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On the Cover: The bits and pieces, and final results, of various Heathkit restoration and modification projects we’re bringing you this month and next. Our mini-special begins on page 16.
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LDG Z-100A Specifications

- Frequency Range: 1.8 to 54 MHz
- Power: 125W SSB, 50W FT-8, 30W AM/FM
- Input Impedance: 50 ohms
- Tuning Range: 10:1 SWR, 3:1 on 6M
- Memories: 2000
- Retune Time: Less than 1.0 second
- Voltage: 13.8 VDC +/-15%
- Current Draw: 500 mA tuning, 20 mA idle
- Size: 6.3"x6.3"x1.5", 160x160x40mm
- Weight: 1.5 pounds, 680 grams

LDG Electronics
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St. Leonard, MD 20685
Phone: 410-586-2177
e-mail: support@ldgelectronics.com
www.ldgelectronics.com
JULY

HARRISBURG, PENNSYLVANIA — The Harrisburg Radio Amateurs Club will host its 30th Annual Firefighter Electronics Expo and Hamfest and 2021 ARRL Pennsylvania State Convention beginning 8 a.m., Saturday, July 3 at the Harrisburg Post Employees Picnic Grounds, 1500 Roberts Valley Road, Contact: Terry Snyder, WB8BSN, (717) 896-0256. Email: <tstngm2@verizon.net>. CQ are available to agencies of the United States government

PLAINSBORO, NEW JERSEY — The Murgus Amateur Radio Club will host the 42nd Annual Wilkes-Barre, Murgus ARC Hamfest and Convention beginning 9 a.m., Saturday, July 3 at the American Vets Auditorium, 50 Main Street, Contact: Michael Kozloski, KA3NQ, (570) 829-2869. Email: <murgusarc@gmail.com>. Website: <http://hamfest.murgusarc.org>. Talk-in on 146.6 PL 82.5. VE exams.

MENDOTA, ILLINOIS — The Starved Rock Radio Club will host the Amateur Radio Hobbyst & Collectors Show from 8 a.m. to 3 p.m., Saturday, July 3 at the Mendota Community Center, 501 1st Avenue. Contact: Art Putnam, KD8VJ, (815) 396-7197. Email: <art.putnam@verizon.net>. Website: <www.w4tmk.org>. Talk-in on 147.120+ PL 103.5.

INDIANAPOLIS, INDIANA — The Indianapolis Amateur Radio Club will hold the 57th Indianapolis Hamfest and 2021 ARRL Indiana Convention beginning 8 a.m., Saturday, July 3 at the Indianapolis International Convention, 500 North Capital Drive, Contact: Charles Fox, K8CDX, (317) 545-2600. Email: <k8cdx@arrl.net>. Talk-in on 147.050 PL 103.5. VE exams.

CAVE CITY, KENTUCKY — The Mammoth Cave Amateur Radio Association will hold the Amateur Hamfest beginning 8 a.m., Saturday, July 3 at the Cave City Convention Center Parking Lot, 502 Mammoth Cave Street. Contact: Larry Keenan, K4WDR, (270) 651-2639. Email: <larrykeeman@ky.rr.com>. Website: <www.cavecityhamfest.com>. Talk-in on 147.150 PL 101.5.

AUVERN, INDIANA — The Northeastern Indiana Amateur Radio Association will host the Amateur Hamfest from 9 a.m. to 2 p.m., Saturday, July 10 at the Auburn Cord Duesenberg Museum, 160 Swayne Street. Email: <w4aua@arrl.net>. Website: <www.indyhamfest.org>. Talk-in on 147.050 PL 101.5.

CAMILLUS, NEW YORK — The Radio Amateurs of Greater Syracuse will host the RAGS Hamfest 2021 from 7:30 a.m. to 12:30 p.m., Saturday, July 10 at the Camillus Elks Lodge #2367, 6117 Newport Road. Contact: Roger Hamilton, WA2EWE, <hamfest@w2ewe.org>. Talk-in on 147.050 PL 101.5.

RANDOLPH COUNTY 4-H FAIRGROUNDS, 1855 U.S. Highway 27. Phone: (765) 383-0011. Email: <inhamfest@gmail.com>. Website: <www.randolphhamfest.com>. Talk-in on 146.914 PL 103.5. VE exams.

16 through Sunday, July 18 at the Glacier Meadow RV Park, 15735 U.S. Highway 2 East. Email: <directors@gwhamfest.org>. Saturday, July 17 at the Johnson County Fairgrounds, 386 NW 145th Road. Contact: Kristl Thompson, K9RiSTL, <hamfest@w9lar.org>. Website: <http://w9cva.org/hamfest>. Talk-in on 147.375+ PL 110.9.

Saturday, August 7 at the Northern Indiana Events Center, 21565 Executive Parkway. Email: <info@elkharteasthamfest.com>. Website: <http://elkharteasthamfest.com>. Talk-in on 145.430 PL 141.3 VE exams.

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A Kickstart for Cycle 25?
The solar scientist who’s been bucking the tide of pessimism from most of his colleagues and predicting a huge sunspot cycle (see News Bytes, Sept. 2020 issue) continues to see lots and lots of spots in the future. According to spaceweather.com, Scott McIntosh of the National Center for Atmospheric Research in Colorado, along with colleague Bob Leamon of the University of Maryland / Baltimore County, are predicting that a “terminator event,” in which oppositely charged magnetic fields collide near the sun’s equator and annihilate each other, will be occurring soon. This is a normal occurrence between solar cycles, they say, but the key to predicting the strength of the new cycle lies in the timing between terminator events — the longer the time between them, the weaker the new cycle will be. They are predicting a short 10 years between the previous terminator event and the upcoming one, and McIntosh says, “If the Terminator Event happens soon, as we expect, new Solar Cycle 25 could have a magnitude that rivals the top few since record-keeping began.”

Asked about the fact that most other solar scientists feel the new cycle will be a weak one, like its predecessor, McIntosh replied, “What can I say? We’re heretics!”

NOAA: Expect Another Active Hurricane Season
The National Oceanic and Atmospheric Administration (NOAA) is predicting another above-average hurricane season in the Atlantic and Caribbean this year, but does not expect a repeat of last year’s season in which the number of named storms exceeded the letters in alphabet. NOAA’s Climate Prediction Center says we should expect 13-20 named storms, of which 6-10 will develop into hurricanes and 3-5 will become major hurricanes, with sustained winds of 111 miles per hour or greater. Hurricane season officially began on June 1st and runs through November 30th, but the season’s first named storm, Ana, developed in late May. The center is also predicting a near- or below-normal season in the central Pacific.

FCC Promises to Keep Hams’ Email Addresses Private
As of June 29th, all license-related applications filed with the FCC must include an email address at which commission staff may contact you. Changes in email addresses must also be provided, and licenses are subject to cancellation or revocation if emails are returned as undeliverable. The new requirement raised concerns about privacy, but the ARRL says its counsel has been assured by FCC staff that amateurs’ email addresses will be “masked” in the Universal Licensing System (similar to date of birth) and will not be visible to the public. This is part of an FCC move to eliminate all paper correspondence with licensees, including the mailing of licenses, which now may only be downloaded from the FCC website.

A Tale of Two SATERNs
Among hams, SATERN has long been an acronym for the Salvation Army Team Emergency Radio Network. Now, according to the ARRL, it also stands for Strategic Auxiliary Team Emergency Readiness Net, a new group organized by former Salvation Army SATERN manager Lee Glassman, WASLEE. To make matters even more confusing, the “new SATERN” holds daily nets on 14.265 MHz, the frequency formerly used by the original SATERN for its daily nets, which have now been moved to 14.325 MHz on a reduced 3-day-a-week schedule.
16 COVER: New Life For Old Heathkits — Part 1

Restoring half-century old radios to operating condition can be a very involved process, from replacing leaky capacitors to painstakingly recreating a badly damaged front panel using 21st-century technology. Our Heathkit restoration mini-special begins on page 16. (Cover montage by Art Director Elizabeth Ryan)

RESTORATION MINI SPECIAL: As most restorers know, restoration of old electronics takes a deft hand, patience, and ingenuity to get the best results. This month, three authors tackle restoring old Heathkits to their former glory and share with us their tips for making the project as successful as possible. Read all about it on pages 16, 20, and 24.

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The Best of the Best

Narrow Band SDR Transceiver

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The most advanced digital narrow band SDR technology is combined with the RF Front-End engineering,
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- Large dot matrix LCD display with Rapid Spectrum Scope
- Enhanced Operating Features:
  - Large diameter Main Tuning Dial (1.6") with Torque adjustment
  - Pop-up Menus for quick and easy operation
  - Large Transmit/Receive indicator
  - Three Programmable Front Panel Function Keys
  - Especially designed FC-50 External Antenna Tuner (option)

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Restorative Medicine

My hometown has weekly “Cruise Nights” each summer, at which classic car fans get together to show off their vehicles, compare notes, and generally have a good time together. Some of the cars on display have been carefully cared for since they were new; others (perhaps the majority) were saved from junkyards and lovingly restored to working order. It’s a step back into a simpler age, when cars were mechanical marvels rather than computers on wheels.

This issue is the radio version of Cruise Night, with four articles on the topic of vintage gear, along with two more that we couldn’t fit in and will bring you next month. Three of the four deal with Heathkits, K9ARZ’s “Three ‘Gifts’ From Heathkit,” N8RG’s restoration of the very first Heathkit electronic kit, the K-1 AM “All-Wave” receiver, and K3MD’s restoration of a classic Heathkit DX-60 transmitter. (Next month, we’ll have an article by AG4W on converting an SB-220 HF amplifier to 6 meters and a “CQ Classic” look back to 1954 for our first review of a Heathkit radio.) Our fourth article on the same theme is “A Dummy Load for Power Supplies,” in which KBØVKS guides us through the process of making sure that a “pre-owned” power supply you might pick up online or at a flea market doesn’t itself need restoration before use. Plus, KØNEB’s Kit-Building column this month focuses on a one-tube AM broadcast transmitter kit one could build to provide your own signal source to crystal sets or restored antique broadcast receivers.

Of course, restoring and operating vintage gear has long been a popular sub-hobby in amateur radio, but I was struck by the number of restoration-related articles we received in a short period of time. Was there a connection, I wondered, between restoring old radios and what we’ve all gone through in the past year-plus with the Coronavirus pandemic? Does doing this take us back to a simpler and more predictable time — when radios glowed in the dark and were marvels of mechanical as well as electrical engineering rather than computers that generate RF — and give us at least a temporary sense of order and control? Is this “restorative medicine” in a non-physical sense?

I posed these questions to frequent CQ contributor Jim Millner, WB2REM, who practices psychology when he isn’t writing radio articles. His response not only confirmed what I was thinking, but also drew a parallel between the field of restorative medicine and the activity of restoring vintage radios.

“Restorative medicine provides a chemical balance to your body while restoring old rigs takes broken parts and makes the radio whole again.” Jim wrote. “Our lives over the last year or so with Covid have been broken like old-time radios. There have been many pieces in our lives that have been lost forever or are in dire need of repair. By restoring a classic rig, the act of taking something broken and making it whole again can be symbolic of what life will be after the pandemic is in the rear mirror … The word ‘gestalt’ also comes to mind, ‘An organized whole that is perceived as more than the sum of its parts.’”

Thank you for your perspective, Jim. In our view, ham radio has always been more than the sum of its parts. It is not just a jumbled assemblage of many different interest areas, from contesting and DXing to restoring classic radios, but so much more when the skills and experiences gained in each of those many interest areas are brought together to create something greater, particularly in times of need.

Ham radio helped many of us get through the pandemic with our mental health intact by providing a means of social contact even if we were quarantined in our homes. It might have been working DX or contesting, taking part in nets that went from weekly to daily in order to check in regularly on members, or using ham radio to help schedule vaccine appointments, as WB2REM described in his most recent CQ article, “The Ham Radio Hunger Games,” in this past May’s issue.

Now it’s poised to help us through the return to normalcy, by taking our rigs outdoors to activate “OTA” (on the air) locations such as summits or parks, expanding the limits of our networking technology (as N2IRZ discusses in his Digital Connection column this month), or restoring classic radios. Like bringing old rigs back to life in our shacks, ham radio itself provides us with a good dose of “restorative medicine” when we let it.

One final note on restorations: Restoring an old radio doesn’t necessarily mean using old parts and old tools to complete the job. When N8RG was fixing up his K-1 receiver, he realized that the front panel was too badly damaged to be repaired. So he used two decidedly 21st-century tools — a high-resolution digital camera and a personal computer — to help him along. He took a very hi-res photo of the damaged front panel, opened that photo in his drawing program, and reconstructed an image of the original panel, pixel by pixel. He then sent that image to a company that prints photos directly onto a sheet of aluminum. When the finished product arrived a few days later, Ray drilled new holes for various switches and dials, trimmed the edges and, voilà, brand new front panel!

Also in this issue, we have the results of last February’s CQ WPX RTTY Contest, our CQ Hall of Fame inductees for this year and finally, *gonculators!* Ya gotta read KH6WZ’s Ham Notebook column to find out what that’s all about.

Enjoy this issue, and your summer, and we hope that both will provide you with a good dose of restorative medicine.

– 73, Rich, W2VU
One of the most famous air disasters in history was the May 6, 1937 crash of the Hindenburg airship as it prepared to land in Lakehurst, New Jersey. WLS (Chicago) radio reporter Herbert Morrison was on the scene recording the landing when the ship burst into flames and crashed to the ground, leading to his famous quote, “Oh, the humanity!”

The source of the spark that ignited the hydrogen gas that carried the Hindenburg had not been determined in the nearly 85 years that have passed since the disaster. Enter N2OO, and airship expert Dan Grossman, whom Bob met at a 75th anniversary observance in Lakehurst in 2012. It seems that back in 1937, Bob’s mom and his uncle were at Lakehurst to watch the Hindenburg’s arrival, and Uncle Harold was filming the landing. He was in a different spot than all the newsreel cameramen and had a different perspective on the airship as it approached. According to Bob, his uncle offered to share the film with investigators at the time, but no one was interested.

Skip ahead 75 years and Dan Grossman was very interested. Now, Bob, and Uncle Harold’s film, are the centerpiece of a PBS “Nova” documentary, “Hindenburg: The New Evidence.” The program aired on May 19th but is available online at <https://tinyurl.com/3fhphy7w>. There’s enough science and technology involved to keep most hams interested. And the secret word is: Capacitor. (Tnx to N2OO and NL7XM)
The 2021 CQWW WPX RTTY contest was held 11 months into the global coronavirus pandemic. Vaccines were being offered to only the oldest age groups and seniors in care facilities. Remote operations, one of the only really safe ways to maintain multi-op collaborative efforts, became the norm, with many taking advantage of technology either to activate multi-op stations or to navigate travel restrictions to regular DX contesting sites around the world. As with other contests over the last year, this changed the landscape of the logs submitted, both from whom and how many were received. This fact, and with the Northern Hemisphere struggling with typical winter weather woes, certainly had an impact.

"With covid restrictions in place, I was unable to head to my preferred contest location in Devon. So, a simple 40-meter vertical with ground radials was hidden among the trees outside my flat and I am amazed at how well it worked, surrounded by trees in a dip with a hill to the west of me."

—Rob G1N (GOURR)

I think it’s safe to say there was quite a bit of this going on. But it did not stop hundreds of RTTY contest enthusiasts from getting on the air, from wherever, and however to have a great time.

---

**Results of the 2021 CQWW WPX RTTY Contest**

**BY CHRIS TATE, *N6WM**

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**SINGLE OPERATOR HIGH POWER ALL BAND**

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**7 MHz**

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</table>

**MULTI-OPERATOR SINGLE TRANSMITTER (HIGH)**

<table>
<thead>
<tr>
<th>CALL SIGN</th>
<th>EB</th>
<th>QSOs</th>
<th>WPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>QQ4C</td>
<td>1,209,576</td>
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</tr>
<tr>
<td>QQ4B</td>
<td>1,039,008</td>
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</tr>
<tr>
<td>QQ4A</td>
<td>966,900</td>
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</tr>
<tr>
<td>QQ4J</td>
<td>830,126</td>
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</tr>
<tr>
<td>QQ4I</td>
<td>799,254</td>
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**5.5 MHz**

<table>
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<th>EB</th>
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<tbody>
<tr>
<td>9A5X</td>
<td>6,730,556</td>
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<td></td>
</tr>
<tr>
<td>OM2VL</td>
<td>5,420,520</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT9BWr</td>
<td>4,956,246</td>
<td></td>
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<tr>
<td>YU2D</td>
<td>4,798,752</td>
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</tr>
<tr>
<td>WSQ0Q (N8OIQ)</td>
<td>3,982,134</td>
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</table>

**3.5 MHz**

<table>
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<th>CALL SIGN</th>
<th>EB</th>
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<tbody>
<tr>
<td>9A5A</td>
<td>2,575,210</td>
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<tr>
<td>9A5X</td>
<td>2,537,740</td>
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<tr>
<td>UX2X (UT1XQ)</td>
<td>2,268,020</td>
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</tr>
<tr>
<td>9A5Y (9A3LG)</td>
<td>2,166,112</td>
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<tr>
<td>I4AVG</td>
<td>1,804,680</td>
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**LOW POWER ALL BAND**

<table>
<thead>
<tr>
<th>CALL SIGN</th>
<th>EB</th>
<th>QSOs</th>
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</thead>
<tbody>
<tr>
<td>TM12Z (F6DSK)</td>
<td>6,977,412</td>
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</tr>
<tr>
<td>I56K0Y</td>
<td>6,148,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LY7Z</td>
<td>5,932,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UW1M</td>
<td>5,612,624</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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*Email: <n6wm@largeradio.org>*

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**CLASSIC HIGH POWER**

<table>
<thead>
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<th>CALL SIGN</th>
<th>EB</th>
<th>QSOs</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ED8W (EABDO)</td>
<td>4,844,484</td>
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<tr>
<td>ECIK</td>
<td>3,251,260</td>
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<tr>
<td>W5L9</td>
<td>1,766,256</td>
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<tr>
<td>IZ2POS</td>
<td>1,321,155</td>
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<tr>
<td>QA1CT</td>
<td>1,210,880</td>
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<tr>
<td>SN4X (SP80XJ)</td>
<td>1,083,754</td>
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<tr>
<td>LX2LX</td>
<td>1,044,240</td>
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<tr>
<td>PX1A (PY2XW)</td>
<td>1,032,846</td>
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<tr>
<td>AEV8</td>
<td>926,187</td>
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</tr>
<tr>
<td>IK5FKE</td>
<td>838,228</td>
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**LOW POWER**

<table>
<thead>
<tr>
<th>CALL SIGN</th>
<th>EB</th>
<th>QSOs</th>
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</tr>
</thead>
<tbody>
<tr>
<td>DK1KC</td>
<td>1,089,004</td>
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<tr>
<td>V9EI</td>
<td>1,086,176</td>
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<tr>
<td>KD9MMO</td>
<td>1,051,498</td>
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<tr>
<td>W1PNJ</td>
<td>1,051,024</td>
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<tr>
<td>WW8W</td>
<td>967,904</td>
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<tr>
<td>K6KSQ</td>
<td>863,328</td>
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<tr>
<td>QO4U</td>
<td>789,243</td>
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<tr>
<td>G8GUP</td>
<td>693,427</td>
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<tr>
<td>CN1LX</td>
<td>664,326</td>
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<tr>
<td>DF42L</td>
<td>626,400</td>
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**TRIBANDER WIRES HIGH POWER**

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<th>CALL SIGN</th>
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<tbody>
<tr>
<td>GW0A (GWA4SKA)</td>
<td>4,006,040</td>
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<tr>
<td>N3GE</td>
<td>3,500,643</td>
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<tr>
<td>UZ1YWW</td>
<td>3,369,762</td>
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<tr>
<td>MM9H (GM0DPS)</td>
<td>3,284,424</td>
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<tr>
<td>T6A</td>
<td>3,266,703</td>
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<tr>
<td>DO1Y (DF2SD)</td>
<td>3,246,264</td>
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<tr>
<td>SV2BAX</td>
<td>3,215,355</td>
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<tr>
<td>M7T (G3YD)</td>
<td>3,192,045</td>
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<tr>
<td>YO6A (Y06BH)</td>
<td>3,046,050</td>
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<tr>
<td>DP1K (DJ9NG)</td>
<td>2,905,084</td>
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**MULTI-OPERATOR MULTI-TRANSFORMER**

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<th>CALL SIGN</th>
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<tbody>
<tr>
<td>DP7D</td>
<td>12,987,476</td>
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<tr>
<td>W3HG</td>
<td>5,971,467</td>
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<td>NR6O</td>
<td>4,575,900</td>
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<tr>
<td>DR3W</td>
<td>3,920,376</td>
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<tr>
<td>DDØVS</td>
<td>800,670</td>
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**MULTI-OPERATOR MULTI-DISTRIBUTED**

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<th>CALL SIGN</th>
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<th>QSOs</th>
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<tbody>
<tr>
<td>J4S2</td>
<td>9,451,847</td>
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<tr>
<td>I9QME</td>
<td>5,006,074</td>
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<tr>
<td>WW4IL</td>
<td>5,412,376</td>
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<tr>
<td>KW4P</td>
<td>5,378,570</td>
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<tr>
<td>IU2NSZ</td>
<td>3,120,280</td>
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<tr>
<td>KZ1W</td>
<td>1,553,885</td>
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<tr>
<td>VR2CC</td>
<td>954,750</td>
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<tr>
<td>OL1Z</td>
<td>516,516</td>
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**ROOKIE HIGH POWER**

<table>
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<th>CALL SIGN</th>
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<tbody>
<tr>
<td>DM7XX</td>
<td>3,390,524</td>
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<tr>
<td>UA4S (R4SAD)</td>
<td>2,190,509</td>
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<tr>
<td>W2MJI</td>
<td>1,120,434</td>
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<tr>
<td>LB4GI</td>
<td>4,216</td>
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<tr>
<td>DJ5CT</td>
<td>3,042</td>
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<td>HPI1ELY</td>
<td>2,178</td>
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<tr>
<td>KN4QDE</td>
<td>1,456</td>
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**LOW POWER**

<table>
<thead>
<tr>
<th>CALL SIGN</th>
<th>EB</th>
<th>QSOs</th>
<th>WPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW2DX (W4PJC)</td>
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<tr>
<td>DL4VDA</td>
<td>609,102</td>
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<td>EAJC1</td>
<td>425,338</td>
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<td>URESF7V</td>
<td>416,448</td>
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<tr>
<td>SO5KR</td>
<td>374,664</td>
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<tr>
<td>N2OQ</td>
<td>335,240</td>
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<tr>
<td>TA4GN</td>
<td>325,268</td>
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<tr>
<td>YB1RKT</td>
<td>224,014</td>
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<td>S6SAL</td>
<td>207,100</td>
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<tr>
<td>EWY0K</td>
<td>201,720</td>
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</tr>
</tbody>
</table>

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*Low Power*
2021 WPX RTTY TOP EUROPE SCORES

SINGLE OPERATOR HIGH POWER

CR6K (CT1LT) . 9,590,535
SN7O (SP7GQI) . 9,381,528
OMZ2W . 9,045,876
SO9 (SO9RF) . 6,187,710
HBGR (HAFJY) . 6,041,518
U6B5M . 5,753,542
Y08HP . 4,952,172
EA4G0Y . 4,843,616
EMOS . 4,729,074
EM2G (UR7GO) . 4,694,375

21 MHz

CR6T (CT1ESV) . 1,169,480
UT2W . 410,564
9A1CCY (9ATDX) . 281,820
HAI7T . 239,290
SV9COL . 133,136

14 MHz

LX7I (DFFTE) . 2,326,064
HG15 (HAI1AE) . 2,289,299
YT3X . 2,224,080
SOAM . 2,152,548
HSGB (HAG0Z) . 1,853,326

7 MHz

9A5W . 6,730,556
OM2YW . 5,420,520
IT8IRB . 9,456,246
YU7W . 4,798,752
UY4U (UT5UO) . 3,884,706

3.5 MHz

9A9A . 2,575,210
9A5X . 5,357,240
UX6X (UT2XQ) . 2,268,000
9A5Y (9A5G) . 2,166,112
4A4V . 1,804,680

LOW POWER 5-WATT ALL BAND

TM3Z (FADSK) . 6,977,412
IK86XO . 6,148,000
LY7Z . 5,932,500
UW1M . 5,612,246
IK2VX (I1Q9VR) . 5,102,412
UW0K (USDXW) . 4,715,965

2021 WPX RTTY PLACO DONORS AND WINNERS

SINGLE-OPERATOR HIGH POWER

World: Jeff Blaine, AC0C. Won by: CR6K (op. Filippe Monteiro Lopes, CT1LT)
North America: Marty Sullaway, NN1C. Won by: ZF2WF (op. Bill Feltham, W9KKN)
USA: Abrahm Neal Software by K9NC. Won by: Bud Trench, A3B
USA 7th Call Area: Hank Lorton, KX7 in memory of Bob Wurbl, W7GG.
Won by: Jeff Stal, W7XJ
Europe: FlexRadio Systems. Won by: SN7Q (op. Krzysztof Sobon, SP7GQI)
Africa: Viado Karamirov, N3CZ. Won by: E6BW (op. Manuel Angel Manolo, E6ABO)
Asia: Mike Trowbridge, KA4RRU in memory of Steve Vead, N4DXS.
Won by: Yuri Kunygin, R9BA

SINGLE-OPERATOR LOW POWER

World: Gerry Treas, K8GT. Won by: TM3Z (op. Dimitri Cossos, F4D3K)
North America: Wray Dudley, AB4FS. Won by: Ted Jiminez, HST
USA: Gerry Treas, K8GT. Won by: John Bayne, K9GA
Europe: FlexRadio Systems. Won by: Andrea Tonci, I3GXO
Oceanica: Doug Faith, NTOS. Won by: Kent Carlson, K6CJ

SINGLE-OPERATOR QRP

World: Viado Karamirov, N3CZ. Won by: Vlady Filonenko, RM5F
North America: FlexRadio Systems. Won by: Edvald Frias Mesa, CM5EFM

SINGLE-OPERATOR SINGLE BAND

World 14 MHz: Steve “Sid” Caesar, NH7C. Won by: LX7I (op. Helmut Mueller, DF7EE)
World 14 MHz Low Power: Kenny Young, AB4GG.
Won by: EA1A (op. Juan R. Varela Seoane, EA1X)
North America 21 MHz: Doug Faunt. Won by: Jose A Rivera Carrausillo, PK4JFR
World 28 MHz: Steve Bookout, N4RM, and the “Goat Farm Gang”.
Won by: D41CV (op. Luca Alpinandi, I2NCG)

MULTI-OPERATOR, SINGLE-TRANSMITTER HIGH POWER

World: Rich Cady, N1XIF. Won by: I2QFC (ops. MIIFL, MKDOW, IH4VR, IK4MGP, IU4OMO, IZ4AC)
North America: John Lockhart, W0DCD. Won by: W7FX (ops. NTTY, W8RR)
Europe: Billy, GM6DX. Won by: I1QFY (ops. I1WBZ, I13BG)

MULTI-OPERATOR, SINGLE-TRANSMITTER LOW POWER

World: Ed Muns, W9YK. Won by: WP9C (ops. WP9C, WP5ST, W2VQ, N2GK)
USA: FlexRadio Systems. Won by: K9NR (ops. K9NR, K9QT)

MULTI-OPERATOR, MULTI-TWO

World: Steve Bookout, N4RM, and the “Goat Farm Gang”.
Won by: ED1R (ops. E1AP, E1ATL, E1KR, EA1AO)
USA: CTRI Contest Group in memory of Chris, KA1GEU (SK).
Won by: N93R (ops. N9J, N9SR)
Europe: FlexRadio Systems. Won by: YL2UI (ops. YL2UI, YL2CI, YL3CU)

MULTI-OPERATOR, MULTI-TRANSMITTER

World: Steve Bookout, N4RM, and the “Goat Farm Gang”.
Won by: DP7D (ops. DF1QR, DJ4MAH, DH4AIF, DL5YX, DL5RT, DEBOE)
USA: BeLoud.US. Won by: W3GH (ops. NSWMC, WBWJ, WC9J, K1M, AG3I, N6GKR, W3GOW, K3ES, NSMA, K3STT, K3ZDF, AC3BG, K30QX)

MULTI-OPERATOR, MULTI-DISTRIBUTED

Canada: FlexRadio Systems. Won by: XM2X (ops. V2ARC, VE2PK, VE2PI, VE2SG, VE2EBK)

CLUB COMPOSITION

World: Potomac Valley Radio Club. Won by: Bavarian Contest Club
North America: Virginia Contests Club. Won by: Potomac Valley Radio Club

www.cq-amateur-radio.com
We also introduced the Multi-Distributed category, giving operators an opportunity to try something new by collaborating with other physical stations, helping keep the mult-op torch burning during the pandemic.

**Conditions**

There was a broad sample of reports on conditions during this contest, ranging from, “GREAT!” to, “not so great.” As most regular contesters are aware, aside from the odd anomaly that boosts scores across the board, this contest – like most others – was favorable in certain areas and a bit more challenging in others. In North America, the general consensus was that most would rather be operating RTTY prefix than shoveling snow, provided that ice was not weighing down their antennas.

So, with that, let’s take a look at the competition itself and see how it came together.

In the Single-Op High Power (SOHP) All-Band category, CR6K operated by Filipe, CT1ILT, managed to best SN7Q (SP7GIQ), both with scores approaching 10 million points. A couple of well-known North American contesters made the box, and had a close race themselves, with Bud, AA3B, taking top North American honors and narrowly beating AK1W, operated by Randy, KSZD.

Single-Op Low Power All Band had another close race with TM3Z, operated by Dimitri, F4DSK, taking the top spot over IK6VXO, who was close behind. The sole U.S. entrant in the top 10 was John, KK9A, who turned in a respectable 4.2 million points to represent North America in this group.

Classic is a category that seems to be gaining more popularity of late. With a shorter operating window and a more traditional approach, new and fierce competition can be found here as well.

The Classic High-Power category produced a clear winner as Manuel, EA8DO, operating as ED8W, solidly took first place with nearly twice the score of the runner up.

In the Classic Low-Power category, there was a tight four-way race with Michael, DK1KC, taking top honors with VE3KI just on his tail as runner up by just 3,000 points. Vitaly, RZ5F, took top QRP All-Band category honors and Jason, WK9U, powered through to win the U.S. Please check the line scores for the Single-Operator, Single-Band QRP winners.

