Wire Antennas: A Primer, p. 50

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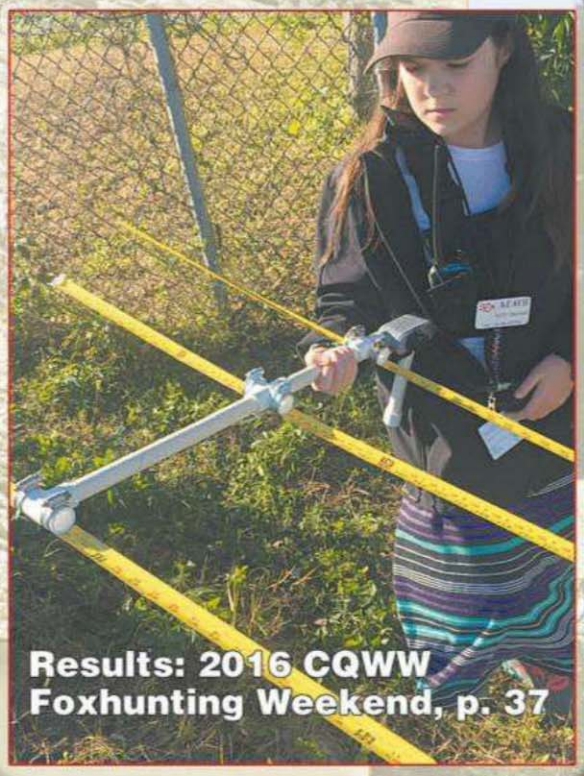
CQ Amateur Radio

COMMUNICATIONS & TECHNOLOGY

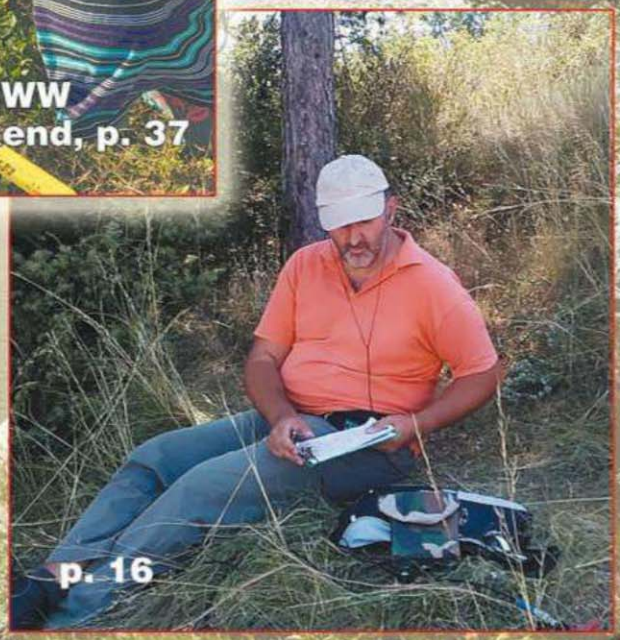
FEBRUARY 2017

QRP Special!



Results: 2016 CQWW Foxhunting Weekend, p. 37

p. 10



p. 16

On the Cover: Low-power ham radio is a great way to take your hobby with you on a variety of outdoor activities. Cover photo details on page 84.

Back To Space

Amateur Radio on the International Space Station (ARISS) is a global group supported by NASA and the space agencies of other countries and groups such as the ARRL, AMSAT-NA, IARU, and Center for the Advancement of Science In Space CASIS).

The ARISS mission is to provide and operate Amateur Radio systems in space aboard the International Space Station, helping inspire, educate and engage youth and communities worldwide in science, technology, engineering and mathematics.

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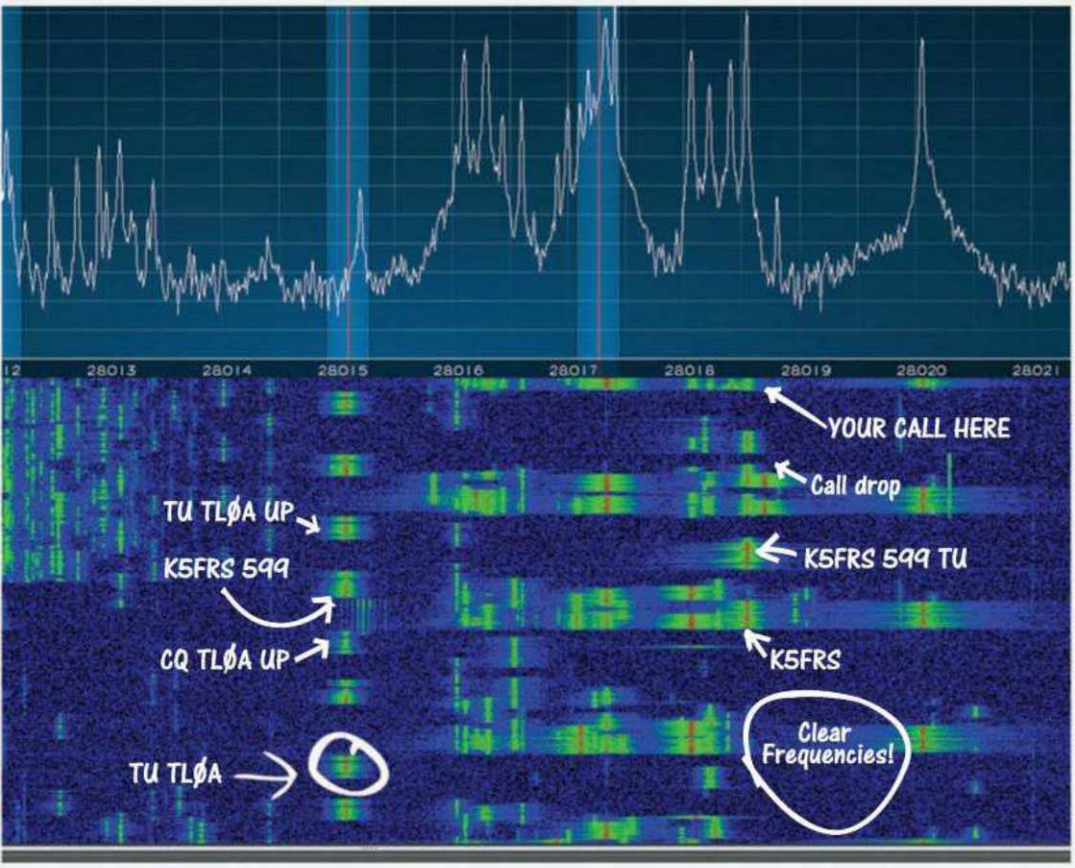

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- Ward Silver, N0AX

"Hit It, Maestro: Using Maestro in a Contest Environment" sidebar, page 57, QST, November 2016

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announcements

FEBRUARY

FORT LAUDERDALE, FLORIDA — The Dade Radio Club of Miami will hold the **2017 Tropical Hamboree** Friday, February 3 and Saturday, February 4 at the War Memorial Auditorium, 800 NE 8th Street. Phone: (305) 590-8523. Email: <tropicalhamboree@gmail.com>. Website: <http://hamboree.org>. Talk-in 147.000 (PL 94.8). VE exams.

NORTH CHARLESTON, SOUTH CAROLINA — The Charleston Amateur Radio Society will hold the **44th Annual and Original Charleston Hamfest, Computer Show** and the **2017 ARRL South Carolina State Convention** Saturday, February 4 at the Armory Park Community Center, 5000 Lackawanna Blvd. Contact: Greg Amirrault, KI4TVA, (843) 469-5305. Email: <carsinfo@wa4usn.org>. Website: <http://wa4usn.org>. Talk-in 146.790-. 146.940- (PL 123), or 147.045+ (PL 103.5). VE exams.

NEGAUNEE, MICHIGAN — The Hiawatha Amateur Radio Association of Marquette County will hold the **HARA Swap and Shop** Saturday, November 4 at the Negaunee Township Community Center. Contact: Fred Mouser, KD8JIP, (906) 662-0106 or (906) 360-3326. Email: <fmouser@gmail.com>. Website: <www.qsl.net/k8lod>. Talk-in 147.27+ (PL 100).

PALM SPRINGS, CALIFORNIA — The Desert Radio Amateur Transmitting Society will hold the **2017 Palm Springs Hamfest** Saturday, February 4 at the Palm Springs Air Museum, 745 North Gene Autry Trail. Website: <http://palmspringshamfest.com>. VE exams.

RICHMOND, VIRGINIA — The Richmond Amateur Telecommunications Society will hold **Frostfest 2017** Saturday, February 4 at the Richmond Raceway Complex, 600 E. Laburnum Ave. Contact: RATS/Frostfest, P.O. Box 14828, Richmond, VA 23221-0828. Website: <http://frostfest.com>. VE exams and DXCC card checking.

ORLANDO, FLORIDA — The Orlando Amateur Radio Club will hold the **Orlando Hamcation 2017** Friday, February 10 through Sunday, February 12 at the Central Florida Fairgrounds and Expo Park, 4603 West Colonial Drive. Contact: 2017 Orlando Hamcation, P.O. Box 574962, Orlando, FL 32857. Phone: (407) 841-0874 or (800) 214-7541. Email: <info@hamcation.com>. Website: <www.hamcation.com>. Talk-in 146.760- or 147.015-. VE exams, special event station, W1AW/4.

YUMA, ARIZONA — The Yuma Amateur Radio Hamfest Organization will hold the **Yuma Hamfest** and **2017 ARRL Arizona Section Convention** Friday, February 17 and Saturday, February 18 at the Yuma County Fairgrounds, 2520 East 32nd Street. Email: <info@yumahamfest.org>. Website: <www.yumahamfest.org>. Talk-in 146.840- (PL 88.5). VE exams, DXCC card checking.

BROOKSVILLE, FLORIDA — The Hernando County Amateur Radio Association will hold the **Brooksville Hamfest** Saturday, February 18 at he Sand Hill Scout Reservation, 11210 Cortez Blvd (Hwy 50). Contact: HCARA, 15430 Waxweed Ave., Spring Hill, FL 34610. Email: <wb4nod@tampabay.rr.com>. Website: <www.hcara.org>. Talk-in 146.715-. VE exams.

BROWNSBURG, INDIANA — The Hendricks County Amateur Radio Society will hold the **6th Annual HCARS Brownsburg Hamfest** Saturday, February 18 at the American Legion Post #331, 636 E. Main Street. Email: <hcars46122@gmail.com>. Website: <www.hcars.org>. Talk-in 147.015+.

MARLBOROUGH, MASSACHUSETTS — The Algonquin Amateur Radio Club will hold its **Amateur Radio Flea Market**, Saturday, February 18 at the Marlborough 1Lt. Charles W. Whitcomb School, 25 Union Street. Contact: Tim Ikelda, KA1OS, (508) 919-6136 (before 9 p.m.). Email: <fleamarket@n1em.org>. Talk-in 147.27+ (PL 146.2). VE exams.

RICKREAL, OREGON — The Salem Repeater Association will hold the **37th Annual Salem Hamfair**, Saturday, February 18 at the Polk County Fairgrounds, 520 S. Pacific Highway West. Contact: Wayne Silver, KE7ANM, (503) 779-6998. Email: <hamfair@w7sra.org>. Talk-in 145.33- (PL 186.2). VE exams.

WORLDWIDE — The Novice Rig Roundup will be held from 0000 UTC Saturday, February 18 through 0000 UTC Monday, February 27. For more information and rules contact: Brian Carling <ah4k@hotmail.com>. Website: <http://novicerigroundup.com>.

BRIGHTON, COLORADO — The Aurora Repeater Association, **Rocky Mountain Ham Radio**, and **Cherry Creek Young Amateur Radio Club** will hold the **ARA Swapfest** Sunday, February 19 at the Adams County Fairgrounds, 9755 Henderson Road. Contact: Wayne Heinen, NØPOH, (303) 699-6335. Email: <info@n0ara.org>. Website: <http://n0ara.org>. Talk-in 147.15+ (PL 100). VE exams.

LIVONIA, MICHIGAN — The Livonia Amateur Radio Club will hold its **46th Annual Swap-N-Shop** Sunday, February 19 at the Civic Park Senior Center, 15218 Farmington Road. Contact: Livonia ARC, P.O. Box 51532, Livonia, MI 48151-0532. Phone: (734) 941-5043. Email: <k8uns@arrl.net>. Website: <www.livoniaarc.com>. Talk-in 145.35 (PL 100).

MANSFIELD, OHIO — **The Intercity Amateur Radio Club Inc**. will hold the **Mid*Winter Hamfest & Computer Show** Sunday, February 19 at the Richland County Fairgrounds, 750 North Home Road. Contact: Danny Bailey, W8DLB, 70 Euclid Street, Shiloh, OH 44878. Phone: (419) 896-2165 (after 3 p.m.). Email: <w8dlb113@gmail.com>. Website: <www.iarc.ws>. Talk-in 146.94 (PL 71.9). VE exams.

ALBEQUERQUE, NEW MEXICO — Rocky Mountain Ham Radio will hold the **2017 New Mexico TechFest** Saturday, February 25 at the New Mexico Veterans' Memorial Event Center, 1100 Louisiana Blvd. SE. Website: <www.rmham.org>.

BIG FLATS, NEW YORK — The K2LIM Contest Group will hold its **Winter Hamfest** Saturday, February 25 at the Big Flats American Legion, 45 Olcott Road S. Phone: (607) 739-7305. Website: <www.ka2lim.com>. VE exams.

LA PORTE, INDIANA — The La Porte County Amateur Radio Club will hold the **Cabin Fever HamFest** Saturday, February 25 at the La Porte Civic Auditorium, 1001 Ridge Street. Contact: LPARC, P.O. Box 148, Michigan City, IN 46361. Phone: (219) 851-2143. Email: <cabinfever-hamfest@gmail.com>. Website: <http://lparc.org>. Talk-in 146.610 (PL 131.8). VE exams.

SARASOTA, FLORIDA — The ARRL West Central Florida Section will hold the **3rd Annual TechCon** Saturday, February 25 at the Sarasota County Red Cross Headquarters, 2001 Cantu Ct. Website: <http://arrlwcf.org>.

ORANGE, TEXAS — The Orange Amateur Radio Club and the **Jefferson County Amateur Radio Club** will hold the **Orange Hamfest 2017** Saturday, February 25 at the Orange County Convention & Expo Center, 11475 FM 1442. Contact: Rocky Wilson (409) 988-8906. Email:

(Continued on page 109)

A publication of

CQ Communications, Inc.
17 West John Street
Hicksville, NY 11801 USA.

CQ Amateur Radio (ISSN 0007-893X) Volume 73, No. 2. Published monthly by CQ Communications, Inc., 17 West John Street, Hicksville, NY 11801, Telephone 516-681-2922. E-mail: cq@cq-amateur-radio.com. Fax 516-681-2926. Web site: www.cq-amateur-radio.com. Periodicals Postage Paid at Hicksville, NY 11801 and at additional mailing offices. Subscription prices (all in U.S. dollars): Domestic-one year $38.95, two years $70.95, three years $102.95; Canada/Mexico-one year $51.95, two years $96.95, three years $138.95: Foreign Air Post-one year $63.95, two years $120.95, three years $177.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government including military services, only on a cash with order basis. Requests for quotations, bids, contracts., etc. will be refused and will not be returned or processed.

Printed in the U.S.A.
POSTMASTER: Send address changes to:
CQ Amateur Radio, 17 W. John Street., Hicksville, NY 11801

Amateur Radio Parity Act Dies in Senate

Despite unanimous passage by the House of Representatives, the objections of a single U.S. senator prevented final Congressional approval of HR 1301, the so-called Amateur Radio Parity Act, which would have directed the FCC to draft rules requiring homeowners' associations to permit amateurs to put up some form of outdoor antenna. The bill passed the House after the ARRL and the Community Associations Institute (CAI), which represents homeowners' associations, agreed on revised language that allowed both groups to support the measure. In the Senate, however, the objections of one member – Sen. Bill Nelson of Florida – prevented the bill from coming to the floor for a vote before the 114th Congress ended in December. According to the ARRL Letter, Nelson considered the CAI's support as "irrelevant," and continued to oppose the bill despite multiple meetings with ARRL representatives and thousands of e-mails, letters and phone calls from constituents. (It is noteworthy that Florida has the nation's second-largest ham population and perhaps the greatest concentration of homeowner association-controlled communities as well.)

The ARRL board of directors was planning to discuss its options for the bill at its January meeting. (Editorial comment: In our view, the ARRL did everything right in its efforts to secure passage of this bill and provide a legal framework for requiring homeowners' associations to permit outdoor amateur antennas. We encourage our readers in Florida to continue putting pressure on Sen. Nelson to drop his objections, presuming that a new version of the bill will be re-introduced in the 115th Congress.)

Rep. Walden (W7EQI) Gains Powerful House Committee Chairmanship

Oregon Representative Greg Walden, W7EQI, is the new chairman of the House Energy and Commerce Committee, one of the most powerful posts on Capitol Hill. As chairman of that committee's Subcommittee on Communications and Technology in the previous Congress, Walden was a strong supporter of HR 1301, the Amateur Radio Parity Act (see previous story) and helped guide it to unanimous passage in the House. According to the ARRL Letter, Walden's elevation to the full committee chairmanship may have been in recognition of his success in protecting the Republican Party's House majority in the last election as chairman of the National Republican Congressional Committee. He defeated two more senior members in a closed-door vote by the House GOP Steering Committee.

Wheeler Steps Down as FCC Chair; Trump to Make Two Appointments

FCC Chairman Tom Wheeler announced his intention in December to resign at the end of President Obama's term in office, allowing President Trump to make two appointments to the 5-member commission, one from each political party, and to designate a new chairman. Both parties must be represented on the commission, with the party controlling the White House having a 3-2 edge in membership. Currently, there are two sitting Republican commissioners – Michael O'Rielly and Ajit Pai – and one Democrat, Mignon Clyburn. Democratic commissioner Jessica Rosenworcel's term expired in 2016 and a vote to confirm her for another term was not taken before the Senate adjourned.

FCC Promises "Aggressive" Amateur Enforcement; Closer Ties with Revamped ARRL OO Program

FCC Special Counsel Laura Smith, who is in charge of enforcement activities for the amateur service, says recent cutbacks in the Commission's Enforcement Bureau will not compromise amateur enforcement. According to the ARRL Letter, Smith told a forum at the Pacificon convention in October that the FCC is already more aggressively policing the ham bands and that she does not anticipate any significant reduction in amateur enforcement after the realignment of the Enforcement Bureau takes effect. She said that a closer working relationship with the ARRL's Official Observer (OO) program will help fill any gaps in staff enforcement efforts. Smith also noted that she is working with the League to completely revamp the OO program to help make Official Observers, according to the Lettter, "the first line of defense in amateur radio enforcement."

FCC Affirms Fine for False Distress Call, Unlicensed Operation on Ham Repeater

The FCC has affirmed the Enforcement Bureau's proposed $23,000 fine against Daniel Delise of Astoria, New York, for transmitting on amateur frequencies without a license and transmitting a false officer-in-distress call on a New York City Police Department radio frequency. Delise had argued that he had no way to pay the fine because he was in prison for the false distress call charges. The Commission didn't buy that argument…

Kennedy Center Honors for WB6ACU and Fellow Eagles

Joe Walsh, WB6ACU, and fellow Eagles band members Don Henley and Timothy B. Schmit were among seven notable artists receiving Kennedy Center Honors recognition in 2016 for their lifetime contributions to American culture. The awards are the nation's highest level of recognition for artists, musicians and actors. Sharing the spotlight with the Eagles at the Washington, DC, ceremony were singer/songwriter James Taylor, singer Martha Staples of the Staples Sisters, actor Al Pacino and pianist Martha Argerich. The ceremony was telecast on CBS on December 27.

Hams Around the World Provide Support in Disasters and Drills

Ham radio emergency communications groups in widely scattered locations were called into action in December. Amateur Radio Emergency Service (ARES) volunteers in Tennessee provided communications for American Red Cross shelters in the wake of evacuations resulting from the wildfires that ravaged the Great Smoky Mountains and popular resort areas, according to the ARRL Letter. On the other side of the country, nearly four dozen hams took part in an interoperability drill sponsored by Region X of the Federal Emergency Management Agency (FEMA), which covers the states of Washington, Oregon, Idaho and Alaska. FEMA's regional emergency communications coordinator, Laura Goudreau, KG7BQR, told the ARRL the exercise was "very successful" and that similar drills would be conducted in 2017.

(Continued on page 94)

VOLUME 73 NUMBER 2

CQ FEBRUARY 2017 CONTENTS

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FEATURES

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Dit ... Dit ... Dit ... Dah... Ten Years of Code-Free Licensing

Ten years ago this month, on February 22, 2007, a volunteer examiner team somewhere in the United States administered the final code test for an FCC amateur radio license. It was the closing act in a long-running drama that played out over the course of more than three decades, with the Greek tragedy-style chorus each time wailing of the imminent death of ham radio.

The drama began in 1974, when the FCC first proposed eliminating the Morse code exam for the Technician Class license. The computer age was dawning, most VHF/UHF activity was on voice and many of those hams and would-be hams who were interested mostly in the "high-tech" of the times felt the code exam was an impediment to growth in the hobby. The amateur community at large strongly opposed the proposal and the FCC backed down. The U.S. had roughly 350,000 licensed amateurs at the time.

Over the next decade-and-a-half, there were more proposals and changes in an effort to increase our ranks and to bring more young people into the hobby (the initial round of baby-boomer "kids" who found a home in ham radio in the 1950s and '60s were beginning to age and grew concerned about competition for technically-oriented young people in the generation that followed). In 1978, Technicians were given Novice HF privileges [they had been limited to 50 MHz and up, despite passing a 5 word-per-minute (WPM) code test and the General Class written exam]. A decade later, Novice Enhancement loosened many of the restrictions on Novices and gave them limited voice privileges on the 10-meter, 220-MHz, and 1296-MHz bands. But there were no changes in code test requirements. At this point, there were just under 430,000 hams in the U.S.[1]

The beginning of the end for code testing came in 1990, when the FCC once again proposed eliminating the code requirement for Technicians. Despite loud opposition, the mood of the broader amateur community had shifted and comments generally favored the FCC proposal. Code tests for Techs rode into the sunset on Valentine's Day, 1991. But the so-called No-Code Techs were given only VHF and UHF privileges. Passing a code test to become a "Tech Plus" licensee was required in order to access those limited HF Novice privileges that Techs had been granted a decade earlier. The amateur radio ranks had grown to just over 530,000 by this point, but hand-wringing continued about the hobby's future and the chorus wailed that eliminating the Technician code test would turn the VHF and UHF ham bands into CB.

Next came license restructuring in 2000, when the FCC stopped issuing new Novice and Advanced Class licenses, did away with the separate Tech and Tech-Plus distinctions and lowered the code test speed for General and Extra from 13 and 20 WPM, respectively, to 5 WPM for both. In 2003, the International Telecommunication Union dropped the worldwide requirement for hams using HF to have passed a code test. No less than 18 petitions were filed with the FCC to do the same, and in 2005, the Commission issued a Notice of Proposed Rule Making to eliminate code tests for all levels of U.S. amateur licenses. The resulting Report and Order — calling code exams "an unnecessary regulatory burden" — was issued in late December 2006 and took effect on February 23, 2007. It also granted "no-code Techs" the HF spectrum segments they'd previously been denied without passing a code test.

The total number of U.S. amateurs at the end of February 2007 was just under 655,500,[2] but had been declining steadily since peaking at nearly 688,000 in April 2003. Once again, there were dire predictions for the fate of amateur radio, and especially for CW as an operating mode. Without a mandatory code test, the chorus sang, CW would wither and die.

Our feeling at the time was, as it is today, that CW as an operating mode has enough benefits to thrive on its own, without the need for forcing people to learn it (especially with the bizarre reasoning that you must learn code in order to operate voice). We also felt that, once learning code was perceived as a challenge rather than an obstacle, and was something that could be done at your own pace, interest would not only hold steady but would possibly grow. One manufacturer of keys and keyers told us a certain percentage of hams embrace code as an operating mode without regard to license requirements, and that that same percentage of a higher total number of hams would be just fine for his business.

So ... where are we ten years down the road? Has the ham population continued to decline? Has CW use on the air declined? Let's take a look at some numbers: About three months after the code tests went away, the ham population started to grow again. It hasn't stopped. As of the end of September 2016 (the latest month for which figures were available when this was written), there were just under 741,000 licensed hams in the U.S., an all-time high. The number represents a 13% net increase since 2007, and we generally get between 25,000 and 30,000 new people joining the hobby each year.

Of even greater interest, though, is growth by license class. Technician Class licenses have kept pace with overall growth, showing a 14% increase in the past 10 years (and remaining at roughly half the total of licensed hams today, as in 2007). However, the number of General Class hams has grown by 31% in the same time period and the number of Extra Class hams has risen by 32%. Clearly, the code test had posed an obstacle to upgrading for many thousands of hams. But now that learning code was optional, how many of those new Generals and Extras would actually do it?

It's hard to quantify day-to-day operation with any accuracy, since what you hear on the bands at any given time may vary depending on a multitude of fac-

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

tors. When I took a listen on a recent morning, I heard a fair amount of CW activity on 40, 30, and 20 meters — about what I'd expect on a weekday morning in December on the downward slope of a sunspot cycle. Much of what I heard was relatively slow-speed code, suggesting that a certain number of hams who did not need to pass a code test to earn their operating privileges continue to take up the challenge to learn and use CW regardless. I regularly hear from newer hams that their goal for the near future is to either learn code or improve their skills.

This broad level of continued/growing interest is enhanced by the growth in the past decade of interest in QRP (low-power operating) and homebrewing/kit-building. CW is the mode of choice for low power because it gets through better than voice under marginal band conditions, and CW transmitters are simpler to build, smaller and less power-hungry than phone rigs, ideal for "in-the-field" operating.

One area in which we do have numbers to take an objective look is contest logs. In 2006, there were roughly 4,600 CW logs submitted for the CQ World Wide DX Contest. In 2016, the number was over 7,300, a 60% increase! For the CQ WPX Contest, there were just under 2,300 CW logs submitted in 2006; just over 4,200 in 2016, an increase of 85%! (Interestingly, this is more representative of a huge increase in overall contest participation than a spike in CW activity — the number of CW logs as a percentage of total logs submitted in each contest has remained steady as overall participation has surged.)

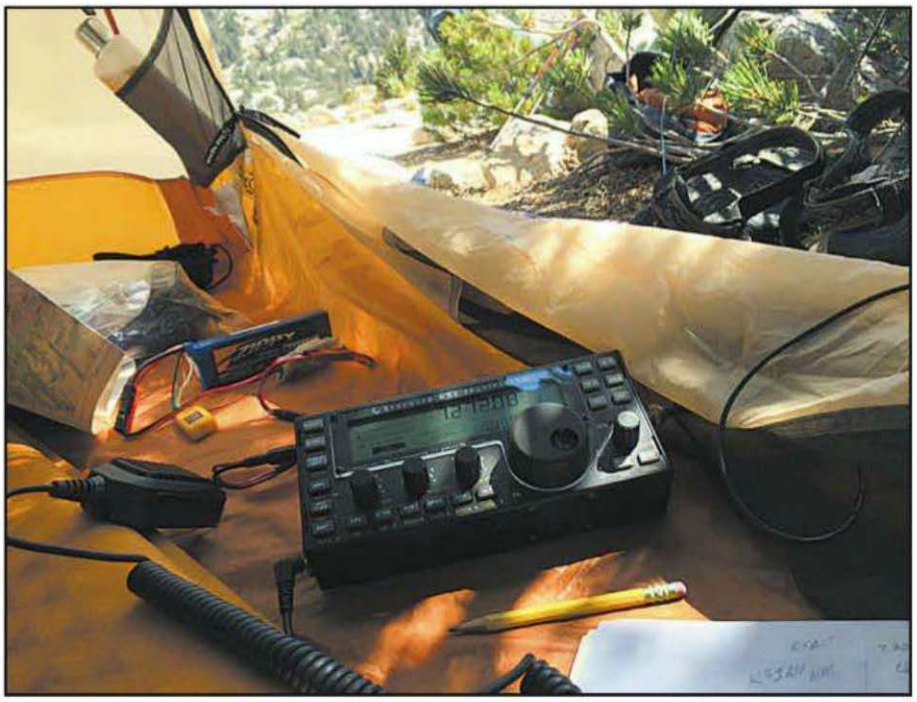
These stats aren't only for CQ contests or hard-core contesters. The number of CW contacts in ARRL's Field Day — which attracts more casual operators than dedicated contesters — increased by 12% over the same time period, and went from 42% of total contacts to 45%.[3]

Bottom line: Ham radio is alive and well, and CW is alive and well, as we enter the second decade of ham licensing that does not require a code exam. Still worried about CW's future? Get on the air (preferably in the General CW subbands), call - . - . - - . - (slowly), and be patient with the newbies who will answer your call. – 73, Rich, W2VU

Notes:

1. 20th century licensing statistics via the W5YI Report
2. 21st century licensing statistics via <ah0a.org>
3. Source: ARRL

Here's one ham's story of joining two passions — backpacking and ham radio — to create an outdoor journey to remember, with many more to look forward to.



A QRP Backpacking Adventure in the High Sierra Wilderness

BY MARK WEIDINGER,* K6MTS

The first time I saw the breathtaking Sierra Nevada mountains, I was awestruck at their immense, precipitous peaks, displaying a raw beauty I had never before witnessed. It was the summer of 1976, driving up Highway 395 through the Owens Valley of California. My oldest brother, Bob, was taking a group of us into the Sierra wilderness for my first backpacking trip ever, and it was then that my unconditional love for the mountains was born.

The range covers some 400 miles, with the crest being comprised of 12 peaks in excess of 14,000 feet that dominate the western skies for 60 miles between the towns of Bishop and Lone Pine, California. The apex of the Sierra Nevada is commanded by the spectacular Mt. Whitney, which overshadows the town of Lone Pine, and at a staggering 14,505 feet, it is the highest mountain in the contiguous United States.

Now, 40 years after that first trip, I still get goosebumps when the majestic Sierra Nevada comes into view. My pas-

Photo A. The author on his annual backpacking trip in the Sierra Nevada. In 2015, for the first time, he brought along QRP ham gear and made contacts at each stop.

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Photo B. K6MTS's portable ham shack included two radios, batteries, antennas, and accessories.

sion for venturing into the wilderness, while traveling for days through some of the most rugged and scenic areas in the world, carrying everything needed to survive on my back, has never been stronger.

Longt'me Listener

Before discovering the Sierra, my fascination for radio was ignited as a youngster lying in bed at night with my little transistor radio and an earphone. Hearing those AM broadcast signals late at night from cities hundreds of miles away was a magical phenomenon that still fascinates me to this day. Even though I was touched by that spark for radio so many decades ago, ham radio did not become a part of my life until late 2012. Now, amateur radio is my favorite hobby and I continue to be fascinated by the HF bands in particular. I'm still amazed that we can make contacts with stations as distant as the other side of the world using nothing more than a transceiver and a piece of wire.

Apples and Oranges, or Fruit Salad?

In late August 2015, I combined my love of backpacking with my re-born fascination with radio by piecing together a portable low-power station and bringing it on my annual Sierra backpacking trip (Photo A). The idea of backcountry travel with the goal of getting away from the crowds and the fast paced, technology-reliant world we live in, and melding that concept with the electronic world of radio and its goal of communicating with others, creates an interesting dichotomy. Somehow, though, these seemingly opposing goals not only fit and work together in unison, but they have produced a nexus that has only further reinforced my love for both of these pursuits.

More From Less

Like the lightweight gear available for backpacking, amateur radio also offers many lightweight and compact rigs built with the backpacker in mind. One such unit is the Elecraft KX3, which is a very compact, lightweight HF/6-meter all-mode QRP transceiver. While equipped with many advanced features, it is a simple rig to run, and mastery of the many options is not required in order to successfully operate it.

I chose to carry high-capacity Lithium Polymer (LiPo) batteries that are much smaller, more efficient, and much lighter than a typical sealed lead acid battery (SLAB). For example, a 4-Ah, 14.8-volt LiPo weighs in at just 11.5 oz., whereas a 4-Ah, 12-volt SLAB can weigh 3.5 pounds or more. It should

Photo C. All the ham gear, along with essentials for five days in the backcountry, fit into or onto this backpack.

be pointed out that LiPos do require extra attention for safe charging and transporting. They also cost a bit more than SLABs, but given the power and weight benefits, I believe they are well worth the added expense.

The 3.5-ounce LNR Precision Par EndFedZ 10/20/40-meter antenna was used for all contacts on this trip, and even though HF propagation was quite poor during my journey (as well as before and after), it proved to work well. With the planned trip being at elevations near and above 11,000 feet, I knew there would be few trees from which to hang an antenna. So I brought along a lightweight telescoping Crappie pole along with three additional sections which, when assembled, created a 26-foot mast. Supporting the mast with three short guys, or strapping the mast to a shorter tree when available, allowed me to set up the antenna in the sloper position.

Photo D. First stop was magnificent Piute Lake, at nearly 11,000 feet above sea level.

Photo E. A whitebark pine served as an antenna support at the author's Piute Lake camping area.

Being my first QRP backpacking attempt and not wanting my communications to be cut short due to equipment failure, ham gear redundancy was in order for the 5-day trek. I carried two each of the following: Wire antenna, fused power cable, mini V regulator (used until the LiPo dropped below 15 volts), mini V meter, LiPo battery, and a length of RG-174 (Photo B). The load was a bit heavier than usual, but despite the objections of my shoulders and knees, my faithful old-school Dana Alpine pack (Photo C) easily accommodated the additional cargo.

The Objective

Typically, a journey like this has some basic goals, but throwing in the extra weight and self-imposed obligation to employ the radio gear added a level of uncertainty to what the primary objective of this trip should be. Did I want to reach the most scenic destinations and make at least one contact a day? Or did I want to make the most contacts possible during the trip? Do I really want to bring all this ham stuff? My wife, Frieda, put my mind at ease when she pointed out that quantity is not the objective. The objective was about me getting out and enjoying nature and being where I love to be, and having fun with my new QRP gear. Just enjoy both and have fun, she wisely suggested, and don't worry about the pace. Smart woman.

The Route

The out-and-back route I chose to trek is located approximately 20 miles west of Bishop, California. It began at North Lake (9,362-foot elevation), headed west into the John Muir Wilderness Area, up past Loch Leven Lake (10,743-foot elevation), past Piute Lake (10,958-foot elevation), over Piute Pass (11,423-foot elevaton) to Desolation Lake (11,375-foot elevation), and back via the same route. I hiked in on a Monday afternoon in August 2015, and back out on Friday the same week.

Can You Hear Me Now?

After many hours of working my way up the scenic canyon from North Lake, I arrived at the stunning Piute Lake late Monday afternoon (Photo D). I was exhausted from the high elevation, being out of shape, having too much

Photo F. On the air from Piute Lake with the KX3 and Lithium Polymer batteries. The author was able to make SSB contacts from here with hams in several states.

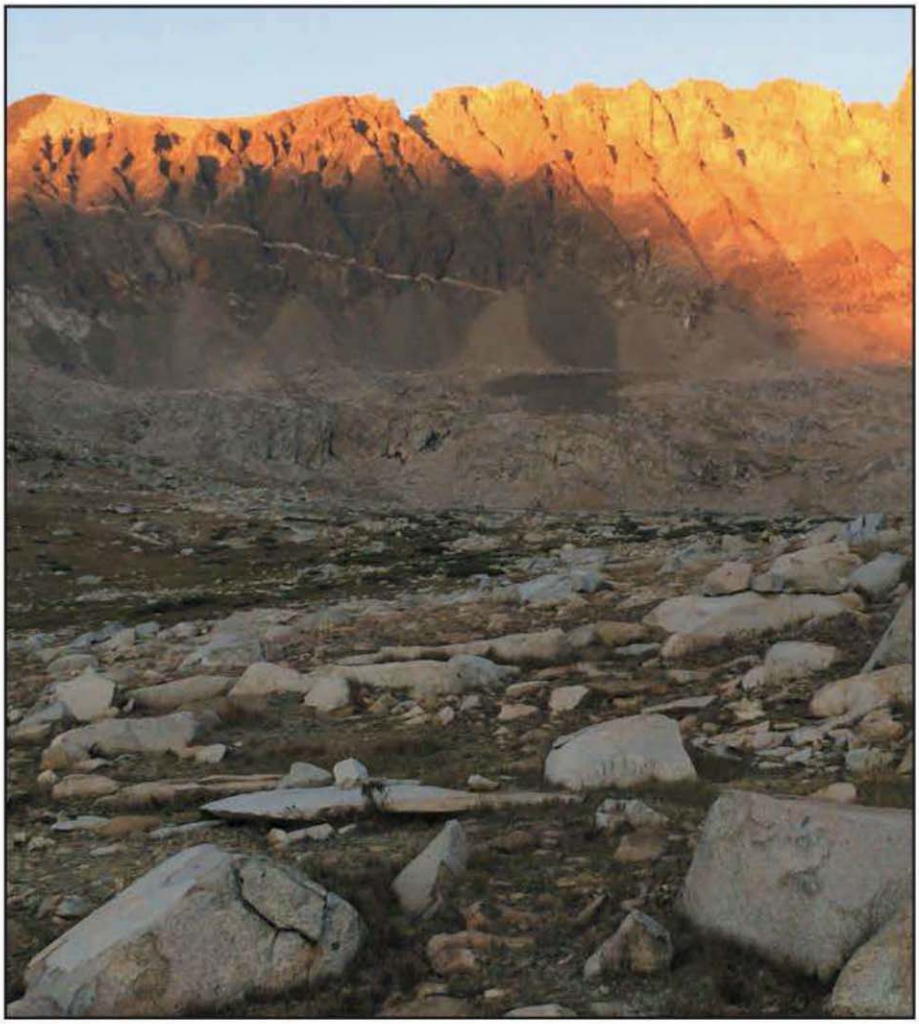

Photo G. The massive Mt. Humphries was the author's constant companion as he made his way from Piute Lake to Desolation Lake on the middle day of his trip.

stuff in the pack, and not having enough sleep the night before. (The summer of 2015 was a time when multiple wildfires were occurring throughout the west. My plan to take a scenic drive from my home northeast of Fresno eastward through Yosemite was altered three-quarters of the way through due to the outbreak of the Walker fire. The untimely closing of Highway 120 due to the fire added an additional six hours to my "scenic drive.")

After setting up camp at North Lake, I strapped the telescoping mast to a nearby whitebark pine (Photo E), and managed to get the rest of the station set up before sundown (Photo F). I was hearing some stations, and most did not hear my call, but after about half an hour I made a 57 contact with Russ, AI6GV, in San Marcos, California. YES! My first low-power portable contact with nothing more than this tiny transceiver, a battery, and a wire that I had hiked in to this beautiful location miles from civilization. This is so cool, I thought…and soon was fast asleep in my cozy tent.

The following day, I had successful contacts with multiple stations on 20, 40, and 80 meters in California, Texas, and Oregon. I want to especially thank Brent, K5EDI, in Texas, as he was determined to make contact with me on 20 meters that evening. After numerous tries, he was finally able to give me a 52 report (I had him 55). This was quickly followed by a 55 contact with Jack, K1HW, also in Texas. Brent's patience in working to make the contact was huge, as QRP is quite the challenge, especially with poor conditions and a compromise antenna. Understandably, some operators do not want to be bothered with sometimes difficult to copy QRP stations. But the next time you hear a QRP station down near your noise level, know that your efforts to make the contact will be very much appreciated.

More Views and More Contacts

On Wednesday, I broke camp and trudged my way up the hot, switchback-laden trail that led to Piute Pass. I was out of breath when I got to the pass, but was treated to incredible views of the Glacier Divide, Humphrey's Basin, and Piute Canyon. Heading north with the massive Mt. Humphries always in view (Photo G), I eventually arrived at windy, exposed and aptly-named Desolation Lake. Once all was battened down to survive the winds, I set up the mast using simple guy lines held in place with some stakes and rocks (Photo H), and was quickly ready for more QSOs (Photo I). There were numerous contacts made with stations in California as well as Nevada, and to top it off, there was an easy contact with Mark, WH7W, in Hawaii. That contact was a 55 and the longest-distance contact of the trip. WooHoo! Aloha, Mark!

Thursday came much too soon, but as I headed out from Desolation Lake, I was soon greeted with spectacular views of the enormous granite wall known as the Glacier Divide (Photo J), which is oriented in an east-west position and forms the northern boundary of Kings Canyon National Park. Continuing back over Piute Pass, I eventually arrived at my final campsite of the journey, perched above the inlet to Loch Leven Lake. It had a nice bench with excellent views, and small stands of stout limber pines to help fend off the wind. Struggling a bit with the windy conditions, I raised the mast for the last time and again made a comfortable camp for relaxing and playing radio, (Photos K and L). I made just three contacts that

Photo H. No trees for support at Desolation Lake. The antenna was held up with the help of three guys held down by rocks.

Photo I. The KX3 in action at Desolation Lake. The author got his best DX of the trip from here — a contact with a station in Hawaii!

Photo J. The Glacier Divide runs east-west in an otherwise north-south mountain range, and forms the northern boundary of Kings Canyon National Park.

afternoon, but one was a strong 58 with Jerry, K5RCS, in Texas, and I also had fun just being an SWL again.

The final day, Friday, was a leisurely morning that included a contact with Harvey, WØHLC, in Western Colorado (I had him 59, he had me just 51), and a 57 contact with Phil, W6YLD, in California. Sadly, it was time to go and, once packed up, I had an easy hike back down to the parking lot at North Lake.

Final Thoughts

This was a fantastic journey! I'm so glad I brought the ham gear, and thrilled I was able to make contacts with some great hams. I learned a lot about setting up and operating QRP portable, and I can't wait for the next trip. Thanks very much to all the stations who took the time to come back to me. It really made all the challenges to overcome with portable QRP more than worth the effort, and it was a very rewarding experience. If you have ever thought about doing a trip like this or just thought about setting up portable QRP in your yard or at the park, I highly recommend you give it a shot. I can assure you it will be both a challenge and an incredibly thrilling feel when you make those contacts.

Photo K. A limber pine tree supported the antenna and provided a wind-break at the author's final campsite, over looking Loch Leven Lake.

Photo L. On the air from Loch Leven Lake. A few more contacts and some SWLing wrapped up the author's five-day QRP backpacking adventure.

Advance planning and a "grab and go" mindset can help you turn nearly any outing into an opportunity for portable low-power operating, according to roving QRPer Z35M.

Guerilla QRP Portable

Ultra-Light Style for More Agility and Flexibility in Portable Activations

BY VLADIMIR KOVACESKI,* Z35M

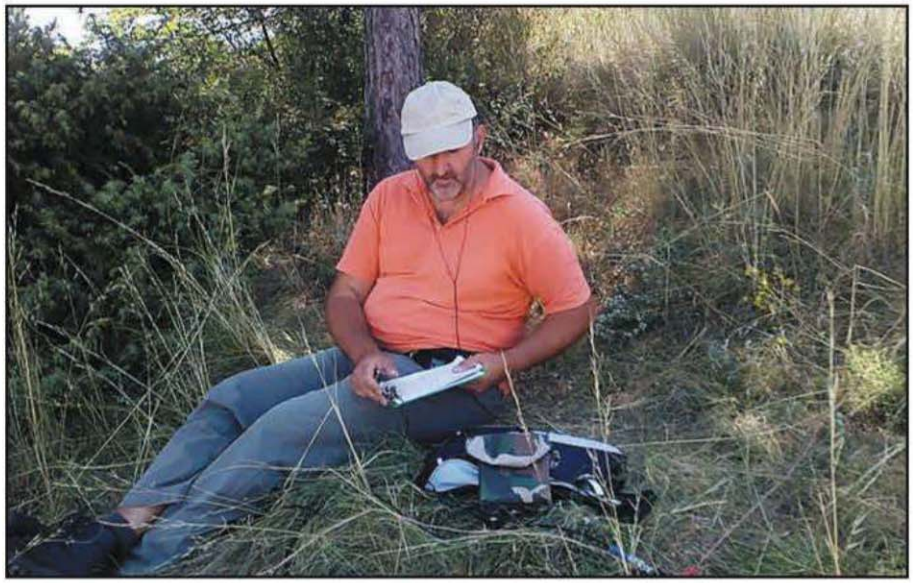

Photo A. Z35M on a "guerilla QRP" activation, sitting on the ground and using a tree limb to support a vertical wire antenna.

The well-known QRP adage: "Do more with less power," goes together naturally with: "Do more with smaller and lighter equipment." This is especially important for QRP portable activations (Photo A). QRP portable enthusiasts tend to take a minimalist approach to every aspect of their activity while at the same time maximizing their enjoyment. Balancing between portability and efficiency is a never-ending process. If someone wants to make their own QRP portable outings an everyday routine, then assembling a small and ultra-light station is indispensable in order to achieve more agility and flexibility.

Portable Station Setup

The portable station setup has to be fast and easy to prepare before the planned outing (Photo B), or even better, to be ready anytime in a small backpack (Photo C). It must be small enough and light enough that the operator doesn't hesitate to take it, even on a casual outing, just in case an opportunity appears for a short activation. Setting up and disassembling such station in the field (Photo D) has to be a matter of no more than 5 to 10 minutes.

The station setup has to be flexible for various types of portable activations and different kinds of transportation to the operating position, including non-motorized access by foot, bicycle, boat, kayak, etc.

Guerilla QRP Portable

The "Guerilla QRP Portable" ultra-light style aims to minimize the weight of all radio equipment (radio, antenna, antenna support, antenna tuner, power supply, cables, key, mike, head phones, accessories for logging, ropes, etc.)[1] to 1-2 kilograms or less (under 5 pounds), allowing the operator to bring all equipment to the field by non-motorized means; to have a 100% "green" activation, using an autonomous power supply, but no fossil fuel; to use objects found on the field as antenna supports, and to encourage outdoor activations using natural shelters and minimizing the need for operator comfort devices.

Radio Choices

Are you ready to leave the comfort of your home and have a lot of real QRP outdoor adventures? The first step is to obtain a small-sized and lightweight QRP transceiver with low battery consumption on both receive and transmit (<150 mA on RX; <1 A on TX at 5 watts). Operators who use only CW have an advantage here over those who like to use phone or digital modes. Single-band, CW-only transceivers are more likely to be lighter and more compact than multiband and/or multimode rigs, although there is a wide range of multiband and multimode portable transceivers on the market today. The smallest and lightest multiband/multimode transceiver available today is the Elecraft KX-2 (370 grams/13 ounces).

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Photo B. It's best to have your guerilla QRP portable equipment ready to travel before you plan a portable operation. That way, you can turn just about any outing into an opportunity to make a few contacts.

Photo C. The author's complete HF portable station fits into this backpack, which he often uses while traveling to an activation by bicycle.

There are more CW-only multiband QRP transceivers suitable for ultra-light portable such as the MTR-3B (125 grams/4.4 oz) which covers three bands at 2.5 watts; MTR-5B (180 grams /6.3 oz); KX-1 (255 grams /9 oz), HB-1B (395 grams /14 oz), or the even "heavier" K1 (610 grams /1 lb, 5.5 oz) or KX-3 (700 grams /1 lb, 8.7 oz), etc. The operator on the other side of the QSO can't notice the signal strength difference between 5 watts going out from a "tuna can" homemade transceiver or from a heavier commercially-made portable transceiver with the power reduced to QRP level. A light-weight paddle or key and ear buds instead of heavier earphones are also needed.

Power

Battery selection depends on the power consumption of the transceiver, the operating style and duration of intended on-air activity. The "Guerrilla QRP Portable" operation is usually a short activation that rarely lasts longer than one hour. Go for the battery with the minimum weight and size which matches your intended activation. The weight of the battery is recommended to be under 300 grams/10 ounces.

Antennas

Whenever possible, use resonant antennas which are simple, lightweight, and easy to erect without complex assembly and tuning. If only one band

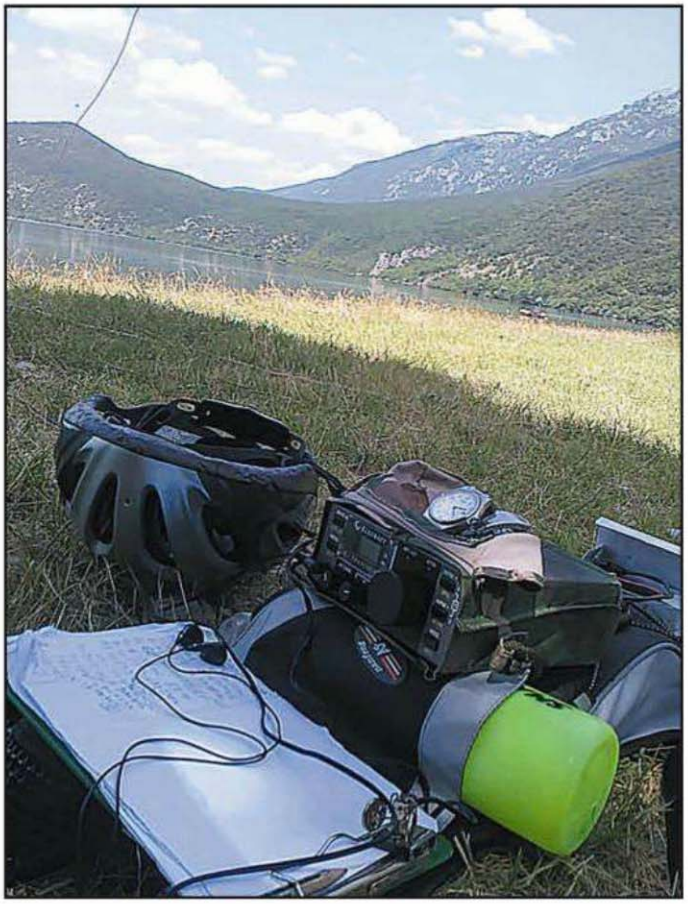

Photo D. Z35M's portable station, ready to be set up in the field.

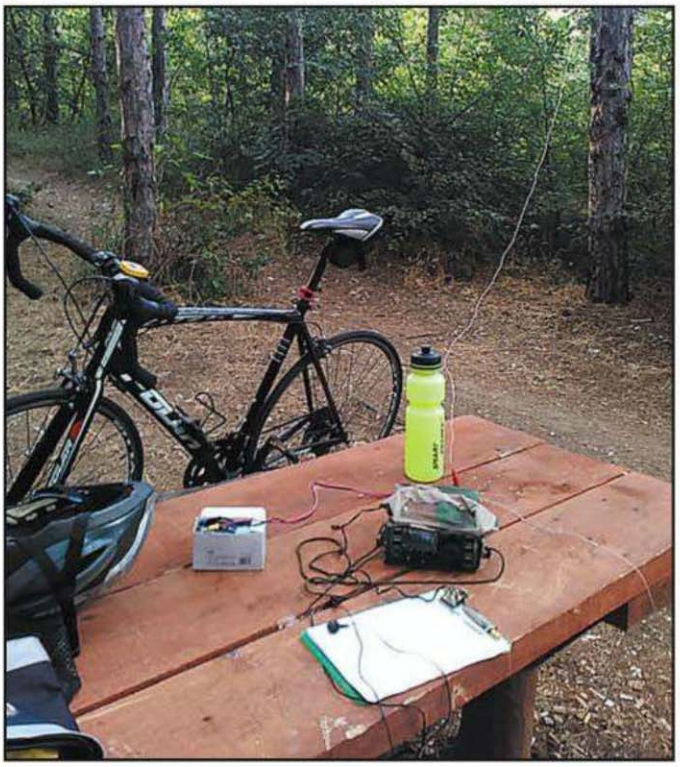

Photo E. A picnic table and some trees for antenna supports add a little comfort to a guerilla QRP operation, as opposed to the author's "sitting on the ground" setup in Photo A.

is used, the antenna selection is easier. Multiband activations need antennas resonant on more than one band or an antenna tuner, which adds to the weight and size of the equipment. If you need to use an antenna tuner, the best option is one integrated into the same box as the transceiver.

Antennas made of thin wire are lighter than those made of aluminum tubing and those with integrated traps. Antennas with small parts or those which need using tools for assembling and tuning are not a good option. If you can't avoid using coax, then go for shorter runs of thinner line. The recommended weight of the antenna with feedline is up to 300 grams/10 ounces.

Antenna Supports

Do we need to carry an antenna support, or are there antenna supports everywhere around us?

The best option for antenna support structures are those found in the area where you'll be operating. If you are going somewhere with a lot of trees or other types of tall vegetation, they can be used to support a variety of wire antennas (Photo E). Higher rocks, mounds, walls, vineyard poles, fences, old bridges or other infrastructure in the field can also be used (Photo F). Some whip antennas can be directly mounted on the transceiver's cabinet. In the areas without suitable antenna supports, a light-weight fiberglass pole is a good option (a 5-meter/16-foot pole weights around 500 grams/1 lb, 1.6 oz).

Logging Programs

Can we leave the laptop at home and do our logging with a pencil on a piece of paper?

Old-fashioned paper logging is recommended for ultra-light QRP activations. Computer or smartphone logging adds to the complexity, weight, and size of the equipment. The number of contacts usually is not too high for writing all of them down with a pencil and later entering them into your computer-logging program at home.

A Different Sort of Log

Do you need a picnic table and chair for short activations in the wilderness? Sitting on a log or even on the ground is acceptable for brief portable activations, especially in remote locations with no motorized access. In a good weather conditions, you also don't need any kind of shelter.

Technical Considerations

Be practical! If you have an opportunity only for a short activation, then check the propagation right before the planned outing and choose only one band on which to operate. This is especially advisable when the outing is not solely devoted to amateur radio activities and the activation will be implemented only if time and circumstances permit.

While in the field, we really don't need to bring all the measurement instruments from our home radio shacks. We can surely "survive" without knowing the exact SWR of our chosen antenna. If our portable QRP station works well from the start, then enjoy making contacts and don't look back to adjust the SWR from, say, 1.3:1 to 1:1 because the stations on the receiving end will not notice any difference in your signal strength. It makes no sense if the assembly and setup of the portable station takes much more time than on-the-air activity. More perfectionism results in fewer QSOs.

Avoid heavy suitcases and consoles for your equipment, or "grab and go stations" bigger and heavier than the average ham's base station.

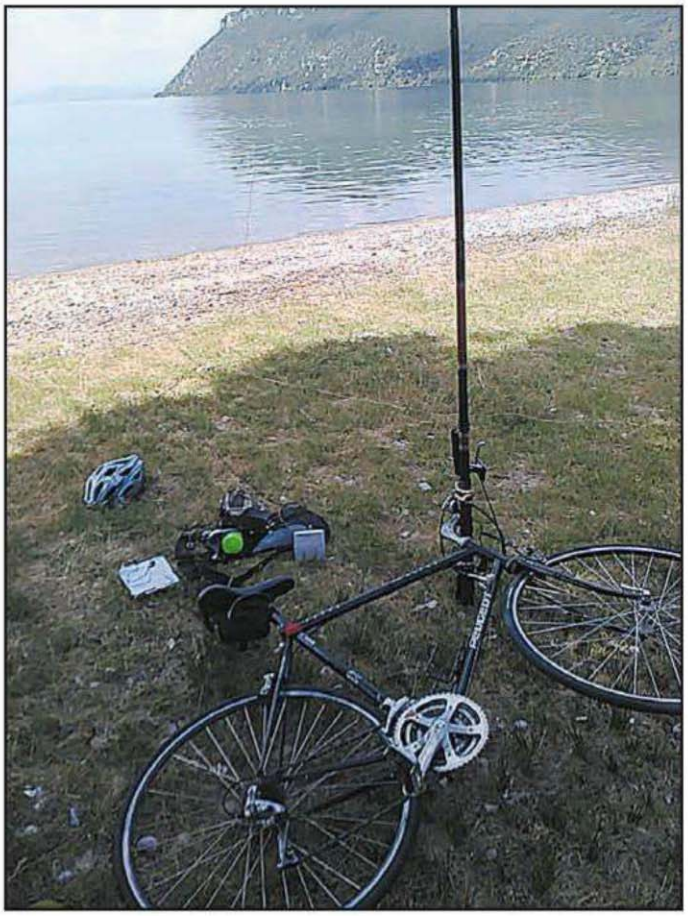

Photo F. Be creative in finding antenna supports where you can. Here, the handlebars of the author's bicycle are holding up a fishing rod vertical.

