Hams Respond to Thai Flooding, p. 13

# Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

APRIL 2012

CQ

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## QRP Special!

On the Cover: Hiroyuki Nagasawa, 7K1PYG, operating QRP portable in Stockholm, Sweden. Details on page 92.

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# Cushcraft R8 *8-Band Vertical*

***Covers 6, 10, 12, 15, 17, 20, 30, and 40 Meters!***


**The** Cushcraft R8 is recognized as the industry gold standard for multi-band verticals, with thousands in use worldwide. Efficient, rugged, and built to withstand the test of time, the R8's unique ground-independent design has a well-earned reputation for delivering top DX results under tough conditions. Best of all, the R8 is easy to assemble, installs just about anywhere, and blends inconspicuously with urban and country settings alike.

**Automatic Band Switching:** The R8's famous "black box" matching network combines with traps and parallel resonators to cover 8 bands. You QSY instantly, without a tuner!

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

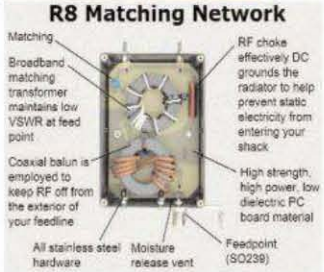
**Compact Footprint:** Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

**Legal-Limit Power:** Heavy-duty components are contest-proven to handle all the power your amplifier can legally deliver and radiating it as RF rather than heat.

**The** sunspot count is climbing and long-awaited band openings are finally becoming a reality. Now is the perfect time to discover why Cushcraft's R8 multi-band vertical is the premier choice of DX-wise hams everywhere!

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

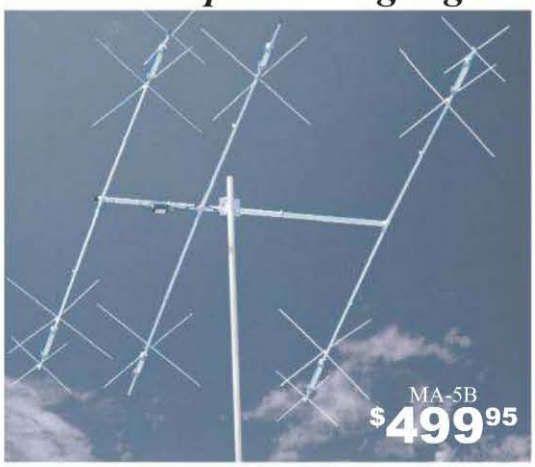
**R8 Matching Network**




**R8's Rugged Design**


# 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.

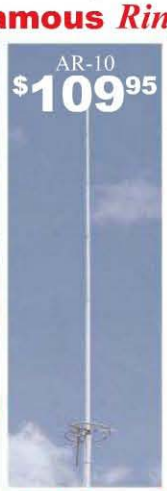
## Cushcraft Dual Band Yagis

***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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### Young Ham of the Year Nominations due May 30

Nominations are open for the Amateur Radio Newsline Young Ham of the Year Award. Nominees must be 18 or younger, licensed amateurs, residents of the US or Canada, and must have made significant contributions to their community, the nation or amateur radio. Nominations must be received by May 30. *CQ* is a co-sponsor of the Young Ham of the Year program. Complete details and nominating forms are online at <www.arnewsline.org/yhoty>.

### 200 Meters and Up!

For the first time in a century, amateur radio operators will soon be able to transmit on wavelengths higher than 200 meters (1500 kHz). The International Telecommunications Union (ITU) has approved a new worldwide secondary allocation for amateur radio between 472 and 479 kHz (approximately 630 meters). The 7-kHz-wide band was approved at February's World Radiocommunication Conference (WRC-12).

According to the ARRL, power is limited to one watt EIRP (effective isotropically radiated power), except that the limit may be increased to five watts in countries more than 800 kilometers (500 miles) from certain countries that want to give greater protection to the aeronautical radionavigation service, which is the band's primary user. These countries include Russia, Ukraine, China and several others, mostly in the Middle East and north Africa.

The new allocation will not take effect until it is published in the Radio Regulations, which the ARRL says will likely be no earlier than next January. In addition, in the U.S., FCC action will be necessary after the new international rule is in force. Hams in the United States have been restricted to wavelengths below 200 meters since the enactment of the Radio Act of 1912.

Fred Maia, W5YI, will cover the new band allocation in detail in the May "Washington Readout" column.

### New 60-Meter Rules in Effect as of March 5

The FCC's new rules for the 60-meter (5 MHz) band went into effect March 5. There is one new frequency—5.358 MHz, replacing 5.368 MHz—plus new modes and increased power. Operation in CW, RTTY, and digital modes is now permitted (as well as USB voice) and the maximum power permitted on the band is now 100 watts PEP.

There's a chance that 60 meters may become a worldwide amateur allocation in a few years. The *ARRL Letter* reports that the delegates to the just-concluded World Radiocommunication Conference agreed to put the matter on the agenda for consideration at the next WRC in 2015.

### K1JT Addresses WRC, Receives ITU Gold Medal

Nobel laureate and CQ Amateur Radio Hall of Fame member Dr. Joe Taylor, K1JT, was presented with a gold medal by the International Telecommunication Union after addressing attendees at WRC-12 in Geneva, Switzerland. Taylor, who shared the 1993 Nobel Prize in Physics for discovering binary pulsars, has also made major contributions to amateur radio weak-signal communications. According to the *ARRL Letter,* he was invited by ITU Secretary General Dr. Hamadoun Touré, HB9EHT, to speak about his vision of the future of radiocommunications. Touré then presented him with the gold medal in recognition of his contributions to research in radiocommunications. (***Watch and listen*** to K1JT's talk at <http://www.youtube.com/watch?v=F028RKkLefI>.)

