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Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

SEPTEMBER 2013

CQ

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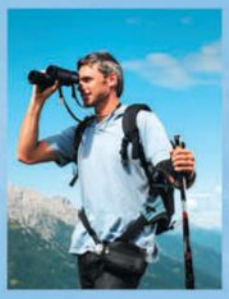
CQ WW RTTY DX Contest September 28-29

On the cover: Liam Hemsworth (L), Harrison Ford (R), this mansion and ham radio all are featured in the new movie, "Paranoia." Details on page 4; story on page 13.



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- Sky Command II
- Stand-alone Digipeater
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- 1000 memory channels
- Cross-tone

The TH-D72A comes with the PB-45L a 1,800 mAH lithium-ion rechargeable battery. A single charge will power the transceiver for approximately 6 hours of normal use at the 5W Transmit level.To save battery power the Output can be set at 5, 0.5, or 0.05 Watts.

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No Radials --1500 Watts

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.

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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.

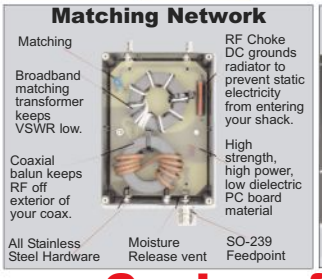
Rugged Construction: Thick fiberglass insulators, all-stainless steel hardware and 6063 aircraft-aluminum tubing is double or triple walled at key stress points to handle anything Mother Nature can dish out.

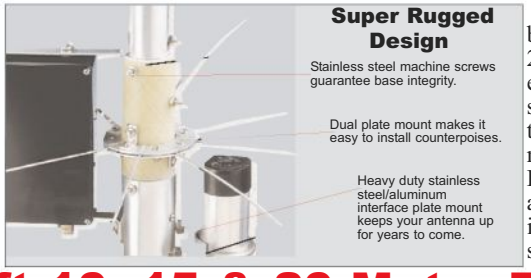
31.5 feet tall, 25 lbs. Mounting mast 1.25 to 2 inches. Wind surface area is 4 square feet.

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 *Ringo* 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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Logbook of the World Troubles Continue

Perhaps a victim of its own success, the ARRL's Logbook of the World online QSO database continues having problems, despite the delayed release in June of a new version of its "Trusted QSL" software (version 1.14.1). At its meeting in July, the ARRL board of directors approved a motion to hire another full-time staffer with "strong IT development and architectural skills" to work on the system, according to the League's website. In addition the board authorized spending $75,000 to hire outside help to improve LoTW's "database implementation."

There had been no indication as of press time as to what impact the ongoing problems and the League's efforts to solve them may have on the addition of LoTW support for CQ's Worked All Zones (WAZ) award, which was targeted for launch in the second half of this year.

Ham Sailor Completes Solo Circumnavigation

She's a grandmother, a retired math teacher and a ham. And now, 70-year-old Jeanne Socrates, KC2IOV, can add solo circumnavigator to her resumé. On July 8, Socrates returned to Victoria, British Columbia aboard her 38-foot sailboat, Nereida, after a non-stop solo voyage around the world that began there last October 22. Ham radio was her main communications link during the nearly nine-month voyage.

The *ARRL Letter* reports that Socrates also had a satellite phone on board but it died a couple of months into the trip. Between October and May, she used *Winlink* on the HF ham bands to send e-mails and update her blog, at <www.svnereida.com>. But then her computer failed as well, and her group of regular ham contacts used SSB to collect updates from Jeanne and post them on the web. Socrates used the trip to raise funds for Marie Curie Cancer Care, a UK-based group that provides free home-based care for terminally-ill cancer patients.

In the words of N7LWF, who first brought this story to our attention, the trip "not only highlights what a 70-year-old woman can do, but also what ham radio can do."

ARRL: No Changes Needed to Encryption Rules

We reported last month that Don Rolph, AB1PH, had petitioned the FCC to permit encryption of certain sensitive information in the course of emergency and emergency-preparedness communications, to avoid running afoul of privacy restrictions in HIPAA, the Health Insurance Portability and Accountability Act. When the FCC posted the petition for comment, the ARRL filed comments in opposition, pointing out that HIPAA rules apply only to health care providers, insurance companies and health care clearinghouses, and that there never has been an expectation of privacy in amateur radio communications. According to the *ARRL Letter*, the League also said it is unaware of any instances in which served agencies have been reluctant to use amateur radio as part of their emergency or disaster plans because of personal privacy issues. The timing of this filing was unusual for the ARRL, which usually waits until the FCC issues a *Notice of Proposed Rule Making* before filing formal comments on petitions.

ARRL to Petition for Modernized Technical Rules

The ARRL board directed General Counsel Chris Imlay, W3KD, at its July meeting to prepare a Petition for Rule Making with the goal of eliminating the "symbol rate" restrictions on amateur HF digital communications. Currently, FCC rules limit HF symbol rates—the number of times per second that a change of state occurs, according to ARRL CEO Dave Sumner, K1ZZ—to either 300 or 1200 bauds. New digital modes that use higher symbol rates within standard RTTY and SSB bandwidths of 2.8 kHz are being stymied by the rules, the League says, so it will petition the FCC to change the rules to "encourage both flexibility and efficiency in the employment of digital emissions by amateur stations."

League Supports Limited Receiver Immunity Standards

The ARRL says an FCC proposal to possibly impose interference immunity standards on home entertainment devices is long overdue, but that similar standards would not be appropriate for amateur-band receivers. Responding to a call for comments from the FCC on a white paper issued by the Commission's Technological Advisory Council, the League argued that such standards for amateur receivers "would compromise the experimental purposes of the Service," pointing out that hams typically resolve station-to-station interference issues on their own and that what amateurs really need is "protection from spurious and out-of-band emissions from other services."

ARRL Looks Beyond the K1ZZ Era

ARRL CEO Dave Sumner, K1ZZ, has not said anything about plans to retire in the near future, but the ARRL board—noting that he is approaching the "normal retirement age" of 65—apparently spent considerable time at its July meeting discussing the issue of choosing a successor. The board established a CEO Candidate Screening Committee, whose first job will be to establish search criteria. It was also authorized to hire an independent management consultant and to recommend at least three CEO candidates to the board for consideration "at the appropriate time."

NASA Intern Upgrades ARISS Scheduling Software

Trying to schedule a school contact with astronauts aboard the International Space Station has been a labor and time-intensive task … which has just been made considerably easier, thanks to the efforts of an Oklahoma State University student interning with NASA's Education Projects Office.

The AMSAT News Service reports that Nolan Replogle, a computer engineering major, upgraded the scheduling software to add a user interface and to integrate more efficiently with NASA computers and staff that deal with the overall scheduling for the space station and its crew. Replogle named the updated software ARRISA, or ARISS Assistant.

Monitoring Times Going QRT

Monitoring Times magazine will be shutting down after its December 2013 issue. Publisher Bob Grove told contributors in an e-mail that, after 33 years, he and his wife, Judy, have decided to retire. He also said that "a combination of a down-turned economy, as well as the ready availability of free listening and technical information on the Internet, has reduced sales and subscriptions throughout the marketplace."

The impending closure of *MT* will leave *CQ*'s sister publication, *Popular Communications,* as the only national magazine serving shortwave listeners, CBers, and scanning enthusiasts.

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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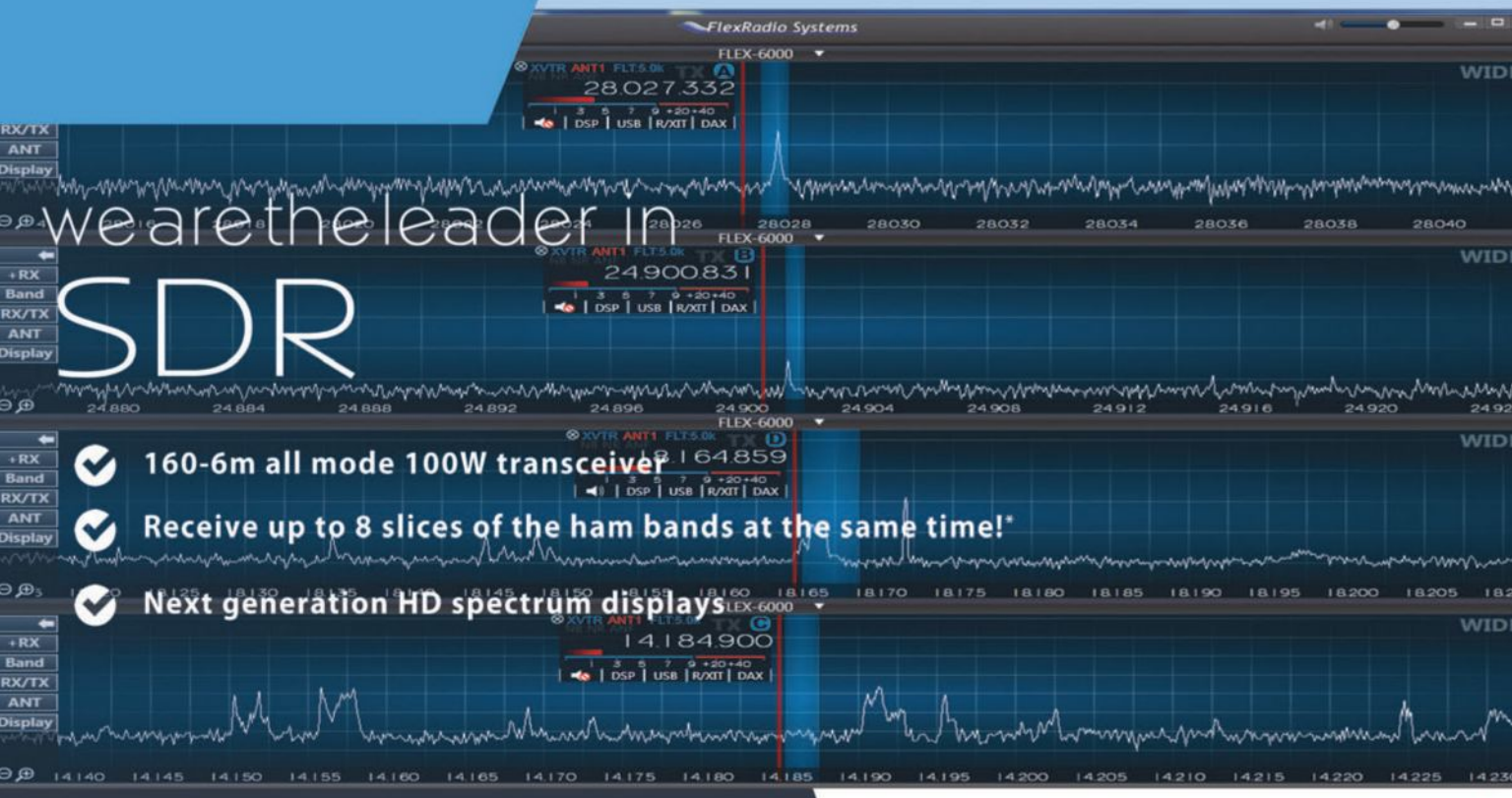

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(*8 slices on FLEX-6700 only)

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ON THE COVER: A mansion outside Philadelphia was one of the locations for shooting "Paranoia," a hi-tech thriller in which Harrison Ford's character is a ham radio operator. The movie was released in mid-August. Bob Schenck, N2OO, takes us behind the scenes for the ham radio part of the shoot in his story, "Ham Radio Goes to the Movies," on page 13. (Mansion photo courtesy Pictometry International Corp. / Inset photo by Peter Iovino, courtesy of Relativity Media, (c) 2012 Paranoia Acquisitions, LLC. All rights reserved.)

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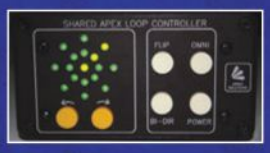
Introducing the Shared Apex Loop Array™!

Now, you have a new interference fighting weapon in your receiving arsenal.

The Shared Apex Loop Array™ is a revolutionary receiving antenna that will change the way that you listen to the radio! The patented design provides performance in a size and over a range of frequencies that will please both the rag-chewer and DX'er alike.

The antenna is a true-time-delay array with four identical wire loops supported by a single non-conductive mast. Signals from each loop are transferred through a ferrite coupler to a short balanced line that connects to the switch/combiner/amp enclosure mounted at the base of the antenna.

Within this enclosure, signals from each loop are routed either directly to a combiner or through a delay line and then to the combiner, where they are amplified by a dual stage balanced broadband amplifier and sent out to the feedline to the controller located in the shack.



The controller connects directly to your receiver, and sends power and control signals over the feedline to the antenna.

Two models to chose from:

- **AS-SAL-18** – optimized for VLF, BCB, Low Band DXing, and shortwave to 15MHz, 20 foot tall about 40 foot footprint
- **AS-SAL-10** – optimized for BCB, and 3-30MHz , 12 feet tall, and 28 foot footprint

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New Functions Enabled by the

The Choice of C4FM Digital

Compared to other digital modulation schemes within FDMA, C4FM has excellent communication quality (BER: Bit Error Rate characteristics). C4FM is the standard method for professional communication devices in FDMA, and is therefore considered to be the main stream digital communication mode in the future.

Automatic Mode Select(AMS) function detects the receive signal mode

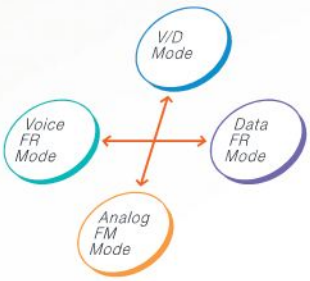
The FT1DR/FTM-400DR operates in three digital modes and an analog mode.
Enjoy communication in the mode that suits each purpose.

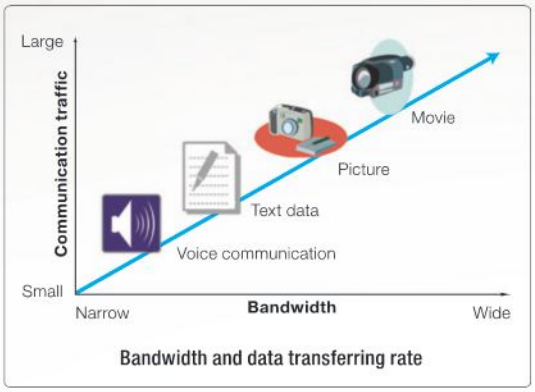
1. V/D Mode (Simultaneous Voice/Data Communication Mode)
A high-speed data communication mode that uses the entire 12.5 kHz bandwidth for data communication. The FT1DR automatically switches to this mode when sending and receiving images, allowing a large amount of data to be transmitted quickly.

2. Voice FR Mode (Voice Full Rate Mode)
Half of the bandwidth is used for voice signal with error correction. The very effective error correction code provides benefits such as minimal interruption of communication.

3. Data FR Mode (High-speed Data Communication Mode)
This mode uses the entire 12.5 kHz bandwidth to transmit digital voice data. The larger voice data size allows voice communication with high sound quality.

4. Analog FM Mode
Analog FM is effective for communication with a weak signal that causes voices to break up in the digital modes. The analog mode allows communication even at distances where noise and weak signals make communication almost impossible.

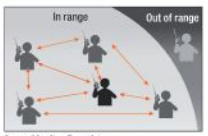




Bandwidth and data transferring rate

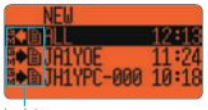
Digital Group Monitor (GM) Function

The digital GM function automatically checks whether members registered in a group are within communication range, and displays information such as distance and direction for each call sign on the screen. This convenient function makes it possible not only to see whether any friends are in communication range, but also to instantaneously determines the location and relationship between all members of the group. This function can also be used to send messages and data such as images between members of a group, permitting convenient and fun communication between friends when out for a drive or hike. Sent and received messages and images can be checked on the LOG List screen, with icons making them easy to distinguish.



Group Monitor Function

Group Monitor screen

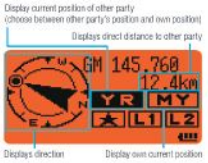


LOG list screen

Smart Navigation Function

A real-time navigation function that records the location and direction of Group Monitor (GM) stations

Digital V/D Mode communicates information such as position data at the same time as the voice signal, allowing you to view the distance and direction of the other party in real time while communicating. This makes it possible to confirm your position and the other party's in situations such as hiking and driving where your positions are constantly changing, providing an easy way to meet up or join routes.



Backtrack Function to Return to Departure Point

This function allows navigation back to the departure point, or a point previously added to the memory.
When hiking or camping, just register the starting point or the position of your tent and then you can constantly check the direction and distance from your current position. The arrow of the compass display constantly shows the direction to the registered point, making it extremely convenient in finding your way back to the registered place – just move in the direction so that the arrow in the heading-up display points straight upward.

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

FT1DR

7.4V 1100 mAh Lithium Ion Battery FNB-101LI and battery charger PA-48 / SAD-11B(USA version), PC Connection Cable SCU-18 included

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C4FM FDMA Digital Transceiver

Digital Group Monitor

Smart Navigation Screen

APRS® Screen

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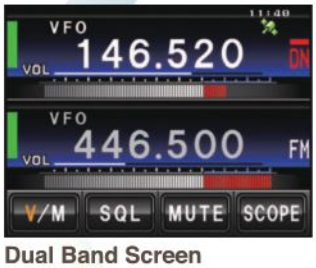

Dual Band Screen

3.5-inch full color touch panel operation

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. The settings and status of the wireless devices are displayed in an easy-to-understand format. You can perform various operations simply and easily by gently touching the screen.

Clock / Timer Screen

Message Screen

Band Scope Screen

Snapshot Function (Image Data Transmission)

Simply connect an MH-85A11U (option) microphone with camera.
Press the microphone shutter button to take snapshots, and then the image data can be displayed on the screen and easily sent to other C4FM FDMA digital transceivers.

* micro SD card is required by the snapshot function.

Image data which was sent from a group member is displayed on the full-color screen. This image data also retains a time record and the GPS location data of the snapshot. It is easy to navigate to that pictured location by using back track function.
In addition, you can observe on the screen, whether or not transmitted data was successfully received by the member station. The snapshot image or received data is stored in a high capacity micro SD card. You can recall and send that image data from the SD card anytime. The pictures and data files may be easily viewed and edited by using a personal computer.

C4FM FDMA / FM 144/430 MHz 50 W DUAL BAND TRANSCEIVER

FTM-400DR

DTMF Microphone MH-48A6JA, Mounting Bracket, Bracket for Controller, Control Cable 10ft (3m), PC Connection Cable SCU-20, and DC Power Cable included

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Learning to Hear

How do you learn to hear? This question came to me during Field Day, when I had the privilege once again of spending several hours operating at W2GLQ with members of the Nutley Amateur Radio Society in New Jersey. In addition to touching base with some old friends, I was pleased to see that nearly half the operators there were new hams, and that they were each having a great time. I spent most of my operating time with them, either logging while one of them operated or vice versa.

While the ARRL says Field Day technically is not a contest (just like it says ham radio isn't really a hobby), the on-air environment certainly sounded like a contest and the operators were having so much fun that most forgot that this was a deadly-serious emergency preparedness exercise and not a hobby competition. But they were also encountering a pretty steep learning curve when it came to making and logging contacts.

One new ham, not yet comfortable with the computer logging software, hand-wrote all of the information for each contact and then copied it later to the computer. Others were nervous about speaking on the mic, or hesitant to jump in and make a call for fear of being thought rude. I'm not afflicted with either of those concerns (at least not during a contest), but the one thing that set apart my skills from theirs, without exception, was my ability to pull call signs and exchange information out of the jumble of noise and signals that define the HF bands during a major operating event.

"How did you hear that?" I was asked repeatedly. "All I hear is noise."

My answer at the time was, "Practice. Experience. I've been at this for a long time."

But I thought about it more after I got home. Listening - as opposed to simply hearing—is something we're told to do nearly from birth. "Are you listening?" our parents and teachers would ask when they thought we weren't paying attention. If you're like me, your spouse still regularly asks that same question. Advice from successful DXers and contesters always begins with, "Listen, listen, listen."

Hearing, on the other hand, is an ability with which most of us are born. You don't have to *learn* it. Or do you? What if you *are* listening, but don't hear what someone else hears? This isn't a matter of paying attention, or of concentration, or in this case, physical hearing ability. What we're really talking about here is *discrimination*. How do you learn to separate the information that you want to hear from all of the noise that often surrounds it? And how do you teach it? *Can* you teach it?

I think you can, with a combination of "book-learning" (including magazines) and "hands-on" ("ears-on"?) experience, preferably with a mentor at your side. In his column this month, DX Editor Wayne Mills, N7NG, profiles a DXer who points out that his "DXing Elmers" advised him to "listen way down between the 'local' stations" to find the DX.

Learning where to listen helped him learn to hear more. It also helps to learn what you're listening *for* ... obviously a call sign, but also other basic information (in a contest environment, this would be the exchange info, such as category and section in Field Day). Once you know what you're listening for, you've made the first step toward being able to hear it.

One of the tools I've developed as a "search-and-pounce" contest operator is taking advantage of the fact that I'm not likely to get through to a station on the first call, especially if the other station has a small signal or a big pileup. So I keep listening between calls, filling in the blanks in the exchange information. Generally, by the time I get through (and most of the time, with patience, I do), I've copied all the necessary info and the actual exchange with the station simply serves to confirm it. So I'm hearing the same information multiple times, and if I'm not 100% certain of it by the time I make the contact, I know exactly what to ask the other station to clarify.

Brain Conditioning

Another part of "learning to hear," especially in a contest environment, is conditioning your brain to the cadence of the information flow. What am I expecting to hear first? What's next? For the new hams at Field Day, the pace sometimes seemed a little too fast. Their brains hadn't had time to process the first burst of information before needing to absorb the next one.

I was reminded of this in the course of an e-mail discussion I've been having with a reader who feels that including signal reports as part of the exchange in the CQ World Wide DX Contest is a waste of time, especially since virtually every report is 59 or 599, even if you can barely dig the signal out of the noise. He suggested either dropping the signal report or replacing it with something less likely to be the same on each contact, such as a grid field or another bit of changeable information. This is a topic that has been discussed before, but interestingly, when the near-final revisions of the rules for the CQ WW were presented publicly for review and comment (more on this in a bit), the subject of changing the exchange never even came up.

Beyond that, though, my experience at Field Day made me realize that the signal report in the CQ WW exchange does play an important role—it provides a brief pause that lets your brain shift from processing the first info burst (the call sign) to processing the second burst (the zone). It keeps things flowing more smoothly, keeps rates up and reduces requests for repeats. So, even though the formulaic "59" or "599" in the CQ WW exchange may seem like a time-waster, it actually helps *save* time and is an important part of the process by which our brains hear and process information.

CQ WW Rules Revisions

Speaking of the CQ WW rules, we have made some pretty significant revisions in them and are presenting them in this issue. The process took several months, involving members of the CQ WW Contest Committee reviewing and commenting on proposed changes, several different versions from Contest Director K5ZD based on those discussions, and finally, an unprecedented period of public comment before the rules were finalized. We believe we have addressed all of the major concerns expressed by the contest community and, while you may not agree with everything (such as the exchange), we believe the new rules make everything much clearer, especially for participants around the world for whom English is not their first language. Our thanks to Randy and all the committee members, and to those contesters who added comments and suggestions, for all of your hard work in making this rewrite come together in time for this year's CQ WW contest. Randy explains the major changes on page 40; the complete rules appear on page 41.

We also have some tweaks in the rules for the CQ WPX Award. We didn't have space to include them in this issue (we'll try for next month), but they will be posted on the CQ website (www.cq-amateur-radio.com). From the home page, click on CQ Awards, then on WPX. Enjoy the fall weather and the beginning of the year's prime DXing season. Thanks for listening, and hopefully, hearing. — 73, W2VU

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

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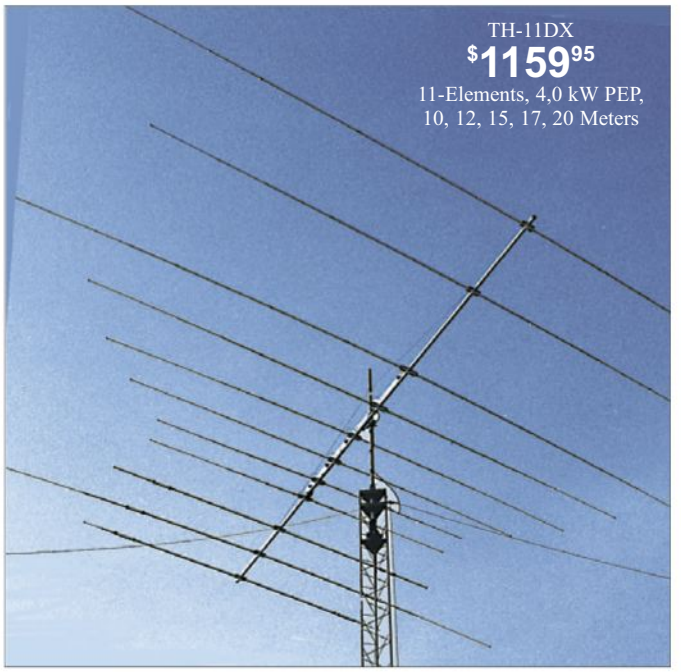

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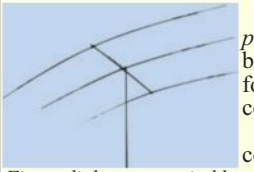

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TH-2MK3	**2**			**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$369.95**
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announcements

MENA, ARKANSAS — Queen Wilhelmina Hamfest Association 44th Annual Queen Wilhelmina Hamfest September 6 & 7 at the Queen Wilhelmina State Park. Contact: Randy Baggett, (479) 928-5845. Website: <http://www.menahamfest.net>. (Exams 9 a.m. to noon Saturday

AUSTINTOWN, OHIO — 20/9 Radio Club Tailgate/Hamfest September 7 at the Austintown Senior Center. Contact: 20/9 ARC, 4939 East Radio Road, Austintown, OH 44515; phone: (330) 651-8420; e-mail: <k8tkanews @hotmail.com>.

BALLSTON SPA, NEW YORK — Saratoga County RACES Association, Inc. Hamfest 2013, September 7 at the Saratoga County Fairgrounds. Contact: Darlene Lake, N2XQG, (518) 587-2385; <http://www.wa2umx.net>. (Exams 9:30 a.m.)

BELVIDERE, ILLINOIS — Chicago FM Club Radio Expo 2013, September 7 at the Boone County Fairgrounds. Contact: Chicago FM Club, 5127 N. Monterey Drive, Norridge, IL 60706-3245; phone: (708) 357-1049; Email: <chicagofmclub@gmail.com>; <http://www.chicagofmclub.org>. (Talk-in 146.76– (PL 107.2), 147.255+ (PL 114.8), or 444.725+ [PL 107.2] echolinked to 146.76; exams 9 a.m. to noon)

DELTA, BRITISH COLUMBIA, CANADA — Delta AES special event station (no callsign given at time of this writing)) to celebrate the Harris Barn Restoration from 1500 UTC September 7 to 0500 UTC September 8. All frequencies and modes will be utilized. QSL via the bureau. Website: <http://www.deltaamateurradio.com>.

GAINESVILLE, TEXAS — Cooke County ARC Gainesville Hamfest 2013, September 7 at the Gainesville Civic Center. Contact: James K. Floyd, N5ZPU, (940) 668-7511; e-mail: <jfloyd54@suddenlink.net>; website: <http://www.gainesvillehamfest.org>. (Talk-in: 147.34 [PL 100] or 442.775 [PL 100]; exams 9:30 a.m.)

LOUISVILLE, KENTUCKY — Greater Louisville Hamfest Association Hamfest 2013, September 7 at the Paroquet Springs Conference Centre. Website: <http:// www.louisvillehamfest.com>. (Talk-in 146.700– [PL 79.7]; exams 9 a.m. to noon)

WYOMING, MICHIGAN — Grand Rapids ARA GRAHamfest 2013, September 7 at The Home School Building. General contact: Rich Douglas, KC8NKA, (616) 531-6218 in the evenings. (Talk-in 147.26+ [PL 94.8]; exams 10 a.m.)

FINDLAY, OHIO — Findley Radio Club 71st Findlay Hamfest, September 8 at the Hancock County Fairgrounds. Contact: Findlay Radio Club, Box 587, Findlay, OH 45839; phone: (419) 423-3402; e-mail: <w8fflrc@gmail.com>; <http://findlayradioclub.org>. (Talk-in 147.15+ or 444.15+)

NEWTOWN, CONNECTICUT — Candlewood ARA Western CT Hamfest, September 8 at the Edmond Town HallContact: Joe de Groot, AB1DO, 30 Sunnyview Drive, Redding, CT 06896; phone: (203) 938-4880; e-mail: <ab1do@arrl.net>; <http://www.hamfest.cararadioclub.org>. (Talk-in 147.300+ [PL 100])

SPRINGFIELD, NEBRASKA — Ak-Sar-Ben ARC Flea-east, September 8 at the Sarpy County Fair Grounds. Contact: Ak-Sar-Ben Amateur Radio Club, c/o Pat Joseph, 1821 Robertson Drive, Omaha, NE 68114; phone: (402) 492-9156; e-mail: <flea@aksarbenarc.org>; <http://www.aksarbenarc.org>. (Talk-in 146.940)

GARDNER, KANSAS — Santa Fe Trail ARC Hamfest 2013, September 14 at the Johnson County Fairgrounds. Contact: Del Sawyer, (913) 244-6150; e-mail: <k0dds@arrl.net>. Mike Costello, (913) 764-0702; e-mail: <kb0isq@arrl.net>; <http://www.sftarc.org>. (Talk-in 147.24)

VIRGINIA BEACH, VIRGINIA — Tidewaters Radio Conventions, Inc. Virginia Beach Hamfest & ARRL Roanoke Division Convention, September 14 at the Virginia Beach Convention Center. Website: <http:// www.vbhamfest.com>. (Talk-in 146.970; exams from 9 a.m. to noon)

WEST WINDSOR, NEW JERSEY — Delaware Valley Radio Association, W2ZQ, Hamfest, September 14 at the West Windsor Community Park. E-mail: <kcc2pqc@ snip.net>; <http://www.w2zq.com/>.

ADRIAN, MICHIGAN — Adrian ARC 40th Annual Hamfest & Computer Show, September 15 at the Lenawee County Fairgrounds, 602 North Dean Street. Contact: Mark Hinkleman, NU8Z, (517) 423-5906; e-mail: <adrianhamfest@w8tqe.com>; <http://www.w8tqe.com>. (Talk-in 145.370 [PL 85.4]; exams 9:30 a.m.)

MULLICA HILLS, NEW JERSEY — Gloucester County ARC Hamfest 2013, September 15 at the Gloucester County 4-H Farigrounds. Contact: Cory Sickles, WA3UVV, (856) 582-9146; e-mail: <wa3uvv@arrl.net>; <http://www.w2mmd.org>. (Talk-in 147.180+ [PL 131.8]; exams 9 a.m.)

ELK GROVE, ILLINOIS — Northern Illinois DX Association 61st W9DXCC Convention, September 20–21 at the Elk Grove Village Holiday Inn. Contact: W9DXCC, 1150 McKee Street, Batavia, IL 60510; e-mail: <w9xa@yahoo.com>; <http://www.w9dxcc.com>.

HENDERSON, MINNESOTA — SMARTS Radio Club & Sibley Emergency Radio Team SMARTSFEST 2013, September 21 at the Henderson RoadHaus & Community Center, 514 Main Street. Website: <http://www.smartsonline.org/smartsfest>. (Talk-in 146.610– [PL 136.5]; exams from 8 to 10 a.m.)

MANCHESTER, CONNECTICUT — Pioneer Valley Radio Association PVRA Superfest, September 21 at Marcus Communications, 33 Mitchell Road. Contact: PVRA, Inc., P.O. Box 903, Manchester, CT 06045-0903; e-mail: <membership@pvra.net>. Website: <http://www.pvra.net>. (Talk-in 146.790 [PL 82.5]; exams)

RICHMOND, KENTUCKY — Central Kentucky ARS Richmond Hamfest, September 21 at the Madison County Fair Grounds. Contact: CKARS, 144 Allen Douglas Dr., Richmond, KY 40475; e-mail: <ke4isw@arrl.net>; <http://www.qsl.net/ckars/>. (Talk-in 145.370 [PL 192.8]; exams 1 p.m.)

BEREA, OHIO — Hamfest Association of Cleveland, Inc. 39th Annual Cleveland Hamfest & Computer Show, September 22 at the Cuyahoga County

(Continued on page 94)

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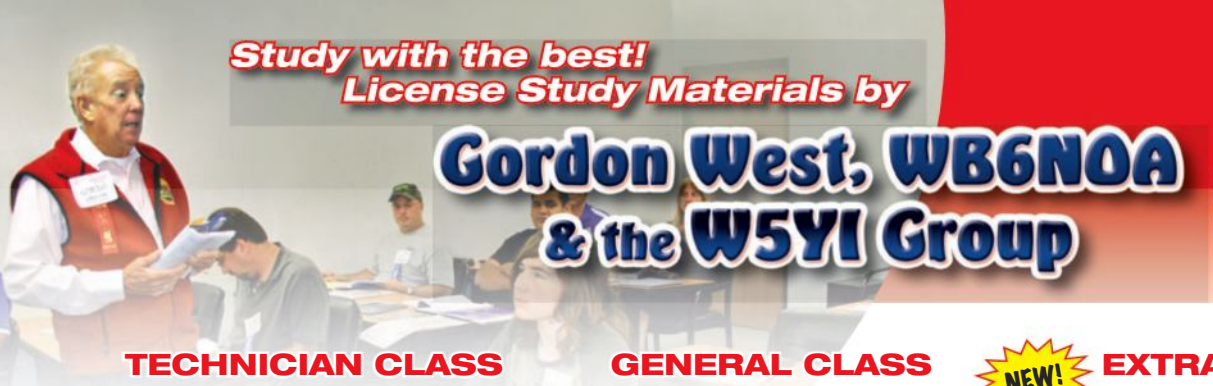

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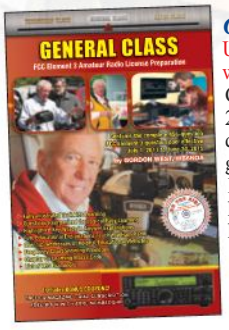

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Ham radio plays a role in Harrison Ford's new movie "Paranoia," which opened last month. N2OO was part of the action and takes us behind the scenes.

Ham Radio Goes to the Movies

BY BOB SCHENCK,* N2OO

Have you ever gotten an e-mail that you thought might be a spoof? Well, in early August of 2012, I got this one:

Bob,

I'm working with a property manager for a new movie with Harrison Ford, where he is a ham. Initially they wanted vintage radios, now this morning I hear they also want a new high-end radio. Sorry to say I don't have these.

Do you have something new and high-end that would look good in a movie? They will need it for a couple of days mid-month. They are shooting near Philadelphia.

Now, I checked to be sure this wasn't coming from a SPAM house in Nigeria. Nope. Not even close. It was from John Dilks, K2TQN! This is real?! What followed was a surreal experience for me, for John, and for John's son Jeff.

Photo A– Liam Hemsworth (L) and Harrison Ford (R)—along with Ford's character's ham radio station—on the set of "Paranoia," released in August. (Photo by Peter Iovino, courtesy of Relativity Media; copyright 2012 Paranoia Acquisitions LLC. All rights reserved.)

Photo B– Aerial view of the mansion outside Philadelphia where filming took place. (Photo courtesy of Pictometry International)

*<n2oo@comcast.net>

Photo C– Front of mansion. Moving trucks were there to store the real owners' furniture during the shoot. (Photo by K2TQN)

So, you need a high-end radio for a Harrison Ford movie (photo A)? I have an Elecraft K3 which (at least in my view) is a high-end radio, but it does not really *look* like a high-end radio. Right away, I think about a Yaesu, since their high-end radios usually have lots of knobs and lights. Just what a movie scene would like, I figure. At first, I offer up the South Jersey DX Association's FT-1000MKV. It looks nice enough for a movie, but I worry it is not "high-end" enough. So I fire off an email to my friend Dennis Motschenbacher, K7BV, at Yaesu. "Can you lend me an FT-DX5000 for a Harrison Ford movie shoot? I need it next week."

Dennis' response was fast. Yes, we can pull one from our convention schedule. "Dennis, we'll need a microphone and the station monitor SM-5000 for full effect," I added. "No problem" he says.

The radio is shipped to arrive several days before the shoot is scheduled. Plenty of time? Sure. The microphone arrives first, then the radio. But no SM-5000 yet. Dennis says it will arrive on Monday. OK, we're good. Well, at least until the movie folks contact John and ask us to come on Monday to help "place" the radios into the set. So, no SM-5000. We still have the FT-DX5000 and microphone.

So, I pack up the 5000, the FT-1000MKV, my own FT-450, a couple of telegraph keys and a dummy load so they can "talk" with zero output and still look "real" if they so desire. John packs up his Ford Flex with tons of vintage radios.

Photo D– Workers remove owners' furniture for safekeeping during filming. (Photo by N2OO)

The scene was being filmed at a mansion outside of Philadelphia (photo B). We are given the address and off we go bright and early Monday morning. I arrive first and call the property master, who says that he will meet me down the street from the entrance to the mansion in about ten minutes. John is about an hour behind me. I wait and, sure enough, along comes a minivan with Missouri license plates… "Bob? That you?" Yes! "OK, follow me in."

Up until this point, I was still not 100% sure that I wasn't being spoofed! After all, a movie set at a mansion with Harrison Ford!? I was about to find out that this was no fantasy. No spoof. It was real.

As I drive down a private road, we turn into a driveway with a guard stationed at the entrance. The property master chats with him, and I am flagged in. I turn a small bend and head right down the main driveway of a very old, very large mansion. There are some large trucks parked in front (photo C). I am told to pull up to the side. I shake hands with the property master and we chat about the equipment and how to bring it in. I start to bring my three boxes of gear into the sitting room of the mansion. I am told that the three paintings in this room are valued in the range of $10 million and to keep my distance from them! Soon afterwards, John and Jeff arrive. They go through the same routine. There are union "moving" people on hand to assist with bringing in our gear. Everything is placed on or under folding tables in the sitting room.

On the Set

We are now shown the room where the actual scene will shoot. It is in the "study" right off the sitting room. It is a large room with floor-to-ceiling bookcases, and some very old (and valuable) furniture. We now see the challenge of how we will be setting up these radios in the set. But first... there will be furniture to move! For the next several hours, we watch as "movers" remove and shrink-wrap the real owners' furniture (photo D), and place it into empty trucks. Then, furniture for the movie was brought in from a local "antique" furniture store. This was furniture that nobody would cry over getting scratched. Movers were also placing cardboard on all the floors, and as a barrier to keep people from getting too close to the wood and artwork on the walls.

John, Jeff, and I stayed outside while all this was going on inside. There were no places to sit outside. But we did find a small brick wall about six feet long where we could "lean." After what seemed like hours, we decided to just walk back in to see what was happening. We found that a lady apparently in charge of "background" for the set was beginning to place radios into the study. We introduced ourselves and we were welcomed to help out. John advised on his vintage gear (photo E), and I was asked to set up the FT-DX5000 on a table behind the main study desk (photo F). After some discussion and work, the movers began lugging in the heavy radios and putting them in place on assorted tables and shelves. John and I placed our CW keys right on Harrison Ford's desk.

Once we all felt things were in place, it was time to leave. We were asked to return the following day for final set preparation and to stay for the filming of the scene and provide advice as needed.

More Preparation

The next morning, we each drive the two hours back out to the mansion. This time, we are told to go to the local high school where the "filming headquarters" is located. One of the security guards remembers me as I drive in and he guides me right to a van that is heading to the set. Just as the van starts to pull out, we get flagged down to wait for another two passengers, and sure enough, in come John and Jeff, who just arrived as well! By now, we are starting to at least feel like VIPs! We are all taken to the set, where we see a lot more activity than we saw the day before. There are trucks, electricians, sound people, cables, large light diffusion screens, a commissary set up in the large garage, canopies, etc. Now, I finally know 100 percent that this is for real.

In the front of the mansion, we see about a dozen high-end cars. Bentley, Morgan, Mercedes, two Ferraris, Jaguar XKE, Aston Martin … all lined up with drivers. All the while, we are still just "hanging out" under a canopy right outside the front door of the mansion. Soon, two monitors as well as several director chairs are set up right in front of us. We wander over to the commissary for some breakfast snacks and coffee from time to time while we wait. And, we occasionally chat with the property master, who is running around looking quite busy and intense. Finally, in drives a big SUV and out pops Harrison Ford. He looks like a man on a mission, checking out things here and there. Then he goes inside the mansion.

After a while, the property master comes out and tells us that Ford has had the new radios removed from the set. He wants to go with vintage radios only. I feel very disappointed. We go inside to assist. All of the new equipment had been removed and "taken away" for safe keeping. They want more vintage gear brought in. John shows them everything he brought and the movers start to bring it into the study. John helps to direct the placement of the vintage radios. I place my Vibroplex Presentation gold semi-automatic key dead center at the front of Harrison Ford's desk and my Russian Key8 on the table behind the desk. John places two keys he brought on the desk as well. After everyone is satisfied, we head outside again.

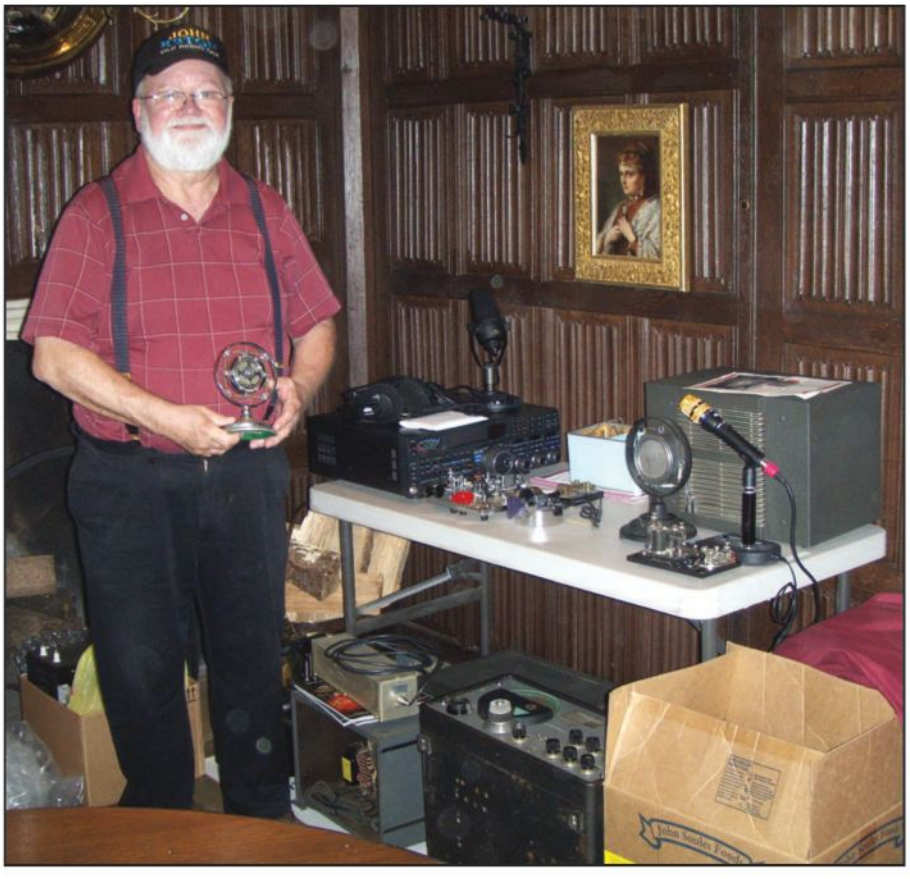

Photo E– John Dilks, K2TQN, and his Hallicrafters SX-23 with matching speaker. This radio was used in the filming. (Photo by KB2CIX)

About the Movie…

PARANOIA

Release: August 16, 2013

Director: Robert Luketic

Writers: Screenplay by Jason Hall, Michael Tolkin and Barry L. Levy, based on the novel by Joseph Finder.

Cast: Liam Hemsworth, Gary Oldman, Amber Heard, Harrison Ford, Lucas Till, Embeth Davidtz, Julian McMahon, Josh Holloway, Richard Dreyfuss, Angela Sarafyan

Producer: Alexandra Milchan, Scott Lambert, William D. Johnson and Deepak Nayar (credits not final)

Executive Producers: Stuart Ford, Sam Englebardt, Douglas Urbanski, Christophe Riandee, Sidonie Dumas, William S. Beasley, Ryan Kavanaugh and Tucker Tooley (credits not final)

Synopsis: The high stakes thriller "Paranoia" takes us deep behind the scenes of global success to a deadly world of greed and deception. The two most powerful tech billionaires in the world (Harrison Ford and Gary Oldman) are bitter rivals with a complicated past who will stop at nothing to destroy each other. A young superstar (Liam Hemsworth), seduced by unlimited wealth and power, falls between them and becomes trapped in the middle of the twists and turns of their life-and-death game of corporate espionage. By the time he realizes his life is in danger, he is in far too deep and knows far too much for them to let him walk away.

(Courtesy Relativity Media)

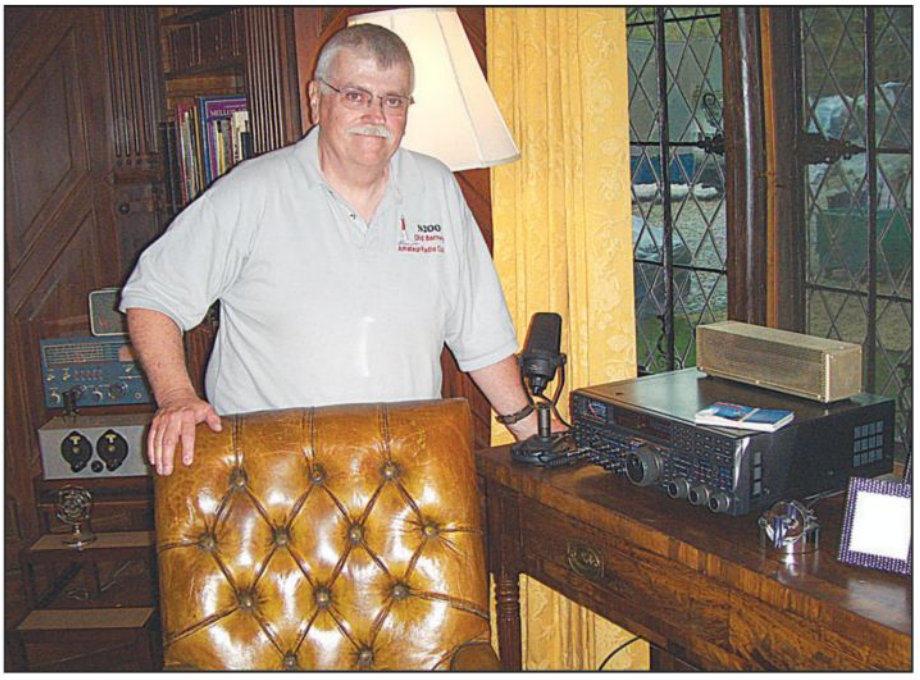

Photo F– Author Bob Schenck, N2OO with the FT-DX5000 on Jock Goddard's desk. This radio ultimately was not used in the scene. (Photo by K2TQN)

We are asked to come with the property master for lunch. We get into the van and head back to the high school. The cafeteria is set up for the movie people, and there must have been over 50 people—all involved in the movie—there having lunch. As we enter, a young lady says that it is director Robert Luketic's birthday and we all sing "Happy Birthday" to him! The food is nothing short of amazing. Definitely *not* high school cafeteria food! We sit down at a table to eat and Gary Oldman (one of the actors in this movie) sits right behind us. The director is sitting two tables away.

Time for the Shoot

After lunch, we head back to the set in the van. Upon arriving, the property master notices that John is having trouble with his back from all of the standing. So, he gives him a "guest" director chair and sets it up right in front of the monitors. Finally, the study scene is ready to start. Everyone is told to be quiet. We look at the monitors and watch Harrison Ford and Liam Hemsworth (photo G) film the scene. Over and over for the next couple of hours, from different angles, we watch the scene. By the end of the day, we know the words as well as the actors do. The scene is about four minutes long. It took over five hours to film it.

The best part… Along about midway into the filming, the actors take a break while the cameras are being rearranged. Harrison Ford comes outside, walks right in front of us and nods his head at us. He obviously doesn't know who we are. As he passes by, John says "Loved It!" Ford says "thanks," turns around and continues walking away. (In an instant, I thought that *this* was our opportunity to actually talk with him). I blurt out, "We're the ham radio guys." Harrison Ford stops dead in his tracks, turns around and comes all the way back to us. He shakes our hands and thanks us for all of our help! Jeff asks for an autograph and is obliged. Jeff also gives him an extra copy of a photo of his son dressed in an Indiana Jones outfit for Halloween, and Ford cordially accepts it. He thanks us again and heads towards the commissary. I again blurt out, "Thanks for using the words 'ham radio' and 'amateur radio' in the scene!" He again turns around and says that he was trying to make sure that he got them in as much as possible. Then he smiles again and actually walks away.

The Adventure Ends

So, finally as it grows dark outside, the people begin to filter out. We retrieve our vehicles from the high school and park them out front of the mansion. But we have to stay until all of the filming is completed so we could then go in and remove all of our radio gear (with the help of the "mover" people). Finally, it's a wrap and we're told that it is time to remove our gear. We go right into the study inside the mansion one last time to remove the gear. With most of the gear removed, we sit on the tailgates of our vehicles waiting to get the last of our equipment. Harrison Ford then comes out and starts to get into his SUV to leave. He sees us sitting in our vehicles and leans back out, waves and says, "Thanks, guys," one last time. Mr. Ford is a genuine guy. I only wish we had more time to chat with him! Finally we pack in the last items and head home. What a surreal experience!

So, what did I do over the summer last year? I worked on a Harrison Ford movie!

Photo G– Liam Hemsworth stars in Relativity Media's "Paranoia." (Photo by Peter Iovino, courtesy of Relativity Media; copyright 2012 Paranoia Acquisitions LLC. All rights reserved.)

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From QST Magazine, March, 2005

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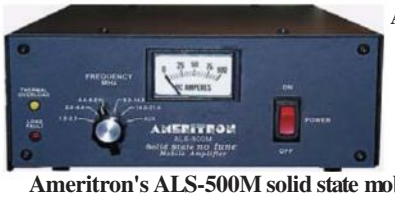

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Battleship New Hampshire Part II: The Battleship at Sea

BY SCOTT REDD,* KØDQ

General Quarters! All hands man your battle stations!

ARRL DX CW

Having undergone a successful shakedown cruise in the 2011 CQ WW CW Contest (see Part I, August 2013 *CQ*), the Battleship New Hampshire contest station got underway on her first deployment "in harm's way" in 2012 (photos G & H). The first battle was joined in mid-February with the ARRL DX CW contest.

On the equipment side, Woody had made some station improvements to include a new 80-meter delta loop that beat the verticals more often than not on receive comparisons. That was borne out in the post-contest RBN (Reverse Beacon Network) analysis, where we improved slightly against Randy, K5ZD, and Paul, K8PO. Woody also added a second IC-7800 so both transceivers were the same.

Propagation-wise, early predictions were for conditions similar to CQ WW CW and things looked good for a record-breaking contest. As game time

*c/o CQ magazine

Photo G– WW1WW was designed to be a contesting battleship, hoping to be as intimidating as the USS Missouri firing one of its 16-inch guns! (US Navy photo by Terry Cosgrove)

Photo H– Scott, KØDQ, and Woody, WW1WW, in the "Combat Information Center" of "Battleship New Hampshire." (KØDQ photo)

approached, however, the solar flux kept dropping and, in the end, 10 meters was only marginal. Saturday morning had great runs on 15, with a high of 216 QSOs per hour. That was good news but always in the back of my mind was the "New England Nightmare" — the situation in which stations farther south in the Mid-Atlantic get a 10-meter opening to Europe but the W1s don't. After listening to Alex, K3CR, on 10 meters running Europeans that I couldn't hear, I started worrying. I finally broke down and went to 10. The rate went down 50% but I worked 77 southern Europeans. As it turned out, they would be the last 10-meter Europeans I'd work in the contest.

