Ham Radio HEROs in the Philippines, p. 13

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Amateur Radio

CQ

COMMUNICATIONS & TECHNOLOGY

JANUARY 2014

Introducing CQ Plus!
See page 25

CQ Interviews: Seeing Eye CEO Jim Kutsch, KY2D, p. 18

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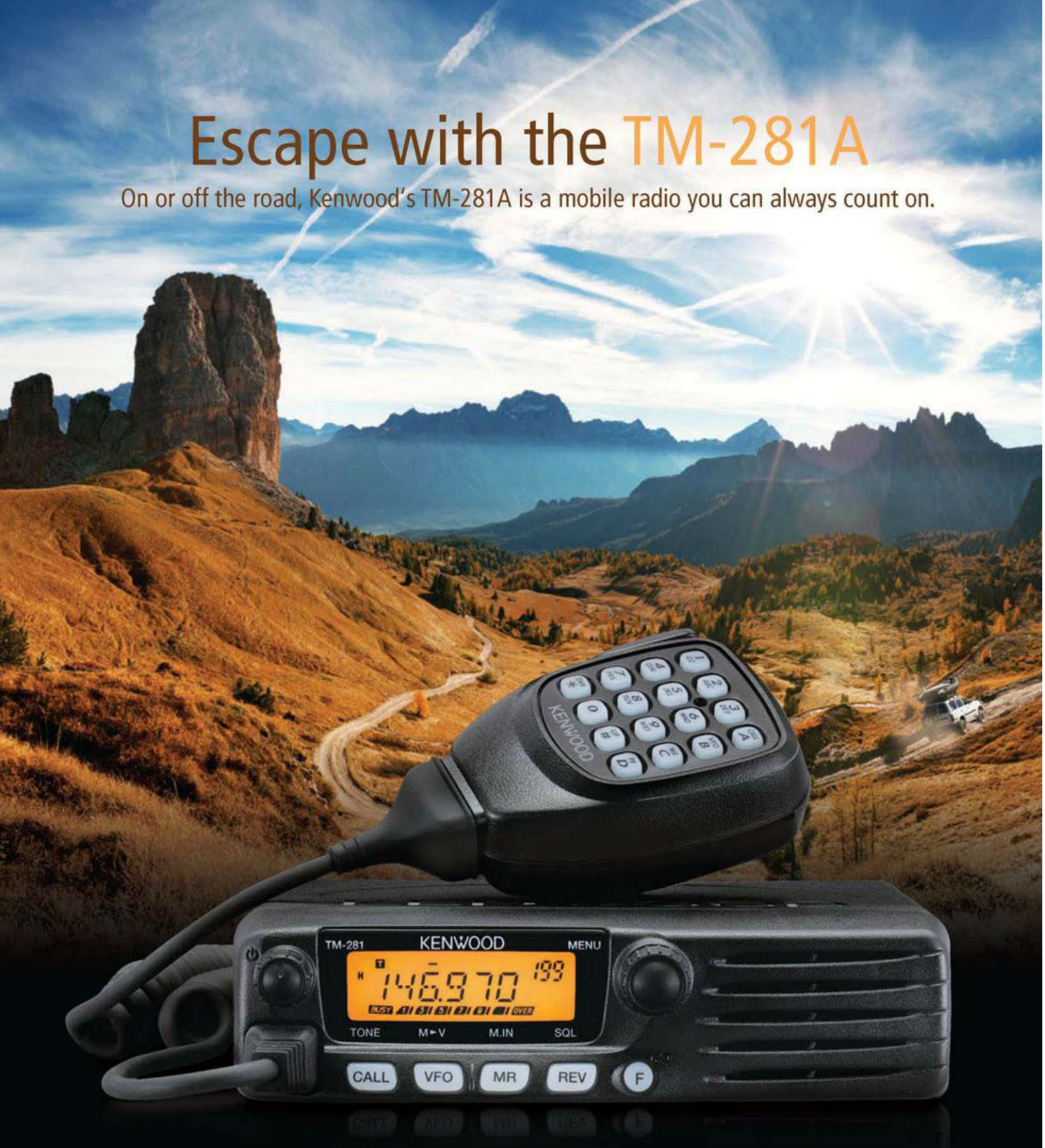
CQ DX Marathon Logs Due 1/10
CQ 160 CW Contest, 1/24-26

On the Cover: Jim Talens, N3JT, of McLean, Virginia, has set up his home station to be operated remotely from his winter home in Florida. See his article on how he does it on page 42; with more about Jim on page 76.

Escape with the TM-281A

On or off the road, Kenwood's TM-281A is a mobile radio you can always count on.



As tough as nails, this MIL-STD-compliant transceiver delivers powerful performance, excellent audio clarity, and a host of advanced features. It offers superb operating ease day or night thanks to the large backlit LCD and illuminated keys. So the next time you take off, take the TM-281A.

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New! Cushcraft R9 . . . *80-6 Meters*

80 Meters . . . No Radials . . . 1500W

Cushcraft's world famous R8 now has a big brother!

Big Brother R9 now includes 75/80 Meters for local ragchewing and worldwide low band DX *without radials*!

It's omni-directional low angle radiation gives you exciting and easy DX on all 9 bands: 75/80, 40, 30, 20, 17, 15, 12, 10 and 6 Meters with low SWR. QSY instantly -- no antenna tuner needed.

Use full *1500 Watts* SSB/CW when the going gets tough to break through pileups/poor band conditions.

The R9 is super easy to assemble, installs just about anywhere, and its low profile blends inconspicuously into the background in urban and country settings alike.

Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury with all RF-energized surfaces safely out of reach.

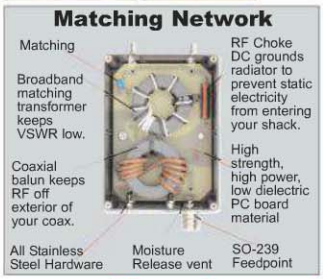
Rugged Construction: Thick fiberglass insulators, all-stainless steel hardware and 6063 aircraft-aluminum tubing is double or triple walled at key stress points to handle anything Mother Nature can dish out.

31.5 feet tall, 25 lbs. Mounting mast 1.25 to 2 inches. Wind surface area is 4 square feet.

R8, $539.95. Like R9 antenna but less 75/80 Meters.

R-8TB, $79.95. Tilt-base lets you tilt your antenna up/down easily by yourself to work on.

R-8GK, $56.95. Three-point guy kit for high winds.



MA-5B *5-Band* Beam

Small Footprint -- Big Signal

The MA-5B is one of Cushcraft's most popular HF antennas, delivering solid *signal-boosting directivity* in a bantam-weight package. Mounts on roof using standard TV hardware. Perfect for exploring exciting DX without the high cost and heavy lifting of installing a large tower and full-sized array. Its 7 foot 3-inch boom has less than 9 feet of turning radius. Contest tough -- handles 1500 Watts.

The unique MA-5B gives you 5-bands, automatic band switching and easy installation in a compact 26-pound package. On 10, 15 and 20 Meters the end elements become a two-element Yagi that delivers solid power-multiplying gain over a dipole on all three bands. On 12 and 17 Meters, the middle element is a highly efficient trap dipole. When working DX, what really matters are the interfering signals and noise you *don't hear*. That's where the MA-5B's impressive side rejection and front-to-back ratio really shines. *See* ***cushcraftamateur.com*** *for gain figures.*

Cushcraft 10, 15 & 20 Meter Tribander Beams

Only the best tri-band antennas become DX classics, which is why the Cushcraft World-Ranger A4S, A3S, and A3WS go to the head of the class. For more than 30 years, these pace-setting performers have taken on the world's most demanding operating conditions and proven themselves every time. The key to success comes from attention to basics. For example, element length and spacing has been carefully refined over time, and high-power traps are still hand-made and individually tuned using laboratory-grade instruments. All this attention to detail means low SWR, wide bandwidth, optimum directivity, and high efficiency -- important performance characteristics you rely on to maintain regular schedules, rack up impressive contest scores, and grow your collection of rare QSLs!

It goes without saying that the World-Ranger lineup is also famous for its rugged construction. In fact, the majority of these antennas sold years ago are still in service today! Conservative mechanical design, rugged over-sized components, stainless-steel hardware, and aircraft-grade 6063 make all the difference.

The 3-element A3S/A3WS and 4-element A4S are world-famous for powerhouse gain and super performance. **A-3WS, $499.95,** 12/17 M. **30/40 Meter** *add-on kits* available.

Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

Dual-bander VHF rigs are the norm these days, so why not compliment your FM base station with a dual-band Yagi? Not only will you eliminate a costly feed line, you'll realize extra gain for digital modes like high-speed packet and D-Star! Cushcraft's A270-6S provides three elements per band and the A270-10S provides five for solid point-to-point performance. They're both pre-tuned and assembly is a snap using the fully illustrated manual.

Cushcraft Famous *Ringos* Compact FM Verticals

W1BX's famous *Ringo* antenna has been around for a long time and remains unbeaten for solid reliability. The Ringo is broad-banded, lighting protected, extremely rugged, economical, electrically bullet-proof, low-angle, and more -- but mainly, it just plain works! To discover why hams and commercial two-way installers around the world still love this antenna, order yours now!

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Hams Pitch In After Philippine Typhoon

Like hams everywhere, amateur radio operators in the Philippines were able to get on the air after Typhoon Haiyan and provide initial communications after the storm destroyed much of the infrastructure in Tacloban and surrounding areas. For detailed coverage, see our Public Service column—"Radio HEROs Provide Critical EmComm in Philippine Typhoon Tragedy" by KI6SN—on page 13 of this issue.

Staff Shuffle at FCC Wireless Bureau

Communications attorney Roger Sherman is the new Acting Chief of the FCC's Wireless Telecommunications Bureau, which oversees amateur radio as well as other two-way radio services. Sherman replaces former Bureau Chief Ruth Milkman, who was named Chief of Staff to new FCC Chairman Tom Wheeler. According to the ARRL, Sherman previously served as the Democratic Chief Counsel to the House Committee on Energy and Commerce, along with other Congressional staff positions.

Hams Carry Olympic Torch to Space and Back

Now this is a torch run! The route from Greece to Sochi, Russia for the torch that will light the Olympic flame at next month's winter games <http://www.sochi2014.com/en/> included a round trip to the International Space Station … carried there and back by crew members who are nearly all hams. The torch was taken up to the station in early November by the all-ham crew of Expedition 38—Astronauts Richard Mastracchio, KC5ZTE and Koichi Wakata, KC5ZTA, and Cosmonaut Mikail Tyurin, RZ3FT. It was brought back several days later by returning Expedition 37 crew members, including Commander Fyodor Yurchikhin, RN3FI, and European Space Agency Astronaut Luca Parmitano, KF5KDP.

Parmitano was very active on amateur radio during his stay on the station, according to the *ARRL Letter,* conducting many school contacts as well as making more than 200 random contacts with hams back on Earth.

More Ham Radio on TV … and More Hams Among Crew Members

The November 22 episode of the ABC-TV comedy "Last Man Standing" included a segment during which star Tim Allen (Mike Baxter, KAØXTT) gets on 20 meters and works a pileup of more than 100 hams! The responses had previously been sent in by hams in response to a request from Producer John Amodeo, NN6JA, for short audio clips.

In addition, the show's crew now includes 17 licensed hams, with eight new amateurs licensed during a November 9th exam session that also included one crew member upgrading to General. "Last Man Standing" airs Friday nights at 8 PM eastern time on ABC.

New LoTW Software Released

The ARRL has released version 2.0 of its TQSL software needed for accessing the Logbook of The World (LoTW) online QSO database. According to the *ARRL Letter*, the new release is completely new and incorporates the earlier TQSL-Cert into the single TQSL program. The user interface is also completely new, and the League promises the new software will be easier to use than past versions. Difficulties using the TQSL software have been among some of the problems plaguing the program recently. More information, including a link to download the new program, is at <bit.ly/HIw335>.

ARRL Petitions for "Symbol Rate" Change

The ARRL has filed a petition with the FCC asking that it replace current limitations on "symbol rate" for digital modes on HF with a simple bandwidth limitation of 2.8 kHz. According to the League, this would permit the use on HF of any digital mode whose signals are no wider than a single-sideband voice signal. It says the current rules were designed for 1980s technology and are impeding technological progress by hams today. At press time, the FCC had not assigned the petition a rule-making number or opened it for comments.

N6CL to West Point

Congratulations to *CQ*'s "VHF Plus" Editor and *CQ VHF* magazine Editor Joe Lynch, N6CL, who is a Methodist minister, on his new position as Director of Religious Education at the United States Military Academy in West Point, New York. As we go to press, Joe and his wife Carol, W6CL, are en route to West Point from Tulsa, Oklahoma. Joe plans to continue both writing his column and editing *CQ VHF*.

WRC-15 Advisory Committee Makes Recommendations Regarding Ham Bands

The FCC's advisory committee for the 2015 World Radiocommunication Conference (WRC-15) has issued three recommendations regarding bands used by amateurs, and the ARRL says it agrees with all three. The first called for no changes to current allocations in the 70-centimeter band, which hams share with government radiolocation. The *ARRL Letter* says one country has proposed allowing international cellphone and broadband use between 420 and 430 MHz, but the advisory committee said it does not feel sharing between the proposed service and radiolocation is feasible. Likewise, the committee recommended no changes to current allocations on 22–26 GHz, a frequency range in which amateur radio has a primary allocation from 24–24.5 GHz. Finally, the committee tentatively approved a proposal for short-range automotive radar in the 77.5–78.0 GHz range. If okayed by the conference, these radars would have co-primary status in the band with amateur radio and amateur satellites.

IARU Region 2 Updates Band Plan

A new band plan has been issued by Region 2 of the International Amateur Radio Union, which covers North and South America. Features include a new satellite subband from 144.000 to 144.025 MHz and the first formal recognition of "near space stations" (e.g., those operating from high-altitude balloons), although no specific frequencies were recommended for these operations. According to the *ARRL Letter*, the plan also includes suggested subbands for microwave ham bands and tries to harmonize the Region 2 band plan with those of IARU Regions 1 (Europe and Africa) and 3 (Asia and Oceania).

FUNcube and Other Ham-Band Satellites Head Spaceward

This past November was prime time for tiny satellite launches, many of which will use the ham bands for communications or telemetry. A November 19 launch from Virginia sent 29 satellites into orbit, including TJ3Sat, the first satellite designed and built by high school students. TJ3Sat includes an amateur radio component (see <http://www.tjhsst.edu/students/activities/tj3sat/>).

A launch scheduled for November 21 from Russia was to send up another two dozen-plus "cubesats," tiny satellites that have become very popular among schools and hams alike. The ham radio "star" of the November 21 launch is FUNcube, a joint project between AMSAT groups in the United Kingdom and the Netherlands (see <http://funcube.org.uk/>).

In addition, four cubesats carrying ham radio payloads were planned to be deployed from the International Space Station on November 25. (ARRL and AMSAT News Service)

QRPMe to Produce Rock-Mite][

The closing of Small Wonder Labs (see last month's News) left in doubt the future of the company's popular Rock-Mite QRP transceiver. An announcement on the SWL website in mid-November said production of the rig—with some modifications—would be taken on by QRPMe, which announced the introduction of the "Rock-Mite][."

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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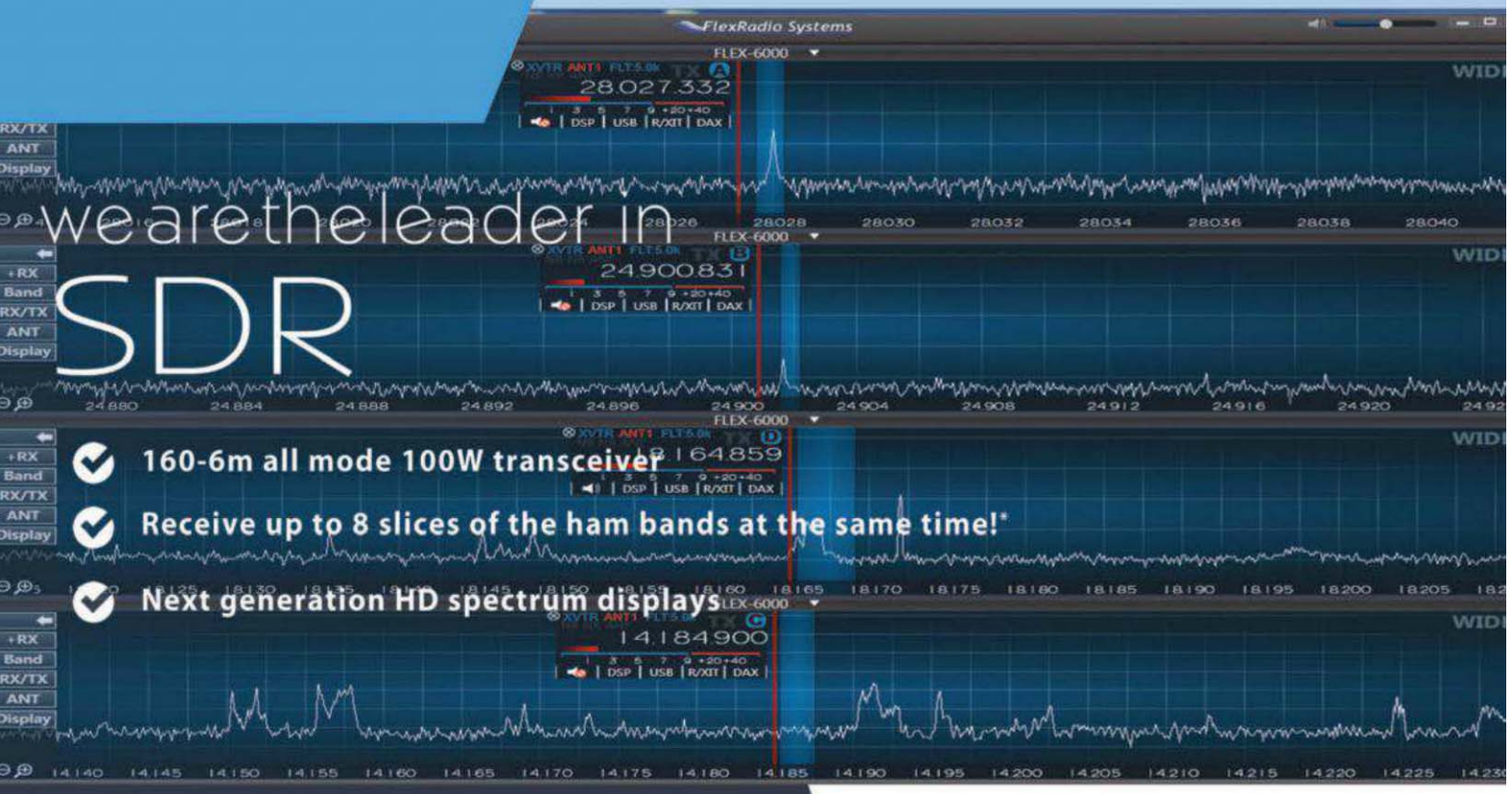

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- 160-6m all mode 100W transceiver
- Receive up to 8 slices of the ham bands at the same time!*
- Next generation HD spectrum displays

Welcome to the Future

FLEX-6000 SIGNATURE SERIES
with SmartSDR™

Never before in amateur radio has the advanced operator been given the ability to be on so many bands at the same time. Check into your favorite net... while chasing the latest DXPedition... while watching for a far away propagation beacon...all at the same time! The new FLEX-6000 Signature Series transceivers give you the ability to be there now. Our ultra low noise direct sampling receiver technology captures the entire HF spectrum then delivers sharp, crisp reception on up to eight (8) simultaneous band slices*. Advanced digital audio processing, plus a high linearity 100W power amplifier, delivers the punch to be heard. FlexRadio's Signature Series radio server platform technology with industry standard shack automation interfaces ensures your investment into the future.

(*8 slices on FLEX-6700 only)

- New SmartSDR™ simple user interface
- Ultra low noise direct sampling receiver
- Built in antenna tuner
- Optional GPS Disciplined Master Oscillator
- Ethernet-attached Radio Server
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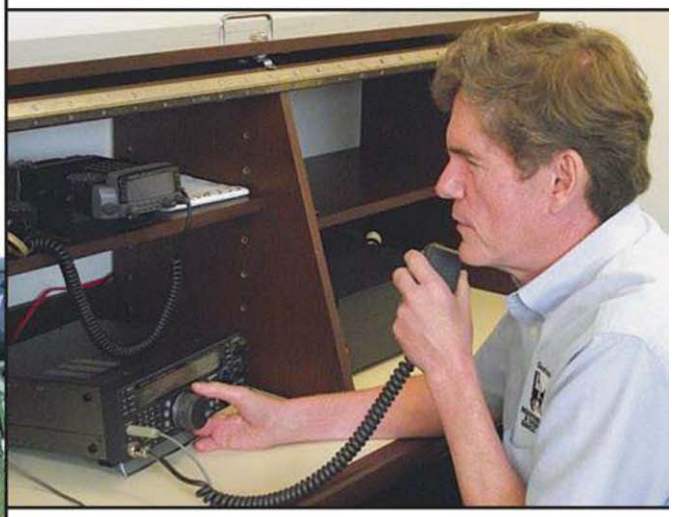

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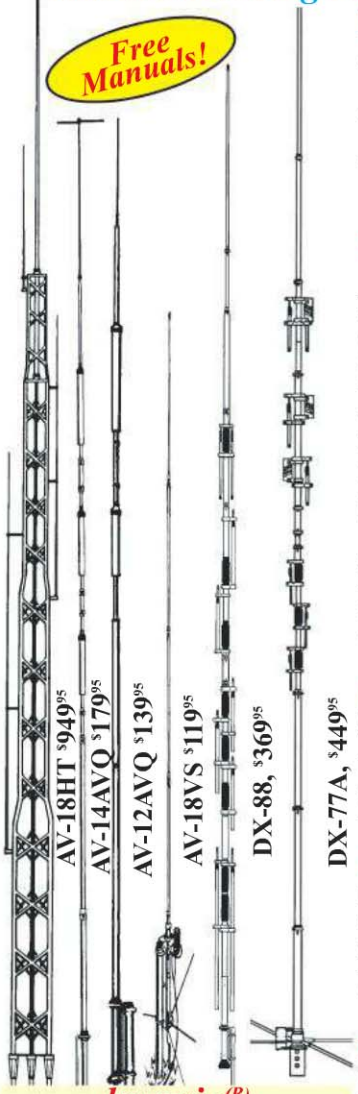
hy-gain® HF VERTICALS

Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . 1500 Watts . . . Low SWR . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connect . . . Two year limited Warranty . . .



hy-gain® Classics

All hy-gain multi-band vertical antennas are entirely self supporting -- no guys required.

They offer remarkable DX performance with their extremely low angle of radiation and omnidirectional pattern.

All handle 1500 Watts PEP SSB, have low SWR, automatic band-switching (except AV-18VS) and include a 12-inch heavy duty mast support bracket (except AV-18HT).

Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators.

Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage.

Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low.

Two year limited warranty.

AV-18HT, $949.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

Standing 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands. Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. The addition of a base loading coil (**LC-160Q, $109.95**), provides exceptional 160 Meter performance. **MK-17, $89.95**. Add-on 17 Meter kit. 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tilt-over hinged base for easy raising & lowering.

AV-14AVQ, $179.95. (10,15,20,40 Meters). 18 ft., 9 lbs. **The** Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $139.95. (10, 15, 20 Meters). 13 ft., 9 lbs. **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

AV-18VS, $119.95 (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs.

All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $199.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

No ground radials required! Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$179.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$139.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$119.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

Hy-Gain 160-6 Meters Self-Supporting Vertical

Full 1500 Watts, 43 feet, includes base mount

New! AV-6160 **$399.95** UPS SHIPPABLE

Operate all bands 160-6 Meters at full 1500 Watt with this self-supporting, 43 feet high performance vertical! It assembles in less than an hour and its low profile blends in with the sky and trees -- you can barely see it . . .

Exceptional Performance

The entire length radiates to provide exceptional low angle radiation 160-20 Meters and very good performance on 17-6 Meters. You can shorten it by telescoping it down for more effective low angle radiation on higher bands.

Just talk with automatic tuner!

A wide-range automatic or manual antenna tuner *at your rig* easily matches this antenna for all bands 160-6 Meters. There's no physical tuning adjustments on the antenna -- you simply put it up!

An optimized balun design allows *direct coax feed* with negligible coax loss (typically less than ½ dB 60-6 Meters and less than 1 dB 160-80 Meters with good quality, low-loss coax).

Extremely low wind loading

With just 2 square feet wind load, the AV-6160 has the lowest wind-loading and lowest visibility of any vertical antenna! The key is a six foot section of tapering diameter *stainless steel* whip that flexes in strong wind instead of stressing the bottom sections. Its 2-inch O.D.and .120 inch thick walled tubing bottom section makes it incredibly strong.

Just 20 lbs., uses super-strong *6063 aircraft aluminum tubing.* Stainless steel hardware.

Assembles in an hour

Ground mounting lets you hide antenna base in shrubbery. Requires ground system -- at least one radial. More extensive ground work better.

Stealth Operation

Low profile. Hide behind trees, fences, buildings, bushes. Use as flagpole. Easily telescopes down during the day.

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- Digital Group Monitor (GM) Function
- Smart Navigation Function
- Snapshot Function (Image Data Transmission)
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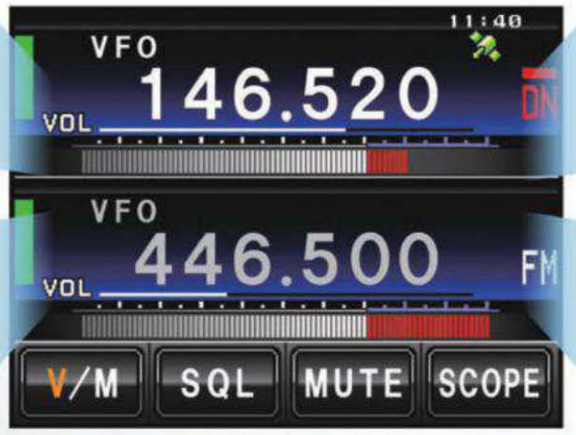
- Wideband Receive (108 MHz – 999.99 MHz)
- Equipped with microSD Card Slot

Advanced visibility and operability with full color touch panel Operation

3.5-inch full color touch panel operation

Band Scope Screen

Altitude Screen



The icon symbols, multi-function key display and pop-up messages are all displayed in high-resolution color thanks to the full-color, high luminance TFT liquid crystal screen.

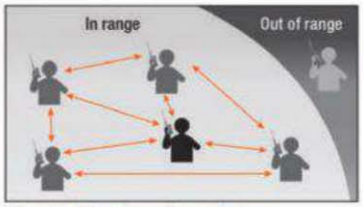
Smart Navigation Screen

Frequency Direct Input Screen

New Functions Enabled by C4FM Digital Communication

Digital Group Monitor (GM) Function

- Automatically checks whether members registered to a group are with the communication range.
- This function can be used to send messages data between group members.



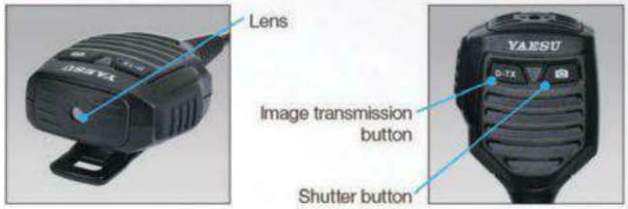
Group Monitor Function

Smart Navigation Function

- Real-time navigation function enables Location checking at any time.
- Backtrack function that starts navigation facing a registered point.

Snapshot Function (Image Data Transmission)

- Image data can be displayed on the screen.
- Image data can be sent easily to other C4FM FDMA digital transceivers.



Additional operating and support features

Wideband Receive Capability

Covers 108 MHz - 999.990 MHz (A(Main) / B(Sub) Band), VHF Marine, Aircraft, Public service channels, etc.

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Hands-free operation is available by using the optional wireless Bluetooth® unit and headset.

(Optional Bluetooth® unit (BU-2) and Headset (BH-2A) are required.)

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Digital Clear Voice
Clear and Crisp Voice Technology

C4FM 144/430 MHz DUAL BAND
5 W DIGITAL/FM TRANSCEIVER

FT1DR

- **Digital Group Monitor (GM) Function**
- **Smart Navigation Function**
- **Snapshot Function (Image Data Transmission)**
- **Built-in GPS with Antenna in the top**
- **Wideband Receive (504 kHz – 999.99 MHz)**
- **Equipped with microSD Card Slot**

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Self-Reliance

Sometimes, a magazine can seem like a living creature with a mind of its own. This issue is an example of that, as it seems to have put itself together, with minimal guidance from me. Tucked between our Technology Special in December and our QRP Special in February, this issue wasn't supposed to have a particular theme. But it seems to have had other ideas, as it assembled itself into what we might call our *Self-Reliance Special.*

Our lead story demonstrates one of our hobby's traditional means of self-reliance, as Public Service Editor Richard Fisher, KI6SN, reports on the response of hams in the Philippines to Super Typhoon Haiyan, which devastated large parts of that country, just weeks after the same region was struck by a magnitude 7.2 earthquake.

Next, we have a *CQ* Interview with Jim Kutsch, KY2D, the President and CEO of The Seeing Eye, the prestigious school for training Seeing Eye Dogs and their visually-impaired human companions. The Seeing Eye helps its students be more self-reliant, and Jim himself has been an example of self-reliance, modifying ham gear for use by people who can't see the dials and displays, inventing the first talking computer for the blind, and more.

We've also got project articles ranging from modernizing a classic "boatanchor" radio with a digital VFO and restoring antique radios to the latest in remote control via the Internet and an excellent tutorial on the basics of filters. In addition, five of our columns this month focus on various aspects of self-reliance, from an introduction to "DIY" (Do It Yourself) in Learning Curve to "Finding and Fixing Problems" in Contesting. Even the results of our September survey (p. 61) on what you do when a piece of your gear breaks speak to our level of self-reliance.

Self-reliance is a key characteristic of the ham radio personality and mindset—it's why ham radio works "when all else fails"—and the articles in this issue help illustrate the wide variety of ways in which that mindset can show itself. It's not just knowing how to get a station on the air when the communications infrastructure around you has crumbled; it's not just the ability to build some (or all) of the equipment for your station, or the technical knowledge to identify and fix problems when they crop up; and it's not just the willingness to experiment, to learn new things, and to share that knowledge with each other. It is all of those things, of course, but more than that, it's a way of thinking, a way of approaching a challenge, an attitude that says, "Yes, I can. I know how to do this. And if I don't know how, I'm willing to learn."

One of the key traits of hams as a group is our ability to make things work, to improvise as needed, and to *get things done*. It is one of the things that sets us apart from the general public, that helps us be more self-reliant, and is something of which we all can be justifiably proud.

Anniversaries and More

If you look closely at the Table of Contents page in this issue, you'll note that this is Issue 1 of Volume 70 … yes, we are beginning our 70th year of publication, and that doesn't include our predecessor magazines, going all the way back to *Pacific Radio News* prior to World War One. For seven decades, we have been chronicling the latest and greatest in amateur radio, and often leading the way into new eras of ham radio communications and technology (it's no accident that those are the words of this magazine's subtitle), including radioteletype, transistors, and amateur satellites. Today, we're leading the way in integrating ham radio into the Maker movement.

Reminder: 2013 CQ DX Marathon logs are due by January 10, 2014. See the CQ website for details.

Seven decades is a long time, but our friends in Newington have been helping to guide and protect our hobby for even longer. This year, the ARRL is celebrating its centennial, to be highlighted by a special centennial convention this summer in the League's original home, Hartford, Connecticut. Congratulations to all of the current and former ARRL officials, employees, and volunteers for your collective century of service to amateur radio.

Speaking of aging … this past weekend, I managed to squeeze in a few hours to operate in the ARRL Sweepstakes. One of the interesting things about this contest is that part of the exchange includes the year in which you were first licensed. And one of the things that stood out to me among the stations I was hearing was the relatively small number of stations first licensed within the past 15 years. There were plenty of 50s, 60s, and 70s out there, fewer 80s, even fewer 90s, and very few zeros or teens. And I spent about half my time on 10 meters, where hams of any license class may operate.

The brightest spot from this perspective was that there were several college stations on (with *very* old "check" numbers but young operators), but the trend is somewhat disturbing. We have record numbers of licensees, but we are still having trouble attracting large numbers of these newer hams to the traditional activities on which our worldwide community is built. It's not just HF contesting; it's radio clubs, repeaters, and yes, magazines. All of these help provide a structure around which "community" is built. And while self-reliance is a trait which we encourage, self-reliance in a vacuum is not. We all are at our best when we can put that self-reliance to use as a community, whether it's to help the members of our wider communities in times of trouble (as we're seeing in the Philippines) or to help each other, either one-on-one or in groups. We've said it before here but it bears repeating: As a group, we must do a better job of identifying newly-licensed hams, inviting them to become part of our activities, and welcoming them into the amateur radio community. Amateur radio is not a solitary hobby. Every contact requires at least two people. We need to be self-reliant. But we need to be self-reliant together.

Happy New Year! May 2014 be a year of good health and good hamming for you!

73, Rich, W2VU

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announcements

BRIGHTON, MISSOURI — Ozark Mountain Amateur Radio Ozark Mountain Hamfest, Saturday, January 4 at the Brighton Assembly of God Church. Contact: Mike Ballantyne, (417) 788-8882; e-mail: <kc5mnp @gmail.com>; <http://www.w0omd.org>. (Exams 10 a.m.)

LOCUST FORK, ALABAMA — Blount County Amateur Radio Club FreezeFest 2014, Saturday, January 4 at the Locust Fork High School, 155 School Road. Contact: Bill Pond, AE4IE, (205) 647-5705; <http://freezefest.w4blt.org>. (Talk-in 146.700 [PL 91.5] or 443.775; exams 10 a.m.)

WAUKESHA, WISCONSIN — West Allis Radio Amateur Club 42nd Annual Midwinter Swapfest, Saturday, January 4 at the Waukesha County Expo Center Forum. Contact: WARAC Swapfest, P.O. Box 1072, Milwaukee, WI 53201. Phil Gural, W9NAW, (414) 425-3649; <http://www.warac.org>. (Exams 9 –11:15 a.m.)

WHITE PINE, TENNESSEE — Lakeway ARC 22nd Annual Hamfest, Saturday, January 4 at the Walter State Community College's Great Smoky Mountain Expo Center. Contact: Pete Balling, K2QZH, <pballing@musfiber. com>; <http:// www.lakewayarc.org>. (Talk-in 147.030; exams 9–11:15 a.m.)

BETHPAGE, NEW YORK — Great South Bay Amateur Radio Club Ham Radio University 2014, Sunday, January 5 at Briarcliff College. Forums, demonstrations, **Special Event Station W2V**... E-mail: <info@hamradiouniversity.org>; <http:// www.hamradiouniversity.org>. (Exams 1:30 p.m.)

GREENWOOD, SOUTH CAROLINA — Greenwood Amateur Radio Society Hamfest, Saturday, January 11 at the Piedmont Technical College Multipurpose Building. Contact: GARS, P.O. Box 2404, Greenwood, SC 29646. E-mail: <w4dew @arrl.net> or <ai4wn@arrl.net>; <http://www.w4gwd.org>. (Talk-in 147.165+ or 443.900+ [PL 107.2]; exams 10:30 a.m.)

SCHERTZ, TEXAS — San Antonio Radio Club (W5SC) 2014 San Antonio Amateur Radio Fiesta & Texas VHF Society Winter Meeting, Saturday, January 11 at the Schertz Civic Center. Contact: Amateur Radio Fiesta, c/o San Antonio Radio Club, P.O. Box 34263, San Antonio, TX 78265-4263. Rowena Archer, KF5JCZ, (210) 415-6894. Website: <http://www.w5sc.org>. (Talk-in 146.940– [PL 179.9]; exams 9 a.m.)

WINSTON-SALEM, NORTH CAROLINA — Forsyth Amateur Radio Club Winston-Salem F.A.R.C. 2014 Winter First-Fest , Saturday, January 11 at the Summit School. E-mail: <info@w4nc.com>; <http://www.w4nc.com>.

HAZEL PARK, MICHIGAN — Hazel Park Amateur Radio Club 48th Annual Hamfest, Sunday, January 12 at the Hazel Park High School. Contact: Bernie Hildebrand, (248) 506-3502; e-mail: <w8nbc@arrl.net>; <http://www. hparc.org>. (Talk-in 146.640 [PL 100])

FORT WORTH, TEXAS — Lockheed Martin Recreation Area and Amateur Radio Club (W5SJZ) Cowtown Hamfest & ARRL North Texas Section Convention, Friday, January 17 to Saturday, January 18 at the Lockheed Martin Recreation Area. Contact: David Forbes, KC5UYR, e-mail <kc5uyr@compuserve.com>; <http://www. cowtownhamfest.com>. (Talk-in 147.28 [PL 110.9]; exams)

FORT MYERS, FLORIDA — Fort Myers Amateur Radio Club, Florida (W4LX) FMARC Hamfest, Saturday, January 18 at 4312 Michigan Avenue. Contact: Drexel Turner, W4DHT, 7670 Eaglet Court, Fort Myers, FL 33912-1828; (239) 225-0826 or (239) 464-1350; e-mail: <dturner@embargmail.com>; <http://www.fmarc.net>. (Talk-in 147.345 [PL 136.5])

HAMMOND, LOUISIANA — Southeast Louisiana Amateur Radio Club 33rd Annual Hammond Hamfest, Saturday, January 18 at the Magnuson Hotel & Conference Center. Contact: SELARC Hamfest Committee, P.O. Box 1324, Hammond, LA 70404. Patti Fauri, <ke5ng@yahoo.com>; <http://www.selarc. org>. (Talk-in 147.000– [PL 107.2], 145.130– [PL 107.2], or 444.250+ [PL 107.2]; exams 8:30 a.m.)

HARRISBURG, PENNSYLVANIA — Harrisburg Radio Amateurs Club Winterfest, Saturday, January 18 at the Cooper Student Union, South Hall. Contact: Tim Lehman, (717) 982-8550; e-mail: <kb3oza@arrl.net>; <http://www.w3uu.org>. (Talk-in 146.76 [PL 100]; exams 10 a.m.)

LOVELAND, COLORADO — Northern Colorado Amateur Radio Club NCARC Winter Hamfest 2014, Saturday, January 18 at the Larimer County Fairgrounds. Contact: NCARC, P.O. Box 272956, Fort Collins, CO 80527; e-mail: <hamfest@ ncarc.net>; <http://www.ncarc.net>. (Exams)

ST. CHARLES, ILLINOIS — Wheaton Community Radio Amateurs (W9CCU) WCRA 47th Annual Mid-Winter Hamfest, Sunday, January 19 at the Kane County Fairground Expo Center. Contact: WCRA, P.O. Box QSL, Wheaton, IL 60187-1055; (630) 604-0157; e-mail: <info@w9ccu.org>; Website: <http://www.wheaton hamfest.org>. (Exams)

JACKSON, MISSISSIPPI — Jackson Amateur Radio Club & Jackson Mississippi Convention & Visitors Bureau Capital City Hamfest 2014, Friday, January 24 and Saturday, January 25 at the Mississippi State Fairgrounds, Trademart Building. Website: <http://hamfest.msham.org>. (Exams 8 a.m.)