**Tribander/Wires High Power**

In the High-Power category, GW4OA operated by John, GW4SKA, took the top position overall with Tim, N3QE, not too far behind to take the North American lead.

The Low-Power category was won by Yuri, UT4LW, who made a solid showing with a tight race with YL1ZF, who finished in second over third-place finisher 3V8SS (op. KF6VEY).

**Rookie Category**

There were some big scores in the Rookie High-Power category with Robert, DM7XX, taking top honors over Alexandr, R4SAD, operating as UA4S coming in second. In the U.S., W3MLJ came in first.
C4FM Digital
Pursuing Advanced Communications

C4FM/FM 144/430 MHz
Dual Band 5W
Digital Transceiver
FT-70DR
  (700 mW Loud and Clear audio,
   Commercial Grade Specifications)

System Fusion II
Supports All C4FM Portables and Mobiles

C4FM/FM 144/430 MHz
Dual Band Dual Receive Digital Repeater
DR-2X

C4FM/FM 144/430 MHz
144/430 MHz Dual Band 50 W
Digital Transceiver
FTM-400XDR
  (Improved 66 ch GPS receiver included)

CW/SSB/AM/FM/C4FM
HF/50/144/430 MHz Wide-Coverage
100 W All Mode Transceiver (144/430 MHz: 50 W)
FT-991A
  (Real-Time Spectrum Scope included)

C4FM/FM 144/430 MHz
Dual Band 5 W
Digital Transceiver
FT3DR
  (Improved 66 ch GPS receiver included,
   Built-in Bluetooth® Unit)

C4FM/FM 144/430 MHz
Dual Band 50 W
Digital Transceiver
FTM-300DR
  (Improved 66 ch GPS receiver included,
   Built-in Bluetooth® Unit)

For the latest Yaesu news, visit us on the Internet: http://www.yaesu.com
Specifications subject to change without notice. Some accessories and/or options may be standard in certain
areas. Frequency coverage may differ in some countries. Check with your local Yaesu dealer for specific details.
NN2DX, being helmed by Connor, W4IPC, wisely chose the Low-Power category and managed to take top rookie honors for the world. This was a solid win with the closest European challenger showing with just half the score Connor racked up.

**The Multi-Ops**

The entire Multi-Single High-Power category top 10 box was dominated by European stations. The IQ4FC station managed to take top honors over team IQ1RY in this category.

The Multi-Single low-power category saw a team operating Alfredo’s fine station, WP3C, in Puerto Rico to take top honors in category. EC7MA had a great score for second place in the world and was first place in Europe.

Multi-Two Transmitter top honors were taken by the ED1R contest team, while NB3R (ops. NB3R and NJ3J) were able to take top U.S. honors with a very simple setup. David, NB3R, commented, “one dual-band, 40/20 beam. Wires for everything else. Great fun.” Wow, two great WPX calls... the author speculates they probably discussed which one to use!

The Multi-Multi category was a bit anemic this year, with the pandemic in various stages of flaring up around the world, and the safer Multi-Distributed category as safe haven, and some of the callsigns are quite surprising and it’s great to offer options even during a global pandemic. The J42S contest team entered this category from Greece and took top honors with a solid 9.5-million point score. IQ3ME with an eight-person Italian team racked up 5.5 million points for second. WW4LL and a seven-person team managed to take top U.S. honors out of Georgia.

Of note is the up-and-coming WV4P team, Ron and Trina Koenig, W4VP and NR4L respectively, who have been working hard to build up their presence in Tennessee. The station was under construction during the contest, so Ron setup a camper to QRV their old station, while Trina operated the new site. The two of them managed to come within striking range of the WW4LL team. We will need to keep an eye on these two.

**Multi-Multi Distributed**

We were curious who would take advantage of this new category offering, and some of the callsigns are quite surprising... 

**The Single Banders**

**High-Power 10 Meters:** Luca, I2N2CJ, operating as D41CV, managed to barely edge out Dan, LU1DX, in Argentina to take top honors in the world. NA4W operated by Cort, K4WI, was first place in the U.S.

**High-Power 15 Meters:** Gunter, V51WH, won first place by narrowly beating CV7S (op. CX7SS) across the Southern Hemisphere pond. Ira, K2RD, was able to position himself on top in the U.S. from his Nevada QTH.

**High-Power 20 Meters:** Helmut, DF7EE, piloted LX7I to the top in the world, narrowly beating Tibi, HA1DAE, who beat HG1S for second. Dan, NB2P, managed the top U.S. position from New Jersey.

**High-Power 40 Meters:** Nicola, 9A5W, took the top spot in the world by over a million points. Victor, N800, operating...
as WQ50O turned in another solid performance to take top U.S. honors. **High-Power 80 Meters:** Eml, 9A9A, chose to take on the 80-meter band this year and was successful in winning the category narrowly over fellow Croatian station 9A5X. WW2R operated by Stephen, N2CEI, finished first in the U.S. **Low-Power 10 Meters:** A win for Takeshi, JF1OVA, who was unable to make too many QSOs but had enough to win the category with XE2N picking up second place. **Low-Power 15 Meters:** A great score from Pekka, EA8AH, bested second place PY2UD in the world. Steve, W8SN, with a fair showing, was good enough to take top U.S. honors. **Low-Power 20 Meters:** EF1A operated Juan, EA1X, took the solid win over another great effort by LZ2JA, who finished in second place in the world. James, W4LC, finished first in the U.S. **Low-Power 40 Meters:** Winfried, DK9IP, powered through the band in low power for the win. WT4O finished first in the U.S. **Low-Power 80 Meters:** Petar, 9A6A, won first place in the world with by over a million points. There were only two entrants in category from the U.S. and Olaf, WSFY, came out on top.

**Congratulations to the Winners**

On behalf of Ed, WØYK, and the entire CQ WPX RTTY team, we hope you had fun and are looking forward to the next run. As of this writing things are looking very good here in North America for a return to traditional contest conditions, and we certainly hope the same for all of our worldwide RTTY contesting colleagues.

— 73, Chris Tate, N6WM

(Scores begin on page 93)
K9ARZ reflects on three station accessories that made his early days in ham radio much more successful and fulfilling.

Three “Gifts” From Heathkit

BY LAWRENCE W. STARK,* K9ARZ

For those of you who do not remember the “halcyon days” of ham radio during the late 1950s and early 1960s, let me say it was a magical time for the amateur service. Sunspots were numerous and the manufacturers of amateur radio equipment did their best to provide us with numerous offerings of domestically produced radios. Back then, radios were large and heavy, with lots of steel used in their manufacture. I personally lusted after my good friend Zack’s Hallicrafters SX101A receiver. Unfortunately, the cost of the SX101A at that time was far beyond what I could afford with my lawnmowing and part-time water meter reading jobs while in high school. I had to settle for a 15-year-old used receiver that I purchased from Allied Radio’s inventory of reconditioned gear. That first really quality multi-band receiver, a Hallicrafters SX-25, was a big improvement over the S-38 that I used as a shortwave listener or my single-band war surplus BC-454. The SX-25 was only reasonably sensitive but it did have a crystal filter circuit that was capable of rather sharp selectivity if adjusted properly (using the CW pitch control along with the crystal phasing adjustment). Unfortunately, the crystal filter, once adjusted, introduced some loss to the receiver that wasn’t the most sensitive to begin with.

Heathkit’s First Gift

During those times, I always had my nose in the ham radio publications. I devoured old issues of CQ and QST magazines, which were given to me by one of my mentors, Bill Nolan, W9TQL. I read the magazines over and over until the covers fell off and the bindings came apart. I did notice in some of the station pictures, a little box perched atop a receiver. That device looked like something I had seen in a Heathkit advertisement. The device was my first “gift” from Heathkit, the QF-1 Q-multiplier kit (Photo A). I read the advertisement for the Q-multiplier and thought it might help improve the performance of my SX-25 receiver. I call it my first “gift” from Heathkit, and although it wasn’t a “free gift,” at the $9.95 price tag, it was well within my lawnmowing and meter-reading budget. After purchasing the QF-1, I still had money left over for dates and gasoline (24 cents a gallon) for my father’s car when I needed it. The only other Q-multiplier available at that time was Millen Model DQ, which sold for more than twice the price of the QF-1 in kit form.

Well, I connected the completed QF-1 to my SX-25 and it was totally amazed at the performance of the device. In the peaking mode, it could bring a weak signal up well above the noise level while narrowing the passband when receiving AM and CW signals. In the peak mode it functioned similar to today’s APF (audio peak filter), but it was more effective than an APF because it functioned in the IF (or mixer) rather than the AF chain.

In the null mode, the QF-1 could be used to “-notch out” unwanted carriers such as nearby CW stations or those annoying carriers that plagued the AM portions of the band. Technically speaking, the Q-multiplier is an oscillator circuit that is regenerative but kept below the point of regeneration or oscillation. When coupled to the mixer plate or plate of the first IF stage (remember, these were all tube radios at the time), the Q-multiplier raises the “Q” of the tuned circuits thus improving the selectivity and sharpening the received signal. The QF-1 was designed for receivers having an IF of between 450-460 kHz. Many of the receivers of the 1940s and 1950s had IFs of 455-456 kHz. That included the following Hallicrafters receivers: S-20R, SX24, SX25, SX28, S-40, S40A&B, S-85, SX-42, SX-99, S-108, SX-110 etc.; Nationals included: HRO, HR0-5&7, NC-57, NC-88, NC-98, NC-98,

* Email: <k9arz@yahoo.com>
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NC-188, NC-109, etc.; Radio Manufacturing Engineers receivers: RME-45, RME-69, RME-4300, RME-4350; Hammarlund receivers: HQ-120, HQ-129, HQ-140, and a myriad of others. Again, any receiver with an IF near 455 kHz (not including AC/DC types) could be used with the QF-1.

Heathkit’s Second Gift

After upgrading from Novice to General, like many at that time, I was confounded by crystal control. Novices were required to operate their transmitters at no more than 75 watts input power with crystal control of the frequency. Many novices, like myself, had only a few crystals to use with their transmitters. I remember having a 3713 kHz and 3747 kHz for 80 meters (the novice band ranged from 3700-3750 kHz at that time).

For 40 meters, I had a 7175-kHz crystal (7150- to 7200-kHz novice range on 40 meters), and a 7051-kHz crystal which tripped to 21153 kHz (21,100- to 21,250-kHz range) for 15 meters. The common practice was to get on and call CQ on one of your crystal frequencies, and then on receive to “tune the band” to listen for an answer. As I recall, most of my contacts on the novice bands were completed “split frequency.” Some contacts were made on the same frequency because most of the crystals used were military surplus and were for channelized military frequencies during World War II. So, it was possible for novices to have crystals on the same frequency.

When operating AM (even by 1960, SSB was occupying a small portion of the phone bands), there were a large number of operators using crystal control of their AM transmitters, especially those using “homebrew” gear. Home construction of vacuum tube VFOs (variable frequency oscillators) was possible, but not for the faint of heart. Mechanical integrity and electrical stability were issues one had to deal with. I tried several times to build a VFO circuit from a magazine article, but instability and drift doomed my efforts.

So if you were operating in the AM portion of the band, besides the wail of annoying heterodynes caused by the beating of one carrier with another, you were likely to hear the following: “CQ, CQ, this is W9XXX, W9XXX, W9XXX, calling CQ on 75 meters and tuning, ‘K’ someone please.” So just as novice operators used split-frequency operation, many higher license classes of ham operators still used split-frequency operation due to crystal control or to facilitate contact with those who were “rock bound.”

VFOs were available during that time period, but they were either relatively expensive or built into newer radios such as the Heathkit DX-100, Viking Ranger, Viking Valiant, or Collins 32V series of transmitters. All of those transmitters were well beyond my meager budget so I looked for something less expensive that I could connect to my Heathkit DX-35 transmitter to allow for frequency agility.

The answer to what I looked for was the Heathkit VF-1 VFO kit (Photo B). The VF-1 easily fit into my budget with its kit price of $19.50, less than half the price of the Johnson Viking VFO that was designed to be used with the Johnson Viking I and II model transmitters. The VF-1 uses a single oscillator tube (6AU6) and voltage regulator tube (0A2) to improve its stability. Both the Heathkit VF-1 and the Johnson VFO are similar in size and in performance. The average output of the VF-1 is approximately 10 volts, which is sufficient to drive most transmitters. I am currently using my VF-1 with an old Johnson Viking Adventurer CW transmitter. The keying circuit of the VF-1 is tied into the keying circuit of the transmitter, which

Photo B. The author's Heathkit VF-1 external VFO is currently teamed up with his classic Johnson Viking Adventurer transmitter.

Photo C. Heathkit’s AM-2 made it affordable for a ham on a tight budget to have an SWR meter that could operate under full power and be left inline all the time. (Photo from Penson, Heathkit: A Guide to the Amateur Radio Products, Second Edition, CQ Communications Inc., 2003)
allows for ease of operation. The keyed signal is amazingly stable for a combo that is over 60 years old. When I first hooked up the VFO there was a bit of AC on the CW note, but that was cured by re-soldering the connections on the 6AU6 tube socket. Either on the DX-35 back in 1961, or connected to my Adventurer in 2020, the VF-1 has performed beyond my expectations. Connecting the output to a frequency counter, I find the dial readout of frequency to be superior to that of most transmitters of that era. Also, the circuitry of the VF-1 is identical to the VFO used in the Heathkit DX-100 and DX-100B transmitters.

**Heathkit’s Third Gift**

At present, we amateurs are slaves to SWR (standing wave ratio) and why not? The SWR on a feedline (coaxial cable in this case) is an indication of reflected power vs. forward power on that line. If the SWR is too high, we are losing precious energy that is dissipated as heat along the line. In the old days when most hams were using balanced line, RF ammeters or light bulb samplers were used to indicate whether RF energy was moving up the feedline or not. When we made the transition to coaxial cables to feed energy to our antennas, other techniques were used to determine the effectiveness of our coupling devices and matching systems. When I put up my first doublet antenna, I consulted the handbook. The book indicated a formula for determining the total length of the antenna. The formula used was the (hopefully) familiar \[468 / \text{freq in MHz} = \text{length of the antenna in feet}.\] Once the antenna was measured, cut, and assembled with the coaxial feedline, it was attached to the transmitter, and if the transmitter loaded according to the manual, you assumed the antenna was okay and ready for use. In the 1950s, I would guess that there were more stations not using devices for measuring SWR than those who were. I am basing this generalization on the published pictures of amateur radio stations that appeared in CQ and QST magazines at the time. The ARRL Antenna Book provided a circuit for an SWR bridge that could be used to determine the reflected power on a coaxial line, but it required a very low-power signal source and could not be left in the line for constant monitoring of the antenna's efficiency.

Then came the third “gift” from Heathkit, the model AM-2 Reflected Power Meter (Photo C). Like the previous two “gifts,” the AM-2 was advertised at the very reasonable kit price of $15.95, far below the cost of the Jones Micro-Match or the E.F. Johnson reflectometer (same as the one that was later incorporated into the later model Johnson Matchboxes).

The AM-2 could be easily assembled in an evening. When connected in series with the coaxial cable from the transmitter to the antenna, the AM-2 indicates the percentage of reflected power, the SWR from 1:1 to 6:1, and provides a relative forward power reading that can aid in tuning up a traditional transmitter, or indicate added output when an amplifier is switched in. Now you no longer had to guess if you had cut your antenna to the proper length for the band in use. You had a good indicator of the relative efficiency of your antenna and you could leave the SWR meter “in-line” to allow for the continuous monitoring of your transmitted signal. I no longer own an AM-2, having replaced mine with Heathkit SWR / wattmeters that provide me with a more complete picture of actual forward power from my transmitter or amplifier.

**Conclusion**

The Heath Company has provided amateur radio operators with many quality examples of transmitters, receivers, and other accessories over the years, not to mention well-designed test gear to permit us to service and design our own gear. I have owned or built the following Heathkit kits since that time: DX-20, DX-35, DX-40, DX-100, Apache, SB-301, SB-401, HW-32A, HW-101, SB-101, SB-102, SB-200, SB-220, SB-104, HW-5400, SA-2014, SA-2016A, HM-102, HM-2140, and many pieces of Heathkit test equipment, not the least of which was the Heathkit grid dip meter. All of these were great examples of Heath engineering and some of these items I still own and use today. But I will never forget the “three gifts” from Heathkit that came at a very critical time in my ham career, when affordable aids to my operating convenience were made available. Thank you Heathkit, we miss you, and your products. (Editor’s note: Heathkit has returned, with new owners and a limited product line. Among its focal points today are products intended to help builders learn and practice the art of surface-mount construction. See <www.heathkit.com>.)

**Notes:**

1. Julius Zaccagnini, then W9EQW, now AAØU.
2. William J. Nolan, W9TQL, then Chief Engineer WLS Radio, Chicago.
3. Later models of the AM-2 indicated SWR to 3:1.
5. All three of the “gifts” from Heathkit were eventually replaced with updated versions: The QF-1 was replaced by self-powered models, the HD-11 and the GD-125. The VF-1 VFO was replaced by the HG-10 (re-designed) and could be used with both cathode-keyed or grid-block keyed transmitters. The AM-2 was replaced by the HM-11 and HM-15, which were essentially the same circuit in a cosmetically re-designed package.
The K-1 medium-wave and shortwave AM radio was Heathkit’s first electronics kit, offered from 1948 through 1949. The Heath Company itself, though, goes back to the early 1900s when it manufactured and sold airplane kits.


Some years after Heath’s death (in an unfortunate airplane testing accident in 1931), the company was eventually purchased and after World War II, changed its product line to kit electronics. It went through a variety of owners over the years until the Heathkit Education Company of Benton Harbor, Michigan, filed for bankruptcy and closed in 2012. In 2019, a successor company established a live website at <www.heathkit.com>. According to its website, Heathkit is back in business, making a limited line of electronics kits and offering a variety of interesting products and services.

Heathkit’s early success and profitability, along with electronics hobby kit affordability, was undoubtedly founded on its designs around abundant supplies of war surplus NOS (New Old Stock) electronics components that were readily available from government auctions and sales for pennies on the dollar.

The Heathkit K-1 advertisements (Photo A) listed pricing at $8.75 ($97.40 in 2021 dollars) for the receiver kit, an optional 2-1/2-inch permanent magnet loudspeaker for $1.95, and headphones for $1.00. The K-2 successor radio kit also offered an optional mahogany cabinet for $2.50. There is ambiguity as to whether more than one plug-in coil was necessary to receive all of the 550 kHz to 6.0 MHz advertised tuning range. From my test of the restored K-1, I’d guess that this radio was designed to cover the entire broadcast and shortwave range with one coil, as selectivity and overload protection is seriously lacking in the design. In fact, a few feet of antenna wire seems to work better than a longwire antenna, improving the K-1’s ability to separate stations and to prevent overload. Regardless, the K-1’s tuning and regeneration control operation is a delicate balancing act, in which this radio is prone to self-oscillation and saturation as would be expected for such a simple regenerative radio design.

The Basic Circuit
The Heathkit K-1 employs a three vacuum tube circuit (Figure 1), with one 12C8 (VT-169) and two 12A6 (VT-134) tubes. The 12C8 operates as a regenerative receiver and AM detector, feeding a 12A6 tetrode audio amplifier stage that drives an audio output transformer and speaker. A second 12A6 tetrode performs as a half-wave rectifier, producing around 150-volts DC. The 12A6 rectifier plate and two grids are tied together, operating as a diode (12A6s must have been abundant and cheap).

This regenerative receiver operates from a built-in transformer-operated 120-volt AC power supply, with internal speaker and plug-in band coils. The circuitry is efficiently laid-

Now, this is dedication … the Heathkit K-1 receiver the author purchased online was in such bad shape that he had to recreate the front panel! Read how he did it, along with restoring the rest of the radio, inside and out.

Restoring the Original Heathkit – The K-1 AM “All-Wave” Receiver

BY RAY GRIMES,* N8RG

* Email: <aero-one@verizon.net>

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Photo A. An ad for the Heathkit K-1 “All-Wave” radio kit. It covered the AM broadcast band and shortwave through 6 MHz (actually, Mc in those days). (Image courtesy rigreference.com)
out in a 6-1/2- x 5-inch package. The front panel includes a 2-1/2-inch speaker, an earphone jack, a tuning control, and a combined regeneration and power ON/OFF switch (though the regeneration function isn’t labeled).

My Heathkit K-1 quest began with a previous eBay search for vintage ham radio equipment, finding an auction for a rare K-1 radio receiver. Unfortunately, I wasn’t aggressive or willing to spend enough to capture this prize. I continued to watch for another Heathkit K-1 radio and much to my surprise, one appeared a couple months ago and I was the happy auction winner, though it cost me $136. My K-1 was a mess, showing signs of poor storage over the past 70 years, with considerable front panel and chassis corrosion and rust (Photos B, C and D). Regardless, it was still an important historical item that deserved careful restoration.

Starting the Restoration
When restoring vintage electronics, I start by testing all vacuum tubes, then replacing all original paper and wax capacitors. It’s been my experience if I replace defective tubes and all original capacitors, vintage radios will more than likely work on the first try (unless they suffered mishandling, a short circuit or fire, or that someone got their hands into it first). I then replace brittle AC cords (as they present a fire and shock hazard). Once the tubes and capacitors have been replaced and the chassis cleaned using an air hose, I can power-it up using my Variac® rheostat to slowly bring up the line voltage (lis-

Photo B. The author’s “new” K-1 before restoration.
tening for crackling and sizzling, and maybe a bad smell). When reaching full line voltage through the Variac, it’s likely that the radio under test will work.

Unfortunately, I soon recognized that one of the transformer secondary wires was hanging free, which was a sign that someone had attempted to troubleshoot a problem but hadn’t completed the repair. I determined that the 12-volt secondary winding was open-circuit, although the 150-volt high-voltage winding was intact. With some effort, I located a replacement power transformer that was small enough to fit in the original space.

Upon replacing the power transformer, the radio still didn’t work. After resoldering several connections, and upon closer inspection, I discovered that the original kit builder (some 70 years ago) attached the transformer wire from a tie strip to one of the power switch terminals but failed to solder it. After that quick repair, the radio came to life.

The next challenge was to attempt a cosmetic repair of the chassis surface which was badly corroded and pitted. Chemical rust remover / reverser had little effect on the surface damage. I then decided to carefully remove the surface rust using sandpaper and steel wool, being careful to not allow metal chips and debris to fall into the circuitry. I then masked and applied a metal-colored spray paint to the chassis. I also removed each vacuum tube and masked them (protecting the white labelling), applying flat black paint to cover scuffs and rust.

The biggest challenge was the K-1 front panel. As with the chassis, chemical rust remover / reverser had little effect, and wouldn’t be able to help with the paint loss and panel metal pitting problems. I decided that only a new front panel would suffice. I took a high-resolution digital photograph of the damaged front panel then proceeded to repair the image using Corel PaintShop Pro®, repairing every defect one pixel at a time. This process took around 8 hours but the result was well worth the effort. I then located a company that made color photograph murals on 1/16-inch sheet aluminum. There are numerous companies offering large format metal prints but I found only one that listed a 5 x 7-inch print option (though custom size adjustments weren’t offered).5 I had concerns that the colors might not be permanent and that flaking of the print material might occur. Most fortunately, the print arrived within a week from ordering, the printing was well-bonded to the aluminum, and the colors and resolution were outstanding.

I then trimmed the metal print edges slightly to the original panel dimensions, using a nibbler tool and small file. I then cut out the speaker grill which was not as difficult a job as I first expected. I used a large hole punch tool then a nibbler tool and small file to reach the proper speaker hole diameter. The original panel served as a template to locate the...
controls and headphone jack connector holes for the new panel (Photo E).

The crowning touch was a rebuild of the seriously decayed wooden cabinet that I suspect the original kit builder made, as a wooden cabinet option wasn’t offered until the K-2 version (1949-1950). The K-2 cabinet had 3/4-inch walls, unlike the home-built cabinet that came with my K-1, made with 3/8-inch stock. I clamped and glued the original cabinet pieces to restore the unit’s integrity then glued 3/4-inch pine plywood over it. Finally, I added 3/4-inch wood molding to the cabinet front edge, finishing by sanding then applying two coats of walnut stain and an overcoat of Deft® satin clear wood finish to smooth the surface.

A “Like New” Result

This Heathkit K-1 restoration was a fun project that required some electronics and basic woodworking skills and a lot of creativity in materials. The end product (Photos F and G) is a “like new” restoration of a memento reaching back to the origins of commercially available radio kits that no doubt sparked interest and skills in many of us that lead to rewarding lifetime hobbies and careers.

Credits and References:
1. <https://tinyurl.com/2eavym2s>
2. Edward Bayard Heath (Wikipedia) <https://tinyurl.com/4phbh44j>
3. <https://tinyurl.com/yuwbx5m2>
4. <https://tinyurl.com/3nyvxfpn>
5. <https://tinyurl.com/k72ky69y>
There have been numerous articles in CQ and QST magazines recently on restoring tube-type receivers and transmitters from the 1950s and '60s. In this article, we will present the restoration of a Heathkit DX-60 transmitter as a how-to article. I have restored around 20 tube-type amateur radio transmitters and receivers, and this article will only cover the very basics of restoring vintage gear. I am mainly a high-speed CW contester, VHF contester, CW ragchewer, microwave wannabe, and dabbler in local ham radio politics, and am not an “expert.”

In this day of the COVID-19 virus, hamfests are few and far between, so eBay, QTH.com classifieds, and eham.net classifieds are the current main source of gear, as well as local amateurs, some of whom would drop used gear off unprotected from the weather at our clubhouse (Susquehanna Valley ARC). The clubhouse has since been reclaimed by the county airport, after demanding removal of our three towers and a Hustler 5BTV vertical.

Be extremely careful bidding on eBay (obviously). If the price is on the low side, there is a problem with the gear that is not described. For instance, a Heathkit MT-1 mobile AM transmitter I recently restored had a frozen band switch, which I forced to 40 meters, and proceeded from there. For shipping, I prefer FedEx or UPS ground to the USPS, which will almost surely damage your radio, especially if it is inadequately packed. Inadequate packing is common.

Getting Started
The DX-60 in question is illustrated in Photo A, with the case removed and flipped upside down. You must first spray adequate non-filming contact cleaner on all switches and controls. Use of Dexit™ is often indicated. However, I find that this agent needs to dry overnight, and you may still find evaporated residue on the chassis. It should be used sparingly. Work each control to its full range several times. Switch detents are often gone, and may be unrepairable. This has no effect whatever on switch functionality. I use an analog meter (Simpson 260 or Tenma, 20,000 ohms per volt sensitivity) to check ohmic and voltage values. The DX-60 may curse you permanently if you use a digital meter. Sometimes use of a VTVM with its 15-megohm input resistance will be required, particularly in the grid and screen circuits of amplifier stages. VTVMs are prolific on eBay and most are extremely easy to restore (unless they fall into the impossible-to-restore category, which some do).

As far as cleaning the chassis, I personally just use a moist cloth. One can also use contact cleaner. You will find that rust on top of the chassis is inconsequential in most cases, unless it affects an electrical contact or some sort of RF shielding.

All paper capacitors must be replaced. I use 600-volt mylar capacitors obtained online from Bob’s Antique Radios and Electronics, <radioantiques.com>, as illustrated in Photo B. Order the starter kit. These can also be obtained in individual values from Moyer Electronics [(570) 286-6707, <moyerelectronics.com>]. Of course, you may be required...
Photo B. 600-volt Mylar capacitors.

Photo C. High-voltage electrolytic discharge technique. Note that operator is insulated from metal and that the shaft of the screwdriver is touching the metal chassis.
to place some capacitors in parallel in order to obtain the correct value. The capacitance of capacitors in parallel is the sum of the individual capacitance values (a General Class license examination question).

At the very least, print out a DX-60 or DX-60B schematic (visit <https://tinyurl.com/w4wexjz>). The 40-microfarad filter caps must be replaced. I used 100-µF, 450-volt capacitors obtained from <tubesandmore.com>. Moyer’s also stocks them. Remember, extra filtration will lessen ripple, however, discharge of the filter capacitors from the bleeders will increase in time. ALWAYS use a “chicken stick” to discharge the filter capacitors. I use a screwdriver, as shown in Photo C. If you do not follow this plan, you will be very unpleasantly surprised. The above-chassis capacitor is just replaced with under-chassis units, after clipping off the factory leads and isolating them with shrink-wrap tubing or high-voltage electrical tape, as shown in Photo D. Do not worry, the stiff leads of the replacement capacitors will prevent them from shorting out to the chassis itself. The stem from the above-chassis capacitor is severed with a large diagonal cutter, leaving the leads soldered together intact. Exact-replacement above-chassis capacitors are available at <tubesandmore.com> or elsewhere, but remember, the electrons do not care what it looks like.

The 20-µF, 160-volt electrolytic capacitors in the bias circuit for the 6146 must be replaced. Any capacitor in the

Photo D. Ugly method of replacing above-chassis multiple capacitor cans.

Photo E. Two-wire double-fused Heathkit or Johnson style plug.

Photo F. QRP crystals.

Photo G. Final product.
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NES10-2MK4
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- Audio overload LED
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- Now with latest bhi DSP noise canceling technology for even better receive audio
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- Simple controls
- Use with speakers or headphones
- Line/speaker level inputs - Use mobile with AA batteries
- High-performance audio processing on all radio bands - Enjoy clear receive audio!

Find out more on www.bhi-ltd.com

Photo H. Restoring classic ham gear can be habit-forming! Here’s part of the author’s collection.
PolyPhaser Adds New VHF/UHF 4.3-10 RF Surge Protectors with 12 Configurations

PolyPhaser has introduced a new 4.3-10 RF surge protector with 12 configurations, available in all gender combinations. Designed to protect outdoor radio and antenna installations, PolyPhaser’s new 4.3-10 VHF/UHF RF surge protectors offer 20-kiloamps of bi-directional, repetitive strike surge protection.

Built into a waterproof IP-67-rated case, the 4.3-10 RF surge protectors are also UL497E certified while being Motorola R56 compliant and offer two different mounting bracket options. With high performance surge protection, the 4.3-10 offers a low let-through high-pass filter design, providing high CW and peak input power (PIP) RF power and low PIM, with 4.3-10 connectors on both sides. It offers reliable broadband performance from 100 MHz to 520 MHz.

Polyphaser’s new surge protectors are available now and have a suggested retail price of $178. For more information, visit <https://tinyurl.com/rqewt3>.

About Those Mods...