At the halfway point at 0000Z Sunday, I had 3188 contacts, only a few less than in CQ WW, and things were looking pretty good. Then conditions started going funky with an obvious disturbance in the geomagnetic field. The strangest occurrence was working a JA on 10 meters near midnight local time on Saturday. Indeed, all signals seemed to be coming over the North Pole with telltale polar flutter. Rates continued to slow and the Battleship limped into port with 4684 contacts and a claimed score of 6.78 million, just above the previous record. I was worried about Alex, K3CR, but he came in almost 900K behind, demonstrating the central influence—and unpredictability—of the effects of propagation on strategy. After log-checking, the Battleship's final score came in at 6,581,169, just 7791 short of the existing record - the difference of one multiplier, or six QSOs!

Interestingly, I lost one multiplier—and what would have been an all-time W/VE record—by "fat fingering" BA1RB's power in the log as 599 rather than the correct 500! I knew I should have worked harder in high school typing class!

Things were looking good in the first stages of combat deployment. Even the crew was starting to feel comfortable in the Battleship's Combat Information Center (CIC). Especially gratifying was the increase in logging accuracy—KØDQ was at the top of the *QST* accuracy index.

The Russian DX Contest (RDXC)

The second battle of the deployment was a last-minute affair. The Russian DX Contest has been growing in popularity in recent years as a worldwide contest. That is reflected in its status as a WRTC (World Radiosport Team Championship) qualifying event, for which it counts the same as ARRL DX. It's a 24-hour contest, which is easier on older bones. It also does not have an unassisted category (i.e., using Internet spotting is permitted in all categories). I'd never done RDXC, or indeed any CW contest with spotting, and thought it would be a good time to try that, as well as keeping in practice. Truth was, I was still juiced from ARRL DX and was looking for another contesting fix.

It was an interesting event—and fun. Once again, conditions were disturbed and contact totals were down. I found I kind of enjoyed using the RBN for spotting, sort of like shooting fish in a barrel with heavy artillery. Conditions were so poor at times that I had higher rates clicking on spots than trying to run. In the final results, KØDQ finished with the top U.S. single-operator score in any category, winning the CW-only category by a good margin with 2.1-million points, another good indicator that the Battleship was becoming more combat-ready.

WPX CW

The third battle of the deployment was one of the big three—WPX CW. Woody had made some hardware changes since ARRL DX. In an effort to boost our 20-meter performance, he added a third low antenna to the 20-meter stack on Tower 2 (see fig. 1 and photos I, J, and K for antenna and tower details), a 6-element diamond drive LFA Yagi, while removing a 6-element 10-meter Yagi from the stack (which later went up on tower 3).

WPX CW is a different beast in several respects. First of all, single operators may only operate 36 hours out of the 48-hour contest period. Figuring out when to take the 12 hours off is probably the major strategic decision. And that decision is made even tougher by the fact that summertime propagation is very different from the other major contests. Given recent propagation history, even that was unpredictable. Secondly, the point scoring is different from the other major contests. You get double credit for contacts on the low bands (40, 80 and 160) and you also get one point for working other W stations. And since prefixes are multipliers, you need to work lots of U.S. stations as multipliers.

I've never felt comfortable with my strategy in this contest. It took me two tries to win the world from Aruba and I had come in second in the U.S. to Krassy, K1LZ, in 2011 before the Battleship was fully up and running. In the event, conditions were generally good and competition was fierce. That was reflected in the claimed scores with nine U.S. stations breaking the old SOABHP (Single-Op All-Band High Power) record. However, I wasn't comfortable with what I was doing during the contest. When 40 meters slowed the first night, I went to 20 for better rates but stayed too long. In spite of 40 meters being our strongest band at the Battleship, I ended up with 140 fewer 40-meter QSOs than Alex, KC3R (K3CR), and each one of those counted double

Photo I. Tower #1 at WW1WW: 200-foot rotatable tower with 4-over-4 OWA on 40 meters, six 5-elements + 9-element LFA on 10 meters. (WW1WW photo)

Photo J. Woody, WW1WW, at the base of Tower 2, which holds three stacks of 6-element Yagis on 20 meters and 15 meters, plus a 7-element Yagi on 10 meters. (KØDQ photo)

points. When the final gun sounded and claimed scores were posted, Alex and I were in a virtual tie for first with Randy, K5ZD, only 200K back at 11.3 million. Log-checking would tell the difference. Alex (who operates from the Penn State University station, also a Battleship-class setup) has been doing this well and for a long time, and I suspected he would have better accuracy and end up with the win and a new record.

When the final results were published it became apparent just how incredibly close the final outcome was. In the *CQ* magazine results article, Randy, K5ZD, wrote that "The race for top USA score was one of the closest finishes ever in DX contesting." Alex won by 0.153%! When I realized how close it was, I went back and looked at my Log-Checking Report (LCR). As it turned out, *one contact—actually one dot, the difference between "I" and "E"—was all that separated us.* I copied and logged IR0R incorrectly as ER0R and lost a multiplier and six QSO points. Had I logged him correctly, I would have won and set the new record.

IARU HF Championship

Along the way, Woody and I had been discussing doing a multi-operator entry in a phone contest. Additionally, a good friend Ed, N4OC (retired admiral and former Vice Chairman of the Joint Chiefs of Staff), and I were both enjoying a more relaxed life after retiring from the Navy and government and we had done several phone multi-ops from Aruba (including, appropriately, P40N - Papa Forty NAVY). CQWW was six months off and we were looking for a chance to have some more fun, as well as give the Battleship a test in a multi-op scenario. IARU looked like a good opportunity.

Woody was still not satisfied with our signal on 20. The RBN analysis from WPX again showed us behind K5ZD and KC1XX on 20 meters. Using RBN he determined that the two-Yagi stack on tower 3 was beating the three-Yagi stack on tower 2 more often than it should. After some detective work, he built a new divider network for tower 2 and realigned the beams in time. That reversed the situation and tower 2 was now predominant on 20. Additionally, he tweaked the phasing on the 40-meter stack. Finally, he added a 7-element 10-meter Yagi (previously on tower 2) to tower 3, giving us big guns on the multiplier tower on all bands from 10 through 40.

We put together a pickup team. In addition to N4OC, Fred, KK1KW, who had operated several phone contests from Woody's, was a natural addition. Since the only multi-operator category was mixed mode (CW and phone) we needed

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another strong CW operator. We sent out the press gang and they came back with Dave, KM3T. Dave is a regular at the KC1XX multi-multi and, in addition to his operating skills, is a stellar computer guy. Woody and I rounded out the team. Our major competition looked to be Rich, NN3W, and his team operating from the N3HBX contest superstation just outside Washington, D.C. They had won the year before and had set the extant multi-op record in 2010. They were loaded for bear and looking for a repeat.

Conditions at the start were great. We had 200+ QSO hours for the first four hours, three on CW and one on phone. Then, once again, the pattern of two of the last three major contest outings repeated itself. Conditions began to deteriorate as the effects of a massive coronal mass ejection (CME) began to be felt. Rich and his crew had suffered some significant hardware problems, but fought through and came in at 2.55 million. We persevered, operating about 60% CW, and finished the contest with just under 3000 QSOs and a claimed score of 3.1 million points which, after log-checking, turned out to be a new U.S. multi-op record.

Photo K– Original Tower 3 at WW1WW, showing details of one of the Diamond Drive LFAs on 15 meters and two of the 10-meter OWA Yagis. This tower has now been moved and reconfigured. See text for details. (KØDQ photo)

CQ WW CW 2012— A Heartbreaker

Preparation ... The last battle of the 2012 contest year was also the biggest. As noted earlier, CQWW is the largest and most competitive worldwide DX contest of them all. Woody had been busy since IARU in the summer. First, he had added a second full-size delta loop on 80 meters. Phasing the two loops provided a clear improvement and paid off in the contest. Similarly, the phased verticals on 160 had proven difficult to reliably match, with intermittent behavior. Switching the SW vertical to a parasitic element provided clear, repeatable gain and front-to-back, both to Europe and the Southwest and seemed to be loud enough into the Caribbean. To boost the higher angle signal on 10 meters, Woody replaced the bottom 5-element LFA Yagi in the six-stack with a 9-element LFA "Elephant Gun" on a 63-foot boom. It also played well.

The *pièce de résistance*, however, was a new, homebrew prototype solid-state amplifier capable of SO2R (single-op, 2 radios) operation. Designed to cover 10 through 160 meters, the amplifier resembled a VHF "brick." It had one switch—the on/off switch on the power supply - and two input coax connections—one for each transceiver. The two output SO-239s went to the only instrumentation, two Bird watt meters, and on to the antennas. Band-changing and switching between Radio 1 and Radio 2 was instantaneous (the DX Doubler, combined with the Win-Test software, prevented transmitting on two bands at the same time). In short, it was like operating two 1500-watt transceivers - the amplifier was hardly noticeable.

Since I hadn't operated for over four months, I came up on Wednesday before the contest to get in the groove. Setup went well and we had a wonderful Thanksgiving dinner with Woody's family near Boston on Thursday. On the way back to the Battleship, we stopped by *chez K1DG* for coffee and dessert with Doug and his family. "Family" included his brother-in-law John, K1AR, who, combined with K5ZD, accounts for a majority of US SOABHP CQWW trophies over the last two decades (plus a few multi-op trophies). Doug had set both CQ WW phone and CW records in 2011 and had the highest claimed score in single-op phone a month earlier. He was definitely the man to beat and a little trash talk ensued, moderated by the spirit of the season. Doug had found an old *QST* write-up from the 1974 contest when I had made over 10,000 QSOs as 6J9AA and graciously gave me a framed copy. We got home about 9 PM and, after a quick check of the bands and radios, I went to sleep.

Friday dawned cold and clear in the New Hampshire woods. Conditions were good and the solar flux was predicted to be around 120, which should give us ten meters into Europe, a predicate for high scores. But there was a dark cloud on the solar horizon; once again, almost as if on schedule, a major CME was earthbound and conditions for day one of the contest were predicted to be poor, perhaps very bad.

Off to the races. I dread the minutes around the opening gun. Nerves are up and adrenalin is flowing. Many people establish a run frequency before the start of the contest, but I decided to start cold and not call CQ until the contest began. Midnight Zulu rolled over and I started calling CQ ... without much success. Three of my first six QSOs were on the second radio on 80 meters. I listened briefly to K1LZ running Europeans I could barely hear at the bottom of the 40-meter band and thought something must be broken. Finally, I realized it must be propagation.

An axiom of military planning is that *the first casualty of contact with the enemy is the war plan.* I had gone to school on Doug's and Randy's logs from 2011 and had a fairly specific game plan in mind. Clearly, that was out the window. Instinct kicked in and, slowly but surely, things began to come together. The first day had a few pleasant surprises. One-hundred sixty meters was surprisingly good with decent activity and a quiet band. Also, the solid-state amplifier was pure joy. It took a while to realize that there

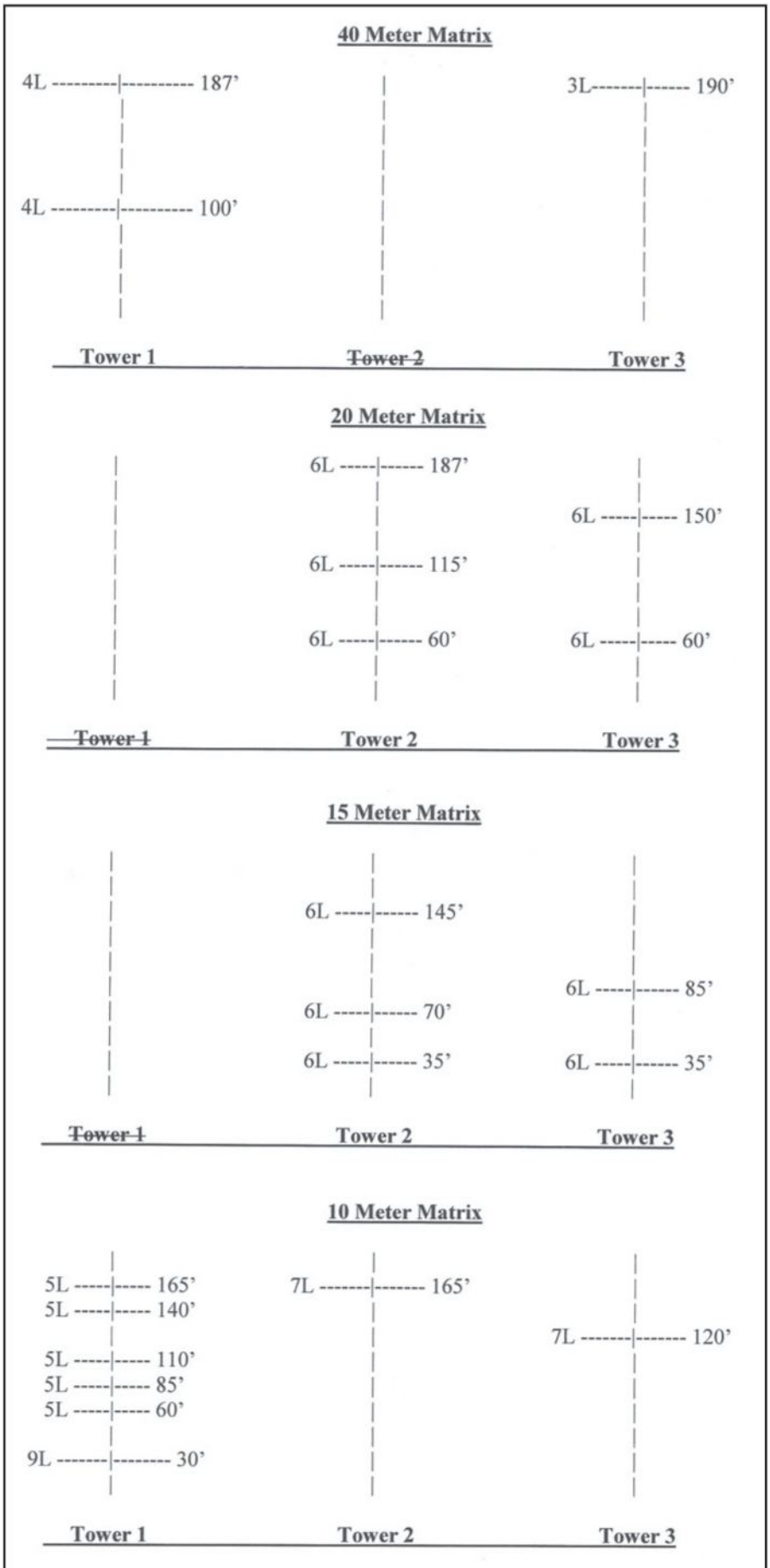

Fig. 1– Antenna diagram by band on each tower at WW1WW, AKA "Battleship New Hampshire."

was no need to mentally debate changing bands because of having to retune the amplifier. Instead, just hit the button and transmit. But in spite of that, most of the first 24 hours was challenging, with a lot of work required on the second radio to keep the rate up. That is both physically and mentally taxing, and I was starting to worry about making it to the first (and only) anticipated break around 3:00 AM local Sunday.

The first 24 hours went in the log with 2751 raw QSOs, not bad given conditions but down over 400 from the year before. The surprising thing in a contest—especially when conditions are unsettled—is that you often have no idea how you're doing in comparison with the competition. During the entire contest, I heard Doug, Randy, and Alex only once each. Doug had a similar experience. So the mental dimension becomes big. Keep going. Persevere. Focus on the next contact, etc.

Although I had no way of knowing at the time, when I went to bed at 0815Z on Sunday, I was more than 200 QSOs ahead of K3CR and over 100 ahead of

K1DG. Doug also took a break and by the time he was back on, I had opened the gap to 190 QSOs. Alex, however, is an iron man. He did not take a break, operating all 48 hours. While I slept, he closed the gap to 37 QSOs.

Propagation the second day was much better. Shortly after wakeup the high bands opened with a vengeance - what we had hoped for the first day. Rates rose, staying above 200 for well over an hour on 10 meters. Again unknown to me, by 2000Z on Sunday afternoon I had opened the lead over Alex to 107 QSOs and was almost 300 ahead of Doug. But the last hours were a slog. I couldn't get a run going anywhere and started searching and pouncing, slowing the rate significantly, although picking up a few multipliers. The contest ended and I remember thinking I felt reasonably good physically. Maybe I could have gone 46 hours instead of 45!

The envelope, please. Doug and I posted our claimed scores on 3830 immediately. My score was just over 10 million, a score seemingly impossible 24 hours earlier. I was dismantling the SO2R setup when Woody saw Doug's post and yelled, "Doug's in at 9.1 million." That was obviously encouraging news. Then Randy posted at 10.7 million in a different category (assisted), accounting for two of the three known threats. Congratulatory e-mails started coming in. I knew Alex had yet to be heard from, but I started thinking maybe, just maybe, I had indeed finally won the national championship in the big one. Forty hours later, the bubble burst. Alex posted a claimed score of 10.09 million, 0.8% higher than mine. He had closed the QSO gap significantly in the final hours. I ended up only three QSOs ahead and down by three multipliers. Once again, the final results were in the hands of the log checkers. In the end, Alex prevailed.

The Final Battle ARRL DX CW 2013

In early 2013, it became clear that the first deployment was coming to an end. The Battleship would need to go into the shipyard for overhaul while Woody moved tower three to a nearby hilltop (where it will likely re-emerge with an 80-meter Yagi on top). Thus, ARRL DX CW in February 2013 was shaping up to be the author's last serious battle of this deployment.

My goals entering the contest were to (1) win, (2) set a new W/VE record (after last year's near miss), and (3) break the 5000 QSO (after dupes) barrier, something which had never been done from the U.S. by a single operator.

In the event, the Battleship and her crew came together in happy synergy. Friday morning dawned with conditions that were good but not great. Solar flux was only around 100, but happily, there were no major disturbances. In spite of mediocre conditions, the first day was the best ever I've had from the US - 3345 QSOs. That included a mind-blowing hour of 241 QSOs on Saturday morning, the best rate I'd ever had from the US and not far from the best rates from P40Q. However, 10 meters was only marginally open to Europe on Saturday. Although I'd heard Alex, K3CR, working Europeans I couldn't hear, I had stayed on 15, betting the ranch on the propagation forecast that conditions would improve slightly on Sunday. This time, the prognosticators were right and 10 opened to Europe about 1220Z with good signals, albeit in typical spotlight fashion *(a very narrowly focused opening to a small area, like a spotlight beam—ed.)*. That opening resulted in nearly 600 QSOs on 10 the second day, which were enough to lift the total contact tally to nearly 5400 (with dupes).

About 1500Z on Sunday, I looked at the running score and realized the old US record was toast.

When the dust cleared, the final claimed score was 8.2 million with 5205 QSOs after dupes, beating the old US record by almost 25% and accomplishing the last two goals. However, I had yet to hear from the competition. I had slept three hours Saturday night and was worried about Alex doing his 48-hour iron man thing. In this case, however, he reported he had turned into a zombie Sunday and ended up about 500 QSOs and 800K points behind.

Several days later I realized that assuming it passed log-checking, the score would not only be an all time W/VE record but also an all time World Record, beating the previous record of 7.5 million set by PJ4A in 2011! Final results confirmed not only the win but both records as well. It was - all in all - a fitting finale for the Battleship's first combat deployment.

Looking Back ... and Ahead

I believe it's clear the Battleship has proven her combat-readiness. Operating in six contests in her first deployment, she won one world and four national championships by clear margins and came in a close second in the other two. In the process, she set one all-time world (and U.S.) record (ARRL DX CW 2013 SOABHP), and one U.S. record (IARU Multi-op). She also missed setting two all-time U.S. records (ARRL DX CW 2012 and WPX CW, both SOABHP) by the narrowest of margins—a combined total of *three keystrokes!*

Reflecting over the two years, I was struck by a recent editorial in the *National Contest Journal* (NCJ) by Kirk, K4RO. In it, he noted that the essence of ham radio contesting was not looking back to the last contest but looking forward to the next one. Did you win the last one? Good. Did you do well? Enjoy. Savor the moment. Did you lose, or turn in a disappointing performance? No problem. The next contest is just around the corner. What can you do to improve your performance next time? Indeed, the time between contests has been made much richer and more fascinating by the teamwork with Woody as we mulled ways to find another dB or other sliver of (ethical) advantage.

For most of us, that's the draw, the continuing attraction. We look back, not to see how we did, but to see what we can do better. I have now contested in seven decades, beginning in the 1950s. I still look forward to the next contest and all its opportunities. That, to me, is the best type of competition. The fact that you can remain competitive as you approach (or surpass, as my friend N6TJ has shown) the biblical norm of three score and ten years makes this a unique and wonderful hobby.

As always, there are lots of people who make our enjoyment of the hobby possible. First on my list is "Mrs. Admiral" (a.k.a. Donna, ex-WN1NTB), my bride of 43 years. She graciously gave me a hall pass to miss Thanksgiving with the family for the second year in a row, not a small thing given I'd been away at sea for not a few of those 43 years. She remains my best friend.

Finally, I'm grateful to Woody Beckford, WW1WW, for this opportunity to reclaim some contesting years which were lost to demands of higher priorities. Most of us can only dream of helping design and operate a contesting superstation. Thanks to Woody, I've been able to live that dream. I can't imagine having a better shipmate!

The Honorable John Scott Redd, Vice Admiral, U. S. Navy (Ret.), served as the first Director of the U. S. National Counterterrorism Center (NCTC). Earlier he spent 36 years in the U. S. Navy, commanding eight organizations from a ship to a fleet. Licensed at age 10, he has won twelve world championships and seven national championships in worldwide amateur radio contests.

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Profile:

Padraig Lysandrou, KC9UUS

2013 Newsline Young Ham of the Year

This has been a busy summer for 16-year-old Padraig Lysandrou, KC9UUS. While many of his classmates at Bloomington South High School in Indiana might have been working summer jobs or relaxing by the pool, Padraig spent much of his summer on the road, going to Japan with his school's Solar Bike Racing Team for an international competition (he's the team mechanic), attending a course at Brown University in Rhode Island on "The Inventions of Nikola Tesla," a course at Michigan State University on the physics of atomic nuclei; and a 4-H electronics and robotics workshop at Purdue University in his home state. Plus, a trip to Huntsville, Alabama, to accept the 2013 Newsline Young Ham of the Year award, as well as a week at SpaceCamp, courtesy of *CQ*.

Last spring, Padraig gave a presentation at the Dayton Hamvention® youth forum on turning a family vacation to Cyprus the previous summer into a mini-DXpedition (he also wrote about the trip for *QST*). And somewhere in there, he went to New York with the Hoosier Youth Philharmonic orchestra (he plays cello) to play at Carnegie Hall.

Padraig says he works ham radio into much of what he does—he was hoping to do some HF operating from Japan this summer, and planned to expand his trip to Rhode Island to include a visit to the MIT Amateur Radio Club (where last year's Young Ham of the Year is a member) and repeat his Dayton presentation.

"He told Newsline that his interest in radio grew from a combination of stamp collecting and his mother, Carolyn's, interest in shortwave listening."

He told *Newsline* that his interest in radio grew from a combination of stamp collecting and his mother, Carolyn's, interest in shortwave listening. "My mom would show me all the letters and all the stuff that she got back from shortwave stations," Padraig recalled, "all these intricate stamps." The stamps led him to an interest in radio, which led him, just two years ago, to his high school's ham radio club. Club advisor and co-nominator Neil Rapp, WB9VPG, said it took Padraig only three weeks to learn enough to pass his Technician exam, which was followed two months later by his General and just one month after that by his Extra.

Padraig quickly became president of his school's radio club, a position he currently holds, as well as an appointment as the ARRL Indiana Section's Assistant Section Manager for Youth. A club program on the 3Y0X DXpedition to Peter I Island sparked his interest in operating from his family vacation in Cyprus last year, which led to his magazine article about the trip, which led to his invitation to talk about the experience at the Dayton Youth Forum.

Padraig Lysandrou, KC9UUS, speaks at the 2013 Dayton Hamvention® youth forum. (Photo courtesy Carolyn Lysandrou, KC9UUR)

Not content to just operate, Padraig also enjoys the technical side of ham radio and electronics in general. "I've been designing circuits and messing around with a bunch of high-voltage circuits and transformer drivers," he told *Newsline,* "and all sorts of stuff that fuels my interest between amateur radio, electronics and chemistry."

The Newsline Young Ham of the Year Award

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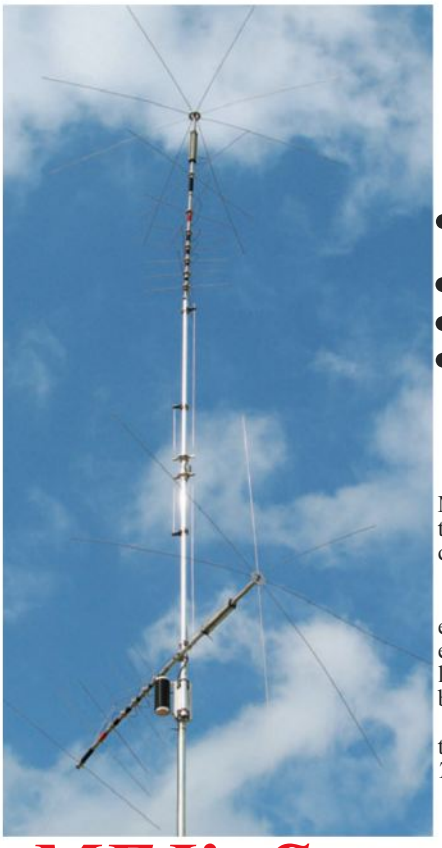

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Results of the 2013 CQ WW WPX SSB Contest

BY TERRY ZIVNEY,* N4TZ

Even though the 2013 CQ WPX WW SSB Contest fell on Easter weekend, we received a record number of logs this year, 5461, up from the 5365 received last year. The number of logs submitted has more than doubled in the last ten years, with nary a down year in the decade. If only the stock markets were so reliable!

For many, Easter is a time for family activities, with ham representing the main dish on the Easter table. Many amateurs found room for another helping of "ham" this holiday.

Andy, KU7T, did a multi-single activity in Washington State. "My 9-year-old daughter Emma ran her first contest and did about 100 QSOs. We did a semi-serious effort in between Easter and other weekend activities. It was a blast to see my daughter work the radio and computer."

Brian, N8WRL, reports from South Carolina: "My high-school-junior daughter (KJ4OTY) and I made our first serious attempt at contesting in this past weekend's WPX phone. We had an absolute blast and I was delighted that she was interested in doing it with me! Most of our operating was one of us logging while the other operated. I can tell you her voice was gold in the runs—not many YLs!" Brian and Olivia had the top Multi-Operator Single-Transmitter score in the USA W4 region, with low power yet!

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Olivia, KJ4OTY, and proud dad Brian, N8WRL, made a fine showing in their first serious contest winning M/S in W4, with low power!

Joe, IT9BLB, in Sicily notes: "For us, Easter weekend and WPX are not the best to drop together, so we decided to mix the traditional stay together with our families, typical barbecues, and a big contest. Having some active XYLs (IT9APL and IT9ZRU) and some other ham friends who came just for the fest, we decided to run a fun Multi/Multi giving them the opportunity to be really part of the contest. For some reason, it was also decided to

Olivier, ON4EI, erected this fine field-day-style antenna farm for his operation as EI1A primarily powered by green energy (see the wind turbine and the solar cells?). What other kind would you expect from the Emerald Isle?

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SmallIR Vertical

- 20-6m Coverage
- 18ft element
- 12lbs / 1ft^2 wind load
- Available optional coils to cover 40m/30m or 80m/40/30m bands

2 Element Yagi

- 20-6m Coverage
- 2x36ft Elements
- 57inch Boom
- 30lbs / 4ft^2 wind load
- 18.2ft turning radius

*shown with optional 39ft 40m/30m dipole

3 Element Yagi

- 20-6m Coverage
- 3x36ft Elements
- 16ft Boom
- 51lbs / 6.1ft^2 wind load
- 19.7ft turning radius

*shown with optional 39ft 40m/30m dipole

4 Element Yagi

- 20-6m Coverage
- 4x36ft Elements
- 32ft Boom
- 99lbs / 9.7ft^2 wind load
- 24.1ft turning radius

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Steef, PA3S, at the run station of PI4CG.

use our Elmer's call, IT9ZGY, instead of the usual IR9Y. Several newcomers had many hours of nice contesting for their first time: Real fun for everybody!" I'll bet it was real fun to run up with over 20-million points in the M/M category.

Those who dislike contesting say it is about the Haves and the Have Nots. . . . Well, it is. There are those having fun and those who are not. You don't have to win to have fun.

Witness the excitement found in the contest by Elizabeth, KI6TIB: "Made my second and third HF contacts ever, on my own and without my Elmer!"

Many people participate in contests because it is an easy way to collect contacts toward various awards. The CQ WPX SSB Contest received logs from more than 150 countries around the world, many sporting unusual prefixes. D4C set a new prefix-worked mark with 1926 prefixes. As might be expected, the two top single-operator scores led the way amongst individual operators with 1433 and 1429 prefixes, respectively. CR3A had an amazing 1320 prefixes on 15 meters alone. 140 stations worked at least 1,000 prefixes. It takes 300 prefixes confirmed on SSB to qualify for *CQ* magazine's WPX award (see the rules elsewhere in this issue). 1,363 stations had at least 300 prefixes worked during the contest weekend. I imagine that eQsl.cc and ARRL's LoTW websites got quite a workout after all of the activity this year's contest generated.

Still, competition is at the heart of contesting. The CQ WPX Contest provides many levels of competition– for a plaque, for a spot in the top scores box, with the operator just ahead of you in the box or the call area, or with your own score from last year. With over 5,000 competitors, and many more participants who didn't send in logs, there are numerous examples. Just a couple: UA9OMT edged YT8T by 1,660 points out of over 1.46 million for seventh place, 15 meters low power—a difference of less than one mult. E75A edged ER2RM by 474 points out of 69,000 for fifth place, 160 meter low power—just a couple of busted callsigns difference. You can find out how you, and your competitors, did at ,www.cqwpx.com> where the full line scores of all the categories will be posted, along with a searchable database of scores for all past CQ WPX contests. You will also find public logs from all the competitors to help you plot your strategy for next year. You are looking forward to next year, right?

Single-Operator All Band

Some people might think that Jim, W7EJ, had a tough decision to make. As the operator of CN2R, he holds all of the WPX SSB single operator world records except for the 10-meter category. But, if he tried to capture the 10-meter record for a clean sweep, he might lose his prestigious All-Band record to Tom, W2SC, at his 8P5A station. In the end, Jim chose to defend his All-Band title and set a new record, improving his 2012 total by nearly 3-million points. Tom could only increase his North American record by 2.3-million points. As it turned out, PX5E's top 10-meter score was over 2.5-million points less than his 2012 record, so it appears Jim made the correct choice all the way around!

Three Canadians made the world top ten, led by CF3A (VE3AT op) in fourth place overall. KJ3X/4 (K4XS op) in Florida was tops

The operators of PI4CG: PD4DX, PDØMP, PD2EDR, PA3S, PD2PKM, PD2GSP, PA7CRX. They gave PI4DX a real run for their money in the M/2 category.

2013 WPX SSB TROPHY WINNERS AND DONORS

SINGLE OPERATOR ALL BAND

WORLD: Stanley Cohen, W8QDQ Trophy. Won by: **CN2R operated by James P Sullivan, W7EJ**
WORLD Low Power: Caribbean Contesting Consortium Trophy. Won by: **Rob Van Geen, NH6V**
WORLD QRP: Phil Krichbaum, NØKE Trophy. Won by: **Ymanol Caires,YW2LV**
USA: Atilano de Oms, PY5EG Trophy. Won by: **KJ3X/4 operated by Bill Kollenbaum, K4XS**
USA Low Power: Terry Zivney, N4TZ Trophy. Won by: **NV1N operated by Edward Sawyer, N1UR**
USA QRP: Doug Zwiebel, KR2Q Trophy. Won by: **Randy Shirbroun, NDØC**
USA Zone 3 High Power: Lauri "Mac" McCreary, KG7C Trophy. Won by: **Brad Wallingford, K7ZSD**
USA Zone 3 Low Power: Buz Reeves, K2GL Memorial Trophy. Won by: **Paul E. Dorey, WN6K**
USA Zone 4 High Power: Society of Midwest Contesters Trophy. Won by: **George A. Demontrond III, NR5M**
USA Zone 4 Low Power: Society of Midwest Contesters Trophy. Won by: **Greg Chapoton, NA8V**
USA Zone 5 High Power: Paul Obert, K8PO Trophy. Won by: **Robert L. Shohet, KQ2M/1**
EUROPE High Power: Jim Hoffman, N5FA Trophy. Won by: **RT4F, operated by Pavel Bagachev, RK4FD**
EUROPE Low Power: Ed Sawyer, N1UR Trophy. Won by: **EI1A, operated by Olivier Vandenbalck, ON4EI**
EUROPE QRP: Rick Williams, VE9HF Trophy. Won by: **Igor Golikov, R2MA**
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **3V8BB, operated by Hrane Milosevic, YT1AD**
ASIA: Chris Terkla, N1XS Trophy. Won by: **UP2L, operated by Grigoriy Smirnov, UN9LG**
NORTH AMERICA: Albert Crespo, F5VHJ Trophy. Won by: **8P5A operated by Tom Georgens, W2SC**
NORTH AMERICA Low Power: Ed Sawyer, N1UR Trophy. Won by: **Kei Fukuda, KG2A/VP9**
NORTH AMERICA QRP: Phil Krichbaum, N0KE Trophy. Won by **Julius Fazekas, N2WN/4**
OCEANIA High Power: Phillip Frazier, K6ZM Memorial Trophy. Won by: **Atsuo Sakuma, 5W1SA**
OCEANIA Low Power: YB Land DX Club Trophy. Awarded to**: Felimon Morano, Jr., DV1JM**
SOUTH AMERICA: Andrew Faber, AE6Y Trophy. Won by: **P40L operated by John A. Fore, W6LD**
SOUTHERN CONE (CE, CX, LU) Low Power: LU Contest Group Trophy. Won by**: XR3Y operated by Esteban Asenjo, XQ7UP**
CANADA High Power: Saskatchewan Contest Club Trophy. Won by: **CF3A operated by Ron Vander Kraats, VE3AT**
CANADA Low Power: Paul Cassel, VE3SY Memorial Trophy. Won by: **Steven Goldberg, VA3SWG**
JAPAN: Hamad Alnusif, 9K2HN Trophy. Won by: **Masaki Okano, JH4UYB**

SINGLE OPERATOR, SINGLE BAND

WORLD: Steve Merchant, K6AW Trophy. Won by: **CR3A operated by Luis E.P. Gomes, CT3DL (21 MHz)**
WORLD 28 MHz: Jorge Taboada, EA9LZ Trophy. Awarded to: **PX5E operated by Sergio Lima de Almeida, PP5JR**
WORLD 28 MHz Low Power: Six Stars Contest Station LS1D Trophy. Won by: **ZY2WPX operated by Guilherme Vaz, PU2LEP**
WORLD 21 MHz: Stuart Santelmann KC1F Memorial (W3UA/RA3AA sponsor) Trophy. Won by: **PW5G operated by Walter Vicente Gomes Filho, PP5WG**
WORLD 14 MHz: Jorge Taboada, EA9LZ Trophy. Won by: **P41A operated by Jean-Pierre Lauwereys, P43A**
WORLD 7 MHz: Jorge Taboada, EA9LZ Trophy. Won by: **YT8A operated by Dusan Ceha, YU1EA**
WORLD 7 MHz Low Power: Neal Campbell, K3NC Trophy. Won by: **Daniel Nunes, YY4DNN**
WORLD 3.7 MHz: D4C Contest Team Trophy. Won by: **Omari Odoshashvili, 4L5O**
WORLD 1.8 MHz: UA2 Contest Club Trophy. Won by: **Algirdas Uzdonas, LY7M**
USA 28 MHz: Maurice Schietecatte, N4LZ Trophy. Won by: **KZ5MM operated by Chuck Dietz, W5PR**
USA 21 MHz: Maurice Schietecatte, N4LZ Trophy. Won by: **KR4Z operated by Jay E. Camac, N4OX**
USA 14 MHz: Charles Wooten, NF4A Trophy. Won by: **John Bayne, KK9A/4**
USA 7 MHz: Yankee Clipper Contest Club Trophy. Won by: **Pat Sonnier, W5WMU**
USA 3.7 MHz: Bernie Welch, W8IMZ Memorial (WB8MRU sponsor) Trophy. Won by: **Steven Sussman, W3BGN**
EUROPE 14 MHz High Power: SJ2W Contest Team Trophy. Won by: **SJ2W operated by Mikael Larsmark, SM2WMV**
EUROPE 3.7 MHz High Power: Ranko Boca, 4O3A Trophy. Won by: **DR1D operated by Alexandre Correia, DL1NX**

SINGLE OPERATOR ASSISTED

WORLD: Emir-Braco Memic, OE1EMS Trophy. Won by: **P40Z operated by Helmut Mueller, DF7ZS**
USA: Alabama Contest Group Trophy. Won by: **Gene Shablygin, WU3A/1**
EUROPE: Martin Huml, OL5Y Trophy. Won by: **LX7I operated by Phillipe Lutty, DJ8OG**

OVERLAY CATEGORIES

WORLD Tribander/Single-Element: Helmut Mueller, DF7ZS Trophy. Won by: **Yuri Onipko, VE3DZ**
USA Tribander/Single-Element: Paul Newberry, N4PN Trophy. Won by: **NX0X/4 operated by Paul H. Newberry, Jr., N4PN**
USA Tribander/Single-Element Low Power: Al Josza, KG1E Trophy. Won by: **Peter Bizlewicz, KU2M**
Europe Tribander/Single-Element: Roger Miner, K1DQV Trophy. Won by: **Igor Vachevsky, RT4RO**
WORLD Rookie: Val Edwards W8KIC Memorial (K3LR sponsor) Trophy. Won by: **Victor Ivanov, UN8GV**

MULTI-OPERATOR, SINGLE-TRANSMITTER

WORLD: Latvian Contest Club Trophy. Won by: **P33W operated by RX3APM, RL3FT, UA4FER, R3DCX, RW4WR, and RA3AUU**
USA: Steve Bolia, N8BJQ Trophy. Won by: **K1LZ operated by K1LZ, AE2W, K3JO, N8BO, and W1UE**
AFRICA: Rhein Ruhr DX Association Trophy. Won by: **EB8AH operated by EA5DY, EA8AH, EA8ZS, and EA8RM**
ASIA: W2MIG Memorial (NX7TT Sponsor) Trophy. Awarded to: **H27A operated by R2AA, 5B8AD, RN3TT, R9WR, UA9SCX, UU6JR, UA9CDV, RK3QS, and RT3T**
EUROPE: Tonno Vahk, ES5TV Trophy. Won by: **EI7M operated by EI3JE, EI8IR, EI3JZ, MØWLF, EI5GM, and MØMAT**
NORTH AMERICA: North Pole Contest Group Trophy. Won by: **WP2Z operated by K8MJZ, WP2XX, K9VV, and NQ6N**

MULTI-OPERATOR, TWO-TRANSMITTER

WORLD: Ken Adams, K5KA Memorial Trophy. Won by: **RF9C operated by R9DX, RA9CMO, RA9FW, UA9CDC, UA9CIR, and UA9MA**
USA: Florida Contest Group Trophy. Won by: **K9CT operated by K9CT, K9PW, K9ZO, KB9UWU, and WE9V**
AFRICA: Walter Skudlarek, DJ6QT Trophy. Won by: **ED9Z operated by EA7HZ, EA7JB, EA7RU, and EA9LZ**
EUROPE: Bernd Och, DL6FBL Trophy. Won by: **TM6M operated by F1AKK, F4DXW, F5MUX, F8DBF, F8FKJ, F8FTY, and TU5KG**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Gail M. Sheehan, K2RED Trophy. Won by: **D4C operated by I4UFH, IZ4DPV, CT1ESV, and HB9DUR**
USA: Dale Hoppe, K6UA Memorial Trophy. Won by: **WX3B operated by WX3B, K3WI, N8IVN, NE3K, K3AJ, WA3AER, NH7C, KB3CS, and N3YIM**
EUROPE: Rick Dougherty, NQ4I Trophy. Won by: **DR1A operated by DJ7EO, DL1QQ, DL2YL, DL3DXX, DL4NAC, DL6FBL, DL8DYL, DL9DRA, DM3DA, JK3GAD, PA1TX, SP3LPG, and UU4JMG**

CONTEST EXPEDITION

WORLD: C6APR Memorial (PT7ZZ sponsor) Trophy. Won by: **TO7BC operated by Hartwig Kauschat, DL7BC**

2013 WPX SSB WORLD TOP SCORES

Single Op All Band High Power

CN2R	30,683,396
8P5A (W2SC)	27,171,006
P4ØL (W6LD)	19,873,941
CF3A (VE3AT)	16,362,927
3V8BB	15,592,250
UP2L (UN9LG)	14,672,413
VE3EJ	14,193,114
VE3DZ	13,751,535
6V7S (RK4FF)	13,706,505
KJ3X/4 (K4XS)	13,560,534

Single Op 28 MHz High Power

PX5E (PP5JR)	15,065,172
CW5W (CX6VM)	14,879,280
LU5FC	11,248,038
PX2B (PY2LED)	7,124,299
PP5FB	4,518,612
T5TC (TA1HZ)	557,535
TI2OY	492,338
PP5ZP	462,364
ZP5MAL	458,575
5Z4/EA4ATI	451,484

Single Op 21 MHz High Power

CR3A (CT3DL)	15,458,520
PW5G (PP5WG)	8,426,025
4LØA (4L4WW)	5,701,340
E77XZ (DK6XZ)	5,273,280
YU5A (YU1EW)	3,904,242
C4Z (5B4AIZ)	3,771,220
TM1W (F1HAR)	3,549,333
LV5V (LU5VV)	3,109,658
4A1TD (XE1H)	2,232,358
EE6E (EA6DD)	2,214,225

Single Op 14 MHz High Power

P41A (P43A)	10,726,620
9Y4W	9,382,641
PR5B (PY2LSM)	8,485,672
YW4D	7,938,495
SJ2W (SM2WMV)	6,986,865
KK9A/4	6,526,884
EA1FDI	3,428,568
OHØR (OH2PM)	3,109,194
PJ2T (VA7AM)	3,085,582
YT1A	2,969,175

Single Op 7 MHz High Power

YT8A (YU1EA)	8,645,858
SSØA	7,840,833
OH9W (OH2TA)	1,079,296
S57O	1,067,065
DM6DX	926,289
IKØGDG	826,232
EA7RM	697,878
WH7W	620,972
UR6EA	504,612
VY2LI	441,344

Single Op 3.7 MHz High Power

4L5O	3,511,998
EB3CW	1,681,160
YT4A (YT1AA)	1,459,659
9A3B (9A1AA)	1,377,288
US5D (UT7DX)	1,147,531
YTØW (YU1JW)	1,120,952
PA9M	1,032,240
S58WW	952,380
LY5W	819,396
YO3VU	668,388

Single Op 1.8 MHz High Power

LY7M	501,208
HA3HZ	76,825
UA6AIW	54,612
GM4AFF	46,032
F5VMN	29,748
EA1DLU	15,252
W3UR	7,176

Single Op All Band Low Power

NH6V (@KH6LC)	6,679,200
NV1N (N1UR)	4,835,721
XR3Y (XQ7UP)	3,159,708
RV9CBW	3,135,492
RT9S	3,124,355
EI1A (ON4EI)	2,984,805
PY2NY	2,796,570
KG2A/VP9	2,447,240
E21EIC	2,411,550
KU2M	2,383,264

Single Op 28 MHz Low Power

ZY2WPX (PU2LEP)	6,029,904
CX5CBA	3,456,162
YB2DX	3,040,414
LU6FOV	2,758,007
EA8TX	1,635,108
ED8B (EA8CZT)	1,370,172
CX2CC	1,062,100
PY1PL	985,072
PY2HT	950,850
PU5FJR	943,460

Single Op 21 MHz Low Power

YV5KG	2,563,600
D3AA	2,341,340
TA4AU	2,032,758
CO6LC	1,884,882
UA9OMT	1,461,460
YT8T	1,459,800
UN9GD	779,009
JF3BFS	736,460
CT1EVE	515,361
TA7EB	451,350

Single Op 14 MHz Low Power

YW5T (YV5JBI)	2,700,753
PY1ZV	1,459,722
TGØAA (TG9ANF)	1,031,472
HI3TT	964,308
EF2F (EA2DNR)	795,844
FM4KA (FM5FJ)	769,515
UA1AQA	742,026
LR1H	695,072
XR1C (CE1KR)	525,096
HC1JQ	480,974

Single Op 7 MHz Low Power

YY4DNN	4,549,878
EA3GLB	1,132,428
JH9URT	1,036,146
DJ3HW	594,509
UT5IA	521,778
HI3K	496,661
UV3QF	404,602
YT1ET	328,650
TC3D (TA3D)	320,350
DL5RU	286,134

Single Op 3.7 MHz Low Power

II3M	587,028
UU2JM	528,900
YL2GUV	407,612
SQ2PHG	378,777
HA5MY	218,476
R3DPM	166,260
4K6FO	148,512
EA5EOR	135,999
R9WT	111,540
IB2Z (IK2DZN)	77,525

Single Op 1.8 MHz Low Power

9A2AJ	206,150
YU6DX	69,795
E75A	69,530
ER2RM	69,056
SM6FJY	60,897
OK1JOK	53,938
OK2BEN	25,920
UA6JQ	24,780
VE3EDY	20,820
LY2ND	20,384

Single Op All Band High Power Assisted

P4ØZ	19,190,829
UPØL	15,117,796
LX7I (DJ8OG)	11,394,656
IR4M (IK4MGP)	9,449,952
KP2MM (N2TTA)	8,681,780
S57AL	8,517,504
YP9W (YO9GZU)	8,346,180
WU3A/1 (W3UA)	8,254,554
GW9T (MWØZZK)	7,293,483
UW7LL	7,277,900

Single Op 28 MHz High Power Assisted

LW6DG	5,246,772
NH2DX (KG6DX)	2,175,815
VK6DXI	1,747,440
4XØA (4X1VF)	1,380,917
LZ2HM	531,066
LZ2DF	364,056
UT7QF	344,588
IQ2MM (IK2QPR)	285,950
DF9ZP	256,088
JA5FBZ	247,852

Single Op 21 MHz High Power Assisted

DQ8N (DL2ARD)	5,390,510
9K9K (9K2RR)	5,307,837
4Z5LA	4,630,920
OE8Q (OE8SKQ)	4,485,780
S53F	4,206,015
RUØFM	3,322,890
RT5Z (RA3CW)	3,079,401
YT7Z (YU7EE)	2,847,072
OQ4U	2,738,826
UN8GV	2,594,775

Single Op 14 MHz High Power Assisted

ED8W	7,438,136
II1A (IZ1LBG)	4,062,585
TM1T (F5TRO)	3,977,100
YTØZ (YU1ZZ)	3,768,615
YU1ARC (YT1HA)	3,689,988
NS1L/4 (W4SVO)	3,208,128
LZ4RR	2,921,344
DK2OY	2,915,643
US1I (UX2IO)	2,636,767
EA7LL	2,407,200

Single Op 7 MHz High Power Assisted

IR2R (IZ2EWR)	2,897,076
RY3D	2,575,466
S56X	2,425,200
PY6HD	2,176,550
OM8DD	1,882,412
OK1WCF	1,766,440
OK1UG	1,677,870
PT2CM (PT2FE)	1,670,380
5B4AIF (5B4AIE)	1,622,646
LN9Z (LA5KO)	1,492,920

Single Op 3.7 MHz High Power Assisted

DR1D (DL1NX)	2,596,932
9A5Y (9A7DX)	2,141,570
3Z8T	1,640,646
YQ5C (YO5OHO)	796,590
Z3ØA	725,912
UT2PX	683,520
VE3CX	575,126
EA7EU	438,984
9A6AIV	348,128
IT9XTP	347,447

Single Op 1.8 MHz High Power Assisted

S56P	422,752
EU3AR	393,056
DL2SAX	188,916
DF2UU	101,885
W3LL	63,020
OZ1ADL	37,800
F5DRD	11,178

Single Op All Band Low Power Assisted

EO3Q (UR3QCW)	4,588,653
RV9UP	3,498,097
IB1B (IW1QN)	3,277,290
HA6NL	2,417,688
RK9UE	2,353,978
DF2SD	2,009,250
KG1E	1,996,995
S5ØXX	1,987,626
CX5TR	1,823,428
KT4ZB	1,798,955

Single Op 28 MHz Low Power Assisted

LO5D (LU8EOT)	4,980,654
PY1NX	4,357,350
EE8T (EA8MT)	2,211,209
YBØMWM	2,081,384
PU2STZ	1,026,018
PU2SPW	774,974
LU1UM (LU5ULV)	627,072
PU1MKZ	535,366
PY1RBM	461,016
ZM3T (W3SE)	343,434

Single Op 21 MHz Low Power Assisted

HA4XH	1,691,840
IR9W (IWØHBY)	1,238,160
9A6A	699,566
N9TGR	606,390
RU4CS	587,898
LZ2JA	547,242
YB1JYL	449,904
F5VKT	352,897
BD5FFK	289,501
UW2L (UT5LO)	277,035

Single Op 14 MHz Low Power Assisted

YT5CT	1,221,528
UA6LUQ	873,120
UT3IZ	594,048
Z39A	534,726
KP2DX (KP2BH)	412,696
TA1CR	351,388
OL9R (OK6RA)	325,540
EY7BJ	295,728
VA2AFH	270,544
UT7Y (USØYW)	207,645

Single Op 7 MHz Low Power Assisted

S57DX	1,780,200
UZ7M (UT9MZ)	1,680,000
II4K (IZ4AMS)	1,270,935
MØC (G3WGN)	981,288
YT2AAA	683,212
2E1FVS	588,420
DF8AE	367,353
PD9X	310,464
UT3XA	292,878
RW9QA	204,660

Single Op 3.7 MHz Low Power Assisted

SV5DKL	803,520
E74WN	595,940
SP8LBK	446,176
S52WW	353,106
UX1VT	280,211
HA5NB	217,828
NY6DX/2	185,610
YV8AD	79,665
SQ2NNN	49,132
S53NW	36,703

Single Op 1.8 MHz Low Power Assisted

E77EZ	85,536
IKØXBX	76,032
SQ7FPD	35,340
HAØNAR	15,770

Single Op All Band QRP

YW2LV	3,205,800
PJ2DX (NØKE)	1,086,288
N2WN/4	706,859
R2MA	567,210
7Z1SJ	493,095
NDØC	459,672
RN4HAB	447,140
K3WW	393,900
EU1DZ	360,126
YO9FTN	352,440

Single Op 28 MHz QRP

I5KAP	39,449
LU6EVD	23,940
LU3HFA	14,337
LW2EE	10,855
JA4DQX	8,400

Single Op 21 MHz QRP

JH7RTQ	279,677
R7NA	230,480
YT1CS	145,152
RT4W	115,062
UN8PT	82,422
RT7F	52,725
F/E73CQ	44,064
EE7Z (EA7FUN)	43,736
R7FO	39,184
SP4GFG	37,076

Single Op 14 MHz QRP

HG3M (HA3MY)	281,250
EI4II	215,840
VE6EX	132,720
YR8V (YO8DHA)	129,402
NW2K	94,672
IZ1ANK	83,288
N5VEZ	72,314
SP3DRM	71,552
E72NA	70,896
SP4LVK	56,602