ARCADIA, FLORIDA — DeSoto Amateur Radio Club Inc. (W4MIN) 18th Annual Hamfest in Arcadia, Saturday, January 25 at the Turner Civic Center Exhibit Hall, 2260 NE Roan Street. Contact: Doug Christ, KN4YT, (863) 990-2507; e-mail: <kn4yt@yahoo.com>; <http://desotoarc.org>. (Talk-in 147.075+; exams 10 a.m.)

COLLINSVILLE, ILLINOIS — TSt. Louis & Suburban Radio Club Inc. Winterfest 2014, Saturday, January 25 at the Gateway Convention Center. Contact: St. Louis and Suburban Radio Club Inc., P.O. Box 2233, St. Louis, MO 63139. Jim Glasscock, WØFF, (636) 584-8888. Bill Coby, KBØMWG, (313) 504-1104; e-mail: <bcoby@att.net>; <http://www.slsrc.org>. (Talk-in 146.760)

LOCKPORT, NEW YORK — Lockport Amateur Radio Association 53rd Annual Winter Hamfest , Saturday, January 25 at the South Lockport Fire Company. Website: <http://www.lockportara.us/>.

MIAMI, FLORIDA — Dade Radio Club of Miami, Inc. 48th Annual South Florida Tropical Hamboree, Friday, January 31 to Saturday, February 1 at the Miami Dade Fair Expo Center. Contact: Dade Radio Club of Miami, Inc., P.O. Box 835387, Miami, FL 33283. Phone: (305) 590-8523; e-mail: <tropicalhamboree@gmail.com>; <http://hamboree.org>. (Exams)

A publication of

CQ Communications, Inc.
25 Newbridge Road
Hicksville, NY 11801 USA.

CQ Amateur Radio (ISSN 0007-893X) Volume 70, No. 1. Published monthly by CQ Communications, Inc., 25 Newbridge Road., 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.

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Radio HEROs Provide Critical EmComm in Philippine Typhoon Tragedy

"Ham Emergency Radio Operations" Steps Up to Connect the Missing Links

BY RICHARD FISHER,* KI6SN

Thelma Pascua, DU1IVT, an avid radio amateur and DX QSL manager living in Paranaque City, was at a loss: "No words to describe what my beloved Philippines is going through," she posted on Facebook.

Typhoon Haiyan (photo A), believed to be the strongest storm in human history, had leveled much of the region, leaving some social networking and amateur radio as the only means of communication. The death toll reached into the thousands. Cell phone service was spotty or non-existent following the Category 5 typhoon's passing.

Pascua was one of the untold Filipino radio amateurs who did their best to help bring relief to an unimaginable tragedy.

Massive power outages affected regions including Masbate, Ticao Island, Southern Sorsogon, Romblon, Northern Samar, Eastern Samar, Samar, Leyte, Southern Leyte, Biliran, Northern Cebu, Cebu City, Bantayan, Camotes Islands, Northern Negros Occidental, Capiz, Aklan, Antique,

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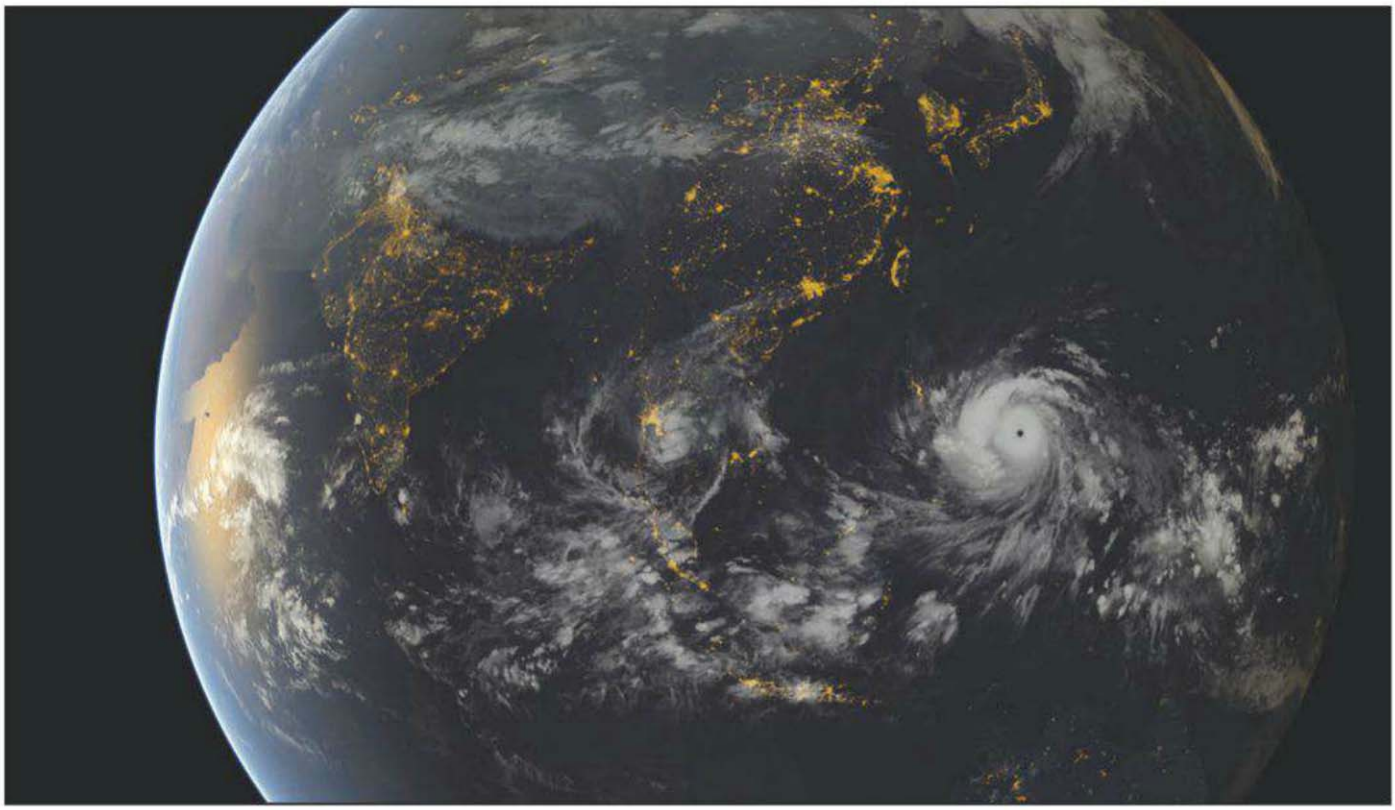

Photo A. Imagery of Super Typhoon Haiyan, the massive and deadly Category 5 storm system that slammed the Philippines in November – was captured in a composite incorporating data from geostationary satellites of the Japan Meteorological Agency (MTSat 2) and EUMETSAT (Meteosat-7), overlaying NASA's "Black Marble." (Published with permission: Copyright 2013, JMA/EUMETSAT)

Iloilo, Guimaras, and Dinagat Province, according to published reports.

Philippines President Benigno Aquino inspected Tacloban City, where most all buildings were lost "as huge surge waves came through its streets. He pledged that local authorities are to house about 45,000 families and give them food," according to published reports. "The President said he was lost for words to adequately describe the enormity of disaster affecting 36 provinces. He has declared a national calamity."

Ramon Anquilan, DU1UGZ, of the Philippine Amateur Radio Association (PARA), said its Ham Emergency Radio Operations (HERO)—PARA's equivalent to the United States' Amateur Radio Emergency Service (ARES®)—handled EmComm relief messages for local and government authorities on 7.095 and 144.74 MHz. Nathan Eamiguel, DU5AOK, and other RADNET (District 5 Radio Amateur Network) members were operating DX5RAN in the devastated Tacloban. The station was heard running 100 watts on 40 meters.

"They are acting as field liaisons to validate and secure requested information on the whereabouts and situation of Tacloban residents from relatives from all over the country," Anquilan said in reports distributed across the Internet. "Our National Traffic System (NTS) Co-Chairman Jojo Vicencio, DU1VHY, together with Max Santos, 4F1BYN, relocated to La Montana Estates in Antipolo, the QTH of Peter Schuemann, DU1DL, to better copy transmissions from Tacloban City." (See photo B.)

At one point during the storm, Anquilan reported that "those along the typhoon path [had to] shut down their radios" as they waited for it to pass. "In a few hours, we feel we should be hearing them again," he said at the time.

"We have established a good HF communication link with Tacloban City," DU1IVT said in published reports. "Exchanges on air are for emergency, priority or welfare traffic to and from Leyte Province. This may take days while other means of communications are yet to be restored." DX5RAN was operating at the Tacloban City Hall "powered by a generator and using a wire antenna." Tacloban City is on Leyte, the hardest-hit island and one of six islands that Typhoon Haiyan slammed.

At *CQ* press time, "the farthest that RADNET members have penetrated is Palo, which is the nearest municipality to Tacloban City," Anquilan said. "There are still no cellular phone services or electricity in the area." In Tacloban, the streets were "filled by ocean surges and [became] a swamp-like smelling mess."

RADNET operators, "with Nathan Eamiguel DU5AOK, Vilma Eamiguel DU5VIE, and the members of their local club, are working hard," Anquilan said.

"Their HF station is located on the second floor of the Tacloban City Hall, powered by a generator maintained by the local government unit," he said. "Two-meter band communications is simplex because there is no electricity to power their repeater. The VHF members serve as field personnel who go on various errands—verification of requested information, liaison work, and bits and ends." Led by DU5AOK, officers "dispatch their members based on the priority traffic handled by the HF station."

In published reports, Anquilan said the Tacloban HERO station "has been used by the Red Cross to track a relief vehicle verifying the welfare of its volunteers who were stopped and ransacked by those impatient for aid to arrive." Other requests for help came from the National Telecommunications Commission (NTC) regional office in Tacloban that needed hand-held radio communications.

"In his report [DU1UGZ] talks of another local club, ACCESS 5, attached to responding government agencies and relief organizations," said Jim

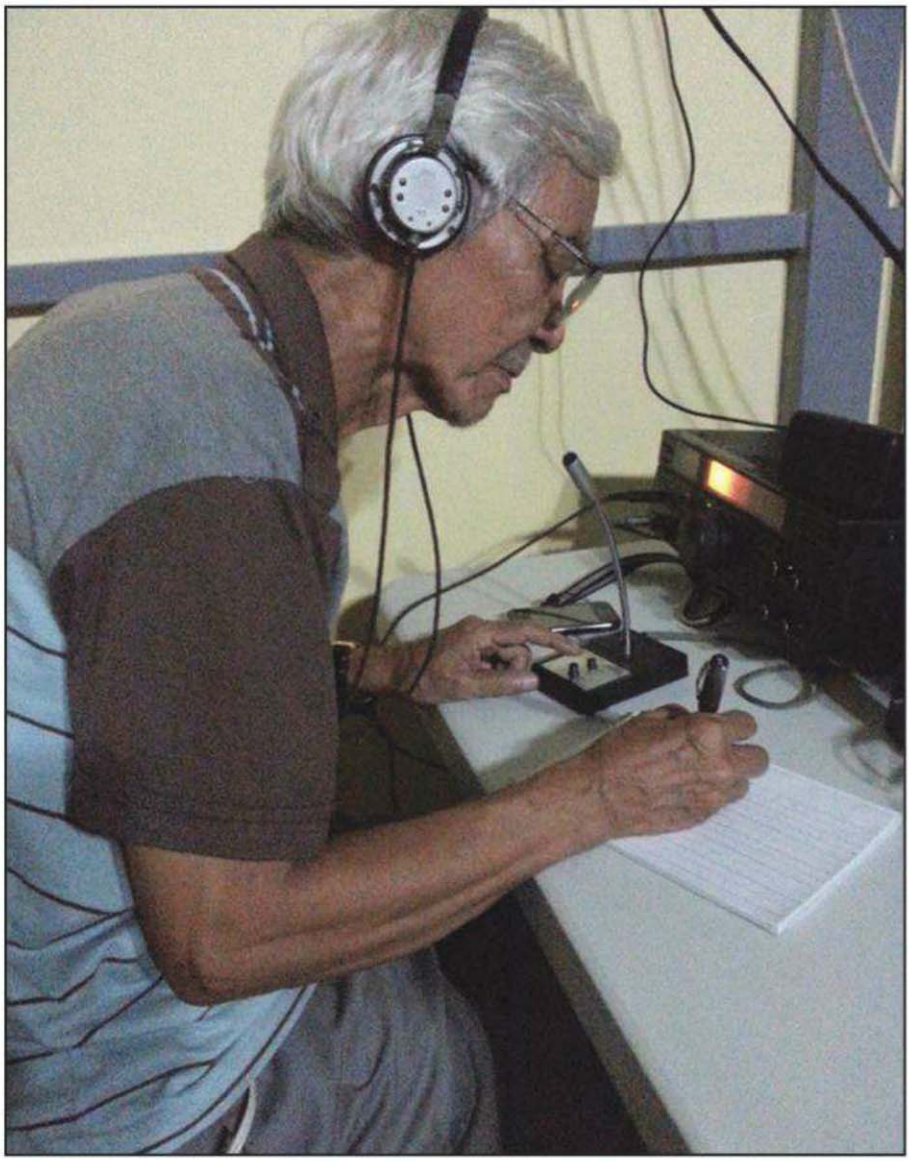

Photo B. Max Santos, 4F1BYN, in Antipolo City, Philippines, receiving health and welfare message traffic from DX5RAN from Tacloban, Leyte, Philippines. The Philippine Amateur Radio Association's Ramon Anquilan, DU1UGZ, was interviewed on NNPR's "Weekend Edition" on November 17. Listen to the interview at <http://n.pr/17gOwwF>. (Photo by and courtesy of Jojo Vicencio, DU1VHY/KK6BQQ)

Photo C. U.S. Marines carry an injured Filipino woman on a stretcher for medical attention, assisted by a Philippine Air Force airman at Vilamore Air Base in Manila. Super Typhoon Haiyan impacted more than 4.2 million people across 36 provinces, according to the Philippine government. (U.S. Marine Corps photo by Lance Cpl. Caleb Hoover)

Linton, VK3PC, Chairman of the IARU Region 3 Disaster Communications Committee. "A military HF station is linked with the National Disaster Risk Reduction and Mitigation Council (NDRRMC) which is located inside Camp Aguinaldo in Quezon City."

"ACCESS 5 is using VHF very effectively acting as guides for rescue and retrieval teams in the field, just like some RADNET volunteers," DU1UGZ said.

IARU Region 3's VK3PC said that "in Eastern Samar, Lester Price, DV5PO, (also ZL5PO), based in Borongan, [was] providing valuable situation reports. Lester and his wife had a very lucky escape. They held onto the doors of their house for four hours until the surge waters receded; waters claimed around 500 lives in the coastal barangay or village alone."

An HF station activated by the Department of Science and Technology (DOST) was using equipment from DU5AOK, Linton said. "His friend, Dominique, walked half-a-day to the government center in Palo and the DOST Regional Office" to help as an alternate operator." She is the office driver, and was joined by Regional Director Dr. Eduardo Esparancilla in the radio operations.

As part of HERO support in DU7, (Cebu, Bohol and Negros Oriental islands including the island province of Siquijor), the Cebu Amateur Radio League (CARL) dispatched a team to the northern tip of Cebu, VK3PC's report noted.

An operator group, part of the CARL's DX7CA, was deployed to the Bantayan Islands, one of the hardest-hit areas east of Cebu Province, Aquilan said. Four members were stationed at the Cebu Capitol Building. "Survivors sheltering in damaged homes described how the noise sounded like a jumbo jet was flying above their roofs."

"This municipality [was] the hardest hit in Cebu with an estimated 90 per cent of structures levelled," he said. "The CARL team . . . [was] handling HF traffic. Another component is the Chocolate Hills Amateur Radio League (CHARL) based in Tagbilaran City in Bohol, an area struck by an intensity 7.2 earthquake" in October *(See "CQ World Wide" elsewhere in this issue for more on the ham radio earthquake response.—ed.).*

"The club station, DU7BC, along with its members Gerry Marmito, DU7AU; and Ador Lamoste, DU7AL, [were] ready to monitor and relay messages between Tacloban and the principal receiving stations.

Another DU7 component "[was] from Dumaguete City. Roy Alcantara, DU7DDJ, together with James Uy, DU7JGU, (Island Province of Siquijor) [led] NORAD-7 with long-range communications to the Dumaguete local government unit passing traffic from Tacloban to their area in Negros Island,"

Photo D. Displaced Filipinos are assisted by U.S. Marines from the back of a KC-130J Super Hercules at Vilamor Air Base. The photograph was taken November 11. (USMC photo)

Linton said. "NORAD-7 members also act as field operators and runners.

"In DU6 (Panay, Negros Occidental and neighboring islands) heard [were] Bobby Garcia, DU6BG, in Iloilo, Iver Astronomo, DV6ILA, and Arnel, DV6WAV, in the Roxas Provincial Capitol, as they [were] embedded with the Provincial Disaster Risk Reduction and Mitigation Council (PDRRMC)."

Philippine stations receiving outgoing traffic from Tacloban and the other affected areas were "scattered all over the archipelago," VK3PC said. Among them Jojo Vicencio, DU1VHY, Romy Isidro, DV1SMQ; Max Santos, 4F1BYN: and DU1IVT—"acting as the main receiving stations on a rotational basis since HERO activation began.

"Other stations [were] also active in receiving outbound welfare traffic, mainly to inform family members and relatives of their conditions: Totie Navela, DV1TEE; Lito Alv Ea, DU4DF; Albert, DU4ABA; Bobby Garcia, DU6BG; and DU1UGZ. Standby operators included: DV9DOC, DU8WX, DU1RP, and others.

"Another facet of the operations [was] the use of Echolink by CARE-4 in Naga City (DU4) and COMPASS in Tondo, Manila (DU1)," Linton said.

"Basically, the Tacloban and other stations in the disaster areas permit only outbound traffic as priority messages," DU1UGZ said. "This is a policy decision by NTS Co-Chair DU1VHY and as requested by RADNET. We can classify the messages as follows: *We Survived* messages; [messages from] institutions/government agencies to their central or partner offices in Manila, and urgent requests for specific form(s) of assistance or relief items."

"As the primary telecoms services are restored, there will be less reliance on the amateur radio service in Tacloban,"

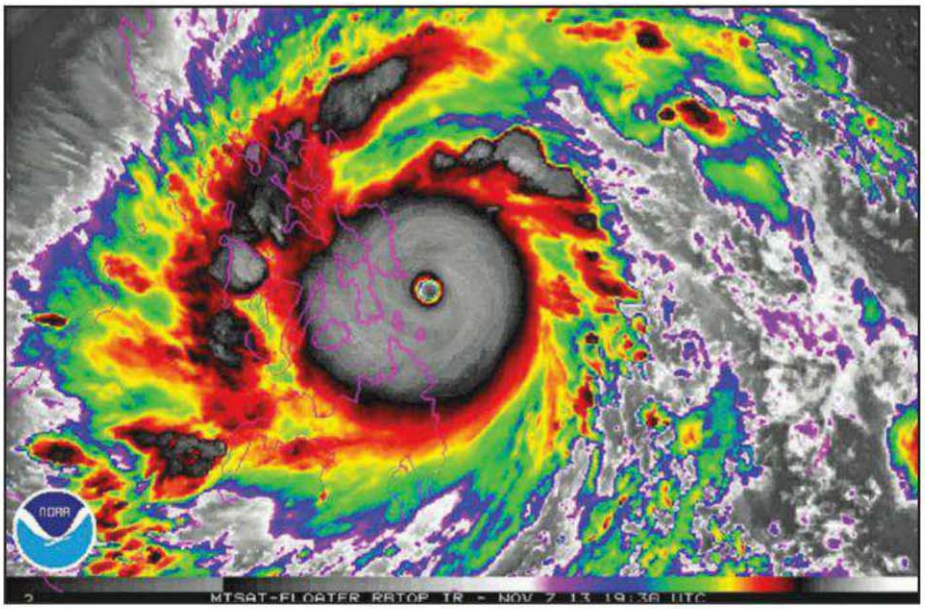

Photo E. Satellite imagery from the National Oceanic and Atmospheric Administration (NOAA) shows Super Typhoon Haiyan's assault on the Philippines. Color bands show the storm's areas of greatest intensity. (Courtesy of NOAA)

Aquilian said. "This will mean a more difficult period because the remote areas not reached yet by government and other agencies will now demand communication links.

"Our assets will be thinly spread resulting in gaps which only a robust service such those found in first world countries (could fill)," DU1UGZ said.

"Currently an average of one to two minutes is spent per message, and depending on band conditions, the rate of traffic per hour would be 40 to 60 messages," Linton reported. "A more in-depth analysis is not possible until all HERO stations are closed and submit their log details."

DU1UGZ said the news media "has started to notice ham radio, but don't understand that the HERO network is playing an important role in the disaster. Although there's some very brief TV exposure, they are yet to adequately report on the voluntary service it provides, and the emergency communications to the agencies and community in times of disaster."

An initial international relief effort was under way "although it remains mostly chaotic with rescue workers struggling to reach some remote areas. Some 22 countries and the European Union have pledged help," VK3PC said at the time. The U.S. sent the Marine Corps to assist (photos C and D). The losses include 71,000 hectares of agricultural land with crops of rice and corn hardest hit."

Pascua said that the National Telecommunications Commission monitored radio amateur traffic on the HERO networks on 40 and 2 meters. "We admire these hams, with such a short break from their relief and humanitarian operations [from October's earthquake], here they are again ready to help out in communications," she said. "They are in the Governor's palace as the command center."

High-ranking government officials were expected to use a HERO link, with DU5AOK as the operator, to communicate with the National Disaster and Risk Reduction Council.

"The Philippines Amateur Radio Association (PARA) activated the HERO operators in advance of Typhoon Haiyan, and it has been in use ever since," Linton said "After leaving the Philippines the fast-moving typhoon . . . headed across the South China Sea [toward] other countries—Vietnam and China among them.

At the time of his report, Aquilan said there had been "no news emerging from the islands, as the initial national government focus has been on Tacloban City and its neighboring municipalities. However, the Governor … has already gone to the islands and convened a needs-assessment meeting with local officials."

The Philippine government set up command centers in both the Eastern and Western Visayas, and had the HERO network at its service "to better coordinate the recovery effort."

"Among the regions in the path of the typhoon was the island of Bohol, which was the epicenter of a (7.2) magnitude earthquake in October that killed more than 200 people and left some 5,000 others now living in tents," VK3PC said. "Rescuers and relief supplies in the aftermath of the quake are only now reaching some remote areas for the first time."

"DX7BC, in Bohol, is with us on 7.095 MHz, ready to relay, in case propagation becomes poor between DU1 and DU5," Pascua said, although the station did not have access to commercial power. "Bohol is on the eastern side of Leyte."

"The typhoon made landfall at about 4:40 a.m. local time . . . in Guian Estern Samar, about 600 kilometers (roughly 375 miles) southeast of Manila, and neighboring provinces [were] affected," Anquilan said (see photo E**).** "Then it made second landfall over Dulag-Tolosa, Leyte with maximum sustained winds of 235 kilometers per hour (146 mph) near the center and gusting up to 275 kph (170 mph)."

At *CQ* press time, about 300 pieces of emergency traffic had been handled, Anquilan said, adding that more reports were expected. PARA called for 7.095 and 144.74 MHz to be kept clear for EmComm traffic.

CQ will continue to follow this story in future issues and on the CQ Newsroom web page, <http://cqnewsroom.blogspot.com/>.

73, Richard, KI6SN

Turning adversity into opportunity, and with ham radio never far away, Jim Kutsch, KY2D, has devoted his life to changing people's attitudes from "you can't do that" to "how can you do that?"

CQ Interviews:

Jim Kutsch, KY2D President and CEO, The Seeing Eye

BY RICH MOSESON,* W2VU

When Jim Kutsch was a 16-year-old growing up in Wheeling, West Virginia, he'd already gained a reputation as a cut-rate radio and TV "fix-it" guy who also liked to tear apart lawnmowers and was slowly rebuilding a Volkswagen Beetle, a piece or two at a time. In school, everything except math and science bored him and his goal in life was to get his FCC first-class "phone" ticket and become a broadcast engineer. College was not in his plans – although it was in his parents'.

So how did he end up:

- With a Ph.D. in computer science
- Inventing the first talking computer for the blind
- Being a college professor
- A distinguished member of the technical staff at Bell Labs
- And now head of The Seeing Eye, the nation's premier school training blind people and guide dogs to work together?

In an interview at his office at the prestigious school in Morristown, New Jersey, Kutsch explained that his plans, and his life, changed in an instant one spring day near the end of his junior year in high school while he was pursuing an extracurricular interest in chemistry.

In a neighbor's back yard, he was making explosives and pyrotechnics and "unfortunately, I had a jarful ... explode in my hand and I lost most of my right hand and the flying glass fragments slashed both of my eyes, so I was blinded immediately from this accident."

Such a life-altering accident, at such a young age, would have devastated many people. But not Jim – and part of the reason it didn't was the local ham radio club.

Enter Ham Radio

Some of the members of the club read about his accident. "(They) said, 'You're interested in all this radio stuff. Have you ever thought about ham radio?' And I said, 'Well, yeah, but I didn't know where to begin.'

"And so that began an Elmer relationship that I had with WA8RDX—*WA8 Rare DX*—is what he used to say. John Echoles. He's now a Silent Key." John worked the morning shift at his job, so he would finish right around the time Jim

Photo A. Jim Kutsch, KY2D, and his Seeing Eye dog, Vegas, at The Seeing Eye headquarters in Morristown, New Jersey, where he is President and Chief Executive Officer. Jim is the school's first graduate in its 85-year history to also be its leader.

*Editor, CQ magazine
e-mail: <w2vu@cq-amateur-radio.com>

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"A lot of the things that have happened through my life would have been different, had ham radio not been a part of who I am."

was getting home from school. And every afternoon, he would call Jim on the phone and teach him CW and theory for his Novice license. "Back then, anybody who was a General or above could give Novice exams, and he had a very easy way of doing this," said Jim. "One day, after weeks and weeks of practicing the code over the phone and I was verbally calling back the letters, he said, 'Well, you just passed your Novice exam.' "

Jim said he had no problem with the theory and quickly climbed the ladder to General and Advanced, then got his Amateur Extra in the early 1980s. His first station was similar to what many of us from that era remember:

"My Elmer, John, said the best thing to do is take however much money you have and put all of it in a receiver, and then borrow a Novice transmitter from somebody. So I followed his advice and my first station was a Drake 2B receiver and then I borrowed a Knight T-60 crystal-controlled Novice transmitter as the first station, and I had a flat-top 40-meter dipole made out of 300-ohm twin lead stapled under the wooden gutters of (my parents') house." A Hallicrafters HT-37 phone transmitter followed after he got his General, and eventually a pair of Drake twins—the T-4XB transmitter and R-4B receiver—which he used for many years.

Those of you who remember these rigs will no doubt recall that they were not designed with the visually-challenged operator in mind. Jim says it required a good bit of creativity. Modifying equipment for operation without sight was always a challenge, Jim recalls, and "always in the forefront of things along the way." For example, he'd crank up the Drake 2B's crystal calibrator "and that's what I used to know where I was frequency-wise, or at least approximately where I was, and where the band edges were. I had an audio oscillator SWR bridge that I used for either tuning an antenna tuner or tuning the finals on a transmitter. I used it to just peak the pitch of the tone to get maximum power out of the transmitter."

For the Drake T4XB and R4B, Jim recalled that "somebody designed (a) little Lucite® skirt that went around the dial in place of the little metal skirt that was on that radio, and it had an individual little brass tack for each kilohertz, so you had 25 of these around the dial, and then you used a bent bobby pin to be the pointer to which one of these you had, and there were Braille numbers— again, using the brads that were nailed into the plastic—and I could get down to a tenth of the band indicator there. I guess it was a tenth of a kilohertz, 100 Hertz, on that; pretty easy for setting frequencies."

A Man of Many Majors

Kutsch attended West Virginia University and shared a dorm room with another ham whom he'd met on only the air, Tom, WA8TWR. "The first time we had an eyeball QSO was in the dorm as we were moving in with our suitcases," Jim recalls. Tom brought his Heathkit station and they loaded up the downspout and gutter system as a makeshift antenna.

Jim notes that his blindness provided both obstacles and opportunities as he pursued his college education. His ini-

Photo B. Jim at the controls of club station W2TSE (The Seeing Eye). During our visit, the station was off the air due to a major renovation project that was under way.

Photo C. One of the ham station antennas at The Seeing Eye.

tial goal, he said, was to major in electrical engineering—"and actually the electrical engineering department was phenomenal about it"—but EE majors at the time needed to take a chemistry course and the chemistry department said it wasn't prepared to deal with a blind student in a chem lab (*this was before the Americans with Disabilities Act—ed.*). Jim had to find a new focus. He decided to go into teaching and switched his major to philosophy, then to psychology. And then, at the end of his freshman year, Jim came to The Seeing Eye to train with his first dog.

"I met a guy here—another blind individual—who was a computer programmer. Now ... I had gone through a high

About The Seeing Eye

A statue in downtown Morristown, New Jersey, attests to the ongoing relationship between the town and The Seeing Eye. The statue, on the town green, is of school co-founder Morris Frank and his dog, Buddy. The Seeing Eye was founded 85 years ago this month, in January, 1929.

The Seeing Eye is celebrating its 85th birthday this month. KY2D took a few moments during our discussion to describe the school and its role in helping visually-impaired people to be as independent as possible.

"In brief, we breed and raise and train special dogs to eventually be Seeing Eye dogs to lead blind people, and then we teach the blind people how to safely use and care for those dogs. We also provide follow-up care afterward if there is a training issue after a person graduates from the program. ... We were the original school to do this. There are over 80 schools around the world that train dogs to lead blind people, but we were the original and actually, Seeing Eye is a registered trademark of our school. So in the same way that not all facial tissues are Kleenex or not all photocopies are Xerox copies, not all dogs that lead blind people are Seeing Eye dogs. Only ones here, from our school in Morristown. We serve applicants from all 50 states and all provinces of Canada, and what we do is supported through the generosity of individuals, corporations and some foundations that believe in our mission and send donations to our school. We're on the web at <http://www.seeingeye.org>. There's plenty more information there."

Photo D. The W2TSE QSL card features four Seeing Eye dogs and the school's logo on the front, as well as information about the school and the station on the back.

school that had no computers, the university was just getting computers—big mainframe computers —and I had never heard of computer programming. I had no idea what this was. So in the course of staying here for a month, training with my first dog, this other gentleman, Norm, from Baltimore, (who was also) training with his dog, he told me at dinner and at lunch, what it was like to be a computer programmer ... And I thought that was really interesting. That's sort of like radio, and it's sort of like electrical engineering. At least it's a lot closer than psychology and philosophy are!"

He returned to school with a commitment to take a computer science class and see what it was all about. He did, and fell in love with it. After finishing his undergraduate degree in psychology, Jim immediately went into WVU's Masters program in computer science and then to the University of Illinois for a Ph.D. so he could teach at the college level.

Enter the Talking Computer

Jim's ham radio knowledge and experience played a significant role as he pursued his computer science degrees. "When I was an undergraduate … I had to hire other people to read the computer output. Now this wasn't PCs and computers of today; this was mainframe computers and punch cards and printed output. So I hired somebody to read the output as I was doing my programming lessons. And that always was frustrating.

"One day, while sitting in front of an old teletypewriter that was attached to a computer, I realized that it made a lot of noise while it was printing, and so being the good innovative ham, I wondered if you could control that to make a lot of noise and not much noise and affect the timing."

Jim learned that printing the letter "W" was the loudest because it was the most metal to hit the page, and that spaces and backspaces were fairly quiet. So he developed some software to convert the computer's output to print "Ws" and spaces, at a three-to-one ratio, giving him dits and dahs from the teleprinter and producing a Morse code readout of his programming assignments. "What was printed was absolute junk," he noted. "What was important was, 'What did it sound like while it was printing?' "

Later, in part to save paper, Kutsch programmed the mainframe's alarm bell to produce Morse output (much to the annoyance of the IBM engineers stationed at the university to keep the computer running smoothly), and then one of his friends in electrical engineering built him an oscillator with a headphone that was connected to one of the output leads of the computer (much to the relief of the IBM engineers). That led, in his Ph.D. work, to his designing the first talking computer for blind computer users, which was the precursor of today's screen-reader programs.

After finishing his Ph.D., Jim returned to WVU and taught computer science for three years—including a course on computer hardware that drew heavily on his ham radio experience—before getting a job at Bell Labs and beginning a 28-year career in the telecommunications industry, first with AT&T, and then with Cincinnati Bell and a Cincinnati Bell spinoff company called Convergys. Kutsch says he attributes his hiring and acceptance at Bell Labs to his ham radio background.

"At a time when many people with disabilities, in particular blind people, were being told 'you can't do this' or 'you can't do that,' and there was a lot of hesitancy to hire blind people ... I would hook the person's engineering interest and rather than saying, 'you can't do that,' they would say, 'Hmm. How can you do that?' And it would lead to a discussion that was very fruitful about inventing alternate techniques and other ways to access information and computers."

We wondered whether any of the pro-

Ham Radio and Accessibility

Modifying electronics gear for use by blind people has been a constant component of Jim Kutsch's life, starting with ham equipment when he was a teenager (see main text). He says some of today's ham gear is more accessible than in the past, but that there's still a long way to go.

"The accessibility of products is much easier than the days of bent bobby pins and other things that aren't tone oscillators for reading meters and so on. The Kenwood radios have speech boards … I am very much an Elecraft fan. I have a KX-3 (which has a CW readout). Although accessibility can be accomplished with ham radio, it's never been totally, totally, built-in, with (a few) exceptions … Some of the other manufacturers have put speech boards in, but it's not a solved problem.

Jim believes software-defined radio (SDR) has "serious, serious, accessibility problems. You need to rely on graphical user interfaces that have no key alternatives, no keyboard alternatives to mouse clicks; some of the newer digital modes, you've got to rely on being able to look at waterfall displays and align things in order to receive those, so some of the old tricks of figuring out alternative ways to do this are still as much a challenge today as they were in the '60s when I was trying to figure out how to read an SWR bridge without looking at the meter. So those issues are still out there."

jects on which Jim worked at Bell Labs and Cincinnati Bell/Convergys, had direct ham radio tie-ins. There were, of course, but not in the ways you might expect.

"Probably the best tie-in that I could explain was, as a ham, I got very interested in traffic nets and for many years, was a net control operator for the West Virginia Phone Net, and West Virginia CW Net ... So I had a lot of experience with net protocol and one of the responsibilities I had within one of my assignments at AT&T was to be the incident management and disaster recovery lead.

"I was in north Florida at the time, in Jacksonville, and we would have hurricanes come through the area and be quite an issue for … our facility. We had 4,000 employees in our building at the time, and we were a 24-hour-a-day, 7-day-a-week operation, and we had to keep things running ... I became, essentially, net control on a conference bridge that sometimes had over 50 people on the (call). And the discipline that I learned in net control operation from the ham radio operation I think was one of the things that made me very successful as an incident manager ... and I've often thought about that later, that that would have been much harder without my NCS experience."

After several years as a member of the technical staff and then Distinguished Member of the Technical Staff at Bell Labs, Kutsch moved into management. He became Vice President of Computing and Network Services and then Chief Information Officer for AT&T Universal Card Services; and Vice President of Strategic Technology at Convergys, a role in which he was responsible for evaluating new technologies and incorporating them into the company's products and services.

Into The Seeing Eye

In 2006, Kutsch was looking for new challenges, a quest that brought him to his current position as President and Chief Executive Officer of The Seeing Eye. In addition to his association with the organization going back to his freshman year in college, Jim had been on The Seeing Eye's Board of Directors since 1996. He is the first president of the organization to also be one of its graduates.

"The president of The Seeing Eye was retiring and I was starting to think about going back to teaching … and I thought, 'this would be even better, to go to The Seeing Eye.' By that time, I had had several dogs from The Seeing Eye because dogs, unfortunately, don't live as long as we humans do ... In fact, Vegas (*Jim's current dog—ed.*) is my eighth dog. So that's how I ended up here."

Does ham radio continue to play a role in Jim's current position, and at The Seeing Eye overall? "For many years, blind people have seen ham radio as a way to reach out and interact with others," he says. "This is a mobile society and blind people have not as much flexibility with mobility. We don't have driver's licenses, etc. Public transportation isn't necessarily great everywhere ... The Seeing Eye dog is the solution ... to easier independent travel, to be able to go from place to place to place. But still, the idea of reaching out and interacting with other people via radio is something that I think attracted a lot of folks who were blind, several decades ago, and still does today."

"There's also the fact that your disability is anonymous over the radio," he adds. "When you're a voice on the radio, when you work me in a contest, when we have a QSO, you're not necessarily thinking, 'I'm talking to a guy who is blind.' You're thinking, 'I'm talking to KY2D.' And you talk about radios, you talk about common interests and so on. So that is another advantage."

The Seeing Eye has a club ham station, W2TSE (for The Seeing Eye), that is available for any licensed student to operate. Kutsch notes that "students" at the school may cover all ages from 16 up, "as long as they are physically up to the rigors of doing the training with the dog," with a maximum of 24 students per month-long training class.

Most classes have at least one or two hams. Kutsch pointed out that the ham station is not part of the formal program at The Seeing Eye, but rather "a part of the off-duty recreational environment that we provide here for our students. Students are coming for a month. They're living in the dorms. They're residing on campus as they train with their dogs, and we have an exercise room downstairs, we have various musical instruments if somebody is a musician; we have radio, TV, lots of books on tape for people to listen to; so there's lots of things for people to do in their down time, and one of those things is the radio station. And it has the advantage that non-hams can sit alongside a ham and observe what's going on and over the years, I'm sure—although I can't document it—I'm sure that we've sparked the interest of some new hams through them being here, in the same way that I learned about computer science and learned about computer programming from my time here…"

Jim notes that ham radio continues to be of interest to people who are blind, comparing it with the social networks of the Internet. "You get on frequency with a lot of other people and talk about things. And isn't that like Facebook? Isn't that like Twitter? ... And you group around interests. You know, you have the traffic handlers that get together, you have individuals that are interested in satellite communications, in AMSAT, they get together."

It's natural that blind hams get together as well, Jim says, citing two weekend nets to which blind ops from all over the country check in "and share their experiences or just stay in touch." Kutsch said everyone—sight challenged or not—is welcome.

Jim says he's also part of a group trying to bring blind hams together on VHF and UHF, through Internet-linked repeaters, including an Echolink/All-Star Link node at his home station. "We have a couple of other Seeing Eye graduates—one is Eddie, KB5ELV, in Erie, Pennsylvania, and the other is Rob, in San Antonio, Texas, KB5UMJ—and they also are running repeaters. And we are connecting the three ... together fairly regularly ... We're hoping that more of our Seeing Eye graduates will link in with us. Folks can link in with us through All-Star Link or they can link in through Echolink. ... At home, I have KY2D/R on Echolink or it's on All-Star Link, it's node 2396. And folks, other graduates can link into those and stay in touch with us."

