learn for licensing purposes. Many learned just enough to get their licenses but never used it on the air; they really wanted voice privileges, or worse, they got frustrated and lost interest in amateur radio. In the 15 years since the last licensing requirement to know CW, to the surprise of many, CW has not disappeared from the bands; in fact, it is flourishing with many new hams learning and using it.

Fun With Morse Code

Like many things in life, things are more fun when you choose to do them instead of being forced to do them. Current users of CW and a growing number of new learners are using it because it is fun. In addition, they are finding out that it can be a very effective method of making contacts when band conditions are poor, you are running low power, or you have a marginal antenna. CW can often make QSOs when SSB can't. CW has a potential 25 dB advantage over SSB (*Figure 1*). It is also a prevalent contesting mode and a way for Techs to get on the HF bands and make worldwide contacts. I have a whole slideshow titled "Fun With Morse" <tiny.cc/fwm>. This presentation is packed with software and other resource links that I have no space to highlight in this article, so please take a look.

Photo A. CQ "Learning Curve" editor Ron Ochu, KOØZ, operating CW from a local park during Field Day.(KOØZ photo)

Technician HF Privileges with CW

CW privileges for Technician licensees are a legacy of the original Novice license and revamped Tech Plus License. These CW-only privileges consist of segments of the 80-, 40- and 15-meter bands (*Figure 2*), along with the full CW-only segment of 10 meters. (General and Extra Class licensees have CW privileges on all amateur radio bands.) With no licensing requirement for learning CW, these privileges are of little use unless new hams know how to use CW.

Learning How to Use CW

Getting on the bands using Morse code actually consists of multiple steps:

1. Learning to copy the individual characters (letters and numbers)
2. Putting together the copied characters to form words, callsigns, abbreviations, Q-signals and prosigns (Procedural signs or prosigns are shorthand signals used in Morse code

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website <www.k8zt.com>

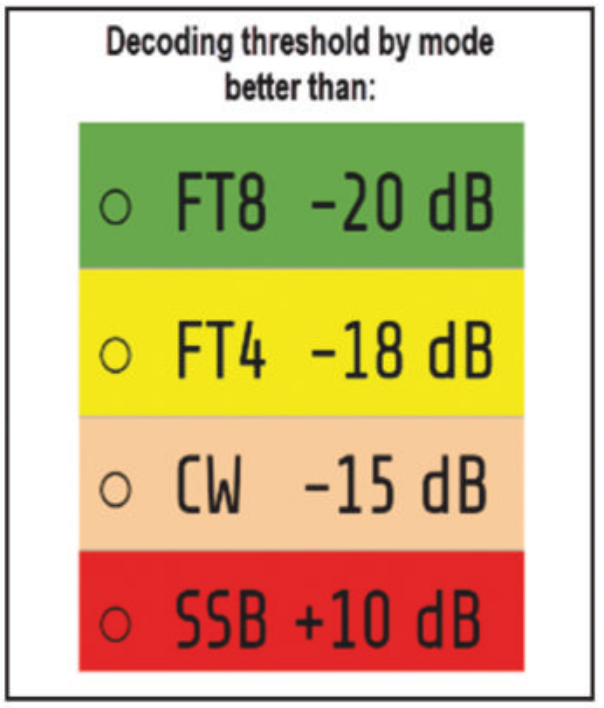


Figure 1. CW contacts can be made with lower signal-to-noise ratios (SNR) than SSB voice.

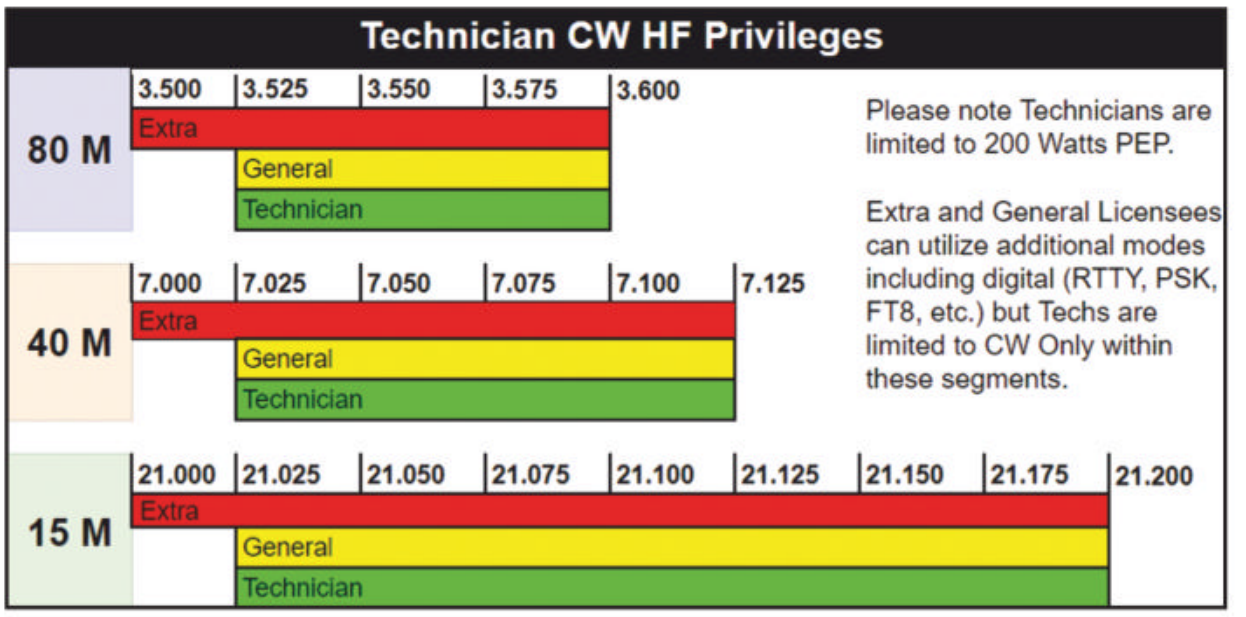


Figure 2. A chart showing Technician Class CW HF privileges on 80, 40, and 15 meters. For a chart of all band and mode privileges for all classes of license, see <https://tinyurl.com/4u7cemh8>.

radiotelegraphy procedure to simplify and standardize radio communication).

3. Learning to send individual characters and words

4. Understanding the format of common CW contacts, usage of abbreviations and prosigns, etc.

5. Making on-air CW contacts

6. Practicing and improving skill and speed

Over the years, many methods have been used to teach / learn the code. Various recording methods have been utilized to provide code instruction and copy practice to learners, including paper tape, record albums, and cassettes. Some of the problems with each of these were that the learner would memorize the limited materials, and speeds could not be easily varied. Computers have resulted in many programs that can generate infinite amounts of practice, allowing speed adjustment of character per minute (CPM) and word per minute (WPM) settings. Different learners learn CW differently, so the best methods for individuals may vary. A couple of generally accepted tips include:

• Treat the code as an audio language. Avoid visuals, mnemonic devices, other "trick methods," etc. These multistep methods might give a beginner a way to decode the characters, but the extra steps will make the process too slow for on-air usage.

• Playing characters at a fast enough speed to avoid "counting the elements of dahs and dits (dashes and dots). Typically no less than 12 WPM.

• Utilizing the Farnsworth method of increased character speed with a slower WPM by allowing more space between characters.

• Short, frequent, and regularly scheduled practice sessions are better than longer, infrequent, or irregular practice.

• Don't forget the ultimate goal is to get on the air and make contacts, so make sure you also learn the procedures of making contacts and getting on the air as soon as possible.

My final tip is to consider doing your learning with a buddy or group. A buddy or group can allow better practice in receiving and sending and encourages continuous improvement. Many local clubs did in-person code classes as part of the licensing process. These classes are much less frequent today, but the wide use of internet-based instruction has gained traction during the COVID pandemic, providing classes to a worldwide audience of hams. Two groups in particular offer excellent online programs.

The **CW Ops** group <https://cwops.org> (*Figure 3*) has the **CW Academy Classes**. From their website, "There is no cost or obligation to participate in CWops CW Academy Classes and membership is not required. Enrollment is open to anyone with the desire to learn or improve their proficiency in Morse Code. CW Academy training and mentoring for beginners and those with Morse Code experience needing help are offered three times a year, in two-month increments: Jan-Feb; May-Jun; Sep-Oct." If you sign up, you will be assigned an instructor and work with a small cohort of other students. Typically, classes are held twice a week with individual and small group practice between "formal" sessions. There are four levels of classes:

1. Beginner – Limited or no prior experience with Morse Code

2. Fundamental – Familiarity with Morse Code characters. Operating at 6 wpm plus and desire to increase proficiency

3. Intermediate – Operating 10 plus wpm and desire to increase proficiency for contests, DX, and rag chews

4. Advanced – Operating 20 plus wpm and desire to increase proficiency for higher-speed on-air activity

For a presentation by the CW Ops Academy, visit <https://youtu.be/yegPZTAHYJ4>.

The second group is the **Long Island CW Club (LICWC)** <https://longislandcwclub.org> (*Figure 4*). From their website, "The Long Island CW Club started in 2018 to promote and expand the use of Morse Code — CW amongst amateur radio operators, initially in our geographic area. Today,

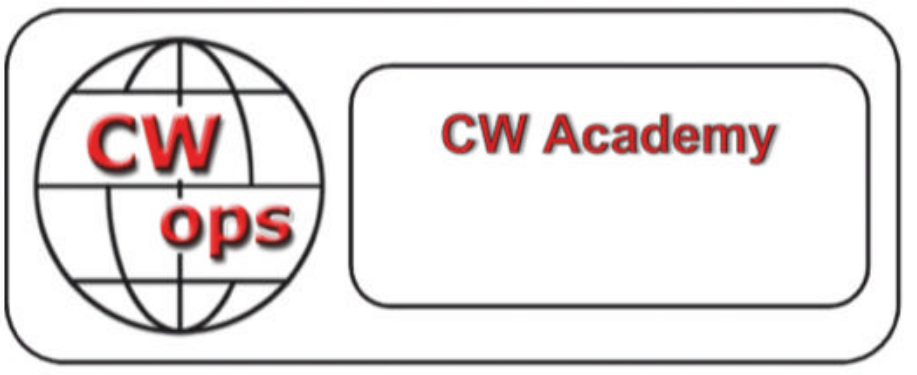


Figure 3. The CW Ops group sponsors the online CW Academy program.

Figure 4. The Long Island CW Club also sponsors online code lessons, with a slightly different structure and format than CW Academy.

there is no longer an FCC requirement to learn CW to obtain an amateur radio license. Yet we find there is still pent-up demand for learning the code, becoming more proficient at it and taking part in activities centered around this interesting skill. To help fill this void, we have put together a group of dedicated teachers of Morse Code — CW. We conduct CW training classes via internet video conference classes at various skill levels. We have grown quickly, branching out with members nationwide and overseas. There is much more to LICW than learning CW. Our forums and presentations, with visiting speakers, are a place to broaden your education and have fun!"

One of the most significant differences in LICWC is that students are not "enrolled" in specific classes with specific instructors. After completing the three recommended intro classes (Club Resources, Training Software, and Sending Prep), students can choose to attend any of the many beginner's classes scheduled throughout the week. There is no starting point for entering a class as the class work is arranged in a "carousel" format circling through letter groups and then repeating the groups. This means that students can start throughout the year without having to wait for a class to start. For an interview I did with the Long Island CW Club founder Howard Bernstein, WB2UZE, visit <https://youtu.be/yhGLn3btTS0>.

Getting On the Air with CW

Learning CW is just the start; getting on the air and making contacts is the ultimate goal. One of the common misconceptions is that you need to be a high-speed CW expert before you can get on the bands and make contacts. There are many opportunities for CW newbies to make contacts. CW Ops sponsors a slower-speed 1-hour contest twice a week, the SST (Slow Speed Test). Contests are actually an excellent way for CW newbies as you have a much shorter contact, a limited amount of information and a highly scripted format as opposed to CW rag chewing. For an audio interview I did on this, visit <www.ditdit.fm> and search for episode #12. If you are new to contesting, take a look at my June CQ column "Getting on the Air with Contesting;" get the CQ video, "Getting Started in Contesting;" view my slideshow "Intro to Amateur Radio Contesting" at <tiny.cc/ar contest>, or watch a video of it at <https://youtu.be/qFZ98VTINPs>.

No matter what type of contact you make, do not be afraid to send a QRS (please send slower) request to another station if it is too fast for you. Most stations will be glad to accommodate you. Good luck on your CW journey, and I hope to work you on the bands soon.

That's it for this month. If you are interested in some of my recent ham radio presentations to radio clubs via Zoom, visit <tiny.cc/k8zt-p>. Remember, I am always looking for information on your new activities, ideas for future columns, and feedback from this column, so please email me at <k8zt@arrl.net>.

CW Academy: How it Works

From CW Academy Website:

• CW Academy semester description:
° Eight weeks long sessions
° Twice weekly sessions are usually held on Mondays and Thursdays each week, typically starting at 7 p.m. or 8 pm. online using Zoom or Skype
° Where possible, advisors and students are grouped together by time zone
° Students are given daily assignments prior to each meeting
° During the online meetings, students and advisors can all see and hear each other, as well as the Morse being sent by any of them. Using Zoom or Skype creates, in effect, a virtual training room.

• Minimum essentials:
° High-speed internet access
° Access to Windows operating system or capable emulation device
° Webcam (camera, microphone)
° Key paddle (single lever or dual lever)
° Keyer with sidetone or radio with built-in keyer and sidetone
° Dedication to 60 minutes of daily practice

Long Island CW Club Online Code Classes — How They Work

From the Long Island CW Club Website:

• How we teach Morse Code in our CW Online classes and what you can expect from our instruction.
° Our Morse Code training curriculum is totally flexible and there is no requirement to attend specific classes. Students can participate in any class at any level as they have the time.
° Of course, the more classes attended, the faster the learning curve, but we fully realize that our students have busy lives and we do not want learning Morse Code-CW to be a burden. Our goal is for students to have fun with CW.
° No student is left behind and we work diligently for the success of anyone interested in Morse Code-CW. Ideally, attending two classes per week and practicing 15-20 minutes per day would be the best minimum effort.

• To get started taking our CW online classes:
° Visit our Membership to join. Full instructions will be emailed back to you.
° You will need Zoom.com video conference software and high-speed internet
° A computer with a mic and video camera will be needed.
° LICW Morse Practice Page (our new trainer) is a web-based, cross-platform training tool that functions on any PC, Mac, Linux, smartphone, or tablet.

• Eventually, you will need a straight key or electronic keyer and paddle along with an oscillator so that you can practice sending. The side tone of an HF radio will be fine in place of an oscillator. We recommend starting with a straight key first and then progressing into an electronic keyer.

mf/lf operating: Life Below the AM Broadcast Band

BY JOHN LANGRIDGE, * KB5NJD

Murphy Makes an Appearance at W3TS

Plus … New Antenna System at KL7L; WØYSE/7 Returns to Air With a Minimal But Effective Antenna System; AA8SH Visits the Shelby Hamfest to Talk Ground Wave and a Few Statistics for the 2021 / 2022 Season

One of the things that is just a fact of life when operating 630 and 2200 meters and that we talk about a lot in the interest of safety is high-voltage arcing at the antenna. Most of the active operators have done it at least once. If we are lucky, there is minimal damage, but most of the time carbon tracking necessitates cleanup and repairs so that it does not happen again. For years, I tracked these incidences of arcing and sometimes the fire that accompanied them in the "Hall of Flame" until my website ceased to exist. Paul Kelley, N1BUG, of Milo, Maine, stepped up to take over the presentation on his website[1] and the collection still elicits shock and awe to those who see it for the first time. Arcing that brings fire and destruction is a new thing for most high-frequency (HF) operators because full-sized and matched, resonant, antennas typically exhibit comparatively low voltage since reactance can be managed without large loading devices. It is something to keep in the back of your mind if you plan on operating on these low bands.