Finally, the number of contacts can be significantly increased if you announce in advance or while operating if your operating location is in an area that is valid for some operating award such as WWFF, IOTA, SOTA, lighthouses, castles, etc.

Give it a Try!

In the last 8 years, I have very successfully implemented this style of operating in close to 400 QRP portable activations from almost anywhere and can assure you that this works[2]. This approach is really very flexible and is a ticket for a lot of QRP outings. So go guerilla…make your QRP portable station really portable and use it at every opportunity.

Notes:

1. The author's portable station: Elecraft K1 (610 grams), 1.30Ah, 12-Volt battery (500 grams), 14-MHz wire vertical with four ground radials, center insulator and 2 meters of RG-58 coax (270 grams), Bull Dog mini paddle (30 grams), 4.5-meter fishing rod (450 grams), paper logging device (70 grams), tiny ropes (20 grams), rubber clamps (70 grams), totaling just over of 2 kilograms/4.5 pounds.
2. You can see my previous articles related to this topic: "Flight of the QRP Bird ... or the Freedom of QRP" in CQ Amateur Radio, June 2012, and "Bicycle QRP Mini DXpedition to Albania" in CQ Amateur Radio, June 2016.

What's a dedicated QRPer to do when the sunspot cycle is less than cooperative … a situation some experts predict may be with us for many years to come? Past CQ QRP Editor W4DNN has a suggestion (plus a mini-review that kind of tips his hand on what he's about to suggest).

GAB: A QRP Paradigm for the Coming Sunspot Minimum

Plus: A CQ Mini-Review of the RM Italy HLA-305V Amplifier

BY DENNIS LAZAR,* W4DNN

For the QRP purist, this article may seem like an exercise in sacrilege; a sellout to the siren song of the higher powers (anything more than five watts). But don't be too quick to judge.

I am one of the many ham radio elders who have lived through the glory days of historic sunspot maximums. Those were the days you may have heard about from old codgers sitting around drinking coffee after a club meeting, regaling the young-uns with tales of times gone by in which a half watt and a paper clip could literally "work the world." Solar Cycle 19, at its peak in March 1958, boasted a monthly SSN (smoothed sunspot number) of 201.3! (By comparison, NASA says current Cycle 24 peaked in 2014 at an SSN of 116.4 – ed.)

But we've also seen our share of solar minima during which running 100 watts was often as challenging as operating QRP. These were times when the bands seemed to be dead forever. Now, solar scientists tell us that we are well into the downward spiral toward the end of Cycle 24. But this time, there is little hope for a rebound to levels of solar activity anything like what we have experienced in the past.

According to some NASA scientists, our future could well resemble the "Maunder Minimum." This was a 70-year period from 1645 to 1715 in which sunspots disappeared entirely. In the ensuing "Little Ice Age," England's Thames River froze over in summer. Another, less intense, ice age-like period, the Dalton Minimum, arrived in 1790 and lasted until 1830. Now, many scientists are predicting a 50-year minimum in our future, possibly beginning with Solar Cycle 25 (see Figure 1).

QRP Without Sunspots

In practical, operational terms, it means that while the challenge of making contacts using QRP power levels remains,

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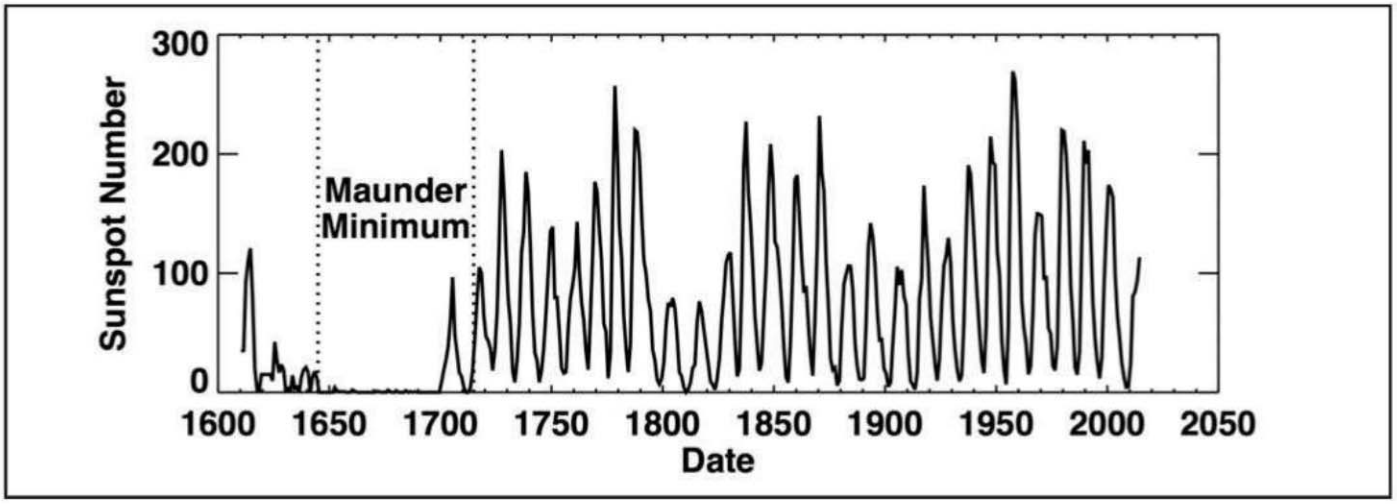


Figure 1. This NASA chart illustrates the 70-year zero-sunspot Maunder Minimum. The Dalton Minimum from 1790 to 1830 presented a low level of sunspot activity for 40 years.

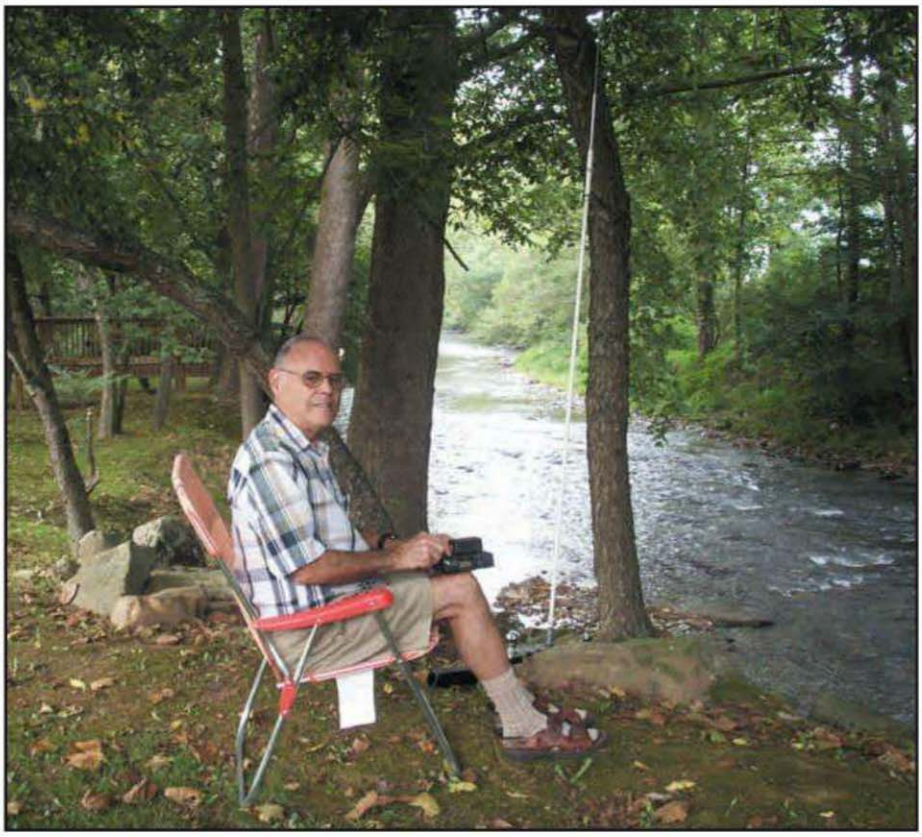


Photo A. When operating QRP from the river bank, it's OK to expect the receiving op to work hard. But from your home shack, it's best to apply the GAB Protocol (see text for details).

My new routine might be called, "Grab and Blab," or "GAB." The contact begins with the QRP hunt-and-pounce, followed by the heart-pounding acquisition of a reply.

the possibility of maintaining a contact long enough to exchange more than RST, QTH and name becomes less probable as we rapidly fade into the background noise (QSB). To me, nothing is more frustrating than to end a QSO by simply disappearing.

My motto has long been that the "QRP kilowatt" is located between the ears of the op on the receiving end and that "real hams use headphones." But isn't it cruel to expect the receiving station op to strain ears and brain, trying to pull our signals out of the noise for any length of time just to satisfy our QRP purism? Why not make the contact and then, if you're not in the field running on batteries (Photo A) and have the necessary facilities, crank up the power!

GAB: A New QRP Paradigm

My new routine might be called, "Grab and Blab," or "GAB." The contact begins

with the QRP hunt-and-pounce, followed by the heart-pounding acquisition of a reply. Then the usual minimal exchange ensues and finally, depending upon your received RST report, the "power-up."

The real challenge and excitement of a sport, as many fly fishermen will attest, is in catching a fish with a minimalist rig. Later, satisfaction may come with a good fish meal. Likewise, the fun of QRP is largely in snagging that other station and successfully completing the basic exchange using a minimalist radio. Then it is time for the rag chew "meal."

Over the past few years, I would routinely grab a contact using QRP and, if my received report was S5 or above and there was little QSB on the band, I stayed with my 2 or 5 watts unless things began to deteriorate. If I noted that there was serious QSB or QRN or that the receiving op told me that I was dropping into the mud, I would switch rigs and go to 100 watts to ragchew. In worst cases, I could use an amp. It was a bit clunky, but now everything has changed, thanks to a chance visit to one particular booth at the Dayton Hamvention®. First, however, here are a few notes about power transmitted and received.

To dB or Not dB

The decibel is the unit we most commonly use to measure a transmitted signal's strength as heard at the receiver. The basic dB, or decibel, is a tenth of a Bel. It is based on how the human ear operates. A sound would have to increase in intensity by 10 times to be twice as loud when heard. Thus dB measurements represent a logarithmic response. They represent a ratio between two power levels. For instance, if a signal is measured as 20 dB over S9 (S9 being the power transferred by a 50-µV signal into a 50-ohm load per IARU and ARRL standards), that signal strength is 100 times greater than the S9 standard. 20 dB represents a power ratio of 100. Thus, if you double the transmit power, you increase the received signal by 3 dB. Ten times the power will result in a 10 dB increase and 1,000 times the transmit power will increase the signal by 30 dB.

Practical Results Seen at the S-Meter

S-meters provide a convenient guide to reporting signal strength. However, in conventional analog rigs, they operate from the AGC (automatic gain control) circuit and are not all that accurate. Also, one would not necessarily hear a difference as indicated on the S-meter since the AGC would tend to hold the audio level constant. In a software-defined radio (SDR), the RF signal amplitude is measured directly so these are the most accurate of ham radio S-meters. A very simplified estimate of the effect of transmitter output power on the S-meter is that on the receiving end, the S-meter will show a one S-unit increase for every 6-dB increase in the received signal. Doubling the transmitted power will result in only a 3-dB gain. Therefore,

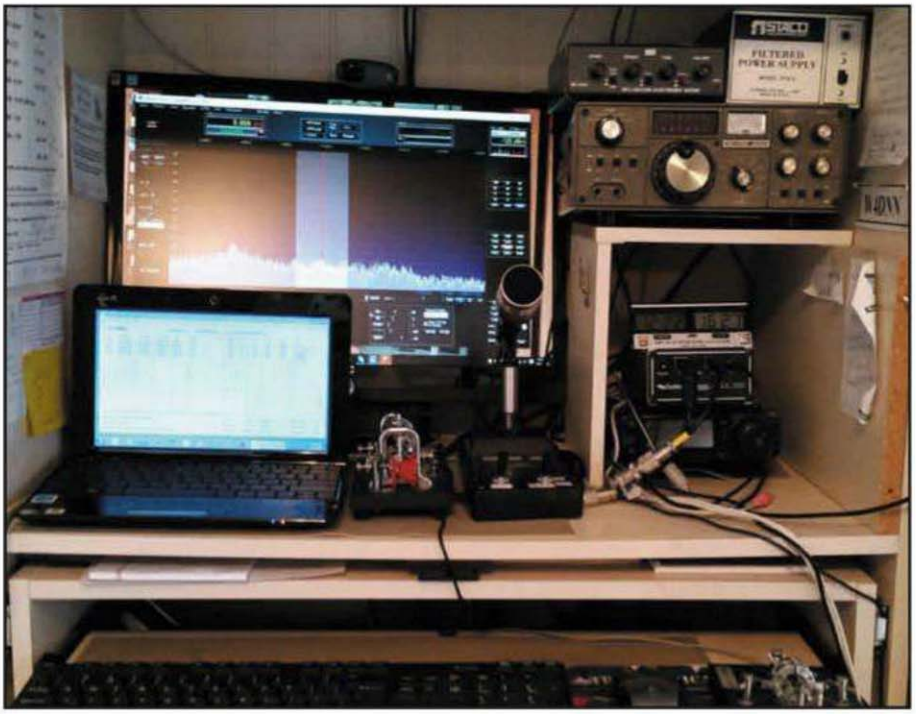


Photo B. The heart of my home QRP station today is the FlexRadio Flex1500 software defined radio (underneath clock at center-right, with display on large computer screen. The small netbook computer at left provides logging or QRZ.com viewing without disturbing the SDR display. Two toggle switches in front of the microphone allow me to quickly turn on either or both amplifiers seen in Photo C.

Photo C. Two RF amplifiers — the little RM Italy HLA-305 on top of the computer tower linked to the vintage Heathkit SB-200 on the left — provide me with the ultimate in QRP/QRO flexibility.

The radio... YAESU

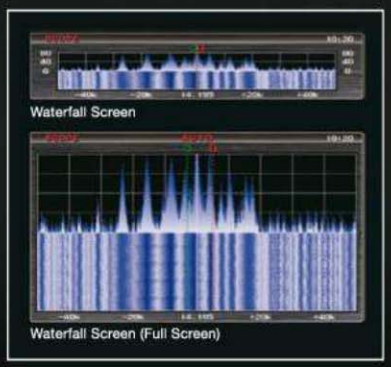
HF/50 MHz 100 W Transceiver

FT DX 3000

New Crystal Roofing Filters provide ultimate weak signal receiver performance in crowded, strong signal environments

[New Feature] Waterfall Display with High Speed Spectrum Scope

Easily find your way around on today's busy bands with Yaesu's FTDX3000D spectrum scope display.

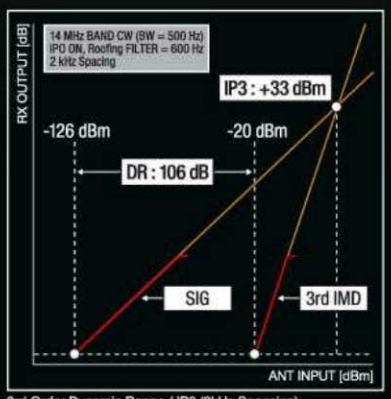


Amazing Crystal Roofing Filter performance

Down conversion 9 MHz 1st IF frequency construction allows for very tight narrow 300 Hz (option), 600 Hz and 3 kHz bandwidth roofing filters.

Outstanding receiver performance, the heritage of the FTDX5000!

High dynamic range IP3 performance originally designed for and proven in the FTDX5000.



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one would have to increase power from five watts to 20 watts to gain one S-unit at the receiver. The next S-unit would require 80 watts and the next, 320 watts. Finally, you'd need 1,280 watts to gain a total of four S units. My power increase solution is based loosely on these figures and on ease of operation. In the real world, in a test of one well-known transceiver's S-meter, an increase from 5 to 150 watts resulted in a five S-unit increase, double what the standard predicts. It's all relative.

From Little Pistol to Big Gun: My QRP-to-QRO Solution

For a number of years, I have been employing high-tech, mid-tech, and low-tech gear in my shack (Photo B). My ham radio loves include (my XYL, K4KLQ, of course, plus) QRP, CW, and vintage (boat anchor) gear. My usual station consisted of a Flex-1500, a little SDR QRP rig which has an output of 5 watts; an old Yaesu FT-100ND with an output of 100 watts and a vintage Heathkit SB-200 amplifier with a maximum output of 600 watts.

Software-defined radios have the advantages inherent in a receiver based in software So even though the 1500 is a QRP rig, its receiver is right up there with contest quality gear. Features include infinite filtering choices, panadapter, waterfall, spectrum scope and histogram displays and binaural audio as well as a plethora of controls and customizable features too numerous to mention. Therefore, I usually used the SDR for receiving. When necessary, I have been able to increase my power during a QSO by switching the antenna to the FT-100 and dialing in the frequency. If things got really tough, I could use the Heathkit amp. It's a workable solution but switching rigs during a QSO is a little clunky in application.

Italians to the Rescue

Last May at the Dayton Hamvention®, I happened across the

CQ Mini-Review: RM Italy HLA-305V Amplifier

From QRP to QRO at the Flip of a Switch

It came to my ham shack from across the Atlantic, traveling across the U.S. to California and back across the U.S. to Florida. Sounds like some rare type of propagation but in this case, it was a 12-pound box of electronics. It was the HLA-305V (Photo D), the latest linear amplifier offered by the venerable RM Italy. Their U.S. office is in Fremont, California.

RM Italy (RM Costruzioni Elettronich) has been a manufacturer of radio communications equipment for more than 42 years. Founded in 1974 by Remo Marchioni in Perretta Terme, Italy, the company currently produces a wide variety of products. This includes 33 RF amplifiers of which eight are listed as FCC-certified in the U.S. In addition, the company offers antennas, power supplies, transceivers, and accessories.

Founder Marchioni attributes his success to the "Italian capacity to discover a winning product and being able to design and make it by means of an industrial process but with extreme flexibility."

Known during the CB craze for producing 27-MHz amplifiers, many of which were not known for their RF signal purity, the company lately has produced a number of top-quality HF ham amplifiers, one of which has gained an enthusiastic following in the U.S. The HLA-300 plus, still a current offering outside the U.S. and available online, can output up to 200 watts with an input of 2 to 15 watts.

Photo D. RM Italy's newest amplifier, the HLA-305V, uses two large fans to quietly cool its sizable heat sink. It will produce up to 250 watts from QRP input for those times when 5 watts just can't get through reliably.

Last year, the newest offering, the HLA-305 (305V with fans), was a big hit at the Dayton Hamvention®. It is the company's first HF amplifier to be fully FCC certified, offered for sale direct from RM Italy U.S., and represents a substantial upgrade from their previous ham radio flagship, the HLA-300.

Comprehensive reviews and videos of this amplifier are available online, so I won't replay these stats. However, I want to point out the many upgrades that have been employed to make the HLA-305V well worth the difference in price from its predecessor.

So, What's New?

The first and most obvious difference is a larger heat sink that can dissipate 25% more heat. This allows a larger internal printed circuit board, providing improved layout of critical circuit components to facilitate a higher duty cycle (Photo E).

Two larger diameter variable-speed fans replace the three small fans on the 300. This results in whisper-quiet operation.

A more linear input circuit improves the measurement of frequency and input power.

The HLA-305V makes use of a more powerful processor to improve control of the amplifier's protection circuits and functionality. This amplifier looks out for itself. It will sound an alarm and shut itself down if it senses high SWR, high RF input power, over-temperature, a filter fault, out-of-range frequency, or forbidden frequency (such as CB). A bright LCD display provides a readout of the status of the amplifier and some of the operating parameters.

A new system for digital-to-analog conversion allows measurement of all values at the same time instead of sequentially (sample and hold). Also added is measurement of the input current and a redesigned SWR sensor circuit, which now features a "Tandem Match" that results in better linearity and precision.

RM Italy U.S. booth and was introduced to their new, FCC-certified HLA-305V QRP to QRO linear amplifier (see sidebar article for a mini-review). It was love at first sight. I just knew that this was the answer to my ham radio dreams. The XYL responded, "Dream on!" … but a little nagging and whining won the day and soon, a big 12-pound UPS box left California with my name on it. Unfortunately, it met up with Hurricane Matthew in Jacksonville, FL and, due to catastrophic flooding, languished in the UPS hub for nearly a week before arriving at my Southwest Florida shack.

The new amp can output 200 watts (on its HI setting) from a paltry 5-watt input (250 watts from an 8-watt input). It is the perfect answer to my stair-step GAB power strategy. Using the SDR QRP rig as the RF generator, I wired the output directly into the new amp, and the HLA's output into the Heathkit amp (Photo C). RF proceeds through an SWR/wattmeter and out to the antenna, a vertical mounted adjacent to our Florida saltwater canal. Great ground plane.

My GAB protocol involves stepping from 4-5 watts to 100 watts and then to 500 watts, depending upon band conditions. I mounted two toggle switches on my desk, one to activate each amp. With the amps off, I am putting out a QRP purist's 4-5 watts. Flipping on the HLA amp gives me 100 watts output on the amp's LO setting. If I need more oomph, I reduce power to 80 watts out from the HLA and flip the switch on the SB-200. This gives me 500 watts out. I could increase this to a maximum of 600 watts but why strain the 48-year old tubes unless that last dB is really necessary?

While I still enjoy the challenge of making those initial contacts QRP, I can almost hear the initial surprise and then the sigh of relief on the other end (not really, at least not in CW) when my signal increases from "225, Ur barely readable hr OM" to "WOW, ur 599. How did you do that?" The receiving op can now lean back, pour a cup of coffee and enjoy "arm-chair copy" and a good old-fashioned ragchew.

The six low-pass filters have been completely redesigned and are now five-pole Cauer designs. This greatly improves the attenuation of the harmonic output. Larger (AMIDON) cores avoid core saturation. New high-quality silver mica capacitors are better able to cope with excessive voltage in the case of a poor load.

The RF stage has been reengineered with the adoption of a classic Motorola design which, although more complex, improves linearity with respect to frequency and reduces signal distortion. The collector supply is now provided via the feedback transformer so the DC supply is no longer passing through the output matching transformer. This greatly reduces the possibility of core saturation. Four MRF 455 transistors in the final are more robust than the MS1051s used in the original HLA-300 (the 1051s have been discontinued by their manufacturer).

The bias circuit has been completely redesigned and is stabilized in both voltage and temperature to keep the bias supply constant with changing supply loads and transistor temperature.

Finally, RX/TX switching time has been greatly reduced.

RM Italy has established a new Ham Radio Division that will focus exclusively on the ham amplifier market. A few new products that will make their debut this year include the 600-watt, solid-state BLA-600, a 100-/120-watt HLA-105 (a smaller version of the HLA 305V), a VHF/UHF amplifier for 5-watt HT radios and the HBF-1000 low-pass filter. In addition, DX Engineering has become a distributor for RM Italy products.

From Peanut Power to Big Gun

The main feature of the new amplifier, for those of us who enjoy QRP and have a shack full of little QRP transceivers, is that these amps accept up to 10 watts maximum input and can produce up to 250 watts output (200 watts from five watts input). At a retail price of around $729, they won't break the bank. Have a little FT-817 or Flex-1500 in the shack? Now it can be both your QRP travel rig and your main high-power shack transceiver.

Photo E. A larger circuit board permits optimum component placement inside the HLA-305V. (Courtesy of RM Italy)

When is 100 less than 10? When you're looking at effective radiated power of 100 watts going into a short antenna for 630 meters versus that of 10 watts heading into an HF beam. Veteran LF/MF operator WØRW says anticipated FCC rules may make our soon-to-come MF band a QRP band by default.

630 Meters for the QRPer

BY PAUL SIGNORELLI,* WØRW/WA2XRM

When the FCC authorizes 630 meters for U.S. amateur radio operators, longwave communication will be possible for all hams — even low power enthusiasts. As this is written, we are awaiting FCC action on a proposal to allow U.S. amateurs to operate in the 630-meter band (472-479 kHz) as well as 2200 meters (135.7-137.8 kHz)[1]. As most hams realize, operating at these frequencies requires electrically-long antennas and different operating techniques from those used on HF. But as with an HF antenna, electrically long doesn't necessarily mean physically long.

What can you expect from a small Medium Frequency (MF) antenna? That was my question. I started to operate on MF in 1998 using a Part 5 Experimental License (WA2XRM – see Photo A) on 164 kHz, after the GWEN (Ground Wave Emergency Network) program was terminated. In 2000, the U.S. Coast Guard abandoned the MF ship bands and I was granted approval for 480 kHz.

My interest in LF began in 1963. One of the programs I got to work on (I got paid to do this stuff!) was a VLF communication system (TACAMO) that used a 6,000-foot paraballoon antenna that was flown out in the Mojave Desert. This worked better than the "Hawes" VLF tower near Barstow, California that was 1,226 feet high (taller than the Eiffel Tower).

I have been operating for years on 480 kHz from Colorado and have had reception reports from Nova Scotia, San Diego, and Alaska using QRSS (very slow speed CW). I am running 100 watts to a 30-foot vertical which has top and bottom loading and a 10-foot-by-10-foot top hat. It is slung between two trees in a small city lot. Photo B shows my loading coil. I am currently using a KB5NJD amplifier which uses a single IRF540 FET to give 100 watts[2]. The single FET replaced my old DX-100.

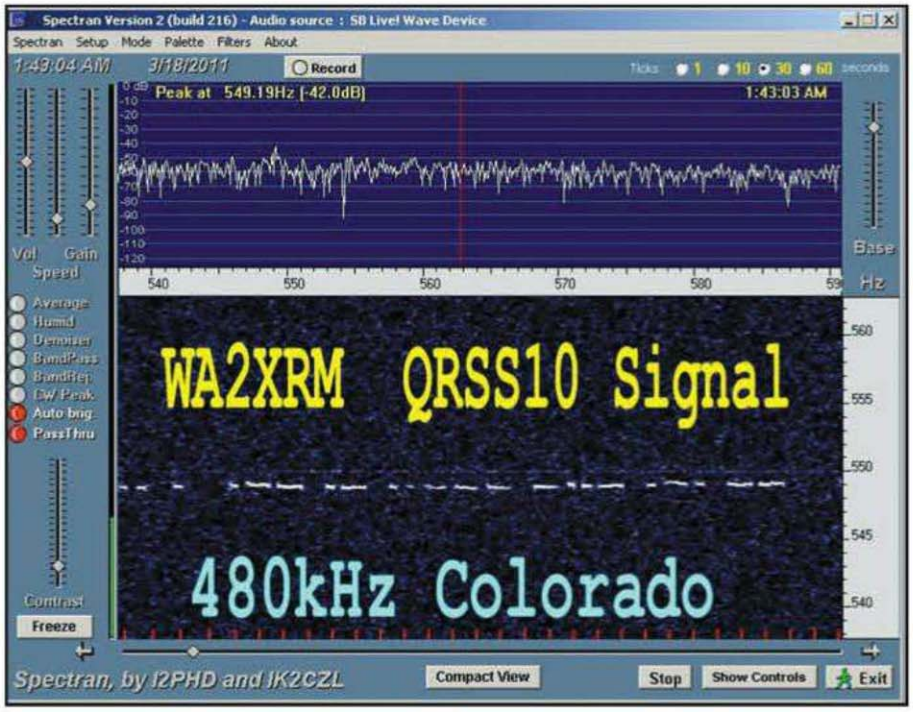

Photo A. This isn't your typical ham QSL card. Besides being a screenshot from the Spectran program the author uses for LF digital contacts, the WA2X… callsign indicates that the station is licensed by the FCC as an experimental station, not a regular amateur station. General amateur use of 630 meters in the U.S. is still awaiting an FCC rulemaking.

A short antenna for MF bands makes the antenna efficiency go way down and the effective radiated power (ERP) is really QRP. Typical HF QRP operations — 5 watts going to a 10-dB beam antenna — gives a 50-watt ERP. In MF operations using a very short antenna, 100 watts output might give 1 to 2 watts ERP. The average small MF station should be able to reach 1,000 miles on

* email: <w0rw1@msn.com>

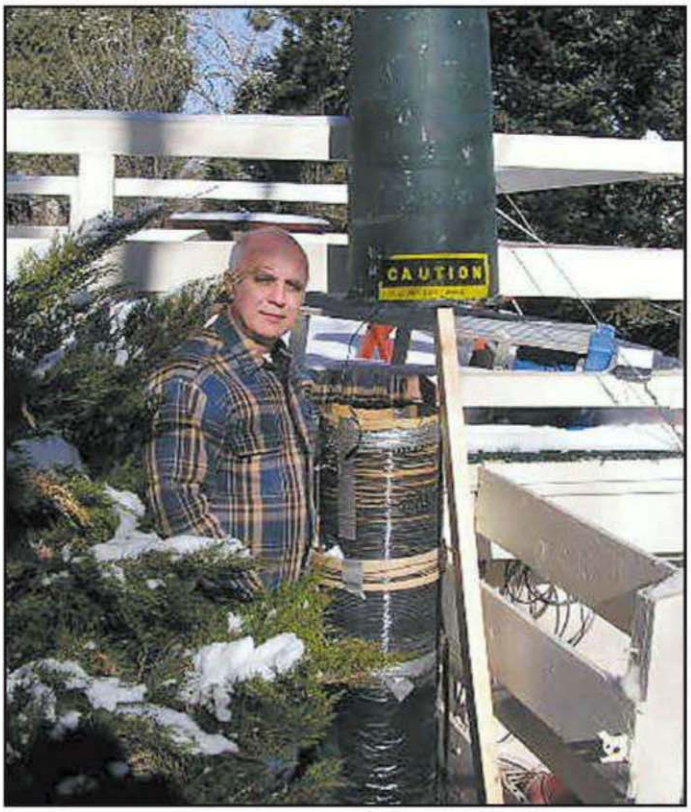

Photo B. The author and the massive loading coil for his "compact" 630-meter antenna. It also features a 10-foot by 10-foot top hat.

I have been operating for years on 480 kHz from Colorado and have had reception reports from Nova Scotia, San Diego, and Alaska using QRSS (very slow speed CW).

CW and many more using digital modes like WSPR. Ralph, W5JGV, prepared a chart detailing what a short vertical might look like. See <http://bit.ly/2h32jA0>. In addition, this link: <http://bit.ly/1bwHyIB> can be used for EIRP calculations.

CAUTION: Even at these low power levels, the antenna will have a lot of 'fire' on it. The use of big insulators and anti-corona balls might be necessary to prevent fires.

Getting Ready to Get On 630

The FCC may permit use of the band 472-479 kHz by licensed amateur radio operators, using either 1 watt or 5 watts of Effective Isotropically Radiated Power (EIRP) from an antenna not exceeding 15 meters in height. The final details are not firm.

If the FCC continues to delay, a Part 5 experimental license is easy and fast to obtain (See <http://bit.ly/2gaCJfA>).

Even though we don't know the details yet, it is clear that amateur allocations at 630 and 2200 meters will very likely become a reality in the not-too-distant future. Now is the time to start planning how to best operate on these bands.

Notes:

1. See <http://bit.ly/2gCsZXK>
2. See <http://njdtechnologies.net/> for details on the KB5NJD amplifier and other 630-meter information

The quality of QRP rigs from China is improving, says the author, but prices are still low. AH6CY suggests picking up some low-power bargains while you still can ... and offers a quickie project to overcome one common problem.

Minimalist 40-Meter QRP CW Transceiver Kits From China

Who Says Ham Radio Has to Be Expensive?

BY HIROKI KATO,* AH6CY

Before the 1960s, old timers well remember, Japanese products were known to be cheap but often shoddy. Today, Japanese products are synonymous with high-quality goods. History seems to be repeating itself: Many mass-produced Chinese exports are cheap but often lacking quality control. There is every indication, however, that the quality of Chinese manufactured goods is improving and their prices will soon be rising.

Among Chinese products currently available are some extremely inexpensive QRP transceiver kits. They are copies or modified and improved versions of familiar QRP radios originally designed in the U.S. and U.K. in the 1980s and 1990s, such as the 49er, Frog Sounds[1], Rock Mite, and Pixie (Photo A). These are all rock-bound (crystal-controlled) 1-to-3-watt, single-frequency minimalist transceivers with direct-conversion receiving circuits.

The kits cost from $3 to $20 and are available only online, direct from China through such vendors as eBay, Amazon and banggood.com, or for a few dollars more, from U.S. distributors such as 3rd Planet Solar <http://kc9on.com>. You cannot find them in brick and mortar stores like RadioShack or HRO. They are complete kits and, once assembled, all you need to get on the air are an antenna, a 9- to 12-VDC power source, a straight key, and a pair of head/ear phones.

A Few Issues...

You need to be aware, however, of some issues in ordering and building these kits:

1. These kits are often shipped with no manual/schematic or with a manual written in poor English.
2. Virtually all of them come with a crystal for 7023 kHz. The Chinese distributors, for some reason, do not seem to be aware that in the U.S., this particular frequency is available only to Extra Class amateurs. However, there are ways to deal with this limitation, as explained below.
3. It can take many weeks for your order to arrive. There are some U.S.- and Canadian-based distributors who can ship the same kits faster but you need to pay a little more.
4. Some parts may be missing or redundant. You would want to take inventory of parts before you begin assembling and soldering.
5. Some kits may be DOA. Since these kits are so cheap, you may consider ordering two or three of the same kit to start with.

Why bother with these kits if there are so many potential problems, you may ask. Well, the answer depends on your philosophy. Here's my perspective: If you can have hours of fun for the price of one or two cups of latte at Starbucks, wouldn't you think it is worth the risk? If you are a QRO "appliance" operator of the instant gratification school, these kits are definitely not for you. On the other hand, if you are the type, like me, who enjoys making things with your own hands (even if they don't always work), these radios have a very high ROI (Return On Investment) with minimum investment. Just as QRPers often talk about "miles per watt" to gauge QRP achievements, perhaps we can talk about "watts per dollar" to earn "bragging rights."

Solving the Crystal Dilemma

The limitation of the single fixed frequency can be overcome in a number of ways. The simplest would be to substitute a different frequency crystal for the original 7023-kHz one. You can order inexpensive crystals (type HC49) from some of the vendors who sell these radios. At these prices you might even consider building several separate radios for different fixed frequencies.

Another way to cope with the single fixed frequency limitation is to get several extra crystals and change frequencies with a rotary or slide switch. You don't have enough space to mount a switch with multiple crystals on the kit's own board, so you need to connect them externally. See what I did (Photo B) as one example. I bought a package of eight different 40-meter frequency crystals on eBay (under $10, including shipping). For some of these transceiver circuits, you need two sets of crystals and a two-bank rotary/slide

* email: <hiroki@pacbell.net>
(Portions of this article appeared in the Oct. 2016 issue of the QRPp Journal.)

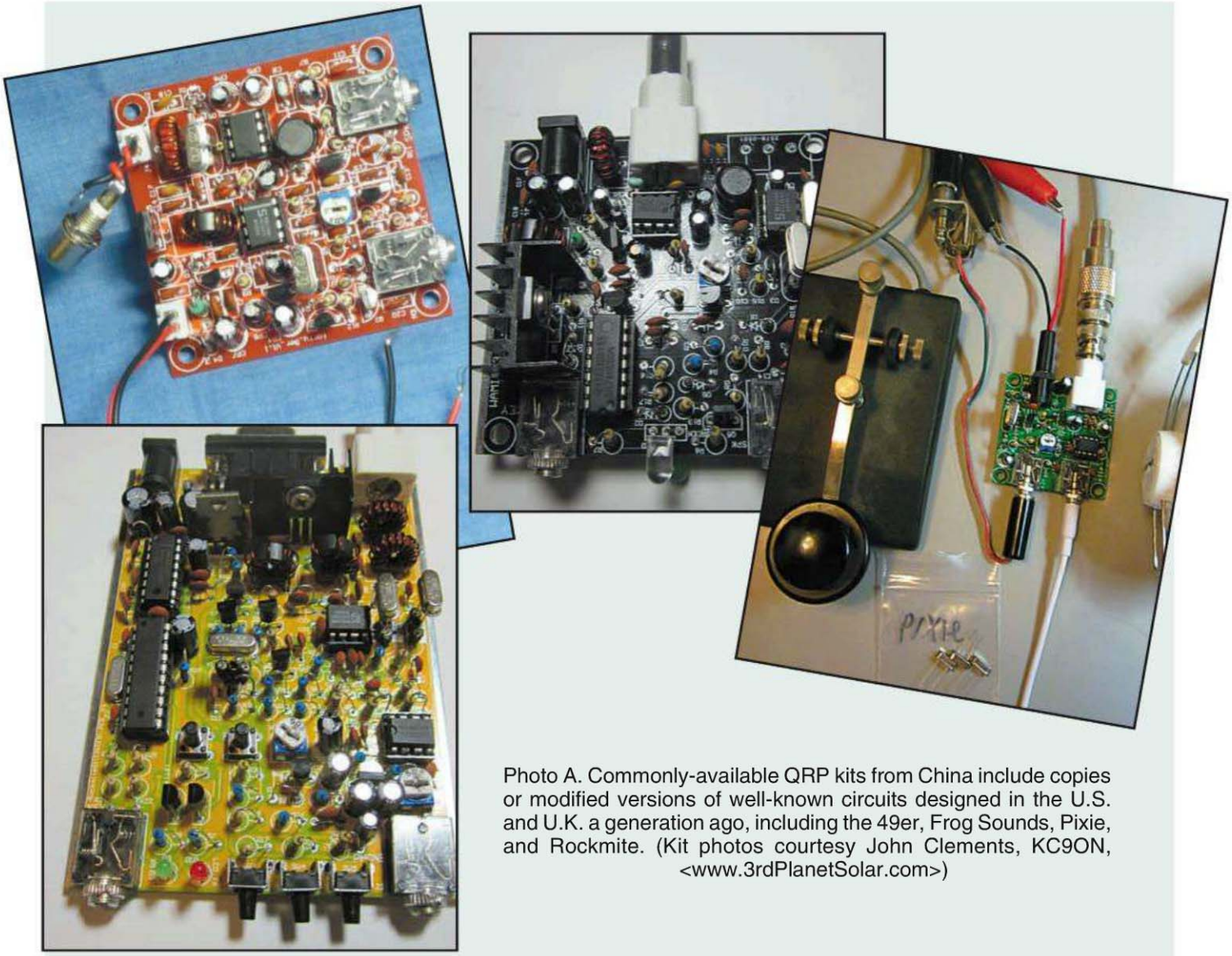

Photo A. Commonly-available QRP kits from China include copies or modified versions of well-known circuits designed in the U.S. and U.K. a generation ago, including the 49er, Frog Sounds, Pixie, and Rockmite. (Kit photos courtesy John Clements, KC9ON, <www.3rdPlanetSolar.com>)

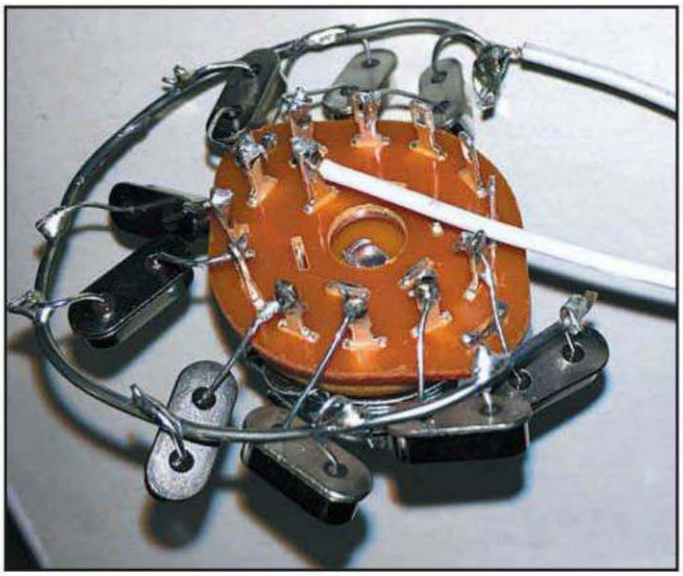

Photo B. One way around the single 7023-kHz crystal dilemma is to buy several crystals on different frequencies and mount them on a rotary switch.

switch. The example shown here is for the Pixie model, which requires only one set.

An example of a much more sophisticated approach for overcoming the fixed frequency limitation was shown in the March 2016 QST article "A Modular 40-M Transceiver with VFO." It utilizes a DDS (Direct Digital Synthesis) component and an Arduino Nano microprocessor, again inexpensively available from China. Hams who have built this particular VFO modification (see mine in Photo C) report that you can have a perfectly workable VFO-controlled 40-meter QRP transceiver for under $50 total. This approach is not for the faint of heart, however. It requires some knowledge of, and experience with, microprocessors, as well as some general kit-building experience. It is possible that some QRP kit vendors will soon offer a complete package of the necessary parts and easy-to-follow manual for a DDS VFO Arduino-controlled modification for most of the inexpensive Chinese transceiver kits.

A Case for a Case

Most of these Chinese kits do not come with an enclosure, although some vendors offer a good-looking plastic enclosure, such as the one shown in Photo D. The Altoids® tin

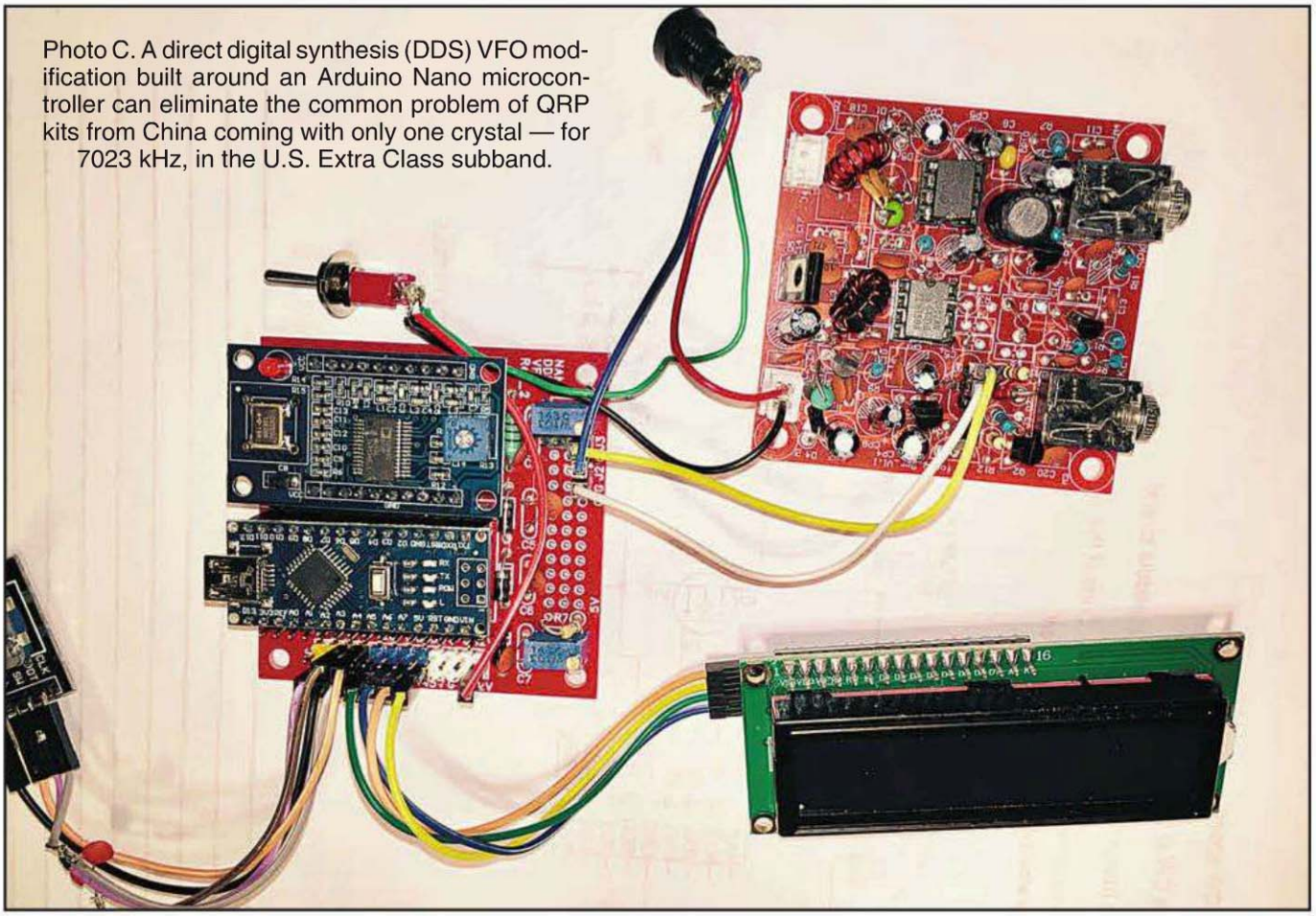

Photo C. A direct digital synthesis (DDS) VFO modification built around an Arduino Nano microcontroller can eliminate the common problem of QRP kits from China coming with only one crystal — for 7023 kHz, in the U.S. Extra Class subband.

what's new

New Regulated Power Supplies

NTE Parts Direct (ntepartsdirect.com) has extended the available power ratings of its 12-volt AC-DC switching regulated power supplies up to 120 watts. The company now offers a 96-watt power supply at 8 amps and a 120-watt power supply at 10 amps desktop version as part of the line. Both feature 2.1-millimeter by 5.5-millimeter plugs that permit easy connection to your application.

Both power supplies are available now and have a suggested retail price of $81.73 for the 96-watt version and $83.37 for the 120-watt version. For more information, visit NTE Parts Direct at <www.ntepartsdirect.com>.

Note: "What's New" is not a product review and does not constitute a product endorsement by CQ. Information is primarily provided by manufacturers/vendors and has not necessarily been independently verified.

and tuna tins are QRPers' favorite standby for this type of DIY project, but you can go wild with your own creative juices.

I happened to have a Vietnam-era handheld VHF transceiver (AN/PRT 4A). I took the original "guts" out of the case and put my Pixie transceiver in it along with extra crystals on a rotary switch (Photo E). You may notice in the photo a simple key made of a microswitch (mentioned in CQ, October

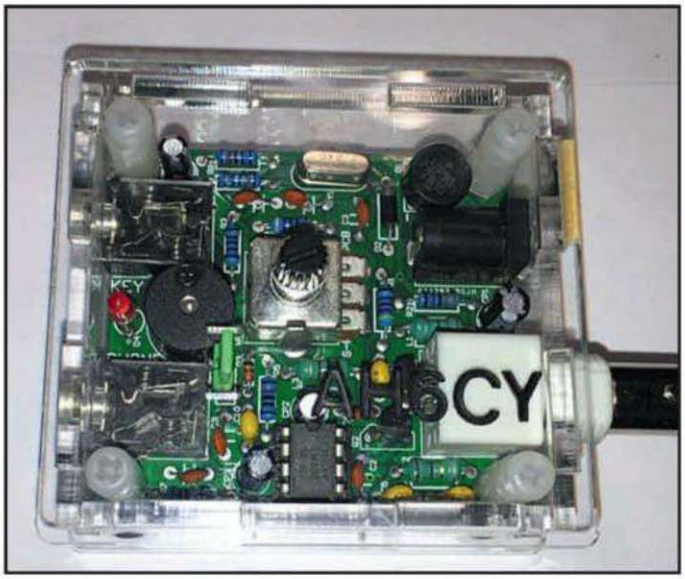

Photo D. Some kit vendors offer attractive plastic enclosures for their kits. For others, you may need to rely on a mint tin or make your own case.

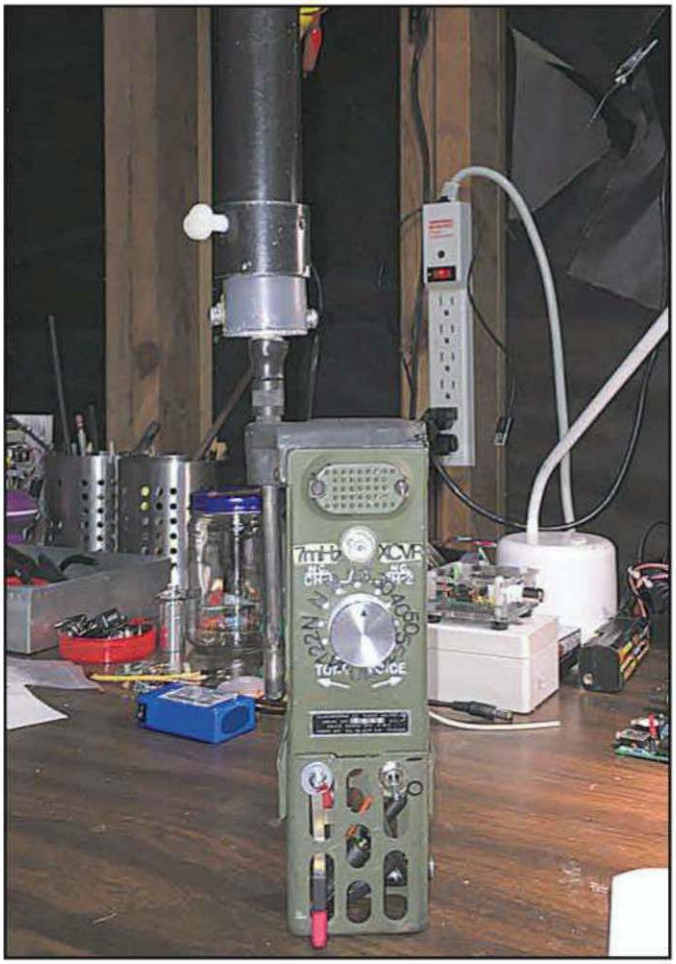

Photo E. The author used an old Vietnam-era military hand-held case to hold a Pixie CW transceiver kit and a rotary switch with multiple crystals for a choice of frequencies.

2016, pp. 41-43) embedded in the lower detachable compartment (originally used as a detachable battery storage compartment). The original telescopic antenna has been modified to attach an old MP-1 vertical antenna's coil for the 40-meter band.

Give It a Try!

On the air tests of these inexpensive radios prove that they are all perfectly workable radios, minimalist as they are. No frequency drift is noticeable. Even with a low-hung, end-fed-half-wave wire antenna, I worked with my 1-watt Pixie, among others, a station in Chico, California, about 200 miles from my QTH in Portola Valley, during the day. If you are at a good radio location, such as near the sea, or with a much better antenna, I have no doubt that you can work DX when the band conditions are good, just as I have done many times with QRP rigs like the Yaesu FT-817 and Elecraft KX3.

The availability of these cheap Chinese radios may not last long if the historical pattern holds true. I had lots of fun building these (five to date and climbing) and I hope you will not miss the opportunity.

Note:

1. See following article, "Froggie – A Very Low Cost QRP 40-Meter Transceiver," for more on this radio and some simple mods to make it an excellent performer.

QRP kits from China offer a lot of low-power "bang" for very few bucks. But they also have a fair number of limitations. W1VIV looks at one of these radios and offers some mods to improve its performance and flexibility.

Froggie – A Very Low Cost QRP 40-Meter Transceiver

A $10 Kit Plus a Few Extra Parts Equals $100 Worth of Fun

BY SUMNER WEISMAN,* W1VIV

I have been an active ham for 64 years, and have operated many different modes, both analog and digital. I have run power from 15 watts to the legal limit, have gone from vacuum tubes to modern ICs, and I was running out of new challenges. Last Field Day, I suddenly discovered QRP. I borrowed a friend's old Heathkit HW-9, fired it up on 15-meter CW, and made a number of contacts. After a lifetime of "life is too short for QRP," to my surprise, I was quickly hooked.

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Looking East

I soon discovered, on a Chinese website, a crystal controlled 40-meter CW transceiver kit for only $10.52 with free shipping. To see it, just go to Banggood.com. In their search engine, type "Frog Sounds Ham Radio." Like the low-cost Chinese HTs that many American hams are now using, you get a lot of radio for a very low price. I ordered it and built the kit, and it worked reasonably well.

It has about a 2.5-watt output and you can run it on a 9-volt battery or a 12-volt gel cell. All necessary information is provided, including a PC board layout diagram, a schematic, a parts list, and step-by-step instructions. The kit includes

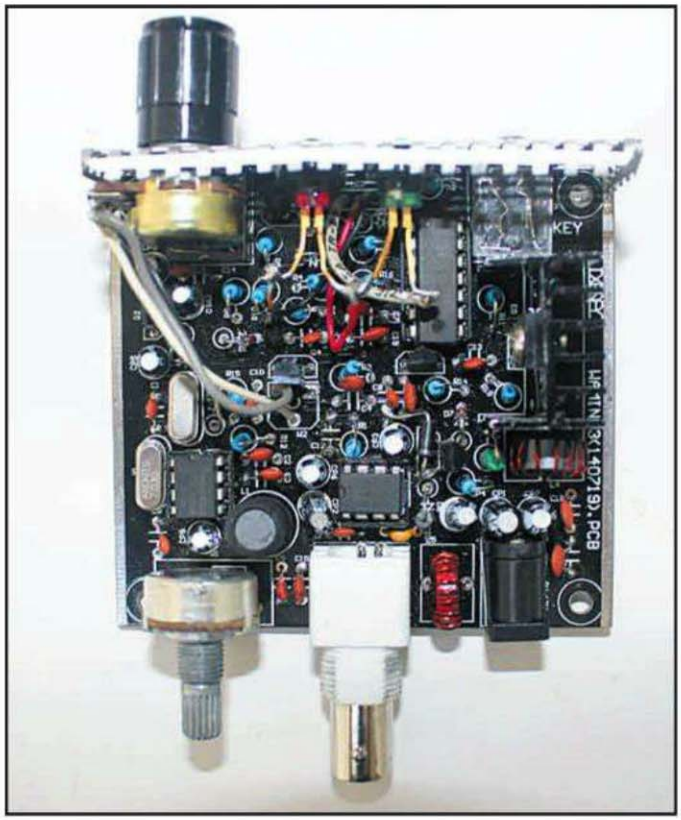

Photo A. The Frog Sounds QRP transceiver from China is built on a tiny circuit board. The author made several modifications that are outlined in this article.

Photo B. The "Froggie" transceiver fits in a Band-Aid® box. The author moved the RIT (receiver incremental tuning) control from the circuit board to the front panel.

Photo C. The bottom of the Band-Aid box serves as the transceiver's rear panel. Note the rubber feet added for operating with the box placed horizontally.

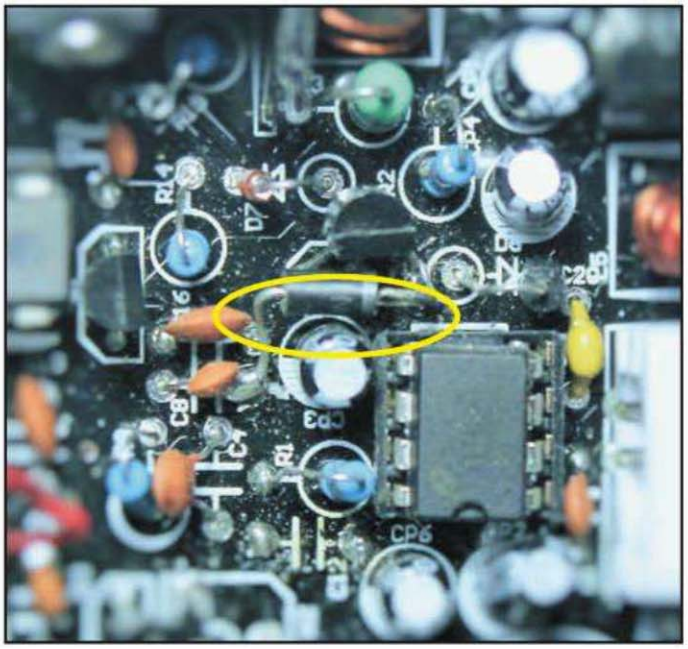

Photo D. One change the author made on top of the circuit board was adding a diode across the voltage regulator to protect it against accidental shorts to ground.

some proven QRP designs, including a direct conversion receiver and a simple crystal-controlled transmitter. Two identical crystals are provided, one for the oscillator and the other for a series-resonant bandpass filter at the receiver input. It even came with a 50-ohm dummy load resistor for testing the unit. The PC board is very small, only about 3 X 3.5 inches (Photo A), and it fit perfectly into an old Band-Aid® box (Photos B and C). I cleaned the box and added a coat of clear spray.