Finally, we asked Kutsch whether he had any advice for *CQ* readers.

"Just that Elmering is really important ... I probably would not have gone into the hobby if the local radio club hadn't said, 'Hey, maybe this guy will be interested in radio.' And if John, WA8RDX, hadn't called me on the phone and said, 'Listen to this, I'll send you some CW over the phone,' I might not have gone down the path. It's hard to say, but I think a lot of the things that have happened through my life would have been different, had ham radio not been a part of who I am."

Read More on the Web

For more about The Seeing Eye and about Jim—including his story of providing public service communications while riding a tandem bike—or to hear Jim's complete interview on audio - go to the highlights page for this issue on the CQ website at <www.cq-amateur-radio.com> and click on "Digging Deeper: KY2D and The Seeing Eye."

ANNOUNCING:

CQ plus

WELCOME *POP'COMM* AND *CQ VHF* READERS!

Beginning this month, readers of *Popular Communications* and *CQ VHF* will be receiving *CQ* every month, as those magazines suspend publication. Starting *next* month, content from both of these magazines as well as *WorldRadio Online* will be carried over to a new expanded digital edition of *CQ*, which we're calling *CQ Plus.*

"The hobby radio market is changing," explained CQ Communications President and Publisher Dick Ross, K2MGA, "and we are changing what we do and how we do it in order to continue providing leadership to all segments of the radio hobby." CQ Communications is currently the only publisher in the United States serving the broad radio hobby, from broadcast-band DXing to amateur radio moonbounce and satellite communications, and we will continue to do so through our enhanced digital edition of *CQ*.

Effective with the February 2014 issue of *CQ*, said Ross, content from the magazine's three sister publications, *Popular Communications, CQ VHF,* and *WorldRadio Online*, will be incorporated into *CQ*'s digital edition as a supplement to be called "*CQ Plus*." With this change, hobby radio enthusiasts of all types will be able to go to a single source — *CQ* — for articles on the broader aspects of hobby radio, from shortwave listening and scanner monitoring to personal two-way services and Internet radio, as well as amateur radio. Richard Fisher, KI6SN, currently Editor of both *Popular Communications* and *WorldRadio Online*, will be Editor of *CQ Plus*.

"Our primary audience is ham radio operators," explained Ross, "but very few hams began their radio involvement as amateurs. Most of us started out as shortwave listeners, broadcast-band DXers, CBers, or scanning enthusiasts. Many continue to be involved in many different aspects of the radio hobby in addition to amateur radio.

"By consolidating four specialized publications into one," Ross continued, "we will be better able to keep these multidimensional readers informed on all aspects of the radio hobby while simultaneously exposing those who are not hams to all the excitement and opportunities that amateur radio has to offer. We see this as a win-win for all of our readers and our advertisers, who will now be able to reach a wider and more diverse audience."

The expanded material will be an integral part of the digital edition of *CQ*, and will be included as part of a standard digital subscription. Each month's digital edition will simply continue beyond where the print edition ends, offering supplemental material on all aspects of hobby radio communication and will include selected columns carried over from the other magazines. **Follow this link for a preview of the complete table of contents for February's *CQ* and *CQ Plus*: <http://bit.ly/19mzbOK>.**

What's Happening With My Subscription?

Current subscriptions to *Popular Communications, CQ VHF,* and *WorldRadio Online* have been converted to CQ subscriptions — and will include *CQ Plus* at no additional charge!

Print subscribers to *Pop'Comm* and *CQ VHF* will receive *both* the print and digital editions of *CQ* (including *CQ Plus*) for the remaining number of issues in their subscription terms.

Subscribers to *WorldRadio Online* and the **digital editions** of *Pop'Comm* and *CQ VHF* will receive the digital edition of *CQ* (including *CQ Plus*) for the remaining number of issues in their subscription terms.

CQ subscriptions remain unchanged. Print subscribers will continue to receive the print edition, with the same great content you signed up for! *CQ* digital subscribers will continue to get that same great content, *plus* the bonus of all the *CQ Plus* articles as well. *CQ* print subscribers wishing to add a digital subscription should contact our office for a special add-on offer.

While we understand that not everyone will be happy with these changes, they are the best that we are able to do in a difficult economy to continue providing the coverage of the broad radio hobby that our readers have come to expect and look forward to. Again, a preview of the February issue's Table of Contents for *CQ* and *CQ Plus* is available right now on the CQ website at <http://bit.ly/19mzbOK>.

Results of the 2013 CQ WW VHF Contest

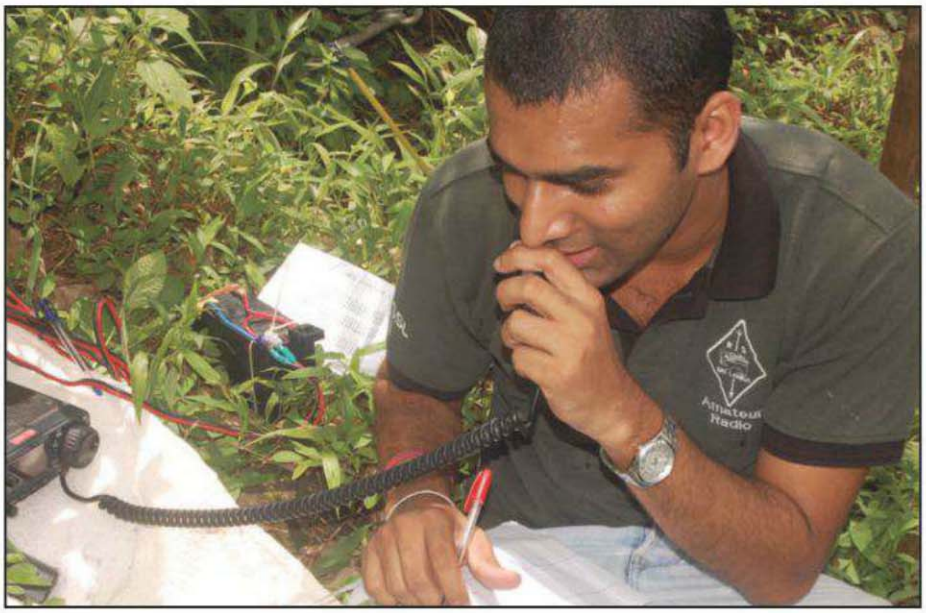
BY STEVE BOLIA,* N8BJQ

The 2013 CQ WW VHF Contest provided the 823 entrants some good times and some bad times. Six meters provided nearly everyone at least one good opening and many had a couple. Comments were mixed with some reporting excellent conditions and others the opposite. AC4G commented that he operated 6 hours Saturday and band was hot! Sunday, however, was a different story with only 18 Qs in his log in 10 hours.

The 823 entries are a record for the contest and an increase of 90 from last year. Europe and Asia provided the biggest increase in entries (+75 from 2012). Participation from outside the US is now up to 43% of all logs received. There were at least 350 stations who made 20 or more Qs who chose not to submit a log. Electronic submissions are easy and fairly painless. If you need help, just ask. More logs make log checking more accurate and several of the missing 350 would have been certificate winners. Please send in your log for the 2014 contest.

These results are a month earlier than 2011 and 2012 (the 2012 results are in the Winter 2013 issue of *CQ VHF* magazine.). This is the result of shortening the log deadline and *CQ* readjusting its publication schedule. We should be back in *CQ* now that the dust has settled on the transition. Thanks for your cooperation by getting your logs in earlier. The extra few weeks allowed us to start the log-checking process earlier. The complete line scores, expanded tables, "Scatter" comments, and the operator lists will now be found on the *CQ* magazine website at <http:// www.cq-amateur-radio.com/cq_contests>. Select WW VHF Contest and then Results.

Thanks to N2CEI, KG6IYN, and E21EIC who made contributions to this article as well. Steve gives a rundown on his winning rover operation, Bruce has a great description of his portable operation, and Champ gives us some insight into VHF contesting in Thailand. If you have an interesting story about your 2014 contest operation and would like to share it, please contact me. Pictures are always appreciated as well.



This is Jaliya, 4S7JL on 6 meters. Jaliya promises to be back and make more contacts in 2014.

USA

Jeff, K1TEO moved up from fourth in 2012 to win the All Band title, with Bob, K2DRH, dropping down one spot to second. Jeff had an 85 Q advantage (mostly on 2 meters) while Bob had a slight grid advantage. Third place went to Jim, W4RX, with Bob, N4BP fourth and John, W1XX fifth.

George, NR5M and Chuck, W5PR ran a close race for the 6-meter title. In the end, George finished with 25 more Qs and 5 more grids to claim the top spot. Tom, WD5K, Dan, K1TO, and Hud, K5ZG all topped 60K to round out the top five.

Two-meter activity in the US was pretty sparse compared to Europe and Asia. Only four logs were received in this category. John, KN2GSP took the top spot, with N7LKL second and W8DPK third. Don't forget 2 meters. There are lots of potential contacts on the FM simplex frequencies. Try some pre-contest advertising. Especially in larger population centers, there could be plenty of FM simplex contacts to be made.

In his first try at VHF contesting, Dick, ABØCD came away with the top spot in the Hilltopper category. Dick had a blast: "First time VHF contesting. Stuck with QRP Hilltopper class. I am an HF QRPer. Arrow beam on 2 meters. Makeshift rotatable dipole—50 cents worth of hookup wire and a piece of PVC—on 6 meters. FT-817. Sat on the ground in the hills above Denver. What an absolute blast!" Sounds like a new VHF contester has been hooked. Jon, NØJK finished second, losing two hours to a thunderstorm. WI2W, K5TED, and K2ZC rounded out the top five.

Steve, N2CEI led the rovers with an impressive 105K score. His grid total of 234 (216 on 6m) was only surpassed by K5QE's 235. Steve's original plans were to operate from eight grids, but Mother Nature changed her mind on Saturday night. Read more about Steve's trip in a sidebar elsewhere in the article. Mark, K2QO with Dick, K2ZR took second, with 2012 winner Darryl, WW7D third (see <http://tinyurl.com/ww7dCQWW13> for details), K9JK fourth (comments from his "Illinonly" rove can be found in the scatter comments on the web), and Mike, WB8BZK fifth. If my math is right, the rovers activated 35 unique grids worldwide.

The team at K5QE (K5QE, K5MQ, N5NU, N1XS, N5YA, N5KDA, KE5VKZ) were the Multi-Op champs with 185K. Marshall and crew started slowly but propagation got better as the contest went on. The K2LIM crew (KA2LIM, KB2YCC, WA3CSP, N2IK) made the most 2-meter contacts (198) on their way to second

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place. KBØHH with KAØKCI and KD5EKX finished in third, with W4MW fourth, and W3SO fifth.

Chris, W1MR and Curt, K9AKS again were the QRP leaders. While most scores went down a bit in 2013, Chris was able to increase his score by about 7,500 points. The battle for third was extremely close, with John, W4IX edging out Tom, K3TW by 10 points. John, WØPV finished in fifth, only 136 points ahead of Lisa, N6LB.

DX

While most US scores went down slightly, DX scores increased considerably in many areas and categories. Some of the increase is likely due to the increased interest and participation from Europe and Asia. The All Band race was hotly contested with the top four separated by less than 2,500 points and all five besting the top score last year. Antonio, CR5A ending up number one at 26.7K with Dusan, OK1DC edging Janos, HA3UU by 90 points for second. Nikolay, UXØFF was fourth and IW2NOD/4 fifth. All five beat the 2012 top score.

Six-meter scores were also up considerably from last year. Drago, S59A was the 2013 champ with a very fine 63K. 9A5Y was second, with 2012 champion

TOP SCORES
WORLD

All Band
CR5A 26,760
OK1DC..... 24,892
HA3UU..... 24,804
UXØFF 24,265
IW2NOD/4..... 19,976

6 Meters
S59A 63,358
9A5Y 46,248
E7ØT 45,288
EA8DBM 41,028
EI1A 29,853

2 Meters
OK1OUE 28,536
US1IY..... 6,344
UT5DV 4,898
HG5BVK/P 4,806
US4IEK 2,484

Hilltopper
HA2VR/P.....6,765
UW4I/P 6,028
HS9XDF/P 520
HS8JNF/P 468
HS8XKL/P.....246

QRP
HA5KDQ 16,240
HS6RMY 6,344
US6IF.....5,400
E21GJC 5,348
E22HUV 4,858

Rover
US3ITU/M 14,070
VE3RKS/R 2,145
PY2CDR/R.....448
F5MYK/MM 100
R8CAA/R 66

Multi-Op
HA6W.....128,982
HG1Z 62,988
UT1I/P.....45,441
UT5B.....43,920
VE7JH.....30,099

USA

All Band
K1TEO 135,372
K2DRH.....118,314
W4RX 101,378
N4BP 79,508
W1XX 65,076

6 Meters
NR5M.....146,688
W5PR.....138,567
WD5K.....69,496
K1TO.....68,226
K5ZG.....60,755

2 Meters
KN2GSP 266
N7LKL..... 190
W8DPK..... 120
KB3VSP..... 2

Hilltopper
ABØCD.....2,640
NØJK 1,665
WI2W 780
K5TED 350
K2ZC 126

QRP
W1MR 19,500
K9AKS 9,045
W4IX 4,794
K3TW 4,784
WØPV 4,312

Rover
N2CEI/R 105,768
K2QO/R 61,663
WW7D/R 52,771
K9JK/R 36,530
WB8BZK/R.....32,096

Multi-Op
K5QE 185,885
K2LIM.....129,192
KBØHH.....109,548
W4MW 106,377
W3SO 97,908

GRID LEADERS BY BAND
WORLD

Single Op 50 MHz
S59A.....158
EA8DBM.....156
9A5Y.....141
E7ØT.....136
CR5A.....115

144 MHz
OK1OUE.....58
UXØFF.....53
UR3EE.....38
US3ITU/M.....37
UT5DV.....31

Multi Op 50 MHz
HA6W 111
UT5B.....90
EE5SR 81
YU7W 81
HG7T 76

144 MHz
HG1Z 57
HA6W 55
HG6Z 43
9A5G.....38
UT5B.....31

USA

Single Op 50 MHz
NR5M.....192
W5PR.....187
K2DRH.....152
NØURW.....145
K5ZG.....145

144 MHz
K1TEO 41
W4RX.....39
K2DRH.....37
K2OS.....30
KG6IYN 24

Multi Op 50 MHz
K5QE.....181
W4MW 160
KBØHH.....156
NØMA.....133
KO3T.....131

144 MHz
K5QE.....54
K2LIM.....48
W3SO.....46
KBØHH.....23
KO3T.....18

QSO LEADERS BY BAND
WORLD

Single Op 50 MHz
S59A.....401
E7ØT.....333
9A5Y.....328
VE7XF.....305
EI1A.....279

144 MHz
HS1EFA 499
E29RZQ 444
E29AD 417
E22FFJ.....391
E21GJC.....382

Multi Op 50 MHz
HA6W 297
VE7JH 273
UT5B 243
YU7W 212
HG7T 163

144 MHz
HA6W 240
HG1Z.....224
HS4AK.....176
HG6Z.....171
9A5G 123

USA

Single Op 50 MHz
NR5M 764
W5PR.....739
N4BP.....572
WD5K.....511
K1TO.....497

144 MHz
K1TEO 170
KG6IYN 144
W4RX.....123
K2DRH.....103
K2OS.....68

MULTI OP 50 MHz
K5QE.....606
K2LIM.....371
KBØHH.....520
W4MW 421
W3SO.....309

144 MHz
K2LIM.....198
W3SO.....144
K5QE.....92
W4MW 90
KBØHH.....46

E70T third, EA8DBM fourth, and EI1A operated by Olivier, ON4EI in at number five.

Libor, OK1OUE used 1500 watts and lots of antennas to grab the top spot in the 2 -meter category with an excellent 28.5K score. Second place went to US1IY, with UT5DV third, HG5BVK/P fourth, and US4IEL fifth.

Gyula, HA2VR/P and Vlad, UW4I/P turned in fine scores in the Hilltopper category with Gyula emerging on top with a very good 6.7K score. Nice scores were turned in by HS9XDF/P, HS8JNF/P, and HS8XKL/P rounding out the top 5.

The 128K score by the ops at HA5W (HAØLZ, HA6ZFA, HAØMK, HAØHO, HA5OKU, HA6WX, HAØDU, HA6WP, and HAØLC) topped the DX Multi-op category. Their score was the #3 Multi-op score in the world, only behind K5QE and K2LIM. Nice job, guys. The HG1Z team finished second, with UT1I/P in third, UT5B fourth, and VE7JH fifth.

HA5KDQ operated by HA5IW led the DX QRP ops with a world second high 16.2K. Second place finisher HS6RMY made 70 more Qs but was only able to work 13 grids, compared to 70 for Simon. US6IF took third, followed by E21GJC and E22HUF.

Alex, US3ITU took the Rover title with a nice 14K score. Nice job, Alex. VE3RKS came in second and PY2CDR in third.

CQ WW VHF 2013 as N2CEI/R

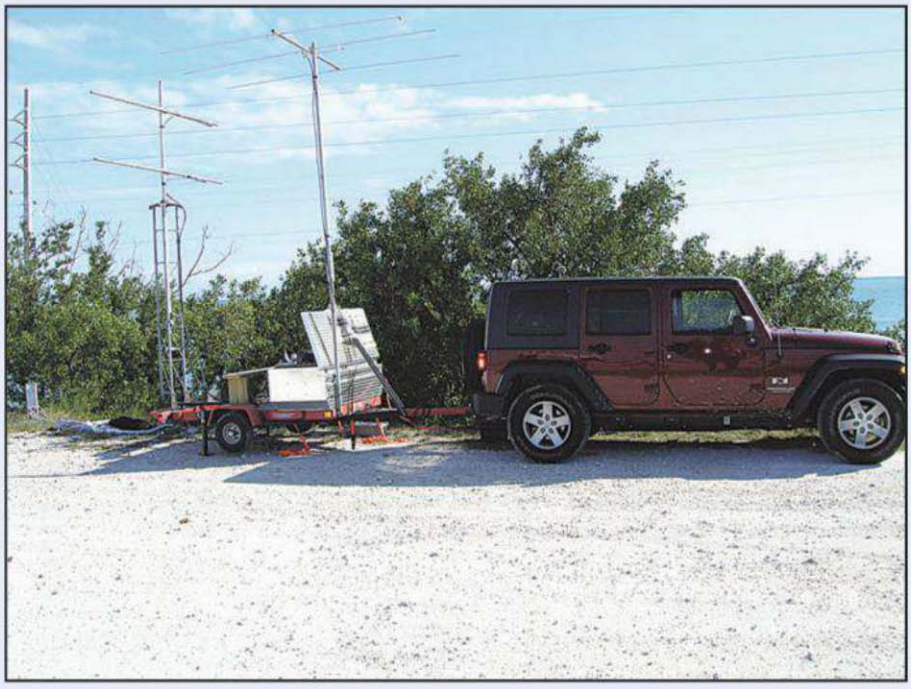
By Steve Kostro, N2CEI/R

Wanting to do something different for the contest this year, I got the Rover Rig ready for 6 and 2 meters and left Saturday morning of the contest for the four grid corner of EM90, 91, 80, and 81. This is located within the Okefenokee Swamp in south Georgia. The southeastern part of the US had been experiencing an above-normal amount of rain this summer, but the issue did not become reality to me until I turned onto the farm road I normally use. It was flooded! The road is used by large machinery and trucks for the crops, so with a 4×4 Jeep, it was useable as long as I didn't run into any deep water. The feature of this road is that it connects all four grids in the corner and is off the public road.

Setup was easy but the bands were dead until late afternoon, and of course, that's when the local rain showers started. As it got closer to sunset, 6 meters picked up but the rain came down harder. I operate an open trailer with a tarp, so when it rained hard, I closed the equipment box and drove to the next grid. I can travel slowly with the antennas extended, which turned out to be maximum speed on the flooded muddy road anyway! All was going well until I came across some deep water before I could cross into the last grid of the night, EM90. Well, I didn't try! I backtracked and re-operated in the three previous three grids. By 9 PM it stopped raining and the moonlight "woke up" the swamp life. I noticed that water I had crossed before was deeper now and the swamp was reclaiming the fields with me in them if I stayed, so I packed up around 10:30 local and hit the road. Six meters was still open.

My original contest plans were to go to eight grids, two separate four corners, but after gassing up and changing my wet clothes, I changed my plans. Missing EM90 was disappointing, so I headed for the EM90, 80, EL99, 89 corners instead of the four corners farther south. That would now give me six grids total instead of eight for this contest. There is a logging road that connects all four grids with a place to camp out in the Jeep over night. I think it was the right thing to do. I was ready at sunup and I re-operated EM80 then gave out three new grids until the band died a little after noon time. There was one nasty lightning storm that shut me down for almost 45 minutes but—had lots of fun! I may do it again next year with my roving partner K4SME.

Steve's well-thought-out rover operating position.

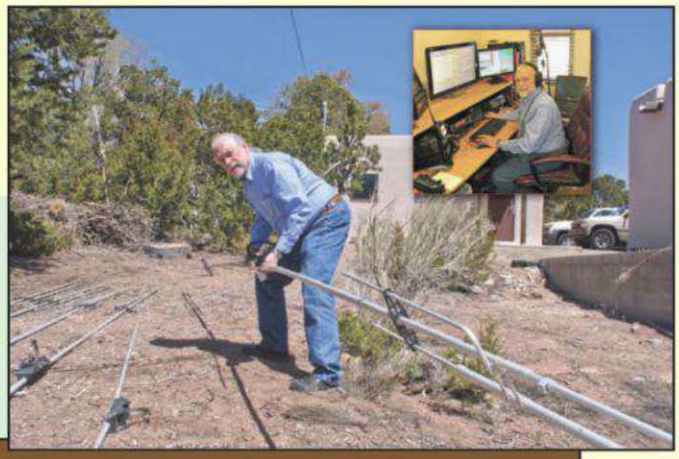


Here's the N2CEI rover rig.

CQ 2014-15 calendar

15 months of value
January 2014 through March 2015

$10.95 plus shipping



Fifteen spectacular color images of some of the biggest, most photogenic shacks and antennas from across the country and. . . new this year. . . we've included three Classic Radio and three CQ Contest pictures for good measure! These six shots, along with nine interesting and diverse Amateur Radio Operator's shacks from various locations across the country, comprise what we're sure you'll agree is our best calendar to date!

As in the past, 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 2014 - March 2015) is truly a must have!

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CLUB COMPETITION

(Minimum of 3 entries required for listing)

UNITED STATES

Club Name	# Entries	Score
POTOMAC VALLEY RADIO CLUB	25	397,285
FLORIDA CONTEST GROUP	12	302,783
PACIFIC NORTHWEST VHF SOCIETY	26	239,710
NORTH EAST WEAK SIGNAL GROUP	7	214,858
SOCIETY OF MIDWEST CONTESTERS	14	196,343
FLORIDA WEAK SIGNAL SOCIETY	4	180,252
DFW CONTEST GROUP	5	176,558
GRAND MESA CONTESTERS OF COLORADO	8	134,137
CAROLINA DX ASSOCIATION	9	117,218
BADGER CONTESTERS	9	98,884
CTRI CONTEST GROUP	3	84,213
COLD BROOK CONTEST CLUB	3	72,568
ALABAMA CONTEST GROUP	4	65,393
ARIZONA OUTLAWS CONTEST CLUB	9	54,828
NORTHERN CALIFORNIA CONTEST CLUB	12	47,510
YANKEE CLIPPER CONTEST CLUB	14	44,446
NORTHERN LIGHTS RADIO SOCIETY	4	36,971
FRANKFORD RADIO CLUB	5	33,775
SOUTH EAST CONTEST CLUB	5	29,992
BRISTOL (TN/VA) ARC	5	14,576
MAD RIVER RADIO CLUB	4	13,766
NORTH COAST CONTESTERS	3	13,116
KANSAS CITY DX CLUB	3	11,974
HUDSON VALLEY CONTESTERS AND DXERS	5	10,057
PORTAGE COUNTY AMATEUR RADIO SERVICE	3	7,938
MERIDEN ARC	3	7,275
MINNESOTA WIRELESS ASSN	6	6,583

DX

UKRAINIAN VHF INTERNATIONAL CONTEST CLUB	19	128,366
UKRAINIAN CONTEST CLUB	19	54,395
ORCA DX AND CONTEST CLUB	4	39,274
CONTEST CLUB ONTARIO	9	38,355
BERGEN ARA	5	28,903
BLACK SEA CONTEST CLUB	5	13,439
RHEIN RUHR DX ASSOCIATION	3	6,597
BAVARIAN CONTEST CLUB	3	6,330
YO DX CLUB	3	1,529
CDR GROUP	7	1,472

Here are a few words from the custodian of records, K9AKS. Curt will update the records pages at <www.cqww-vhf.com> by the time this article is published.

In the all-band entry category, USA winner K1TEO attained his highest score ever, 135k (not counting the exceptional year of 2006, when scores skyrocketed in many parts of the country). Two rather high scores, and country records, were attained by IW2NOD/4 in Italy (19.9k) and HA3UU in Hungary (24.8k).

As usual, the 6-meter-only category was not only popular but also generated some fine scores. In the USA, NR5M and W5PR both worked over 700 QSOs on 6, over 100 more than any other station in any category, and W7JW in Michigan reached the highest score ever in 8-land, 38.5k. The all-time highest score from Africa, 41k, was posted by EA8DBM, and S59A's 63.3k was the third highest ever reached in Europe. Two nice scores from Ireland—EI1A (ON4EI op) (29.8k) and EI9FBB (27k)—were by far the highest ever recorded from that country.

In the Multi-Operator category K2LIM broke their own 2-land record with a 129k performance. Significant state record scores were made by W4MW in North Carolina (107k) and NØMA in

Operating the VHF Contest from Thailand

By Champ Muangamphun, E21EIC

This was the 17th year of CQ WW VHF Contest in Thailand. The first year of this contest in Thailand was 1996 and at that time I was still a student at high school. The CQ WW VHF Contest is very popular for Thai VHF hams. We now have around 300,000 VHF hams in Thailand who use 144–146 MHz and only in FM mode.

For the last two to three years, the Radio Amateur Society of Thailand (RAST) has sent a request to the National Broadcasting and Telecommunication Commission (NBTC) asking for permission for Thai hams to be able to operate on 6 meters. We finally got a special permit from NBTC which allows Thai hams to operate on 6 meters during the CQ WW VHF Contest but only for all club stations in Thailand, which normally only have 2-meter permission.

Thailand's CQ WW VHF Contest 2013 had a total of 32 stations and only three stations operated on 6 meters: HSØAC, HS4AK, and HS5AM. Just before the contest, these three stations set up the 6-meter antennas. HSØAC used a 6el Yagi, HS4AK used 2×6el Yagis, and HS5AM used a 3el quad.

Saturday morning Thailand time was when we could start operating 6 meters according to the license received from NBTC. All three stations started at almost the same time and got more than 200 QSOs. But during the contest period, which started Sunday morning Thailand time, 6-meter propagation was so bad that they got only a few QSOs.

For the 2-meter band all enjoyed the operation and many new Thai hams joined this contest for the first time. The Thailand prefix HS is no longer available since the beginning of year 2013. Now we have no call areas, which mean all Thai hams will get a call by a running process no matter which location they are in. The current call is now E23MXX.

In Thailand the CQ WW VHF Contest is still popular for hams who study in university. Many thanks to *CQ* for understanding the importance of the VHF contest.

The 6-meter antenna array being set up.

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75 Amps maximum and 70 Amps continuously. Adjustable voltage 4.0-16 VDC. Short circuit, overload and over-temperature protection, 10.5 lbs. 9¾Wx5½Hx9½D". Great for Ameritron's ALS-500M mobile amplifier!

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Power multiple Transceivers/accessories from a* single *DC power supply . . . Keeps you neat, organized and safe . . .Prevents fire hazard . . . Keeps wires from tangling up and shorting . . . Fused and RF bypassed . . . 6 foot, 8 gauge color coded cable . . .

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MFJ-1116, $59.95. 8 pairs binding posts, 15A total.Voltmeter, on/off switch.

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MFJ-1117, $64.95. Powers *four* transceivers simultaneously (two at 35 Amps each and two at 35 Amps combined). 8x2x3 inches.

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MFJ-1128, $104.95. 3 high-current outlets for transceivers. 9 *switched* outlets for accessories. Mix & match included fuses as needed (one-40A, one-25A, four-10A, four-5A, three-1A fuses installed). 0-25 VDC *Voltmeter*. *Extra* contacts, fuses. 12Wx1¼Hx2¾D".

MFJ-1126 **$84.95**

MFJ-1126, $84.95. 8 outlets, each fused, 40 Amps total. Factory installed fuses: two 1A, three 5A, two 10A, one 25A, one 40A. *0-25 VDC Voltmeter*. Includes *extra PowerPoles®*, *extra* fuses -- *no extra cost*. 9Wx1¼Hx2¾ inches.

MFJ-1129 **$114.95**

PowerPoles™ AND 5-Way Binding Posts

MFJ-1129, $114.95. 10 outlets each fused, 40 Amp total. 3 high-current outlets for rigs -- 2 *PowerPoles®* and one 5-way binding post. 7 *switched* outlets for accessories (20A max) -- 5 *PowerPoles®* and 2 binding posts. Fuses include (1- 40A, 2-25A, 3-10A, 3-5A, 2-1A installed). *0-25 VDC Voltmeter*. Includes extra *PowerPoles®* and fuses, 12½Wx1¼Hx2¾D inches.

MFJ-1124 **$64.95**

MFJ-1124, $64.95. 6 outlets each fused, 40 Amps total. 4 *PowerPoles®*, 2 high-current binding posts, Installed fuses: 1-40A, 2-25A, 2-10A, 1-5A, 1-1A. Includes extra *PowerPoles®* & fuses -- *no extra cost*.

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15 Amps continuous, 17 Amps max at 13.8 VDC. Over-voltage, over-current protection. 5-way binding posts. Load fault indicator and automatic shutdown. 90-130 VAC input. 1½ lbs. Tiny 3¾Wx2¼Hx3¾D inches fits easily in an overnight bag.

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MFJ-4035MV **$149.95**

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The Unofficial "Left Coast" Report . . .

By Bruce Kripton, KG6IYN

Saturday morning 0600, I departed from home to go to the hilltop contest location (otherwise known as my "secret, above ground lair" with intentional Dr. Evil intonations). I had my daughter Kira, an aspiring soon-to-be-ham radio operator and contester with me, as she wanted to run the computer and do the logging effort for the contest. My son Robert was also along for the ride, as he likes spending time on the hill exploring and doing photography of the event.

We arrived on Los Pinos Mtn., CA (4900 ft. ASL, DM12rr) at approximately 0715 AM local time to find that an approaching storm front was generating winds and gusts ranging from 25 to 50 MPH. This is not unusual for this location, but I have always been able to find "gaps" to set up and or tear down for a contest. We waited until about 0830 local time for any break in the winds, but with none found, moved ahead with assembling and staging the M^2 'JHV, Cushcraft 13B2's, keeping them lowered in hopes the weather would taper off. With 1030 hours approaching, we decided to put up the 13B2's, with a wrestling match and both of the "harmonics" helping with the guy lines. At 1130 we did the same for the 'JHV, which was much more exciting in the high winds than the 2-meter beams. We had everything done and secured shortly thereafter, and almost as if on cue, and as if the weather had given in to our refusal to admit defeat, all winds died down immediately.

Radios, rotor controls, and computer were set up in the vehicle. I had the radios, Kira had the computer for logging ... modest openings in to the Pacific Northwest, along with "local" traffic on 6 meters. Es died out for about an hour or so, leaving us to work the locals on 6 and 2 until about 0120 GMT when the band opened back up on 6 meters into the Pacific Northwest, Idaho, Oklahoma, Kansas, Ohio, Maryland, North Carolina, and more. . . . Although the contest for us was almost all PNW, the handful of one plus and double-hop contacts and grid squares kept it interesting.

On a side note, many thanks to all of the Canadian ops who were on the air for the contest: VE7XF, VE7JH, VE7FPO, VE7FFW, VE7DAY, VE7CX, VE7CUS, VE7BEE, VE6PL, VE6JMB, VE6CPP, and VE6BEE. Great to have worked you from DM12rr.

Also interesting was the light and random Es conditions, especially for this late in the season and on 2 meters. From this location it's an "easy" shot for almost all adjacent grid squares and the next ones beyond. It's also fairly easy working into Phoenix (330 miles east, roughly) with little to no enhancement and into the San Francisco Bay Area (500+ miles to the north)with light to moderate Es. This weekend we were extremely pleased to work "unofficial" rovers that happened to be on the air travelling to Arizona from San Diego, as well as surprised home operators in Fresno and farther north in California, as well as Nevada and Utah, which is a tough shot over the higher local mountains from this location. As such, between tropo and the favorable although sporadic Es, the 2-meter score was better than I think I have ever turned in for this contest. Also important were all of the FM operators who were supporting a regional drill and were pleasantly surprised they were able to make contacts from Imperial Valley back in to San Diego.

The KG6IYN setup on top of Los Pinos Mtn.

The contest setup started with winds delaying setup, was interrupted twice for thunderstorms (unplug coax and rotor controls, move vehicle away from the antennas until the lightning and rain cleared), and ended roughly an hour early Sunday for another round of rain and thunderstorms. While the lightning did subside, the rain did not, so tear down was conducted solo, while the harmonics watched from the fire lookout tower where it was warm and dry. It was not until 6 PM local time when I was done, gear packed, and the last antenna strapped down on the roof of the SUV when the weather completely cleared up. Go figure :-)

Thanks to everyone who participated and were on the air supporting the event. Thanks to my two children for setting up and hanging in there with me . . . Robert for taking the photos, and Kira for running the computer (she apologizes in advance for any logging errors that might have occurred; this was her second run at doing this and there's nothing quite like the excitement of a 12-year-old daughter when she hears a station calling and says "Dad ! That's a new grid square we don't have yet!"). This is still my favorite VHF contest, and I'd have to check to make it official, but I believe I started this contest in either 2003 or 2004, with only one year missed due to a family event :-).

Thanks to *CQ* magazine and all of those who help make this event happen each year. We'll "see" you all next year!

Iowa (44.6k), and KBØHH broke their own state record from 2012 (61k) with a 109k score. In Canada, VE7JH's 30k score came close to the all-time Canadian Multi-op record by VE7DXG in 2000 (32k).

HA2W's 128k score more than tripled the previous high in Hungary.

In the QRP category, HA5KDQ posted the third-highest QRP score in the history of the contest in Europe, 16.4k. In the USA, N6LB's 4.1k score from Washington was the second highest ever in 7-land. The 2-meter QRP multi-op crowd in Thailand was very active and very productive. Three of them made over 400 contacts on 2 meters and several others over 200. Totals like that on 2 meters, for stations in any category, are occasionally reached in Europe, but rarely elsewhere. The highest 2-meter total in the USA this year, 198, was attained by the multi-op group at K2LIM.

Other Stuff

There were 68.5K QSOs reported in the logs. Of these, 53.8K were 6-meter Qs with the remainder on 2 meters. About a third of the 2-meter Qs (4800) were made in Thailand. There were 417 different grids active at some point during the contest period, up from 368 in 2012. There were entries from all continents with 506 from North America, 213 from Europe, 81 from Asia, 16 from South America, 5 from Africa, and 2 from Oceania. Logs were received from 56 countries plus 1 maritime mobile station.

Please send in your log. All logs (including paper ones) are greatly appreciated. If you are still paper logging and have a computer, there are several "free" contest logging programs that are available that are easy to set up, will generate the Cabrillo file required, and don't require high-power computers. If you are using a DX logging program and it does not generate a Cabrillo file, you can send an ADIF file directly to me and I can convert it to the right format as long as it has all of the required information. Electronic log submission is relatively quick and painless. As long as your log is in Cabrillo format and you have filled out the header fields correctly, your log will go through on the first try. If you do get a reject notice, read the note at the bottom of the e-mail. It will tell you what is wrong. Often it is just something minor that you can change quickly and resubmit. If you go to <http://www.cqww-vhf.com/logs.htm>, you can find the answers needed to fix the errors. Some of the most common errors are using 6 and 2 for the CATEGORY-BAND: field instead of 50 and 144. The robot will send you an error message that it does not recognize 6 or 2 as valid bands and change your log to an All Band entry. This could result in your log being placed in the wrong category. Warnings about club names are just warnings. The club name you list will not be deleted. The message is only telling you that your club name is not listed in the master CQ Contest Club database. Send me an e-mail with your club's name and it can be added to the database. If you need help submitting your log please send me an e-mail.

There appears to be a bit of confusion about the use of spotting assistance during the contest. Assistance ***is*** allowed in ***all*** categories as long as you don't spot yourself. Those using EME/MS can post only your call, the sequence, and your frequency.

Thanks to K9JK, K9AKS, E21EIC, and UT1IC for their invaluable assistance. Curt, K9AKS maintains the contest records, John, K9JK prints all of the certificates, and they answer my dumb questions and keep me reasonably in line. Champ, E21EIC and Yuri, UT1IC have really been promoting the contest in their countries and working hard to get logs into the system. Thanks to all for your efforts for the contest. Also again thanks to Dave, W3KM for his excellent software support.

The 2014 running of the CQ WW VHF contest will be July 19–20. Rules can be found on the *CQ* magazine website at <http://www.cq-amateur-radio.com/cq_contests/cq_ww_vhf_contest/index_cq_ww_vhf_contest.html>. If you haven't tried the contest, you should. If we get a good 6-meter opening, the band will sound like 10 meters did in 2013 CQ WW DX SSB contest. If you are an HF contester and have not tried a VHF contest, give it a shot. Many of the newer radios include 6 meters and it doesn't take much of an antenna to make lots of contacts if the band is open. Hope to see you on.

73, Steve, N8BJQ

Can the speaker you use with your rig make signals easier to copy? Yes, if it has digital signal processing (DSP) built in. WB6NOA checks out the latest offering from British manufacturer bhi.

CQ Reviews:

bhi Desktop Amplified DSP Base Station Speaker

By Gordon West,* WB6NOA

An external speaker—especially an amplified speaker—is an easy way to enhance the audio output performance of your base station HF transceiver. Enjoy "armchair copy" with full fidelity sounds with a speaker system specifically tuned for base station use.

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Beyond a more full sounding output, you could add up to 10 watts of audio output for older transceivers, too. Older transceivers without *digital signal processing* can now accommodate audio frequency DSP in one neat base station package.

We tested the bhi Desktop speaker with my new Kenwood TS-990 base radio (photo A), as well as some of my older Swan, Collins, and some very old Hallicrafters shortwave receivers. The acoustic audio output from the bhi speaker was amazing!