In early August of this year, Mike Michaels, W3TS, of Halifax, Pennsylvania, began experiencing an arcing problem at the top of his antenna system on 630 meters that he speculated was the result of preventative maintenance performed earlier in the year. Murphy always seems to make an appearance at the worst times and in the worst locations and, as the old saying goes, if it ain't broke, don't fix it!

Mike's system consists of a 30-foot tower with a 32-foot-tall mast attached to the top tower section. The mast is designed to be lowered down the length of the tower face so that antenna maintenance can be accomplished from the top of the tower. The design was intended so that maintenance would be a one-person job. The mast supports 40- and 80-meter dipoles with a common feed point oriented 90° apart. On 160 and 630 meters, each dipole leg accomplishes the function of toploading and is supported by the top of the mast by way of an insulator. An RG8X feed line for the dipoles functions as the vertical radiator on 160 and 630 meters with the system brought to resonance and matched to a feed line with a switched network at ground level. Similarly, the common-fed dipoles for 40 and 80 meters can be selected from the operating position. A radial system consisting of seventy 70-foot-long radials rounds out the system. Mike notes that despite this system being in use since the 1990s, it has been very stable and reliable.

In order to keep the coax that functions as a feed line for the dipoles and a radiator for 160 and 630 meters away from the mast and tower legs, Mike uses TV twin-lead stand-off insulators. The

This image shows the offending stand-off insulator where high voltage from the coax shield arced across the plastic spacer to the metal eyelet and on to ground. The excess tape that trapped moisture can be seen above and below the eyelet. (Courtesy of W3TS)

Here is the offending eyelet and insulator removed for inspection and replacement that is adjacent to one that appears to be intact but showing the signs of stress on the inner edge of the black plastic insulator. (Courtesy of W3TS)

*827 Middle Run Ct.
Duncanville, TX 75137
<kb5njd@cq-amateur-radio.com>

RG8X coax is fed through the metal eyelet of the standoff, insulated by a small plastic insert that maintains a centered position for the feed line as it passes through the eyelet. As these were originally designed for use in television reception and twin-lead feed line, voltage was never a design concern. But who can argue with what has worked for 30 years?

Mike indicated that the preventative maintenance that led to the problem might have been avoided in dryer weather conditions. During a winter trip up the tower to repair a broken top loading wire (a dipole leg), Mike decided to improve upon the insulation at one of the standoffs that was located along the top mast by wrapping the coax and eyelets with Scotch 33+® electrical tape. The hope was to prevent buildup of the things that might result in an arc and subsequently require another trip up the tower in the winter. These "things" include moisture, particulates, and "dirty" snow and ice, all of

Here is the implementation of the feed line "vertical." If you look carefully, you can see the 40- and 80-meter dipoles at the top with the standoff insulator holding the coax away from the mast extending above the top tower section. While the feed line does slope back to the tower, it is sufficiently insulated (so far!) from the tower leg to avoid problems. Mike has a strong signal so the configuration does not appear to be adversely impacting his operations. (Courtesy of W3TS) →

KL7L brought in heavy hardware to clear an area for his new vertical. The goal is to avoid having extremely high voltage near the birch trees which have historically supported his wire verticals and associated top loading. This thinking is more important now that his lakefront location is beginning to fill-in with other residences. (Courtesy of KL7L)

Here is the 26-meter (85-foot) Spiderpole vertical in situ. It is raised using the "falling derrick" method with a pivot at the base and pre-cut guy lines to facilitate the safe and non-destructive raising of the otherwise long and flimsy pole. Note the radiator wrapped around the pole. (Courtesy of KL7L)

Here is the base of the vertical including the wooden pivot support. Note the black insulation between the pole and the timbers where they meet. Also note the presence of the black insulator attached to the wooden timber that supports the radiator wire. This insulator was added following an arc that developed during testing. Laurence did tidy up the strap to prevent current paths between the pole and the wood. In theory, the strap is not needed since the guy ropes hold everything in place but a little extra security never hurts. (Courtesy of KL7L)

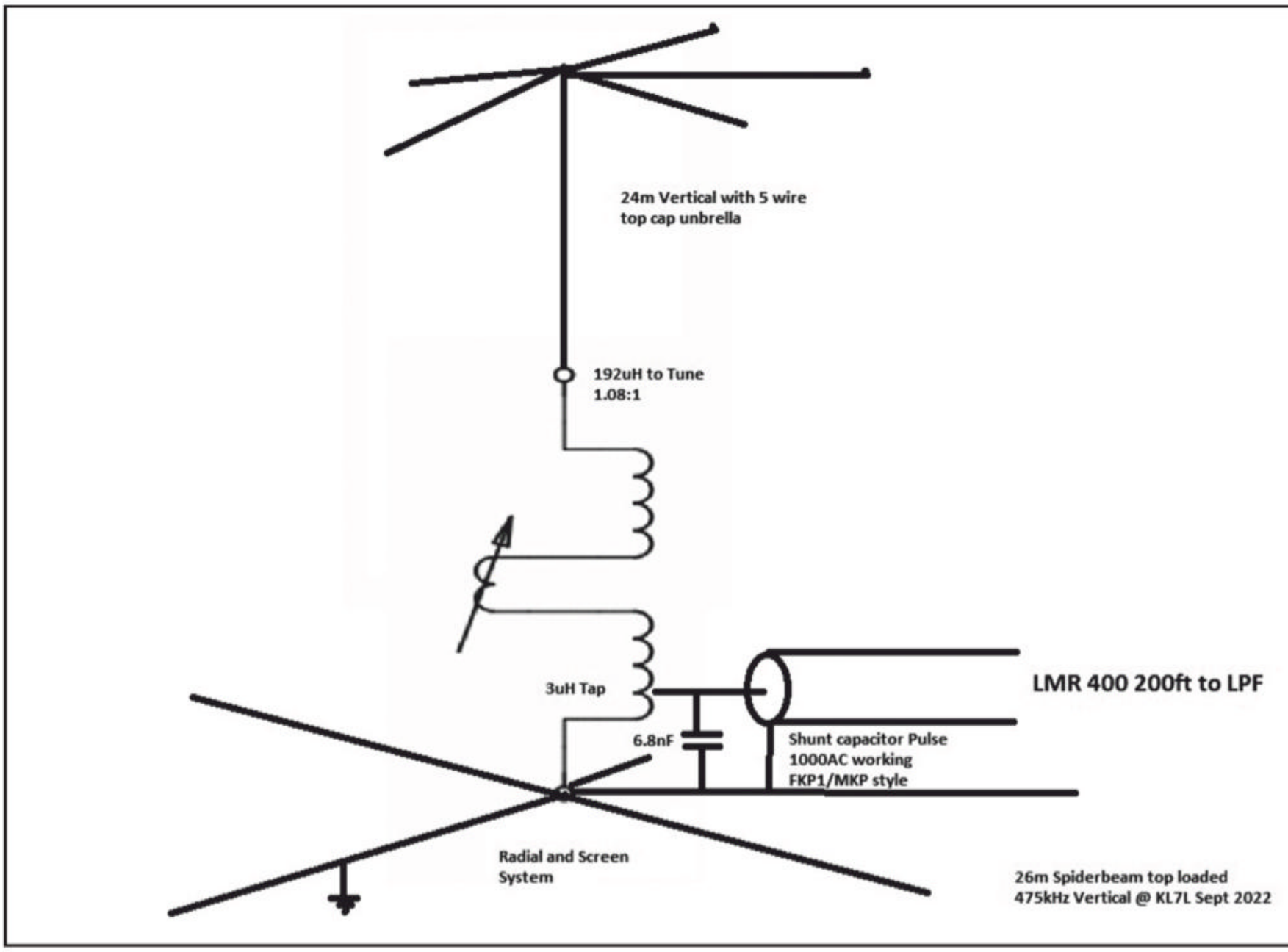
which have contributed to past entries in the Hall of Flame. Unfortunately, the good intention resulted in trapped moisture under the tape, creating a quandary for the small piece of plastic centering the feed line in the eyelet that was never designed for high voltage in the first place. The metal portion of the eyelet is at DC ground and anchored to the top mast so any path found by high voltage would be exploited and only get worse. And fast.

As heat from the summer began to subside, Mike made the trip to the top of the tower, lowering the mast so that he could work on it. It was as bad as he expected. An arc path had been established that resulted from carbonization of the compromised insulator material in the center of the eyelet. To make matters worse, Mike had to wrestle with the tape that he had placed over the damage site which had all summer long to turn into a sticky mess. After a few trips up and down the tower, the situation was resolved by replacing the insulator pieces in the eyelets and replacing the tape under very dry and warm conditions. Moisture was not a concern now. Whether moisture stays out of the junction over the long haul remains to be seen.

The reason I wanted to share Mike's incident is that many amateurs are retrofitting their HF and 160-meter antennas for use on 630 and 2200 meters and those antennas may need some attention prior to beginning operation at lower medium and low frequencies (MF and LF, respectively) in order to avoid problems later. This is particularly relevant in light of what I reported in my September 2022 column about AA8SH's efforts to encourage HF and 160-meter operators to listen and try MF and LF ground wave during the weekend daylight GWEN exercises that began this past spring. Always keep in the back of your mind that just because something works today, it may not work tomorrow, next week, next month, or next year when the physical conditions at the antenna change. Insulators get wet and deposit particulates. Sometimes top-loading wires that might otherwise function as dipoles get too close to tree branches that may be sagging under the weight of foliage. I inspect and trim my trees as well as power wash my vertical's base insulator about once a month all year long (avoiding freezing weather, of course) and avoid operating when everything is very wet so that my very small guy ropes don't act like fuses. Of course, these recommendations only scratch the surface and every situation being different requires vigilance to avoid costly problems, both in terms of money and time.

Sometimes new, dedicated installations conceived by experienced MF and LF operators still result in problems. As I prepare this column, regular contributor Laurence Howell, KL7L, of Wasilla, Alaska is working on a new MF vertical antenna system that is located in the open, away from the birch trees through which top-loading wires have been threaded in the past. Following the destruction of his antenna systems in winter 2022, Laurence thought it would be a good idea to rebuild his MF system in a way that would not utilize trees as primary supports. Fire has always been a concern in his birch forest. Utilizing a 26-meter-tall (85 feet) Spiderpole support, he installed a fold-over system with a wire vertical element and top loading, fed against a combination ground screen and radial system and resonated with a variometer. Initial tests were promising, but Laurence did manage to arc the wayward vertical antenna element just off of the antenna tuning unit (ATU) to a piece of pressure-treated wood that was part of the fold-over support. As I said earlier, most have done it at least once. Laurence has since added an insulator to prevent the wire from slacking onto surrounding objects. Be mindful and flexible in your planning and testing. Sometimes necessity truly is the mother of invention (and improvisation).

A private discussion with Laurence also brought up what was reported in this column in July 2018 where I documented the efforts of Ben Gelb, N1VF, of San Francisco, California (since relocated to Sunnyvale, California), who had installed a Spiderpole against a pressure-treated wood timber that was secured in ground. While using a wire vertical that was firmly affixed to the pole with vinyl electrical tape, it seems that high voltage found a way through the pole to the treated wood timber and on to ground. The resistive path was not obvious until Ben examined the structure with a FLIR (a heat camera), noting numerous hot spots which were corrected by using improvised rubber boots and sheets to separate the pole



Here we see the layout of Laurence's new antenna system. There is plenty of top loading and he uses an L-network for matching instead of a ferrite transformer. (Courtesy of KL7L)

from the wood and ground. Laurence took this situation to heart in his design but noted that he was planning some changes to how he lashed the pole to the fold over support timbers to avoid potential problems in the future. Don't forget that a lot of materials are conductors in the presence of high voltage that might be insulators at lower, more common voltages encountered by amateurs.

WØYSE/7 Returns to Air From the Greater Salt Lake City Area

Following a multi-year hiatus from activity on 630 meters because of a temporary relocation to the Pacific Northwest, Neil Klaage, WØYSE, has returned to northern Utah as well as 630 meters. His new home has stringent restrictive covenants but that has not stopped Neil from getting back on the air. Late summer WSPR listening netted reports for many stations located west of the Rockies using a simple wire loop that was tacked to the wall of his garage 5-8 feet above ground level. That's rather remarkable today, given that noise from power and electronics often limits indoor antenna performance and can sometimes even scuttle efforts to hear with outdoor antennas. Encouraged by his results, Neil set a goal of hearing stations that were east of the Rockies before the start of the new season and he accomplished the goal just in time. On August 31st, he reported in the #kHz SLACK channel and the 630-meter research group email reflector that he decoded WSPR transmissions from Bob Johnson, K9KFR, of Columbia City, Indiana and Tom Costa, N9RU, of Marion, Illinois. The bidirectional loop was more or less pointed to Alaska and Texas as Neil was hoping to report Dick Anderson, KE7A, of Southlake, Texas as well as my station which had been operating WSPR intermittently at very low power levels (0.5 watts EIRP) through the second half of the summer. Neil ultimately did report Dick's transmissions a few days later.

Neil also tried a Wellbrook loop that he installed in his driveway that loosely resembled something that might be found in a flower bed or garden. Results were not as good as with the larger loop mounted in the garage but Neil noted that he needed to experiment more with the associated preamplifier.

Taking incremental steps, Neil decided to take the plunge with transmitting once again, this time applying just one watt to the small, resonant loop attached to his garage wall that he had previously been using for receiving. While the actual EIRP was calculated to be in the microwatt range, Neil's best DX reports using WSPR came from Clint Turner, KA7OEI of West Jordan, Utah, some 30 miles away with a signal level of -22 dB S/N. So, Neil still has some "gas in the tank" for more distant stations as the young season continues.

A Few Notable Operator Statistics for the 2021 / 2022 Season

At the end of the 2021 / 2022 season, I made a request for

Here is WØYSE/7's Wellbrook loop sitting in the driveway of his home in a covenant-restricted neighborhood. Reports are that he has brought this loop into the garage alongside the transmitting loop and following some work on the preamp after initial testing. It seems to be hearing pretty well. (Courtesy of WØYSE)

active stations to send me their two-way contact statistics for the season on 630 and 2200 meters so that I could include them in this column. While there were quite a few contacts completed in a season that was down a bit due to increasing sunspot numbers, the response was a bit more lackluster than I expected. Nevertheless a few stalwarts reported their numbers and I am grateful for this.