The Problems with Froggie

Although this rig (and others like it) provides an opportunity for hams to get into QRP for an amazingly low price, there were a number of problems I had to solve in order to end up with a decent transceiver. Here are a few examples.

• Probably to cut costs, the design of the audio amplifier, an LM386, was quite inadequate. I consulted with fellow radio club member Jim Congdon, WN1A, who had worked close-

what's new

International Ham Stores Group Formed From Three Companies

Waters & Stanton Limited, InnovAntennas Limited, and Nevada Radio, three of UK's leading ham radio retailers and manufacturers, have joined forces as the International Ham Stores Group. The new company will operate from a combined showroom and distribution center in Portsmouth, England, beginning April 1st 2017. A "soft start" migration to Portsmouth will commence for both Waters & Stanton and InnovAntennas from their current Hockley facility in January 2017. This strategy is being employed to ensure a smooth transition with the least amount of disruption to the day-to-day operations and customer service.

IHS™
INTERNATIONAL HAM STORES GROUP

The three companies will continue to operate under their own names, but combine resources for logistics, marketing, repairs, and customer service, IHS Group will become the largest importer of hobby radio related products in the U.K. supplying ham radio, CB, and scanner retailers along with major retailers including Maplin and Amazon. Professional and PMR services will also be focused upon by the newly formed Business Radio Division.

Whistler to Update TRX-1 / TRX-2 Scanners with NXDN™

The Whistler Group, Inc. has released the NXDN™ update to the TRX-1 and TRX-2 scanners, which currently feature Digital Mobile Radio (DMR) capabilities.

The Whistler TRX-1 (handheld) and TRX-2 (desktop/mobile) originally released in May 2016 are multi-system adaptive digital trunking scanners with Motorola P25 Phase I, X2-TDMA, Phase II and DMR. Additionally, Whistler announced during the initial product debut, that development of NXDN™ monitoring was underway and the TRX-1 and TRX-2 would receive an NXDN™ upgrade later at no cost to the consumer.

NXDN™ is a Common Air Interface (CAI) technical protocol for mobile communications developed jointly by ICOM Inc. and JVC Kenwood Corp. Many market segments such as security, transportation, railways, construction, taxi companies, hotels and more use NXDN™. In addition, areas of public safety _ with agencies including police, fire, municipal services and military – are using NXDN technology.

The TRX-1 and TRX-2 began shipping in late June 2016 and have suggested retail prices of $649.95 and $729.95 respectively.

Note: "What's New" is not a product review and does not constitute a product endorsement by CQ. Information is primarily provided by manufacturers/vendors and has not necessarily been independently verified.

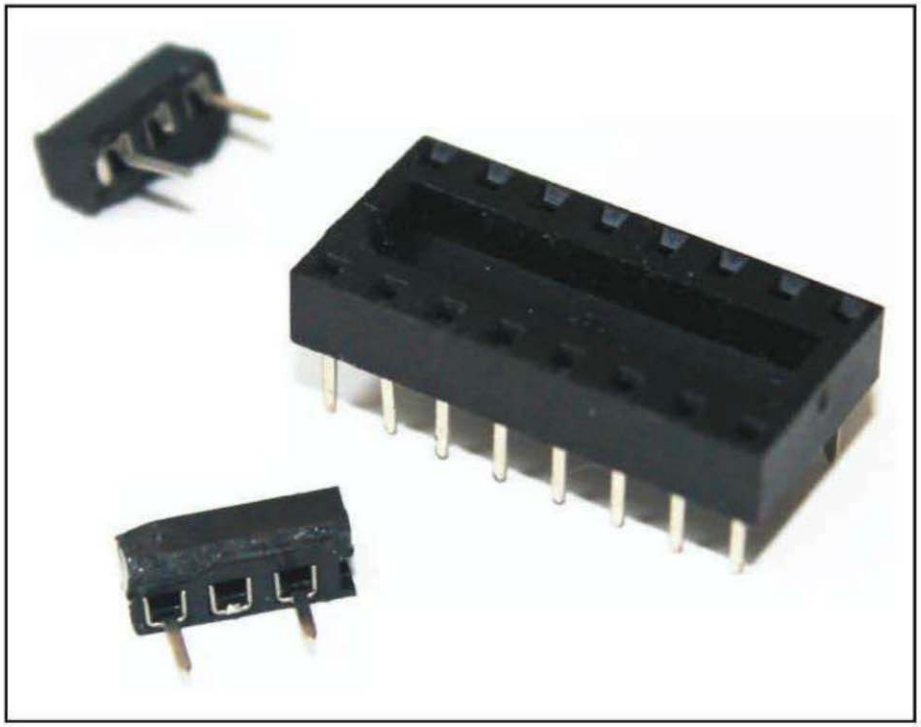

Photo E. The kit comes with instructions to solder the crystals to the board. The author added flexibility by adding crystal sockets he made from a spare IC socket and ordering additional crystals.

ly at National Semiconductor with one of the two co-designers of the LM386, Tom Frederiksen, AC6QS (SK). Jim suggested several improvements to the amplifier, and these were added.

• There is a 6-volt, three-terminal regulator, a Texas Instruments 78L06, in the power supply. The kit omitted a power diode that protects the regulator from accidental shorts to ground at the input. The TI specification sheet, available on the internet, recommends this diode, which I added (Photo D).

• The receiver portion has a receiver incremental tuning (RIT) trimpot on the PC board, with no way to operate it when the board is mounted in a case. I found that this pot is really needed, so I removed it and installed a panel-mounted pot on the front panel instead (see Photo B).

• The instructions are poorly translated from the Chinese, and in some cases are quite difficult to understand.

• The kit was designed for the crystals to be soldered directly into the board. For flexibility, I added plug-in sockets by cutting up a low profile IC socket (Photo E).

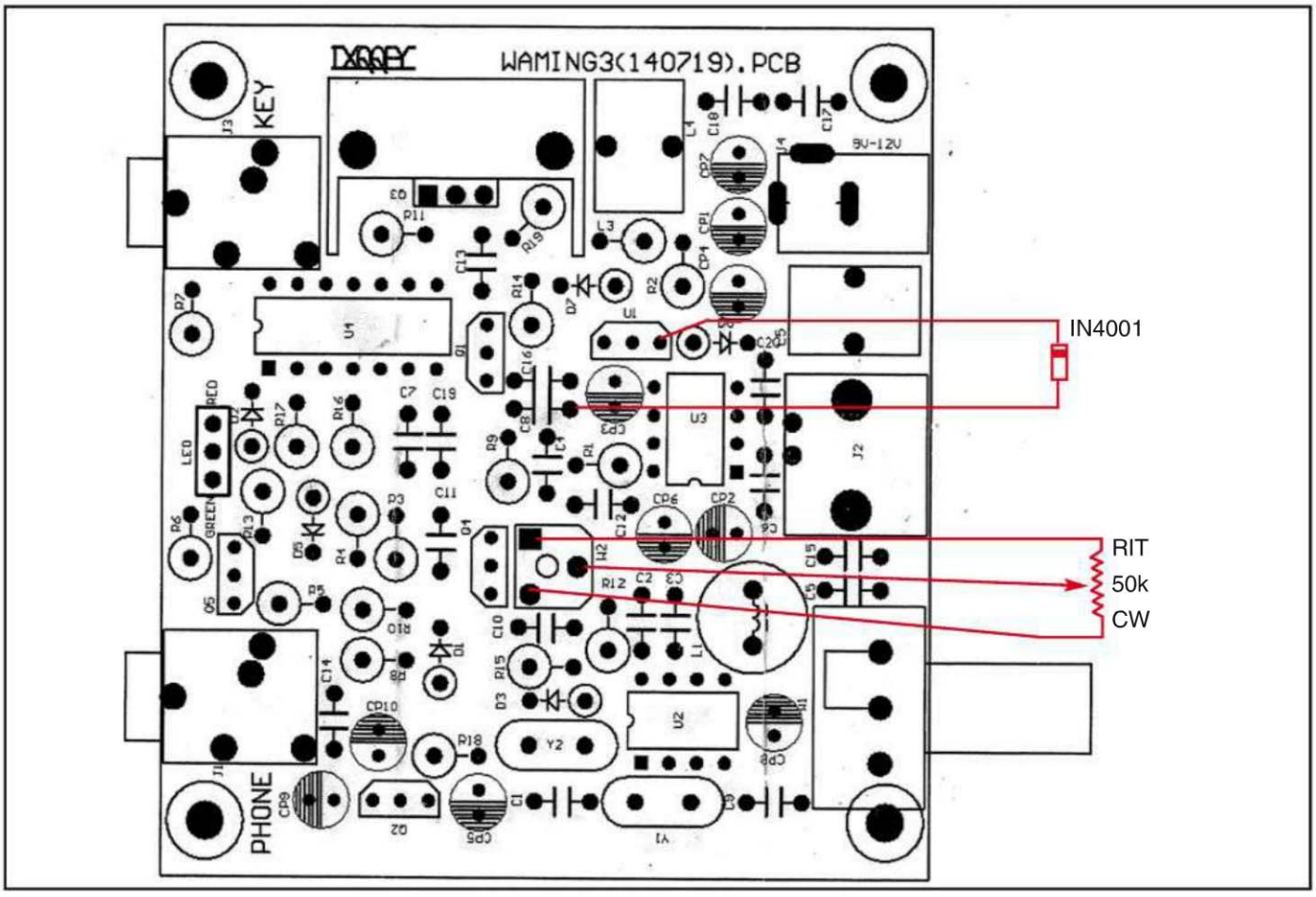

Figure 1. Components added either to the top of the circuit board (such as the 1N4001 diode) or off the board (such as the front-panel-mounted RIT control).

• The crystals provided were for 7.023 MHz, which can only be used by Extra Class hams in the U.S. I purchased a pair of crystals for 7.030 MHz, so that I could contact hams with other license classes. This small change provided a big increase in activity.

• Optional: A two-color LED was provided on the board, lighting green for receive and red for transmit. But there was no way to mount it to the case, so I replaced it with two separate LEDs, a red and a green, which I then mounted on the front panel. If you're happy with the dual unit supplied, there is no need to replace it.

The Solutions

General instructions: First, build the kit using the instructions provided with it. You may have to read the instructions several times to understand them, but I didn't have any real problems. When winding the coils, be very careful about the correct number of turns. Although they didn't mention it, I added a small amount of thermal grease between the RF output transistor Q3 and the heat sink. Be careful not to over-tighten the Q3 mounting screw.

Do not install the following components: W2, the 47k-ohm PC board-mounted trimpot; crystals Y1 and Y2; and the 0.01-µf disc ceramic capacitor, C12. Optionally, do not install the board-mounted LED indicator if you are planning to change it.

The LM386 Amplifier

The original design has a 10-µF electrolytic capacitor between the two gain terminals, pins 1 and 8. According to National's application notes, which can be found on the internet, this configuration provides a gain of 200 (46 dB). I added a capacitively-coupled resistor to ground, connected to Pin 1. This greatly increased the amplifier gain, and is probably the most important improvement of the entire project. I was now easily copying stations that I could barely hear with the original design.

Note the series 22-ohm resistor and 47-µF capacitor to ground. The smaller the resistor selected, the greater the gain will be. I found that audio feedback occurred with resistors of less than 22 ohms, possibly due to board layout, limiting the amount of gain I could add. I also added a 10-µF capacitor from the bypass terminal to ground, to filter out any power supply noise. These components were soldered point-to-point on the bottom of the board, minimizing strays. Capacitor C12 was changed from a 0.01-µF disc ceramic to a 0.1 µF,

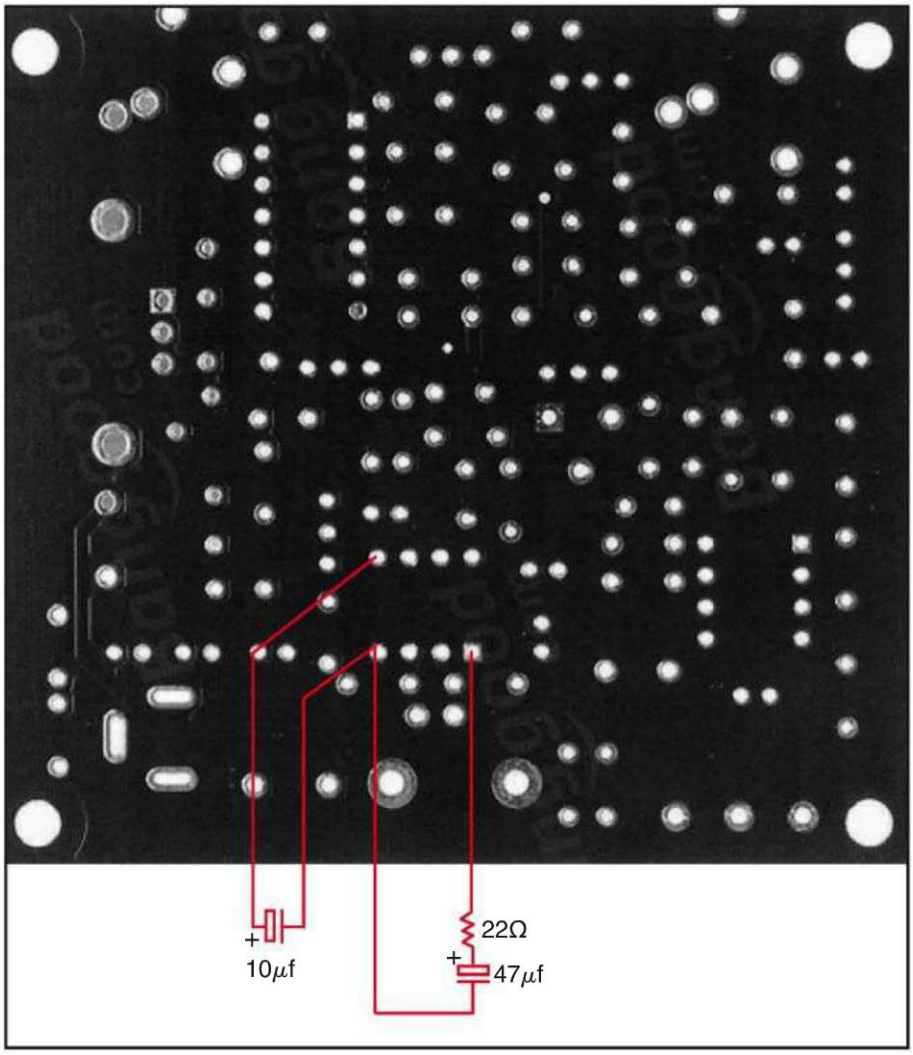

Figure 2. Components added to the bottom of the board. Placement was not critical but the author tried to minimize lead lengths.

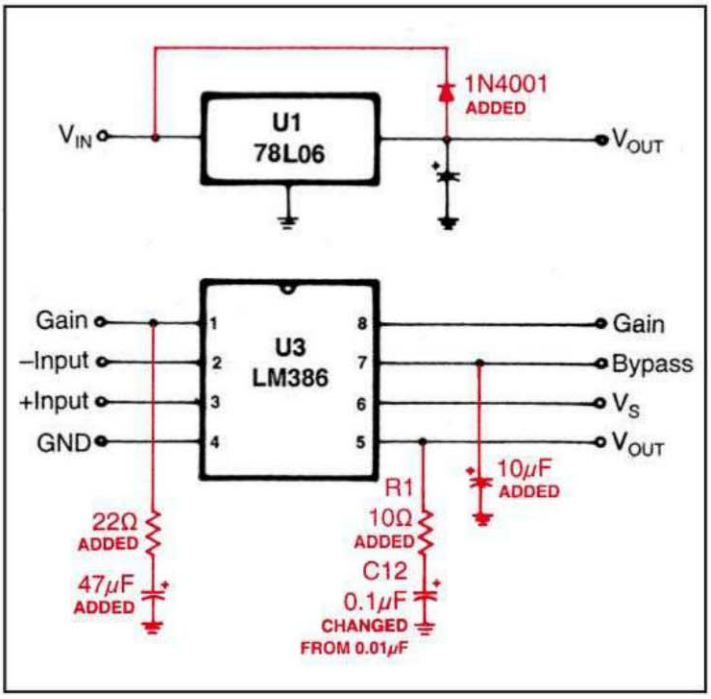

Figure 3. Schematic diagram of the additions and changes to the original Frog Sounds circuit discussed in the text.

since the supplied 0.01 µF simply did not provide enough capacitance.

Installing the Other Components

I mounted a 1N4001 diode on top of the board, to protect the three-terminal regulator 78L06. As shown, it is connected from U1 pin 3 to the ungrounded side of C8. I ran three short wires from W2, the RIT (receiver incremental tuning) location on the board, to a 50k-ohm panel-mounted potentiometer on the front panel. I also ran three short wires to the red and green LEDs, from the board to the front panel. You can choose between mounting some of the added components either above the board or beneath it. I did some of both to keep the leads short, but there is nothing unique about the way I did it.

Here is a summary of the added parts: Many hams have pretty good junkboxes; but if you don't have these parts, they are readily purchased. See Figures 1 and 2 for a pictorial view of the added parts, and Figure 3 for a schematic of the changes.

(1) 50k-ohm miniature panel-mount potentiometer
(1) 22-ohm 1/4-watt resistor
(1) 1N4001 silicon rectifier
(1) 10-µF 16VDC electrolytic capacitor
(1) 47-µF 16VDC electrolytic capacitor
(1) 0.1-µF disc ceramic capacitor
(2) crystal sockets, either bought or made as described

Optional parts:

(2) 7.030 MHz crystals
(1) red panel-mount LED
(1) green panel-mount LED
(1) suitable housing for transceiver
(4) stick-on plastic feet

Notes:

These crystals are in very small HC-49S cases. Be sure to order the correct size. I found them on the Internet.

There are green and red LED markings on the PC board. Wire the panel mounted units accordingly.

Under "key-down" conditions, the heat sink only gets a bit warm. Still, I used a perforated aluminum front panel for ventilation. Or, you can drill a few holes in the heat sink area.

Caution: There is an error on the schematic diagram that was included with the kit. Pin numbers were reversed on U1, the 78L06 voltage regulator. Vin is actually on pin 3 and Vout is on pin 1. The board layout is correct.

Operating Froggie

If this is your first direct conversion receiver, you may be surprised when you hear a CW signal equally strong on either side of zero-beat. Unlike more elaborate receivers, one side is not suppressed. This can actually be an advantage in some cases. If there is an interfering signal on one side, you can simply tune to the other side of zero-beat with the RIT control. That is one of the reasons I took that control (W2) off the board and put it on the front panel. There is another reason for moving it to the panel. A direct-conversion receiver has poorer selectivity than a superheterodyne receiver, which has an IF strip, and two or three CW signals may be heard at times. The RIT control allows you to optimize one signal.

Conclusion

Depending upon the depth of your junk box and the generosity of your ham friends, you can probably build the improved QRP kit for a total cost of $15 or $20, an amazing bargain when you consider all you get. Where else can you have so much fun for so little money? Think about Froggie when you're looking around for your next great radio club project.

Results of the 2016 CQ World Wide Foxhunting Weekend

BY JOE MOELL,* KØOV

"Warm up your antennas, charge your batteries, and gather up your maps. Hunting season is open and you don't need a license for this one!" Those were the creative words of Tim Bosscher, K8TB, as he announced the "Spring is Almost Here" hidden transmitter hunt in Hudsonville, Michigan.

To Tim and his friends, looking for hidden radio transmitters is a favorite ham radio activity. For 19 years, CQ Amateur Radio has sponsored the annual World Wide Foxhunting Weekend to encourage hams and prospective hams everywhere to join the fun of using radio direction finding (RDF) techniques to track down transmitters that their fellow hams have put in unusual places. "Foxhunting" is just one name for this activity. You also may hear it called "T-hunting" or "bunny hunting."

As always, my 2016 Foxhunting Weekend announcement in CQ brought a batch of hunt announcements and reports about hams having fun. Rules were determined locally so few hunts were alike, except for the on-foot, radio-orienteering events that followed standard rules of the International Amateur Radio Union. As you prepare for Foxhunting Weekend 2017, read on to find out how your fellow hams had a blast doing transmitter hunting all last year.

The most popular form of RDF contesting in the U.S. is the mobile T-Hunt on 2 meters. The Michigan rules are typical, as Tim described in his announcement: "Be at the starting point, get your odometer reading recorded and be ready to take off at 0900 hours. You'll have two hours to roam the countryside looking for the vixen (female fox) before we call it quits and meet up for the post-hunt session where we'll hear all the coulda, woulda, shoulda excuses. Remember that being inexperienced doesn't mean you can't win."

Five-year-old Jacob Sanderson helped his mother Patty, N9PLS, find 14 hidden transmitters in an hour during the on-foot foxhunt at the 2016 Dayton Hamvention®. (Photo by Bob Frey, WA6EZV)

Foxhunting in Michigan is a warm-weather sport, but in other places, the temperature doesn't matter. In South Windsor, Connecticut, Paul Gibson, N1TUP, gets it started on New Year's Day afternoon. Unlike the Michigan hunts, where lowest elapsed mileage determines the winner, Paul's hunt is won by the first team to find the fox.

"The fox will take a roll call at 1300 hours on the BEARS repeater," Paul announced. "The repeater will be used for all communication and information sharing. The fox will be located within 20 air miles of the starting point, not within Hartford or Springfield, on publicly accessible property that will not require anything other than a standard passenger car for access. I encourage communication between participants and any fixed stations that can supply helpful information to the hunters. Once you have spotted the fox, you should stop all transmissions. Pay attention. If someone says they are going to check an area and you never hear from them again, that might be a clue. Get bearings on the repeater input frequency, as that is the frequency the fox will be transmitting on. Do not hunt on the repeater output frequency as that will just lead you to the repeater."

Sometimes there's an unexpected ending to a mobile foxhunt. On such example took place August 26 on Long Island, New York, as reported by Larry Berger, WA2SUH: "Only Joseph Bizzaro, WJ2B, found the transmitter, which was on a ledge in a restroom at the dog park in West Hills County Park. We were at the entrance to the horse stables and the signal was extremely strong. We got out of the car and walked toward the horse barns. I came across

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Taped to a tree branch is one of 27 little transmitters for the 2016 Hamvention® on-foot foxhunt. (Photo by Dick Arnett, WB4SUV)

Blind foxhunters with sighted helpers are welcome at southern California on-foot transmitter hunts. At a West Side Amateur Radio Club session in the Kenneth Hahn State Recreation Area, Richard McDonald, KK6MRH, is getting bearings and navigating to a hidden transmitter with assistance from his wife, Charina. (Photo by Joe Moell, KØOV)

a yellow police tape and saw two park rangers on the other side. I stepped over the tape and was asked what I wanted. I told them and they said that this area was closed and, by the way, it is inappropriate to cross a police tape.

"Earlier in the day, illegal dumping had been found at the riding stables and it had been cordoned off with the yellow tape. Ron hid the transmitter just to the south of this area and the rangers came over and told him to vacate. So the rest of us headed to the Sweet Hollow Diner. It was a very frustrating evening for the hunters, but what are the chances that the transmitter would be hidden at a crime scene?"

Ever Increasing Difficulty

When mobile foxhunters are new to the sport, the hunts should be simple, with one hider in his or her vehicle making occasional transmissions and perhaps giving clues after a while. Experienced hunters expect more of a challenge, so the hiders have to step up their game. Some spend hours staring at Google Earth, trying to find hiding places that are out of the way and difficult to access. They check topographical maps in hopes of finding ways to reflect the fox signal and give false bearings to the hunters. The result is a hunt that can last a long time, such as the one near San Diego on April 2 that was dreamed up by Joe Corones, N6SZO; Greg Spaulding, W6BAF; and Karen Spaulding, KI6FON. They set out two transmitters with 11-element Yagis, one aimed toward El Capitan and the other toward Lyon's Peak. Even though the transmitters were only 0.7 mile apart, the signals seemed to be coming from two very distant places.

Mobile hunts for multiple transmitters like that are also an opportunity for audio trickery. Joe Loughlin, KE6PHB, described the hunt that he and Tony Boegeman, WA6ZMZ, organized for the San Diego hunters: "To add a twist, instead of clearly identifying each transmitter uniquely, all four transmitters played exactly the same audio for 15 seconds in sequence, providing the hunters with a constant but cycling signal to hunt. Since hunters were not told how many transmitters were in the hunt, their job was to identify each transmitter by bearing only."

Going a step further, Bob Thornburg, WB6JPI, wrote: "I have three Baofeng transmitters connected to DigiSpark Arduino computers set up to identify, in some arbitrary order, the same three transmitter numbers. The transmission is of random code tone and random speed and with random timing. The hunters have to unravel the mess."

Many would-be foxhunters have work commitments on weekends and other prime foxhunting times. Others, especially newcomers, want a no-stress opportunity to carefully test their RDF equipment and learn how to use it effectively. For these folks, a hunt-anytime option is ideal. In Connecticut, Paul Gibson, N1TUP, fills that need with his user-commanded foxbox.

Even though it has a 2-watt transmitter, the battery in Paul's foxbox typically lasts two weeks. When he deployed it in April, he wrote: "There is no designated starting place. While going about your travels, periodically try to activate it. Key your transmitter, ID and then press DTMF 1. If the foxbox can hear you, it will transmit its very distinctive sound for 30 seconds, ID, and then go back to sleep. You can make it transmit as often as necessary to find it.

"Once you are able to bring it up and hear it," Paul continued, "please report that information to the other foxhunters via the group email list. Do not reveal its location, just your location and bearing. This then becomes a starting point for the others."

After reading about the Connecticut fox-on-demand, Mike Hill, W8DER, of Byron Center, Michigan decided to provide something similar for foxhunters in the Wolverine state. So he built what he calls the Grand Rapids Version[1]. In September, he sent a message to the Connecticut foxhunters: "We have been following your 2-week hunts for some time and finally decided to try a local extended hunt using your template. We started the hunt early Monday morning and have had four members of different clubs find the fox. Many others are trying and reporting locations where signals have been heard. As I sit here tonight, it is dark outside and raining cats and dogs. With my beam antenna, I can hear hunters still trying to find the fox even in these conditions. What fun we are having! Thank you CTFoxHunters group."

In these days of "see something, say something," it's wise to make sure that a hidden transmitter won't be considered to be a threat. In another group message, W8DER wrote: "After discussions with the supervisor of the Michigan State Police Bomb Squad, some changes were made. Two permanent labels were engraved and placed on the top of the box. In addition, a 'name tag' type message, sealed in plastic, is clipped to the top handle with two current phone numbers for additional information, my home phone and my cell phone. During a hunt, I am sure to keep my cell on at all times."

Anton James, VE7SSD, (at left) presented the crystal bunny award to Jan Vozenilek, VA7VJ, winner of the 80-meter portion of the Surrey Amateur Radio Club's annual on-foot foxhunt. (Courtesy of Surrey ARC)

Taking it to the Woods

Every year brings more reports of Foxhunt Weekend events that are all on foot, no vehicles involved. These no-vehicle events draw a lot of interest from young people because they reward physical ability instead of driving and street navigation skills. Kids don't need driver's licenses or ham licenses to receive and to hunt. RDF gear for 2-meter, on-foot hunts can be very simple, just a handi-talkie with a small beam and an RF attenuator.

The annual foxhunt at the Dayton Hamvention® is perfect for family fun. As usual, the 2016 hunt took place at Sinclair Park, less than two miles from Hara Arena, on Saturday, May 21. Before the hunt, Bob Frey, WA6EZV; Dick Arnett, WB4SUV; Phil Smith, KG8AP; and his son, Ben, scattered to the four corners of the park and stashed 27 tiny transmitters. Hunters were given sheets listing the frequencies of the transmitters then they had 1 hour to locate as many of them as possible.

Nine teams and individuals searched for the foxes, including two blind persons who hunted with assistants. Mike Brost, WA9FTS, of the Chicago Foxhunters described the scene: "Some transmitters were in trees out in the open but covered by ivy. Others were on the outskirts of the park in the woods. There were picnics and parties going on nearby to add to the noise. Even though it had rained the day before, the ground and grass had dried out, making it easier to search through the heavy woods. In the end, Matt Sanderson, KC9SEM, was first with 24, but he missed the one right next to the start-up table. I missed that one also. I thought it was funny that a signal was coming from there but never checked it out. I found 16 transmitters for second place. My wife Patty, N9PLS, with Jacob, our 5-year-old, found 14 to take third. Tom Geletka, N9CBA, discovered nine and the other hunters from around the country found fewer." (We're guessing that Hamvention organizers will be hunting for a new foxhunt location this year, closer to the new show location in Xenia. – ed.)

Antennas

The measuring-tape Yagi[2] is a simple, safe, and very effective direction-finding antenna for 2-meter, on-foot foxhunts. It also makes an excellent club project. At all of our southern California on-foot transmitter hunts, including the annual Foxhunting Weekend session at Hillcrest Park in Fullerton, there is an opportunity for newcomers to build and test these antennas and offset type attenuators[3] from kits.

Last summer, antenna building and foxhunting took place on a grand scale in the most populous city in India. This two-day event was a joint effort of the Don Bosco Institute of Technology in Mumbai; the Institute of Electrical and Electronics Engineers, Mumbai section; and the Mumbai Amateur Radio Institute. I received this report from Shailesh Deshmukh, VU2LOC, of MARI: "The Yagi building workshop started with an introduction of antenna physics and fundamentals. A total of 57 students participated, including some college faculty members. Nineteen teams homebrewed their tape Yagis and learned how to tune them using an antenna analyzer. Day two began with an introduction to foxhunting, followed by four hunts. The third was particularly challenging, as students took around an hour and a half to locate the transmitter. All together it was an excellent event full of learning, experimentation, and fun. A video of the workshop and the hunts has been posted to YouTube[4]."

For physically fit hams of any age, a few local foxhunts with a measuring-tape Yagi can be the start of a lifetime of championship Amateur Radio Direction Finding (ARDF), also called foxtailing and radio-orienteering. Once a year, foxtailing fans get together somewhere in the U.S. to see who is best. In 2016, USA's ARDF Championships took place near Killeen, Texas.[5] Plans are under way for this year's championships, which will be in the Cincinnati area during August. They will be open to anyone of any age who can safely navigate and carry lightweight RDF gear from point to point in the woods for 5 kilometers or more. Details and reg-

The 2016 ARRL National Convention at the Orlando HamCation on the second weekend of February included a RDF class for youth. Faith Hannah Lea, AE4FH, is learning to use a measuring-tape Yagi for 2-meter foxhunting. (Photo by Larry Jacobs, WA7ZBO)

istration information will be in future "Homing In" columns.

On Saturday, May 21, Crescent Park in South Surrey, British Columbia, was the site of the annual Surrey ARC ARDF event with 23 participants. John Schouten VE7TI, provided this report in the SARC Communicator newsletter: "Course-setter Les Tocko, VA7OM, was onsite early and set out five 2- and 80-meter foxes in areas of the park. Les familiarized the rookies in attendance with transmitter location techniques and loaned some gear to get them started, if needed. At 10 a.m., after a briefing by event organizer Anton James, VE7SSD, the hunt was on. An excellent barbecue lunch followed, then the presentation of the coveted crystal bunny to the top score in the 80-meter group and the pink fur bunny to the best 2-meter top scorer."

While the majority of hidden transmitter hunts are on 2 meters, they can be done on almost any ham band. You can read about techniques, which vary from band to band, in my October 2016 "Homing In" column. At the 2016 convention of the South East Radio Group at Mt. Gambier in south Australia on the second weekend of June, there were hunts on the 80-, 10-, 6-, and 2-meter bands plus 70 centimeters as part of the annual Australian Foxhunting Championships. You can see a video of the action, including some good aerial drone footage, on YouTube.[6]

Next Foxhunting Weekend — May 13-14, 2017

Mobile or on-foot, one transmitter or many, a radio foxhunt is sure to stir up activity in your ham club. Now is the time to plan for this year's CQ World Wide Foxhunting Weekend, which will be May 13-14. CQ doesn't impose any specific rules or offer any awards for Foxhunting Weekend. That's up to you and the hams in your hometown. Your hunt can be for mobiles or all on foot. Use the international rules or make up your own. For many clubs, Foxhunting Weekend kicks off a season of regular transmitter hunts. For others, it's a special once-a-year event, like Field Day. Since the primary objective is lots of hunt participation, we don't insist that your event be on that weekend. Any time in the spring is fine with us.

These hams in Mumbai, India are still enthusiastic after two full days of building, training, and foxhunting. (Courtesy of Shailesh Deshmukh, VU2LOC)

Joe Corones, N6SZO, and Greg Spaulding, W6BAF, put on an unusual mobile transmitter hunt in El Cajon, California on the first weekend of June, starting from Grossmont Community College. A simulated "jammer" drove this track and hunters were encouraged to cooperate by sharing bearings and locations on a separate simplex frequency to intercept him as quickly as possible. Of course, they didn't get to see this track before the hunt.

If your club has always had one kind of hunt on Foxhunting Weekend, why not try something different this year? Some hams prefer the formalities of carefully-crafted boundaries, specifications for signal parameters, time limits, and so forth. Others are content just to have one or more signals to hunt. No need for any regulations, they say. Talk it up on the local repeater and see what your friends have in mind.

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

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

Make your Foxhunting Weekend activities into a magnet for every club member. Better yet, include the whole community, especially young people. Invite a Scout troop to experience on-foot transmitter tracking or to ride along with the mobile hunters. Look for opportunities to incorporate foxhunting into Scout activities such as Camporees, Scout-O-Ramas and Jamboree-On-The-Air. Seek out other youth groups that might be interested.

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

I am eager to read your reports of this year's foxhunting activities and the new ideas that you come up with. Happy hunting!

Notes:

1. http://bit.ly/2gwcNGw
2. http://bit.ly/2gD8MFc
3. http://bit.ly/2gDbLNS
4. https://youtu.be/xowFzVx6dUg
5. Full report in "Homing In" column for August 2016
6. http://bit.ly/2gw4b2P

Old-time DXers likely have at least a few QSLs from these former U.S. possessions in their card collections. W4YO looks at five former U.S. territories, how they came to be administered by the United States and their status today.

America's DXCC History: Former Possessions, Former Prefixes

BY EDMUN B. RICHMOND,* W4YO

Since the late 1800s, the United States has had many possessions in various parts of the world. For the most part, these have been islands or island groups. Many of them became U.S. territories during the heyday of the Guano Islands Act[1]; many others as a result of the Allied victory after World War II. Since that time, a number of these possessions have gained their independence, and exist today as part of the international community with full membership in the United Nations. This article will offer a brief history of these former U.S. territories, along with their amateur radio activity before and after transition to independence. We shall look at six former American DX entities, including Canton and Enderbury Islands (KB6), Eastern Caroline Islands (KC6), Western Caroline Islands (KC6), Marshall Islands (KX6), Swan Islands (KS4), and the Panama Canal Zone (KZ5).

Canton and Enderbury islands (KB6/VR1)

Both the United Kingdom and the United States laid claim to these islands. The British claimed Canton Island in the 1850s, but didn't visit the island until August 1936. The UK reaffirmed its claim by making several visits to the island in that year, and in August 1937, built a radio station there. In June 1937, a joint American-New Zealand National Geographic expedition landed on Canton to view and research a total eclipse. At that time, the American contingent claimed the island for the United States. Although the British ambassador to the United States protested, U.S. President Franklin D. Roosevelt reasserted the claim of the islands on behalf of the country. Although the dual claim strained relations between the two countries, diplomatic talks settled down to a mutual and amicable agreement. From 1939 to 1979, the two islands were formed into a joint condominium[2], and were governed by both countries until 1979.

In May 1939, Pan American Airways built a facility on Canton for its Flying Boat service to New Zealand, and during WWII, the U.S. Navy constructed a 6,230-foot (1.9-km) runway on the island, which became a stopover point for its transport service to Australia and New Zealand. It also was the staging point for attacks on the Gilbert Islands, which, at that time, were occupied by the Japanese.

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In 1979, both the UK and U.S. relinquished control over the two islands to the newly-formed independent nation of Kiribati. The condominium was dissolved under the Treaty of Tarawa, and the islands became part of the Phoenix Islands administrative group of the new nation, an area now called Central Kiribati. Because of the newly-adopted orthography used in Kiribati, Canton is now spelled Kanton.

During the condominium years, both the U.S. and UK issued amateur radio licenses, with British hams using the prefix VR1 and Americans licensed to use the KB6 prefix[3]. This British/American Condominium brought about an unusual DXCC ruling. A contact with a VR1 station in a location on Canton Island would be granted credit for British Phoenix Islands. By the same token, an American operating with a KB6 call from the very same station and location would be granted credit for Baker, Howland, and American Phoenix Islands. After the American callsign change in 1979, the KH1 prefix was used until transition to Kiribati.

Caroline Islands (KC6)

In the western Pacific Ocean, just north of the equator and east of the Philippine Islands, lies a large archipelago called the Caroline Islands. The island group covers some 830 square miles (2,150 square kilometers). The main and largest islands of the Western Caroline Islands are Yap and Palau, while Eastern Caroline is made up of Ponape (now Pohnpei), Truk (now Chuuk), and Kusaie (now Kosrae). Both groups, volcanic in origin, contain hundreds of smaller islands and reefs.

The Spanish were the first Europeans to claim the archipelago in 1875, although they did not formally occupy any island until 1886. As a result of their defeat in the Spanish-American War in 1898, the Spanish ceded Guam to the United States and sold the Caroline Islands to the German Empire. In 1914, Japan occupied the islands, and in 1920, received a mandate from the League of Nations to govern them, along with the Marshall Islands and Northern Mariana Islands. The Japanese remained until the conclusion of WW II. In 1947, the Carolines, along with the Marshall Islands and Northern Mariana Islands, were placed under U.S. administration by the United Nations. Both became part of the U.S. Trust Territory of the Pacific Islands (TTPI).

The TTPI formed its own constitutional government in 1979, declared its independence, and became a sovereign state in 1986, as the Federated States of Micronesia. However,

Photo A. The Swan Islands were jointly claimed by the U.S. and Honduras, and were home to several U.S. government facilities, including a weather station and Radio Swan, which broadcast to Cuba in the 1960s. Hams there were issued KS4 prefixes before the U.S. renounced its claim and the islands reverted to Honduran administration. (QSL photos courtesy K8CX Ham Gallery, <www.hamgallery.com>)

two former members of the TTPI took separate paths to independence. They became the Republic of Palau and the Republic of the Marshall Islands. All three of the independent states entered into a Compact of Free Association with the United States, and are now members of the United Nations. The Northern Marianas, however, did not seek independence, but preferred to forge closer ties with the U.S., and sought commonwealth status with America. In 1978, a new government was formed, a new constitution was ratified, and the area became the Commonwealth of the Northern Mariana Islands.

Amateur radio prefixes have also changed. The original prefix for both East and West Caroline Islands was KC6. The only way to ascertain which of the Carolines was worked was to ask the operator. Independence solved that problem. As independent nations, they each received their own exclusive prefixes from the International Telecommunication Union (ITU). Palau became T8, while the FSM received V6. As a territory of the U.S., the Northern Marianas did not undergo a severe prefix change. The basic prefix was KG6 for Guam, KG6R for Rota, KG6T for Tinian, and KG6S for Saipan. These prefixes remained in effect until the revamping of U.S. prefixes in 1979, when Guam became KH2 and the Northern Marianas became KHØ.

Marshall Islands (KX6)

The Marshall Islands are located east of the Federated States of Micronesia, north of Kiribati, and south of Wake Island. The nation consists of 29 atolls and five isolated islands, forming two groups, known as the Ralik Chain and the Ratak Chain. The islands' early history and subsequent entanglements with Spanish explorers, Japanese invaders, mandated territory, and World War II military action are closely related to that which was discussed above about the Carolines and will not be repeated here.

At the conclusion of WW II, the Marshalls were consolidated into the Trust Territory of the Pacific Islands, which was governed by the U.S. After 1946, the Marshalls became the site of the Pacific Proving Grounds for atomic research and testing. The U.S. tested 67 nuclear devices there, and in 1952, the first hydrogen bomb was exploded on the island of Elugelab. The island was completely vaporized. Eleven of the islands continue to be leased by the U.S. They are part of the Ronald Reagan Missile Defense Test Site, which includes testing of electronic and optical systems used for missile and missile-interceptor defense, as well as for space operations support.

In 1979, the Government of the Marshall Islands was established, making the country self-governing and in 1986, the area was granted sovereignty as the Republic of the Marshall Islands, under a Compact of Free Association with the U.S. Amateur radio was quite active after WW II, and many stations appeared with the KX6 prefix.

The French website, Les Nouvelles DX[4], shows 71 QSLs from KX6-land. After independence, the new prefix for the Marshalls became V7 and the former KX6 prefix was retired.

Swan Islands (KS4)

The Swan Islands are located in the western Caribbean Sea, approximately 95 miles (152.9 kilometers) off the northern coast of Honduras, and 400 miles (804.6 kilometers) from Key West, Florida. They are another example of America's claim to territory via the Guano Island Act. The Swan Islands consist of three islands, Great Swan, Little Swan, and Booby Cay. Great Swan is nearly two miles (3.22 kilometers) in length with a maximum elevation of 68 feet (20.7 meters) above sea level. Little Swan is about 1.5 miles (2.4 kilometers) in length by 0.3 miles (0.48 kilometers) wide with a maximum elevation of 78 feet (23.8 meters). Booby Cay is a small cay off the southwestern tip of Great Swan and is only about 100 yards (91.4 meters) long.

Photo B. Prior to World War II, amateurs in the Panama Canal Zone were issued K5 prefixes. Interestingly, these calls were issued by the local Canal Zone military governor, not the FCC.

In the early 1900s, the Swan Island Commercial Company leased part of Great Swan to the United Fruit Co., which planted thousands of coconut palms on the island. The company also provided weather data for hurricanes from 1928 until 1932. The U.S. Weather Bureau (precursor of the National Weather Service) established a part-time weather station there in 1938 which was manned only during hurricane seasons until it became a year-round operation in the early 1940s. An aircraft radio-navigation beacon was installed on Great Swan in 1946 for guidance of Caribbean air traffic. It was operated by the FAA until 1971, when the FAA departed. This left only U.S. meteorologists on the islands.

In 1960, a 50,000-watt radio station was set up on Great Swan by the CIA and began broadcasting programs in Spanish. This occurred shortly after Fidel Castro took over Cuba. It was decried by the Castro regime as a propaganda outlet for expatriate Cubans. The station, known as Radio Swan, was changed in 1961 to Radio America and the headquarters moved to Miami. The station was deactivated in the late 1960s. Both Honduras and the U.S. had claimed the islands until the U.S. dropped its claim in 1972.

Over the years, ham radio stations were active with the KS4 prefix (Photo A). These callsigns disappeared after the islands reverted to Honduran administration. Occasionally, there is an IOTA expedition to Swan[5], but there is no more DXCC status for them.

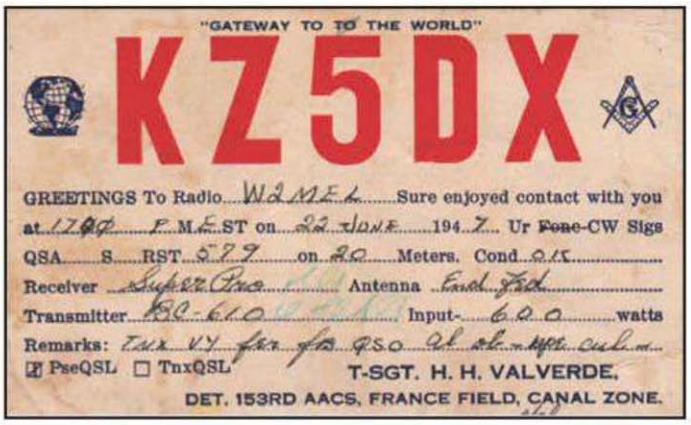

Photo C. After World War II, the Canal Zone prefix was changed to KZ5 and remained that way until the U.S. returned the zone to Panamanian sovereignty in 1999.

Panama Canal Zone (K5/KZ5)

The Panama Canal Zone was a strip of United States territory located within the Republic of Panama. It was 553 square miles (1,430 square kilometers), including the canal, but also extended 5 miles (8.1 kilometers) on each side of the centerline of the canal. Although it ran through the cities of Colon and Panama City, those two cities were not included in the zone. It was created in November 1903, with the signing of the Hay-Brunau-Varilla Treaty. From that time until 1979, the territory was controlled by the United States, under the jurisdiction of the U.S. Defense Department and was administered by a governor appointed by the President of the U.S. At the same time, the governor, who was always a U.S. Army general, headed the "civil government" of the Canal Zone. He was also the president of the Panama Canal Company. In addition to naval and air force bases at both ends of the canal and at the ocean ports, the U.S. maintained fortresses, airfields, and a permanent military force in the zone, all under the control of the U.S. Southern Command. From 1979 to 1999, the canal was under joint control of Panama and the U.S. Full operation of the canal was relinquished and turned over to the Panamanians on December 31, 1999.

Amateur radio licenses in the Canal Zone were not issued by the FCC, but rather by the local Canal Zone government. The prefix before World War II was K5 (Photo B); after the war, it became KZ5 (Photo C). Many club stations existed, as well as individual stations. KZ5 stations were very active daily, running phone patches back to the U.S. On any given day, the frequencies of 21.400 and above were filled with stations in the Canal Zone engaged in that activity. K8CX's HamGallery[6] shows 27 pre-WW II QSLs and 98 post-WW II QSLs for the Canal Zone.

In Closing...

This article has described, if only in a brief way, some of the changes in America's possessions, DX history, and how that history relates to the present state of the DXCC entity list. Any old-time DXer will recognize these entity deletions and prefix changes, and probably will have a few QSLs to match up with each territory. As the saying goes, to understand the present, one must investigate the past. Countries come and countries go. Some countries are absorbed, others emerge from old ones, while others disappear and are forgotten with the passage of time. One thing is certain. Changes in geopolitical alignment, and how those changes affect DXCC, are inevitable. All we have to do is wait for them.

Notes

1. See my article, "DXing the Guano Islands," CQ, Jan/Feb 2015, p. 30
2. In international law, a condominium is a geopolitical territory in which two or more sovereign powers formally agree to govern jointly and equally, without dividing that territory along national zones.
3. Immediately after WW II, the prefix KC6 was used before the KB6 prefix was issued.
4. See <http://lesnouvellesdx.fr>
5. IOTA reference number NA-035, prefix HR6
6. See <http://hamgallery.com/qsl/deleted/CanalZone>

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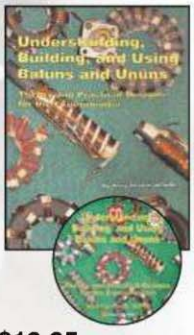

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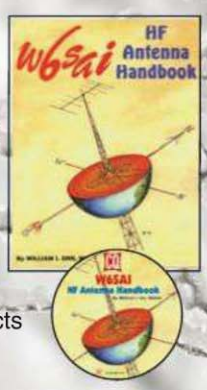

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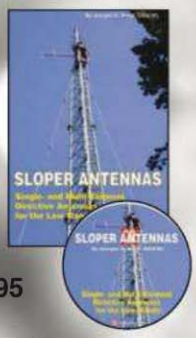

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Emergency and public service communications support is no longer limited to FM voice and repeaters. A new generation of amateur radio support systems takes advantage of multiple modes and bands. Here's one example from New Jersey.

The Ham-Pod: A New Kind of Go-Kit

BY TONY OTLOWSKI,* W2WCC
Photos by S. Todd Rush Jr.,% W7STR

A major challenge to amateur radio organizations that deploy for public service is equipment. Radios, coax, and antennas must all be stored and packed for easy transportation to the deployment site. Sources of power must be located onsite or brought along. If an organization wishes to use digital modes, computers and other equipment need to be added to the mix. All of this presents significant logistical challenges to emergency and public service deployment.

When the Medical Coordination Center for the Southern New Jersey region (MCC-South) wanted to increase its use of amateur radio in mass casualty and mass care scenarios, it went in search of a way to have all of the gear necessary to support a small team of operators contained in one package that was easy to transport, set up, and use. The result was the Ham-Pod, a self-contained unit that houses radios, antennas, and accessories while also providing several options for power based on on-scene conditions.

The Ham-Pod is the brainchild of then-ARRL Section Emergency Coordinator John Zaruba, K2ZA; CQ Emergency Communications Editor Cory Sickles, WA3UVV, and Bob Saunders, KC2UYS, who heads up the MCC-South, which is based out of Cooper University Healthcare in Camden, NJ. When John and Bob came across Rescue 42's website advertising the PodRunner <http://thepodrunner.com>, they saw the possibility for an amateur radio system. They approached Tim O'Connell, president of Rescue 42, with their idea to create an amateur radio version of the PodRunner. A year of discussions and drawings sent back and forth finally resulted in a workable design. Bob was able to secure some grant money through Cooper UHC and the MCC-South and construction commenced. A total of five Ham-Pods were built with the initial grant money, at a cost of approximately $20,000 each.

Each Ham-Pod includes:

- 1 Yaesu FTM-400DR dual-band FM/C4FM transceiver
- 1 ICOM IC-5100 dual-band FM/D-STAR transceiver

A Ham-Pod ready for use. The PC on the left is running DRATS and the one on the right is running FLDIGI.

- 1 Yaesu FT-857 HF/6M/2M/70cm transceiver
- 1 ICOM ID-1 1200 MHz FM/D-STAR transceiver
- 1 Alinco DR-235T MKIII FM 220MHz transceiver
- 1 Kantronics KPC-3 packet TNC (terminal node controller)
- 2 Yaesu FT1-DR dual band FM/C4FM handhelds
- 2 ICOM ID-31a 70-cm FM/D-STAR handhelds
- 2 Laptop PCs
- Antennas for all of the mobile radios

The antennas mount to NMO (or type "N" for 1.2-GHz) mounts on the lid of the unit. When the lid is open, the antennas extend vertically from the top of the Ham-Pod. Other antennas can be connected by disconnecting the coax from the NMO mount and connecting the desired antenna in its place. Other amenities on the Ham-Pod include dimmable scene lights, pull-out writing shelves, a number of 120-VAC, USB, and cigarette lighter style outlets for charging or powering other devices, and a RIGrunner to plug in devices fitted with Anderson power poles.

When selecting radios, much effort was put into taking advantage of the available infrastructure in the region. Southern New Jersey has a robust D-STAR system, which

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Williamstown, NJ 08094
email: <W2WCC@Comcast.net>
% email: <strushjr@gmail.com>

A Ham-Pod being set up and tested at the Joint Base McGuire-Dix-Lakehurst Air Show.

was built with grant money as a joint venture between the MCC and the southern NJ counties. Including D-STAR in the Ham-Pod takes advantage of this infrastructure. With the advent of Yaesu's System Fusion, many System Fusion repeaters have gone up, and continue to go up in the region.

Including the FTM-400DR and FT1-DRs in each Ham-Pod also allows for the use of APRS (Automatic Packet Reporting System). While APRS can be used as a position-tracking tool to track operators, that is not the primary use envisioned for APRS on the Ham-Pods. The messaging function of APRS allows for short messages to be sent from one operator to another, thus allowing for a type of texting without need for cell phone service. Bulletins can be sent from the Ham-Pod to all of the operators to pass message traffic to multiple operators at once. This can be used to warn of weather conditions or other incidents at a scene.

For maximum versatility, each Ham-Pod has a variety of power options. There is an onboard large-capacity deep-cycle gel cell battery in every unit. Each Ham-Pod can also operate from standard 120-VAC shore power using a standard extension cord. To make the Ham-Pod a truly stand alone system, each unit includes a third power option. Two of the Ham-Pods have solar panels that are deployed on a mast and connected to an on-board solar charge manager. The other three units have an inverter generator stored in a compartment in the back that can be deployed on scene.

Despite their size and weight, the Ham-Pods are designed to be rapidly and easily deployed in a variety of settings. The Ham-Pods can be carried by any vehicle with a standard 2-inch trailer hitch, provided the vehicle can support the weight of the unit (approximately 500 lbs). In practice, most full-size pickups and large SUVs work very well. Each Ham-Pod has a universal hitch adapter mounted underneath. This adapter replaces the ball-hitch on the vehicle. Once the Ham-Pod is mounted on the hitch, the wheels are cranked up off the ground; thus there are no motor vehicle registration issues to worry about.

When off of a vehicle, the Ham-Pod rolls on urethane foam tires which eliminate the need to check tire pressure. The height of the unit is adjustable via a crank on the side, which operates a scissor lift under the box. Ham-Pods are designed to fit through any ADA compliant doorway, and can fit in most standard elevators.

Initial Deployment for Papal Visit

When it was announced that Pope Francis was coming to Philadelphia, the MCC-South prepared to deploy assets to support people making their way to Philadelphia via Camden. The NJ EMS Task Force, which consists of EMS assets from all over the state of New Jersey, would deploy to five major points around Camden. It was decided to deploy a Ham-Pod at each of the EMS locations. Amateur radio would be tasked with sending information to the MCC from these EMS locations.

More than 25 operators from as far away as Connecticut volunteered to work with the Ham-Pods over the course of the weekend. With the Ham-Pods ready and staged at Cooper UHC, the first challenge was deployment. Personal vehicles were forbidden inside the secure area of Camden for the weekend. The universal hitch adapter design allowed for utility vehicles from the EMS Task Force to carry the Ham-Pods to their deployment locations. Not only did the hitch adapters perform as designed, but the EMS Task Force was happy to assist with transportation since the Ham-Pods would be supporting them.

During the course of the weekend, most people coming to the Papal events bypassed Camden, meaning that the EMS Task Force had a considerably lower than anticipated patient volume. This provided a perfect opportunity to give the Ham-Pods a "shakedown cruise" in a relatively low-stress environment. All of the operators who worked with the Ham-Pods were impressed by their ease of use and excellent design. Officials from the EMS Task Force and other agencies, such as the state Office of Homeland Security, visited the Ham-

Author and ARRL SNJ Section Emergency Coordinator Tony Otlowski, W2WCC, sending NBEMS (Narrow Bandwidth Emergency Messaging System) traffic from a Ham-Pod at the air show.

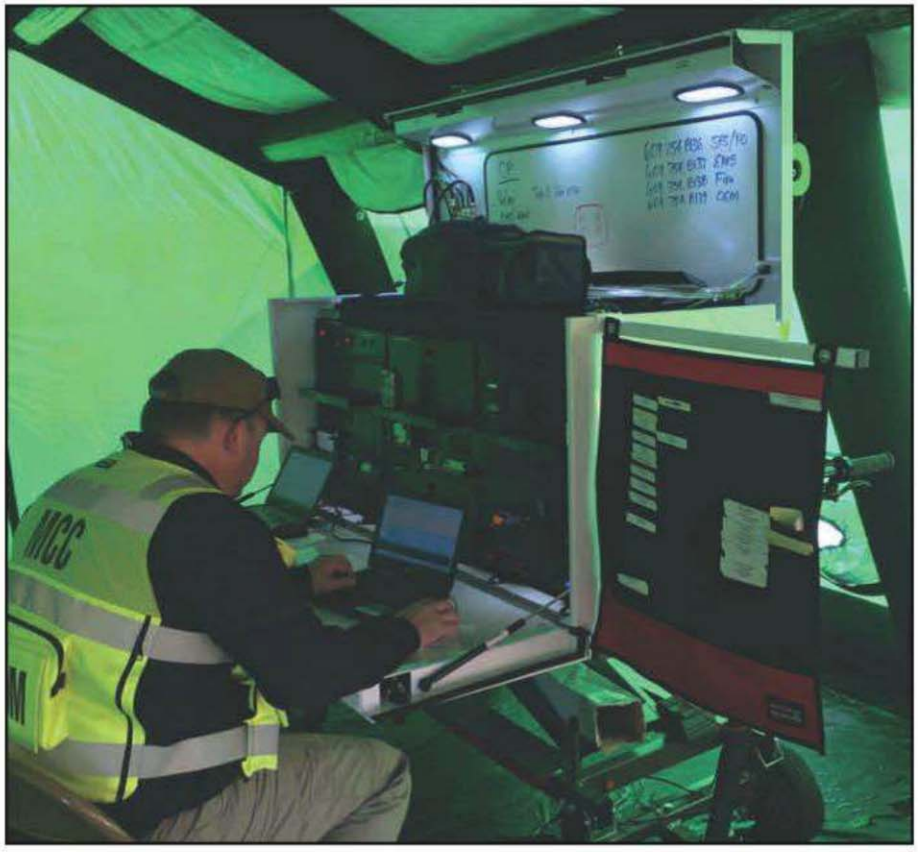
Pods and were impressed by both the capabilities of the units and their clean, professional appearance.