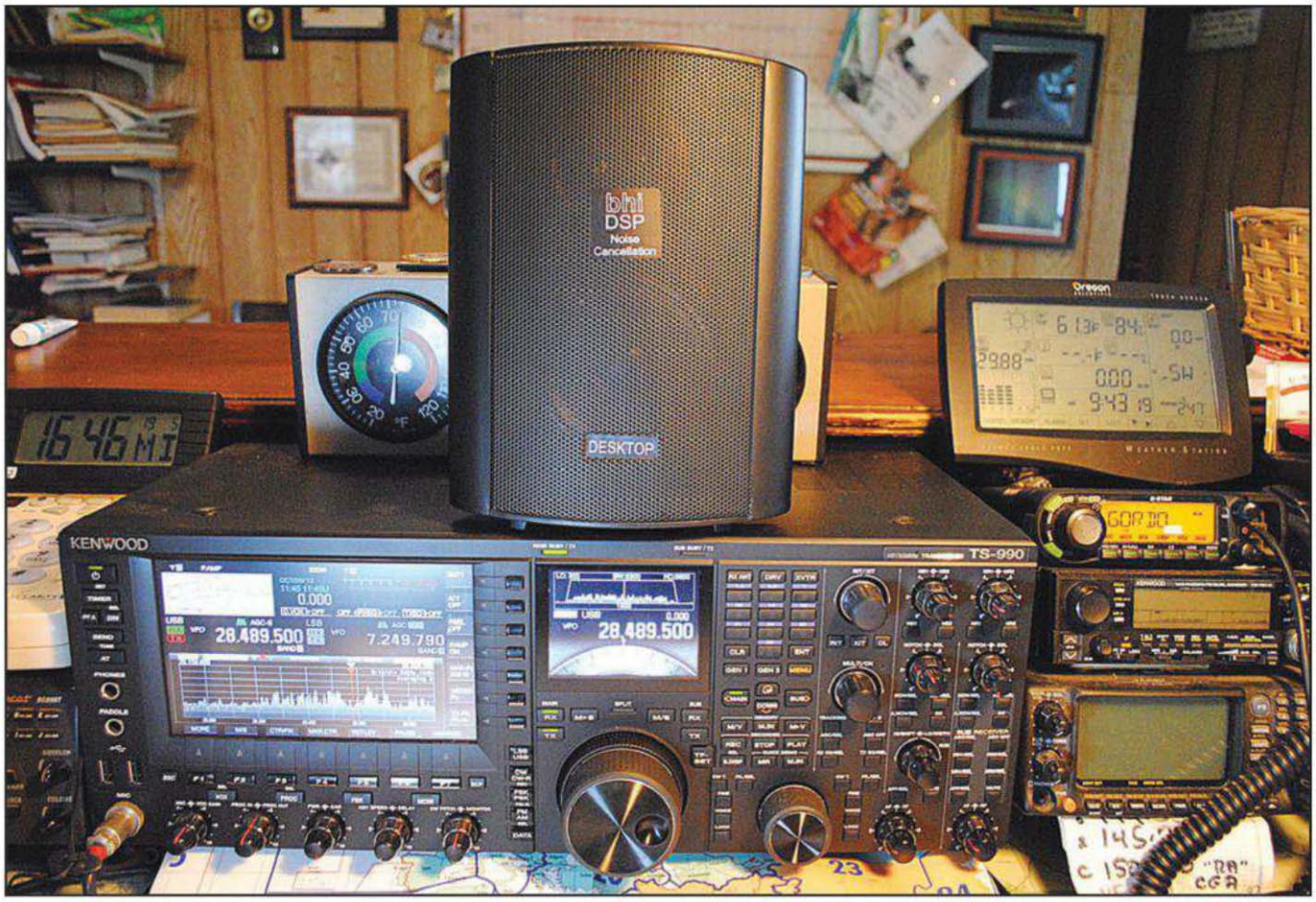


Photo A. The bhi Desktop amplified DSP speaker hooked to the author's TS-990 transceiver. Since the 990 has DSP built in, in this setup, the speaker's DSP is turned off. (Photos by the author)

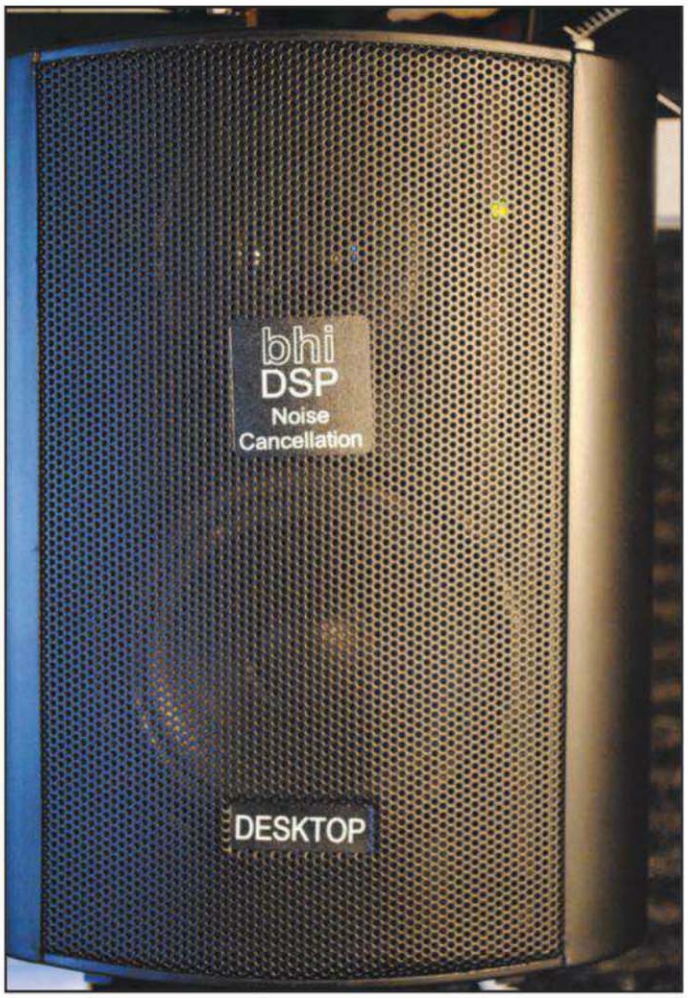


Photo B. Front view of the Desktop speaker. Note the green LED at the upper right, indicating that the speaker is powered on.

Photo C. Side view, showing volume and filter level controls, along with a headphone socket if you want to get the benefits of audio DSP while using a headset.

This speaker system from bhi, out of England but sold in the USA by GAP and W4RT, is their finished product after a year of testing an earlier model.

A Brief Tour

"The bhi Desktop speaker has a 4-inch bass driver and a 1-inch tweeter with 10 watts of amplified DSP noise canceling capability," comments Graham Somerville, Managing Director of bhi.

LEDs illuminate red if the speaker is off, green when the speaker is on (see photo B), and red blinking if you are pumping too much audio from your radio into the speaker input. The volume and DSP level knobs on the side of the speaker (photo C) each have an additional push-button control. Pressing the volume control knob will turn the speaker on and off. When switching back on, the speaker will go to the last stored setting.

Pressing the filter level control switches DSP noise filtering on and off. There are also four tone settings for the audio—off, low, medium, and high. By pressing and holding the volume control, you can select the most pleasing tone out of the speaker.

If you forget and leave the speaker on after you turn off the radio, the Desktop will go into a sleep mode until you next turn on your radio.

The speaker runs on 12 volts DC, drawing about 2 amps at moderate volume output. A headphone jack allows you to take advantage of the internal DSP, and, when plugged in, cuts out the speaker audio.

You can drive the speaker from a low level stereo line out jack, or from the more conventional speaker jack (photo D). I found the speaker jack allowed me to keep the amplifier within the speaker unit turned down low, for some very nice loud output. On line out, more speaker amplification is required, and this raises the potential of transmitted RF getting back into the speaker system. More about this later. According to Somerville, the line out was mainly added to match the new breed of SDR radios like the Flex 1500 and Eleckraft KX3, which have line-level outputs.

If you have an older rig, you will be impressed with how DSP takes a second or two to first analyze background noise, and then pull the noise away from voice or CW signals way down in the background. If you're working this into a modern transceiver that has built-in DSP capability, simply turn off the external Desktop speaker's DSP to enjoy the "armchair copy" audio out, without the need for headphones.

"Under the Hood" (or Should We Say "Bonnet"?)

"With eight steps of adjustable digital signal processing," explains Somerville, "our DSP circuit analyzes the signal in each of several sub-bands to differentiate between speech and noise. It then removes the noise and passes through both

voice and CW information. The amount of noise removed depends on the filter level setting between 9 and 35 dB."

The actual audio frequencies within receiver-recovered single or double sideband are far too complex for a non-agile DSP chip to perform "magic." However, white noise and constant background static are quite predictable. This is where the noise subtraction "magic" takes place, allowing voice and CW to pass with little attenuation.

The beat-canceling feature of this DSP base station speaker was well-designed by bhi, allowing CW dits and dahs to pass through easily while steady carriers are blocked. As long as operators are using the Farnsworth method of sending CW (in which the letters are sent at a faster rate than the words, with spacing used to slow things down), the DSP circuit knows the difference between Morse code and a tuner-upper.

The amplified speaker output specifically enhances voice intelligence frequencies around 1,000 Hertz and lower. This saves your ears from high crackles, but don't expect this speaker system to produce high fidelity concert hall lows and highs. It does mid-range best.

RF Feedback Issues

We tested the bhi Desktop speaker on a transceiver tied into an off-center-fed Windom. The Windom had acceptable SWR dips on most of the ham bands, with 15 meters *always* problematic with OCF antennas, because it is not naturally resonant with any of the other bands showing low SWR.

Some built-in automatic antenna tuners will match 15 meters, and, of course, a manual tuner will provide a transceiver "match" on nearly any frequency. The reflected waves are still coming back down the outside of the coax, and as with most any amplified speaker system, you will hear yourself, on transmit, coming back through the speaker system. bhi's Somerville notes that "We have found that by using a separate power supply the chance of RF breakthrough is reduced quite significantly."

Ferrite beads on all exposed wiring, plus internal filtering within the bhi Desktop, also help to mitigate transmit modulation getting back into the speaker. The bhi Desktop was clean when SWR on the line was low, but with elevated SWR on the coax leading to your transceiver, transmit audio was noticeable. So, match your antenna system up at the antenna feed point, follow the tips above and you won't hear a peep out of this speaker on transmit!

Closing Notes

I am regularly asked whether audio DSP from an external DSP amplified speaker on top of the transceiver's IF DSP will provide additional signal improvement. Answer: Not really. If you have a radio with built-in IF DSP, bypass the DSP circuit in the bhi speaker, and enjoy great audio output. However, if your transceiver has no DSP, then enjoy the amplified circuit in the bhi Desktop. You will be impressed with how the DSP circuit scrubs constant white noise and magically pulls up the signal for improved clarity. Retail price is approximately $240 US.

To see the complete lineup of bhi audio products visit <http://www.bhi-Ltd.com>. All of itsr products are sold in the U.S. by GAP Antennas (<http://www.gapantenna.com>), and by W4RT Electronics. (<http://www.w4rt.com>).

what's new

Pasternack's new low-loss test cables are available with N, TNC or SMA connectors. (Courtesy Pasternack Enterprises)

Pasternack Low Loss Test Cables

Pasternack Enterprises has introduced a new line of low loss test cables rated to 18 GHz. The company says these low loss, expanded dielectric coax cables, coupled with durable stainless steel Type N, TNC, and SMA connectors, are ideal for test environments where a rugged, phase stable cable assembly is required.

The cables are made from a specially designed 0.3 inch diameter coax which results in 83% Velocity of Propagation (VoP) and may be useful for applications including prototyping and antenna range testing. The cables may be ordered in custom lengths and are also available in standard lengths from 12 to 60 inches, as well as several metric lengths. For more information, visit <http://bit.ly/19XsPjY> or call 1-949-261-1920.

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. The purpose of "What's New" is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

Photo D. Rear view showing speaker level inputs on the bottom row of connectors, with line level input at upper left and power connector at upper right.

Announcing:

2014 Nominations Open for the *CQ* Amateur Radio, DX, and Contest Halls of Fame

Each year *CQ* recognizes those who have made significant contributions to amateur radio in general, and to DXing and contesting in particular, creating three categories of awards. Nominations for all three Halls of Fame are now open and will close on **March 1, 2014.**

CQ Amateur Radio Hall of Fame

Amateur radio operators have been responsible for many advances in communications technology, and entire industries have been built on the foundation of amateur radio experimentation and activity. In an effort to recognize outstanding amateurs and their achievements, and help the public appreciate the far-reaching and long-standing value of amateur radio in our society, we have established the *CQ* Amateur Radio Hall of Fame. Nominations for the 2014 "class" are now open. Members of the 2013 "class" were announced last May and appeared in the July issue of *CQ*.

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

Nominations for the Amateur Radio Hall of Fame may be made by clubs, organizations, or individuals. State your candidate's name, where to contact him/her if still living, for which category you are nominating him/her, and a brief one- to two-paragraph description of this person's accomplishments. Please include your name and contact information as well. E-mail to <hall-of-fame@cq-amateur-radio.com> or mail to *CQ* Amateur Radio Hall of Fame, 25 Newbridge Rd., Hicksville, NY 11801. The official nomination form is on the *CQ* website <www.cq-amateur-radio.com>. *Please indicate in your e-mail subject line for which hall of fame the nomination is being submitted.*

CQ DX and Contest Halls of Fame

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

A maximum of two (2) people may be inducted into each hall of fame (DX and contest) each year. Nominations for the CQ Contest and DX Halls of Fame should be directed to CQ DX Hall of Fame or CQ Contest Hall of Fame, 25 Newbridge Rd., Hicksville, NY 11801; or via e-mail to <hall-of-fame@cq-amateur-radio.com>. *Please indicate in your e-mail subject line for which hall of fame the nomination is being submitted.*

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

We will announce this year's selections at the Dayton Hamvention® in May. Please help us recognize these "ham radio heroes" whose contributions have helped shape our hobby, our nation, or our world. Remember, the nomination deadline for all three CQ Halls of Fame is **March 1, 2014**.

Announcing:

The 2014 CQ World-Wide WPX RTTY Contest

February 8–9, 2014
Starts: 0000 UTC Saturday Ends: 2359 UTC Sunday

I. OBJECTIVE: For amateurs world wide to contact as many amateurs and prefixes as possible during the period of operation.

II. PERIOD OF OPERATION: 48 hours. Single Operator stations may operate 30 of the 48 hours – **off times must be a minimum of 60 minutes** during which no QSO is logged. Multi-operator stations may operate the full 48 hours.

III. BANDS: Only the 3.5, 7, 14, 21, and 28 MHz bands may be used. **Observance of established band plans is strongly encouraged.**

IV. EXCHANGE: RST report plus a progressive contact serial number starting with 001 for the first contact. Note: Multi-Two and Multi-Unlimited entrants use separate serial number sequences on each band.

V. SCORING:

A. Score: The final score is the result of the total QSO points multiplied by the number of different prefixes worked.

B. QSO Points. A station may be worked once on each band for QSO point credit:

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

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

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

C. Prefix Multipliers: The prefix multiplier is the number of valid prefixes worked. Each PREFIX is counted only once regardless of the band or number of times the same prefix is worked.

1. A PREFIX is the letter/numeral combination which forms the first part of the amateur call. Examples: N8, W8, WD8, HG1, HG19, KC2, OE2, OE25, LY1000, etc. Any difference in the numbering, lettering, or order of same shall count as a separate prefix. A station operating from a DXCC entity different from that indicated by its call sign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation, the portable designator will then become the prefix. Example: N8BJQ operating from Wake Island would sign N8BJQ/KH9 or N8BJQ/NH9. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (/W8, /AD8, etc.). Portable designators without numbers will be assigned a zero (Ø) after the second letter of the portable designator to form the prefix. Example: PA/N8BJQ would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or other license class identifiers do not count as prefixes.

2. Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

VI. ENTRY CATEGORIES:

A. Single Operator Categories: All operating and logging functions are performed by one person (the operator). Only one transmitted signal is permitted at any time.

1. Single Operator High (ALL BAND or SINGLE BAND): Total output power must not exceed **1500 watts.**

2. Single Operator Low (ALL BAND or SINGLE BAND): Total output power must not exceed **100 watts.**

3. Single Operator QRP (ALL BAND or SINGLE BAND): Total output power must not exceed **5 watts.**

B. Single Operator Overlay Categories: Single Operator entrants may **also** submit their log for **one** of the categories shown below by adding an additional line in the Cabrillo log file header called CATEGORY-OVERLAY. All Overlay entries are grouped into high power and low power in the results.

1. Tribander/Single Element (TB-WIRES): During the contest an entrant shall use only one (1) tribander (any type, with a single feed line from the transmitter to the antenna) for 10, 15, and 20 meters and single-element antennas on 40 and 80 meters.

2. Rookie (ROOKIE): To enter this category the operator must have been licensed as a radio amateur three (3) years or less on the date of the contest. Indicate the date first licensed in the SOAPBOX field.

C. Multi-Operator Categories (All Band, High power only): More than one person can contribute to the final score during the official contest period. Select category based on number of transmitted signals. Total output power of each transmitted signal must not exceed **1500 watts.**

1. Single-Transmitter (MULTI-ONE): Only one transmitted signal is permitted at any time. A maximum of ten (10) band changes may be made in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a single serial number sequence for the entire log.

2. Two-Transmitter (MULTI-TWO): A maximum of two transmitted signals is permitted at any time on two different bands. Both transmitters may work any station. A station may only be worked once per band regardless of which transmitter is used. **The log must indicate which transmitter made each QSO** (column 81 of CABRILLO QSO template for CQ contests). Each transmitter may make a maximum of eight (8) band changes in any clock hour (00 through 59 minutes). Use a separate serial number sequence for each band.

3. Multi-Transmitter (MULTI-UNLIMITED): A maximum of five transmitted signals, one per band, at any one time. Five bands may be activated simultaneously.

Use a separate serial number sequence for each band.

VII. AWARDS: Only logs submitted in electronic format are eligible for awards. A single-band log will be eligible for a single-band award only.

To be eligible for an award, a Single Operator station must show a minimum of 4 hours of operation. Multi-operator stations must operate a minimum of 8 hours.

A. Plaques are awarded to recognize top performance in a number of categories. View the current list of plaques and sponsors at <www.cqwpxrtty. com/plaques.htm>.

Only one plaque will be awarded per entry. A station winning a World plaque will not be considered for a sub-area award. That award will be given to the runner-up for that area if the number of entries justifies the award.

B. Certificates will be awarded to the highest scoring station in each category listed under Section VI:

1. In every participating country.

2. In each call area of the United States, Canada, Russia, and Japan.

3. At the discretion of the contest director second- and third-place awards may be made.

VIII. CLUB COMPETITION: A plaque will be awarded each year to the club that has the highest aggregate score from logs submitted by its members. To be listed in the results, a minimum of three logs must be received from a club.

A. The club must be a local group and not a national organization (e.g., ARRL or DARC).

B. Participation is limited to members residing in or operating from a local geographic area (except for DXpeditions conducted by members living within the defined club geographic area). Club contributions from DXpedition scores are a percentage of the number of club members on the DXpedition.

C. Single-operator entries can only contribute to one club. Multi-operator scores may be allocated to multiple clubs as a percentage of the number of club members participating in the operation. Please spell out the full club name in your entry.

IX. GENERAL RULES FOR ALL ENTRANTS:

A. Entrants must operate within the limits of their chosen category when performing any activity that could affect their submitted score.

B. A different callsign must be used for each entry. Only the entrant's callsign may be used to aid the entrant's score.

C. Do not exceed the total output power limitation of the chosen category on any band. Total output power on any band at

any time is measured at the output of the active amplifier(s).

D. Self-spotting or asking to be spotted is not permitted.

E. Use of QSO alerting assistance is permitted in all categories.

F. The **station location** is where all transmitters, receivers and antennas are located. All transmitters and receivers must be within a single 500-meter diameter circle. Antennas must be physically connected by RF transmission lines to the transmitters and receivers.

G. All operation must take place from one station location. Remote operation is permitted if the physical location of all transmitters, receivers, and antennas are at one station location. A remotely operated station must obey all station license, operator license, and category limitations.

H. Remote receivers outside the station location are not permitted.

I. Only one signal on a band is allowed at any time. When two or more transmitters are present on the same band, a hardware device MUST be used to prevent more than one signal at any one time. Alternating CQs on two or more frequencies on a band is not permitted.

J. All requests for contacts, responses to calls, and copying of call signs and contest exchanges must be accomplished during the contest period using the mode and frequencies of the contest.

K. Correction of logged call signs and exchanges after the contest by using any database, recordings, email or other methods of confirming QSOs is not allowed.

L. Call signs logged must be the same as those exchanged over the air by the entrants during the QSO.

X. LOG INSTRUCTIONS: Electronic submission of logs is **required** for all entrants who use a computer to log the contest or prepare contest logs.

A. The log MUST show the following for each contact: correct date and time in UTC, frequency (or band), call sign of the station worked, exchange sent, and exchange received. A log without all required information may be reclassified to Checklog. Contacts should be logged immediately as they are completed. Stations competing for World and Continent awards should provide accurate frequencies for all contacts in the log.

B. Single band entrants are required to include all contacts made during the contest period, even if on other bands. Only contacts made on the band specified in the Cabrillo header or summary sheet will be considered for scoring purposes. Logs with contacts only on one band will be classified as single band entries.

C. The CABRILLO file format is the standard for logs. See <www.cqwwrtty.com/logs.htm> for detailed instructions on filling out the CABRILLO file header. Failure to fill out the header correctly may result in the entry being placed in the wrong category or reclassified as a Checklog. Note: U.S. stations must indicate the station location in the CABRILLO header (e.g., LOCATION: OH).

D. E-mail or Web upload is the expected method of log submission. Logs in CABRILLO format should be sent to <rtty@cqwpx.com>. Include only the entry call sign in the "Subject:" line of the e-mail. Web upload of logs is available at <www.cqwpx.com/ logcheck/>. All logs received will be confirmed via e-mail. A listing of logs received can be found at www.cqww.com.

E. Instructions for NON-CABRILLO electronic logs: If you are not able to submit a CABRILLO format log, please contact the Contest Director for assistance with submitting another format.

F. Instructions for paper logs: Paper logs may be mailed to CQ WPX RTTY Contest, P.O. Box 1877, Los Gatos, CA 95031-1877, USA. Each paper log entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the entrant's name and mailing address in BLOCK LETTERS.

XI. LOG DEADLINE:

A. All entries must be sent WITHIN FIVE (5) DAYS after the end of the contest, no later than 2359 UTC 14 February 2014. Resubmitting an entry after the deadline will result in it being considered as a late log.

B. An extension may be requested by e-mail to <w0yk@cqwpxrtty.com>. The request must state a legitimate reason and must be received before the log deadline. Extensions are granted only upon confirmation by the Contest Director.

C. Logs submitted or postmarked after the deadline may be listed in the results, but are not eligible for awards.

XII. JUDGING: The CQ WPX RTTY Contest Committee is responsible for checking and adjudicating the contest entries. Entrants are expected to follow the rules and best amateur radio practices. Violation of the rules of the contest or unsportsmanlike conduct may lead to disciplinary action by the Committee.

A. Unsportsmanlike Conduct: Examples of unsportsmanlike conduct include, but are not limited to:

1. ARRANGING or CONFIRMING any contacts during the contest by use of ANY non-amateur radio means such as telephones, Internet, instant messaging, chat rooms, VoIP, social media or web sites.

2. Transmissions by the entrant on frequencies outside of license limitations.

3. Changing times in the log to meet band change or off time rules.

4. Taking credit for excessive unverifiable QSOs or unverifiable multipliers.

5. Signals with excessive bandwidth or harmonics on other bands.

B. Observer Program: The Committee may request of any entrant to accept a visit by an observer during the contest. Failure to allow a Committee appointed observer full access to the station during the contest period may result in the entry being disqualified.

C. Disciplinary Actions: In the event of a violation, the entrant is subject to disqualification at the discretion of the Committee.

1. DISQUALIFICATION: Entry will be listed at the end of the published results and is not eligible for an award.

2. Notification of Committee actions will be sent by email to the address provided with the log submission. The entrant has five days to appeal the decision to the Contest Director. After that time the decision is final.

3. An entrant may withdraw the submitted log for any reason within 30 days of the log deadline. Contact the Contest Director for instructions.

4. The Committee reserves the right to change the category of any entry based on its examination of the log or other information.

D. Log Checking: All logs are checked using custom software and human judgment.

1. Duplicate contacts are removed with no additional penalty.

2. Contacts with an incorrectly received exchange are removed with no additional penalty.

3. Call sign errors or call signs not found in the other log are removed with no additional penalty.

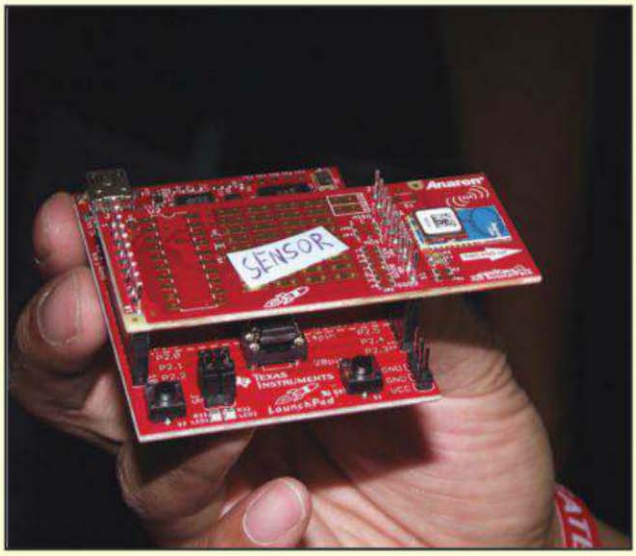
4. Contacts that do not meet the band change rules for multi-operator entries are removed with no additional penalty.

XIII. DECLARATION: By submitting a CQ WPX RTTY Contest log, and in consideration of the efforts of the CQ WPX RTTY Contest Committee to review and evaluate that log, an entrant unconditionally and irrevocably agrees that he/she has: (1) read and understood the rules of the contest and agrees to be bound by them, (2) operated according to all rules and regulations that pertain to amateur radio for the station location, (3) agreed the log entry may be made open to the public, and 4) accepted that the issuing of disqualifications and other decisions of the Committee are official and final. If an entrant is unwilling or unable to agree to all of the foregoing, the entrant should not submit the entry or submit the entry as a Checklog only.

Questions pertaining to the CQ WPX RTTY Contest may be emailed to the CQ WPX RTTY Contest Director, Ed Muns, WØYK, at <w0yk@cqwpxrtty.com>.

Goodies from Maker Faire

The New York Maker Faire was covered in detail in the December issue of *CQ*, but three products we saw there stood out in terms of potential ham interest:



The Sub-GHz Booster Pack for Texas Instruments' LaunchPad microcontroller consists of two data transceivers that operate on 433 and 915 MHz, both shared with ham bands.

TI LaunchPad Sub-GHz Booster Pack: This add-on to the MSP430 LaunchPad microcontroller from Texas Instruments is a low-power data transceiver operating on 433, 868, and 915 MHz (unlicensed ISM, or industrial, scientific and medical, bands). The 433- and 915-MHz frequencies are shared with ham bands so there are great possibilities for Part 97 use as well. The basic LaunchPad is only $10 and the Sub-GHz booster pack—which contains two transceiver boards—is $20, so two LaunchPads and one booster pack can provide two complete stations. See <www.ti.com/launchpad> and <www.ti.com/boosterpacks> for more info.

Voltset Smartphone Multimeters: Imagine a voltmeter the size of a credit card! Well, that's what Tom Wang and his partners at Voltset are working on, with hopes to ship by next spring. The Mini-Voltset ($40) is a combination voltmeter and app for your Android smartphone, displaying voltages on your phone's screen. The more versatile Voltset Megameter ($50) is the size of a typical smartphone and will be a full-fledged multimeter. For more info, including Kickstarter contributions and updates on availability, visit <www.voltset.com>.

Smart Jars: These jars are a low-tech storage solution, but simple is often best. They slide and lock into holders that clip into a standard pegboard for secure storage. To remove, twist and pull out the jar. Owner Giacomo Strollo is also trying to raise funds via Kickstarter. He says an anti-static version is in the works if he gets enough funding. Visit <www.smartjars.com> for more info.

The Voltset Mini voltmeter works with an Android smartphone to provide users with a credit-card sized voltmeter.

SmartJars President Giacomo Strollo holds one of his storage jars … they lock into holders that attach to standard pegboards.

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. The purpose of "What's New" is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

Remote control of ham radio stations is now possible thanks to radios with computer interfaces and wide availability of broad-band Internet service. The common approach is to use a computer in the shack that is then accessed remotely through the Internet using readily available software. But some rigs now connect directly to the Internet. N3JT takes us through the process of setting up no-computer-needed remote control of an antenna rotator as well.

Remote Operation of Your Rotator Without a Computer in the Shack

BY JIM TALENS,* N3JT

Articles in the amateur radio media[1] and the availability of commercially made devices allow us to approach setting up our stations for remote operation with some confidence. Generally, this involves connecting through a computer at the station location. The alternative is to connect station equipment directly to the house Internet router, with no intervening computer. An example of the latter is the Elecraft Remoterig® system, but it does not support remote control of the station rotator. The purpose of this article is to outline how I added remote rotator control to overall remote operation of my station using just the router at the station location.

Most of what I've read about remote rotator control relies on a computer in the station shack and accessing that computer remotely.[2] Given my Elecraft K3 radio is now remotely controlled without using a computer in the shack, I wanted to do the same with the rotator. This simplifies the overall remote system and removes those pesky computer glitches, especially relevant if one is away for weeks or longer. Moreover, in the event of a power interruption, restoration is more readily accomplished using just the router.[3]

There are two ways to interconnect the rotator control box and router: *Ethernet* or *Wi-Fi*. Ethernet refers to a network system that interconnects a number of computer systems with Internet Protocol (IP) addresses to form a local area network (LAN). It uses modular RJ45 jacks and plugs (larger than the RJ11 jacks used for telephones) and is commonly installed in homes and offices to provide cabled (usually "CAT 5") networking connectivity. Wi-Fi is a short-range radio link, mostly in the 2.5- and 5-GHz bands, that can substitute for Ethernet cabling. Your LAN consists of everything connected to your router, although the Wi-Fi segment is referred to as the Wireless LAN (WLAN).

Which method is better for unattended remote control of your home station? Several years ago, I had a nearby lightning strike that, among other things, produced a power surge on an Ethernet cable that damaged a computer and router. This experience led me to link all peripherals to my router via Wi-Fi – and to improve tower and shack grounding.[4] My station power strip, now remotely controlled and linked to the

*e-mail: <jtalens@verizon.net>

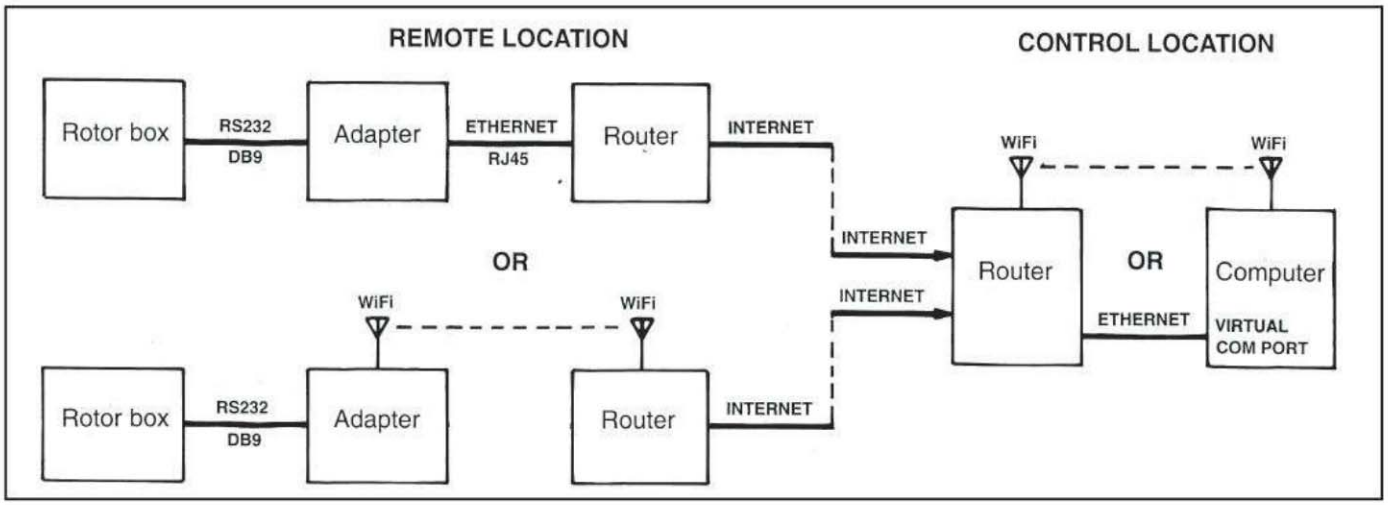


Fig. 1. Two approaches to rotator control from afar.

house router by Wi-Fi, has internal protection against power surges to protect the rotator control box from lightning and other power anomalies.[5] Of course, Wi-Fi carries its own set of risks,[6] including radio failure, bandwidth limitations, channel interference, and interception.[7] Ethernet wiring is somewhat easier to set up because it does not require dealing with SSID information and security codes. In this article, both approaches are discussed. *(For more on networking basics, see the sidebars "A Little Networking Background" and "A Little More Networking Background."—ed.)*

Some Basics

A ham rotator can be controlled remotely if its control box has a data port to transmit and receive rotation and azimuth information. Most, but not all, modern rotators include this feature. My M^2 Orion rotator has a DB9 connector for just this purpose—i.e., to send and receive serial data in the RS232 format. However, the format and voltage levels are different from those needed for data transport over the Internet. The challenge for implementing rotator remote control, then, is to adapt these formats and levels to produce a functional link between the router and the rotator control box. Fortunately, the required adapters are now available at reasonable prices.

Fig. 1 shows the layout of my rotator control system with two options I used for getting rotator serial data to the Internet using my home router: Ethernet cable and Wi-Fi. At the control location for both options, a router is used to bring the data in IP format from the Internet to a Windows®-based laptop computer running the rotator control software. I use N1MM Logger, which includes a subprogram called "N1MM Rotor" to provide rotator control and position display.[8] It is at the remote location where the Ethernet or Wi-Fi approaches are implemented.

The Cable Connection

First we'll look at how to set up the remote end of the rotator control link using an Ethernet cable. As noted, a serial-to-Ethernet adapter is required to change the format of the data for transport over the Internet. My choice of serial-to-Ethernet adapter is based largely on suitability and price. An uncased serial-to-Ethernet adapter consisting of simply a circuit board is about half the price of a similar product in a plastic case.[9] This particular card (photo A)

needs no serial port setup because it comes preset to the standard parameters of 9600, 8, 1, N (baud rate, word bit length, stop bits, parity).

The CV9600 serial-Ethernet adapter features both pre-assigned LAN IP and forwarding port addresses.[10] The installation instructions, available for download on the seller's website, tell us that the installed IP address is 192.168.1.57 and the port number is 8000.[11] However, all my other LAN devices, strictly for reasons of convenience, follow an IP address sequence that is in the range of 192.168.1.100 to 192.168.1.250. I wanted my adapter to have the address 192.168.1.106.

The CV9600 LAN IP address can be changed using software called SerialPortTester, downloadable from the vendor's website.[12] Like many other such programs, SerialPortTester uses hexadecimal commands, which required learning that 192.168.1.106 translates to C0 A8 01 6A. To implement the LAN IP address change, the adapter is connected through a serial-USB converter to a laptop PC. This creates a COM1 serial port that appears in the laptop's Windows Device Manager under Ports. The SerialPortTester operating options are chosen to receive and send HEX, setting the stage for the LAN IP address change. The HEX-based commands are entered in accordance with the instructions supplied. Finally, entering "C1" in the screen's lower window triggers the adapter to respond in the upper window with the HEX IP address equivalent of 192.168.1.106 (see fig. 2). The LAN IP address has been changed successfully. This exercise is worth understanding even if there is no need to change the LAN IP address from 192.168.1.57, because a different or future adapter may require the change.

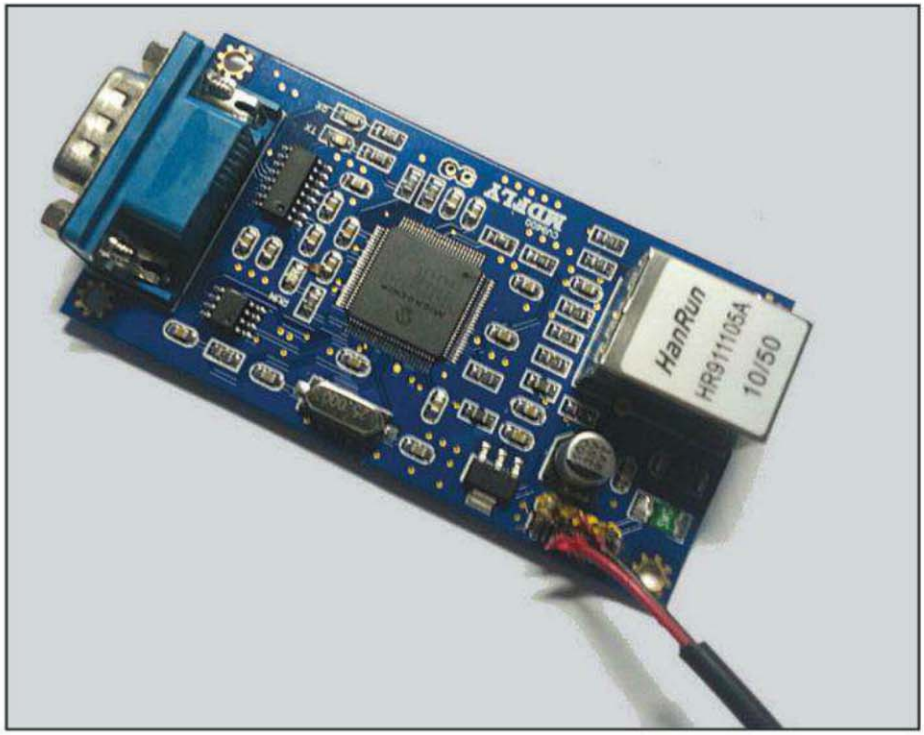


Photo A. The CV9600 serial-Ethernet adapter. Note the DB9 serial port on the left and the RJ45 Ethernet jack on the right.

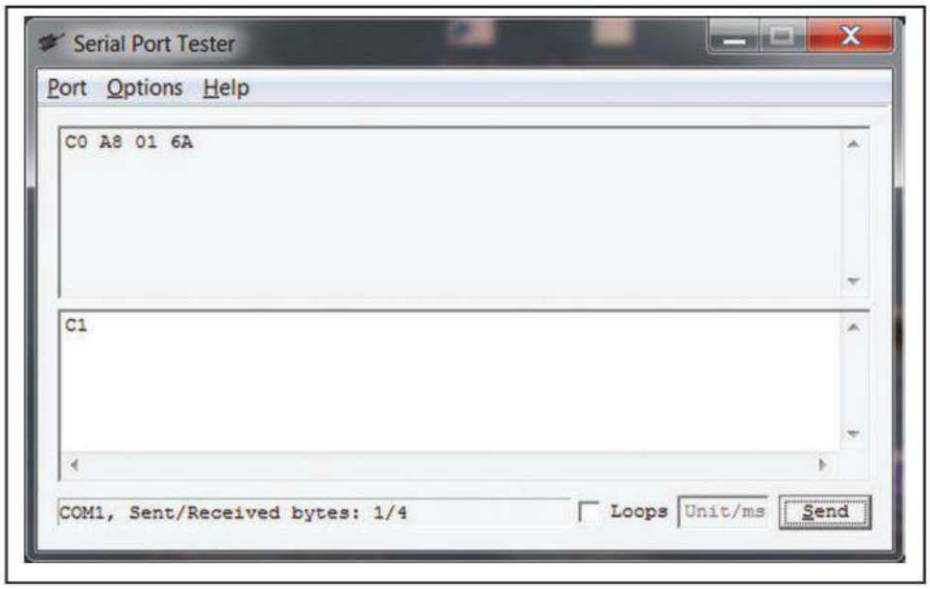


Fig. 2. Success in modifying the serial-Ethernet adapter's IP address!