In the "pole position," Mike Michaels, W3TS, who was the centerpiece of the first story detailed in this month's column, reported 788 completed two-way CW QSOs on 630 meters which is remarkable. Mike completed a number of digital mode contacts as well but did not report those. Tom Costa, N9RU, who was also mentioned earlier, reported over 500 two-way CW contacts on 630 meters. Tom's station was down for several weeks following a summer lightning strike that damaged the computer he used for logging so his report is an estimate and probably on the low end. Louis Alexander, K4BYN, of Raleigh, North Carolina, reported the most complete details with 128 total 630-meter contacts. Forty-two were CW, one was RTTY, five were FT4 and 80 were FST4. Jamie Labadia, N2VJ, of Windham, New York, reported 232 CW QSOs on 630 meters with 110 FST-4 QSOs. Jamie also reported experiments with RTTY, PSK-31, and SSTV but found no others to use those modes with while he was testing. Russ Dwarshuis, KB8U, of Ann Arbor, Michigan, reported four QSOs on 2200 meters, two using CW and another two using a hybrid of CW and FST-4. Bob, Johnson, K9KFR, previously mentioned in this month's column, indicated that he completed 97 FST-4 QSOs on 2200 meters and a single CW QSO. During a 160-meter CW QSO with Ken Koyan, K8TV, of Grafton, Ohio, he reported a single QSO with a VE7 stations on 2200 meters for his best DX on the band but he did not note the mode. Context suggests that it was FST-4, however.

At KB5NJD, I had a down season due to less evening activity but great summer activity resulted in 464 two-way CW QSOs on 630 meters. I completed a single 2200-meter FST4 QSO with Keith Ericson, KØKE, of Parker, Colorado.

If you are active on these bands, please keep a log and send me your statistics at the end of the season (August 31st of each year). All of them are important and may inspire someone else to try these bands in the future if they see that reasonable activity exists.

That's all for this month. If you have comments or questions, you can reach me at <KB5NJD@gmail.com>.

Notes:

1. <https://tinyurl.com/yx7vvxeh>

Clark Ackison, AA8SH, of Huntington, West Virginia(s eated at table), made a trip to the Shelby (North Carolina) Hamfest in early September to bolster support for and interest in the Ground Wave Evaluation Network (GWEN) that he spearheaded in spring / summer 2022. Clark indicated that 49 stations showed interest and stopped by to speak with him. Five of those have already submitted their notifications to the Utilities Technology Council (UTC) of their intent to operate on 630 and / or 2200 meters. (Courtesy of AA8SH)

awards

BY STEVE MOLO,* KI4KWR

Is the Tradition of Amateur Radio Awards Disappearing?

Stepping into my virtual time machine and going back over 10 years, you could obtain an award for making contacts with amateurs in many countries. Now, back from the virtual trip to December 2022 and the availability of awards is significantly reduced, but do we know why? What could be the reason for the decline in awards from the past? Have new modes in the amateur radio community created a loss of interest? Are there other factors? Let's look at some possibilities.

Availability of Awards

My research has shown that, prior to 2010, you could find an award for every continent and many countries (most of the exceptions were smaller countries with very small ham populations). Within this search, most of the awards have expired the timeframe they covered, or the award's manager / leadership have become SK. I can understand the loss of time-limited awards, but why did nobody take over the management of long-running awards?

Awards Management

One thing that I would not want to do is insult the management teams of any currently active awards. Managing the awards, reviewing submissions, and sending out certificates does take time and requires volunteers to achieve everything. With some awards having a small group or club that sponsors them, it can be very time consuming to handle the administration and deal with the stress of satisfying everyone submitting.

Could integration into online logs tools like LoTW (Logbook of the World) or QRZ Logbook make confirming an easier process for the awards managers? This does add a layer of need from those two examples that need permissions and approval, but could potentially make awards come back to life.

Paper logs or online log submission no doubt makes the verification process a manual step and requires personnel. Manual processes have been going away in current business daily flows and turned into processes with other systems integration to make such tasks flow quickly. If you are reading this article and support an award in this hobby, could automating the verification process be possible to make your award more readily available? Again, this does require other parties to get involved but can result in greater (and quicker) success for someone seeking the award and reduced stress on the administrators.

Cost of Awards

This could be the sole reason of awards going away for many operators worldwide. The cost of everything in the current climate has gone up, so that is nothing new to anyone. Some awards, past and present, had a small fee of $5 and not mentioning any specific award or the group in charge of awarding it, but one I checked out to obtain for myself would cost over $100. Would automating the award submission and verification process make this go away? Perhaps, in some cases. However, some award sponsors use the funds for printing of award certificates or plaque costs.

Using the FT-8 awards as an example, the system for submitting is streamlined and you just download the award. This is likely the result of collaboration by several web developers working together to make this happen. But when the award is a plaque or a specially designed piece of artwork, that is something you cannot give away for free; it needs to be paid for to cover the cost of managing, creating, and mailing the artwork.

*Email: <KI4KWR@cq-amateur-radio.com>

CQ USA-CA Monthly Update

500 County Level
JH3LIB – Award number 3844 dated October 16, 2022
JS1MRA – Award number 3845 dated October 20, 2022
W8GU – Award number 3846 dated October 21, 2022

1000 County Level
W8GU – Award number 1953 dated October 21, 2022
I2DMI – Award number 1954 dated October 25, 2022
DF1BN – Award number 1955 dated October 28, 2022

1500 County Level
W8GU – Award number 1604 dated October 21, 2022

Are There Too Many Awards?

In no way would this be true, or could it? This seems kind of paradoxical in a column about the shrinking number of available awards, but I guess the real question is whether there are too many options for the awards that are available. Personally, you can never have enough radios so the same should be for awards. But if you have looked at any of the now-possible 80-plus awards available for FT-8 and the other digital modes, you could cover the walls of your radio room with just those. Could the only awards people desire to achieve be the CQ and ARRL options and don't go beyond that? Both organizations have been providing awards for a very long time and it's possible that local Elmers and clubs may only be mentioning them to new award seekers.

Another possibility is changing interests of different generations. It is possible that most current award chasers are from an older generation while "wallpaper" has less interest to the younger hams. If that's the case, how can we change those interests and attitudes?

What Can You Do?

Is this a plea to readers to support chasing awards? Yes, 100%. Obtaining an award is a personal goal but also has benefits of showing that your station is working well and you worked a QSO that not many have the ability to do. Is there a special event or activity coming up in your area for which your club or group might sponsor a short-term award?

Do you belong to an organization that supports an award, and nobody is seeking it? Maybe this is the time to jump start it and revise the application process and make it available for online certificate printing. It could cut costs for printing and mailing on your end and automated submission could be the refresh that is needed. I know there are awards out there that are rare and, with the solar cycle being so good, would make the bands live again. If there was something for just the 10-meter band in this year's CQ World Wide DX Contest, I would bet many of us would have had been eligible for something on that band alone.[1] How amazing it was!

Notes:

1. Editor's note: There sort of already is … all participants in the CQWW who submit logs may download participation certificates regardless of their score (with the temporary exception of stations in Russia and Belarus due to the invasion of Ukraine). So, if you operated single-band on 10 meters and submitted your log, a certificate will be available once the results are finalized.

dx

BY BOB SCHENCK,* N2OO

This month, we head to the North Pole! Well, almost … In September, the Dateline DX Association (DDXA) organized a DXpedition to Svalbard as JWØA. Svalbard is located in the Arctic Ocean, midway between the northern tip of Norway and the North Pole. I hope you enjoy this unique DXpedition to the northernmost permanent settlement on Earth (not counting Santa's workshop – ed.)! – Bob, N2OO

JWØA: On the Road Again, Even if There Are … Polar Bears!

BY TOM HARRELL, N4XP; NATHAN WOOD, K4NHW; AND GREGG MARCO, W6IZT

Dateline DX Association (DDXA <www.ddxa.net>) members have traveled the world … well, almost. They have operated from 9MØ to BS7 to BV9 to C9, ZS8 and FT5 to HKØ and YVØ, to KH1, KH4, KH5K and KH9, to KP1 and KP5, VKØH, VP8O and ZD9, among many other needed entities. But not to the Arctic! After the long Covid period of non-existent DXpeditions, it was decided that DDXA was going north. It was also decided that this operation would be different — for once, no boats, no packing and carrying hundreds of pounds of equipment, no horrible food and sleeping in tents or on coral reefs. Most important, no years of trying to get permission! The map was studied, and it was quickly realized that the ideal location for this trip was SVALBARD.

Svalbard

The Norwegian archipelago of Svalbard is a string of seven islands above the Arctic Circle, 400 miles north of the tip of Norway and 650 miles from the North Pole (*Photo A*). At 78° north latitude, the island of Spitsbergen is the most northern populated community with a year-round population of some 2,600, virtually all living in or around Longyearbyen, the island's largest settlement. Svalbard is a popular tourist location and swells in population nine months of the year. For DXCC, this island group is a separate entity falling under the Norwegian callsign block as JW. Planning started in late 2021 with a core team of DDXA regulars.

It was quickly learned all requirements could be met — fly in/out, local lodging and restaurants with hospital and other personal needs readily being available. However, most importantly, the well-known and well-equipped JW5E club station is located on the fjord at the edge of the settlement. JW5E rents its facilities with almost all that is needed to operate for an extended period. Based on these important requirements, more serious planning was initiated and late September 2022 was selected as the timeframe for the operation. This period was considered to provide acceptable weather with temperatures averaging +2° to +6°C (35°-43°F) with a good ratio of daylight to darkness. Once the station was reserved, it was decided the Norwegian government would be petitioned for a unique JW license. On February 28, 2022, the group was issued JWØA and DDXA was fully committed.

During a Zoom meeting with the club custodian, Peter, JW7QIA, it was learned that *polar bears* live in the region and that if one leaves the limits of the settlement, you must carry a long-barreled weapon just in case. At that point, planning took a pause. However, like any hard-nosed DXers, we quickly cast those concerns aside and the race was on!

As with most DXpeditions, team makeup changes over time but planning continued and the final team was formed with Tom Harrell, N4XP, a founding DDXA member, plus Joe Blackwell, AA4NN; Rigo Diaz, HI8RD, and his XYL, Annie

Photo A. Located north of the Arctic Circle, Svalbard is quite far from just about everywhere! (All photos courtesy the JWØA team)

*email: <n2oo@comcast.net>

Gonzalez, HI8ADD; Nathan Wood, K4NHW; Rick Boulis, N4HU; David Johnson, WB4JTT/KH6; Gregg Marco, W6IZT; Hal Turley, W8HC, and Ramón Pérez Brett, YV5EED (*Photo B*). Another DDXA first was the accompaniment of two XYLs, one licensed YL and a non-ham friend, Raymond, an acquaintance of N4XP.

With the operation scheduled for September 19th to 28th, travel was planned for the team to meet in Oslo, Norway, the only departure point for JW, on September 17th with the flight to Svalbard the following morning. As it turned out, two of the team members would not be able to arrive on that date but would arrive the next day.

As these operational plans were being made, six members elected to depart early and visit Stockholm and Helsinki before meeting the full team in Oslo. N4XP, K4NHW, AA4NN and XYL Margaret, N4HU and team friend Raymond would visit SM5COP and XYL SM5NZG, and SM5AQD and XYL Gun, before proceeding to Helsinki

Photo B. The JWØA team … Rear, from left: David, WB4JTT; Rick, N4HU; Tom, N4XP; Gregg, W6IZT; Nathan, K4NHW; Hal, W8HC; Joe, AA4NN; Annie, HI8ADD, and Margaret. Front row, from left: Beth, Raymond, Raymon, YV5EED; and Rigo, HI8RD.

Photo C. The main tower at JW5E is 26 meters/85 feet high. See text for antenna details.

CQ DX Awards Program

No Update

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. We recognize 341 active countries. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

where they would spend the day with OH2BH and XYL, as well as OH2BAD and OH2BAI.

The team met as planned in Oslo with a departure for JW on September 18th. After meeting with Erling, LA6VM, and Just, LA9DL, W6IZT and W8HC soon followed and arrived on Svalbard on September 19th. Then the fun began!

Getting Up and Running

When the team arrived on Sunday, they were met with fairly mild weather and clear skies. Only one night did it drop below -3°C with light snow flurries and only one day with rain. Light snow on the ground was present everywhere except on the roads, but the rain washed it all away.

Upon arrival, host Peter, JW7QIA, gave the team a station orientation with a detailed description of the available antennas and expectations for propagation. When speaking about the expected propagation, the news was not full of warm fuzzies. Polar flutter, aurora noise, and one-way propagation were some of the common experiences from being so close to the North Pole. On the bright side, the antennas were very diverse with an easy switching system, band-pass filters for every band, and the coffee was only a few feet from the operating positions.

Just behind the shack was a 26-meter (85-foot) high tower (*Photo C*) that was the support for a JK Navassa that was capable of operation on 10, 12, 15, 17, and 20 meters and a JK 40-meter rotating dipole; sloping dipoles for 30 and 60 meters; an 80-meter inverted-V; and a 160-meter double-L. The team came prepared with their own equipment including Elecraft K3s transceivers and KPA500 amplifiers (*Photo D*). It wasn't

The WAZ Program

SINGLE BAND WAZ

6 Meters

198 ..... DK8MCT, 25 Zones
199 ..... DL4CW, 25 Zones
200 ..... NØTB, 7 Zones

20 Meter SSB

5545 ..... N9FDE

30 Meter Digital

18 ..... K3EA
19 ..... N6PAT

40 Meter SSB

125 ..... K3LR

160 Meters

698 ..... SP6CZ, 38 Zones

ALL BAND WAZ

CW

1212 ..... NE6I

Digital

394 ..... VA3VF
395 ..... OK1NF
396 ..... NN4EE

Mixed

10318 ..... N5YT
10319 ..... W2DGU
10320 ..... VA3VF
10321 ..... N9FDE
10322 ..... OZ2PM
10323 ..... W3TW
10324 ..... EB7EBL
10325 ..... 8P6NW
10326 ..... WP3AV
10327 ..... NN4EE
10328 ..... N4UFP

SSB

394 ..... VA3VF
395 ..... OK1NF
396 ..... NN4EE

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, Jose Castillo, N4BAA, 6773 South State Road 103, Straughn, IN 47387.. 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 Jose Castillo, N4BAA. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <n4baa@cq-amateur-radio.com>.

The WPX Program

CW

4067 ..... N7ZUF

SSB

4442 ..... DD5VL
4443 ..... RQ7L
4444 ..... N8CWX

Mixed

4487 ..... W4GOV
4488 ..... KB1UZ
4489 ..... K9SUL
4490 ..... KB3N
4491 ..... N2KHH
4492 ..... K5VG
4493 ..... IZ1CQN
4494 ..... N2CR
4495 ..... W7TMD
4496 ..... W1FOX
4497 ..... JA1KPF
4498 ..... IU2PAA
4499 ..... N1QKD
4500 ..... KT4WM
4501 ..... CE2EP

Digital

1818 ..... JP1GHJ
1819 ..... SV1OCA
1820 ..... W4GOV
1821 ..... KB1UZ
1822 ..... KE7IN
1823 ..... DL1LTG
1824 ..... W7AJC
1825 ..... IU4AAJ
1826 ..... W5FO
1827 ..... YDØBJJ
1828 ..... KD5DDV
1829 ..... KB3N
1830 ..... N2KHH
1831 ..... K5VG
1832 ..... N2CR
1833 ..... IU2PAA
1834 ..... N6TVC
1835 ..... IZ2PRI
1836 ..... JL1RTG
1837 ..... K1MNT
1838 ..... ON4APU
1839 ..... K9AAN

CW: 350: N9UNX. **400:** VE3FAC. **2000:** WA6KHK. **5200:** W8IQ.