### Ham Radio Study Tucked into Payroll Tax Bill

Using classic legislative sleight-of-hand, sponsors of the ARRL-backed bills to mandate a study of "impediments to enhanced Amateur Radio Service communications"—such as homeowner association antenna restrictions—tucked the language away deep in the bill Congress passed in mid-February to retain current payroll tax cuts through the end of 2012. The *ARRL Letter* reports that section 6414 of the *Middle Class Tax Relief and Job Creation Act of 2012* directs the FCC, in consultation with the Department of Homeland Security, to study the "uses and capabilities" of amateur radio in emergencies and disaster relief and to identify "impediments to enhanced (amateur radio) communications, such as the effects of unreasonable or unnecessary private land use restrictions on residential antenna installations." The law, which was signed by President Obama on February 22, also requires the FCC to make recommendations "regarding the removal of such impediments" and to report back to Congress with its findings within six months.

A ham from Arizona is taking a different tack in attempting to get the FCC to pre-empt homeowner association antenna restrictions. Len Umina, W7CCE, has filed a petition claiming that the FCC's position that its limited pre-emption of state and local antenna laws does not extend to private land-use regulations violates the equal protection clause of the 14th Amendment to the U.S. Constitution. His petition has been designated as PRM12WT. As we went to press, it had not yet been posted for public comment.

### FCC Denies Waiver Request on No-Test Relicensing

The FCC has said no to the Anchorage VEC's request for a temporary waiver to permit re-issuing of expired amateur licenses without the need for retaking a license exam while it considers the group's pending rulemaking petition to permit no-test relicensing on a permanent basis. According to *Newsline*, the Commission suggested that it was unlikely to approve the underlying petition, noting that its rules require all licensees to demonstrate their qualifications before receiving licenses, and that plenty of exam opportunities are available. However, it left the door open for possibly reaching a different conclusion when it decides on the petition in FCC Docket WT 11-130.

### NASA to Launch Fox-1 Cubesat

AMSAT has had a big financial burden lifted from its shoulders with the acceptance of the planned Fox-1 satellite into NASA's "Educational Launch of NanoSat" program. The AMSAT News Service reports the space agency will pay the satellite's integration and launch costs, allowing AMSAT to put all of the money it raises for the project into designing and building the satellite itself. Actually, it need to build two satellites—one to fly and one spare—and notes that major donations are still needed, especially for the high-efficiency solar panels needed to provide the spacecraft with as much power as possible.

*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.*

# Download Your Next Radio From FlexRadio Systems

## New RF Tracking Notch Filter Provides Revolutionary Capability!

### Tracking Notch Filter™ (TNF)

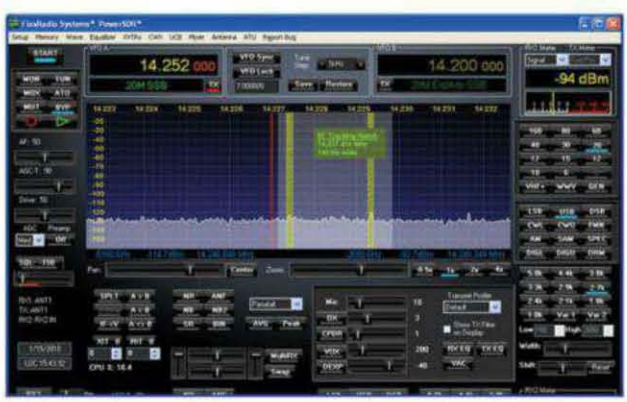
FlexRadio Systems has developed a revolutionary new tool in the never ending fight against foreign broadcast carriers, "birdies", narrowband noise sources, and local shack interference: Infinitely adjustable RF Tracking Notch Filters. TNF gives the FlexRadio user the ability to have up to 18 frequency locked notches active in the receiver passband at the same time and the ability to memorize any number of notches across all bands. This includes the MultiRX™ mode second audio passband plus the FLEX-5000's RX2 second receiver.

### How TNF Works

Since FlexRadio Systems' Software Defined Radios (SDRs) are based on software and digital signal processing, the math to create a single fixed audio notch such as "Automatic" notch filters (ANF) is a very simple process. Even fixed DSP radios can do this today. The challenge comes when the radio is tuned to keep a notch tracking the desired frequency. FlexRadio approached this from a different angle by developing a mathematical method to change the IF frequency of the notch as the radio is tuned in real time. Because this method is done in the digital SDR domain away from any analog component variations, notch tracking and repeatability problems are virtually eliminated. Best of all, if one tracking notch filter can be created, it's straightforward to create as many as needed. The result is a virtually unlimited number of stable, frequency locked, tracking notch filters.

### How to Use TNF

The reason TNF works so well is the intuitive graphical user interface for adding, adjusting, and deleting TNF notches. TNF notches are added with a click of the mouse then dragged over the offending signal. A visual TNF ZOOM - TUNE mode allows for precise positioning and bandwidth control of the TNF notch. This combined with instant audio feedback allows you to optimize each TNF to remove just the offender while leaving your wanted signal in the passband. If the offending carrier is too strong for a NORMAL notch, right click the TNF notch and set it to DEEP or VERY DEEP to remove even the strongest interfering signals. When the TNF notch is properly adjusted you can easily make the TNF permanent. Tune away and come back, the TNF notch is there. Change bands and come back, TNF is on the frequency where you need it. You can even power down the radio and come back next week. Still there!




### When to Use TNF

Some examples of when to use TNF are to remove constant DSL and environmentally generated birdies. Or spend a few minutes on 40 meters to magically remove those annoying AM carriers that appear across the band. Additionally, you can use TNF to temporarily block strong adjacent CW and digital signals.

Remember, you can only get TNF on PowerSDR™ for FlexRadio Systems products. To learn more check out our whitepaper or watch the TNF YouTube™ video. You can find these at http://www.flexradio.com/TNF.

### Note to FlexRadio Owners

To download the revolutionary TNF feature for your FLEX-Series radio today, just visit www.flexradio.com for the latest version of PowerSDR™.

If you are not yet a FlexRadio owner, check out TNF and all the other revolutionary features that make the FlexRadio Systems SDRs the most amazing radios on the air!