Virtual Serial Port

The serial-Ethernet adapter is now ready for installation, but the laptop PC that will be used at the control location of the remote link first needs to be prepared. That starts with removal of the serial-USB cable between the laptop and adapter, and installation of a virtual serial port (VSP) on the laptop to serve as the interface between the rotor software on the laptop and the Ethernet format carried on the Internet.[13] The VSP requires insertion of IP routing data that will be needed by the N1MM Rotor program. In the VSP setup, I assigned COM9 as the serial port, largely because that port is not being used elsewhere. For testing purposes, the IP address can be the LAN address for the serial adapter or your external IP address. I use the Elecraft/Remoterig system for rig control, but there are other systems in use and more may come to market given the growing interest in remote operation. As discussed in the sidebar "A Little More Networking Background," I also have a Remoterig-assigned IP address that automatically accommodates external IP address changes. I used that address, and I entered the serial adapter's port forwarding address of 8000 in the window to the right of IP address (fig. 3). These entries enable N1MM Rotor to access the rotator control box at the remote location (fig. 4).

The adapter was then connected to the router using an Ethernet cable and to the rotator control box using a DB9 cable, with power applied to the adapter using a 5-VDC module. A small RX LED on the circuit board blinked, hinting at

success. The VSP and N1MM Rotor programs had been set up and the rotator control box had been turned on. The rotator was activated using N1MM Rotor but nothing happened! A trace of the Internet link using Telnet commands confirmed that the connection was functioning correctly.

Some RS232 devices are classified as DCE (data communications equipment) and some are DTE (data terminal equipment), which means that pins 2 and 3 of their DB9 connectors may be reversed for purposes of a given application.[14] I built a 3-wire adapter consisting of a male and female DB9 con-

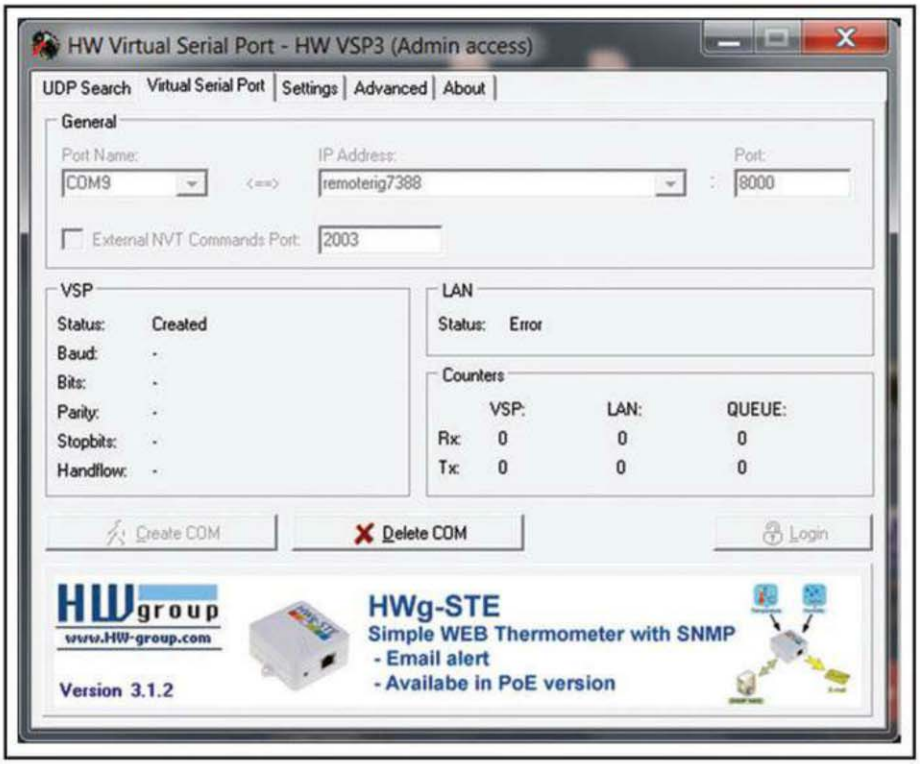


Fig. 3. Virtual Serial Port setup window. Note COM9, IP address (Remoterig 7388), and port number (8000).

A Little Networking Background

The internal IP address assigned to the serial-Ethernet adapter serves as the local area network (LAN) street address of the rotator control box. The port forwarding address is analogous to the mailbox within your LAN to which your rotator data are delivered. There is also an IP address assigned by your Internet Service Provider (ISP) to your router. Referred to as the external IP address, it can be seen by typing <www.ipchicken.com> in your browser. This is the IP address used by everyone outside your house to identify your router and obtain access to the devices behind it.

Finally, there is a unique LAN IP address that your router itself has for internal access purposes. It is typically 192.168.1.1 (though this may vary by router manufacturer), which when typed into your Web browser will take you inside your router. A login and password are normally needed. Once there, you can see all the LAN IP addresses, and the various settings and parameters used by the router. It is also where you can install port forwarding assignments that route data from outside your LAN to the correct device within your LAN. Basically, LAN IP addresses are not used by anyone outside your house. That is the purpose of port forwarding. Using your router's external IP address and port forwarding (and often a password), your LAN devices can be reached from outside. In fact, this is how you are able to access your rotator control box from virtually anywhere in the world.

Most routers have a procedure for assigning a port used to forward incoming data to a specific LAN IP address. Nearly any port number can be assigned, although it is best to avoid common defaults of 80, 8080, 443, and 8443 to prevent conflicts with devices that may have pre-assigned port numbers. Numbers in the range of 100–500 and higher normally are good choices for assignment.*

When data addressed to your remote external IP address arrive from the Internet, the included port number will assure routing to the correct LAN or WLAN (wireless local area network) device.

**See <http://bit.ly/WBjVn>.*

Morse Express Christmas Key

Our December issue had just gone off to the printer when Marshall Emm's annual announcement of his Morse Express Christmas Key arrived in the mail. So … better late than never, here's the scoop:

The 2013 Christmas Key is a miniature telegraph key made by GHD in Japan. It's fully adjustable with two miniature binding posts, hard silver contacts and a triangular base finished in polished chrome. The knob is made of hand-turned ebony and there are three small anti-skid rubber feet on the base for stability. The key weighs just over two ounces and measures 1 3/16 by 2 inches at the base. Only 150 were made; cost is $89.95 US plus shipping and handling. For more information or to order, call 800-238-8205 or visit <www.MorseX.com>.

The SoundDew Bluetooth speaker from White Label has a wireless range of about 30 feet and is water-resistant. Hams may find it useful for operating while camping or during public service events. (Photo courtesy White Label, Inc.)

Water-Resistant Bluetooth Speaker for Outdoor Use

The SoundDew Bluetooth speaker from White Label is water-resistant and designed to be clipped to clothing or a backpack. It could be of interest for hams active in public service activities or those who enjoy "trail-friendly" operating from out in the woods, where running a speaker line from a headphone jack isn't always practical. It's about the size of the palm of your hand and—important for backpackers—weighs only 4 1/2 ounces. List price is $49. For more info, visit <http://www.whitelabel.co/SoundDew.html>.

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. The purpose of "What's New" is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

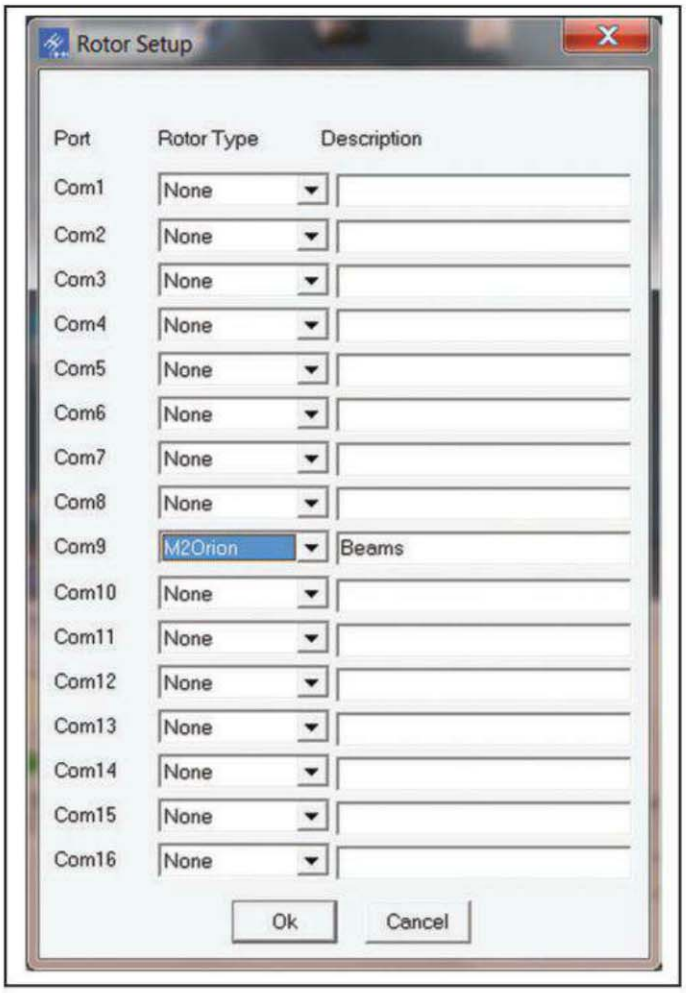


Fig. 4. N1MM Rotor setup window.

nector with pin 2 of one connector wired to pin 3 of the other and vice versa, and pin 5 to pin 5 (ground)—and installed it between the adapter and the cable to the rotator control box.[15] That fixed the problem!

Commands issued in N1MM Rotor on the laptop cause the Orion rotator to turn and display azimuth on the laptop display (fig. 5; the "unknown message returned" statement is apparently a software artifact and does not affect operation.). In sum, the rotator data are going from the rotator control box through the serial-Ethernet adapter to the local router, out over the Internet to the router at the control location and via Wi-Fi to the local laptop PC and its virtual serial port and rotor control software. It works as advertised.

Going Wireless

The alternative approach to remotely controlling a rotator control box uses Wi-Fi instead of an Ethernet cable between serial conversion and remote router. This can be accomplished either by using the serial-Ethernet adapter discussed earlier and adding an Ethernet-Wi-Fi adapter[16] or by using a standalone serial-Wi-Fi adapter.[17] I chose the combined serial-Wi-Fi adapter (photo B) because the functionalities are packaged efficiently and it is straightforward to set up and install. The additional steps in using Wi-Fi are associated with installation of the WLAN SSID and security key.[18]

The serial-Wi-Fi adapter is first connected to a local computer using a serial-USB adapter cable. Like the serial-Ethernet adapter, the serial-Wi-Fi adapter requires 5 VDC,

but for now the power can be provided using the supplied cable that connects to a PC USB port.[19] This adapter does not use HEX instructions, so the Tera Term terminal program worked fine in setting the parameters.[20] As with the Ethernet adapter, the HW Virtual Serial Port is set for COM9 on the laptop PC, although in this case port 2000 (associated with a different LAN IP address) was assigned for port forwarding to avoid complications when experimenting with multiple LAN devices. Otherwise, the same COM9 and port 8000 could have been used as long as only one adapter at a time—Ethernet or Wi-Fi—would be used for rotator control.

The adapter's default security scheme is WPA (Wi-Fi Protected Access). If you use WEP (Wired Equivalent Privacy), then the command "set wlan auth 8" must be issued during setup. This and other useful commands are listed and explained in the adapter's technical manual available for download on the vendor's website. Fig. 6 shows the Tera Term window with my SSID recognized and connection to router port 2000 enabled.

At this point the serial-Wi-Fi adapter is removed from the laptop PC and connected to the rotator control box. The rotator now functions precisely as it did using the serial-Ethernet adapter, except there is no cable between the adapter and the router at the remote station location.

Conclusion

Using a readily available and economically priced serial-Ethernet or serial-Wi-Fi adapter, remote control of your sta-

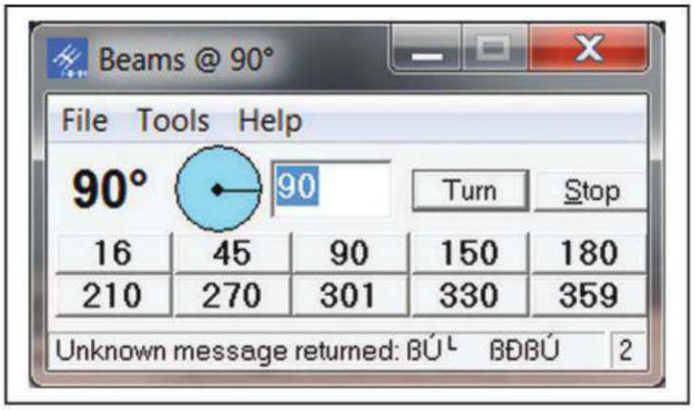


Fig. 5. N1MM Rotor control window as it appears on laptop.

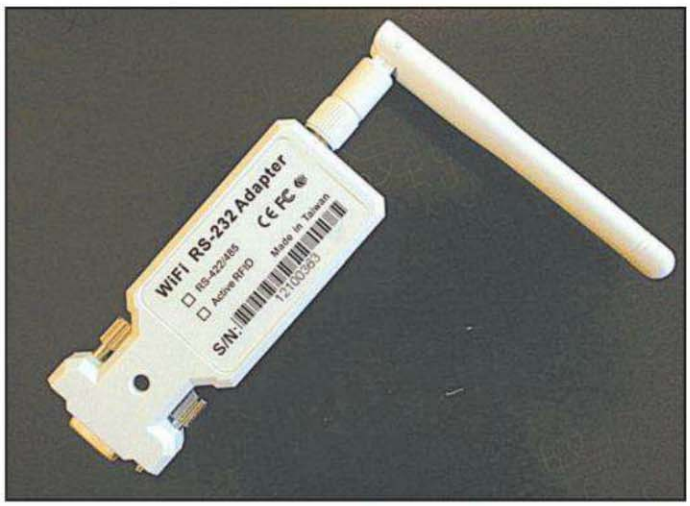


Photo B. The serial-Wi-Fi adapter.

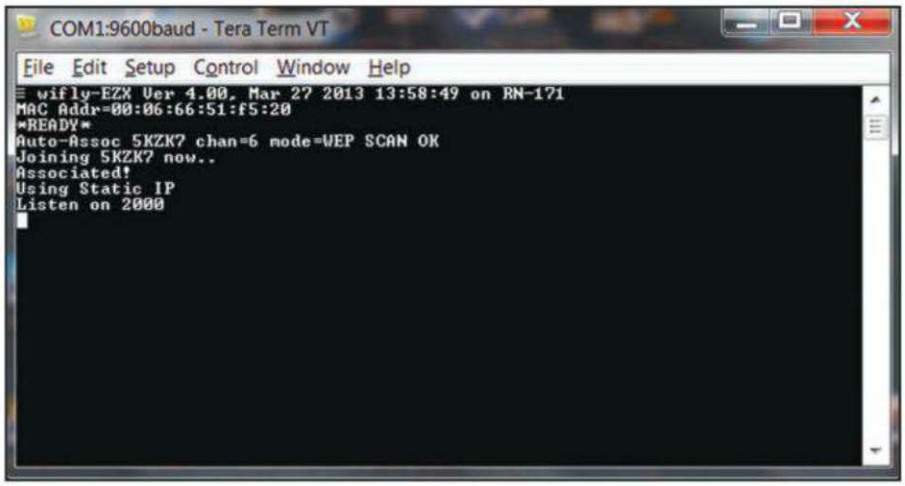


Fig. 6. Tera Term window showing successful parameter settings and connection to Wi-Fi.

A Little More Networking Background

Most routers are set for Dynamic IP Addressing, which means your router accepts periodic external IP address changes initiated by your Internet Service Provider (ISP). Turning your router off and on likely will also cause your ISP to assign a new external IP address. Most of the time these changes are of little consequence. However, if the external IP address of your router changes and you try to connect to it from a distant router using the old external IP address, the link will not be made. One solution is to pay your ISP a monthly fee to provide a fixed IP address for the remote-end router. A less costly approach is to subscribe to a dynamic DNS address service, such as <www.dyn.com> or <www.tzo.com>. This service associates your actual external IP address (in its numerical form) with a fixed mnemonic address, such as n3jtworksdx.ddns.com. The service tracks any remote IP address change and automatically forwards data to it. You simply use the mnemonic address and don't worry about external IP address changes at the remote-end router. Elecraft's Remoterig® provides such a dynamic DNS address service to purchasers of Remoterig control boxes. The Remoterig-assigned mnemonic IP address, not the ISP-assigned numerical external IP address, is entered during VSP setup.

tion's rotator can be readily accomplished from virtually anywhere without need for a computer at the station location. All that's required is a router and Internet service. Moreover, the principles discussed here for remote rotator control are equally applicable to implement remote control of other equipment having RS232 ports.

Notes

1. For example, see <http://www.arrl.org/link-remote-control>.

2. The standard terminology is as follows: The station shack with its antenna system, rotator and radio gear, is referred to as the *remote location* and the place from which you are operating when away is called the *control location*. In my case, the control location is in Florida and the remote location is in Virginia.

3. I use a remotely controlled power strip in the shack. It includes the option of automatic power restart in the event of a power outage. *See* <http://www.digital-loggers.com/lpc.html>. Also, the router's administrative settings can be set to allow remote router rebooting. My AC power reliability is somewhat unique, though, because most of the house is protected by a solar power backup system (with battery and generator). *See* "An Emergency Solar Power Backup System," May 2011 *QST*, by Jim Talens, N3JT; *see also* Technical Correspondence, September 2011 *QST*.

4. See "A Simple and Effective Approach to Station Grounding," September 2010 *QST*, by Jim Talens, N3JT.

5. See note 3, above.

6. Wi-Fi is decreasingly reliable with distance so it is advisable to keep the router and rotator control box in close proximity. Longer distances can be achieved by using Wi-Fi repeaters, which are readily available. *See, e.g.*, <http://bit.ly/y8l0TJ>, which can serve as a Wi-Fi repeater, bridge, client, etc. I use several of these units in the client mode, meaning they are used simply as transparent links between equipment and router.

7. Remote control during winter usually has less lightning risk, but snowstorms

with lightning do occur. Setting up a Wi-Fi connection adds complexity because it requires installing SSID (Service Set IDentifier) identification and encryption keys, not unlike setting up a wireless printer or other device. (SSID is the "name" of your wireless network.)

8. Rotators controllable through N1MM Rotor software are listed at <http:// bit.ly/1bqVYTS>. Other free rotator programs that are stand-alone and offer a variety of useful features include PsTRotator and LP Rotor, <http://pstrotator.software.informer.com/> and <http://lp-rotator.software.informer.com/2.1/>. N1MM Rotor is located in the QSO entry window of the N1MM Logger under "Window" (choose "rotor").

9. <http://bit.ly/HONbDL>. It is model CV9600, and costs $28.

10. The "port forwarding address" is not functionally related to the serial port. The serial port appears as an external port in Windows Device Manager in your computer. *See* the insert, A Little Networking Background.

11. See <http://mdfly.com/Download/Module/CV9600.pdf>

12. See <http://bit.ly/17VIjZK>. Click on *SerialPortTester.* Note, however, that the port forwarding number is fixed at 8000. This means that only one such adapter can be used at a given location. There are many other adapters available, however, and of course using the Wi-Fi adapter discussed below will not conflict. The principles associated with setup and application are common among all of the Ethernet adapters.

13. There are numerous VSPs available. I use HW-Virtual Serial Port, downloadable at <http://download.cnet.com/HW-Virtual-Serial-Port/3000-2085_4-10277998.html>. This virtual serial port is used to establish a destination and internal interface for data that will be used by the N1MM Rotor program. It is not the temporary COM1 port that was used earlier with the adapter to change its IP address. Note that throughout these procedures the laptop PC has been linked to its local router using the laptop's internal Wi-Fi card. As an aside, it is worthwhile running an anti-malware program after downloading any new software. For example, <http://www.malwarebytes.org/> is well regarded by CNET. *See* <http://www.cnet.com/1770-5_1-0. html?query=malwarebytes&tag=srch>.

14. For more details, *see* <http://www.bb-elec.com/Learning-Center/All-White-Papers/Serial/FAQ-RS-232-Connections-That-Work.aspx>. Pins 2 and 3 are used for data, pin 5 for ground.

15. Commercially-made null modem adaptors are inexpensive. *See, e.g.,* <http://amzn.to/19nnQa6>

16. I use an Ethernet-Wi-Fi adapter (in the "client" mode) for my web-controlled power strip. This adapter is used for devices already assigned an IP address, not for RS232-ported devices like the rotator control box. *See* <http://bit.ly/y8l0TJ>. The user guide is downloadable at <http://bit.ly/17VHCQn>. It is easy to install in the client mode and is reliable.

17. See <http://bit.ly/Rum7rN>.

18. See note 7.

19. Of course, when operating remotely the computer in the shack will not be activated so a 5-VDC module would be used.

20. *See* <http://cnet.co/P6Ui8M>. The Orion rotator user's manual refers to Hyper Term as the preferred terminal program but Windows 7 and later Windows versions do not include it. There are other programs that allow your computer to emulate a terminal device so you can communicate directly with the adapter for setup. Tera Term is one of those. An instruction manual for this serial-Wi-Fi adapter, called "How to setup a Serial Wi-Fi adapter" [sic], is available at <http://bit.ly/1cYskvT>. This document recommends using a terminal emulator called Putty, downloadable at <http://bit.ly/HSYvil>. The more detailed instructions, commands and options for this amazing adapter are available at the link referenced in n. 17, above.

If you're a "boatanchor" enthusiast who wants your vintage gear to operate with modern conveniences and meet modern technical standards, K6CTW shares his experience in building and setting up a direct digital synthesis (DDS) VFO for his classic Heathkit DX-60 transmitter, along with circuitry for switching between transmitter and receiver.

Updating a "Boatanchor": DDS-VFO Version 2.0

BY KEN MILLER,* K6CTW

A common issue for those of us using vintage gear on the bands today is that they don't generally come with precision frequency readouts, so getting exactly on frequency is problematic without crystals. [This is quite important if you're trying to use one of these rigs for National Traffic System (NTS) nets and schedules.] Since this station's vintage Heathkit DX-60 transmitter only has four crystal positions, and no front-mounted crystal socket, I needed to come up with a better solution, and besides, crystals are no longer cheap. Also, there is usually a problem with drift. Although the Heath HG-10B VFO here was fine on 80 meters, it did drift somewhat on 40 and this made the transmitter unusable on 20, 15, and 10 meters as the 40-meter base frequency, doubled for 20 and tripled for 15 meters, etc., also doubled etc., the drift. After a bit of research, I decided to look at modern Direct Digital Synthesis (DDS) type circuits. These designs would provide state-of-the-art frequency stability as well as an accurate digital dial, and a pure CW note (or AM carrier).

We hams also need to consider the operational input and keying requirements, when bringing these boatanchor transmitters back into regular service. This means understanding, before we begin, that the complexities of the task mean it is not usually just as simple as building the boards, hooking them together and getting on the air. The good news is that hams, and especially those who restore and repair their own equipment, are builders and experimenters. Therefore, this does not represent a problem, it's an opportunity. Building equipment and accessories, and configuring them just the way that's needed, can bring a great deal of satisfaction.

What follows is a description of my most recent efforts along these lines, following efforts chronicled earlier this year in *Electric Radio* magazine.[1] This time, I used the DDS-VFO suite of kits from WA1FFL's Hagerty Radio Company[2] and replicated the interface of the Heathkit HG-10 series VFO to drive yet another restored DX-60 AM/CW transmitter. Since this is a follow-on exercise in restored equipment upgrades, experience using the Nor Cal QRP Club kits[1,3] has proven to be very beneficial.

Boatanchor Disease

I became fully infected with the aforementioned disease, while performing restorations to recreate a 1960s Novice station with a Drake 2-B and Heathkit DX-60. That station, with the upgraded VFO[1], has proven to be as capable as any of the modern rigs when running CW traffic nets or rag-chewing. The station was also small enough (no individual element weighed over 23 lbs) that my XYL didn't really notice. Recently, I acquired a very nice Collins 75A-1 receiver (which she did notice as it weighs over 50 pounds and is considerably larger than the 2-B), and it has become my preferred AM receiver. Because of this, I wanted to have a way to switch it in with my newly remanufactured DX-60 (that is a complete set of new parts where possible, re-plated chassis, new wire wiring harness, etc.). The other issue was that the NorCal version[1] was not designed to support AM but was optimized for full break-in CW. To run it in the AM mode[4], I needed to throw the closing switch on

Photo A. The DDS VFO (Version 2) is intended to be a nearly plug-and-play replacement for the classic (but very drifty) Heathkit HG-10 VFO. It also provides voltages and switching needed for use with multiple receivers. (Photos courtesy of Joe Havrilla, N3DHD)

* e-mail: <k6ctw@earthlink.net>

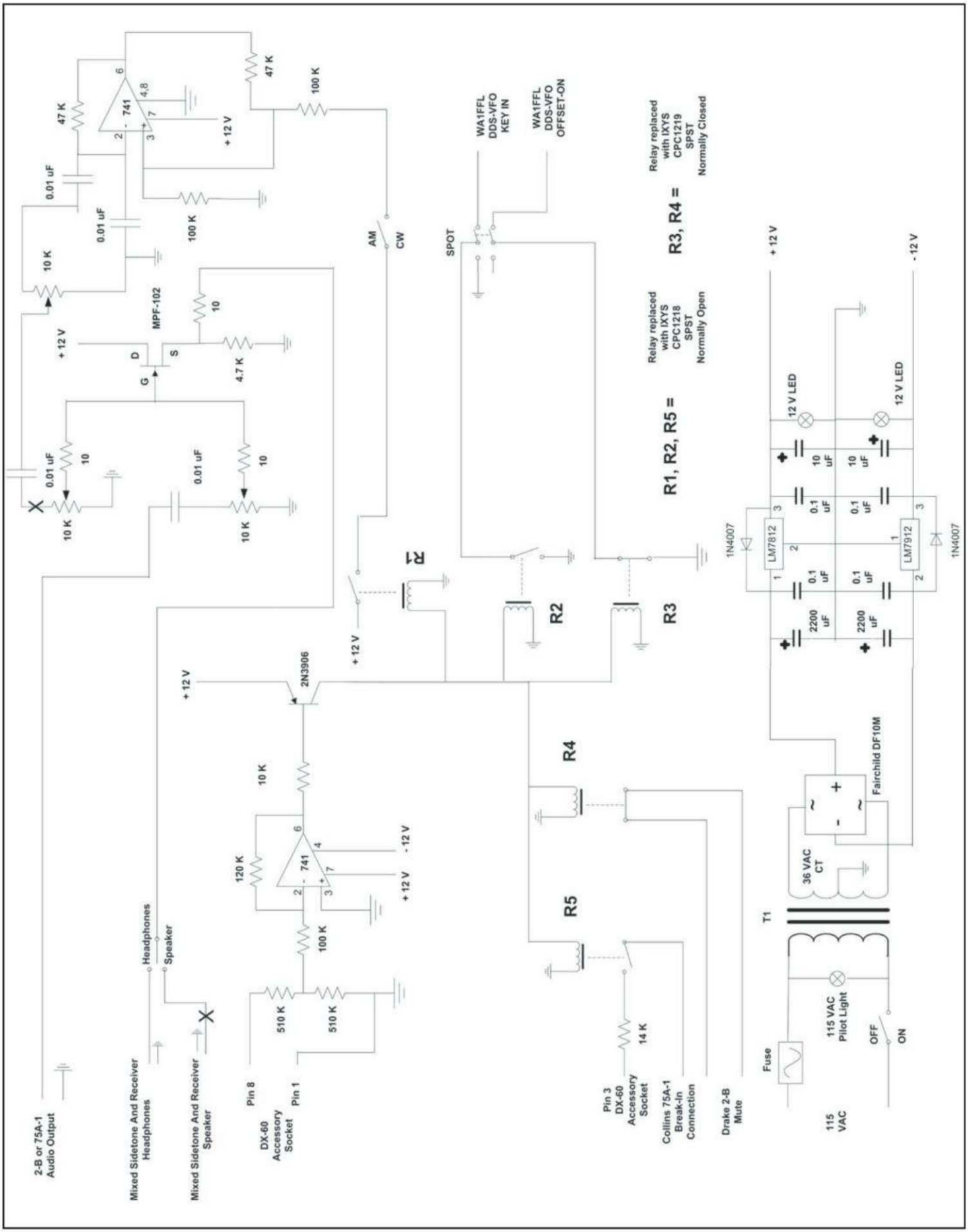


Figure 1. Schematic diagram of K6CTW's DDS-VFO project.

Photo B. Front view of K6CTW's DDS (direct digital synthesis) VFO for his classic Heathkit DX-60 transmitter.

my bug, manually switch the receiver to standby (since the T-R switch doesn't really mute the receiver during transmit) and then switch the transmitter to AM to transmit. Then, on receive, I had to reverse the steps. Not at all very "user friendly" (i.e. I needed a better interfacing method). The good news is that the NorCal original will work perfectly when I get around to restoring a classic set of Drake "twins", the 2-C and 2-NT.

Frequency Agility and a Stable VFO

Since the NorCal version was no longer available, the obvious solution—to me at least—for flexibility, stability, accuracy, and drive power was the WA1FFL DDS-VFO system[2]. Rather than try to explain all the benefits of the WA1FFL system in this article, go to the Hagerty Radio Company website[2] and then click on the links to his *QEX*[6] and *CQ*[7] articles. I highly recommended reading both of these now, before continuing with the remainder of this article.

Although Jim's system is very complete, that still left issues of a seamless, user-friendly interface when running AM and the varied QSK (break-in) requirements. Also, since the receiver was now muted during transmit, a sidetone was needed when running CW. And finally, there was the noise of the relays used in the NorCal version.

Preliminary Build

Before going any further, for those who want to duplicate this version, there are a few things to note. First, when ordering the VFO, specify a custom offset frequency (I asked for 25 kHz). Since the VFO is free-running, this moves its receive-mode frequency outside the bandpass of your receiver. Note on the schematic that I have implemented both the offset and the enable keying.

Second, since you are going to be driving an older tube rig, get the buffer amplifier kit as the VFO alone won't provide enough voltage swing to drive a tube oscillator by itself as the output measured on this unit was about 0.5 V.

Finally, I recommend ordering the rotary bandswitch kit. And when you do, make sure you ask Jim to include the Valiant overtone option. This option sets up the bandswitch and the VFO so that it will put out a fundamental frequency for 160, 80, and 40 meters and then on 20 meters, it will display a 20-meter frequency while delivering one in the 7.0-MHz range (which the transmitter's circuitry will then double). It will operate similarly for 15 meters (displaying 3 times the actual output frequency) and on 10 meters it will be 4 times. You'll want to note when operating on these bands (20, 15, and 10) to set the frequency step rate to a finer level for smoother tuning because the step rate is multiplied (as you might guess) right along with the base frequency.

To get a case for this VFO, I once again went to Ten-Tec for one of its B-Series cabinets (BK-BU 959). For labels, I used a P-Touch label maker with black-on-clear tapes and then spray-painted a clear lacquer over it to preserve them. For the panel cut-outs, I got some great assistance during lunch from a friend in his machine shop.

Unlike the NorCal kits, all of the surface mount components in the WA1FFL system are already mounted on the boards (except for a transformer, but it's easy to solder in) so there should be no issues for most builders. There are two toroids to wind, as well, but the wire and the donut are both large enough, and the windings are simple enough, that they don't take any time at all. The documentation is excellent with a number of high definition pictures that really help in getting things placed properly. The parts are all "kitted" in separate paper envelopes that generally follow along with the assembly steps in the documentation.

Building all of the kit elements (DDS-VFO, amplifier, bandswitch assembly), with my additional shielding efforts, only took about 20 hours (and I'm kinda slow). Be advised though, this is NOT a beginner's kit. When the DDS-VFO and ancillary kits are completed, a power supply, enclosure, and keying interface(s) are still needed. The keying interface can be very basic, depending on the requirements for QSK, transmitter keying scheme (grid-block, cathode, etc.), availability of a receiver mute signal, and so on. These will be the same requirements for just about any boatanchor VFO accessory, which is the interesting part of the development.

Power Supply and Keying Controls

As was noted at the beginning of the article, this VFO is intended to be almost a "plug-and-play" duplicate (at least for control and keying purposes) of the Heath HG-10. The difference comes in the independent power supply as the HG-10 normally derives its high voltage and filament power, along with keying, from the transmitter. The reason for this type of supply came about when working out an interface to the grid-block keying circuitry of the DX-60. A grid-block design has a negative open circuit voltage. This was shown to be -65 VDC on my DX-60 between pins 8 (keying) and 1 (ground) on the accessory socket. A bit of experimentation also confirmed that this circuit is very lightly loaded, so a high impedance interface was called for. Since it is a negative voltage, there needed to be a way to transform that into a positive voltage which could be used to control some sort of switch to toggle the key and the offset lines on the VFO, along with some other circuits.

What resulted from experimentation with a number of possible interface circuits was a simple voltage divider, providing approximately -5 Volts to an op-amp (here a 741, but any general purpose one will do) configured as an inverter[8]. That op-amp's output is used to control a PNP transistor switch[9] (a 2N3906 works fine since it needs to handle well less than 100 ma) to operate the relays which provide all of the keying, not only for the VFO, but for all of the other attached equipment and accessories. One of the relays grounds the VFO key line and another the +25 kHz offset when in transmit mode to return the VFO to its fundamental (and displayed) frequency. The 2N3906 also controls the +12 VDC to key the sidetone. The

additional relays it controls are used to key external accessories. In this case, those are the Drake 2-B's mute circuit (using a normally-closed relay) and the mute/QSK circuit in the 75A-1 (which uses a normally open relay).

During initial design and then bench testing, these were mechanical relays but were switched to solid state relays which were much cheaper, smaller, and completely silent. The IXYS solid-state relays (normally-open, Mouser Part No. 849-CPC1218 ~$2.00), which handle up to 48 volts and 1 amp, are being used for the 75A-1 (+20 VDC) QSK voltage (developed through a dropping resistor, from pin 4 of the accessory socket on the DX-60) and the VFO control lines. To provide for muting of the Drake 2-B, an IXYS, normally-closed version of the same solid-state relay type (Mouser Part No. 849-CPC1219 ~$1.40) was chosen. As they say on television, your mileage (or keyed interfaces in this case) may vary.

This circuit worked nicely as a prototype on the bench. However, that meant coming up with an internal power supply in the unit that, like my test bench unit, could supply both plus *and* minus 12 V for the op-amp. After considering using a transformer or a voltage tripler on the available 6.3 VAC filament voltage from the accessory socket on the DX-60, I opted for the direct approach and built the linear, regulated, dual-voltage supply seen in the schematic (fig. 1). Besides, having the plus and minus 12 VDC means that I have what is needed should I decide to add in a 60-Hz notch filter (also based on a 741 op-amp) on the audio line from the receivers.

As mentioned above, you'll also see a sidetone generator and a mixer circuit to combine the sidetone output with the audio output of the receiver, giving you the same capability as more modern rigs. I found a simple sidetone circuit[10] and wired it up. However, just bringing out that sidetone didn't really bring the rig up to modern convenience levels so a simple, FET-based, 2-channel mixer was added. Once you have the system in operation, adjust the sidetone to a comfortable level, connect the receiver's audio output to the other set of leads, and the mixed audio is delivered to a single output.

That Nasty Residual Signal

One thing you'll notice after you get the VFO built and powered on is that when it is in receive mode, the VFO is still running, although at a significantly reduced output. However, this means that it is radiating a signal, and thus it will still be

Photo C. Rear view of the VFO, showing connections for keying, relays, and audio.

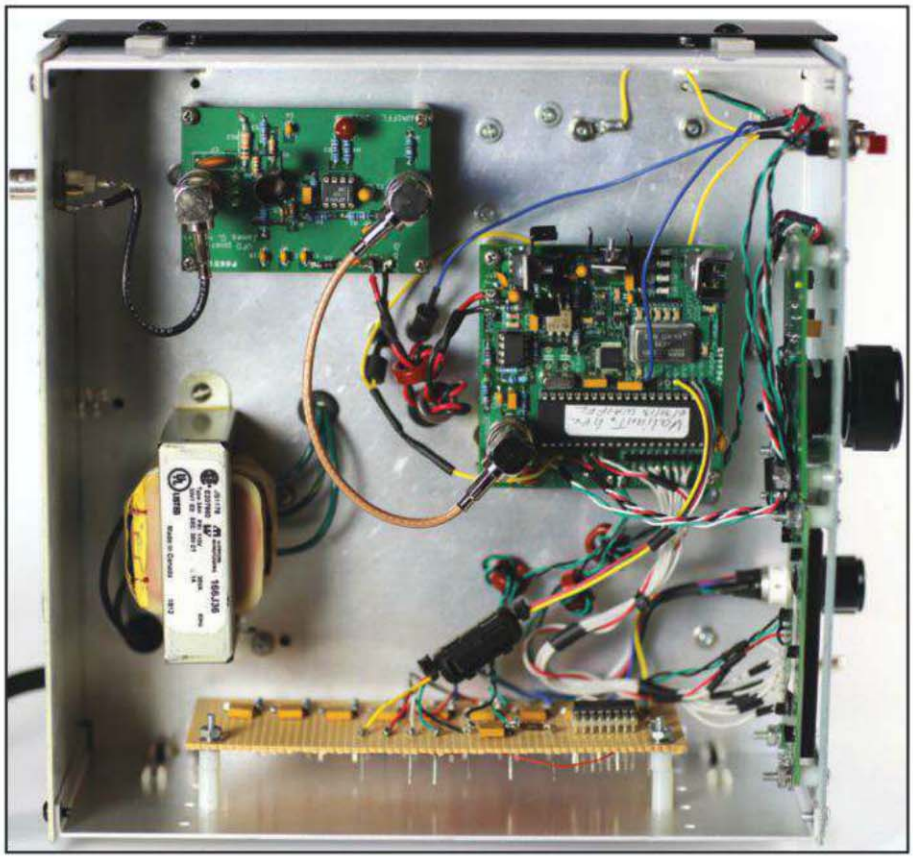


Photo D. Top view of the DDS VFO. Note the transformer for the built-in power supply (one difference from the classic HG-10, which got its power from the transmitter).