SSB: 500: K6VHF, WA3RGH. **650:** DD5VL. **950:** DL6JZ. **1000:** N7ZUF. **1950:** WA6KHK.

Mixed: 400: KB3N. **450:** N2KHH, N1QKD, KT4WM. **500:** AB9BH, VE3FAC, W8BO, N9UNX, W1FOX. **600:** JP1RLN, WA3RGH, K5VG. **650:** N1IVY, JP1RLN, W7ONY. **750:** W4GOV, KD2RUY. **800:** VK3PIA. **900:** DL5KLX. **1000:** JG1JPE, N6DSC. **1100:** JG1JPE. **1150:** KM4VI. **1350:** M7ZUF, IK8FLW. **1500:** N8IK, K9AAN. **1900:** PU4MMZ. **2200:** NKØS. **2450:** N6PM. **2500:** WA6KHK. **2700:** AE5B. **6100:** ON4APU.

Digital: 350: N1IVY, KE7IN, KB3N. **400:** AB9BH, W8BO, N2CR, IU2PAA, JL1RTG. **450:** DL1LTG, N2KHH, K5VG. **600:** JP1RLN, W7ONY. **650:** JP1RLN. **750:** W4GOV, KD2RUY, IZ2PRI. **800:** N7ZUF, VK3PIA. **850:** DL5KLX. **1000:** JG1JPE, N8IK, N6DSC. **1100:** SV1OCA, JG1JPE, AE5B, KM4VI. **1150:** G8GNI. **1350:** NKØS. **1450:** KC1UX. **1500:** K9AAN. **1700:** K6VHF. **1750:** PU4MMZ. **1800:** WD8ANZ, ON4APU. **1950:** W9VOB. **2100:** AA8SW. **2300:** N6PM.

160 Meters: G8GNI, W7TMD, K9AAN
80 Meters: K9AAN
40 Meters: N7ZUF, W8BO, N9UNX, IU2PAA, IZ2PRI
30 Meters: JG1JPE, N8IK, DL5KLX, K9AAN
20 Meters: JG1JPE, N7ZUF, SV1OCA, W4GOV, WA3RGH, KB3N, N2KHH, KT4WM
17 Meters: JP1RLN, JG1JPE, AB9BH, N8IK, K9AAN
15 Meters: JG1JPE, N7ZUF, JP1RLN, YDØBJJ, W7ONY, JA1KPF, K9AAN
10 Meters: K9AAN
6 Meters: DL6JZ, G8GNI

Asia: N8IK, N7ZUF, JP1GHJ, YDØBJJ, JA1KPF, JL1RTG, K9AAN
Europe: JP1RLN, N7ZUF, DD5VL, VE3FAC, W4GOV, DL1LTG, IU4AAJ, YDØBJJ, KB3N, N2KHH, K5VG, IZ1CQN, N2CR, W1FOX, IU2PAA, IZ2PRI, K9AAN
Oceania: N7ZUF, N7ZUF, W9VOB, VK3PIA. JA1KPF, JL1RTG
North America: JG1JPE, DL6JZ, N7ZUF, W4GOV, KB1UZ, KE7IN, W7AJC, W5FO, KD5DDV, K9SUL, K5VG, VK3PIA, DL5KLX, N2CR, W7TMD, N8CWX, W1FOX, N6TVC, K1MNT, N1QKD, KT4WM, K9AAN
South America: DL6JZ, N8IK, CE2EP, K9AAN

Award of Excellence: TF3JB
160M Bar: TF3JB
30M Bar: TF3JB
17M Bar: TF3JB
12M Bar: TF3JB
6M Bar: TF3JB
Digital Bar: TF3JB

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.

long before the team was on the air and making contacts (*Photos E, F, G*). The first QSO was with VK4FB on September 19th at 1344 UTC.

The team of nine ops was split into three shifts of three ops each that rotated 3-4 hours of operating time around the clock. This allowed for comfortable chair time and at least six hours of rest in between shifts. The schedule was also designed to let each shift see different times of the day/night and experience a variety of propagation to various parts of the world. When the bands were good, SSB and CW were utilized as much as possible. On bands that were challenging, FT8 was a great alternate to continue making Qs.

Toward the middle of the trip, the noise of the northern lights reared its ugly head. It was loud and harsh at S9+! In trying to escape the QRN, the JK Navassa and the 40-meter dipole were rotated in all directions. It became evi-

5 Band WAZ

As of October 20, 2022
2417 stations have attained at least the 150 Zone level, and
1108 stations have attained the 200 Zone level.

As of October, 2022
The top contenders for 5 Band WAZ (Zones needed on 80 or other if indicated):
CHANGES shown in **BOLD**

Callsign	Zones	Zones Needed
AK8A	199	17
DM5EE	199	1
EA5RM	199	1
EA7GF	199	1
H44MS	199	34
HAØHW	199	1
HA5AGS	199	1
I5REA	199	31
IKØXBX	199	19 on 10M
IK1AOD	199	1
IZ3ZNR	199	1
JA1CMD	199	2
JA5IU	199	2
JA7XBG	199	2
JH7CFX	199	2
JI4POR	199	2
JK1AJX	199	2 on 10M
JK1BSM	199	2
JK1EXO	199	2
K1LI	199	24
K1OA	199	28
K3LR	199	23
K4HB	199	26
K5TR	199	22
K7UR	199	34
KZ4V	199	26
N3UN	199	18
N4NX	199	26
N4WW	199	26
N4XR	199	27
N6PF	199	23 on 10M
N8AA	199	23
N8DX	199	23
N8TR	199	23 on 10M
RA6AX	199	6 on 10M
RU3DX	199	6
RW0LT	199	2 on 40M
RX4HZ	199	13
RZ3EC	199	1 on 40M
S58Q	199	31
SM7BIP	199	31
SP9JZU	199	19 on 10M
US0SY	199	1 on 15M
VK3HJ	199	34
VO1FB	199	19
W1FJ	199	24
W1FZ	199	26
W3LL	199	18 on 10M
W3NO	199	26
W4LI	199	26
W6DN	199	17
W6RKC	199	21
W6TMD	199	34
W9OO	199	18 on 10M
W9XY	199	22
9A5I	198	1, 16
AB4IQ	198	23, 26
DL6JZ	198	1, 31
EA5BCX	198	27, 39
F5NBU	198	19, 31
F6DAY	198	2 on 10M & 15M
G3KDG	198	1, 12
G3KMQ	198	1, 27
HB9FMN	198	1 on 80M & 10M
I1EIS	198	1 & 19 on 10M
JA1DM	198	2, 40
JA3GN	198	2 on 80M & 40M
JA7MSQ	198	2 on 80M & 10M
JH1BNC	198	2 on 80M & 10M
JH1EEB	198	2, 33
KØDEQ	198	22, 26
K1BD	198	23, 26
K2EP	198	23, 24
K2TK	198	23, 24
K3JGJ	198	24, 26
K3WA	198	23,26
K3XA	198	23,34
K4JLD	198	18, 24
K9MM	198	22, 26
KI1G	198	24, 23 on 10M
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Z31RQ	198	1, & 2 on 10M
ZL2AL	198	36, 37

The following have qualified for the basic 5 Band WAZ Award:

Callsign	5BWAZ #	Date	# Zones
VA3VF	2413	10/04/2022	157
IT9DAA	2414	10/09/2022	178
JA3ENN	2415	10/10/2022	199
8P6NW	2416	10/15/2022	154
YB2DX	2417	10/15/2022	189

Updates to the 5BWAZ list of stations:

Callsign	5BWAZ #	Date	# Zones
HI3T	2318	8/19/2021	190
IK5ZUK	1908	6/8/2015	196
K3LR	2051	6/22/2018	199

New recipients of 5 Band WAZ with all 200 Zones confirmed:

5BWAZ #	Callsign	Date	All 200 #
None			

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, Jose Castillo, N4BAA, 6773 South State Road 103, Straughn, IN 47387. 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 Jose Castillo. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N4BAA may also be reached via email: <n4baa@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).**

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dent very quickly that the northern lights were indeed *south* of the station! On another night while working 40-meter SSB, a relay was made of an Antarctic station trying to break through the pileup reporting JWØA at 20 over S9! Everyone was asked to stand by for the other polar station but to no avail. These were indeed the things that the team was warned about before the first QSO.

In between shifts, the team also made sure to enjoy the breathtaking views of the snowcapped mountains and visit the tourist spots for which Svalbard is known. The team visited the local shops, the world's northern most fuel station, the Svalbard Museum, the Global Seed Vault (*Photo H*) and the North Pole Expedition Museum (*Photo I*). And above all enough cannot be said about the quality and variety of the local food — let's just say no one went hungry.

Even walking around the streets of the small community, an encounter with a reindeer (*Photo J*) or a snow fox was quite common. Luckily, no encounters with the polar bears were reported, although it was very common to see "friendly" ones posed on the airport luggage carousel (*Photo K*), standing in the corner of the hotel lobby, or pulling a chair up to the world's northernmost bar.

Trips such as this typically do not go off without their fair share of problems. Svalbard was no exception. Between two pieces of lost/late luggage, minor equipment malfunctions, RFI and adjusting to the 6+ hour time change, the team came together and made it happen just like seasoned DXpeditioners always do.

Although overall the operation was smooth, several problems did occur healthwise and caused concern for the entire team. Two ops came down with typical winter congestion issues and caused them to be room-bound for several days.

Photo D. Team members brought their own rigs – Elecraft K3s transceivers and KPA500 amplifiers.

Photo F. Nathan Wood, K4NHW, handling a pileup on SSB.

Photo E. Team member Joe Blackwell, AA4NN, operating CW on 20 meters.

Photo G. Team leader and Dateline DX Association founding member Tom Harrell, N4XP, working the world.

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.

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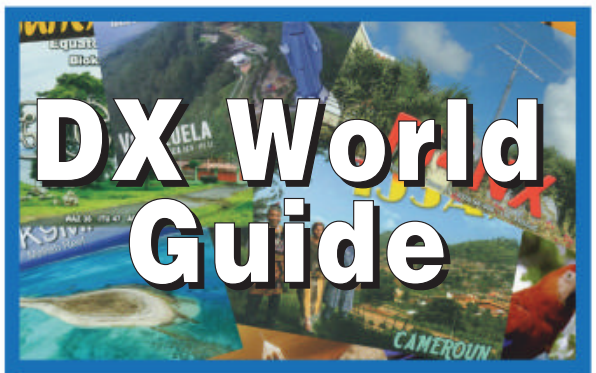

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By Franz Langner, DJ9ZB

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But in the end, everyone was feeling pretty good by the time ramp down started on Sunday afternoon. Our last QSO was with R3MAJ on September 25th at 1506 UTC.

Teardown plans were to be totally packed and ready to leave for the airport by late Sunday night. Once that was accomplished, the station and its surroundings were cleaned and returned to the conditions that were in place when the team arrived.

The schedule for departure to Oslo for nine team members was noon on Monday. The remaining four would then depart on Wednesday. The return home — although long — took place without difficulty.

JWØA completed almost 14,000 QSOs over six days while operating two stations 24/7 and a third when conditions demanded it with 8 to 9 operators. It is hoped that all who called were able to enjoy a QSO. QSL to K4NHW.

Photo H. Non-radio visits included a stop at the Svalbard Global Seed Vault, a repository of seeds from over 5,000 plant species, an effort to preserve biodiversity in the event of an ecological disaster. It is built into solid rock. See <www.croptrust.org> for more information.

Photo J. It's December, so we have to include a photo of a local reindeer (it's unclear whether this one can fly!). They are a common sight on the streets in Svalbard.

Photo I. Another tourist stop for the DXpeditioners was the North Pole Expedition Museum in Longyearbyen. For more info, visit <northpolemuseum.com>.

Photo K. The group was relieved that the only polar bears they saw in Svalbard were "friendly" ones, such as this one at the airport.

contesting

BY TIM SHOPPA,* N3QE

Topband, Ten and CWT

The first two weekends of December feature two single-band contests sponsored by the American Radio Relay League: the **ARRL 160-Meter** and **10-Meter** contests. There are several new rules for 2022, including a 100-watt power limit for those entering in the low power classes, and an allowance for multi-operator and Unlimited (also known as "Assisted") operators to use social media to promote the contests. Find the new rules at the ARRL contest portal, <https://contests.arrl.org>.

Band Usage Recommendations for the ARRL 160-Meter Contest

For much of the 20th century, usage of the 160-meter spectrum inside the U.S. was complicated by detailed regional restrictions on frequency and power usage consistent with amateur radio's secondary status relative to the primary user, the LORAN radio navigation system. As medium-frequency radionavigation systems have been retired worldwide and replaced by GPS (UHF) technologies, nearly all of these 160-meter restrictions have been lifted.

Prior to 2020, the ARRL 160-Meter Contest rules had specifically called for the section of the band between 1830 and 1835 kHz to be reserved for DX-to-W/VE QSOs. As contesting on topband grew in popularity, this "DX Window" was increasingly being used for domestic, not DX, contacts. Starting with the rules for the December 2020 running of the ARRL 160, this section of the rules was removed.

Despite these simplifications in regulations, it makes sense to check out the frequency usage in this contest where W and VE stations work each other as well as DX stations working only W/VE's. *Figure 1* shows the 160-meter band usage gleaned from public logs from the 2020 and 2021 ARRL 160-Meter Contests as a histogram, broken down by 1-kHz frequency bins. You'll notice the bulk of the activity is made up of 2-point QSOs between W/VE and other W/VE stations, shown in green. There is some DX to work, and the high 5-point QSO value for DX QSOs is highlighted as the red part of the histogram bar. Many of the 5-pointers will, of course, also be a multiplier with a new DX country for you.