Single Op 7 MHz QRP

HG6C (HA6IAM)	89,466
N1TM	42,960
UX4CR	22,568
3Z6AEF	7,812
II7M	6,612

Single Op 3.7 MHz QRP

S57SU	220,922
SQ9ORQ	198,886
OK6K (OK5IM)	111,280
ON9CC	50,336
UT5UUV	26,418
LA9BM	20,370
UT5DJ	12,397

Single Op 1.8 MHz QRP

SP2DWG	4,656
R9AT	4,560
UT3N (UT3NK)	3,960
YP8A (YO8WW)	3,854

Single Op All Band QRP Assisted

NA1DX/3	52,052
RL3DZ	29,601
IT9EJP	18,792
N4TOL	17,976
N5TIT	12,640

Single Op 28 MHz QRP Assisted

IZ3NVR	16,188

Single Op 21 MHz QRP Assisted

HG52FC (HA5BSW)	173,420
ON6NL	168,402
BD7IXG	19,872
RAØSMS	16,632

Single Op 7 MHz QRP Assisted

I2/IZ3IBL	122,475
SP2QOT	60,579
YT7M (YU7RL)	42,978
HG1DX	24,000
IZ2KPE	15,478

Single Op 1.8 MHz QRP Assisted

S52OT	54,375
YTØA (YT7AW)	19,710
9A2UZ	15,106
HA8BE	6,710

Multi-Single

P33W	41,425,699
EB8AH	38,908,862
H27A	38,344,185
5D5A	32,399,955
WP2Z	23,494,800
CQ9T	22,283,028
KP2TM	21,519,234
K1LZ	20,458,646
EI7M	19,735,254
9A33P	18,507,672

Multi-Two

RF9C	36,911,589
TM6M	34,953,422
A71AM	32,794,520
II9P	24,620,580
9K2HN	24,421,124
ED9Z	24,115,446
PJ4D	21,924,036
OL7M	21,277,524
HG7T	21,141,274
LR3M	19,405,138

Multi-Multi

D4C	89,969,238
HK1NA	65,361,128
DR1A	38,940,150
ES9C	33,551,852

CE3CT 32,346,300
LZ9W 28,404,288
OT5A 26,092,115
PW7T 24,239,208
HA3ØS 23,776,684
EE1W 22,903,696

ROOKIE
Single Op All Band High Power
UA5B 8,993,208
AB1OC 1,883,448
HZ1XB 1,052,520
NR6M/7 1,021,554
NZ9Y/Ø 1,004,445
EA5HRV 886,488
ON7HLU 556,850
OD5ZZ 424,864
HS5NMF 381,696
JA2BNN 374,700

Single Op 21 MHz High Power
UN8GV 2,594,775
IQ4FA (IZ4UEZ) 1,199,250
ZL2GQ 328,790

Single Op 14 MHz High Power
DN2HAM 42,048
WØWDF/3 5,814

Single Op All Band Low Power
SQ6PLH 929,355
EI3HDB 622,856
OH6ECM 607,698
R9UA 540,176
VK5PAS 489,086
AG6AN 458,805
CS8ABA 450,140
WW1MM (N1EN) 421,610
YO5PRP 288,600
RU4IT 274,026

Single Op 28 MHz Low Power
ED8B (EA8CZT) 1,370,172
PU2STZ 1,026,018
PU5FJR 943,460
LU3YEP 258,656
DU1/A61DJ 90,675
PU5AGM 78,228
EA8CYM 76,066
PU5IKE 35,952
PU4JRV 29,754
VU2CCJ 24,570

Single Op 21 MHz Low Power
PY1KR 328,944
RDØWAD 222,880
RA1ABR 211,603
YC3ELS 188,478
IT9CLN 167,608
UR6LEY 149,952
JA5PXG 87,552
PY8WW 85,759
IZ5UGE 30,120
UB9SBH 28,381

Single Op 14 MHz Low Power
HZ1TT 309,969
2EØZAZ 77,381
WU8R 46,576
IZ2WMW 18,096
SQ3RLC 13,871
IZ7DMT 10,416

Single Op 7 MHz Low Power
YV5EPM 252,096
9A3BWW 141,264
VA3PAW 59,584
EW4RFC 17,052
KK4CIS/8 13,875

Tribander/Single Element
Single Op All Band High Power
VE3DZ 13,751,535
ZZ2T (PY2MNL) 11,917,560
KP2MM (N2TTA) 8,681,780
RT4RO 6,748,744
NXØX/4 5,858,256
SV9GPV 5,196,555
EA3RR 5,031,884
6Y3M (VE3NZ) 4,746,732
EW2A 4,108,256
NF4A 3,754,980

Single Op 28 MHz High Power
VK6DXI 1,747,440
4XØA (4X1VF) 1,380,917
TI2OY 492,338
OE5UAL 117,603
ED5J (EA5DM) 58,950
IZ5YHD 41,580

Single Op 21 MHz High Power
C4Z (5B4AIZ) 3,771,220
4A1TD (XE1H) 2,232,358
EE6E (EA6DD) 2,214,225
OA4SS 1,829,625
KZ5J 780,312
ED5T (EA5KV) 730,830
UA3RF 722,916
BU2AW 471,168
VO1TA 421,400
PY2CDR 369,467

Single Op 14 MHz High Power
EA1FDI 3,428,568
9Y4LDK 2,558,445
RX6AM 1,842,324
IZ8CCW 1,301,400
UC7A 851,136
W6AEA/7 658,424
G4R (YO4RDW) 657,720
DL3BQA 629,239
PY2KJ 420,223
SV9COL 393,960

Single Op 7 MHz High Power
DD1MAT 980,992
EA7RM 697,878
WH7W 620,972
VY2LI 441,344
WN2O (N2GC) 423,018
KX9DX 143,312
EI4GXB 94,860
KG9Z/8 85,000
S57YX 33,796
VA3XH 22,770

Single Op 3.7 MHz High Power
EB3CW 1,681,160
YT4A (YT1AA) 1,459,659
9A3B (9A1AA) 1,377,288
S58WW 952,380
YO3VU 668,388
EA1GA 589,407
EA7EU 438,984
4M5W (YV5MSG) 126,451

Single Op 1.8 MHz High Power
S56P 422,752
DL2SAX 188,916
W3LL 63,020

Single Op All Band Low Power
IB1B (IW1QN) 3,277,290
XR3Y (XQ7UP) 3,159,708
RT9S 3,124,355
KG2A/VP9 2,447,240
KU2M 2,383,264
TO7BC (DL7BC) 2,288,776
DF2SD 2,009,250
KG1E 1,996,995
HZ1DG 1,971,891
PV7M (PT7ZT) 1,842,236

Single Op 28 MHz Low Power
PY1PL 985,072
EE8L (EC8AFM) 673,560
5R8UI 510,875
ZM3T (W3SE) 343,434
KP4ROS 274,500
PY7AHA 197,472
CT8/KØRUI 138,866
YB6LAY 131,720
EF7T (EC7AKV) 115,440
EC7KW 106,774

Single Op 21 MHz Low Power
RU4SO 362,752
F5VKT 352,897
XE1XOE 331,452
IZ5CMI 196,075
ON6NL 168,402
KM4HI 155,805
PY5ZW 151,980
PY4XX 140,390
W7UPF 137,826
Z32ØR (Z35F) 125,240

Single Op 14 MHz Low Power
XR1C (CE1KR) 525,096
CS8/PD9DX 341,506
OL9R (OK6RA) 325,540
VE3IAE 291,650
EI4HQ 232,512
CT1EEK 218,994
DL9ZP 218,420
JR4GPA 201,450
IK1HZZ 195,690
USØMS 148,835

Single Op 7 MHz Low Power
MØC (G3WGN) 981,288
YT2AAA 683,212
UT5IA 521,778
F1FPL 264,260
IZ1DGG 253,164
OK2KLD (OK2ILD) 236,602
EV5ØWB (EU1AZ) 203,364
ER3AU 104,468
EA1EHW/8 93,603
OK2XKA 71,064

Single Op 3.7 MHz Low Power
YL2GUV 407,612
HA5NB 217,828
NY6DX/2 185,610
SQ2NNN 49,132
S53NW 36,703
AE7VA 11,440

Single Op 1.8 MHz Low Power
IKØXBX 76,032
OK2BEN 25,920
VE3EDY 20,820

in the USA and finished tenth worldwide. KQ2M/1 was second USA from Connecticut, and NR5M from Texas was third place USA. RT4F edged out OM2VL by a fraction of one percent for European bragging rights.

Single-Operator Single Band

PX5E (PP5JR) nosed out CX5W (CX6VM) for 10-meter honors. CR3A (CT3DL op) ran away from the pack on 15 meters. P41A (P43A) had the top 20-meters score. John, KK9A, didn't go to P4, but stayed home in NC and won the USA on 20 meters. YT8A (YU1EA) and S50A were the standouts on 40 meters, while 4L5O won 80 and LY7M put up the top score on top band.

Single-Operator Low Power

The most popular category is single-operator low power all band. This year, nearly 1,500 people chose this classification. Rob, NH6V, used KH6LC's fine station to win the world. Ed, N1UR, used his NV1N alias to chalk up second place worldwide from his Vermont home. Rob was able to garner 500 more 10-meter contacts than Ed, and that made the difference. XR3Y, RV9CBW, and RT9S were all within one percent of each other in positions three through five, while ON4EI piloted EI1A to sixth place overall and tops in Europe using green energy. In the USA, NV1N's score was nearly the total of the next three entrants: KU2M, NA8V, and KS9K. Hartwig, DL7BC, packed his suitcase for Mayotte and brought home the Contest Expedition trophy as TO7BC.

You can have a lot of high-powered fun running low power on a single band, especially if you choose the right band. ZY2WPX's score would have been fifth HP 10 meters. Not only that, but he also had the second highest LP score in any category, only 10% less than NH6V's top all band score. On 15 meters, YV5KG beat out D3AA. YW5T (YV5JBI) was the man on 20. YY4DNN's low-power 40-meter score would have been third overall high power. On 80, the top six scores came from Europe, headed by II3M. If you're going to operate 160 SSB LP, you had better be in Europe. 9A2AJ's score was the second highest unassisted 160-meter score overall.

Single-Operator Assisted

794 entries reported using QSO alerting assistance. Worldwide, P40Z had an impressive all band assisted score, just 700k less than P40L's unassisted score, while WU3A/1 was tops USA. A lot of action took place in the assisted single band categories as well. LW6DG took 10-meter honors. All other assisted single band champions were located in Europe: DQ8N (DL2ARD) edging past 9K9K (9K2RR) on 15; ED8W on 20; IR2R (IZ2EWR) on 40; DR1D (DL1NX) on 80; and S56P beating out EU3AR on 160.

EO3Q (UR3QCW) had the highest all band low power score in Europe, assisted or unassisted. Having a South American QTH is important if you wish to score big on 10; LO5D (LU8EOT) beat PY1NX. HA4XH was king of 15 meters LP assisted, while YT5CT (20), S57DX (40), SV5DKL (80), and E77EZ (160) were the remaining LP assisted winners.

Single-Operator QRP

254 hardy individuals used 5 watts or less. YW2LV (YV5YMA op) ran away with the QRP all band category in 2013. This is his third time topping this category. Ymanol also won in 2007 and 2010. Look out for him in 2016! NØKE at PJ2DX may have been far enough south, but Ymanol's mountain-top location made a big difference. N2WN stayed home in Tennessee to capture the USA QRP crown. Only 8 operators chose to enter the new QRP all band assisted category vs. 112 QRP all band unassisted. I guess the moral of the story is: If you're tough enough to do it with 5 watts, you're tough enough to do it alone.

2013 WPX SSB UNITED STATES TOP SCORES

Single Op All Band High Power
KJ3X/4 (K4XS) 13,560,534
KQ2M/1 10,853,583
NR5M 9,705,269
KC3R (LZ4AX) 8,469,972
KT5J (K5TR) 7,127,406
K3ZO 5,886,452
NXØX/4 5,858,256
K7ZSD 4,293,044
K4BAI 3,405,984
K5RT 3,264,768

Single Op 28 MHz High Power
KZ5MM (W5PR) 366,543
K2SSS 208,131
NC2V/4 174,051
W3EP/1 142,416
KA1ZD 50,540

Single Op 21 MHz High Power
KR4Z (N4OX) 935,450
KZ5J 780,312
W6AFA 722,533
AK5DX 478,750
W4PV 280,000
N2YBB 147,840
WA1JMP 135,010
K1QS 70,668

Single Op 14 MHz High Power
KK9A/4 6,526,884
N2MM 1,866,088
NN1N 873,828
K6HNZ 746,640
W6AEA/7 658,424
W7PU 174,096
KD8SQ 130,200

Single Op 7 MHz High Power
WN2O (N2GC) 423,018
WB2REM/4 404,481
KBØEO 352,980
AB9H 340,200
KX9DX 143,312
KG9Z/8 85,000

Single Op 3.7 MHz High Power
W3BGN 391,155
K9SH 189,140
WB5AAR (N5RZ) 116,727

Single Op 1.8 MHz High Power
W3UR 7,176

Single Op All Band Low Power
NV1N (N1UR) 4,835,721
KU2M 2,383,264
NA8V 1,841,770
KS9K (N4TZ) 1,463,400
WD5K 1,397,647
WB8TLI 1,227,435
WN6K 777,920
KK7AC 763,758
NN6CH 740,806
WA2JQK 702,336

Single Op 28 MHz Low Power
NA4W (K4WI) 169,814
KO3T 59,220
KE5FXE 50,172

Single Op 21 MHz Low Power
KJ4QHL 302,270
KM4HI 155,805
W7UPF 137,826
K7XE/6 97,801
K1ZO 86,996
N1WRK 76,152
KM6Z 76,140

Single Op 14 MHz Low Power
WB2TFM/4 200,143
N7FLT 70,864
K2HVE 67,064
KDØNEL 56,274
W5CSM 56,108
KG2AF 54,168

Single Op 7 MHz Low Power
W1DYJ 61,472
AB1J 31,185
WN4AFP 17,487
N2WF/4 16,170
KK4CIS/8 13,875

Single Op 3.7 MHz Low Power
AE7VA 11,440

Single Op 1.8 MHz Low Power
K4WI 2,205

Single Op All Band High Power Assisted
WU3A/1 (W3UA) 8,254,554
AA3B 5,747,691
W3FV 4,561,841
NF4A 3,754,980
W4ML (W4MYA) 3,669,602
W6TK 3,060,873
NØHR 2,313,759
NA3M 2,251,192
N2BJ/9 2,034,120
KW7XX 2,022,384

Single Op 28 MHz High Power Assisted
W2RR (WA2AOG) 69,564

Single Op 21 MHz High Power Assisted
N7RQ 795,893
NQ5K (W5ASP) 738,234
W5GN 626,535
NF8J 65,888

Single Op 14 MHz High Power Assisted
NS1L/4 (W4SVO) 3,208,128
KI7M 938,630
NJØF 388,745
WØYR/4 36,080

Single Op 7 MHz High Power Assisted
W5WMU 1,122,720
W2IRT 136,959

Single Op 3.7 MHz High Power Assisted
K4KZZ 101,536

Single Op 1.8 MHz High Power Assisted
W3LL 63,020

Single Op All Band Low Power Assisted
KG1E 1,996,995
KT4ZB 1,798,955
KZ1M (W1UJ@W1UJ) 1,685,764
W2RDS 1,330,368
W3FIZ 1,077,462
AD7JP (K2PO) 957,719
KK5I (W5CW@K5CM) 856,284
KS1J 852,390
NE5LL (N1CC) 721,140
KK6P (W7IV) 689,832

Single Op 21 MHz Low Power Assisted
N9TGR 606,390
N3ZA 182,517
WBØN 35,937

Single Op 14 MHz Low Power Assisted
N8HP 51,189
WU8R 46,576
KA9O 26,418

Single Op 3.7 MHz Low Power Assisted
NY6DX/2 185,610
NA5NN (K2FF) 24,750

Single Op All Band QRP
N2WN/4 706,859
NDØC 459,672
K3WW 393,900
KCØMO (KØOU) 291,148
NAØCW/6 (W8QZA) 199,898
NT4TS 139,400
KB1HNZ 133,056
AB3GB 45,952
K2MIJ 35,595
KT8K 27,328

Single Op 21 MHz QRP
KFØGX 11,775

Single Op 14 MHz QRP
NW2K 94,672
N5VEZ 72,314
KA8SMA 31,510

Single Op 7 MHz QRP
N1TM 42,960

Single Op All Band QRP Assisted
NA1DX/3 52,052
N4TOL 17,976

Multi-Single
K1LZ 20,458,646
KM3T/1 16,686,484
KD4D/3 9,654,004
WR3Z 9,050,454
NV9L 6,925,566
NX6T 3,242,059
WA7LT 2,991,500
KX7M/6 2,521,846
KK7PR 2,038,782
K3MD 1,999,872

Multi-Two
K9CT 13,552,283
WC6H 9,553,212
NØMA 3,374,560
W1BV 2,899,368
NF1R/6 2,278,740
KU6W 2,157,507
N4WW 1,220,310

Multi-Multi
WX3B 21,179,688
NQ4I 20,702,668
AK6W 16,013,067
NE1C 6,198,063

ROOKIE
Single Op All Band High Power
AB1OC 1,883,448
NR6M/7 1,021,554
NZ9Y/Ø 1,004,445
KK4DZP 175,904
KJ4YPY 116,028
KK4EIR 73,899

Single Op All Band Low Power
AG6AN 458,805
WW1MM (N1EN) 421,610
KK4HEG 219,876
AK4QU 150,738
NJ6G 112,988
K4AMQ 105,660
KK4AIO 76,797
KC9CDW 75,684
KB3VMR 71,292
KB3ZOZ 60,320

Single Op 14 MHz Low Power
WU8R 46,576

Single Op 7 MHz Low Power
KK4CIS/8 13,875
KD8RAP 10,620

Tribander/Single Element
Single Op All Band High Power
NXØX/4 5,858,256
NF4A 3,754,980
K4BAI 3,405,984
W6TK 3,060,873
NE5D (K5RX) 2,461,230
N6JV 2,019,039
N3UM 1,509,056
KØLUZ/4 1,399,560
WR5O 1,240,672
AJ4RW 1,016,060

Single Op 21 MHz High Power
KZ5J 780,312
N2YBB 147,840

Single Op 14 MHz High Power
W6AEA/7 658,424
KD8SQ 130,200
W8GOC 47,677

Single Op 7 MHz High Power
WN2O (N2GC) 423,018
KX9DX 143,312
KG9Z/8 85,000

Single Op 1.8 MHz High Power
W3LL 63,020

Single Op All Band Low Power
KU2M 2,383,264
KG1E 1,996,995
KT4ZB 1,798,955
WD5K 1,397,647
W2RDS 1,330,368
WB8TLI 1,227,435
KK7AC 763,758
N2WN/4 706,859
KK6P (W7IV) 689,832
K6GHA 522,975

Single Op 28 MHz Low Power
KO3T 59,220

Single Op 21 MHz Low Power
KM4HI 155,805
W7UPF 137,826
K1ZO 86,996
WA4AXT 36,960

Single Op 14 MHz Low Power
NW2K 94,672
N5VEZ 72,314
N7FLT 70,864
KA8SMA 31,510
KE1J 20,962

Single Op 7 MHz Low Power
W1DYJ 61,472
AB1J 31,185
WN4AFP 17,487

Single Op 3.7 MHz Low Power
NY6DX/2 185,610
AE7VA 11,440

Some noteworthy QRP single band scores were posted by JH7RTQ and R7NA on 15, HG3M (HA3MY) on 20, and HG6C (HA6IAM) on 40. S57SU and SQ9ORQ showed what perseverance can do with 5 watts SSB on 80 meters.

Overlay Categories

The Rookie overlay category was established to encourage recently licensed hams to try the contest experience. This year, 251 entries checked this overlay category. Just one fifth of the Rookies entered an assisted category, about the same number that used high power. UA5B put up 8.98 meg and AB1OC 1.883 meg; HZ1XB, NR6M/7, and NZ9Y/Ø were also "millionaires" in this category. AG6AN and WW1MM (N1EN) were fighting it out in the Rookie Low Power category. UN8GV had a fine 2.6 meg on 15M.

The Tribander/Single-Element overlay category recognizes that many stations face space constraints for antennas. 849 entrants selected this overlay. VE3DZ led the world in this category, with ZL3IO having the top low-power score. NXØX was the leader among the USA Tribander/ Single-Element competitors. KU2M had the highest USA low power score.

Multi-Operator

P33W set a new high-water mark in the Multi-Operator Single-Transmitter category, while EB8AH also bested the previous mark, with H27A a close third. Speaking of the M/S category, the guys at D4C had planned on a M/S effort with four operators, but the hours leading up to the contest were so good they couldn't resist the urge to go for the M/M record with just three stations and four operators. D4C totaled nearly 90-million points in the M/M category to demolish EB8AH's record set only last year. They also set a record for the most prefixes worked—1926. K1LZ and KM3T/1 were the big dogs in the USA M/S.

There was plenty of competition in the Multi-Operator Two-Transmitter category as well. RF9C beat TM6M for overall bragging rights, while A71AM took honors over 9K2HN in Zone 21, and

2013 WPX SSB EUROPE TOP SCORES

Single Op All Band High Power
RT4F (RK4FD) 10,608,444
OM2VL 10,567,228
CR6K (CT1CJJ) 9,737,532
UA5B 8,993,208
S53MM 8,276,310
EF5Y (EA5GTQ) 8,025,804
OG8X (OH6UM) 7,954,386
HA8JV 7,626,528
4O7ZZ (RZ1ZZ) 7,474,475
EU1A 6,544,836

Single Op 28 MHz High Power
CR2T (CU2AF) 335,274
YU5R (YU9DX) 220,997
M6T (GØAEV) 203,404

Single Op 21 MHz High Power
E77XZ (DK6XZ) 5,273,280
YU5A (YU1EW) 3,904,242
TM1W (F1HAR) 3,549,333

Single Op 14 MHz High Power
SJ2W (SM2WMV) 6,986,865
EA1FDI 3,428,568
OHØR (OH2PM) 3,109,194

Single Op 7 MHz High Power
YT8A (YU1EA) 8,645,858
S5ØA 7,840,833
OH9W (OH2TA) 1,079,296

Single Op 3.7 MHz High Power
EB3CW 1,681,160
YT4A (YT1AA) 1,459,659
9A3B (9A1AA) 1,377,288

Single Op 1.8 MHz High Power
LY7M 501,208

Single Op All Band Low Power
EI1A (ON4EI) 2,984,805
ED7R (EA7IZJ) 1,678,320
RA7T 1,490,055
UR4U (UR4UDI) 1,489,530
EA2LMI 1,458,108
LY9A 1,423,233
OH4A (OG3MS) 1,291,956
UA3BL 1,263,574
UR5IRM 1,214,378
DD5M (DJØZY) 1,190,484

Single Op 28 MHz Low Power
CT8/KØRUI 138,866
EE7R (EA7IA) 132,800
SV2JAO 127,917

Single Op 21 MHz Low Power
YT8T 1,459,800
CT1EVE 515,361
RU4SO 362,752

Single Op 14 MHz Low Power
EF2F (EA2DNR) 795,844
UA1AQA 742,026
CS8/PD9DX 341,506

Single Op 7 MHz Low Power
EA3GLB 1,132,428
DJ3HW 594,509
UT5IA 521,778

Single Op 3.7 MHz Low Power
II3M 587,028
UU2JM 528,900
YL2GUV 407,612

Single Op 1.8 MHz Low Power
9A2AJ 206,150

Single Op All Band High Power Assisted
LX7I (DJ8OG) 11,394,656
IR4M (IK4MGP) 9,449,952
S57AL 8,517,504
YP9W (YO9GZU) 8,346,180
GW9T (MWØZZK) 7,293,483
UW7LL 7,277,900
TM7F (F6GLH) 7,075,776
RT4RO 6,748,744
UA4M (RU4HP) 6,611,374
RM2U (RU3UR) 5,653,199

Single Op 28 MHz High Power Assisted
LZ2HM 531,066
LZ2DF 364,056
UT7QF 344,588

Single Op 21 MHz High Power Assisted
DQ8N (DL2ARD) 5,390,510
OE8Q (OE8SKQ) 4,485,780
S53F 4,206,015

Single Op 14 MHz High Power Assisted
II1A (IZ1LBG) 4,062,585
TM1T (F5TRO) 3,977,100
YTØZ (YU1ZZ) 3,768,615

Single Op 7 MHz High Power Assisted
IR2R (IZ2EWR) 2,897,076
RY3D 2,575,466
S56X 2,425,200

Single Op 3.7 MHz High Power Assisted
DR1D (DL1NX) 2,596,932
9A5Y (9A7DX) 2,141,570
3Z8T 1,640,646

Single Op 1.8 MHz High Power Assisted
S56P 422,752
EU3AR 393,056
DL2SAX 188,916

Single Op All Band Low Power Assisted
EO3Q (UR3QCW) 4,588,653
IB1B (IW1QN) 3,277,290
HA6NL 2,417,688
DF2SD 2,009,250
S5ØXX 1,987,626
S56A 1,665,454
DK2CX 1,647,216
OMØA (OMØAAO) 1,519,365
ER3CT 1,317,267
UY2IG 1,295,021

Single Op 28 MHz Low Power Assisted
IU9A 186,960
TK4LS 135,218
CR5D (CT1FJO) 118,230

Single Op 21 MHz Low Power Assisted
HA4XH 1,691,840
IR9W (IWØHBY) 1,238,160
9A6A 699,566

Single Op 14 MHz Low Power Assisted
YT5CT 1,221,528
UA6LUQ 873,120
UT3IZ 594,048

Single Op 7 MHz Low Power Assisted
S57DX 1,780,200
UZ7M (UT9MZ) 1,680,000
II4K (IZ4AMS) 1,270,935

Single Op 3.7 MHz Low Power Assisted
SV5DKL 803,520
E74WN 595,940
SP8LBK 446,176

Single Op All Band QRP
R2MA 567,210
RN4HAB 447,140
EU1DZ 360,126
YO9FTN 352,440
ON4MW 313,747
S59D 266,409
UX8IX 216,234
SP2DNI 188,190
EU3NA 139,932
PE2K 132,545

Single Op 21 MHz QRP
R7NA 230,480
YT1CS 145,152
RT4W 115,062

Single Op 14 MHz QRP
HG3M (HA3MY) 281,250
EI4II 215,840
YR8V (YO8DHA) 129,402

Single Op 3.7 MHz QRP
S57SU 220,922
SQ9ORQ 198,886
OK6K (OK5IM) 111,280

Single Op 21 MHz QRP Assisted
HG52FC (HA5BSW) 173,420
ON6NL 168,402

Single Op 7 MHz QRP Assisted
I2/IZ3IBL 122,475

Multi-Single
EI7M 19,735,254
9A33P 18,507,672
RL3A 18,002,215
ED1R 15,708,820
IO5O 14,277,120
ED3X 13,645,055
9A7A 12,363,239
TMØR 11,488,932
RM5A 10,258,024
IR6T 7,813,116

Multi-Two
TM6M 34,953,422
II9P 24,620,580
OL7M 21,277,524
HG7T 21,141,274
S51A 11,972,457
OH5Z 11,328,423
PI4DX 10,470,130
PI4CG 10,042,584
DM4X 7,822,044
4U1ITU 6,748,560

Multi-Multi
DR1A 38,940,150
ES9C 33,551,852
LZ9W 28,404,288
OT5A 26,092,115
HA3ØS 23,776,684
EE1W 22,903,696
IT9ZGY 20,670,020
E7DX 16,509,467
LY7A 14,221,034
SH3Y 10,489,102

Rookie
Single Op All Band High Power
UA5B 8,993,208
EA5HRV 886,488
ON7HLU 556,850
IZØVXF 208,208

Single Op 21 MHz High Power
IQ4FA (IZ4UEZ) 1,199,250

Single Op All Band Low Power
SQ6PLH 929,355
EI3HDB 622,856
OH6ECM 607,698
CS8ABA 450,140
YO5PRP 288,600
RU4IT 274,026
ER1JA 208,572
DL2VV 198,383
DO6CC 182,984
LA9OSA 182,612

Single Op 21 MHz Low Power
RA1ABR 211,603
IT9CLN 167,608
UR6LEY 149,952

Single Op 7 MHz Low Power
9A3BWW 141,264

Tribander/Single Element
Single Op All Band High Power
RT4RO 6,748,744
SV9GPV 5,196,555
EA3RR 5,031,884
EW2A 4,108,256
DL6NDW 2,302,674
8SØC (SMØMPV) 2,131,688
IZ3SQW 2,036,280
DFØBV (DL1MAJ) 2,030,986
9A7R 2,010,084
EF2O (EA2AOO) 1,680,426

Single Op 28 MHz High Power
OE5UAL 117,603

Single Op 21 MHz High Power
EE6E (EA6DD) 2,214,225
ED5T (EA5KV) 730,830
UA3RF 722,916

Single Op 14 MHz High Power
EA1FDI 3,428,568
RX6AM 1,842,324
IZ8CCW 1,301,400

Single Op 7 MHz High Power
DD1MAT 980,992
EA7RM 697,878

Single Op 3.7 MHz High Power
EB3CW 1,681,160
YT4A (YT1AA) 1,459,659
9A3B (9A1AA) 1,377,288

Single Op 1.8 MHz High Power
S56P 422,752
DL2SAX 188,916

Single Op All Band Low Power
IB1B (IW1QN) 3,277,290
DF2SD 2,009,250
ED7R (EA7IZJ) 1,678,320
S56A 1,665,454
OMØA (OMØAAO) 1,519,365
UR4U (UR4UDI) 1,489,530
LY9A 1,423,233
ER3CT 1,317,267
UR5IRM 1,214,378
EW5W 1,132,490

Single Op 28 MHz Low Power
CT8/KØRUI 138,866
EF7T (EC7AKV) 115,440
EC7KW 106,774

Single Op 21 MHz Low Power
RU4SO 362,752
F5VKT 352,897
IZ5CMI 196,075

Single Op 14 MHz Low Power
CS8/PD9DX 341,506
OL9R (OK6RA) 325,540
EI4HQ 232,512

Single Op 7 MHz Low Power
MØC (G3WGN) 981,288
YT2AAA 683,212
UT5IA 521,778

Single Op 3.7 MHz Low Power
YL2GUV 407,612
HA5NB 217,828

PI4DX nosed out PI4CG in another neighborhood rivalry. K9CT won USA from his fine Illinois station.

Multi-Multi and D4C—what else is there to say? Well, it took nearly 23-million points to make the top ten, so there was a lot of other activity in this category. There are fewer M/M stations stateside for this contest because of the difficulty in keeping the 80 and 160 stations busy working DX this time of year. But WX3B nipped NQ4I by less than a half-million points.

Records

The high overall level of activity is reflected in several new records: CN2R (World SOAB HP), P33W (World M/S), D4C (World M/M), K1LZ (USA M/S), 4L5O (Asia 3.5), 8P5A (North America SOAB HP), RF9C (Asia M/2), HK1NA (South America M/2), Highest Prefix total: D4C (1926). Records for all of the various categories and countries can be found at <www.cqwpx.com/records.htm>.

Miscellaneous Statistics

Only 31 stations entered the M/M category, but they made 147,998 QSOs. That's an average of 470 QSOs per operator (315 total M/M ops). The 198 M/S stations were staffed by 879 operators, who averaged 320 QSOs per person. To put this into perspective, the median sized log for all categories of stations reported making 182 QSOs. The four operators at D4C made the most QSOs, 12,866.

Low-power entries were submitted by 2,954 single operator stations, while 1,724 used higher power and 254 went QRP. Overall, unassisted operation was favored by a solid two to one margin, 3,335 to 1,597. High-power stations narrowly favored

unassisted (930 vs.794) while low power operators overwhelmingly endorsed the "boy and his radio" style of operation (2,185 unassisted vs. 769 unassisted) and the QRP ops voting 220 to 34 for the unassisted style of operation. Even rookies were four times more likely to be operating without than with assistance.

Final Observations

The CQ contests have grown so popular that the number of pages required for properly reporting the activity has mushroomed. Therefore, the line scores traditionally found at the end of the magazine have been moved to CQ magazine's website, <www.cq-amateur-radio.com>, as well as the WPX Contest website, <www.cqwpx.com/results.htm>. In addition to the searchable databases on the WPX Contest website, complete PDF versions of the printed article, including line scores, are available through both websites. Assisted stations' line scores are now found immediately after the single-operator unassisted line scores for each call area or country. Logs received after the official deadline are shown in italics in the line scores and are not eligible for any awards. For the QRM and expanded tables plus the list of operators of the multi

CQ WW WPX SSB CONTEST ALL-TIME RECORDS

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	CN2R('07) 1,613,955	399
3.5	CN2R('06) 11,849,076	894
7.0	CN2R('05) 14,724,696	931
14	CN2R('08) 15,778,840	1199
21	CN2R('11) 20,704,164	1443
28	PX5E('12) 17,785,368	1368
AB	CN2R('13) 30,683,396	1443
QRP/p	HC8A('94) 7,520,562	714
Assisted	P41P('12) 23,229,884	1303

Multi-Operator Single Transmitter

P33W('13)	 41,425,699	1571

Multi-Operator Two Transmitter

EB8AH('11)	 68,072,520	1765

Multi-Operator Multi-Transmitter

D4C ('13)	 89,969,238	1926

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95) 327,712	308
3.5	K1UO('10) 2,161,782	602
7.0	WU3A/1('11) 4,731,424	796
14	KQ2M('09) 7,034,082	1082
21	KQ2M/1('11) 9,591,670	1210
28	NY4A('00) 6,006,573	877
AB	K1LZ('11) 15,921,388	1246
QRPp	KR2Q('00) 2,688,158	649
Assisted	KI1G('11) 13,075,616	1268

Multi-Operator Single Transmitter

WW2DX('12)	 19,167,080	1373

Multi-Operator Two Transmitter

K1LZ('10)	 30,393,480	1560

Multi-Operator Multi-Transmitter

KM3T('00)	 29,338,460	1355

CLUB RECORD

Contest Club Finland ('00) 250,320,141

QRPp RECORD

HC8A('94) 7,520,562

WPX (Prefix) RECORD

D4C('13) 1926

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	CN2R('07) 1,613,955	399
3.5	CN2R('06) 11,849,076	894
7.0	CN2R('05) 14,724,696	931
14	CN2R('08) 15,778,840	1199
21	CN2R('11) 20,704,164	1443
28	D44AC('02) 15,707,401	1123
AB	CN2R('13) 30,683,396	1443

ASIA

1.8	*YMØT('05) 486,846	222
3.5	H2T('10) 3,067,296	534
7.0	5B/KC2TIZ('10) 6,761,872	754
14	P33W('10) 8,004,130	1030
21	JA6GCE('11) 7,055,664	996
28	H22H('00) 9,092,146	931
AB	UPØL('12) 18,541,055	1235

EUROPE

1.8	SN3R('07) 835,884	434
3.5	EI7M('10) 3,527,075	731
7.0	EI7M('11) 10,787,690	1054
14	TM77M('10) 8,271,768	1046
21	CS2C('11) 9,479,430	1245
28	GM7V('00) 8,305,756	982
AB	E7DX('11) 20,438,120	1322

NORTH AMERICA

1.8	VA1A('99) 535,225	271
3.5	ZF1A('08) 2,269,344	462
7.0	TI4CF('05) 8,057,479	751
14	KP2A('95) 7,088,976	912
21	VP2EH('11) 14,899,185	1305
28	KP2A('00) 11,385,710	1046
AB	8P5A('13) 27,171,006	1429

OCEANIA

1.8	KH6ND('07) 26,432	59
3.5	WH7Z('03) 1,208,900	308
7.0	ZL3A('08) 8,200,800	816
14	KH6ND('03) 6,493,727	887
21	AH7DX('00) 7,645,990	890
28	TXØDX('00) 12,049,422	847
AB	KH7X('11) 20,676,524	1244

SOUTH AMERICA

1.8	HK1KYR('10) 44,814	77
3.5	P4ØA('96) 1,715,076	426
7.0	HK1T('12) 14,512,230	1062
14	HK1X('11) 13,783,532	12599
21	ZX5J('10) 16,746,977	1369
28	PX5E('12) 17,785,368	1368
AB	HC8A('01) 25,180,199	1199

MULTI-OPERATOR SINGLE TRANSMITTER

AF	5D5A('12) 38,510,454	1601
AS	P33W('13) 41,425,699	1571
EU	TM6M('11) 28,016,921	1541
NA	VP2EC('92) 24,409,580	1115
OC	KH7X('12) 19,038,120	1180
SA	HC8A('93) 32,502,677	1107

MULTI-OPERATOR TWO TRANSMITTER

AF	EB8AH('11) 68,072,520	1765
AS	RF9C('13) 36,911.589	1529
EU	EI100T('12) 33,721,072	1616
NA	K1LZ('10) 30,393,480	1560
OC	VK4KW('11) 26,528,482	1369
SA	PJ4Z('12) 57,741,867	1641

MULTI-OPERATOR MULTI-TRANSMITTER

AF	D4C('13) 89,969,238	1926
AS	P3A('00) 53,554,592	1456
EU	DR1A('11) 63,397,890	1909
NA	WL7E('00) 42,013,215	1395
OC	KH7R('02) 32,806,032	1304
SA	HK1NA('13) 65,361,128	1687

stations, also go to the CQ magazine website listed above.

There are a number of volunteers who make this contest possible. Randy, K5ZD, has been the director of this contest for the past five years, and has done everything possible to make the transition seamless to the participants and painless to me, the new director. The software support from K1EA and K5TR enabled the timely processing of your logs. N8BJQ, K3WW, K5ZD, and WI9WI provided the skilled personal analysis of the logs that computers alone cannot provide. Barry, W5GN, prints and mails your certificates, and Doug, K1DG, handles the plaques, both in a very timely manner. Paper logs were manually entered by K9QVB, K9ZM, KC9EOQ, K9WX, N9LF, KB9OWD, W7KAM, and N4TZ. K5ZD runs the outstanding CQ WPX website.

The 2014 CQ WPX SSB Contest will be held **March 29–30**. The log deadline is five days after the conclusion on the contest, **April 4 at 2359Z.** Updated rules will be published in the February 2014 issue of *CQ* and will be posted on the websites mentioned above. *—73, Terry, N4TZ*

SH3Y Youth Team

A Multi-Multi international youth team consisting of youngsters from Finland, Belgium, Holland, Estonia and Sweden got together at the SK3W contest station using the call SH3Y. Team members were as follows: SA0ACT Mattias, SAØCAV Alexander, SAØCAD Andreas, SAØBSJ Joakim, SA7BUU Jennifer, SA7BQP Per, OH2FKX Kati, OH2FPK Mari, ES7GM Kristjan, ES1TRE Kristjan, PA2LS Lisa, ON3LOL Maarten, SA3BRX Joel, and SA3BPG Markus.

Conditions were not so good. But the team did well and ended with a score of over 10.5 million points, setting a new national record in Sweden. The spirit in the team was very good and despite some failures of amplifiers and interfaces they did a fantastic job.

The support team was SM3SGP Gunnar (owner of the contest station SK3W), SA5BJM Johan (Team Leader and organizer of it all), SM5EPO Per-Olof, SMØDZB Tore, and SM5CBM Bertie who made sure there was food on the table, fixed broken amps and provided general ground support. But the youngsters did all the rest, handling the pile-ups and logging all of the stations working SH3Y.

—Bertie Hayden, SM5CBM

SH3Y operators. This photo appeared in Swedish Ham Magazine *as front page, according to SM5CBM. (SM5CBM photo)*

Reader Survey September 2013

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/CQSep13> [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:** September 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 more about what happens when things don't work the way they should.

1. When a piece of gear in your shack breaks, what are you most likely to do to get it fixed? (List in priority order, 1–7)

Troubleshoot and repair myself 1
Ask a local ham to help troubleshoot and repair 2
Take it to a local ham dealer for service 3
Send it back to the manufacturer for service 4
Send it to an independent service facility 5
Buy a replacement and try to sell/give the broken unit to someone who can fix it 6
Other 7

2. If a project you're building doesn't work as it's supposed to, what are you most likely to do? (List in priority order, 1-8)

Troubleshoot it myself 8
Ask a local ham to look at it 9
Ask another ham (not necessarily local) for advice 10
Contact manufacturer/seller if a kit 11
Contact author if built from plans in article or book 12
Give up and move on to something else 13
Design my own fix or workaround for the problem 14
Other 15

3. When you build something, what is the likelihood that it will work as intended on the first try? (Choose one)

Excellent 16
Good 17
50/50 18
Poor 19
Not a builder 20

4. How would you rate your electronic troubleshooting and repair skills? (Choose one)

Expert 21
Excellent 22
Good 23
Fair 24
Poor 25
Non-existent 26

5. Which of the following have you ever done? (Choose all that apply)

Built a piece of gear for your ham station 27
Built a piece of gear for another ham 28
Repaired a piece of your own gear 29
Repaired a piece of gear for another ham 30
Helped another ham build or repair equipment 31
Taught another ham how to build or repair equipment 32
Learned from another ham how to build or repair equipment 33
None of the above 34

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

Survey Response for Issue:

Name _____ **Call Sign** _____

Address _____

City _____ **St/Prov** _____ **Zip/PC** _____

Country _____

E-mail _____

What You've Told Us…

Our June survey asked about your outdoor interests and activities, especially as they relate to ham radio. Overall, you're a pretty active bunch, with 61% of respondents at least occasionally going walking, jogging or running, followed by 43% who enjoy hiking or camping, 33% bicycling, and 23% boating; followed by 17% geocaching (32% among our online respondents), 14% "foxhunting," and 13% motorcycling. Only 15% don't do any of these things.

Many of you include amateur radio in your outdoor activities: 28% do so frequently, 26% occasionally, 23% rarely, 7% always and 14% never. Among those of you who do operate ham radio outdoors, 81% of you operate on VHF/UHF bands and 64% operate on HF.

Sixty-two percent of you have or plan to build or buy ham gear specifically intended for outdoor operating. That gear includes homebuilt portable antennas (60%), HF radios (50%), commercially-built portable antennas (38%), VHF/UHF radios (35%), and other (14%).

Eighty-five percent of you take part in at least one outdoor focused ham activities, including Field Day (75%), VHF/UHF public service communications (40%), general QRP operating (38%), Other (24%), Islands on the Air (14%), foxhunting (12%), and lighthouse activations (10%), followed by Summits on the Air and satellite operating (9% each).

This month's free subscription winner is Steve Zielke, N7JLF, of Federal Way, Washington.

Summary of Rule Changes for 2013 CQ World-Wide DX Contest

BY RANDY THOMPSON,* K5ZD
CQWW CONTEST DIRECTOR

This issue of *CQ* contains revised and updated rules for the 2013 CQ WW DX Contest. These changes represent months of work by the CQ WW Contest Committee, as well as input from the contesting public. The public comment period produced over 280 emails with very helpful corrections, suggestions, and requests.

The CQ WW DX Contest rules have evolved for over 50 years. Changes in technology, operating practices, and enforcement efforts caused the rules to become increasingly complex. In some cases, the wording was difficult even for native English speakers to fully understand. The translators were also having trouble with the text. The major goal of the rewrite was to make the rules simpler and easier to understand.

At the same time, we took advantage of this opportunity to remove some categories that had not been attracting much activity. This includes the Team Competition and the Xtreme category. We also added some new *Overlay* competition categories. The new *Classic Overlay* category is in direct response to the CQ WW Survey comments that asked for a time-limited category. The *Rookie Overlay* category is based on the success this category has had for many years in the CQ WPX Contest. These categories are explained more fully below. As one commenter put it, "The rules are evolutionary, not revolutionary." If true, then we have achieved our goal.

Below are a few general comments and explanations about the new rules.

• The basic information about bands, exchange, and scoring has been moved to the beginning. We wanted everyone to quickly grasp the basics so they could get on the air and join the fun. There is no change to the scoring.

• The entry categories are substantially unchanged. We still have separate Single Operator and Single Operator Assisted categories for high, low and QRP power levels. The wording for the multi-operator categories has changed, but the definition of the categories is the same.

• *Xtreme Contesting* and *Team Competition* categories have been removed. The Xtreme Contesting concept, which only began in 2009, had special rules and a very low number of entries. The Team Competition was not attracting many entries and we decided that we would rather put more effort into promoting the club competition.

• *Checklog* is now listed as a category. Checklogs are not a competition category, but we wanted to help everyone understand Checklogs and how they are counted. Checklogs are very important in helping us with the log checking.

• A first for CQ WW, there are now two new *Overlay* categories. The Overlay categories are a second contest within a contest. Entrants receive a score in their traditional entry category and will also have a second score listed in the Overlay results. It is like entering two contests for the price of one!

• The *Classic Overlay* category is intended for the radio purists who want to participate in the most traditional way. It is one operator, one radio, no outside assistance, and only the first 24 hours of actual operating time (with breaks a minimum of 60 minutes with no QSO) will count for the score. Of course, Classic operators are welcome to operate as much as they want, but only first 24 hours of "on time" will count for the score. It should be interesting to see what the winning strategy of this new competition will be. The traditional single operator categories remain with no time limit.

• The *Rookie Overlay* category is for anyone first licensed within three years of the date of the contest. It's a great opportunity for new operators to compete with others who are also learning. We have enjoyed watching new operators in the CQ WPX Contest build their skills each year and make significant efforts in their final year of eligibility.

• Award certificates are now being offered to each category winner in every country plus each call area in the USA, Canada, Japan and Russia. Plaques continue to be offered for categories where they are sponsored.

• The *Club Competition* rules have been changed to create two separate competitions; one for clubs within the USA and one for clubs in the rest of the world (DX). The concept of a club being defined by a 175-mile circle is well established in the USA, but has not worked so well in other parts of the world where the contesting population is more spread out. The DX club area is now defined as *the country where the club is located AND the area within a 275-kilometer radius of the club's selected location*. For example, the Bavarian Contest Club may have members from any part of Germany as well as others who fall within the 275-km circle around Munich, which may include Austria and Switzerland.

• The general rules define some of the specific requirements that govern all entries. Each entry must use a different callsign, only one signal on a band at a time, etc. Entrants are required to log QSOs as they occur and not edit the log after the contest.

• Log submission instructions are unchanged. We do ask high scoring stations to include exact frequencies in their logs. The log deadline remains at five (5) days after the end of the contest.

• The judging section spells out examples that are considered unsportsmanlike conduct, how disqualifications are managed, and the log-checking deductions for logging errors (there are some changes here). Signals with excessive bandwidth may be considered as being unsportsmanlike and earn disqualification.

• Red and Yellow cards have been removed in favor of one action – disqualification.

• The declaration section reminds all CQ WW entrants of their responsibility to obey the rules and to accept the decisions of the CQ WW DX Contest Committee.

We are currently working to have the new rules translated into German, French, Spanish, Italian, Portuguese, Japanese, Russian, Chinese, and Arabic. If you would like to help with translation into other languages, please send an email to <questions@cqww.com>.

The frequently asked questions (FAQ) page at <http://cqww.com/rules_faq.htm> will be expanded to answer the most common questions about the new rules. The interpretations on the FAQ page explain how we will be judging the new rules, so everyone is encouraged to read this page carefully.

Thanks to everyone who provided input or feedback into the rule change process.

We look forward to another record year of entries, fun, and excitement in the CQ WW DX Contest. Please read the new rules carefully before the contest and have fun!

* *email: k5zd@cqww.com*

Announcing:

2013 CQ WW DX Contest

SSB: October 26–27

CW: November 23–24

Starts 0000 UTC Saturday
Ends 2359 UTC Sunday

I. OBJECTIVE: For amateurs around the world to contact as many other amateurs in as many CQ zones and countries as possible.

II. BANDS: Six bands only: 1.8, 3.5, 7, 14, 21 and 28 MHz. Observance of established band plans is strongly encouraged.

III. CONTEST EXCHANGE: SSB: RS report plus CQ Zone number of the station location (e.g., 59 05). CW: RST report plus CQ Zone (e.g., 599 05).

IV. SCORING:

A. Score: The final score is the result of the total QSO points multiplied by the sum of zone and country multipliers. Example: 1000 QSO points * (30 Zones + 70 Countries) = 100,000 (final score).

B. QSO Points: Stations may be contacted once on each band. QSO points are based on the location of the station worked.

1. Contacts between stations on different continents count three (3) points.

2. Contacts between stations on the same continent but in different countries count one (1) point. *Exception:* Contacts between stations in different countries within the North American boundaries count two (2) points.

3. Contacts between stations in the same country have zero (0) QSO point value, but are permitted for zone or country multiplier credit.

C. Multiplier: There are two types of multipliers.

1. Zone: A multiplier of one (1) for each different CQ Zone contacted on each band. The CQ Worked All Zones rules are the standard.

2. Country: A multiplier of one (1) for each different country contacted on each band. The DXCC entity list, Worked All Europe (WAE) multiplier list plus IG9/IH9, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

V. ENTRY CATEGORIES:

A. Single Operator Categories: One person (the operator) performs all operating and logging functions. There is no limit on operating time or band changes. Only one transmitted signal is permitted at any time.

1. Single Operator: QSO alerting assistance of any kind is prohibited (see VIII.2).

a. High Power (All Band or Single Band): Total output power must not exceed **1500 watts.**

b. Low Power (All Band or Single Band): Total output power must not exceed **100 watts.**

c. QRP (All Band or Single Band): Total output power must not exceed **5 watts.**

2. Single Operator Assisted: Entrants in this category may use QSO alerting assistance (see VIII.2).

a. High Power Assisted (All Band or Single Band): Total output power must not exceed **1500 watts.**

b. Low Power Assisted (All Band or Single Band): Total output power must not exceed **100 watts.**

c. QRP Assisted (All Band or Single Band): Total output power must not exceed **5 watts.**

B. Single Operator Overlay Categories: Any Single Operator All Band entrant above may ALSO submit his/her log for one of the categories shown below by adding the appropriate CATEGORY-OVERLAY line in the Cabrillo log file header. Overlay category entries will be listed separately in the results; grouped by high power and low power.

1. Classic Operator (CLASSIC): The entrant will use only one radio, no QSO alerting assistance, and may operate up to 24 of the 48 hours—**off times are a minimum of 60 minutes during which no QSO is logged.** If the log shows more than 24 hours of operation, only the first 24 hours will be counted for the overlay score. The one radio must not be able to receive while transmitting.

2. Rookie (ROOKIE): The operator was first licensed as a radio amateur less than three (3) years before the date of the contest. Indicate the date first licensed in the SOAPBOX field.

C. Multi-Operator Categories (all-band operation only): Any number of operators is allowed. QSO alerting assistance is allowed. Only one transmitted signal per band is permitted at any time. Total output power must not exceed **1500 watts** on any band at any time.

1. Single Transmitter (MULTI-ONE): Only one transmitted signal on one band permitted during any 10-minute period (run transmitter). Exception: One—and only one—other transmitted signal (multiplier transmitter) may be used during any 10-minute period, if—and only if— it is on a different band than the run transmitter **and** the station worked is a new multiplier. The run and multiplier transmitters are governed by independent 10-minute rules. Ten-minute periods begin with the first QSO on a band. The log must indicate which transmitter (run or multiplier) made each QSO. The multiplier transmitter may not call CQ (solicit contacts).

2. Two Transmitters (MULTI-TWO): A maximum of two transmitted signals on two different bands may be used at any time. The log must indicate which transmitter made each QSO. Each transmitter may make a maximum of 8 band changes in any clock hour (00 through 59 minutes).

3. Multi-Transmitter (MULTI-UNLIMITED): The six contest bands may be activated simultaneously. Only one transmitted signal per band is permitted at any time.

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

VI. AWARDS:

A single-band log will be eligible for a single-band award only. A log containing more than one band will be judged as an all-

band entry unless specified as a single-band entry. A Single Operator station must operate a minimum of 4 hours to be eligible for an award. Multi-operator stations must operate a minimum of 8 hours to be eligible for an award.

A. Certificates: First-place certificates will be awarded in each category for every participating country and in each call area of the United States, Canada, Russia, and Japan.