What to do with undocumented modifications? These are always a problem, and Heathkits were favorites for all sorts of mods. On my Hallicrafters HT-37, I finally just ripped out the VOX-on-CW circuit, since it tended to cut off the first character of every word send after the VOX relay returned to its unexcited state. On this particular DX-60, a PTT and what looks like a super-modulation circuit had been added. I just replaced all of the associated electrolytics with exact-replacement values and hoped for the best. It worked in this case. Remember, this is Heising modulation, and will not sound as good as the plate modulation you might be used to on a Johnson Ranger, Eico 720, or similar plate-modulated transmitter.

The final product is illustrated in its case in Photo G.

What’s Next?

After you conquer the DX-60, you may want to do more. Classic rig restoration may be habit-forming! (Photo H) Perhaps your next project might be to build the K3MD junkbox QRP transmitter, or, if you are really into it, restore a Collins KWM-2A with a converted Heathkit HP-23B power supply or a Collins 516F-2 (extremely overpriced and needs to be converted to solid state with an eBay kit). Get out your 100-watt soldering gun, 1.5-mm solder, long-nose pliers, and diagonal clippers! 73!
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You got a great deal on a DC power supply at a hamfest. But how do you know you won’t fry your rig when you plug it in? KBØVKS has a simple-to-build resistive test load to make sure everything is OK before you connect it to your radio.

A Dummy Load for Power Supplies

BY DAN SWENSON,* KBØVKS

If you acquire an unknown power supply, it would be a good idea to test that supply before connecting it to your radio. Testing may save your expensive radio from being damaged by a bad power supply. To test the supply, a resistive load takes the place of the radio. This article shows you how to build one to test 13.8-volt DC supplies with varying current levels and a minimum of parts. It will also take you, step-by-step, through the design process.

Designing a Test Load

Three things are needed to design a proper load, and they won’t cost you a dime:

1. Ohm’s Law, I = E / R. I is current measured in amps, A. E is electrical force measured in volts, V. R is resistance measured in ohms, (Ω).
2. Watt’s power formula, P = I x E. P is power measured in watts, W. I & E are the same as above.
3. Parallel resistance formula, 1/R_T = 1/R_1 + 1/R_2 + 1/R_3 + ... R_T is total resistance. R_1 is first resistance. R_2 is second resistance. The formula accommodates many resistances.

Design

I had an unknown 30-amp, 13.8-volt supply that needed to be tested. A test load needs to draw less current than the maximum output of the supply. Using 28 amps as a trial design target, estimate the required load resistance. Changing Ohm’s Law to R = E / I gives you 13.8V / 28A = 0.49Ω. Round to 0.5Ω. Now let’s move from an estimate to concrete figures. Re-calculate the load current with Ohm’s Law, I = E / R as 13.8V / 0.5Ω=27.6A. Next, use Watt’s formula to determine the total amount of heat to dissipate. P = I x E = 27.6A x 13.8V = 381 watts. It is desirable to spread this large amount of heat among several smaller resistors instead of one large expensive resistor. Let’s aim for a parallel configuration that has about 100 watts per leg. This results in 381W / 100W = 3.8 legs. Round to four parallel legs. This is 381W / 4 = 95.2 watts per leg, much easier to manage with common power resistors.

Now determine the current per leg. Changing Watt’s formula to I = P / E = 95.2W / 13.8V = 6.9A per leg. Determine the resistance per leg using this form of Ohm’s Law, R = E / I or 13.8V / 6.9A = 2Ω per leg. Since this structure has four parallel legs, let’s verify the result using the parallel resistance formula:

\[
\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots
\]

\[R_T = \frac{2Ω}{4} = 0.5Ω\]

This result agrees with the beginning calculation. While 2- or 4-Ω resistors could be used to build this project, online research revealed more favorable pricing for 1-Ω resistors, about $1.80 each in quantity of 10. Also, I can easily use the excess 1-Ω resistors in other projects. Let’s decide on using two 1-Ω resistors in series, resulting in 2Ω per leg, for each of four parallel legs. There is also a thermal advantage to this configuration which can be seen next.

Previously, there was 95.2 watts per leg. This heat is shared by two series resistors, resulting in 95.2W / 2 = 48W per resistor. While it might be tempting to use resistors rated at 50 watts, it is common design practice to use a 2:1 safety factor when selecting the wattage rating of power resistors. So, 2 x 48W = 96W. Round up to a 100-watt rating. In this way, there is less thermal stress on each resistor.

In summary, the design result has four parallel legs, each leg consisting of two 1-Ω 100W resistors in series, yielding
a design total of eight reasonably-priced resistors, sharing the 381 watts of total thermal dissipation with a nice safety margin.

Construction
I used a scrap aluminum plate 17-inches wide x 24-inches tall x 1/8-inch thick. This provides about 50 square inches per resistor (remember, they’re dissipating a lot of heat). Since testing is an intermittent process, most of the heat dissipation is by conduction. If you opt for 3/16-inch thickness, the outer dimensions of the plate could be reduced to 15-inches wide x 18-inches tall, and still have the same mass of heat sink. Exact dimensions are not critical. The important part is to mount the resistors a uniform distance from each other on a stiff flat surface that has mass (see Photo A).

Put a thin film of thermal compound underneath each resistor. Two pieces of dry plywood on each end of the metal panel provide electrical insulation for mounting the metal bars. Two coats of polyurethane will keep the wood dry. The metal bars were drilled and tapped for the connecting hardware. I recommend the metal bars be copper or brass, not aluminum. Using copper or brass bars keeps all the plated copper connections in the same galvanic family, thereby preventing corrosion in the connections.

Each leg was wired with the same length of 16 AWG stranded wire (equal lengths are important; see below). The main cables are 10 AWG stranded wire. All wire ends were tinned to prevent spaying of the strands. I built my project so that I could individually connect and disconnect each leg at points A, B, C, and D as shown on the schematic (Figure 1). This feature allows changing the load, depending on the size of the power supply. Lastly, a barn door handle at the top of the project provides for easy transport (Photo A).

A panel to test 50-amp supplies could be easily constructed with the same format. Use seven legs on a proportionally taller panel. The load would be 6.9A x 7 = 48A. The gauge of the leg wiring remains the same. The gauge of the main cables would need to be increased to 8 AWG.

Equal Potential Wiring
An easy way to visualize the concept is to trace the various current paths. First, trace from the positive terminal, through the A leg, then to the negative terminal. Note the length of the path. Second, trace the entire path through the B leg. Again, note the length of the path. Do the same with the third and fourth legs. By comparison, all four paths are exactly the same length through the conductors. The symmetry ensures the voltage drop in the bars will be equal, no matter which path is used. This assures that each leg receives equal voltage while under load. Whether you use bars or thick wires, the concept is the same.

Testing Hints
The first thing to test is voltage sag under load. Measure the voltage with no load, then measure the voltage under load. Some voltage sag under load is normal. Some power supplies have remote sensing. Properly wired, these supplies have little voltage sag under load. Some power supplies have a duty cycle; 20% is a common figure. For example, in a 50-second cycle, 10 seconds (20%) at full load should be followed by 40 seconds (80%) of light or no load. Typical power supplies are not designed to deliver full load continuously. Do not subject them to heavy loads for extended periods. Lastly, while under load, use a scope to see how much residual ripple is present. Specifications and individual results will depend on the manufacturer and on the application.

A Special Note for Beginners
Do not let the math intimidate you. Doing the math, one step at a time, will help you immensely in understanding Ohm’s Law, Watt’s power formula, and the parallel resistance formula. This will benefit you greatly as you progress in electronics.

<table>
<thead>
<tr>
<th>Leg</th>
<th>Max. current (in amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A only</td>
<td>6.9</td>
</tr>
<tr>
<td>A+B</td>
<td>13.8</td>
</tr>
<tr>
<td>A+B+C</td>
<td>20.7</td>
</tr>
<tr>
<td>A+B+C+D</td>
<td>27.6</td>
</tr>
</tbody>
</table>

Table 1. Maximum current values for different configurations at 13.8-volts DC. Maximum load should be less than the rated capacity of the power supply.

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Figure 1. Schematic of the test load circuit. All resistors are 1-ohm, 100-watt, 5% tolerance. See text and Photo A for wiring to engage varying loads, and Table 1 for maximum current values. (Artwork by Emily Leary)
Announcing:

2021 Inductees to the CQ Amateur Radio, Contest, and DX Halls of Fame

CQ magazine is pleased to announce its 2021 Hall of Fame inductees, including two new members each for the CQ DX Hall of Fame and the CQ Contest Hall of Fame, along with six inductees to the CQ Amateur Radio Hall of Fame. This year’s inductions were again conducted online due to event cancellations resulting from the COVID-19 pandemic.

The CQ Amateur Radio Hall of Fame honors those individuals, whether licensed hams or not, who have made significant contributions to amateur radio; and those amateurs who have made significant contributions either to amateur radio, to their professional careers or to some other aspect of life on our planet. This year, we are inducting six new members, bringing to 339 the total number of members inducted since the hall’s establishment in 2001. The 2021 inductees (listed alphabetically) are:

Archibald Doty, W7ACD (SK), engineer, inventor, researcher into efficient radial systems for vertical antennas and pioneer of college radio; co-founded what is now WESU at Wesleyan University in Connecticut in 1939, the second-oldest college radio station in the U.S.; also served as a pilot in the U.S. Army Air Corps in World War II.

Nathaniel Frissell, W2NAF, founder of HAMSci (Ham Radio Science Citizen Investigation), a collaboration between radio amateurs and ionospheric scientists; organizer of the 2017 Solar Eclipse QSO Party, which also served as a research project on the effects of a total solar eclipse on HF propagation.

Lorin Hollander, WA1PGB, world-renowned classical concert pianist who has performed with virtually every major philharmonic orchestra in the U.S., along with many others overseas; heavily involved in music and arts education and in relationships between music and medicine.

Christopher Imlay, W3KD, ARRL Counsel and General Counsel from 1982-2018; represented the League before the FCC on a wide variety of issues, including PRB-1, now enshrined in FCC Rule 97.15 (b), that requires state and local regulations to reasonably accommodate amateur radio antenna structures.

Cathryn Mitchell, MØ1BG, Academic Director of the University of Bath Doctoral College (UK) and recipient of the 2019 Edward Appleton Medal “for pioneering research in tomography and data assimilation revealing a completely new perspective on Earth’s ionosphere in response to extreme space weather.”

Admiral Charles “Chas” Richard, W4HFZ, commander of USSTRATCOM, the United States Strategic Command, one of 11 unified commands of the Department of Defense; served previously as Commander of U.S. submarine forces and Director of Undersea Warfare at the Pentagon.

The CQ DX and Contest Halls of Fame honor those amateurs who not only excel in personal performance in these major areas of amateur radio but who also “give back” to the hobby in outstanding ways.

The CQ DX Hall of Fame was established in 1967 to recognize those amateurs who have made major contributions to DXing and DXpeditioning. This year, we induct two new members. The 2021 inductees are:

Jacky Calvo, ZL3CW/F2CW, a veteran of the French Air Force and the International Committee of the Red Cross, with postings that took him (and his ham station) to a dozen countries around the world; a participant in more than two dozen DXpeditions and WRTC (World Radiosport Team Championship) competitions from 2010-2018 and is a team leader for 2022.

Francesco Valsecchi, IKØFVC/HV0A, who has regularly activated Vatican City for the past 30 years using HV0A and other callsigns, as well the Sovereign Military Order of Malta (SMOM) as 1AØKM, along with fellow operators. Francesco has logged more than 3322 •• CQ •• July 2021
300,000 QSOs for the two tiny entities, averaging roughly 10,000 contacts per year for hams around the world.

The CQ Contest Hall of Fame was established in 1986 to recognize those amateurs who have made major contributions to the art of radio contesting. The 2021 inductees are:

**Robert Wolbert, K6XX,** a “renaissance man” of contesting, advancing the state of the art in designing amateur equipment at Elecraft, a participant in more than 1,100 contests over 35 years and a many-time winner (he is a 9-time recipient of the Jim Maxwell Memorial Trophy for the highest-scoring California single-op unassisted station in the ARRL DX CW Contest); member of the organizing committee for the first WRTC in 1996 and a team leader in 2000 and 2014; has authored many articles for amateur contesting publications, presented at multiple conferences and is a longtime member and leader of the Northern California Contest Club (NCCC).

**David A. Pruett, K8CC (SK),** author of the NA contest logging program as well as a log-checking program and host of many multi-multi operations from his Michigan contest station over 30 years; longtime chairman of the Michigan QSO Party; former editor of the *National Contest Journal* and longtime member and leader of the Mad River Contest Club.

Formal inductions to the CQ Contest and DX Halls of Fame were conducted online once again, as a result of the COVID-19-related cancellations of the Dayton Hamvention® and associated contest and DX dinners. CQ World Wide DX Contest Director John Dorr, K1AR, led the Contest Hall of Fame induction at the conclusion of Contest University’s online seminar on May 20th, while CQ DX Editor Bob Schenck, N2OO, conducted the DX Hall of Fame induction on May 26th on the Ham Nation podcast on the Ham Radio Crash Course YouTube channel.

Recordings of both ceremonies may be found online. The Contest Hall of Fame induction is on DX Engineering’s YouTube channel at <https://tinyurl.com/mpn2e48b> (beginning at approximately 7 hours and 37 minutes into the Contest University video), and the DX Hall of Fame presentation may be found at <https://tinyurl.com/3ycxbymv>, starting 3 minutes and 30 seconds into the podcast.

Our thanks to all and congratulations to the inductees!
The CQ World Wide DX RTTY Contest (CQWW RTTY) offers 48 hours of non-stop DX chasing fun. Whether you are competing for awards, looking for a few new band-countries, or simply filling the logbook, the CQWW has something for everyone. Check out the Classic and Rookie Overlay Categories.

Contest Basics
Working stations is easy. Exchange and log signal report and your CQ Zone number, e.g. 599 14. Continental U.S. and VE stations also send QTH, e.g., 599 05 MA. If you’re not sure which zone you’re in, visit <http://bit.ly/1BHtmsP>. Generally speaking, the U.S. West Coast is in Zone 3, the East Coast is in Zone 5, and the rest of the lower 48 is in Zone 4. Contacts are only valid on the 3.5-, 7-, 14-, 21-, and 28-MHz amateur bands. Please observe established band plans.

Scoring
Final score is based on QSO points earned for each contact times the number of multipliers worked.

Multipliers are the number of DX entities worked on each band plus the number of CQ Zones worked on each band plus the number of US/VE QTHs worked on each band.

Contacts with other continents count three points each. Contacts with the same continent, but different country, count two points. Same country contacts count one point.

Don’t worry about calculating your score; the contest log checking software will do that for you when you submit a log.

Entry Categories
The competition is divided into Single Operator and Multi-Operator categories. Single Operator categories also offer two additional Overlay categories.

Single Operator (all bands or any single band): only the 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 Assisted (all bands or any single band): the one operator may use the DX Cluster or other tools to help find contacts. The one operator must make and log all contacts.

Classic Overlay: Allows the use of only one radio, no QSO finding assistance, and only counts the first 24 hours of operating time — off times are a minimum of 60 minutes during which no QSO is logged. Single Operator Assisted entries are not eligible for this Overlay category.

Rookie Overlay: Only open to operators who were first licensed as radio amateurs less than three (3) years before the date of the contest. Indicate date licensed in the soapbox field of your log.

Multi-Operator: More than one person is involved in operating the station.

Single-Transmitter: This category allows one transmitter to work any station. It may change bands as many as 8 times per hour. Note: A second transmitter may be used to work multipliers only. This category has some very specific restrictions so please read the full rules carefully.
- High power: Up to 1,500 watts
- Low power: 100 watts or less

Two-Transmitter: Allows the use of two transmitted signals on two bands. Each station may change bands as many as 8 times per hour.

Unlimited: Allows the use of one transmitted signal on each of the five bands.

Awards
Electronic certificates will be made available for download for everyone who submits an entry.

Submitting Your Log
All entrants who use a computer to log the contest or prepare their contest logs MUST submit their logs electronically. Electronic logs should be in the Cabrillo format. Upload your log on the Web at <www.cqww.com/logcheck/>. The website also includes a utility to convert your ADIF format log file if needed. See full rules for instructions regarding paper logs.

All entries must be sent WITHIN FIVE (5) DAYS after the end of the contest: No later than 2359 UTC October 1, 2021. Resubmitting an entry after the deadline will result in it being considered as a late log.

Only one entry is permitted for each callsign. Any log submission will replace any previous submissions.

Full Rules
The complete rules of the CQWW RTTY DX Contest are available in different languages on the Web at <www.cqwwrtty.com/rules.htm> and in English only on the CQ magazine website at <www.cq-amateur-radio.com> (Look for link on home page or the CQWW RTTY DX Contest main page). Please review the rules before the contest. Questions may be submitted by email to <questions@cqwwrtty.com>.
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As promised last month, we will continue our discussion of supercapacitors in this issue. As we mentioned, these unique devices can actually replace batteries in some applications and can be recharged many times, but have one important consideration that you must be aware of. The maximum voltage of many of these is only around 2.7 volts. If you need higher voltages, then you have to connect them in series. With "normal" capacitors this is not a problem, but with supercapacitors you usually cannot exceed 2.7 volts per device or you run the risk of damaging them. The schematic in Figure 1 shows one way to do this safely and to charge them.

As you can see, we have taken four supercapacitors and connected them in series. This makes the voltage across the string equal to 10.8 volts maximum. You will also note that in order to not exceed this value when charging them, we have used a 10-volt regulator, the Texas Instruments µA7810 series, to drive the string. This will assure we do not exceed the 10.8-volt level since the maximum output of the µA7810 regulator is 10.7 volts (according to the data sheet). In addition, the minimum input voltage of the regulator is 12.5 volts so all should be OK. Note that a 12-volt input would be marginal but might actually be OK; you will have to check this. If you use a different 10-volt regulator, it would be a good idea to check the output voltage of it as well to be sure it will not exceed the 10.8-volt point. You will also note the 56K resistors across each capacitor. These are there to equalize the voltage across each capacitor so that they divide properly. This is a technique often used in the past to do the same when series-connecting high-voltage capacitors as well.

The use of the 15-ohm 10-watt power resistor at the output is to limit the maximum current when charging the capacitor string. When the capacitor string is fully discharged, it will have an impedance of close to 0 ohms and, with an input of 12.5 volts, the regulator will provide 10.7 volts and the resistor will limit the current to around 0.72 amperes (10.7 volts across 15 ohms). As a result, the resistor will dissipate about 7.7 watts (10.7 volts x 0.72 amperes). The total power dissipated by the circuit will then be 12.5 x 0.72 or 9.2 watts with the additional 1.5 watts dissipated by the regulator.

If the input now rises to 14 volts, the regulator output will still be 10.7 volts and as a result the resistor will still dissipate 7.7 watts but the whole circuit will now dissipate 14 x 0.72 or 10 watts and the dissipation of the regulator will rise to 2.3 watts. These power ratings for the two components are therefore liable to result in warm or even hot components during operation so it is best to take this into account when mounting them. As the capacitor string charges, however, the dissipation of the resistor and regulator will drop.

The output of the supercapacitor string is then applied to a three-terminal regulator from the common 7800 series family, and since the output from the resistor driving them will be around 10.7 volts when the capacitors are fully charged, the regulators can be the common 7805, 7806, or 7808 series. The purpose of these regulators is to try to keep the output voltage constant as the capacitors discharge. You can also use Zener diodes or other types of regulating circuitry to achieve this. Remember, however, that a fully charged capacitor string will discharge at a rate determined by the load.

The information given here is simply one way to assure that supercapacitors in a series string can be charged properly and used to provide a stable higher voltage output. The same technique can certainly be extended to capacitors with higher voltages (if you can find some), but in all cases, be sure to take steps to not inadvertently apply too much voltage to any supercapacitor string in excess of its ratings. Also, when connecting them in series, be sure to use all capacitors with the same voltage rating. Do not try to mix them. If you do, the string may not divide properly and you may damage expensive parts.

In conclusion, please forgive my calculations as I have not bench-tested this exact circuit. Due to tolerances, voltages, currents, and wattage values may not be exactly the same as stated here so your results may not be as close as my calculations. But most important of all, before connecting the actual capacitor string to the circuit, recheck all connections and then test the circuit first with the capacitor string replaced by short (the discharged position) and then disconnected (the fully charged position). – 73, Irwin, WA2NDM
JEFFERSON, WISCONSIN — The Tri County Amateur Radio Club will hold its Hamfest 2021 from 8 a.m. to 3 p.m., Saturday, August 7 at the Onalaska American Legion Hall, 731 Sand Lake Road. Contact: Rick Kolter (608) 397-5286, Email: rckolter@gmail.com. Talk-in 146.970 (PL 127.3). VE exams.

ONALASKA, WISCONSIN — The Riverland Amateur Radio Club will hold its Swapfest from 8 a.m. to 1 p.m., Saturday, August 7 at the Onalaska American Legion Hall, 731 Sand Lake Road. Contact: Rick Kolter (608) 397-5286, Email: rckolter@gmail.com. Talk-in 146.970 (PL 127.3). VE exams.

ROANOKE, VIRGINIA — The Roanoke Valley Amateur Radio Club will hold the RVARC Hamfest from 8 a.m. to 1 p.m., Saturday, August 7 at the Gospel Light Baptist Church, 6307 Cleonvale Road. Contact: Rogers, KFY6P, (703) 873-7794 or Kevin Scott (540) 293-3138. Website: <http://w2eza.com>. Talk-in 146.985- (PL 107.3).

FAYETTEVILLE, NORTH CAROLINA — The Cape Fear Amateur Radio Society will hold the CFARS Swapfest from 8 a.m. to noon, Saturday, August 14 at the Cumberland County Shrine Club, 7040 Ramsey Street. Contact: David K4WV, <sk4oe@nc.rr.com>. Website: <http://cfarsnc.org>. Talk-in 146.910- (PL 100). VE exams.

FORT PIERCE, FLORIDA — The Fort Pierce Amateur Radio Club will hold the Fort Pierce Hamfest from 8 a.m. to 1 p.m., Saturday, August 14 at the Indian River State College, 3209 Virginia Avenue. Contact: Pete, KD4SPW, (772) 465-5204. Website: <www.farc.org>. Talk-in 147.345+ (PL 107.2).

WORLDWIDE — The QSO Today Virtual Ham Expo will be held continuously from Saturday, August 14 through Sunday, August 15 and will feature a virtual expo hall and speakers, panel discussions, kit-building workshops and much more. Website: <www.qsotodayhamexpo.com>.

EAST GREENBUSH, NEW YORK — The East Greenbush Amateur Radio Association will hold its Hamfest 2021 from 8 a.m. to 1 p.m., Saturday, August 21 at the East Greenbush Town Park, Town Park Road. Contact: Bryan Jackson <w2dtr@outlook.com>. Website: <http://egaclub.co>.

HUNTSVILLE, ALABAMA — The Huntsville Hamfest and 2021 ARRL Southeast Division Convention will be held from 9 a.m. to 4:30 p.m., Saturday, August 21 and from 9 a.m. to 3 p.m., Sunday, August 22 at the Von Braun Center, 700 Monroe Street SW. Email: <info@hams.org>. Website: <www.hams.org>. Talk-in 146.94 (PL 100). VE exams.

LEWIS CENTER, OHIO — The Blues and Beyond Amateur Radio Society will hold the Central Kentucky Hamfest on Saturday, August 14 at 2319 Woodhill Drive. Website: <http://bluegrass.org>.

BARABOO, WISCONSIN — The Yellow Thunder Amateur Radio Club will hold the Circus City Hamfest from 8 a.m. to noon, Saturday, August 28 at the Badger Steam & Gas Engine Show Grounds, E3347 Sand Road. Contact: Tom Harrison, N9POL, (608) 963-0762. Email: <n9pol@yellowthunder.org>. Website: <www.yellowthunder.org>. VE exams.

MILWAUKEE, WISCONSIN — The Milwaukee Amateurs’ Club and MAARS will hold the MOARC & MAARS Interclub Swapfest from 8 a.m. to noon, Saturday, August 28 at the Elks Lodge #46, 5555 W. Good Hope Road. Phone: (414) 459-9741. Email: <swapsfest@w8fr.org>. Website: <www.w8fr.org>. Talk-in 145.390 (PL 127.3) or 145.130 (PL 127.3).

OWENSVILLE, OHIO — The Cincinnati Hamfest and WDXCC Convention will be held from 8 a.m. to 2 p.m. (hamfest) and from 2:36 p.m. (convention), Saturday, August 28 at the Clermont County Fairgrounds, 1000 Locust Street. Email: <info@cinchnittahamfest.org>. Website: <http://cincinnatihamfest.org>. Talk-in 147.345+ (PL 123.0) or 443.450+ (PL 123.0). VE exams.

NEW KENSINGTON, PENNSYLVANIA — The Skyview Radio Society will hold its 2021 Swap Meet Convention from 8 a.m. to 2 p.m., Sunday, August 29 at the Gospel Light Baptist Church, W3KFS, (724) 339-3821. Website: <www.skyviewradio.net>. Talk-in 146.640- (PL 131.8).

NEWTOWN, CONNECTICUT — The Candlewood Amateur Radio Association will hold the Western CT Hamfest beginning 8 a.m., Sunday, August 29 at the Edmond Town Hall, 45 Main Street. Contact: John Morelli, W1JGM, (203) 417-0160. Email: <hamfest@cararadioclub.org>. Website: <http://cararadioclub.org>. Talk-in 147.300+ (PL 100).

SEPTEMBER

NAPERVILLE, ILLINOIS — The Northern Illinois DX Association will hold the WDXCC Convention Friday, September 10 and Saturday, September 11 at the Chicago Marriott Naperville, 1801 North Naper Boulevard. Website: <http://w8dxcc.com>.

COLOMBINE, MINNESOTA — The SMART8 Radio Club will hold its SMART8 Hamfest from 8 a.m. to noon, Saturday, September 18 at the Compass Community Center, 1211 Village Parkway. Email: <contactus@smart8.org>. Website: <http://smart8.org>. Talk-in 147.165+. VE exams, card checking.

PAXTON, ILLINOIS — The Paxton Area Amateur Radio Club will hold the PARRC Superfest from 6 a.m. to 4 p.m., Saturday, September 18 and from 6 a.m. to 1 p.m., Sunday, September 19 at Avanti’s Dome, 3401 Griffin Avenue. Email: <ve@w9dxcc.com>. Website: <http://w9dxcc.com>. Talk-in 147.075+ (PL 156.7). VE exams, balloon launch.

RICHMOND, KENTUCKY — The Central Kentucky Amateur Radio Society will hold the Richmond Hamfest Sunday, August 29 at its club grounds, 6176 Tuckers Bridge Road, 40509. Kentucky Fairgrounds, 3327 Old KY 52. Contact: Mike, N1KRS, (502) 964-7176. Email: <n1krs@comcast.net>. Website: <http://w9dxcc.com>. Talk-in 147.165+. VE exams, card checking.

NEW YORK — The Ham對 Ham Radio Society will hold the RRRA Hamfest and 2021 ARRL Dakota Division Convention from 8 a.m. to 2 p.m., Saturday, September 25 at the RRRA Fairgrounds – Hartl Building, 1805 Main Avenue W. Phone: (701) 371-1398. Email: <hamfest@rrra.org>. Website: <http://rrra.org>. Talk-in 145.350- (PL 123) or 444.875 (PL 123). VE exams.

EAST STRoudsburg, PENNSYLVANIA — Eastern Pennsylvania Amateur Radio Association will hold its Hamfest 2021 beginning 8 a.m., Sunday, September 26 at the American Legion Post 346, 126 E. 5th Street. Phone: (570) 350-1185. Email: <3w3fnz@gmail.com>. Website: <www.qsl.net/3fs>. Talk-in 147.045 (PL 131.8). VE exams.
~ There is (or was) a bizarre Brazilian station showing up on 5899.1 and 7455 kHz between 1000 and 2000 UTC identified as Radio Casa 8000 in Ampara, in Sao Paulo state, playing continuous rock/pop music. Supposedly using 750 watts on 5 MHz and 350 watts on 7455 kHz, claiming to be a non-profit operation.

~ That mysterious Venezuelan Radio Onda Cofta Venezjuela (ROCV) from El Tigre has been recently noted in Europe around 0500 UTC on 6216 kHz. The station was previously heard on 6205 kHz and myriad other frequencies.

~ Here comes yet another North Korean opposition broadcaster: The North Korean Democratization Committee. CDNK radio goes on the air Tuesday, Thursday, and Saturday from 1400-1430 UTC via an unspecified location in Central Asia.

~ Eye Radio, the South Sudan opposition station, has deleted its broadcasts via Issoudun (France).

~ Denmark’s World Music Radio is now supposedly using a new transmitter on 25770 kHz, although no specific air hours were announced.

~ It took almost a year, but a British DXer finally got a QSL from VOIRI’s English service on 9855 kHz.

~ In Myanmar, over 100 staff members of Myanmar Radio have joined some 1,000 government employees in protests against the government and the military coup. That unrest might help explain Myanmar Radio’s spotty operation of late.

**Listener Logs**

Your shortwave broadcast station logs are always welcome. But please ensure 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 ... I know you’re out there! Even though there are no call letters after my name, 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** from Anchor Point on 7355 at 1226 with a woman speaking in English; on 9580 at 1422 with contemporary Christian music. (Taylor, WI) On 9730 at 1530 in Russian and a possible religious lecture; On 13635 from the Mali relay at 1800 open. (Barton, AZ)

**ALGERIA—Radio Algerienne** on 6050 via France at 0359 with opening, a man singing, male and female announcers beginning Arabic service. (D’Angelo, PA) On 11985 at 1937 with Arabic talks. (Brossell, WI)

**ASCENSION ISLAND—BBC North Atlantic Relay** on 11810 at 2105 on Armenia. (Sellers BC) On 15410 at 1952 in Hausa. (Brossell, WI)

**AUSTRALIA—Reach Beyond** on 9590 from Kununurra at 1212 with woman speaking in Hindi; on 11905 at 1148 in Rohingya, male followed by female announcers. (Taylor, WI) On 9610 at 1306 in Marathi. (Taylor, WI)

Now that Austria has blitzed replying to QSLs, your only hope for that country is through AWR’s Moosbrunn relay.

*’c/o CQ magazine*
Issoudun, the RFI transmitter site, also relays other international broadcasters as well as several opposition broadcasters.