Note that the bottom of the band — between 1800 and 1810 kHz — is part of the spectrum where ITU Region 1 amateurs — mostly Europe and Africa — are not authorized to transmit. Logcheckers in all 160-meter contests now will remove QSO point and multiplier credit with ITU Region 1 hams who ignore their frequency allocation limits. Especially in the ARRL 160-Meter Contest, there will be some DX for U.S. and Canadian stations to work at the bottom of the band, most notably Caribbean contest stations. In fact, Caribbean stations will often avoid the QRM higher in the band and prefer

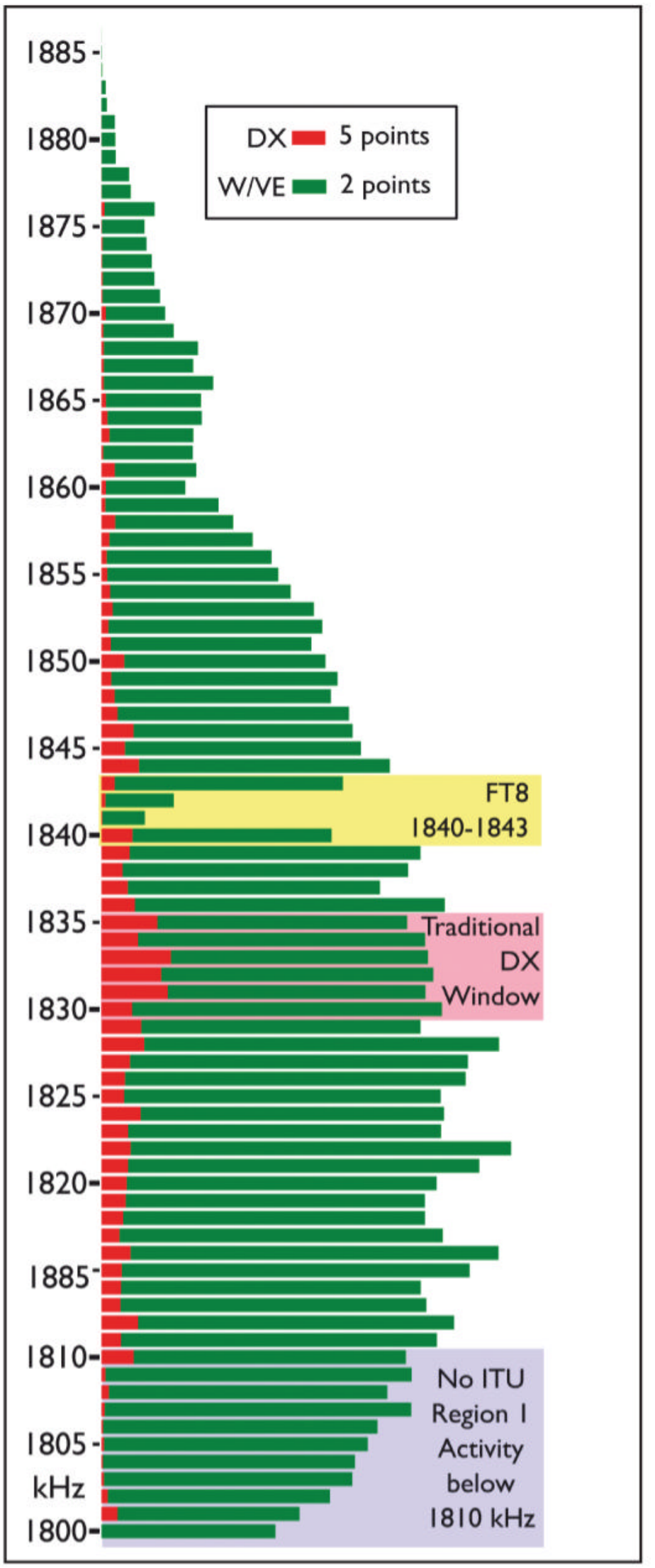


Figure 1. Histograms of domestic (green) and DX (red) activity for each kHz of spectrum in the ARRL 160-Meter Contests, summed over 2020 and 2021. (Data from ARRL Contest Portal public logs)

email: <n3qe@cq-amateur-radio.com>

to operate below 1810 kHz because there is less congestion down there.

Farther up the band on *Figure 1*, note a slight enhancement shown in red for DX QSOs completed in the traditional DX Window between 1830 and 1835 kHz. Even though the DX Window no longer appears in the rules, some DX operators in particular will still set up in this traditional window.

A drastic change in 160-Meter activity in the past several years is the always-present FT8 digital mode occupying the spectrum between 1840 and 1843 kHz. Every 15 seconds, you'll hear a second or two of apparent vacancy as the FT8 odd / even slices switch over; you might briefly think that you could set up and call CQ there. You will be disappointed by any attempt you make at CW contesting in this digital part of the spectrum, and instead you should look higher in the band for a more productive and less congested frequency.

It can be hard to overcome the psycho-acoustical barrier of the digital mode signals around 1840 kHz, but there certainly is activity in the big CW topband contests all the way up to 1880 kHz. You may find some local SSB or AM ragchewers who make some frequencies less desirable than others. I've noticed that prominent 160-meter DX stations often call CQ and have great transatlantic success above 1860 kHz, and I've taken advantage of that myself during particularly good European openings.

Sunspots Will Entice You to the ARRL 10-Meter Contest

In my December 2021 ARRL 10-Meter Contest log, I see that I made no contacts with Europe. The DX I worked was all to the south, including a handful of QSOs between my location in Maryland and stations in Africa. This 2021 running was held on a weekend when the Solar Flux Index (SFI) was under 100.

In the fall of 2022, the solar flux index (SFI) has often been well over 125, and 10-meter activity has been booming. Using just my wire antenna in the trees, I found the 10-meter band incredibly productive for several hours each day to Northern Europe in the Worked All Germany contest in early October.

You may prefer CW over SSB in this contest because each CW QSO is worth twice the points of a SSB QSO. Keep in mind that multipliers are per mode, so by using both CW and SSB, you'll be able to rack up nearly twice as many multipliers and nearly twice the score, with just a little effort.

A Meta-Analysis: CWOps CWT Scores vs. Reversebeacon Statistics

Pete Smith, N4ZR, and I have been discussing the CWOps CWT (CW Test) events as a microcosm of contest activity. I've previously recommended these four 1-hour CW sessions, held each Wednesday, for the practice they give in CW and contesting techniques. Several hundred operators show up for one or more of the sessions each Wednesday to exercise their stations and their skills, and submit their scores to the <https://3830scores.com> website. You can learn more about the CWTs, and CWOps' broader mission of promoting CW activity, at the CWOps website, <https://cwops.org>.

Pete has been most interested in the mix of running (calling CQ) and search-and-pounce behavior in the CWT. I did a deep dive into the reversebeacon data collected from CW skimmers across the world recording on-air CQ activity dur-

Calendar of Events

All year	**CQ DX Marathon**	**http://bit.ly/vEKMWD**
Dec. 1	QRP ARCI Top Band Sprint	www.qrparci.org/contests
Dec. 2-4	ARRL 160-Meter Contest	www.arrl.org/160-meter
Dec. 3-4	PRO CW Contest	https://tinyurl.com/5n9atwxx
Dec. 3-4	FT Roundup	https://tinyurl.com/yc885v42
Dec. 3-4	UFT Contest	https://tinyurl.com/we863yfa
Dec. 7	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Dec. 10-11	ARRL 10M Contest	www.arrl.org/10-meter
Dec. 10-11	Vernon 28 MHz SWL Contest	http://bit.ly/2L9eT1L
***Dec. 10-11	TRC Digi Contest	https://trcdx.org/rules-trc-digi **CANCELED**
Dec. 10-12	PODXS070 Club Triple Play Low Band Sprint	http://bit.ly/2Cq2yUA
Dec. 11	CQC Great Colorado Snowshoe Run	https://tinyurl.com/mw9ufvjk
Dec. 11	QRP ARCI Holiday Spirits Homebrew Sprint	www.qrparci.org/contests
Dec. 14	VHF-UHF FT8 Activity	https://tinyurl.com/bdwvv3d2
Dec. 16	AGB Party Contest	http://ev5agb.com/contest/contests_e.htm
Dec. 17	RAC Winter Contest	www.rac.ca/contesting-results
Dec. 17-18	Croatian CW Contest	www.9acw.org/index.php/rules/english
Dec. 17-18	OK DX RTTY Contest	www.crk.cz/ENG/DXCONTE
Dec. 17-18	Stew Perry Topband Challenge	www.kkn.net/stew/stew_rules.html
Dec. 18	ARRL Rookie Roundup, CW	www.arrl.org/rookie-roundup
Dec. 21	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en/
Dec. 25	RAEM Contest	https://raem.srr.ru/rules
Dec. 26	DARC Xmas Contest	www.darc.de/?id=820
Dec. 30	YOTA Contest	www.ham-yota.com/contest
Dec. 31-Jan. 1	Bogor Old and New Contest	https://orari.or.id/events/list
Jan. 1	AGB New Year Snowball Contest	https://tinyurl.com/2bhzx96n
Jan. 1	AGCW Happy New Year Contest	www.agcw.de/contest/hnyc/hnyc-engl
Jan. 1	AGCW VHF/UHF Contest	www.agcw.de/contest/vhf-uhf
Jan. 1	ARRL Straight Key Night	www.arrl.org/straight-key-night
Jan. 1	QRP ARCI New Year's Day Sprint	http://qrpcontest.com
Jan. 1	SARTG New Year RTTY Contest	www.sartg.com

ing the 1900 UTC CWT session of October 19, 2022. I chose the 1900 UTC session as it has the highest participation of the four CWTs, with 449 scores reported by participants on that particular Wednesday, and good participation across both North America (where it is in the afternoon) and Europe (where it is in the early evening).

The reversebeacon raw data includes many statistics about each skimmer's reception report, including CW speed, time and date, frequency, band, the call of the CQing station, and the callsign of the reversebeacon node. In past columns, I've broken down the data by CW speed and cross-referenced it against the score. In this analysis, I looked at two different measures of the CQing behavior of a station.

The first measure I devised is the number of minutes in the 1900-1959 UTC hour when the call was spotted as CQing. I call this the "runningness." This is a number between 0 (the station was not spotted at all because he didn't CQ) to 60 (was spotted by a skimmer calling CQ in each and every minute in the hour). Note that each individual skimmer in reversebeacon network will only spot a station on the same frequency every 10 minutes. But I have found that over the duration of a contest even as short as the hour-long CWT, there's enough variation between when a skimmer makes it first spot and subsequent spots that spots by different nodes are quickly distributed across the 10-minute re-spotting window. Also note that purely S&P stations will occasionally be spotted, too (usually not more than a couple times per hour), as singleton spots.

The second measure is the number of minutes in the 1900-1959 UTC hour during which the call was spotted by skimmers as calling CQ on two different bands. This measures how often the station is using the advanced contesting technique of *Two Band Synchronized Interleaved QSOs*, so I call this "2BSIQness." The high activity of each CWT, and especially the 1900 UTC CWT which always has multiple open bands, is where many advanced contesters exercise their stations and build their 2BSIQ skills. Note that a station which was not truly 2BSIQ, but just switched CQing from one band to another, might get a count of 1 or 2 by this measure, once for each band change because there would likely be some click minutes where he was CQing on two different bands during his band change.

The two panels of *Figure 2* show scatter plots for each class of station (high power, low power, and QRP), allowing us to compare the CQ behavior vs. score for each type of entry.

The most obvious conclusion from the top panel is that both high-power and low-power entrants with high scores call CQ a lot. Each of the top six high-power scores are seen in the skimmer data calling CQ for at least 50 of the 60 minutes. The adage every contester learned 70 years ago, "If you aren't CQing, you aren't winning!" proves to be true.

We also see there is at least one caveat with reversebeacon data; one station, N4AF manned by long-time contester Howie Hoyt, appears to have a high score but was only seen by skimmers as calling CQ for 13 of the 60 minutes. Howie most often uses a form of CQ in the CWT that is unlikely to be picked up by CW skimmers; he neither includes "CQ" nor "TEST" in his CQ. Howie's common way of calling is simply "N4AF CWT" — a form that is obvious to an operator's ears as a CQ, but doesn't quite meet the syntactical requirements

Jan. 4	UKEICC 80 Meter Contest SSB	https://ukeicc.com/80m-rules.php
Jan. 4	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Jan. 7	ARRL Kids Day	www.arrl.org/kids-day
Jan. 7	PODSX PSKFest	http://bit.ly/2Qv3wkA
Jan. 7-8	Original QRP Contest	www.qrpcc.de/contestrules/index.html
Jan. 7-8	WW PMC Contest	http://bit.ly/2y2QWCc
Jan. 7-8	ARRL RTTY Roundup	www.arrl.org/rtty-roundup
Jan. 7-8	EUCW 160m Contest	www.eucw.org/eu160.html
Jan. 8	DARC 10-Meter Contest	http://bit.ly/2pCiRo1
Jan. 8	Veron SWL New Year Contest	http://bit.ly/2L9eT1L
Jan. 11	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Jan. 14	YB DX Contest SSB	https://ybdxcontest.com
Jan. 14-15	Feld Hell "Low Down" Sprint	https://bit.ly/3eKxi2f
Jan. 14-15	North American CW QSO Party	http://ncjweb.com/naqp
Jan. 14-15	UBA PSK63 Prefix Contest	http://bit.ly/2Oi8fsa
Jan. 18	VHF-UHF FT8 Activity	www.ft8activity.eu/index.php/en
Jan. 21-22	Hungarian DX Contest	www.ha-dx.com/en/contest-rules
Jan. 21-22	North American SSB QSO Party	http://ncjweb.com/naqp
Jan. 21-22	PRO Digi Contest	www.procontestclub.ro/PDC%20Rules.html
Jan. 21-23	ARRL January VHF Contest	www.arrl.org/january-vhf
Jan. 25	UKEICC 80 Meter Contest CW	https://ukeicc.com/80m-rules.php
Jan. 25-26	AWA Linc Cundall Memorial Contest	https://bit.ly/3iDUm34
Jan. 27-29	**CQWW 160M CW Contest**	**http://cq160.com/rules.htm**
Jan. 28-29	AWA Linc Cundall Memorial Contest	https://bit.ly/3iDUm34
Jan. 28-29	BARTG RTTY Sprint	http://bartg.org.uk/wp/contests
Jan. 28-29	REF CW Contest	https://tinyurl.com/p4bbva92
Jan. 28-29	UBA SSB Contest	http://bit.ly/W0gZiE
Jan. 28-29	Veron SLP Contest	http://bit.ly/2L9eT1L
Jan. 28-29	Winter Field Day	www.winterfieldday.com
Feb. 11-12	**CQWW WPX RTTY Contest**	**www.cqwpxrtty.com**
Feb. 24-26	**CQWW 160M SSB Contest**	**http://cq160.com/rules.htm**

of the CW Skimmer software to be automatically spotted.

Also of note in the top panel is that the high-scoring QRP operator, K1DJ, was not spotted calling CQ a single time. The lesson here is that simply calling CQ at low power levels is not necessarily the most effective behavior. W7LG, the second-highest score of the QRP entrants, was spotted calling CQ for 14 of the 60 minutes; I conclude that he was largely S&P for the hour.

The lower panel, showing the measure of 2BSIQ-ness for each score, shows that this advanced contest technique was used by only 13 operators for more than 10 minutes of the event. The top four high-power scores came from N2IC, AA3B, K3WW, and EA1X, all with formidable contest stations and operators often seen at the top of every big domestic and DX contest.