After the Papal weekend it was decided that, while the Ham-Pods performed admirably, a few changes were desired. The biggest of these was the addition of a Signalink attached to the FT-857 on each Ham-Pod. This would allow for messages and files to be sent via Narrow Bandwidth Emergency Messaging System (NBEMS), complementing the existing Winlink and DRATS capabilities of the Ham-Pods.

Air Show Support

With the Signalink units newly installed, the MCC received a request from the U.S. Air Force to support the OEM at the air show to be held at Joint Base McGuire-Dix-Lakehurst. The air show is a very large event with thousands of people coming from all over the region to see the show headlined by the world famous U.S. Air Force Thunderbirds. Base OEM wanted back-up communications capabilities in the event that primary radio systems failed or were overloaded.

Once again, all five Ham-Pods were deployed, accompanied by a crew of over 20 operators. Both the DoD and the New Jersey State Police (NJSP) were impressed by the capabilities of the operators and the Ham-Pods. During the two-day event, the Ham-Pods used voice, DRATS chat, and NBEMS to send traffic between locations on the base, and back to the MCC. The NJSP offered to bring the Ham-Pod at the command post onto the "Jersey-Net" system developed for public safety agencies during large incidents. With the Jersey Net dongle, the command post Ham-Pod had internet access that, while not critical, was a good opportunity for interoperation.



Chuck Lanard, KD2EIB, monitoring NBEMS traffic at a Ham-Pod set up in the command tent at the air show.

Another Grant = Two More Ham-Pods

The success of the Papal visit and air show operations convinced the State of New Jersey to provide additional grant money for two more Ham-Pods, bringing the total number of units in service to seven. As part of the grant agreement, the Ham-Pods will be stationed in each county supported by the MCC-South. While the Papal visit and air show operations were great opportunities for large-scale operations with all of the Ham-Pods active at the same incident, that is not necessarily their primary mission.

A more likely concept of operations for the Ham-Pods moving forward is a single Ham-Pod deployed to an incident with a small team of operators. Missions of this type could include medical needs shelters, mass casualty incidents, and mass gatherings that require an EMS presence. With their mix of fixed and handheld capabilities, and ability to be self-sufficient, the Ham-Pods should excel at this mission. The Ham-Pods are maintained and staffed by an AUXCOM unit consisting of seven amateur operators from the MCC who are credentialed by Cooper UHC. During an incident, these operators would work with local amateurs such as ARES groups to provide support.

To what extent does an amateur radio antenna tower on your property affect your neighbors' property values? An article in a legal publication suggests the answer might be … it doesn't.

Ham Towers and (Other People's) Property Values

BY RICH MOSESON,* W2VU

Beauty is in the eye of the beholder, it's said, and what we hams perceive as a magnificent addition to our local landscape — a beautiful tower supporting beautiful antennas — is often perceived differently by our neighbors. And one argument frequently made by neighbors opposing a ham's application for permission to build a new tower is that it will constitute an eyesore that will reduce their property values. But will it?

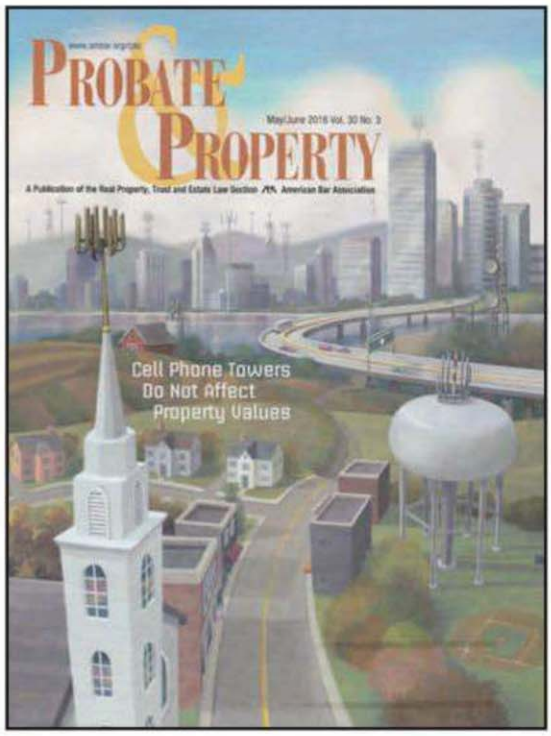
A recent article in an American Bar Association magazine examined this question with regard to cell phone towers and concluded that, as it says on the cover, "Cell Phone Towers Do Not Affect Property Values." The article in the May/June 2016 issue of Probate and Property magazine[1] focuses on a court case in Delaware in which lengthy procedural delays actually helped AT&T analyze the impact of a temporary cell tower in the same location as its proposed permanent tower over a two-year period. The conclusion, based on empirical data from real estate transactions in the neighborhood before the tower was put up and while it was up, was that prices rose and fell in step with those in the rest of the community and that the presence of the tower had no impact on property values.

The article also cited multiple past studies that came to the same conclusion, but noted that those often were not accepted by zoning boards or courts in individual cases, "on the apparent theory that such studies fail to take local factors into account." What made the Delaware case significant, the authors wrote, was that the area studied was not only like the one at issue, it was the one at issue.

No Direct Comparison

Of course, it would not be valid to try to make a direct linkage between this case and an amateur tower case. One of the reasons cited in the article for the lack of influence on property values is that, according to appraisers, cell towers have become so ubiquitous that they "are much like other modern infrastructure" such as streetlights and telephone poles, and that while they "may initially be noticed, they quickly fade into the background and have no appreciable effect on value…"

Amateur radio towers are nowhere near as numerous as cell phone towers so they don't necessarily "fade into the background" as quickly for neighbors. In addition, cell towers tend to be more commonly located in commercial areas while amateur towers nearly always are in residential areas, so a direct comparison would likely be dismissed.



Borrow the Methodology

However, if you are applying for a tower permit and running into this argument, it may be a worthwhile investment of time and/or money to research effects on property values around the homes of amateurs with similar towers in nearby locations. The methodology used here can certainly be applied — looking at home sales and/or rental prices in the two years prior to the tower's installation and the two years after, then comparing those figures with similar statistics for the broader neighborhood. If they are relatively consistent, then that would indicate little to no impact on property values. If they are out of step with the surrounding community, then there may be some validity to the argument in that specific case. However, based on the multiple studies referenced in this article about cell towers, as well as the specific case cited as the focus of the article, establishing a valid link would be highly unlikely … since it is highly unlikely that the mere presence of a radio tower, whether for a cell site or a ham station, has any significant actual influence on the value of surrounding properties.

Notes:

1. Forsten, Stabler and Fagbami, "Cell Phone Towers Do Not Affect Property Values (Or the Case of the Three Board Hearings and One Temporary Tower)," Probate & Property, May/June 2016, Vol. 30, No. 3, p. 10; published by the Real Property, Trust and Estate Law Section of the American Bar Association, <http://www.ambar.org/rpte>.

* Editor, CQ

Here is a down-to-earth, non-engineering level description of what basic wire antennas are, methods of coupling to them, and some interesting possibilities when using them.

Wire Antennas: A Primer

BY BOB SHRADER, W6BNB (SK)

Editor's note: The author, now a Silent Key, was a frequent CQ contributor and the author of Electronic Communications, a standard engineering textbook published in multiple editions between 1959 and 1991. We present this article with the author's original hand-drawn illustrations.

What is a dipole? Since the beginning of amateur radio, one of the basic horizontal wire antennas has been the dipole. It is a wire cut to a half-wavelength (1/2-wave) for the middle of the band of frequencies on which it is to be used. A 1/2-wave wire allows electrons to oscillate back and forth along it most easily at its resonant frequency length.

"Dipole" can be considered to mean the shortest antenna that can have only two different maximum voltage polarities. When one end is at a maximum positive polarity, the other end will be at a maximum negative, with zero polarity in the middle. If it is a little too long or too short, the true maximum voltage cannot be developed on the wire. If a radio frequency (RF) AC voltage drives enough negative electrons to produce a 500-volt negative charge at one end of a dipole, the other end, having now lost that number of electrons, becomes 500-volt positive.

An important question for the radio amateur is: To what length should a dipole antenna be cut? The 160-meter band, which is 1.8 to 2.0 MHz, is our only medium frequency (MF) band. MF means 0.3 to 3 MHz. Our other 10 high frequency (HF) bands are between 3 and 30 MHz. The length of a dipole in feet for any of these bands can be determined if the desired frequency of operation is known in megahertz (MHz). The formula is:

Dipole length in feet = 468/MHz

This formula includes the required shortening to ±95% of a dipole's length factor because of its two capacitive "end effects." When there are two or more dipole wires connected in series, any added dipoles should all be computed by a no-end-effects-shortening formula, or:

Second or other dipoles in feet = 492/MHz

All of the answers obtained will be the operating length of the wire between the holes in the two end insulators. Add 3 or 4 inches of wire at each end to go through the insulator holes and come back to be twisted back around the dipole wire. If an antenna has to be low or erected near metal objects, shortening it a little might help its operation.

Let's assume a dipole should be a 1/4-wave above its "effective ground level." And what is that? A good effective ground level would be the surface of a salt-water-soaked soil, or marsh, extending out many wavelengths in all directions under the antenna. If the soil is dry and possibly sandy or rocky, the effective ground level may be one to several feet below the surface. The effective ground level at a station usually depends on how wet or dry the soil happens to be that day. You can see we may be playing with rubbery numbers when talking about antennas.

Small length variations will probably not affect how well an antenna seems to radiate and receive. Antenna theory can be an exact science for any given frequency, but just getting close to the correct length for a mid-band dipole for our relatively wide amateur bands may be all that a ham needs to worry about. If he (or she) uses an antenna tuner, that can correct for most slightly incorrect dipole lengths, heights, etc.

It is generally agreed that doubling the height of a dipole above ground level almost doubles its effectiveness for both transmitting and receiving. So tall poles, towers, and trees look pretty good to radio amateurs — but unfortunately not to the people who make the laws on allowable antenna heights and antenna placements in cities and other places.

A Dipole Antenna

The antenna in Figure 1 is an 80-meter band, 1/2-wave dipole, cut for some frequency in the "CW" (**C**ontinuous-strength **W**ave) part of that band, let's say for 3.550 MHz. By using the formula:

length = 468 /3.55 = ±131.8 ft long

If the antenna happens to be cut a foot long or short, it should still work fine, even if an antenna tuner is not used. Most transceivers today have an internal output "Tune" button that corrects small values of incorrect inductive or capacitive reactance (detuning) exhibited by the antenna.

A dipole for the 80-m "radiotelephone" ('phone) band, let's say 3.900 MHz, should be:

length = 468/3.9 = ±120 ft long

It's interesting that either of these dipoles will work quite well over the whole CW and phone parts of the bands if open-wire feeders and an antenna tuner are used, as described later.

A dipole wire cut apart in the center becomes two 1/4-wave wires. If such a dipole is fed RF at its center by some kind of a 2-wire RF "transmission" or "feed" line, it will be a "balanced" dipole. The open middle ends can be said to have a "radiation resistance," or a "center feed-point impedance" of ±73 ohms to RF AC. This "feeder impedance" is abbreviated as "Z_f." ("Z" for impedance and "f" for feeder or feedpoint).

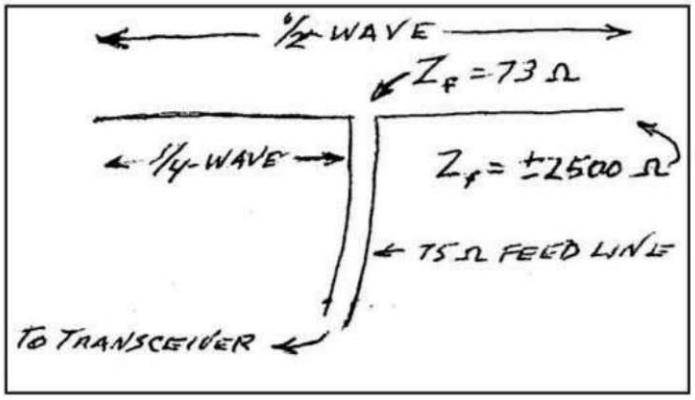


Figure 1. Basic dipole lengths and impedances. The high Z_f, or feedpoint impedance, is at the ends of the dipole. (All illustrations are hand-drawn originals by the author)

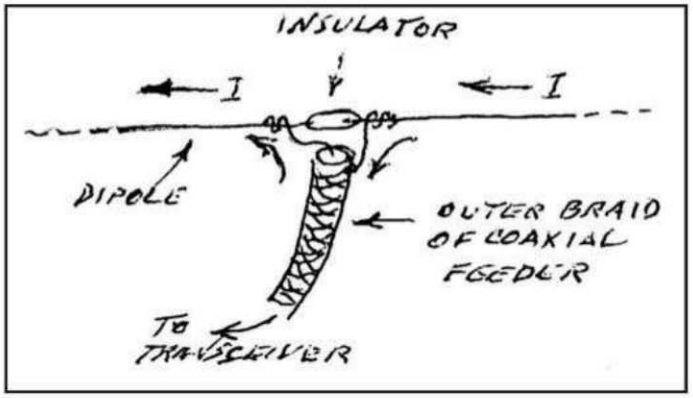


Figure 2. Connecting a coaxial feeder to a dipole.

The center of a dipole has a low Z_f, but the ends always have a high Z_f, a value of let's say ±2,500 ohms, but it may vary considerably due to length, wire thickness, ground material, etc.

High Z points are also points of high RF voltages and little current. Low Z points carry higher currents because all oscillating electrons have to go through these points and voltage values will be low. So a dipole antenna wire could theoretically be thinner at its ends and thicker at its center, but it is usually a simple bare copper wire having a wire gauge of #10 to #16. (A thinner lacquer insulated #22 gauge wire might be used if it is supposed to be "hidden"!) If the wire is insulated, it works fine, but if the insulation is solid plastic, in a few years it will dry out, begin to peel, hang down, and some of it may drop off, making the antenna's appearance pretty crummy.

Rotary dipoles for higher frequency bands, or the elements of beam antennas, usually use aluminum or some other metal tubing. The wider diameter and greater surface area may suggest slightly shorter computed lengths. This is usually disregarded, but the diameters are usually reduced as the ends are approached to reduce tubing weight and physical drooping.

If the two middle ends of a dipole are connected to a 2-parallel-wire transmission line having an inductance-to-capacitance ratio that produces a 73-ohm Z_f, the antenna and the transmission line impedances will match at the antenna feed point. This allows RF energy to transfer between feedline and the antenna with essentially no loss.

But amateurs often use a 50-ohm transmission line rather than 73 ohms. Why? The modern manufacturers of amateur radio equipment usually design their output/input circuits to have a ±50-ohm impedance, for good reasons. A horizontal dipole has a center Z_f of ±73 ohms; the common vertical 1/4-wave antenna has a base Z_f of ±36.5 ohms; and beam antennas usually have 50-ohm Z_f inputs. A transceiver's 50-ohm Z_f output/input is about halfway between horizontal and vertical antenna center impedances, and is a match for beam antennas. The difference in operation between 73 and 50 ohms, or between 50 and 36.5 ohms, is not too much, particularly with modern transceivers having an internal reactive correcting circuit that tunes the antenna to operate with a minimum SWR (below).

Coaxial Cables

Trying to produce a 2-parallel-wire 50- or 73-ohm transmission line with its wires held apart the required small fraction of an inch to allow them to provide the desired impedance along the whole line's length is not too practical, particularly in wet weather. This why 50-ohm Z_f "coaxial" cable transmission lines are usually used. The center wire of a coaxial cable would be connected to one of the two 1/4-wave wires of a dipole, as shown in Figure 2. The outer metallic conductor of coax is a tubing-like copper braid around the thick-insulation covered center wire. This outer braid would be connected to the other 1/4-wave wire. A small strain insulator should be used between the two dipole wires.

If RF AC power feeds from a transceiver's 50-ohm Z_f output fitting into the end of a 50-ohm coaxial cable and then into the 73-ohm antenna, energy will couple transceiver-to-transmission line-to-antenna with some loss of radiated energy from the dipole, but now some of the RF energy will be radiated from the more or less vertical coax cable's outer braid.

Long coaxial lines have greater losses due to the energy absorbed by the resistance present in the internal insulating material. Also, the higher the frequency of the RF, the greater the losses in coaxial cables. However, they can be cut to any length, assuming the impedances at both ends match reasonably well. The open end of a coax cable where it is connected to the antenna must be coated with some type of waterproofing and insulating substance.

The arrows shown on the dipole's RF radiating flat top in Figure 2 indicate that at this particular moment, RF current is flowing in the same direction in both of the 1/4-wave wires, but it will be running in the opposite direction in the feedline (Remember, RF is an alternating current). A half-cycle later, the flat top RF currents will both be flowing in the opposite direction, reversing all polarities. Since the two 1/4-wave flat-top currents are flowing in the same direction, they radiate as a single 1/2-wave dipole.

If the 80-meter antenna in Figure 1 is used on 40-meters, each half of the dipole is now one 1/2-wave in length, providing high Z_f to any low Z_f 50-ohm coaxial feeder. The two 1/2-wave wires will now accept very little power to be radiated as a transmitted signal, although the outer braid of the coaxial cable will now be radiating some RF energy.

SWR

RF feedline energy recognizes any mismatched antenna impedance connection when it comes up to it. Some or most of its energy will be reflected back down the transmission line to the source (all of it in the case of a short circuit at the antenna feedpoint end) and "standing waves" of voltage or current are developed on the transmission line.

The ratio of the high-to-low voltages (or currents) along the line develops a "standing-wave ratio" (SWR) value that

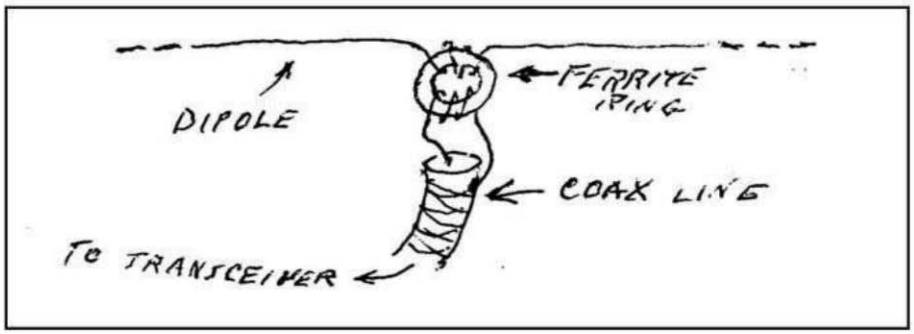


Figure 3. One form of a balun involves wrapping several turns of both the balanced antenna wire and the unbalanced coaxial feedline through a ferrite core.

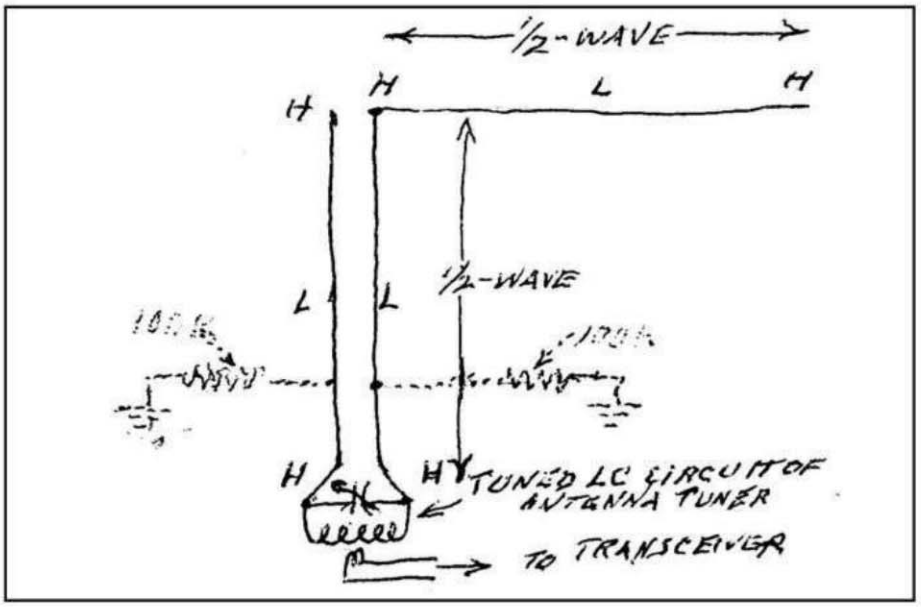


Figure 4. A half-wave open-wire feed line coupled to the end of a dipole. See text for discussion of the LC tuning circuit and the two 100k resistors to ground shown in dashed lines.

can be shown on a "reflectometer" connected in the transmission line. The greater the impedance mismatch, the higher the SWR and the less transmission of energy to the antenna. An example would be trying to feed the high-Z_f of ±2,500 ohms at the end of a dipole with a 50-ohm coax line, a ±2500/50 mismatch, and an SWR of ±50:1. Although an SWR of 2:1 may reduce energy transmission and antenna radiation somewhat, as the SWR increases over 3:1, the antenna no longer wants to accept much RF power, so RF radiation decreases as the SWR increases.

In the cases of matching a 50-ohm transceiver and coax line to the center of a dipole, the differences in impedances may be 73/50 for an SWR of ±1.46:1. When a vertical antenna base is coupled to a 50-ohm line, the SWR will be 50/36 or ±1.4:1. Neither of these is near the perfect 1:1 SWR ratio, but both are close enough. Note that the greater value is always divided by the lesser. An internal reactance-correcting circuit can bring the SWR to 1:1.

No matter how high the SWR, there will always be some radiation and reception with any antenna. The greater the SWR in a coax cable, the greater the transmitting loss will be because signals will be reflecting back and forth in the coax due to the mismatch, losing energy on each reflection. It is interesting that the reception of RF signals with a high SWR will be much better than will be its transmission of RF power. Tuning a transceiver's antenna improperly makes this quite evident — with almost no transmission of RF there are usually fairly strong received signals.

The Balun

When using a coaxial-fed dipole, there can never be equal capacitances between the right and left halves of the dipole to both the inner and outer coaxial conductors. Simple coaxial coupling to a dipole, while it works well, produces an unbalanced antenna feed system. The outer coaxial braid, from transceiver to the antenna, will emit part of the total RF radiated energy, more or less vertically. To correct this, a small ferrite-ring with two small coils on it forms an RF transformer. It can be used to couple the **BAL**anced dipole wire halves to the **UN**balanced coaxial cable, as shown in Figure 3. If such a "balun" is used with a coax-fed antenna, the system becomes balanced. The dipole radiates horizontally and all of its feedline RF waves are kept inside its coax cable. There are several different types of baluns, and some may be more frequency-sensitive than others.

Dipole Heights

The center impedance of a dipole at different heights is interesting. If lying on the ground, it has a center Z_f of only a few ohms. As it is raised, its center Z_f continually increases up to its first 73 ohms value at a height of 1/4-wave. Continuing up in height, it goes through a Z_f peak of about 97 ohms before decreasing to 73 ohms again at a 1/2-wave height. Continuing on up to its 3/4-wave height, it dips down to about 58-ohms Z_f before rising back to 73 ohms again. From there on, its impedance peaks and dips vary less and less above and below 73 ohms every 1/4-wave in until above about 3 wavelengths in height, its Z_f remains essentially constant at 73 ohms. All this can make matching the Z_f of a dipole to a feedline very interesting.

Harmonic Transmission

Center-fed dipoles can also operate on their odd harmonic frequencies. For example, a 7-MHz band dipole also works on its third harmonic, in the 21-MHz amateur band. The 7-MHz dipole is now working as three 1/2-wave dipoles connected in series. The low-Z_f center point of the middle dipole may now be a little higher than 73 ohms, but the mismatch may not be all that important, particularly if a balun is used. (Other harmonics of frequencies in the 3.5-to-4 MHz and the 7-to 7.3-MHz bands also fall into other HF ham bands.)

Coaxial feed can be used to any point that is 1/4-wave from either end of any multiple-1/2-wave long antenna wire, or to the center of any of its 1/2-wave sections.

Open-Wire Transmission Lines

How can a dipole be made to accept power efficiently if it is fed at its high-impedance (high-voltage) end? An-

swer: Match its high-Z_f (±2,500 ohms) end with a high-Z transmission line.

A transmission line using two parallel #14 wires held an equal distance apart by ±5-inch-long thin insulator spacer rods every 3 to 5 feet along the line, can produce a very low loss feedline of ±600 ohms Z_f. While 600 ohms matches the end Z_f of a dipole better than a 50-ohm coaxial cable does (SWR = ±2500/600 = ±4:1), this is still not good. With a 4:1 SWR, the dipole accepts little RF with considerable vertical radiation from the feedline because line current maximums do not line up to cancel.

Cutting such an "open-wire transmission line" to a 1/2-wavelength produces high-Z_f at both ends. When cut to a 1/4-wavelength, if it sees a high Z_f at one of its ends, it will have low Z_f at its other end. When operating as a tuned 1/2- or 1/4-wave open-wire line, exactly equal spacing between the wires is no longer too important.

Larger antenna wires have less RF "skin resistance" because RF AC travels only on or near the surface of wires resulting in less RF loss with larger-size antenna wires. If resonant feedlines are a little too long, they are "inductively reactive." Small capacitors can be added in series with them to balance out the inductive reactance. If too short, they are "capacitively reactive" and small tapped coils can be added in series with them to balance out the capacitive reactance.

Coaxial cables can also be used as tuned lines. They must be cut to ±0.66 of the 468/MHz or 492/MHz values, making them more or less single-band dipoles.

Coupling Open-Wire Lines

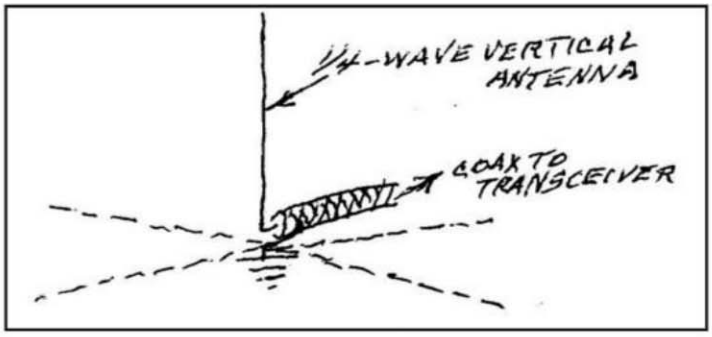
Suppose the high-Z_f end of a dipole is connected to one end of a 1/4-wave open-wire transmission line. The transmission line sees the dipole's high-Z end so it assumes a high-Z value there. A 1/4-wave down the line, its impedance will now be a low-Z value and provides a reasonable match to a 50-ohm Z_f transceiver antenna fitting.

If a 1/2-wave long open-wire transmission line is attached to the high-Z_f end of a dipole (see Figure 4), it will repeat its high-Z value at the transceiver end. This length requires a high-Z antenna tuner between the feeder's high-Z_f value and the low-Z_f transceiver antenna fitting. What makes up a high-Z circuit? A parallel coil and capacitor (LC) circuit tuned to the operating frequency is one example of a high-Z resonant circuit. A high-Z_f transmission line's wires can be connected directly across such a high-Z tuned LC circuit. Antenna tuners usually have parallel resonant circuit LC circuits as their output circuit. The antenna tuner must also provide a reasonably good match to the low-Z_f transceiver antenna fitting. This could be by using a few-turns low-impedance "link coupling" coil coupled into or coiled around the center turns of the tuner's LC circuit, as indicated. When the tuner is tuned to the operating frequency, the transmission line will see high-Z matches at both of its ends and the dipole will radiate RF energy efficiently. Antenna tuners use more involved 50-ohm impedance coupling circuits. The impedance values are shown in capital letters.

When center-feeding a dipole, the maximum radiation is at 90 degrees from the wire direction. When end-feeding a dipole, the maximum radiation direction is slightly more in line with the wire and away from the feedpoint. The longer the antenna, the more exaggerated this effect becomes.

If a 1/2-wave open-wire tuned line can couple an end-fed dipole to a high-Z antenna tuner, couldn't a 1/2-wave-long single wire (high Z_f at both ends) couple energy to the end of the dipole? It could. But with a 2-wire tuned open transmission line, the currents in the two parallel wires are equal but opposite in direction, canceling RF radiation from them. The only radiation is from the dipole. With a single 1/2-wave wire feeding the end of a dipole, both the 1-wire feeder and the antenna will now radiate energy. Half of the power will be radiated by the horizontal dipole and half by the essentially vertical one-wire 1/2-wave feedline. Two such series connected 1/2-wave resonant wires form a "full-wave" antenna. An interesting thing about this antenna is that when RF current is going outward from the antenna tuner, at the same time, the RF current will be going inward on the horizontal dipole. A half cycle later, both currents reverse.

Figure 5. A quarter-wave vertical. Dashed lines represent radials.



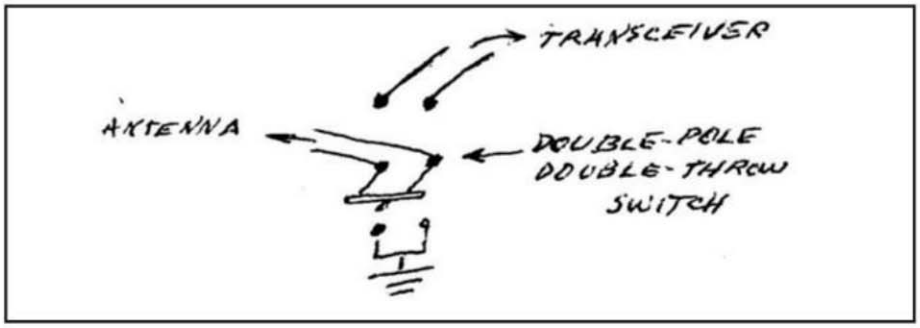


Figure 6. How an antenna grounding switch is connected. The DPDT switch assures that both antenna leads are grounded. You need to be sure that the switch you choose can handle the maximum power you will be transmitting.

Different Types of Dipoles

There are several different antenna designs used by amateurs that are each variations on the basic 1/2-wave dipole. We'll take a look at the most common ones, starting with one that — at first glance — doesn't seem to either be a 1/2-wave antenna or a dipole.

The Quarter-Wave Vertical Antenna

A common amateur antenna is a metal pole or wire 1/4-wavelength long, with its bottom end grounded (see Figure 5). It is actually half of a vertical dipole, with the earth operating as the other 1/4-wave element to make it a resonant 1/2-wave circuit. Actually, the earth operates as an almost infinite number of 1/4-, 3/4-, 5/4- etc. wave elements extending outward in all directions.

Making a good RF ground connection for a vertical antenna can be difficult. An 8-foot, copper-clad iron pipe is often

driven into the ground to form the ground connection, but where is the effective ground level? To provide a better ground system, four or more 1/4-wave wires may be laid out in different directions from the base of the antenna to form a "radial system." The radial wires may be laid on the ground, be buried a few inches under the ground, or may even be on top of a building if the antenna is also up there. If only one radial wire is used and it is going outward toward the north, the antenna will radiate more of its RF northward.

When a 1/4-wave vertical antenna is opened at its base, it has ±36.5-ohm feedpoints. These are usually fed by amateurs with 50-ohm coaxial lines. Maximum radiation is only a few degrees above the horizon with vertical antennas, making them very desirable as DX antennas. They have zero RF radiation directly above them, making them useful as aviation markers.

Marconi Antennas

Any antenna using the earth or ground to make it resonate properly is known as a "Marconi" antenna. It may be a 1/4-wave vertical or a horizontal antenna some odd multiple of a 1/4-wave long, although an exact length may not be too important if an antenna tuner is used at the transmitter end. Shipboard radiotelegraph low-frequency (90-160 kHz) Marconi antennas were usually made as long as possible with loading coils added to them. A 90-kHz 1/4-wave ship station antenna should be: **468/2**, **or 234/.09 = ±2600 ft**, or **±0.5 mile long** — on a ship? A whole lot of loading coil inductance was needed between the transmitter and a ship's ±250-foot antenna wire to make it work like a 1/4-wave Marconi antenna.

An old-time amateur method of coupling the near end of a 1/4-wave, single-wire Marconi antenna to a transmitter output was to push a two- or three-turn link coupling coil into the nearest-to-ground-potential turns of a transmitter's output LC circuit. The farther this link was pushed into the coil, the tighter the coupling was to the antenna circuit. The free end of the link coil might be either grounded or be connected to a variable capacitor or inductor to ground for best antenna tuning. Today, antenna tuners are usually used to couple Marconi antennas to transceivers.

Hertz Antennas

Any antenna that does not depend on the ground or earth to make it resonant, such as a dipole or any multiple of a 1/2-wave wire, is known as a "Hertz" antenna. But a Hertz antenna should always be resistively grounded in some way to discharge any possible high DC static electric charges that may build up on it. Very high-voltage DC charges can build up on a large ungrounded antenna system just by its being in the atmosphere. For the Hertzian antenna in Figure 4, a 1- or 2-watt, 100,000-ohm resistor could be used from both open-wire transmission line wires to ground (see dashed lines) to assure the antenna wires would always remain DC discharged.

Coaxial transmission lines to Hertz antennas are normally grounded through the output circuitry of the transceiver. But this is no protection against nearby lightning strikes. The best protection from lightning strikes is to completely disconnect the antenna from the rig and connect it to a metal pipe driven into the ground, or to any other good ground connection outside the building. An antenna grounding switch is shown in Figure 6.

Windom Dipoles

A single #14 copper wire alone in air is said to have a self-impedance of ±500 ohms. Such a single wire can be used as a transmission line if it is connected to a ±500-ohm point on a dipole, usually ±14% out from its center (or to a similar point on a vertical antenna) and then to a similar Z_f point above ground on an antenna tuner. This is known as a "windom" antenna. How much vertical radiation it also puts out depends on the length of the feeder wire. One thing about this antenna, at all frequencies other than the computed one, it probably tunes as a top-loaded vertical antenna on any band with an antenna tuner. The operator may never know how it is working. Windom antennas can also use a parallel 2-wire feeder to cancel radiation from the feedline if the off-center impedance opened point equals the impedance of the feedline.

Zepp Antennas

A dipole fed at one end with a tuned open-wire transmission line is known as a "Zepp" antenna. In the early 1900s, when gas-filled, lighter-than-air dirigibles flew the skies of the world, such zeppelins (named after Ferdinand von Zeppelin) dropped this type of antenna out of the radio-operating cabin while in flight. A fairly heavy insulator attached to its end kept the antenna and its transmission line taut and more-or-less straight horizontally. Your author communicated with the Graf Zeppelin by CW on 500 kHz from his passenger ship while the Graf Zeppelin was flying near Spain in the mid 1930s. Incidentally, his first ham antenna in 1931 was a 40-meter Zepp (but is now a 40-meter double Zepp). Today, blimps seen flying above football fields use small VHF or UHF antennas to send TV and audio signals to their local ground stations.

A vertical VHF dipole with a 1/4-wave open-wire transmission line attached to the bottom end of the dipole forms a "J antenna." The two bottom open-wire transmission line ends can be connected directly to a coaxial cable and to a transceiver. Or, the two open-wire line ends and a coax cable shield may be connected together with the cable's internal lead going up a short distance to a 50-ohm point above the shorted parts on either of the transmission wires, usually through a small capacitor. J-antennas are popular "omnidirectional" (all directions) VHF or UHF vertical Zepp antennas with the transmission line coupled to the transceiver through a long coaxial cable,

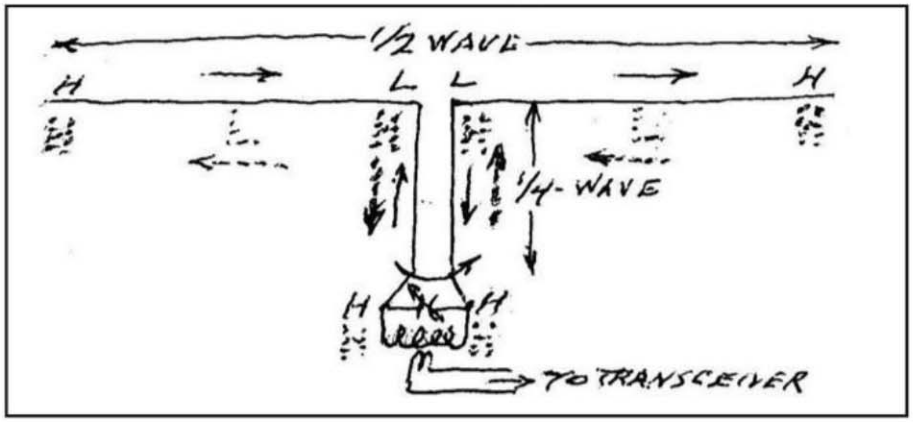


Figure 7. Possibly the best ham wire antenna, says the author, is an 80-meter dipole fed with open-wire line and an antenna tuner. See text for discussion of the dotted letters and the arrows indicating direction of current flow.

allowing the little antenna to be mounted high enough for good radiation and reception.

A Multi-Band Antenna

Possibly the best wire antenna for all HF amateur bands is shown in Figure 7. It does require an antenna tuner. It is a center-fed (CF) 1/2-wave 80-meter dipole. It might be ±130 feet long with a 1/4-wave ±65-foot long open-wire transmission line. On 80 meters, it has low Z_f at its center. Moving down the 1/4-wave feeder, the open-wire line presents a high-Z to the antenna tuner. Coupling the antenna tuner to the transceiver might be by link coupling or some other low-Z coupling system.

The tuner's resonant LC circuit acts electrically like a 1/2-wave dipole. Every 1/2 wave along an antenna or feed line, the RF voltages reverse polarity, so they do the same across the tuner's LC circuit. The solid arrows show the 80-meter RF currents present at some particular time. High and low voltage and Z_f points are indicated by the solid H and L letters. The currents in both of the 1/4-wave horizontal wires of the dipole are in the same direction, producing one complete 1/2-wave dipole radiator on the 80-meter band.

On the 40-meter band, the flat top is now two end-fed 1/2-wave dipoles coupled to the transmitter by a 1/2-wave tuned feedline. The dipoles, feeders, and the antenna tuner all have high-Z_f points at their connections. The high and low voltage and Z_f points are now indicated by dashed H and L letters. On the 40-meter band, this is two separate Zepp-fed dipoles, or a "double-Zepp."

As a 40-meter double-Zepp, the current in the left dipole might be going left, as shown by the dashed arrow. The current then reverses and goes downward in the left-hand feeder. It reverses again across the resonant LC circuit. It reverses yet again to go upward on the right-hand feedline, and finally reverses to leftward on the right-hand dipole. So, the two 1/2-wave dipole flat-top currents are going in the same direction, or are radiating "in phase." They are now radiating twice as much power at exactly right angles to the wires of both dipoles. This is a power gain of two times, or 3 dB, in this direction. This is actually a 2-element wire-type beam antenna. Because the currents in the two feeder wires are in opposite directions, radiation from them is zero.

The next higher frequency amateur band is the 30 meters, a U.S. no-'phone band from 10.1 to 10.15 MHz. Here, each antenna radiating section is ± 0.75-waves long, or three 1/2-waves long. An antenna tuner will tune it to a 1:1 SWR. It is now an "extended double-Zepp." It radiates 1/3 of its power at 90° from the antenna wire and 2/3 of its power in two other directions at about 50° from the antenna wire.

On all other higher bands, starting with 20 meters, the antenna can be brought to an SWR of 1:1 by an antenna tuner and operate quite well in all directions, horizontally polarized.

If the antenna tuner tunes to 160 meters, it can bring this 80-mipole dipole circuit into resonance on Top Band as well, but the antenna will only be radiating as two 1/8-wave flat-top wires in series. It is not very efficient, but it will tune to 1:1 SWR and radiates about half power. If there is enough real estate to double the lengths of the 80-meter dipole and the feedline to produce a 160-meter dipole, it will do much better on 160. On the other hand, if you can only put up a 66-foot 40-meter dipole with a 33-foot 1/4-wave open-wire feedline, it will also work on higher frequency amateur bands, but not very efficiently on 80 meters.

If the antenna tuner output circuit is not grounded, a 2-inch diameter, 20-turn, coil can be added in series with one of the open-wire transmission lines in case the antenna and feed lines are not quite long enough. If the antenna/feedline combination is too long, a 200-pF variable capacitor can be added in series with one of the feedlines. Bend the tip of one end rotor plate so it touches a stator plate to short the capacitor out of the circuit when it is not needed.

Horizontal Radiation Lobes

The RF "radiation pattern" or "lobe" of a north/south dipole wire in outer space, seen end-on, is outward in all directions (Figure 8a**)**, and is a circular lobe. It is picturing the relative radiation in all possible directions.

When looking down on a N/S dipole, the radiation lobes to both its E and W sides appear as slightly elongated circles (Figure 8b), with maximum horizontal radiation at 90° from the wire. This is picturing the total radiation as RF current flows from one end of a dipole to the other end.

If near earth, a horizontal dipole radiates equal RF in all directions at right angles to the wire. Some of the downward radiation may warm the earth a bit, but much of it may be reflected upward at many angles by the earth and may then be re-reflected downward by the ionosphere.

With the 40-meter double-Zepp, the radiation lobe at 90° from the wire would be twice as long as when it was used as a single 80-meter dipole. Since there is no more power being

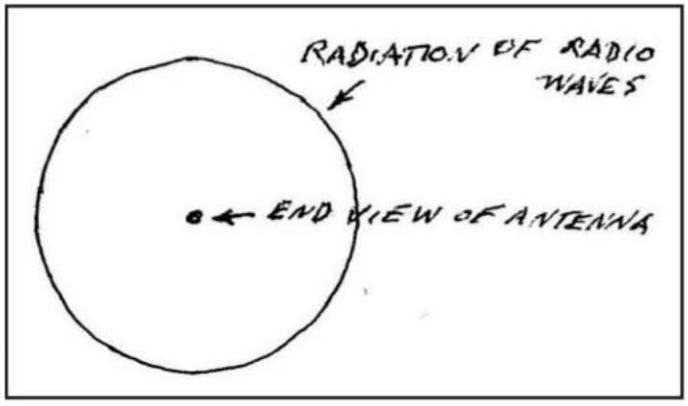


Figure 8a. Circular lobe of the horizontal radiation of a dipole antenna, looking at it from the end of the wire.

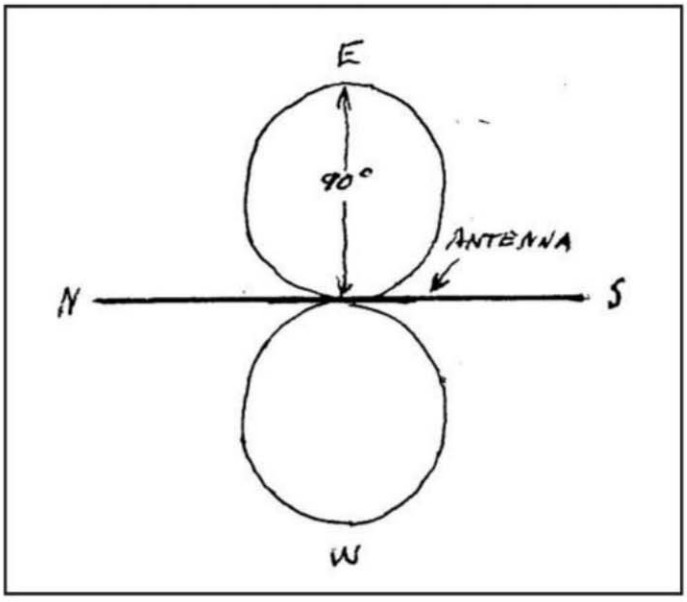


Figure 8b. Horizontal lobes of a dipole with a north/south orientation, looking down from above.

transmitted, its radiation lobe width (a picturing of its total radiated energy) would be reduced from the nearly 90° of a single dipole to about 45°. Actual lobe shapes may be changed by antenna heights, nearby structures, trees, nearby wires, metal poles, etc.

The radiation pattern of a full-wave N/S antenna (two dipoles long) looking down on it in outer space is shown as four major lobes, all roughly 50° from the antenna, with maximum lobe widths of about 40° (Figure 8c). Note that the two dipole lobes cancel each other because the currents in them will always be in opposite directions, resulting in zero 90° radiation. With a 100-watt transmitter, the total power radiated by a dipole, a double Zepp, a full-wave antenna, etc. will all be the same, but different amounts of the RF power will be radiated in the different lobe directions. In between lobes are directions of theoretically zero radiation, called "nulls."

The radiation from an antenna that is 1.5 wavelengths long (3 dipoles long, such as the 30-meter extended double-Zepp antenna) in outer space is shown in Figure 8d. Its middle 1/2-wave section is developing two lobes at 90° from the antenna. The other two dipoles produce four lobes like a full-wave antenna, but at about 40° from the antenna, with six lobes and six nulls.

The radiation of two full-waves in phase (as an 80-meter dipole on 20-meters) is shown in Figure 8e. Its beaming effect develops four longer and slimmer main lobes at about 35° from the wire. Since four currents are cancelling each other, there is no lobe at 90° from the wire.

If a receiver is in a null direction between two lobes or off the end of an antenna there should be no RF transmitted to the receiver. However, the ionosphere, up 200 or so miles, is in constant motion and provides many constantly billowing reflective surfaces. Any RF signals striking them are reflected or refracted in many directions. So there will always be RF energy reflected or refracted to points on earth in unexpected places. This is why signals are heard in null directions and why signals may sometimes be heard in the expected skip zone of a station.

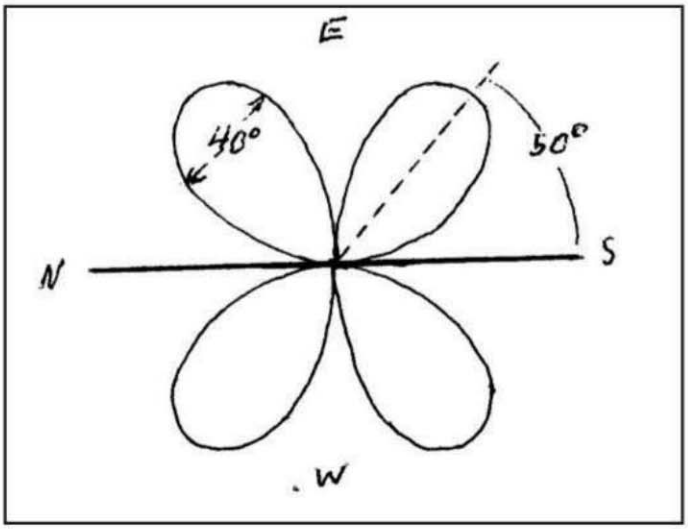


Figure 8c. Lobes of a full-wave antenna, also oriented north-south.

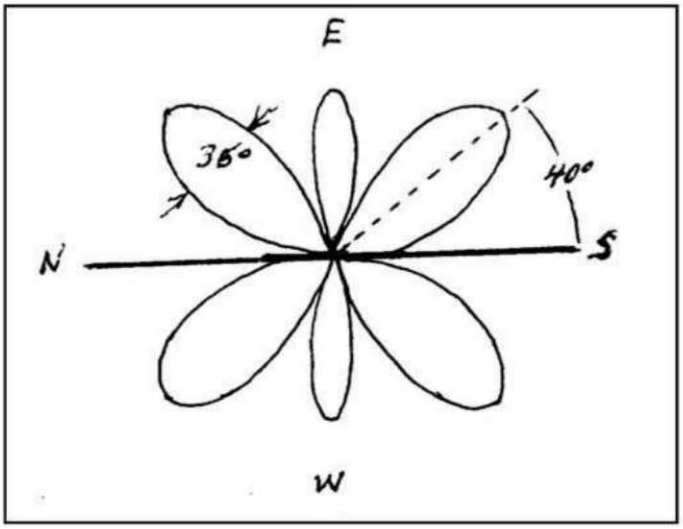


Figure 8d. Lobes of an antenna that is three half-wavelengths long.

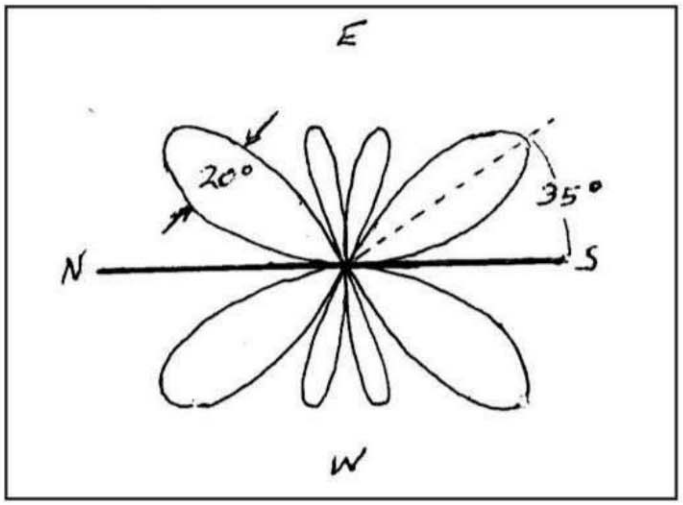


Figure 8e. Lobes of a two-wavelength long dipole. All of these may exist on the same physical antenna (see Figure 7), depending on the frequency band in use at the time.

Looking Ahead in CQ...

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

- Schematix: Transmit Circuit Diagrams Without a Computer
- Results: 2016 CQWW RTTY DX Contest
- Phantom of the Attic
- DX History: Spanish Sahara

Upcoming Special Issues

- **June:** Take it to the Field
- **October:** Emergency Communications
- **December:** Technology

Do you have a hobby radio story to tell? Something for one of our specials? CQ now covers the entire radio hobby. See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/cq_writers_guide/cq_writers_guide.html>.

The nulls of a handheld 1/2-wave VHF receiving dipole or a loop antenna can be used as relatively sharp directional indicators of hidden transmitters a short distance away. Lobe peaks are never very sharp directional indicators.

A horizontal N/S dipole wire always radiates horizontally polarized signals at right angles to the wire, or E and W. It also has vertical radiation lobes. For heights up to almost 1/8-wave, most of the radiation is upward. At 1/4-wave height, the radiation is some upward but more outward. When 1/2-wave high, the lobes are all outward at ±30° with nothing upward. At 3/4-wave, its upward lobe is greater than the outward lobes. At 1-wave high, there is only outward with nothing upward. For all 1/2-wave heights above on full wavelength, there is nothing going upward. In between is both upward and outward, with the upwards lessening as height increases.

The E/W lobes of a horizontal N/S antenna, being partially outward, will be radiating to some extent in both northerly and southerly directions. The ionosphere can reflect and refract these waves down to distant stations in both N and S areas and actually provide reasonable strength signals in these directions — off the ends of the antenna — and in supposedly null directions! A full-wave N-S antenna wire radiates even more RF in line with the antenna wire, producing quite strong N-S distant received signals as well as in the expected major lobe directions. The ionosphere reflects or refracts some additional signals down to earth in these directions.

Theoretically, at a short distance, a vertical antenna should pick up no signal from a horizontal antenna and vice versa. Actually, a horizontally radiated wave begins to lose its radiated angle. After a few miles a vertical antenna may pick up horizontally transmitted waves quite well due to reflected signals from the ionosphere.

Erecting Dipoles

A dipole operated at a 1/4-wave height above effective ground level, or any multiple of 1/4-wave, provides a 73-ohm center impedance value to its transmission line. If not at exactly 1/4-wavelength in height, it may have some other center impedance value. Actually, a dipole at about 0.2 wave and again at about 0.6-wave heights has a center impedance of close to 50 ohms and matches a 50-ohm coaxial cable nicely.

If operating at less than a 1/4-wave height, much of its RF downward radiated energy is reflected upward by the ground and may be re-reflected right back down again by the ionosphere. As a result, the higher a horizontal antenna is the better it will be for long distance DX. If lowered, its reflected signals may provide better and stronger shorter distance reflected signals.

A wire dipole is fairly simple to put up and work with. It can be hung between two reasonably equal height trees, buildings, or poles. Or its center may be fed at the top of a single tall pole, with its two flat-top wires dropping down to shorter poles, making it a non-rhombic "inverted V" or a "drooping dipole" antenna. Dipoles usually have shorter skip-distances than vertical antennas. While categorized as bidirectional, as pointed out above, lower dipoles are often more or less "omni-directional" or all-direction radiators.

For RF powers up to perhaps 500 watts, glass or other types of end insulators need not be more than about three inches in length. It is usually better not to put too much tension on antenna wires or guy wires. A little slack helps ceramic or glass insulators in high winds.

Although more expensive and difficult to build, multi-element unidirectional rotary beam antennas provide stronger transmitted and received signals in the direction they are pointed. But that's another story.

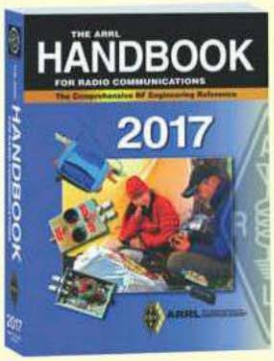
what's new

ARRL Handbook and Operating Manual

The 2017 ARRL Handbook for Radio Communications and the 11th edition of the ARRL Operating Manual are now available. As we have said in the past, these two references should be in every ham's library and refreshed every so often as technology and operating modes progress.

The ARRL Handbook

As always, the Handbook covers the basics of RF communication technology, including the fundamentals of electronic theory, design principles and more. New additions for 2017 include "A Revised Approach to Measuring Crystal Parameters" and "Updated Details on the Placement of Filter Stubs" for the engineers among us, plus more practical segments on "Decoding Fox-1 Satellite Telemetry," "A 30, 17 and 12-Meter Antenna Project" and "A Raspberry Pi Network Server/Client for Antenna Rotators." The book includes a CD with all the text and illustrations from the print edition as well as software, PC board templates and more. The hardcover Handbook sells for $59.95; the softcover edition is $49.95.

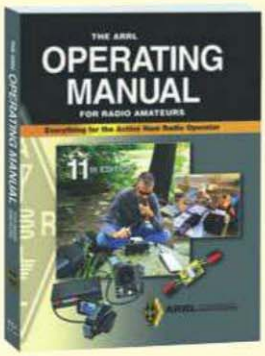


ARRL Operating Manual

The first thing we noticed about the 11th edition of the ARRL Operating Manual for Radio Amateurs was that it appeared to be thinner than the 10th edition, and indeed, it is nearly 100 pages shorter. The contents have been completely reorganized, with 14 specifically-focused chapters in the 2012 edition changed to four broadly-focused chapters in the new book:

- Basic Station and Operating Techniques
- Radio Clubs and Public Service
- On-Air Activities and Radiosport
- Resources for the Active Ham

Most of the subjects covered in the previous edition are included within those four broad subject areas. It is significant, though, that the 10th edition chapter on traffic-handling has been reduced to about three pages within "Radio Clubs and Public Service"; the chapter on remote station control over the internet has been cut to about three paragraphs in two widely-separated areas of "On-Air Activities and Radiosport," and the previous chapter on "FCC Rules and You" has been eliminated entirely. We find those changes somewhat curious.



Nonetheless, the Operating Manual continues to be an excellent resource, and has actually come down in price by $10 from the previous edition to $24.95.

Both books are available from ARRL, 225 Main St., Newington, CT 06111, <www.arrl.org>, or from any number of ham radio retailers.