B. Plaques: Plaques and trophies are awarded for top performance in a number of categories. View the current list of plaques and sponsors at <www.cqww.com/plaques.htm>. Only one plaque will be awarded per entry. A station winning a plaque will not be considered for a sub-area award; the plaque will be awarded to the runner-up in that area.

VII. CLUB COMPETITION:

The club score is the total aggregate score from logs submitted by members. There are two separate club competition categories.

A. USA Clubs: Participation is limited to club members living and operating within a 175 mile radius circle from the center of club area (except for DXpeditions to other countries conducted by members who live within the club circle).

B. DX Clubs: Participation is limited to club members living and operating within the DXCC country where the club is located OR within a 275 km radius circle from the center of club area (except for DXpeditions to other countries conducted by members who live within the club area).

C. General club rules:

1. National organizations (e.g., JARL, REF or DARC) are not eligible for the club competition.

2. Single-operator entries may 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. The log entry must spell out the full club name (and club allocations if multi-op).

3. A minimum of four logs must be received for a club to be listed in the results. Checklog entries are not counted for the club score.

VIII. DEFINITIONS OF TERMS:

1. Station location: The area in which all the 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.

2. QSO alerting assistance: The use of any technology or other source that provides call sign or multiplier identification along with frequency information to the operator. It includes, but is not limited to, use of DX cluster, packet, local or remote call sign and frequency decoding technology (e.g., CW Skimmer or Reverse Beacon Network), or operating arrangements involving other individuals.

IX. GENERAL RULES FOR ALL ENTRANTS:

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

2. A different call sign must be used for each entry. Only the entrant's call sign may be used to aid the entrant's score.

3. Do not exceed the total output power limitation of the chosen entry category on any band. Total output power on any band at any time is measured at the output of the active amplifier(s).

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

5. 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.

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

7. 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.

8. 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.

9. 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.

10. 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.

1. 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.

2. 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.

3. The CABRILLO file format is the standard for logs. See <www.cqww.com/cabrillo.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).

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

5. 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.

6. Instructions for paper logs: Paper logs may be mailed to CQ WW DX Contest, P.O. Box 481, New Carlisle, OH 45344, 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:

1. All entries must be sent WITHIN FIVE (5) DAYS after the end of the contest: no later than 2359 UTC November 1, 2013 for SSB and 2359 UTC November 29, 2013 for CW. Resubmitting an entry after the deadline will result in it being considered as a late log.

2. An extension may be requested by e-mail to **questions@cqww.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.

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

XII. JUDGING:

The CQ WW DX 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

(e.g., splatter, clicks) 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 and receive a penalty of two times the QSO point value for that contact.

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 WW DX Contest log, and in consideration of the efforts of the CQ WW DX 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 WW DX Contest rules may be submitted by e-mail to **questions@cqww.com.** Answers for many frequently asked questions can be found at <www.cqww.com/rules_faq.htm>.

Make the most of your solar panel in the field! Here's how to use the portable solar-panel tracking stand that was built in part one to get maximum power from the sun.

Follow the Sun with Your Solar Panel—Part II

BY MIKE PULLEY,* WB4ZKA

Solar panels are great for providing power and charging batteries for hams in the field, but keeping them pointed directly at the sun greatly increases their efficiency. In part one of this article, we covered the design and construction of a tracking stand that can be easily adjusted to follow the sun (photo I). In this conclusion, we'll discuss how to set it up in the field, along with tips on usage, maintenance, and more.

For field assembly, when you arrive at a station and are ready to start generating power, follow these steps to assemble, orient, and operate your tracking solar-panel mount:

1. Based on the season, select the lower and upper leg pipes. Pull out the lower hub/axle assembly and the upper hub from the storage bag. Position the panel (already mounted on its spindle assembly) within your reach.
2. Press-fit the lower legs to the lower hub and the upper legs to the upper hub. Do not (yet) attach the upper hub to the axle.
3. Place the lower legs lying flat on the ground and stand on them so the axle sticks up in the air (photo J).
4. Orient the panel so the index tube and inclination gauges are at the bottom.
5. Slide the spindle over the axle while standing on the lower legs so the assembly doesn't topple over.
6. Support the panel, step off the lower legs, and lean the assembly toward yourself. Support the lower hub with your foot. Press-fit the upper hub to the axle. Rotate the hub to align the upper and lower legs (photo K).
7. Settle the assembly firmly on its legs.
8. Prevent the panel from pin-wheeling by locking it in place with the index pin (photo L).
9. Connect your power cable from the panel to your charge controller. (More on this cable later.)

Positioning

Place the panel and stand where it will receive the maximum clear exposure to sunlight. Any shadows on the panel severely decrease power generation. For instance, my panel in unshaded noonday sun (photo M) produces about 36 watts to a resistive load of radios, lights, and fan motors (photo N). When I shade about 10% of the panel with a sheet of paper (photo O), the panel output power drops about 74% to 9 watts (photo P). The effects of shadowing are not linear. A little shadow saps a lot of power. Therefore, even shadows from tall grass or overhead wires must be avoided if at all possible.

Orient the lower end of the frame toward the equator. (In the Northern Hemisphere, towards the south. In the Southern Hemisphere, towards the north.) Use a compass. Magnetic north/south orientation is good enough. (A frame built for the mid-latitudes may

Photo I– The solar tracking stand set up in its summer configuration to capture the most sunlight.

**2708 N Pennington Drive, Chandler, AZ 85224*
e-mail: <Mike.J.Pulley@cox.net>

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Whether you're relaxing in the mountains or beach or at your antenna restricted neighborhood, MFJ's BigEAR™ portable HF dipole puts out a strong full-size dipole signal!

Full Size Performance

BigEAR's™ whopping 34-feet stainless steel radiator -- *twice the length* of other portables -- gives you *full-size dipole* performance on 20-6 Meters. An *ultra low loss*, high-Q adjustable *air-wound* loading coil gives you highly efficient loaded dipole performance on 30/40 Meters.

Full-size and ultra low loss loading coil is a winning combination that stands head and shoulders above shorter backpack antennas. All your power is radiated, not wasted in loading coils.

Rotatable Dipole Directivity

BigEAR's™ dipole pattern lets you aim a strong main lobe toward your QSO or null out QRM by simply rotating your tripod or mount.

True General Coverage

You can tune it up with exceptionally low SWR on any frequency between 7.0 and 55 MHz. Handles QRP to a full killowatt PEP.

Element Tips High In-the-Air

Distinctive V-shaped elements are set 45 degrees from the horizon to keep element tips high in the air. This maximizes radiation, minimizes ground loss and prevents hazardous contact.

Built-in Guanella Current Balun

Current Balun gives you consistent high-performance. Kills feedline radiation, pattern distortion, SWR shifts, RFI, noise pickup.

True Backpack Portability

Antenna is over 34 feet long fully extended, but disassembles and collapses to 27 inches in seconds. Fits most backpacks or suitcases! Just 2 pounds -- you'll hardly know you are packing it!

Goes Up Fast

Fewer parts to assemble. Much faster tune-up procedure. Heavy-duty aluminum center block instantly mounts on any mast/tripod up to 7/8 inches with MFJ's heavy-duty *NoTool*™ mast lock. SO-239. For confined spaces, shorten whips and use loading coil to resonate.

BigStick™ 18-foot Portable Vertical

For the Ham on-the-go!

Carry a BigStick™ for strongest, loudest portable signal on the band!

MFJ-2286
$99.95

MFJ's extra long 17 foot stainless-steel telescoping whip gives you *full-size antenna* for full size performance 20 to 6 Meters but collapses to just 28 inches.

An ultra low loss, high-Q adjustable *air-wound* loading coil gives you highly efficient operation on 30/40 Meters.

This extra long radiator and ultra low loss loading coil is a winning combination that stands head and shoulders above shorter backpack antennas.

Antenna is 18 ft. fully extended. Disassembles and collapses to 28" in seconds. Fits most packs or suitcases! Just 2 pounds, you'll hardly know you are packing it!

Tapped loading coil covers 7-55 MHz without gaps. Great for Ham Bands and outstanding for image-free shortwave broadcast!

Everything included for instant operation. Easily mounts to any mast up to 1/2 inch. SO-239 for coax. 3/8-24 antenna connector.

Counterpoise kit included. Ensures low SWR, high efficiency.

All aluminum, stainless steel construction ensures years of excellent performance. *One Killowatt rated.*

18 foot Telescopic Fiberglass Mast with Tripod

MFJ-1919EX, $139.95.

***Put your antennas anywhere and get them up high with this super-strong* 18 foot telescoping fiberglass mast and heavy-duty steel MFJ-1919 tripod.**

QuickClamps™ easily collapses mast to 5 feet. Mast has thick 1/8 inch wall, .75 inch diameter top, 1.5 inch bottom. 15 lbs.

All tripods are black heavy-duty steel with braced triangle base, non-skid feet and mast lock.

MFJ-1918EX, $89.95. MFJ-1918 *tripod with super strong 9.5 foot telescoping fiberglass mast.* Collapses to 3.8 feet. *QuickClamps*™. Mast has thick 1/8" wall, 3/4 inch top, 1 inch bottom. Weighs 6.5 lbs.

Tripods Only

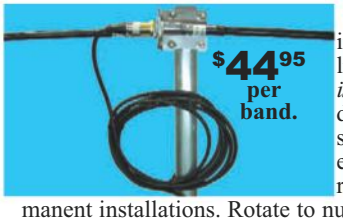
MFJ-1919, $89.95, *Large tripod.* Supports 100 lb. antenna. Built-in 1.4 inch diameter mast extends 7.8 feet. Collapses to 4.5Hx.5D feet. Triangle base spreads to 4.8 feet on a side. Weighs 9.75 lbs.

MFJ-1918, $49.95, *Smaller tripod.* Supports 66 lbs. 1 inch diameter mast extends 6 foot. Collapses to 3.2Hx.3D feet. Triangle base spreads to 2.75 feet. Weighs 6.75 lbs.

17 foot *Stainless Steel* Telescoping Whip

MFJ-1979, $59.95. Super-strong, super long *17 foot stainless steel* telescoping whip. 27 in. collapsed. 10 sections. 3/8-24 threaded base.
MFJ-1977, $44.95/12ft;**MFJ-1796, $39.95**/10ft
MFJ-1974, $34.95/8ft;**MFJ-1972,** $14.95/4 1/2ft

Single-band Rotatable *mini*-Dipoles



Use these inexpensive, lightweight, *isolated* mini-dipoles when space is limited for temporary or permanent installations. Rotate to null QRM/noise and to focus your signal. Coax choke balun, mast not included. For 40/30/20/17/15/12/10/6 Meters. Order **MFJ-22XX** (insert band in "XX") **$44.95**. 75/60 Meters, $49.95 each. Total length 14 feet. For mounting masts up to 1.25" OD.

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Photo J– The stand ready for the solar panel spindle to slip over the top. Stand on the lower legs to prevent the panel from toppling over onto the ground.

Photo K– Panel mounted on the stand and the upper hub attached. The assembly is ready to stand up on its legs.

Photo L– The index pin installed to lock the panel in position. Remove this pin to rotate the panel.

Photo M– Unshaded PV panel generating maximum power.

Photo N– Power output for author's unshaded panel is about 36 watts.

Photo O– A folded sheet of paper shadows about 10% of the panel.

Photo P– The power drops by 74% to about 9 watts when the panel is shadowed 10%. A little shadowing has a big effect on PV panel output.

not have an upper and lower end of the frame, based on the season. In that case, just orient the axis north and south.)

Operation and Maintenance

The ham in the field needs portability, efficiency, and reliable simplicity, so this design uses an "Armstrong" rotor to turn the panel. The pipes extending from the lower east and west corners of the panel serve two purposes: protecting the panel corners from accidentally striking the ground and showing the sun's inclination to the panel. The inclination gauges have two marks: 15º and 30º. The index tube at the bottom of the panel provides five positions for the index pin to hold the panel: –60º, –30º, 0º (horizontal), +30º, and +60º.

Begin the day with the panel rotated east to the first position. When the panel's shadow touches the 15º mark on the east inclination gauge (photo Q), advance the panel to the second position. The panel's shadow will touch the 15º mark on the west inclination gauge. Continue to advance the panel this way every few hours all day. If you find the east inclination gauge showing 30º, advance the panel one position as normal, but then you'll need to advance it again in about half the normal time.

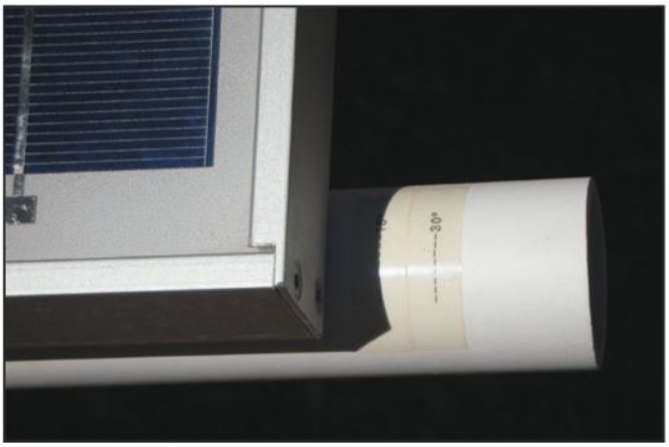

Photo Q– Markings for sun angles of 15 and 30 degrees allow the user to determine when it is time to move the solar panel to its next position.

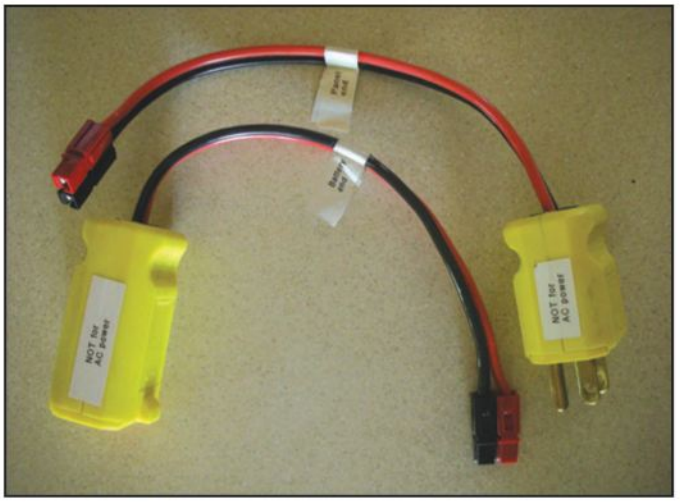

Photo S– Adapters to use a standard utility power cord to conduct the DC power from your PV panel to your charge controller.

Photo R– The author uses a standard outdoor extension cord as a power cable, along with adapters at each end to convert the AC plug and socket to DC PowerPole® connectors. See text for important details.

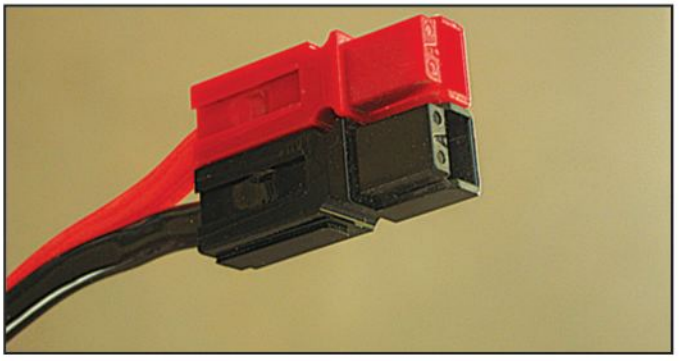

Photo T– Standard convention for PowerPole® connectors. "Tongue top, red right."

The panel has very little wiggle room in the –60º, –30º, +30º, and +60º positions; the weight of the panel snugly holds the index pin. However, in the 0º (horizontal) position, the panel does have a little play. Use that feature to your advantage to fine-tune the panel aiming during the peak charging time of day. Use the inclination gauges to guide your adjustments.

Wipe off dust, bird droppings, or tree sap as soon as possible, as these cast power-stealing shadows on the panel. Usually a damp cloth is enough. However, when the panel is cooking along in full summer sunlight, I don't recommend putting a cold, wet cloth on it. Let the panel cool to avoid thermal shock and possibly cracking the glass when cleaning it.

Disassembly

Reverse the assembly process. Tip: It's easy to forget to remove the index pin before trying to remove the panel from the axle, so begin by unplugging the power cable and then unplugging the index pin.

Again, it's easy for the panel to fall face-first onto the ground during disassembly. Ouch! Thus, stand on the lower legs while removing the panel from the axle just as you stood on them while setting up the stand. Take your time and pay attention to avoid damaging the panel. After disassembly, stow the PVC parts in the carry bag.

Storage

The face of your solar panel will be either glass or bare semiconductor silicon. Treat it like an expensive window. Don't let sharp objects press against the front or back of the panel. I store my panel either face down, flat against the cushions in my travel trailer, or standing on edge leaning against something sturdy. You don't want a gust of wind to topple your panel when it's not on the PVC mount. The same goes for carrying it in your vehicle. Don't let the panel flop or tumble.

Power Cable

Here's the principle: Camp in the shade; charge in the sun. You need to get the PV energy from the sunny spot over to your shaded camping or operating site.

You need a two-conductor cable to connect your panel to your charge controller and battery. Clearly, the cable needs

to be able to handle the current produced by your panel. Beyond that, the cable needs to be the largest current-carrying capacity you can manage. Large wires minimize the voltage drop in the cables. Remember, Mr. Ohm taught us that voltage drop in the cable equals the resistance of the wire multiplied by the current through the wire, E = IR. The longer your cable, the more R in that equation, and therefore the more voltage lost in the wires. Note: the resistance is the *round-trip* resistance of the "+" and "–" leads combined, so the larger the wire diameter, the lower the IR voltage drop, and the more voltage is available to the load.

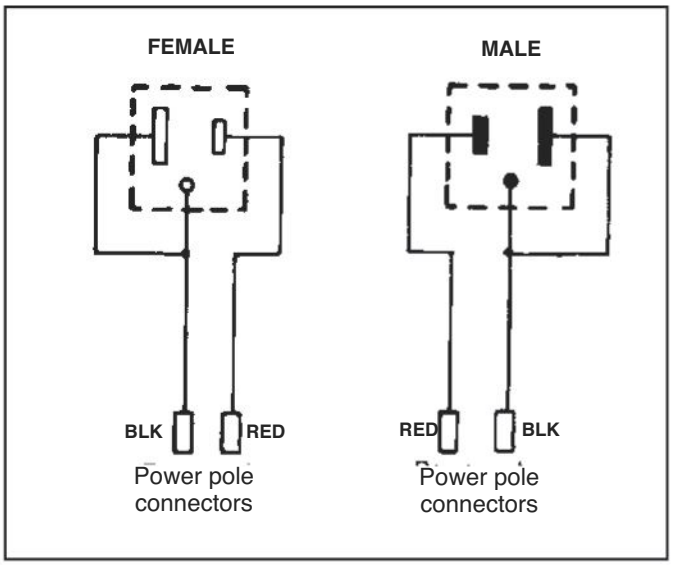

Fig. 1– Simple schematic for building adapters to use standard outdoor power cables with the solar-panel power system. This converts the AC plug and socket on the cable to DC PowerPoles® used with the solar panels.

Two-conductor cables—especially the heavy-gauge stuff—can be frightfully expensive! I've found a solution. I use a cable that I already have that is commonly available in useful lengths and that I can use for other purposes when I'm not using the solar panel. It's the utility power extension cord (see photo R).

If you use a common extension cord such as a 25- or 50-foot variety used in home-maintenance or building projects, you'll need an adapter from the three-prong configuration to the two-conductor PowerPole® connectors that I recommend for your panel. You can find one each male and female three-prong plug and receptacle at your local hardware or home-improvement store. A short length of two-conductor #14 or heavier wire and 30- or 45-amp PowerPole® connectors are all it takes (photo S). See the schematic (fig. 1) for a recommended wiring diagram. Note that the "neutral" and "safety ground" contacts are tied together. That feature parallels the white and green wires of your cable, reducing your voltage drop by 25% compared to using just two of the wires.

Follow the standard convention for the PowerPole®s, as shown in photo T.

Of course, using a utility power cable for low-voltage DC brings its own hazards—namely, someone accidentally plugging the male end of your cable into a 120-VAC receptacle while you have a DC component connected to the other end. Ka-BLOO-ey! (*Legal disclaimer: We are not responsible for your carelessness. Pay attention.—ed.*) I moderate this hazard by always connecting the female end of the utility cable to the solar panel. That way, if someone accidentally plugs

the extension cord into an AC outlet, all I've lost is the panel, not the charge controller, batteries, and any electronics connected to the DC bus. Furthermore, I always connect the male end of the cable to my charge controller *first*, removing any temptations for well-meaning helpers to plug it into a handy AC outlet.

There is also the possibility that an AC appliance accidentally plugged into the female end of the power cord could be damaged by any DC produced by the charge controller, but I think the likelihood is small.

Charge Controller

The difference between a solar battery charger and a solar battery cooker is a *charge controller*. Nominal 12-volt PV panels can produce roughly 20 volts in full sun to a light load. Even if your battery can withstand that much voltage for a limited time, can your electronics? A charge controller prevents you from finding out the hard way.

First, the charge controller has to be sized for the voltage and current of the panel(s). In portable field uses, 12-volt batteries and therefore 12-volt PV panels and charge controllers are most common. If your panel can produce 4 amps, for example, your charge controller must be rated for at least 4 amps.

A discussion of all the charge controller types is beyond the scope of this article. I use a pulsewidth modulated type. When it senses the battery voltage is low, it allows lots of power from the PV panel into the battery. As the battery starts approaching full-charge, the controller tapers the charging voltage to avoid overcharging the battery.

The model I use detects nighttime and automatically disconnects the panel to avoid current leakage that could drain the batteries back through the panel. The next morning when the PV panel starts generating again, the controller returns to duty, protecting the batteries and the electronics connected to them.

Since I've been asked before, I should mention that the charge controller goes closest to the battery. That way, any voltage drop associated with the wires delivering power from the PV panels happens before the controller. You don't want the controller regulating to 13.2 volts, for example, and then having the cables lose another half volt before reaching the battery. Nope, take the IR loss between the panel and the charge controller.

Finally, in my application, I installed PowerPole® connectors on the input and output of my charge controller. I color coded them and labeled them clearly. That way, I can insert a Watt's Up® meter[1] inline to monitor or diagnose any issues.

Beyond the Basics

Now you have a solar panel recharging your battery during daylight hours. If you've designed your system well, you can completely recharge all your batteries in one day so you can operate your goodies indefinitely. Fine. Now let's look at some more subtle points of using a solar battery-charging system.

First, let me show you an opportunity to get free power from your system. Yes, I know your panel costs money and so do your charge controller and battery. I get that. However, there is a way to get extra power from your system. Let's start with an example:

Suppose you have a cell phone, a ham handheld, and some FRS (Family Radio Service) radios that also need charging. One approach is to plug in their chargers while charging your main battery. That's fine, except that by drawing down the power available to charge your main battery, it takes longer to fully charge all of them.

Here's an alternative: Wait until the main battery is almost fully charged. Remember that the charge controller tapers the voltage to prevent overcharging? Well, when that happens, your solar panel has surplus current available that is going to waste. If you plug in your cell phone, handheld, and FRS radios during that period, you can use that surplus current without retarding your main battery charging. It's "free" power.

The worst case is to charge your main battery and then plug in your other accessories to recharge at night. Every time energy goes into a battery or comes out of a battery, you lose efficiency. Every conversion costs you watts. Therefore, for every watt going *into* your main battery, somewhere around 0.9 watts will be available *from* the battery. Then when you draw that power out of the battery to run a charger (another loss) for an accessory battery (another loss), you've used the most expensive power available. Instead, charge your accessories from the "free" power from your PV panel during the afternoon and skip some of that energy-conversion loss.

Another subtlety is how to increase the power-generating capacity of your PV system. As I mentioned before, I rec-

ommend against getting a mondo-sized panel. Instead, get two or more smaller, more-manageable panels and connect them together. Most commercially available panels come with two pigtail leads coming from the utility box on back of the panel. I recommend replacing both of them with red-black zip cord and PowerPole® connectors. Wire the new pigtails in parallel. Then you can have a string of panels out in the sunlight connected to one another with red-black zip cord, nose-to-tail like pachyderms on parade, and one wire leading back to the charge controller and battery. That wires all the panels in parallel, adding their currents together. If one panel becomes shaded, it doesn't contribute current, but neither does it consume any[2] and the remaining panels can keep on pumping out power to your battery. In order to work efficiently, the panels should have the same output voltage rating so one panel doesn't do the lion's share of the work while the other one(s) loaf off.

Of course, if you upgrade your panel capacity, you also may need to upgrade your charge controller and your utility power cord to match. Also, before plunking down money on another panel, do a little back-of-the-envelope calculation to verify that the total PV current capacity doesn't exceed 20% of the battery's total charge capacity. Don't cook your battery.

One final tip: If you have a PV panel and tracking stand, you have a natural pool of shade behind your panel. That's a good spot to hang a wireless outdoor temperature sensor. Direct sunlight drives those sensors to register a much higher temperature than they should, so the manufacturers recommend mounting in a shady spot. (See photo F from part one of this article.)

Mine is zip-tied to the spindle on back of the PV panel. Even back there, it is affected by heat radiated from the back of the panel. I take advantage of that fact, though. In the morning, I can tell when the sun first reaches the panel just by watching the outdoor temperature reading. The battery-charging voltage usually doesn't respond as quickly, since the sun is weakest first thing in the morning when the battery charge is at its hungriest. However, the temperature jumps a few degrees when the sun first strikes the PV panel. Likewise, it drops a few degrees in the evening when the shadows overtake the panel. Nonetheless, the temperature sensor gives me a good idea of how to dress before stepping out of the travel trailer.

Solar-panel efficiency has really climbed in recent years, and the dollar cost per watt has dropped from about $5 to about $1 to $2. Therefore, solar battery charging is a much better deal than it was just five years ago. Even so, this portable tracking stand helps you squeeze every watt out of your panel(s) while holding your panel safely and securely off the ground and protecting it from wind gusts.

Summary

So there you have it … not only a way to use the sun to power your equipment in the field, but a mounting system designed to maximize your power output and some tricks to get even more out of your solar panel. This setup can be used for portable operation of any sort, from radio camping trips to emergency or disaster deployments.

Notes

1. Watt's Up meters, made by <www.rc-electronics-usa.com>. Available from <www.powerwerx.com>.

2. Virtually all commercially available PV panels include a blocking diode in the electrical box on back of the panel. The diode prevents current from flowing backwards through a shaded panel and sucking down current.

BY IRWIN MATH,* WA2NDM

Build Your Own HF SWR Meter

In November of 2012 and January of this year you may recall that we urged you to "get your feet wet" by building something. Hopefully you actually did, because this month we are going to present still another simple, but useful project. This time the device is a very easy to construct SWR meter that can be used to determine the match (or mismatch, for that matter) to your antenna. This meter is a variation of a design that has been around since the early 1950s and is based on a unit described in the *Radio Handbook* of 1970. Until the popularity of automatic antenna tuners in today's "modern" rigs, an SWR meter was considered one of the most important accessories in the shack, especially when the output of a transmitter had to be manually "tuned" to the antenna.

Fig. 1 is the schematic of the SWR meter, which is, as were the other projects, fairly simple to fabricate. It consists of a pickup sensor, a couple of capacitors, diodes, connectors, a switch, a meter, and a resistor. The hardest job in this entire project is the construction of the pickup sensor, which, as you shortly will see, really is not that difficult. Table I is a list of the parts you will need. If you were to buy everything new, all of this would probably cost you about $25 or so. If you shop around and "scrounge" sources such as e-Bay, a friendly ham, etc., you probably can build it for half that amount or even less.

Fig. 2 is a pictorial drawing of the complete SWR meter for reference. Start construction by drilling the aluminum box so you can mount the two SO-239 connectors, one near each end, $4\frac{3}{4}$ inches apart and roughly 1 inch down from the top of the box. If you do not have a drill of the proper size, you can always drill a series of holes in a circle (with a hand drill) and then remove the center piece and file the resulting hole. Try to keep the two finished connector holes directly in line and at the proper distance. While you are drilling, you also can make the holes for the meter, pot, various mounting hardware, as well as the switch. The location for these are not critical but should be located roughly as shown.

Now mount the two SO-239 connectors (with 4-40 screws, nuts, and solder lugs as shown) and carefully measure the final distance between the center pins of the two connectors. Fig. 3 is a drawing of the pickup sensor in detail. To build it first cut a length of the copper tube so that each end just reaches the two center-connector pins and remove any remaining burrs at the ends of the tubing. Using a small file (or a $\frac{1}{8}$-inch diameter drill), make an opening at the exact center of the copper

*c/o CQ magazine

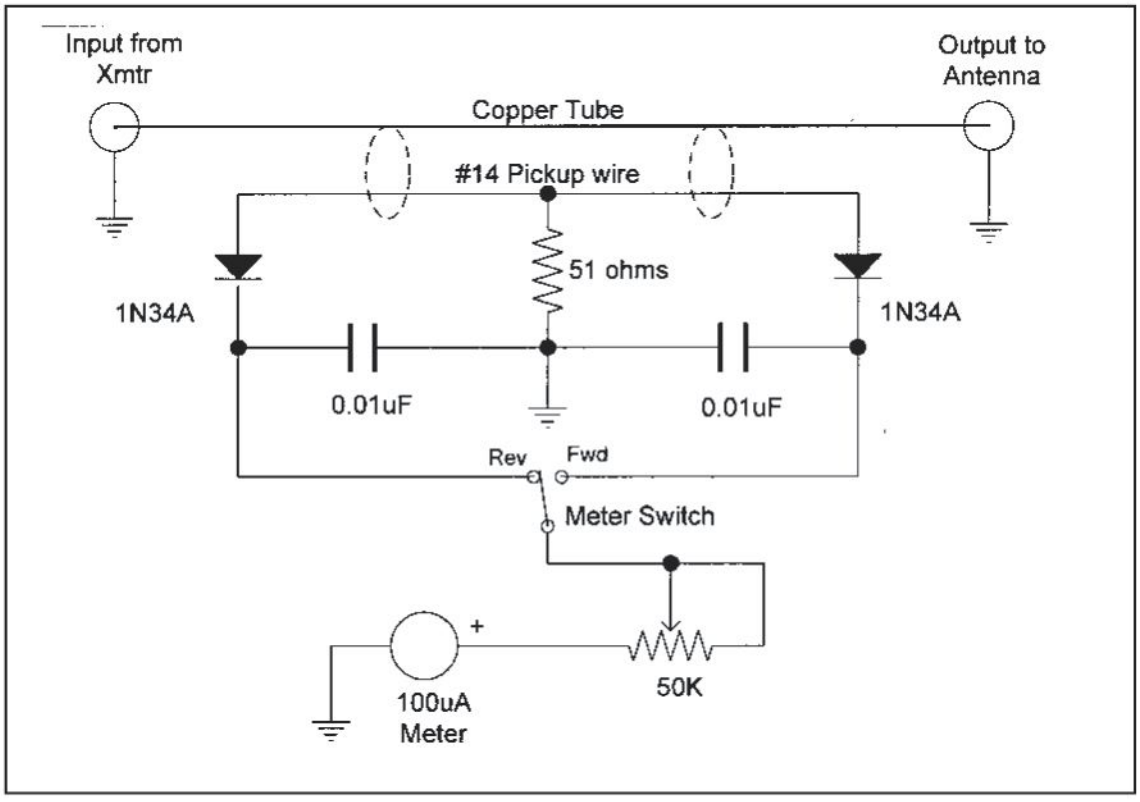

Fig. 1– Schematic of SWR meter.

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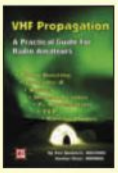

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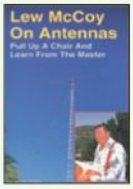

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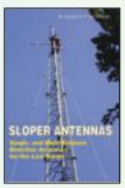

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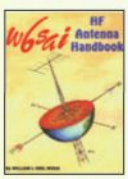

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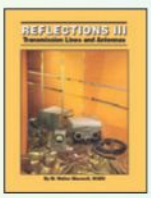

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tube. This opening should be somewhere around 1/8 inch in diameter but does not have to be perfectly round. Cut a 6-inch length of one of the conductors from a length of common #14 Romex house wire (black or white; it does not matter) and carefully strip a 1/8-inch wide section at the center of the wire. You may have to use an X-ACTO® type knife for this. Tin the center section of the wire with a decent amount of solder.

Now thread the Romex wire through the copper tubing until you see the stripped center portion through the central hole of the tubing. Carefully solder one lead of a 51-ohm resistor (or one lead of two 100-ohm resistors in parallel) to the stripped portion of the wire. A small soldering-iron tip will help. Make sure that the resistor lead is properly soldered and does not come in contact with the copper tube. Finally, carefully solder the edge of the copper tube to the two connector pins and fill the resistor hole and the open ends of the copper tube with a dab of hot glue to prevent shorting and further movement. Strip the wire ends to about 1/8 inch as shown for the diode connections. Now using an ohmmeter make sure that the center lead and resistor are insulated from the copper tubing. As previously mentioned, fig. 2 shows what all of this should look like when you are finished.

Parts List

2	1N34 germanium diodes (Mouser Electronics 526-1N34A)
1	SPDT switch (Mouser 612-100-A1421)
1	51-ohm 1/2-watt carbon resistor (Mouser 293-51-RC)
1	50K linear taper potentiometer (Mouser 31CN405-F))
1	Knob for potentiometer (Radio Shack 270RN-120L)
2	0.01-µF disk ceramic capacitors (Mouser 140-100Z5-103Z-RC)
1	DC micro-ammeter (0-100 uA) (e-Bay for approximately $7.50) or All Electronics PMD-100UA for $12.00
1	Metal project box (Radio Shack 270-238)
2	SO-239 coaxial connectors (Mouser 523-83-1R)).
6 inches	1/4-inch diameter flexible refrigerator ice-maker copper tubing. (Probably you can get a free sample at a local home-goods store.)
6 inches	one conductor from a price of 14-gauge Romex wire (white or black, not the bare copper). (Try to get a free sample at a local home-goods store.)

Note that by careful shopping the cost for these components (or equivalents) can be reduced significantly.

Table I– Suggested parts list for the SWR meter.

Finally, complete the wiring of the rest of the meter as shown in the pictorial diagram and schematic.

To test the final SWR meter you will need a 50-ohm non-inductive resistor with enough power to allow your trans-

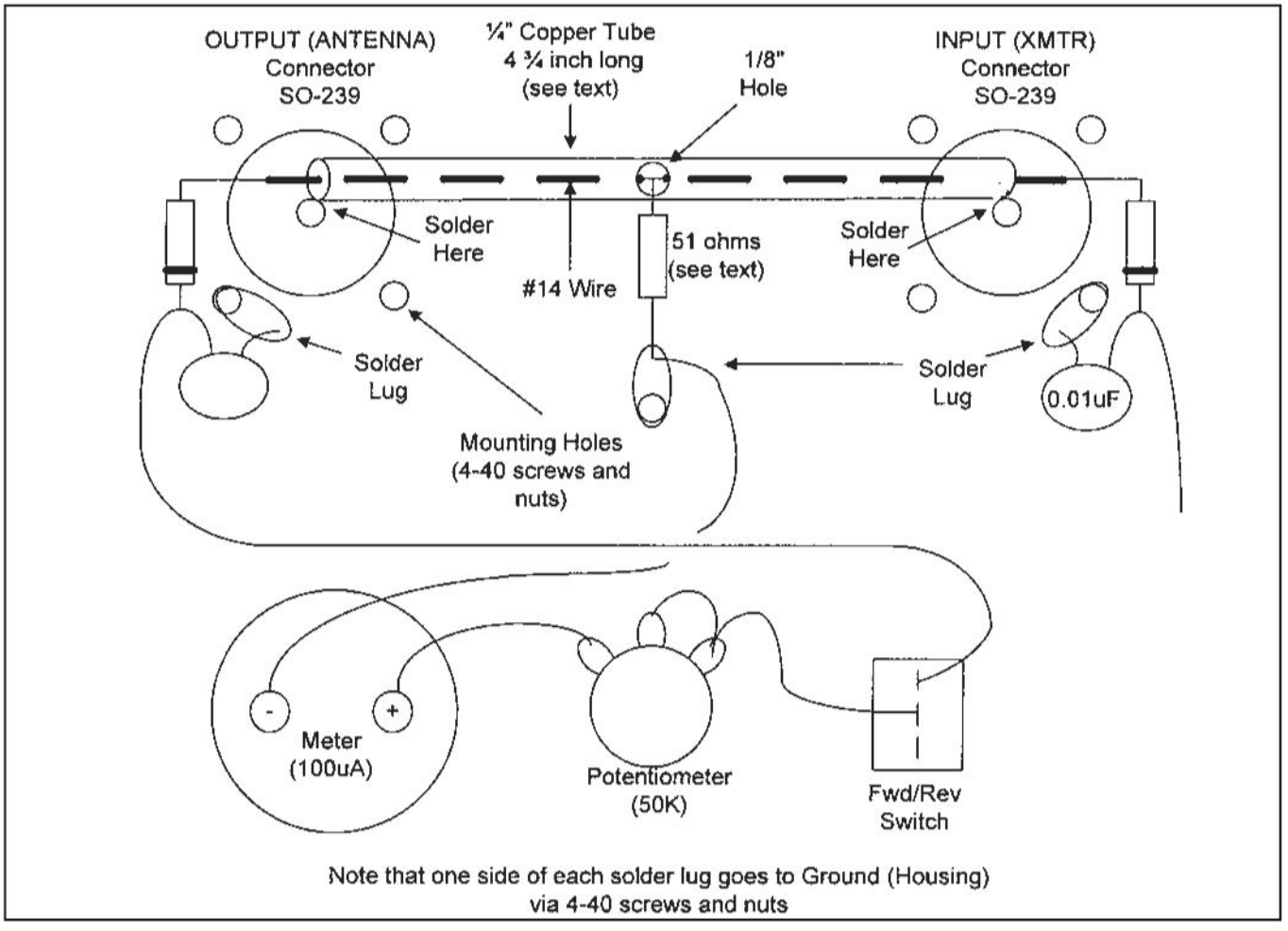

Fig. 2– Detail of SWR meter and pickup sensor.

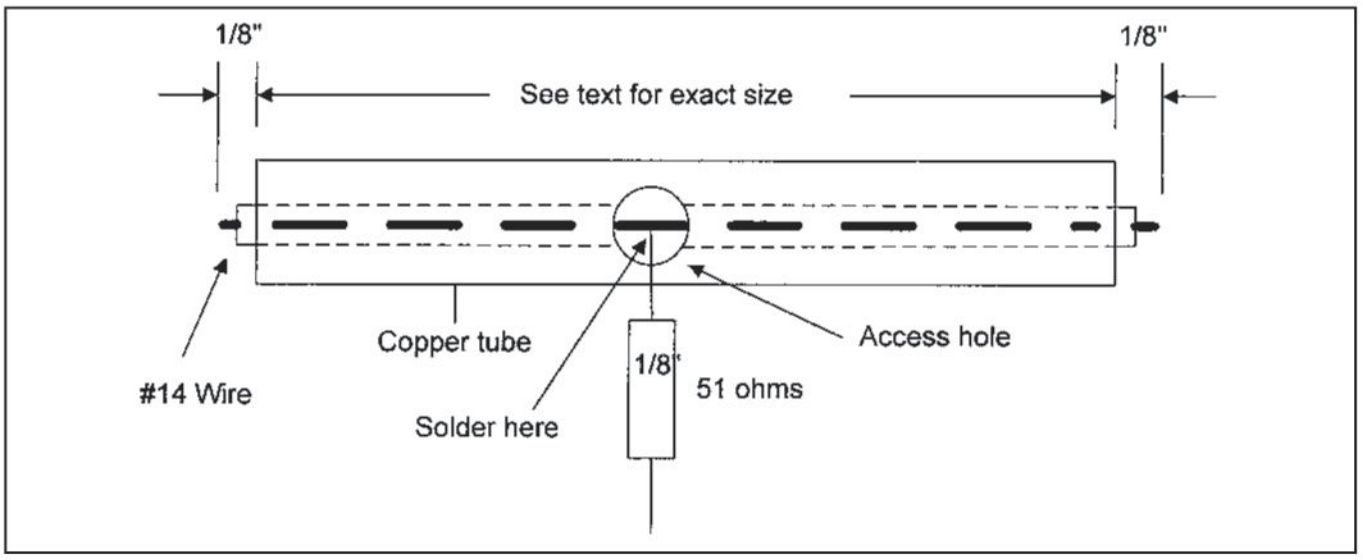

Fig. 3– Further detail of pickup sensor.

Meter	SWR	Meter	SWR
0	1.0	50	3.0
5	1.1	75	7.0
13	1.3	80	9.0
20	1.5	100	Infinite
30	1.9		

Table II– Approximate SWR versus meter reading on a 0–100 scale.

mitter to drive it at the lowest power setting. If you do not have a suitable dummy load, six 300-ohm, 1-watt carbon resistors connected in parallel (Mouser 294-300-RC) will dissipate as much as 15 watts for a few seconds or 6 watts continuously and should suffice. Turn the potentiometer to its highest resistance setting and connect the output of your transmitter to the input of the SWR meter. Connect the output of the SWR meter to the 50-ohm load and the switch on the SWR meter to the "Fwd" position. Set your transmitter to the CW mode and adjust the transmitter for minimum power output (be sure it is within the wattage rating of the dummy load). If your transmitter has a low-power "tune up" setting, use this. Now momentarily key the transmitter and quickly adjust the potentiometer for a full-scale reading.

Next turn the switch on the SWR meter to the "Rev" position. The reading should drop to near zero. Just how close to zero the meter can go is a function of how closely the 1N34A diodes are matched and how careful you were in construction to keep everything symmetrical. To wherever the meter does go, however, this is the 1:1 SWR point and your desired final goal.

When all is working properly, replace the dummy load with your actual antenna. Still using low power, again readjust the potentiometer for full-scale deflection in the "Fwd" position. Switch to the "Rev" position and note the new meter reading. This is the approximate SWR of your antenna. Table II is a listing of the approximate SWR for a meter that reaches zero in the "Rev" position with a 50-ohm load and has a 0 to 100 scale. For best results you should always try to adjust your transmitter, antenna, or feed line for the lowest possible SWR reading you can achieve.

When this SWR meter is connected to a transmitter with an automatic antenna matching network, you will get a good idea of how well the tuner works. After you are satisfied with your match, slowly increase the power to the level at which you want to operate. Be sure to continuously readjust the potentiometer as you do this so that the reading in the "Fwd" position always stays at 100. Finally, *do not exceed 100 watts with this meter.*

Keep in mind that this device is not intended as a precision SWR meter, but merely as an aid to allow you to have a general ideal of your match (or mismatch, for that matter). The main goal, as I have mentioned, is to have the "Rev" reading as low as possible with respect to the "Fwd" reading. Also note that this meter frequency is sensitive and will have to be readjusted every time you make a major change in frequency.

As before in this column, I hope this sort of project will serve as an impetus for you to build something. This one is not particularly difficult and will prove to be a useful addition to your shack.

73, Irwin, WA2NDM

public service

BY RICHARD FISHER,* KI6SN

Wilderness Protocol 2.0: Drilling Even Deeper on a New EmComm Concept

Since April, *CQ*'s "Public Service" has been hosting a sort of national forum on the radio amateur's backwoods emergency communications plan known as the Wilderness Protocol.

Mike Pulley, WB4ZKA, of Chandler, Arizona, had suggested a sweeping simplification of the present VHF-UHF calling plan and a retool to include the increasingly-popular Family Radio Service (FRS). *(**SEE:** "Time for a Change? 'Wilderness Protocol 2.0,'" April 2013* CQ*, page 43.—KI6SN)*

The fact that Mike and *CQ* continue to receive feedback on his Wilderness Protocol 2.0 is an indication that lots of outdoors-oriented operators agree that the current initiative isn't working and that, indeed, 2.0 may be preferable.

The Wilderness Protocol was developed long ago to allow backcountry radio amateurs in distress to get help when they're outside of repeater range—and in more recent years, outside of cell service.

The long-held protocol identifies five VHF/UHF simplex frequencies—50.525, 146.52, 223.5, 446.0 and 1294.5 MHz—to be monitored for distress calls every three hours at the top of the hour from 7 a.m. to 7 p.m. As we noted in "Public Service," we agree with Mike: *Much too complicated. Impossible to follow.*

In April, Mike's Wilderness Protocol 2.0 called for broadening the plan's base while narrowing its scope—and then promoting the heck out of it (photos A and B):

· Monitor 2-meter FM's 146.52 simplex frequency

· Monitor Family Radio Service (FRS) Channel 1 at 462.5625 MHz *(**IN DEPTH:** What is Family Radio Service? Visit <http://fcc.us/1229Q8f>.—KI6SN)*

In June's "Public Service," veteran outdoorsman Bruce Prior, N7RR, of Blaine, Washington, proposed that radio amateurs also take advantage of the LiTZ, or Long-Tone Zero feature on many 2-meter handheld radios:

"Press the Zero DTMF (Touch-Tone®) button while pushing the push-to-talk button at least three seconds before an emergency transmission. Yes, 146.52 (simplex) is a fine frequency to do that if a LiTZ-enabled repeater is not in range." *(**SEE:** "Voices from the Wilderness Add to the Clamor for a New Backcountry EmComm Protocol," June 2013* CQ*, page 62.—KI6SN)*

In response, Mike subsequently wrote that he'd considered incorporating LiTZ, but "dismissed it as an unnecessary complication. LiTZ requires the injured person to know the magic 'combination' to open my receiver. The only reason to mute my receiver with a LiTZ decoder is to eliminate annoying chatter on the frequency. In the wilderness, too much chatter from too many radios isn't the problem."

While roundly applauding N7RR's proactive stance and forward thinking, Mike said he could not "in good conscience recommend the cost, complexity, and weight of LiTZ decoders when the calling frequency is too quiet already ... If we eliminate the LiTZ decoder, just transmitting three seconds of DTMF '0' as a distress call seems no more attention-getting than "MAYDAY," "PAN," or simply "HELP!"

Mike underscored that he advocates "success through simplicity. So, while I appreciate that (N7RR) obviously thought carefully about this, I can't agree that LiTZ buys anything for the Wilderness Protocol 2.0."

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e-mail: <ki6sn@cq-amateur-radio.com>

Photo A– A yellow flier posted by WB4ZKA on the message board at Sitgreaves National Forest in Arizona <http://www.fs.usda.gov/asnf> advises fellow hikers and campers carrying Family Radio Service (FRS) or amateur radios to monitor for emergency communications. (Courtesy of WB4ZKA)

KJ6VU: Electronic Design for an Emergency Signaling System

On the other hand, George Zafiropoulos, KJ6VU, of San Jose, California, writes that "if there was some agreement on (implementing) a standard (emergency) signaling system—the LiTZ-DTMF

Photo B– Specific recommendations on the WB4ZKA EmComm flier include monitoring FRS Channel 1 (462.5625 MHz) and 2-meter FM simplex's 146.52 MHz for emergencies, "especially at 7 a.m., 10 a.m., 1 p.m., 4 p.m. and 7 p.m." (Courtesy of WB4ZKA)

sequence, for example—I would be interested in designing a board that could be used for the decoding the emergency signal. We could make this an open-source project and make boards available if people wanted them." *(**NOTE:** KJ6VU "does a lot of repeater control system design." Visit: <http://www.SierraRadio.net>.—KI6SN)*

While George agrees that "adding FRS and focusing on 146.52 makes a lot of sense," he has felt for a long time "it would be a great service if we could monitor an emergency calling frequency to help people in need. We have a 2-meter remote base on some of our repeater sites, so listening to 146.52 for emergency calls is easy to do. The problem, of course, is that we hear all the daily routine non-emergency traffic as well. So I would propose that we come up with some kind of selective calling standard that can be used to alert listeners to a high level repeater system." In addition to LiTZ, there are other "obvious ways to do this." For example:

- Pick a PL decode frequency
- Pick a DTMF decode sequence—*how about 911?*

"When the special alert decoder receives the signal, it can connect the remote base 2-meter radio to the repeater or send out an alert on the local repeater system telling users to tune into 146.52. There are many ways to do this but we need to pick a standard. In my opinion, using some kind of DTMF signaling is best. There may be better ideas out there, though.

"What I would suggest," KJ6VU continued, "is an add-on package for any repeater that wanted to include monitoring for the emergency signal. You can add a receiver to monitor 146.52 and simply add the interface/decoder board. When the signal is decoded, the board would key up the repeater and inject a beep alert so that people monitoring the repeater know that someone pulled the emergency trigger.

"You could have the board continue to send the beep—say, every 10 minutes—until someone enters another code to clear it. On systems with Internet access, the control board could send an email or text message to the users telling them that the trigger was pulled.

"I like this idea because you don't need to be monitoring the repeater when the emergency trigger is activated. In our case, with a network of linked UHF repeaters, we could even make the 146.52 MHz monitor receiver be a remote base that can transmit as well. So, when the emergency signal is decoded, the users are alerted. We could then turn on the 146.52 MHz receiver audio path into the UHF repeater and enable the 2-meter transmit path so we could have bidirectional communications to the person who pulled the emergency trigger on 2 meters."

George is "involved in a few *very large* linked repeater networks covering the southwestern U.S. – the Cactus Intertie <http://www.cactus-intertie.org>, Bay-Net <http://www.Bay-Net.org> and others—and groups like this would be a great place to start. Certainly we could beta test this feature here in the Bay Area."

KJ6VU is eager to get readers' feedback. Send comments to <ki6sn@cq-amateur-radio.com> and we'll be sure George gets them.

K7XH: Take the Lead on 2.0, and Consider GMRS

Mike Fischer, K7XH, from Renton, Washington, read WB4ZKA's recommendation for Wilderness Protocol 2.0 and thinks Mike is *spot on.*

"As one who goes in the back country regularly to hike, climb or hunt," writes K7XH, "all too often I find myself in places that have no cell or repeater coverage. I think we would be well served, as would the public, if—as hams—we led the way with this protocol.

"Case in point: I was snowshoeing on Snoqualmie Pass during a late-season snowstorm. There were three areas along our route where I did not have repeater or cell coverage. There was an avalanche that day. Fortunately, it occurred in an area close to a ski resort and emergency personnel quickly responded. *(**VIEW:** Current conditions around Snoqualmie Pass at <http://bit.ly/13cfpPS>.—KI6SN)*

"Luckily for my group, we were not in that area. While our trip was uneventful, one of the guys I was with is 62 and was having a hard time, which had me evaluating regularly what I would do if we had a problem. "The day's events probably have a lot to do with my responding to *CQ "*Public Service*"* invitation to readers to let it know what we think. "I would only add to Mike's thoughts that we should add a GMRS channel to the monitored frequencies. *(**IN DEPTH:** What is GMRS? Visit: <http://bit.ly/151AzSN>.—KI6SN)*

"Most GMRS units sold today have anywhere from 1- to 5-watts output, which can make a big difference in rough country. Just a thought." *(Note: GMRS is a licensed service, so any use by an unlicensed individual would need*

Photo C– Terry Bridges, WB6QNS; Graham Bowkett, K5GJB; and Bob Witters, AC6MH, assist in emergency communications during the Tres Lagunas fire in New Mexico. (Courtesy of KF5VHE)

Photo D– The San Miguel County Mobile Emergency Operations Center was put in position at Pecos High School during Tres Lagunas fire operations. (Courtesy of KF5VHE)

to truly be a life-and-death emergency.—ed.)

New Mexico EmComm Ops Assist Fire Officials

New Mexico radio amateurs provided emergency communications to assist local government officials in the wake of the Tres Lagunas wildfire, Photos C and D. The blaze, ignited by a downed power line, was in rugged terrain about 15 miles north of Pecos.

"The San Miguel, New Mexico, Amateur Radio Emergency Service (ARES) team activated May 31 in response to a request from the county's emergency manager to support communication for the San Miguel County EOC (Emergency Operations Center) in Pecos," according to Michael Scales, K5SCA, ARRL Section Emergency Coordinator for the New Mexico section. "The blaze, aided by high winds and dry conditions, covered more than 10,200 acres."