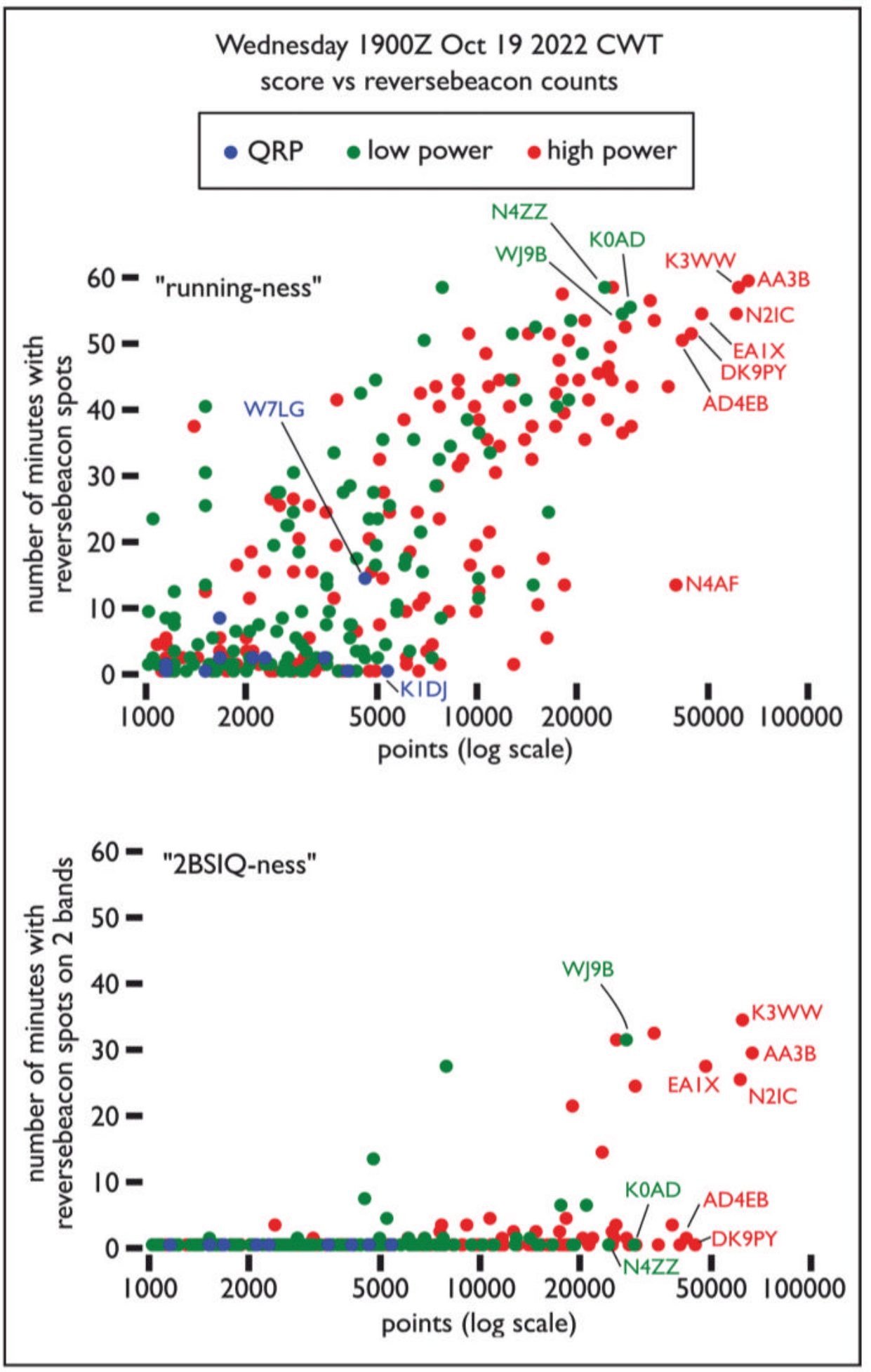


Figure 2. Two scatter plots showing the relationship between CWOps CWT scores and operator CQ activity as recorded by CW skimmers in the Reverse Beacon Network. (Data from <https://reversebeacon.net/raw_data>)

December and January Contest Highlights

The **ARRL 160-Meter Contest** doesn't follow the typical 48-hour contest clock; it starts earlier, Friday December 2nd at 2200 UTC, and runs through Sunday December 4th at 1600 UTC. The **ARRL 10-Meter Contest** is the usual 48-hour format starting at 0000 UTC Saturday December 10th. You can find the newly revised-for-2022 rules for these single-band contests through the ARRL contest portal, <https://contests.arrl.org>.

For those who want more 160-meter action, you will find the second December topband contest, the **Stew Perry Top Band Distance Challenge**, starting at 1500 UTC on Saturday December 17th. The unique scoring format rewards working for distance with additional per-QSO credit for working low power and especially QRP stations. Stew Perry, W1BB (SK), pioneered DXing techniques on the 160-meter band and the Boring Amateur Radio Club holds the "Big Stew" every year near winter solstice. Full rules and entry tips are at <www.kkn.net/stew>.

The same weekend, the Radio Amateurs of Canada holds its 24-hour **RAC Winter Contest**. Starting at 0000 UTC on December 17th (Saturday evening in North America), there is activity on both phone and CW. While this is an everyone-works-everyone contest, there is a large per-QSO point bonus for working Canadians. Find past results and rules at <www.rac.ca/contesting-results>.

The first weekend of January 2023 overlaps New Year's Day and hand-sending CW enthusiasts will find 24 hours of action in the **ARRL Straight Key Night** (which starts on New Year's Eve in North America). The 2023 **ARRL RTTY Roundup** starts Saturday, January 7th and — just like 2022 — this event is RTTY only, no FT4 or FT8. See the ARRL Contest Portal for more information.

Whether you are a new contester or the most experienced 2BSIQ operator, you'll want to mark your calendars for the **NAQP CW** on Saturday, January 14th and **NAQP SSB** on Sunday, January 21st. These events are specifically tailored with a 100-watt power limit to flatten the playing field between average and big stations. In my January column, I'll give operating tips for these events; you can find full rules and past results at <https://ncjweb.com/naqp>.

propagation

BY TOMAS HOOD,* NW7US

The Coronal Veil: Are the Sun's Magnetic Arches an Optical Illusion?

Quick Look at Current Cycle 25 Conditions:
(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, September 2022: **96**
12-month smoothed, March 2022: **69**

10.7-cm Flux:
Observed Monthly, September 2022: **135**
12-month smoothed, March 2022: **112**

One Year Ago:
(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, September 2021: **52**
12-month smoothed, March 2021: **21**

10.7-cm Flux:
Observed Monthly, September 2021: **87**
12-month smoothed, March 2021: **79**

Two Years Ago
(*Illustrating the upward trend of the new cycle*)

Sunspots:
Observed Monthly, September 2020: **1**
12-month smoothed, March 2020: **3**

10.7-cm Flux:
Observed Monthly, September 2020: **71**
12-month smoothed, March 2020: **70**

When you view the Sun through protective eyewear (see, for example: <https://amzn.to/3N0MIAD> – *remember to never look directly at the Sun without proper protection, as the Sun can irreversibly damage your eyes, causing blindness*), the Sun appears blank and featureless. However, when we view the Sun through a solar telescope in a different wavelength, there is much more going on than meets the naked eye.

When we view the Sun in extreme ultraviolet light (EUV), the Sun resembles a rumpled ball of yarn. It bristles with giant radiant arcs known as *coronal loops* soaring through the Sun's *corona*, or outer atmosphere. Coronal loops are considered fundamental to the Sun's workings. Understanding how they form, change, and move is one of the key goals to understanding our closest star.

Solar physicist Anna Malanushenko and her co-authors argue in a recent research paper in *The Astrophysical Journal* <https://tinyurl.com/ycyry4fe> that some coronal loops may not be what they appear to be. Instead, coronal loops may sometimes be optical illusions created by folds or wrinkles in much larger *sheets* of solar material that the authors call *coronal veils*.

"If this is really correct, then we will have to change the entire way we look at and interpret coronal loops," said Malanushenko, a scientist at the National Center for Atmospheric Research in Boulder, Colorado, and lead author of the research paper.

Scientists have hypothesized on the loops' structure ever since capturing the first images of coronal loops in the late 1960s. The model in vogue saw them as magnetic *tubes* formed by the Sun's magnetic field lines, which are invisible. What we see in the EUV view is the bright solar material that flows through them like water through a garden hose. This "garden hose" model of coronal loops fits well with known physics. Why should we doubt the established science? Because, eventually, observations that didn't fit began to stack up as evidence against that model.

** P.O. Box 110*
Fayetteville, OH 45118
Email: <nw7us@nw7us.us>
@NW7US (https://Twitter.com/NW7US)
@hfradiospacewx (https://Twitter.com/HFRadioSpaceWX)

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for December 2022

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 4-7, 11-15, 19-20, 22, 31	A	A	B	C
High Normal: 1-2, 10, 17, 21, 23, 25-26, 28-29	A	B	C	C-D
Low Normal: 8-9, 27	B	C-B	C-D	D-E
Below Normal: 3, 16, 18, 24, 30	C	C-D	D-E	E
Disturbed: n/a	C-D	D	E	E

Where expected signal quality is:
A--Excellent opening, exceptionally strong, steady signals greater than S9
B--Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C--Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D--Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E--No opening expected.

HOW TO USE THIS FORECAST

1. Using the Propagation Charts appearing in "The CQ Shortwave Propagation Handbook, 4th Edition," by Carl Luetzelschwab, George Jacobs, Theodore J. Cohen, and R. B. Rose.

a. Find the *Propagation Index* associated with the particular path opening from the **Propagation Charts**.

b. With the *Propagation Index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the **Propagation Charts** with a *Propagation Index* of **3** will be good on December 1st and 2nd, poor to fair on December 3rd, then excellent from December 4th through December 7th, and so forth.

2. Alternatively, you may use the *Last-Minute Forecast* as a general guide to space weather and geomagnetic conditions throughout the month. When conditions are *Above Normal*, for example, the geomagnetic field should be quiet, and space weather should be mild. On the other hand, days marked as *Disturbed* will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these geomagnetic conditions. In general, when conditions are *High Normal* to *Above Normal*, signals will be more reliable on a given path, when the ionosphere supports the path that is in consideration. This chart is updated daily at <https://SunSpotWatch.com> provided by NW7US.

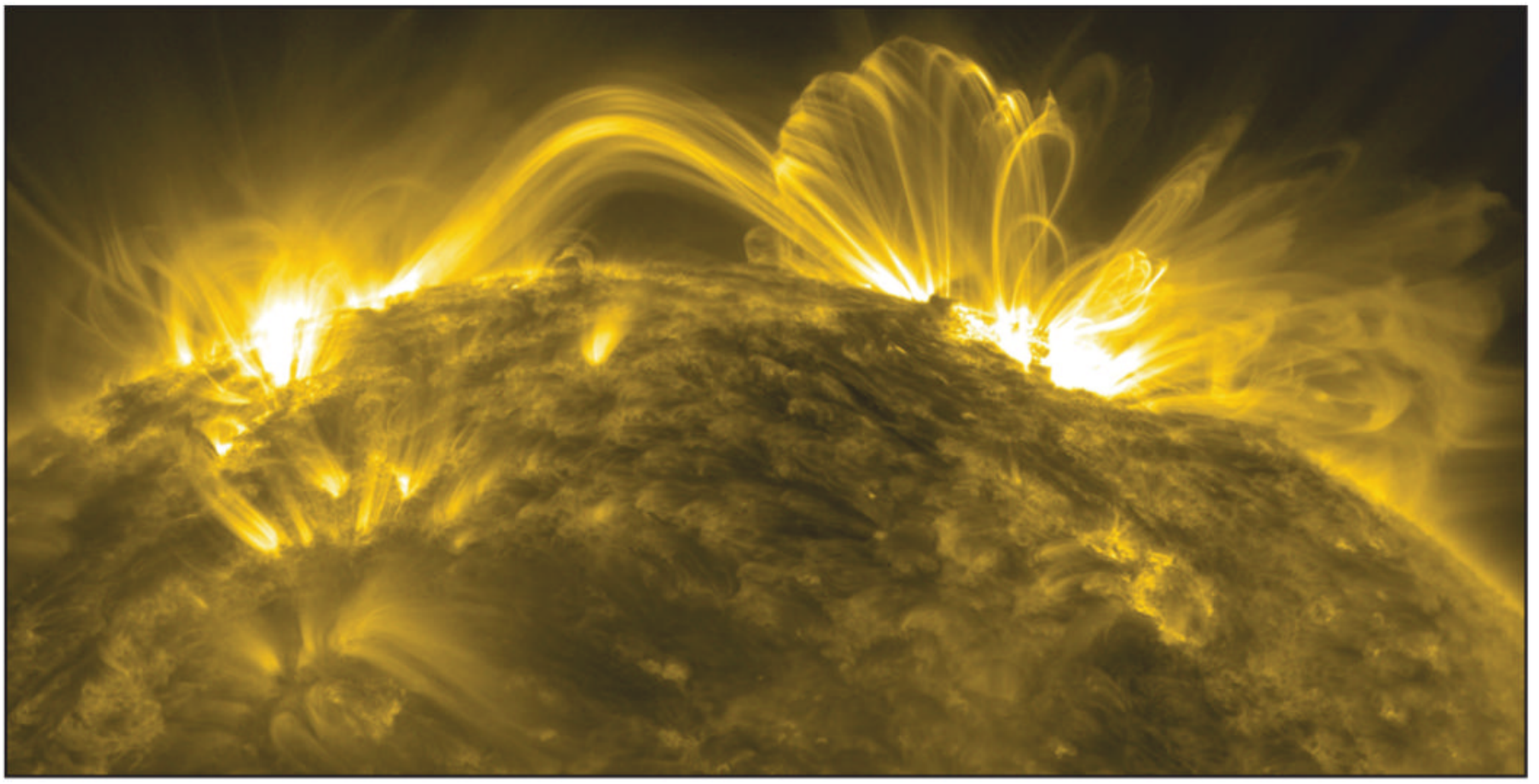


Photo A. Coronal loops on the Sun are captured in ultraviolet light using the 171-ångström channel of the Atmospheric Imaging Assembly (AIA) instrument on NASA's Solar Dynamics Observatory. (Courtesy of NASA/SDO)

In the same way as Earth's air gets thinner at higher altitudes, the Sun's bright plasma, or electrically charged gas, gets thinner with height. That's why the plasma grows dimmer with height. If coronal loops are tubes of plasma, so should they. But many loops maintain a consistent brightness, with no obvious explanation.

Add to that, coronal loops don't expand as they move away from the Sun, riding the magnetic field that expands to fill space. "But they don't get nearly as wide as we think they should," Malanushenko said. "Most of them stay too thin and we don't understand why."

Because of this mystery, Malanushenko questioned the observations themselves. She wanted to understand the optical tricks that could occur in that kind of environment.

Malanushenko simulated the process of observing coronal loops with a computer. She repurposed a 3-D simulation of the Sun originally used to study flares, then wrote a program to observe it. The resulting simulation comprising many 2-D images revealed bright arcs. These were artificial coronal loops on a simulated Sun.

But unlike the real Sun, Malanushenko could pause the simulated Sun and look at its 3D structures behind them. She found something markedly different from tubes predicted by the model.

"I don't have words how to describe it, because this is not like anything that we see on Earth," said Malanushenko, "I want to say this formation looks like clouds of smoke, or maybe a veil or curtains that are wrinkled."

Malanushenko created a simple model to illustrate how a veil could produce the illusion of coronal loops. The shadow created against the wall represents the 2-D image we see in solar telescopes. The veil's folds and wrinkles create a pattern of darker and brighter strands, in some ways similar to the image cast by real tube-like strands.

"But many of the strands that you see here, they're just a projection effect. They're not real," Malanushenko said.