Lack of space, funds, and a tall tower do not mean we have to compromise our efforts to work DX or a coveted DXpedition. I designed this antenna to overcome these limitations by a little study and modification of a well-known design. The result is a solution that met my goals. Perhaps other hams who have the same constraints will follow suit.

A 20-Meter Extended Double Zepp Antenna – With Enhancements

BY BOB HOUF,* K7ZB

"Tks for the QSO…FB on your antenna work. I can still hear your sig in mind. Your sig was easy copy and the 569 was legit (I don't like giving false reports). CU again soon. 73, Jim, VQ9…"

Shortly after stringing the highly-modified dirigible antenna up in two trees in my yard, I tuned the transceiver to 20 meters and answered a CQ in the CW portion of the band. My 100 watts from Michigan was heard with an S6 report — "good signal strength" — by the book as the VQ9 operator confirmed by email shortly after the contact.

The simple wire antenna with a capacitor in each half worked well beyond my expectations. The email I received after the contact from the operator on Diego Garcia, 10,000 miles away in the Indian Ocean, confirmed that my effort had paid off handsomely — especially in light of the small investment in materials and modest amount of antenna computer modeling involved.

That and the antiquity of the antenna added to the satisfaction I had in continuing to participate in the enhancement of the "Zepp" antenna designed for the original Zeppelins over a century ago.

A Wire to Europe…

I decided to put up a wire antenna dedicated to 20 meters over a Christmas/New Year holiday while I lived in Michigan. I was constrained to wire antennas supported by trees in my heavily-forested suburban yard, but only two of them were oriented for radiation broadside at the desirable 40° bearing to Europe.

The question asked then was: How do I get more gain (at a take-off angle between 10-30° of elevation) than a mere dipole at 35 feet with enough directivity to put as much of my signal as possible into Europe, yet still have reasonably narrow beamwidth, minimizing noise from the sides?

In other words, how could I make a simple wire behave more like a directive array than a dipole — or to be even more precise, more like an "8JK" two-element wire beam that had been developed in the 1930s by my university antenna professor, Dr. John Kraus, W8JK, at The Ohio State University?

That's a lot to ask of a simple wire antenna and it was clear the standard dipole would not come close to meeting my objective.

As Dr Kraus stated in his classic RADIO magazine article of June 1937, "The dimensions of an amateur's backyard usually determines the size of the antenna he puts up." And I had room for only one wire.

Modifying and Modernizing the "Zepp"

I looked at several antennas but a modified version of the greybearded Zepp, now called the Extended Double Zepp (EDZ) kept coming up everywhere — in the ARRL Antenna Book, Reflections by Walter Maxwell, W2DU, articles by Rudy Severns, N6LF, and other internet sources. Dr Kraus had even mentioned the double-Zepp in his 1937 article. There has been a lot written on this venerable old design over a century since the original Zeppelin antenna was developed with its unique feedline arrangement and there are commercially available models of derivative versions on the market today.

The most promising enhancement for my needs was a 40-meter version that N6LF described in an article entitled, "An Improved Double Extended Zepp," originally printed in the ARRL Antenna Compendium, Vol. 4, 1995. Rudy's improvement of adding capacitive reactance in each of the extended elements to improve the current distribution along the antenna eliminated the unwanted side lobes of the unmodified EDZ.

Would a Scaled Design Work on 20?

I wanted to see if I could meet my performance criteria on 20 meters by using Rudy's innovative contribution of adding capacitive reactance in the elements for pattern shaping to enhance the directivity while simultaneously minimizing side lobes and achieving a reasonable take-off angle for DX work.

Using EZNEC antenna modeling software, I scaled the 40-meter dimensions for 20 meters and then made numerous iterations of wire antenna lengths and capacitor values until I found the optimum dimensions using a commonly available RF transmitting capacitor that could handle the current and voltage (see Figure 1). After I completed the modeling (Figure 2), it was clear to me that I likely would never have been able

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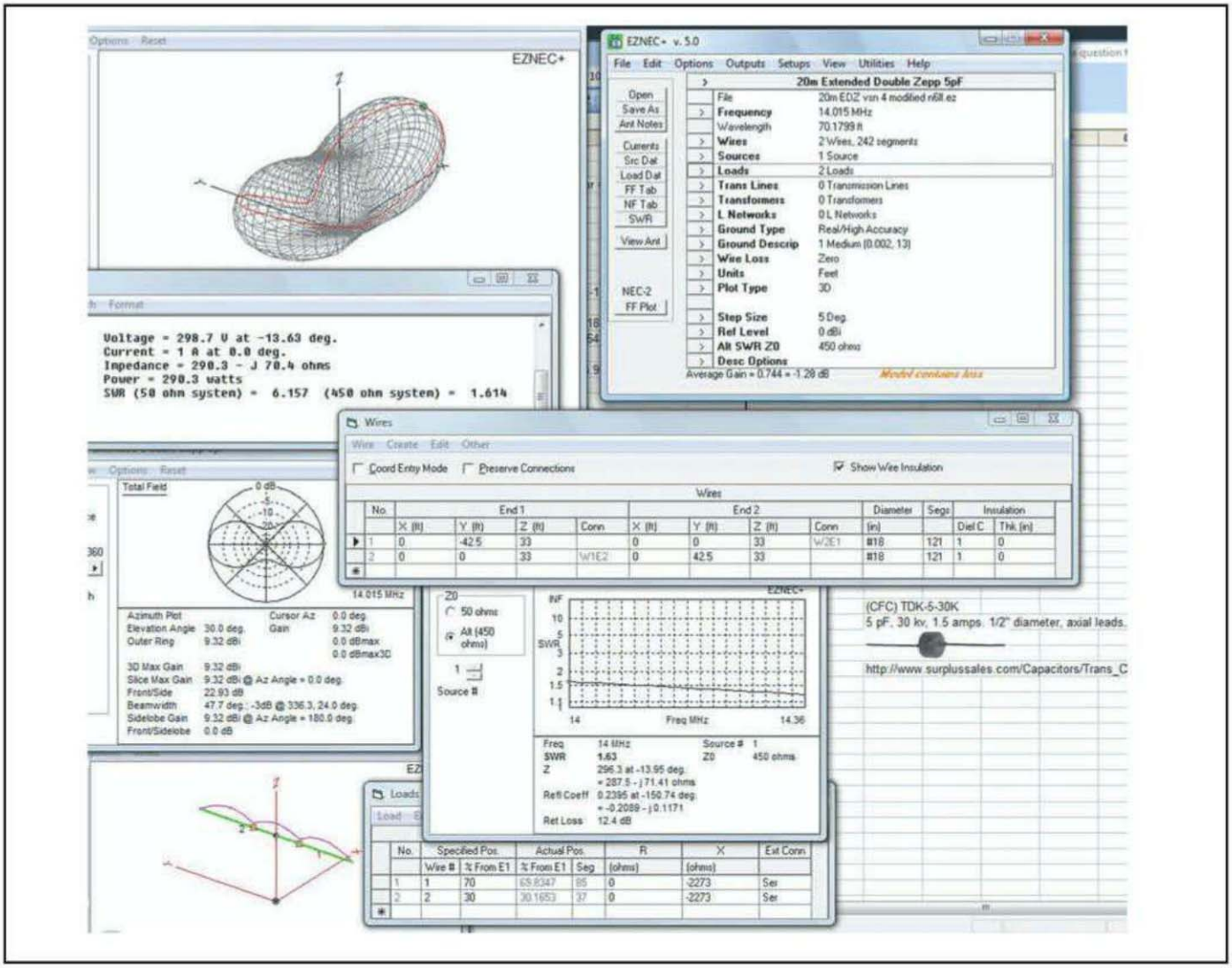


Figure 1. EZNEC model of the 20-meter Extended Double Zepp antenna.

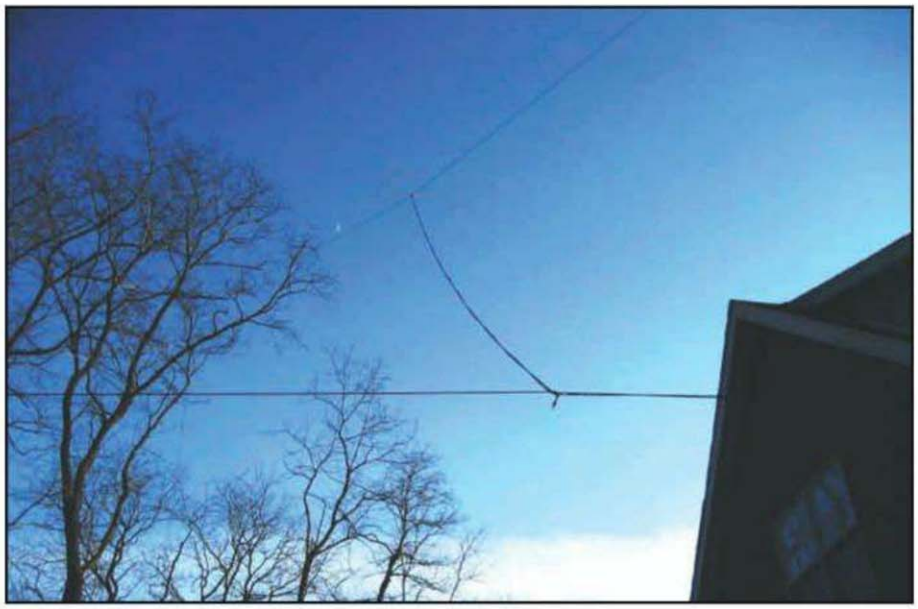


Photo A. Detail of feedline making a sharp right turn to the house. The driven element is at top; parachute cord is used to hold the ladder line away from the antenna.

to determine the exact combination for success without the benefit of EZNEC antenna modeling. Commercially available EDZ antennas do not use these dimensions, and of course, without the capacitors they 'waste' RF in unwanted side lobes on transmit and allow undesirable signal interference from the sides when receiving.

The result is a version of Rudy's EDZ, modified for 20 meters, which yielded some desirable pattern advantages along with an acceptable impedance for matching 300-Ohm ladder line.

Since an antenna height in my trees of 33-35 feet above ground was all I could manage, I did some EZNEC comparisons to a reference dipole and found the gain is approximately 3-dB better than a standard dipole over real earth ground at that height.

The Ladder Line Challenge

Running ladder line to my upstairs radio shack window would be another chal-

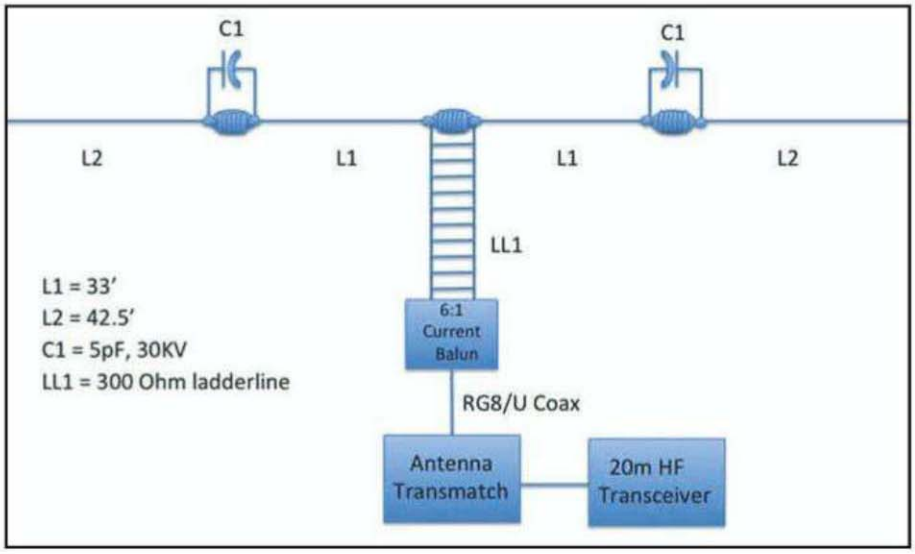


Figure 2. Antenna dimensions based on EZNEC modeling.

Photo B. The 5-pF, 30-kV doorknob transmitting capacitor (prior to wrapping for weather protection).

lenge of a different kind — not just electrically but mechanically. Erecting antennas in late December in Lake Michigan's lake-effect snowbelt with its attendant cold temperatures and heavy, wet snows makes putting up antennas almost a Winter Olympic-quality sport.

The feedline had to make a 90-degree bend toward the house about 15 feet below the antenna as well as being brought forward along the northern-oriented element at a 45-degree angle before the bend to reduce transmission line interaction with the antenna. Preferably, the ladder line would have been a straight-down run to the radio shack but to add more insult to the feedline I had to drape it over the peak of a roof on a room addition before I got it to the outside of the second floor window.

At the window of the shack, the feedline was transformed from ladder line through a 6:1 current balun into a short piece of coax, through the window and into an antenna transmatch.

By the Numbers…

The modeled antenna feedpoint impedance of 288-j71 Ohms coupled through approximately 75 feet of 300-Ohm ladder line resulted in an SWR at the transmatch antenna input terminals of 2.6:1 on my AEA VIA Analyzer. That was easily within the range of my antenna transmatch to handle 100 watts of transceiver output.

Although I chose a design frequency for the antenna of 14.015 MHz in the CW portion of 20 meters, the SWR plot shown in Figure 1 indicates an acceptable match for the entire band, making it highly suitable for those who favor SSB. The complete EZNEC modeling information is shown in Figure 1. The resultant antenna dimensions are in Figure 2.

Photo A shows the elements running across the top with max broadside RF at 34°, which covered Europe from my location. These are bidirectional antennas and the other lobe did a nice job into the southwestern U.S. (and obviously, to Diego Garcia as well).

The capacitors shown in Photo B are 5-pF, 30-kV leaded ceramic doorknob-style transmitting caps and are readily available [Nebraska Surplus Sales p/n (CFC) TDK-5-30K]. The capacitor is inserted in each half of the wire antenna by breaking the wire with an insulator at the appropriate dimension and soldering the leads of the cap across the two wires as shown in the figure.

Results

This antenna has good directivity and is a competitive and effective design compared to a standard dipole or commercially available EDZ for working 20-meter DX despite the low antenna height and tight space constraints.

Perhaps an antenna with this performance would be suitable for working that coveted DXpedition when larger antennas aren't possible — it is certainly cost-effective when the goal is to put max RF on target with the least amount of wire, waste, and interference.

Regardless, we can be sure that Dr. Hans Beggerow of Berlin, who patented the original Zepp antenna for airships in 1909, could not have foreseen how his invention would be doubled, extended and enhanced into the 21st century in its current form.

Your Turn…

Don't let the lack of a perfect situation keep you from experimenting with antennas and feedlines — you may be surprised how well your installation performs even though you weren't able to follow all the well-advised rules-of-thumb for a "proper" installation.

A Suggested Reading List

BY IRWIN MATH,* WA2NDM

When I see the amount of interest in the "new" Makers' movement, I smile as I recall the old philosopher's statement: "There is nothing new under the sun." The history of amateur radio is filled with do-it-yourself projects and numerous magazines devoted to "home brewing." I am proud to say that I have certainly contributed my share for the past more than 40 years.

But amateur radio is not unique. At the turn of the century (the last one, not the current one), young people built virtually everything. They did not need a special "movement" to stir them on. To show you what I mean, I would like to present a short list of books that I personally have in my possession and have read and reread many times (from when I was a child to the present) that in my opinion illustrate just how "new" (old) the movement actually is. If you reference your local library or search on the internet and can get a copy or two, you will not only be amazed but notice that much of what was written "way back then" still applies.

We will go way back and begin with The American Boy's Handybook, originally copyrighted in 1882. This 430-page book consists of 62 chapters arranged by the seasons of the year. Each season and its related chapters cover all sorts of build-it-yourself projects oriented toward the specific season. For example, Spring covers fishing tackle, kites, stocking and maintaining aquariums and various plants. Summer covers how to rig boats, tie all sorts of knots, a water telescope, how to rear birds, homemade hunting apparatus etc. You get the general idea. Although it would be considered somewhat sexist today ("The boys...", not "The boys and girls..."), that was the norm then. I am quite sure, however, that many girls were also captivated by these projects. All projects, by the way, were specifically intended for the youngster to actually do. No one was afraid that someone might get hurt or something would not work. It was assumed that youngsters (at least at that time) were reasonably intelligent. No significant electronics yet, but remember that it was not even 1900.

Once we pass the turn of the century, jumping to 1929, we encounter an author by whom I personally was captivated, Alfred P. Morgan. His The Boy Electrician was given to me in well-read condition (I am not that old) and dog-eared from use, but it was one of the books that sparked my interest in radio. The book specifically introduced electricity and then moved on to radio such as it was then. In the early chapters, youngsters were taught about magnets, static electricity, batteries, wires, measuring instruments, and the like. All subjects were explained with easy-to-implement experiments and projects that made learning fun. Theory was at a minimum but doing the experiments and building the various devices gave the reader a very good practical knowledge of what was actually going on. Morgan went on to write many more books on the subject, such as The First Book of Radio and Electronics (1954) and finally, The Boy's Fourth Book of Radio and Electronics (1969), in which he discussed the transistor.

When I see the amount of interest in the "new" Makers' movement, I smile as I recall the old philosopher's statement: "There is nothing new under the sun." The history of amateur radio is filled with do-it-yourself projects and numerous magazines devoted to "home brewing."

A similar author of the time was Raymond F. Yates, who wrote such books as The Boy's Book of Communications (1942), which contained instructions for building a telegraph set, a telephone including the complete construction of a carbon microphone, and a rudimentary FAX machine which could actually transmit a rough picture. Plus, there was a plethora of projects offered in such publications as Radio Electronics, Electronics World, Popular Electronics (remember Carl and Jerry?), CQ, 73, Ham Radio, and QST, to mention just a few. Authors and publications such as these went a long way toward influencing young people and, in many instances, guiding them into the careers that they would eventually follow. I know it certainly influenced me to the degree that I personally wrote several books in the same light, not to mention this column since 1973.

Now I am not criticizing the Makers' movement in any way whatsoever. In fact, I wholly support it. It is imperative that today's youngsters learn about technology and there is no better way to do it than with actual projects. Sure, anyone can buy a cell phone and use it, but if you build an amateur station, even the most simple and elementary one, and then actually contact someone with it, the thrill is far more rewarding than downloading some meaningless application and playing a game with it. Consider that many of the developments in current technology were the result of "makers" who were not afraid to get their hands dirty or burned with a soldering iron, or to question the "it can't be done" attitude of many "professionals." What I am trying to relate in this column is that the build-it-yourself urge is far from new and if you are aware of (or have) any so inclined youngsters, be absolutely sure to encourage them. In some way, the future is in their hands!

– 73, Irwin, WA2NDM

*c/o CQ magazine

the listening post

BY GERRY DEXTER*

Radio Afghanistan Makes Brief Appearance in Europe

Plus: Cuba Will Receive First Digital Broadcasts; Radio Bahrain Speaks English

Radio Australia Flip-Flop

Back in December, we reported that rumors of the impending shutdown of Radio Australia's shortwave service were unconfirmed and that we shouldn't jump to conclusions. Well, unfortunately, now it is confirmed. See the update in this month's "CQ World Wide" column on page 65, and I'll have more on this next month. –GLD

As usual, let's start by checking some shortwave-lets:

~ The rarely heard or reported external service of Radio Afghanistan has been noted in Europe on 6100 from 1530-1635 UTC. There is no chance of hearing the station in the U.S. with that strange time and frequency combo, even under the best conditions.

~ The Caribbean Broadcasting Union and the Digital Radio Consortium have announced they will bring the first live digital broadcasts to Cuba and the Caribbean … even reaching northern South America and as far north as Florida. The broadcasts go out via Ascension on 21720. That frequency also carries the BBC World Service.

~ Radio Bahrain, 9745 has apparently switched from Arabic to airing English around the clock. That makes it doubly unfortunate for those of us, including me, who find receiving Bahrain an impossible challenge!

~ It seems that Brazilian standard frequency and time station PPE in Rio has returned to life on 10000 kHz with its 1-kilowatt signal. You can hear it occasionally, given the right conditions, and providing WWV/WWVH isn't in tone mode.

~ The status of shortwave in Indonesia doesn't seem to be improving much. It appears now that RRI 7290-Nabire (Irian Jaya) is off the air. The overseas service of the Voice of Indonesia is still jittery, frequency-wise, on nominal 9625.

~ Sudan Radio has resettled on its regular 7205. It's been varying to 7206.

*c/o CQ magazine


babcock
trusted to deliver™

Re: Reception Report: Test transmission briefly on 14 December 2015 from 1415 to 1419 UTC on a frequency of 12,065 kHz

Tue, Sep 20, 2016 3:24 pm

From Trans Mission transmissiontest@gmail.com

To rdangelo3 rdangelo3@aol.com

Hello,

Thank you for your report and I confirm the details are correct. These transmissions were to fault-find on a 250/300 kW sender at the UK HF transmitter station at Woofferton.

These duration of these tests can be variable as the engineers can sometimes need a long time to establish a fault or they may interrupt the test, make an adjustment and resume. This is particularly so if the fault is of an intermittent nature.

Babcock, Woofferton is the only remaining UK HF sender broadcast station and also is the only one with this transmission test audio and email address.

The audio is contained in a file play-out system and incorporates non-copyright music and voice announcements from one of the engineers, Martin 2E1EKX at the transmitter site.

Thanks for your interest.

73

Dave G4OYX,
(Retired) Senior Transmitter Engineer Woofferton 1982-2012.

The UK's Babcock Media Services confirmed Rich D'Angelo's reception of their Woofferton test transmission on 12065.

Leading Logs

ANTARCTICA—Radio Nacional Archangel, (t) San Gabriel, 15476 with carrier at 2030 but not much more. Off at 2101. (Valko, PA) (A **testosterone** log! –GLD)

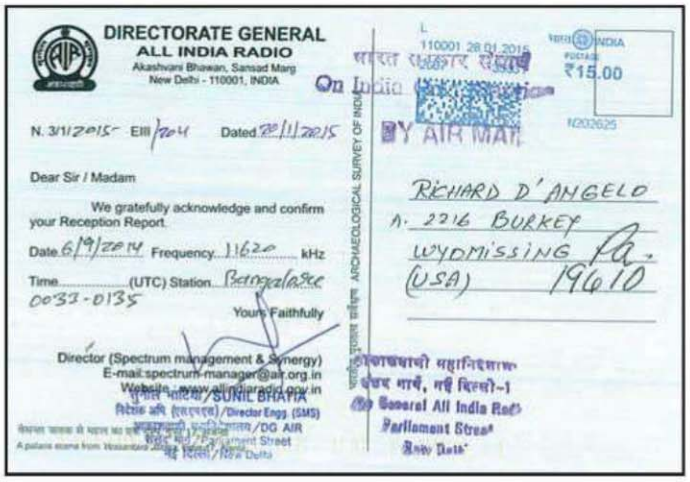
ALGERIA—Radio Algerienne, 9710 via France at 2101 with Holy Qur'an in Arabic, after apparent N.A., later seeming news in Arabic. (Cooper, PA)

ANGOLA—Radio Nacional, (p) 4950 at 0033. (Cooper, PA) 0155 in Portuguese with man and a woman talking. (Cooper, PA) 0220 in Portuguese with talks by a man and several music selections. Poor, but rising above the noise now and then. (D'Angelo, FCDX) 0224 with man speaking at length. (Taylor, WI)

ASCENSION ISLAND—17830 at 1703 with BBC News. (Cooper, PA)

AUSTRALIA—Radio Australia, 9580-Shepparton with woman discussing unknown author's new book. (Cooper, PA)

ABC Northern Territory Service, 4835-Alice Springs with vocals at 1010-1103, then an ID followed by ABC News. (D'Angelo, FCDX) 1033 and


DIRECTORATE GENERAL
ALL INDIA RADIO
Akashvani Bhawan, Sansad Marg
New Delhi - 110001, INDIA

N. 3/1/2015- Ell/2014 Dated 22/1/2015

Dear Sir / Madam

We gratefully acknowledge and confirm your Reception Report.

Date 6/9/2014 Frequency 11620 kHz
Time 0033-0135 (UTC) Station Bengalaske

Yours Faithfully

Director (Spectrum management & Synergy)
E-mail:spectrum-manager@air.org.in
Website : www.allindiaradio.gov.in

SUNIL BHATIA
Director Engg. (SMS)/DG AIR

₹15.00

BY AIR MAIL

RICHARD D'ANGELO
A. 2216 BURKEY
WYOMISSING PA.
(USA) 19610

All India Radio confirmed D'Angelo's reception on 11620. Note that AIR noted "Bangalore," rather than the more geo-politically correct Bengaluru.

1315. (Cooper, PA) 1309 on costs. (Brossell, WI) Already getting audio at 2020 with man & woman hosts taking phone call, woman still at 2117, 5025-Katherine at 0825 under Rebelde. Best in lower sideband. (Valko, PA) 2011 good at peaks over CODAR QRM. (Wood. MA)

AUSTRIA—Adventist World Radio, 9770-Moosbrunnat 2018 in Dyula, a West African language, with haunting music. Off at 2025. (Cooper, PA)

BANGLADESH—Bangladesh Betar, 15105 at *1227-1327 poking through, mostly the music made it. (D'Angelo, FCDX)

BOLIVIA—Radio Chaski, Cochabamba, 3310 at 0905 in Spanish/Quechua with man giving apparent news, followed by brief music. (Cooper, PA)

Emissora Pio XII, Siglo Veinte, 5952 at 0156 with mellow music and man speaking in Spanish. (Taylor, WI) 0203 with man speaking, giving ID, then brief musical bridge. Not usually scheduled at this hour. (Cooper, PA)

Red Patria Nuevo, La Paz, (t), 605 at 2345 with man speaking and music in Spanish. (Cooper, PA)

Radio Santa Cruz, Santa Cruz, 6135 at 2216 with man speaking and vocals in Spanish. Eventually an ID. LSB needed due to co-channel Brazil. (Cooper, PA)

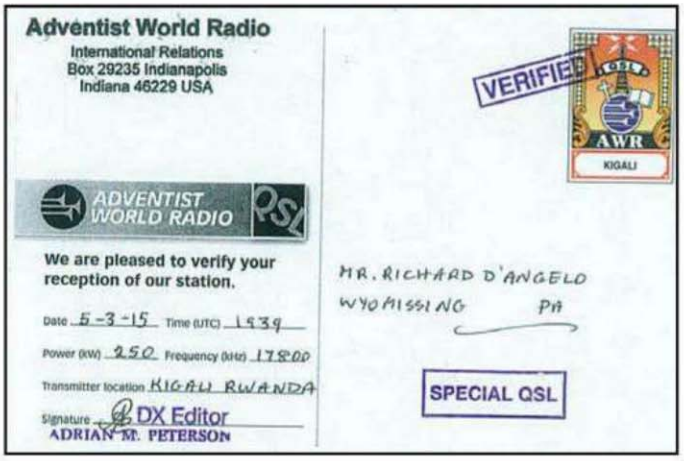
ETHIOPIA—Amhara State Radio (p), Addis Ababa, 15360 at 1737 in Amharic with man in a long monologue. (Cooper, PA)

Radio Fana, Addis Ababa, 7210 with lively music at 0649, male announcer in Amharic. Gone at 0656. (Valko, PA)

Radio Oromiya, Addis Ababa, 6030 fair at 1957 with HOA music. Closing announcement in Afar, then choral at 1958. (Valko, PA)

Voice of the Tigray Revolution, Addis Ababa, 5950 at *0257 blending with much stronger Brother Stair. The music made it through the noise, but was generally poor. (D'Angelo, PA)

MADAGASCAR—Madagascar World Voice, Mahajanga, 7390 at 0248 with religious program, man/woman announcers with program promos, 17640 at 2040 with a male voice and New Testament story, later another man talking about Christianity in Africa. (Cooper, PA) 9600 at 0130 with male announcer and religious program, 11945 at 1955 in Russian with contemporary Christian music, man with ID and Anchor Point address. Off at 0356, 1790 at 2242 in Arabic with Radio Feda program, male/female announcers. (Taylor, WI) 11610 at 11610 with KNLS IS to sign on, Recheck at 2118 they were



Rich also landed Adventist World Radio via Kigali.

in Chinese. (Brossell, WI) 11740 at 1835-1855* with African Pathways program. Off rather suddenly. (D'Angelo, PA) African Pathways program, 11825 on Madagascar World Voice, with instrumental to 0406, talk and music bridges. Poor and was soon lost in the noise. (Sellers, BC)

PERU—Radio Tarma, Tarma, (p) 4775 in Spanish at 0000 with beautiful OA huayno music, usual dramatic voiceover with complete ID at 0002, then live DJ. (Cooper, PA) 0008 with man speaking Spanish, and IDs with OA vocals. (D'Angelo, FCDX) 0050 with a long, preacher-like speech amidst lots of noise and QRN, man/woman talking at 0758 recheck. (Cooper, PA)

Radio Cultura Amauta, Amauta, 4955 at 1020 with 2 men speaking Spanish, later woman speaking and music. (Cooper, PA)

Radio Quillabamba, Quillabamba, 5025 at 2220 with Rebelde off, man/woman hosting campisino music after 2230. Rebelde stayed off all evening including another ad block at 0012. (Valko, PA) 0007 live studio male DJ and TC including IDs, gone shortly after 0012. (D'Angelo, FCDX)

Radio Huanta dos Mil, Huanta, 4740 at 0000 with OA music and an ad block. (Valko, PA)

RUSSIA—SVK Saka, 7345-Yakutsk (p) with female/male announcers in Russian. (Taylor, WI)

Adventist World Radio also sent views of their studio at Colombo, Sri Lanka.

SOMALIA—Puntland Radio, 13800-Garowe in Somali at 1341, man talking, 1347 into HOA music. (Valko, PA) 1429 with apparent HOA music, later man talking, woman talking from 1439, ID at 1441 then male announcer with "Radio Somali" ID. Thanks Valko for tip. (Cooper, PA)

More logs are available at <http://cqpluslisteningpost.blogspot.com>.

Who Goes There?

~ 9315 at 1528 man taking phone calls, beginning to fade around 1545; later, fanfare and then Sahel-style singer, woman talking, then man talking and off at 1559. Different parts were in French and Arabic. Nothing listed anywhere I could find. (Taylor, WI)

~ Radio Logos, Bolivia, uncertain at 1045 in Spanish. (Cooper, PA)

Just Sayin'

Lately unidentified pirate logs are beginning to dominate this section and squeeze out the "legit" mysteries, which need more of our attention. (As the late SWBC DXer A.R. Niblack used to say, "needs further work.") Thus, I am closing this section to these unidentified pirates. Too many of them appear to be "one offs" anyway, and will have to remain as lost signals.

QSL Quests

Dave Valko checks in with replies from pirates Renegade Radio, FRSH, Moonlight Radio, and the Europirate Radio Enterprise. A nice Halloween haul.

Back in the Day

Government broadcaster, Radio National Khmer, Phnom Penh, Cambodia, 9695 in Khmer at 1355 on February 11, 1967.

Thanks

Back slaps, man hugs and high fives to all the guys who did the good thing this time: Ralph Perry, Wheaton, IL; John Cooper, Lebanon, PA; Dave Valko, Dunlo, PA; Mark Taylor, Madison, WI; Richard D'Angelo, Wyomissing, PA; Harold Sellers, Vernon, BC; William Hassig, Mt. Pleasant, IL, Steven C. Wood, Harwich, MA; KB3FJO, Arthur Delibert, North Bethesda, MD; KB2DMD, Rich Parker, Pennsburg, PA; John C. Cooper, Lebanon, PA; Bob Brossell, Pewaukee, WI; Fotios Padazopulos, Athens, Greece; and Chris Lobdell, Tewksbury, MA. Thanks to each of you.

Until next month, Keep on keepin' on! -GLD

Australia Dominates the Headlines

Plus Hams Answer the Call in New Zealand

BY TOM SMERK,* AA6TS

VK hams push for high power and plan a large popular hamfest, UK students show ham radio to Parliament, PARA celebrates its 84th anniversary, testing returns to Lebanon, New Zealand quake victims aided by hams, and ham radio stars in ground-breaking new movie.

WIA Pushes for Higher Power

Wireless Institute of Australia (WIA) Director Roger Harrison, VK2ZRH, recently commented in the WIA News <www.wia.org.au/members/broadcast/wianews> that the WIA is continuing to push to raise that country's power limit from 400 watts to 1 kilowatt for Advanced license holders and from 10 watts to 50 watts for the Foundation license. The Spectrum Strategy Committee has had the issue of the use of high power on the WIA's "log of claims" with the Australian Communications and Media Authority (ACMA) since 2013.

"The central issue comes down to that of compliance with electromagnetic radiation standards in Australia," Harrison said, "not what other countries may allow." He noted that radiocommunication regulation in Australia is embodied both in license conditions and in compliance with electromagnetic radiation standards, and ACMA has a responsibility to ensure that emissions from all radio transmitting systems do not expose the public to harm.

In order to do so, the ACMA needs to know where possibly harmful transmitter systems are located and that such locations are recorded on a license. Complaining that other countries allow high power does nothing to help the case. (Apparently, neither does the fact that not a single study has ever shown a verifiable link between incidental exposure to RF radiation and negative health effects. – ed.)

The ACMA decided in August 2013 not to raise the permitted power for Advanced licensees. The WIA asked if the issue could be revisited in 2014 and received a positive response. Then a new Minister for Communications, Malcolm Turnbull, was appointed in September 2013. In 2014, he announced the Spectrum Reform program — a wide-ranging overhaul of spectrum management and licensing.

The Spectrum Reform process launched by Turnbull is continuing, with the Department of Communications and the ACMA working to produce a new and different radiocommunications act.

Harrison stated that while talks are continuing, the WIA is continuing to advocate for improved future licensing conditions for Australia's amateur radio community and prospective amateurs to come.

[WIA]

Also from "down under"…

Wyong Field Day (Hamfest) in Australia

It is time again for the annual Wyong "Field Day." Although it is called a Field Day, it is actually more of a hamfest. Alex Stewart, VK2PSF, from the Waverley Amateur Radio Society explained to me in an email that the concept is essentially a carry-over from its use in the farming industry where a field

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

Students from England's Sandringham School set up a station at Westminster Parliament and made an Amateur Radio on the International Space Station (ARISS) contact with British astronaut Tim Peake. The students are, from left: Emma, M6GJQ; Sandy, M6SQQ; Polly, M6POG, and Stanley, M6OJW. (Photo by Rhian Rhoderic, Head of Science at Sandringham)

day literally means a farmer opens up a field and all the different tractor or agricultural suppliers would bring their products for the district farmers to check out in actual conditions. The Wyong Field Day seems to apply this concept to the amateur radio hobby.

This event, the largest meeting of hams in the Southern Hemisphere, will take place on February 26th, 2017 at the Wyong Racecourse on the Central Coast of New South Wales. The Central Coast Amateur Radio Club (CCARC), the hosting club, will be celebrating its 60th anniversary. The CCARC has been holding those gatherings for the past 60 years as a way to raise money for the club.

The event promises a large flea market, license testing, lectures, raffles, commercial exhibitors, and more for a $10 entry fee.

By the way, Australia's actual "Field Day" (as we know it in the US) is the John Moyle Memorial Field Day which is held in March, so watch for more information about this event in this column next month.

[CCARC, Alex VK2PSF, Amateur Radio Newsline]

While the next story is not an amateur radio item, I know that many of you enjoy shortwave listening, so I thought you would like to hear about yet another decline in SWL broadcasts:

Shortwave Broadcasting Comes to an End in Australia

The Australian Broadcasting Corporation (ABC) has announced that it will end its shortwave transmission service in the Northern Territory and to international audiences effective January 31 in favor or expanding its digital content offerings, online and mobile services, and FM services for international audiences.

According to a press release (see <http://about.abc.net.au/press-releases/shortwave-radio/>), Michael Mason, ABC's Director of Radio said, "while shortwave technology has served audiences well for many decades, it is now nearly a century old and serves a very limited audience. The ABC is seeking efficiencies and will instead service this audience through modern technology."

International listeners can continue to access ABC International services via a web stream at: <http://www.radioaustralia.net.au/international/listen>, in-country FM transmitters (see Radio Australia's 'Ways to Listen' at <http://www.radioaustralia.net.au/international/radio/waystolisten/fiji>, the Australia Plus expats app (available in both iOS and Android), and partner websites and apps such as <www.tunein.com> and <www.vtuner.com>.

[Australian Broadcasting Corporation]

For those of you who still believe there is no future for ham radio, read on …

U.K. Students Present Amateur Radio at Parliament

Four grade 9-11 students from Sandringham (UK) School recently had the opportunity to visit the Westminster Parliament where they set up a radio to speak with U.K. astronaut Tim Peake while he was aboard the International Space Station. The students were Sandy Cairns, M6SQQ; Polly Gupta, M6POG; Stanley MacMurray, M6OJW; and Emma Wilkinson, M6GJQ.

Judges were impressed with their engineering project at the regional heats of The Big Bang UK Young Scientists and Engineers Competition, an annual contest designed to recognize and reward young people's achievements in all areas of science and engineering, as well as helping them build skills and confidence in project-based work.

[Watford Observer]

Our Filipino ham friends are having an anniversary!

PARA Celebrates 84th Anniversary

The Philippine Amateur Radio Association (PARA) celebrating its 84th anniversary on November 27 in Marikina City with a full day of activities that included VE testing, fox hunting, a CW challenge, and a Go-Kit contest. The anniversary program also honored members of HERO who assisted during October Typhoons Karen and Lawin.

PARA was organized and admitted into the International Amateur Radio Union on November 27th, 1932 with Leon V. Grove, KA1LG, as its founding president. Grove was then the Principal of the Philippine School of Arts and Trade.

[PARA/Amateur Radio Newsline]

Can you imagine waiting 10 years to become a ham or upgrade your license?

Ham Tests Return to Lebanon After More Than a Decade

Fifty or so were on hand in Beirut to take the amateur radio license exam to become a new OD5 or upgrade their current license class. It has been more than a decade since the Lebanese Ministry of Communications offered the last test session.

According to Amateur Radio Newsline, Hani Raad, OD5TE, president of the Radio Amateurs of Lebanon is being credited for spearheading the effort to getting the exam scheduled.

[Amateur Radio Newsline]

When all else fails – amateur radio saves the day!

Hams Provide Communication in New Zealand Quake

When a 7.8-magnitude earthquake struck the northeastern corner of New Zealand's South Island in mid-November, thousands of people were left stranded, roads and buildings were destroyed, utilities, and communications were not functioning. While the quake affected a mostly rural area, it caused extensive damage in Kaikoura and Culverden, killing at least two people.

While there was no formal activation of Amateur Radio Emergency Communications (AREC), hams monitored traffic on the bands. Ken Duffy, ZL4KD, a local ham told Amateur Radio Newsline in an email that he activated the local Christchurch repeater shortly after the first quake struck and remained on the air through the series of aftershocks. Ken said AREC could not gain access to many of the affected areas because of the severity of the road damage.

Another ham, Daniel Ayers, ZL1DFA, was on holiday in the town of Waiau, just a few miles from the epicenter, and had a VHF handheld radio with him. Daniel was able to contact other areas of the South Island over a local VHF repeater to get more information on the situation.

Daniel was eventually able to get leave the area in his car and retrieve his SUV, which was outfitted with emergency communications equipment on HF and VHF. He returned with the vehicle to Waiau and resumed providing more capable emergency communications from the quake area to other parts of New Zealand.

Daniel worked for hours on using the Civil Defense system equipment before being asked to use his own amateur radios

to help the New Zealand fire service pass messages to its regional office in Christchurch, 100 miles away.

Daniel commented: "What I found that was very interesting is that the 'amateur' VHF networks were more reliable in this instance — and this was not the only instance where we have seen this in this part of the country. The amateur infrastructure was more reliable than the radio communications infrastructure for Civil Defense."

Once again, the saying is proven to be true "When all else fails – amateur radio!"

[Amateur Radio Newsline]

Have you enjoyed watching those old movies filmed in Cuba? Now that the U.S. and Cuba have re-established relations, you will begin to see new movie collaborations between Hollywood and Cuba. The first features ham radio as its star!

Cuba and U.S. Collaborate on New Film Featuring Ham Radio

Ham radio is a main part of the plot of the new movie "Sergio and Sergei," scheduled to be released later this year. This film is the first co-production between the U.S. and Cuba in 56 years. The story takes place in 1992 and is about a cosmonaut stranded on the Mir Space Station during the time when the Soviet Union was collapsing and the new government lacked the resources to bring him home. The cosmonaut uses the onboard ham radio to contact a philosophy professor in Cuba for help. The professor, in turn, reaches out to an American journalist who covers NASA (played by Ron Perlman, who also co-produced the film), and the three work together, transcending political boundaries and ideology to try to save the cosmonaut's life.

[El País/Dateline Hollywood/Amateur Radio Newsline/Southgate Amateur Radio News]

In Closing

As I write this column in advance, we are approaching Christmas, and I can't help but thinking about all of the new ham radios and accessories that hit the market this year and how they would make great Christmas presents! Let me know if anyone in your family actually thought to give you a ham radio gift!

Please continue to send your news, photos, and stories to <aa6ts@cq-amateur-radio.com> when you have something you think would be right for our column. I am always happy to hear that you are enjoying this column, so please make an effort to contribute. I can't write about it if I don't know about it!

– 73 de AA6TS

CORY GB SICKLES, WA3UVV

The Tools You Carry

Part (90) of the Solution or Part (90) of the Problem?

From the time that FM began to be a "thing" on our VHF and up bands, hams have associated themselves with used and surplus Land Mobile Radio (LMR) transceivers originally used in public safety or business applications. Be they mobile, portable or repeaters, it is safe to say that just about all of us have used one of these pieces of equipment at some time — whether we actually owned it or not, and whether we actually knew it or not.

In the early days, most sported radios from RCA, GE, or Motorola. The latter seemed to be the most desired of all — at least in my neck of the woods. One of my first portables was a two frequency HT-200 (known as a "brick" for good reason), which came with a rubber duckie, a telescoping 1/4-wave antenna, battery and charger. By today's standards, it was massive.

Larger still was the P-13 single-frequency "luggable" that used "instant on" tubes in the transmitter. The radio's case was mostly battery and for good reason. Eventually, manufacturers started producing radios specifically directed at the amateur market and I ended up with a Wilson 1402 that stood about 9 inches tall, had six crystal-controlled channels cost me a then bargain price of $200. That equates to over $800 in today's "Dollarettes." I thoroughly enjoyed that radio and eventually bought a Standard SRC-146A, which was one of the most solidly-built handhelds I ever owned. Standard, through various twists and turns, would become a part of Yaesu, by the way. The SRC-146 was known as "The poor man's Motorola"— being compared then to the HT-220.

But enough about history and how I chose to invest money in radios during the 1970s. Suffice it to say that LMR gear (also known as "Part 90" based on the section of the FCC rules that structures and regulates land mobile radio in the U.S.) has been with us in one form or another for roughly the past half century. Today, you can still find many hams who prefer Motorola "Batwing" radios over something built for hams. Kenwood and ICOM produce LMR gear that closely resembles some of their ham offerings, so there's a sense of quality about that, as well.

This is especially true when it comes to some of the digital methodologies in use, such as DMR, NXDN, and P25. Motorola has been a trailblazer when it comes to DMR and its MotoTRBO line is well known. Likewise, you'll find P25 radios from Motorola (such as the Astro Sabers I own — about the same height as that Wilson 1402), as well as Kenwood, ICOM, and Vertex-Standard — makers of the smallest P25 portable I know of.

*Email: <wa3uvv@gmail.com>

The Standard SRC-146A is an example of a 1970s land-mobile handheld used by many hams. (Photo courtesy rigpix.com)

When it comes to NXDN — a joint effort of ICOM and Kenwood — you'll also now see that Alinco is getting into the game. Alinco has also announced (and is shipping) a DMR portable.

Enter the "CCR"

In the worlds of DV (Digital Voice) and legacy analog FM, Part 90 radios have traditionally been attractive — given their build quality, support and an intangible je ne sais quoi of having something associated with "the big boys." However, not all Part 90 radios are made the same and in recent years, there has been a flood of such radios that many categorize as the "Cheap Chinese" variety.

But it is in the analog FM arena where most of a crop of inexpensive (and downright cheap) Part 90 portables have infiltrated the ham radio bands. More than just the bands, they have invaded the ham radio market. Unlike the "bragging rights" or "instant credibility" of a seriously rugged radio from the LMR world, these are popular for one primary reason — cheap price. So much so, that they are grouped together by many as "Cheap Chinese Radios" (CCRs).

While that is attractive in the short view, it is damaging in the long view. Every purchase of one of these radios also represents a lost sale for one of

the manufacturers that develop well-designed and professionally-supported transceivers specifically for the amateur radio market — from Kenwood, ICOM, Yaesu and Alinco (KIYA). Further, every purchase of a CCR from some online discount entity is a lost sale for one of the amateur market retailers.

While there's not a lot of profit to be made from the sale of the radio, there is from accessories. One of the things I learned decades ago while working for RadioShack was that it was better — from a net profit standpoint — to sell $500 worth of batteries than it was to sell a $500 stereo system. The loss of a few dollars to help keep the lights on may not be felt — individually — but there is a cumulative effect. The loss of more income from accessory sales is felt individually and you can bet it's felt cumulatively.

So while some of us may feel good when we save a few dollars by purchasing a CCR and some accessories through the website of a company that couldn't care less about ham radio, we won't when we see that our favorite ham radio retailer isn't there anymore. Should you think that is a far-fetched idea, think back to the news about one multi-store amateur radio retailer in the middle of 2016 and reconsider your position.

In a vein of "If you can't beat them, join them," more than a few of the members of our amateur radio retail community have added certain CCR brands to their product mix. While I'm sure they'd rather be selling the same quantities of radios and accessories from the brands we've come to know and love, at least they're getting "something" and that's important.

(I can hear the keys tapping on computers as some of you read this. Good. I want to hear your well thought out opinions and musings on this subject — whether you agree with me or not.)

I'll also recognize that some marketing innovation has arisen at some retailers — choosing to bundle a "starter kit" of a CCR, some desirable accessories and Tech Class license guide. That's a "win-win" idea for everyone, as it's better to get those accessories now — not just to allow said retailer to make a little more profit, but to also save the buyer the additional expense of shipping, when they realize they want those accessories.

By the same token, it would be nice if they offered at least one of the same sort of package with a KIYA radio at the heart of it. In Sears catalogs of years ago, they often had a "Good, Better, Best" set of options, allowing the cus-

tomer to decide what features, capabilities and price point was best for them. That was good business and was good for customers — encouraging them to make educated decisions.

There are certain radios — and they are Chinese — that are manufactured by companies that are well-known and respected in the LMR word, such as Hytera. Part of Hytera's line of DMR radios — now in ham-friendly, keypad programmable versions — are being sold by one ham radio retailer in particular. DMR is not something from Kenwood, ICOM, or Yaesu that you find being sold in ham radio stores — although Alinco is.

Again, Hytera is a solid brand and a solid company. It should not be grouped into the CCR classification, as its products stand up well and do well in the areas of spectral purity and more. The same can not be said about CCRs. Sometimes I wonder if most CCRs truly are "Part 90" radios — or not.

DMR is the second-fastest growing DV methodology in amateur radio today. While it uses LMR technology, the advent of products directed specifically at hams is a welcome and worthwhile effort. One of the things that restricts the adoption of Part 90 gear is the designed-in lack of any way to program a radio "on the fly" from a user-navigated menu system.

At the Hamvention® last year, I picked up a Hytera MD-380 DMR portable for VHF, having a Connect Systems' portable for my UHF activity. While it doesn't allow for full access — as I have with the programming software — I was able to set up a repeater pair, color code, slot, and talkgroup assignment — all with just the keypad and display. I was soon rewarded with a nice conversation with a ham in Austria — Karl, OE5KBO. The fact that I could do that with just the radio was and is still cool.

Notice that I got that from a ham radio retailer, not some other place. In the past year, I've purchased items from DX Engineering, Ham Radio Outlet, KJI Electronics, Main Trading, R&L Electronics, Radio City, and Universal Radio. By no means are those all of the retailers across North America, but at least it is some of them.

Radios to Rely On

If you're going to get a radio — one that you know you can rely on when it counts — I suggest you steer clear of a CCR. If you must (for whatever reason) get one, then please purchase it from an amateur radio retailer. It may make little difference to you, but collectively, it can make a big difference to them — and — the rest of us in the amateur radio community.

What difference does it make in the world of EmComm as to what radios you buy and use? More than you might think. Remember that you are interacting with professionals who have (in many cases) very expensive transceivers — mobile and portable. I'm not suggesting we all "need" to have an APX-8000 on our belts, but in those less intense moments during a marathon or bike race, when you are asked about ham radio and what kind of portable you have, do you really want to say you're using something that cost less than the first pair of 27-MHz "walkie-talkies" I got for my seventh birthday? Just how much do you think that's going to raise your "street cred" in the eyes of a public safety employee or first responder who knows full well that their radio is a lifeline to other resources?

You have to see things from the perspective of others — especially the ones in agencies you are there to serve. To most people, perception is reality. Just as you are going to inspire more confidence by showing up in a freshly-showered state, wearing a clean polo shirt and ironed slacks — than if you have "bed head" hair, a well-worn T-shirt, and "randomly vented" wrinkled jeans — the tools you carry speak volumes.

All of this is not to say that Part 90 radios have no place in amateur radio EmComm. Properly thought out, Part 90 radios offer additional flexibility that Part 97 models may not. If you have occasion to provide communications for an event or group that is offering to pay you, then we all know that use of amateur frequencies is prohibited. We also all know that club treasuries can benefit from such opportunities.

If word gets out that your radios are cheap (and word will get out somehow) and readily available, then some "graphite commando" in the group is going to quickly figure out that that it could be cheaper to just buy a bunch of radios themselves and kick your group to the curb.

They won't as quickly see the value in having experienced communicators there — as they will some way to save a buck. Keep in mind the difference between "price" and "value." Also keep in mind that American management knows how to do one thing better than any other — fire people, including volunteers.

Thus, having Part 90 radios and using them on license-free itinerant frequencies or even those temporarily authorized to us by their respective licensees is of value — in more ways than one. You may be able to facilitate communications through a GMRS repeater (please be licensed) or simply via simplex on a VTAC/UTAC interoperability or MURS channel — as may be appropriate. Here again, the use of radios that look and feel more like what the served agencies' personnel use to will go a long way toward having the confidence that encourages such things.

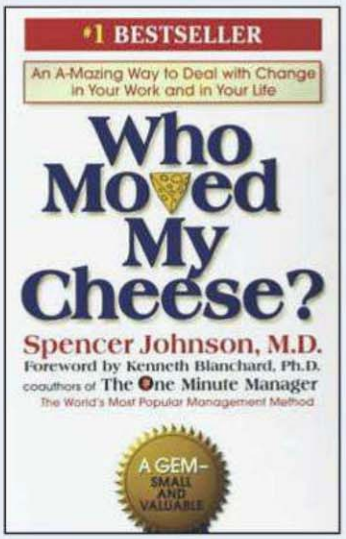
There are also times when something such as a SAR (search and rescue) operation expands and requires a few more radios. Or, perhaps one of the radios being used by "the pros" fails for some reason. Here, you have an opportunity to provide them with a professional tool that increases your value.

I know this is a controversial subject for many (hey, it's something to argue about other than politics) and there are many facets to all of this. Just keep in mind that the purchasing choices you make have ramifications. That's true for you, the industry and the EmComm opportunities that may come your way.

Book of the Month:

Our Book of the Month (more or less) is "Who Moved My Cheese?" by Dr. Spencer Johnson. With more than 28 million copies sold, it is an easy-to-read and digest text about changes in our workplaces and overall lives, with motivations about how we can see change coming, adapt to the change, and seek out new opportunities that are of benefit to us.

The concepts in the book are applicable to many things that hams encounter, such as club dynamics, changes in the marketplace, seeking out new opportunities, and recognizing when "the writing is on the wall" and what it means. "Who Moved My Cheese?" is available from most online and brick-and-mortar bookstores.



CQ 2017-18 calendar

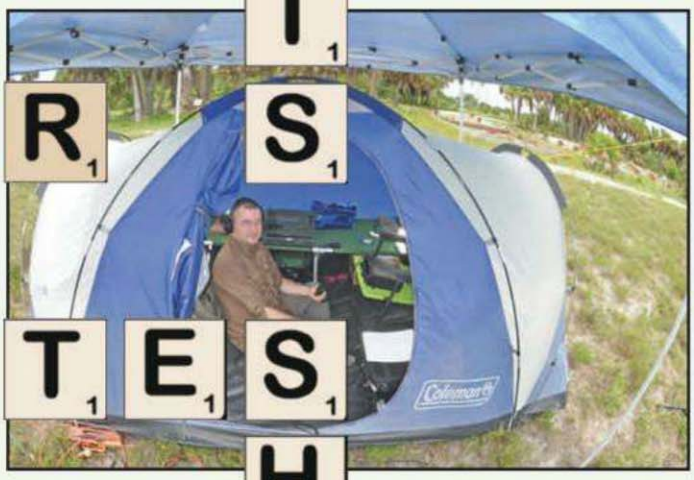
Fifteen spectacular color images of some of the biggest, most photogenic shacks and antennas from across the country and... also this year... a number of favorite shots from CQ magazine thrown in for good measure!

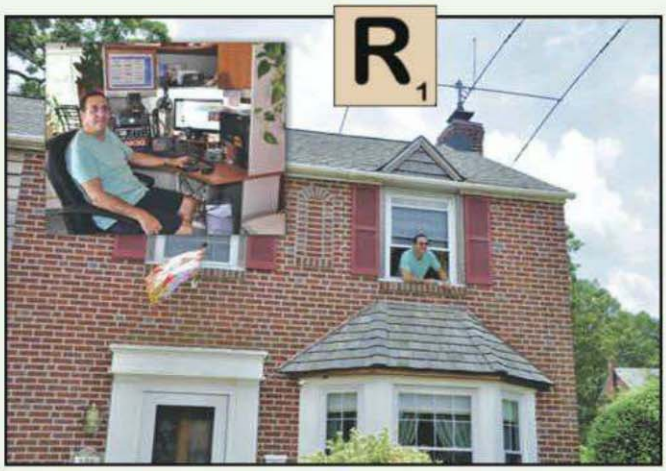
Calendars include dates of important Ham Radio events, major contests and other operating events, meteor showers, phases of the moon, and other astronomical information, plus important and popular holidays. CQ's 15-month calendar (January 2017 through March 2018) is truly a must have!

15 months of value
January 2017
through March 2018

BIG BLOW-OUT SALE!!!!

CONTESTS
EVENTS
CALENDAR
AMATEUR RADIO DATES
ANTENNAS
HAMS
SHACK





$7.95 plus $3 s/h

Shipping charges:
USA $3; Canada/Mexico $5;
All other countries $10.

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BY R. SCOTT ROUGHT,* KA8SMA

QRP Special

Keeping QRP's Flare When Ol' Sol Takes a Nap

Never an Excuse Not to Work QRP!

Welcome to the February column and CQ's annual QRP Special. I received numerous emails with positive input regarding the October column ("The Do's and Don'ts of QRP Contesting"). I hope that all of you who participated in the CQ World Wide DX contests this fall did well despite the declining sunspots and sometimes poor band conditions.

One question that I often receive is: "What can you do with QRP when solar activity is on the decline?" The answer: Everything you are doing now! I admit QRP operations may be a bit more challenging with fewer sunspots, but contacts can still be plentiful.

This month, we focus on various activities that are "QRP-friendly" whether sunspots are plentiful or not; and, in QRP Achievements, we highlight a newer ham who has discovered what can be achieved with low power. First, though, a short primer on solar activity and band conditions for the QRP operator.