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## features

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### *QRP Special:*



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## departments

# Array Solutions Your Source for Outstanding Radio Products

## Professional Grade Equipment from Array Solutions


**NEW!**

## PowerMaster II

- New Larger, Sharp & Fast LCD Display
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- SWR Threshold Protection (with amp PTT bypass)
- Hi / Lo Power Level Monitoring
- Single and Dual Rack Mount available
- New "Power Master Basic" Software - Free!

## AIM *uhf* Analyzer


- Frequency range from 5 kHz to 1 GHz.
- Data plots include SWR, RL, R + X, series and parallel, magnitude, phase, and more.
- Dual Smith charts with rotation and 20 markers.
- Plots and calibration files can be saved and used anytime in CVS and dynamic formats.
- AIM 4170C is still in production covering 5kHz to 180 MHz.
- New TDR functionality

## ACOM – Outstanding HF Power Products

### ACOM 2000A

The ACOM 2000A Automatic HF Linear Amplifier is the world's most advanced legal-limit HF amplifier designed for amateur use. (160 thru 10m) (2x 4CX800A Tubes)

**ACOM 1000**
**160-6m Amplifier**
The world's best value in an amateur HF & 6m amplifier. Delivers 1000 watts output on all bands
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Economical 800 watt output 160-10m
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**ACOM 1011**
**160-10m Amplifier**
Fast 30 second warm-up, 700 w output, 160-10m.
(2x 4CX250B Tubes)

Coming in 2012 ..
**ACOM 800S Solid State Amplifier**
**160 through 6 M, 800 W from 1.8 to 54 MHz, no time limit**
This Device has NOT been approved by the F.C.C. and my not be offered for sale or lease until approval of the F.C.C. has been obtained.
The information shown is preliminary and may be subject to change without notice or obligation.


## OptiBeam Antennas

OptiBeam antennas are the best antennas you can buy. Whether it is an array of mono-banders or a multi-monobander antenna, you will more likely be first through a pileup with an OptiBeam. An OptiBeam is...

- Antenna Technology
- Technical Qualities
- Electrical Properties
- Mechanical Quality Throughout
- Physical Properties
- Avoiding Disadvantages of Other Antenna Systems

## RigExpert AA-1000 Antenna Analyzer

**NEW!**


RigExpert AA-1000 is a powerful antenna analyzer designed for testing, checking, tuning or repairing antennas and antenna feedlines.

## Vector Network Analyzer Model VNA 2180


Measures impedance magnitude, phase and transmission parameters for antennas, filters, and discrete components - using one or two ports.

- Frequency range is 5KHz to 180MHz.
- Data plots include: impedance, SWR, return loss, S11 and S21.
- Plots can be saved for before and after comparisons.
- New TDR functionality

## AIM 4170C Antenna Lab RF Analyzer


The AIM 4170C antenna analyzer measures the complex impedance (magnitude and phase) at each frequency of interest in the range of 5KHz to 180 MHz. A PC is used to calculate all RF parameters, including R +/-X, Magnitude and Phase, SWR, Return Loss, line loss, and more and plot the results in an easy to read graph and interactive Smith Chart.

- New TDR functionality

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Array Solutions' products are in use at top DX and Contest stations worldwide as well as commercial and governmental installations. We provide RF solutions to the DoD, FEMA, Emcomm, UN, WFO, FAA and the State Dept. for products and installation of antennas systems, antenna selection, filtering, switching and grounding. We also offer RF engineering and PE consulting services.

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Choice of the World's top DX'ers℠

# Choice of the

## Covering HF and 6 meters the FT-DX9000 Series answers the call for the ultimate DX base station.

### FT DX 9000MP

No other Amateur transceiver offers you 400 Watts of transmitter power for the biggest, cleanest voice on the bands. And switching to Class-A operation at 100 Watts of output, you enjoy the benefits of ultra low distortion others can't match at 100 Watts! Two pairs of Meters, plus LCD Window; Data Management Unit and Flash Memory Slot Built In. Main/Sub Receiver VRF, plus Full Dual Receive Capability, External 50V/24 A Switching Regulator Power Supply and Speaker with Audio Filters.

### FT DX 9000D

The "Fully loaded" model represents the total FT DX 9000 experience. Included is the large TFT display, along with 1.8-14 MHz high-Q "μ" front-end RF tuning circuit, utilizing a large-diameter 1.1" (28mm) ferrite core and precision motor drive. Its Q of over 300 provides razor-sharp RF tuning-ideal for today's crowded bands! Large TFT, Data Management Unit and Flash Memory Slot Built In, Main/Sub Receiver VRF, plus Full Dual Receive Capability, Three μ-Tuning Modules for 160 – 20 M, 50 V/12 A Internal Switching Regulator Power Supply.


### FT DX 9000 Contest

The FT DX 9000 gives you the opportunity to build up your radio to match your operating style and competitive requirements. World-class ergonomics combine with leading-edge performance to put more QSOs in your log faster. This is what Amateur Radio is about: building the best, so you can be your best! Two Pairs of Meters, plus LCD Window, VRF Input Preselector Filter, Three Key Jacks, and Dual Headphone Jacks, 50 V/12 A Internal Switching Regulator Power Supply.

## FT-2000, FT-2000D, FT-950 and the FT-450D

### FT-2000 and FT-2000D

This rugged DX hunter has power and performance to spare. The FT-2000 provides a full 100 Watts RF output on 160 through 6 meters with an internal power supply, but the FT-2000D version doubles down with 200 Watts and an external supply. The impressive feature list for both versions includes dual receive capability for effortless split frequency operation; a receiver front-end VRF (Variable RF Tuning) preselector; 1st IF roofing filters (3/6/15 kHz) for superb dynamic range; variable IF bandwith and IF Shift; receiver DSP with Auto-Notch, Manual Notch, Digital Noise Reduction; and a continuously-variable passband contour control.