Ten members of San Miguel ARES® "provided communications support for five days at the county communications trailer at Pecos High School," he said. The team also "maintained a relay station in Las Vegas, New Mexico, and traveled with three volunteer fire departments in the county." Meanwhile, "Santa Fe ARES® remained on standby during the period, in case additional resources were needed."

ARES® operators provided communication support, as well, to the San Miguel County EOC in Pecos, the New Mexico State EOC operations in Pecos, the county evacuation shelter at Pecos High School "and three volunteer fire departments conducting patrols near the Tres Lagunas fire looking for spot fires and assisting people with respiratory problems."

Flooding in India Brings Amateurs to Forefront

*The Times of India r*eports that monsoon flooding in the northern India state of Uttarakhand has prompted officials in other flood-prone regions, Photo E, "to establish amateur radio facilities to provide emergency communication ... In the state of Tamil Nadu, recent rain damage led to a decision to install a ham radio station to link local government with officials further up the administrative hierarchy in Coimbatore and Pollachi. The amateur radio club in Pollachi," *The Times* reports, "has said it would establish the station ... to support emergency communication in disasters."

The flooding "has prompted us to approach the authorities with such a proposal," *The Times* quotes K. Ibrahim, VU3IRH, of the Pollachi Amateur Radio Club.

According to Kasi Viswanathan, VU2FFM, of Udumalpet, "in Uttarakhand, ham radio operators are playing a pivotal role in coordinating rescue works as normal telecommunication gave way in several places."

Valparai officials have shown "great interest in learning about amateur radio," he said.

Finis ... for this Month

Wilderness Protocol 2.0 and radio amateurs doing great work in New Mexico and India are just a few of the many EmComm snapshots worthy of your review in *CQ* "Public Service."

We welcome your input and strongly encourage you to keep us posted on your EmComm activities—whether going it alone, or with a group. Whether it's an EmComm reality, exercise, or support of a community event, share your stories and photographs by writing to <ki6sn@cq-amateur-radio.com>. We look forward to hearing from you soon.

73, Richard, KI6SN

Photo E– A footbridge across the Mandakini River in the northern India state of Uttarakhand was one of the casualties in recent widespread flooding. Indian radio amateurs were called upon by government officials to help provide emergency communications in the disaster. (Courtesy of Mukerjee via Wikimedia Commons)

"The Tale of the Tuner": Building the MFJ-941EK

BY JOE EISENBERG,* KØNEB

As the popularity of multiband antennas such as trapless multiband verticals and G5RV wire antennas increases, so does the need for an antenna tuner. These types of antennas provide for a wide range of bands of operation, but require a tuner to match their impedance to the transmitter that has a greater range of matching capability than the autotuners present in many newer HF rigs. One of the most popular and capable antenna tuners available is the MFJ-941E. The great news is this popular antenna tuner is now available as a kit, the MFJ-941EK! This versatile tuner covers from 160-10M and handles up to 300 Watts. Having a kit that appeals to both QRP enthusiasts and those who operate higher power levels should make this a very popular kit.

Features

The MFJ-941EK has a lot of features that will make it an important addition to your shack. With the built-in antenna switch, you can connect up to three different antennas as well as a dummy load. Two of the antennas can be coax-fed, and the third can be either an end-fed longwire or a balanced ladder-line-fed antenna. There are two meter ranges for measuring RF power and SWR. One allows up to 300 Watts and the low power range is up to 30 Watts. With its built-in cross-needle wattmeter/SWR meter and wide-ranging T-matching circuit, this tuner can meet most hams' need for power measurement, antenna matching, and antenna switching all in one unit.

For those who do not relish the idea of winding toroids, there is good news! Both the balun and SWR toroids are already wound for you and their leads pre-dressed. In addition, the main inductor is already pre-wound with the complex wiring of its taps to the rotary switch already completed, making for easy assembly.

Making this job even easier, the jumper wires for the point to point wiring are already cut, and some of their ends are stripped and tinned, ready to assemble. Some wires will need to be trimmed, however, for good lead dress and RF handling. The case is already drilled, labeled and marked, making it ready for final assembly. I admit that cases are probably the hardest part of a kit for me, including the drilling, labeling and assembly, so this kit was a pleasure to see. What you really get in this kit is what the MFJ assembly line gets to put together for the assembled version. In fact, the front label does not indicate it is the kit version. Since this is an antenna tuner, and not a radio, there is a lot less PC board assembly to complete, and a lot more mechanical assembly to perform. With that in mind, I quickly discovered that I didn't have on hand all of the various sizes of nut drivers and Allen keys needed to put this kit together. A quick trip to Harbor Freight remedied that problem at a very low cost.

Construction

Sorting out the parts, it quickly becomes evident that the hardware parts outnumber the electronic components, so keeping it all secure and sorted is a must. The instructions are very clear when dealing with the mechanical assemblies with clear diagrams of the various screws, washers and nuts and what order and position they need to be in for the tuner to work. Since some of the controls are insulated from the case ground, it is very important to follow the instructions carefully to be sure that those parts that need to remain insulated from the case ground do so.

Assembly of the MFJ-941EK begins with the PC board-mounted parts. The RF connectors on the back panel follow the installation of the PC board. The balun toroid and the meter are next, followed by the variable capacitors and the large inductor/switch assembly. This is an area to which the

MFJ-941EK tuner kit ready to assemble.

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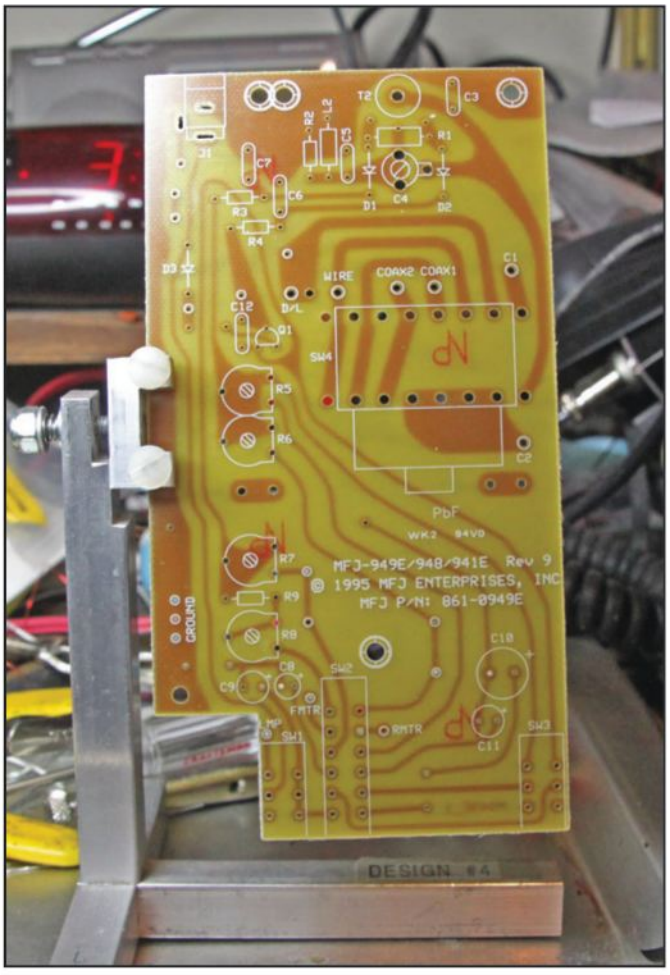


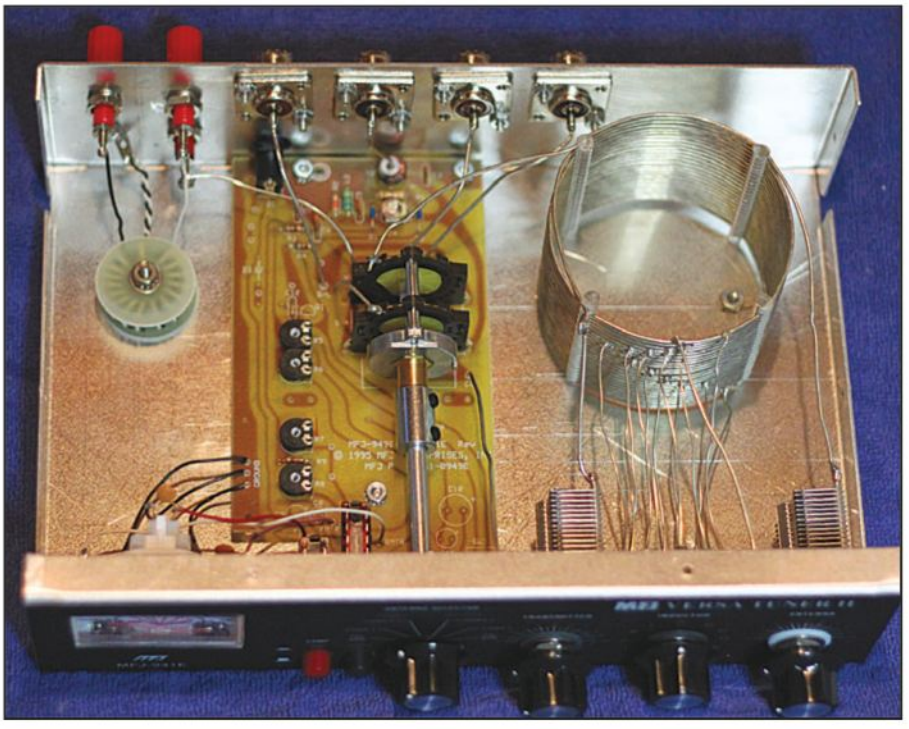
Single-sided PC board. Notice wide parts spacing for easy assembly.

Kit parts being sorted into a secure container for assembly.

builder needs to pay particular attention, making sure this inductor/switch assembly is installed and wired correctly. After mounting the inductor and the switch, *be sure that none of the wires leading to the switch from the inductor are touching any other wires.* The wire used to connect to the inductor's rotary switch is not as rigid as the heavy buss wire used to make some of the other RF connections. This makes it easy to bend the wires into a position that brings them into contact with adjacent wires. You want to avoid this, of course, so *check and double-check* to make sure there is no unintended contact between wires.

Alignment

The alignment requires a source of 100 watts of CW RF as well as a dummy load capable of handling that amount of power. In addition, you will need to be able to reduce the power output to complete the calibration of the lower wattage scale as well as the reverse power meter. A known accurate



View inside the finished MFJ-941EK.

Front panel of the finished kit, ready to use on the air!

wattmeter is needed to adjust the settings, with a Bird 43 suggested in the manual. I performed my calibrations using an Elecraft W1 wattmeter that I had previously checked against a Bird 43 for accuracy. The process involves passing RF to the dummy load at different levels, adjusting a trim pot on the board, and then reversing the connection of the RF source to calibrate the reverse power meter for both ranges. Once calibrated, the SWR is read from the center scale by finding the point where the two needles cross. This method allows for fast and accurate tuning and an instant reading of both forward and reverse power.

The meter as supplied has an incandescent bulb to illuminate the meter face. MFJ does offer an LED upgrade kit for some of its meters. We kit builders already know how to improve on our projects, and placing a 1.2K ohm resistor in series with an LED will allow us to power it from 12VDC and choose our own preferred color of LED for the meter illumination. I have had the best success lighting up meters using either cool white or warm white LEDs. Experiment to see which kind and color of LED illuminates the meter scale the best, keeping in mind that red as well as black markings are present on the meter face. In this kit, the 12VDC power input is only used for meter illumination, not for powering any other circuits. If you do not need to light up your meter, you need not connect a 12VDC power source to the back of this tuner.

Operational Note

It is recommended that you use no more than 100 watts to perform the tuning functions. Once tuned, though, the unit is capable of handling up to 300 Watts of RF. I spent about four hours altogether assembling this kit and performing the calibration, so plan on a good evening or afternoon build, and take plenty of breaks to be able to enjoy this fun kit.

The MFJ-941EK sells for $129.95 and is currently available from your favorite MFJ dealer or direct from MFJ at <http://www.mfjenterprises.com>.

Until next month . . .

73 de KØNEB

The Science of Ham Radio: Bringing Ham Radio to the People

BY WAYNE YOSHIDA,* KH6WZ

Recently, I received an invitation to participate in a demonstration at a local science museum. Although the timing was awkward—the weekend after Field Day—I decided this was an opportunity I could not refuse: The invitation notice mentioned they anticipated an audience of 3,000 guests during the two-day event. This was a double treat for me, since I have never visited the science center before.

So, I convinced my friend Dennis Kidder, W6DQ, and a non-ham friend and physics model-maker, Walter Clark, to join me in the "Meet the Makers" event at the Discovery Science Center (nicknamed "The Cube") in Santa Ana, California (fig. 1). According to a science center news release, "Meet the Makers" coincided with the science center's current exhibition: "Da Vinci—The Genius." The exhibit is the most complete and comprehensive traveling exhibition ever created on Leonardo da Vinci.

Fortunately, coming up with a suitable demonstration on a short notice was not too difficult, since we had previously exhibited at Maker Faire and other events, including Field Day. Over the last several years, I have been displaying ham radio in non-ham radio venues, but with an important change in angle: Rather than setting up a "traditional" demonstration station and making contacts (just like Field Day), I decided to get away from this stereotypic example of ham radio.

I did this because I am trying to show people that ham radio is not necessarily a hobby for old retired engineers talking to strangers from their basements and closets. I want to show people that the Amateur Radio Service is much more chic and many of us are using today's technology and applying it to ham radio activities. As a science and education tool, ham radio has a lot to offer.

The "Meet the Makers" participants were scattered throughout the science center. We became a part of the exhibits, and all locations provided very good visibility to visitors (fig. 2).

The Projects and Demos

I set up my APRS (Automatic Packet Reporting System) beacon at our table, and it both became a display piece and sent out our location information. I promoted this beacon to the Discovery Center staff as a great way to increase publicity for The Cube, since the beacon includes a bit of text as part of the transmitted data. Fig. 3 is a screen capture of my APRS beacon location at the Discovery Science Center. The eye icon is an attention-getter, isn't it?

My APRS beacon is based on a TinyTrak2, some ten years or more old (fig. 4). It is good to

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Fig. 1– The Discovery Science Center in Santa Ana, California provided a unique opportunity to show off ham radio in a different venue.

Fig. 2– All "Meet the Makers" displays became part of the science center's displays – we truly became a part of the science center's attractions.

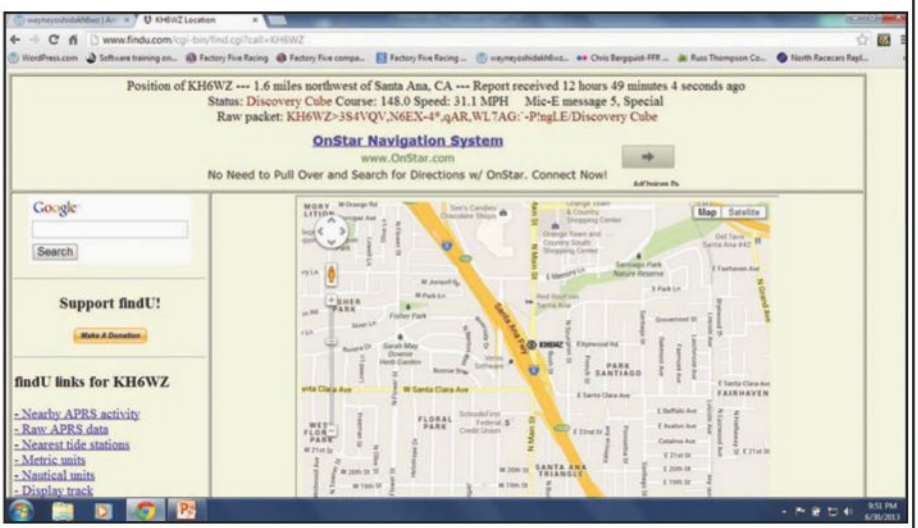

Fig. 3– Screen capture of the KH6WZ APRS beacon. This adds visibility to the venue as well as showing its location.

see that Byonics still has the firmware as well as the programming information on its website after all these years. The TinyTrak is an inexpensive way to get an APRS beacon on the air, and as a bonus, it is very compact. For the science center display, I mounted the individual units to my home made Giant Radio Clipboard, used for public service events. The radio clipboard holds my handie-talkie, a homemade J-pole antenna and a pad of paper. It is a hand-held desk for pedestrian mobile operations. A suitable poster explaining APRS was created by Dennis, W6DQ, for the 2012 Bay Area Maker Faire, and we re-used it for this event.

A 10-GHz frequency radio station, with the cover removed, is shown in fig. 5. It is capable of record-setting DX, and I added a sticker documenting this on the side of the rig. I made a poster with a block diagram of the rig, as well as an explanation of the frequency multiplication scheme. A better poster might be a map showing my "best DX" contact and a brief explanation of tropospheric ducting.

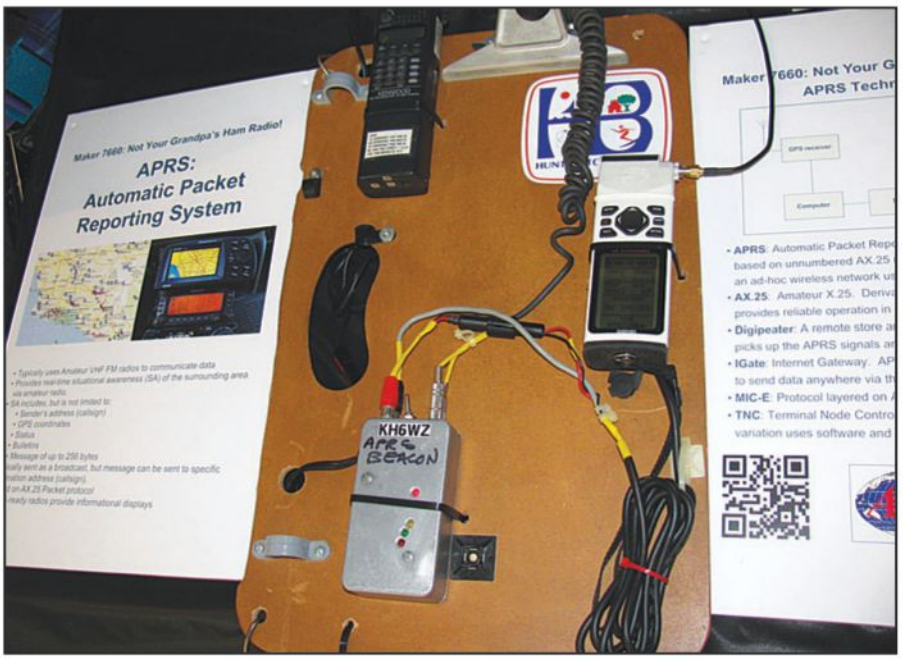

Fig. 4– The KH6WZ APRS beacon is based on an old 2-meter HT, a Byonics TinyTrak2 and an old Garmin GPS. It's good to see this 10-plus year old system still works.

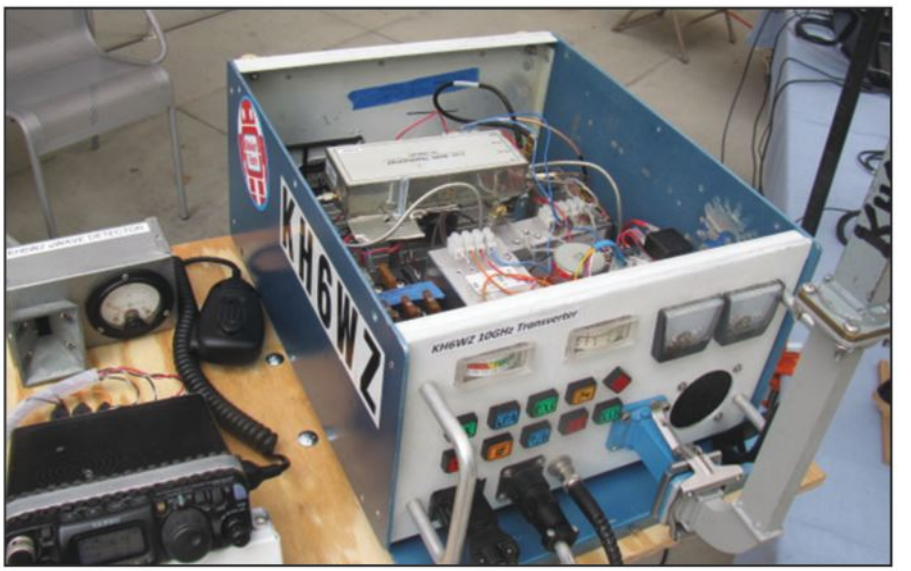

Fig. 5– My 10-GHz transverter system, with cover removed, easily becomes a display unit. A simplified block diagram helps explain what is happening inside and how the frequency multiplication math works. My microwave detector (field strength meter, visible in the background) is used to demonstrate polarization, antenna gain (and null) patterns, and signal strength.

During demonstrations of the microwave rig, I use my microwave field strength meter to show what happens when the horn antenna moves toward and away from the transmitter horn or dish antenna, and also what happens when I rotate the detector from horizontal to vertical polarization.

Dennis set up his Flex 1500 software defined radio (SDR), transverter system, and computer to demonstrate his dual-band 10-GHz and 24-GHz microwave station (fig. 6). Dennis also brought a project under construction, a compact 10-GHz *synchrodyne* transceiver. Dennis provides an overview of his projects, including an explanation of "synchrodyne" for those who aren't familiar with it:

The first item is my dual-band 10-GHz and 24-GHz SDR, which provides narrowband

Fig. 6– Dennis Kidder, W6DQ, brought his 10-GHz SDR (software-defined radio) as well as another project under construction to show science center visitors.

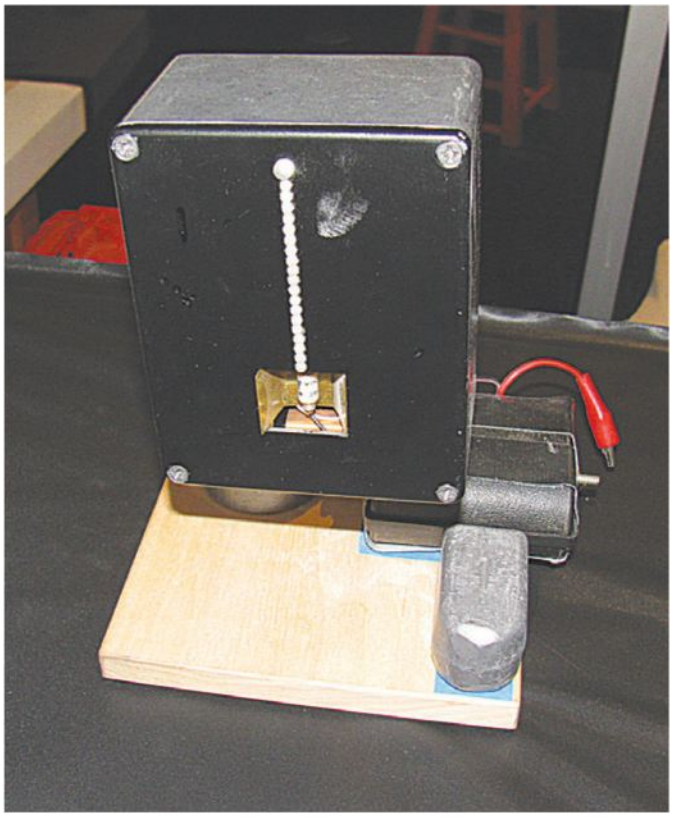

Fig. 7– Walter Clark built this fascinating unit to visually show radio wave polarization.

communications and has two distinctive features. First, it uses an omni-directional antenna. Most microwave radios utilize directional antennas. A directional antenna provides stronger incoming and outgoing signals (gain) while reducing interference from other RF sources adjacent to the signal path. The "omni" does provide some gain but the advantage is that it does not require alignment to the other station. Therefore it can be used remotely or even mounted in an automobile for mobile operation. The second distinction is that it utilizes a software-defined radio (SDR) to perform the 'backend' functions of the set. An SDR digitizes the radio signal and then processes it to recover or 'demodulate' the information in the signal, whether voice or data. The software signal processing can potentially provide greater performance than a conventional analog system.

My second project is a 10-GHz handheld synchrodyne transceiver. This is a prototype receiving system for the overall project that is still in process. Reception of higher radio frequencies generally involves the *heterodyne* principle: Two frequencies, when mixed together, will result in two additional signals on the sum and difference of the two initial frequencies. In conventional radios, the incoming signal is mixed with a local oscillator or LO to provide an intermediate frequency or IF. The IF section of the receiver can have higher performance (better gain, better selectivity) than the earlier stages of the system. The output of the IF is then demodulated and the information within the signal is recovered.

In a synchrodyne receiver (or transmitter), the LO frequency and the incoming frequency are the same. When mixed, the output will be the difference of the two, which is the information contained in the signal. In this case, it is voice (single sideband). Other names for synchrodyne are *direct conversion, zero IF, or homodyne.*

Walt made two demonstrations that visually show the structure of radio waves, and describes his projects for us:

My first demonstration (fig. 7) is used to visually show the structure of a radio wave *as angles* around the direction of travel. This is

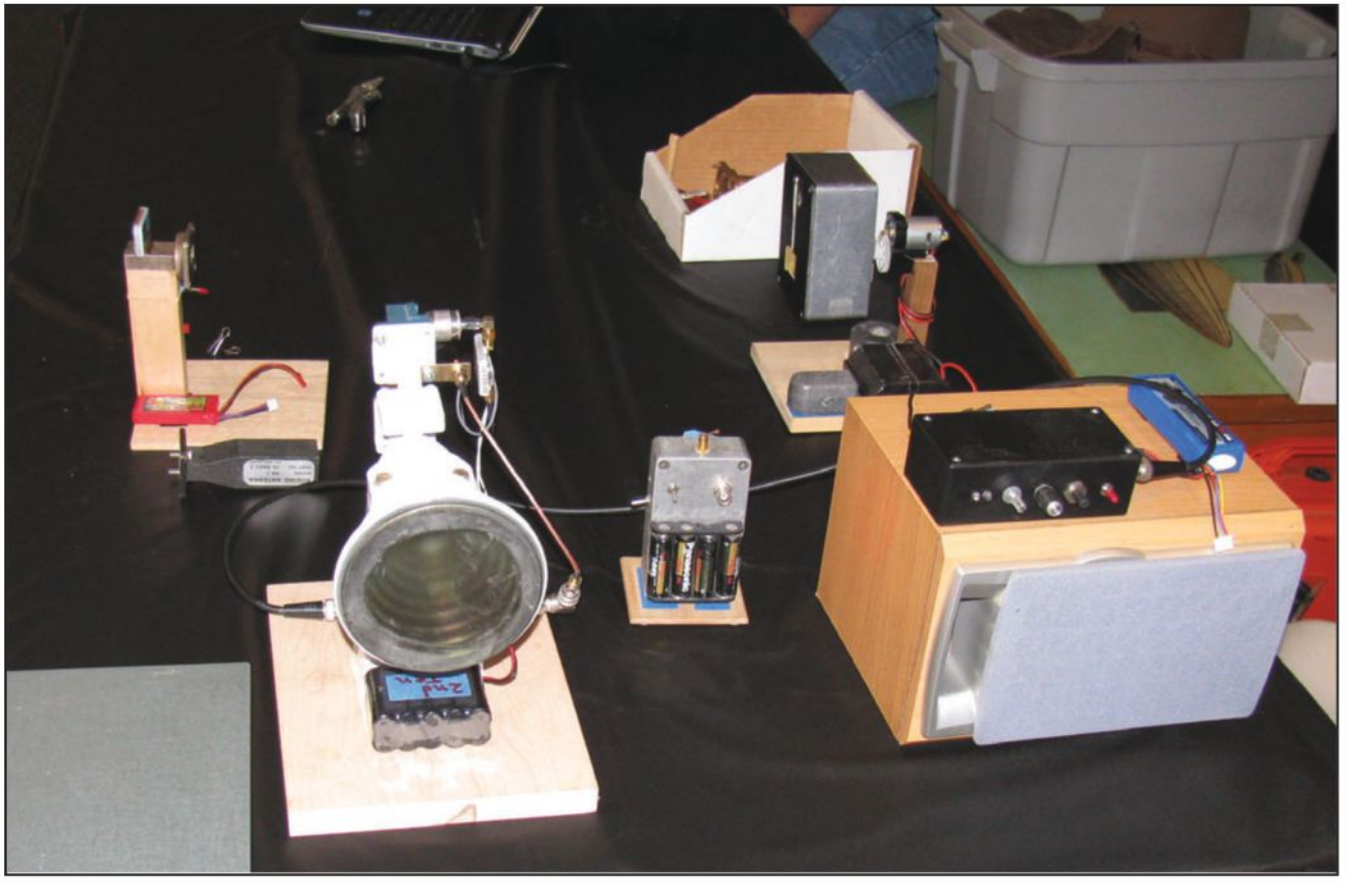

Fig. 8– Walt's second demonstration unit gives a visual as well as aural rendition of radio wave propagation.

called *polarization. A spinning bar graph* that includes a receiving antenna spins, and reveals the way radio waves look to a receiving antenna. The bargraph shows signal strengths as the receiving antenna spins around an axis—the lesson here is that the receiving and transmitting antennas have to be oriented to the same angle.

The second demonstration (fig. 8) provides an aural as well as visual view of the structure of a radio wave *along* the direction of travel. When a receiver is arranged to look exactly into the direction the radio waves are going out, reflections can be measured. This is the general idea for radar. The reflection off of someone's hand or body causes the speaker to be loud or quiet, depending on the exact position of the reflecting object. It cycles from loud to quiet every 1.5 cm whether inches or many feet away. This equipment allows you to both see and hear the wavelength and especially note that the wavelength is the same no matter how far the radio wave travels.

Making the Science of Radio Fun

I want to point out several benefits of demonstrating ham radio in a non-ham radio venue. First, it is a great way to show physics principles in an audio-visual and everyday sort of way. One young lady visitor said that she took physics and electricity in college, but had a difficult time understanding it because it was not something that can be held in one's hands. The theory was too abstract. These demonstrations were wonderful examples of the theories she tried to learn in school.

Second, potentially thousands of people will walk by the displays. Although not everyone will stop and visit, a small percentage will be curious enough to truly want to learn more. And this is a great way to find new hams because they were drawn to the exhibit. This is a "pull" rather than a "push" to learn something. Some visitors were active hams, and several had licenses but never got on the air. Make sure you have hand-outs or at least a list of links to various websites handy so visitors can find more information.

Other things to keep in mind: the power of networking strikes again. The invitation to display at the Science Center came to me via my connection with the local Mini Maker Faire last year. It is another example of the saying about today's job market: "It is no longer what you know, it is no longer who you know, it is now *who knows you*."

Finally, having a "go box" of ham radio demonstration gear greatly simplifies the task of inventing something to bring to such events. Include extension cords, an AC voltage indicator (neon bulb), a power supply, and notepad. Posters and visual aids should be tailored to the audience—for example, it would be a good idea to prepare materials and hand-outs for children as well as their parents. Links to more information will also improve the visitors' experience visiting your display and demonstration.

Summer and fall are great times to go out and play and visit local attractions such as museums. Why not check to see if demonstration opportunities are available so *you* can be on display! 73, Wayne, KH6WZ

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Da Vinci the Genius Traveling Exhibition <http://www.davincithegenius.com>

San Bernardino Microwave Society <http://www.ham-radio.com/sbms>

TinyTrak APRS Units: Byonics, Electronic Projects for Amateur Radio <http://www.byonics.com>

WordPress Blog: wayneyoshidakh6wz <http://wayneyoshida-kh6wz.com>

Better Software for Better Projects

BY MATT STULTZ,* KB3TAN

As our skills develop as makers, we sometimes get to a point where we don't want our projects looking quite so slapdash or as the hacks that they are. We, as tinkerers, may see the beauty in a perfboard covered in components with wire sticking out everywhere and solder bridges providing the magic glue, but not everyone does. Sometimes it may not even be about aesthetics. Sometimes we just can't manually do the thing that we need to do to finish an idea. In these cases, all we need may be some powerful software to step things up. Of course, if that software was free and open-source, that wouldn't be a bad thing, either!

I am often asked about the tool chains I use for my creations. I have come to rely on a few pieces of software that I use for almost everything I make. Nearly all of these applications have been introduced to me throughout the years by other amazing makers, who—when I went to them and said, "Hey, I want to do X. Do you know of a good way to do that?"—would reply, "I know just the application," and off I would go.

Free and open-source software really lowers the hurdles to getting started with solving a problem. If I don't have to shell out money to even try to see if my technique will work, I'm more apt to try it. Sometimes the cost of commercial software alone can be a barrier to entry. I would love to have and know Solidworks, but at several thousand dollars for a single seat license, I can't justify it. A free and open alternative might not be as fully featured, but it might have just enough to get me where I need to go. Here are a few examples.

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The GIMP

If you have ever seen *Pulp Fiction* and are now concerned what direction I'm headed, don't worry; it's not *that* Gimp. Instead I'm talking about the *GNU Image Manipulation Program* (www.gimp.org). GIMP is an image-editing suite akin to Adobe's Photoshop. GIMP is free and open-source and is fully cross-platform with distributions on Mac, Windows, and Linux.

The tools in GIMP (fig. 1) allow you to quickly and easily either draw an image or edit an existing one. This can be very useful when trying to do something like using a photo as the basis of a project layout. Background elements can be removed from the image and details can be sharpened with just a few clicks. This can help other tools to more easily determine shape, size, and position of items in the image.

Plus, when it comes time to document your project to share with others, GIMP can help make your photos look great. When I need to make any adjustments to white balance, image size, cropping, or any post-processing tasks, GIMP is my go-to tool. It does have a learning curve, but there are many example videos and blogs out there that

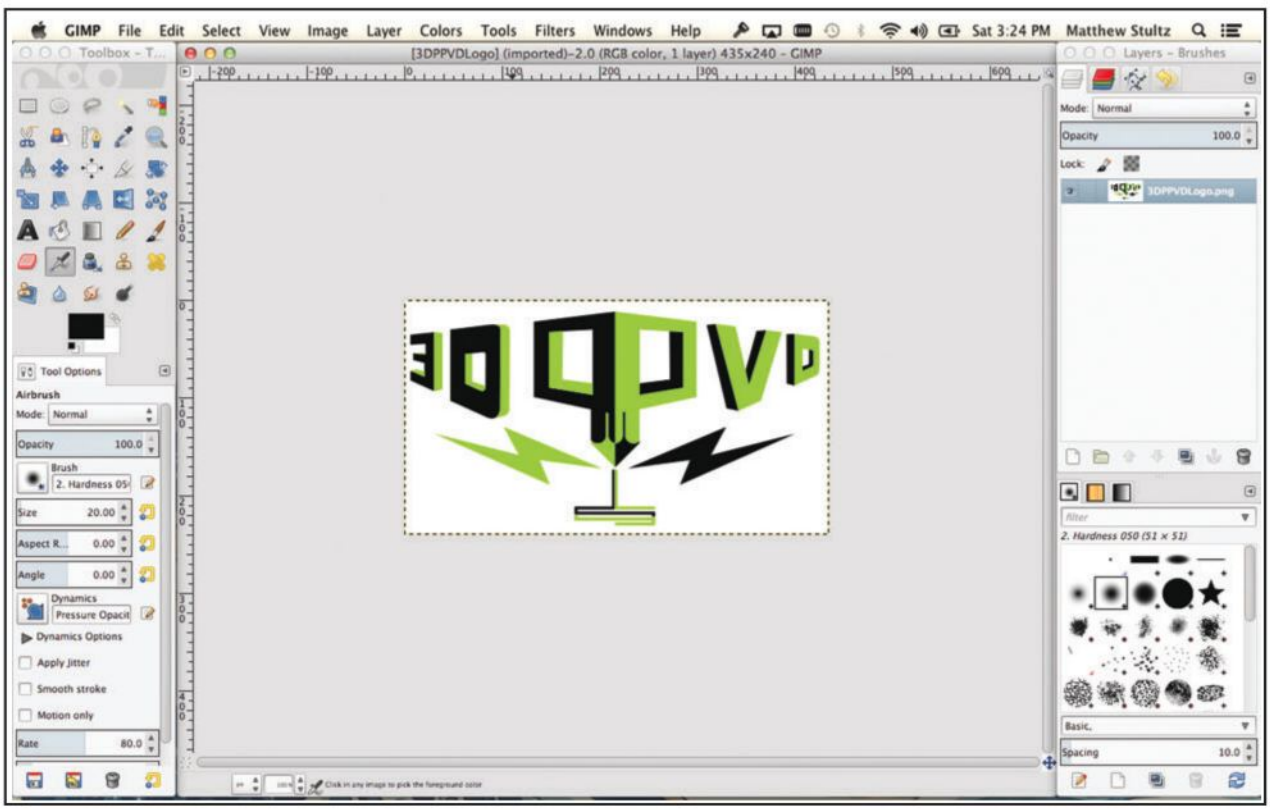

Fig. 1– GIMP is an open-source image-editing suite.

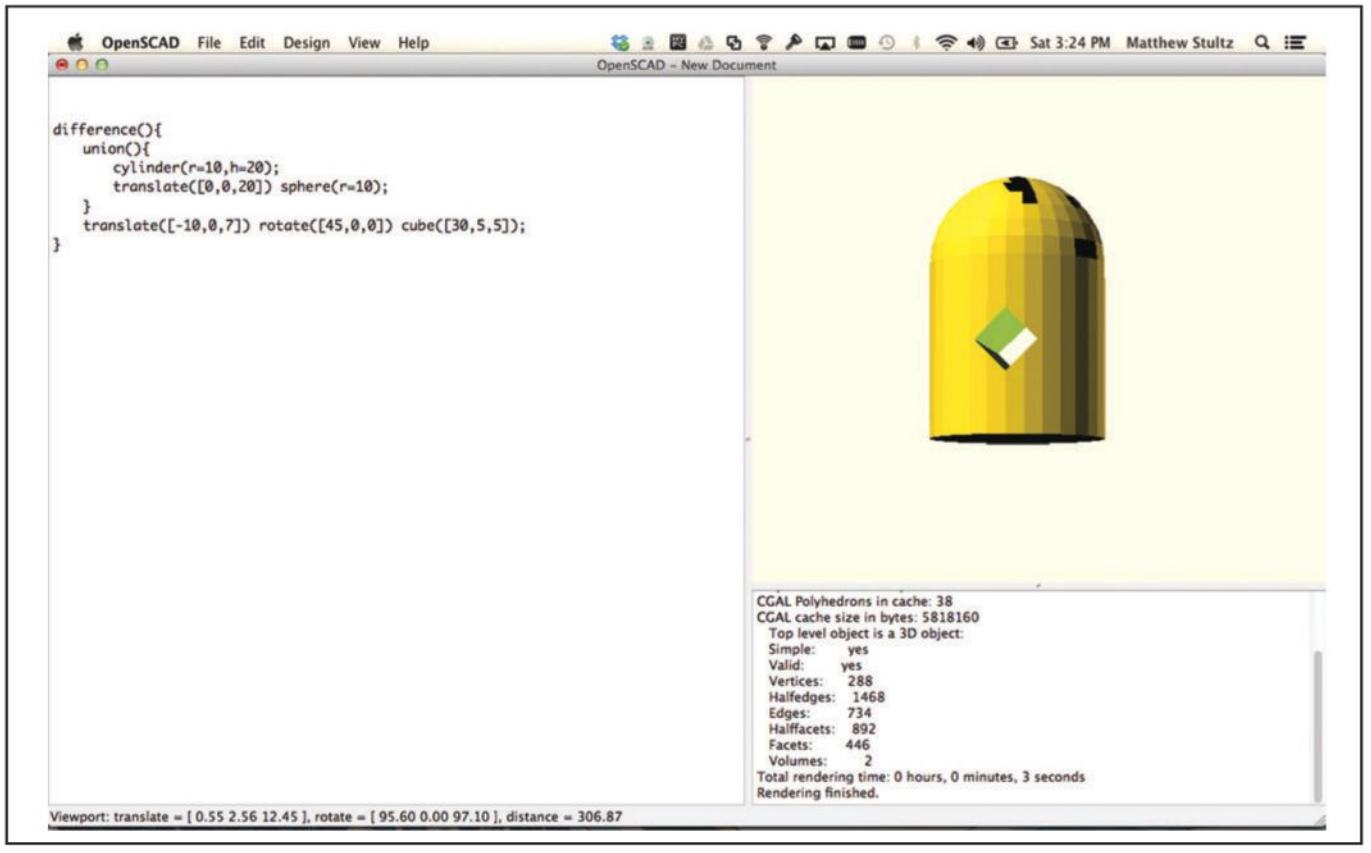

Fig. 2– OpenSCAD lets you do computer-aided drawing (CAD) in an open-source environment.

will easily help you out. If you already have experience with applications like Photoshop, the concepts are the same; it's just a matter of learning which tool in GIMP corresponds to the same function in Photoshop.

OpenSCAD

When I need to make a design and ensure that all parts are precisely in the place I need them, I turn to OpenSCAD (www.openscad.org). I use OpenSCAD (fig. 2) mostly in designing models for 3D printing (see my 3D printing article in the December 2012 issue of *CQ*). Unlike most CAD (Computer Aided Drawing) tools, OpenSCAD doesn't use a traditional drawing system. Instead, all designs are done in code. By just learning a few commands and some simple syntax you can create dynamic models with a high level of precision.

OpenSCAD starts by taking simple geometric shapes (cube, cylinder, sphere, and polyhedron) and either combining them (union) or subtracting them from each other (difference). The objects can then be transformed with such commands as "rotate" and "translate" to place them where they are needed in the model. The code for a basic OpenSCAD model may look something like this:

```
difference(){
        union(){
                cylinder(r=10,h=20);
                translate([0,0,20]) sphere(r=10);
        }
        translate([-10,0,7]) rotate([45,0,0]) cube([30,5,5]);
}
```

You are not bound to these basic shapes. Modules can be created to make more advanced shapes from them. Each module can then be used as a single object. STL files can also be imported into OpenSCAD. These imported STL files are then treated as primitive shapes as well. This is convenient, especially when trying to make an item that needs to mate perfectly to another object. A design can be created in OpenSCAD that doesn't fit; then a model of the item to which it should be matched can be imported and subtracted from the original design. The final design will be perfectly mated to the desired piece.

OpenSCAD is not limited to 3D designs. 2D layouts can also be created, using the same syntax, but with different "primitives." Cubes are replaced with squares, cylinders with circles, and polyhedrons with polygons. Final designs can then be exported in the common .DXF cad format.

The designs created in OpenSCAD are also parametric. This means that everything in the model can be adjusted based on relations to each other. If all holes in a model are designed for one bolt size and you want to change the bolt size, all holes can easily be adjusted with the change of one parameter. It's not hard to imagine how useful this can be, especially when designing a prototype.

Recently I discovered another great toolchain in which to use OpenSCAD: *Pepakura*. This is, sadly, a closed-source tool that only runs on Windows, but its capabilities make it worth its hassles (www.tamasoft.co.jp/pepakura-en/). Pepakura can take a 3D model and turn it into a 2D pattern that can be cut out of paper, fabric or any other flat medium. The conversion from 3D to 2D has never been easier.

Blender

If you are looking for an all in one 3D design tool that can do anything from designing physical objects to creating special effects for your next SciFi movie, then look no further than

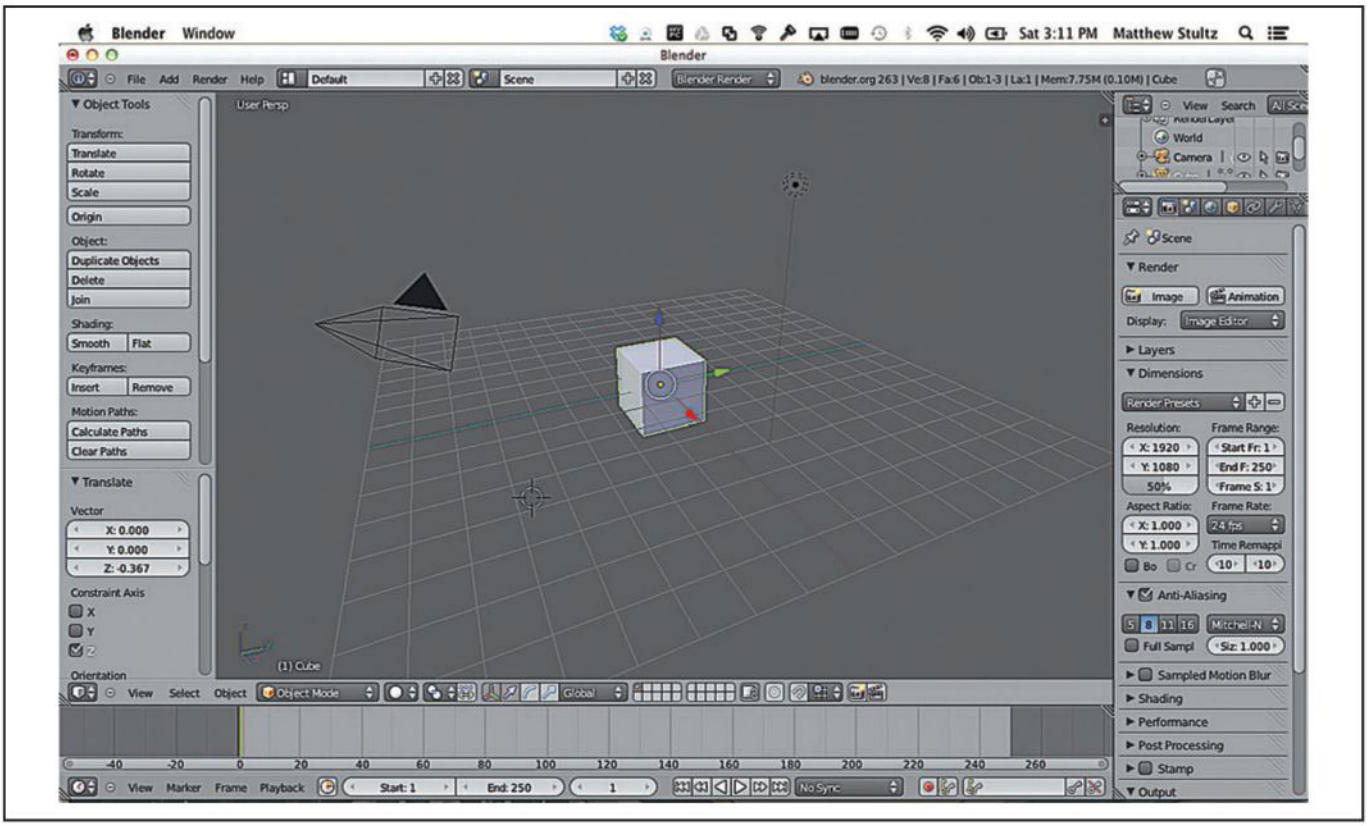

Fig. 3– You probably won't want this Blender on your kitchen counter, but you can probably use this 3D design program to help you build something to mix up your next margarita!

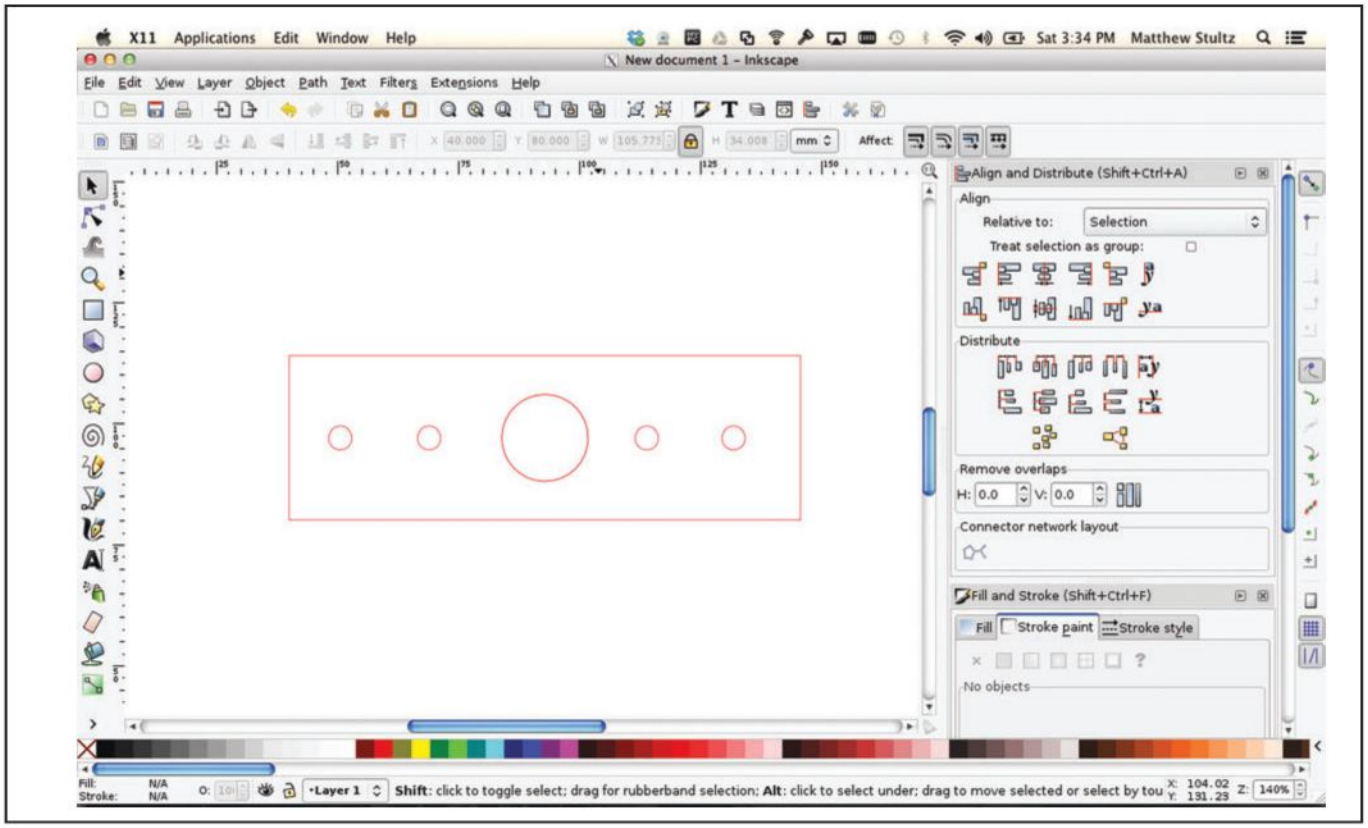

Fig. 4– Inkscape is a vector graphics editing program. Its designs can be scaled to any size necessary with all parts remaining in proper proportion to each other.

Blender (www.blender.org). Originally designed by a Dutch animation studio, Blender (fig. 3) has grown into a behemoth of features (and some say complexity). Unlike OpenSCAD, designing a model in Blender is largely a point and click operation by choosing tools and using them to make your changes in a similar way you would use an image manipulation tool like GIMP.

With its large community and active development, Blender has a function or an add-on for almost anything you might want to do. For 3D printing, blender has an add-on that places many helpful tools in one convenient location, the 3D Printing Toolbox. Including such functions as model cleanup and rescaling, the toolbox contains tools that make model prep easy. Error checking functions help ensure that your model will print correctly. When 3D printing, all models must be solid objects (also referred to as *manifold* or *watertight*). If a model has a hole in its outer skin, then it is considered *non-manifold*. When the slicing engines that turn your model into instructions for your printer try to slice a non-manifold model, they will fail - resulting either in an error or in a model that just doesn't print correctly. Blender's 3D printing toolbox error checking can help detect and fix a non-manifold model.

One criticism that is often made of Blender is its learning curve. With all the functions and power of Blender, it can sometimes be difficult for those new to the tool to get started. The effort will quickly be rewarded, though, when you develop the abilities to use this powerful tool to its fullest.