Ol' Sol's Impact on the Ionosphere

As hams, we understand that the ionosphere is responsible for bending/refracting radio waves over great distances back to earth in the high frequency (HF) radio spectrum. The ionosphere is fueled by ultraviolet (UV) radiation that is produced by sunspots (magnetic storms on the sun that emanate UV radiation). When solar activity is high, the ionosphere is "super charged" with UV radiation which, in turn, creates a thick ionospheric blanket that refracts most of our radio signal back to earth with little of it escaping into space. Propagation in the upper HF bands (10, 12, and 15 meters) can be a bit surreal during periods of high sunspot activity. A short piece of wire dangling from a tree at the neighborhood park connected to a QRP transceiver can produce worldwide contacts with ease. I have cranked down my power to less than one watt and still had solid worldwide contacts on both CW and SSB. This always creates a little awe for those passing by who find it hard to believe that a QRP transceiver the size of a small book, a battery and a short piece of wire can contact someone on the other side of the world. When sunspots are high and band conditions are good, ham radio is magical, especially for those onlookers who are non-hams.

As we enter the next solar minimum (period of the 11-year sunspot cycle with fewer sunspots), HF communication can be more challenging, but nothing that the skill and determination (and sometimes patience) of the QRP operator cannot overcome. Shortly after the October CQ World Wide DX SSB contest, I began hearing talk about how low sun-

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Figure 1.
The 13 Colonies certificate with QRP endorsement.

Band (meters)	CW (MHz)	SSB (MHz)
10	28.060	28.385
12	24.906	24.950
15	21.060	21.385
17	18.096	18.130
20	14.060	14.285
30	10.106	—
40	7.040	7.285
80	3.560	3.985
160	1.810	1.910

Table 1. Suggested QRP Calling Frequencies

spot numbers would be the "death" of QRP operations for the next several years. I heard this doomsday discussion during the last lull in the solar cycle (one of the worst solar minimums on record) and although fewer sunspots did require a little more effort, QRP operators were making contacts on a regular basis.

Two hams that I worked on 17-meter SSB on numerous occasions during the last solar minimum were GI3DZE in Northern Ireland and OH2BAD near Helsinki, Finland. At that time, propagation forecasts showed band conditions to be "poor" or "fair" at best, and I could count the number of sunspots on one or two hands (sometimes no hands). The Saturday morning pileups trying to work these stations were heavy and the big guns were always present en masse. Worse yet, I was always working against a "hard stop" of 1400Z as I regularly took my daughters to the matinee each Saturday morning. Working these stations became a "regular" activity for me…my 3 watts always made the haul across the Atlantic during a time when I was repeatedly advised by my ham friends to pack up the QRP gear until the sunspots returned. I generally received S5 signal reports, which I gladly accepted as many of the big guns, running 500+ watts into a beam mounted on a tall tower aimed at Europe, could not do better than an S7. Maybe it's just me, but I thought I could always hear a bit of frustration in the big gun's voice after receiving their signal report knowing that I was running QRP…especially after GI3DZE would announce to everyone in the pileup that I worked him again with 3 watts.

I should mention that both GI3DZE and OH2BAD used an excellent technique (in my opinion) to control their pileups. They called QRZ and made a list of about 10 stations they could hear. After a minute or so of writing down callsigns, they would announce the list of stations to be contacted, work each station, and then call QRZ to start the process over. A very efficient method for working heavy pileups during poor band conditions! I was always appreciative that they used this method as my QRP signal otherwise may not have cut through the monster pileups.

To better understand the impact of solar conditions on HF propagation, it is important to be attentive to the sunspot number, solar flux, and level of geomagnetic activity. All three play a vital role in band conditions. The sunspot number is simply the number of sunspots on the sun. More sunspots means more UV radiation, which further enhances HF propagation. The sunspot number can range from 0 to several hundred and can change on a daily basis. Solar flux is the amount of radio noise (intensity of solar radiation) generated by the sun at a frequency of 2800 MHz (10.7 centimeter wavelength). Solar flux is measured in solar flux units (SFUs) and can range from a low of 67 SFUs to several hundred. A high solar flux (over 150 SFUs) generally means good HF propagation; however, as the solar flux increases, band conditions can become noisier. Geomagnetic activity, typically identified by the A and K indices, provides the status of the Earth's magnetic field, which is disturbed by variations in the sun's magnetic field. These disturbances can deteriorate HF propagation. The A index can range from 0 to 400 and the K index from 0 to 9. Lower indices generally indicate better HF conditions. An excellent resource that provides an in-depth and complete explanation of the principles of ionospheric propagation, the sunspot cycle, and HF propagation prediction is The New Shortwave Propagation Handbook (available from CQ Communications, Inc.). This book belongs on every ham's bookshelf and is a must-have for the QRP operator. Understanding these phenomena will also help you make best use of the monthly updates and predictions in this magazine's "Propagation" column.

One important note about propagation…NEVER rule out the possibility of a sudden opening on the upper HF bands. On numerous occasions, I have worked stations on 10 and 15 meters when sunspot numbers were nearly nonexistent and the online propagation models had identified these bands as "poor" or virtually unusable. Do not be fooled by the propagation forecasts as they are not always accurate and cannot predict sudden band openings. I know some hams who scroll across the upper HF bands listening for activity, hear nothing, and then shut down their stations, believing conditions are too poor to be on the air. Do not fall into this trap…remember, if everyone is listening and no one is calling CQ, then no one would ever make a contact. I have been surprised when the propagation forecast for 15 meters is "poor" with no activity heard, and I have called CQ with a return call from a DX station. Be active and call CQ — do not be the ham who is always listening for someone else.

Even though you should keep an ear on the upper HF bands, 20 meters is the "workhorse" band and is generally open even when the higher bands are closed. The solar cycle has less effect on the lower HF bands. Conditions on 40 meters during a lull in the sunspot cycle are about the same as they are during a solar maximum. In general, the longer wavelengths associated with the lower bands are more easily reflected by the ionosphere than the shorter wavelengths associated with the upper HF bands, even during the solar minimum when the ionization potential is low due to a lack of sunspots. The point here is to not overlook the lower bands for QRP. Many of us often associate QRP with the upper HF bands and never shift operations to the other end of the HF spectrum.

Ways to Stay Active

There are always on-air activities and events allowing the QRP operator to stay active even when sunspots are on the decline or when propagation may not be that favorable. Following are a few activities that keep me energized when conditions are tough. I have also listed the suggested QRP calling frequencies (Table 1) recognized by most organizations. I have found that someone is generally standing-by to make a contact on or near one of these frequencies, especially on CW.

Special Event Stations — A Weekender's Delight

Special event stations are a popular pastime and there is generally an abundance of them on the air each weekend.

Photo A. VU3MEY operating his BitX20 transceiver. Also note the BitX40 (blue box) and mcHF SDR transceiver (atop the BitX40). See this month's "QRP Achievements" section for more on Amey and his station. (Photo courtesy VU3MEY)

"Be active and call CQ — do not be the ham who is always listening for someone else."

Tuning across the HF bands on a Saturday or Sunday afternoon generally provides several of these stations which are easy prey for QRP operators as many are stateside, generally operate on 20 and 40 meters (good bands to operate QRP during the solar minimum) and are eager to make QSOs to advertise their special event. I often contact these stations to help determine propagation, especially when the special event is operating on more than one band (i.e. 15 and 40 meters).

The annual 13 Colonies Special Event <www.13colonies.net> which is held during the first week of July is one of my favorite special events each year. Since its start in 2009, it has grown into a major event with well over 100,000 contacts made each year. Dedicated SSB and CW operators are enlisted from each state comprising the original 13 colonies. These operators are on the air at various times during the special event, making contacts with as many stations as possible. A contact with any one of the 13 colony special event stations earns you a certificate (Figure 1) and contacts with all of the colonies yields a "Clean Sweep" endorsement. Best of all, the organizers of this event realize that breaking these pileups may be difficult for the QRP operator (some of the pileups are DXpedition-worthy) and have made an effort to enlist a dedicated SSB/CW QRP operator for each state. If you make your contacts via QRP, you will receive a special QRP endorsement on your certificate. With plentiful stations to work on all HF bands, this well-orchestrated special event is a must for the QRP operator. Be sure to include this event as part of your 2017 operating schedule…and work it QRP.

Contests — A Plethora of QRP Activity

In the October column, we discussed various techniques to successfully work a contest via QRP. All of the major contests (CQ's World Wide and World Prefix contests, as well as ARRL's International DX and Sweepstakes contests) offer QRP categories. CQ also offers a QRP category for the annual DX Marathon, which runs the entire calendar year (January 1st through December 31st) and keeps contestants in tune with the world. Scoring for this contest is simple — each country worked is worth one point and each CQ zone worked is worth one point (countries and zones count only once). The sum of the number of countries and CQ zones worked is your total score. Since the DX Marathon runs the entire year it promotes DX activity every day rather than only on contest weekends and during DXpeditions and offers the QRP operator the opportunity to be part of a contest (and possibly earn an award) without the QRM often associated with weekend contests. The contest entry is a spreadsheet listing your contacts for the year…proof of the contact (QSL card) is not required. For those who enjoy DX and like to contest, the DX Marathon is for you. The complete rules for the DX Marathon are listed on CQ's website or visit the DX Marathon webpage at <www.dxmarathon.com>.

In addition to the major contests, there are numerous smaller contests that offer QRP entry categories and/or are designed specifically for QRP. A list of dates and general information for upcoming contests is listed each month in the Contesting column and on the CQ website <www.cq-amateur-radio.com>. My only advice on contesting is to plan ahead as it can be addictive. I populate my calendar with the major contests (at least one to two years out) first, then work in the family vacation schedule, and input the smaller contests last. My XYL is very understanding.

Going Portable Will Help Your Solar Doldrums

"Get out and blow the stink off ya!" This was one of my mother's favorite things to say while my brother and I were growing up and she wanted us out of the house to get a breath of fresh air (or simply to get out of her hair…not sure which, hi hi). If you are in the ham shack and begin to feel a twitch because the lack of solar activity has got you down, then pack up your QRP equipment and hit the local park, trail, or even your backyard for an afternoon of operating. I do not want to delve too far into portable operations as I have a lot planned for the June column (CQ's "Take it to the Field" special), but working portable is a snap for QRP and will "reset" your brain.

Several years ago I was frustrated with the lack of sunspots and its toll on the upper HF bands and difficult DX conditions. In order to combat my feelings of depression, I mounted my

QRP station to a wooden cutting board for portability and set up operations on my backyard deck for an afternoon of casual operating. I used a piece of wire (in concert with my antenna tuner) that stretched from the chimney on the back of my house to a tree along the rear property line (a distance of approximately 75 feet) as an antenna. I focused primarily on 40 meters, working a variety of special event stations, as well as DX on 15 and 20 meters when openings occurred. An afternoon of QSOs in a portable setting can do a lot for your mindset, help sharpen your operating skills, and blow a little stink off ya…of course, beer helps too!

Join a QRP Club!

Hams have a variety of interests and whether we focus on DXing, contesting, digital modes, etc., we all share the same common interest and are part of the same hobby. However, QRP operators are not always understood by other hams. I suspect QRO operators think as strangely about me as I do them (hi). Joining a QRP club will provide you the means to interact with other QRP operators, have a little camaraderie with hams who share the same interests, and learn from others.

To find a QRP club, simply do an online search for "QRP Clubs." Many of these clubs publish monthly or quarterly newsletters, have a club internet site where they exchange ideas, and host annual gatherings and meetings. The larger clubs have an international or national focus, whereas some of the smaller ones tend to have a more local or regional focus. However, don't let the name or location of the club fool you. I am a member of the Michigan QRP Club, which has members from around the country and world. Although I live too far away to attend their monthly breakfasts, I am kept apprised of club activities via their quarterly newsletter which is full of QRP adventures and tinkerings with radios, antennas, power supplies, and so on.

Never an Excuse

Spending time brushing up on your knowledge of propagation will help you learn and identify the best times to be on the air while sunspots are declining. This applies to all hams, not just QRP operators. With a little insight on HF propagation, the myriad of special event stations and contests to work, fun in going portable, and the pleasure of exchanging ideas and meeting others who have an interest in QRP, there should be no lull in your QRP activities as we enter the next solar minimum.

QRP Achievements

This month, we highlight Amey Pandit, VU3MEY, from Goa, India (Photo A). Amey received his ham license in May 2015 and has discovered the thrill of low-power communications by working DX with his homebrew BitX 20-meter SSB transceiver (about 10 watts output) and a dipole antenna. In addition to the BitX20, Amey has also constructed a BitX 40-meter SSB transceiver and a mcHF SDR transceiver. Amey worked the 2015 CQWW DX SSB contest shortly after being licensed and jumped for excitement when he heard K3LR, VY2ZM (Prince Edward Island, Canada), and 5W1SA (Samoa), all well over 7,000 miles from his QTH, coming back to his call during the contest. As Amey indicated, "It was a real thrill that my low power station was heard between big giants on a busy contest day."

Welcome to the club, Amey. The big giants (QRO stations) you alluded to in the contest will always be there, but you have proven to yourself that less can be more!

– Until April, 73

kit-building

BY JOE EISENBERG,* KØNEB

QRP Special

The NS-40+, Plus a New Soldering Source

There is nothing better than having a well-designed kit on your bench ready for some hot solder. This month is no exception as I dive into the NS-40+. In 2008, David Cripe, NMØS, introduced us to the utter simplicity of the NS-40, which is a very simple 5-watt, 40-meter CW transmitter kit offered by the Four-State QRP Group. Now, for 2017, David is back with an improved version of the NS-40, called the NS-40+. The NS-40+ gets its name from the fact that there is "None Simpler." The very low parts count, all through-hole components, and innovative inductors etched onto the PC board means no toroids to wind, and precision control of the inductance of the four PC board inductors.

The NS-40+ is capable of up to 5 watts of CW RF output using its Class-E amplifier circuit. Without going into a lot of circuit theory, a Class-E amplifier is quite efficient, resulting in much less wasted energy. With the transmitter key down into my dummy load/wattmeter, I was able to see about 4.5 watts of RF output.

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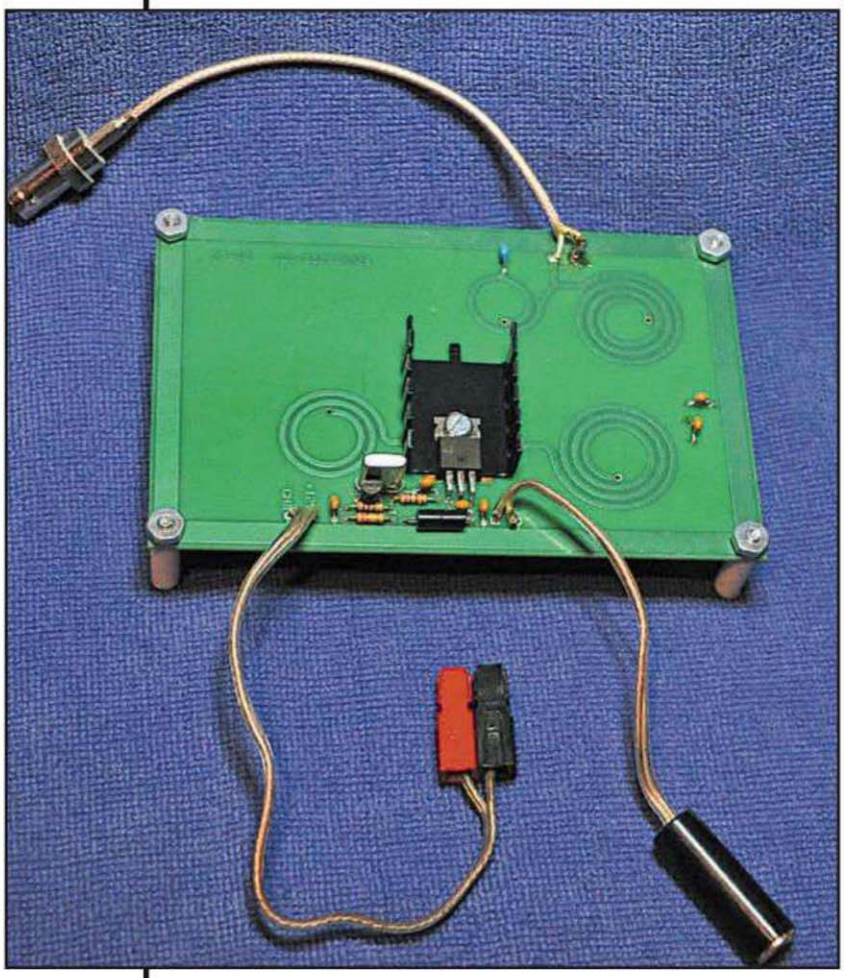


Original NS-40 kit with my pigtails on it.

There are two main differences between the original version and the new version. The original required builders to make their own connections to the board. I interfaced mine with three pigtails, one for RF, one for power, and one for the key. The new version has onboard jacks to make this process a lot easier. By using a standard 2.1-millimeter coaxial power jack, a PC-mounted BNC connector, and a 1/8-inch key jack, The NS-40+ is all ready to go without making pigtails. The other difference was a slight adjustment of the inductors to make them more efficient.

Detailed assembly instructions are included, and there is a minimum of parts, making this kit easily able to be assembled and on the air in less than an hour. David follows the convention of first placing the resistors, then capacitors, followed by the rest of the components, to make assembly go quickly. One task I recommend is adding heatsink compound to the output transistor/heatsink surface. The instructions mention this step as being optional, but I think it is a good idea, as it allows a lot better transfer of heat from the transistor to the heatsink.

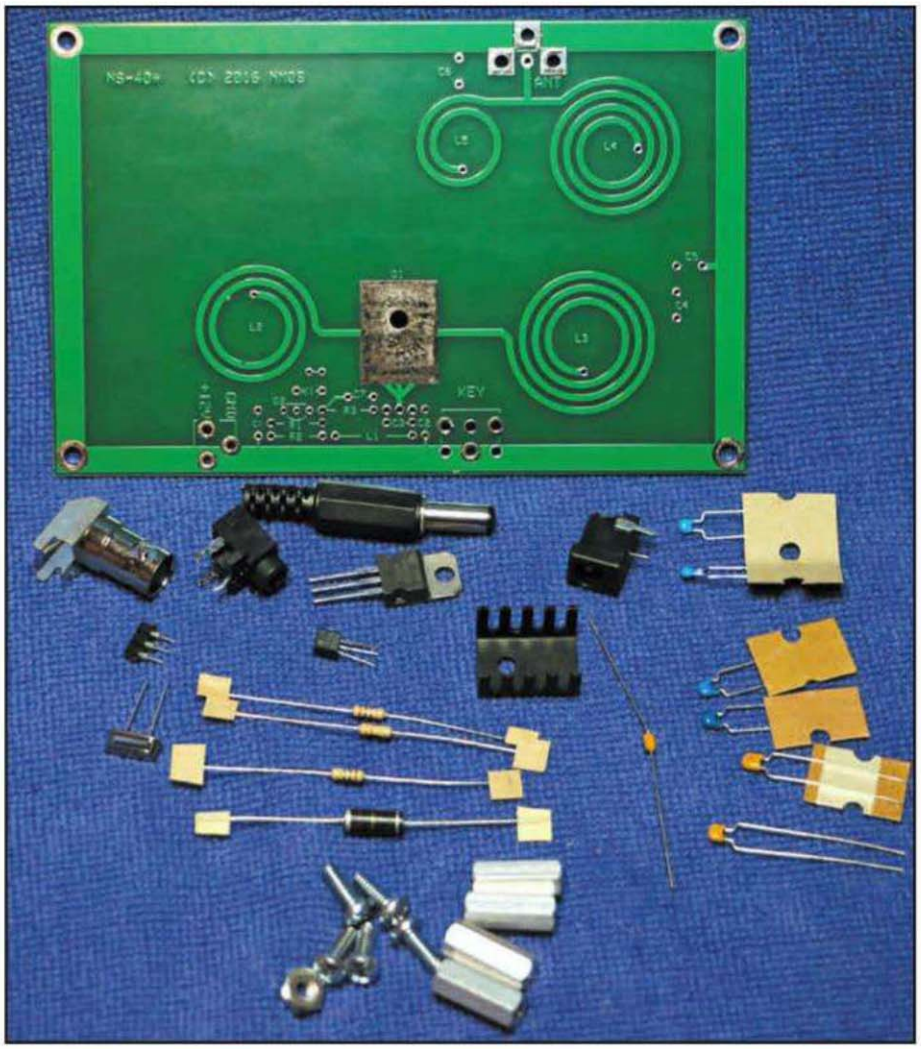
The heatsink does not get extremely hot, even after being keyed down for a couple of minutes while I took photos of the meter reading. That lower amount of heat is testament to the efficiency of the Class-E amplifier. The main disadvantage of this kit is the lack of T/R switching, but there are plenty of kits available to perform that function as well as using manual switching.

The real good news is that the great performance of the NS-40+ will be incorporated as part of the Four-State QRP Group's latest kit, the "Bayou Jumper." I will have more on this kit in a future issue. You can pick up the NS-40+ on for $30 plus shipping here: <www.tindie.com/stores/nm0s_qrp> or by searching for nm0s_electronics on eBay.

X-Tronic Marks the Spot

It was brought to my attention by a couple of fellow hams that there was a source of affordable soldering stations right here in my city of Lincoln, Nebraska. I finally looked into this and discovered a large national supplier of soldering tools was right in my midst and I didn't know it. X-Tronic International is located a few short miles from my QTH, and distributes a diverse lineup of soldering stations geared for the professional as well as the hobbyist.

With the increasing amount of surface mount components in modern electronics, including kits, there is a need for hot-air type soldering equipment.



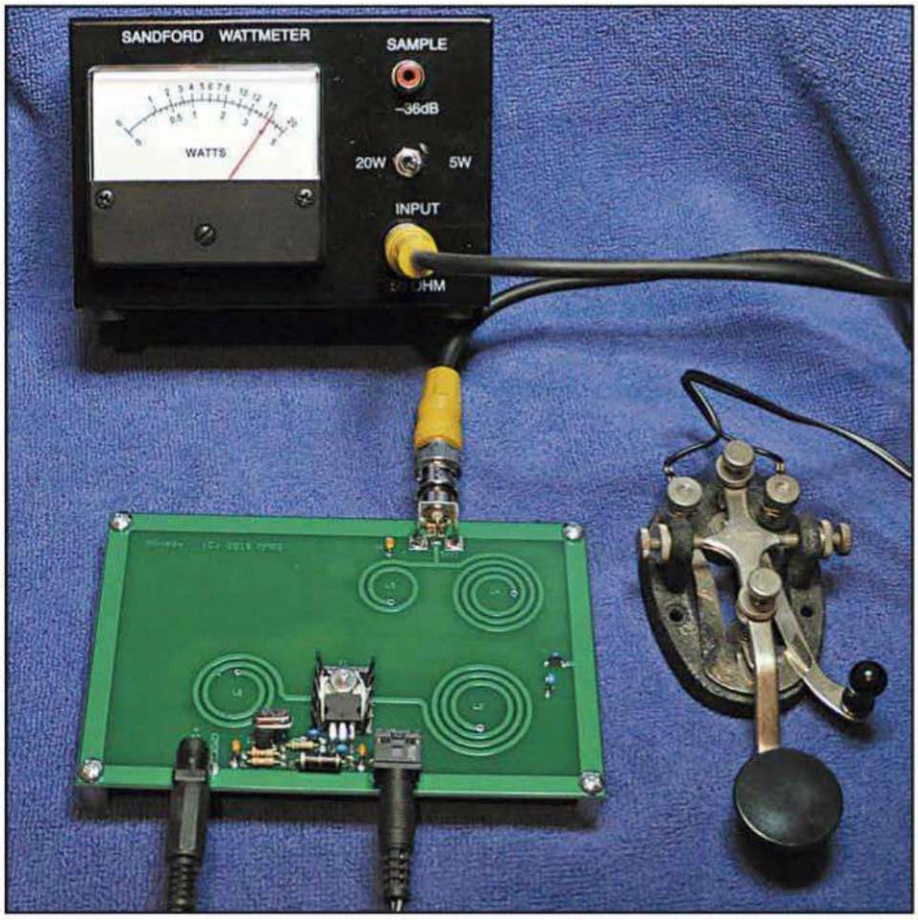
NS-40+ kit – Low parts count means an easy and quick build time!

X-Tronic sells a variety of these, and I'll be covering them in a future issue.

For the majority of hams who either just solder things like PL-259s, or build kits, there is a need for a temperature-controlled soldering station that is not just variable in heat, but provides a stable temperature, even when soldering for an extended period of time. The vast majority of low-cost soldering stations under $80 do not directly regulate the temperature at the tip, rather relying instead on simply varying the voltage supplied to the heater. All of the products produced by X-Tronic regulate the temperature to within 2° Celsius.

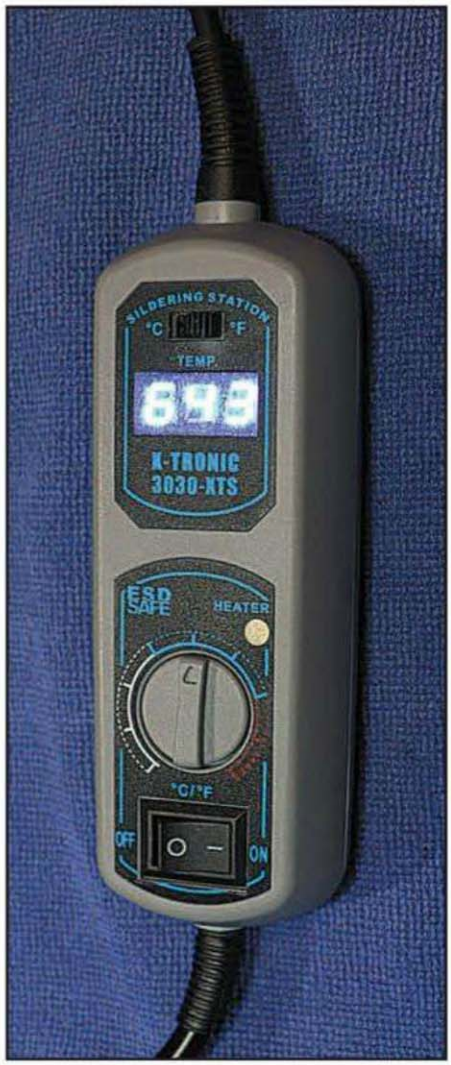
The X-Tronic 3020 is a low-cost digital temperature-controlled soldering station that sells for $49.80 with free shipping in the continental U.S. The 3020 looks similar to other low-cost soldering stations, but also includes a digital temperature display as well as a solder roll holder to keep your solder from wandering off of the bench while soldering. The digital temperature display can be switched from Fahrenheit to Celsius if needed. I recommend a temperature around 640-650° F if you are using 63/37 solder.

The tips on most of their tools are the same as those used by some Hakko tools, making them easy to come by. Some of these soldering tool kits come with a full lineup of tips of various shapes plus space to store them on the iron holder. I often have a need for a portable soldering iron that is light and easy to pack when I travel, and the model #3030 fills that need. This iron is still digitally temperature regulated, but has the controls in a box on the cord. This tool is designed to be taken when traveling and comes with its own travel case complete with three tips, a fold-up stand, tip cleaner, and a spare heater module. I tried this tool first, and it worked superbly when building a kit. The X-Tronic #3030 sells for $79.32, and will become a part of my travelling tool kit. Having precise temperature control can make the difference between having good quality connec-



Completed NS-40+ with the key down into a dummy load/wattmeter.

X-Tronic 3030 Travel soldering kit, complete with three different spare tips and a spare heating element.



X-Tronic 3030 soldering iron in-line temperature controller.

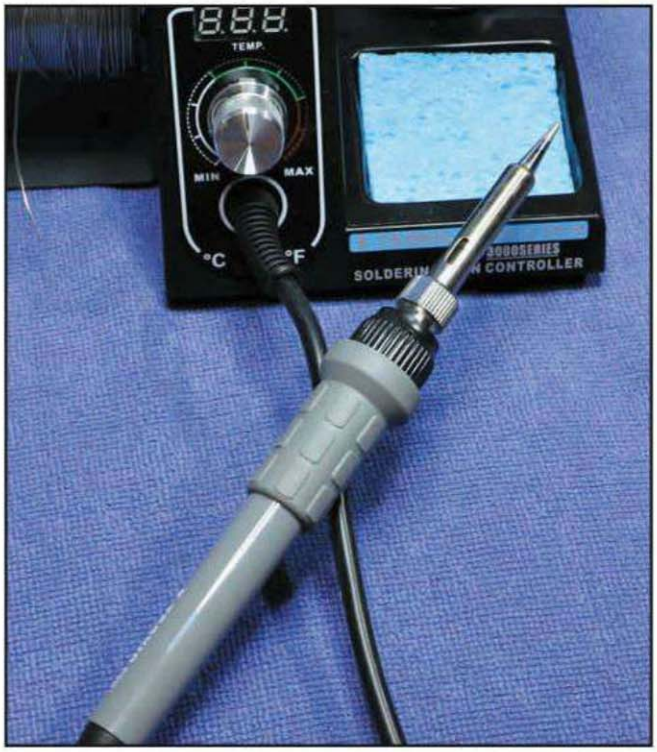
tions and cold solder joints. The reason is that if the amount of heat diminishes as the wire and PC board absorb heat during the soldering process, there is a possibility that the tip can cool to the point where the solder ceases to flow properly.

The opposite problem can also occur, where the heat is set too high, causing component failure or having the flux vaporize too soon, also causing poor quality solder connections. With temperature control, the iron maintains a stable temperature throughout the soldering process, allowing the solder to flow properly and resulting in a consistent quality. When building a kit with lots of parts, having this amount of control makes for a lot more enjoyable experience. You can find the X-Tronic line of soldering tools at Amazon.com by searching for "X-TRONIC" or at <www.-xtronicusa.com>. (I found more models offered by them through Amazon than on their own site. –KØNEB).

If you see me at an upcoming hamfest, remember to say hi!

– Until next time, 73 DE KØNEB

X-Tronic 3020 Soldering station warming up. Two different tip cleaners are included as is the solder roll holder, which attaches to the left side.



X-Tronic 3020 handpiece. The handpiece on the 3020 is the same as the 3030 travel kit.

BY JEFF REINHARDT,* AA6JR

It's Almost Spring!

Pay no attention to the weather outside your window. Instead of longing for a glimpse of a robin, or a crocus poking its leafy probe through the melting snow, CQ readers in rural areas know that, here in the depths of winter, a sure sign of spring is the arrival of the annual seed catalogs. This is the time of year when farmers and gardeners place their orders for the seeds that will hopefully jump from the ground with wondrous bounty, given a favorable mix of sunlight, warmth, water, and good soil. So while snow and frigid temperatures may be the case where you are, the wise planter already has visions of lush summer fields.

The smart mobile operator can learn a lot from our brothers and sisters in agriculture. Planning ahead is a key to success, so we're told. So why not plan on a "re-do" of your mobile installation now, ready for placing in your vehicle as winter melts away into spring? After all, we often remodel our homes with a fresh coat of paint, some flooring, or even the dreaded kitchen update (dreaded, as in $$$). So taking a fresh approach to refurbishing your car, truck, or SUV with new gear may be "just what the doctor ordered" for breaking through those winter doldrums. Some readers may have even more reason to embark on this planning because of a new vehicle purchase. So much the better — you can't put old gear in a new vehicle, right?

As we've written before, today's mobile rigs are incredible. Depending on your choice, it's possible to have coverage from the low bands right up through UHF (and in some cases beyond) in one compact transceiver. There's even more flexibility in that many modern transceivers now come with remote control heads, allowing the "business end" to be tucked away in some nook or cranny, which is absolutely great.

In addition to the myriad choices of multi-band transceivers, our ham "seed catalog" now offers a dizzying array of antennas, from monoband to some pretty exotic auto-tuning multiband skyhooks. Imagine being able to work the low bands, VHF, and UHF with just one or two antennas? It's possible if you choose wisely.

Digging deeper into our mobile operations "re-do," don't forget to accessorize. Glancing through catalogs, websites or by visiting your local ham store, you'll be amazed at the number of clever "doo-dads" that will enhance your installation. Cup holder or air vent inserts can support a control head or microphone mounts that keep things orderly and mobile power connection ports are just a few of the goodies waiting for your inspection.

While we tend to focus on the glitter side of the equation, it's foolish to overlook the infrastructure

Why not plan on a "re-do" of your mobile installation now, ready for placing in your vehicle as winter melts away into spring?

that will make your mobile installation a "winner," that is, one that will function well and reliably now and far into the future. Some items to consider would be:

- Heavy-gauge, primary-power wires that exceed the needs of your equipment
- Grounding braid to bond the metal parts of your vehicle into a uniformly grounded system
- Installing a spare battery and battery isolator to power your system, depending on your intended uses.

Granted, the last item may be more suitable for the serious mobile operator, such as a contester, hill topper or one running power amplifiers. However, having an independent battery can make the difference between having adequate power to start your car (or not) and perhaps bring the added benefit of much less electrical interference coming through your radios.

We'll also pass along our usual reminder to check with your vehicle's manufacturer for its specifications on using mobile transceivers in their respective vehicles. Some information may be available online but you may need to make a request from your dealer or the manufacturer for any service bulletins or policies that apply to installing mobile radios. Nearly all of them have such information, including power limits and areas to avoid routing RF-carrying coax cables. Given the cost and the number of computers now found in cars and trucks, it's a precaution worth taking, as warranty coverage may not apply if the failure was caused by the user exceeding manufacturer's specs.

The good news is, automakers are aware that RF is prevalent and vehicles are tested for their resistance to interference. And remember that amateur radio is not the only possible source of RF in a car, but it may be one of the higher-powered forms of transmitters. Manufacturers must also account for police radios, dispatch radios for taxis and delivery services, and telemetry radios for fleet tracking, not to mention cell phones and even vehicle-borne WiFi found in some new models. But few of those transmitters operate at the power levels we're authorized to use.

Spring Planning, Part II

Assuming your installation is in place and you're now ready to hit the road, then what? Sure, ham

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radio adds enjoyment to the daily commute, security when driving in adverse weather conditions and the opportunity to make a new acquaintance anytime the radio is operating. But what about planning some travels around using your new gear?

One easy trip to plan is to one of the regional ham radio gatherings. They're found all over the country and if you haven't attended one, you're missing out on companionship, flea markets, informational forums, learning the latest technical developments, and opportunities for volunteerism that could make good use of your operating skills and perhaps your mobile capabilities. Organizations such as Skywarn, the Red Cross, SATERN, ARES, RACES, and others need skilled operators and you can often chat with those folks at ham conferences.

Then there's "the big one" — a pilgrimage to Dayton in May; actually now relocated to nearby Xenia, Ohio. If you haven't done a road trip in a while, taking the XYL or one or two ham friends for a jaunt to this annual event is a "must" for every ham. I've made the road trip several times from the West Coast and at other times I've had to fly to and from Dayton. In my opinion, the road trip is an experience that's far more enjoyable. Making HF and repeater contacts along the way adds to the fun, not to mention the sight-seeing and touring attractions that you just don't get to experience from 35,000 feet.

Having a new HF transceiver in your car or truck provides an additional level of security. Help may be available in areas where cell phone service does not exist and there are nets that monitor HF frequencies for the purpose of proving assistance to motorists. One I've enjoyed is the County Hunters net, usually found on 14.336. While listening for calls from motorists, this group also has mobile operators who transmit from counties across the U.S., with an eye toward helping others attain CQ's USA-CA award (See the Awards column on p. 92). It's a great pastime and I must admit, addictive. I've even helped others by planning trips to relatively rare counties to put them on the air.

What else can you do with your new mobile? The list is long and I think it's growing. Field Day is a possibility, supporting scouting activities such as JOTA (Jamboree on the Air), community events like parades, foot races, arts festivals, disaster relief, and more.

It all begins with you and starting with your research, be it online or using our version of the "seed catalog" — one of the ham catalogs available through retailers, manufacturers, or suppliers. Most of us have to live within a budget but consider that the cost of advanced transceivers has been decreasing while features and useful band coverage has been on the upswing. A possible "boost" to your purchasing power may also come in the form of your annual tax refund. The old adage of "a dime spent now may be worth a dollar later" can apply, given the projected life of your purchase may be 10 years or more. Divide your gross purchase by 10 and the cost per year of ownership makes a lot of sense, more if you add in the intangible value of enjoyment. That translates into great value, or "bang for the buck." Then get to work planning a great installation that will make your mobile setup look like it came from the factory where the car or truck was made.

So shed the winter doldrums and begin the cheerful process of planning the mobile setup of your dreams. These are "seeds" that will reap enjoyment for years to come.

– 73 and Happy Mobiling!

learning curve

BY RON OCHU,* KOØZ

Propagation, Eggs and Beacons!

Propagation, eggs and beacons, is that a real title? Forgive the play on words, but in many ways the title is apropos. If you're like me, then starting off the ham radio day begins with a good breakfast and eggs fit that bill nicely. The next item on my plate is determining what current propagation conditions are like at my central Illinois QTH (location). All the DX literature instructs the savvy ham to listen, listen, listen and to listen some more to the bands. That is not bad advice at all. Listening is the primary determinant of local propagation conditions. Simply scan the bands and hear who is operating. However, not hearing a signal from a distant DX location does not necessarily mean the band isn't open. More likely, it means that no one is transmitting from the other end of an opening. Often "dead bands" are in fact not dead at all but may be suffering more from a lack of participation than a lack of propagation. Any tool in our box that can make the task of propagation assessment more accurate is welcome.

NCDXF and IARU Beacons

Enter the Northern California DX Foundation (NCDXF) <www.ncdxf.org>. It was founded in 1972 with the purpose of assisting "worthwhile amateur radio and scientific projects with funding and equipment." NCDXF's funding comes entirely from voluntary contributions from members and friends; grants from other foundations and organizations, and from investment income from the foundation's initial $250,000 endowment. An 11-member board of directors oversees all of the foundation's business.

Wouldn't it be nice if a continuous signal from various parts of the globe would be on 24/7? Luckily, the NCDXF – in cooperation with the International Amateur Radio Union (IARU) – operates and maintains an international beacon network. NCDXF's 18 beacons operate 24 hours a day, seven days a week throughout the world transmitting from: Hawaii, KH6WO; West Coast U.S., W6WX; Canada, VE8AT; East Coast U.S., 4U1UN; Venezuela, YV5B; Peru, OA4B; Argentina, LU4AA; Madeira Island, CS3B; Finland, OH2B; Israel, 4X6TU; Kenya, 5Z4B; South Africa, ZS6DN; Russia, RR9O; Sri Lanka, 4S7B; Hong Kong, VR2B; Japan, JA2IGY; Australia, VK6RDP; and New Zealand, ZL6B.

A beacon is a modulated CW transmitter emitting a signal for propagation studies. The NCDXF beacons operate on five High-Frequency (HF) bands; specifically, 20 (14.100 MHz), 17 (18.110 MHz), 15 (21.150 MHz), 12 (24.930 MHz), and 10 (28.200 MHz) meters. These beacons are sequenced, which means they take turns transmitting for 10 seconds on a band at a designated sequenced time slot. The first transmission gives the beacon's callsign in 22 WPM CW followed by four 1-second dashes. The first dash after the callsign is at 100 watts, the second dash is at 10 watts, the third at 1 watt and the fourth dash is 100 milliwatts. It takes 3 minutes for the beacons to complete one world-wide cycle on a band. By listen-

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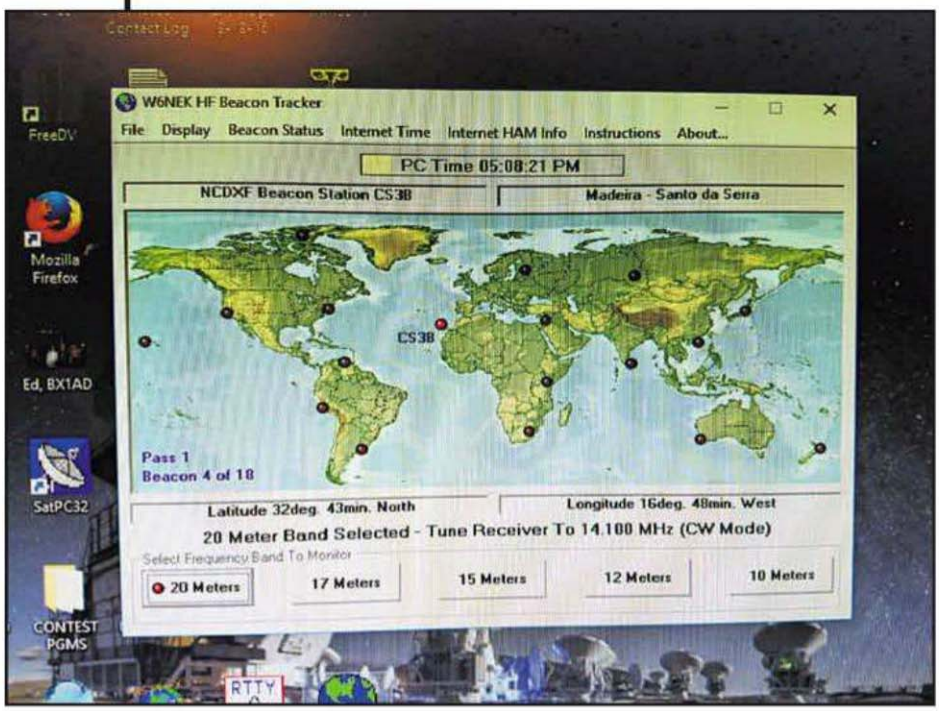

Photo A. Screen shot of the W6NEK Beacon Tracker software. Transmitting beacon glows red. (All photos by KOØZ)

Figure 1. The Northern California DX Foundation operates a worldwide HF beacon network..

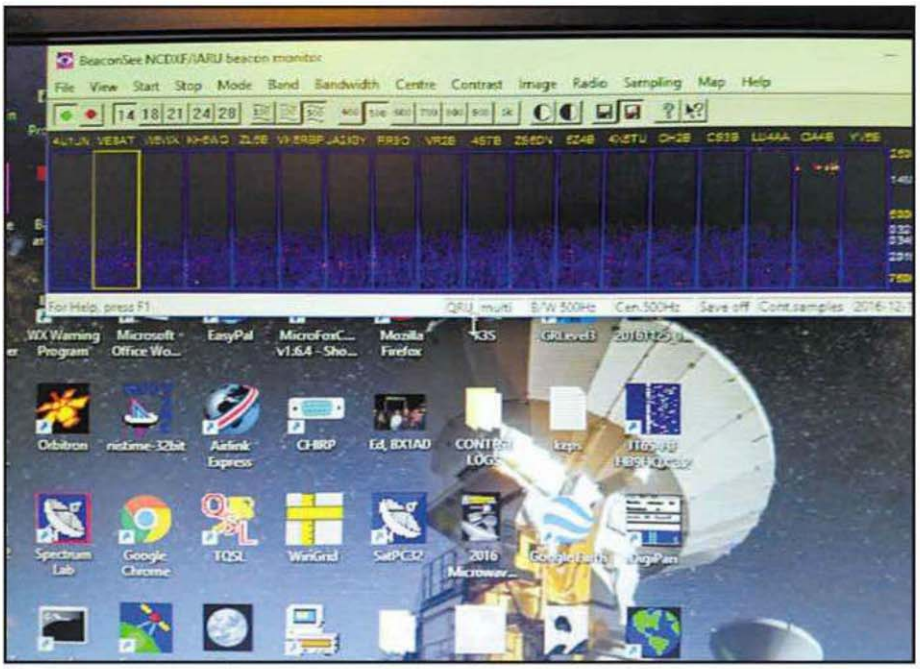

Photo B. BeaconSee software screen shot. The transmitting beacon is bracketed in yellow and white dots indicate received beacon signals.

Figure 2. The International Amateur Radio Union supports the NCDXF beacon network.

ing to the entire 3-minute period, it is possible to assess band propagation conditions at your QTH with your antenna. If you're able to hear a beacon's callsign and each four dashes all the way down to the 100 milliwatt level, then you know band conditions are great to that part of the world from your QTH with your antenna. These 18 beacons do it again on four more upper HF bands. Therefore, it's possible to check band openings from your QTH from 20-10 meters.

Is There an App For That?

Yes, there is an app for HF beacons. The DX Zone has an iOS app <http://bit.ly/2gKHThh>. Unfortunately, it is not available for Android. However, NCDXF Beacon by Wolphi LLC is available for Android and it converts your smart phone screen to a worldwide map indicating which beacon is transmitting, but it tells you nothing about the beacon and propagation. It does list the frequencies and combined with a mobile or portable HF radio it could be a very useful app.

I prefer the software programs that are available that run on my shack's computer. In my shack, I use two beacon programs to aid with propagation studies. Both are free to download and run flawlessly with Windows 10. W6NEK HF Beacon Tracker is a fine program that synchronizes with your computer clock revealing which beacon is scheduled to transmit (Photo A). Each beacon location is marked with a dot that lights up when it's time for it to transmit.

It's important to synchronize your computer clock to an accurate time source such as WWV or online with NIST. W6NEK indicates the beacon callsign and the band. The software is very intuitive and the support page <www.w6nek.com/> is very well written and very understandable. It also offers a great overview of the NCDXF beacon network. This program provides links to update NCDXF/IARU beacon status with the program. Kudos to Frank Franco, W6NEK, for making this free beacon program available.

I will tune my transceiver to one of the five HF bands, usually 20 or 17 meters in the morning, and then listen for the beacons. W6NEK gives me a visual indication of which beacon on the band of interest is transmitting and I will listen for the beacon. Determining which beacons are heard gives me a good idea of band propagation from my QTH with my antenna. It's fun to switch antennas and to run an A/B comparison between the two over a period to see which one is performing better on that day. Listen and determine which beacons become louder as the day progresses.

BeaconSee Software

BeaconSee is by far my favorite NCDXF/IARU beacon-tracking program. It runs well with Windows 10; however, the help feature will not work with Windows 10. A window pops up informing me that Microsoft no longer supports an older program's help feature. Not to fret, there is a well-written website that offers step-by-step directions as well as a program download at <http://bit.ly/2hlluY>.

Other than that issue, BeaconSee offers no problems that I've found. The reason I like this program so well is that it interfaces with your transceiver to monitor beacon reception at your QTH using your antenna. This software provides a visual indication of beacon reception.

BeaconSee uses Fast Fourier Transforms to plot received beacon strength over frequency against time. Amazingly it will even detect beacon signals too weak to hear. The received beacon signals appear as a line of white dots in its assigned column (Photo B). Note that BeaconSee has 18 columns with the callsigns of each NCDXF/IARU beacon listed at the top. As with W6NEK's program, it is important to synchronize your computer clock with an accurate time source.

It is also advisable to correctly set the transceiver's audio level into the computer card's input. This is mostly done through trial and error. You want to avoid an overdriven computer sound card input because the resulting image will look like Photo C. Although the beacon dots are visible, there is also a lot

On the Cover

QRP, or low-power, operating can take many forms and allows you to pursue your ham radio hobby in a variety of locations where using higher power would be much more difficult. This year's QRP Special showcases several possibilities and we've gathered a few of them on this issue's cover.

The main background photo and the upper inset photo of an antenna sprouting from a pine tree are both from "A QRP Backpacking Adventure in the High Sierra Wilderness," which begins on page 10. The article and the photos are by Mark Weidinger, K6MTS. The background photo shows Piute Lake in the Sierra Nevada mountains of California, the first stop on Mark's nearly-weeklong backcountry trek. The lake is at an elevation of 10,958 feet! The inset photo shows his fishing-pole antenna support tied to a tree at Loch Leven Lake, at "only" 10,743 feet above sea level.

The inset photo at the lower right shows "Guerilla QRP" author Vladimir Kovaceski, Z35M, operating QRP portable from one of the many places in Macedonia and surrounding countries to which he routinely travels by bicycle (or occasionally other means) to get on the air from a temporary station. Vlado's article, which begins on page 16, offers tips for planning successful portable operations.

In our center inset photo, young ham Faith Hannah Lea, AE4FH, is learning to use a tape-measure Yagi to find a hidden transmitter during a foxhunting class at last year's Orlando Hamcation. Foxhunting is most definitely a QRP activity as the "fox" transmitters always use very low power, and the hunters use none at all! The results of last year's CQ World Wide Foxhunting Weekend begin on page 37. The photo of Faith was taken by Larry Jacobs, WA7ZBO.

If you haven't yet explored the fun you can have with QRP — both in your shack and out in the field — now is a great time to give it a try!

of noise present in the column, obscuring the beacon graphic.

Once BeaconSee is installed on your computer, open the program. Now, scroll along the menu bar and click on **Radio**. A menu will pop-up; select **Setup** and pick your transceiver model such as Kenwood, ICOM, Yaesu, etc. A radio command window will pop-up and in the upper left-hand corner under COM, put in the com port number that controls your radio. It is possible to have BeaconSee monitor more than one band at a time, if your transceiver will accept the program commands. BeaconSee automatically detects the computer sound card. All you need to be concerned with is setting the audio level.

Antenna Choices

Perhaps one of BeaconSee's greatest strengths is it will allow you to compare antennas. An omnidirectional antenna, such as a multiband vertical, can provide reception in all directions; whereas a directional antenna, such as a Yagi,

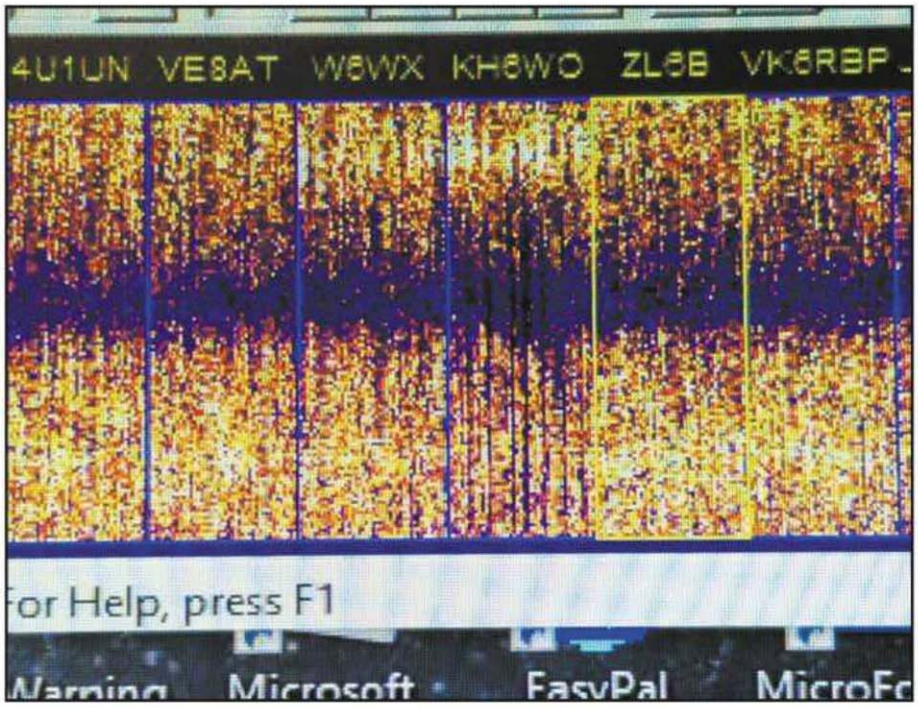

Photo C. An example of an overdriven sound card input. It's important to correctly set sound card audio levels, otherwise beacons are difficult to distinguish.

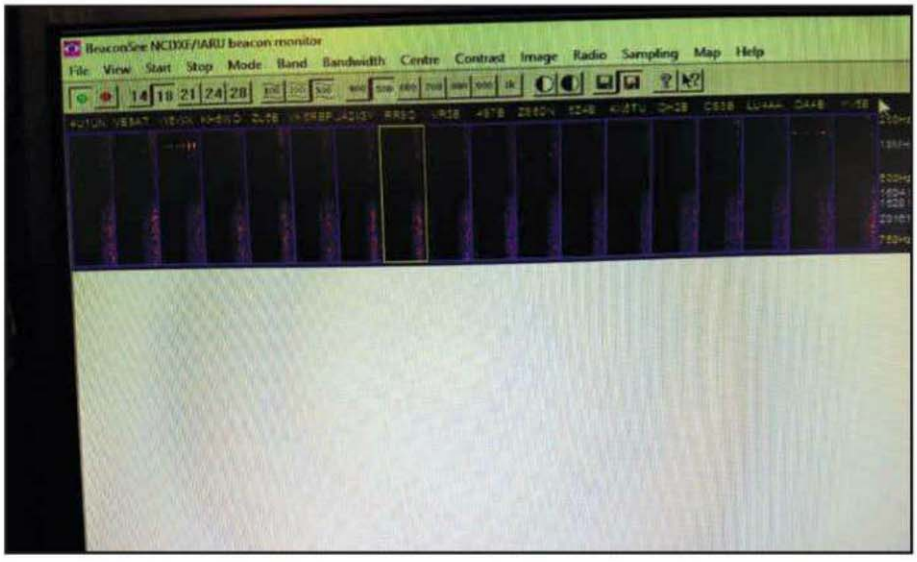

Photo D. BeaconSee screen, 17 meters at 1600Z. White dots on W6WX and OA4B show that the beacons are active.

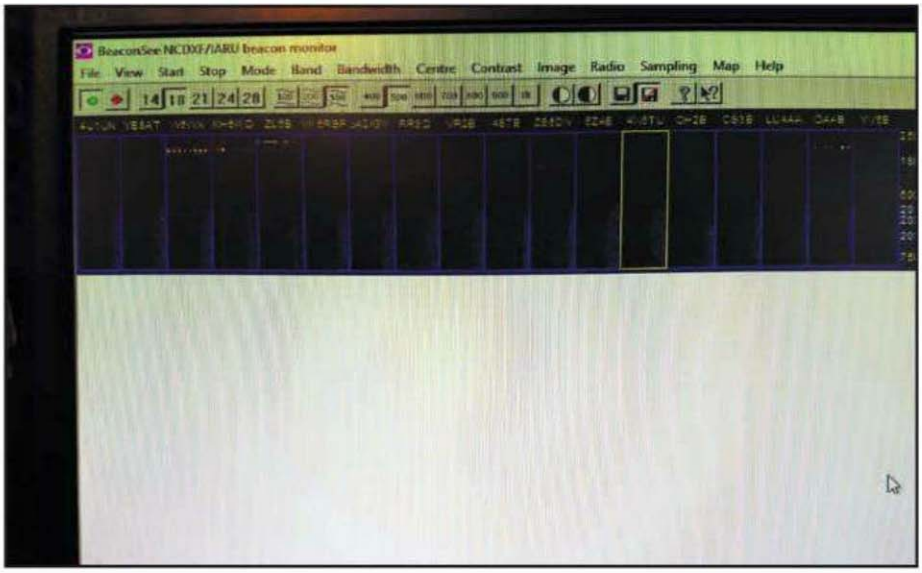

Photo E: BeaconSee screen, four hours later on 17 meters. Note the stronger beacon signals westward.

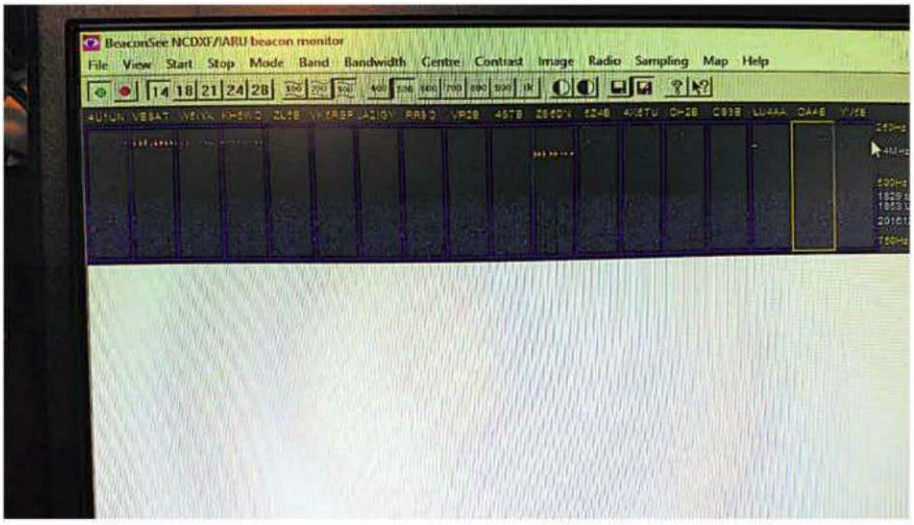

Photo F. Twenty-meter beacons received, late morning, shown on BeaconSee.

will favor one direction more than others. Still it is possible to make A/B antenna tests. Over a period of time, say 30 minutes, run BeaconSee with one antenna for 15 minutes and then 15 minutes on another antenna and compare the beacon data points. It's possible to roughly estimate signal strength, propagation paths, and directional characteristics.