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# *World's top DX'ers*

## FT DX 5000 Series

The FT DX 5000 Series HF/50 MHz 200 Watt Transceivers are a premium Class of Yaesu radios with 2 Independent Receivers plus many options and accessories designed for the serious DXer.

With 112 dB dynamic range and an IP3 [3rd Order Intercept Point] of +40 dBm (CW, 500 Hz BW), you'll find extra sharp roofing filters for VFOA/Main receiver are selectable between 300 Hz (optional on some versions), 600 Hz, 3 kHz, 6 kHz and 15 kHz.

Three electro-luminescent sub-displays indicate sub frequency, graphical wave and menu functions. Additional features: Parametric Microphone Equalizer; Dual Receive In Band Function Contest-ready Antenna Selection; Manual and Automatic Digital Notch; High Speed Automatic Antenna Tuner; DSP Noise Reduction.

**FT DX 5000MP**
Station Monitor SM-5000 included; 0.05 ppm
OCXO included; 300 Hz
Roofing Filter included

**FT DX 5000D**
Station Monitor SM-5000 included; 0.5 ppm
TCXO included; 300 Hz
Roofing Filter optional

**FT DX 5000**
Station Monitor SM-5000 optional; 0.5 ppm
TCXO included; 300 Hz
Roofing Filter optional

### FT-950

Whether you're a serious or casual DXer, the Yaesu FT-950 should be at the top of your list. The FT-950 packs a 100 watt punch on 160 through 6 meters and includes a built-in antenna tuner; triple-conversion superheterodyne receiver; three factory-installed 1st IF roofing filters; variable IF bandwidth and IF shift, manual IF notch filter, an Automatic Digital Notch Filter (DNF) and many other expanded features available with optional DMU-2000 Data Management Unit.

### FT-450D

This easy-to-pack radio is a DXpeditioner's dream come true – a lightweight, high performance transceiver spanning 160 through 6 meters with 100 Watts RF output. When it's time to wade into the pileups, you'll appreciate the FT-450D's 10 kHz bandwidth roofing filter in the 68 MHz first IF, right after the first mixer. This filter provides outstanding selectivity when the going gets rough – a feature rarely found in rigs in this price range!

zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

# The Power of QRP

Welcome to our first (in a long time) QRP special! The title above, "The Power of QRP," may seem something of a contradiction in terms at first glance. After all, QRP is all about using *less* power. But its unique power, as you will see in this issue's articles, is its ability to increase our enjoyment of ham radio. For the uninitiated, "QRP" is "ham-speak" for low power, specifically making contacts with five watts or less. But why would anyone want to operate with *less* power than his/her station is capable of producing?

First of all, like gravity, it's not just a good idea, it's the law! FCC rules require us to use the minimum power necessary to establish and maintain contact with other stations. For some of us, that means a kilowatt at all times (don't want to take chances, after all), or perhaps cutting back to a few hundred watts if signals are very strong. But the reality—as this issue's articles will demonstrate—is that it is often quite possible to establish and maintain contact with very little power.

Second reason: It's a challenge. Many of us come into ham radio for the challenges it presents—making lots of contacts in faraway places, making more contacts in more places than the next guy over the course of a weekend, contacting every county in the United States, designing and/or building your own equipment and having it work, providing communications during an emergency when all else has failed. Meeting these challenges provides a sense of accomplishment, and operating QRP is one more challenge on the seemingly never-ending list that our hobby provides.

Third reason: Camaraderie. QRPers form one of many subgroups within ham radio (like DXers and contesters), and when they get together on or off the air, they enjoy swapping stories or working together on group projects (like DXers and contesters). It's a great group of people (they're hams, after all!), and they're always ready to help out somebody just getting started or trying something new.

Reason #4: It's "green" ham radio. Putting less power out means that you need less power going in from the electric grid. Plus, there is little to no concern for potential RF safety issues (see this month's "Washington Readout" column).

Reason #5: QRP is good for your health. The small size and portability of most QRP transceivers encourages users to get out of their shacks and operate from hilltops and hiking trails, or local parks within walking or biking distance of home. No other part of ham radio (perhaps besides tower-climbing) offers so much regular encouragement to combine ham operating with healthy exercise. And finally…

Reason #6: It's fun. We must never lose sight of the fact that amateur radio is a hobby, and it is supposed to be fun. Yes, it is a hobby with responsibilities—in exchange for the use of the public airwaves, we are expected to provide public service and emergency communications, help advance the state of the art in telecommunications, provide self-training for our fellow hams in order to create and maintain a pool of trained communicators and technicians for times of national need, and to help promote international goodwill by conducting one-on-one diplomacy with citizens of other countries. We do all of this, regularly and well. But in between the times that our skills are needed for the "service" part of the Amateur Radio Service, we keep our skills sharp by embracing the "amateur" part—something done for the love of it. And we love it because ham radio is *fun*. It is the combination of hobby and service that makes amateur radio unique, and keeping a balance between them is essential for our continued success in both areas. QRP is just one more way of having fun with ham radio.

## Less is More?

As you read through this issue's articles, you will see how operating QRP opens doors to getting on the air from antenna-restricted locations, from vacation spots and more. In addition, QRP is inextricably tied up with building—the two have always gone hand-in-hand—and you will see how the potential for success at low power is motivating hams with no building experience and no CW experience to try their hands at both (see "The 'Splinter' QRPp Trans-Receiver" on page 22).

If reading this editorial is your first exposure to QRP operating, I'd suggest that you begin your journey through this issue in the middle of the magazine, starting out with K7SZ's "QRP Primer" in his "Learning Curve" column on page 66, then come back up front to read about the variety of QRP experiences that we're able to share with you in this issue. (Since QRP is also inextricably tied up with portable operating, look for more QRP/portable stories in June's "Take it to the Field" special.)

Of course, we realize that not everyone will find low-power operating to be something that gets their ham radio juices flowing, so we also have both features and columns in this issue that are *not* about QRP. Plus, since this is April, we have our annual visit to these pages by Professor Emil Heisseluft, who this year checks out a group of entrepreneurs who will happily help you get the vanity callsign of your choice … even if someone else already has it!