Inkscape

No matter what tool I need to use for a project, be it a 3D printer, laser cutter, vinyl cutter, CNC router, or even my cheese printer, *Inkscape* (fig. 4) helps me get the job done. Inkscape (www.inkscape.org) is a vector graphics-editing program similar to Adobe's Illustrator. Vector graphics, as opposed to image formats like bitmaps, consist of defined lines, curves, and shapes.

Much like the 2D designs created with OpenSCAD, the lines and curves of a vector graphic are relational to each other. This makes the files capable of being scaled to any size without a loss in quality. The same file can be cut the size of a postage stamp on a laser cutter, or blown up to the size of a sheet of plywood and cut on a CNC mill. For this reason, many companies design their logos as vector graphics. That way, whether they need their logo on a t-shirt or a billboard, they don't have to go back and have a designer rework it to keep it clear. The lines and curves that make up the image can directly be related to the tool paths needed to cut out the design, so often little to no post-processing or other tools are needed to machine the design.

Probably the most incredible feature of Inkscape is its system for creating add-ons. Inkscape allows users to create plugins by programming them in Python. Python is a great language for anyone interested in getting started in programming. Its simple syntax makes learning easy, and its flexibility helps users get things done without bogging them down in the minutia associated with many other programming languages. If you are interested in getting started with Python, I suggest trying *Codeacademy* for excellent free online training (www.codecademy.com/tracks/python). If you have a Mac or Linux box, you already have Python installed.

These plugins can take Inkscape from a simple graphics program to a product design tool or hardware interface. A great example of this is the tabbed box maker extension (bit.ly/LSGFax). Often we find ourselves in need of enclosures for our projects.

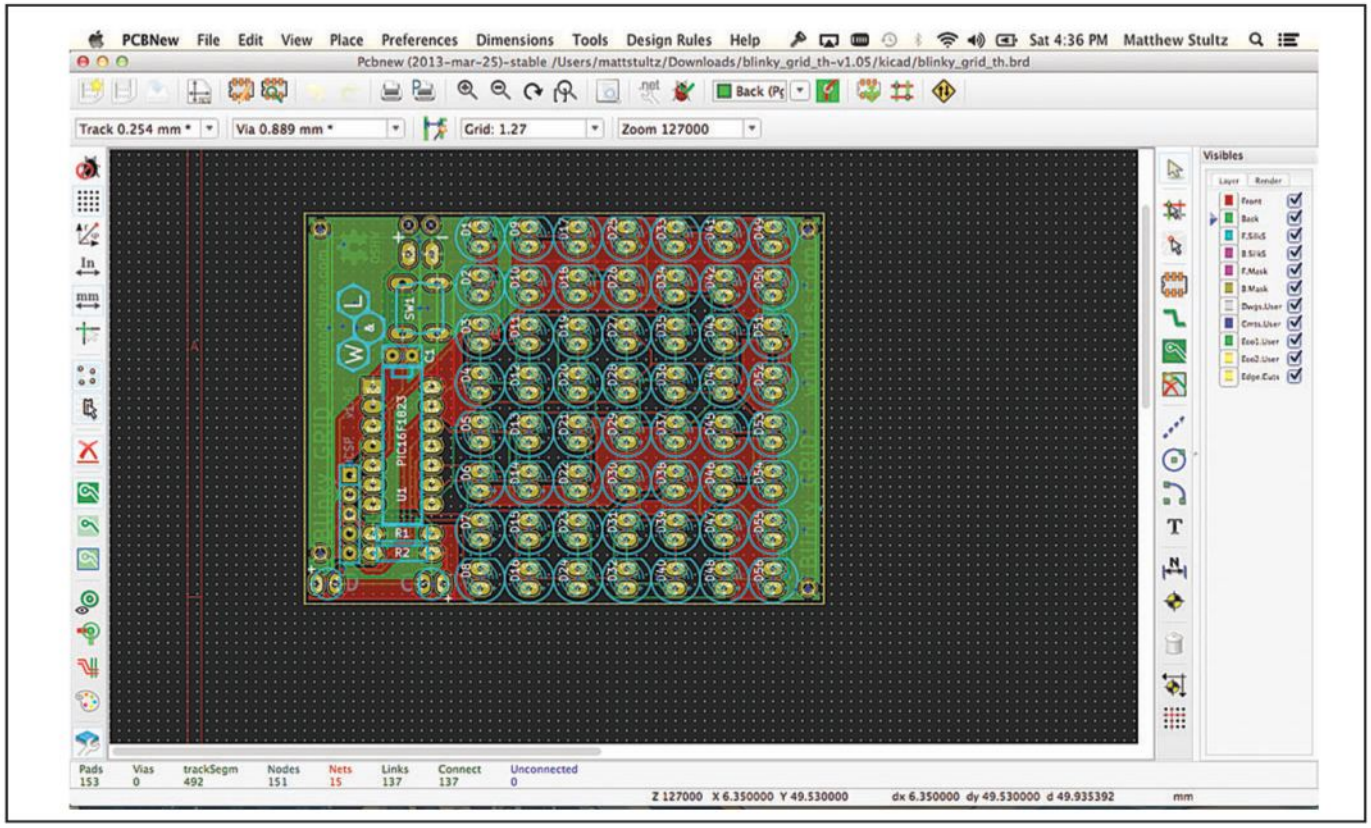

Fig. 5– KiCad is an open-source program for designing printed circuit boards, particularly useful to the ham who likes to create his own circuits.

With the tabbed box maker extension, you can plug in the size of the box you need along with a few other parameters, and it will automatically create the layout for the box with tabs. Once laser-cut, the box can be press-fit together. Once the extension creates the basic layout for your box, you can quickly add any other elements to the design to fit your final needs.

My good friend, Marty McGuire, KB3TOW, wanted a way to be able to make complex shapes in OpenSCAD. He wrote an Inkscape plugin that will take a vector graphic and turn it into a polyhedron that can then be imported into OpenSCAD and extruded to the desired height. A good example of this can be found in my silly "Put A Corgi On It" thing on Thingiverse (www.thingiverse.com/thing:16390). One of Marty's other Inkscape plugins, a *gcode* creator for making 2D images that can be drawn with the Makerbot Unicorn system, became the basis for one of my plugins. When I built my cheese printer (a 3D printer that prints in cheese) I made a plugin that allows me to export gcode directly from Inkscape to my printer. Soon, anything I could draw in Inkscape, I could print in cheese.

KiCad

Of course, one of the most-needed tools for hams and other makers is a tool to help design printed circuit boards. A popular choice for this is the commercial software, Eagle PCB (www.cadsoftusa.com). Eagle does provide a free version for those interested in getting started, but the size of the PCB that you can design with it is highly limited (4 × 3.2 inches—the exact size needed for an Arduino shield). *KiCad* (www.kicad-pcb.org), however, provides an unlimited experience in a free and open-source product.

Another friend, Matthew Beckler, KB3VDJ, turned me onto KiCad (fig. 5). Matt is one half of "Wayne and Layne," an open-source kit company. Matt and Adam design all of Wayne and Layne's kits using KiCad. This makes their kits more than just useful as teaching aids for people interested in learning to solder and program. It also makes them useful for those who want to dig deeper and learn more of the electronics and design theory that went into making the kits. If one of their customers can view their designs without needing to purchase expensive software, they feel this becomes a bigger asset to their customers (read more about Wayne and Layne and their open-source philosophy in my open-source hardware article from September 2012).

Searching the Internet will find you many great tutorials on getting started with KiCad. *The Curious Inventor* has a great series of tutorials for the first time user (bit.ly/9In2NS). When you are ready to move onto advanced techniques, be sure to head back over to Wayne and Layne for their advanced KiCad techniques series (bit.ly/18qlJ7U).

Many More

Of course, this list is nowhere near complete. I could write on and on about products like *Fritzing* (fritzing.org), *Processing* (processing.org), and so on. The above five, though, are pieces of software that I feel are changing the way we as makers are designing and completing our works. Each of them comes with a learning curve, but all are worth the investment of your time.

I hope there is a tool here that can help you with your next project and I would love to hear your picks for open-source tools that have been game-changers for you. E-mail me at <KB3TAN@cq-amateur-radio.com> or send me a message on twitter @MattStultz. Also don't forget to follow CQ on twitter @deCQCQCQ.

73, Matt,KB3TAN

BY KENT BRITAIN,* WA5VJB

PIM—Passive InterModulation

Passive InterModulation, or PIM, is a specification we are seeing more and more on coax connectors, filters, circulators, and more importantly, antennas. It is an interesting concept, that an RF signal is distorted just by passing though a coax connector. You now have new distortion products or "splatter." This is really a concern on repeaters or any system on which you are trying to talk and listen at the same time. Most of the work on this issue has taken place in the cell phone industry, but we hams can benefit from the results.

Cell phones have gotten physically smaller over the years (photo A) and their power outputs have dropped from several watts to a few hundredths of a watt. This has done wonders for cell phone battery life, but really puts pressure on the cell site receivers to pull out those weaker and weaker signals.

Some years ago, engineers realized that most of the noise the receivers were hearing was coming from their own transmitters. Thus the drive for extremely low phase-noise oscillators, extremely linear power amplifiers, higher isolation filters, and fixing anything else in the system that could cause noise.

There were other important developments along the way. One was *feed forward* amplifiers in which a second amplifier was added to give the power just a little boost on modulation peaks so the waveform would not come out clipped or distorted.

Another important technology was *pre distortion*. A computer looks at the input waveform to the amp, and the output waveform from the amp. Then the computer designs a digital filter to inversely distort the drive signal. When the 'pre-distorted' signal passes though the amplifier and is subject to "distortion," out comes a very clean signal. Predistorters clean up even a good transmitter by about 10 dB. So that means 10 dB less splatter out of the amps.

Modern cell phone sites have driven sensitivity to the point that about half of the noise they hear is coming from the thermal noise of the Earth and the universe.

One of the nagging problems was low-level noise coming from any passive hardware in the RF path when the transmitter was on. This noise was caused by intermodulation products and is known as *PIM,* or *Passive InterModulation*. PIM can be a problem in any repeater system, whether it's a cell phone repeater or a ham radio repeater.

Applying PIM-Reducing Technology to Ham Repeaters

There are three basic places where we commonly see PIM in a repeater system: connectors, anything made of iron, and joints, especially between dissimilar metals. Let's look at each of these.

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Connectors: In fig. 1, we have an enlarged view of the pin connection in a coax connector. When transmitting, there are micro-arcs around the contact points. Not much, and typically not even visible, but these arcs become an important source of broadband noise when transmitters and receivers share the same antenna at the same time.

The solution is a connector with more contact area and much higher contact pressures, as seen

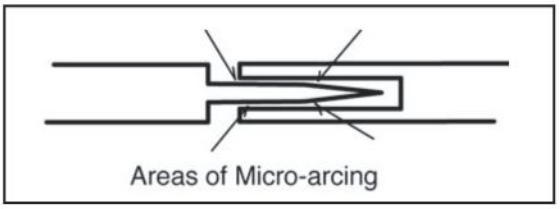

Fig. 1– Generally too small to see, most antenna connectors have tiny gaps that result in micro-arcing, which results in higher noise levels.

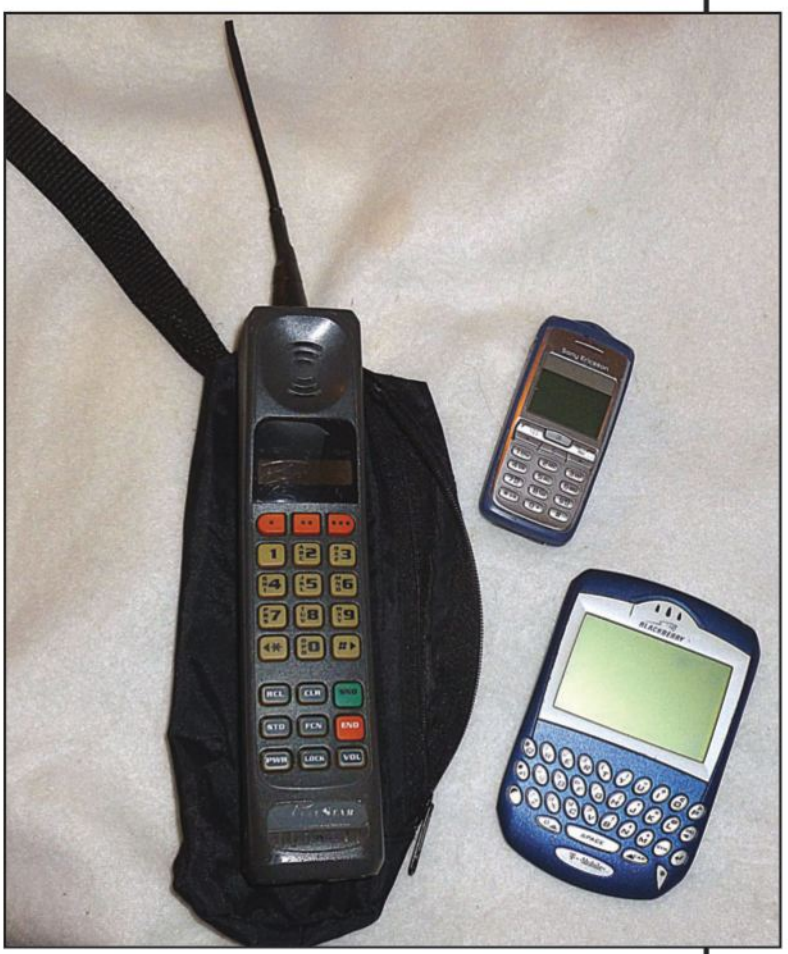

Photo A– Phone technology through the years has evolved to give us much smaller phones with very low-powered transmitters. This requires very sensitive and very low-noise receivers at cell sites.

Photo B– DIN 7-16 (left) and N-Type coax connectors (right). See text for discussion.

in photo B. Note how the DIN 7-16 (on the left) has much more contact area than the more familiar "N" connectors (on the right), and if you have ever connected one, you know how much more pressure is need to connect the mating surfaces.

These connectors have been through years and years of development for low PIM. They not only have large surface area contacts with very tight fits, but are also made from materials chosen for low-resistance connections and no hysteresis. They are typically rated for –160 dB PIM. That's pretty low.

The 7-16 has nothing to do with a common wrench size, by the way. Rather, the numbers represent the diameter in millimeters of the inner and outer contacts.

Iron: This is a bit more complex concept, but let's start with the *ferrite isolators* in photo C. Ferrite isolators are very handy devices that can be compared with diodes or, better yet, hydraulic check valves, in that RF flows though the device only in one direction. The downside of ferrite devices is that they will *saturate* with increasing RF power.

There are two places in a typical HF ham station where you might see the effects of ferrite/iron saturation. First would be when you push that KW amplifier too hard and the power transformer gets real hot. Much of that heat is not from the high current in the windings, but rather from *hysteresis losses* in the iron core of the transformer when the core is saturated. The next one is a bit harder to see. You'll need a cross-needle SWR meter or one that is constantly calculating SWR. If you have a ferrite balun in your antenna system rated for, say, 400 watts, and you drive it well beyond 400 watts, you will see SWR peaks on your voice peaks. Those peaks are from the ferrite core saturating and tell you that your 4:1 balun is no

Photo C– Ferrite circulators permit RF to flow in only one direction, but are subject to noise-inducing saturation if over-driven.

longer 4:1. This holds true for 1:1 baluns as well. Your antenna is not impedance-matched at peak power if you saturate the ferrite in your baluns.

Thus a ferrite isolator can gently clip the tops of the waveforms. With any clipping, though, you introduce harmonics and distortion. These distortion products are very low, so low that your typical spectrum analyzer will not even see them. But this tendency to clip the waveform extends to any ferromagentic material in the RF path. Just making the body of a coax connector out of a metal containing any iron will result is a slight clipping of the waveform. Again, not much, but enough noise is generated to make it hard for a cell site receiver to hear that phone a couple of miles away trying to get though the walls of a Walmart. In short, if a magnet can pick it up, it can generate noise, and you don't want it in the RF path of a low-noise repeater system.

Back to isolators. They are very handy devices. As I said, RF only goes though them only in one direction. Your antenna can fall down, and the transmitter will still see a 1:1 SWR. Sounds like a good future topic. (For the lads who are just champing at the bit to flame me, yes, I know about ferro resonance and terminating the 3rd port on some designs. Give me a chance to bring all that together.)

Joints: Dissimilar metals have been used to make diode junctions since the first days of spark gap radios. The mechanical junction of two dissimilar materials can create a voltage threshold and again we have waveform clipping.

Low PIM antennas have all connections soldered or welded, or are made from one continuous piece of metal. *There are no mechanical connections in a low PIM antenna*. For ham antennas, make sure the joints are clean as you assemble the antennas and tighten the hardware. When possible, solder mechanical joints.

Remember that all those coax connectors are also mechanical joints. Clean your coax connectors before assembling the system. A typical repeater will have at least four cavities with two connectors each. Next are the six to ten jumper cables, again each with two connectors. In all, you can easily end up with 20–30 connectors, most of which probably have been sitting in storage for many years. The contacts on the male and female connectors certainly will have a film of dust on them. Now the pins do not mate securely and you have a lot of micro arcing along the gaps. Add in any oxide films and we are back to those dissimilar metals problems again. So clean those connectors before you connect them, and only use those tarnished ones if you have no other choice.

Practical Benefits

Now what has all this work bought you? If you just talk on your rig, not very much. But to the coverage of a repeater, it can mean a lot. When the repeater is transmitting, cheap connectors, steel-braided coax and mechanical joints in the antenna are all generating low-level noise. In reality, most repeaters suffer more from poorly-tuned diplexers, high phase-noise synthesizers, and other local noise sources, than from PIM. But we can take advantage of low PIM surplus coming out of the cell phone industry to reduce this often-overlooked source of noise in the repeater system.

As always we welcome your questions and topic suggestions. Just drop a snail mail to my QRZ.COM address or an email to <wa5vjb@cq-amateur-radio.com>. For other antenna articles and projects, you are welcome to visit <www.wa5vjb.com> and look in the Reference section. 73, Kent, WA5VJB

learning curve

BY RON OCHU,* KOØZ

Signal Reports and Just What Is a "Valid QSO," Anyway?

In the past few installments of this column, we discussed why and how to QSL. A QSL card is the final courtesy of a QSO. But just what makes up a valid QSO, anyway? I'd like to thank a *CQ* reader, Bryan Buck, WH7DX, for e-mailing. He feels that a valid QSO does not require a signal report but says others disagree. He is right – a signal report is not required for a QSO to be "valid." So that begs the question of just what information *is* required to constitute a valid QSO.

First, we need to define what constitutes a QSO. After doing a little research on the subject, ham radio pundits agree that a QSO is a two-way radio contact in which there is an exchange of information. Virtually all agree that call signs between two stations need to be exchanged. Now here is where the interpretation of a valid QSO definition gets interesting!

Defining a Valid QSO

The topic of a valid contact was addressed back in March, 1957, by Ed Tilton, W1HDQ, in his *QST* column, "World Above 50 Mc." He defined a valid QSO as consisting of a two-way exchange of information with the minimum including call signs and one other piece of unknown information. This could include signal reports, location, grid square, etc. Next, both stations must acknowledge the information correctly.

Unknown Information

Therefore, Bryan, WH7DX, is correct in bringing up the point that signal reports do not necessarily need to be included on a QSL card to validate a QSO. As long as there is one other piece of previously unknown information such as a grid square or the other ham operator's QTH along with call signs. However, it is important to mention that some operating awards and a lot of contests *do* require the exchange of signal reports. Therefore, it is still a good idea to include an honest signal report on the QSL card (if not on the air).

Ham radio tradition dictates that while on the high frequency bands, a signal report should be given to the operator with whom you are having a QSO. Convention also tells us to give out an honest signal report. The thought being that the other station would like to honestly know how well his/her signal is being received. Perhaps the operator at the other end is trying out a new antenna or feed line. Propagation will also affect signal strength and that is helpful to know as well.

Case In Point

Here's a case in point: I can remember in my earlier ham radio days, I rented a home and I didn't have the funds or my own property to put up elaborate, permanent antennas. I did have a 40-meter inverted vee up, and I had just discovered the joys of "split operation" DXing during the wee hours of the morning. In essence, split operation means the DX station transmits outside of the U.S. portion of the phone band—say around 7.090 MHz—and announces that he will be listening within the phone portion of the U.S. band plan, let's say, on 7.235 MHz. All I have to do is leave my rig's main tuning dial (VFO A) set to 7.090 MHz, then set my rig's secondary or "B" VFO to 7.235 MHz, and activate the "split" feature. That way I can hear the DX station call on his frequency and respond on mine, keeping everything legal. [Until recently, the frequencies available to hams in Europe on 40 meters did not overlap with the U.S. phone band, so split operation was the only way to make transatlantic voice contacts. The situation has improved somewhat today (40 meters in Europe now extends to 7.2 MHz), but the technique continues to be used and it is great fun!]

So much fun, in fact, that while sitting on my rented back porch as a young man, I began to wonder how to improve my 40-meter signal within the confines of a small suburban lot. I noticed that I had a tree just about a quarter wavelength away from my inverted vee. What would happen if I made a second inverted vee antenna, but with the element two percent shorter so that it would act like a director? And while I was at it, what if I added another set of insulators to that second inverted vee and then addd an *extra* two percent to the wire length so that with a pair of alligator clips jumping across the second set of insulators, I could now turn my director into a reflector! What made this new configuration especially attractive

Photo A– Mark Kerhlikar, WD9HBF, asking for a signal report from his mobile. (Photo by Mark Kerhlikar, WD9HBF, used with permission).

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

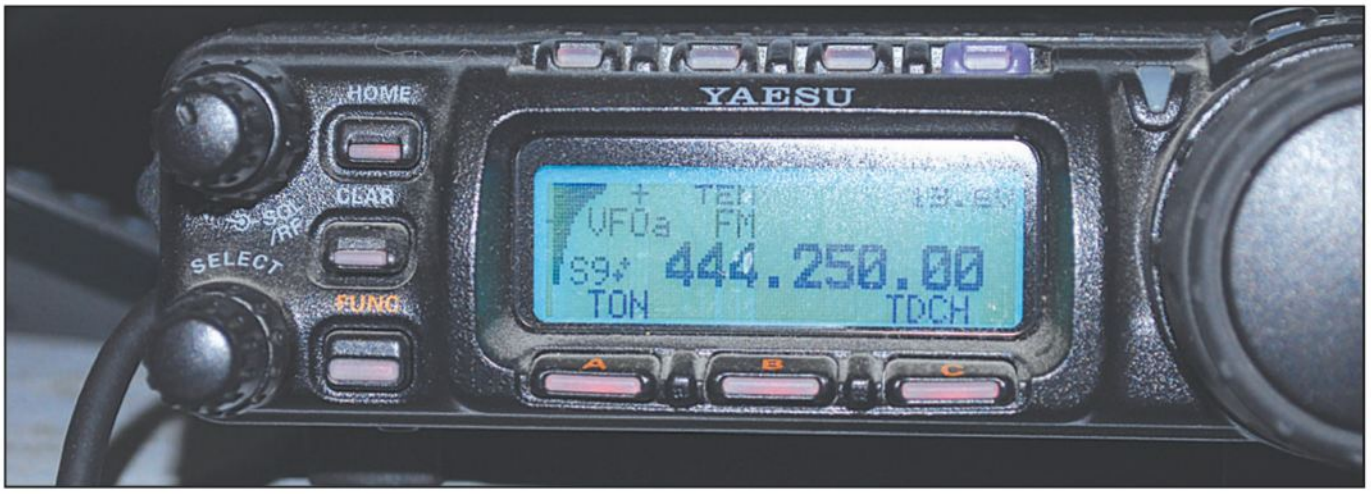

Photo B– A Yaesu FT-857 S-meter showing a signal of S-9+. (Photos B–D by KØØZ)

was that as a director, my primary direction would be towards Europe, and with the reflector added in, it would change my primary direction towards Oceania! I could hardly wait to hear the signal reports from my new antenna configuration. The reports did come in and they were very positive. On the average, stations that I chatted with regularly noticed a big improvement in my signal strength … and told me so in their signal reports! This was very useful information and it started me on the road of antenna construction and experimentation. The point is that to have a valid QSO, a signal report does not have to be given; however, it sure can be helpful and doesn't take much additional effort to include.

Honest Signal Reports

What's important to remember, I think, is to give out an *honest* signal report (see photo A). However, that can be somewhat of a daunting task because the signal report process is so subjective. In other words, there is not a tried and true absolutely objective way to give out the report. For example, a thermometer is a calibrated device and we all can agree that if it reads 90 degrees F, then it is a fairly safe bet that at that location the temperature is 90 degrees F. Radios, on the other hand, are not quite so simple.

Sure, radios have an "S" meter, but do they all read the same? How many times have you heard someone over the air claim that their S-meter was stingy or too tight? In other words, my receiver may be receiving a station very clearly and it sounds like the signal is "pounding in," but the meter only reads an S-5. If I go by the meter and I am using phone, I would give the other operator a 5-by-5 when I really want to give him a 5-by-9. What's going on and what should I do? But first, what do those RST numbers mean anyway?

Signal Reporting Using the RST system

According to ARRL website "Quick Reference Operating Aids," the RST system is an acronym used to give another station a signal report.

The "R" stands for *readability*. In other words, how well can you understand the station's signal's intelligibility? Here is the scale:

Readability

1: unreadable
2: barely readable; only occasional words distinguishable
3: readable but with considerable difficulty
4: readable with practically no difficulty
5: perfectly readable

The "S" represents *Signal Strength*. Once again there is a scale:

Signal Strength

1: very faint signals
2: very weak signals
3: weak signals
4: fair signals
5: fairly good signals
6: good signals
7: moderately strong signals
8: strong signals
9: extremely strong signals

The "T" represents *Tone* and it is used in the report for CW, RTTY, and other digital transmissions. With voice (phone) transmissions, this part of the RST system is omitted when giving out a report. This scale also has nine levels:

Tone

1: A sixty-cycle hum is present on the signal. Very rough and raw to listen to.
2: Very rough, harsh and broad a.c. hum is present on the signal.
3: Rough a.c. tone, rectified but not filtered
4: Rough note, some trace of filtering
5: Filtered rectified a.c. but strongly ripple-modulated
6: Filtered tone, definite trace of ripple modulation
7: Near pure tone, trace of ripple modulation
8: Near perfect tone, slight trace of modulation
9: Perfect note, no trace of ripple or modulation of any kind

But Is It Objective?

Now that you have a better idea of what RST actually means, it doesn't take too much investigation to determine that this supposedly objective reporting system still leaves a lot of room for guessing. In other words, it isn't quite as objective as one would think. It still is useful, but it does have its flaws.

For example, the readability section seems rather straightforward, doesn't it? I suppose that among "purists" and

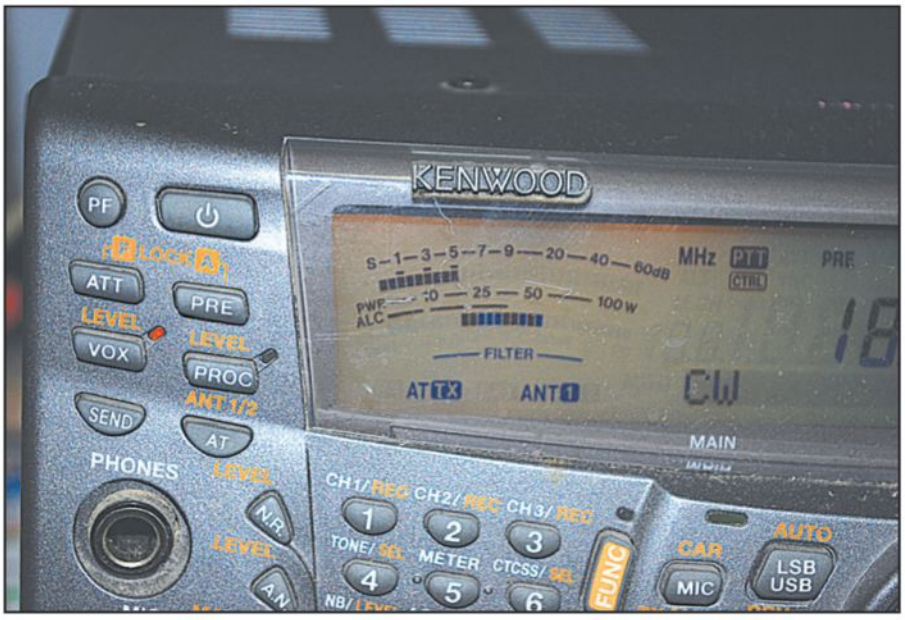

Photo C– Kenwood TS-2000 S-meter showing a signal level of S-5.

grammarians there may be some difficulty with an R-4 vs. an R-5; namely, what is the difference between practically no difficulty and perfectly readable? To further add insult to injury, I have heard readability reports given on repeaters that made me cringe.

I am a DXer and a VHF weak signal operator, which means that I've trained my ear to listen for faint, barely-readable signals. Sometimes, these can be a challenge to copy well, but with regular practice it can be done. I always get a smile on my face when another operator asks me how I am able to pick a call sign out of the noise level! Yet on some of the local repeaters, I have heard some ops give another op a poor readability report when I was able to hear each and every word uttered by the op asking for the report. To be fair, there was some noise on the signal, so his signal wasn't, as FMers refer to it, "full quieting," but I was able to understand each and every syllable without even really trying. I would have given the chap a good report and then mentioned that he wasn't full quieting, but I could copy every word.

Now let's look at signal strength. The same thing applies here, but even more so. For instance, what is the difference between fair signals (S-4) and fairly good signals (S-5)? Likewise with moderately strong (S-7) vs. strong signals (S-8)?

Photo D– Yaesu FT-726R with an analog S-meter.

S-meters to the Rescue!

One may think that a receiver's S-meter determines the signal strength reading. A lot of hams think that and in turn. use their transceiver's S–meter to give out a more objective signal report. Among electrical engineers, an S-9 HF signal means that there is a –73dbm or a 50-microvolt signal present at the receiver's antenna input of 50 ohms (photo B). For VHF, there needs to be a –93dbm or 5-microvolt signal present at the receiver's 50-ohm antenna input. To further complicate matters, one S unit is equivalent to a difference of six dB. What's a dB? It stands for *decibel* and a decibel is the smallest audio level the human ear can detect. Many receivers have AGC (Automatic Gain Control) circuits, which are wonderful circuits for keeping you from blowing out your ears. For example, if you are listening to a 40-meter phone signal originating half-way across the world when suddenly a local station decides to call "CQ" running 1000 watts only a few hundred hertz away, I can assure you that you'll be glad that your AGC circuit will kick-in. You will most definitely hear the nearby station's increased signal level, but thanks to the AGC, your eardrum won't be shattered and your skull split in two! That's a good thing, but the problem with the AGC is that not all of them give the proper 6-dB per S-unit correspondence, which now results in an S-meter being "too tight" (photo C). Combine that AGC factoid with the fact that not everyone uses the same antenna, and they do vary in gain, so that an S-4 signal on my vertical will not compare favorably with an S-8 signal on my Yagi antenna. As you can see, we are back to being somewhat subjective again with our signal strength reporting (photo D).

Reporting Tone

A number of hams have suggested that the tone section needs to be dropped, since virtually all modern transmitters produce sharp, clean, tones. Plus, unless you have a lab grade, calibrated oscilloscope properly matched to your receiver, it is practically impossible to objectively tell another op that his tone is a 3 or a 6. What is the lab definition of a near-perfect note (8) vs. a perfect tone (9)? A purist might offer that the difference can be by detecting a slight trace of modulation vs. no trace of rip-

ple or modulation. But once again, we get back to the need for an oscilloscope or a carefully trained ear. I'll go with the oscilloscope, but how many hams have one connected to their transceivers with the proper grounding and impedances matched? Nonetheless, it is possible to hear a hum on a signal without an oscilloscope and it is important to tell the operator with whom you're in QSO that his signal is raspy or has chirp. Such signals violate FCC rules, and you'll be doing your fellow ham a big favor by letting him/her know there is a problem.

Bottom Line

The bottom line is that as carefully as the RST system was designed to give hams an objective means in which to honestly give out a meaningful signal report; the fact is that the subjective element was not entirely removed. Plus, for expediency's sake during DXpeditions or contests, many ops give out 59 or 599 reports for all contacts, regardless of the actual, real reception level that is present. So in a way, the RST system is more of a subjective system than an objective one. Yet, it is still the one most widely used by hams.

However, there are some variations. VHFers—when working another station via the aurora using CW—might give a report like "55A." The "A" stands for aurora and that's because the aurora puts a "buzz" on the signal and it is impossible to give a 9 for tone when working aurora. EME (Earth-Moon-Earth) ops using JT65 software don't even give out "traditional" signal reports. Instead, they exchange information like call signs, grid squares, "OOO," "RO" and "RRR," with maybe a "73" thrown in for good measure.

So What Should I Use?

Over time and with experience, as you get to know the characteristics of your rig, it will become increasingly easier to give out more "accurate" signal reports. The key thing to remember is that a signal report is not a "be-all to end-all." It is subjective and it is relative. Along with the signal report, some useful information to gather would be what type of antenna and feedline the other station is using, how active the ionosphere was when the QSO was made, and when using VHF or UHF FM, whether there were any enhanced operating conditions such as tropospheric scatter or ducting.

With time and experience you, too, will be able to tell whether a received signal is an S-5 or an S-9 without having to look at your transceiver's S-meter. I can guarantee that there will be times when making a contact, you are going to give out a report that you know sounds like an honest S-7, even though your S-meter is only reading an S-2! It all depends on how well the AGC is tracking that signal level present at the receiver's antenna input. So if the signal sounds like a true S-7, then I would suggest giving out a 5 by 7 for phone or a 579 report when using CW.

Signal Reports and Repeaters

When it comes to giving out signal reports on FM repeaters, the phrase that you'll most likely hear is that the signal is *full quieting*. In other words, the signal is very intelligible and there is no static present or any dropping out. There is "armchair copy," and the transmitting station sounds like he/she is in the same room. On the other hand, sometimes you'll hear the term, *"picket fencing."* To *picket-fence* means that the received signal is rapidly dropping in and out, so the transmitted audio sounds like it is fluttering. When the signal is present, it is fine, but when it drops out, then it is gone. One of the causes for picket-fencing is the presence of some obstruction partially blocking the path between the transmitted signal and the repeater's antenna. Other times it can occur in the repeater's "fringe" area where the signal level is so low that it is hard for the repeater's limiters to lock onto the signal. It's okay to tell someone when they are picket-fencing.

One More Criterion for a Valid QSO

Before leaving the topic of valid QSOs, there is another criterion that the late Gene Zimmermann, W3ZZ (SK), made in his *QST* column, "The World Above 50 MHz" in March, 2006. Gene stressed that in addition to call signs and some other unknown bit of information, it is vital for the operators engaged in the QSO do so by themselves and with only their radios. There should not be anyone else aiding them with the QSO information. Coaching or mentoring is fine, but the operators should be able to rely only on each other and not depend on the aid of a cell phone or a net to tell them if they got the transmitted information correctly interpreted over the air. Ham radio has a proud tradition of policing its own ranks and being honest is a cornerstone of that tradition. There have been times when I desperately needed a contact with a DX station and I know that the DX can hear me, but I am unable to hear the DX that well. I desperately wanted that QSO for a QSL card, but I knew deep in my heart that I hadn't really made the two-way contact. I had to remind myself that there would be other times with better propagation, and there were, and I eventually put the contact into my log book! Would anyone have been the wiser if I had cheated? Perhaps not, but I would have known and I wanted my achievement to mean something to me!

Summary

Again, thank you to Bryan Buck, WH7DX, for suggesting this month's topic. In most cases, signal reports are not required to have a valid QSO, but exchange of call signs and some previously unknown information such as a grid square, or a QTH or an island number will make a valid QSO. Remember to make your QSO without relying on someone else, outside of the station that you are in QSO with, to confirm the needed information. Although the RST reporting system tries to be objective there is still some subjectivity, but do try to give out an honest signal report. I hope this sheds some light on striving for a valid QSO! 73, Ron, KOØZ

BY TOM SMERK,* AA6TS

Israeli Hams Reach Compromise on Antennas

Our first story this month comes to us from Israeli ham Daniel Rosenne, 4X1SK. I found it interesting because it is a nice follow-up to last month's story about the ham in New Zealand who had so much trouble with the City Council, fighting to keep his tower. I believe that as time passes, ham antenna and tower installations will continue to become more of a target for environmentalists, and we need to make sure that our hobby is protected by laws that will stand up in court if we are ever called to defend our antennas and towers. Here is what 4X1SK has to say about it:

Amateur Antenna Regulations—the Israeli Way

By Daniel Rosenne, 4X1SK

Amateur antenna restrictions are becoming a world-wide problem, and Israeli amateurs are no exception. Public phobia of electromagnetic radiation and the no-restraint attitude of cellular service providers have resulted in public demand for laws and regulations restricting non-ionizing radiation sources, antennas and towers.

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In Israel, a Non-Ionizing Radiation Law was passed in 2006, aiming to protect the public and the environment from the possible harmful impacts of exposure to non-ionizing radiation, including radiation from cellular base stations and electricity network installations. It regulates the establishment and operation of non-ionizing radiation sources, including amateur radio stations. Furthermore, municipalities enforce strict building regulations, and obtaining building permits for towers and large antennas has become virtually an impossible mission.

These laws and regulations had enormous negative effects on the Israeli amateur community, and required a public policy campaign in order to find a way amateurs can survive in the new legal environment.

Political leaders understood the public interest in amateur radio. Fortunately, after some persuasion by Israeli amateurs, important political figures, including the Minister of Communications (responsible for amateur radio licensing), the Minister of Environmental Protection (responsible for non-ionizing radiation licensing) and the Minister of Interior affairs (responsible for building regulations) understood the public interest in ama-

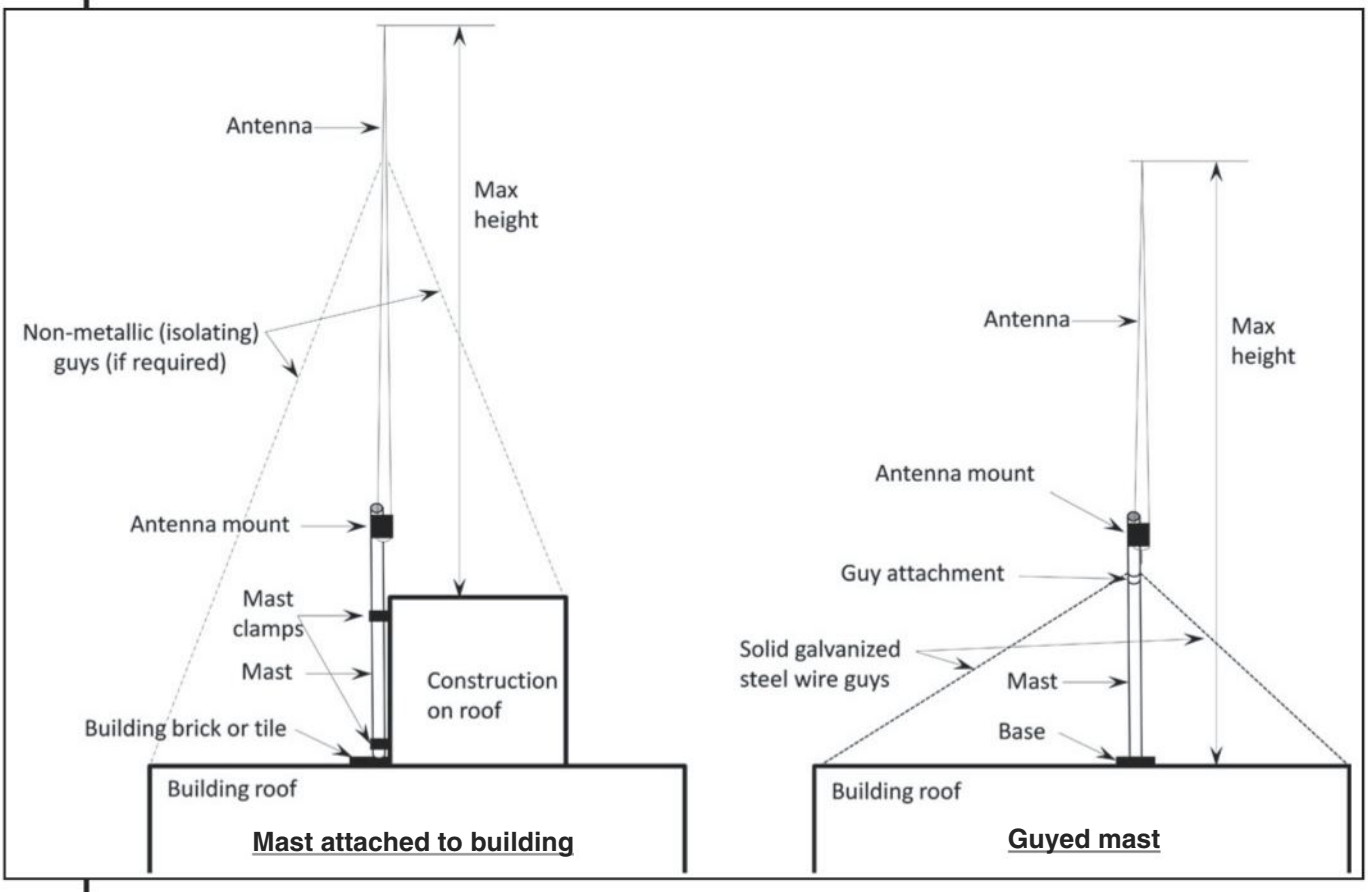

Fig. 1– Simple vertical antenna structure examples included in Israeli buildings regulation. Antennas meeting these standards do not need separate engineering approval.

teur radio, both for creating interest in technology among young people and providing essential communications in emergency situations, and came to the rescue.

After lengthy and tedious lobbying, suitable exemptions for radio amateurs were introduced in the relevant laws and regulations. One can now practice amateur radio in this new and improved legal environment, with minimal constraints.

As of now, Israeli radio amateurs can reasonably obtain all necessary permits. Once passing amateur exams and receiving an amateur radio license, in order to put together an amateur radio base station, Israeli amateur radio operators have to obtain two additional permits: a "non-ionizing radiation source" permit and a building permit.

The "non-ionizing radiation source" permit is granted by the Noise and Radiation Abatement Department in the Ministry of Environmental Protection. Radio amateurs are required to fill station and antenna details in a specific form, and self-calculate the theoretical non-ionizing radiation levels to show they meet the ministry thresholds. The application may be filed by e-mail, and a minimal fee is required for a two-year permit. Commercial radio stations (such as cellular base stations) require actual measurements and continuous monitoring. Amateur radio stations are exempt from all this.

Building permits for towers and antennas are granted by a local committee of the respective municipality. A radio amateur wishing to erect a high-profile arrangement, such as a tower with a rotating beam, has to go through normal procedures, which are rather lengthy and can meet public objections (for detracting the beauty of the neighborhood, etc.). However, if one wishes to put up a low-profile arrangement, such as wire antenna or a vertical, this can be done within the framework of a fast-track permit, obtained with minimal hassle and simple procedure. The regulation specifically forbids the municipality from raising unnecessary requirements.

Most Israelis live in multi-tenant buildings (with flat roofs, rather suitable for simple antennas), and in this case, tenants' signatures are required. Wire antennas may be attached to existing structures. The maximum height for a vertical under the fast track arrangement is limited to 29 feet, 6 inches (9 meters). If the proposed antenna is built according to the examples specifically described in the regulation (see fig. 1), no construction engineering approval is required. These verticals are limited to a weight of less than 22 pounds (10 kilograms) and wind surface of less than 6.5 square feet (0.6 square meters). If manufacturer specifications do not meet free standing at 80 mph, guys must be added. The mast should be $1^1/_4$ or $1^1/_2$ inches OD steel pipe, less than 16 feet, 4 inches (5 meters) long.

Reasonable compromise is in the public interest. It is important that amateur radio, as a public service and as part of the community, be accessible to everyone and must abide by all laws and regulations. Israeli amateurs were successful in enlisting major political figures for the cause of amateur radio, thus enabling modification of laws and regulations to provide practical answers for amateurs, meeting the public interest, within a rather restrictive legal environment.

The fast-track building permits for low-profile antennas is a reasonable compromise, solving many problems and assuring radio armatures can practice their hobby. However, although this regulation establishes a positive attitude towards amateur radio, it does not solve the problems of radio amateurs wishing to put up full scale towers and large antennas.

IARU Helps Raise Ham Radio Visibility in Ghana

Last month, I told you how Ghana was taking the first steps toward administering amateur radio in that country. Since then, I have been following the developing story of ham radio in Ghana, and I am happy to report that there is a lot of optimism lately about your chances of adding a 9G prefix to your logbook.

Recalling last month's story, we discussed how The International Amateur Radio Union (IARU) offers Amateur Radio Administration Courses (ARACs) in developing countries, primarily to train regulators or prospective regulators on the administration of the Amateur and Amateur-Satellite services, and that Ghana's National Communications Authority (NCA) hosted the ARAC June 3–7 in Accra, the country's capital and largest city.

According to ARRL Chief Technology Officer Brennan Price, N4QX/9G5AB, one of the course instructors, 28 students attended the course, 24 of whom were from the NCA. In addition, three were from Kenya and one was from South Sudan. Another instructor for the course was IARU Region 1 President Hans Blondeel Timmermann, PB2T/ 9G5AA.

Ghana was chosen as the site for this training because, according to NCA Director General Paarock Vanpercy, "None of the licenses which have been granted to amateur radio operators by the NCA went to Ghanaians." Vanpercy further said, "In Africa and Ghana specifically, amateur radio operations have not been patronized as they have been in the developed countries." Price said there are only 10 Ghanaian licensees on the books.

One of the goals was to stress the need for Ghana to encourage amateur radio as a means to develop an interest and awareness of technology among the country's youth.

Vanpercy also commended amateur radio for its role in emergency communication.

Timmerman added that the NCA would soon publish the syllabus for the amateur radio examination, clearly outline modalities for the examination, and conduct Ghana's first examinations in some time.

The ARAC addressed several topic areas, including: Organization of International Telecommunications Union (ITU) and IARU; Nature of Amateur Radio Services; ITU Radio Regulations; Introduction to Amateur Radio Activities; ITU Radio Regulations: Amateur Allocations, National Allocation Table and Sub-Regional Arrangements; Implementation of World Radio Conference (WRC) Changes; How Society Can Benefit from Amateur Radio; National Licensing and Regulations; Amateur Radio Examinations; International Roaming (i.e., reciprocal licensing); Emergency Communications; and Electromagnetic Compatibility.

Similar courses have been held over the years at ARRL Headquarters under the administration of the United States Telecommunications Training Institute (USTTI). Price said the curriculum in Ghana was largely the same as the USTTI courses.

Price and Timmerman were granted licenses to operate from Ghana, and both did so "for instructional and recreational purposes," Price said. As 9G5AA, Timmerman logged more than 1000 QSOs while Price reported logging "dozens of contacts" as 9G5AB.

Terms of South African 5-year Amateur Radio License Still Being Worked Out

Apparently, there are still some bugs to work out in South Africa's conversion from one-year to five-year amateur radio license terms. The South African Radio League (SARL) recently received a communication from the country's telecommunications regulator, stating that if a South African radio amateur paid for five years and has advised the agency accordingly, the problem would be sorted out, even if a ham in that nation has received a license for only this year.

Nonetheless, the South African Radio League placed the matter on the agenda of its June liaison meeting with the telecommunications regulator. The results of that meeting had not been announced at press time.

(Courtesy South African Radio League)

Beacon Now Covers All of South Africa

Speaking of South Africa, after the two-element Yagi of the ZS2X six-meter VHF beacon was turned north by Tim Joubert, ZS2X, its signal is now covering most of South Africa. The 25-watt beacon near Port Elizabeth transmits FSK modulation on 50.007 MHz, and produced some very strong radio bursts during the Arietids meteor shower, which is the most intense daylight meteor shower of the year.

The beacon can also indicate country-wide tropospheric ducting as well as tropo scatter propagation on 50 MHz in the early mornings, as well as aircraft scatter along the planes' flight paths.

(Courtesy SARL)

Hams in Spain and Germany Granted New Bandspace

Salvador Bernal, EA7SB, General Secretary of Unión de Radioaficionados Españoles (URE), recently announced that Spanish radio amateurs have been granted an extension of the 160-meter band, from 1810–1830 kHz, on secondary basis. This is in addition to the country's primary allocation at 1830–1850 kHz. In addition, Spanish hams are now allowed to use the 600-meter band from 472–479 kHz on secondary basis.

Amateurs in Germany have had their 6-meter band extended to include from 50.03 to 51 MHz until at least the end of this year. German radio amateurs may use all modes with a bandwidth up to 12 kHz, but must not cause interference to the German military, which is the primary user of the band.

Does Ham Radio have an Emergency Communications Role in Europe?

As I wrote this column in June, delegates and guests were preparing to meet in Zurich, Switzerland, for the Global Amateur Radio Emergency Communication (GAREC) 2013 Conference. Some of the goals included learning the approaches being taken in different parts of the world, identifying the true objectives of amateur radio emergency communication, dissemination of disaster information at an international level, discussing how to have hams prepared, trained and involved, and how to convince authorities about the effectiveness of amateur radio emergency communications.

Stefan Streif, HB9TTQ, an organizer of GAREC 2013, advised that one topic on the agenda was whether amateur radio has an emergency communications role in Europe. According to Streif, the authorities believe their infrastructure is so good, and its technical level so high, that a disaster could not affect communications over a wide area.

The conference was held June 25-27. I will be watching with interest for more information on the outcome of this conference because of the unique nature of the topics for discussion.

October Brings Major Brazilian Ham Show

It is time to mark your calendar and, if your resources permit, plan to attend FENARCOM (Feira Internaconal De Radio Comunicacão), the major ham show for Brazil, which is scheduled for October 3–6, 2013 at Pavilhã Viber in the city of Indiatuba, which is located in the state of São Paulo, in southeastern Brazil.

The idea of creating a radio communication fair in Brazil came up many years ago, inspired by the American experience of the Hamvention® held in Dayton, Ohio, which has been happening for over 50 years. In Brazil, FENARCOM has been through six important changes, including an upgrade to reach new markets. From this seventh edition onwards, FENARCOM also embraces the commercial and public-sector radio communication market, bringing the main players from this sector and visitors from sectors ranging from managerial, security, industry, military forces, etc.

FENARCOM is supported by several exhibiting companies, including Icom, Comet, Daiwa, Kenwood, and the Brazilian edition of CQ magazine. For information, see <http://www.fenarcom.com.br> or e-mail <fenarcom@inovaexpo.com.br>.

Tell Us Your News

As you can see from the first story this month, we're happy to give you credit for your story, or if you prefer, just send me the details and I will research the information and write a story based on your facts. I would also like to receive more photos from newsworthy events or photos of hams having fun while helping to promote our hobby around the world. Please send your comments, stories and photos to Tom Smerk, AA6TS, at <aa6ts@cq-amateur-radio.com>. Until next month, 73, Tom!

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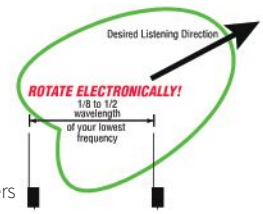

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BY WAYNE MILLS,* N7NG

Back in the Day . . . Some DXing History

History can teach us many lessons. While listening to a "60 Minutes" broadcast about the movie "Lincoln," I was thinking that some of our present day politicians might learn something by studying the history of Lincoln and his political environment. Then again, maybe not. Regardless, studying the history of DXing and DXers can teach many of today's DXers a few things. As a start, I have put together a brief history of one six-land DXer. I am not suggesting that the mini-history below is the only way to become proficient at DXing, but it did work for the individual involved.