Comparing Data Points

Once BeaconSee is configured and gathering data, determining propagation paths is now simply a matter of looking at the data points being displayed for each beacon. This program offers a more objective way of gathering real-time propagation data tailored to your QTH and antenna-feed line system. For example, let's examine the beacon data points received at KOØZ in central Illinois on December 12, 2016 on 18 MHz using low-loss feedline to a Cushcraft rotatable WARC dipole at 45 feet.

In Photo D, around 16:00Z (UTC) beacon signals from W6WX and OA4B were indicated by a string of white dots. The photo tells me that my sound card audio is still a little overdriven. It's approximately 10 a.m. local time and it looks like I have propagation to the Caribbean basin and parts of Peru on 17 meters. Now, let's examine Photo E. Four hours later, using the same system, BeaconSee now indicates that I am receiving strong signals from not only W6WX and OA4B, but KH6WO in Hawaii, and to a lesser extant ZS6DN from South Africa. This makes sense since 17 meters follows the sun's path

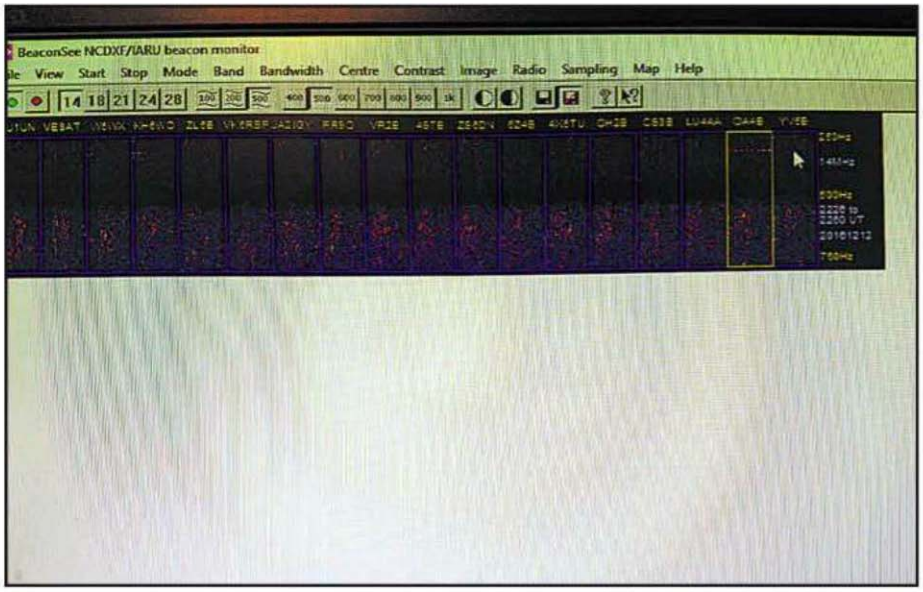

Photo G. Twenty-meter beacons received, late afternoon with BeaconSee.

and propagation should be favoring western stations during my afternoon.

We have a good idea of what 17-meter propagation was like on December 12, 2016 at KOØZ, but what about 20 meters? Photo F was taken around 18:30Z using low-loss feedline, a Cushcraft triband Yagi raised 40 feet and pointing east on December 12, 2016. Notice that off the backside of the Yagi (which is facing west), W6WX and KH6WO are moderately strong; VE8AT (off to the Yagi's side) is strong; South Africa, ZS6DN, is strong; and OA4B (off to the side) is weak, but detectable.

Four hours later, around 22:30Z, late afternoon propagation on 20 meters at KOØZ is beginning to shut down. With the Yagi pointed west, Photo G indicates that South America, OA4B, and out west KH6WO and W6WX are coming in, but not as strong as before. Amazing what a difference a few hours can make in propagation pathways. Judging by the 20-meter beacon data points, 20 meters was the better band for working world-wide DX on December 12th.

Don't Forget

When making your comparisons, don't forget to also record solar indices. On December 12, 2016, the SFI was 71, the A index was 6 and the K index was 1. A very handy, "one stop propagation shop" website can be found at <http://dx.qsl.net/propagation/>. Ol' Sol is the source of space weather and space weather directly influences ionospheric propagation on Earth. In addition, keep in mind the relative position of the Sun during various seasons. Propagation is going to be different during summer as compared to winter. Using BeaconSee will give you real-time, objective data.

Other Tools?

W6NEK HF Beacon Tracker and BeaconSee are not the only propagation tools available for ham radio ops to use. There are other programs, but they cost money and are more complex to use. W6NEK and BeaconSee are free and easy to use. Best of all, BeaconSee provides real-time, objective, data points to aid in determining propagation paths from your QTH and antenna system.

Keep in mind that there are many factors affecting propagation, such as ionospheric dynamics, signal arrival angles relative to the antenna, directional versus omnidirectional antenna patterns, etc. These programs help us make better assessments of our antenna systems. It helps to take out some of the guesswork.

Propagation, Eggs, and Beacons!

Starting the day off right with a better understanding of propagation, some eggs and a side order of beacon networking allows me to more efficiently use my time. It also furthers my understanding of ionospheric propagation. I hope that someday soon, NCDXF and IARU will be able to establish beacons on 30-80 meters. The HF beacon network is a great reason to generously support these organizations. Thank you for reading CQ and I hope this article motivates you to start making more objective propagation assessments!

– 73, GL de Ron, KOØZ

BY KENT BRITAIN*, WA5VJB

Online Antenna Calculators – Convenient But Be Cautious

Certainly a quick web search will find gobs of quick antenna calculators out there in cyberspace. But using one is a buyer-beware situation and you didn't pay anything for it.

I did a quick survey and about half the online calculators I found were of no value or gave wrong answers. On one of them, I could even change the length of the antenna and gain the never changed.

Signs of Trouble

Let's start with how many digits they show (see example in Figure 1). You probably know the guy who says "OK, I drove 275 miles, then put in 7 gallons of gas. That means I got 39.28571429 miles per gallon!" Of course the odometer on the car doesn't have that kind of accuracy and neither does the gas pump. His significant digits are ludicrous.

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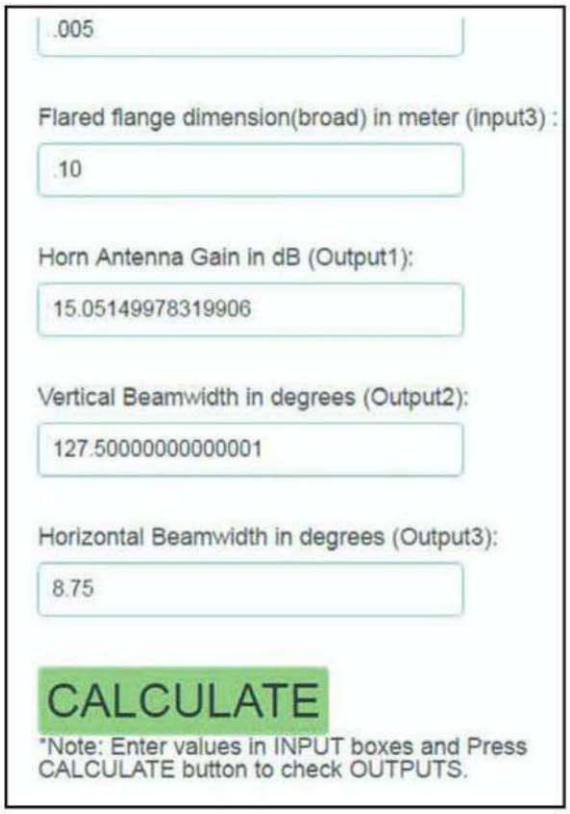


Figure 1. An example of an online antenna calculator that claims to resolve gain to tiny fractions of a decibel. Even the antenna experts at the National Institute of Standards and Technology (NIST) can't approach this level of precision … and remember, precision does not always equal accuracy. It's very easy to be very precisely wrong!

"Reflections, corrosion in the reference antenna, coax loss changing with temperature, changes in the moisture content of the soil, and drift in the equipment all add up to about 1 dB of day-to-day variations."

With antenna ranges, you have about 1 dB of uncertainty. Reflections, corrosion in the reference antenna, coax loss changing with temperature, changes in the moisture content of the soil, and drift in the equipment all add up to about 1 dB of day-to-day variations. Some years ago I was at one of the antenna ranges at the National Bureau of Standards (NIST today, but still NBS then) as they did precision measurements on a horn antenna. Doing mathematical analysis of dozens of measurements in a chamber lined with absorber, they felt they had the uncertainty down to 1/10 dB. So when you see someone claiming they know the gain of their antenna to 1/100 of a dB, just remember, even NIST can't do that!

"In short, just remember that most of the calculators were not done by RF guys and they have no idea if the answers are even close to reality."

In short, just remember that most of the calculators were not done by RF guys and they have no idea if the answers are even close to reality. There are few you can trust and if you see those .000000001 dB answers, beware!

Talk to Me!

As always, some of my best topics come from you, our readers. Snail mail to my QRZ.COM address works or an email to <wa5vjb@cq-amateur-radio.com> is a bit faster.

I try to field all antenna questions. It's that time of the year to dream and plan for those spring antenna projects. Just remember that anything in the air works better than that antenna in a planning file!

vhf plus

BY TONY EMANUELE,* WA8RJF

Upgrading Your VHF Station? A Comparison of Feedlines

VHF Plus Calendar

DUBUS 144 & 432 MHz EME Contest:	February 11 & 12
DUBUS 2.3 GHz EME Contest:	March 11 & 12
DUBUS 1.2 GHZ EME Contest:	April 1 & 2
North East Weak Signal Group (N.E.W.S.) Conference:	Hartford CT area, April 21 & 22
Southeastern VHF Society Conference:	Charlotte, NC April 27 & 28

For most locales in North America, February is a quiet month on the VHF-and-above bands with little or no Sporadic-E, no major meteor showers, and with the weather generally still under the influence of the polar jet stream, there is not much in the way of tropo openings. But with spring just around the corner, it is a good time to start planning or undertaking a station improvement or two.

From a systems approach point of view, the typical VHF station is pretty simple: A VHF transceiver, a transmission line, and an antenna. This month's column will emphasize the importance of transmissions lines, commonly referred to as feedlines, at VHF and above. The purpose of the feedline is to transfer power from the transmitter to the antenna and to transfer received energy from the antenna to the receive portion of the system. The most common type of feedline on the bands below 10 GHz is coaxial cable.

Coaxial cable has an inner center conductor surrounded by a cylindrical insulating layer that is, in turn, surrounded by a tubular conducting shield often covered with a protective nonconductive jacket. The center conductor can be solid or stranded copper wire and the outer conductor can be a single copper braid, a double copper braid for improved shielding, or a solid copper or aluminum jacket for the most effective shielding.

The characteristic impedance is determined by the dielectric constant of the insulating material between the inner (center) conductor and the outer conductor shield and the ratio of the distance between the two conductors[1]. The vast majority of amateur radio installations use 50-ohm coaxial cable[2]. All coaxial cables have losses and those losses are determined by the dielectric material and the loss due to the conductors. Loss increases as the operating frequency increases and manufacturers typically specify loss in dB/foot or dB/100 feet at a given frequency.

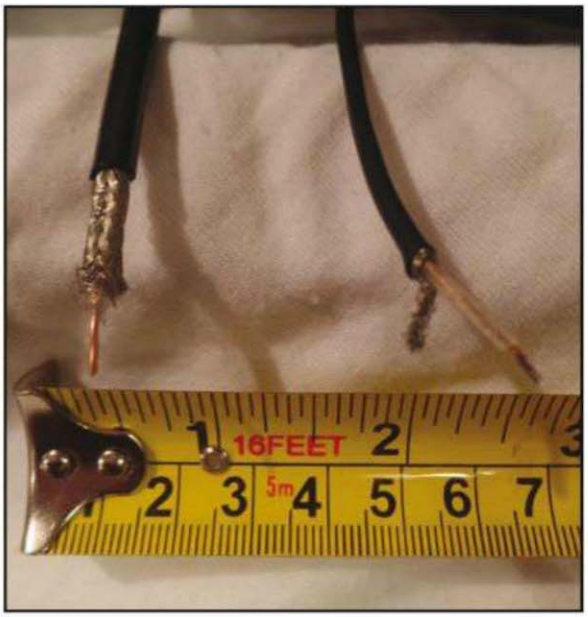


Figure 1. A comparison between RG 58 (left) coaxial cable and RG 174 (right) coaxial cable.

c/o CQ magazine
e-mail: <wa8rjf@cq-amateur-radio.com>

Examples of commonly used coaxial cables:Loss in dB per 100 feet

Cable type	50 MHz	144 MHz	222 MHz	432 MHz	902 MHz	1296 MHz
RG 174[3]	6.6 dB	10.5 dB	12.1 dB	17.5 dB	30 dB	>30 dB
RG 58	3.3 dB	6.2 dB	7.4 dB	11.2 dB	16.5 dB	>23 dB
RG 8X	2.5 dB	4.6 dB	6.0 dB	8.6 dB	12.8 dB	>15 dB
RG 213	1.6 dB	2.8 dB	3.5 dB	5.2 dB	8.0 dB	>10 dB
LMR 200[4]	2.3 dB	3.9 dB	4.8 dB	6.9 dB	10.0 dB	12.2 dB
LMR 400	0.9 dB	1.5 dB	1.8 dB	2.7 dB	3.9 dB	5.1 dB
LMR 600	0.5 dB	0.9 dB	1.2 dB	1.7 dB	2.5 dB	3.3 dB
1/2-inch Hardline[5]	0.5 dB	0.8 dB	1.0 dB	1.5 dB	2.2 dB	2.7 dB
7/8-inch Hardline	0.3 dB	0.5 dB	0.55 dB	0.8 dB	1.3 dB	1.5 dB
1 5/8-inch Hardline	0.15 dB	0.28 dB	0.33 dB	0.5 dB	0.8 dB	0.93 dB

Table 1.

See Figure 1 for examples of RG 58 and RG 174 coaxial cable. See Figure 2 for examples of 1-5/8-inch hardline (Andrew LDF7-50) and 1/2-inch hardline (Andrew LDF4-50.)

System gains or losses are usually and conveniently expressed in decibels. A decibel is one-tenth of a Bel, a unit of measure named after Alexander Graham Bell. Originally the decibel, dB, was used in telephone audio work to describe a change in loudness levels. One decibel represents a just detectable change in signal strength. A 10-dB increase in signal corresponds to 10 observable steps in increased signal level. The number of decibels corresponding to any power ratio is equal to 10 times the common logarithm of the power ratio or:

dB = 10 log (P2/P1),

where P1 is the referenced power and P2 is the power compared to the reference. An example: What is the power gain if my transmitter power is increased from 100 watts (P1) to 200 watts (P2)?

10 log (200/100) = 3.01 dB

In other words, doubling the power gives you a 3-dB gain. Conversely, if the power is cut in half, 100 watts to 50 watts, then the gain equals minus 3 dB or a loss of 3 dB in signal strength, in this case power out.

10 log (50/100) = - 3.01 dB

A poor choice of feedline at a given frequency can have measurable negative impact. As an example, using the same transmit power of 100 watts, 100 feet of RG 58 coax used at 50 MHz will result in a little less than half the transmitter power reaching the feedpoint of the antenna.

Minus 3.3 dB for 100 feet of RG58 @ 50 MHz (from Table 1) = 10 log (P2/100 watts).

Solving for P2: P2 = log-1 (-3.3/10) * 100 = 46.8 watts at the antenna feedpoint.

The effect that feedline selection can make on station performance can be quickly appreciated by reviewing Table 2 (Pout = Power Out in watts). It is important to note that the choice of feedline also has an impact on your station's receive performance. Without a preamplifier at the antenna, the line loss is the equivalent of adding an attenuator equal to the feedline loss in the receive path. I will explore receiver noise figure (NF) and preamplifiers in a future column.

Assuming 100 watts input to 100 feet of the following coaxial cables[6]:

	Pout @ 50 MHz	Pout @ 144 MHz	Pout @ 432 MHz	Pout @ 902 MHz	Pout @ 1296 MHz
RG58	47 W	24 W	9 W	2 W	< 1W
RG213	69 W	53 W	30 W	16 W	< 1 W
LMR400	81 W	71 W	54 W	41 W	31 W
1 5/8-inch hardline	97 W	94 W	89 W	83 W	81 W

Table 2.

As you consider different station improvements in 2017, an upgrade to the feedline could make a noticeable improvement in your station's performance.

On the Bands

• The Magic Band showed some magic on Thanksgiving Day (see Figure 3), but for the most part six meters had been quiet until the peak of the Geminids Meteor Shower on December 13th and 14th (see Figure 4).

• According to the 144-MHz EME newsletter published by Bernd Mischlewski, DF2ZC <http://bit.ly/2hMbNAq>, Gene Shea, KB7Q, will be QRV from Hawaii as KH6/KB7Q in BK29 and BK28 from February 5th to 8th. The EME station will be

Figure 2. A comparison between LDF7-50 1-5/8-inch hardline (left) and LDF4-50 half-inch hardline (right).

equipped with a single 144-MHz, five-wavelength Yagi and an 800-watt SSPA. See: <http://kb7qgrid.blogspot.com/> for late-breaking news.

• Steve Gross, N4PZ EN52, continues to champion 70-centimeter activity in the Midwest. On any given Monday evening at 8 p.m. central time, the usual suspects might include: W9HRQ EN61, WA8MOA EN71, KC9KCR EN52, KOØZ EM59, N9ABR EN51, KDØIF EN41, WB9TFH EN53, WØHL EM27, K4XR EM64 ALABAMA, N9EM EN53, KØDOK EM48, N9JBW EN61, W8SOL EN71, K9LQZ EM68, KC9CLM EN52, W9EWZ EN52, KØSIX EN34, KU8Y EN61, NØSDM EN37, KBØHNN EN25, KGØSJ EN22, and VE3ZV EN92.

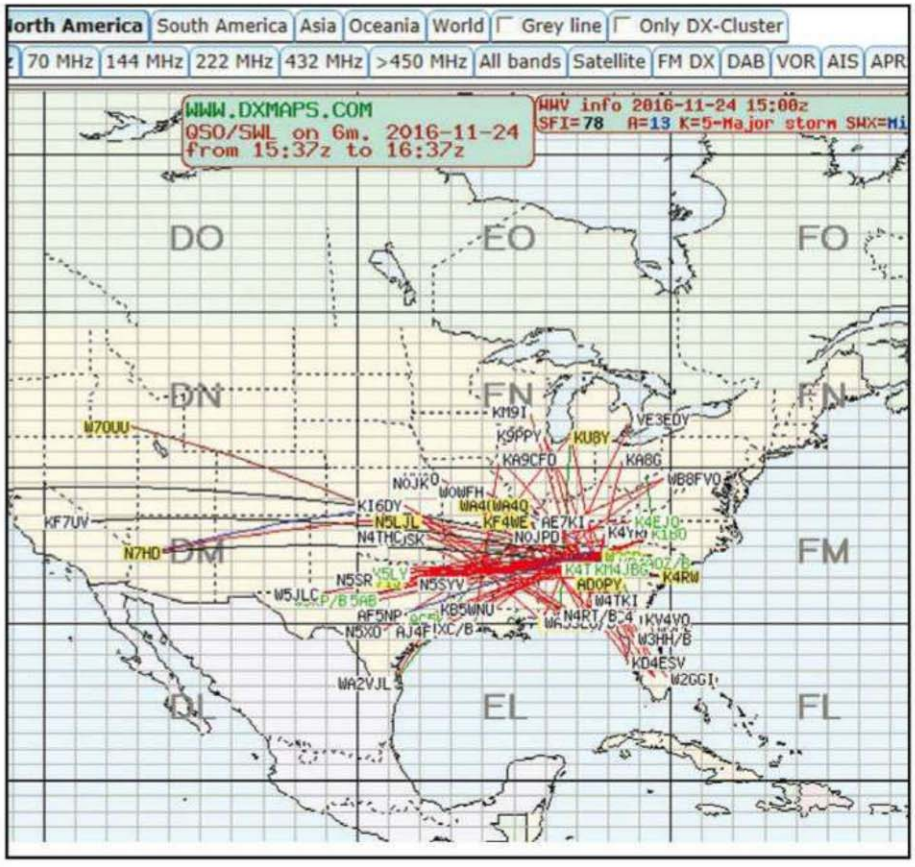


Figure 3. Six-meter Sporadic-E opening that occurred on Thanksgiving Day, 2016.

Oops...

Bad Elf!

Well, it appears that Santa (or at least the elf responsible for the gift tags on our December cover) may not be a ham ... seems that two of the letters in the boss's callsign got transposed. Publisher Dick Ross is still K2MGA, not K2GMA, despite what the elf wrote on the gift tag. (Do you seriously think any of us in the office is going to take responsibility for this when we all know it was an elf who messed up?) Sorry, boss... (Tnx K1AR, a.k.a. "elfbuster")

Resistance is Futile!

In November 2016's "Math's Notes" column, the schematic in Figure 2 for the Simple Outlet Tester shows values of 100k Ohms each for the resistors between the power source and neon lamp for the hot and ground leads, but omits the value for the neutral lead. That resistor should also be 100k. The text was clear on this but the diagram was not. (Tnx K9GTQ)

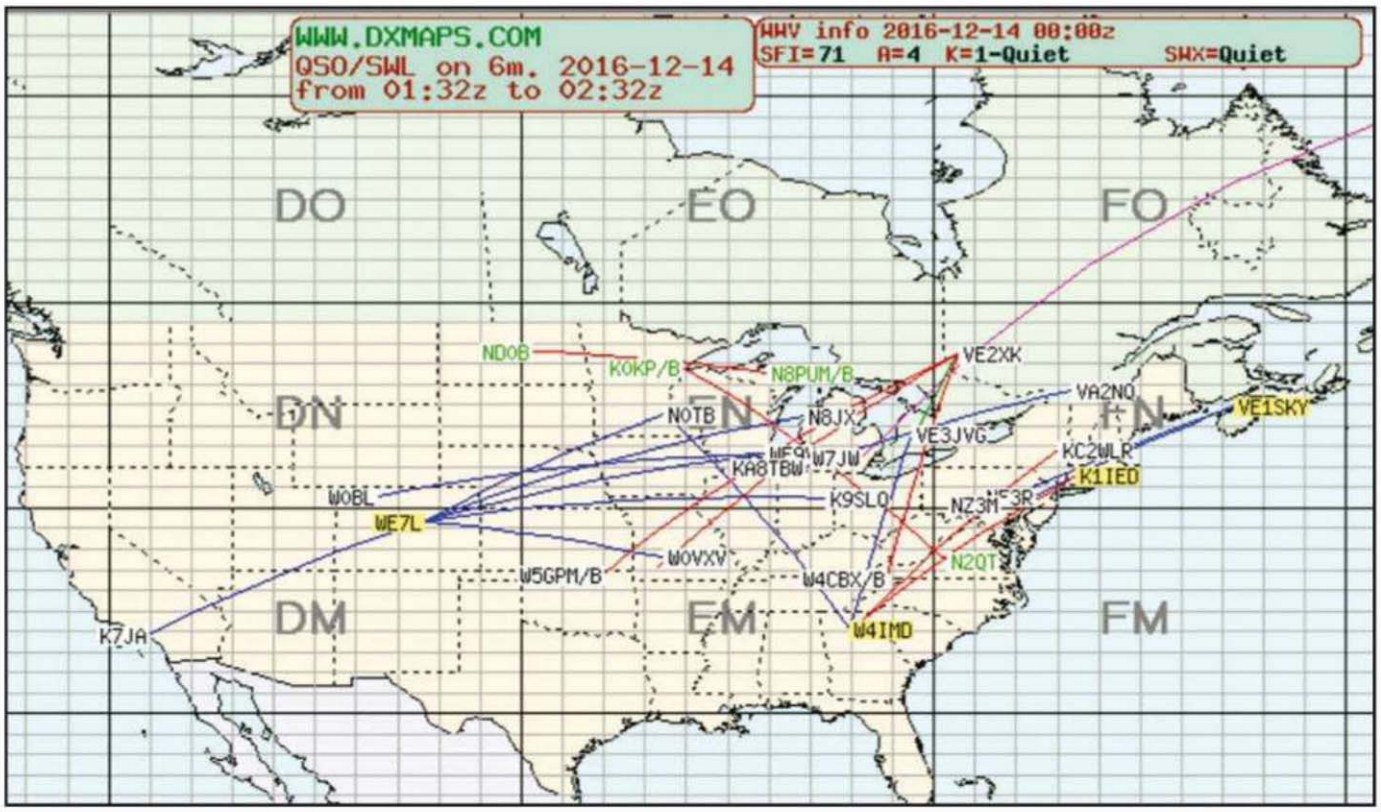


Figure 4. Meteor scatter paths that were open on 6 meters during the Gemenids meteor shower at 0130 UTC December 14, 2016.

• Over 60 VHF enthusiasts attended the 22nd Annual Pacific Northwest VHF-UHF-Microwave Conference which was held in October in Bend, Oregon. At the conference, the Pacific Northwest VHF Society named Robert Householder, K7JBU, The 2016 VHFer of the Year for his work promoting the society and VHF activity in Southern Oregon. Presentations included: VHF/UHF/Microwave SDR Transceiver On The Air by John Petrich, W7FU; Inexpensive Lightweight High-Performance Small Yagi Antennas for VHF-UHF Portable Operation by Rick Campbell, KK7B; Activating Saint Martin as TO2EME & Sint Maarten as PJ7/PE1L by veteran DXpeditioner Marshall Williams, K5QE, and On the Dark Side of Sequencing also by K5QE. All are a good read and the conference proceedings can be downloaded at <http://bit.ly/2hMSSlj>.

Until next month, 73 and CU on the bands!

–Tony, WA8RJF

Notes:

1. Zo = Characteristic impedance in Ω is equal to: (138*log(D/d)) divided by the square root of the relative permeability of the dielectric. D = inner diameter of the outer conductor and d = diameter of the inner conductor.
2. Surplus 75-Ohm TV coaxial cable is also a low-loss inexpensive transmission line for VHF and above. Simple band-specific transmission line transformers to 50 Ω can be easily constructed.
3. Available from several manufacturers
4. Times Microwave
5. Andrew Catalog #37. Andrew LDF4-50A, LDF5-50A, LDF7-50A surplus "hardline" can be found at hamfests, auction sites, etc.
6. Approximate

BY TED MELINOSKY,* K1BV

Award Programs Using CQ's WAZ Zones

Oops :

The November 2016 USA CA Award update incorrectly listed DF3ZE's certificate number as 3713. The correct number is 3710.

Special Honor Roll: All 3077 Counties

Elemer A. Bielek HA9RE, USA-CA 3077 #1258
November 3, 2016

Jim Bussone K4PBX, USA-CA 3077 #1259
November 9, 2016

This month's theme describes several awards which are earned by contacting all of (or most of) the countries in a particular CQ WAZ Zone. Two of the awards are for Zone 15 in central Europe, but each award is a little different, so you have a chance to earn double awards using most of the same cards.

Austria: OVSV Series – Worked All Countries in CQ Zone 15

This award is sponsored by OVSV, the Austrian Amateur Radio Society, the country's national ham radio association.

General requirements: Fee for this award is 10 , cost for endorsements is 1 or 2 IRC. The sponsors accept GCR by two licensed amateurs or the award manager of your national society. Do not use registered mail. SWL OK.

Send applications to: Richard Kritzer, Aich 4, A-9800 Spittal/Drau, Austria. Europeans may pay by electronic funds transfer using: BAWAG Konto.Nr. 98416006261 IBAN: AT971400098416006261 BIC: BAWAATWW.

Award Rules:

Contact at least 20 of the 27 DXCC countries that are included within the borders of CQ Zone 15. SWL OK. Three (3) contacts with each of the countries are required. A minimum of 60 contacts will be needed. The following PREFIXES may be counted: E7, ES, HA, HV, I, IS0, LY, OE, OH, OH0, OJ0, OK, OM, S5, SP, T7, TK, UA2, F, K, UB2-UI2, YL, YU, ZA, Z3, 1A0, 4O, 9A, and 9H.

Each club station you contact may be used as "wild card" and will count for the three (3) QSOs in their country. This award can be distributed via download as a PDF and sent to you by email at a reduced fee of 5 . (Electronic award applications go to the e-mail address below. Otherwise the standard fee for the print version is 10 .)

E-mail: <diploma@oevsv.at>

Internet: <www.oevsv.at/oevsv/diplome>

*12 Wells Woods Rd., Columbia, CT 06237
E-Mail: <k1bv12@charter.net>

USA-CA Honor Roll

500

DL7DSL.....3716
K4PBX.....3717

1000

CT1EEB 1887
K4PBX.....1888

1500

K4PBX.....1576

2000

K4PBX.....1461

2500

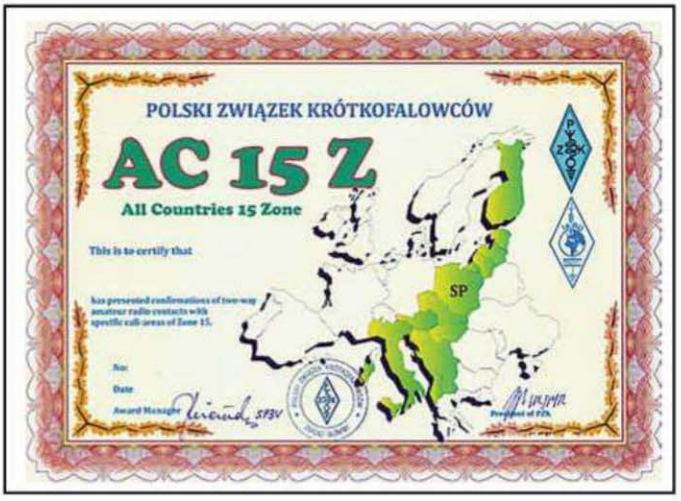
K4PBX.....1379

3000

K4PBX.....1284

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

Austria's OVSV offers this certificate for hams and SWLs who make contacts with stations in CQ's Zone 15.



Poland offers a similar award for Zone 15 contacts.

Poland: All Countries of the 15th Zone (AC 15 Z)

This award is one of several offered by Poland's national amateur radio association, PZK.

General Requirements: Awards are available to licensed amateurs or SWLs. The price for each award is 5 , $5 U.S., or 5 "new" IRCs. Endorsement stickers are 2 , $2 U.S., or 1 "new" IRC. All contacts, with the exception of satellites or repeaters, regardless of band or mode, are valid for their awards. You must possess the QSLs, but GCR rule applies. Apply to: Award Manager PZK, Jerzy Gomoliszewski, SP3SLU, P.O. Box 62-700, Turek, Poland.

This list is essentially the same as the one for the Austrian award listed above, but some of the countries have different numbers of QSOs needed, so the list below refers to this award exclusively.

Contact at least 23 countries/call areas located in CQ Zone 15 as follows:

Aland Is. OH0
Albania ZA
Austria OE (2 call areas)
Bosnia E7
Corsica TK
Croatia 9A
Czech Rep. OK
Estonia ES
Finland OH (3 call areas)
Hungary HA
Italy I
Kaliningrad UA2
Latvia YL
Lithuania LY
Macedonia Z3
Malta 9H
Market Reef OJ0
Montenegro 4O
Poland SP (4 call areas)
San Marino T7
Sardinia IS
Serbia (Yugoslavia) YU
Sicily IT
Slovakia OM
Slovenia S5
Sov. Mil. Order of Malta 1A0
Vatican City HV

The contacts with four (4) different call areas of Poland are mandatory. Your list should be in alphabetical order. Contacts are valid from 1 Jan 1955.

Email: <sq2lic@interia.pl>
Internet: <www.awards.pzk.org.pl/>

Iceland: Zone 40 Award

This award is available to all licensed radio amateurs and SWLs. There is no time limit on QSOs. There are no band limitations, but all QSOs must be in the same mode to achieve the award, i.e. 2XCW, 2XSSB or 2XRTTY. Single-band achievements can also be endorsed upon request.

Confirmed contacts are required with each of the following DX entities located in CQ Zone 40: Iceland (TF), Greenland (OX), Jan Mayen (JX), Svalbard (JW), and Franz Josef Land (R1FJ).

Requirements:

a. DX-stations: One confirmed contact with each entity (A total of five QSOs).

b. EU-stations: Same as DX, except that QSOs are needed with three different TF-stations (A total of seven QSOs).

c. TF-stations: Same as for DX, except that QSOs are required with five different TF-stations (A total of nine QSOs).

d. Special note: Contacts with stations /TF, /OX, or TF/ etc. are not valid for this award.

A GCR list, verified by two licensed radio amateurs or your local club officials, must be submitted. The list must show stations worked including call, date, year, time, band, report and mode. The IRA-Awards manager reserves the right to ask for proof of QSLs. The first award issued to a DXCC entity will be endorsed as such. Fee for the IRA Zone-40 Award is 8 IRCs, $5 U.S., or 5 . Apply to the Awards Manager: Brynjólfur Jónsson, TF5B, Engim ri 8, IS-600 Akureyri, Iceland.

Email: <tf5b@internet.is>
Internet: <http://bit.ly/2gkqj4Q>

Romania: YO-20Z Diploma

This award is part of the Romanian Federation Of Radioamatorism (FRR) Series. (For more information of the YO-20Z award, see CQ September 2016, p.80). Hams must contact stations in CQ Zone 20. The total number of contacts and

On the other side of the Pacific, hams in Indonesia provided emergency communications following a magnitude 6.5 earthquake there on December 7; and the Philippine Amateur Radio Association's HERO (Ham Emergency Radio Operations) group conducted emergency nets before, during and after a Christmas Day typhoon battered the island nation, making landfall seven separate times. A spokesman told ARRL that several government agencies monitored the HERO net and occasionally joined in, seeking information.

German Hams Now on 60 Meters

Class A amateurs in Germany now have access to the 60-meter band. A rule that took effect on December 21 opened up the frequency range from 5351.5-5366.5 kHz for amateur use on a secondary basis, according to the Deutscher Amateur Radio Club (DARC). Hams are limited to a maximum signal bandwidth of 2.7 kHz (the bandwidth of an SSB voice signal) and a top power level of 15 watts effective isotropic radiated power (EIRP). Hams in the US continue to be restricted to five discrete channels on the band.

Chinese Radar on 40 Meters

Following up on last month's story about the return of Russian over-the-horizon radar on the HF ham bands (although without the level of interference caused by the Russian "woodpecker" a few decades back), the International Amateur Radio Union (IARU) reports that a Chinese over-the-horizon radar system is now transmitting on 6.999 MHz, with a 10-kHz-wide signal that sometimes covers up the very low end of the 40-meter amateur band. The ARRL Letter also reports on 40-meter QRM from military stations in Kyrgyzstan and Radio Eritrea (as well as a jamming signal from Ethiopia).

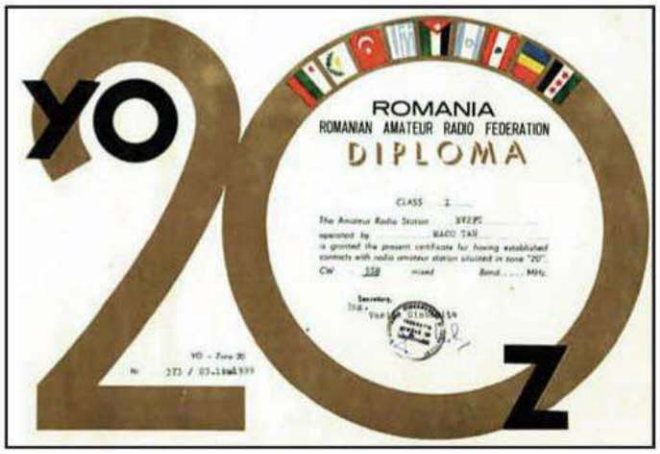
FCC: No Power Waiver for Expert Amps

The FCC has turned down a request from Expert Linears America, LLC, for a waiver from Part 97's current rule that sets maximum gain for an HF linear amplifier in the ham radio HF bands to 15 dB. The company sought the waiver in order to be able to sell an unmodified version of its Model 1.3K FA amp in the U.S. while the FCC was considering its petition for rule making requesting elimination of that limit. That proceeding is still pending. Most of the comments on the waiver request supported it but the Commission was persuaded by comments in opposition from FlexRadio, contending that a waiver limited to one specific company and one specific product would give that company an unfair advantage in the marketplace. The Commission concluded that granting the waiver while it was still considering the rulemaking request "would prejudice the rulemaking proceeding" and "would provide an unfair market advantage for one equipment model over other manufacturers' RF power amplifiers that would still be limited" by the current rule. It said the public interest is best served by letting the FCC give "full consideration" to the pending rulemaking and "applying the result of the rulemaking proceeding to all Amateur Radio Service equipment."

NPOTA Tops the Million-QSO Mark

The ARRL says it has exceeded its goal for the National Parks on the Air (NPOTA) program, a year-long special activity in 2016 to help celebrate the centennial of the National Park System. According to the ARRL Letter, "activators" operating ham stations from national parks, monuments and historic sites around the US surpassed the one-million-contact mark in mid-December. Program administrator Sean Kutzko, KX9X, called NPOTA "one of the most popular events in the history of the League." The program ended on December 31.

The Zone 40 Award requires that you contact only five entities. But they won't be easy! Good luck.



Romania offers this certificate to stations that make enough contacts in CQ Zone 20. (How many "enough" is depends on your proximity to Zone 20. See text for details.)

countries depends on your own zone (1 QSO/country). YO is required as one of the countries for all of the award levels.

General Requirements: All contacts must be made on or after 1 September 1949. Awards may be endorsed upon request for single bands or modes. Send a GCR list and fee of 5 Lei (for YO), 7 IRCs or the equivalent in U.S. dollars or Euros (currently $7 or 5) to: FRR, Romanian Federation Of Radiomatorism, CP 22-50, 014780 Bucharest, Romania, or directly to Pit Stefan Fenyo, P.O. Box 19-43, RO-033210, Bucurestil, Romania.

Internet: <www.hamradio.ro/diplome>

The Diploma is available in three classes, as follows:

Applicant Zone	15, 16, 20	14, 17, 21, 33, 34	All other zones
Class I	10 QSOs 10 countries	8 QSOs 8 countries	6 QSOs 6 countries
Class II	8 QSOs 8 countries	6 QSOs 6 countries	4 QSOs 4 countries
Class III	6 QSOs 6 countries	4 Qsos 4 countries	2 QSOs 2 countries

Zone 20 countries: 4X, 5B, E4, JY, LZ, OD, SV, SV5, SV9, SV/A, TA, YK, YO, and ZC4.

Let us know of any new certificates or awards programs that might be used in future columns.

An URL (internet address) is all we need to start the process.

BY BOB SCHENCK, N2OO

The Rarest of the Rare

A Quick Look at the Top Five "Most Wanted" DX Entities and Why They Are So Rare

Club Log <www.clublog.org>has compiled an up-to-date list of DX entity rankings using 15 different "filters" based on most-needed entities in different areas of the world (see Table 1). For our discussion we will use the "Global Log." The top 5 most-needed DX entities "globally" are:

1. P5: DPRK (North Korea)
2. 3Y/B: Bouvet Island
3. FT5/W: Crozet Island
4. KH1: Baker Howland Islands
5. BS7H: Scarborough Reef

We'll examine them in reverse order.

5. Scarborough Reef

The last operation occurred in May 2007. BS7H reported 45,820 QSOs made by Ops AA4NN, DL3MBG, I8NHJ, ND2T, BV6HJ, W6RGG, OH2BH, K9AJ, K4UJ, BA1HAM, N6MZ, 9V1YC, BA1RB, BA1AAX, BA4RC, and BA4RF. A well-written overview story can be found at: <http://bit.ly/2i70INn>.

Scarborough Reef is located about 123 miles west of Subic Bay, Philippines. It is a "disputed territory" with claims to it by the People's Republic of China, Taiwan, and the Philippines. Although not in the Spratly Islands, it is often discussed in conjunction with other territorial disputes in the South China Sea.

* <n2oo@comcast.net>

Table 1

ClubLog maintains a list of DX entity rankings with different "filters" to show their order in different parts of the world (since some entities that are very difficult to contact from the U.S. east coast, for example, may not be rare at all if you are in Africa) The filters are as follow:

Global Log (Worldwide rankings)
Europe
Europe West
Europe East
North America
North America West Coast
North America East Coast
South America
Asia
Asia Far East
Asia Middle East
Oceania
Oceania VK and ZL
Africa
Antarctica

Why is it so rare? This one is a bit strange. Being multiply "claimed" and the center of political tensions in the area, getting permission to go is often quite difficult, and could put a team in jeopardy. In 2012, there was a standoff between China and the Philippines when the Philippine Navy apprehended eight Chinese fishing vessels in the Scarborough Shoals. Getting permission from one country could very well cause tension and possibly a reaction by another country.

Actually "administering" the reef by occupying it is nearly impossible due to the fact that it is mostly submerged, although the area is frequently patrolled by both the Chinese and Philippine navies. Only a group of "rocks" are above water at high tide, the highest of which is what is called "South Rock" that measures only 5.9 feet above high tide. It is impossible to set up a station on most of these "rocks" due to their small overall size. There are only a few that can be used, and they are not especially close to each other. Each rock requires a full station setup including its own power source. The ones used were maybe about 8-15 feet across, and definitely NOT level as you can see in Photo A. As such, physically setting up a DXpedition here is (and has been) a difficult task. As a matter of fact, the first DXpedition in 1994 did

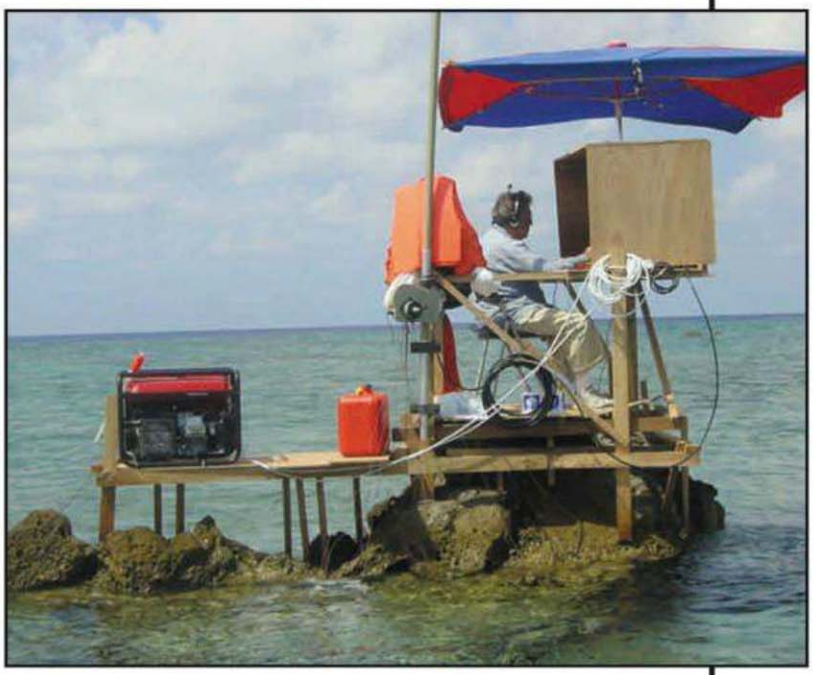


Photo A. W6RGG operating from one of the rocks at Scarborough Reef BS7H in 2007. (Courtesy of hamgallery.com)

The WAZ Program

ALL BAND WAZ

Mixed

9339	F1ICS	9343	PY2ALC
9340	JA1QJI	9344	ZS6C
9341	EA4UV	9345	DL7URB
9342	JR3RIU	9346	F4FLF

SSB

5352 ..... F4FLF

RTTY

264 ..... JI8XLD

SINGLE BAND WAZ

20 Meters CW

629 ..... SP5TT

20 Meters SSB

1235 ..... KB1DMX

160 Meters

480 ..... S59ZZ, 40 Zones

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, John Bergman, KC5LK, 125 Deer Trail, Brandon, MS 39042-9409. The processing fee for all CQ awards is $6.00 for subscribers (please include your most recent CQ mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to John Bergman. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <kc5lk@cq-amateur-radio.com>.

CQ DX Awards Program

CW Endorsements

WA9PIE	1.8MHz	N3RC	315
WA9PIE	298	N2LM	321

SSB Endorsments

WA9PIE	1.8MHz	VE6MRT	322
WA9PIE	282	N2LM	328
N3RC	319	HB9DQD	335
K8IHQ	321		

RTTY Endorsements

VE6MRT 235

The basic award fee for subscribers to CQ is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. We recognize 340 active countries. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

The WPX Program

CW

3771	DL9FCY	3775	K4AFE
3772	K9KJ	3776	JA1GQC
3773	WA3UTC	3777	W5SUM
3774	JS1ERB		

SSB

3952	EI5VHO	3957	DM2TO
3953	J6/N8WD	3958	K4HDW
3954	WD8CW	3959	K1KQC
3955	WA3UTC	3960	W5SUM
3956	YL2BR		

Mixed

3326	MØRCU	3334	N6JNL
3327	DL9FCY	3335	VK3GA
3328	CU7MD	3336	K4AFE
3329	SV3ICK	3337	JA1GQC
3330	JS1ERB	3338	W5SUM
3331	N3OUC	3339	KC7YE
3332	UA1ZKI	3340	EC7DWP
3333	K4HDW	3341	VE2HJ

Digital

574	AD$$FL	577	UA1ZKI
575	ZS6AJZ	578	AC6ZM
576	N8TUT	579	WAØWHE

CW: 350 K4AFE. 500 JA1GQC, W5SUM. 550 DL9FCY. 750 KO9V. 850 PS7DX. 1050 DM2TO. 1100 KN1CBR. 1400 AG9S. 1500 HB9BIN. 1900 W3LL. 2650 KØARS

SSB: 350 J6/N8WD. 400 EI5VHO, N8TUT, W5SUM. 700 WF1H, HK4KM. 750 K6VXI. 800 DM2TO. 850 KO9V. 900 KB7HDX. 1000 HB9BIN. 1900 AG9S. 3100 UT7DX. 3200 W3LL

Mixed: 450 WD8CW, N3OUC. 500 MØRCU, KC7YE, WA3QWA, N4JJS. 550 SV3ICK, EC7DWP. 600 WA3UTC, AC6BW, JA1GQC. 650 UA1ZKI. 700 N8TUT, W5SUM. 750 K6VXI. 800 PY3CJS, HK4KM. 900 VE2HJ. 950 KB7HDX. 1000 DL9FCY. 1150 K9RR. 1250 WF1H. 1400 KO9V. 1600 DM2TO. 1950 HB9BIN. 2200 CU7MD. 2500 AG9S. 3500 N3XX. 3650 W3LL. 5600 ON4CAS

Digital: 400 HB9BIN. 450 N8TUT. 500 N4JJS. 600 ADØFL, UA1ZKI. 800 PY3CJS, WF1H, KO9V. 2400 W3LL

160 Meters: AC6ZM, K4AFE
40 Meters: NØVVV, VE2HJ
20 Meters: N8TUT, UA1ZKI, VK3GA, HK4KM
15 Meters: WF1H, HK4KM
10 Meters: N8TUT, HK4KM

Asia: PY3CJS, UA1ZKI
Europe: EI5VHO, WF1H, ZS6AJZ, J6/N8WD, WA3UTC, N8TUT, N3OUC, UA1ZKI, K1KQC, HK4KM, VE2HJ
North America: WF1H, K9KJ, WA3UTC, N8TUT, N3OUC, K4HDW, K4AFE, HK4KM, WAØWHE, VE2HJ
South America: PY3CJS, HK4KM

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.

not count for DXCC because the scaffold used was not on the reef (under water) which was not in accordance with DXCC rules.

A few years ago, there was a rumor at Dayton that a Chinese team was planning to activate Scarborough Reef but that never happened. I can only

5 Band WAZ

As of December 15, 2016
1944stations have attained at least the 150 zone level, and 953 stations have attained the 200 Zone level.

As of December 15, 2016
The top contenders for 5 Band WAZ (zones needed on 80 or other if indicated):
CHANGES shown in BOLD

Callsign	Zones	Zones Needed	Callsign	Zones	Zones Needed
EA7GF	199	1	W6DN	199	17
H44MS	199	34	W9XY	199	22
HA5AGS	199	1	9A5I	198	1, 16
I5REA	199	31	AK8A	198	17, 22
IK1AOD	199	1	DM2EE	198	1,31
IK8BQE	199	31	EA5BCX	198	27, 39
IZ3ZNR	199	1	F5NBU	198	19, 31
JA1CMD	199	2	G3KDG	198	1, 12
JA5IU	199	2	G3KMQ	198	1, 27
JA7XBG	199	2	IK0FVC	198	1, 31
JH7CFX	199	2	JA1DM	198	2, 40
JK1BSM	199	2	JA3GN	198	2 on 80 & 40
K1LI	199	24	K2EP	198	23, 24
K3JGJ	199	24	K2TK	198	23, 24
K7UR	199	34	K3JGJ	198	24, 26
K8PT	199	26	K4HB	198	24, 26
KZ4V	199	26	K4JLD	198	18, 24
N3UN	199	18	**K4XP**	**198**	**18, 23**
N4NX	199	26	K6FG	198	17, 18
N4WW	199	26	KB0EO	198	22, 23
N4XR	199	27	KZ2I	198	24, 26
N8AA	199	23	N2QT	198	23, 24
RA6AX	199	6 on 10M	N4GG	198	18, 24
RU3DX	199	6	N8LJ	198	17, 24
RW0LT	199	2 on 40M	NS6C	198	17, 22
RX4HZ	199	13	OK1DWC	198	6, 31
RZ3EC	199	1 on 40M	UA4LY	198	6 & 2 on 10
S58Q	199	31	US7MM	198	2, 6
SM7BIP	199	31	VE2TZT	198	23, 24
VO1FB	199	19	W4UM	198	18, 23
W1FJ	199	24	W5CWQ	198	17, 18
W1FZ	199	26	W6OUL	198	37, 40
W2LK	199	23	W9RN	198	26, 19 on 40
W3NO	199	26	WA2BCK	198	23, 24
W4DC	199	24	WC5N	198	22, 26
W4LI	199	26	WL7E	198	34, 37
			ZL2AL	198	36, 37

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

953 ..... F8BBL

New updates to the 5BWAZ list of stations:

1940, K4XP, 198 Zones

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

1943 DK2LO, 198 Zones 1944 F8BBL, 200 Zones

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, John Bergman, KC5LK, 125 Deer Trail, Brandon, MS 39042-9409. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent CQ mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to John Bergman. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <kc5lk@cq-amateur-radio.com>.

assume that Scarborough Reef will always be researched by experienced DXpedition leaders, but can only be done safely with approval by all involved. This one will be very difficult especially considering the current political situation in the area. Don't hold your breath.

#4 Baker & Howland Islands

The last operation was to Baker Island in April-May, 2002. The call used was K1B. The team of YU1AU, YU1DX, KW4DA, N6TQS, KD7DCD, RZ3AA, RA3AUU, RW3AH, Z32ZM, ZS6MG, S56A, and LY3NUM made 95,127 QSOs. Baker Island lies 1,920 miles southwest of Honolulu, Hawaii. The island covers 0.81 square mile with 3 miles of coastline. There is a WWII runway (abandoned in 1944) that is 5,463 feet long but is completely overgrown with vegetation and unusable.

Howland Island lies 42 miles north northwest of Baker Island. Howland covers 1.7 square miles and has 4 miles of coastline. The only access to either island would have to be by boat using either a Zodiac style landing on the beach or a helicopter. Both islands are National Wildlife Refuges managed by the U.S. Fish and Wildlife Service (Photo B). In 2009, they were made part of the Pacific Islands Marine National Monument.

USFWS personnel visit the islands only once every one or two years. Access can only be made with permission of the USFWS and, as such, would be highly restricted if permission was ever granted at all. Currently, a DXpedition was being planned for Baker Island in late 2017 but nothing further has developed as far as I know. I know that USFWS permission can be complicated and tricky. Best to leave this with very experienced DXpeditioners who have previously worked with the USFWS. I'll call this one 50/50 since, although the travel issue can be difficult, it is not insurmountable. The political issue will be the most difficult and will require extreme patience, tedious planning and most importantly, sincere diplomacy.

#3. Crozet Islands

The Crozet Group is part of French Overseas Territories and consists of six sub-Antarctic islands (not including numerous minor islets and rock reefs). Overall they consist of about 136

Photo B. Fish and Wildlife sign on Baker Island, with additional writing in Chinese, Japanese, and Korean. The sign also shows significant fading and wear. (Photo by Joann94024 at English Wikipedia)

square miles. The highest mountain is located on East Island and stands at 3,580 feet. They are located at 46° 25' 0" S, 51° 59' 0" E or about 2,000 miles south-southeast of Cape Town, South Africa. The only inhabitants are "Possession Island" at research station Port Alfred (Alfred Faure). It has been continuously manned since 1963 with between 18-30 people working at the base. The base is visited a few times a year by the Marion Dufresne, an oceanographic research vessel that delivers supplies and rotating crews of scientists. Crozet was designated as a nature reserve in 1938 and upgraded in 2006 to the National Nature Reserve of the French Southern and Antarctic Lands.

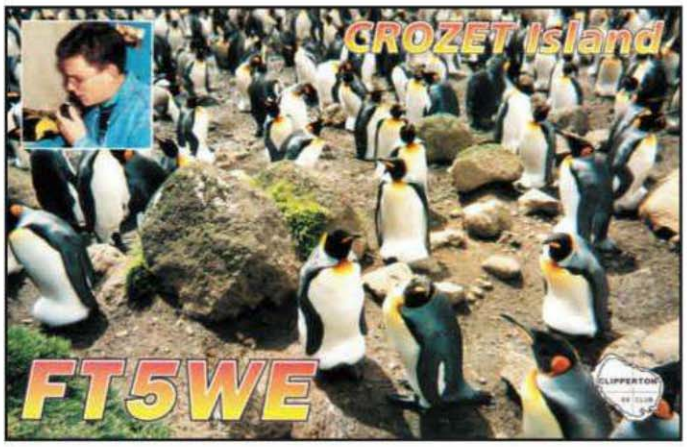


Photo C. Crozet Island FT5WE QSL from 1996. (Courtesy of hamgallery.com)

There have been occasional "short visit" activations over the years. But I was unable to locate any serious DXpedition activations. Over the years there have been occasional activations by "base personnel" but not much such activity since the early 1990s. A good site to look at with QSL images of most operations from Crozet can be viewed at <http://bit.ly/2hnmo3R>. It seems that the most recent larger operation was in 1996, probably by FT5WE (Photo C) or FT5WF, who were both part of the scientific team working on the island. FT5WE made about 16,000 QSOs (tnx K8CX).

I know of at least one major DXpedition group that was attempting to activate Crozet. However, no progress has been made in getting appropriate permission from the French authorities. Crozet is administered by the "Terres Australes Et Antarctiques Francaises" (TAAF). Access is difficult due to environmental and logistical concerns. I strongly suggest leaving this to the very experienced DXpeditioners who have

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 340 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. (Stickers for the 340 level and Honor Roll are available.) Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA.