## Hamfest Season

The 2012 hamfest season is under way. I'm just back from Orlando as I'm writing this, and by the time you read this, we'll have been to Charlotte as well. And we'll be starting to think about Dayton (see "Magic in the Sky" on page 86, but keep your tongue planted firmly in your cheek).

At Orlando, the feedback on the digital edition of *CQ* was overwhelmingly positive, and there was quite a bit of discussion on things we can do to make the digital edition experience even better than it already is. One thing clear is that it is a work in progress, and likely always will be, and we're all learning together about its capabilities and its limitations. My thanks to all of you who took a few moments to stop and chat with us at Orlando. The best part of going to hamfests (besides hamfest food, HI) is the chance to chat with our readers. I always come home with a renewed sense that what we're doing here is important and valuable to all of you. Thank you for your ongoing support and encouragement. We will continue to do our best to meet your very high expectations.

73, Rich W2VU

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

# hy-gain® HF VERTICALS

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

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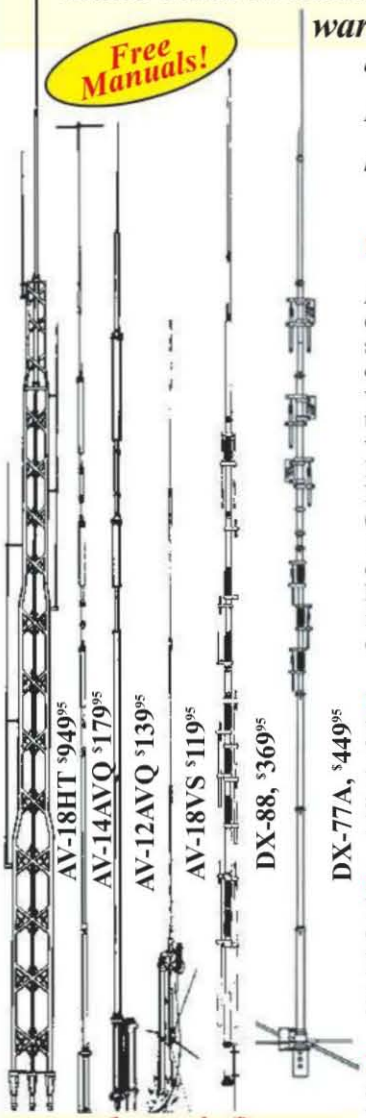


## hy-gain® Classics

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

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

***Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators. Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage. Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low. Two year limited warranty.***

**AV-18HT, $949.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.** **Standing** 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands. Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. The addition of a base loading coil (**LC-160Q, $109.95**), provides exceptional 160 Meter performance. **MK-17, $89.95**. Add-on 17 Meter kit. 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tilt-over hinged base for easy raising & lowering.

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

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

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

**DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs.** **All** bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $199.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

**DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.** *No ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

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| AV-18HT | $949.95 | 10,15,20,40,80 | 1500 W PEP | 53 feet | 114 pounds | 75 MPH | ------ |
| **AV-14AVQ** | **$179.95** | **10,15,20,40** | **1500 W PEP** | **18 feet** | **9 pounds** | **80 MPH** | **1.5-1.625"** |
| AV-12AVQ | $139.95 | 10/15/20 M | 1500 W PEP | 13 feet | 9 pounds | 80 MPH | 1.5-1.625" |
| **AV-18VS** | **$119.95** | **10 - 80 M** | **1500 W PEP** | **18 feet** | **4 pounds** | **80 MPH** | **1.5-1.625"** |
| DX-88 | $369.95 | 10 - 80 M | 1500 W PEP | 25 feet | 18 pounds | 75 mph no guy | 1.5-1.625" |
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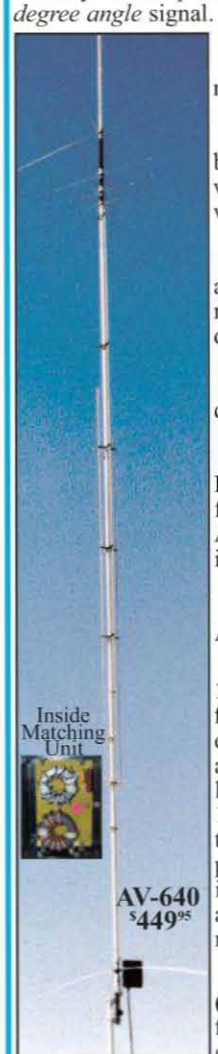


***No ground or radials needed***

**Effective** counterpoise replaces radials and ground.

***Automatic bandswitching***

**Single** coax cable feed. Each band is individually tunable. Extra wide VSWR bandwidth. End fed with broadband matching unit.

***Sleek and low-profile***

**Low** 2.5 sq. ft. wind surface area. Small area required for mounting. Mounts easily on decks, roofs and patios.

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# announcements

**The following events are scheduled for April:**

**CUYAHOGA FALLS, OHIO —** The Cayahoga Falls Amateur Radio Club will hold the **58th Annual Hamfest Electronic and Computer Show** from Saturday, **April 4** at Emidio & Sons Party Center, 48 East Bath Road. Activities include a flea market and door prizes. Contact: Dan Atkinson, W8DFA, (303) 431-2090. E-mail: <skywarnohio @yahoo.com>. (Talk-in 147.27+)

**LOWELL, MICHIGAN —** The Amateur Radio Group of Youth will hold the **ARGYL Hamfest** on Saturday, **April 7** at the Lowell High School, 11700 Vergennes Street. Activities include a flea market, door prizes, and refreshments. Contact: Al Eckman, (616) 450-4332. E-mail: <al.eckman@comcast.net>. (Talk-in 146.620 [PL 94.8] or 145.270 [PL 94.8]; exams)