School Days (1950–1960)

"For me, it all started in 1950 when my neighbor, Dave, and I built a 'crystal set' out of a razor blade and a pencil lead," recalled this DXer. "I was about eight years old at the time. The detector was described in *Boy's Life* magazine. (I'll bet some of you remember that article.) That detector, a pair of 'phones and a 60-foot end-fed wire about 15 feet above the ground was more than enough to receive the 50KW of KNBC (680 kHz) about five miles from my home! (Actually, I think some bad tooth fillings would have been enough to copy that station.) There was no tuner and no selectivity at all. There was an opera station in the background all the time, but it didn't bother me much. I was intrigued that the "radio" I built brought broadcasts to my ears late at night-when I was supposed to be sleeping. That "radio" was the spark.

Dave and I then worked on the Morse code with an old paper tape machine. We studied the Novice test written material, and we both had our Novice licenses in short order, Dave first, then me. My DX band was 80 meters, and my equipment was such that when the 75-meter rag-chewer up the street transmitted, I heard nothing but him. Selectivity? Nada. Kind of like the razor detector.

The Novice license was easy; I think I sent about 20 wpm in the code test. The General Class was different. The theory was difficult for this ten-year-old, drawing schematics and all. Eventually, thanks to Ted, W6BJH, I made General Class.

Dave and I did Field Day three times in the mid-fifties, and by the time I "graduated" from eighth grade in 1956, I was chasing DX and contesting. I had 90 watts on 20 meters, a dipole at 20 feet and a brand new National NC-88 receiver. The NC-88 had no crystal filter, but I added a Heathkit QF-1 Q-Multiplier, which helped immensely. That station started me in the world of DX. I added a pair of 811As in push-pull and a home-built two-element Yagi at 35 feet, and by 1959 had DXCC.

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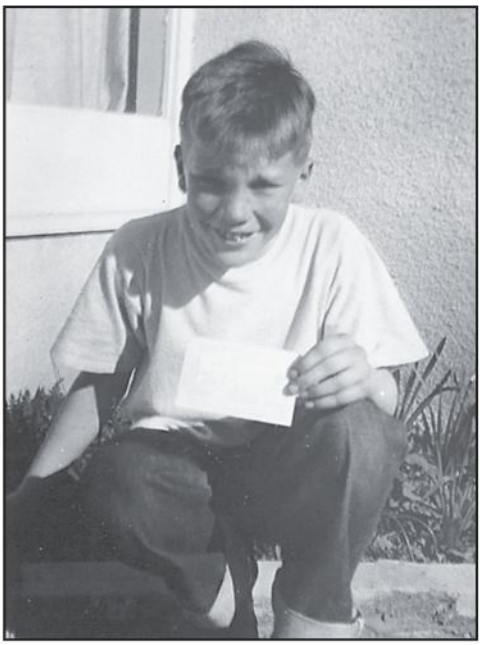

Our mystery ham, at age 10 in March 1953, displaying his brand new KN6ALH paperwork.

My first "real" DX, October 8, 1956 at 0540Z. A real thrill!

With 500 watts, I thought I was a "big gun." (I still have one of the 811As with two holes in the plates.)

Note that all of this activity was on CW. CW was the key (pun, sorry!), because the alternative at that time was mostly AM phone. If you have ever heard a pileup of big-gun AM stations calling DX, you would really appreciate CW even more. SSB was out there in limited use, but it was more difficult to implement, and even if you were able, some of the old timers would run you off. "None of that 'Slop Bucket' (SSB) allowed 'round here." Code was the thing, and that early practice paid off nicely in later years. DXing is still easier on CW, and these days more DXpedition QSOs are still made on CW than any other mode. History suggests to DXers: "Learn the code."

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DXE-F6-1000	75 Ω	1,000'	**$149.95**

Multi-Conductor Control Cable

The ideal cable to control your rotator or antenna switch, this color-coded stranded copper cable is reliable and flexible. A vinyl jacket shields it from the elements and it is available by the foot and in bulk spools. Find all the details at DXEngineering.com.

Part Number	Conductors (Gauge)	Description	Price/ Foot
COM-CW3	3 (20 AWG)	Standard	**$0.25**
COM-CW4	4 (20 AWG)	Standard	**$0.28**
DXE-CW8	2 (18 AWG) 6 (22 AWG)	Standard	**$0.48**
DXE-CW8-HD	2 (16 AWG) 6 (18 AWG)	Heavy Duty	**$0.89**
DXE-CW9	9 (24 AWG)	Cat5e	**$0.32**
DXE-CW9S	9 (24 AWG)	Shielded	**$0.36**

DXE-8X BNC Jumper Cables

These male BNC jumper cables use secure, crimped connectors and tube-shrink seals, which make them impervious to the elements. They are Hi-Pot and high voltage tested. In addition to these 50 Ω assemblies, 75 Ω cables are available as well.

DXE-8XDB002 2' Length.....**$14.25**
DXE-8XDB003 3' Length.....**$14.75**
DXE-8XDB006 6' Length.....**$15.75**
DXE-8XDB012 12' Length.....**$17.75**
DXE-8XDB025 25' Length.....**$21.75**
DXE-8XDB050 50' Length.....**$32.75**

Phasing Cables

DX Engineering provides precision, electrically-tuned phasing lines for your 50 or 75 Ω applications. Choose from pre-manufactured four-square and two-antenna array cables or contact us with your custom application.

Multi-Conductor Heavy Duty Tinned Copper Flat Braid

A critical part of any grounding system, this Flat Braid is made with terminals for quick, easy installation. See more sizes and grounding solutions at DXEngineering.com.

Part Number	Length	Price
7 AWG Braid Rated at 85 Amps 1" Wide, for a 1/4" Stud		
DXE-TCB10-RT01	1'	**$5.75**
DXE-TCB10-RT03	3'	**$8.75**
DXE-TCB10-RT05	5'	**$12.75**
DXE-TCB10-RT10	10'	**$18.75**
10 AWG Braid Rated at 53 Amps 1/2" Wide, for a #10 Stud		
DXE-TCB05-RT01	1'	**$4.75**
DXE-TCB05-RT03	3'	**$5.75**
DXE-TCB05-RT05	5'	**$6.75**
DXE-TCB05-RT10	10'	**$9.75**

DX Engineering is the Best Place to Get Coax, Here's Why:

- 100% Hi-Pot and High Voltage Tested
- Your **Coax Cable Order is Shipped FREE** Anywhere in the Contiguous 48 States
- Weatherproof: Adhesive Shrink Tubing Seals Connections
- Silver-plated PTFE-insulated Connectors
- Hand Crafted by Top Techs

See DXEngineering.com for more connector options.

Made in USA

Black PVC Jacket

DXE-8U Low-Loss Foam Dielectric Cable

- .405" high-flex PVC jacket

Attenuation per 100 feet	Power Rating	Efficiency
0.3 dB @ 5 MHz	5.4 kW	93%
0.5 dB @ 10 MHz	4.1 kW	90%
0.9 dB @ 30 MHZ	2.2 kW	81%
1.2 dB @ 50 MHz	1.8 kW	77%
2.2 dB @ 150 MHz	1.0 kW	60%

Pre-cut Cable with Connectors		
Part Number	Length	Price
DXE-8UDU002	2'	**$13.25**
DXE-8UDU003	3'	**$13.75**
DXE-8UDU006	6'	**$16.75**
DXE-8UDU025	25'	**$41.75**
DXE-8UDU050	50'	**$64.75**
DXE-8UDU100	100'	**$117.75**

UV-Resistant, Non-Contaminating, Black PVC Jacket

DXE-213U MIL-Spec Cable

- .405" Type II UV-resistant jacket is non-contaminating and suitable for outdoor use

Attenuation per 100 feet	Power Rating	Efficiency
0.4 dB @ 5 MHz	4.9 kW	90%
0.6 dB @ 10 MHz	3.4 kW	87%
1.0 dB @ 30 MHz	2.0 kW	79%
1.3 dB @ 50 MHz	1.5 kW	73%
2.4 dB @ 150 MHz	0.9 kW	57%

Pre-cut Cable with Connectors		
Part Number	Length	Price
DXE-213UDU003	3'	**$14.75**
DXE-213UDU006	6'	**$18.75**
DXE-213UDU012	12'	**$24.75**
DXE-213UDU025	25'	**$39.75**
DXE-213UDU050	50'	**$68.75**
DXE-213UDU075	75'	**$95.75**
DXE-213UDU100	100'	**$118.75**
DXE-213UDU150	150'	**$171.75**

UV-Resistant, Black PE Jacket

DXE-8X Low-Loss Foam Dielectric Cable

Known as RG-8X or Mini-8

- Very flexible; ideal for short, in-shack jumper cables
- .242" Type II jacket is non-contaminating and UV-resistant
- Direct-bury

Attenuation per 100 feet	Power Rating	Efficiency
0.6 dB @ 5 MHz	3.0 kW	86%
0.9 dB @ 10 MHz	2.2 kW	81%
1.4 dB @ 30 MHz	1.2 kW	69%
2.0 dB @ 50 MHz	0.9 kW	62%
3.8 dB @ 150 MHz	0.4 kW	42%

Pre-cut Cable with Connectors		
Part Number	Length	Price
DXE-8XDU003	3'	**$11.75**
DXE-8XDU006	6'	**$12.75**
DXE-8XDU012	12'	**$16.75**
DXE-8XDU025	25'	**$21.75**
DXE-8XDU050	50'	**$32.75**
DXE-8XDU075	75'	**$43.75**
DXE-8XDU100	100'	**$53.75**
DXE-8XDU150	150'	**$74.75**

UV-Resistant, Non-Contaminating, Black PVC Jacket

DXE-400MAX Low-Loss Cable

- Gas-injected foam, polyethylene dielectric bonded tape foil covered by a braided copper shield
- .405" low-density UV-resistant polyethylene jacket is ideal for outdoors
- Direct-bury

Attenuation per 100 feet	Power Rating	Efficiency
0.3 dB @ 5 MHz	6.9 kW	93%
0.5 dB @ 10 MHz	4.8 kW	90%
0.8 dB @ 30 MHz	2.8 kW	83%
1.1 dB @ 50 MHz	2.1 kW	79%
1.8 dB @ 150 MHz	1.2 kW	65%
3.3 dB @ 450 MHz	0.7kW	47%

Pre-cut Cable with Connectors		
Part Number	Length	Price
DXE-400MAXDU003	3'	**$16.75**
DXE-400MAXDU006	6'	**$18.75**
DXE-400MAXDU018	18'	**$35.75**
DXE-400MAXDU025	25'	**$43.75**
DXE-400MAXDU050	50'	**$66.75**
DXE-400MAXDU075	75'	**$99.75**
DXE-400MAXDU100	100'	**$119.75**
DXE-400MAXDU150	150'	**$179.75**

The WPX Program

CW

3412 ..... KB1ODO
3422 ..... K8WHA
3423 ..... W3IZ
3425 ..... RØJF
3426 ..... NE1RD
3427 ..... F5IYJ
3429 ..... G3KMQ
3430 ..... KØMD
3431 ..... K6UM
3433 ..... I2WEQ
3434 ..... AB1QP

SSB

3231 ..... NR7E
3264 ..... A61K
3308 ..... EA7ZY
3316 ..... K6ATZ
3328 ..... AF6GL
3329 ..... N9GUU
3330 ..... W3IZ
3331 ..... I2VGW
3332 ..... IZ8GUQ
3333 ..... IW9ABZ
3334 ..... YV5TX
3335 ..... K8CVZ
3336 ..... EI9GLB
3337 ..... K2YNY
3338 ..... KØMD
3339 ..... K6UM
3341 ..... KB1ODO
3342 ..... W2DZ
3343 ..... AB1QP
3344 ..... TA1HZ
3345 ..... I8YAV

Mixed

2426 ..... A61K
2503 ..... K6ATZ
2505 ..... IV3AVQ
2522 ..... KC9TTR
2523 ..... W3IZ
2524 ..... I2VGW
2525 ..... SP5APW
2526 ..... JA8IAF
2527 ..... JG3FEA
2528 ..... YV5TX
2529 ..... N4QM
2530 ..... IW2FND
2531 ..... EI9GLB
2532 ..... JA2ACI
2533 ..... KØMD
2534 ..... K6UM
2535 ..... HK4L
2538 ..... I2WEQ
2541 ..... I8YAV

Digital

205 ..... IW5BT
206 ..... IV3AVQ
212 ..... DH2ID
213 ..... W3IZ
214 ..... I2VGW
215 ..... JA2ACI
216 ..... K6UM

CW: 350 RØJF. 400 G3KMQ. 600 AB1QP. 700 K6UM, KB1ODO. 800 KØMD. 950 W3IZ. 1950 WD9DZV. 3100 K9UQN.
SSB: 350 KE3O, NA1DX, K6ATZ, WB4VMH, EI9GLB, K4JKB, W2DZ. 400 EA7ZYT. 500 I2VGW, AB1QP. 550 WA3PZO, KB1ODO. 600 K6UM. 650 A61K. 700 TA1HZ. 850 KØMD. 900 NE1RD. 1050 W3IZ. 1350 WD9DZV. 1450 K5CX. 1950 K9UQN. 2600 DL8AAV.
Mixed: 450 IV3AVQ. 500 W2DZ. 550 K3JHT, WB4VMH. 600 G3KMQ. 650 K8WHA. 700 A61K, K4JKB N7ZO. 750 TA1HZ. 900 AB1QP. 1000 NE1RD. 1050 I2VGW, F4GTB, KB1ODO. 1150 WB2RHM, K6UM. 1250 KØMD. 1500 W3IZ, JG3FEA. 2000 DH5MM, HA8QC. 2650 WD9DZV. 3500 K9UQN. 6400 WA2HZR.
Digital: 350 IV3AVQ, JA2ACI. 400 N7ZO. 450 K8WHA, W3IZ. 500 I2VGW. 650 K6UM. 950 F4GTB. 1000 WB2RHM. 1600 WD9DZV.

160 Meters: W3IZ, XP2I, KØMD, K6UM
80 Meters: W3IZ, KØMD, K6UM
40 Meters: W3IZ, K5CX, KØMD, K6UM, AB1QP
20 Meters: W3IZ, A61K, G3KMQ, WA3PZO, KØMD, K6UM, AB1QP, TA1HZ, K6VXI
15 Meters: W3IZ, A61K, JA8IAF, F4GTB, KØMD, K6UM, AB1QP
10 Meters: W3IZ, KØMD, K6UM

Asia: W3IZ, WB2RHM, A61K, K5CX, JA8IAF, KØMD, K6UM, TA1HZ
Europe: SP5APW, IZ8GUQ, W3IZ, A61K, G3KMQ, N4QM, KØMD, K4JKB, K6UM, I2WEQ, TA1HZ, I8YAV
Oceania: K6UM
North America: K4ED, W3IZ, YV5TX, K6ATZ, A61K. G3KMQS, KØMD, K6UM, K6VXI, HK4L
South America: DH5MM, KØMD, K6UM

Award of Excellence
12M Bar: UX1AA
Digital Bar: UX1AA

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX, S58MU, UX1AA, AB1J, DM3FZN, AG4W, UA3QNS, RX3AGD, WB5JID, LY3W, LY5W, RW4WZ, VO1CV, VE1YX, DK8MCT, HB9DDO, DL4CW, W9RPM, IZ3ENH, DM2DXA, EY8MM, K4HB, K6ND, TF3Y, K4CN, W1RM, W3LL, 4Z1UF, W3UA, N8VV, HA8QC.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, N3XX, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, NN1N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UR5FEO, N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, S58MU, UX1AA, DM3FZN, AG4W, UA3QNS, RX3AGD, LY3W, LY5W, VO1CV, HB9DDO, DL4CW, W9RPM, IZ3ENH, DM2DXA, EY8MM, K4HB, K6ND, W1RM, W3LL, 4Z1UF, W3UA.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will now accept prefixes/calls which have been confirmed by eQSL.cc. and the ARRL Logbook of The World (LoTW).

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are $6.50 each.

CQ DX Awards Program

CW

1144 ..... KW4CQ

SSB

2604 ..... N9GUU
2605 ..... KW4CQ
2606 ..... N6FS
2607 ..... W5BOS
2608 ..... EI3GAB

RTTY

64 ..... VE6MRT

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

With some help from my DXing Elmers, W6BAX and W6MX, working DX with low power and mediocre antennas was pretty easy. Really easy, in fact. They advised me to listen way down between the "local" stations. Sure enough, the DX was there. Weak, but in there. My first "real" DX was OH2XK in October, 1956 at 0540Z. Niilo was 579. I remember the details. That QSO was quite a thrill.

There were no spotting networks, so you really did have to listen to find DX. Today, if you can't be the first to work a rare DX station at least once a week, you need more listening practice. At the time, though, I didn't realize why it was so easy. I did learn quite a bit about how to get the rare stuff in the log, but eventually I realized that it was mostly Cycle 19! It seems that Cycle 19's smoothed sunspot number of 201 in March of 1958 had a lot to do with my success. For a while, I thought I was really good. History suggests to DXers: Listen carefully for the weak ones and hope for good propagation.

Unfortunately, at the time, I had no idea what sunspots were. No one mentioned the plethora of spots that was Cycle 19. Equally unfortunate was being stuck with simple home-built equipment, 20 meters only. Because of this, I couldn't take advantage of the spots to work more stuff on the higher bands, fifteen and ten. Of course, 20 meters was the place for DX to show up, so it wasn't that much of a handicap.

I was eventually able to upgrade to an old National HRO-7 with a crystal filter for selectivity. The problem with that receiver was that it took nearly an hour to warm up, drifting more than 30 kHz in the process. I had it turned it on with an alarm clock timer an hour before I got up in the morning. (Usually, I slept in, but sometimes I was there for the Far East and the long path to Europe.)

When I started DXing, one of the highlights each month was the DXCC Honor Roll listing in *QST*. It was great to see my Elmer, W6MX, approaching Charlie Mellen, W1FH, and Don Wallace, W6AM, in the one column-inch Honor Roll listing.The Top of the Honor Roll

5 Band WAZ

As of July 1, 2013, 904 stations have attained the 200 zone level and 1827 stations have attained the 150 zone level.

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

None

The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):

KØQC, 199 (26)
W4DC, 199 (24)
N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40)
IK1AOD, 199 (1)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
RU3FM, 199 (1)
N3UN, 199 (18)
W1FZ, 199 (26)
SM7BIP, 199 (31)
N4NX, 199 (26)
EA7GF, 199 (1)
JA5IU, 199 (2)
W6OUL, 198 (37, 40)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
N5AW, 199 (17)
JH7CFX, 199 (2)
RA6AX, 199 (6 on 10)
RX4HZ, 199 (13)
S58Q, 199 (31)
K8PT, 199 (26)
N8AA, 199 (23)
IZ1ANU, 199 (1)
IN3ZNR, 199 (1)
JK1BSM, 199 (2)
RWØLY 199 (2 on 40)
JA1CMD, 199 (2)
I5REA, 199 (31)
EA5RM, 198 (1, 19)
N8LJ, (17, 24)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
F5NBU, 198 (19, 31)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
UA4LY, 198 (6&2 on 10)
JA7XBG, 198 (2 on 80&10)
JA3GN, 198 (2 on 80&40)
N4GG, 198 (18,24)
K4JLD (18, 24)
W1FJ 198 (19,24)

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

PY1CAS (159 zones)
OK2QA (186 zones)
UR1MI (170 zones)
W2FB (189 zones)
NM5Z (164 zones)

5 Band WAZ updates:

None

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

then was about 270 countries. Another aperiodic interest was the series of *CQ* magazine articles by Danny Weil, VP2VB, describing his exploits aboard the Yasme I, II, III, etc. etc. I guess he never made it all the way around the earth alone, as was his goal.

The College Era (1960–1970)

My college years didn't help me add to my country total. I did work a few during breaks, and summers, but new ones came slowly. Wisely, I didn't become active at school until I was a graduate student. I really didn't worry much about totals, though, just a few new ones from time to time were enough to interest me. One summer, using a 900-foot rhombic at a Stanford Research (SRI) field site, I worked Gus Browning, W4BPD, at AC5A in Bhutan and AC5A/AC4 in Tibet. That was a learning experience. Gus's "receiver roulette" and working cross-band as the situation required taught me some new techniques: Listen carefully.

Post College-Starting Over? (1972–1977)

Prior to the 1977 DXCC Rule 9 change, a new QTH required starting DXCC over from the beginning if you moved more than 150 miles. In 1972, we moved out of California. At 293 confirmed, I wasn't at all interested in starting over. During the next five years I operated a few contests and kept my pileup skills tuned up. When the rule was changed in 1977, allowing DXCC participation from anywhere within a single DXCC entity, I was ready to pick up where I left off.

Back in the Saddle (1977–1984)

We built a house on five acres in 1977. Before the house was finished, I had put up a tower and tribander. I had also

The WAZ Program

6 Meters

115 .....SP3E (25 zones)

12 Meters CW

74 .....NIØG
75 .....NIØC

40 Meters CW

297 .....AI9Y

160 Meters

426 .....VK4MA (40 zones)

All Band WAZ Mixed

9019 .....PY1CAS
9020 .....EI2GLB
9021 .....NA9L
9022 .....W1ASB
9023 .....N6DVR
9024 .....N9ZI
9025 .....K9GVT
9026 .....SP3FGQ
9027 .....WØOVM
9028 .....SQ1EIX
9029 .....DF2SD
9030 .....KI2P
9031 .....KB2FCV

SSB

5258 .....W1ASB
5259 .....W3GLL
5260 .....EA2WD
5261 .....NN6MM
5262 .....NM5Z

CW

717 .....JA1HEH
718 .....IK6IJF

RTTY

240 .....IK2DZN

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

THE WPX HONOR ROLL

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

MIXED

6798 9A2AA	4344 VE3XN	3382 W2OO	2531 W6OUL	1818 AK7O	1329 DK8MCT	1002 IK8YFU	712 ISØEBO	647 PAØQRB
6480 K2VV	4333 KØDEQ	3379 K1BV	2515 AG4W	1818 KX1A	1322 AA4FU	978 V51YJ	710 WS5J	644 KWØH
6140 W1CU	4292 W9OP	3376 K9UQN	2499 VE6BF	1722 VE6BMX	1307 K4HB	976 KM6HB	707 W1/E74OF	636 ZS2DL
5594 9A2NA	4290 I2PJA	3335 JN3SAC	2476 K5UR	1667 SQ7B	1272 KA5EYH	964 K8ZEE	706 OE8TLK	634 UA3LMR/QRP
5250 EA2IA	4228 N6JV	3305 JH8BOE	2338 I2EAY	1655 SV1DPI	1269 K5WAF	940 K1DX	684 FG4NO	629 WB4SON
4866 N4NO	4129 S58MU	3265 OZ1ACB	2289 N3RC	1594 NE6I	1201 IT9ABN	924 IW9HII	682 AI8P	620 PI4DHV
4864 VE1YX	4022 N9AF	3252 W9IL	2192 N2SS	1593 S55SL	1148 W9RPM	908 K4JC	682 N8HM	616 DL5JH
4762 KF2O	4005 I5RFD	3075 W3LL	2116 AE5B	1524 K6UXO	1116 YU7FW	825 KD4W	670 WW3QB	615 KØBAM
4722 YU1AB	3970 N8BJQ	3151 N6QQ	2133 KØKG	1462 DL4CW	1107 PY2MC	815 KL7FAP	662 JA7OXR	607 K3CWF
4589 S53EO	3966 IK2ILH	3007 W2WC	2040 W2FKF	1446 DF3JO	1075 N6OU	808 W6PN	662 KJ4BIX	600 IK1RKN
4429 ON4CAS	3866 WB2YQH	2946 YO9HP	1961 W7CB	1400 NKØS	1071 K6HRT	751 YB2TJV	662 SP8HKT	600 KB9OWD
4415 I2MQP	3809 SM6DHU	2905 AB1J	1918 NXØI	1394 K4CN	1066 9A3ST	726 K5IC	653 KK3Q	600 K9OHI
4363 YU7BCD	3757 KC9ARR	2670 WD9DZV	1906 HA8QC	1383 IWØHOU	1066 JA1CKE	725 WK3N	650 N3YZ	600 VA3VF
4353 WA5VGI	3412 9A4W	2532 N3XX	1862 VE9FX	1331 YB1AR	1010 VE3RZ	723 KØDAN	649 RA9OO	

SSB

5247 IØZV	3323 OE2EGL	2609 IK2DZN	2315 SV3AQR	1940 PT7ZT	1550 IK2RPE	1146 SQ7B	1007 VE6BMX	735 K6HRT
4950 K2VV	3170 KØDEQ	2595 EA1JG	2209 IK2QPR	1935 SV1EOS	1480 AB5C	1145 EA3EQT	1004 K4HB	724 W3TZ
4847 OZ5EV	3108 I4CSP	2568 SM6DHU	2201 NQ3A	1927 AE5B	1464 VE7SMP	1098 K4CN	978 EA7HY	717 KØDAN
4757 VE1YX	3061 YU7BCD	2556 N8BJQ	2156 YO9HP	1913 K9UQN	1463 I2EAY	1089 IZ8FFA	965 VE6BF	714 YB2TJV
4584 F6DZU	3022 I8KCI	2542 W2OO	2131 N6FX	1879 K3IXD	1410 S55SL	1089 IT9ABN	931 YB1AR	690 W6PN
4442 9A2NA	2903 IN3QCI	2497 S58MU	2098 K5UR	1861 JN3SAC	1408 N3XX	1083 KX1A	919 KA5EYH	640 UA9YF
4238 I2PJA	2871 WA5VGI	2494 KI7AO	2094 I8LEL	1825 KQ8D	1401 K5CX	1045 NE6I	893 W9RPM	637 K5WAF
4112 I2MQP	2857 4X6DK	2493 N6QQ	2093 W2WC	1774 W6OUL	1386 IK4HPU	1042 IZØBNR	883 WA5UA	606 KJ4BIX
3901 EA2IA	2846 KF7RU	2451 EA3GHZ	2077 AG4W	1712 N3RC	1386 NXØI	1031 IK8OZP	875 K7SAM	600 WA2BEV
3890 KF2O	2742 W3LL	2409 DL8AAV	2076 K2XF	1641 AE9DX	1358 WD9DZV	1031 K4CN	833 DK8MCT	
3557 N4NO	2711 LU8ESU	2376 W9IL	2040 W2FKF	1623 VE9FX	1258 N1KC	1022 NW3H	802 N6OU	
3335 CT1AHU	2652 I3ZSX	2326 CX6BZ	1955 EA3NP	1611 W2ME	1189 NKØS	1012 KU4BP	758 IV3GOW	

CW

5930 K9QVB	3750 VE7CNE	3210 N8BJQ	2513 W2OO	2081 N6QQ	1549 AF5CC	1210 DL4CW	821 HB9DAX	695 S55SL
5810 WA2HZR	3749 WA5VGI	3003 K9UQN	2502 JA9CWJ	2010 K5UR	1504 K6UXO	1205 VE1YX	813 VE9FX	665 K6HRT
5741 K2VV	3695 KF2O	2880 JN3SAC	2478 W9IL	2008 YO9HP	1480 WO3Z	1186 NXØI	794 LA5MDA	629 IV3GOW
4395 N4NO	3676 S58MU	2788 IK3GER	2424 W2WC	1985 W6OUL	1447 EA2CIN	1165 VE6BMX	783 YB1AR	615 JH6JMM
4228 N6JV	3608 KØDEQ	2773 KA7T	2381 N6FX	1983 EA7AAW	1443 WA2VQV	1125 IØWOK	753 F5PBL	608 W9RPM
4071 LZ1XL	3604 W8IQ	2769 IØNNY	2373 VE6BF	1968 N3RC	1353 IT9ELD	1078 AG4W	749 AE5B	600 IK2SGV
3964 9A2NA	3504 YU7BCD	2723 EA7AZA	2311 W9HR	1957 WD9DZV	1227 NE6I	1049 K5WAF	743 JA5NSR	
3952 EA2IA	3216 I7PXV	2638 OZ5UR	2267 I2MQP	1940 AC5K	1223 KX1A	891 DK8MCT	732 SQ7B	
3918 VE7DP	3214 SM6DHU	2632 W2ME	2139 N3XX	1848 I2EAY	1220 AA4FU	825 W3LL	720 K4CN	

DIGITAL

1980 W3LL	1636 WD9DZV	1330 KF2O	1047 RW4WZ	912 KØDEQ	778 JN3SAC	670 IV3GOW	635 K9UQN
1763 N8BJQ	1351 AG4W	1297 IK2DZN	1009 GUØSUP	866 SQ7B	690 EA2IA	668 KA5EYH	
1709 N6QQ	1333 YO9HP	1160 W2OO	929 N3RC	783 YB1AR	672 K9AAN	672 K9AAN	

worked in two DX contests. My priorities were in order. After that, I worked almost everything that was available. I subscribed to the *West Coast DX Bulletin*, and much of what was reported there was stuff I needed. Having already confirmed some of the rarest stuff years before (Heard Is., Burma, Amsterdam Is., etc.), some serious DXing with a good antenna and amplifier brought me to the Honor Roll level by 1979.

At this point, I have to mention that I never thought I would ever make the Honor Roll. It was a major achievement, and I just never thought it would happen. That was also the case with the Top of the Honor Roll, Five-Band DXCC, and the Challenge. I just kept working DX. As I appeared to get close, I made a final push, and voila! There I was. None of these achievements was ever a goal. I guess I am just not very goal-oriented.

The DXpeditioning Era

In late 1983, I entered my DXpeditioning phase with an invitation to Clipperton Island. By 1985 we made it to Clipperton. In 1988, I did it again, this time to Auckland Island with ZL1AMO and ZL1BQD. In 1989, an invitation to XF4L with OH2BH, XE1L, W6RGG and others. More followed, and we hit a high point in Albania, ZA1A in 1991. Still more followed. Lots of off-shore contesting was also wedged in.

The "six-land DXer," if you haven't figured it out on your own by now, was me. KN6ALH of the early 1950s is today's N7NG.

The Activism Era-DXpeditioning Basics, DXAC, and ARRL

By 1992, I was becoming interested in the quality of operating-a natural consequence of operating from both sides of the pileup. Going back to at least 1978, I noticed that some DXpedition operators just couldn't control the pileups, and bad things would happen. Having some success in this area, due to some excellent training, I started my activism by writing "DXpeditioning Basics" and participating in DXing politics. I was a DXAC (ARRL DX Advisory Committee) representative, and then the DXAC Chair (1996-2001). I participated on the ARRL's DXCC 2000 Committee charged with reconsidering certain aspects of the DXCC program, and in 2000, I sold my business and went to work for ARRL as Membership Services Department Manager. In this job, I was supervising DXCC, contests and other operating services including-eventually Logbook of The World, LoTW. In the later years, LoTW absorbed most of my time, and at seven years it was enough. It was fun, I liked the east, but it was time to return to the west.

I learned of the great satisfaction one realizes by working DX from one location-wherever-no matter how difficult. Since returning home, my ham radio activity has been concentrat-

ing on Topband DXing. Cycle 24 has been strange in that solar activity has been so low that the low bands haven't been that bad-good for Topbanders.

Perspective

Much of the Mountain West is a good place for learning personal responsibility and eschewing handouts. As such, it's fertile ground for developing classic DXing skills. At its best, it's a solitary activity. Make no mistake about it: Attitudes are important in determining how successful we are as DXers. If you rely too much on others and expect handouts, you won't do well as a DXer.

Further, understanding ourselves as well as others is critical. If we spend all of our time blaming someone else for transmitting on the DXpedition frequency, calling out of turn on "my frequency," having better propagation, etc., we just won't be very successful. We won't learn much.

Of course, I spent many of my early DXing years in the Far West, the land of the "suffering sixes." While we in the West had a big advantage to the Pacific and the Far East, many more DXCC countries are right through the auroral zone toward Europe. Contests are tough from out there. DXing is tough, too, especially on the low bands. But I don't remember complaining much.

Finally, if you think the cacophony on the bands today is a new phenomenon, you probably have a short memory. I can tell you many stories even from the early days. Operating isn't the same, but it can be equally frustrating. But working with low power, poor antennas, and the Big East Coast Wall made working DX on 20-meter CW a challenge and a learn-

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604.

Mixed

K2TQC....277	VE3ZZ....207	HA9PP....190
W1CU....244	JN3SAC....207	ON4CAS....191
HAØDU....240	NI6T....207	BA4DW....188
VE7IG....240	HA5WA....206	HB9DDZ....188
HA1RW....239	F6HMJ....206	K8YTO....186
VE3XN....234	KF8UN....205	K2AU....183
HA5AGS....228	OK1AOV....205	K2SHZ....182
K8SIX....228	RW4NH....203	KJ6P....180
9A5CY....227	W4UM....203	K1NU....180
N8PR....224	N4MM....203	HA1ZH....178
W6OAT....220	IV3GOW....201	W5ODD....177
HA1AG....218	K8OOK....201	NØFW....176
KØDEQ....216	N5KE....200	HB9BOS....175
VE3ZZ....214	N4NX....192	

SSB

W1CU....224	KØDEQ....192	JN3SAC....177
W4ABW....202	N4MM....187	NØFW....176
VE7SMP....193	W4UM....184	DL3DXX....175

CW

DL6KVA....238	JN3SAC....202	N4MM....183
W1CU....233	W4UM....197	N4NX....177
DL3DXX....213	OK1AOV....196	N7WO....175
DL2DXA....209	HB9DZZ....186	
KØDEQ....207	OK2PO....184	

Digital

W1CU....184

The June 2013 DX University session at the ARRL Rocky Mountain Division Convention in Estes Park, Colorado.

ing experience. History, others' experiences, can teach us much about how to be better DXers.

DX University News

On June 27, 2013, The Mile High DX Association and the DX University presented another learning session. It was conducted as part of the ARRL Rocky Mountain Division Convention in Estes Park, Colorado. The moderator was Dick, K8ZTT. Participating professors were Walt, WØCP; Phil, NØKE; Kelly, NØVD; Jonathan, W6GX; Wayne, N7NG; Barry, NØKV; Ken, WØLSD, and Jim, AD1C. Check the DX University website <www.dxuniversity.com> for upcoming sessions.

There's an eleven-minute snippet of CW DXpeditioning operating by FO/UT6UD at the Marquesas Is. on the DX University site, <www.dxuniversity.com/audio/>. It's recorded in stereo, with a narrow filter on the FO, and a bandwidth of up to 4 kHz on the pile up. The operator is quite good. However, there is an interesting variety of operating both on the part of the FO, and those in the pileups. Study it and make some notes. See if you can list some of the more irregular techniques. In each channel, what's good and what's not so good? Send me your notes, and we'll see who can list the most cases. (Of course, I'll be the judge…) There are some useful things to be learned from listening to this recording.

WWV Visit

Scheduled as part of the RM Division Convention was a rare tour of the WWV/WWVB broadcast station near Fort Collins, Colorado. Although most of the transmitting equipment is fairly standard, the output circuitry—antennas and tuning apparatus—for the 70-kW 60-kHz WWVB transmitting system is something special. Many of us grew up using WWV for propagation services as well as time and frequency information. I did some time and frequency work as an undergraduate, so for me, this was a great trip. If you ever have the opportunity to tour WWV and WWVB, take advantage of the opportunity. Thanks to the station staff, Matthew, Douglas, Glenn, and Bill, for their hospitality.

Of Interest for September

09/06–09/16 XW: Laos by 9M6DXX and others

09/15–09/19 T8GM: Koror (OC-009), Palau

09/12–09/14 K4S: Sapelo Island (NA-058)

73, Wayne, N7NG

K9W: Commemorative DXpedition to Wake Atoll

A group of DXers plans to activate Wake Atoll (KH9) in early October as K9W to commemorate the lives of 98 civilian contractors who lost their lives there in October 1943, during World War II.

The group of contractors has been named the "Forgotten 98," and the expedition is described by team leader Lou Dietrich, N2TU, as "amateur radio's independent effort to keep their memories alive" 70 years later, and to "stir old family memories in an attempt to get family members to come forward for DNA testing (and) re-repatriating unidentified war dead on Wake and elsewhere."

Wake Atoll is #15 on Club Log's most-wanted entities list. The group hopes to be able to fly to Wake on October 4 and stay for two weeks, but the exact schedule will be dictated by the very limited availability of transportation. Look for updated information on the group's website, <http://wake2013.org>. More information on the "Forgotten 98" may be found at <http://wake2013.org/pages/forgotten98.html>.

The CQ DX Field Award Program

Mixed

134.....W3LL

CW

66.....W3LL

SSB

77.....W3LL

Digital

23.....W3LL

Endorsements

W3LL..... ALL Mixed: 1.8, 3.5/7, 28, 50 MHz

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. Please make all checks payable to the award manager.

BY TED MELINOSKY,* K1BV

State, City, and Park Awards

As of when this column was written, in early July, there are 37 states that offer a counties award or plaque and 13 states that do not. This provides an opportunity for you or your club to fill the gap if you happen to live in: AK, DE, HI, ID, IA, KS, MN, NE, NM, NV, ND, RI, and TN. If you know that one of these states does offer a county award, let me know. These awards may be earned as you progress in your efforts to complete the USA-CA All Counties requirements, and provide a morale boost showing your progress at "working them all." The current rules for each of the 37 states can be found at: <http://www.dxawards.com/UScountyawards.htm>.

The Mississippi Counties Award was one of the states on the no award list above until Floyd Gerard N5FG, (*CQ* magazine's custodian of the Worked All Zones Award) told me that his club, the 599 DX Association, developed the Worked All Mississippi Counties award. The rules are shown below.

Sponsored by the 599 DX Association, the Worked All Mississippi Counties Award was created to promote on-the-air activity among stations both inside and outside of the state of Mississippi.

Worked All Mississippi Counties Award

Sponsored by the 599 DX Association to promote on-the-air activity among stations both inside and outside of the state of Mississippi, the basic award requires proof of contact with at least 41 of the 82 Mississippi counties. When you provide proof of having contacted all 82 Mississippi counties, you are eligible to apply for a handcrafted wooden plaque. All bands and modes OK, with the exception of repeater or VoIP. Modes will not be shown on the award.

Send a GCR list to the award address, which can be found on the club website noted below. The application is a PDF form of the type you can enter information in designated fields.

Fee for the certificate is $US10. Fee for the plaque is $US70 for USA stations and $US100 for shipping to DX addresses. Send completed application and payment using cash, check, or money order to: Jason Mchail, PO Box 104, Brooklyn, MS. 39425. (For any other payment method, such as PayPal, IRCs, etc., contact the award manager for further instructions.) E-mail: <K5JUM@ 599dxa.org; Internet: <http://www.599dxa.org> (Awards)

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Clarence Newstead, VE5EGK
USA-CA All Counties #1235
June 25, 2013

USA-CA Honor Roll

500		2000	
VE5EGK	3611	VE5EGK	1433
1000		**2500**	
VE5EGK	1842	VE5EGK	1350
1500		**3000**	
VE5EGK	1548	VE5EGK	1261

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

For the Worked All El Paso Award, started in 1936, contact 15 El Paso, Texas stations, any band or mode, no time limitations.

El Paso Award

Many years ago, I listened in to a QSO on 10 meters and my ears perked up when the Texas station mentioned that the contact was good for the El Paso Award. I added the simple rules to the new awards directory I was planning to write. Fast forward to the

Fairgrounds. Contact: Hamfest Association of Cleveland, Inc., P.O. Box 81252, Cleveland, OH 44181-0252; phone: (800) CLE-FEST (253-3378); <http://www.hac.org>. (Talk-in 146.73– [PL 110.9] or 444.900+ [PL 131.8])

BENSALEM, PENNSYLVANIA — Mt. Airy VHF Radio Club Inc. (**Packrats**) **2013 Mid-Atlantic VHF Conference**, September 27–29 at The InnPlace Hotel. Contact: Dave Mascaro, W3KM, 1603 Mink Road, Ottsville, PA 18942-9541; <http://www.packratvhf.com>.

PIGEON FORGE, TENNESSEE — South-Eastern DX & Contesting Organization, **Inc**. (**SEDCO**) will hold **W4DXCC IX** from 4 p.m. to 8 p.m. Friday, September 27, and from 6 a.m. to 7:30 p.m., Saturday, September 28 at the Mainstay Suites Conference Center. Saturday activities include the Ten-Tec Hamfest at the Ten-Tec factory at 6 a.m., manufacturer's exhibit hall opens at 9 a.m., convention forums beginning at 11 a.m., and a banquet that begins at 7:30 p.m. Tickets are $25 if you pre-register by September 15, $30 afterwards. Price of tickets includes one raffle ticket, drinks, and snacks. Banquet tickets are $30 and are available until September 15. Contact: Rosie Lamb, 3134 Allen Drive, Maryville, TN 37803; phone: (865) 681-2279 or (865) 898-2279; <http://www.w4dxcc.com/>.

CARLTON, MINNESOTA — Carlton County RACES Fallfest-2013, Saturday, September 28 at the 4 Season Sports Facility. Contact: Teresa Dall, KAØCDO, 2848 County Road 4, Carlton, MN 55718; (218) 390-1308; e-mail: <wd0gvw @gmail.com>. (Talk-in 146.94– [PL 103.5], 147.00– [PL 103.5], or 146.94– {PL 114.8})

CEDARBURG, WISCONSIN — Ozaukee Radio Club ORC Fall Swapfest, September 28 at the Fireman's Park. Contact: Ozaukee RC, (262) 377-6945; <http://www.ozaukeeradioclub.org>. (Talk-in 146.97 [PL 127.3]).

HORSEHEADS, NEW YORK — Amateur Radio Association of the Southern Tier, **Inc**. (**ARAST**) **38th Annual Elmira International Hamfest/ Computerfest**, September 28 at the Chemung County Fairgrounds. Contact: Elmira Hamfest, P.O. Box 614, Horseheads, NY 14845-0614; phone: (607) 301-0040; <http://www.arast.org>. (Talk-in 147.360+ or 146.700–; exams 9 a.m.)

SPOKANE VALLEY, WASHINGTON — Inland Empire VHF Radio Amateurs, **Kamiak Butte Amateur Repeater Association**, **Northwest Tri-State ARO**, **Spokane DX Association**, **Palouse Hills ARC**, **University High School ARC**, **Lilac City ARC**, **& Panoramaland ARC** will hold the **Spokane Hamfest & ARRL Washington State Convention**, September 28 at the University High School. Contact: Spokane Hamfest, P.O. Box 2552, Spokane, WA 99220-2552. Betsy Ashleman, N7WRQ, (509) 448-5821; e-mail: <n7wrq@aol.com>; <http://www.kbara.org>. (Talk-in 147.38+; exams 11 a.m.)

TSAWWASSEN, BRITISH COLUMBIA, CANADA — Delta Amateur Radio Society ComFest Swap Meet & Communications Fair, September 29 at the South Delta Recreation Center. Contact: Delta Amateur Radio Society, c/o Tom Robson, 6510 Bradford Place, Delta, B.C. V4E 1G3. Website: <http://bit.ly/16dPWG3>.

*Please submit hamfest and special event announcements **at least three months in advance** by e-mail to <hamfest@cq-amateur-radio.com> or <specialevent@cq-amateur-radio.com>, or by postal mail to: CQ Magazine, Attn: Hamfests (or Special Events), 25 Newbridge Rd., Hicksville, NY 11801.*

Sponsored by the GPDX-CE Portuguese Group DX of Ceará, Brazil, the award requires working stations operating from the Lighthouse of the Stateof Ceará.

future, I was in the process of cleaning out dead/inactive awards and checked this one via a Google search. A new page on the club website validated it was still around, and that there still was no charge! That's a rarity these days. I suggest you provide a large SASE or a dollar to cover postage.

Started in 1936, the Worked All El Paso Award is believed to be associated with the second oldest contest in amateur radio. Contact 15 El Paso, Texas stations, any band or mode, no time limitations. Look for a special activity each year during the first weekend in November. No award fee for applicants. Send GCR list including name of the operator you worked to: El Paso ARC, 2100 San Diego Avenue, El Paso, TX 79930. Internet: <http://www.qsl.net/w5es/3_0/3_0.html>

Award of the Lighthouses of Ceará

Most lighthouse awards I've seen apply to the USA and Europe. Lighthouses do their job all over the world, and here's one from Brazil, a country with a huge coastline, but whose lighthouse activations are not commonly encountered on the bands. Spotting networks and web pages covering lighthouse activations are the best way to be informed of current and planned trips to rarer spots.

Sponsored by the GPDX-CE Portuguese Group DX of Ceará, the award requires working stations operating from the Lighthouse of the Stateof Ceará. SWL OK. All bands and modes accepted. Contacts on or after 1 August 2008 count for the award.

The basic award is available for contacting at least 5 different lighthouses of Ceará State, and a special award of merit for all 12 lighthouses. Contact the sponsor for cost of the special merit award, as all of the lighthouses have not yet been activated.

Fee for the basic award to South American stations is 5 IRCs, $US5, or 5 Euros. For all others the basic award fee is 8 IRCs, $US8, or 8 Euros. Endorsements cost 2 IRCs or $US2. Send the GCR list with the appropriate fee to Carlos Moreira Rua Pamela Loren, PT7ZT, 59 Mangabeira, 61600-000 Eusebio CE, Brazil. Internet:<www.gpdx-ce.org/diplomasingles.htm>

List of valid lighthouses:
CE-01 Jericoacoara
CE-02 Itapajé
CE-03 Pontal Das Almas
CE-04 Mundaú
CE-05 Mucuripe
CE-06 Aracati
CE-07 Pontal dos Cajuais
CE-08 Pecem
CE-09 Paracurú
CE-10 Camocim
CE-11 Morro Branco
CE-12 Tip of Mucuripe

Estonian Flora and Fauna Awards (ESFF)

One of the most recent countries to develop a "Flora and Fauna" awards series is Estonia. This type of award was initiated by Russian amateurs, and

One of the most recent countries to develop a "Flora and Fauna" awards series is Estonia, the Estonian Flora and Fauna Awards (ESFF). (Tks PT7ZT)

in the past 5 years about 20 countries have followed their general format of providing awards for having contacted stations that operate within the perimeters of their country's national parks, wildlife preserves, and other officially protected lands and waters. During the summer months, look for activity on 14022 and 14044. Stations usually will operate portable and provide an ID something like ESFF-005 to show that they are in the country of Estonia, operating from a fauna-flora park or preserve number 005 on the official list. The website of the country involved will almost invariably contain a complete list of all the valid parks and preserves in the country.

The worldwide list is available at <http://www.wff44.org/program/wff/>. The site is in Russian, but you will find a link on the left-hand side of the page "WFF DIRECTORY" and the word "Download." This will lead you to a master listing of some 9000 parks and nature preserves around the world. The USA section shows 512 valid locations for the award. I even found two not very far from my QTH in Connecticut. I think it's an interesting idea for a local DXpedition, which will be well received, because there aren't many stations in the WFF program in the USA. Here are the rules from Estonia:

Contact stations operating from within Estonian national parks and protected areas.

Class I—Work at least 7 different parks or protected areas.

Class II—Work at least 5 different parks or protected areas.

Class III—Work at least 3 different parks or protected areas.

Each class is a separate award. Send log extract including all the usual contact data. Fee for the awards is 5 Euros each. It is possible to send funds to Valery Kuznetsov (ES4RX) Swedbank's account number 1104957249 or through PayPal to <vkv@starline.ee>. Make sure that you provide your home address and send data via e-mail to ES4RX (es4rx@erau.ee).

Internet: <http://www.erau.ee/index.php?option=com_content&view=article&id=209>

List of parks and protected areas: <http://www.erau.ee/index.php?option=com_content&view=article&id=141&Itemid=116>

We are always interested in learning of new awards for this column. Please contact me with any details; a URL on the internet would be fine. 73, Ted, K1BV

BY JOE LYNCH,* N6CL

K4N to EL84, plus many more VHF-plus Happenings

Owing to the high demand for EL84 for the Fred Fish Memorial Award (FFMA), the Grid Bandits activated that rare grid between July 12 and July 15, using the special event callsign K4N. Here is their July 17 update from Marshall Williams, K5QE:

K4N from EL84 is now history. We enjoyed our adventure aboard Captain Greg's *Yankee Caps* 100-ft fishing boat, out of Key West, Florida.

QSO Statistics: 6 meters—1401 QSOs, the last one being with W3UR via SSB; and 2 meters—50 QSOs, the last one being with K2TXB via meteor scatter.

We worked Lance Collister, W7GJ; Hal Shaffer, N7NW; Paul Kiesel, K7CW; Frank Reynolds, W6BBS; and Mark McMillan, W7MEM via 6-meter EME. We also worked Brad Fuller, WQ5S, and Bud Semon, N7CW, using JT65A when we were trying EME. These last two QSOs were terrestrial in nature. Maybe something like *Es* and a bit of tropo?

Stations used included: Station number 1 (6m) 1.0 KW out into 6M5 M^2 Yagi; Station number 2 (6m) 1.5 KW out into 6M7JHV M^2 Yagi—EME; and Station number 3 (2m) 350 W out into 2M12 M^2 Yagi—SSB/CW.

Please remember that our QSL Manager is Joey Fiero, W5TFW. Send him your card plus an SASE and he will get you a QSL card in return. It will take me at least four weeks to design the card and then to get it printed. Please do not send QSL cards to the traveling members of our group, as we will not have any blank cards to send back.

Joey, as the QSL Manager, please help him do the job. This time with 1400+ contacts, it may take him a bit longer. However, he will get the job done. Please give Joey a break: Please do not hassle Joey about the cards.

Also, remember that this DXpedition was a joint effort. A lot of people helped us get this done. I personally want to thank the other operators. This was a somewhat difficult enterprise to pull off.

The operators included: Bill Simpson, N5YA; Bill Musa, K5YG; George de Montrond, NR5M; Jason Goldsberry, N5NU; Pete Walter, K9PW; Dan Bates, N5TM; and Marshall Williams, K5QE.

CQ WW VHF Contest: N6CL & W6CL Efforts

Last year my wife Carol, W6CL, and I made a major investment in our station when we bought the Elecraft K-3, KPA500, and KAT500. It has proved to be a very good investment. Carol uses it almost every day. She is net control for two HF traffic nets. The 500 watts makes the difference in getting through during some of the rough propagation days.

On the other hand, there is the 6-meter capability of the station that I have wanted to check out. Because of my hectic schedule, it came down to the last major VHF contest that would take advantage of the sporadic-*E* propagation, the CQ WW VHF Contest in July.

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

Sept. 5	New Moon
Sept. 12	First quarter Moon
Sept. 14–16	ARRL Sept. VHF QSO Party
Sept. 15	Moon perigee
Sept. 19	Full Moon
Sept. 21–22	ARRL 10 GHz and Above Cumulative Contest Round 2
Sept. 23	144 MHz Fall Sprint
Sept. 26	Last quarter Moon
Sept. 27	Moon apogee
Sept. 28–29	ARRL International EME Competition (2.3 GHz & Up)

—EME conditions courtesy W5LU

Having an already crowded city lot with loops for 80, 40, 30, 20, and 10 meters, plus a 10-element 2-meter quad, I decided to build something simple that would give me omnidirectional capability and future portability. Also, I wanted to see how much I could build using do-it-yourself (DIY) hardware-store inventory.

The result you see is in photo 1, a 6-meter horizontal loop built from 1/2-inch, schedule-40 electrical PVC conduit. Most of the fittings came from the plumbing side, however.

In photo 1 you can see that I used T-connectors to string the 14-gauge THHN house wire. I used a T-connection for the end and two cross-connectors for the cross spreaders and a place to string guy ropes, if needed.

For the mast, I used an old push-up mast. I mounted the PVC pipe inside the top section and

Photo 1– My homebrew 6-meter loop antenna. (N6CL photo)

Photo 2– Some of the QSL cards that K7CW accumulated for his 6-meter DXCC. (K7CW photo)

bolted it in place. Fully extended, the loop is up around 25 feet.

The performance has been very good. Thanks to the better than expected sporadic-*E* propagation during the contest, I was kept busy working stations. During the limited times that I was able to get on the air, I worked nearly 50 stations on both SSB and CW. I really appreciated the omnidirectional characteristic, which kept me from having to keep rotating a beam to accommodate the changing propagation, although most of the propagation was to the northeast from my QTH.