**AUSTRIA**—Adventist World Radio on 11880 via Moosbrunn at 2049 in French with woman giving a Côte d’Ivoire address. (Sellers, BC)

**BOTSWANA**—VOA Relay on 15580 at 1938 on an asteroid seen in Hawaii. (Sellers, BC) On 2150 with station ID and hip-hop. (Brossell, WI)

**BRAZIL**—Radio Nacional Amazônia from Brasilia on 11780 at 2023 in Portuguese with smooth jazz. (KB2DMD, PA) On 2133. (Brossell, WI)

**CHINA**—China Radio International on 5965 from Beijing at 1500 in Russian; on 7220 from Jinhua with woman speaking in Japanese and instrumental music. (Barton, AZ) On 9590 from Shijiazhuang in Russian; on 11980 at 1201 from Kunming in English with news; on 13630 via Mali with Chinese language lesions. (Brossell, WI)

**CNR-5-Beijing**. Cross Points Radio-Beijing in Mandarin at 1203. (Taylor, WI)

**CNR-6** on 6165 from Beijing (co-channel) at 1936 with Thazin Radio at 1148 in Mandarin/Burmese, China with man and occasionally a woman with choral vocals. (Taylor, WI)

**CNR-7** Cross Strait Radio on 5925 from possibly Beijing at 1036 with contemporary music, male and female announcers. (Taylor, WI)

**CNR-11** on 9530 from Bojiin at 1148 in Tibetan with man talking at length. (Taylor, WI)

**CNR-13** on 9420 from Lingshi at 1214 in Uighur. (Taylor, WI)

**PBS Nei Menggu** from possibly Hohhot on 9520 at 2235 in Mandarin. (Taylor, WI)

**Ecuador**—Radio Progresso on 4765 from Bejucal at 0345 with a woman speaking in Spanish, children singing national anthem, off at 0400. (Barton, AZ)

**EIIB** on 6150 from Sirjan at 0043 with women and their Turkish service. (D'Angelo, PA)

**FRANCE**—Radio France International on 11995 from Issoudun at 1900 with man speaking in French and probable news. (Barton, AZ) On 15300 at 1936 in French. (Brossell, WI)

**GERMANY**—Deutsche Welle on 15275 via France at 1602 in Amharic. (Brossell, WI) At 1320 in Fulani, woman giving an interview. (Taylor, WI)

**GUAM**—Adventist World Radio on 9875 at 1237 in Mandarin with Bible teaching. (Taylor, WI) On 12040 from Agat at 2200 sign on in Sudanese followed by man speaking in English, English listed here Sunday, Tuesday, Thursday. (Sellers, BC)

**INDIA**—All India Radio on 11560 from Bengaluru at 1322 in Dari. (Brossell, WI) Possibly on 13710 from Bengaluru at 2230 popping on in mid-program with man and woman speaking in Chinese. (Sellers, BC)

**IRELAND**—Radio Andorra, which went off shortwave some years back, recently marked 80 years of broadcasting through a tribute on Atlantic 2000.

**IRELAND**—Radio Andorra on 15105 from Manzini at 1946 in Lingala. (Brossell, WI)

**IRELAND**—Radio Andorra on 5925 from Bejucal at 0345 with woman speaking in Spanish, children singing national anthem, off at 0400. (Barton, AZ)

**IRELAND**—Radio Andorra on 6050 from Pichincha in Quechuan at 0135 with sanjuanitos. (KB2DMD, PA)

**IRELAND**—Radio Andorra on 11810 from Woofferton at 2001 on COVID-19. (Brossell, WI) On 11825 via Philippine Relay with carrier on at 2258, audio from 2259 then station IDs, time pips, news. (Sellers, BC)

**IRELAND**—Radio Andorra on 11825 via Philippine Relay with carrier on at 2258, audio from 2259 then station IDs, time pips, news. (Sellers, BC)

**IRELAND**—Radio Andorra on 11825 via Philippine Relay with carrier on at 2258, audio from 2259 then station IDs, time pips, news. (Sellers, BC)

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**IRELAND**—Radio Andorra on 11825 via Philippine Relay with carrier on at 2258, audio from 2259 then station IDs, time pips, news. (Sellers, BC)

**IRELAND**—Radio Andorra on 11825 via Philippine Relay with carrier on at 2258, audio from 2259 then station IDs, time pips, news. (Sellers, BC)
JAPAN—Radio Japan on 6135 at 0400 with woman giving station ID and open in Russian; on 13650 from Yamaha at 2356 close with continuous instrumental music, listed in Vietnamese or Burmese. (D’Angelo, PA) On 9820 at 0118 with woman speaking in Hindi, carrier dropped at 0120. (Taylor, WI) On 9855 via Madagascar at 2045 in French. (Brossell, WI)

MADAGASCAR—World Christian Broadcasting on 11610 from Mahajanga at 2100 sign on with IS, announcements, website and into Chinese. (Sellers, BC)

African Pathways Radio on 13670 from Mahajanga at 1800, man giving a religious lecture. (Barton, AZ)

MALI—RTV du Mali on 5995 from Bamako at 2310-0000 with man speaking in French and lively group vocals. (D’Angelo, PA) At 2326 from Bambara. (Taylor, WI)

MEXICO—Radio Educacion from Mexico D.F. on 6185 at 0433 with continuous romantic vocals and a woman speaking in Spanish. (D’Angelo, PA)

NEW ZEALAND—Radio New Zealand on 15720 from Rangitaiki at 0042 with pop, then an interview. (Barton, AZ)

NIGERIA—Voice of Nigeria on 11770 from Abuja at 2035 with talks in Hausa. (Brossell, WI)

NORTH KOREA—Pyongyang Broadcasting Station on 6180 at 1157 with DPKR opera. (Taylor, WI)

OPPOSITION—Voice of Hope (South Korea to North) on 3990 at 1113 with woman speaking in Korean leading into man talking; also on 4885 & 9100 with poor reception and fading. (Taylor, WI)

Furusato No Kaze (via Taiwan to North Korea) on 9705 at 1345 in Japanese. (Taylor, WI)

Nippon No Kaze (via Taiwan to North Korea) on 9940 at 1208 in Korean. (Brossell, WI) At 1301. (Taylor, WI)

Echo of Hope (South Korea to North) on 9095 at 1214 with Korean pop music. (Taylor, WI)

National Unity Broadcasting (via Taiwan to North Korea) on 9475 at 1205 with man and woman speaking in Korean and Korean pop music, DPRK grind jamming. (Taylor, WI)

Eye Radio (via Vatican to South Sudan) on 15410 at 1609 with Arabic talks. (Brossell, WI)

Radio Tamaruz (via Madagascar to South Sudan) on 11650 at 0412 in Juba Arabic to 0427; also on 7315 unheard. (D’Angelo, PA)

Denge Weiat (via Moldova to Turkey), at 1226 with woman talking at length in Kurdish. (Taylor, WI)

Radio Lap Loi Song Nui (via Taiwan to Vietnam) at 1234 in Vietnamese with DPRK jamming also audible. (Taylor, WI)

Republic of Yemen Radio (Saudi Arabia to Yemen) on 11880 at 1302 with man talking in a slow Arabic. (Taylor, WI)

PHILIPPINES—Far East Broadcasting on 9795 from Iba at 2320 with man speaking in the Mon language, songs, IS at 2330 and into Laotian. (Sellers, BC) On 9920 from Iba at 1217 in Jarai (a Vietnamese minority language) with stringed instrumental music. (Taylor, WI)

PIRATES—Chinese Dick Radio on 6925 at 2020, 2027 mention of Ashley Falls, MA address, off at 2029. Butplug Radio, 6930 USB (u) at 2358, seemed to be comedy pop. (These names get cuter and cuter, don’t they? – GLD), Skunk House Radio on 6928u at 2153 with several progressive rock things. Outhouse Radio on 6925u at 2349 occasional Ute QRM, Slow-Scan TV (SSTV) / FAX. (Hassig, IL)

Reported earlier: Radio’s Balsmacker, Wolverine, Two Dog Mix, Radio Enigma 7, KDOG, TRI, Fubar, KIND. (Hassig, IL)

Goat Farmer Radio on 4180u at 0201, Zeeky thanks Redhat for a good show, “Long Cool Woman” with station ID. Goats

Herder Radio on 6925u at 0119 with looped phrase, Zeeky comments, goat sound effects, etc. (Taylor, WI)


ROMANIA—Radio Romania International on 9610 from Tiganesti at 1943 in Spanish. (Brossell, WI) On 7310 at 2233 with traditional music, male announcer and poor reception. (Sellers, BC)

SAO TOME—VOA Relay on 11900 from Pinheira at 1929 in French with English station ID. (Brossell, WI) At 2110 with an English lesson. (Sellers, BC)

SAUDI ARABIA—BSKSA Radio on 9675 at 1848 in Turkish. (Brossell, WI)

Al-Azm Radio on 11745 from Jeddah at 1257 in Arabic. (Taylor, WI)

Holy Qur’an Radio on 17895 from possibly Riyadh at 1348 with a man speaking in Arabic on the Qur’an. (Taylor, WI)

SINGAPORE—BBC-Far East Relay on 9410 from Kranji at 1153 with woman telling a story; on 12065 at 1308 with “Newshour.” (Taylor, WI)

SPAIN—REE on 11685 at 2126 with interview, brief instrumental music, dead air until 2234, into French. (D’Angelo, PA) On 11940 from Nobeljas at 2205 with its Monday, Wednesday, Friday with English service and in-depth news coverage. (Sellers, BC)

SWEDEN—IBRA Radio on 15510 via Woofferton at 1830 in Spanish, man then man and woman with Bible lesson. (Taylor, WI)

TAWAIN—Radio Taiwan International on 9425 from Paochung at 1254 in Vietnamese; on 9490 at 1156 in Spanish. (Taylor, WI)

TURKEY—Voice of Turkey on 9635 from Emirfer at 2010 in French. (Brossell, WI) On 9830 from Emirfer at 2211 with news. (Sellers, BC)

UNITED STATES—VOA on 9740 from Greenville at 2124 with man and woman speaking in French on the telephone, off at 2129. (Sellers, BC) On 9800 via Philippines at 1304 in Korean; on 11610 via Woofferton at 1613 in Somali; Dewa Radio on 12035 via Thailand at 1306 in Pashto. (Taylor, WI, Brossell, WI)

Radio Liberty on 15090 via Lampert-heim at 1357 in Pashto with woman giving the station ID sequence; on 15225 via Thailand Relay at 1400 in Turkman; on 15310 from Woofferton at 1495 in Uzbek. (Taylor, WI)

Radio Farda on 12005 via Woofferton at 1304 & 1756 in Farsi. (Taylor, WI, Brossell, WI)

Adventist World Radio on 9800 via Nauzer at 2130 sign on with English station ID into the Twi language. (Sellers, BC) On 11680 via Madagascar at 1954 in Arabic. (Brossell, WI) On 15255 via
Tajikistan at 1315 in Napalese; on 15430 via Sri Lanka at 1325 in Bengali; on 15440 via Tajakistan at 1330 in Thai. (Taylor, WI)

Overcomer Ministry on 5900 via Bulgaria at 0330 with Brother Stair. (D’Angelo, PA)

VATICAN—Vatican Radio on 13830 at 1814 in Portuguese. (Brossell, WI)

VIETNAM—Voice of Vietnam on 11885 from SonTay at 2108 with news in Spanish then news in English at 2139. (Sellers, BC)

Quien Sabe?
Harold Sellers notes an unidentified on 9930 kHz with a man and woman talking in an unknown language at 0216 UTC, then a man in a discussion. Weak signal, and gone by 0234 UTC.

QSL Quests
Radio Austria International is saying “nuts” to this QSL business. No explanation was given. Let’s just guess it was too expensive and/or too time-consuming for their already limited staff. Likely one of those standby excuses. You can still QSL Austria through the Adventist World Radio Moosbrunn relay, most often heard on 6185 kHz.

As Time Goes By
The Malawi Broadcasting Corporation, Kimbe, running 100 kilowatts for English on 3380 kHz. Heard at 0409 UTC on September 27, 1995. Sign on was at 0301 UTC.

Just Sayin’
I’ve finally had it with this pirate “garbage.” As one, now retired, Voice of America (VOA) guy likes to say of pirates,

World Music Radio (Denmark) recently announced the additional use of 25770 kHz.

“kids playing radio,” I suspect there are only a handful of guys operating all the Radios this or that or the Besmerch Radios. That, and the same-old/same-old programming tends to be a total turn off. So, henceforth, I will include pirates only if they are new or have an unusual aspect attached.

Thank You
Thank you, thank you to Rick Barton, El Mirage, AZ; Harold Sellers, Vernon, BC; Mark Taylor, Madison WI; William Hassig, Mt. Pleasant, IL; Rich D’Angelo, Wyomissing, PA; Rich Parker, KB2DMD, PA; and Bob Brossell, Pewaukee, WI.

‘Until next time, keep on keepin’ on ... and be sure to CELEBRATE SHORTWAVE!’
EMERGENCY COMMUNICATIONS

BY STAN BROADWAY,* N8BHL

Can We Really? (Yes, We Can)

This column is not about me, or my own experience. It’s about you — amateur radio operators around the world who step up when things are down. That might be to help coordinate a neighborhood fun run. It might be a major athletic or political event. It might be a genuine emergency ... a weather-related disaster, a large wildfire, an earthquake or now, even a pandemic. This column is about questions which can be universal to our corner of this great hobby and service. Some of those I received from my new ARRL Section Manager, Tom Foy, WB8LCD, who is busy trying to do the “rapid indoctrination” into the many facets of amateur radio going on in the Ohio section. Tom can’t be the only one wondering ... even those of us deep in the trenches have found ourselves wondering, “Can we really?” In answering him, I hope to be an encouragement, prodding you to keep going, keep the enthusiasm, keep the dedication to community. And I thank Tom for graciously allowing me to share his questions with you.

“When All Else Fails...”

This is a pretty bold statement, Tom writes. “It seems that about 99% of emergencies that we deal with are weather-related. I used to be pretty confident that industry and government were hardening their systems so that weather would not be such a big factor in the future. This year’s storms in Texas kind of debunked that theory! Are we prepared for that kind of emergency?”

It is easy to point him to situations where a lone ham operator was able to cobble together an antenna and portable power supply to be the first heard from a devastated area. I’ve taken that hurricane report from an operator whose antenna was lying on the ground as she looked out her window at 100+ mile-per-hour winds. We replay tapes from the Haitian earthquake (Photo A) and Caribbean hurricanes containing the excitement of masterfully handled radio communication. But can the average ham operator perform in like fashion today, he wonders. For the good of your response, we all should find out.

Amateur radio is still a frontline system anywhere in the country when severe weather is a threat. The Skywarn system has expanded over recent years to include winter storms and conditions (see Figure 1). While the National Weather Service has a well-provisioned cadre of weather condition reporters <www.cocorahs.org>, the onset of warm or cold severe weather can (and I think should) prompt hams to start communicating. Spotter activities are a bit unique in that ham operators are already deployed — we live in the midst of it — and we are in a unique position to organize our reporting and deliver significant observations to our local agencies.

* <n8bhl@cq-amateur-radio.com>

Photo A. Despite the massive destruction caused by an earthquake in Haiti in 2010, hams were still able to get on the air and communicate with the outside world. (Illustrations courtesy of National Oceanic and Atmospheric Administration)
from the Weather Service to emergency management agencies (EMAs) and more. Weather spotting got me interested in this hobby, and it continues to hold my attention.

There are other immediate activities that find amateur operators providing exemplary service. Here in the safety of fly-over states, we dodge the threats of hurricanes, wildfires (Photo B), and earthquakes. If you’re in the western states, you may be a volunteer for the different wildfire teams … setting up comm points, deploying MESH nodes and cameras, and tracking movement of troops and flame. Your work is exciting and exemplary! Despite enhanced public communication systems, large-scale event managers welcome amateur radio as an additional resource able to communicate over and around mountainous terrain.

In Iowa last year, severe derecho conditions with pockets of over 120 miles-per-hour winds raked across the state (Figure 2) flattening communication resources and parts of cities. Amateurs immediately started talking … in the simplest form of communication, exchanging news of what important stores were open, where supplies were available and where there was damage. Iowa SEC (Section Emergency Coordinator), now Section Manager, Lee Garner, WA0UIG, who lived in the middle of one of the hard-hit areas, reported recently that hams readily grabbed their radios to participate and serve their communities even in situations where public service radio still existed.

Powerless
Back to Tom’s original question, yes, Texas’ winter storm did test everyone’s ability to cope. The storm nearly dropped the state’s power grid, coming within four short minutes of triggering shutdown because of power draw and a drop in cycles-per-second to dangerous low levels. After Texas, after major earthquakes, and after all severe weather events, there is at least one common element: The loss of commercial power for a prolonged period. Obviously, other major problems exist depending on the situation, but power’s a big deal.

Can I tell my new Section Manager not to worry, we’ve got this covered? No, I don’t think I can. That would be overly optimistic. But I believe there is a significant majority of seasoned amateur operators out there who could figure out how to get a battery set up, find a generator, cut an antenna, and get on the air. Would we start dispatching emergency crews, climb poles and drive big bucket trucks? Never. Would we be able to provide accurate situational awareness to our local and state EMAs? Yes, absolutely. Would we be able to transmit formal messages between agencies? Many would, others would quickly catch up.

We Can Get Even Better
There are ways we can teach newer hams how to be productive during an emergency event. In my area, a series of “Ham Boot Camps” is springing up. These educational experiences help participants learn things like antenna basics, how power supplies work, operating radios in different conditions, and so on. I see great promise in this where hams who may get a “one-day-and-done” amateur radio license can now get more deeply involved in learning what can make them more valuable to their communities. Simple acts that many take for granted — soldering a coax connector, securing and measuring antenna wire, creating an off-grid power source — are all absolutely critical in an emergency. George Reidel, N1EZV, spent time standing portions of broken antenna towers back up, repairing antenna parts, and get-
ting crippled police / fire stations back on the air in the aftermath of Hurricane Maria on the islands. These are skills amateur operators should all possess.

What About Other Things?
Tom’s letter continues to ask about other types of emergencies. He writes, “the recent pipeline shutdown seems significant. What kind of communications problems could result from that type of activity and are we prepared to do anything about it?” (See, he’s already doing what great Emergency Coordinators and communicators do … playing that “What if” game! –SB). He continues to the heart of this issue, asking, “What could hackers do to our whole communications infrastructure and what kind of response could amateur radio provide?”

The answer, despite declarations to the contrary from people selling communication systems, is yes, our public communication system can be vulnerable. These are not fragile systems by any means. Some of the best minds are behind protecting these systems, especially because many depend on the internet in some form or other to operate. But they can be crippled. In Ohio several years back, a pinhole-sized steam leak saturated a switching office and took down six state radio systems, along with 911 service over six counties. These stories are few, but significant when they happen. Our optimistic approach is the worse it gets, the more useful amateur radio will be. Again, it takes hams who are capable of portable, off-grid power operation. Can you?

It also takes good operators who can function in very tightly controlled net conditions! This is no place for rambling “sunshine reports” from operators who really want to participate but who aren’t seasoned enough to know that listening is often more important. It takes hams who can handle digital messaging. Our agencies are years … centuries? … past the word-limited ARRL message form. They depend on the NIMS/ICS forms and we need to be able to live, work, and breathe in that environment. Our goal, then, is to train newer hams and constantly refresh the veterans so that when it does hit, all are ready. My years in the fire service convince me beyond a doubt that constant training will produce actions that get the job done when finally called for.

Other Situations
Many amateur groups were pressed into service to assist our agencies with pandemic response. Some helped direct

Photo B. Hams on the west coast responding to wildfires face different challenges from those in the southeast who worry most about hurricanes.
crowds, communicated needs and flow. Others actually handled health department call centers, volunteering for weeks at telephones, scheduling times and places. That type of response can translate into communication for PODs (Points of Distribution) after large disasters and understanding the health concerns in those situations.

Tom continues his “What if” scenario by noting a malware situation might last longer than a couple of days or, if there was no ransom, it was an attack merely to bring us down. Now we’re getting serious! The good thing is that amateur radio doesn’t rely on the internet; it’s impervious to hacks. That makes it a dependable resource that can continue untouched through many situations. As mentioned, the common element in many of our doomsday examples is a long-term power outage, perhaps a grid down scenario. Research has shown that the U.S. power grid is extremely vulnerable and if taken down, it would be down for many months. Can we amateurs step into that situation and be successful, wonders Tom. I would like to think we’d “save the world” but it would honestly involve a much lower number of participants. We would have to overcome the challenge of a long-term backup power source... a challenge that grows as power-lost time expands. Consider that nearly all of what we take for granted would eventually stop. How long would we be able to continue? How long would you?

The “Really Big One”

Tom’s question then goes a step further — to EMP, or electromagnetic pulse, resulting from the high-altitude detonation of a nuclear bomb. He says, “I’ve asked this question many times over the past 20 years and the answer (from some pretty bright and/or connected people) is always the same: Not something we need to worry about. Exactly why I worry about it! What would we be capable of? How could we be better prepared?”

I think he’s going to work out all right. The best answer I can suggest is from the bomb scares of the ’70s. Despite frenzied warnings to the population, the common-sense approach involved a potential enemy not needing to turn the entire continent into scorched rubble. They might conquer the country, but if there was nothing left, there would be no benefit to having it. Calmer minds in those years suggested that since a lot of aggression was a matter of making a statement, we might expect attacks on the government, military, commerce, and maybe communication. That would bring down several larger cities but not the entire country. It made sense to me at the time.

The same might be true of an aggressor’s EMP. Would it really take the entire continent back to the 1800s? Or would there be wide areas where electronics still function? There might be one or two EMP-proof buildings around (how do you test that?), but I would suggest the majority of us would potentially be finished when it comes to communication equipment. There might be a few with a radio inside a grounded metal can, but not many. There are many who would have to ignore the radio in favor of finding supplies, food, water, and other survival needs. Perhaps the worst case is a solar EMP, which is far more indiscriminate.

Now he’s got me doing it! Writes Tom, “I’d like to be able to say these are things that we’ve at least got some kind of a pre-planned response for.” I totally agree, and I am reassured that the vast majority of amateur organizations do have some level of planning in place. We all should. Do you? And as life happens, we’ll be able to improve them if we share our experiences.
One of the consequences of the pandemic is spending a lot of time at home and on the air and, of course, building kits. I have spent lots of hours cleaning up and updating my shack and antennas as well as my workbench, and finally the rest of the basement got its turn. Although not yet complete, over 42 trash bags later, I have made significant progress, and begun sorting things into storage totes. I now have storage containers of finished kits, unbuilt kits, parts, and connectors. RF adapters alone filled a small container.

Now that I know what things I don’t need to buy anymore at hamfests, it will be a lot easier to know what I really do need. The other benefit of this task has been finding unbuilt kits that will be lots of fun to assemble. Some of the kits I found are no longer available, but the supplier has similar kits still available.

One kit I found was the K-488 one-tube AM broadcast transmitter kit (Photo A) that could be used to generate a signal to demonstrate things like crystal sets, restored antique radios, etc. with your own music instead of the more talk-oriented broadcast stations more common on AM radio.

The K-488 used to be produced by Antique Electronic Supply in Tempe, Arizona. The company still produces a 2-tube regenerative AM and shortwave receiver kit built in a similar fashion to K-488, but it runs on DC. This AM transmitter kit includes an AC transformer and power cord as it runs directly from 120-volts AC. A drilling template (Photo B) is part of the manual for drilling pilot holes and mounting holes into the supplied wooden base. I taped the template to the block of wood and used a Dremel® tool to make tiny holes so I could then remove the template and use my regular drill. Drilling the holes and mounting the lugs and things like the transformer come first in the assembly of the AM transmitter (Photo C).
Once the lugs are in place, the components that are on the main board are soldered into place, followed by the components that attach to the tube socket. The socket is then mounted to the board and its components soldered to their respective terminals. There are some leads that need to be sleeved due to the higher voltage applied to them or their proximity to other nearby leads. I measured 153-volts DC on the B+, which is open in several places, so be careful when using this kit or any similar tube-type kits. I used the included tuning tool to place the signal on AM 1150, unused in my area, and found that it needs speaker level audio to modulate it. I simply turned up the audio level from my source until it sounded good in my radio and was not distorted. You can get a similar kit that makes a 2-tube regenerative receiver from Antique Electronic Supply at <www.tubesandmore.com>.

Pinball Wizard?
Another treasure uncovered in the process was a 1975 Gottlieb pinball machine (Photo E) I had gotten in the mid-80s and restored, but it had been used for many years and then, once it quit working, it was covered up and relegated to a far corner. Uncovering it revealed a need to replace the rubber bumpers, which had become stiff and dried out or crumbling. A host of #44 bulbs were flickering or out and so ordering a kit to restore it was in order. A complete set of the “rubbers” as well as a few bulbs and a couple of new balls and a Plex-stone rounded out my order. The Plex-stone is a flexible abrasive contact cleaner that should only be used on pre-1977 machines, due to the materials used on the contacts on the relays and switches. After 1977, silver- or gold-plated contacts, similar to those we see on our CW keys and paddles, came into use as the voltages involved lowered significantly once the scoring and playfield changed from purely electromechanical to a microprocessor-based controller and score display. Using an abrasive like this on more modern contacts would remove the coatings vital to low-resistance contacts. In these older machines, using an emery board, as we do for removing the insulation from enameled wire leaves grit particles from the board between the contacts, while the Plex-stone does not shed any. It is still not appropriate to use any abrasive on key or paddle contacts, or most relays we use in radios.

I spent a few hours cleaning the glass...
and playfield as well as doing the maintenance (Photo F) and was rewarded with a fully functional 1975 electromechanical pinball machine almost arcade-ready! The coin box and coin mechanism are the only things I did not deal with yet. Wiring a doorbell button across the quarter coin drop contacts allows games to be initiated without having to open the door and touch the contacts or put coins in. The loud doorbell-type chimes and loud snap of the free game solenoid to me are much nicer than hearing the digitally synthesized sounds of more modern arcade gaming machines. All the “logic” in these electromechanical machines is made up of solenoids, relays, and motorized rotary switches that perform tasks such as coin handling, resets, target values, scoring, ball count, tilt / tamper control, and awarding free games.

With wiring harnesses similar to those found inside the Heathkit SB-200 amplifier, there are a lot of similarities between these entertaining machines and some older radios of the same era. The good thing is that these older pinball machines have retained their value and there are sources for some replacement parts, such as the solenoids and switch contacts. These are not old parts, they are currently manufactured as many models of pinball machines continue to share a lot of the same basic parts. I found my parts at <www.marcospecialties.com>. There are a number of other parts suppliers as well, depending on which type and make of machine you are working on.

**Hamfests Ahead**

I am anxiously anticipating the Huntsville Hamfest in August as well as others, including the Peoria Superfest in September, so I can once again see everyone in person. Be sure to say “hi” and enjoy the easing back into more normal life.

– Until next time, 73 de KØNEB Hamshack Hotline #5855
We humans seem to have a trait that forever embeds in our memories significant “firsts.” First day of school, first date, first car, just to name a few.

Now I have a friend, a real estate broker, who wryly told me there are times when it pays to be second. I asked, “for instance?” She shot back, “Second mouse, second wife, second real estate agent.”

This being a magazine devoted to our magnificent hobby, I’ll shift back to firsts and have you recall the thrills of your first encounter with the existence of radio, your first successful experience passing a license exam, your first two-way contact and after that, you can fill in the blanks on those significant “firsts” of your own, such as awards, new (to you) operating modes, your first experience operating a “dream” radio and so on. Each significant recollection should raise a smile, as these and more are what has been the crux of this column for so many years — the Magic In The Sky — and it is really an indescribable, unquantifiable force, perhaps similar to dark matter, that first attracts us, then keeps us engaged and fascinated by this medium we call “radio.”

For me it was a crystal radio, a gift from Dad (KB2YAL-SK). He was an electronic technician by trade and didn’t become a licensed ham until his senior years, but even in the 1940s he saw the future was centered around electronics. He told my youthful ears in the early 1960s to think about studying computer technology because that’s where the world was headed. Remember, those were the days when IBM and UNIVAC were words just beginning to make their way into the business world. Paper punch cards and tape reels were the storage media of the time. And while he plied his trade mostly in aerospace technologies, he always had a home workshop that repaired TVs and radios, mostly for friends and relatives, and usually at little or no profit to himself. Somehow, he either saw in me, or instilled in me, a fascination with radio.

He also taught me how to operate a tube checker. Guess what my job was when we went to a TV repair call?

The crystal set was a kit that was able to assemble, using Fahnestock clip connectors for the components. My room was on the second floor of a city house that looked quite similar to that shown at the beginning of All in the Family. Archie Bunker could well have been one of my neighbors, except that I lived at the other end of New York State. What mattered was that I could throw about 25 feet of antenna wire...
out of the window next to my bed, without it hitting the driveway that separated our home from the house next door. Following the instructions, I looked for a suitable place to connect the ground wire. Then discovered I didn’t really need one. For whatever reason, the small headphone came to life and I was able to receive radio stations near and far quite well.

In a sop to the instructions, and prompted by a possible increase in reception performance, I tried running a ground connection to the nearby furnace register. However, it didn’t make a difference, so I removed that trip hazard that for a brief time, ran across the bedroom floor.

That little cardboard-mounted crystal set lasted years. The earphone was replaced by one of those flexible plastic ear sets that inserted in your ear and came supplied with many of the early “shirt pocket” transistor radios, you know, the kind you’d take to school and try to hide from the teacher while you listened to the World Series games that were all played in daytime back in those days. Thus, that little earphone began my love affair with listening for late night DX AM radio signals, especially when the other local stations would sign off, after playing the National Anthem, of course. And sometimes, when signoff was occurring, that station would have a very official sounding announcer state the callsign, location of that station, and a statement that might say, “WXXX (name the city) is licensed by the Federal Communications Commission to operate on 950 kilocycles at an authorized power of 5,000 watts, with studios and transmitter located in (name of the city.) We now conclude our broadcast day and will return to the air at 5 a.m. tomorrow morning with the Farm and Home show. Goodnight.” OK, I was hooked. While some guys my age were reading Ian Fleming novels under the blankets with a flashlight, I was tuning up and down the loopstick searching for new DX, often falling asleep with the earphone embedded in my noggin.

Then one Christmas, Dad gave my brother and me a pair of 100-milliwatt CB handhelds. This was a big improvement over the string and soup can communicators we had tried to perfect. It seemed going around corners or past closed doors always messed up the can and string experiments. As those were no longer obstacles, we went through 9-volt batteries like a thirsty mule drinks water in Death Valley. We even broke the law by talking to some nice lady in the neighborhood who happened to chat on a licensed CB station. We never figured out who she was but she had to be near our limited power output; nevertheless, she heard us “five by nine.” Fortunately for us (and her) the FCC apparently took no interest or failed to monitor our illicit transmissions. I only disclose that now, assuming the statute of limitations has run out on this confession. Otherwise, I may have to request a presidential pardon for this federal infraction.