Note that not all coronal loops are visual illusions. There were many instances where hose-like structures do

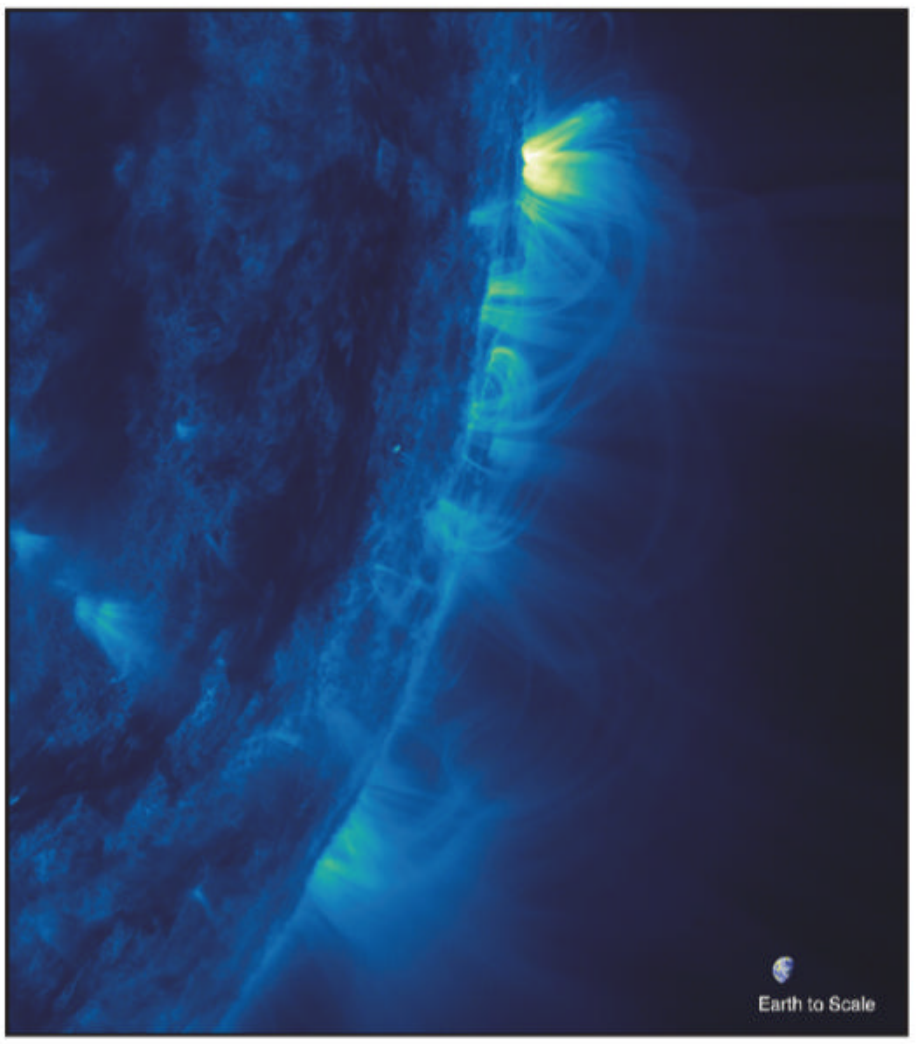


Photo B. This ultraviolet image of coronal loops on the Sun was taken using the 335-angström channel of the Atmospheric Imaging Assembly telescope on NASA's Solar Dynamics Observatory. Earth is shown to scale. The image shows solar plasma at temperatures around 4.5 million° F (2.5 million° C) colorized in blue. In this image, loops extend far from the solar surface without expanding much with height, which is counter to the expected physics according to the "garden hose" model of coronal loops. (Courtesy of NASA/SDO)

really form, even in the simulation that Malanushenko studied.

"It would be exciting if we could say, 'our thinking was all wrong, we have a totally new paradigm,'" said Jim Klimchuk, a solar physicist at NASA's Goddard Space Flight Center and coauthor of the paper. "It's not that way at all, but these veils, I'm sure they do exist, and now it's a question of proportions: Are veils more common or are loops more common?"

This begs for more research.

"Now, do we have any idea why those veil structures are produced?" asked Malanushenko. "No! We literally just discovered them. Now we need to explain them, and we don't have a good explanation yet."

Stay tuned for updates and other space weather and radio propagation information.

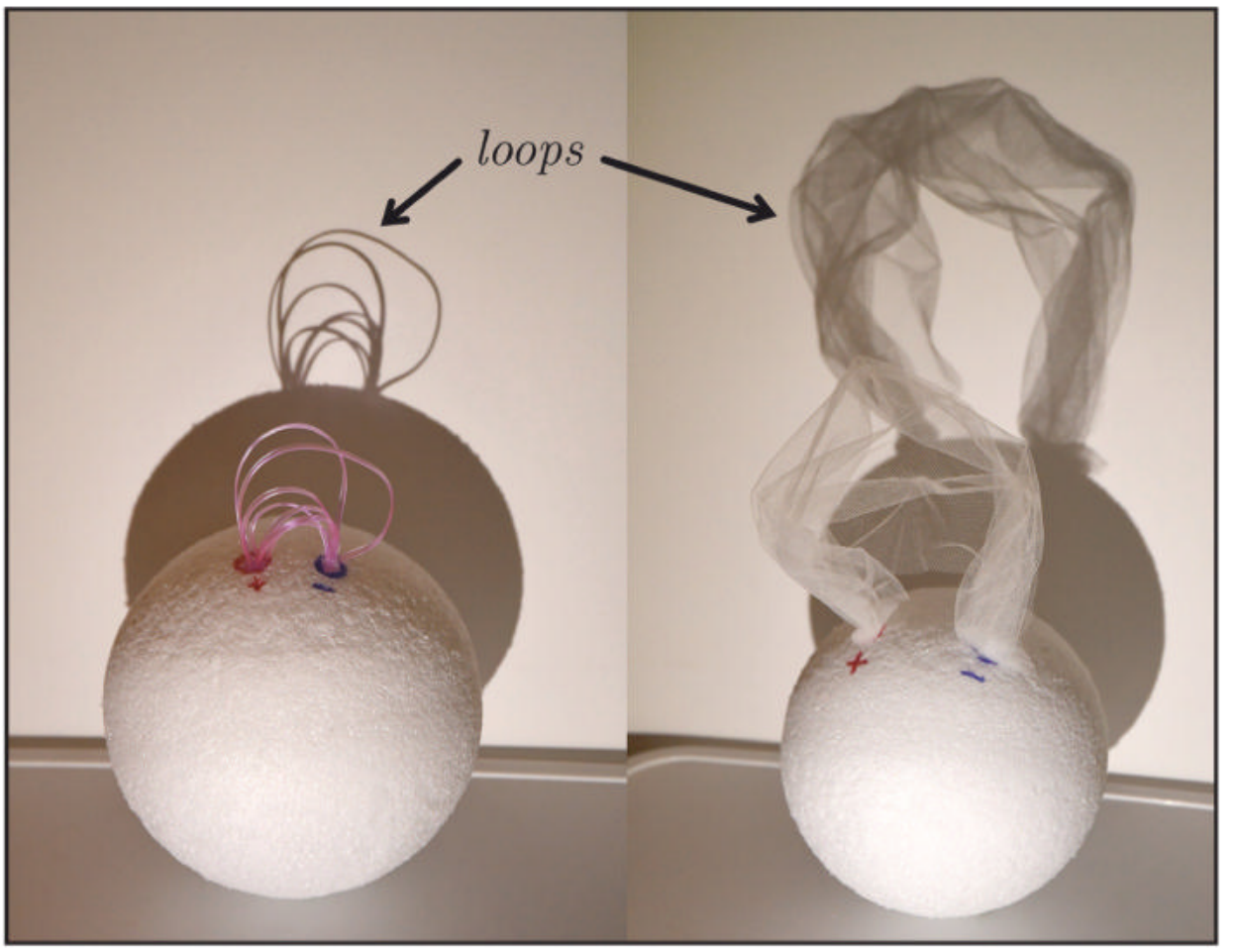


Photo C. This simplified model compares the "garden hose" model of coronal loops (left) to the coronal veil model (right). In both images, the ball represents the Sun, and the shadow represents the image of the Sun that would be observed by telescopes. On the left, individual strands or tubes connect one part of the Sun's surface to another. The shadow reveals obvious loop-like structures. On the right, a more complicated "veil" or translucent sheet connects one part of the Sun's surface to another. The shadow still creates the impression of loop-like strands that in some places resemble those created by the garden hose model. (Photo by Anna Malanushenko, courtesy of NASA)

December Shortwave Propagation

Expect moderate solar activity this month, with 10.7-cm flux levels possibly peaking in the 180s. In the Northern Hemisphere, expect the seasonal increase of the ionosphere's density to increase more rapidly after sunrise than during other seasons. On sunlit paths, this will make higher frequencies more stable for openings supported by that day's solar energy.

Static and atmospheric noise levels will be at seasonally low values during the month. Reasonably strong signal levels are expected on most of the open high-frequency (HF, 3- to 30-MHz) bands. The higher bands will carry world-wide DX propagation more often, as we are seeing a steady rise in sunspot activity.

Ten- and 12-meter DX openings will be a daily occurrence but only during daylight hours, with the most reliable paths where the propagation circuit crosses sunlit regions. Already in the last few months, these two bands have been major players in worldwide DXing!

Expect good daytime openings on the 15-, 17-, and 20-meter bands primarily on north-south paths, but also east-west, with strong openings on all three of these bands. The hottest band of the three will be 20 meters, starting with early morning openings in all directions until about an hour or two after sunrise, and then remaining open into one place or another through the day until early evening. It might even provide nighttime propagation (look for long-path openings).

The 30-meter band will be a strong player for DXing, following the pattern of 20 meters. Expect this band to remain open toward the south and west from early evening until about midnight, mostly for DXers in the lower latitudes.

On 40 meters, regional daytime openings will remain strong for most of the day, while great DX will open early in the afternoon, lasting into the early evening hours. From midnight to sunrise, 40 meters will have some of the hottest nighttime DX during December. The first DX openings should be toward Europe and the east during the late afternoon, then move across the south through the hours of darkness, while remaining open into most parts of the world. Just after sunrise, openings will be more in a westerly direction. Low seasonal noise will make DXing a pleasurable endeavor.

Expect conditions on 60 meters to resemble a mix of what we see on the 40- and 75-meter bands, which will make this an excellent band to explore.

DX openings on 160 meters and 80/75 meters during the hours of darkness and into the sunrise period, with considerably decreased static levels, are a sure bet during the longer hours of darkness in the northern latitudes. Look for openings toward Europe and the south from the eastern half of the U.S. and towards the south, the Far East, Australasia, and the South Pacific from the western half of the country. The 80/75-meter band becomes reliable for DXing throughout the entire period of darkness during December. Openings should peak towards Europe and in a generally easterly direction around midnight, and then open in a generally western direction with a peak just after sunrise. The band should remain open towards the south throughout most of the night. The same goes for the 160-meter band. However, remember that 160 meters is a medium-wave band, and exhibits somewhat different characteristics than a low-frequency HF band. The D-region plays a much larger role in how the band behaves.

For short-skip openings during December, try 80/75 and 40 meters during the day for paths less than 250 miles, and 80/75 or 160 meters at night for these distances. For openings between 250 and 750 miles, try 40 and 30 meters during the day, and both 80/75 and 160 at night. For distances between 750 and 1,300 miles, 20 and 30 should provide daytime openings,

while 40 and 80/75 will be open for these distances from sunset to midnight. After midnight, 80/75 meters will remain open out to 1,300 miles until sunrise. Try 30 and 40 meters again for about an hour or so after sunrise. For openings between 1,300 and 2,300 miles, openings will occur on 20, 17, and 15 meters, with fewer on 12 and 10 meters, during the daylight hours. During sundown to midnight, check 20, 30, and 40 meters for these long-distance openings, and then check 40 and 80/75 meters after midnight until sunrise. Try 40 meters again for an hour or so after sunrise.

VHF Conditions

Aurora is not expected to occur often this month. Look for days with conditions at Disturbed or Below Normal, when there is a possibility for Field Aligned Irregularities (FAI) and Auroral-E propagation. Check the Last-Minute Forecast for those days during December that are expected to be in these categories.

Look for some decent meteor shower activity this month, providing conditions for meteor-scatter openings on the VHF bands for distances up to about 1,000 miles.

Meteor scatter propagation is a mode where radio signals are refracted off the ionized plasma trails left by dust and small particles that have entered into our atmosphere at thousands of miles per hour. The ionized trail is produced by vaporization of the meteor. Meteors no larger than a pea can produce ionized trails up to 12 miles in length in the E layer of the Ionosphere. Because of the height of these plasma trains, the range of a meteor scatter contact is between 500 and 1,300 miles. The frequencies that are best refracted are between 30 and 100 MHz. However, with the development of new software and techniques, frequencies up to 440 MHz have been used to make successful radio contacts off these meteor trains. On the lower frequencies, like on 6 meters, contacts may last from mere seconds to well over a minute. The lower the frequency, the longer the specific opening made by a single meteor train. A meteor train that supports a 60-second refraction on 6 meters might only support a 1-second

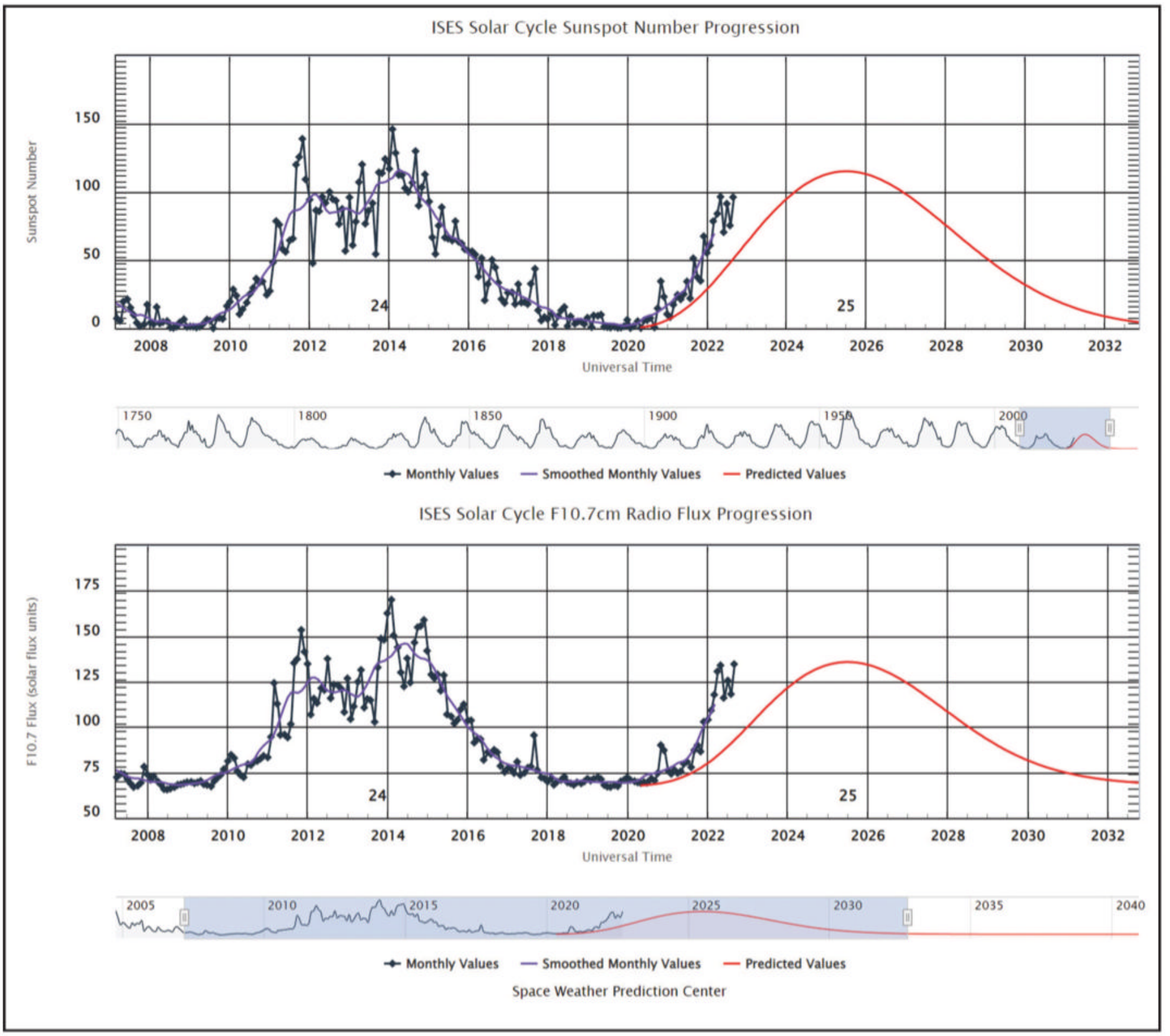


Figure 1. These plots reveal the current level of solar cycle activity that we are seeing in Sunspot Cycle 25. (Courtesy of NOAA/SWPC)

refraction for a 2-meter signal. Special high-speed methods are used on these higher frequencies to take advantage of the limited available time.