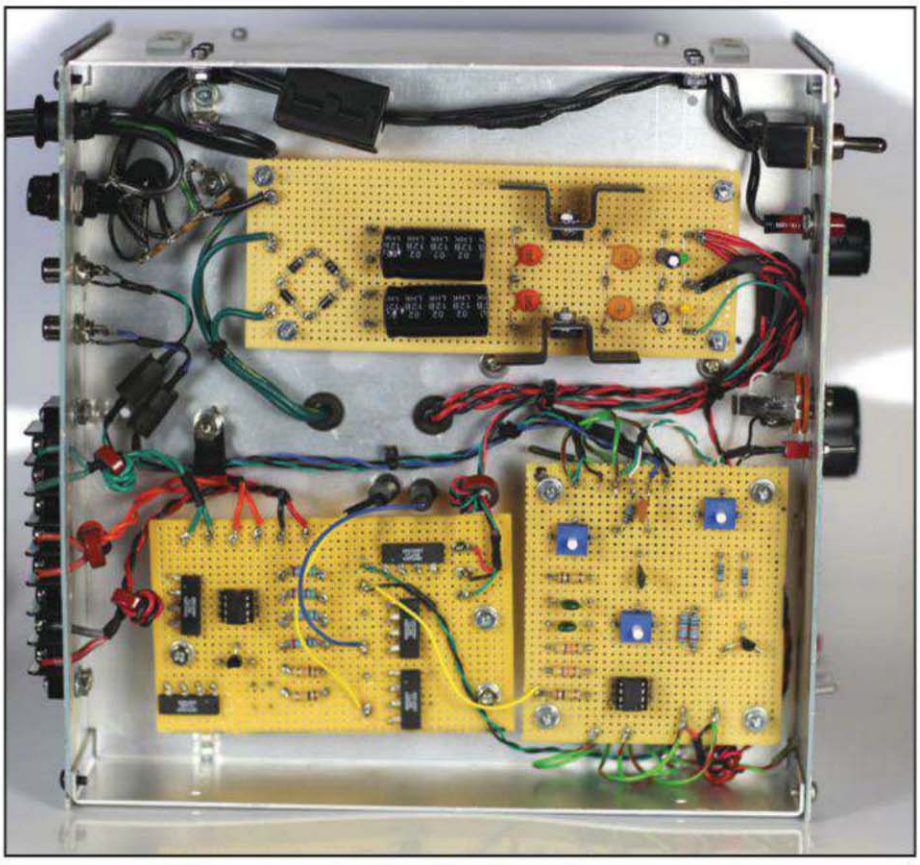


Photo E. View of the underside of the VFO chassis.

"there" in the station receiver. Although with this implementation, which includes the rotary bandswitch and Valiant overtone setup, I did not hear the residual signal on 160, 80, or 40 meters while performing calibration, the signal was "there" on 20, 15, and 10 meters. That is why I recommend that builders specify an offset frequency when ordering the kit if they are planning to use it in this kind of boatanchor installation. As noted earlier, with the 25-kHz offset, the residual signal is out of the receiver's passband and does not cover up or otherwise interfere with the signal being listened to. To enable this, you will need to toggle the receiver offset line, which is de-bounced on the rotary bandswitch board, hence the additional relay described earlier. Note in the schematic that this is a normally-closed relay, thus when un-keyed, it offsets the VFO, and when keyed, that offset is removed. Note this, too, in the double-pole, double-throw SPOT switch. It must open the connection to the normally-closed relay connected to the offset and ground the key input.

The Hostile RF Environment

Based on my earlier trials and tribulations with RF in the shack, I decided that extra shielding, ferrite beads, and toroids would best be done *before* there could be any issues, discretion being the better part of valor and all that. Thus, ferrite beads were put on the control and display lines and a toroid is used with each power pair (+12 and ground, –12 and ground, and the +5 and ground from the VFO to the display, control board, and rotary bandswitch assembly). I also put beads on the VFO key line and the receiver offset keying line, as well as all power lines to the keying interface and sidetone/mixer boards. Although this may be overkill, I felt that it would be a prudent step in the build-out of this unit, and of course, it can't hurt.

Bandswitching and Other Controls

A great feature of the WA1FFL series of kits is the one for rotary bandswitching. My setup of this interface is shown on the left side of the top section of the cabinet. It was done with wire-wrap as this was still in the prototype phase. When you order yours, there is now a circuit board available that is a lot more compact.

With the bandswitch setup as currently configured for the Valiant, it requires the builder to go out and get his/her own 6-position (160, 80, 40, 20,

15, 10) switch (or 9- if you need all the HF bands). When using this system, just remember to hit the *SAVE* push-button before changing bands. Then, when you return to that band, your frequency will re-appear when you return. Very helpful in the spring and fall on traffic nets where you are switching from a net frequency on 80 meters to 40 meters to pass the traffic and then returning (or vice-versa). If you don't remember to hit *SAVE*, the VFO will return to the bottom end of the band and you'll have to reset the frequency manually.

Since this unit is replacing a tube VFO on a boatanchor transmitter, you won't need to supply push-buttons for RIT. You will, however, still need momentary switches for the front panel for *SPOT*, *STEP*, and *SAVE* to give yourself the full capabilities of the VFO. Remember to run the *CAL* procedure, which requires the *CAL* push-button, before mounting the control board into the cabinet.

Initial Testing and Operation

Calibration went smoothly, according to the supplied directions, and I was able to get the VFO to be +/–1 Hz on each of the bands. Interestingly, it was within 100 Hz on all bands before calibration. I also quickly realized during this process that I had forgotten (being a 99% CW guy) that I needed to add in a switch to *disable* the sidetone when I am running AM. The next operation was to connect my primary CW receiver (the Drake 2-B) and set the sidetone level and the mixer levels into my headphones. This, too, went smoothly. However, the next time I build something like this, I'll put the sidetone and mixer level controls somewhere I can reach them more easily than inside the case, on a circuit board, on the underside of the unit.

After re-verifying the connections, and voltages from the DX-60's accessory socket and on the op-amp, it was time to test the system on the bench. For this, I connected a dummy load to the DX-60, and then completed the rest of the wiring to/from the VFO with the DX-60 and my primary CW receiver. After making all the connections and doing the preliminary testing, I was pleasantly surprised to see that everything worked. All the connections were keying and the signals were going to their appropriate state. Then I unplugged the headphones (from the VFO front panel jack) and switched the output to speaker, and tried again. The sidetone, which was usable on the headphones, was barely readable in the speaker. Obviously, the speaker needed more drive from the sidetone oscillator, so I wired in an audio pre-amplifier module[11] to boost the output to a level that worked better for the speaker.

With the keying controls (and sidetone) verified and working correctly, it was time to test the unit on the air and verify the drive levels to the oscillator. This, too, went quite well. However, the drive with the WA1FFL amp in line was at a much higher level (~14 Volts RF) than I'm used to with either the HG-10 or my previous DDS VFO. The only issue with that is that the gain control on the DX-60 has been put almost back to zero and it takes very little movement to get to the 2.5-ma level for normal operation. Besides a 3-dB pad, I'll be adding an audio bypass relay so when the VFO is powered off, audio will bypass the unit and go straight to the speaker or headphones.

Conclusion

This project has been a lot of fun, and I now have a vintage station that has all the capabilities of a modern station. It is a blast chasing DX with only about 40 watts out on CW and with a station that I either restored or built myself. If I find that there are additional modifications to be made on any of these station components, I won't hesitate to warm up the soldering iron and give it a "go" as all of it is accessible.

Epilogue

Hopefully, this article has helped to encourage you to also take on the task of providing a VFO upgrade and/or other accessories for your vintage gear. Let's keep their "voices" strong and vibrant on the air for many years to come. I'd also like to take this opportunity to thank my incredibly supportive and lovingly patient XYL, who put up with my many hours at the workbench and computer, during the design, construction, and testing of this VFO, and writing of this article. I'm sure I speak for many of us when I say that we don't acknowledge their sacrifices to our ham radio ~~obsession~~ hobby often enough.

Notes:

1. "A Continuing Boatanchor Experiment", *Electric Radio* #288, May 2013
2. Hagerty Radio Company, <http://www.wa1ffl.com>
3. NorCal QRP Club, <http://www.norcalqrp.org>. Unfortunately, the NorCal QRP club has recently discontinued this offering. W6DQ and I are trying to work with The NorCal QRP Club to see if the group will release the software and the PCB designs into the public domain.
4. Western AM Club <http://www.ami-west.com>
5. *Electric Radio* Magazine, Issue # 288, May 2013
6. *QEX*, May/June, 2008, pages <http://www.wa1ffl.com/Hagerty_QEX.pdf>
7. *CQ*, June, 2011, pages 44-50, <http://www.wa1ffl.com/VFO_driver_amp.pdf>
8. Op Amp Applications, W. G. Jung, *Analog Devices*, Section 1, page 8
9. RCA Transistor Manual (1964)
10. "Build It Yourself from *QST*, Part 3", *QST*, June 1992 page 44
11. Kemo Electronics, <http://www.kemo-electronic.de>

High-pass filters, low-pass filters, roofing filters, power supply filters … our shacks and our radios are full of filters. Most of us have at least a general idea of what they do (some things get through, others don't), but it's a good bet that many of us don't know how they do it or the theory behind it. Read on, and become a little more educated.

Something About Filters or What Are These Filter Things?

BY BOB SHRADER,* W6BNB (SK)

Bob Shrader, W6BNB, became a Silent Key in 2012. Author of the authoritative text Electronic Communications, *Bob was also a frequent* CQ *contributor and when he died, we had several of his articles still awaiting publication. Since he had the rare skill of being able to explain complex concepts in easy-to-follow language, we plan to continue sharing his extensive knowledge with you. This is the first installment.* — *W2VU*

What is a filter? Let's assume that essentially nothing is known about all the filter circuits that may be in our radio transmitters and receivers, so let's start at the very bottom!

First, if you were to put a handkerchief across the top of an empty cup and poured some real dirty water through it, the water in the cup should be a lot cleaner. You can say that the water in the cup was filtered by the handkerchief. By filtering, it allowed only what you wanted to pass through to the cup. Something like that happens in electronic circuits.

You probably know that a "capacitor" (symbol C) is basically two or more metallic plates separated by some kind of an insulator … paper, mica, etc.

You probably know that an "inductor" (symbol L) is basically a coil of wire wound around an iron core, or a paper or other more or less solid core, and maybe even an air core.

You probably know that a "resistor" (symbol R) is basically a metal wire or other solid material that decreases the value of any current sent through it.

Let's set up a variable frequency alternating current (AC) generator across a fixed resistor, as seen in figure 1A. In radio work, such a variable frequency AC generator is usually a tunable-frequency solid-state or vacuum-tube "oscillator" circuit. It may generate a band of "audio frequency" (AF) AC—i.e., 5 to 15,000 "cycles-per-second," or "hertz," or "Hz." Or it may generate bands of "radio frequency" (RF) AC—i.e., 15 kHz to 300 GHz (billions of cps or Hz). In these cases, the AF or RF oscillator is known as an AC "source" and the resistor is the "load." If the source voltage, E, is 100 volts and the load resistor, R, is 200 ohms, then by Ohm's Law the load current, I, would be I = E/R, or 100/200, or 1/2 ampere of current. No

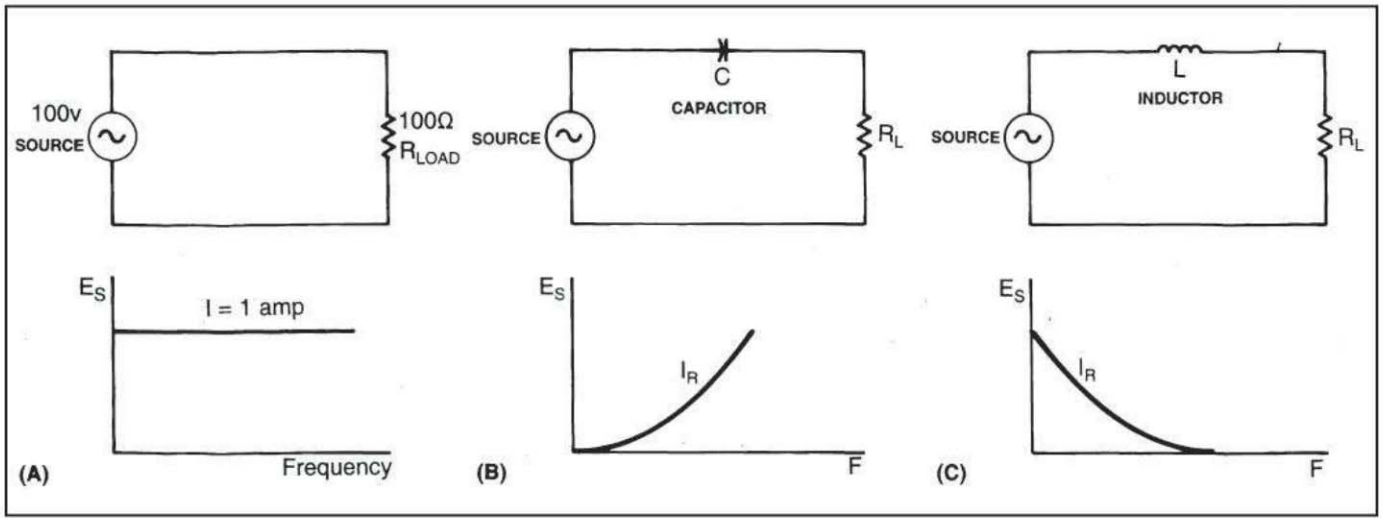


Figure 1.(A) Source and resistor load; (B) Capacitor in series with load; (C) Inductor in series with load (see text for details).

matter to what *frequency* the source AC may be changed, the current will not change, so there is no "filtering" here.

If a capacitor is connected in series with the resistor (figure 1B), changing the frequency of the source now *does* cause the load current to change. At low frequencies, the capacitor will slowly charge up to its maximum electron-holding value for that source voltage. As the AC frequency increases, the same maximum number of electrons going into and out of the capacitor occurs more rapidly, so there will be more electrons forced through the load by the source per cycle. The varying resisting effect the capacitor has is called *capacitive reactance*. Its symbol is X_C and it is measured in ohms. Its resisting value changes as the source frequency changes, as shown by the E-I-f curve. The higher the frequency of the source, the less X_C the capacitor has and the greater the AC current it allows to flow through the load.

If an inductor, or coil, is connected in series with the load resistor (figure 1c) a different effect is produced. When AC flows through an inductor it produces magnetic fields that expand out from the turns and contract back into its turns. These moving fields around each turn induce a "counter-emf," or a voltage opposite to the source voltage, in any turns next to it, in each turn itself and in all connecting wires. As the AC flowing through the coil increases in frequency the magnetic fields build up faster, generating more counter-emf, reducing the effect of the source voltage and therefore the load current. Thus, an inductor in series with the load decreases the load current as the source frequency increases. This resistive effect is known as *inductive reactance*. Its symbol is X_L, and it is also measured in ohms. With X_L acting in the circuit, the circuit AC current value decreases when the source frequency increases, as shown by the curve.

The symbol for ohms in resistor circuits is usually the Greek letter "Ω." The symbol for reactive ohms may sometimes be indicated by the Greek letter "ω," although this letter also represents the constant "2πf" part of the reactance formulas discussed below.

Constant-*k* Filters

A "constant-*k*" low-pass filter circuit diagram is shown in figure 2A. Here both the X_L and the X_C pass lower frequencies to some degree, but at a certain "cut-off" frequency, together they begin to attenuate the load current and it drops off as indicated. The "*k*" means that this L/C filter has some ratio of its reactances that allows it to develop a desired cut-off frequency with certain load and source "impedances" ("ohms" if reactance and resistance are both involved). These formulas are quite complex! See the internet or electronic texts for such formulas. Our goal here is to explain what filters look like and what they do, not how to build them!

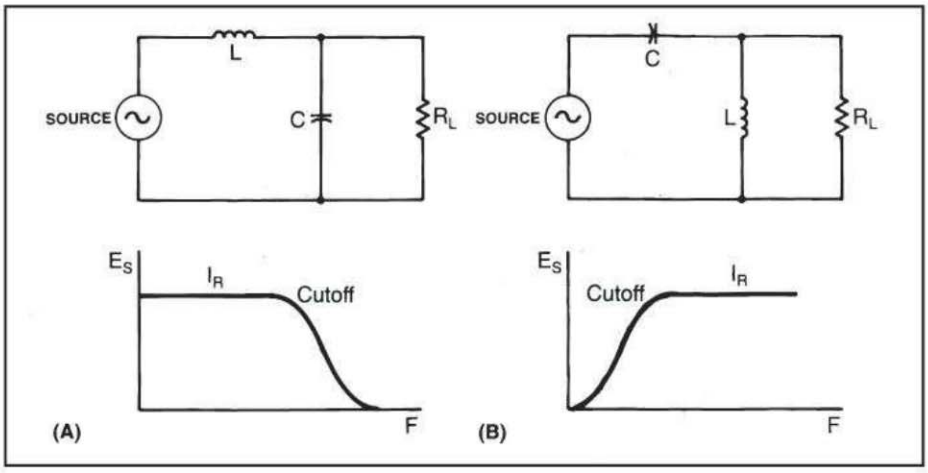


Figure 2. (A) Constant-k low-pass filter; (B) Constant-k high-pass filter

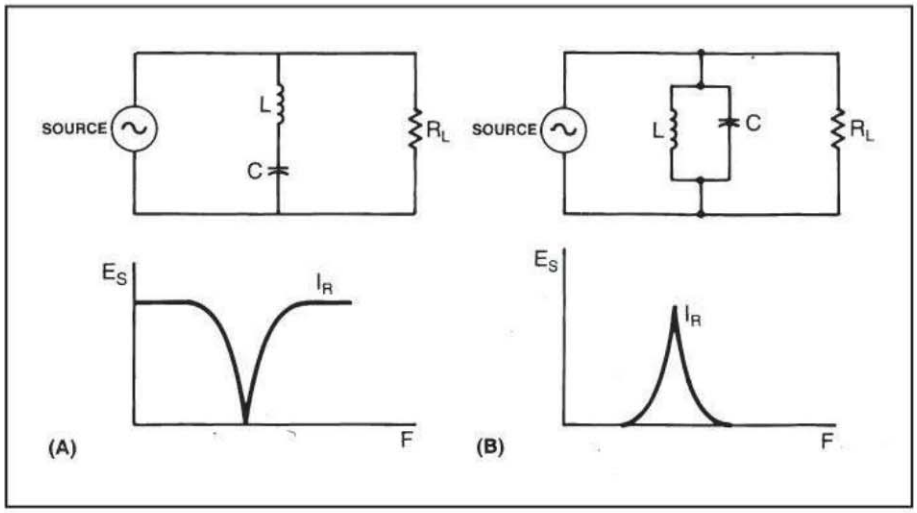


Figure 3. (A) Frequency-stop filter; (B) Frequency-peak filter

While the discussion so far has been on a constant-*k low-pass* filter, the same general theory holds for a constant-*k high-pass* filter, as in figure 2B, where the L and C positions in the circuit have been reversed.

Why Use a Low-Pass Filter?

In the old days when TV stations operated in the lower part of the VHF band, amateur station harmonics often interfered with 50 MHz or somewhat higher TV signal frequencies. To prevent this, amateurs would connect an LC low-pass filter between their transmitter and its antenna, having a cut-off frequency somewhere around the top of the 10-meter band, or roughly 29 MHz. It passed frequencies lower than 29 MHz, but cut off everything above that frequency. The very simplest of such filters would be the constant-*k* low-pass filter above.

Why Use a High-Pass Filter?

Suppose an AF amplifier has a frequency range of 15 to 30 kHz, but there are some specific signals that are required to be amplified somewhere between 16 and 30 kHz. To prevent any normal lower AF signals from interfering with the 16- to 30-kHz signals, a 15-kHz cutoff LC high-pass filter could be used. The amplifier would no longer be useful for amplifying the lower audio frequencies. A possible low-pass circuit and pass-band curve are shown in fig-

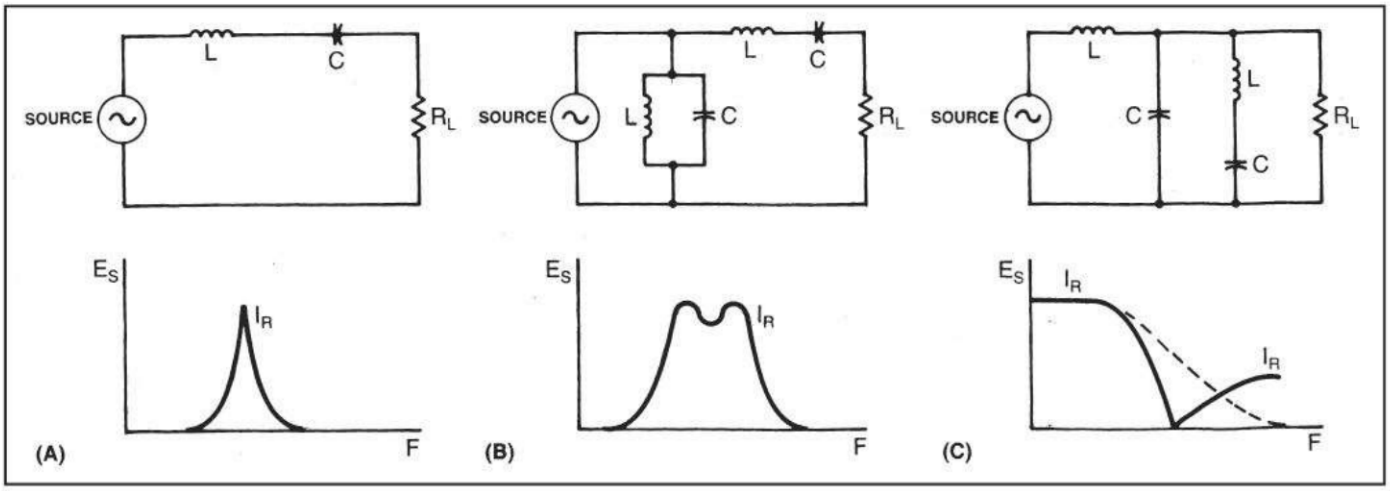


Figure 4. (A) Series-resonant circuit allows I_R to peak; (B) Series plus parallel resonant circuits produce a band-pass circuit; (C) m-derived low-pass filter.

ure 4. Note that some frequencies below 16 kHz would be reduced but not completely attenuated.

Resonant Circuits in Filters

If LC filters were to be produced, the X_C value will have to be computed for the capacitors. The formula is $X_C = 1/2\pi fc$, where the Greek letter π is 3.1416, f is frequency in hertz, and c is capacitance in *farads*. Capacitor values are usually specified in *microfarads* (μF, meaning millionths of a farad), or in micro-microfarads (μμF, which is also "picofarads," or pF). (As indicated above, this formula might be shown as, $X_C = 1/\omega c$.)

The reactance value in ohms for inductors is computed by the formula, $X_L = 2\pi fL$ (or by $X_L = \omega L$), where L is inductance in *henrys*. In radio circuits, inductances values are more likely to be in *millihenrys* (thousandths of a henry), or *microhenrys*.

When X_L and X_C are connected together and are equal, they form a "resonant" circuit. If connected in series, they form a "series resonant" circuit, figure 3A. Having equal and opposite reactances they will have zero ohms reactance, resistance, or impedance. They will act as a zero-resistance short circuit across any AC circuit operating at their resonant frequency. Both reactances will become fully charged in this case.

If the L and C are connected in parallel, they form a "parallel resonant" circuit, which has a very high resistance, reactance, or impedance at resonance, figure 3B. The voltage value across a parallel resonant circuit peaks at whenever the source value is at the resonant frequency.

If X_C = 1000 ohms, and X_L = 1000 ohms are in series, the total reactance across them is +1000 ohms plus –1000 ohms, or zero! Figure 4A shows them in series with a load. At their resonant frequency, there is zero voltage drop across the two and the load current peaks at their resonant frequency. At lower frequencies, the capacitor decreases the load current. At higher frequencies, the inductor decreases the load current.

With a series-resonant circuit in series with a load, and a parallel-resonant circuit across the load, figure 4B, if the two peaks are tuned 50 Hz apart, the circuit would be a somewhat dented 50+ Hz "band-pass" filter. There is always some resistance in reactances so the peaks would flatten out somewhat. If the parallel resonant circuit were in series with the line and the series-parallel circuit were across the load, this would make up a kind of dented "band-stop" filter for the load. Since the drop-off is never vertical, the bandwidth of filters is always a little wider than the cutoff frequencies. This why the actual bandwidth is stated at 3 dB down from the peaks. The wire in coils and the dielectric material of a capacitor always have a little resistance in them. It is these resistances, plus any added circuit resistances, that help to determine the peaks, depths, heights, widths and flatness of LC filters.

M-Derived Filters

If the drop-off past the cut-off frequency of a constant-k low-pass filter is not steep enough, a series-resonant L and C circuit, tuned to a frequency somewhat above the cut-off frequency, produces an essentially zero current frequency, with a pop-up above the zero current frequency, as shown in figure 4C. The addition of the series-resonant circuit makes this an "m-derived" low pass filter. The m can be from zero to one. Zero m is when its series-resonant circuit is at the cut-off frequency. The pop-up is right back up to the cut-off value and there is no drop off past that point. If m = 1, the series-resonant circuit frequency is the same as where the constant-k filter would have gone to zero by itself. An m value of ±0.6 as shown seems to be about the best choice. Adding another constant-k filter with a cut-off at the zero current frequency would decrease the pop-up current. Similar theories can be applied to a constant-k high-pass filter, where the series-resonant frequency would be below the cut-off frequency.

There are an untold number of different forms of filters in all the different kinds of radio equipment that amateurs operate today. The few discussed here only give a basic idea of how a few filters circuits might be connected and what they might do.

Power-Supply Filters

There are several basic forms of power supply filters. If an AC transformer has a diode rectifier in series with a load (figure 5A), the load resistor would have one voltage pulse across it and one pulse of current through it every other half cycle of the AC from the transformer. This is producing no filtering, just half-wave "rectification" of AC to pulsating DC.

If only an iron-core (the parallel lines) inductor, or "choke coil" (figure 5B) is connected in series with the load, this would be a form of "inductive filtering" for the load. The load current pulses

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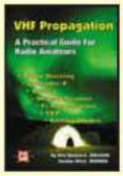

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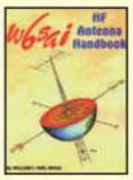

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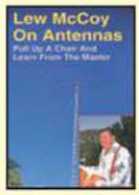

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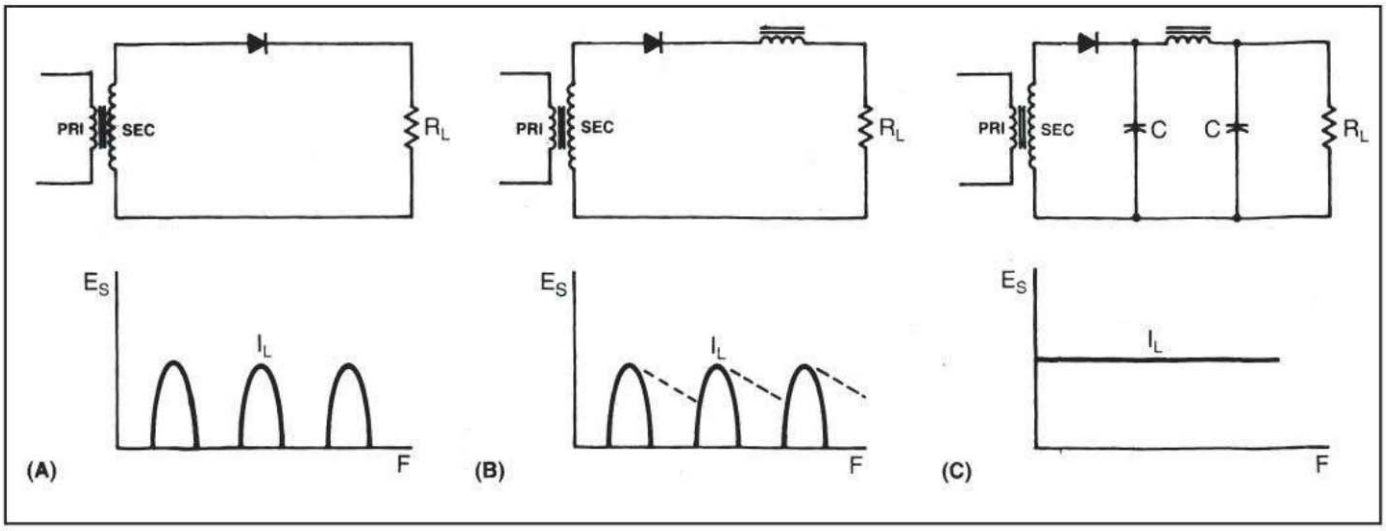

Figure 5. (A) Half-wave rectifier; (B) Inductive rectifier; (C) Standard π-type power supply filter.

would be smoothed out somewhat, to a "varying-DC," shown by the dashed lines. The amount of smoothing depends on how much magnetic field energy is stored up by the pulse energy and by how heavy the load is. The heavier the load, the more quickly the pulse would diminish.

With only a capacitor across the load (no inductor), this would be a simple "capacitive filter" for the load. The capacitor would charge up the peak AC voltage and store electrons in it. Again, depending on the load, its current might be pulsating or varying DC. With no load, the output voltage across the capacitor would stay at the peak voltage produced by the source.

An inductor in series with the load *and* a capacitor in parallel with the load produce an "L" type filter which can greatly reduce the variations of the dc. If another capacitor is added in front of the inductor, this filter circuit becomes a form of "π," the Greek letter (π) type of filtering, named for obvious reasons. This circuit can also be termed "capacitive input" pi type filtering, and usually provides satisfactory filtering for most circuits. If another iron-core inductor is added in series before the -filter, it is known as an "inductive input π-filter." If more filtering is required, one or more LC low-pass constant-*k* sections can be added between the π-filter output and the load.

Only single diode half-wave rectification has been used here. AC may be full-wave rectified as well, producing a DC pulse for both halves of the input AC wave. Only half as much filtering will be needed with full-wave rectification, assuming the same load current and DC voltage output. In many cases where the load is light, a fairly low value of resistor can be used instead of the inductor in filters. These are known as RC filters. There are also several forms of three-phase AC rectifiers and filters. But we won't get any more involved than the basics of filtering. HI.

The filter for a high-voltage RF power amplifier power supply is usually a high voltage π-type, in which the power amplifier stage is the load. A high value "bleeder" resistor must always be connected across the output of such a DC power supply filter for vacuum-tube circuits to make sure that the filter capacitors will become discharged if the amplifier and its power supply are turned off. Many amateurs have been thrown across the room when attempting to get inside a vacuum tube power amplifier rig to make adjustments after turning the power switch off. In such cases, there may have been no bleeder across the power supply filter circuit, or it may have burned out, leaving the high voltage filter capacitors fully charged to ±1000V! When fiddling around with the insides of our tube radio equipment, always be doubly careful! Most of our modern solid-state circuit power supplies may produce no more than 35 V or so, and therefore may not be dangerous unless wet hands and grounds are involved! Of course there are always those 115-V or 230-V AC input lines in the power supply to stay away from!

I hope this brief introduction has given you a better understanding of how and why the various filters in our ham station equipment do what they do.

What You've Told Us…

Our September survey asked about your radio troubleshooting and repair skills. On the first two questions, we asked you to rank your responses in priority order rather than just selecting one answer. When a piece of gear in your shack breaks, 80% of you said your first course of action is to troubleshoot and repair it yourself, followed by asking a local ham for help, taking it to a local dealer for service, sending it back to the manufacturer or sending it to an independent service facility.

If a project you're building doesn't work properly, 84% of you would start out trying to troubleshoot it yourselves, followed by contacting the manufacturer or seller for advice, asking other hams for help, or contacting the author if the project is from a magazine or book. About 16% of you would also try to design your own workaround if you couldn't identify the problem yourself.

Most of you don't see the scenario above as a problem, because 87% of you say the likelihood of a project you build working on the first try is good (54%) or excellent (33%). Likewise, 74% of you rate your troubleshooting and repair skills as good (41%), excellent (20%) or expert (13%).

Also not surprising, 96% of the readers who responded have built a piece of gear for their stations and 91% have repaired a piece of station equipment. Three-quarters of you learned building/repair skills from another ham, but only half of you have "paid it forward" by teaching another ham how to build or fix electronic gear. On the other hand, two-thirds of you have helped another ham fix a piece of broken gear, and just over half of you have fixed something for another ham. Let's remember the old saying about teaching a man to fish…

This month's free subscription winner is John Chapman, WB8INY, of Gahanna, Ohio.

Reader Survey January 2014

We'd like to know more about you … and especially what's important to you in ham radio and how we at *CQ* can help serve you better. If you're a regular reader of these surveys, you'll notice that **there is no longer a pull-out card** to fill in and return. Instead, you may:

*** Respond to the survey online** at <www.surveymonkey.com/s/CQJan14> [From the digital edition, just click on the link].

- OR -

*** Cut out or photocopy** this page

*** Circle the numbers** that correspond to your answers

*** Mail your completed survey to:** November Reader Survey, CQ magazine, 25 Newbridge Rd., Hicksville, NY 11801.

We will continue to select one respondent to each survey to receive a free one-year subscription (or extension) to *CQ*. This month, we'd like to know a little more about your ham radio plans for the new year.

1. How much time do you expect to devote to ham radio this year compared with last year? (Select one)

More 1
About the same 2
Less 3
Can't predict 4

2. Are you planning to try something new in ham radio this year? (Select all that apply)

Yes, a new band 5
Yes, a new mode 6
Yes, a new activity 7
Yes, a new radio 8
Yes, a new skill 9
Yes, other 10
No 11

3. Are you planning to learn more about a particular aspect of ham radio this year? (Select all that apply)

AM voice 12
Amateur television 13
Antenna design 14
Contesting 15
Digital (keyboard) modes 16
Digital voice 17
DXing 18
DXpeditions 19
FM and repeaters 20
Ham radio software (including apps) 21
Ham radio networking (e.g., MESH) 22
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High-altitude ballooning (near-space) 24
Homebrewing 25
Kit-building 26
Mobile operating 27
Morse code 28
Operating awards (including specialty programs, e.g., IOTA) 29
Portable ("trail-friendly") operating 30
Propagation 31
Public service & emergency communications 32
QRP (low-power) 33
Remote control 34
Satellites 35
VHF/UHF operating 36
Other (what?) 37
No 38

Thank you for your responses. We'll be back with more questions in upcoming issues.

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If you're already using a Yagi antenna on the VHF or UHF bands and still need more gain, take a look at W4VYD's plans for replacing your reflector with a modified split paraboloid and giving a boost to both your transmitted and received signals.

Boosting VHF and UHF Yagi Gain

BY NUNZIO ADDABBO,* W4VYD

Licensed since 1950, I have designed and built virtually every type of ham antenna and can tell you—if you didn't know—the key to a successful QSO is a superior, finely tuned and properly directed antenna. Additionally, the higher the gain, the better the QSO.

During the 18-month International Geophysical Year period from July 1, 1957 to December 31, 1958, when I was director of the Moonwatch Satellite Tracking Station in Terre Haute, Indiana, with 16 telescopes, I invented the *split-paraboloid* antenna and was the first person in the U.S. to officially track and record Sputnik (on 20.005 MHz) on October 4, 1957.

The split-paraboloid is a parabolic dish, cut in half, separated by a parabolic reflector with the same curvature, connected to a Yagi antenna and triples the Yagi's gain! The width of the reflector is the length of the Yagi's reflector. My experience is that most hams don't have the financing and/or adequate working space to fabricate a full-scale split-paraboloid. Therefore, these instructions deal only with a Yagi connected to a parabolic reflector, which I call a *modified split-paraboloid.*

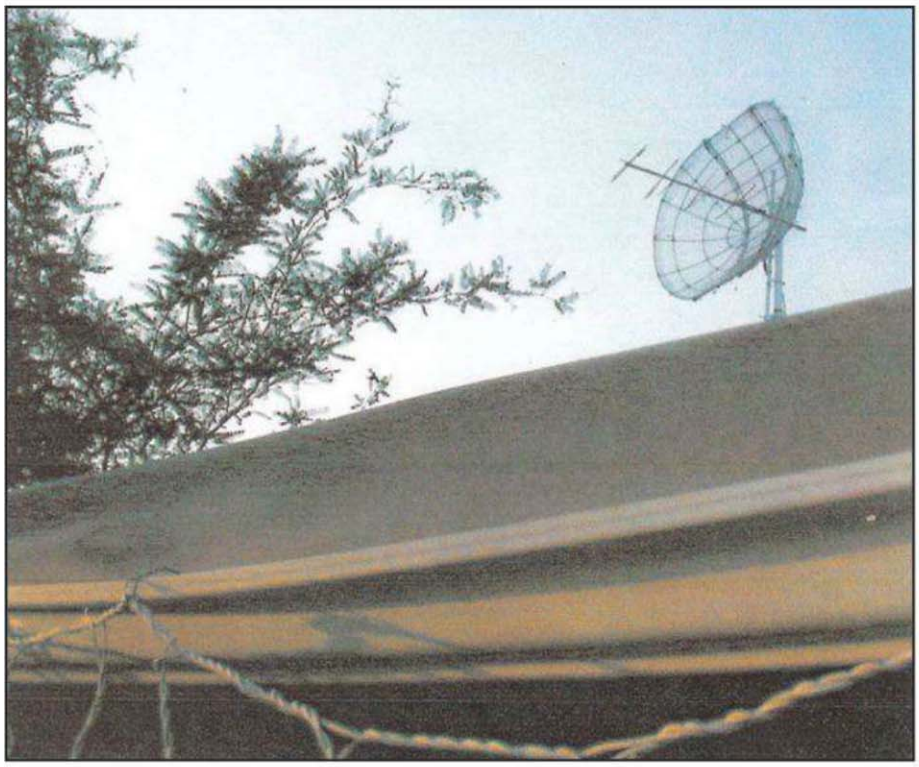


Photo A. The author's 5-element 448-MHz split-paraboloid antenna, lined with aluminum screen.

The Modified Split Paraboloid

Here's how to boost your Yagi gain: Let's start with the basics. The Absolute gain of a Yagi is 1.66 times the number of elements. You then convert Absolute gain to Isotropic gain. You can do the conversion if you still remember logarithms and have the log tables, or, it's easiest if you have a scientific calculator. Isotropic Yagi gain is 10 log Absolute gain. Example: If your Yagi has 5 elements, the Absolute gain is: 1.66 * 5 = 8.3 dB; then, l0 log 8.3 = 9.19 dB Isotropic.

Here's the trick that will boost gain. Your Yagi reflector will no longer be an element rod; it will be a parabolic reflector. To design the parabolic reflector, you start with the parabolic formula:

$$y^2 = 4\,ax$$

where:

"a" is the focal point of the parabola. In the parabolic formula, "a" is the distance from the reflector to the driven element of your Yagi.