A visit to relatives in Boston really sealed the deal for me. Shortly after arrival, I learned my older cousin was a ham. He was thrilled that I took interest in his hobby and I spent most of the evenings during our visit with him in his “shack.” We made several contacts on a 6-meter AM rig (he even let me talk!), respecting the limits of his Technician Class license, but we spent many more hours tuning and listening to the many ham and shortwave frequencies his 12-ton (so it seemed) hollow-state receiver could pull in.

I never assembled the money to buy a rig, or the knowledge to take the FCC ham test, until much later in life. It seemed that in my youth, one of those issues compounded the other; no money, no rig, no license, flip the order any way you like and you come up with the same result. High school brought its myriad topics of focus (courses) and distractions (girls, extracurricular activities, sports, cars, part-time jobs) and radio kind of dropped down the list of

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interests. College started the same way, but then I took up working at the campus radio station as a DJ, later going on to be program director and station manager. Radio and I were reunited, this time on a professional level, as after graduation I made a living in broadcast radio for some 15 years. While I never became a broadcast radio superstar like Rick Dees or Don Imus, it paid the bills and got me over the fear of taking a FCC license test, as you needed at least a third-class radiotelephone license with “broadcast endorsement” to operate most stations back in those days. There was also some technical satisfaction in operating transmitters ranging from 250 watts up through 50 kilowatts.

Fast forward a decade or so and I shifted from broadcasting to a marketing career, part of which required a move to California. There I became part of my new community by joining a citizen response team (now called CERT) that would assist in times of emergency, something with which Californians are all too familiar. In that group, I met a few folks who were hams and, voila, they helped me overcome my resistance to obtaining a license and getting on the air. The rest, as they, is history. I ascended quickly to an Extra Class ticket, even having to pass the 20-wpm code test to attain it, not for any ego-driven reasons but to enjoy the full set of privileges that come with that license.

So, it took several decades from my radio “awakening” with the crystal set to achieve the important “firsts” like first contact, first award certificate, first Field Day, and many others. Special thrills came from making contacts with old friends and making many new ones with logbook entries and QSL cards from all over the planet. But it’s been great fun and radio continues to fascinate, entertain, challenge and at times, mystify.

While this installment has been an unintentional autobiography, the underlying intent is for you, dear reader, to reflect on your own radio history and perhaps share it with children, grandkids and any others who may wonder what it is that drove you to making the commitment to learning the technology, investing in your knowledge and in your equipment, and using radio as a means to reaching out to others across “the ether” as an extension of yourself.

So after a lifetime of fascination, I still can’t explain what makes you or me attracted to this amazing pastime. I can only refer to it as part of “The Magic In The Sky.”

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**Congressional Resolution Declaring Amateur Radio Day Reintroduced**

A bipartisan resolution has been introduced in Congress (H. Res 329) that would designate April 18, 2022 as National Amateur Radio Operators Day. This is a second attempt to move the resolution forward; the first expired at the end of the last session.

To promote passage, it would be helpful if each ham would contact his or her representative using email or USPS with a simple message, “Please support H. Res 329.” To find your representative’s email or mailing address, go to <www.house.gov>. It would make a good statement to send your request for support to the rep’s DC office on a QSL card – AA6JR

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Our avocation encompasses so many disciplines and facets that I could argue that the sum of ham radio’s parts does indeed exceed its whole. That’s the beauty of ham radio, there’s a niche for anyone. All it requires is an interest. With time and experience, that interest will deepen into a rewarding and lifelong hobby that contributes not only to personal development, but to the community as well. Ham radio has so much to offer; yet it can be daunting as to where to begin. And once on that path, what suggestions are there for continued growth within our hobby?

There are a lot of publications available to inform and guide prospective and fledgling ham radio operators into the hobby. All of them are very good, but “Ham Radio for Dummies, 4th Edition” by H. Ward Silver NOAX, excels (Photo A). The “… Dummies” series, published by John Wiley & Sons, Inc., is well known and respected for taking complex subjects and managing them into fun-to-read, easily understandable bites, and NOAX’s book is no exception. In fact, Ward Silver’s book excels in briefly covering the entire amateur radio spectrum. It is for those interested in entering the hobby, as well as those already licensed.

It’s no easy task to write a friendly, easy-to-read introductory book to ham radio. Yet, Ward Silver’s welcoming prose invites the reader to discover more about radio by briefly introducing ham radio’s many operating and technical aspects to get them up to speed as quickly as possible. Ward points out, “A ham radio license is really a license to learn!” His writing makes it easy to get started and to learn more about ham radio. For those already licensed but not yet on the air, Ward’s book will assist you in moving from being a listener to becoming a doer. Ward cautions readers that his book isn’t a license exam study guide, for that would make for a very thick book. I agree, but I’d like to point out that reading his book will put you well on your way toward passing a ham radio exam.

Contents at a Glance

Ward’s “Contents at a Glance” is an excellent start to get a “feel for the landscape” (Photo B). “Ham Radio for Dummies” is a perfect read that answers almost any question newcomers have regarding ham radio. Ward even offers an explanation as to how ham radio came to be known as “ham radio.” If you’re curious, I suggest getting the book and checking out page 8, “Ham: Not Just for Sandwiches Anymore.” As the title suggests, Ward employs a little humor to make points, which makes for fun, enjoyable learning. For newbies, NOAX reminds them that they are already using a two-way radio in their pocket. Cell phones are wireless radios, but many people don’t think of them in that way. “Contents at a Glance” offers the reader a quick topic reference, letting you then go to the Table of Contents for a more focused explanation without having to search the entire chapter. It allows you to shop and choose topics of interest.

Table of Contents

“Ham Radio for Dummies, 4th Edition” is 409 pages, but the book does not need to be read cover to cover (although I

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

Photo A. “Ham Radio for Dummies, 4th Edition” by H. Ward Silver, NOAX, is a well-written and comprehensive introduction to ham radio. (All photos by author)

Photo B. Contents at a Glance gives the reader a great “feel for the land” before delving into the material. It also allows a reader, based upon personal experience, to shop and choose various topics.
highly recommend it). It is arranged so that topics of interest can be quickly found and read (Photo C). Topics include: What is a station, choosing a radio, antenna, station accessories, mikes, keys, remote control, RF (radio frequency) and electrical safety, grounding, logging, operating on the airwaves, interference, mobile radio, QSLing (confirming contacts), mastering Morse Code, Citizen Science, HamSCI, cubeSats, radio jargon, technical fundamentals, and tips from masters. Wow! Don’t let the 409 pages scare you off. NØAX arranges his book in bite-sized pages in easy-to-understand prose. Perhaps, at this time, you have little interest in satellites. That’s okay, you don’t need to read that section. That’s the beauty of his book. You as the reader get to shop and choose topics. In traditional “dummies” format, icons for tip, reminder, technical stuff, and warning are prevalent throughout the pages (Photo D) and these facilitate learning.

Mentoring
Ham radio mentors (also known as “Elmers”) are the unsung heroes of our hobby. These dedicated folks take inexperienced, want-to-be hams and licensed hams new to a particular facet under their tutelage and show them the ropes. Ward devotes an entire chapter (Chapter 3) to mentors, online communities, videos, and training. However, he doesn’t stop there. He continues with ham radio specialty groups such as Youth on the Air (YOTA), Handihams (a very beneficial group devoted to assisting hams with physical impairments), Young Ladies Radio League (YLRL), Parks on the air (POTA), Summits on the air (SOTA), Islands on the air (IOTA), Radio Amateur Satellite Corporation (AMSAT), and QRP (very low power) clubs. The listing of available resources, alone, makes purchasing this book a good investment. The power of mentoring cannot be overstated. Mentoring not only helps folks get into ham radio, but it also sustains active participation. NØAX’s quote, “A ham radio license is really a license to learn!” is so apropos. Ham radio clubs looking to increase membership rosters can glean a plethora of helpful suggestions from this edition. Ward Silver is conscientious about keeping his book updated and current.

Hamming It Up
Part 3: “Hamming It Up,” is one of my favorite sections. It includes Chapter 8: Receiving Signals, Chapter 9: Basic Operating, Chapter 10: Public Service Operating, and Chapter 11: Operating Specialties. I made mention that NØAX is diligent with regards to keeping his book current and topical. For example, Chapter 8: Receiving Signals encourages his readers to learn by listening. He delves into using receiver tuning with a knob and with software-controlled tuning. Software-defined radio (SDR) is the current cutting-edge rage in ham rigs. In addition, he explores tuning on the HF (high frequency), VHF (very high frequency), and the UHF (ultra-high frequency) bands. In so doing, he is able to reach out and touch just about every reader’s radio interests. He also offers helpful tips on listening to SSB (single sideband), CW (continuous wave), as well as digital signals. Some newcomers and more seasoned hams are hesitant to ask questions, mostly out a concern for appearing to be stupid among
peers. Of course, we know that the only stupid question is the one not asked, but still we hesitate. NOAX’s book takes away that fear. Many of those questions are answered throughout the text.

Public Service
A good number of new licensees enter ham radio to get involved with public service operating, and that is laudable. NOAX dedicates Chapter 10 to public service operating. Tips on finding a public service group, volunteering for ARES (Amateur Radio Emergency Service), and preparing for and operating in emergencies and disasters are explored. Ward also offers tips on providing public service for activities like parades, charity events, and weather spotting.

Operating Specialties
Part 3 is rounded out with an exploration of ham radio operating. Going digital with FT8, FT4, PSK31, Automatic Packet Reporting System (APRS), and radioteletype (RTTY) has 10 pages devoted to these modes. DXing (long distance contacts) on HF, VHF, and UHF are covered. Likewise, radio contests are included in this chapter. Although this section does not offer a detailed set of instructions on how to set up these modes, it does however, give the reader a good explanation of what these modes are, and why hams enjoy operating them so much. Choices, choices, so many choices!

Building a Station
Part 4: “Building and Operating a Station that Works,” is another strong, informative section of this book. NOAX dedicates four chapters to developing and building a station. To be honest, NOAX’s entire book both directly and indirectly moves the reader along toward that goal. Currently, most ham radio stations utilize computers, and this book offers tips and suggestions on what to examine for your station. When you do get on the air, many hams enjoy confirming their contacts (QSL) with you. NOAX offers advice on how to participate in the ham radio tradition of QSLing.

Interference
Getting on the air is rewarding. Getting on the air and hearing interference is frustrating. I think it is safe to say that nearly every ham radio operator will experience interference of some type. This book explores many of the reasons for interference and offers suggestions on managing it. I’m impressed with NOAX’s willingness to not only write about the great offerings of ham radio, but to also write about some of its “pitfalls,” such as interference.

Part 5: The Part of Tens
Part 5 of “Ham Radio for Dummies”, is aptly titled: “The Part of Tens.” Ward introduces his readers to the 10 most-common types of ham radio jargon heard on the air, he explores 10 important technical fundamentals that make ham radio work and follows up with 10 tips from ham radio masters. Being somewhat of a geek, I had to see which 10 technical fundamentals NOAX selected. There are so many to choose from.

Chapter 18 deals with technical fundamentals. This chapter is informative, well-illustrated and clearly written. NOAX introduces us to electrical units and symbols. He then describes Ohm’s Law, power, decibels, attenuation (loss and gain), bandwidth, filters, antenna patterns, standing wave ratio (SWR), battery characteristics, and finally satellite track-

by my count, I keep coming up with 11; although, I suppose satellite tracking isn’t as critical to making ham radio work (big gasp!), technically speaking, like power, attenuation, bandwidth, and antenna patterns. Regardless, I assure you that after reading that chapter you’ll be able to converse with anyone on these topics. Better yet, after reading this chapter, you’ll have a far better understanding while attending a seminar and hearing an expert expound on the subject. You may even want to join us on satellites.

Final Thoughts
I take pride in my station and my ham radio library. I have some very notable collections in my radio library. Among them is an autographed copy of the late Doug DeMaw, W1FB’s, “QRP Notebook.” I met Doug years ago at the QRP suite in Dayton, Ohio at the Hamvention®. I wanted to say something meaningful to Doug when he signed my copy of his book. I thanked him by telling him that I cut my “ham radio teeth” by reading his publications when I was starting off. He stopped, flashed me an ear-to-ear grin and thrust out his hand to shake mine and he then thanked me! I vividly remember that evening, almost as if it were yesterday, some 40-odd years later. W1FB’s writing style brought concepts down to ground (pun intended) in a fun, straightforward and sometimes lighthearted way. I believe you’ll find Ward Silver’s, “Ham Radio for Dummies, 4th Edition” to be equally informative. I welcome his book as a fine addition to my personal library and I believe that you will as well. The book is available in both print and digital editions, retailing for $29.99 and $18.00, respectively, wherever “Dummies” books are sold.

– Thank you for reading CQ and until next month, 73 from Ron KOOZ
This article is inspired by a chain of coincidences from very different origins. One of my sisters asked me to make some “electrical busy box toys” for her three- and five-year-old sons, since they are always playing with (and often breaking) appliances and gadgets around the house, like the cellphone, clock radio, TV remote controls, and other things.

So I built some “gonculators” for my nephews, see Photo A. The gadgets are intended to keep little hands and minds busy. Kids using the machines may learn something in the process and may become curious and use their imaginations as they play with the units. In the picture, from left to right: “Number One” has single-pole, double-throw (SPDT) switches randomly connected to power and LEDs. The banana jacks can be connected to the second unit, called “Octopus,” which features eight test leads, multiple jacks, LEDs, and a button-activated piezo buzzer. The third gonculator is a model rocket launch controller, equipped with safety features to prevent accidents.

Like my electronic art / sculpture called “Inventory Reduction” in Photo B, the boxes feature switches, lights, and sound-makers. Electrically speaking, none of these units do much. Inventory Reduction is a fancy wall lamp with decorations. When it was on display at Maker Faire, I was always surprised by how many people — usually kids — were so fascinated by the thing.

The name gonculator comes from the 1960s television comedy series “Hogan’s Heroes” in the episode “Klink vs. the Gonculator.” The prisoners of war create a ruse based on an electro-mechanical contraption made from junk parts to meet and help an enemy engineer trying to defect to the allied side.

Imagination, Imagination, and Creativity

Within the same week, one of my LinkedIn connections, Vicki Skrull, shared an article from the online publication

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Photo A. Three gonculators, intended to keep little hands busy and stimulate the imagination.
Communication Arts about a marketing campaign by Fisher-Price called “See Toys Everywhere.”

In the 30-second commercial, a young boy talks about and shows examples of everyday things that can become toys if one uses imagination. The light switch for the ceiling lamp turns into a “strobe light,” a colander from the kitchen becomes a “bonnet,” a broom becomes a “guitar,” a garden hose becomes a “snake,” and a twig becomes a “magic wand.”

The Communication Arts article includes responses by a company spokesperson, who said the commercial spot is directed at parents and is a reminder that kids “see the world differently” and the pandemic taught us that “humans are resilient and resourceful — and that goes double for kids ... we wanted to celebrate that spirit of child-like optimism in an authentic and playful way. We took to the social media platforms parents use every day to show them how to embrace this spirit.”

As I think about this, it reminds me of a LinkedIn article I wrote called “Staying Relevant by Staying Curious,” inspired by a series of promotions for public television (PBS). In one commercial, a young boy wakes up before dawn, grabs a flashlight, goes to the family’s chicken coop and shines the flashlight into the coop. The rooster wakes up, thinking it is a new day, and crows. In another spot, a young girl wonders about raising fish. She goes into the kitchen, grabs a jar of caviar, and dumps it into a fishbowl. I guess she wanted some new pets.

In my article, I emphasize the importance of having an inquisitive mind and having a continuous desire to learn about new things, which are important traits to have in one’s career and life.

In both cases, this “feature” of being a kid — the use of one’s imagination — often goes away when kids grow into adults. Having an imagination is similar to creativity, and creativity often leads to useful skills in problem solving.

The Opposite Thing

On the other hand, I remember many days when a group of us kids sat on the front porch on a Saturday morning, having a conversation like this:

“What do you want to do today?”
“I dunno. What do you wanna do?”

We had many days filled with boredom, which often led to doing something destructive or some other activity that led to trouble. (Of course, asking mom this question always led to the answer, “clean your room.” – WY)

This problem of boredom and lack of imagination is similar to discussions I’ve heard both on and off the air by many people new to ham radio. And that question is, “I got my license. Now what?”

Every time I hear this question, I sort of cringe, since this question should have come up before the person studied for the license and successfully passed the exam. It may be possible that ham radio is not for this person. There. I said it. It is the same as getting the cart before the horse. Something is out of order.

I suppose a person who approaches ham radio this way may have been motivated by something besides the enjoyment of getting on the air or building something — like ham radio volunteer public service, such as Community Emergency Response Team (CERT), Amateur Radio Emergency Service (ARES), or Radio Amateur Civil Emergency Service (RACES). And that is a good thing. Every community needs trained and helpful emergency communicators to help when normal channels of communication are disrupted.

Another possibility could be — “because I have kids in school,” or “my spouse is into it,” or “because my parents said I should get a ham license.” For this line of thinking, I must wonder whether or not the person understands what ham radio is about, and it almost seems like they did not learn anything from the ham radio license classes and the examination.

Something Good and Helpful

On the positive side of this conundrum, and my advice anytime this question comes up, is to guide the person to join a local ham radio club. It provides an excellent forum where one can make new friends who may be in the same situation, as well as people who have experienced the same thing.

Of course, a great resource for this advice is the radio club or radio school that helped coach the person in learning how to pass the exam.

At least one radio club produces a series of workshops specifically for the new ham and divides them up according to license class.

George Zafiropoulos, KJ6VU, a co-host on the Ham Radio Workbench podcast and BayNet Radio Club member, points to the club’s ham radio training workshops.

The club website Resources page has a section called “Ham Radio 101 - New Ham / New Upgrade Training” and currently lists the following classes:

- Ham Radio 101 (2019) VHF Gear for the new Technician class ham
- Ham Radio 101 (2019) VHF operating for the new Technician class ham
BEST SERVICE. BEST WARRANTY. BEST VALUE. NO ONE BEATS LDG!  CONTACT YOUR FAVORITE DEALER TODAY!

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Generic Tuner for HF Radios • Includes Icom Interface Cable • 125W SSB/30W Digital • Other Interface Cables Available @HamGadgets.com

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George says, “the Tech session is very VHF- and UHF-centric and the General / Extra session is very HF-centric. “The gear sessions cover the basics of what a station should include with specific examples. We try to answer questions like ‘what is the difference between a $30 HT and a $300 HT?’ and ‘which one should I buy and why?’” "In the operating sessions we cover the basics of frequency spectrum, propagation, modes of operation, operating activities, and so on.”

The Orange County Amateur Radio Club, W6ZE, is a “general purpose” club with many active hams who are active in all aspects of ham radio. More than a dozen activities are listed, including “just talking to other hams.”

During the pandemic year, I discovered some other online resources that address this issue. One very relevant discussion is from the “100 Watts and a Wire” podcast, Episode 296: “This Isn’t What I Thought I Was Getting Into.” As hosts Christian and Steve point out, the discussion “could have gone another way.”

But as I listened to the podcast, I am not sure if the discussion and the suggestions – as well as the comments on the Facebook page – were helpful, since I am unsure what the person was looking for. It is similar to my boring Saturdays on the porch, trying to think about what to do.

Become a Kid Again

And here is where the power of imagination and creativity comes in.

whats new

bhi ATT2 Attenuator Pad High-Level to Low-Level Audio Converter

The new bhi ATT2 audio converter is used to convert high-level audio signals to low-level audio. The ATT2 attenuator pad was designed for use with amateur radio transceivers and receivers, mainly for use with the bhi ParaPro EQ20 range of audio DSP units, but can also be used with other audio equipment.

The ATT2 is a passive device which effectively enables a wider range of AF/volume adjustment to be used on the radio equipment before the overload LED on the bhi ParaPro EQ20 unit comes on, making it less sensitive and easier to use. The ATT2 accepts mono or stereo speaker level signals and will accept input levels up to 2 watts (2.828 volts p-p into an 8-ohm speaker) and will attenuate the audio down to line level at around 1 volt (line level at 10k Ohm).

The ATT2 unit simply fits between the extension speaker socket of your radio (high level audio source) and your bhi ParaPro EQ20/EQ20DSP unit, or audio equipment. Connect from the extension speaker socket of your radio or audio source to the input socket on the ATT2 unit using a 3.5-millimeter mono or stereo jack plug lead. Connect the output lead of the ATT2 unit to your bhi ParaPro EQ20/EQ20DSP unit or audio equipment.

The ATT2 is available now at DXEngineering.com or GigaParts.com and has a suggested retail price of $32.99 U.S. For more information, contact: bhi Ltd, P.O. Box 318, Burgess Hill, RH15 9NR England. Website: <www.bhi-ltd.com>.

Armed with ham radio knowledge, the license to make station operation legal, a bit of imagination and guidance from advisors, there is an entire universe of things to do with one’s ham radio license.

I am sure this is why a ham license is also known as a “ticket.” It is a credential that can lead anyone to go on an amazing adventure.

In short, ham radio is what one makes of it. No one can answer the question for another: Each individual must begin his or her own journey on the airwaves. Entering “what to do with a ham radio license” into the Google search engine spits out about 6,110,000 results in 0.65 seconds. That is a lot.

As a practical exercise, let us consider what one can do with the U.S.’s entry level ham ticket, the Technician class license. Off the top of my head, here are some things I have done, or want to do — and I have an Amateur Extra. The list is limited to operating on the bands and does not include any of the non-on-the-air activities such as teaching a radio class or building something like an antenna.

1. Talk on VHF or UHF FM repeaters and make new friends
2. Access IRLP or any of those gateway stations to access DX
3. Participate in a VHF / UHF contest
4. Work the ham satellites
5. Go fox-hunting
6. Join and participate in CERT / ARES / RACES activities
7. Build and operate a portable APRS (Automatic Packet Reporting System) beacon
8. Set up a slow-scan TV (SSTV) station to receive images from the International Space Station (ISS)
9. Talk to the ISS
10. Get on the 10-meter band, on FM and CW
11. Get on the microwave- and / or millimeter-wave ham bands

So, if you are bored or do not know what to do with your license, become a kid and let your imagination and creativity kick in. You just might find something fun or interesting to do, and maybe even avoid cleaning up your ham shack or garage.

— 73, Wayne, KH6WZ

References

Vicki Skrul’s post on the Fisher-Price Advertisement <https://tinyurl.com/yx49m66v>
Communication Arts article <https://tinyurl.com/pzc27pd7>
“Staying Relevant by Staying Curious” LinkedIn article <https://tinyurl.com/y6v5jijc2>
Ham Radio Workbench podcast – search for “Listener Question” <www.hamradioworkbench.com>
100 Watts and a Wire podcast – search for “Episode 296: This Isn’t What I Thought I Was Getting Into” <https://100wattsandawire.com>
The Orange County Amateur Radio Club, W6ZE <www.w6ze.org>
Some Previous Articles Exploring this Question
“You Passed the Licensing Exam; Now What?,” CQ, May 2004, page 72
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Packet Not Packet

Should You Care How Your Message Moves?

When you call CQ, it’s not a stretch of the imagination to understand the mechanism of how your signal gets to be heard. You don’t need to really understand the physics behind it all, it’s sufficient to understand that you press a button, and your properly connected wiring allows your antenna to scatter your signal into the ether. But now consider a telephone call: Do you really know how your signal gets to the other end? While it is likely to be a mixture of technologies, the real question is, should you care? As long as you can get Grandma on the phone, all is well.

The point is, it isn’t necessary or even sometimes desirable to understand a technology as long as the application layer (e.g., a full-duplex audio circuit) does what it’s supposed to. It just works, and that’s enough. This sets us up for a discussion of the TARPN packet radio network.

TARPN, What’s It Good For?

I’ve written often about TARPN (Terrestrial Amateur Radio Packet Network <tarpn.net>), and interest and networks continue to grow. But many start out wondering what good it is, a so-last-century technology whose replacements are far superior. Sure, folks still cling to AM, and CW shows no sign of becoming any less popular than it was in the 1970s, so maybe it is simply folks using a technology out of sheer technical interest and potential learning experiences? In other words, why build a TARPN packet network in 2021?

Well, it isn’t to support the BBS function. It’s nice to have, sure, but other technologies have that covered. Another nice-to-have feature is the emergency communications potential, the ability to move a useful amount of text over dozens of
As it turns out, building a TARPN network is really for a singular purpose, and the fact that it’s a packet network is almost irrelevant. The killer app, as it might be called, is Chat. Chat is a text-based system allowing several people to maintain conversations in real time. Due to its architecture, stations on the edges of a TARPN network get roughly the same performance as those in the middle of it — latencies on the order of a second or three are typical. And, again due to its architecture, the TARPN approaches 100% data saturation, its performance barely degrades, almost too little to measure.

The pandemic made it clear to many of us that even if we consider ourselves introverts (as I do) we still want and need human contact. I may have mentioned before that I’m an avid homebrewer of beer. Brewer’s Friend, one of my online tools, has a forum and every month we have a Zoom call where we all get together and talk. Generally, we talk about beer and brewing but the conversations tend to range far and wide. I genuinely look forward to these monthly meetings, chatting with friends from literally around the world, representing six of the seven continents.

My local ham radio club has moved its meetings to Zoom as well. The most recent North Fulton Amateur Radio League <nfarl.org> meeting had over 80 participants, so many that we couldn’t all fit on a single screen. As I write this, the United States Centers for Disease Control <cdc.gov> says you don’t need a mask anymore if you’re fully vaccinated, so the May meeting (we write about two months in advance of publication) will be held in person — the first one in a while — and many of us are excited for it.

But one thing I’d enjoy is somewhat more frequent interaction. I can email friends in the club, but I don’t know everyone’s email address. Ditto with texting. I mean, I only joined a few months ago and have not really established many friends in the club. So what about something like a text, but in real time, with multiple participants, accessible through most any device (PC, phone, tablet, etc.), amongst a group of like-minded people? Ah, this is Chat.

Let’s Chat

The GB8PO node software has a chat feature, by which anyone on the network can chat with anyone else. The TARPN network leverages this and the TARPN Home application (essentially a web-enabled GUI structure), written by Fin Gold, NC4FG, to create a local chat network consisting of everyone with a node (i.e., everyone on the network). Just put your node on the air within the network, start TARPN Home (which runs on a Raspberry Pi computer), and open the chat tab in a browser. Since the Pi can be accessed by any device that can connect to your home network, I can connect to TARPN Home with my iPhone or iPad to keep in touch while enjoying a beer in the backyard, for example, or playing in the workshop.

Don’t underestimate the power of chat. With it you have a real-time connection to everyone else in the network. Your device can be set to alert you to any new messages, or messages directed at you, much like cell phone texting. The other network ops are your friends, who share a common set of interests (including ham radio and TARPN), whom you’ve visited to help get their stations running, and upon whom you depend for help when needed.

In practice, we find that conversations aren’t limited to TARPN or even ham radio. Get a bunch of people together, and the conversations tend to diverge rapidly into many different directions. Just like on my brewing forum, where a discussion about hops devolves into boiling times for hot wort and the best yeast for making cider. This makes it interesting and refreshingly unpredictable.

But chat uses packet. TARPN to be specific. And to participate in a TARPN network, you become a node operator. I’ve written about this before, but TARPN eliminates the concept of user ports, and at the same time removes the division between users and infrastructure supporters. Everyone runs a node with a connection to at least one other node, and access to the network is through your own node. There are several advantages to this, as well as a few disadvantages, but this Networking On Purpose (NOP) is proving to be useful at drawing younger hams into the social fold, all due to the chat.

Build a TARPN Network

Tadd Torborg KA2DEW, doesn’t try to promote TARPN as a packet network, but as a real-time online chat system for local hams, which just happens to use radio to move data. Building a node is surprisingly inexpensive, often under $150 including radio and antenna. So far, as with many endeavors, the hardest part is finding another ham who both

Photo A. Leaking electrolytic capacitors were cause for worry on the one motherboard I had that provided good floppy disk drive support. Thankfully it worked long enough for the needed task, after which it was reverently recycled.
wants to link to your node and lives in a place to which a radio path exists. I currently have the first part here in Atlanta, but not the second part. One interested fellow is over in Kennesaw, Georgia, but between us is a tall ridge about 400 feet higher than either of us. The residents on the ridge peak are, sadly, not hams, and access to the commercial site at the tippy top is, er, difficult. We did try a 2-meter voice QSO to see if, by some miracle, a path might exist, but physics said no. So, what we need is someone living nearby but maybe 30° off the direct line between our stations, and a three-node network could be born. Still looking.

Here’s the bottom line: If you and one or more local hams have even a slight interest in a real-time chat system, then you might be the one who can make it work. Hams, who have grown up in a world that always has an internet and iPhones. The network has other, more traditional uses, of course, but the primary purpose isn’t packet for the sake of packet, but as a tool for chat box connectivity.

**Spring Cleaning**

Switching gears, a short blurb about old data and electrolytic capacitors. Doing some spring cleaning recently, I decided to power up the many leftover computers littering the basement shelves to see which ones still worked and how they were equipped. A side goal was to take all the data I have off the floppy disks — hundreds of 5-1/4-inch and 3-1/2-inch floppies — and move them onto a more modern storage medium, like a USB hard disk. To do that, I needed a computer that had floppy drive support and USB support, or at the very least used an IDE hard drive, which I could temporarily connect to a computer with USB support.

The short version of the story is that the data from virtually all of my 3.5-inch floppies is now safely archived, and virtually none of the data on my 5-1/4-inch floppies has survived. I did have one computer that supported a 5-1/4-inch drive, but the first dozen disks I tried couldn’t be read. Not willing to believe that all the disks were bad, I tried several things, including another floppy drive, but the results were consistently awful.

Desperate, I formatted a floppy and wrote data to it, and it read back perfectly. Ugh. The conclusion was that almost every one of the floppies had failed, and the data was lost. Nothing of tremendous consequence, of course—I hadn’t even looked at that data for over a decade — but I’d have liked to keep some of it.

So the lesson here is: If you have data sitting on some older hardware (like floppy disks), take action to preserve it. At the very least, identify what might be valuable and focus on that. Bootleg copies of old commercial software really have little value since you can probably find a genuine copy somewhere online and you’ll need hardware that it can run on. But your own data, that’s unavailable elsewhere and should be your focus.