I am considering building a stacked loop antenna. However, that will be a future project that I will have to put off until next year.

Six-Meter DXCC from PNW

The following is from Paul Kiesel, K7CW:

It is not impossible to achieve 50 MHz DXCC from a QTH in the Pacific Northwest.

Photo 3– K7CW's 6M9KHW Yagi in the elevated position. (K7CW photo)

Photo 4– K7CW's collinear array. (K7CW photo)

There has been some suspense out there about who was going to get the first 50 MHz DXCC in the PNW states of Washington, Oregon, and Idaho.

The last several months have had me doing everything I could to get the last two QSL cards that I needed to submit all one hundred cards to the ARRL DXCC card checker.

In any event, it's been a fun chase. I received my last needed card on June 28, and had Richard Swanson, K7BTW, check the cards for me right away. There are a bunch of other guys in the 50 MHz DXCC chase in the area. Among those in the hunt are John Adams, VE7DAY; David Lofgren, K7RWT; James Costello, W7FI; Steve McDonald, VE7SL; Harold Goodell, N7NW; John Kiesel, KE7V; and Mark McMillan, W7MEM. The last I heard from Mark, he had two countries to go to have all hundred. I apologize for not mentioning others who are in the chase. I also need to mention that Ralph Parker, VE7XF, has already achieved 50 MHz DXCC.

I've been working on 50 MHz DXCC since I moved to Tahuya, Washington in 1987, but not seriously until the *F2* propagation of Cycle 23 started up. It soon became clear that I was going to need help or I would die before getting the award, or at least I thought that at the time. I'm not so sure about that now.

Anyway, I decided to try EME in an effort to get my last continent, Africa. It took me three years to finally work a station in Africa. It was via EME and it is still my only contact on that continent. The contact was with V55EME in Namibia. Alex Artieda, HB9DRI, and a buddy went down there on a small EME expedition. I was barely able to detect them, but we exchanged all information for a complete QSO. I like to call it my "miracle contact." My 100-entity contact was with my old contesting buddy Dale Green, CE2AWW. Dale is also VE7SV from our neighborhood in CN99 and many of you have worked him. This was a very special QSO for me.

TX5K was my 99th country. It was an EME contact with the 2013 Clipperton Island DXpedition and the operator was Lance Collister, W7GJ. Lance has gone on several 6-meter EME DXpeditions and has provided a new country to us on each trip. Some of the other countries from which he furnished QSOs include: E6M (Niue Island), 3D2LR (Fiji) and 5WØGJ (Samoa). My best DX on 6 meters is VK7MO. I am the first USA station to work T8 on 50 MHz, that being T88BV. Photo 2 shows some of the QSL cards.

My two antennas are a 6M9KHW Yagi (see photo 3) and a 15-element stacked collinear (see photo 4). I have a mechanism on the 6M9KHW that allows me to elevate the antenna for purposes of pointing the antenna directly at the moon for EME. The 15-element stacked collinear is actually 8 each 2-element Yagis with driven elements end-fed with window line. There are four bays of two horizontally stacked 2-element Yagis on each bay. This antenna got me a lot of DX in the Caribbean region. It reached out and got some special stuff, too. For example, my contact with R.S. Graham, VK4BRG, occurred during an aurora that we were experiencing. It turns out that there was a link between the auroral curtain and *F2* propagation to Australia. VK4BRG and I both had auroral flutter on our signals.

Some of the stations or countries whose cards I submitted were worked on more than one mode. Take David Gillies, MMØAMW, for instance. I worked him via sporadic-*E* and via EME. For anyone who is interested, I have a pdf file that contains a list of cards that I submitted for 50 MHz DXCC. Along with the calls, I have noted the propagation modes used for each contact. This information is best used for entertainment, rather than for good data.

Concerning my efforts to work DXCC from PNW, three facts become immediately apparent: The first is that I needed the EME contacts in order to get it done! The second is that I was fortunate to have had *F2* propagation available in Cycle 23 or else I would be nowhere near completing DXCC. The third thing is that the same is true about the recent years' explosion of very long-distance sporadic-*E* propagation. So, things worked out for me in fine fashion. It may be that those guys who were not active during the Cycle 23 peak may not have it as easy as I had in working a hundred countries.

Photo 5– Onsala Space Observatory's 25-meter dish. (Photo courtesy Yi-Nan Chin)

Recent DXpedition Reports

Rwanda: Hermann Pietsch, DL2NUD, and René Hasper, PE1L, operated from Rwanda as 9XØEME and 9XØHP between June 26 and July 6. Their final report on July 6 is as follows:

Today we did struggle with bad conditions and high sun noise. We did add 13 QSOs to the log and 7 of them did not QSO with Rwanda before. Because of the conditions today and the new moon tomorrow we decided that this was the last day of the Rwanda moonbounce expedition.

Our score is: 316 initials at 144 MHz in 48 countries (418 QSOs); 14 initials at 432 MHz in 9 countries; 20 initials at 1296 in 12 countries; and 4 initials at 2320/2304 in 4 countries.

Photo 6– SM6GXV in the compartment of the Onsala 25-meter dish where TX/RX is attached to the feed. SM6CKU photo.

The DXpedition's website is: <http://www.emelogger.com/rwanda/default.asp>. Clicking on Multimedia will give you links to photos and videos of the DXpedition. QSL to PE1L. Hermann will be FP/DL2NUD this month and Rene will pop up from Africa next year.

SK6OSO 2013 Operation

The Swedish West Coast Microwave Group (callsign: SK6HV, website: <http://www.sk6yh.se>) operated the Onsala Space Observatory's 25-meter parabolic dish over the weekend of July 13–14 using the callsign SK6OSO. Photo 5 shows the dish as photographed by Yi-Nan Chin several years ago. Photo 6 shows Ulf Kylenfall, SM6GXV, in the compartment where TX/RX is attached to the feed. Ulf was in charge of the whole operation because he works at the site.

From the <amatorradiomassan. se/blog/?p=69> website is the following report on the activity translated from Swedish:

SK6 Onsala Space Observatory is the call sign when West Coast Mikrovågsgrupp may use the 25.5 m big dish just down by the Kattegat. Last time it went on the air was in 2011 and then we were at 5760 MHz. This year's activity was the most successful so far, with around 115 QSOs, of which 60 in telegraphy and the rest divided in equal parts SSB and JT65C. Many stations with marginal equipment had a chance to contact us by the moon. If you search the SK6OSO on You Tube and you'll find a lot of clips from last weekend, but even older material. In the first film recorded by SM7FWZ you can hear how it sounded at Ronny with 4-meter antenna and then at OK1DFC with a 10-meter antenna.

Among the 1296-MHz SSB QSOs was this one with Mateusz Pigon, SQ7DQX: <https://www.youtube.com/watch?feature=player_embedded&v=YJMD5HTNz6I>. More posts about the operation can be found on the Facebook page: <https://www.facebook.com/groups/180939538638522/>.

Testing the Perth to South Africa Tropo Path

The following is from Southgate Amateur Radio News (http://www. southgatearc.org/news/june2013/attempt_to_prove_the_perth_to_south_africa_path.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+AmateurRadioNews+%28Southgate+Amateur+Radio+News%29&utm_content=Yahoo!+Mail#.UedCg228Fgc):

A new amateur radio 2-meter beacon on 144.950 MHz has been established in Perth, Western Australia, by the Northern Corridor Radio Group in an attempt to prove the Perth to South Africa path.

The beacon, VK6RIO, will use Chirp modulation which can be detected some 50 dB below the noise floor in a 2-kHz bandwidth. The beacon will run 100 W into 4- by 8-element Yagis directed toward South Africa. With the processing gain from using Chirp modulation the Effective Radiated Power is 100 megawatts.

The beacon is GPS locked both in frequency, time, and Chirp synchronization. Tests across Australia have proven the effectiveness of Chirp modulation for detecting very weak signals.

An article explaining Chirp modulation, and its application to propagation measurements and beacons, can be found in the March edition of the RSGB *RadCom* magazine. There is also an article explaining the Chirp beacon in *Dubus* 4-2011.

In order to detect the Chirp beacon the receiving station will require a GPS-locked Software Defined Radio (SDR), a GPS locked 2-meter converter and 1 pulse per second from a GPS receiver to time-stamp received signals. Open-source PC software by Hermann von Hassein, DL3HVH, will be provided for processing the received signals.

This beacon can only be detected if there is someone on the other end with "similar equipment" and a desire to be the first to receive these signals in South Africa or surrounding countries. Is that someone you?

Anyone interested in more details regarding the new beacon should contact Keith Bainbridge, VK6RK, e-mail: <vk6rk@wia.org.au>.

Another Kickstarter Satellite Project

The following is from Southgate Amateur radio News (http://www.southgatearc.org/news/june2013/uk_radio_ham_plans_lunar_cubesat.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+AmateurRadioNews+%28Southgate+Amateur+Radio+News%29&utm_content=Yahoo!+Mail#.UehTDW28Fgc):

UK Radio Ham plans Lunar CubeSat

Radio amateur Michael Johnson, MØMJJ, is raising funds on Kickstarter for a CubeSat that will travel to the Moon.

Pocket Spacecraft hopes to raise at least £290,000 to fund a 3U (30 × 10 × 10 cm) CubeSat that will travel to the Moon. The CubeSat will carry Pocket Spacecraft known as "Scouts," which are disks with flexible electronics, smaller than a CD, containing transceivers and solar cells.

It's planned the CubeSat will release some of the wafer-thin Scout satellites into Earth orbit and also deploy another batch of the Scout satellites into Lunar orbit.

It is understood the mission may use the 435- and 2400-MHz bands.

Further information and video on the Pocket Spacecraft project is at: <http:// www.kickstarter.com/projects/ 1677943140/send-your-own-pocket-spacecraft-on-a-mission-to-th>.

Tropospheric-Ducting Forecasting

William Hepburn maintains a website that forecasts tropospheric ducting around the world. This URL will take you to

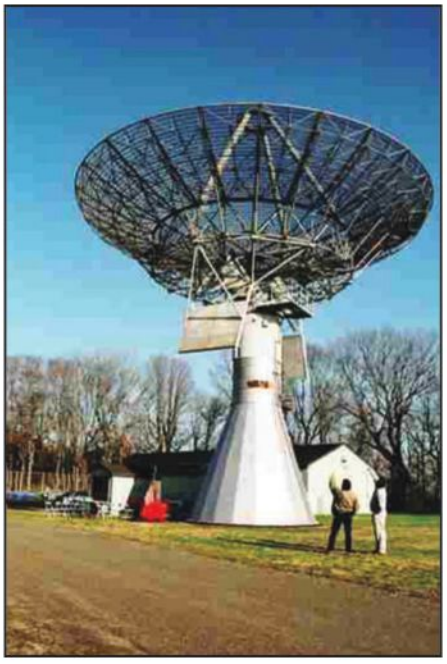

Photo 7– The TLM-18, the 60-foot tracking dish antenna. Photo courtesy ARRL.

the Eastern North Pacific forecasts: <http://www.dxinfocentre.com/tropo_enp.html>.

Huge Tracking Dish to be used for EME

The following is from the ARRL (http:// www.arrl.org/news/huge-tracking-dish-to-become-available-for-eme):

Huge Tracking Dish to Become Available for EME (July 9, 2013):

The InfoAge Science History Museum in Wall Township, New Jersey, plans to make TLM-18, the 60-foot tracking dish antenna, available to hams for moonbounce, secondary to its function as a radio telescope (see photo 7). It was on the InfoAge site, then part of Fort Monmouth, that the US Army's "Project Diana" team in 1946 first received radio signals bounced from the moon.

According to InfoAge's Martin Flynn, W2RWJ, Daniel Marlow, K2QM, an InfoAge board member who teaches physics at Princeton, wants to use the dish, currently under rehabilitation after being dormant since the 1970s, to pursue radio astronomy for instructional purposes. Marlow's primary goal is to restore the TLM-18 dish antenna to working order and use it to see the 21 centimeter radiation from the Milky Way.

However, he also wants to observe radio pulsars, and since that activity can be performed at 70 centimeters, the TLM-18 will be made available to the Amateur Radio community for EME at 432 MHz on a secondary basis. The dish, adjacent to the Ocean Monmouth Amateur Radio Club's (OMARC) N2MO at InfoAge, offers a gain of 35 dBi at 465 MHz.

Project Diana occupied the building housing N2MO, Flynn noted. The after-effects of Hurricane Sandy continue to hinder the dish rehab project; power on the InfoAge campus remains out since the storm last year and the facility is running on generator power. "It has slowed down the efforts at putting the TLM-18 back into service but has not stopped them," Flynn said, noting that OMARC members have been behind the project from Day One.

It's hoped the dish will be ready for service next year. Thanks to InfoAge and Martin Flynn, W2RWJ.

AMSAT-UK Colloquium Videos Available

The following is from Southgate Amateur Radio News:

Thanks to the hard work of volunteers from the British Amateur Television Club (BATC) videos of the presentations given to the AMSAT-UK International Space Colloquium held in Guildford July 20–21, 2013 are now available online. You can watch the videos at <http://www.batc.tv/>. Click on the "Film Archive" icon. Select "AMSAT-UK 2013" from the Category drop down menu. Click "Select Category." Select the video you wish to watch. Click on "Select Stream." Click the play icon ">" on the player. Clicking on the icon to the left of the player volume control will give you full screen display.

Current Contests

The **ARRL September VHF QSO Party** is September 14–16. The second weekend of the **ARRL 10 GHz and Above Cumulative Contest** is September 21–22. The **144 MHz Fall Sprint** is September 23. The **ARRL 2.3 GHz and Above EME Contest** is September 28–29.

For ARRL contest rules, see the issue of *QST* prior to the month of the contest or its URL: <http://www.arrl.org>. For Fall Sprint contest rules, see the Southeast VHF Society URL: <http://www.svhfs.org/>.

Current Conference

The **TAPR/ARRL Digital Communications Conference** will be held September 20–22, in Seattle, Washington, at the Cedarbrook Lodge. Reservations: 1-877-515-2176. For more information, go to: <http://www. tapr.org/dcc.html>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following organization or conference organizer has announced a call for papers for its forthcoming conference:

Microwave Update: A call for papers has been issued for the Microwave Update conference, to be held in Morehead, Kentucky. The deadline for proceedings paper submissions is August 30. The Word file format (text) is preferred for these papers. The deadline for the presentation version of selected papers is September 15; PowerPoint (slides) file format is preferred for presentations. If you are interested in submitting a paper for publication in the *Proceedings*, e-mail your papers, as well as questions or comments, to <mud2013@downeastmicrowave.com>.

AMSAT-NA 2011 Space Symposium: Technical papers are solicited for the AMSAT Space Symposium and Annual Meeting to be held November 1–3, in Houston, Texas. Proposals for papers, symposium presentations, and poster presentations are invited on any topic of interest to the amateur satellite program. Papers on the following topics are solicited: Students & Education, ARISS, AO-51, P3E, Eagle, and other satellite-related topics.

Camera-ready copy on paper or in electronic form are due by October 1. Papers received after this date will not be included in the printed *Proceedings*. Send abstracts and papers to Dan Schultz, N8FGV,<n8fgv@amsat.org>.

And Finally . . .

We now conclude another column of stories of what is happening in the wonderful world of the VHF-and-above frequencies. If you have a story to tell and want to see it considered for a future column, please e-mail it to me at: <n6cl@sbcglobal.net>. Thank you.

Until next month . . .73 de Joe, N6CL

BY GEORGE TRANOS,* N2GA

CQWW: Changing the Rules in an Ever-Changing World

This issue of *CQ* features the new and revised rules for the CQ World-Wide DX Contest. Much has changed in the world in the 65 years since the first CQ WW DX contest in 1948. Modern radios, antennas, switching and filtering system, and computers have significantly enhanced the operating experience and have changed the landscape of contesting. Computerized log-checking was first introduced by *CQ* in 1979 and has become more sophisticated and a staple of the contest scoring and adjudication process.

Over the years, revisions have been made to add club competition (1954), multi-single and multi-multi categories (1959), start and end times (1962), a QRP category (1978), an assisted category (1989), a low-power category (1991), and a multi-two category (2002). The log submission deadline also changed and is now five days after the end of the contest. The world has changed, amateur radio has changed, contesting has changed, and now the CQ WW DX contest rules have changed, as well!

Public Comment

An interesting aspect of the rules change process is that for the first time, *CQ* provided a 30-day public comment period before the rules were finalized. This process allowed contesters to help refine the rules, make corrections and clarifications, suggest improvements, and make requests. Nearly 300 comments were received. This resulted in a collaborative endeavor that has created an evolutionary change to the rules that hopefully everyone can live with. The end result is the rules you see published in this issue.

According to Randy Thompson, K5ZD, CQ WW DX Contest Director, "(t)he major goal of the rewrite was to make the rules simpler and easier to understand." Randy goes on to say that "(t)he basic information about bands, exchange, and scoring has been moved to the beginning [of the rules]. We want everyone to quickly grasp the basics so they can get on the air and join the fun. There is no change to the scoring. The entry categories are substantially unchanged. We still have separate Single Operator and Single Operator Assisted categories for high, low, and QRP power levels. The

Erratum
2012 CQ DX Marathon
Zone Certificate Winners

Callsign	Countries	Zones	Score
N6ML	283	39	322
K9NB	277	40	317
UA9FAR	268	40	308
VK6HG	177	37	214

Note: Top scorers in other zones received Plaques or Top Country Certificates. Complete listing of all Zone Leaders is available on the CQ website.

*P.O. Box 657, Copiague, NY 11726
e-mail: <n2ga@cq-amateur-radio.com>

Calendar of Events

All year	**CQ DX Marathon** **http://bit.ly/vEKMWD**
Sept. 2–3	MI QRP Labor Day CW Sprint http://www.miqrp.org/
Sept. 7	AGCW Straight Key Party http://www.agcw.org/en/
Sept. 7	QCWA Fall QSO Party http://www.qcwa.org/2013qso-party.htm
Sept. 7–8	All Asian SSB Contest http://bit.ly/As5VzH
Sept. 7–8	QRP ARCI Two Side Bands Sprint http://bit.ly/KnjOoE
Sept. 8	DARC 10 Meter Digital Contest http://bit.ly/18gGDIM
Sept. 8	North American CW Sprint http://www.ncjweb.com/sprintrules.php
Sept. 14–15	Arkansas QSO Party http://www.arkanhams.org/standrules.pdf
Sept. 14–15	Worked All Europe SSB Contest http://bit.ly/JUUR1n
Sept. 14–16	ARRL September VHF QSO Party http://www.arrl.org/september-vhf
Sept. 15	North American SSB Sprint http://www.ncjweb.com/sprintrules.php
Sept. 20–22	D-Star QSO Party http://www.icomamerica.com/en/products/amateur/dstar/dstar/default.aspx
Sept. 21	QRPAfield http://newenglandqrp.org/afield
Sept. 21–22	ARRL 10 GHz and UP Contest http://www.arrl.org/10-ghz-up
Sept. 21–22	SARL VHF/UHF Analog/Digital Contest http://bit.ly/H0IqQf
Sept. 21–22	Scandinavian CW Activity Contest http://www.sactest.net/blog/rules/
Sept. 21–22	Washington State Salmon Run http://www.wwdxc.org/salmonrun/
Sept. 22	BARTG Sprint 75 http://www.bartg.org.uk/sprint75contest.asp
Sept. 28	AGCW Contest http://www.agcw.org/en/
Sept. 28–29	ARRL EME Contest (2.3 GHz & up) http://www.arrl.org/eme-contest
Sept. 28–29	**CQ WW RTTY DX Contest** **http://www.cqwwrtty.com**
Sept. 28–29	Texas QSO Party http://txqp.net/
Sept. 29	Maine QSO Party http://www.qsl.net/ws1sm/Maine_QSO_Party.html
Oct. 3	German Telegraphy Contest http://kontest.de/dtc/DTC-Rules_e.pdf
Oct. 3	SARL 80m QSO Party http://bit.ly/H0IqQf
Oct. 5	EU Autumn Sprint SSB http://www.eu-sprint.com/
Oct. 5–6	California QSO Party http://www.cqp.org/Rules.html
Oct. 5–6	Oceania Phone DX Contest http://www.oceaniadxcontest.com/rules.pdf
Oct. 10	10-10 Intl. 10-10 Day Sprint http://bit.ly/yTsaDk
Oct. 26–27	**CQ WW DX SSB Contest** **http://www.cqww.com/rules.htm**
Nov. 23–24	**CQ WW DX CW Contest** **http://www.cqww.com/rules.htm**

Upgraded Wattmeters from RF Concepts

RF Concepts, manufacturer of Alpha Amplifiers, has upgraded two of its RF wattmeters. Both the Model 4510A and Model 4520A now cover 1.5 to 55 MHz, adding six meters to their operating range (the original models were designed only to operate on the HF bands). The 4510A is a 3-kilowatt version and the 4520A will handle up to 5 kW. Introductory pricing is $745 for the 4510A and $795 for the 4520A. To order, or for more information, visit <www.rfconcepts.com> or call RF Concepts at (303)473-9232.

Looking Ahead in CQ

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

Emergency Communications Special in October:
- Mesh Networks and EmComm
- Ham Radio at the National Hurricane Center
- South Counties Emergency Network — Built on Relationships

Upcoming Special Issues
December: Technology
February: QRP
June: Take it to the Field

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

Andy, AE6Y, receives his 2012 CQ WW WPX Contest plaques for his operations from P49Y from Doug, K1DG, who administers the WPX Contest plaque program. The 2013 CQ WW WPX SSB Contest results are published elsewhere in this issue, as are the CQ WW DX Contest Rules for 2013.

wording for the multi-operator categories has changed, but the definition of the categories is the same."[1]

We Are Not Alone

Other competitive sports also periodically review and change their rules. The Association of Tennis Professionals (ATP) has administered the worldwide circuit of men's professional tennis since 1989. Its change of rules to institute electronic review of line calls provided players the ability to challenge a questionable call and have an unbiased video review to positively determine the correct call.

The United States Golf Association (USGA), the preeminent organization for golfers and the sport's governing body, has a regular four-year cycle for changes to the Rules of Golf. The most recent change, which prohibits anchoring the club in making a stroke, will take effect on January 1, 2016. The decision to adopt the new rule came after a comprehensive process in which comments and suggestions from across the golf community were collected and thoroughly considered.

The USGA prepared a detailed report to explain the reasons for the decision to adopt the new rule. Likewise, the changes to the CQWW Contest rules qre the result of a comprehensive review process and are accompanied by a detailed explanation, some of which we will review here and all of which appear elsewhere in this issue.

All of these changes in the different sports were made for the so-called betterment of the game. As with any such endeavor, some of these changes were effective and some were not. Many rules changes were introduced with good intentions but were subsequently judged ineffective and changed again. So it is with contesting. This set of new rules will be implemented and feedback will be obtained. In time, these rules, too, will be adjusted to better meet the needs of contesters in the future.

Penalty Box

One CQWW change worth noting is the elimination of the yellow and red cards for rules violations written about in this column previously (*see "Penalties," June 2013 issue—ed.*). Thompson says, "The judging section spells out examples

that are considered unsportsmanlike conduct, how disqualifications are managed, and the log-checking deductions for logging errors. ... Signals with excessive bandwidth may be considered as being unsportsmanlike and earn disqualification. Red and Yellow cards have been removed in favor of one action—disqualification."

What has not changed is the requirement for rules adherence and compliance. Contesters should strive to be the best they can be and to compete on an even playing field with others in their category. They should follow the contester's code of conduct to use good sportsmanship and honesty. Those who break the rules not only cheat others in the contesting community, they also cheat themselves. And if they cheat on a regular basis, they can and will be caught and disgraced.

Overlays

Most contesters operate to have fun, try to improve their operating skills, compete with their friends, and gain needed contacts for DXCC and other awards. Many operators realize they will never "win" a contest outright. The new rules do provide these operators with a couple of additions to help them get closer to the top. The CQWW contest committee has created a set of "overlay" categories for this purpose. K5ZD states:

"A first for CQ WW, there are now two new *Overlay* categories. The Overlay categories are a second contest within a contest. Entrants receive a score in their traditional entry category and will also have a second score listed in the Overlay results. It is like entering two contests for the price of one! The *Classic Overlay* category is intended for the radio purists who want to participate in the most traditional way. It is one operator, one radio, no outside assistance, and only the first 24 hours of operating time will count for the score. Of course, Classic operators are welcome to operate as much as they want, but only first 24 hours of 'on time' will count for the score. It should be interesting to see what the winning strategy of this new competition will be. The traditional single operator categories remain with no time limit.

"The *Rookie Overlay* category is for anyone first licensed within three years of the date of the contest. It's a great opportunity for new operators to compete with others who are also learning. We have enjoyed watching new operators in the CQ WPX Contest build their skills each year and make significant efforts in their final year of eligibility."

Rule #1: Have Fun!

Take some time and read the new CQ WW DX Contest rules. Try to understand the changes that apply to you. Questions pertaining to the CQ WW DX Contest rules may be submitted by e-mail to <questions@cqww.com>. Answers for many frequently asked questions can be found at <www.cqww.com/rules_faq.htm>. Most of all, after reading the rules, get on the air and have fun!

The CQ World-Wide DX Contest is the *biggest* contest of the year! Many rare countries are activated just for the contest, both SSB and CW modes. You'll have a great opportunity to work some of the rare ones, rack up lots of contacts, enjoy some unusual propagation paths, and make some new friends. Contesting can be fun and exciting and CQ WW DX is the place to be when the contest weekend gets here.[2] Don't miss out; be part of the action this year.

73, George, N2GA

Notes

1. See K5ZD's complete discussion of the CQWW rules changes elsewhere in this issue.
2. This year's CQ WW DX Contest dates are October 26–27 (SSB) and November 23–24 (CW).

propagation

BY TOMAS HOOD,* NW7US

Autumn is a Time of Change

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, June 2013: 53
Twelve-month smoothed, December 2012: 60

10.7 cm Flux
Observed Monthly, June 2013: 110
Twelve-month smoothed, December 2012: 120

***Ap* Index**
Observed Monthly, June 2013: 12
Twelve-month smoothed, December 2012: 8

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, June 2012: 65
Twelve-month smoothed, December 2011: 63

10.7 cm Flux
Observed Monthly, June 2012: 121
Twelve-month smoothed, December 2011: 122

***Ap* Index**
Observed Monthly, June 2012: 10
Twelve-month smoothed, December 2011: 8

Once again, it's time for some of the best long-range DX openings of the year. With autumn right around the corner, the season for radical improvement in radio propagation conditions is beginning. This is the time to make sure that you finish any antenna project, double-check your coax or ladder line, the antenna itself, and certainly, your grounding system. The DX "hunting" season is opening this month! Let's get right to the exciting high-frequency (HF) propagation conditions starting in September.

At the end of September the Sun will be directly over the equator. On the Autumnal Equinox (September 22 at 2044 UTC), everywhere in the world, the hours of daylight are equal to the hours of darkness. This results in an ionosphere of almost similar characteristics over large areas of the world. It makes for the best time of the year for long DX openings between the temperate regions of the Northern and Southern Hemispheres on all shortwave bands.

Expect a vast improvement on the higher frequencies (20 meters up through 12 meters) with more frequent short-path openings from mid-September through mid-October between North America and South America, the South Pacific, South Asia, and southern Africa. The strongest openings will occur for a few hours after sunrise and during the sunset hours.

Long-path openings also improve during the equinoctial periods. A variety of paths open up on 30 and 20 meters. Expect a path from southern Asia around sunset, daily morning openings from southern Asia and the Middle East, expanding to Africa.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 2013

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-2, 5-6, 9-10 13-17, 21-25, 27-29	A	A	B	C
High Normal: 4, 7, 11-12, 20	A	B	C	C-D
Low Normal: 3, 8, 18, 26, 30	B	C-B	C-D	D-E
Below Normal: 194	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be excellent (A) on Sept. 1st and 2nd, fair (C) to good (B) on the 3rd, good (B) on the 4th, etc.

3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is ionospherically supported.

Also look for signals from the Indian Ocean region long-path over the North Pole. Afternoons will fill with South Pacific long-path, and then extend to Russia and Europe. Look for possible long-path openings on 30, 40, 60, and 80/75 meters for an hour or so before sunrise and just before sunset.

The winter DX season is slowly approaching, making for additional exciting DX conditions. While the weather is still warm and fair, tighten hardware on your antenna system, check coax cables, and fine-tune your radio station. Get ready now to reap the DX in the comfort of home during those cold months ahead.

Autumn is Aurora Season

As we've explored in past editions of this column, the Earth has a magnetic field with a north and a south pole that is enclosed within a region surrounding the Earth called the *magnetosphere*. As the Earth rotates, its hot core generates strong electric currents that produce the magnetic field, which reaches 36,000 miles into space.

The magnetosphere prevents most of the particles from the sSun, carried on the solar wind, from impacting the Earth. The solar wind distorts the shape of the magnetosphere by compressing it at the front and causing a long tail to form on the side away from the Sun. This long tail is called the *magnetotail*.

The speed of the solar wind fluctuates. During this year, we're seeing a range of solar wind speed of between 300 km/s to around 800 km/s on average. When the solar wind picks up speed and contains above-normal amounts of solar material, geomagnetic storms might be triggered. For radio signals, this could be a good thing, or a bad thing, depending on the frequency and radio path. In simple terms, for HF radio signals geomagnetic storms cause the ionosphere to lose its ability to "reflect" radio signals. However, during these storms, aurora could occur, which can become an exciting opportunity for VHF weak-signal propagation off the highly energized *E*-region of the ionosphere.

While aurora events generally are visible close to the poles, severe magnetic storms impacting the Earth's magnetic field can shift them toward the equator. Fig. 2 shows a striking aurora image taken during a geomagnetic storm that was most likely caused by a coronal mass ejection (CME) from the Sun on May 24, 2010. The International Space Station (ISS) was located over the Southern Indian Ocean at an altitude of 350 kilometers (220 miles), with the astronaut observer most likely looking toward Antarctica (not visible) and the South Pole.

Auroras happen when ions in the solar wind collide with atoms of oxygen and nitrogen in the upper atmosphere. The atoms are excited by these collisions, and they typically emit light as they return to their original energy level. The light creates the aurora that we see. The most commonly observed color of aurora is green, caused by light emitted by excited oxygen atoms at wavelengths centered at 0.558 micrometers, or millionths of a meter. (Visible light is reflected from healthy [green] plant leaves at approximately the same wavelength.) Red auroras are generated by light emitted at a longer wavelength (0.630 micrometers), and other colors such as blue and purple are also sometimes observed.

Low sunspot counts combined with coronal hole activity or coronal mass ejections (fig. 2) often contributes to days of very poor propagation on the high frequencies (30 MHz and below). When the solar wind speed is high (over 650 kilometers per second), when there's a release of solar plasma on that wind stream, and

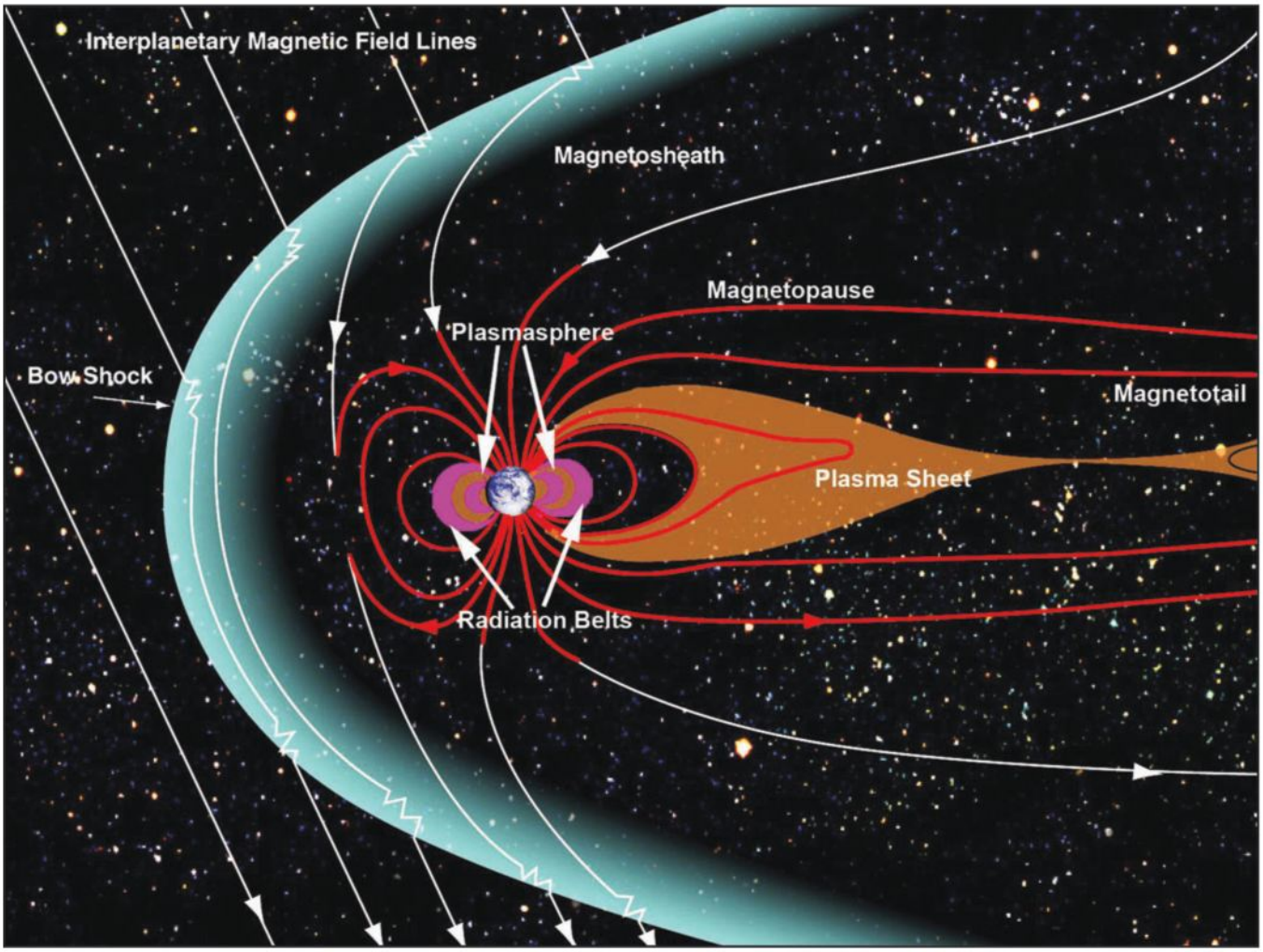


Fig. 1– Earth's Magnetosphere and Plasmasheet , a magnetosphere is that area of space, around a planet, that is controlled by the planet's magnetic field. The shape of the Earth's magnetosphere is the direct result of being blasted by solar wind. The solar wind compresses its sunward side to a distance of only 6 to 10 times the radius of the Earth. A supersonic shock wave is created sun-ward of Earth and called the bow shock. Most of the solar wind particles are heated and slowed at the bow shock and detour around the Earth in the magnetosheath. The solar wind drags out the night-side magnetosphere to possibly 1000 times Earth's radius; its exact length is not known. This extension of the magnetosphere is known as the magnetotail. The outer boundary of Earth's confined geomagnetic field is called the magnetopause. The Earth's magnetosphere is a highly dynamic structure that responds dramatically to solar variations. Also residing within the magnetosphere are areas of trapped charged particles: the inner and outer Van Allen Radiation Belts, the plasmasphere, and the plasmasheet. (Credit: NASA/Goddard/Aaron Kaase)

when the orientation of that wind stream is aligned to combine with the magnetosphere, the geomagnetic field will "open" to the incoming plasma, and aurora occurs. That is when VHF comes alive for the exotic aurora-mode propagation.

During September we'll see a number of days when aurora will occur, so be ready for interesting VHF propagation well beyond line-of-sight. When the planetary *K*-index (*Kp*) is higher than 5, there is a good chance of aurora. Check my web page at <http://aurora.sunspotwatch.com> for current conditions and resources about the aurora.

HF Propagation

With the 10.7-cm flux levels expected to be around 134 during September, 10 through 17 meters will support *F*-region propagation on paths mostly near the equator. Additionally, some short-range *E*-region propagation may occur. On these higher bands, conditions may be marginal during the month, but these bands certainly are coming alive as sunspot Cycle 24 picks up energy. There will be less polar propagation as we move toward winter, though, making some parts of the world difficult to work over these circuit paths. To catch the openings over high latitudes, get on these bands shortly after sunrise, or watch for polar signals as they close for the evening.

Fifteen meters will be the most reliable "higher" band. This band usually will supply day-path propagation even over the polar paths. A considerable improvement is expected, with the band opening shortly after sunrise and remaining open until after sundown. However, it will not stay open late into the night like it typically does during the Spring season. Openings should be possible from all areas of the world, with conditions best from Europe and the northeast before noon, and from the rest of the world during the afternoon hours. Openings from the South Pacific, Australia, New Zealand, and the Far East should be possible well into the early evening, particularly when propagation conditions are High Normal or better.

The 17- and 20-meter bands compete with 15 for the best daytime DX band this month. Look for these to open for DX at sunrise and remain open from all directions for a few hours. It should be possible to work many areas of the world throughout the daylight hours, with a peak in the afternoon. Nighttime conditions will favor openings from the south and tropical areas, but some openings will also be possible from other areas. Look for polar gray-line propagation from Asia. Long-path is common on 17 and 20 from southern Asia, the Middle East, and northeastern Africa as well as the Indian Ocean region via the North Polar path.

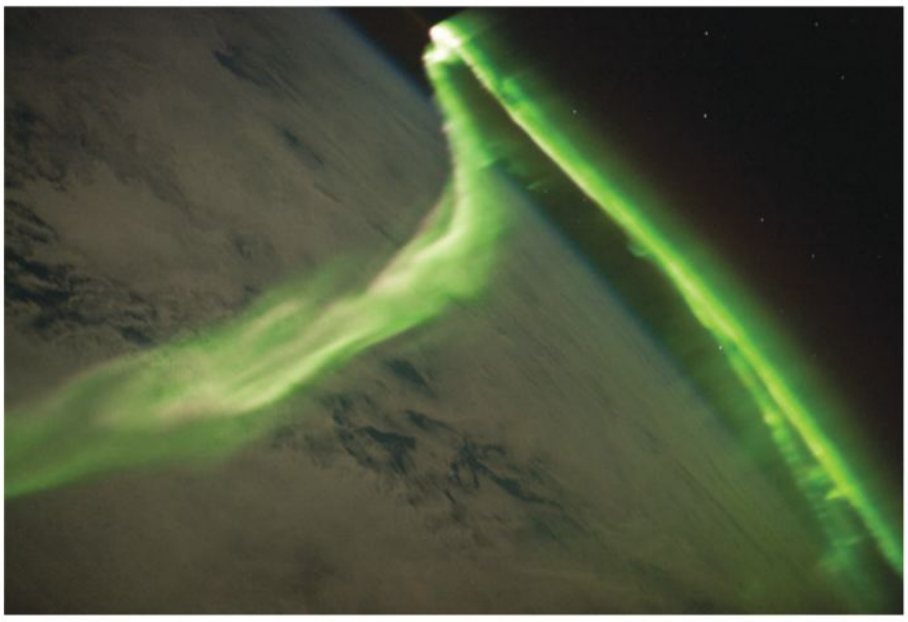


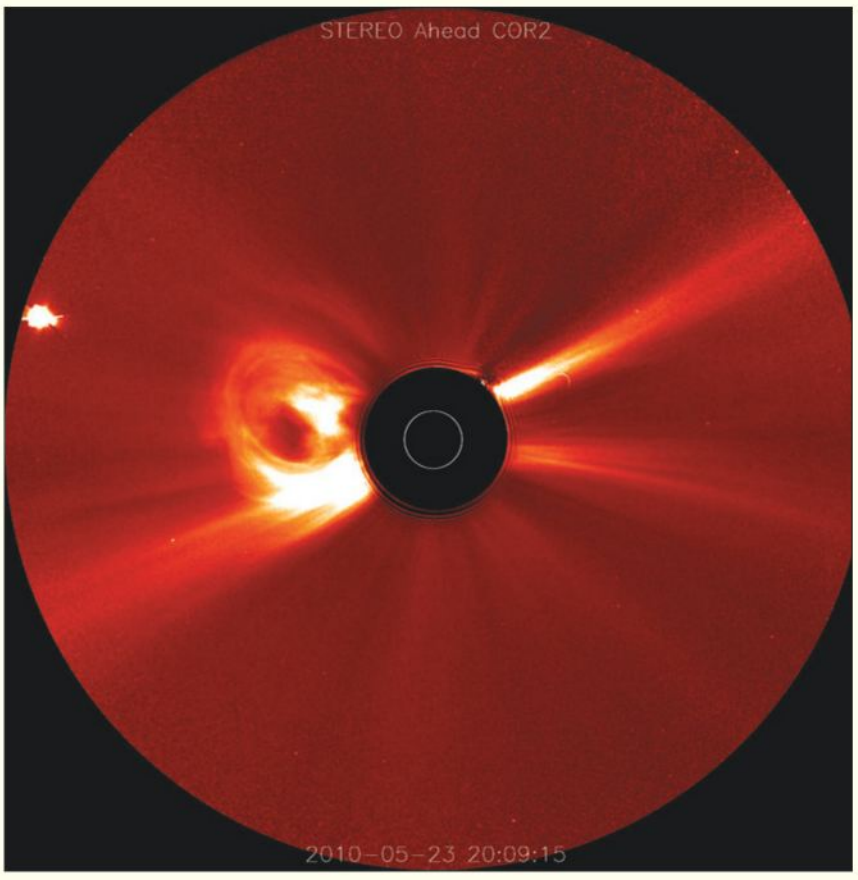
Fig. 2– Among the views of Earth afforded astronauts aboard the International Space Station (ISS), surely one of the most spectacular is of the aurora. These ever-shifting displays of colored ribbons, curtains, rays, and spots are most visible near the north (aurora borealis) and south (aurora australis). poles as charged particles (ions) streaming from the Sun (the solar wind) interact with Earth's magnetic field. The aurora has a sinuous ribbon shape that separates into discrete spots near the lower right corner of the image. While the dominant coloration of the aurora is green, there are faint suggestions of red left of image center. Dense cloud cover is dimly visible below the aurora. The curvature of the Earth's horizon (the limb) is clearly visible, as is the faint blue line of the upper atmosphere directly above it (at image top center). Several stars appear as bright pinpoints against the blackness of space at image top right. (Credit: NASA/Astronaut photograph ISS023-E-58455, acquired on May 29, 2010, with a Nikon D3 digital camera, and is provided by the ISS Crew Earth Observations experiment and Image Science & Analysis Laboratory, Johnson Space Center. The image was taken by the Expedition 23 crew. The image in this article has been cropped and enhanced to improve contrast. Lens artifacts have been removed. The International Space Station Program supports the laboratory as part of the ISS National Lab to help astronauts take pictures of Earth that will be of the greatest value to scientists and the public, and to make those images freely available on the Internet.)

The 30-meter band is an all-season band. Expect strong and frequent openings on this band. Of course, it is not an SSB band, and power restrictions apply, but propagation, especially in your local morning and early evening hours, can be very good to many areas of the world. Use JT65A or Morse code, for instance, and reap the rewards. The conditions prevalent on 17 and 20 are more pronounced, and last much longer, on 30 meters. Look for stations a few hours before sunrise through early morning, then again in the early evening before sunset, until around midnight.

After the Autumnal Equinox, expect ever-improving nighttime DX conditions on the 40-, 60-, 80/75-, and even 160-meter bands into October. This is due to the gradual increase in the hours of darkness and a seasonal decrease in the static level. Forty meters should be best for worldwide DX from sunset to sunrise. Don't forget to play on 60 meters, where you can always depend on hearing signals from early evening (from before sunset) to a few hours after sunrise. For exotic regional signals, check 80/75 through 160 meters during the hours of darkness, especially for an hour or so before local sunrise.

Medium-Wave (160-meter) Propagation

With a possible increase in geomagnetic activity this month, there is a chance for occasional weak to moderate geomagnetic disturbances that can attenuate medium-wave DX over northern latitudes. This can be a blessing for those trying to contact DX equatorial and mid-latitude medium- and low-power stations. Signals on 160 meters will improve from this month onward into winter as the hours of darkness increase, and because of the



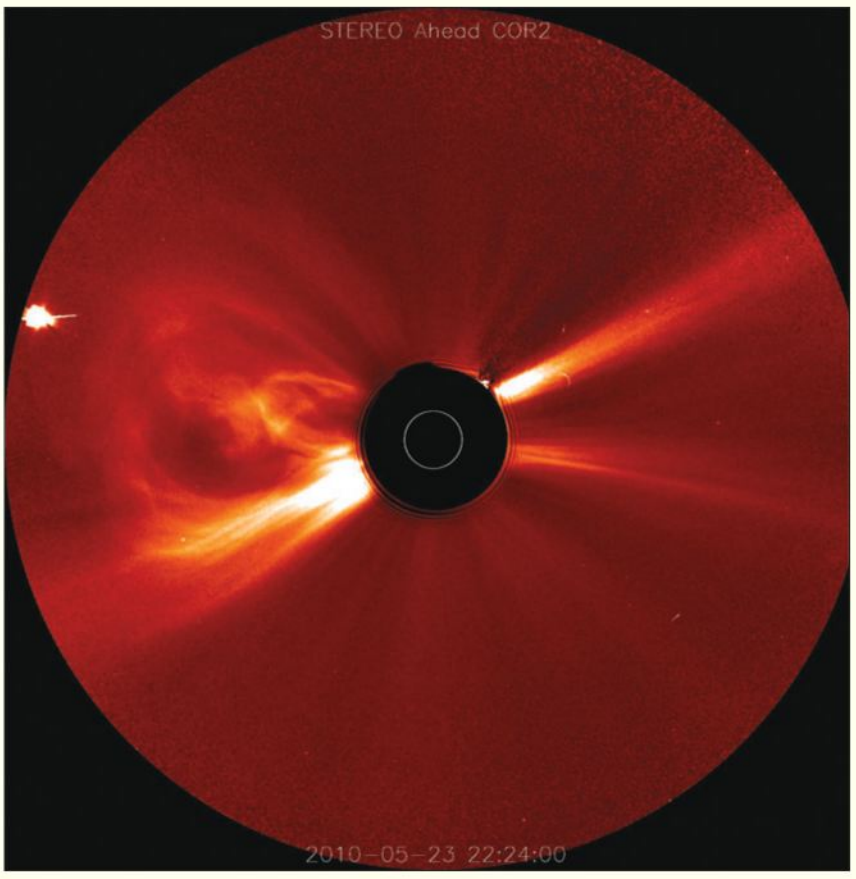


Fig. 3– The Sun released a series of four coronal mass ejections between May 22 and May 24, 2010. These images show one CME on May 23. Solar storms bombard Earth with a stream of electrons and other charged particles that interact with gases in the atmosphere to generate colorful aurora. A coronal mass ejection, a large solar storm, can expel a billion tons of matter at a million miles per hour or more. The strongest solar storms have the potential to interfere with communications, power grids, and satellites. Solar storms happen most frequently when the Sun is in the active phase of its 11-year cycle, called solar maximum. Both images were taken by the Solar Terrestrial Relations Observations (STEREO) Ahead spacecraft. The top image is from 2009 UTC. STEREO Ahead acquired the lower image just over two hours later at 2224 UTC. In the top image, a bright mass of charged particles loops from the Sun's atmosphere. Two hours later, the looped mass had expanded and was moving away from the Sun. The images show only the Sun's corona, the outermost layer of the atmosphere. A dark disk covers the rest of the Sun, and a white circle represents the Sun's surface. When the charged particles from May's coronal mass ejections reached Earth, they caused no damage, but they did generate sheets of colored light dancing across polar skies. (Credit: NOAA/STEREO)

decline of noise-producing weather. Seasonal static, which makes it difficult to hear the weak DX signals, is decreasing little-by-little as we move away from the Autumnal Equinox. Stretch out those Beverage antennas, and start looking for signals along nighttime paths.

VHF Conditions

The sporadic-*E* season we experienced earlier in the year is pretty much over now. There will be a few openings late this year, but this is not the month typically associated with sporadic-*E*.

Troposcatter is a real possibility, however. Look for signals on paths crossing through stalled high-pressure zones in the Midwest, or along cool, wet air masses.

Additionally, toward the end of September, trans-equatorial (TE) propagation will begin to occur between southern North America and northern South America. Openings generally will occur in the late afternoon to early evening. Tropospheric conditions are often very good for many of the VHF bands during September with the appearance of different weather fronts. This will be the primary mode for working up to 300 miles. Continue to expect a high number of coronal mass ejections, possibly triggering aurora during September and October. Look for days when the *Kp* index is above 5.

Current Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a monthly mean sunspot number of 52.5 for June 2013, considerably weaker than May's 78.7, and the lowest since February. The low for the month was 11 on June 11. The high of 95 occurred on June 21. The mean value for June results in a 12-month running smoothed sunspot number of 59.6 centered on December 2013. Following the curve of the 12-month running smoothed values, a smoothed sunspot level of 82 is expected for September 2013, plus or minus 12 points.

Canada's Dominion Radio Astrophysical Observatory at Penticton, British Columbia reports a 10.7-cm observed monthly mean solar flux of 110.2 for June 2013, down from May's 131.3. The 12-month smoothed 10.7-cm flux centered on December 2012 is 120.1. A smoothed 10.7-cm solar flux of about 134 is predicted for September 2013.

The geomagnetic activity as measured by the planetary *A*-index (*Ap*) for June is 13, up from May's 10, continuing in the slow yet steady climb in space weather activity. The 12-month smoothed *Ap* index centered on December 2012 is 7.5. Geomagnetic activity should be much the same as we had during August. Refer to the Last-Minute Forecast for the outlook on what days that this might occur (remember that you can get an up-to-the-day Last-Minute Forecast at <http://sunspotwatch.com> on the main page).

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://forums.hfradio.org/>. If you are on Facebook, check out <http://www.facebook.com/spacewx. hfradio> and <http://www.facebook.com/NW7US>. Speaking of Facebook, check out the CQ Amateur Radio Magazine fan page at <http://www.facebook.com/CQMag>.

I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX!

73, Tomas, NW7US

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WANTED: MIT Radiation Lab Books, '70s micros: KIM; AIM, SIM, etc.; Unimats; Watchmaker Lathes, etc. John Rawley, 215-884-9220; <rawl@comcast.net>; 1923 Susquehanna, Abington, PA 19001

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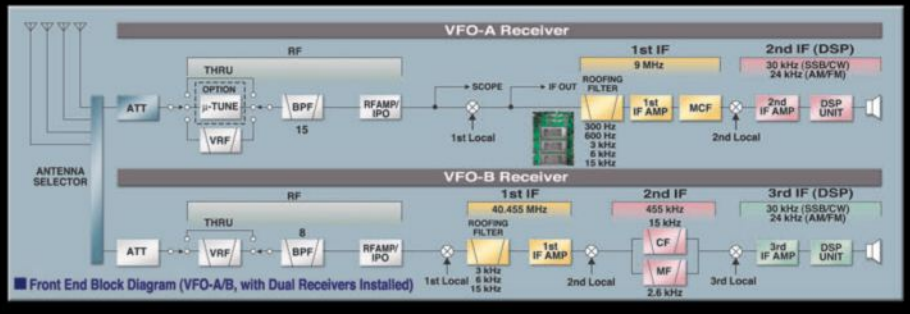
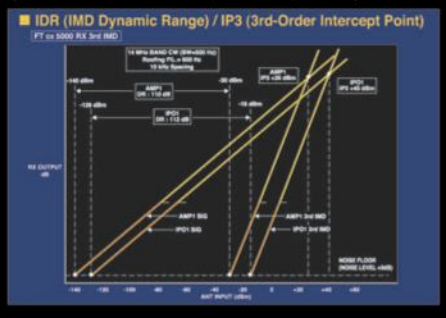


Front End Block Diagram (VFO-A/B, with Dual Receivers Installed)



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