**RALEIGH, NORTH CAROLINA —** The Raleigh Amateur Radio Society will hold the **40th Annual RARSFest** and **ARRL NC State Convention** on Saturday, **April 7** at The Jim Graham Bldg., NC Fairgrounds, 1025 Blue Ridge Road. Activities include SKYWARN Spotter training, hands-on projects, youth lounge, DXCC card checking, meeting and forums, and cash prizes. **Special event station W4DW** will broadcast from 8 a.m. to 4 p.m. Saturday. Frequencies are 7.235 and 14.235 (±QRM). Contact: Steve Ferrarini, KJ4BX, 107 Thomas Pl., Knightdale, NC 27545; (919) 247-8690; e-mail: <steve.kj4bx@gmail.com>; <http://www.rars.org/hamfest>. Talk-in 146.64; exams)

**GODALMING, UNITED KINGDOM — The Wey Valley Amateur Radio Group** will air a special event station, **GR100MGY**, on **April 10–15** to honor the 100th anniversary of the sinking of the *Titanic*. Frequencies on eight HF bands from 3.5 MHz to 28 MHz. QSL information: <http://www.QRZ.com>. Contact: Michael Shortland, GØEFO, <michaelgs1 @talktalk.net>.

**CHATHAMPORT, MASSACHUSETTS – Special event station KM1CC** from former coast station WCC to commemorate the 100th anniversary of the sinking of the *Titanic*; 1200 UTC **April 12** to 2000 UTC **April 15**. Two CW, one digital, and one SSB station on phone 14.260, 21.260, 7.160, 7.160/7.060; CW 14.030, 21.030, 28.030, 7.030; PSK31 14.070, 21.070. QSL with SASE and sufficient postage to K1UI (K1UI@arrl.net).

**BELTON, TEXAS – The Temple Amateur Radio Club** will hold **HamEXPO!** on **April 14** at the Bell County Expo Center, Belton. Fleamarket, tailgating. Contact Mike LeFan, WA5EQQ, phone (254) 773-3590, e-mail: <expo@tarc.org>; <http:www.BeltonHamExpo.org>. (Talk-in 146.820–, tone 123.0; exams)

**STOUGHTON, WISCONSIN – The Madison Area Repeater Association** will hold the **40th Annual Madison Hamfest**, Saturday, **April 14** at the Mandt Community Center, 400 Mandt Parkway. A 26,000-square-foot flea market. Contact: Paul Toussaint, N9VWH, (608) 205-1994; e-mail: <w9hsy@execpc.com>; <http://www.qsl.net/mara>. (Talk-in 147.150 [+600], PL 123.0 Hz; exams 10 a.m.)

**YAKIMA, WASHINGTON – W7AQ, Yakima Amateur Radio Club** will hold the **Yakima Hamfest** Saturday, **April 14** at the Selah Civic Center, 216 South 1st Street. Activities include VE exams, a 2-meter bunny hunt, door prizes. Contact: Lindsay Kooser (509) 965-6612; e-mail: <n7rhw@arrl.net>; <http://www.w7aq.org>. (Talk-in 146.660 [PL 123.0]).

**YORK, PENNSYLVANIA — The York Hamfest Foundation** will hold the **2012 York Hamfest** Saturday, **April 14** at the Porters Community Fire Company, 1199 Porters Road (rain or shine). Contact: KB3QLQ, <duane.sterner@yahoo.com>. (Talk-in 147.33 +.600 [CTCSS 123.0 Hz])

**VISALIA, CALIFORNIA — The Southern California DX Club** in association with the **ARRL** and the **San Diego DX Club** will hold the **63rd Annual International DX Convention April 20–22** at the Holiday Inn Hotel and Convention Center, 9000 West Airport Drive. Activities include classes, forums, seminars, QSL card checking, CW pile-up competition, exhibitors, and a golf tournament. To register visit: <http://www.dxconvention.org/reg/>; info <http://www.dxconvention.org/>.

**VISALIA, CALIFORNIA — Elecraft** is sponsoring the **DX University** Friday, **April 20,** at the Holiday Inn Hotel and Convention Center, 9000 West Airport Drive. Lecturers include AA7A, G3SXW, K4UEE, K9LA, N7NG, W3UR, W6OAT, W9KNI, and XE1KK. Topics include propagation, optimizing stations and antennas, awards, ethics, remote operations, QSLing, and more. Registration is $55. Contact: Wayne Mills, <n7ng@arrl.net> or Roger Western, <g3sxw@btinternet.com>. Info <http://www.dxuniversity.com>.

**PICKERING, CANADA — The North Shore Amateur Radio Club** and South Pickering Amateur Radio Club will hold the **Durham Region Amateur Radio Hamfest 2012** Saturday, **April 21** at the Pickering Recreation Complex, 1867 Valley Farm Road. Activities include a flea market, Contact: Durham Region Amateur Radio Hamfest, P.O. Box 53, Pickering, ON, Canada L1V 2R2. Website: <http://drhamfest.tripod.com>. (Talk-in 147.373+)

**PERU, INDIANA — The Kokomo Amateur Radio Club** will hold the **Seventh Annual North Central Indiana Hamfest** Saturday **April 21** at the Miami County 4H Fairgrounds, 1029 West 200N. Activities include a flea market and raffle. Contact: Steve Shepler, Box 824, Marion, IN 46952; e-mail: <shepler1@gmail.com>; <http://www.nci-hamfest.net>. (Talk-in 147.345+; exams 8–10 a.m.)

**GEORGETOWN, DELAWARE — The Sussex Amateur Radio Association** and **Sussex Technical High School** will hold the **Delmarva Amateur Radio & Electronics EXPO** on Saturday, **April 21** at Sussex Technical High School, 17099 County Seat Hwy. Tailgating, guest speakers, card checking, raffle, auction, police K9 demonstration. Contact: Bill, KB3KYH, (302) 537-4755; <http://www.radioelectronicsexpo.com>. ((Talk-in 147.075 [PL 156.7]; exams)

**SONOMA, CALIFORNIA — The Valley of the Moon Amateur Radio Club** will hold its annual **ARRL Hamfest** Saturday, **April 28** at the Sonoma Valley Veterans' Memorial Building, 126 First Street West. Activities include demonstrations of radio stations and emergency communication vehicles, displays, swap meet, transmitter hunt, door prizes. Contact: Darrel, WD6BOR, (707) 996-4494; e-mail: <wd6bor@ vom.com>; <http://vomarc.org/>. (Talk in 145.35 –600 [PL 88.5]; exams 9 a.m.)