You then solve the formula for "X" using even-numbered millimeters or centimeters, or inches for the "Y" dimension. The formula then becomes:

$$x = y^2/4a$$

The "Y" dimension will be double the "X" dimension at the focal point. This is true of all parabolas; and the opening of

*e-mail: <eponymouse@cox.net>

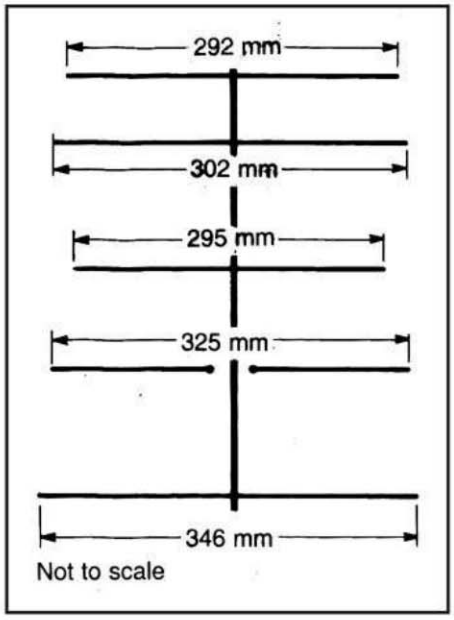


Figure 1. Element lengths and width of reflector for my 5-element 70-cm (448 MHz) Yagi.

the parabola at the focal point will always be four times the focal distance. Extending the "Y" and "X" dimensions will provide more reflection and gain, but depends on how much material you have on hand and/or your assembly working space.

The next step is to accurately plot the parabolic curve on a piece of plywood or pressed wood, and cut it to the curve. This will serve as the template to bend your aluminum tubes or wires for the reflector. Copper tubes or wires are oaky for UHF but too heavy for VHF parabolic reflectors.

Figure 1 shows the element lengths and width of reflector for my 5-element 70-cm (448 MHz) Yagi; figure 2 shows the element spacing; figure 3 shows an isometric of the reflector; and figure 4 shows the beta ("hairpin") match. The width of the reflector, 346 mm, is the Yagi's designed reflector length. All dimensions are millimeters. The RG-I74/U or RG-8 balun length is 246 mm and the 18-or 22-gauge solid copper wire hairpin is 62 mm. You should note that I use telescoping elements and boom, which I find necessary to fine-tune the Yagi before establishing the width of the reflector. You then remove the Yagi's reflector rod and replace it with the parabolic reflector.

The gain of a parabolic reflector is directly proportional to the gain of a parabolic dish with the same focal point and is 52 percent of the dish. The Absolute gain of a parabolic dish is π^2 times dish diameter, in meters, squared, divided by the wavelength squared. Wavelength is 300 divided by the frequency in MHz and π^2 is always 9.87. Remember, if you use inches, you must convert inches to meters in this formula! Inches times

Y	X
0	0
25	1.15
50	4.60
75	10.34
100	18.38
125	28.72
150	41.36
175	56.30
200	73.53
225	93.06
250	114.89
272	136.00 = Focal Point

Table I. Dimensions, in millimeters, required to lay out the parabolic curve for 448 MHz on a piece of 5/8-inch plywood or pressed board. You can see that Y is double X at the focal point.

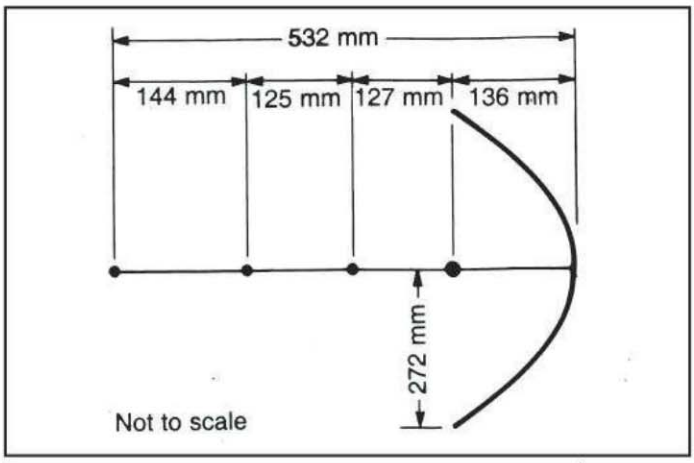


Figure 2. Element spacing for the Yagi.

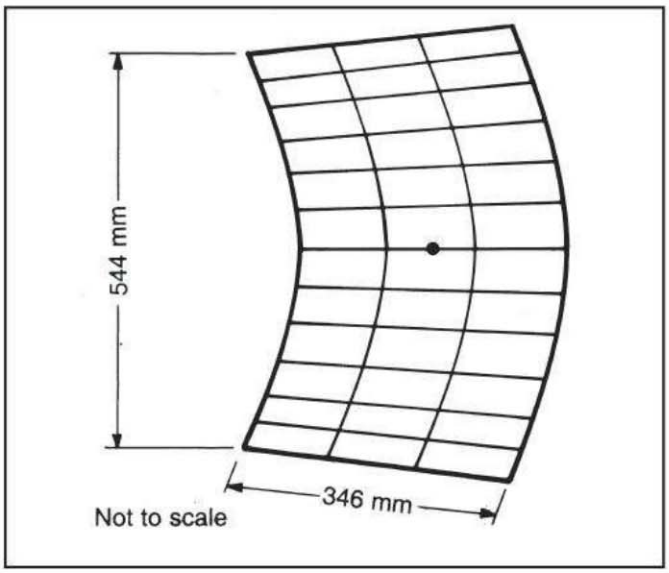


Figure 3. An isometric of the split-paraboloid reflector.

0.0254 equals meters, and inches times 25.4 equals millimeters.

The Absolute gain for this 448-MHz parabolic dish is:

(9.87 * 0.5442) / 0.44836 = 6.51

Therefore, the Isotropic becomes l0 log 6.51 = 8.136 dB.

The Isotropic gain of the parabolic reflector becomes 8.136 * 0.52 = 4.23 dB; and the total Isotropic gain of the Yagi and reflector becomes 9.19 + 4.23 = 13.42 dB.

That's good gain for a modified 5-element Yagi.

The Payoff

What makes parabolic dishes so attractive is that when you double dish diameter, you quadruple the Absolute gain! You should be reminded that when the Absolute gain is a number higher than 10, the Isotropic will be a lower number, and, conversely when the Absolute is less than 10, the Isotropic will be a higher number. When you do the math, if you double the above 448-MHz dish diameter from 0.544 to 1.088 meters, the Absolute gain becomes 26.04 dB, which is exactly quadruple the 6.51 dB gain.

The other attractive thing about parabolic dishes is that all radio waves striking their surfaces are directed to the focal point; and, with parabolic reflectors, all radio waves are directed along the full length of the driven element and that these antennas are extremely directional. With my split-paraboloid, the split dishes direct all waves to the tips of the driven element.

Table I shows the "Y" and "X" dimensions, in millimeters, required to lay out the parabolic curve on a piece of 5/8-inch plywood or pressed board, for 448 MHz. If wind is no problem, you can line the reflector with aluminum screen for more reflection. Since my 20-element 2.4-GHz Wi-Fi split-paraboloid is small, I lined it with aluminum foil and use it in my shack or under the patio roof where wind is no problem. My large 2-meter split-paraboloid, lined with aluminum wire, was warped totally out-of-shape two years ago by a strong micro-burst, so I finally settled for a Yagi with a parabolic reflector. For good results, with all these antennas, use a 50-ohm feedline, a tuner, and aim the antenna at the repeater or station of choice. Photo A shows my full 5-element 448-MHz split-paraboloid antenna, lined with aluminum screen.

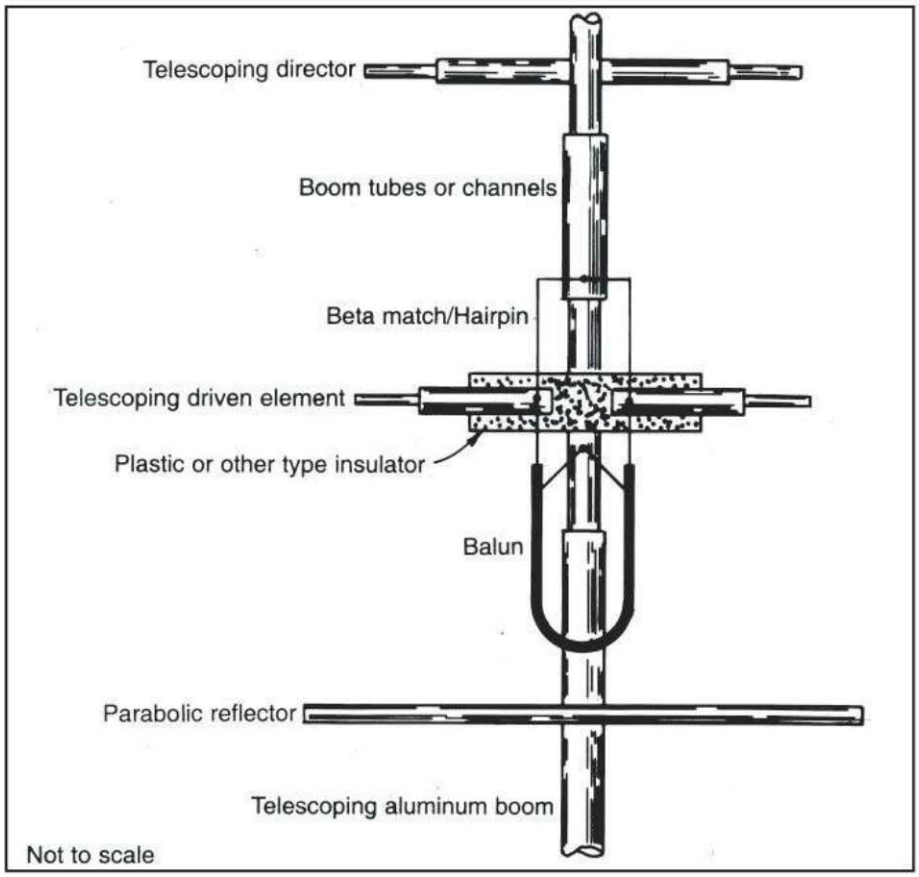


Figure 4. Details of the balun and the hairpin beta match.

About the Author

Nunzio Addabbo, W4VYD, is the inventor of the split-paraboloid antenna and author of *Ham Radio Heroes.*

An Antique Radio Restoration Project

BY IRWIN MATH,* WA2NDM

One part of our hobby that I have not written about in the past is the restoration of older equipment, including the so-called "boat anchors." These relics of the past hold a certain fascination for me, and I love to see how radio has progressed through the ages based on actual equipment. I also have several old radios (manufactured before the 1930s) that I have restored to full operation. When restoring such equipment, I feel that it is important to try to keep the units as original as possible. Fortunately, there are a number of sources that have quite a bit of "new old stock" components, so it is not too difficult to find what you are looking for. From carbon composition resistors to paper capacitors, vacuum tubes, dial cords, and even old-style cotton-covered magnet wire, one can search the internet and usually find a suitable source.

Recently we had the luck of finding an Atwater Kent model 84 cathedral style radio receiver, circa 1931, at a local flea market (see the accompanying photo for an idea of what this radio looks like and why we were so enamored by it). The design was classic, and since it was in perfect physical shape (and at an extremely reasonable price), we bought it. The seller, however, was quick to point out that it did not work and in fact was "completely dead," which is why it was priced so low. It looked so nice to me, however, that we decided to purchase it and attempt to fully restore the unit. We did and wound up with a totally operational 1931 radio. The steps we took and what we found along the way should be of interest to anyone who wishes to try their hand at a similar task. As a result, here is what we noted and did.

This is a photo of an Atwater Kent model 84 receiver of the exact same type that we bought and restored.

The Restoration Process

When we first got the radio home, we connected it to an isolation transformer and a Variac™ (even though the unit had an internal power transformer). This combination was used for all of the following procedures for safety.

We applied power, slowly raising the voltage to full line voltage and nothing at all happened. The seller was right; the radio was completely dead! Removing power and using our ohmmeter (after cleaning out years of dust), we quickly found that the power switch was open. The switch was then removed from the chassis and closely inspected. When we did we found that the internal set of contacts had either bent or worn to the point where they would not complete the circuit even though the switch did produce an audible "click." Some "adjustment" with a pair of needle nose pliers and a liberal amount of contact cleaner easily solved the problem, and we then re-installed the switch. Now when power was applied the pilot lamp and all tubes lit properly, but the only sound from the speaker was a loud hum. No stations were received at all.

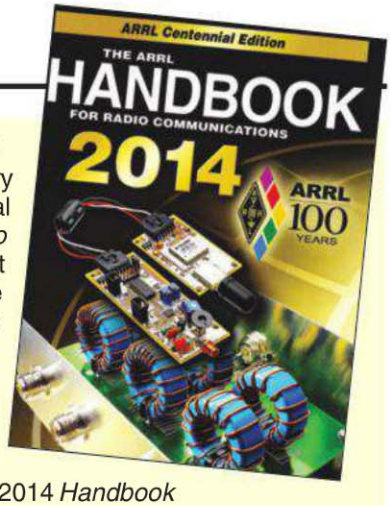
We then connected our oscilloscope across one of the 8-µF (475-volt) filter capacitors (there were two) and found a rectified DC voltage but with a ripple level that was almost equal to the peak DC value. Temporarily bridging one of the capacitors with a 10-µF 600-volt unit we had on hand significantly reduced the hum. We therefore removed the two capacitors, carefully drilled out the housings (making a mess in the process), and replaced the inside of each with a 10-µF 600-volt unit which fortunately easily fit with no problem.

Due to the obvious voltage (the original ones were marked 475 volts) we made sure the capacitors were completely isolated from the housing and then potted them with some black epoxy we had on hand. The result looked very much like the original.

The leads came out of the bottom of the capacitor housing and were then connected to the rest of the circuit at the same point (and chassis) and with the same polarity as the original ones. In this case we did not use or even look for an "old new

*c/o CQ magazine

what's new



ARRL Centennial Edition Handbook

The ARRL is celebrating its 100th anniversary this year and has released a special Centennial Edition of *The ARRL Handbook for Radio Communications*. This is a reference that should be in every ham's library, and if you're like most of us who buy one only every few years, this should be a good commemorative edition to hold onto in the future. This year's edition starts out with a history of the *Handbook* itself, which was first published in 1926. That book was less than 200 pages long, and in a small format. By comparison, the 2014 *Handbook* is over 1200 pages long, with additional material on an included CD.

New this year is a chapter on telemetry and navigation, as well as significant updates throughout the book. Contributors include Nobel laureate Joe Taylor, K1JT, as well as *CQ* columnists Joe Eisenberg, KØNEB, and Riley Hollingsworth, K4ZDH, plus *CQ VHF* columnist Bill Brown, WB8ELK, and *WorldRadio Online* Propagation Editor Carl Leutzelschwab, K9LA.

The *Handbook* (including CD-ROM) sells for $49.95 in softcover ($59.95 in hardcover) and is available from ARRL book dealers or directly from the League at <www.arrl.org> or 860-594-0200.

Lightweight Lithium Power from Cutting Edge Enterprises

Cutting Edge Enterprises has introduced its WorldPack Lithium Power Supply for the PowerPort WorldPack and DXpedition Pack power systems. The new lightweight pack provides 9 amp-hours of 12-volt DC power and comes standard with a 6-amp fast charger. Weighing just 2.5 pounds it's nearly 5 pounds lighter than the original power pack and provides an additional 2 AH of juice with up to 2000 charge cycles.

The Lithium WorldPack sells for $229.95 and may be ordered from the PowerPort Store at <www.poweportstore.com> or 805-528-4190.

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. The purpose of "What's New" is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

replacement part," since any capacitor from the 1930s, especially an electrolytic, would probably be bad as well. This particular compromise was one I could live with since there was really no other choice and from a quick look everything seemed "original." After we replaced the capacitors and applied power the hum was completely gone but the radio still did not receive any stations. We did not attempt to replace any of the other signal capacitors since many were in sealed metal cans, and if they were defective, we decided that we would deal with that later.

Luckily the schematic for the radio was available on the internet and we downloaded a copy. We first located the audio stage, a type 45 vacuum tube, and touched the grid with our finger (across a 500K resistor). This caused a buzz which indicated that the tube and speaker were fine. The schematic indicated that the IF frequency was 130 kHz, so we set our signal generator to 130 kHz with 400-Hz modulation and coupled it to the input of the IF amplifier, which in this particular radio was at the top of the volume control (don't ask me why; that's just the way it was). A loud tone (that could be varied by the volume control) was now clearly audible indicating that all of the following circuitry was OK. Still no received signals, however. All that was left was the detector/RF stage and the local oscillator.

Since the IF was 130 kHz, we set the radio to 1 MHz ("100" on the radio's dial). We then "probed" the radio with a short length of hookup wire connected to the antenna terminal of our Kenwood R-600 receiver in the vicinity of 1.0 MHz ±250 kHz to see if there was any local oscillator signal. If there were it would be either above or below 1 MHz by 130 kHz. Nothing, however, was detected on either side of 1 MHz.

Again, with power turned off we carefully examined the various components around and connected to the oscillator tube (a type 27). We eventually found a broken corroded wire going from the grid of the oscillator tube to the oscillator coil. Luckily this was actually pretty easy to repair and we did so in a minute or two. (It was not that easy to find, however, and without the schematic it probably would have been a real pain.) Now when we scanned with our R-600 we could hear the local oscillator clearly. At the same time it seemed that we were hearing some actual signals from the radio as well.

Now it was time to reassemble and realign everything. This we did by setting the radio to "100" again and our sig-

nal generator to 1.0 MHz (also with 400 Hz modulation). We coupled the signal generator to the radio with a short length of hookup wire near the antenna binding post on the rear of the chassis. Each trimmer we could see was turned slightly CW and CCW for the greatest received signal. We also learned that this radio had a strange receiving scheme and IF filter and we did not want to get too involved with trying to figure out an 80-year-old "trick circuit." At any rate, none of the trimmers were far from their ideal setting anyway. Interestingly, none of the IF cans had externally available trimmers, so we did not adjust anything there. We then connected a 3-foot length of hookup wire to the antenna binding post and were rewarded with an operational receiver and plenty of strong, clear broadcast-band signals. We had restored a true 1930s classic and were ecstatic!

Restoration Tips

While this column is specifically related to restoring a specific vintage radio, similar steps certainly could be followed to restore any communications receiver or radio you might purchase (at a good price) from a flea market, yard sale, etc. When and if you do, be sure to observe the following:

1. Always use an isolation transformer even if the radio had its own internal power transformer. Many AC/DC sets of the past do not, and touching any part of the circuit, including the chassis, can result in a dangerous shock! Also, you don't know the condition of a power transformer in a radio that has one, so don't take a chance!

2. Always use a Variac™ so you can slowly raise the AC input voltage the first time. Often capacitors, especially electrolytic filter devices, have dried out and may be shorted or open, as in our case.

3. Always try to get a schematic for the radio you are restoring. It will save countless hours of time and frustration. These often are available on the internet from the various antique radio components dealers or websites devoted to antique radios.

4. Finally, always use common sense in troubleshooting. First get the power supply working properly. Then replace any vacuum tubes that do not light. Start to signal trace from the audio stage back through the IF amplifier stage or stages and then move on to the detector/oscillator, and finally, when all seems to be working, proceed to deal with the local oscillator/detector and RF stage if present. Look for open solder joints, dried-out capacitors, broken coil leads, rubbing variable capacitor plates (especially the small trimmers on the side of many main tuning capacitors), and most of all have fun! Don't get hurt and have plenty of patience.

When you finally get a "old timer" working properly you will not only have a piece of history you can be proud of, but you will be able to hear exactly what your ancestors listened to.

In conclusion, once again I want to wish all of you a very Happy New Year and hope that all of your hopes and dreams really do come true in 2014. 73, Irwin, WA2NDM

Note

If the idea of restoring older radio equipment is of interest to you, contact Jon Kummer, WA2OJK, who publishes a magazine called *Antique Radio Classified*. This publication lists various technical articles and serves as a good guide to the whole world of such restoration efforts. He can be reached at <www.antiqueradio.com>. *(Jon is also the Advertising Manager for all of CQ Communications' magazines and can be contacted at <Jon.Kummer@cqcomm. com>.—ed.)*

learning curve

BY RON OCHU,* KØJZ

DIY and Yes, You Can Do It!

Happy New Year! In accordance with the New Year tradition of making resolutions, I wonder if having a better understanding of basic electronics just happens to be one of your personal resolutions for 2014. Many of us earned our entry-level licenses and many of us know basic electronic components, but we are not very confident as to how these components work in a circuit, not to mention that it is a little embarrassing to admit that looking at a schematic makes little sense.

"DIY"

Why would somebody want to learn more about ham radio electronics? The letters "DIY" stand for "Do It Yourself" and a "DIY" attitude is what helps to separate so-called "appliance operators" from more experienced hams. Notice that I purposely used the noun "attitude." In my opinion, having the desire to learn more about a radio's functions as opposed to just getting on the radio ultimately brings a deeper personal understanding of the hobby, which is ultimately more fulfilling!

*e-mail: <ko0z@cq-amateur-radio.com>

Photo A. Rainbow Kits OSC-2 kit.

For example, a newbie to ham radio had some degree of difficulty in grasping the notion that a rubber-duck antenna is nowhere near as efficient as a larger base-station antenna with more gain. Isn't an antenna an antenna? When given an explanation as to antenna fundamentals, he reinforced what he learned by building a J-pole antenna and now he is able to get out much better than before with only his rubber duck. Not only does he sound better on the air, but he has a better grasp of antenna theory and he also has the satisfaction of a "DIY" project.

Antennas are fun to build, but so is building your own electronic projects. When looking for an electronic kit-building guru, we are fortunate to have Joe Eisenberg, KØNEB, writing for *CQ* each month with his "Kit-Building" column. I highly recommend Joe's column as a way to get more immersed in this fun facet of ham radio.

Just Do It!

Like most things in life, once you have the proper attitude, getting started becomes just a matter of plunging in and getting wet! There's no better way to get experience than to just do it! You should not only be willing to make mistakes but to expect them as well. Every mistake brings you a step closer to getting it right!

Where to Begin?

The first place to begin is to take a look at the schematic diagram. A schematic can be thought of as an electrical equivalent to a blueprint. A schematic tells you what parts make up a circuit and what that circuit's function is. However, before you can read a schematic, it is important to know what each component within the circuit is supposed to do. Generally a good rule of thumb, especially when starting off, is to begin at the power source and then work your way down the line.

Let's Do It!

Before we begin, I need to write that I love to operate CW (Continuous Wave, ham shorthand for Morse code)! Occasionally, some friends drop by my shack and see me operate CW. Certainly at Field Day and for special event stations, club members can see me operate using Morse code. If I had a dollar for every ham who watches me operate and then says something to the effect "that looks like fun and I've been meaning to learn code," I would be able to buy a new station accessory for my shack. Even though the FCC no longer requires amateurs to know Morse code, the numbers of hams using it hasn't decreased. In fact, CW is alive and well. Why? For one thing, it is fun! Another is that since CW's bandwidth (the amount of radio spectrum a signal occupies) is so narrow that its signal-to-noise ratio (how strong the signal is compared to the noise floor) is better than that of voice. Therefore, most of the time a CW

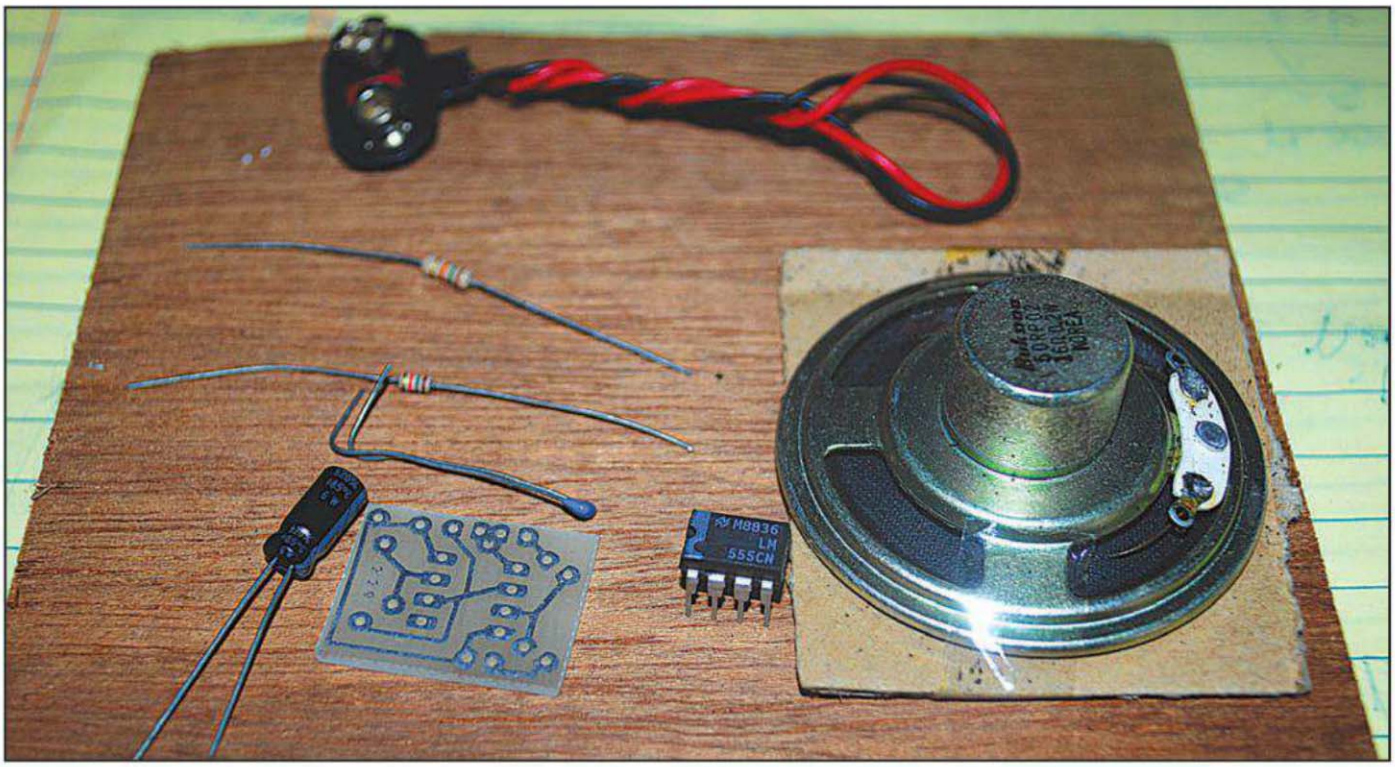


Photo B. Components inside the OSC-2 kit.

signal will "reach out" better than a voice signal using the same amount of power. I also have better luck at cracking CW pileups versus phone pileups when I am DXing, but that is a topic for a future installment of this column!

Why give us the rah-rah CW pitch? Well, maybe—just maybe—you would like to learn Morse code as well as furthering your understanding of basic electronics. Then why not think about building a code practice oscillator to learn more about commonly used electronic components, and when you're done, you'll have a station accessory that will help make learning Morse code even more fun!

The Kit

For the purposes of this article, I chose Rainbow Kits OSC-2 Code Practice Oscillator (photo A). The reason I chose this particular kit is that I just happened to have one and through personal, prior experience, the company has good product support and its kits are very reasonably priced! Rainbow's catalog can be found at <http://www.rainbowkits.com/> and I've noticed that the OSC-3 replaced the OSC-2 and it is listed at $8.95, which includes the printed circuit board, a handful of components, and a 9-volt battery clip. You will have to supply the telegraph (Morse code) key. As an added benefit, this kit can also be used as a signal tracer to repair audio amplifiers!

On with the Tutorial!

As with any kit, it is a good idea to inspect the contents and compare it with the parts list. Doing so will also help to familiarize you with the various components. In our case (photo B), there isn't a lot to inspect. You'll find the printed circuit board where the components will be soldered (we call this "populating the board"), two resistors, one disc capacitor, one electrolytic capacitor, one battery clip, one speaker (if you wish to sound overly impressive, it is also known as an audio transducer), and the heart of the project, the 555 timer chip, along with a schematic and kit-building instructions.

What are These Parts?

You should have become somewhat familiar with all of the parts in this kit while studying for your ham radio license. What may not be so clear is how they actually function in a circuit. Thus, let's take a look at the heart of this oscillator circuit—the LM 555 integrated circuit (IC) chip (photo C).

The LM 555 has been around for a long time and it is used in many applications. Notice that it is an eight-pin (also called legs) chip, with four legs on each side. From the top of the chip, the legs are numbered one through four on the left side and eight through five on the right side. At this point you should be asking yourself, how do I determine the chip's top? Good question! It's easy; all you have to do is to look for the end with the indentation, usually a "U"-shaped indentation, and that will be the IC's top. Sometimes instead of an indented "U" shape

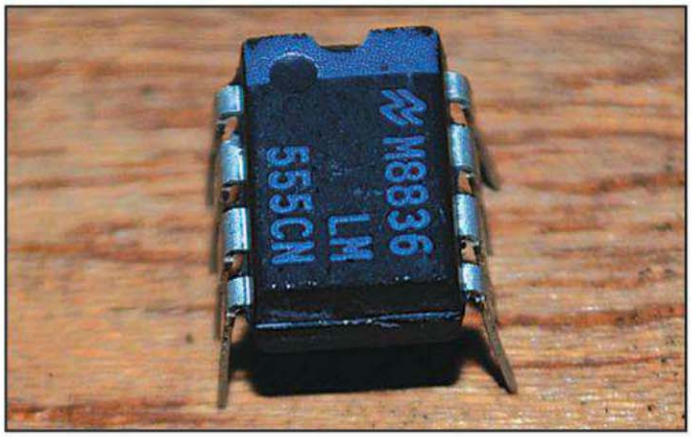


Photo C: The LM 555 IC chip.

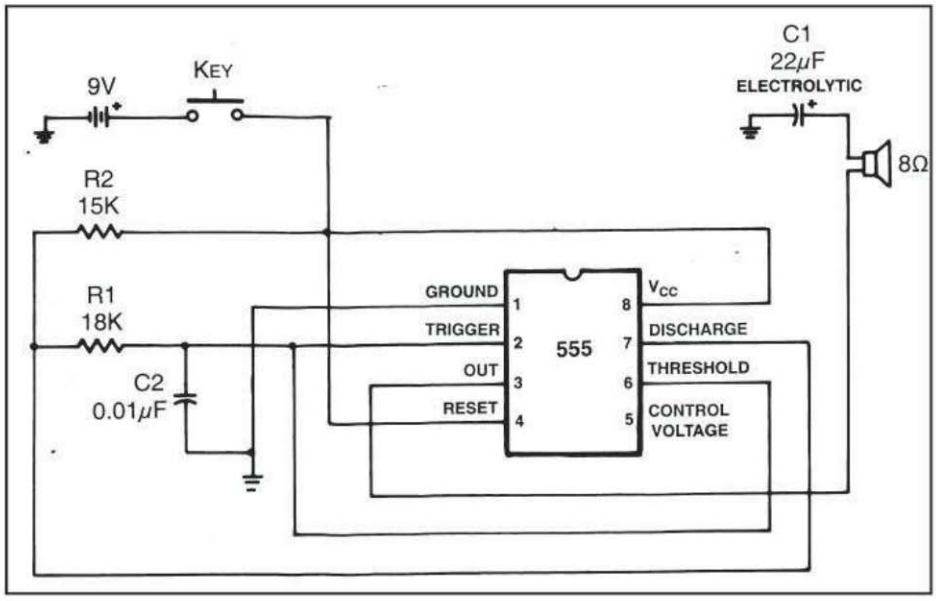


Fig. 1. A code practice oscillator schematic.

you'll find a small indented dot near pin 1. Often you'll hear hams refer to ICs as magic black boxes because they contain many circuits within their structure that you can't see.

The invention of integrated circuits went a long way toward the miniaturization of electronics. For our purposes, we are going to use this timer chip as an oscillator to produce a tone that we can turn on and off to produce Morse code. To make the LM 555 IC work as an oscillator, we will configure the IC to work in *astable mode,* which will allow it to generate a continuous tone. In this column we won't go into the actual workings of the LM 555. Instead, we will focus our attention more on its supporting circuit components. For more information about the internal workings of this extremely useful chip (IC), may I suggest going to Texas Instruments website at <http://www.ti.com/lit/ds/slfs022h/slfs022h.pdf>. Therefore, our 555 chip will be the oscillator that will produce our tone that we can use to drive a speaker, or if we'd prefer, it could be used to inject a sine-wave signal into a circuit that we'd like to test by using an oscilloscope. The rest of the components on our board are used to supply voltage to our chip and to set the audio tone.

Let's Read the Schematic

Earlier, I wrote that one way to tackle a schematic is to start with the power supply. Looking at fig. 1, we see that our power supply is nothing more than a 9-volt transistor-radio battery. The negative side of the battery goes to ground and the positive side is connected to one of our Morse key's contacts. Keep in mind that a telegraph key is nothing more than a switch! It is normally in the open position and your fingers push the switch into the closed position. The key's other contact is connected to the LM 555 IC's pin #8 which is labeled Vcc. This (Vcc) indicates where the chip will get its voltage.

Please notice that along the same line that goes from the key to pin 8 there is another line intersecting it with a dot. The dot indicates that this new line is physically connected to it. If you see lines crossing over one another with no dot at the intersection, then this means the lines are not physically connected. On a printed circuit board, these lines may be either on the top or the bottom of the board, or they may make wide turns or even be jumpered. A jumper is a wire bridge over an existing line. However, in our circuit there are no jumpers or traces to worry about.

At this point, then, we understand that IC pin #8 is connected to the battery through our code key (switch), but we also have another line physically connected to this line that now directs the battery's voltage to IC pin #4 which is labeled Reset. Please also note that there is another line that connects to the line between the key and pin #4, and that goes to resistor R2, which is 15 K (15,000) ohms. The purpose of the resistor is to reduce the voltage and supply it to IC pin #7 (labeled Discharge). But wait, there is yet another line attached to this line, and that turns out to be R1, which is an 18,000-ohm

resistor that at one end connects to IC pin # 7 with reduced voltage, but on the other side it provides IC pin # 6 (Threshold) and IC pin # 2 (Trigger) with voltage as well. But there's more! Please note C2, which is a .01 µF (microfarad) ceramic capacitor that connects one leg of R1 to ground.

What Does a Capacitor Do?

You may recall from your studies that a capacitor is an electronic device that stores voltage. It may help to think of it as a car's gas tank. It supplies energy to the engine until it is empty. The same holds true of a capacitor (photo D). It stores energy until it is time to use it.

Now here is where a capacitor is not like a car's gas tank. Although it stores and releases energy, that energy is frequency-dependent. Depending on the capacitor's value, it will allow alternating current (AC) voltages to pass along at certain frequencies but it will block direct current (DC) voltages. This is most useful when it is necessary to supply a voltage to a device, but you safely need to sample another voltage from the same device.

For example, your radio's final amplifier circuit needs a voltage to power the output transistors (or tubes). At the same time you expect the device to produce RF (radio frequency) to the antenna. What you don't want is a DC voltage on your antenna; especially so when you are using an amplifier with thousands of volts on the tube final. A capacitor will do the trick in that when it is connected to the amplifier power source and the other end is connected to the antenna, the RF will pass from the amplifier to the antenna while safely blocking the supply voltage from the antenna!

Another function of a capacitor besides blocking DC is to act as a bypass circuit. That is exactly what is happening with our circuit. The .01 µF capacitor is bypassing any unwanted voltage ripples or unintended signals to ground.

Getting Back to Our Schematic

Since we just finished with C2's function, I must point out that also connected to this same line is IC pin #1, labeled GND, which as you hopefully guessed stands for ground. Pin #1 provides ground for all the LM 555 IC's internal circuits.

Okay, we now have traced out and understand the components connected to the LM 555 IC's pins 1, 2, 4, 6, 7, and 8. That leaves pins 3 and 5. Let's look

Photo D. A non-polarized capacitor. (Compare with the polarized electrolytic capacitor in photo E.)

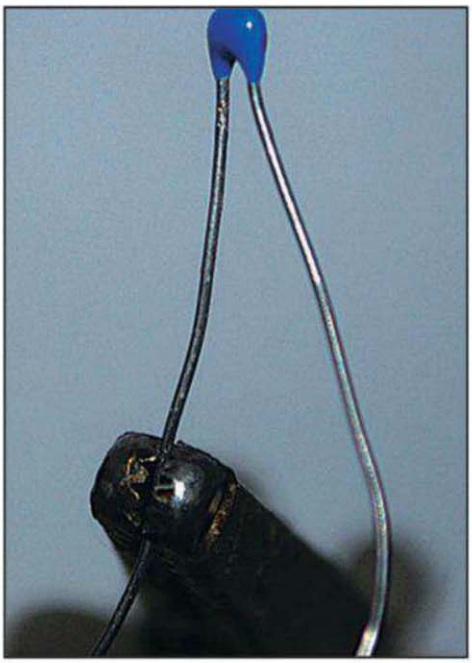


Photo E. An electrolytic (polarized) capacitor. Notice the marking indicating negative and that the negative lead is shorter than the positive lead.

at pin 5 for it is the simplest. It is not used in our circuit, so there is no connection to it. We can just forget about it!

Pin #3—The Business End!

Okay, here is the part of the circuit that produces what we want—namely, an audio note that is made up of a sine wave at a certain frequency that we can turn on and off at will to emulate a CW note. Pin #3 is the IC *output* and it is directly connected to one of the speaker's terminals. The only thing we now need to do is complete the speaker's circuit back to ground, and that is accomplished by connecting C1, which is a 22-µF electrolytic capacitor (photo E), to ground. It is important to note that an electrolytic capacitor is polarized. Polarized means that one leg of the capacitor is positive and the other leg is negative. You do not want to accidentally connect the capacitor's negative leg to a positive (hot) voltage source! If you do, then strange things begin to happen, the likes of which include a strange smell, smoke, a bubbling liquid coming out of the capacitor, and often a loud bang as well! Trust me, for I know from personal experience.

Why do we need an electrolytic capacitor to complete the circuit? In our case, the capacitor prevents us from providing a direct DC path to ground, thereby shorting out our circuit to ground. It also acts as a passive audio roll-off filter, which makes the tone coming out of our speaker sound more steady and pure.