That week I got rid of a bunch of old motherboards and some other bits and pieces, properly disposed at the town’s recycling center. As it turned out, the motherboard that best supported floppy disk drives was on its last legs. Once its last task was done, it got recycled. Close inspection revealed that the “modern” electrolytic capacitors had mostly failed and, if it were to be used extensively, would suffer some reliability problems before it finally failed, most likely with a spectacular release of the magic smoke. Take a look at Photo A to see what I mean.

And so, a second lesson: Open up your computer this weekend and blow out all the accumulated dust. Look everything over for things like leaking capacitors or a weak CMOS battery, and take action as necessary. A little preventive maintenance goes a long way.

Thinking preventatively, think about the cyberattacks in the news lately, and decide if your computer system is even moderately resistant to such an attack. Of course, you know not to follow suspicious email links and to have a modern commercial anti-virus software subscription active. Also be wary...
of anything asking you to verify your credentials or threatening to cut off your access to something. But do you have a backup?

I saw an 8 terabyte (that’s 8,796,093,022,208 bytes) USB hard drive at a national warehouse store for $120. Back in 1986 when I got my first “hard disk” computer, even the government didn’t have 8 TB online. Once a week, I connect this drive to my main computer, run a backup and store a system image, and disconnect it. While there is still a risk in keeping the backup in the same location as the computer — a fire could destroy both — a second USB disk rides in my car, but that gets new data only once a month. It would be rare that both backups get damaged, so even in the event of a ransomware attack, the worst case would be losing maybe a month’s worth of data. For some, a good alternative is keeping an encrypted backup in the cloud.

In a chance encounter, I met computer pioneer David Larsen, KK4WW, (Photo C) and his wife Gaynell, KK4WWW, and had a long and pleasant conversation with them. We chatted about his early work in electronics and computers, and more recently their efforts as managing directors of FAIRS (The Foundation for Amateur International Radio Service). I’d seen the FAIRS classified ad in the back of QST since forever, but never really looked into it as an organization. While I’m out of space this month, go visit <fairs.org> and see if there’s anything laying around in the shack to donate. I plan to send some VHF equipment that will be deployed in the Caribbean to help hams build and work voice repeaters and packet networks.

No Politics
Lastly, politics. While there are many reasons to subscribe to CQ, we’re confident that politics isn’t one of them. With apologies to Chuck Palahniuk, the first rule of politics club is you do not talk about politics club. I truly hope you’re OK with that.

It’s always nice to hear from readers, so drop me a line.

– Until next time, 73 de N2IRZ.
Surprise! I'm still here. In spite of announcing my retirement from the column in my April article, I am still searching for that certain someone to take the helm. If this MF and LF stuff interests you and you are an unconventional, creative thinker who enjoys writing and can keep deadlines, let's chat a bit. I'll be here until we fill the position or until my information resources dry up. Now, on with the show!

Annual KL7L Portable Operation in KH6 was a Resounding Success

Laurence Howell, KL7L, returned to Hawaii for his annual work trip, operating 630 meters from a hotel balcony on Maui, grid square BL10ss. Any trip that allows him to set up a 630-meter antenna from the balcony of his accommodations and not get caught by staff is a successful trip but Laurence reported a few first-time accomplishments during this operation that really made his efforts even more worthwhile. Following the 2020 trip, Laurence determined that the antenna coupler he had built for portable use lacked the range and power-handling capabilities necessary for consistent success using the very short antenna that he was able to install. For the 2021 trip, he knew that he would be limited to a similar antenna consisting of a 10-meter-long fiberglass pole with an attached wire and possibly a short section of top-loading wire which he would be unable to guarantee until he arrived on site. Coupling the 50 watts from his Monitor Sensors 630-meter transverter would be challenging for such an antenna with a compact coupler, but it was far from impossible.

Size and weight for couplers are always serious considerations, so a compact loading and matching scheme configured as an L-network was in order (see Figure 1). While ferrite loading can be a lossy proposition for such a short antenna, the travel constraints dictated that this was going to be the suitable approach for a suitcase-style operation. Like any QRP operation, the station at the other end of the path was probably going to have to do most of the "heavy lifting."

On arrival to his accommodations on Maui, Laurence secured a room with a seaside view on the sixth floor. The

![Figure 1. Here is the loading and matching arrangement used in the KL7L/KH6 operation. Switchable ferrite inductors allow a wide range of values to be selected, forming an L-network when used in conjunction with a shunt variable capacitor. While ferrite loading can often be a lossy approach, traveling often dictates compact solutions. In this case, Laurence enjoyed remarkable success for such a small antenna system.](https://www.cq-amateur-radio.com)
balcony (Photo A) would allow the antenna support and attached wire to be “wedged” at a roughly 45° angle away from the building (Photo B) and a nearby palm tree might facilitate an endpoint for a top-loading wire. Initial reception tests (Figure 2) showed that many of the typical noise sources at his accommodations were manageable, at least during the day. Laurence observed that after 10 p.m. local time, however, solar converters located on the roof and operating in “idle” mode made considerable noise that seriously impacted signal-to-noise ratio, specifically impacting weaker signals. Unfortunately, that’s a reality for this type of operation and operators have to learn to fight through difficulties.

Photo A. The antenna feed point was quite close to saltwater on the sixth-floor balcony. This height above ground likely contributed to a far better system than calculations suggested on paper.

Photo B. Just because it’s not perfectly vertical does not mean it’s not a vertical antenna. KL7L’s arrangement of a sloping fiberglass pole from a balcony once again shows that successful 630-meter micro-operations are possible.

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<td>BL11je</td>
<td>1</td>
<td>KL7L</td>
<td>BL10ss</td>
<td>91</td>
<td>121</td>
<td>2</td>
<td>37</td>
</tr>
</tbody>
</table>

Figure 2. WSPR reception results were fairly consistent with these observed on March 30th. Laurence was hearing well into the central U.S. despite elevated local noise.
As he prepared to take to the air, Laurence’s first antenna arrangement was a simple 10-meter-long radiator with no top loading. There were concerns that his operation would be cut short by the staff if he were caught connecting wires to adjacent trees from his balcony but there was plenty of plausible deniability for a fiberglass pole that resembled a long fishing pole which was extended beyond the balcony given his proximity to water. Grounding was accomplished by connecting to the facility ground. While not an ideal situation, it was a technique used in previous trips that worked well and was essentially the only practical option.

Initial transmissions using WSPR were impressive (Figure 3) as his receivers back in Alaska were decoding his signal despite more than a foot of new snow on the ground, covering the receive antenna feed points. Additionally, K9FD (/KH6) and AI6VN/KH6 were reporting his signal around the islands and KL7KY was also hearing him back in Alaska. He noted that K9FD was reporting his signal at better than -10 dB S/N which is squarely in CW “ragchew” territory and would be a very simple digital QSO to complete, which had been accomplished on previous trips. To be safe, he chose to lower the pole at bedtime on the first few nights. With the previously reported noise that was observed during the late evening, it was not a huge loss.

Laurence’s next test included the full 10-meter-long radiator with a 5-meter top-loading extension. Laurence noted that the antenna deployment allowed for the top-loading wire to be installed.
with the angle at least 90° with respect to the pole. Doing so minimized negative impact to the already tenuous radiation resistance. The addition of a 5-meter top-loading wire made an improvement, as expected, but Laurence was not done with his experiment.

The next step involved an additional top-loading wire using the 10-meter long “vertical” nested at 45° plus a maximum of about 13 meters of top-loading wire. In order to minimize the slope of the “vertical” radiator with respect to the top-load wire, a second fiberglass pole was installed to help extend the top-loading wire away from the radiator section. A longer wire meant a different end point, changing the dynamics of the situation. Still, this addition resulted in the best results for the system, with several morning WSPR transmissions being heard as far east as NO3M in western Pennsylvania and fairly consistently in the central U.S. At this point, Laurence was less worried about getting caught and no one really said anything about his antennas, so he generally left them in place until sunrise each operating session.

So what did Laurence learn during this trip? He showed that a very short, portable antenna with minimal top loading and system grounding was feasible and could be heard as far away as the eastern U.S. mainland, Australia, and New Zealand, even at very low power levels. While most of us are using sizable loading coils, Laurence successfully loaded his system with ferrite coils and a capacitor, forming an L network. While I don’t recommend trading in your bucket coil just yet, the arrangement that Laurence tested was absolutely a workable solution for his situation. Being located next to saltwater certainly did not hurt anything.

In January, I reported that Laurence was testing underwater receive antennas. Those very long wires continue to produce good reception results and have on a few occasions resulted in interesting transmit results with reports of his signal in Hawaii and along the west coast of North America. One interesting but not exclusively radio-related fact that Laurence learned was that in the silt, at ground level under the frozen lake, water flowed all winter long, probably due to geothermal effects. He made this determination by way of impedance measurements. Possibly more on this observation and others in the future. Congratulations to Laurence on yet another exciting radio adventure below the AM broadcast band.

**CW Milestone Reached on 630 Meters**

Mike Michaels, W3TS, has completed a season-high 911 CW contacts between September 1, 2020, which was the start of the new season, and April 2021 when this article is being prepared. Noise levels and fading can make every contact challenging and that is certainly the case on CW, where the operator decodes the signal by ear. Congratulations to Mike and there is still time for him to reach the 1,000 CW contact milestone before the next season begins. Let hope for a quieter than typical summer!

There is a robust CW community on 630 meters. For the would-be operator simply listening for signals, it can be challenging and I often hear comments that “I don’t hear anything.” CW on both 630 and 2200 meters is not like CW on 20 meters most of the time. In many respects, it may not even be like CW on 160 meters. Yes, strong signals are heard at ragchew quality for extended periods pretty regularly, but the casual operator may miss those opportunities or may simply not be prepared to deal with noise or weak signals in a way that might result in a successful listening session. Check the Reverse Beacon Network and filter for 472 kHz or 137 kHz. Also watch DXSummit with filters for 472 kHz and 137 kHz. Don’t set a filter for “CW” as the filter algorithm seems to think that there is no CW on the band, which could not be further from the truth. I regularly post stations during my evening and morning operating exercises and almost always list the mode as CW in the note column. Also, get involved with the active community. Want to know how? Send me an email and I can help you get started. Perhaps you, too, will be the next operator on the way to a 1,000 CW contact season.

**W5EST Releases Volume Four of His 630-Meter Analysis**

If you followed the daily summary that I published for many years on my website, you are no doubt familiar with the efforts of Jim Hollander, W5EST, who spent countless hours poring over data to make sense of some of the observations that...
were reported on the air. Beginning in 2016, Jim compiled many of his best presentations into organized chapters on a variety of topics from propagation to hottest receivers for the year to antenna ideas that were in use by successful operators and continued these seasonal compilations with newly available information and on-air observations until 2021 when my daily reports ceased. Because I no longer maintain a website, volume four has been released to a cloud server with the table of contents found in the biography section of my QRZ.com page.1 Navigate to QRZ.com and search for my callsign, “KB5NJD”; on the biography tab, there will be a link near the top of the entry that will allow you to navigate through other information posted on the page to the W5EST volume of interest. Congratulations to Jim on another fine presentation. It is largely believed that volume four will be his last to be compiled, but I would not put it past him to create additional presentations as the situation warrants.

W7XU Puts Arkansas and Louisiana On the Map for 630-Meter Operators

It was late Fall in 2020 when Arliss Thompson, W7XU, included a note with his daily statistics asking about the feasibility of a portable operation on 630 meters to Arkansas and Louisiana this April. He and his wife would be “on the road,” visiting family and amateurs along the way and camping at venues that might present opportunities to put both states on the air for the first time. Both states are considered high-value targets and, while Arliss is a seasoned DXpeditioner with experience in thinking on his feet to resolve seemingly insurmountable problems, these potential operations might be on par with some of the biggest DX operations in amateur radio when it comes to competition and importance to those within the MF and LF communities. This was not an opportunity to be taken lightly.

On top of the physical-layer challenges of getting a portable 630-meter station on the air and operating effectively are seasonal storms and associated noise that are present in the spring, particularly in the central U.S. and points east. Weather conditions would certainly be a factor for these operations, even before travel has been initiated. Arliss also made his UTC notifications for both of the anticipated campsites, which went unchallenged. The antenna system for the operation was to be a 30- to 40-foot tall inverted-L with a 100-foot horizontal section and resonated with a small coil at the feed point. Radials would be added but the specific details were unknown until arrival at the first campsite in Arkansas. Arliss felt like this antenna would likely fit the campsite somehow, but he prepared for a number of eventualities. The weeks leading up to departure were met with a number of challenges, not the least of which were very high winds back home in South Dakota. While best practice said that the antenna system and station needed to be tested before leaving home, if for no other reason than to ensure that all necessary components were present and accounted for, the winds had other ideas. Arliss reported that his first attempt to raise a free-standing support to elevate the inverted-L ended in disaster, resulting in a “plan B.” The specific details of what happened and what solution was implemented were not disclosed but like any portable operation, multiple options were always available so the setback did not seem to truly threaten the operation.

Early April arrived and the first operation from Arkansas under Part-97 rules commenced from EM36 near the Missouri / Arkansas border in the Ozarks (Photo C). The inverted-L was successfully installed among trees at the campsite (Photo D), but Arliss noted a power supply problem that limited his power output to something on the order of 25-watts total power out and a radiated power level well below the 5-watt EIRP limit. Given the attenuation from trees and relatively low efficiency, there was not much power being radiated but it was not zero! And as can so often happen in the spring, weather does not always cooperate. While storms were avoided at the campsite, associated noise from regional weather made operating very difficult. At the suggestion of NO3M, Arliss added an additional sloping top-loading wire to the antenna and on the second operating session, improved efficiency led to successfully completed FST4 contacts with WØSD, N9RU, and K5DNL. Arliss was heard

Photo E. This was the antenna setup in Louisiana. Arliss reported that the, “trees were much taller here. My friend Bill, N5YA, who lives across Toledo Bend Reservoir in Texas, loaned me a fishing pole so I could get a line high in a tree. My inverted-L here ended up 80- to 90-feet high and 100-feet horizontal. I had the same six radials, 50-feet each.” From this location, Arliss completed FST4 QSOs with 16 stations as well as one CW QSO.
here in North Texas on WSPR overnight, but in the -21 dB S/N range, which meant that a CW QSO was likely out of the question. While QSO totals were low compared to the effort put into this first operation in Arkansas, a tremendous amount was learned about setting up a portable operation on 630 meters. This is nothing like setting up a portable operation on HF!

On to the next venue, a few days later found Arliss and his operation in EM31 near the Toledo Bend Reservoir on the Texas / Louisiana border (Photo E). Trees at the campsite allowed for a far more robust antenna, with a wire vertical that was near 90-feet tall with a mostly horizontal top-loading wire that was 100-feet long. Arliss also enjoyed better noise conditions than the Arkansas operation due to a break in the weather, allowing him to complete FST4 QSOs with WØSD, KØKE, K9KFR, N9RU, K5DNL, ABSS, WB4JWM, NO3M, KE7A, W9SRW, WA3U, WBØTEM, N9LB, W7XU (op. NØLAN), VE7SL (Photo F), and KM5SW. He also completed a lone CW QSO with me, KB5NJD.

Arliss hopes to return to Arkansas and possibly Louisiana again in the fall or winter to fill some of the holes from this trip. Congratulations to Arliss on a job well done. He made many operators happy and potentially motivated many others.

K6STI Reports New Release of Q and Inductance Programs

Brian Beezley, K6STI, reported that he has released a new version of his inductance and Q calculator software. He noted that the changes are specifically for VLF (below 30 kHz!) and that he, “replaced the HF approximation for skin effect with a calculation accurate at any frequency. The proximity effect calculation also now makes sense at low frequencies.” No doubt that these changes will benefit medium- and low-frequency operators as well. He also indicated that error for inductance while comparing a statistically significant number of samples was about 2% of expected values and 5% for expected values when measuring Q. His software is designed for Windows® and is free to use.

Surge in 2200-Meter Activity During the First Quarter of 2021

The first quarter of 2021 saw an increase in 2200-meter activity using WSJTx’s FST4 variants. Stations like WB4JWM, K8HTL, and WB9OWN joined the fray, adding to the ranks from Georgia, Michigan, and Wisconsin, respectively. A number of QSOs were completed during late evening and overnight operating periods in February and, while no DX QSOs were reported, WSPR and FST4W DX signals were reported in parts of North America.

Notable were reports of several Japanese stations in the central and mountain regions of the U.S. By mid-April, however, fortunes had turned once again as Roger Crofts, VK4YB, reported that he, “struggled to get a single WSPR decode at KL7L and AI6VN/KH6. The usual JA FW30 signals were not detected here overnight, nor at VK2AN.” Laurence Howell, KL7L, reported slightly better conditions, noting that he decoded FST4W-30 signals from “... JH1OFX, WSPR VK4YB (just one). No real push of conditions south eastward sadly to L48 (lower 48) or Canada ...”

That’s it for this month. Perhaps you will see me again in October. You can contact me at <KB5NJD@gmail.com>.

Notes:
1. KB5NJD’s QRZ bio with TOC for W5EST volumes: <https://tinyurl.com/uktueejn>
2. K6STI’s coil.zip download: <https://tinyurl.com/zvxmdv22>
When broadband noise creeps into your radio system, there are two more-common local noises you may encounter. By “local,” I mean your house or your neighborhood.

**QRM Reduction Starts at Home**

On 2 meters, the newest noise you see on your FM rig’s S-meter may be interference from light emitting diode (LED) light bulbs right in your own house (Photo A). On weak stations, it is the background noise that makes them hard to hear when nearby ceiling or lamp LED lights are on.

This noise peaks around 150 MHz, and goes about 20 MHz either side, affecting our 2-meter band. The LED noise usually does not affect the HF, or high frequency, bands (3-30 MHz).

This noise is not generated by the LED itself, but by the “chopper” switcher innards taking 110-volt AC down to a much smaller voltage to make the individual LED illuminate. The dimmer function on some LED modules (Photo B) is the noisiest, especially in the mid-dimmer setting.

Try this — tune your 2-meter rig to a distant weather station on 162.400 MHz, or a very weak repeater, and then switch on your radio room or porch LED light bulb. If there is no change in reception, you are good to go.

However, if you turn on the LED bulb or track-light LED lighting, and the weather channel or distant repeater suddenly gets covered with noise, time to switch out the LED bulb for another manufacturer’s bulb. Each manufacturer has its own way of filtering this noise, some with good success, yet others, have no success at all. Again, this LED interference is usually in your own house, and mainly interferes with weak 2-meter reception.

**Around the Neighborhood (AND In Your House)**

On HF, our latest noisemakers are cheap high-current grow lights, and the incessant noise from the power supplies that drive them to full brilliance.

Now add to this RF racket the wall chargers for cell phones and tablets, which frequently cause interference on high frequency within your own house. They are broadbanded in their noise output, from the AM broadcast band all the way up to 10 meters.

Here is the plan to find these HF noisemakers — with a portable receiver (Photo C), start sniffing within your own house first. Remove each wall charger from the AC socket and listen to hear if this one is generating broadband noise. Plug, unplug, replug, and unplug. If the noise stops, then starts again, you’ve found the culprit. But don’t stop there; more than one of these chargers may be noise sources.

Time to search for a replacement, or raid your junk box for older transformer chargers. Just be sure and get the correct voltage, and most important, cor-

* Photo A. LED light bulbs with heat sinks — some are quiet, others not!
* Photo B. Dimmer circuits create major static on HF band reception.
* Photo C. Finding noise sources, using the CCrane receiver on AM.
rect polarity, where center socket might be “+” (positive), but could be “–” (negative).

Now it’s time to find the HF noise sources all around your neighborhood. Chances are the neighbor’s grow lights were direct imports from overseas with no FCC compliance sticker, and the noise can wipe out 40 and 75 meters, up to a block away. Shielding and clamp-on filters may not help — this HF noise is coming straight out of the power supply box. Best bet is to replace them with FCC-compliant models.

Use diplomacy when working with neighbors — I usually indicate these cheap import knock-offs could be a fire danger — after all, I could direction-find to the exact house from which the noise and possible fire hazard are coming. This usually works.

I use a simple AM radio to spot this type of noise — but if you have a short-wave receiver — AM or SSB — all the better. Good excuse to buy that portable QRP internal battery rig you have been drooling over.

There are tons of other noise makers that affect our ham setups, but most only radiate a few feet and go undetected. It is the LED light bulbs in your own home that make a VHF racket, and cheap grow lights with their chopper circuits in the power supply that radiate noise on 75 to 10 meters, tons of noise, halfway down the street.

**The Elk Beam is a Log for Great DFing!**

OK, you solved some of your local noise issues with the pesky LEDs and grow-light switching power supplies, but now you need to find the source of a “birdie,” a steady carrier smack dab on 146.520 MHz FM, the national calling frequency.

You live beside an RV storage park, and luckily for you, the manager is a ham. She says to come on in, find the noise, and she will make contact with the RV owner.

Your mobile Doppler gets you to one end of the park, but all the reflections won’t let you pinpoint the source. Out comes the Elk log periodic antenna (Photo D), which resonates with directivity from about 140-500 MHz. You are now getting closer, but the signal is so strong, your HT without any antenna picks it up at full signal strength. With the log antenna attached, it is far too strong to DF.

Easy solution, only requiring some math skills, and a broadband directional beam antenna, like the Elk LP: Go for the second harmonic. Too strong? Try the third harmonic. Weaker, but still too strong. At the fourth harmonic for the signal on 146.520 MHz, heard weakly at 586.08 MHz, your HT with extended RX, tied into the Elk log antenna, sniffs it right down to the old fifth wheel with a beat-up old battery “tender” charger, which emits a birdie on 52. Success!

The owner is informed of the potential fire danger, and being such a good ham, you buy him a new automatic charger for the RV.

**Antennas for DFing at UHF**

Now here is the real deal on harmonics for DFing: Trying to use a tape measure 2-meter antenna at the 586 MHz fourth harmonic won’t work, as the dedicated 3-element tape measure beam is no longer a directional beam up this high in frequency, and yields essentially omnidirectional reception to the actual “signal” source.

The log periodic antenna continues to hold its beam pattern, way up at 500 MHz, and will still hold a nice tight bearing to the signal source on the second, third, or fourth harmonic. Your HT with broadband receive will no longer overload with no antenna attached, as it is now tuned to the fourth harmonic, just microvolts in signal strength.

A log periodic directional beam, like the popular Elk, is a series of dipole ele-
ments that get shorter down the twin booms, to where they are fed from the front. Each element that detects resonance becomes the active element, and the longer rear elements now act as reflectors. Total frequency coverage is from the length of the longest dipole element to the length of the shortest dipole element.

The individual resonant dipole elements take a small added inductive energy from the longer rear elements as reflectors, and the short elements in the front now become capacitive directors, adding some gain. Expect about 6 dB of forward lobe gain.

On the Elk log periodic beam, each set of dipole elements is screwed into a twin boom, each “side” of the boom insulated from the other side, with a coaxial SO-239 50-ohm connector (See Photos E, F and G). The coax-ground goes to one side of the boom, and the center conductor goes to the other side. The SO-239 is already factory assembled.

The log periodic element spacing leads to a 180° phase shift from one set of elements to the longer element behind it, and the shorter element in front of it. This makes the frequency-resonant dipole the “driven” element. Feedpoint impedance stays around 50 ohms, with slight variations, if a chosen frequency falls in between element resonances.

When comparing gain to boom length of a single-band VHF Yagi, the 2-meter T-hunt tape measure antenna has a bit more gain and sharper directivity than the log with the same boom length. Same with the Arrow VHF/UHF antenna — it, too, may offer a bit more gain than the log period-

**“Ham Nation” Goes Big-Time!**

We had many great video podcast-years with Leo Laporte, W6TWT, on his TWIT Network, hosting and producing our weekly “Ham Nation” shows, with Bob Heil, K9EID; George with Smoke and Solder; Tamitha with solar video; Don with Newsline, plus Amanda, Valerie, Randy, and yours truly.

After multiple years with the fabulous TWIT team, our weekly guests many times outnumbered input lines to the TWIT studio. We needed more guest video line inputs, so we were pleased that Ray Novak, N9JA, with ICOM America, suggested Josh Nass’s “Ham Radio Crash Course” site.

Most of our “Ham Nation” hosts were already familiar with Josh, KI6NAZ, and his wife, Leah, KN6NWZ, who were doing ‘casts on multiple venues … Facebook, Instagram, YouTube (with 182,000 followers), Discord, live streams, etc. Everyone who has watched Josh and Leah knows the excitement at “Ham Radio Crash Course,” seen all over the internet, all over the world.

So, after hundreds of shows and many very successful years with the TWIT network, we made the switch last January to the “Ham Radio Crash Course” live and recorded video podcasts.

We expected our first few shows with Josh might be overwhelming for his home studio, and we were all pleasantly amazed at the smooth transition, and seamless bi-weekly showing of “Ham Nation” and all our regular hosts. And when it came time for multiple guests, Josh made it happen! Josh is an engineer, and we found that nothing fazes him in live-show on-air production!

Josh is a classic podcast host, always upbeat, and usually first with any new ham radio gizmo for his live-action reviews.

Josh is also a real ham, regularly on the air, and always putting new products under the video microscope, and on the air reviews, all with fun and smiles, two of his many trademarks.

So see for yourself what “Ham Radio Crash Course” offers with so much variety of ham radio topics, and be as amazed, as all of us on “Ham Nation” are, for our new bi-weekly home! See you every other week! <www.hamradiocrashcourse.com>

Josh Nass, KI6NAZ, whose “Ham Radio Crash Course” on YouTube is the new home of the long-running “Ham Nation” podcast.

Josh is able to bring live chats for all to see (left side of screen) in addition to live video and audio.
ic, if each set of VHF and UHF elements is fed with separate coax cable leads.

But where the log periodic antenna from Elk Antennas shines is major broadband capabilities on both transmit and receive, which I needed when working with the Coast Guard Auxiliary to locate a 121.5-MHz EPIRB (emergency position-indicating radiobeacon) localizing signal, 170-MHz TX for authorized military channels, 400-MHz military channels, and second harmonic attenuation for finding stuck mics on 156.800 MHz transmissions in the local harbor.

And ... the Elk log periodic elements unscrew from the twin boom in less than 45 seconds total, and are color coded for easy reassembly.

Just remember, the log antenna feeds from the front (the end with the shortest elements), with the coax hanging away from the boom to keep the directional pattern sharp.

And for working the Elk log antenna into the International Space Station’s cross-band repeater, it was a near-instant simple setup, a PVC handle for aiming it, and I was working the ISS even before and after AOS and LOS predictions. (AOS: Acquisition of Signal; LOS: Loss of Signal)

**BEHIND THE BYLINES ...**

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

**Chris Tate, N6WM** ("Results of the 2021 CQWW WPX RTTY Contest," p. 10), is a member of the CQ RTTY Contest Committee. He is an accomplished contester and DX-peditioner, including being a team member on the 2018 VP6D Ducie Island DXpedition. A past president of the Northern California Contest Club, Chris is also a founding member of the Livermore Amateur Radio Group Endeavors (LARGE) club, which operates the W6LRG/WV6I contest station in Livermore, California. He lives in nearby Discovery Bay (which doesn’t appear to actually have a bay!)

**Lawrence Stark, K9ARZ** ("Three 'Gifts' From Heathkit," p. 16), has been licensed since 1960 and has been building his own gear for nearly as long. A retired geographer, Larry is primarily a DXer (we’ll bet he can find every place he works on a map!) and is a member of the Northern Illinois DX Association as well as the Antique Radio Club of Illinois. He lives in the Chicago suburb of Lake Charles, Illinois.

**Ray Grimes, N8RG** ("Restoring the Original Heathkit..." p. 20), is a public safety communications consultant who has written extensively on aviation safety. A resident of Los Alamitos, California, he has been restoring classic radios for years, and had an article in CQ VHF in 2004 on restoring the rare Rogers Black Widow VHF transceiver.

**John Thompson, K3MD** ("Restoring a Heathkit DX-60 Transmitter," p. 24), has had approximately 40 articles published in both amateur radio and professional journals (he is a radiologist) and is active on all bands from 160 meters to 23 centimeters, and on all modes except amateur TV. A contributing editor for the National Contest Journal since 2017, John is vice president of the Susquehanna Valley Amateur Radio Club and a member of many others, including the Frankford Radio Club, Mt. Airy VHF Radio Club, and First Class CW Operators’ Club (FOC). He lives in Winfield, Pennsylvania.

Elk Antennas now has a new home for increased product development in Wyoming, but the company’s website remains the same: <www.elkantennas.com>.

**Mnemonics**

As ham radio operators reporting to a public safety or served emergency agency dispatch center, we need our incoming reports to flow with that agency’s computer or written report form. I find it helpful to identify a mnemonic — a word or words to remind me of the order of voice data when reporting weather emergencies, traffic accidents to 911 operators, crimes in progress, etc.

For example, firewatch hams on a hilltop, reporting wind and weather conditions, can simply remember “WIDTH”

- W wind
- I intensity
- D direction
- T temperature
- H humidity

Every agency has its own progression of needed information, in order, on its dispatch screen. Reporting that information, in order, makes everything go more smoothly and efficiently.

Send me a short mnemonic word and the progression of incoming voice or data for your served agency, and I will come up with a list for all to consider when calling in an emergency message, or communicating, in order, the short details needed by that agency. I will even come up with a word to stand for the flow of info.

Every agency is different, so let’s all sound more professional when, as ham radio operators, we give them the information they need, in order, to flow into the programs in their dispatch centers.

**Tropo Time in July**

Finally, on a hot day in July, with a high-pressure system stalled overhead, dial in your mobile or base station 2-meter system to the weather channels, the ones that are usually too far away to hear on VHF line-of-sight (162.400 MHz to 162.550 MHz, 25 kHz steps, FM, vertically polarized), to monitor for tropo, or tropospheric scatter or ducting.

Last year, Dayton heard Dallas, Texas heard the Florida Keys, and Virginia was hearing Miami. Troposphere ducting at its summertime best, which leads to some fun 2-meter, 440-MHz FM, data, CW, and SSB long(er) range contacts.

Enjoy this summer’s radio-fireworks in July!
Tropospheric Ducting Propagation on the Rise in July

In May, we discussed leveraging your Technician-class privileges. Since that column went to print, there have been many good openings on both 6 meters and 2 meters, with many hams making exciting contacts on digital, CW, and phone modes. Before we leave the benefits of the Technician class, I wanted to mention that you do have access to portions of the 10-meter band (Technicians may use phone and CW on 28.3 to 28.5 MHz, as well as digital modes like FT8). While not technically a VHF band, 10 meters often benefits from Sporadic-E (Es) propagation and it is safe to say that if 6 meters is open, so is 10.