*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.*




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## 65 Ft. Telescoping Antenna Kit

- Eleven telescoping sections from 2" to 7/8" O.D.
- Stainless steel element clamps

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| COM-BAL-11150E | 5 kW, side eyebolts | **$49.95** |
| COM-BAL-11150ET | 5 kW, side and top eyebolts | **$49.95** |
| COM-BAL-11150S | 5 kW, side studs/wingnuts | **$49.95** |
| COM-BAL-11150T | 5 kW, top studs/wingnuts | **$49.95** |
| **1:1 Dual Wire/Dual Core** | | |
| COM-BAL-11140T | 5 kW, top studs/wingnuts | **$69.95** |
| COM-BAL-11140S | 5 kW, side studs/wingnuts | **$69.95** |
| **1:1 Coax/Dual Core** | | |
| COM-BAL-11150DS | 5 kW, side studs/wingnuts | **$69.95** |
| COM-BAL-11150DT | 5 kW, top studs/wingnuts | **$69.95** |
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*When Thailand was deluged by its worst flooding in 50 years, the country's hams provided emergency communications, of course, but also stepped (sloshed?) beyond ham radio's traditional role. K4VUD/HSØZCW tells the stories, with photos by E21EIC.*

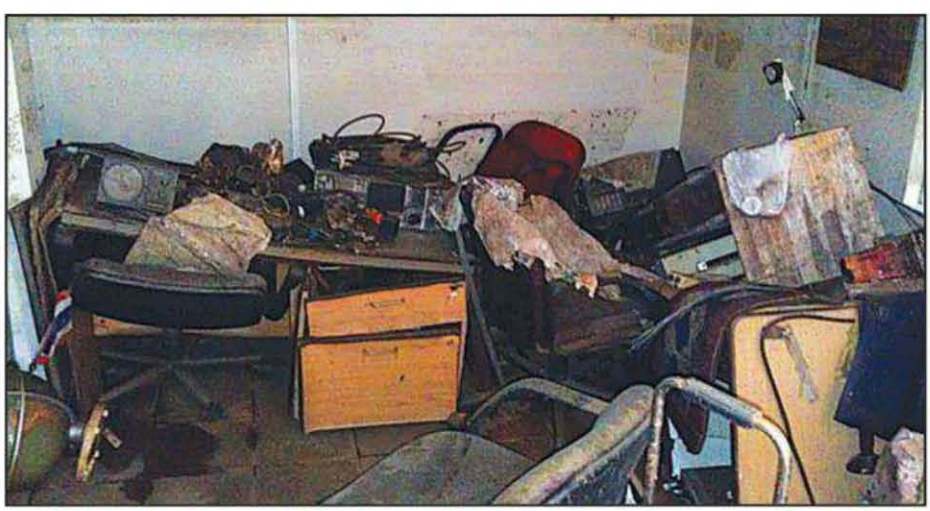
# Hams in Thailand Meet Flood Disaster

BY CHARLY HARPOLE,* HSØZCW/K4VUD

Flooding, the worst in 50 years, rushed angry black waters toward Thailand's huge capital city, Bangkok, the first week of October 2011. Warnings went out and assurances were issued saying that waters would be diverted to outlying areas, keeping the central city safe. Thai hams, nevertheless, went on high alert and began to staff emergency centers. Their help was needed as events demonstrated, because in spite of the best laid plans, floodwaters rushed into the northern part of the city.

That section included HSØAC, the national club station of the Radio Amateur Society of Thailand (RAST), located on the campus of the Asian Institute of Technology. Before anything could be done, polluted and snake-infested waters rushed over the institute's big dikes, into its classrooms and dorms, and sadly, into the ham club station.

HSØAC was rapidly hip deep in water, and for two long months remained under water, which topped out at over six feet deep. The scores of transceivers, lovingly restored, and a new Yaesu FT-1000MP Mark 5 were covered and the desks they were on dissolved into mush. When the water finally subsided, the members found nothing left of use except the concrete shack building and Yagis on the club's three towers.



*Some of the flood damage to the Radio Amateur Society of Thailand's club station, HSØAC. The RAST station was under water for two months. Additional HSØAC photos are on the RAST home page at <http://www.qsl.net/rast>. Scroll down the main page. (All photos by/courtesy of E21EIC.)*

## Communications and More

The real story of Thai hams, however, is in the swift and careful efforts that provided emergency communications and personal vehicles dispatched to brave the waters. The photos taken by Champ, E21EIC, and his wife, Goi, E20NKB, who rapidly deployed in their 4-wheel drive vehicle with snorkel attached and delivered food packets as well as radioing for medical help, are an example and show what they all were up against. When the waters overtopped their 4×4, the intrepid duo flipped a boat off the roof and paddled to those places with six to ten feet of flooding and stranded, hungry people.

Goi said she had to remove the floor plug in the 4×4 so that it would not float helplessly. They, and a host of other Thai hams, pitched in and delivered food and survival packets for weeks.


*Bags of essential supplies were packed up by Thai hams equipped with 4×4s and delivered, along with clean drinking water, to flood victims throughout the country.*

*e-mail: <hs0zcw@gmail.com>

The Thai people's famous stoicism and good humor in the face of adversity shown through as grinning grannies were floated to safety in plastic tubs and bright pink taxis were brought out with inflated tire inner tubes. Although over 600 people lost their lives, most by electrocution (it was reported that wires suddenly fell into the water where folks were wading), and dozens of factories had to close, putting people out of work, the central hub of Bangkok remained dry. This kept the whole country from an economic meltdown.