CW

OH2BN.....340	K4MQG.....338	W4OEL.....338	K8SIX.....338	W6OUL.....335	KØKG.....331	KA3S.....324	N3RC.....315	WA2VQV.....290
K4IQJ.....339	K5RT.....338	W5BOS.....338	N4CH.....338	JA7XBG.....334	K6LEB.....330	N7WO.....323	RA1AOB.....313	K7CU.....282
K9MM.....339	N4AH.....338	W7CNL.....338	N4NX.....338	F6HMJ.....333	N7WO.....330	YT1VM.....322	WA4DOU.....312	PP7LL.....282
WS9V.....339	N4JF.....338	W7OM.....338	YU1AB.....338	K1FK.....333	WD9DZV.....330	4Z5SG.....321	YO9HP.....312	N2VW.....280
DL3DXX.....338	N4MM.....338	W8XD.....338	K8LJG.....337	K9OW.....333	K6YK.....328	N2LM.....321	W4ABW.....306	K4EQ.....280
EA2IA.....338	N5FG.....338	WB4UBD.....338	KA7T.....337	PY2YP.....333	W9IL.....328	ON4CAS.....321	KT2C.....305	WB5STV.....277
F3TH.....338	N5ZM.....338	WK3N.....338	WA5VGI.....337	WG5G/	IKØADY.....327	HB9DAX/	K7ZM.....303	YO6HSU.....275
K2FL.....338	N7FU.....338	WØJLC.....338	W1DF.....337	QRPp.....333	OZ5UR.....327	QRPp.....319	HA5LQ.....300	
K2TQC.....338	N7RO.....338	HB9DDZ.....338	W9RPM.....337	K2OWE.....332	AB4IQ.....325	W6YQ.....318	RN3AKK.....300	
K3JGJ.....338	NØFW.....338	K4JLD.....338	G3KMQ.....336	K5UO.....332	K6CU.....325	HA1ZH.....318	WA9PIE.....298	
K3UA.....338	OK1MP.....338	K7LAY.....338	W7IIT.....336	N6AW.....332	KE3A.....325	CT1YH.....316	K4IE.....295	
K4CN.....338	W3GH.....338	K7VV.....338	K8ME.....335	W4MPY.....332	EA5BY.....324	EA3ALV.....315	YU1YO.....295	

SSB

AB4IQ.....340	K6YRA.....340	VE3MR.....340	K2FL.....338	EA3BMT.....335	OE3WWB.....333	K7HG.....327	N8SHZ.....312	W9ACE.....291
DJ9ZB.....340	K7VV.....340	VE3MRS.....340	K3UA.....338	F6HMJ.....335	AA1VX.....332	WD9DZV.....327	KU4BP.....310	N3KV.....289
DL3DXX.....340	K8SIX.....340	VE3XN.....340	K7LAY.....338	HB9DQD.....335	KE3A.....332	K6GFJ.....326	W6NW.....310	W6MAC.....289
DU9RG.....340	K9MM.....340	W3AZD.....340	K9HQM.....338	IKØAZG.....335	N2VW.....332	KE4SCY.....326	I3ZSX.....309	K7CU.....287
EA2IA.....340	KE5K.....340	W3GH.....340	N4NX.....338	IW3YGW.....335	N5YY.....332	KF4NEF.....325	G3KMQ.....308	IZ1JLG.....282
EA4DO.....340	KZ2P.....340	W4ABW.....340	W4UNP.....338	OE2EGL.....335	K5UO.....331	W9GD.....325	KA1LMR.....308	WA9PIE.....282
HB9DDZ.....340	N4CH.....340	W5BOS.....340	W9RPM.....338	VK2HV.....335	SV3AQR.....331	VE7EDZ.....324	RA1AOB.....308	WD8EOL.....281
I8KCI.....340	N4JF.....340	W6BCQ.....340	YU1AB.....338	W4WX.....335	WØROB.....331	F6BFI.....323	XE1MEX.....308	IWØHOU.....277
IK1GPG.....340	N4MM.....340	W6DPD.....340	4Z4DX.....338	WB3D.....335	W6OUL.....331	ON4CAS.....323	IØYKN.....306	N5KAE.....276
IN3DEI.....340	N5FG.....340	W7BJN.....340	K1UO.....338	AA4S.....334	XE1MEX.....331	W5GT.....323	XE1MW.....305	WA5UA.....276
K2TQC.....340	N5ZM.....340	W7OM.....340	K8LJG.....338	EA5BY.....334	KD5ZD.....330	VE6MRT.....322	K4IE.....304	NØAZZ.....275
K3JGJ.....340	N7BK.....340	W8ILC.....340	N7WR.....338	K9OW.....334	WA4WTG.....330	W4MPY.....322	K4ZZR.....304	SQ7B.....275
K4CN.....340	N7RO.....340	W9SS.....340	WA5VGI.....338	PY2YP.....334	WØYDB.....330	K8IHQ.....321	K7ZM.....303	
K4IQJ.....340	NØFW.....340	WB4UBD.....340	W2CC.....338	VK4LC.....334	ZL1BOQ.....330	KW3W.....320	4Z5FL/M.....302	
K4JLD.....340	OK1MP.....340	WK3N.....340	W2FKF.....338	W8AXI.....334	AD7J.....329	TI8II.....320	K7SAM.....301	
K4MQG.....340	OZ3SK.....340	WS9V.....340	W7FP.....338	XE1J.....334	VE7SMP.....329	YO9HP.....320	KA8YYZ.....301	
K4MZU.....340	OZ5EV.....340	XE1AE.....340	W9IL.....338	CT3BM.....333	CT1AHU.....328	N3RC.....319	4X6DK.....298	
K5OVC.....340	VE1YX.....340	YU3AA.....340	IØZV.....336	IK8CNT.....333	N1ALR.....328	W1DF.....318	K2HJB.....295	
K5RT.....340	VE2GHZ.....340	JA7XBG.....339	K3LC.....336	K8LJG.....333	N2LM.....328	XE1RBV.....317	F5MSB.....293	
K5TVC.....340	VE2PJ.....340	KØKG.....339	K8ME.....336	N6AW.....333	AE9DX.....327	IV3GOW.....312	IK5ZUK.....293	

RTTY

NI4H.....338	WK3N.....338	N5FG.....337	K4CN.....334	W3GH.....333	W9RPM.....330	K8ME.....278	N4MM.....275
WB4UBD.....338	N5ZM.....338	OK1MP.....337	K8SIX.....333	K3UA.....332	AB4IQ.....317	IN3YGW.....275	

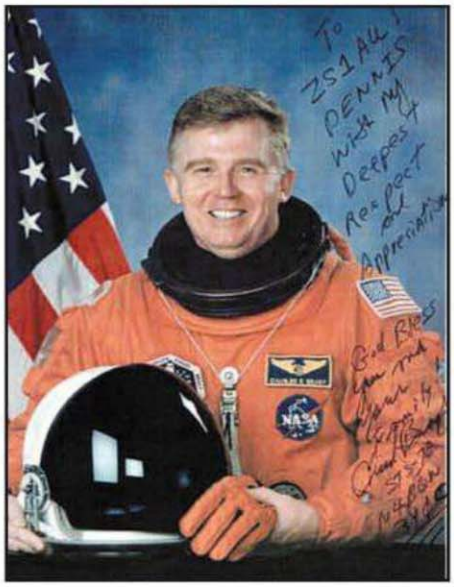


Photo D. Chuck Brady, N4BQW (SK), was an astronaut as well as a DX-peditioning ham. (Courtesy of NASA)

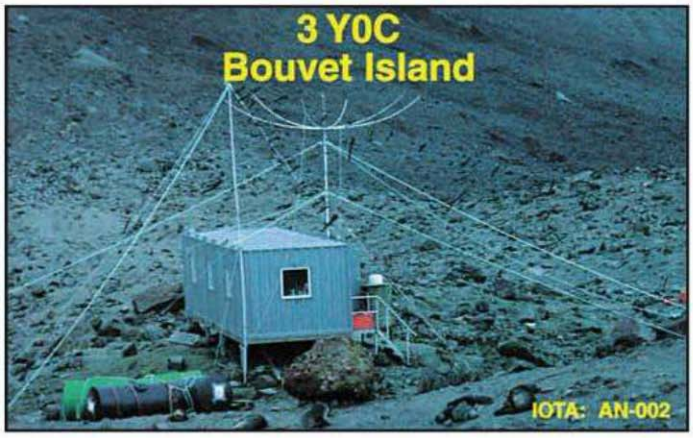


Photo E. 3YØC shack used by Chuck Brady, N4BQW, during his 2000-2001 operation. (Courtesy of hamgallery.com)

already had experience dealing with TAAF. An edge may most likely go to a French team. I am certain that competent leaders are working on this and with any luck, activation will come but I have no concrete evidence at this time.

#2. Bouvet Island

The last operation from Bouvet was by 3YØE in December 2007-February 2008 by Petrus, ZS6GCM. As a new ham, he managed to work about 1,500 stations in between assignments on the island. Prior to Petrus, back in 2000-2001, former astronaut Chuck Brady, N4BQW (SK) (Photo D), activated Bouvet and made 16,828 QSOs as 3YØC (Photo E).

Bouvet is an uninhabited sub-Antarctic island and dependency of Norway located in the South Atlantic Ocean about 1,600 miles south-southwest of the coast of South Africa. The island has an area of about 19 square miles, 93% of which is covered by glaciers. The center of the island is an ice filled crater of an inactive volcano. It is administered by the Polar Affairs Department of the Ministry of Justice and Police in Oslo, Norway. The Norwegian Polar Institute has been involved in establishing and maintaining a small research station on Bouvet.

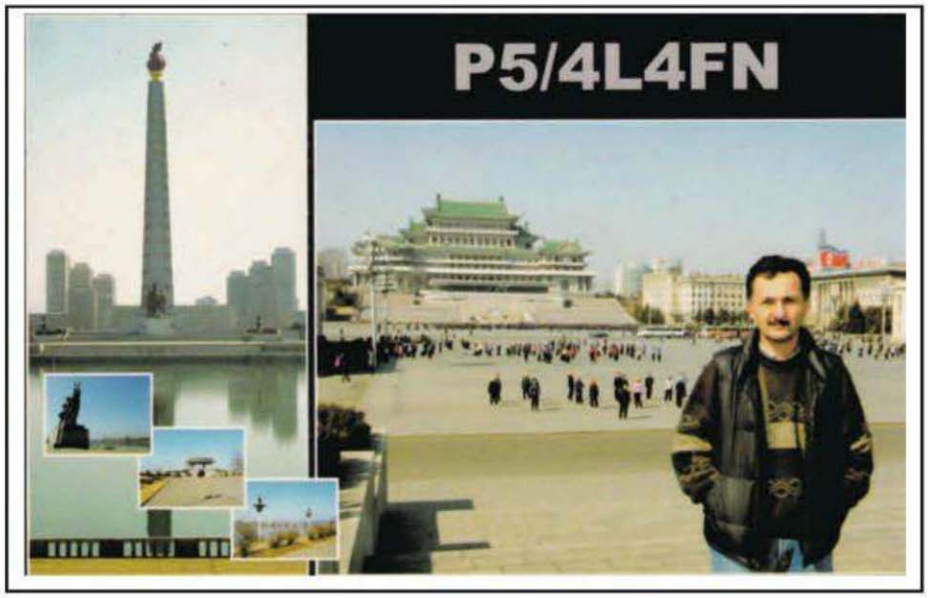


Photo F. North Korea P5/4L4FN QSL from 2002. (Courtesy hamgallery.com)

The biggest problem for activating Bouvet is safe access. Currently, about the only safe way to get onto Bouvet would be by using a helicopter. Beach access is extremely difficult and dangerous.

There is a large scale DXpedition that will be using the callsign 3YØZ that is being planned by Ralph Fedor, KØIR, for early 2018. Ralph is part of a team of 20 experienced DXpeditioners who are sure to bring Bouvet considerably down the most wanted list. They have been working on this project for many years. Go to <www.bouvetdx.org> for updates. This will be a big one!

#1 DPRK (North Korea)

This one should be obvious. North Korea presents multiple problems concerning activation. The only major activation in North Korea was by Ed, P5/4L4FN, in 2001-2002. Ed made 16,194 QSOs during his stay in the Democratic Peoples' Republic. Although there have been a couple of other short activations over the years (note: OH2BH, 3Z9DX), Ed's activity has been the only one that made a large number of QSOs.

I don't have to tell you where North Korea is located since that is commonly known. The only issues with activating North Korea are "permission" and "licensing." Since North Korea does not currently routinely assign amateur radio callsigns, proof must be made that appropriate permission was secured from telecommunications officials in Pyongyang. Activating an amateur radio operation of any sort in North Korea will be extremely dangerous since the authorities appear not to be trusted. At least, I wouldn't trust them currently. We can only hope that someday North Korea will see that a multi-national team of visiting ham radio operators would be a benefit, and not a threat.

There have been several attempts to organize amateur radio activations in North Korea. These include solo and team efforts. Each has tried to organize peaceful, friendly, and diplomatic introductions to amateur radio to North Korean officials. Few have been successful other than to make a handful of contacts. A large planned operation recently was thwarted by some badly-timed influences.

My advice is to forget about this unless you get lucky with one of the smaller activations. And for anyone thinking about trying to go, I say leave this one alone. The "best" have tried. Hopefully, sometime in the future, things over there will calm down.

Check Out Your Region's "Most Wanted" List

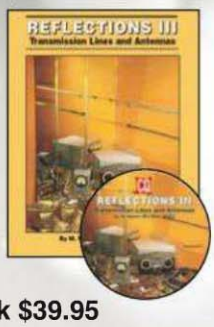
Well, that's the current top five using the Global Log on Club Log with the "no mode filter" selected. I invite you to visit <www.clublog.org> and select the "MOST WANTED" tab on the left side and poke in various parameters. For example, although P5 is #1 in the global log, it is #7 in Asia and #12 in Oceania. It's all a matter of geography. Another example: The top five for Asia are #1 Bouvet, #2 Aves, #3 Mount Athos, #4 Desecheo, and #5 San Felix. Enjoy poking around.

Until next month, See ya' in the Pileups! De N2OO

winter sales to *warm* you...

Reflections III

by Walt Maxwell, W2DU



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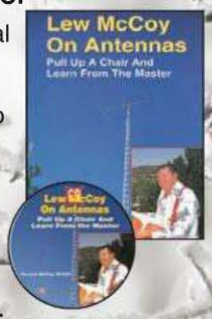

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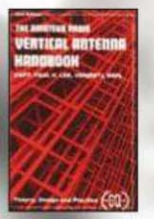

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BY DAVID SIDDALL,* K3ZJ

Major Contests Dominate the February Competition Calendar

Plus: New Edition of K1ZM's "DXing on the Edge"; Notes on Using HFTA to Improve Signals; and WRTC2018 offers Tiles to Supporters

February in the northern areas is a great time to sit in the warm shack and see what shows up on the low bands. This is the month for successive weekends of contesting (just be careful not to overdose!). CQWW WPX RTTY is February 11-12. ARRL DX CW follows closely the very next weekend, on February 18-19. And there's more! The following weekend, February 22-24, is CQWW 160 Phone. And then it's time for the ARRL DX Phone contest. If you are a ham triathlete, this is the month for some serious contesting.

Below, we also take a look at the timely new second edition of "DXing on the Edge, The Thrill of 160 Meters." This new edition was released in December by author Jeff Briggs, K1ZM/VY2ZM. Also, last month we explored N6BV's HFTA (High Frequency Terrain Analysis) software, and we add

k3zj@cq-amateur-radio.com

Calendar of Events

All year	**CQ DX Marathon**	**http://bit.ly/vEKMWD**
Jan. 27-29	**CQ WW 160m CW Contest**	**http://www.cq160.com/rules.htm**
Jan. 28-29	BARTG RTTY Sprint	http://bit.ly/SnijIn
Jan. 28-29	REF CW Contest	http://concours.ref-union.org/contest/?page_id=2
Jan. 28-29	UBA SSB DX Contest	http://bit.ly/W0gZiE
Jan 28-29	Montana QSO Party	http://www.fvarc.org/?q=MT-QSO-Party
Jan. 28-29	Winter Field Day	http://www.winterfieldday.com/rules.html
Feb. 1	UKEICC 80m Contests SSB	http://bit.ly/2cv97YF
Feb. 4	AGCW Straight Key Party	http://bit.ly/1jKUszA
Feb. 4	FISTS Winter Sprint	http://www.fistsna.org/operating.html
Feb. 4	Minnesota QSO Party	http://www.w0aa.org/index.php/rules
Feb. 4-5	British Columbia QSO Party	http://www.orcadxcc.org/bcqp_rules.html
Feb. 4-5	Vermont QSO Party	http://www.ranv.org/ranv.html
Feb. 4-5	Mexico RTTY Int'l Contest	http://bit.ly/1Ml59qF
Feb. 4-5	10-10 Int'l Winter Contest	http://www.ten-ten.org/Forms/QSOPartyRules.pdf
Feb. 4-5	Black Sea Cup Int'l	http://bit.ly/10qIpGu
Feb. 5	North American CW Sprint	http://ncjweb.com/north-american-sprint/
Feb.8-12	ARRL School Club Roundup	http://www.arrl.org/school-club-roundup
Feb. 11	Asia-Pacific Spring Sprint (CW)	http://jsfc.org/apsprint/aprule.txt
Feb. 11	FISTS Winter Sprint	http://www.fistsna.org/operating.html
Feb. 11-12	**CQWW RTTY WPX Contest**	**http://www.cqwpxrtty.com/**
Feb. 11-12	Dutch PACC Contest	http://pacc.veron.nl/
Feb. 11-12	OMISS QSO Party	http://www.omiss.net/Facelift/qsoparty.php
Feb. 11-12	SARL Field Day Contest	http://bit.ly/H0IqQf
Feb. 15	AGCW Semi-Automatic Key Evening	http://bit.ly/1OmoGv8
Feb. 18-19	ARRL CW DX Contest	http://www.arrl.org/arrl-dx
Feb. 18-19	Russian WW PSK Contest	http://bit.ly/2gqYDum
Feb 18-27	Novice Rig Round-Up	http://novicerigroundup.com/
Feb. 22	UKEICC 80m Contests CW	http://bit.ly/2cv97YF
Feb. 24-26	**CQWW 160M SSB Contest**	**http://www.cq160.com/rules.htm**
Feb. 25-26	REF SSB Contest	http://concours.ref-union.org/contest/?page_id=2
Feb. 25-26	South Carolina QSO Party	http://scqso.com/rules/
Feb. 25-26	UBA CW DX Contest	http://bit.ly/W0gZiE
Feb. 25-26	North American RTTY QSO Party	http://ncjweb.com/naqp/
Feb. 26	High Speed Club CW Contest	http://www.highspeedclub.org/
Feb. 26-27	North Carolina QSO Party	http://rars.org/ncqsoparty/index.php?id=rules
Mar. 1	UKEICC 80m Contests SSB	http://bit.ly/2cv97YF
Mar. 4-5	ARRL SSB DX Contest	http://www.arrl.org/arrl-dx
Mar. 5	DARC 10 Meter Digital Contest	http://bit.ly/1gpPnOd
Mar. 5	SARL Hamnet 40M Simulated Emergency Contest	http://bit.ly/H0IqQf
Mar. 7	AGCW YL-CW QSO Party	http://bit.ly/1uNZkyi
Mar. 25-26	**CQWW WPX SSB Contest**	**http://www.cqwpx.com/**

This information also appears monthly on the CQ website.

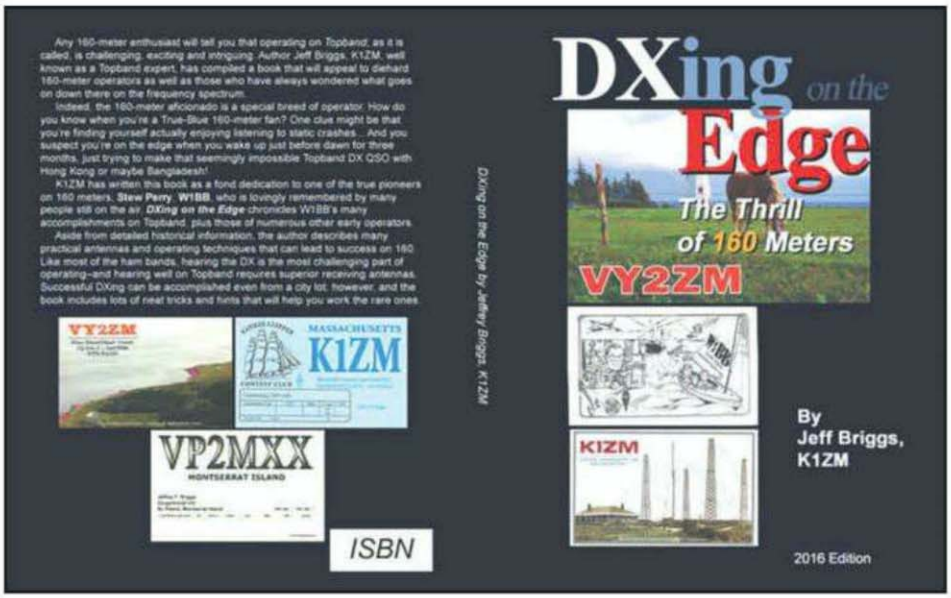

Photo A. Jeff, K1ZM/VY2ZM's, recently-released second edition of his book, DXing on the Edge, aptly subtitled The Thrill of 160 Meters. (Picture courtesy of K1ZM)

some final notes below about using this very valuable program. We conclude with a note about the upcoming WRTC 2018 competition in Germany.

CQ WPX RTTY Contest

This year the rules are the same as last year for the CQ WPX RTTY Contest. It will be held from 0000 UTC February 11 through 2359 UTC February 12. Complete rules in 15 different languages are at: <http://www.cqwpxrtty.com> along with associated information. Just note that 160 meters is not used in this contest, and operators are requested to comply with established band plans.

Interest has been growing in RTTY contesting and in this particular contest. Last year, 3,318 logs were submitted. This is a very healthy number and indicates that participation is likely to be very good this year, with many interesting stations to work with a wide variety of prefixes.

Like all CQ contests, to be eligible for an award your logs must be received at the CQ contest server no later than 5 days after the contest ends. For this contest the log deadline is 2359 UTC on February 17. It is greatly preferred that submissions be made directly over the internet, rather than by email. The log-checking software examines the format of your log for errors and prompts you for corrections before accepting your log, so please use it if you can. This log-checking facility is easy to use and speeds successful log submission for everyone concerned. The screen immediately indicates when your log has been submitted successfully and you can expect to receive a receipt in your email within minutes. But if you must email your log, the address is <rtty@cqwpx.com>.

Finally, there seems to remain some confusion about the meaning and effect of the 5-day deadline for this and the other related CQ contests. If you miss the deadline, your log still will be scored and listed in the results. You have missed only the opportunity for an award in your category. You are encouraged to submit your log, even late, so that other logs can be more accurately checked and a better measure of interest in the contest obtained. So submit it even if you miss the 5-day deadline, either as a log for scoring or as a check log.

CQ World-Wide 160 Meter Phone Contest

The CQ World-Wide 160 Meter DX phone contest once again will take off at 2200 UTC Friday, February 24, and last through 2200 UTC Sunday, February 26. Note that this contest begins two hours earlier on Friday than most other contests, and finishes two hours earlier on Sunday.

If this past fall's 160-meter contests are any indication — and I think that they are — this year's 160 contests are ones that you won't want to miss. We are in the first year of a 4-5 year period of good-to-excellent, low-band propagation as the sunspot cycle settles at relatively low levels.

Generally excellent conditions were reported on 160 by participants in late November's CQWW CW contest, December's ARRL 160-Meter Contest, and the Stew Perry Topband Distance Challenge ("TBDC"). Indeed UD4F, operating at RT4F, claims DXCC with 107 countries worked on 160 meters in the CQWW CW weekend! Top U.S. totals at multi-multis hovered around mid-70 countries for the weekend. So conditions definitely are picking up on 160 and higher scores are expected on 160 this year than last year.

In last month's column we discussed some aspects of the rules that apply to the Phone weekend as well as to the earlier CW weekend. A review of these comments and the rules themselves might be helpful. The complete rules and other associated information, including previous results, are available at: <http://www.cq160.com>.

ARRL DX CW and Phone Contests

The annual ARRL DX CW and Phone contests will be held this month and are very popular. Last year over 4,000 logs were submitted for each segment, CW, and phone. ARRL CW will occupy 160-10 meters from 0000 UTC February 18 through 2359 on February 19. The Phone portion will run two weeks later, from 0000 UTC March 4 through 2359 on March 5.

The objective is for stations outside of the U.S. and Canada to work U.S. and Canadian stations. This results in a different dynamic than that experienced during CQ World-Wide and WPX contests, in which everyone works everyone.

In the ARRL DX contests, stations worldwide point their antennas toward North America and are interested ONLY in working U.S. and Canadian stations. Consequently, stations with smaller antennas tend to work comparatively more of the DX stations that they hear while searching and pouncing because the QRM caused by DX stations working each other over short distances is eliminated. Those with big stations also seem to have better runs for the same reason.

Generally this applies to both modes, especially on the lower bands (40, 80, and 160 meters). The interest of DX operators is excellent in this contest! Years ago, I sat on the other side of the world (in India) during this contest during a low sunspot year. I was genuinely surprised how many Asian stations showed up watching for signals during the couple of hours during which propagation might be available on each band. We chatted with each other while we waited. By the way, I also was amazed to hear strong U.S. signals on 40 and 80 meters both weekends, so expect the unexpected on those bands now that the sunspots are on the low side.

"DXing on the Edge, The Thrill of 160 Meters"

This is the season for low-band contesting and the beginning of a multi-year period of low sunspot activity that brings the "topband" alive. It therefore is with good timing that Jeff Briggs, K1ZM/VY2ZM, announced the release of the second edition of his book "DXing on the Edge – The Thrill of 160 Meters" (Photo A). First published by the ARRL in 1998, Jeff self-published this updated second edition.

Anyone who has ever been in a contest on 160 meters most probably has heard and worked Jeff operating as K1ZM on Cape Cod or VY2ZM on Prince Edward Island. He and his brother and competitor Peter, K3ZM, in Virginia, often are the first DX heard and the last to fade on 160 meters wherever you operate. And even better, almost invariably they hear you when you call them.

Jeff says that the new edition of his book contains everything that was in the old edition plus a new chapter dedicated specifically to receiving antenna solutions for operators living on small lots. Also included is his latest thinking about effective transmit antennas for contesting and DXing. Jeff has a lot of actual operating advice as well, including how to snag the really rare stations on 160 meters.

But the book is not all work and no play. Jeff is custodian of the Stew Perry Memorial Radio Club, W1BB, and includes quite a bit of interesting 160-meter historical information dating back to the 1930s and the time of W1BB, Stew Perry.

Perhaps most important in the book is that which is new: Recent developments in receiving antenna thinking and technology. Adequate reception is very critical on 160 meters, more than any other HF contest bands. Accommodating large antennas for 160 on the small lots typical in cities and towns historically has been difficult to accomplish. The consequence has been that many hams have been discouraged from operating more on 160.

As introduced in our column in September 2015, new thinking and developments have lead to a re-evaluation of the absolute need for Beverage antennas many hundreds of feet in length for adequate 160 reception. Jeff addresses this in his book. He personally has adequate land for large receiving antennas, but also has experience with the newer, smaller vertical receiving arrays.

I can personally attest that Jeff has built stations with excellent 160 receiving capabilities. In February 2014, I operated a very minimal station in the Phone portion of the CQ World-Wide 160 contest from a temporary location on the very northern tip of Denmark. Jeff at VY2ZM was the first trans-Atlantic station heard and worked. His brother K3ZM, operating in Virginia, was my second trans-Atlantic QSO. I only had a couple more the rest of the morning. The story is in the August 2014 CQ magazine.

Photo B. WRTC2018 has commissioned a series of personalized tiles with hangers that can be used as small plaques in your shack to demonstrate support of radiosporting and WRTC2018. A complete set of three signifies a donation of at least 100 Euros in each of three years, 2015-2018. A single donation of 300 Euros will get a complete set. (Exchange rates vary hourly. As of late December, 300 Euros could be sent to WRTC2018 via bank transfer through a service such as worldremit.com for $325.00 U.S., including fees. Donation information is at: <http://bit.ly/1T4qn1H>.)

Jeff's book undoubtedly presents much information that will be useful to all but the most experienced topband operators. It is listed on Amazon but also available from DX Engineering, Array Solutions, and directly from the publisher, Bookbaby, at <http://bit.ly/2hBhALo>. ISBN number is 9781483586458.

Some Additional Thoughts on HF Terrain Analysis

Last month I described N6BV's HFTA program and on a high plane described how contesters could use this software to improve their signals. The subject was suggested to me by what many have told me were their reasons for not ever having used HFTA to look at their own station before, during, or after purchase and construction.

My attention was drawn back to HFTA by a recent email from Fred, K3ZO, after November's CQ World-Wide CW contest. This year, Fred again operated at the very fine station of Stig LA7JO/HSØZGD, as HSØZAR with an international group of operators in the M/2 category. Fred gave their new 2-element, 40-meter quad a good workout on the grayline paths back to the U.S. East Coast. He reported that the 40-meter grayline path signals back here to the East Coast area were strongest from N8DX and WT8V and suggested that I look at WT8V's QRZ page.

Indeed, WT8V's QRZ page has some very good commentary from N8RR on how they used HFTA to determine that "higher" is not always better at that ridge-top location. After extensive testing, they concluded that results from HFTA were confirmed by over-the-air testing. Their conclusions mirror my own, and make for good reading.

It also came to my attention that there are multiple versions on the Web of ARRL's instructions for using HFTA. Be sure to use the latest version of "Operating Instructions for HFTA, Version 1.04." It is dated July 26, 2015. This new version includes information on K6TU.net as well as explains updated methods to download other terrain files.

WRTC2018 Update

The qualification rounds to earn a seat at WRTC 2018 have closed. The race featured in November's column remains close, but the relative positions of the participants did not change after addition of raw scores from the CQ World-Wide Phone and CW contests. We will have the WRTC results once final scores have replaced claimed and raw scores for all of the eligible competitions. You can find the latest information at: <http://bit.ly/2cXcF4Q>.

As we draw nearer to the competition in July 2018, the organizing committee's work is intensifying. I want to note that the Committee sends very nice "tiles" (small plaques) to every one contributing 100 or more Euros (approximately $110 U.S. with transfer fees at this writing) (Photo B). A different tile is sent for each year, in a program titled "1000 X 100" — 1,000 contributors sought to contribute 100 Euros each year. If you make one donation of 300 Euros or greater, they will send you the entire collection of three plaques. See information at: <http://bit.ly/1T4qn1H>.

It's a good cause. – Until next month, 73, Dave, K3ZJ

what's new

BridgeCom Systems' BCS-200 Speaker Mic

BridgeCom Systems, Inc., has announced the availability of the BCS-200 speaker mic for the amateur and commercial radio markets and an ideal mic for use with the BCH-220 handheld radio.

The BCS-200 offers decreased wind noise even in gusty, stormy, conditions. This remote speaker microphone for two-way radios boasts a windporting feature that dramatically lessens background noise from high winds and other severe weather conditions. Audio can pass through the speaker grill even when the microphone port is blocked by water.

The BCS-200 speaker mic is available now and has a suggested retail price of $30. For more information, contact: BridgeCom Systems, Inc.,102 NE State Route 92 Hwy, Ste C, Smithville, MO 64089. Phone: (816) 532-8451. Email: <tim@BridgeComSystems.com>. Website: <www.BridgeComSystems.com>.

Features:

- Clip on back of speaker/mic
- Large push-to-talk button
- Black coiled cord
- Water-resistant
- Clean, clear, audio
- K1 style plug

BY TOMAS HOOD,* NW7US

November Surprise: CQWW CW Contest Conditions Much Better Than Predicted

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, November 2016: 13
12-month smoothed, May 2016: 27

10.7 cm Flux (current):
Observed Monthly, November 2016: 79
12-month smoothed, May 2016: 93

A_p Index:
Observed Monthly, November 2016: 10
12-month smoothed, May 2016: 12

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots:
Observed Monthly, November 2015: 38
12-month smoothed, May 2015: 46

10.7 cm Flux:
Observed Monthly, November 2015: 110
12-month smoothed, May 2015: 123

A_p Index:
Observed Monthly, November 2015: 13
12-month smoothed, May 2015: 13

Sometimes the ionosphere surprises us, and sometimes that's good! I predicted poor to fair conditions for both contest days for the 2016 CQWW CW Contest starting at 0000 UTC, Saturday, November 26 and continuing until 2400 UTC, Sunday, November 27. I postulated that the Planetary A-index (A_p) would start at 15 and climb to 25 on day two.

The 2016 CQ Worldwide DX CW Contest weekend was much better than predicted. The A_p on the first day was 12, falling to 10 by the second day of the contest. The high-latitude A-index was 22 and 12, making over-the-pole propagation paths mostly reliable. The Planetary K-index never got above three. With such quiet geomagnetic conditions, weaker signals are more likely to be heard on those bands where openings are weak yet present. Stable ionospheric conditions allow weak signals to propagate reliably.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for February 2017

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal:				
5-11,17-26	A	A	B	C
High Normal:				
3-4,12-13,16,27	A	B	C	C-D
Low Normal:				
1, 28	B	C-B	C-D	D-E
Below Normal:				
2,14-15	C	C-D	D-E	E
Disturbed:				
n/a	C-D	D	E	E

Where expected signal quality is:
A--Excellent opening, exceptionally strong, steady signals greater than S9
B--Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C--Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D--Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E--No opening expected.

HOW TO USE THIS FORECAST

1. Find the propagation index associated with the particular path opening from the Propagation Charts appearing in The New Shortwave Propagation Handbook by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the propagation index, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a propagation index of 2 will be poor to fair on February 1, not existent or poor on February 2, then fair on February 3 and 4, and good from February 5 through 11, and so forth.

3. Alternatively, the Last Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet, and space weather should be mild. On the other hand, days marked as "Disturbed" will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is supported ionospherically.

The 10.7-cm Radio Flux was 81 and 83, and the observed sunspot count on day one was 13 and 31 on day two, a nice bump for day two. The conditions resulted in reasonable propagation on many of the contest bands. These conditions were better than expected.

How did you fare in 2016 compared to 2015? I am interested in hearing from you regarding the differences between the two years, and how you did overall this time.

February Propagation

From the middle of February through early April, typical equinoctial propagation conditions can be expected on the HF frequencies. This usually means a noticeable improvement in conditions between the northern and southern hemispheres. Look for improvements between the United States and South America, Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation occurs during the spring and fall months, when the sun is most directly overhead at the equator, producing similar ionos-

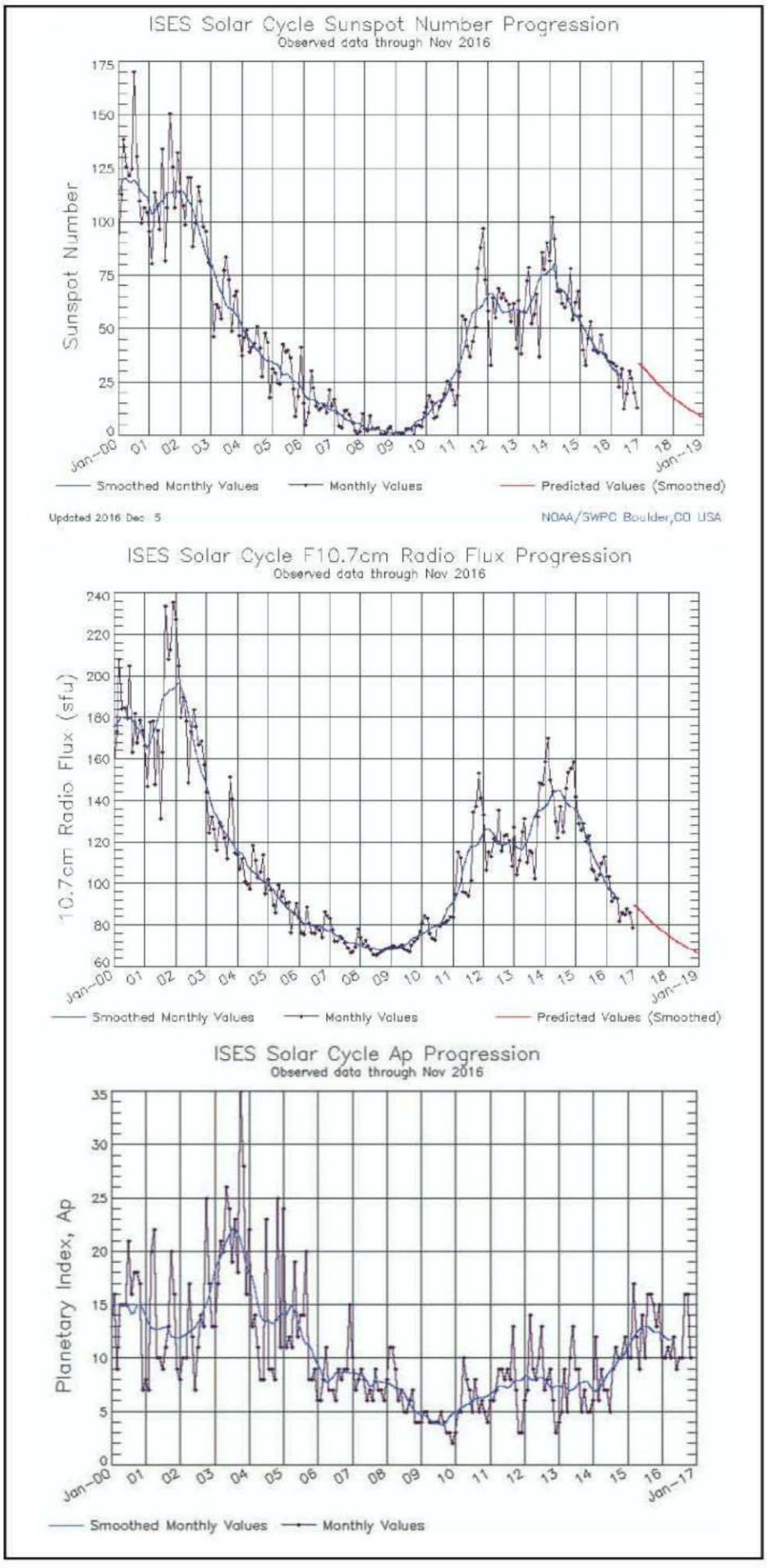
pheric characteristics over large areas of the world. It tends to maximize during sunrise and sunset periods and over both short and long path openings.

We continue seeing sunspot activity, so we continue witnessing propagation at higher frequencies over long-distance paths. It is always a surprise to the casual amateur radio operator to get on a band like 10 meters during the slide down to solar minimum, and discover that there is still some life on the band, beyond short-skip distances. Especially during periods when sunspots occur and the daily 10.7-cm flux levels momentarily increase enough to wake up the higher frequencies. However, the currently weak solar activity does not support worldwide DXing on the highest HF bands for any significant length of time.

During daylight hours, optimal DX propagation conditions are expected on 20 meters. The band is forecast to open to all areas of the world sometime during this period, though often with moderate to strong fading. Conditions on 17 and 15 may be good, too, but usually for far less distances than during peak solar cycle years. Conditions are expected to become optimal for an hour or two after sunrise and again during the late afternoon.

For short-range paths (regional), 40 meters should be usable during most of the daylight hours. With increasing hours of daylight during February, expect the HF bands to remain open for an hour or so longer into the early evening than during the winter months.

Daytime conditions on 10 and 12 meters will be less exciting. Openings



The current solar cycle is represented in several ways. At the top is the Sunspot Number count, in the middle, the F10.7cm Radio Flux, and at the bottom, the A_p Index (a measure of geomagnetic activity, the Planetary-A index) history. In all of the plots, the black line represents the monthly averaged data and the blue line represents a 13-month smoothed version of the monthly averaged data. For the Sunspot Number and F10.7cm, the forecast for the rest of the solar cycle is given by the red line. A significant downward trend can be seen in the monthly averaged sunspot count as well as in the radio flux. It is clear that Solar Cycle 24 is close to minimum, the period of quiet between sunspot cycles, which average about 11 years in length. (Courtesy of NOAA/Space Weather Prediction Center)

will be possible for stations in low-latitudes using north-south paths, with no openings expected into Europe and the Far East.

During the early evening hours and to as late as midnight, eight bands should be available for DX openings: 15, 17, 20, 30, 40, 60, 80, and 160 meters. Fifteen and 17 meters should hold up for openings towards Central and South America and the Caribbean, the Pacific area, Far East, and parts of Asia. Better openings into many areas of the world may be possible on 20 meters during this period, with the strongest signals from southerly and westerly directions. Good DX conditions are also forecast for 30, 40, 60, and 80 meters for openings towards the east and the south. Openings in the same direction, but with higher noise levels and weaker signals, should also be possible on 160 meters.

Between midnight and sunrise it should be a toss-up between 20, 30, and 40 meters for DX paths. These bands should open to many areas of the world with conditions favoring openings towards the south and the west. Expect similar conditions on 60 and 80 meters, but with weaker signals and higher noise levels. Be sure to check 160 for some unusual DX openings towards the south and the west during this period. Conditions on the bands between 160 and 20 meters are expected to peak at local sunrise.

VHF Conditions

Trans-equatorial (TE) scatter propagation tends to increase during the equinoctial period and some 6-meter openings may be possible between 7 and 10 p.m. local time. The best bet for such openings is between the US southern tier states and South America for paths approximately at right angles to the equator. An occasional TE opening may also be possible on 2 meters. Unlike F_2-layer or sporadic-E openings on 6 meters, TE openings are characterized by very weak signals with considerable flutter fading.

Do expect moderate coronal hole activity on occasion. With the influence of coronal mass ejections or elevated solar wind streams, the geomagnetic field may reach minor storm levels. While most days will see quiet conditions, there is a fair chance that geomagnetic storms will trigger modest auroral activity. Auroral activity tends to occur more frequently during the equinoctial period.

Check out <http://www.imo.net/calendar/> for a complete calendar of meteor showers in 2017. Have you worked any of these meteors? Please drop me a note and let me know. I'll construct a summary from your reports for this column's readers to enjoy.

Current Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a monthly mean sunspot number of 12.8 for November 2016, down from 20.2 for October. The mean value for November results in a 12-month running smoothed sunspot number of 26.9 centered on May 2016, down from April's 28.7. Following the curve of the 13-month running smoothed values, a smoothed sunspot level of 27 is expected for February 2017, plus or minus 14 points.

Canada's Dominion Radio Astrophysical Observatory at Penticton, British Columbia reports a 10.7-cm observed monthly mean solar flux of 78.7 for November 2016, down from 86.1 for October. The 12-month smoothed 10.7-cm flux centered on May 2016 is 93.2, down slightly from April's 95.3. A smoothed 10.7-cm solar flux of about 85 is predicted for February 2017.

The geomagnetic activity as measured by the Planetary-A index (A_p) for November 2016 is 10, down from October's 16. The 12-month smoothed A_p index centered on May 2016 is 11.7, about the same as April's 11.8. Geomagnetic activity this month should be about the same as for January 2017. Refer to the Last Minute Forecast for the outlook on what days that this might occur (remember that you can get an up-to-the-day Last Minute Forecast at <http://sunspotwatch.com> on the main page).

Don't forget to check out this columnist's educational tweets on Twitter.com; you can follow @hfradiospacewx <https://Twitter.com/hfradiospacewx> for hourly updates that include the K index numbers, as well as @NW7US <https://Twitter.com/nw7us> which will provide the daily dose of educational tidbits about the Sun and propagation. You can also check <http://SunSpotWatch.com> for the latest numbers.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. Please check out the space weather and radio propagation self-study course that this columnist is offering at <http://NW7US.us/swc>.

You may email me, write me a letter, or catch me on the HF amateur bands. If you are on Facebook, check out <http://www.facebook.com/spacewx.hfradio> and <http://www.facebook.com/NW7US>. Speaking of Facebook — check out the CQ Amateur Radio Magazine fan page at <http://www.facebook.com/CQMag>.

I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX!

– 73, Tomas, NW7US

<n5mtx55@gmail.com>. Additional Contact: Chuck Vincent (409) 540-0477. Email: <batmo@aol.com>. Website: <www.qsl.net/w5nd>. VE exams.

SOUTH PARK TOWNSHIP, PENNSYLVANIA — The Wireless Association of South Hills Amateur Radio Club will hold **WASHfest 2017** Sunday, February 26 at the Home Economics Building-South Park, 3735 Buffalo Drive. Contact: Carol Danko, KB3GMN, (412) 884-1466. Email: <n3sbf@comcast.net> or <washarc@yahoo.com>. Website: <www.n3sh.org>. Talk-in 146.955- or 443.650+ (PL 131.8).

DALTON, GEORGIA — The Dalton Amateur Radio Club will hold its **Annual Hamfest** Tuesday, February 28 at the Dalton Fairgrounds. Contact: Tom Smith, KI4IG, <ki4ig@windstream.net>. Website: <http://w4drc.webstarts.com>.

MARCH 2017

IRONDALE, ALABAMA — The Birmingham Amateur Radio Club will hold **BirminHAMfest 2017** Friday, March 3 and Saturday, March 4 at the Zamora Temple, 3521 Ratliff Road. Contact: BirmingHamfest 2017, c/o Jeff Drew N4JDU, P.O. Box 10464, Birmingham, AL 35203. Email: <birminghamfest@w4cue.com>. Website: <www.w4cue.com>.

CAVE CITY, KENTUCKY — The Mammoth Cave Amateur Radio Club will hold the **Cave City Hamfest**, Saturday, March 4 at the Cave City Convention Center, 502 Mammoth Cave Street. Contact: Larry Brumett, KN4IV, 108 Withers Drive, Glascow, KY 42141. Phone: (270) 651-2363. Email: <lbrumett@glascow-ky.com>. Website: <www.ky4x.org>. Talk-in 146.34+. VE exams.

RUSSELLVILLE, ARKANSAS — The Arkansas River Valley Amateur Radio Foundation will hold the **25th Annual Russellville Hamfest** and **2017 ARRL Arkansas Section Convention** Saturday, March 4 at the L.V. Williamson Boys and Girls Clubs of the Arkansas River Valley, 600 East. 16th Street. Contact: Jonathan Setcer, N5QT, (501) 580-5789. Website: <www.arvarf.com>. VE exams.

CONCORD, NORTH CAROLINA — The Mecklenburg Amateur Radio Society will hold the **Charlotte Hamfest 2017** Friday, March 10 and Saturday, March 11 at the Cabarrus Arena & Events Center, 4551 Old Airport Road. Phone: (704) 948-7373. Website: <http://charlottehamfest.org>. Talk-in 146.655 or 146.940 (PL 118.8). VE exams, card checking.

RAYNE, LOUISIANA — The Acadiana Amateur Radio Association will hold he **57th Annual Acadiana Hamfest** Friday, March 10 and Saturday, March 11 at the Rayne Civic Center, 300 Frog Festival Drive. Website: <www.w5ddl.org>. Talk-in 146.820 (PL 103.5). VE exams and card checking.

BRAZIL, INDIANA — The Wabash Valley Amateur Radio Association will hold the **2017 Terre Haute Hamfest & Computer Expo** Saturday, March 11 at the Clay County 4-H Fairgrounds, 6650 N. State Road 59. Website: <www.w9uuu.org>. Talk-in 146.685 (PL 151.4). DXCC/WAS/VUCC card checking.

CHICOPEE, MASSACHUSETTS — The Mt. Tom Amateur Repeater Association will hold its **30th Annual Amateur Radio & Electronics Hamfest** Saturday, March 11 at the Castle of Knights, 1599 Memorial Drive. Contact: Brian Mullarney, KC1BDF, 20 Spring Street, Easthampton, MA 01027. Phone: (860) 478-6790. Email: <kc1bd@arrl.net>. Website: <www.mtara.org>. Talk-in 146.94 (127.3). VE exams.

PUYALLUP, WASHINGTON — The Mike & key Amateur Radio Club will hold the **36th Annual Mike & Key ARC Electronics Show & Fleamarket** Saturday, March 11 at the Pavilion Exhibit Hall-Washington State Fair Grounds, 110 9th Avenue SW. Contact: Diane Dinkelman, (253) 631-3756. Email: <ddmdink@gmail.com> or <n7wa@arrl.net>. Website: <www.mikeandkey.org>. Talk-in 146.82- (PL 103.5). VE exams.

TULLAHOMA, TENNESSEE — The Middle Tennessee Amateur Radio Society will hold the **MTARS Tullahoma Hamfest** Saturday, March 11 at the First Methodist Church, 208 West Lauderdale Street. Contact: Michael Glennon, KB4JHU, 302 Twelve Oaks Rd., Tullahoma, TN 37388. Phone: (931) 588-0302. Email: <kb4jhu@arrl.net>. Website: <www.qsl.net/mtars> or <www.mtars-ham.org>. Talk-in 146.700- (PL 114.8). VE exams.

FORT WALTON BEACH, FLORIDA — The Playground Amateur Radio Club will hold the **PARC/Fort Walton Beach 2017 Hamfest** Friday, March 17 and Saturday, March 18 at the C.H. "Bull" Rigdon Fairgrounds and Recreational Complex, 1958 Lewis Turner Blvd. Email: <parcfest@w4zbb.org>. Website: <www.w4zbb.org>. Talk-in 146.79- (PL 100). VE exams.

GEORGETOWN, TEXAS — The Williamson County Amateur Radio Club will hold the **WCARC Swapfest** Saturday, March 18 at the Community Center, San Gabriel Park, 455 E. Morrow Street. Website: <http://wcarc.com>. Talk-in 146.64 (PL 162.2). VE exams.

KALAMAZOO, MICHIGAN — The Southern Michigan Amateur Radio Society will hold the **Michigan Crossroads Hamfest and Radio Swap** Saturday, March 18 at Wings Event Center, 3600 Vanrick Drive. Contact: Jay Jarrett, N8ARR, (269) 815-8007. Email:<crossroadshamfest@w8df.com> Website: <www.w8df.com/hamfest>. Talk-In 147.000- (PL 94.8). VE exams.

SCOTTSDALE, ARIZONA — The Scottsdale Amateur Radio Club will hold the **Scottsdale Springfest** Saturday, March 18 at the Scottsdale Bible Church-Mountain View Campus, 17705 N. Pacesetter Way. Website: <http://scottsdalearc.org>. Talk-in 147.180+ (PL 162.2). VE exams.

STUART, FLORIDA — The Martin County Amateur Radio Association will hold the **42nd Annual Stuart Hamfest** Saturday, March 18 at the Martin County Fairgrounds, 2616 SE Dixie Highway (A1A). Contact: MCARA Hamfest Chairman, P.O. Box 1901, Stuart, FL 34995. Phone: (772) 349-7820. Email: <hamfest@mcaraweb.com>. Website: <www.stuarthamfest.com>. Talk-in 147.060+. VE exams.

THOMASVILLE, GEORGIA — The Thomasville Amateur Radio Club will hold the **Great Southern Hamfest** Saturday, March 18 at the Exchange Club Fairgrounds, 2057 GA 122. Website: <http://thomasvilleamateurradioclub.com>.

ANNANDALE, VIRGINIA — The Vienna Wireless Society will hold the **Vienna Wireless Winterfest** Sunday, March 19 at the Northern Virginia Community College-Annandale Campus, 833 Little River Turnpike. Email: <winterfest2017@viennawireless.net>. Website: <http://viennawireless.net>. VE exams, card checking (until noon).

PERRYSBURG, OHIO — The Toledo Mobile Radio Association will hold the **TMRA Hamfest** Sunday, March 19 at the Owens Community College-Student Health and Activities Center, 30335 Oregon Road. Website: <www.tmrahamradio.org>. VE exams.

SOUTHINGTON, CONNECTICUT — The Southington Amateur Radio Association will hold its **Annual Flea Market** Sunday, March 19 at Southington High School, 720 Pleasant Street. Contact: John, WA1JKR, (860) 621-8791. Email: <johnrogus@aol.com>. Website: <www.chetbacon.com/sara.htm>. Talk-in 147.345 (PL 77). VE exams.

ROSENBERG, TEXAS — The Brazos Valley Amateur Radio Club will hold the **16th Annual Greater Houston Hamfest** Friday, March 24 and Saturday, March 25 at the Fort Bend County Fairgrounds, 4310 TX-36S. Website: <www.houston-hamfest.org>.

CHARLESTON, WEST VIRGINIA — The Kanawha Amateur Radio Club will hold the **33rd Annual Charleston Area Hamfest** Saturday, March 25 at the Charleston Civic Center, 200 Civic Center Drive. Contact: Rick Cummings, WV8RC, (304) 610-6404. Email: <rickwv8rc@gmail.com>. Website: <http://w8gk.org>. Talk-in 145.35. VE exams and DXCC/WAS/VUCC card checking.

MT. VERNON, MISSOURI — The Ozarks Amateur Radio Society will hold its **Hamfest** Saturday, March 25 at the Mt. Vernon Arts and Recreation Center, 822 W. Mt. Vernon Boulevard. Contact: Mike Sanders, KØAZ, <k0az@centurytel.net> or Bob Myers <bhmyers@suddenlink.net>. Website: <www.w0oar.com>. Talk-in 146.970- (PL 162.2). VE exams.

LAS VEGAS, NEVADA — The Las Vegas Amateur Radio Club will host the **2017 ARRL Nevada State Convention** Friday, March 31 through Sunday, April 2 at the Eastside Cannery Casino & Hotel. Website: <http://nvcon.org> or <www.lvrac.org>. Talk-in 146.94 (PL 100). VE exams.

APRIL 2017

BRANSON, MISSOURI — The 4State QRP Group will hold the **OzarkCon QRP Conference** Friday, April 7 and Saturday, April 8 at the Stone Castle Hotel & Conference Center, 3050 Green Mountain Drive. Website: <www.ozarkcon.com>.

CLAREMORE, OKLAHOMA — The Green Country Hamfest and **2017 ARRL Oklahoma State Convention** will be held Friday, April 7 and Saturday, April 8 at the Claremore Expo Center, 400 Veterans Parkway. Contact: John Harwell, KD5NAQ, (918) 379-0950. Email: <info@greencountryhamfest.org>. Website: <www.greencountryhamfest.org>. Talk-in 147.09+. VE exams.

CUYAHOGA FALLS, OHIO — The Cuyahoga Falls Amateur Radio Club will hold its **63rd Annual Hamfest Electronics and Computer Show** Saturday, April 8 at the Emidio and Sons Party Center, 48 E. Bath Road. Contact: Mike Luoma, K8MAL, (234) 206-0270. Email: <hamfest2017@cfarc.org>. Website: <www.cfarc.org>.

RALEIGH, NORTH CAROLINA — The Raleigh Amateur Radio Society will hold the **45th Annual RARSFest** and **2017 ARRL Roanoke Division Convention** Saturday, April 15 at the NC State Fairgrounds-Jim Graham Building, 1025 Blue Ridge Road. Website: <www.rars.org>. Talk-in 146.64. VE exams, DXCC/WAS/WAC/VUCC card checking.

VISALIA, CALIFORNIA — The Northern California DX Club will hold the **68th Annual International DX Convention** Friday, April 21 through Sunday, April 23 at the Visalia Convention Center, 303 E. Acequia. Email: <info@dxconvention.com>. Website: <www.dxconvention.com>. Card checking.

CHASSELL, MICHIGAN — The Keweenaw County Repeater Association and **Copper County Radio Amateur Inc**. will hold the **CCRAA & KCRA Hamfest & Swap** Saturday, April 22 at the Chassell VFW Hall, 42103 Wilson Memorial Drive. Email: <ccraaclub@gmail.com>. Website: <http://kcra-mi.net>.

WHITE BEAR LAKE, MINNESOTA — The Northern Lights Radio Society will hold the **2017 Aurora VHF Conference** Saturday, April 22 at the First Lutheran Church, 4000 Linden Street. Website: <www.nlrs.org>.

POOLER, GEORGIA — The Coastal Amateur Radio Society will hold its **2017 Hamfest** Saturday, April 29 at the Savannah Airport Recreation Facility, 250 Crossroads Parkway. Website: <http://coastalamateurradiosociety.net>.

GLENWOOD, IOWA — The Heartland Hams Amateur Radio Club will hold its **Hamfest 2017** Saturday, April 29 at the American Legion Hall, 104 N. Vine Street. Contact: Don Brown (712) 520-7942 or Sharon Sullivan (402) 551-1673. Website: <http://heartlandhams.org>. Talk-in 145.290.

WALDO, FLORIDA — The Gainesville Amateur Radio Society will hold the **Gainesville Hamfest** Saturday, April 29 at the First Baptist Church of Waldo, 14370 Kennard Street. Contact: Larry Rovak, WB2SVB, (201) 697-7721. Email: <wb2svb@arrl.net>. Talk-in 146.820- (PL 123). VE exams.

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