When solar cycle 25 gets fully under way, you will also see worldwide propagation on 10 meters. It can be open day and night to various parts of the world. My point is simply that this is another example of a great opportunity to enjoy our hobby with “just” a Technician license. A simple dipole or vertical for 10 meters can be easily built or erected and give you hours of endless enjoyment when the band is open.

Now that I’ve gotten that off my chest, let’s get back to our regularly scheduled “VHF Plus” programming. As we round out July, the normal Es season will be winding down (but keep an ear out for any late season opportunities). This is a good time to start thinking about late summer and fall, and the tropospheric ducting (tropo) that may result from both the changing seasons and from hurricane activity in the Gulf of Mexico and along the East Coast of the U.S. This is primarily a 2-meter-and-above event, so perhaps it is time to evaluate your current capabilities, including FM, SSB / CW, and digital modes.

There are a couple of VHF-and-above contests in the late summer, and these are great times to try out your equipment or seek out local hams who are doing exciting things on the GHz-and-above frequencies and check out their activities. As far as tropo propagation, early mornings and late evenings are great times to listen and call for such activity, as temperature inversions are often enhanced during those times, as air settles before or after the heat of the day. In addition to longer distance contacts via weak-signal modes, you will often find that FM signals are positively impacted, allowing you to hear distant repeaters and make contacts on simplex frequencies including 146.52 MHz. Many folks keep an FM broadcast-band radio tuned to an empty frequency in order to hear if propagation brings in more distant stations. You can do the same thing on a NOAA weather radio channel not used in your area, listening for distant stations. Both methods will help you see which direction(s) you might be able to work on 2 meters and above.

Tropo can bring added excitement to higher frequencies, including 222, 432, 903 MHz, and above. Many claim that 222 often provides the best of all worlds, compared to even 2 meters. Remember, as frequencies rise, gain antennas become more manageable. As with any band, the quality of your antenna is an important starting point in building a strong station.

As the seasons change, so do propagation opportunities. The bands are seldom truly dead, we just need to create more activity. Let me know what your plans are for the fall operating season.

On the Bands
May has been an exciting month, as previously mentioned, on various bands. Es was active for several days early in the month, including some U.S. contacts into Asia, South America, and Europe.

– Fabrizio Monti, IZØAEG, reported that on May 3rd, from 1540-1730 UTC he observed the first opening this year with the U.S. on 50 MHz. Monti was able to hear W4TAA, AC4TO, NF4A, KA6U, WC3W, and others using FT8. “I don’t use a very long antenna. I use a 6-element with a 7-meter boom, 20 meters above ground. The transceiver is a Kenwood 590SG.

Photo A. On May 9th, a tropospheric duct opened up paths among the southeastern U.S. states.
“and a SunSDR 2 pro,” said Monti. He really likes 6 meters and holds DXCC endorsement #203.

Paul Merrill, W7IV, reports on some exciting Asian contacts in early May. Paul reports, “Basically, I checked the band before going to bed about 2230 local [time] and saw some activity, so I ran out to the shack. I worked about a dozen JAs [Japanese stations], decoded a number who I had worked in previous openings, so I didn’t prioritize them. I saw flags into Western China and Vietnam, but couldn’t complete. I had a couple overs with BV2 and BV6, but never completed. I did get DU6/PE1NSQ, YB1TJ, and VR2XYL into the log and quickly confirmed via LoTW (Logbook of the World). Additionally, I was able to decode two stations in France yesterday (May 14th) at about 1600 UTC and get one in the log. I know some guys in Southern California either copied stations in EU (Europe) or were flagged there, but I’m not sure if anyone completed.” Paul is running a Flex 6700 and PGXL into a 7-element LFA at 100-feet high.

Tropo openings were seen on several days as well, ranging from 2 meters to 222 MHz and up to 432 MHz. Ron Hooper, W4WA, reports that he worked several stations in Florida on 2 meters.

Looking Ahead...

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

- New Life for Old Heathkits Mini-Special – Part 2
- Converting an SB-220 to 6 Meters
- CQ Classic: Reviewing the Heathkit AT-1/AC-1
- What You Need to Know About the FCC’s New RF Exposure Rules

Plus...

- Results: 2021 CQWW 160-Meter Contest
- OH2BH: A Life of DX

Upcoming Special Issues

October: Emergency Communications
December: Technology
February: QRP
June: Take it to the Field

Do you have a hobby radio story to tell? Something for one of our specials? CQ now covers the entire radio hobby. See our writers’ guidelines on the CQ website at <http://bit.ly/2qBF0dU>.
222, and 432 MHz from his station in EM84. (see Photo A)

Mike Kana, AA9IL, reports on some rover / portable work that he and Tom Staley, K9TMS, did. (We are in the N9UHF Stoned Monkey contest group. That sounds like a fun group, right? –AA9IL). Kana and Staley said they were testing equipment for the spring / summer contest season and getting some experience working on 122 GHz.

We made QSOs on 902 MHz, 1.2 GHz, and 10 GHz from EN52, at the Allegheny Sports Park near Grayslake, Illinois. We were contacting Pete Walter, K9PW, and John Kalenowsky, K9JK, who were in EN51. (See Photos B and C)

Mike was also able to provide K9TMS with his first 122-GHz contact of over 1 mile using the VK3CV transmitter / downconverter boards with 21-dBi conical horns. They are planning to extend this range by adding a PTFE lens or offset dishes. Exciting work is being done on the 122-GHz band.

That's it for this month. Keep those activity reports coming in, as well as photos of your station, your operating activities, etc.

Transatlantic Contacts

On several days in May (including May 3rd, as discussed in this column) there were excellent transatlantic openings from Europe into North America (Photo D). Multi-hop Sporadic-E propagation, combined with an excellent path over saltwater, combined for several powerful, long-distance openings. Several European stations reported the contacts beginning with the Caribbean in late afternoon, moving north into the U.S. mainland later in the evening. As with most things 6 meters these days, FT8 was the place to be, with only a few phone and CW contacts being made.
Hello everyone … this month’s column will be on a new award from Indonesia (YB-Land) and widely seen daily on Facebook. I'm lending the keyboard this month to Budi Santoso, YE1AR, to tell you about this prestigious Indonesian award. At the time of writing this up, I have seen a lot of YB stations on 17 meters chasing FT-8, which is — as we all are aware — the current hot ham radio trend. Enjoy this month’s article!

YBDXPI (YB-Land DXing Passion Is) is an online community of radio amateurs that was formed on August 29, 2018 initiated by Budi Santoso, YE1AR (Photo A), an active Indonesian amateur radio operator.

Membership is based on the desire to share knowledge — including DXing, contesting, homebrew experiments, and other interests — with fellow members who share the same interests. YE1AR created YBLand DXing Passion Is on the WhatsApp chat application and began attracting Indonesian hams who rallied around its mission.

The main purpose of YBDXPI is to share knowledge and best communication procedures with hams throughout Indonesia and the world. The group also encourages members to earn the DX Century Club (DXCC) award from the American Radio Relay League (ARRL). “Keep High Spirit for New Entity” is the tagline and motto of YBDXPI, which is a passion shared by many Indonesian hams.

The group is expected to be of benefit to all amateur radio operators, both individually and in groups. It is also a gathering point for hobbyists and users of amateur radio frequencies wherever they are.

YBDXPI hopes that in the future, it will help encourage the “birth” of new DXers and contesters who are reliable, professional, and operate with integrity. Of course, we also want to maintain the continuity of the regeneration process for amateur radio members in Indonesia.

**YBDXPI Appreciation Award**

“Given to those who have sought to achieve it,” this award (Photo B) seeks to encourage an amateur to communicate with as many people as possible, as far away as possible, and using the various modes that exist. It is necessary to have time and patience, two things that cannot be valued in nominal money. YBDXPI has a program to reward members as a form of motivation and respect for hard work and constant persistence in carrying out their hobby. (Awards are only for group members, but anyone anywhere can join. Indonesian amateurs must have confirmed at least 10 DX entities; members elsewhere must qualify for DXCC. –ed)

To get this award, members must be able to prove two-way communication by providing confirmation as evidence recorded in the ARRL Logbook of the World or LoTW.¹ LoTW is one of the most trusted independent two-way communication recording media. It is managed by the American Radio Relay

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²Email: <KI4KWR@cq-amateur-radio.com>
League, which is headquartered in Newington, Connecticut. The ARRL is also a member of the IARU (International Amateur Radio Union).

The following are the categories for award certificates and placards given to members who send LoTW recordings after going through the validity evaluation process:

**CERTIFICATE**
- ARRL DXCC: 50 / 100 / 125 / 150 / 200 / 250 / 300 / 340 entities
- DXCC Certificate: Single-mode, Mixed, Single-band -
  - DXCC Challenge: 500 / 1,000 / 1,500 / 2,000 / 2,500 / 3,000
- ARRL WAS: 50 Mixed / Band / Mode
- CQ WPX: 500 / 1,000 / 1,500 / 2,000 / 2,500 / 3,000 Prefix
- CQ WAZ: 40 Mixed / Band / Mode

**PLAQUE**
- Super Star: DXCC Challenge 5- / 8- / 10-band with 500 / 1,000 / 1,500 / 2,000 / 2,500 / 3,000 entities
- Rising Star: Most entities in 1 year
- New Star: Mixed DXCC holder for the first time
- Star: Available to holders of certificates for entity mixed, mode, band, states, prefixes, and zones

**Meaning of Plaque**

The design of the YBDXPI plaque (Photo C) has special meaning. The logo is a Gunungan Wayang, which is a symbol for a house. The Semar represent characters in Javanese puppets who are described as caregivers and advisors of the knights. The amateur logo is the logo of the Indonesian amateur radio organization, ORARI.

For more information, visit <https://ybdxpi.net> or email Budi at <ye1ar@yahoo.com>.

Thank you, Budi, for a great article on the award and the passion that you and your fellow YB hams have for the amateur radio hobby.

Is there an award that you know about that is highly achievable and fun to obtain? If so, please pass it along to me and I will be glad to highlight it in an upcoming column. Hope to see many of you at the Huntsville Hamfest in Huntsville, Alabama, on August 21-22, 2021.

Note:
1. The ARRL generally limits use of Logbook of the World QSO data to its own awards and those sponsored by organizations, such as CQ, which have made specific arrangements with the League. CQ’s publication of information regarding other organizations using LoTW data for award purposes does not imply our endorsement of this activity. – ed.

**YBDXPI Organizational Structure**

You may be curious about how does the YBDXPI organization structures its work process. Because it was formed from the beginning as a non-profit organization, the main activities are carried out by the management who work voluntarily without being paid to consistently complete their respective tasks and synergize for the benefit of the members and the amateur world in general. Of course, we all thank the donors and sustaining sponsors who have entrusted their money to YBDXPI for international-scale activities.

Functionally, there are three teams working simultaneously on the sidelines of their respective professional activities, namely the membership and database team, the website and infrastructure team, and the database processing team for printing certificates.

The database team is tasked with processing member data and verifying the accuracy of the data through various sources and recording it into an existing database system. After completion of verification, it is processed by the certificate or award team to be printed and then published to the web page by the website team, which has also gone through the validation process.

YBDXPI hopes that the Indonesian amateur world will increasingly realize how easy it is to communicate with fellow amateur hobbyists in Indonesia and with others anywhere in the world that can be reached by radio signals. We all also hope that the members continue to improve their knowledge and skills to become better amateur radio operators with world-class proficiency and integrity.

– Budi Santoso, YE1AR, YBDXPI President
As many of you already know, I have been chasing DX since I was first licensed in 1965. I have also been an active QSL manager since the mid 1970s. I have pretty much seen it all. Let’s look back and then look forward a bit.

Back in the Day …

When I first got licensed, I sent a QSL card to pretty much everybody I worked. It was exciting to collect QSL cards, not only for awards but also to help remember those very special QSOs. Recently, I was asked for a QSL card for a QSO made back in 1969 with my old call, WB2RJJ in Bergenfield, New Jersey. I went into my blank card files and could not locate any of my original WB2RJJ cards from Bergenfield, so I took a long shot and went to Google. I entered “WB2RJJ QSL” and I got a match with the website <www.oldqslcards.com>, which is run by Bob Green, W8JYZ, in North Carolina. I checked on the master file list and voila, there was WB2RJJ listed in Bergenfield! I contacted Bob and he kindly sent me a scan of the card he had in his files. But an added surprise was offered when he went into his “storage files” and located two more of different designs: another card from Bergenfield from 1966, and one more from when I moved to Tuckerton in 1975. He offered to send them to me, asking for a donation to help with his QSL project, which I happily provided. Once I got the cards from Bob, I scanned them myself and used one of the designs to recreate a WB2RJJ QSL card for the fellow requesting the card from 1969. Then, I went into my personal QSL card collection looking for QSLs that I received from the three stations that Bob sent to me. Lo and behold, I had all three. I now have three sets of QSLs representing both ends of the QSOs (see photo for example). Very cool. Bob has a very nice website with a variety of informational links as well as access to the QSL collection list. If you don’t see a particular call that you are looking for, don’t hesitate to drop him an email and he can check his “archives” for you.

In any case, the QSL card was the only way to confirm a QSO for a very long time. It wasn’t until 2003, when the ARRL’s Logbook of the World (LoTW) started, that the way we confirm our QSOs began to change forever. (eQSL actually launched earlier, in 1998, but did not have the widespread impact on QSLing that resulted from the introduction of LoTW. – ed).

QSL!

A Look at QSLing in Today’s World of DXing

*email: <n2oo@comcast.net>

Both sides of QSL cards for both sides of a QSO … On the left is the card — front and back — that Bob (then WB2RJJ) sent to W3KNK back in 1965, as well as Sherd’s card in response on the right. (W3KNK card from N2OO’s QSL collection; WB2RJJ card courtesy <oldqslcards.com>)
LoTW is a double-edged sword. On the one side, it has made QSLing for awards much easier and a bit less expensive. On the other side, it has diminished the use of paper QSL cards. Unfortunately, some folks are no longer using QSL cards and are using LoTW as an excuse to avoid them. I find this to be unfortunate and I beg any of you who have done this to reconsider. The QSL card is NOT just about the awards. It is something that you can touch and see in order to remember a QSO with someone. It is also nostalgia that deserves to be preserved for eternity. I certainly do not expect everyone to send QSL cards to everyone you work like I did back in the 1960s! But, I believe that all hams SHOULD have QSL cards printed so that if anyone does ask for a printed card, you will be able to oblige by providing one of your own in reply. You might also need to send a QSL card in order to confirm something for an award from someone who does not participate in LoTW. If you are an inactive ham, purchasing a small batch of 250 cards might just hold you for a while and would not break the bank. Another option might be to design your own on your computer and print a few at a time on card stock. For those of you who are pretty active, there is a way to design your own QSL card and upload the image to an online printer. I use <www.gotprint.com>. The quality is awesome and the price will surprise you. VERY reasonable. A couple of hints, follow their online guidance. Select the appropriate size 3.5 x 5.5-inch postcard layout and use 14-pt Gloss Cover stock. Set the front for High Gloss UV Coating Front. For the back, do not select high gloss. It will print a non-glossy surface on the back that can be rubber stamped without smearing, or

### The WPX Program

| CW | 4014 | ... | MM3DVZ | 4015 | ... | ON1QX | 4016 | ... | VA3OKG | 4017 | ... | G4BLI | 4018 | ... | DL6NAV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSB | 4360 | ... | N1UZ | 4361 | ... | EA5B | 4362 | ... | KE4DRF | 4363 | ... | QSL Cards | 4364 | ... | KA9WMF | 4365 | ... | N1UZ | 4366 | ... | N3K3D |
| Mixed | 4229 | ... | K1EO | 4230 | ... | W6QF | 4231 | ... | YBQFLY | 4232 | ... | KE4DRF | 4233 | ... | KB1T0 | 4234 | ... | N1UZ | 4235 | ... | N1UZ | 4236 | ... | K2DF | 4237 | ... | OE7BJT | 4238 | ... | N1ECG | 4239 | ... | KW2P |

**CW**: 350 | PG9HF, ON1QX, 400 | G4BLI | 650 | K6UIP | 1500 | W2YR | 8200 | WA2HJR | **SSB**: 350 | NSUED, 400 | KEBKLN | 450 | K6UIP | 500 | N1UZ | 600 | JADEOK | 700 | K3AD | 850 | K7YQJ | 1650 | W2YR |

Mixed: 450 | KE4DRF, KSSQ, K1COC, 500 | K6UIP | 650 | KZDNF, YBQFLY | 600 | OE7BJT | 650 | AEJX | 700 | W2WJD | 750 | K1HJN | KF8L | 800 | W2WJD | 850 | NSIZED | K3AD | 850 | K2S5 | 1050 | K6UIP | 1100 | DK1CMC | 1400 | N5Y5 | 1700 | N1UZ | E85 | 2100 | JR3UIC | NEP | 2350 | ZD9FW | 2600 | W2YR | 4150 | PYSEG | 5450 | ONAPU |

**Digital**: 350 | K6UIP, AB5W, SP4MF, KW2P, HK5FCI | 400 | KE1EO, AB1Q, K1COCA, KE4DRF, OE7BJT, YBQFLY, KSSQ, 600 | DO2MOG, KT4TC, K2DF, 600 | N2TC, JILUX, 650 | NSIZED, AEJX, KA9WMF | 700 | W2WJD | KF8L | OH3PPY | 750 | W2WJD | 800 | DK1CMC | 900 | KBS5 | 1000 | W2YR | JIC1CMC | 1160 | E85 | 1200 | EA5B | 1790 | JR3UIC | 1800 | PYSEG | 2000 | NEP | 2250 | HASPP |

160 Meters: 204 | W2YR, OH3PPY, K2DF, 600, W2WJD |
80 Meters: 205 | K6UIP, W2YR, K2DF, K5QO, E85 |
60 Meters: 305 | NSUY, K6UIP, YBQFLY, PY4ALE, W2YR, KT4TC, JILUX, K2DF, E85 |
30 Meters: 325 | KB25, KA9WMF, W2YR, DK1CMC, W2WJD, E85 |
20 Meters: 275 | NSIZED, K6UIP, W2YR, J1COWC, N1UZ, W2WJD, E85 |
17 Meters: 276 | W2YR, E85 |
10 Meters: 277 | K6UIP, DO2MOG, KA9WMF, W2YR, E85 |
Asia: JF1XXA, YBQFLY, KE8FMJ, JADEOK, W2YR, JS2IYY, JJIC1CMC, OH3PPY, N1UZ, JLZUML, VK4EY, DK1CMC, E85 |
Europe: NSIZED, MM3DVZ, ON1QX, YBQFLY, DO2MOG, IK1TZO, W2YR, G4BLI, DL6NAV, JJIC1CMC, OH3PPY, N1UZ, SW2KY, JILUX, DC1O, OE7BJT, N1ECG, SP4MF, E85, K1COCA |
Oceania: YBQFLY, JADEOK, J1COWC, JILUX, E85 |
North America: NSIZED, K6UIP, PY9F, K1EDRF, W2YR, KA9WMF, KT4TC, K2DF, J1COWC, N1UZ, K2DF, N1ECG, KW2P, K5QO, AASNA, HK5FCI, E85, K1COCA, K3AD |
South America: CE2EP, K6UIP, W2YR, N1UZ, E85 |

**17M Bar**: W2YR

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.

### The WAZ Program

#### Single Band WAZ

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#### Mixed

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#### SSB

| Band | 5509 | DL4TL |

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, KCSKL, 125 Deer Trail, Brandon, MS 30942-9497. The processing fee for all CW awards is $6.00 for subscribers (please include your most recent CO mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to John Bergman. Applicants sending QSL cards to a CO checkpoint or the Award Manager must include return postage. KCSKL may also be reached via e-mail: <kc5k@co-amateur-radio.com>.
Update: Split-Level VHF/UHF Go-Box Plus Base Station

June cover story author Jay Taft, K1EHz, offers this update to his article, “A Split-Level VHF/UHF Go-Box Plus Base Station,” (CQ, June 2021, p. 10)

After using the VHF/UHF go box remotely with Winlink VHF packet on the Raspberry Pi for a number of weeks, I decided the system needs an on-board Windows® computer that can handle all Winlink modes, including Winlink Radio Message Server gateway programs. I looked online at several single-board Windows® computer that can handle all operations. Conveniently, it also runs on 12-volts DC and I was unable to get around this issue with the mobile hotspot built into the Beelink T4. The Beelink T4 and remote access to the go box, I use TeamViewer <www.teamviewer.com>, depending on internet availability and operating conditions.

Jay Taft, K1EHz

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5 Band WAZ

As of April 15, 2021

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Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, John Bergman, KC5LK, 125 Deer Trail, Brandon, MS 30427-8409. The processing fee for the WAZ award is $10.00 for subscribers, $15.00 for nonsubscribers. An endorsement fee of $2.00 for certificates and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to John Bergman. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <kc5lk@cq-amauteur-radio.com>.

*Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).
only lasts as long as the DXpedition is in the news. A QSL card lasts forever. I have looked at QSLs from 40 years ago that show sponsors who are still around today. One thing for sure, an LoTW confirmation will never show this support. Thus, most DXpeditions will focus heavily on providing a paper QSL card, especially in the early QSLing process, in order to support and thank their major sponsors. Often, LoTW will be provided in the early period following the DXpedition ONLY when a QSL card is requested. A full upload to LoTW otherwise could be delayed up to a full year after the DXpedition goes QRT. This is not hard and fast, but it is a reasonable thing to expect. So, there is another reason why QSL cards will continue along for quite a long time to come.

Now, how about those QSL managers? Most QSL managers are hard-working regular hams who are devoted to providing you with an appropriate QSL card for any QSO that they can confirm in the DX station’s log. They provide this valuable service so that the DX station can spend more time on the radio instead of processing QSL cards.

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. 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. 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, Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. Please make all checks payable to the award manager.

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With or without VOX
Excellent large signal performance
Extremely low noise figure
Quality Made in Germany

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ELECRAFT K3 and 1500 watt KPA1500 to an 11 element Log-Periodic and 40 meter Phased array all at 4450’
24/7 Unlimited Operation. Membership $200 a year. (Less than your power bill.)

No Equipment Required,
Just a PC and Internet

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COAXIAL CABLES
Ecoflex® Series
- Low loss & highly flexible
- 5 to 15 mm outer diameter
- PVC & Low Smoke
- Zero Halogen (LSZH)
versions available

SOFTWARE DEFINED RADIO
Perseus – Software Defined Receiver
10 kHz to 40 MHz

ZS-1 Zeus-1 – Software Defined Transceiver
300 kHz to 30 MHz

SSB-Electronic Germany · sales@ssb-electronic.com · www.ssb-electronic.com
SSB Electronic LNA 30 Wideband Preamplifier

SSB Electronic Germany has released the LNA 30, its latest wide-band preamplifier for the 5-kHz to 30-MHz frequency range.

The mast-mounted LNA 30 is built into a UV-resistant, weatherproof mast housing, making the unit ideal for all types of outdoor applications. Signals above 30 MHz are strongly suppressed by a low-pass filter at the input of the amplifier. The MMIC used has a low noise figure with high signal strength. This amplifier can be fed with 12 to 24 volts of power via the UHF socket, which is an N-type connector; or the device can be powered by a 24-volt battery.

The greatest signal strength is achieved with a 24-volt supply and clocks in at 21- / 1.8-dB at 10 MHz, while a 12-volt supply will present the smallest noise figure. Only linear power supplies are recommended for the voltage supply of the LNA 30, since switching power supplies often generate very high interference levels in the low-frequency ranges.

The LNA 30 is available now with a suggested retail price of $217.99. For more information, visit <www.ssb-electronic.com> or email <sales@ssb-electronic.com>.

Most QSL managers do this as a passion. Although they usually require that you provide return funds or an SASE (self-addressed stamped envelope) for direct QSL requests, most will answer bureau cards as well. I can relate, having just shipped out about 75 cards to DX QSL bureaus, which cost me in excess of $600. Add additional costs like card printing, labels, envelopes, postage, incoming bureau expense, rubber stamps, etc., and you can see that it can be costly to all QSL managers for sure. Many now use an online QSL request system (OQRS) such as Club Log which helps. But I can attest that many request QSL requests via OQRS, without any regard for the costs to the QSL manager. If you are requesting a bureau card from a fellow private individual ham in a fairly common DXCC entity, then that is probably all OK. If you are requesting free bureau QSLs from this DXpedition via an OQRS manager, then you SHOULD at least add a donation when checking out. There is usually a place for you to do that but far too many just click past it since it is voluntary. Also, please use an OQRS system if it is available when requesting a bureau QSL. Most QSL managers must pay to receive QSLs from their incoming bureau as well as the cost to ship them out to you. There are so many ways to thank the QSL manager for handling bureau cards, why not take a moment to help out? I must say that there has been background chatter on adding a charge to a QSL bureau OQRS request, especially for a DXpedition. I hope that is not necessary, but fair warning. Think a little when you ask for that bureau card. Especially for a DXpedition QSL card.
Finally, I have always enjoyed keeping a QSL card album for my DXCC logs. It would be pretty hard to do this without all of the QSL cards. I cannot imagine what I would do if a DX station that I needed from a rare location did not print a QSL card. This is where QSL managers will print cards at their own expense. So, for my DXCC cards. It would be pretty hard to do this without help from QSL managers. There are multiple QSL managers who will print cards at their own expense. So, for those who need help with QSL cards.

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**The WPX Honor Roll**

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator’s all-time total. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

**Mixed**

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**Remote Operation**

- **CW**
- **SSB**
- **DIGITAL**

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De N2OO

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**– See ya’ in the Pileups folks!**
CONTESTING
BY TIM SHOPPA, * N3QE

7QP Roving Fun and All About the NAQP

The 7th Call Area QSO Party (7QP) took place May 1 and May 2, 2021 on a busy weekend for state and regional QSO parties. Randy Foltz, K7TQ, and Jay Holcomb, WAØWWW went mobile for the 7QP, activating 24 counties in four states. Jay reports their usual operating pattern as, “we take turns operating for two hours then switch to driving for two hours. That helps break up the day.” Photos A and B show Randy and Jay in the operating seat. “We used N1MM+ on an HP laptop with full rig control,” Randy notes. Photo C shows Randy’s Ford Ranger with a Scorpion 680 antenna mounted in the center. The team used an Elecraft KX2 transceiver with an outboard KXPA100 amplifier to bring the transmit signal up to 100 watts. Randy notes that the 40-meter band was their most productive, with 467 QSOs as compared to only 165 QSOs on 20 meters.

The July and August North American QSO Parties Attract Both New and Experienced Contesters

The North American QSO Parties were my gateway into contesting when I returned to on-air activity in 2008. The 100-watt power limit on all entrants levels the playing field and was a big attraction given my limited station. My first successes CQing during a contest came in the NAQPs. The events only last half a day (starting midday Saturday and Saturday evening), so it was easy to fit a substantial amount of activity into a weekend filled with other family activities. The NAQPs also attract experienced and skilled contesters who enjoy the thrill of operating single-operator-two-radio (SO2R) by interleaving activity simultaneously on two (or more) bands. I learned the basics of contesting in the NAQPs, thanks to the experienced operators and their efficient and friendly on-air exchanges.

This summer, the NAQP RTTY event is Saturday, July 17th. The CW and SSB sessions are on August 7th and 21st, respectively. The National Contest Journal (NCJ) sponsors them and you can find the full rules on its website at https://ncjweb.com/naqp.

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

I will briefly explore the pre-history and growth of the NAQPs, then launch into the valuable propagation knowledge we can learn from this fun on-air activity. Then we’ll look at the way NAQPs build multiple operating skills important in the bigger contests, and finally discuss how contesting clubs have challenged each other to reach new pinnacles in club participation via the NAQP events.

The ARRL CD Parties Were Forerunners of the NAQPs

The CD Parties began in summer 1946. CD stands for “Communication Department” of the ARRL, and appointees of the department and ARRL officials were eligible to work each other on the HF bands for points. ARRL sections (not per band, but per contest, like Sweepstakes) were part of the exchange and served as a multiplier. The other part of the on-air exchange consisted of each participant’s appointed position in the ARRL organization. There were separate Saturday events for CW and phone activity. By 1964, the high CW scores had more than 500 QSOs.

In 1969, the ARRL expanded participation in some CD parties to include all ARRL members. Participation exploded in the “open” version of the CD parties, with the most active operators making over a thousand contacts in just 10 hours of operation.

CD parties continued three times a year — April, January, and October — into 1982. I asked about the very last CD party on the CQ-Contest mailing list and Jim Cain, K1TN, informed me that, “the last ARRL CD Party was April 1982.”

A Simpler Exchange in NAQP Resulted in More Participation

Dave Pruett, K8CC (SK), helped conceive the NAQPs at the 1985 ARRL National Convention in Louisville, Kentucky. Dave explained in a 2003 CQ-Contest thread, “the NAQP was invented to replace the CD parties that the ARRL had just dropped.” The name and state exchange was different from the old CD party exchange that was, “intended to foster QSOs with casual participants,” he explained. The first NAQPs were held on two Saturdays in April 1986, in the phone and CW mode. Like the CD parties, operators could be on the air for up to 10 of the 12 hours.

From 1986 to 1990, the CW and SSB NAQP continued in April. In 1991, the April events were discontinued, replaced by four events a year, two in January and two in August. In July 1996, the summer RTTY session was
added, and the February RTTY event began in 2003. With these additions, the NAQP reached its current slate of six events a year.

The popularity of the NAQPs continues to grow. In January 2021, Marty Sullaway, NN1C, made 1,752 QSOs as a single operator in 10 hours of operation from Massachusetts. Like many east coast stations, Marty’s best hours were right around sunset on the 40-meter band — in particular, he reported 231 QSOs in the hour just after sunset. His competition on the west coast was Dan Craig, N6MJ, who made 1,695 QSOs, with a stunning 316 of them in just the first hour of activity on the 20- and 15-meter bands.

Learn About HF Propagation Through NAQP Participation

In Figure 1, I show band usage over 11 years (a complete solar cycle) of the winter and summer NAQP CW events. For each of the 12 hours in the contest, I used the <reversebeacon.net> archive of skimmer data to count, by band, North American CQ activity picked up by CW skimmers. Winter NAQP CW band usage is shown on the left, and the summer band usage is on the right. The light grey begins when sunset begins for the east coast, and the dark grey band marks when sunset has arrived on the west coast.

The last hour of the contest (0500-0559Z) often has the least activity with fewer stations CQing. Many single-operators operating all 10 hours plan their on-air time so that it runs out shortly after the beginning of this hour.