The annual Geminids meteor shower will peak on the night of December 14th. This is one of the better showers since as many as 120 visual meteors per hour may occur. However, some are saying that this year, we might only see a maximum of 20 visuals per hour. This is a great shower for those trying the meteor-scatter mode of propagation since one doesn't have to wait until after midnight to catch this shower. The radiant rises early, but the best viewing and operating time will be after midnight local time. This shower also boasts a broad maximum, lasting nearly one whole day, so no matter where you live, you stand a decent chance of catching sight of some Geminids.

There is considerably less likelihood for 6-meter trans-equatorial (TE) openings during December but look for a possible opening between the southern states and locations deep in South America. The best time to look for these is between about 8 and 11 p.m. local time.

For a detailed list of meteor showers, check out <https://tinyurl.com/f9v7fj2u> for a complete calendar of meteor showers in 2022. The 2023 calendar is at <https://tinyurl.com/bdcpttcw>. (*Major meteor showers are also highlighted on CQ's calendars – ed.*).

If you use Twitter.com, you can follow <@hfradiospacewx> for hourly updates that include the K index numbers. You can also check the numbers at <https://SunSpotWatch.com>, where this columnist provides a wealth of current space weather details as well as links. Please report your observations of any notable propagation conditions, by writing this columnist via Twitter, or via the Space Weather and Radio Propagation Facebook page at <https://fb.me/spacewx.hfradio>.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for September 2022 is 96.3. The 12-month running smoothed sunspot number centered on March 2022 is 68.9. A smoothed sunspot count of 72, give or take about 9 points is expected for December 2022.

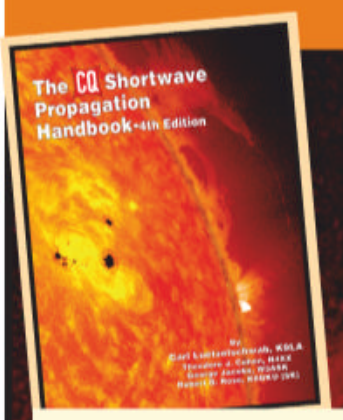
The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 134.69 for September 2022. The 12-month smoothed 10.7-cm flux centered on March 2022 is 117.79. The predicted smoothed 10.7-cm solar flux for December 2022 is 110, give or take 7 points.

Geomagnetic activity level this month is expected to range from quiet to stormy, resulting in occasional degraded propagation this month. Remember that you can get an up-to-the-day ***Last-Minute Forecast*** at <https://SunSpotWatch.com> on the main page.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may email me, write me a letter, or catch me on the HF amateur bands. If you are on Facebook, check out <https://fb.me/spacewx.hfradio> and <https://fb.me/NW7US> — speaking of Facebook — check out the *CQ Amateur Radio* magazine fan page at <https://fb.me/CQMag>. Also, please check out the new alternative social networking ham radio group at <https://amateurhamradio.locals.com> and please share this with your amateur radio friends and clubs.

– 73, Tomas, NW7US

An Indispensable guide to HF propagation for the new sunspot cycle!



The CQ Shortwave Propagation Handbook

4th Edition

Fully updated and expanded to include the latest propagation forecasting tools, as well as our time-tested "analog" tables for making your own customized predictions, the 4th edition of *The CQ Shortwave Propagation Handbook* is a must-have resource for any DXer, contester or emergency communicator.

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announcements *(from page 2)*

<info@hamcation.com>. Website: <www.hamcation.com>. VE exams, special event station K1AA.

DANVILLE, INDIANA — The Hendricks County Amateur Radio Society will hold the **Hendricks County Hamfest 2023** from 8 a.m. to 1 p.m., Saturday, February 11 at the Hendricks County 4-H Fair Grounds Conference Center, 1900 E. Main Street. Website: <http://n9hc.org>.

TRAVERSE CITY, MICHIGAN — The Cherryland Amateur Radio Club will hold its **48th Annual Swap-N-Shop** from 8 a.m. to noon, Saturday, February 11 at St. Francis High School Gymnasium, 123 E. 11th Street. Contact: Joe Erlewein, N8CN, (231) 668-4223. Email: <swap@cherry-landarc.com>. Website: <http://cherrylandarc.com>. Talk-in 146.86- (PL 114.8). VE exams.

MARLBOROUGH, MASSACHUSSETTS — The Algonquin Amateur Radio Club will hold its **Amateur Radio Flea Market** from 9 a.m. to 1 p.m., Saturday, February 18 at the Marlborough 1Lt. Charles W. Whitcomb School, 25 Union Street. Email: <fleamarket@n1em.org>. Website: <http://n1em.org>. Talk-in 446.675- (PL 88.5).

BIRGHTON, COLORADO — The Aurora Repeater Association & Rocky Mountain Ham Radio will hold The Swapfest from 9 a.m. to 1 p.m., Sunday, February 19 at the Adams County Fairgrounds, 9775 Henderson Road. Contact: Wayne, NØPOH, (303) 699-6335. Email: <rockymountainham@gmail.com>. Website: <http://rmham.org>.

COLCHESTER, VERMONT — The Radio Amateurs of Northern Vermont will hold **Ham-Con 2023** from 8 a.m. to 1 p.m., Saturday, February 25 at the Hampton Inn, 42 Lower Mountain Road. Phone: (802) 879-6589. Email: <w1sj@arrl.net>. Website: <ham-con.org>. Talk-in 145.15-. VE exams, card checking.

MARCH

ROSENBERG, TEXAS — The Brazos Valley Amateur Radio Club will hold the **Greater Houston Hamfest** and **2023 ARRL Texas State Convention** on Friday, March 3 and Saturday, March 4 at the Fort Bend County Fairgrounds, 4310 Texas 36. Phone: (713) 826-6917 or (713) 569-8799. Website: <www.houstonhamfest.org>. Talk-in 146.94 (PL 167.9). VE exams.

CAVE CITY, KENTUCKY — The Mammoth Cave Amateur Radio Club will hold the **47th Annual Cave City Hamfest** beginning 7:30 a.m., Saturday March 4 at the Cave City Convention Center, 502 Mammoth Cave Street. Contact: Larry Brumett, KN4IV, (270) 651-2363 or (270) 308-1417 (cell). Email: <lbrumett@glasgow-ky.com>. Website: <http://ky4x.org>. Talk-in 146.35+. VE exams

CONCORD, NORTH CAROLINA — The Mecklenburg Amateur Radio Society will hold the **Charlotte Hamfest** from 3-7 p.m., Friday, March 10 and from 8:30 a.m. to 4 p.m., Saturday, March 11 at the Cabarrus Arena & Events Center-Gold Hall, 4551 Old Airport Road. Phone: (704) 948-7373. Website: <www.charlottehamfest.org>. Talk-in 146.655 or 146.940 (PL 118.8).

PUYALLUP, WASHINGTON — The Mike & Key Amateur Radio Club will hold the **41st Annual Mike and Key Electronics Show & Swap Meet** from 9 a.m. to 3 p.m., Saturday March 11 at the Pavilion Exhibition Hall, Washington State Fairgrounds, 110 9th Avenue SW. Phone: (253) 631-3756. Email: <n7wa@arrl.net>. Website: <www.mikeandkey.org>. Talk-in 146.82- (PL 103.5). VE exams.

RAYNE, LOUISINA — The Acadiana DX Association will hold its **Hamfest & Swapmeet** from 8 a.m. to 2 p.m., Saturday, March 11 at the Rayne Civic Center, 210 Frog Festival Drive. Contact: James Romero, K5CNU, (337) 319-6414. Email: <k5cnu@att.net>. Website: <http://kn5grk.com>. Talk-in 145.410 (PL 123). VE exams.

TULLAHOMA, TENNESSEE — The Middle Tennessee Amateur Radio Society will hold the **MTARS Tullahoma Hamfest** from 8 a.m. to 2 p.m., Saturday, March 11 at the First United Methodist Church, 208 West Lauderdale Street. Contact: Larry Cagle, K4WLO, (251) 680-3250. Email: <k4wlo@arrl.net>. Website: <www.mtars-ham.org>. Talk-in 146.700- (PL 114.8) or 443.950+ (PL 107.2). VE exams.

FORT WALTON BEACH, FLORIDA — The Playground Amateur Radio Club will hold its **53rd Annual Hamfest** from 4-7 p.m., Friday, March 17 and from 8 a.m. to 2 p.m., Saturday, March 18 at the Northwest Florida Fairgrounds, 1958 Lewis Turner Boulevard. Phone: (850) 359-9186. Email: <hamfest@w4zbb.org>. Website: <www.w4bzz.org>.

BUFFALO, MINNESOTA — The Maple Grove Radio Club will hold its **39th Annual Midwinter Madness Hobby Electronics Show** from 8 a.m. to noon, Saturday, March 18 at the Buffalo Civic Center, 1306 County Road 134. Phone: (763) 537-1722. Website: <http://k0ltc.org>. Talk-in 147.000+ (PL 114.8). VE exams, ARRL card checking.

TROY, MICHIGAN — The Utica Shelby Emergency Communications Association will hold the **USECA 2023 Swap and Shop** from 8 a.m. to 2 p.m., Saturday, March 26 at the Balkan America Community Center, 1451 E. Big Beaver Road. Website: <http://usecaarc.org>. VE exams.

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what's new

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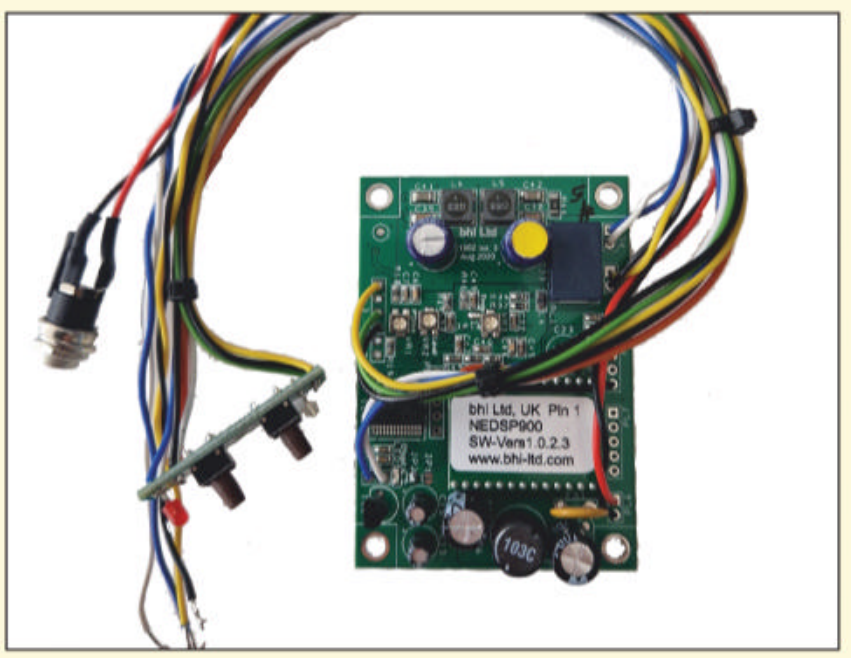
The NEDSP1962-KBD is supplied as a pre-wired assembly with a 2.1-millimeter power socket, audio input and output wires, keyboard switch assembly, and full mounting kit with professional labels and user manual. It is available now from DX Engineering and Gigaparts and has a suggested retail price of $158.14. For more information, contact bhi Ltd, 22 Woolven Close, Burgess Hill, West Sussex, RH15 9RR UK. Email: <info@bhi-ltd.com>. Website: <www.bhi-ltd.com>.



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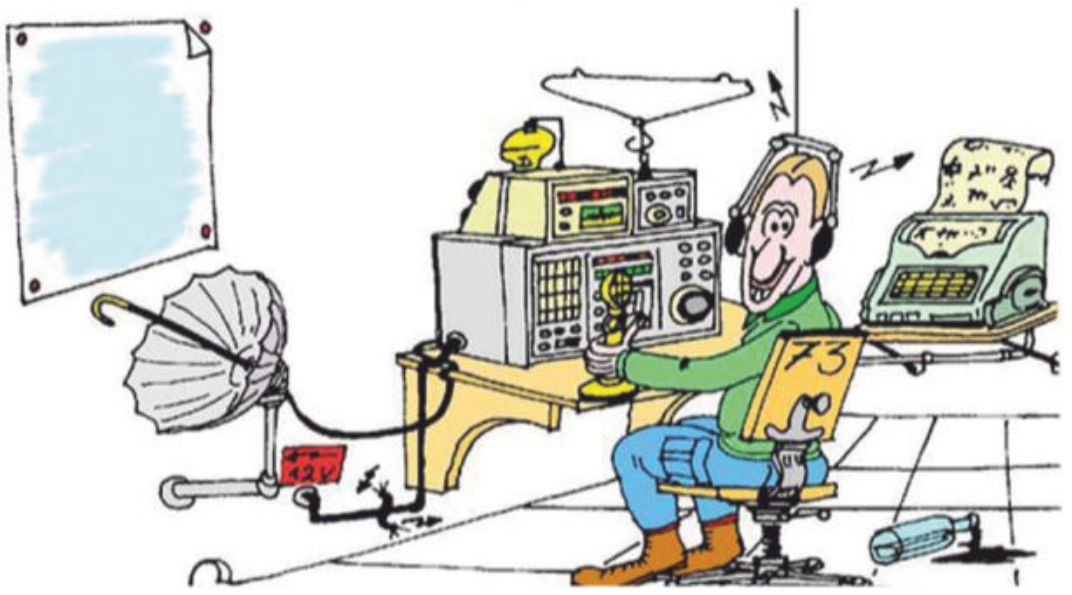

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