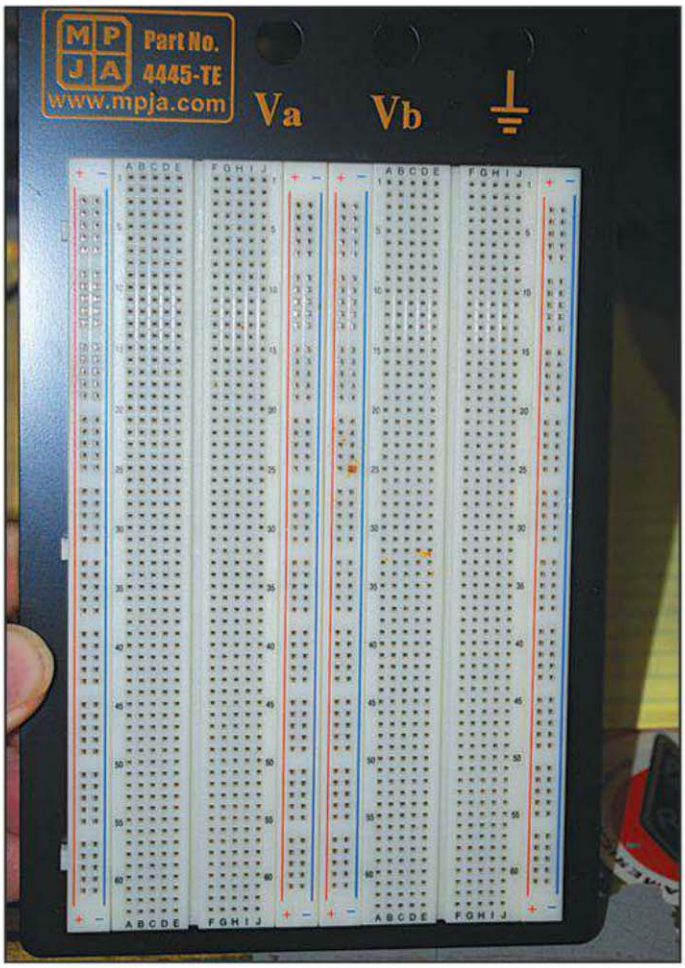


Photo F. Experimenter's board.

Voilà! There you have it . . . a simple code practice oscillator that you can be proud of and best of all, you now can read a basic schematic. Plus, you've increased your knowledge about capacitors, resistors, switches, and an IC. Well done!

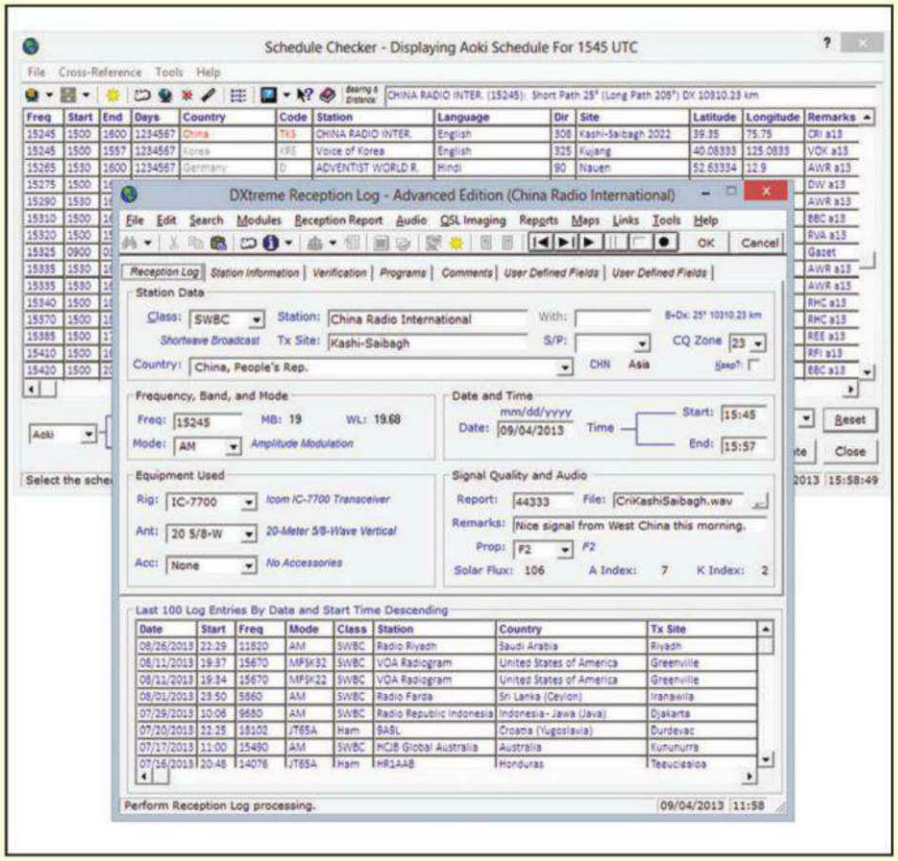
Perhaps this tutorial will inspire you to get a kit for yourself and to put your new-found theory into practice! I hope so! Maybe your junk-box parts bin contains many of the components that you need. Most likely you won't have the printed circuit board, but an experimenter's board (photo F) will work nicely. A good thing about this kit is that it provides everything you need except for the soldering iron, solder, battery, and code key.

Variations of the Same Circuit

The circuit we've examined is truly a simple version. It's not much more work to add a volume control (10 K variable resistor) in line or to add a frequency control to vary the output's pitch simply by adding a 100 K variable resistor between IC pins 2, 6, and 7. For more information I'd suggest going to this URL: <www.electronics-project-design.com/CodePracticeOscillator.html>.

I hope that you've found this tutorial to be informative and even inspiring to delve further into the wonderful world of electronics. As the old adage goes, "information is power," and my corollary to that adage is that an informed mind can be a powerful and wonderful thing! Happy New Year and we will see you later down the log. 73, Ron, KOØZ

what's new



DXtreme Reception Log—Advanced Edition, Version 8.0.

DXtreme Software™ has released a new version of its popular logging program for radio monitoring enthusiasts: DXtreme Reception Log—Advanced Edition™ Version 8.0.

The program lets listeners log the stations they've heard and provides advanced functions including the **Schedule Checker™**, which allows users to import schedules from the Aoki, EiBi, and FCC AM web sites and display that schedule data according to the filter criteria they specify. The Schedule Checker also lets users display antenna bearings to scheduled stations, tune compatible radios to the scheduled frequency and start a log entry for that station.

In addition, the program features a **Last Log Entries Grid,** which shows up to 5000 of the most recent log entries added. It also creates customized reception reports, displays and saves propagation data, lets users create and maintain an audio archive of stations heard, and more.

For those who enjoy monitoring amateur radio operators, Reception Log can retrieve call sign and address information for monitored hams from various online databases and it can send automatic eQSL requests to monitored hams via www.eQSL.cc.

DXtreme Reception Log runs in Microsoft Windows® XP and higher. It retails for $89.95 USD worldwide for electronic distribution. Pricing for CD versions and upgrading users is available on our Web site. All prices include lifetime product support by Internet e-mail. For more information, visit <www.dxtreme.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. The purpose of "What's New" is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

kit-building

BY JOE EISENBERG,* KØNEB

A New Year and a Finished New Rig!

Happy New Year to all of my readers! I hope 2014 is a good year for you and a fun one with time to build lots of kits. Each year new kits appear and other kits vanish. My best advice is when you see that special kit you like, get it now before it disappears. Small Wonder Labs, home of the famous "Rock-Mite" series of kits, has gone out of business. The good news is that Rex Harper, W1REX, of QRPMe (http://wwwqrp.me.com/) will carry on the Rock-Mite legacy, introducing a new "Rocktmite][, with models for 80, 40, 30, and 20 meters. I know I have had fun building the Small Wonder Labs series of kits, and I look forward to seeing that legacy continue. With other kit makers busy as well, 2014 will be a great year for kit building.

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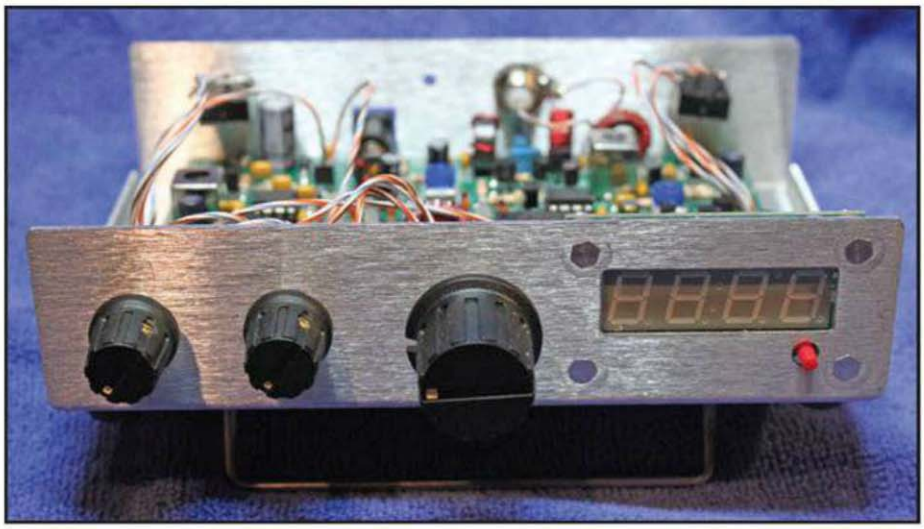
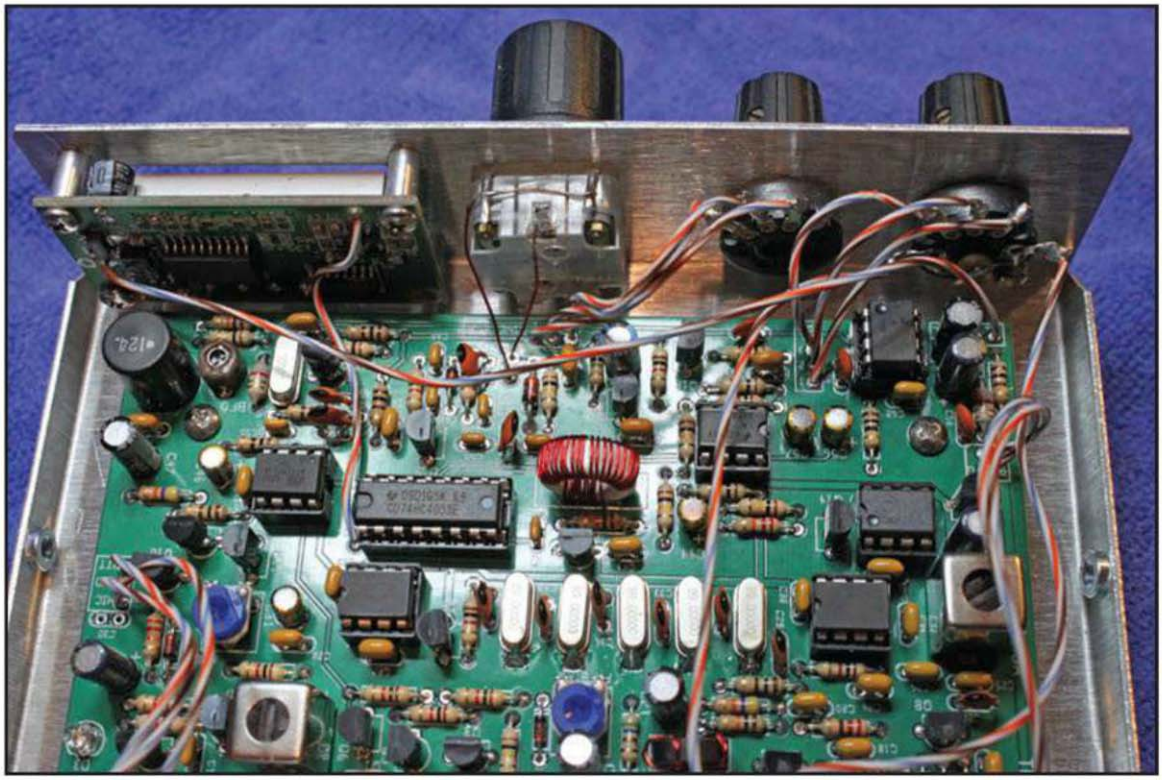
Back to the "Survivor"

Returning to the KD1JV "Survivor" kit, which we began discussing last month, the next step is to build the Digital Dial kit. The Digital Dial is basically a frequency counter with an offset function built in to allow for the difference between the local oscillator and the actual operation frequency to be taken

Survivor kit front panel ready for decals and markings. →



Inside look at the front panel of the Survivor featuring the Digital Dial kit on the left. ↓



into account. As long as the offset between the local oscillator frequency and the operating frequency is known, the Digital Dial can be set to always display the actual frequency of operation. To save on power if using batteries, you can turn off the Digital Dial with a press of the front-panel button.

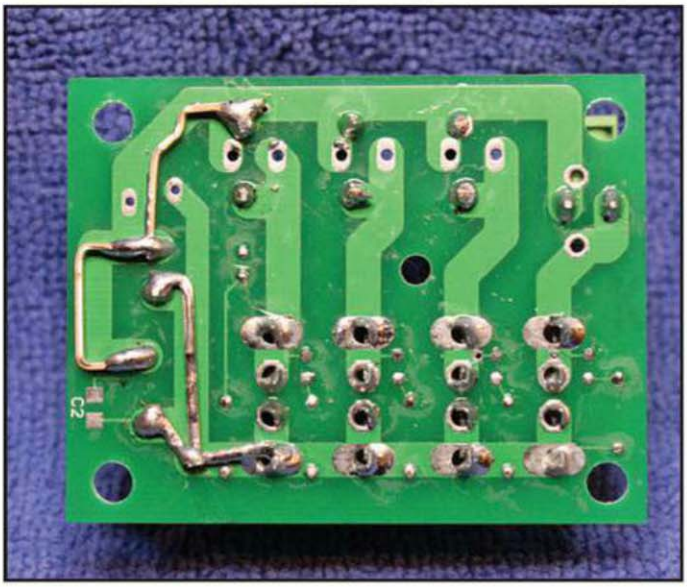
The Digital Dial can be very helpful when setting up the VFO. I found that I needed to add a couple of turns to my VFO toroid to bring it down into the band. The Digital Dial helped a lot during that part of the setup by giving me a precise location of where I was in the 75-meter band. Tune-up was a snap, with only a brief adjustment of the coil slugs. I used a calibrated signal generator to be sure I was where I wanted the VFO to be and the receiver heard its 50 µV (S9) as well as the 1-µV signals quite nicely.

Once the receiver is set up to be in the band and the Digital Dial offset is set, the power amp transistor can be mounted. This kit produces about 10W PEP on SSB, which is a full "QRP gallon." The modulation is set up using an LED that is mounted on the main board. A good optional modification is to remount the LED to the front panel on extended leads so it is visible. Once set, there will not need to be any adjustments to modulation except if you change microphones.

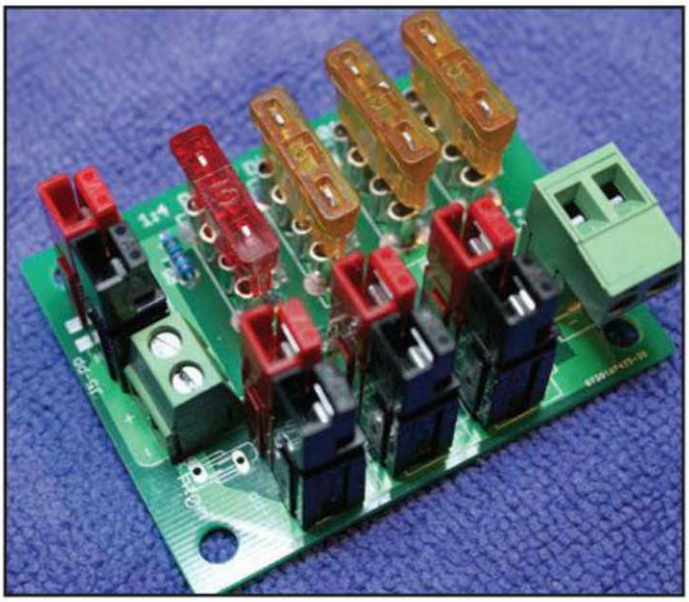
Power Distribution

When building kits, I have often found myself in need of additional Powerpole® or screw terminal connections to my 12VDC power supply. With Powerpole and terminal binding post strips being expensive, it was a matter of time before some clever designer created a kit to make a simple power distribution box, ideal for kit builders. The power distribution module kit I recently built was designed by Barry Buelow, W◻IY, who is a member of the well-known N◻MA "Radio Farm" group of Cedar Rapids, Iowa. Many members of this group are current or former Rockwell/Collins engineers. The proceeds from the sales of this kit help maintain the Radio Farm, which is a huge contest and DX station outside of Cedar Rapids, Iowa. The power distribution module kit has a PC board that is not only plated through and pre-tinned, but has different types of holes allowing the final configuration to be any number of combinations of Powerpoles or screw terminals for the input and outputs. There are four outputs, each of which can be either Powerpoles or terminals.

Each output is individually fused with an LED that lights when that fuse is blown. Thus, if there is a problem on any of the four output circuits, you have an instant indication of which fuse is blown. The kit is designed to use the common larger size automotive-type plastic bladed fuses. There is



Bottom view of the Power Distribution Module kit featuring the addition of heavier conductors on the input side of the board.



Power Distribution Module inputs on the left side of the board and four fused outputs.

On the Cover

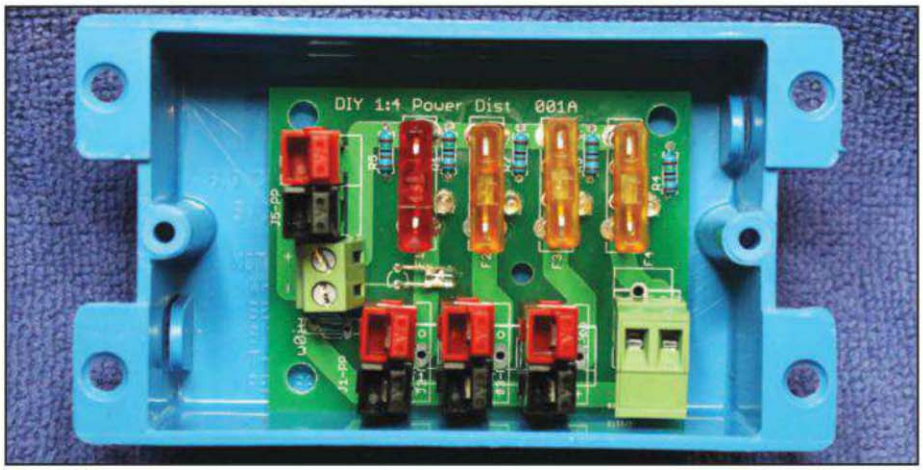
Jim Talens, N3JT, of McLean, Virginia, is a man of many talents. With degrees in electrical engineering, business, and law, Jim has spent his career in telecommunications law, including 22 years at the FCC, where he oversaw or managed a wide array of programs. After leaving the Commission, Jim spent five years working for a large telecommunications law firm in Washington and now consults.

In his ham radio life, Jim is primarily a CW operator; he is a co-founder of the CW Ops Club (<www.cwops.org>) and holds membership #1. A ham since 1960, his main interests are DXing, contesting and rag-chewing, along with DXpeditioning from various locations in the Caribbean and in Central and South America. Jim won the 1991 ARRL CW DX Contest from San Andreas (HKØ).

His most recent project has been setting up his station in Virginia to be operated remotely from the winter home in Florida that he shares with his wife, Nina, KE4PSV. One of Jim's goals is to have the remote setup operate without needing a computer at the Virginia end. His efforts included no-computer control of his antenna rotator, which is the subject of his article on page 42 of this issue.

Jim noted that he could not have pulled off the whole project without help, especially from one ham friend in particular: "I am especially indebted to the patience of Chip Sufitchi, N2YO, who responded so many times to my networking questions, many of which started with, 'How in the world does this work?' Everybody needs somebody like Chip!"

Ham radio's helping tradition … alive and well in Virginia. *(Cover photo by Larry Mulvehill, WB2ZPI)*



Power Distribution Module ready to be mounted inside the case.

also a very bright-blue LED that indicates when power is present on the box. In fact, the power LED is mounted leaning over to light the inside of the box so as not be too bright towards the outside. The power input side of the box has two options that can both be installed at the same time, consisting of Powerpoles and screw terminals.

I found that if I use the Powerpoles to feed the input, I can use the power input screw terminals to attach a small low-cost dedicated LED digital voltmeter to be able to monitor the power-supply voltage in my distribution box. A plastic wall-socket box is supplied with the kit and will need to be drilled to accommodate the mounting of the board. Be sure to check your work before mounting it and pay attention to the instructions regarding beefing up the main power leads using the leftover pieces of Powerpole pins or thicker wire mounted over the input PC board leads. The Power Distribution Module kit assembles quickly and is available from the Radio Farm at <https://sites.google.com/site/radiofarmprojects/>.

Test Radio

I always have recommended using a known good radio for testing purposes when building kits. Sometimes taking the kit to the shack table is a bit of a hassle. I now use a small, portable Yaesu FT-817 for my kit-building bench-test radio so I know if the bands are OK and what can be heard to compare to the kit radios under construction. In addition, it lets me hear my transmitted SSB audio quality and my CW. The 817 is always connected to the main power supply, and can be hooked to a dummy load, a small indoor antenna, or an outside antenna.

I have an outdoor multiband vertical that I now use as my bench-test antenna. This antenna has its feedline passed directly into my workbench room with a coax switch that allows me to pass it on into the shack if needed.

The Grasshopper vertical I use is made by Loops N More in Kansas and can handle 100 watts. It is very lightweight and compact for traveling and possible portable or permanent base operation. It comes with the aluminum tubing pre-cut, pre-assembled, and marked so all you have to do is mount it on your pipe mount and extend out each section until you reach the mark and tighten the hose clamp. The unun that performs impedance matching comes pre-assembled and sealed in a weather-tight plastic box at the base. I mounted mine quickly on the pipe mount I already had in the ground in my backyard. The mount had previously held a ground-mounted Hy-Gain 18AVT for many years and worked perfectly for the Grasshopper. You will need to use a tuner when using this antenna due to its characteristics. I have found that my Elecraft T1 tuner or any of a number of antenna tuners work well. Most any tuner with a coax output should tune this antenna from 80–10 meters. The Loops N More website is at <http://loopsnmore.com/>. Photos of the antenna can be found online here: <http://www.hamradiocenter.biz/loopandmore.html>

I want to make a personal note to those of you who attend the annual convention in Friedrichshafen, Germany. I plan on making my first trip to the big hamfest there in June. In fact, it will be my first overseas trip since 1971! Be sure to find me and say hi! With winter here, my bench will be busy, so until next time.

73 de Joe, KØNEB

The Microwave Radio: You Built It . . . Now Use It!

BY WAYNE YOSHIDA,* KH6WZ

This is a follow-up to my articles on adapting rigs for transverter use (July 2013 *CQ*) and building a high-performance transverter (November 2013 issue). After successfully creating your SHF station, you need someone to talk to. It is often not the case of "build it, and they will come" when the topic is microwave ham radio activity. In most locations, microwave activity centers around the VHF/UHF and above contests.

However, this is not always the case. For example, the San Bernardino Microwave Society, SBMS (http:www.hamradio.com/sbms/), has a 10-GHz "activity net" on the evening before its monthly meeting. This net is meant to increase activity as well as a way to test radio systems on the air. Photo A is a map of the SBMS stations that participate in the 10-GHz net.

You May Have to Start Something

On the other hand, if you are ambitious and enthusiastic, you might be able to convince a group of fellow hams to join you in operating on the SHF bands. Take a look at the excellent website by Mike King, KMØT ("Amateur Radio in Northwest Iowa," <http://www.km0t.com>)). Mike got interested in the VHF and above bands and joined a local contest radio club. He built his microwave radio systems with the help of fellow club members and has continuously improved his station equipment as well as his contest scores over the years. I discovered Mike's website while doing some research on microwave equipment and contesting. Likewise, I found my local microwave radio club using the internet. I even went to a meeting and joined the club on the spot.

Speaking of Contests ...

One of the best things about getting on the microwave bands is the number of points each of these contacts can add to a contest score. For example, for the ARRL VHF Contest (http://www.arrl.org/contests-rules) in January, 50- and 144-MHz contacts are worth one point each, but it is eight points for each 2.3-GHz or higher contact. In the June and September VHF contests, it is still one point for each 50- or 144-MHz QSO, but four points for each 2.3-GHz or higher QSO. In the August UHF Contest, you earn three points for each 222- or 432-MHz contact, and 12 points for each 2.3-GHz (or higher) QSO.

(Note: In the ARRL 10 GHz and Up contest, the scoring is different. Here the emphasis is on DX: The distance in kilometers between stations is worth 100 points for each unique call worked per band.)

For complete details on scoring for each of these contests, see the official rules posted on the ARRL website mentioned above.

Therefore, when thinking about a VHF-and-above contesting strategy, it would be a very wise

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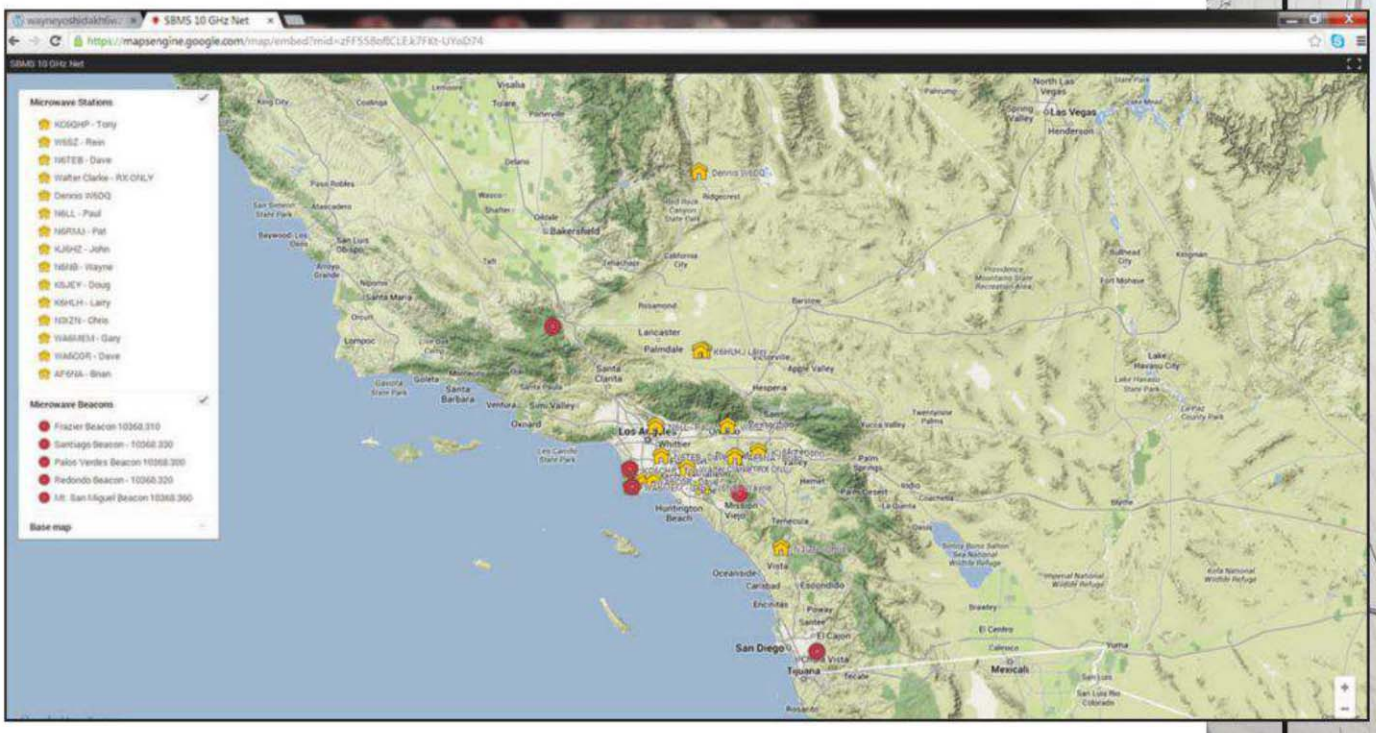

Photo A. Some active microwave clubs have non-contest weekend operating activities. This is a map of 10-GHz net activity by some San Bernardino Microwave Society members.

Photo B. A 10-GHz transverter system can be quite compact and yet have very good performance. This was my first operating location, Huntington Beach, CA DM03xq.

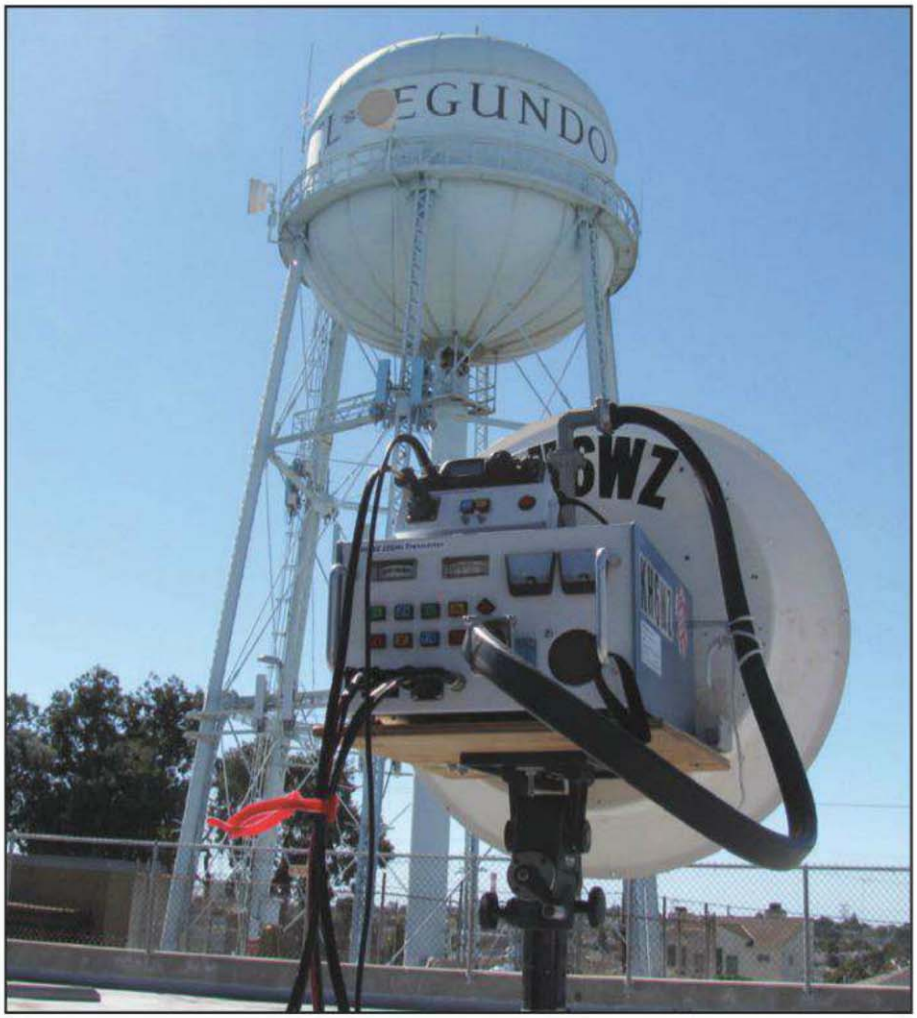

Photo C. This is my station at my second stop, El Segundo, CA, DM03tw.

move to go to the microwave bands to maximize your QSO point value.

Photos B and C show my 10-GHz system in the 2013 10 GHz and Up Contest. I did not plan on doing an intense contest effort, due to health reasons, and I have not installed a suitable power connection in my vehicle. (I had to use a pair of jumper cables for power. This is not a recommended practice, since those big clips can pop off at a very inconvenient time (see photo D). I have a note to correct this situation on my "To Do" list. However, I did manage to rove to two different grid square locations and pass out a new callsign to all of my contacts.

I like the portability of microwave gear, as antennas are relatively small (high gain to size ratio) and can easily be transported in the back of a compact sedan, as you can see in photo E.

Unique in Many Ways

The microwave bands are unique, not only because of their exotic propagation modes and equipment, but on-the-air operating techniques are very different from the other bands and modes. For example, one generally does not call "CQ" on a random open frequency on a random day or time.

There are multiple reasons for this, and the first one may be because many microwave rigs suffer from frequency instability and a lack of frequency accuracy, although this is rapidly changing with phase-locked-loop synthesizers and stable reference oscillators. Thus, the first challenge is knowing where the other station is, frequency-wise, whether or not the stations are drifting, and by how much. By the way, it is very possible that each station is drifting in the opposite direction from each other; in other words, Station A is drifting up while Station B is drifting down!

The second operating quirk is knowing where to "point" your antenna. Because SHF systems usually have high-gain antennas, beam width is very narrow, and aiming the antenna becomes critical. A slight tilt in azimuth or elevation can make the difference in being able to hear a station clearly with S9 signals, or not hearing anything at all.

Third, the terrain between stations becomes important. Geography (or, perhaps more accurately, topography) can either help or hinder signals going from one station to another. Just like light waves, microwave signals can be reflected, refracted, or absorbed. All of this reflecting and refracting can confuse beam headings when trying to establish contact.

These are just some of the reasons

Photo D. You can see a big jumper-cable clip in the right side of this photo. This is not a good way to draw power from a vehicle and fixing this situation is at the top of my "Radio to Do List."

Photo E. The compact system can be easily transported in the back of a compact sedan.

microwave QSO operating techniques have evolved in their unique way. Therefore, in order to establish a contact, both stations first must find each other on the VFO.

In practice, a way to coordinate stations wishing to make contact is used. This can be done via cell phone or on another ham band, such as 2 meters *(Be careful during a contest, as some sponsors limit permitted coordination techniques. Read the rules.—ed.).* This coordination link is sometimes a very critical element in the success or failure to make contacts, since making a microwave QSO is like shooting in the dark: You may not know where your target is. On this coordinating frequency, the station initiating or soliciting contacts (Station A) announces the frequency on which he is operating. The stations in "listen mode" tune their rigs to that frequency.

Next, Station A (the station initiating the contact) will transmit a continuous tone on CW, and other stations will listen for the carrier and tune their rigs so they can hear Station A. This establishes what operating frequency is to be used. Each listening station must be mindful of any drifting taking place. Knowing how your radio performs will help this aspect of frequency determination, because sometimes one will wonder, "Who is drifting? Is it him or is it me?"

Next, the stations listening will move their antennas to maximize received signals. Many operators use a compass or computer apps to determine beam headings, but I have always just "tuned by ear."

When the listening stations have Station A tuned in and are compensating for any drift, the coordinating frequency is used; stations listening tell Station A they are now on frequency and a contact should be possible.

If this sounds like a lot of work and is a little complicated just to make one contact, it is. However, with some guidance from experienced operators and lots of practice, this operating method becomes part of your ham radio repertoire and can be done efficiently.

Building your own station equipment is very enjoyable for a lot of people, including me, and the next phase of any building project is to put it to good use. The pride of craftsmanship, the joy of operating, and the celebration of winning a contest are great rewards of the sub-culture of microwave ham radio communication and contesting. I hope you will join us!

73, Wayne KH6WZ

antennas

BY KENT BRITAIN,* WA5VJB

Will the Real First Computer Please Stand Up?

Every once in a while, our column editors feel the need to comment on something that is not directly related to their column topic. We're generally pretty flexible on that count, since our columnists tend to know about more than just their column topic and usually have something interesting to say. This month, it's WA5VJB's turn to go slightly off-topic. — *W2VU*

For the first time, I am going to disagree with another *CQ* author. In the August issue of *CQ magazine* Warren Bruene, W5OLY (*unfortunately now a Silent Key—ed.)*, said that ENIAC was the first electronic computer.

I strongly disagree. That distinction goes to *Colossus* at Bletchley Park in England (photo A). Colossus went on line nearly two years before ENIAC and was used to attack the German Lorenz Cipher machine. For history buffs, *Enigma* (photo B) was a 3-rotor code machine. The 3-rotor machine was thoroughly broken by Polish cryptographers before the start of World War II. Later, the German navy used a 4-rotor machine that really kept the cryptographers at Bletchley Park busy for a year until it was broken as well.

However, for traffic between Hitler's headquarters and the major field commands, the Lorenz Company developed a 12-rotor system shown in photo C that was used to encrypt teletype messages. Only about 30 of these code machines were made, but this traffic was very juicy.

Colossus optically read teletype tape at 5000 characters a second (photo D). Once they cranked the tape readers up to 9000 characters a second, Colossus could do it, but the paper tape couldn't keep up.

American cryptographer William Friedman had developed a mathematical method of looking for "Patterns within Patterns," and these were what Colossus was used to find. By the end of the war, 10 of these computers had been built and read much of the teletype messages between German headquarters.

Why don't you see Colossus in the textbooks? It seems the Soviets were use coding equipment similar to the Lorenz machines and Colossus was

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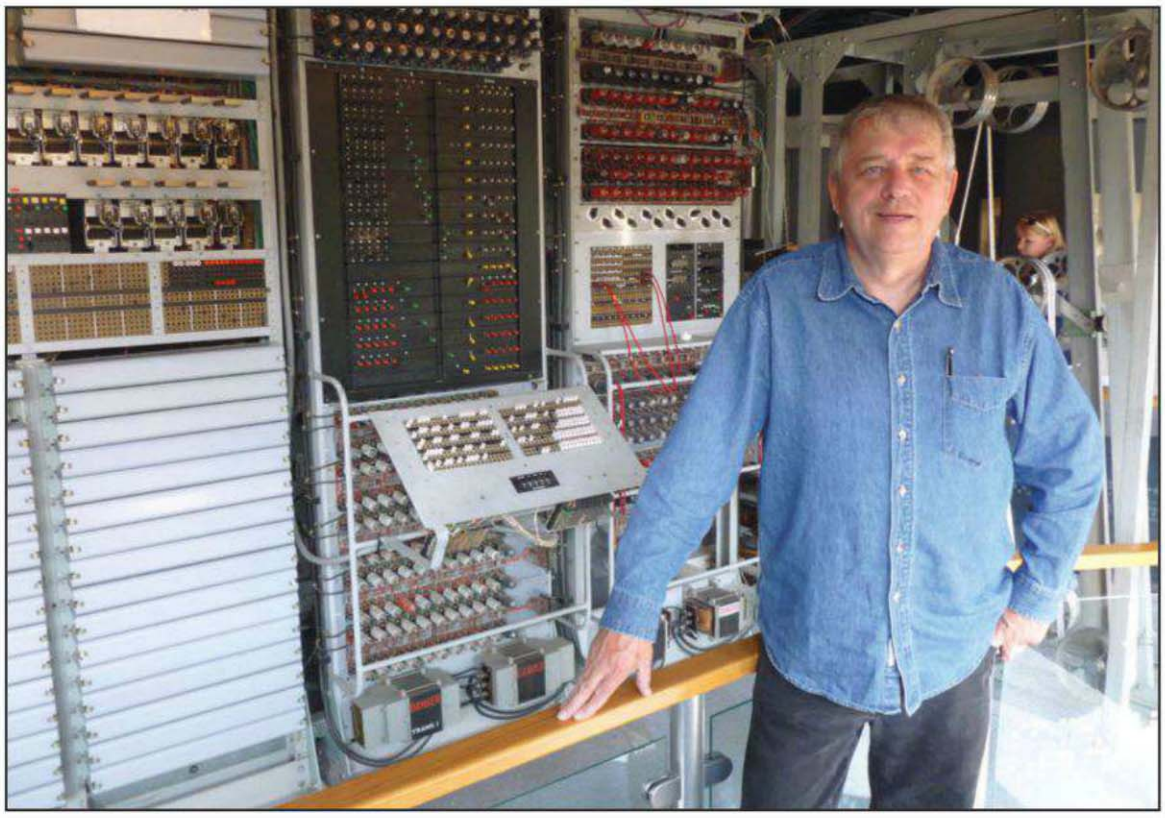

Photo A. Colossus and the author at Bletchley Park in England.