For the past several years at solar minimum, the 10-meter band has not yielded much activity. From my QTH in Maryland, at the starting bell of the contest I can reliably work three to five surrounding states via ground wave. At solar maximum, the conditions can be significantly better, as can be seen by the noticeable blue (10-meter) activity bars in the activity chart. In the winter-time at solar max, the first two to four hours has the majority of activity on 10 meters. But in the summertime, activity on 10 meters can be more sporadic and occur anytime during daylight.

My most memorable 10-meter opening in a summer NAQP was the August 2014 CW event, near the peak of the last solar maximum. I followed my usual advice of starting at 1800Z with some CQs on 10 meters, and in the first 15 minutes I worked locals in Maryland, Virginia, and West Virginia, as well as several stations in Texas, for four state multipliers on this band. At 2200Z, I took a quick listen to 10 meters for activity and was surprised to hear strong activity from all over the Midwest and southeast. I worked 20 additional U.S. and Canadian multipliers and 76 QSOs in the next hour, all on the 10-meter band.

Contesters use the 15-meter band almost exclusively in the daylight hours. The dark green representing 15-meter activity in the charts is much more pronounced in the 2012-2016 graphs, as the band was more broadly useful during solar maximum. Even outside solar maximum, count on 15 meters for multipliers from the other coast. And especially early in the contest during summer, E-skip on 15 meters can yield some close in multipliers.
## Calendar of Events

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<td>July 7</td>
<td>VHF-UHF FT8 Activity Contest</td>
<td><a href="http://www.ft8activity.eu/index.php/en">www.ft8activity.eu/index.php/en</a></td>
</tr>
<tr>
<td>July 10-11</td>
<td>IARU HF Championship</td>
<td><a href="http://www.arrl.org/iaru-hf-world-championship">www.arrl.org/iaru-hf-world-championship</a> (Featured in this month’s column)</td>
</tr>
<tr>
<td>July 11</td>
<td>QRP ARCI Summer Homebrew Sprint</td>
<td><a href="http://www.qrparci.org/contests">www.qrparci.org/contests</a></td>
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<tr>
<td>July 14</td>
<td>VHF-UHF FT8 Activity Contest</td>
<td><a href="http://www.ft8activity.eu/index.php/en">www.ft8activity.eu/index.php/en</a></td>
</tr>
<tr>
<td>July 14</td>
<td>RSVG 80m Club Championship, SSB</td>
<td><a href="http://bit.ly/3avHbk3">http://bit.ly/3avHbk3</a></td>
</tr>
<tr>
<td>July 17-18</td>
<td>CQWW VHF Contest</td>
<td><a href="http://www.cqww-vhf.com">www.cqww-vhf.com</a> (Featured in this month’s column)</td>
</tr>
<tr>
<td>July 18</td>
<td>CQC Great Colorado Gold Rush</td>
<td><a href="https://tinyurl.com/4dfmmy7">https://tinyurl.com/4dfmmy7</a></td>
</tr>
<tr>
<td>July 18</td>
<td>RSVG International Low Power Contest</td>
<td><a href="http://www.rsgb.org/hf/rules/2021/rqrp.shtml">www.rsgb.org/hf/rules/2021/rqrp.shtml</a></td>
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<td>July 22</td>
<td>RSVG 80m Club Championship, Data</td>
<td><a href="http://bit.ly/3avHbk3">http://bit.ly/3avHbk3</a></td>
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<td>July 24-25</td>
<td>RSVG IOTA Contest</td>
<td><a href="http://www.rsgb.org/hf/rules/2021/riota.shtml">www.rsgb.org/hf/rules/2021/riota.shtml</a></td>
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<td>July 26</td>
<td>RSVG FT4 Contest Series</td>
<td><a href="http://bit.ly/3mCNXXH">http://bit.ly/3mCNXXH</a></td>
</tr>
<tr>
<td>July 31-Aug. 1</td>
<td>Missouri QSO Party</td>
<td><a href="https://tinyurl.com/fnwswwre">https://tinyurl.com/fnwswwre</a></td>
</tr>
<tr>
<td>Aug. 1</td>
<td>SARL HF Phone Contest</td>
<td><a href="http://bit.ly/4H1qQf">http://bit.ly/4H1qQf</a></td>
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<tr>
<td>Aug. 7</td>
<td>FISTS Summer Sprint</td>
<td><a href="http://fistsna.org/operating.html/#prints">http://fistsna.org/operating.html/#prints</a></td>
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<tr>
<td>Aug. 7</td>
<td>WAB 144 MHz Low Power Phone</td>
<td><a href="http://bit.ly/31yE4kT">http://bit.ly/31yE4kT</a></td>
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<tr>
<td>Aug. 7-8</td>
<td>10-10 Int'l Summer Contest SSB</td>
<td><a href="http://bit.ly/1FrFeBc">http://bit.ly/1FrFeBc</a></td>
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<tr>
<td>Aug. 7-8</td>
<td>Batavia FT8 Contest</td>
<td><a href="https://batavia-ft8.com">https://batavia-ft8.com</a></td>
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<tr>
<td>Aug. 8</td>
<td>North American CW QSO Party</td>
<td><a href="http://ncjweb.com/NAQP-Rules.pdf">http://ncjweb.com/NAQP-Rules.pdf</a> (Featured in this month’s column)</td>
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<td>Aug. 14</td>
<td>QRP ARCI European Sprint</td>
<td><a href="http://www.qrparci.org/contests">www.qrparci.org/contests</a></td>
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<tr>
<td>Aug. 14-15</td>
<td>Maryland-DC QSO Party</td>
<td><a href="http://www.w3ypr.org/node/325">www.w3ypr.org/node/325</a></td>
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<td>Aug. 15</td>
<td>FISTS Summer Sprint</td>
<td><a href="http://fistsna.org/operating.html/#prints">http://fistsna.org/operating.html/#prints</a></td>
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<tr>
<td>Aug. 15</td>
<td>NJQRP Skeeter Hunt</td>
<td><a href="https://tinyurl.com/zrkh6e8m">https://tinyurl.com/zrkh6e8m</a></td>
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<tr>
<td>Aug. 21-22</td>
<td>ARRL 10 GHz and Up Contest</td>
<td><a href="http://www.arrl.org/10-ghz-up">www.arrl.org/10-ghz-up</a></td>
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<tr>
<td>Aug. 21-22</td>
<td>CVA DX Contest SSB</td>
<td><a href="http://cvadx.org/registamento">http://cvadx.org/registamento</a></td>
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<tr>
<td>Aug. 21-22</td>
<td>SARTG RTTY Contest</td>
<td><a href="http://www.sartg.com/index.html">www.sartg.com/index.html</a></td>
</tr>
<tr>
<td>Aug. 21-22</td>
<td>KCJ Contest</td>
<td><a href="http://www.kcj-cw.com/e_index.htm">www.kcj-cw.com/e_index.htm</a></td>
</tr>
<tr>
<td>Aug. 22</td>
<td>ARRL Rookie Roundup RTTY</td>
<td><a href="http://www.arrl.org/rookie-roundup">www.arrl.org/rookie-roundup</a></td>
</tr>
<tr>
<td>Aug. 28-29</td>
<td>Hawaii QSO Party</td>
<td><a href="http://hawaiiqsoparty.org">http://hawaiiqsoparty.org</a></td>
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<tr>
<td>Aug. 28-29</td>
<td>Kansas QSO Party</td>
<td><a href="http://www.ksqsparty.org">www.ksqsparty.org</a></td>
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<tr>
<td>Aug. 28-29</td>
<td>YO DX HF Contest</td>
<td><a href="http://www.yodx.ro/en">www.yodx.ro/en</a></td>
</tr>
<tr>
<td>Aug. 28-29</td>
<td>ALARA Contest</td>
<td><a href="http://www.alara.org.au/contests">www.alara.org.au/contests</a></td>
</tr>
<tr>
<td>Aug. 28-29</td>
<td>World Wide Digi DX Contest</td>
<td><a href="https://www-digi.com">https://www-digi.com</a></td>
</tr>
<tr>
<td>Aug. 29</td>
<td>SARL HF CW Contest</td>
<td><a href="http://bit.ly/4H1qQf">http://bit.ly/4H1qQf</a></td>
</tr>
<tr>
<td>Sept. 25-26</td>
<td>CQWW RTTY DX Contest</td>
<td><a href="http://www.cqwwrtty.com">www.cqwwrtty.com</a> (Rules in this issue)</td>
</tr>
</tbody>
</table>
Twenty-meter activity is always heavy during the initial hours of the test. You can see from the data on the left of Figure 1 that in summertime, the 20-meter activity reliably continues even after the sun has set on the continent.

Activity on 40 meters (the yellow activity bars) begins several hours before sunset. Especially in the wintertime, the 40-meter band goes long around sun-down, and if you get to the band too late, you may miss out on many close-in multipliers. In the wintertime, 40-meter action becomes less prominent 4 or 5 hours before the end of the contest. In the summertime, 40 meters is often useful right up to the end of the contest.

In the winter, the two lowest frequency bands — 80 and 160 meters — carry the majority of activity in the final hours. As soon as the sun sets on the east coast, activity starts picking up on 80. Summer action on 80 and 160 meters is less consistent and can be hampered by thunderstorms anywhere on the continent — yet they are important for getting multipliers, and a great way to exercise your skills working stations through QRN.

If Going Full-Time, Read the Fine Print of the Off-Time Rule

Single operators in the NAQPs may operate 10 of the 12 hours, with a minimum of 30-minutes off-time. You might think this means that logging one QSO at 18:30:01 and the next at 19:00:10 would count as sufficient off-time, but that is not how the computer log-checking works. NAQP rule 5.a.iv clarifies, “in order to count as off-time, the difference between the times of consecutive contacts must be greater than or equal to 31 minutes (i.e. 30 intervening minutes, during which no contacts occur),” as seen by the log-checking computer in your Cabrillo log.

In the example above, you have one QSO recorded in your Cabrillo log at 1830z, followed by a second at 1900z. Cabrillo logs do not show seconds, just whole minutes, and the time between the two QSOs is only 29 intervening minutes. To have your off-time count, your first QSO after the gap must be at 1901z or later.

The popular N1MM+ logging program has its “Info” window that can be configured to help you with the detailed off-time accounting. Go to the “Info” window, right click in the off-time counter, choose “Display Off Time (full minutes with no QSOs),” and choose “Current Interval Count Up Timer.” Careful attention to off-time details like this in your NAQP entry is excellent preparation for the world of esoteric and varying band-
Call CQ in the NAQP to Learn New Skills

Have you been almost entirely search-and-pounce in contests? If so, the North American QSO Party is a great place to try calling CQ. First, you have to find your run frequency. The band activity details in Figure 1 tells us there are at least two bands in play at any point in time. For those with simple stations, it often will be easier to find a run frequency in the second most productive band. Look for an unused frequency and give CQing a try.

Keep your CQ short. When things are slow, a CQ consisting of your callsign repeated twice in phonetics, followed by “CQ Contest” or “CQ North America,” works well. When your rate starts picking up, shorten your CQ to include your callsign only once.

When a station replies to your CQ, keep your response short and to the point. No need for “please copy,” just read back his callsign, then your name and state. When done, a simple “Thanks” is all that’s needed to acknowledge the complete QSO.

Have you ever been frustrated because a CQing station wasn’t identifying for a stretch as a series of callers was worked? Now you’re the guy calling CQ and you have the responsibility to frequently identify with your call. Even if your rate is high, be sure to identify after at least every third “Thanks.”

Learn How to Move QSOs and Mults to New Bands in the NAQP

Dave, K8CC, noted in 2003 that, “mults-per-band was a conscious effort to allow little gun stations to get into the strategy of moving mults between bands, like the bigger stations do in DX contests.”

The NAQPs are a prime ground to learn how to ask for a move. As an example: In the last hour of NAQP SSB in August 2020, I worked Todd, NRØP, in Kansas on the 40-meter band. I hadn’t yet worked Kansas on 80 meters, so I asked, “Todd, can we try working on 80 meters?” He said he could do so, so I gave him a frequency of 3.772 MHz — a frequency I had recently vacated — and 40 seconds later we had completed the QSO on 80, a new multiplier for both of us.

A broad awareness of propagation is important, as well as some specific knowledge of conditions at that point in the contest. Is the Midwest getting socked with thunderstorms? If so, moving a needed mult in Iowa to 160 meters might not be successful. Have you heard some loud signals from New England booming in on the 10-meter band? If so, it’s a great time to ask for a move if you need any state up there for a multiplier.

Asking for moves with extreme politeness is most effective. You are asking the other station to go to the effort of changing bands, which may require him to switch to a different antenna, and possibly crank some knobs on his antenna tuner as well. It’s best if you have a target frequency for him to find you on. The politeness comes across best in SSB, but it’s also possible to do on RTTY or CW. For example, asking “PSE QSY TO 28.083” on RTTY politely is one approach. And on CW, asking “PSE 28026” after completing a QSO is a way to ask.

The NAQP Challenge Increased Participation by Three Large Contesting Clubs

In the January 2013 Northern California Contest Club newsletter, Dean Wood, N6DE, noted that his club’s members had, “ranked NAQP in the top 5 of all contests that NCCC should emphasize.” To spur activity, NCCC challenged two other large U.S. contesting clubs, the Potomac Valley Radio Club and the Society of Midwest Contesters, to a club competition across the six NAQPs in 2014 with an interesting twist: Each club would earn points for each event by multiplying the sum of members’ scores by the number of club members on for the event. The three clubs began encouraging members to get on, if even briefly, to run up their participant multiplier, while a smaller number of full-timers at each club ran up the club’s total points for that event. The sum of each club’s points across all six events determined the final result for the year. NCCC won the first event, and in subsequent years both SMC and PVRC have taken possession of the traveling trophy.

In 2016, the administration of the NAQP Challenge passed to Tim Gennett, K9WX. He maintains the NAQP Challenge website at <https://naqpc.org>, where you can find the formal rules and the scoring details, as well as a detailed history of scorekeeping.

By 2017, it was becoming clear that big wins in the first two events — the January CW and SSB — could dominate a club’s points for the entire year. The smaller RTTY events had less weight, and if a clear leader emerged in the January results, clubs were less successful in persuading members to turn out for the summer events.

An interesting twist in the club competition was added in 2017 with the introduction of an “Irish Points” system. Ken Low, K6X3, explained that this innovation would, “keep the competition close all year, so a single big win (like our win in the January 2016 CW event) does not make the rest of the year uninteresting for the other clubs.” He went on to point out that it would, “provide an equal incentive across all three modes,” because the Irish points earned by a top place finish in RTTY club win would count just as much as a top place finish in CW or SSB.

The club challenge issued by NCCC was very successful in boosting on-air participation by the challenged clubs. In 2013, SMC members submitted 247 logs across the six events. By 2020, they had more than doubled their initial participation with 638 logs. PVRC participation increased from 371 logs in 2013 to 677 logs in 2020.

July and August Contest Highlights

In addition to the summer NAQPs, I’d like to highlight three more contests in the months of July and August:

The IARU HF World Championship Contest has activity on both SSB and CW, and uses IARU Zones and Headquarters stations as multipliers per band. Make a point of asking the Headquarters stations what other frequencies they are active on, so you can work them on each band for the multipliers. This contest is on for 24 hours between July 10th and 11th, and full details are at <www.arrl.org/iaru-hf-world-championship>.

The CQ World Wide VHF Contest is on July 17th and 18th. Six- and 2-meter contacts on the digital, CW, and SSB modes count for points. If you are operating on the digital modes and notice good conditions, please consider changing modes to SSB or CW where you can achieve higher rates.

The World Wide Digi DX Contest uses the FT4 and FT8 modes and is 24 hours on the last weekend of August (the 28th and 29th). Multipliers are the 2-character grid fields that are commonly exchanged in these modes. The exchange is compatible with non-contesting users of these digital modes, as long as a grid square is being exchanged. Check out rules and especially the operating tips at <https://ww-digi.com>.
Burning Up the Clouds With NVIS

Quick Look at Current Cycle 25 Conditions:
(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, April 2021: 25
12-month smoothed, October 2020: 12

10.7-cm Flux:
Observed Monthly, April 2021: 75
12-month smoothed, October 2020: 75

ONE YEAR AGO:
(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, April 2020: 3
12-month smoothed, October 2019: 2

10.7-cm Flux:
Observed Monthly, April 2020: 70
12-month smoothed, October 2019: 70

As explained many times in this column, the ionosphere is an essential player in propagating an HF (high frequency; 3-30 MHz, also known as shortwave) radio signal beyond line-of-sight distances between a radio transmitter and a radio receiver. Radio signals in the HF spectrum are bent (actually, a combination of mostly refraction and seldom reflection) by the ionosphere, allowing a signal to skip from one location to another. Like a flashlight’s beam of light, reflected off a wall-mounted mirror in a dark room, you can see the beam arriving and departing the mirror at an angle — a radio wave can be reflected in a similar way off the ionosphere.

When the ionosphere is highly energized by solar activity, higher HF frequencies are refracted. But, when solar activity is low, it is as right now because we’re at the beginning of Solar Cycle 25, the ionosphere is weakly to moderately energized. Only the mid-HF frequencies and lower are being efficiently refracted (as a general rule; even the 10-meter band has openings now, when the 10.7-cm Radio Flux rises –TH). The Technician operator who longs to talk to the world by using SSB on HF is generally cut off from the world (but not from regional coverage). The operator must move down to lower bands to work radio stations around the world.

The 10-meter band is useful for shorter distances because of several common types of propagation. These include, for instance, Sporadic-E (Eₜ). And, if shorter distances are desired on HF communications, there is a technique used to target closer areas, using the F- and E-regions. This is known as Near Vertical Incidence Skywave, or NVIS, and it is highly effective.

NVIS is pronounced as “niv-iss.” Another loving descriptive name for NVIS propagation is cloud burning. This radio propagation mode involves using antennas that radiate most of the radio energy at very high radiation angles, approaching or reaching 90° (straight up at and into the ionosphere), at a frequency below the critical frequency of the ionosphere at the point of entry by that radio wave (that frequency that is just lower than what would punch through the ionosphere rather than be refracted back toward the origin of the radio wave –TH).

Using NVIS, it is possible to establish reliable communications over a radius of approximately 200 miles, give or take 100 miles. This technique is used by military and emergency teams when operating in hilly or mountainous terrain where line-of-sight VHF communications is impossible and no repeaters are available. (I’ve had many private correspondences with military communications personnel located in the Middle East, asking for practical details on the best way to utilize NVIS for tactical comms –TH).

If you’re an amateur radio operator with General or Extra license privileges, and have spent time on 160 or 80 meters...
at night, talking with others within a 300-mile area, you might have thought you were working with ground wave propagation, in which the radio signal hugs the ground as it spreads out away from your antenna. However, the case is quite different.

While I lived in Washington and Montana, very tall mountains were within two miles or less, and nearly all around my station. Using NVIS, I was able to establish communications with stations between 50 and 300 miles as if they were line-of-sight from my antenna. Ground wave was not possible, as I was in a deep valley (well, in one residence, a canyon). I had tried to contact them on frequencies above the critical frequency, like on 20, 15, or 10 meters, with no success. Yet, on frequencies below the critical cutoff, we were able to communicate with reliable signals. This was particularly useful when I was in the U.S. Army MARS.

One way of picturing how NVIS works is to imagine taking a flashlight and aiming its light beam toward a white, reflective wall (or mirror). If you were to shine it straight at the wall at a 90° angle, you would see the light reflected back at you. This is how we discovered the ionosphere’s ever-changing ability to reflect a radio wave at any given frequency. Ionospheric sounding is done by sending pulses of radio waves straight up at the ionosphere, and measuring at what frequency the reflections cease. The highest frequency that is reflected back is the critical frequency at that location.

Now, slowly re-aim the flashlight so that you are angled about 10° to the left. What happens to the reflected light? The beam’s azimuth changes, and the light beam illuminates an area just to your left. The more of an angle used, the farther away from you the reflected light radiates. Let’s call that distance the skip zone. In radio, the same thing happens with a radio wave that is refracted. The angle at which the radio energy arrives at the reflective ionospheric layer dictates how far away the reflection will end up. The greater the angle of incidence of the radiation, the farther the distance the radio signal can be propagated.

One then can see that NVIS is all about reducing the angle of incidence, so that the reflected radio energy returns at locations much closer to the originating antenna, than if we were trying to shoot the radio wave far out to the low horizon so we could work very distant stations.

How do you make an antenna so that it radiates most of its energy toward the overhead sky, rather than out to the low horizon? Part of the answer is in how high above the ground you deploy your antenna. Most NVIS antennas are horizontal in polarization, and kept much lower than the height typically sought when attempting DXing. The closer to the ground that you locate an antenna, the higher the angle of the signal’s main radiation. For this reason, it is common to see a dipole cut for 5 MHz only up at the 8-foot level.

A great introduction to NVIS is found at WB5UDE’s page <www.qsl.net/>.
Sporadic-E Propagation

It is also possible to use the E-region of the ionosphere for HF communications even when the Sun’s activity is low. This region is located about 90-160 kilometers above the Earth. The region’s height varies, as does the density of electrons caused by ionization. All of this depends on solar zenith angle. During daylight hours, the E-region is more energized than during nighttime hours, because the supply of soft X-rays from the Sun is the main source of the region’s ionization. These ionization densities are expected under normal conditions, absent of E_s.

Within the E-region, very thin regions of extremely dense ionization can form. These thin regions become dense enough to refract higher frequencies (typically up to 50 or 60 MHz, and higher on rare occasions) than when there are no extremely dense areas. These E_s areas are known to become so densely ionized that they can strongly refract VHF frequencies, allowing VHF signal reception over greatly extended distances beyond line-of-sight. An example of a VHF opening is when E_s allows you to hear an FM station from several states away.

According to the Space Environmental Services Center (SESC), “E_s is transient, localized patches of relatively high electron density in the E-region of the ionosphere which significantly affect radio wave propagation. E_s can occur during daytime or nighttime, and it varies markedly with latitude. E_s can be associated with thunderstorms, meteor showers, solar activity, and geomagnetic activity.”

While this is the best official definition of E_s, we do not yet fully understand the causes of E_s. Scientists are still pursuing the cause or more likely the multiple causes of E_s. As far back as 1959, 10 distinct types of E_s and at least nine different theories of causation were offered. The classification of distinct types has been retained, but since the 1960s, the wind shear theory has become one of the most accepted theories.

Wind shear occurs when the wind blows at different directions and speeds as you increase elevation. Simply, the wind shear theory holds that gaseous ions in the E-layer are accumulated and concentrated into small, thin, patchy sheets by the combined actions of high-altitude winds and the Earth’s magnetic field. The resulting clouds may attain the required ion density to serve as a reflecting medium for higher HF as well as VHF radio waves. Although most research has confirmed a close association between wind shear and E_s propagation, not all aspects of the E_s phenomenon can be explained, including its diurnal and seasonal variations.

Sporadic-E is mostly a summertime phenomenon, though there is normally some E_s activity during late December and early January. It is well documented that E_s occurs most often in the summer, with a secondary peak in the winter. These peaks are centered very close to the solstices. The winter peak can be characterized as being five to eight times weaker than the summer E_s peak.

What does this mean to the Technician-class amateur radio operator? It means that during the summer E_s season, it is possible to work distances beyond the reach of NVIS-mode propagation. While you might not work a station on the other side of the world on 10 meters, you may well be able to work amateur stations many states away from you. At press-time, there are reports of propagation between mid-U.S. and the Caribbean, on even the amateur 6-meter band.

There are other modes of propagation that occur from time-to-time on 10 meters. We’ll look at some of those in the upcoming issues.

Even now at the beginning of Sunspot Last Year, our members worked thousands of hours for NONO PPAAYY And this year are well on their way to doing EVEN MORE! WHY? Because they are giving back to their communities! They are helping with civic events, motorist assistance AND MORE, yes even emergencies and disasters, if needed!

CONTACT REACT INTERNATIONAL 301-316-2900 Or write to REACT INTERNATIONAL P.O. Box 21064, Dept CQ100 Glendale, CA 91221 RI.HQ@REACTIntl.org
Cycle 25, you can enjoy the world of HF communications this month because of the summer $E_s$ season. And, if you use NVIS as well, you have great opportunity to stay communicating.

**July Propagation**

In the Northern Hemisphere, the long-range F-region propagation of radio waves in the highest shortwave frequencies (HF) will be poor, except on paths running mostly north/south crossing the equator. At the same time, July is generally the month in which $E_s$ ionization is most intense. This should result in a considerable increase in short-skip openings on almost all of the HF amateur bands and on 6 and 2 meters as well.

Twenty meters should continue to be the best band for DX propagation during the month. The band is expected to remain open to one area of the world or another from sunrise through the early evening. Peak conditions are expected for a few hours after local sunrise and again during the late afternoon and early evening, when the band should open in almost all directions. In early afternoon through midnight, expect 20-meter openings first towards South America, then towards the South Pacific, and then Oceania. During the best days of the month (when we have the most sunspots), expect additional paths to open, starting with trans-polar paths into Europe and elsewhere.

Fewer DX openings are expected on 15 meters and very few, if any, on 10 meters during July. This is due to a combination of changing seasonal conditions and the current level of solar activity. During this level of sunspot activity, 15 meters should occasionally open towards the south. Look for some short-skip openings into the Caribbean area and Central America as early as 10 a.m., with a peak expected to all areas of Latin America between 3 and 5 p.m. local daylight time. When conditions are better (more sunspots) the band may also open to Africa during the late afternoon from the eastern half of the country, and to Australasia and the South Pacific area during the late afternoon and early evening from the western half of the U.S. Seventeen meters will act somewhat the same as 15, but openings will tend to be longer, and signals perhaps stronger and more stable.

Don’t expect much DX on the 10- and 12-meter bands during July, except by way of short-skip openings towards the Caribbean and possibly Central America as a result of $E_s$ ionization. If we get a high number of sunspots (or more specifically, when the 10.7-cm radio flux exceeds 85) an occasional opening deeper into South America may be possible, especially during the afternoon hours.

Nighttime openings into many areas of the world are possible on 20, 30, and 40 meters. But seasonally high static levels may often make DX reception difficult on 40 meters. High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast during the hours of darkness. Look for 160 meters to be virtually shut down due to the high static levels of summer. Best bet for 40-, 80-, and 160-meter DX openings is an hour or two before midnight for openings toward the north and east, and just before local sunrise for openings toward the south and west.

**VHF Conditions**

Yes, July is one of the two summer months when we expect hot short-skip, $E_s$ propagation. This is a yearly phenomenon, and many radio hobbyists focus most of their efforts on nothing but $E_s$ activity.

Short-skip $E_s$ propagation over distances ranging between approximately 600 and 1,300 miles is typical on 6 meters, and twice that on 10 meters. Openings may also be possible on 2 meters during periods of intense $E_s$ ionization, with stations up to 1,300 miles away. While $E_s$ openings can take place at just about any time of the day or night, statistics indicate that conditions should peak for a few hours before noon and again during the late afternoon and early evening. During July, you can expect 10- and 6-meter $E_s$ on at least three out of every four days. Openings may last from a few minutes up to several hours.

DX enthusiasts know that during the summer months, FM radio stations between 88 and 108 MHz are regularly propagated long distances via $E_s$ propagation. The first sign that an $E_s$ event is starting is by hearing FM stations from distant cities popping up on the local scene. Some of these stations can come in so strongly as to override a local station, capturing the channel. As the ionization level increases, the FM band becomes filled with signals. During $E_s$ propagation, signals can abruptly appear or disappear. Signals are usually strong, and ordinary rabbit-ear antennas are adequate for reception, and are preferred by some FM DXers because they can be sharply directional.

A number of minor meteor showers are expected during July, but none looks promising for significant meteor-scatter propagation. The best chance for meteor-scatter openings will be during the last week of July, when the δAquariids shower is expected to intensify. It should peak on July 30th, but with only about 16 meteors per hour. Check out <https://tinyurl.com/yebf98y9> for a complete calendar of meteor showers in 2021.

If you use Twitter.com, you can follow <@hfradiospacewx> for hourly updates that include the K-index numbers. You can also check the numbers at <http://SunSpotWatch.com>, where I provide 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 April 2021 is 24.83, a nice bump up from the previous 17.03 in March. The 12-month running smoothed sunspot number centered on October 2020 is 11.5. A smoothed sunspot count of 19, give or take about 7 points, is expected for July 2021. The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 74.74 for April 2021. The 12-month smoothed 10.7-cm flux centered on October 2020 is 75.20. The predicted smoothed 10.7-cm solar flux for July 2021 is 76, give or take 7 points.

Geomagnetic activity this month is expected to vary greatly, from day to day at times. Overall, expect mostly active to minor storm level activity, leading to dismal propagation at times, but yielding consistently good propagation conditions during other periods this month (remember that you can get an up-to-the-day Last-Minute Forecast at <http://SunSpotWatch.com> on the main page).

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may email me, write me a letter, or catch me on the HF amateur bands. If you are on Facebook, check out <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>.

— 73, Tomas, NW7US
Number groups after call letters denote following: Band (A = 1.540 - 1.545 MHz; B = 1.550 - 1.555 MHz; C = 1.560 - 1.565 MHz; D = 1.570 - 1.575 MHz; E = 1.580 - 1.585 MHz; F = 1.590 - 1.595 MHz).

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| *K6DS* | 35.62 | 212 | | |
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| *K6WL* | 55.62 | 178 | | |
| *K6ESRS* | 112.25 | 82 | | |
| *K6XK* | 134.12 | 82 | | |
| *N6GMB* | 9.35 | 97 | | |
| *K6HOF* | 7.46 | 77 | | |
| *AA6GO* | 2.49 | 47 | | |
| *N6TJ* | 2.10 | 44 | | |
| *N6GWM* | 3.44 | 45 | | |
| *K6SGL* | 9.30 | 18 | | |
| *N7SSA* | 21.18 | 6 | | |
| *N7SSB* | 42.94 | 178 | | |
| *K9SSC* | 5.89 | 77 | | |
| *K7CTA* | 3.12 | 55 | | |
| *N8YEU* | 17.16 | 15 | | |
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**Notes:**
- *Grid Ref* refers to the grid reference in the international grid system.
- *Code* indicates any additional codes or designations.
- *Notes* provide further details about the station or its operations.

---

**Additional Information:**
- *Lat* and *Long* are the latitude and longitude coordinates of the station.
- *Grid Ref* is the grid reference in the international grid system.
- *Code* may include additional codes or designations associated with the station.
- *Notes* provide further details about the station or its operations.
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**Notes:**
- All coordinates are approximate.
- Grid squares are based on the World Geodetic System (WGS) 84.
- Details may vary depending on the accuracy of the source data.
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