## Beginning to Rebuild

Now reporting several months later, HSØAC club members have scooped out the shack and started the rebuilding. Hundreds of hams worldwide have jumped to donate radios and thousands of dollars. In the grand tradition of hamdom, with this help the station will live again. Truly, it is an international resource, because other than being used by Thai hams, any licensed operator from any nation may visit and operate the station simply by signing HSØAC from the shack. Soon that invitation will be able go out again, because the Thailand club will definitely rebuild (maybe by adding a second floor to the shack in the event of another such disaster!) and bring in HF and VHF transceivers to serve all bands.

Donations remain welcome via the PayPal system (donate@rast.or.th). One silver lining to the disaster is that newly approved permits to import the latest ham rigs into Thailand include previously banned radios that operate on the 6-meter band. Can approval of the opening of that band be far behind this development?

## A True Team Effort

Many helped in emergency communication, including those Thai hams who were frequently on the air during the disaster. Please see the photographs that accompany this article, plus additional photos of relief activities at <http://www.qsl.net/rast/text/Suzuki4x4team>.

HS4DDQ (using HSØAC portable) coordinated emergency medical communications at the Public Health Ministry, and the team members were HS1ER, HS1CHB, HS4DDQ, HS9CA, E20TTJ, and HS3XDB.

The group that went into the waters to deliver food and provide medical communication included E20NKB, E21EIC, HS4DDQ, HS2TEI, the APRS East Group, the Suzuki 4×4 Team, and volunteers from Dhonburi University. Many just waded into the depths and handed out bags of staple foods and toiletries.

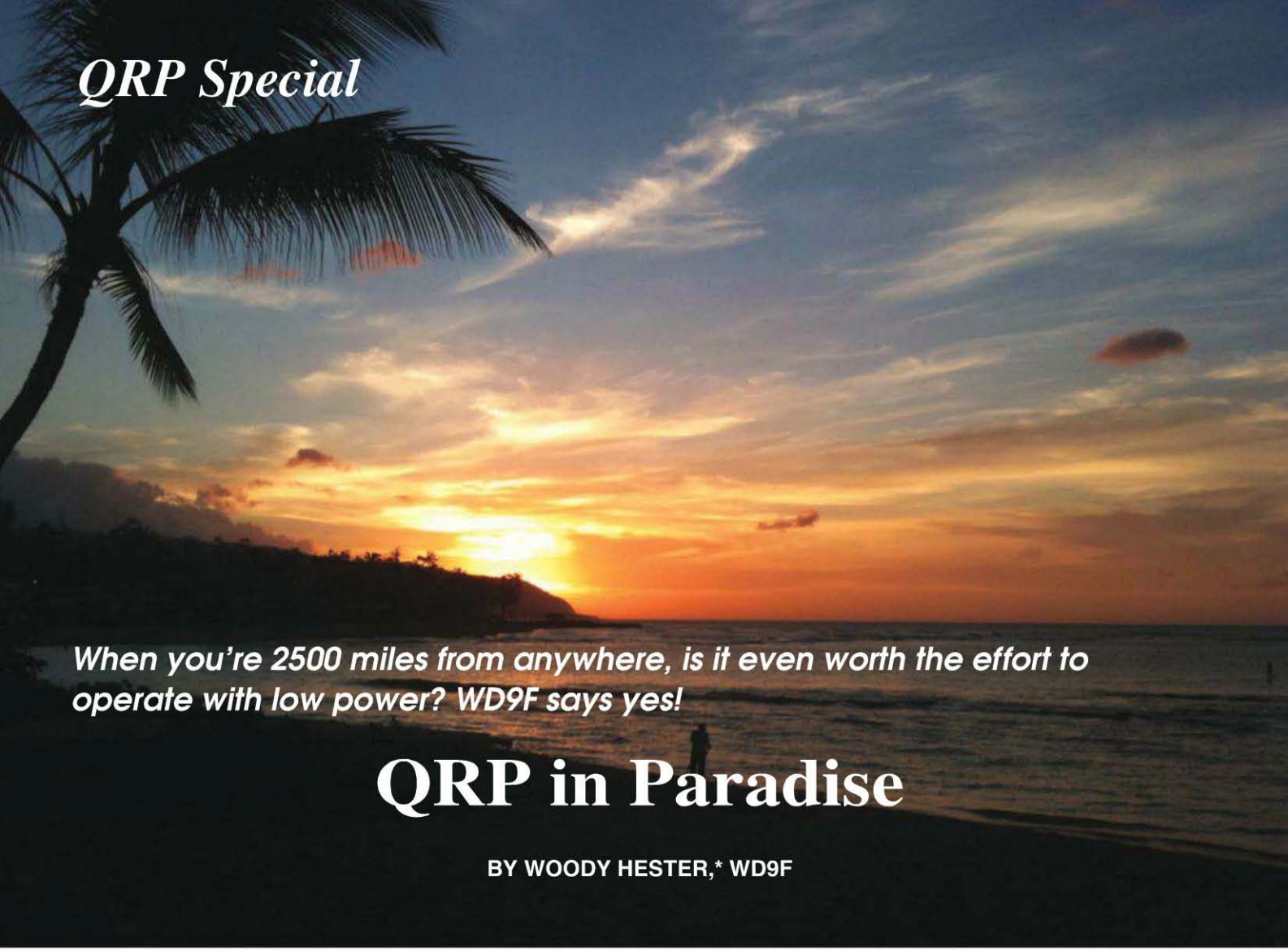
The whole national club, including RAST leadership and coordinating recovery committee, profoundly thank everyone for their kindness and help in every way. Every donated penny will be carefully put to rebuilding and restocking the station, but the club may also buy a small boat to have on hand if the flood waters get this angry ever again.

*How deep were the flood waters? In this photo the water was about 95 centimeters (over 3 feet) deep. In other places, boats were needed to distribute aid.*

*Drinking water and infant formula being handed out at one stop.*

*In some places, the water was so deep that Champ's 4×4 full of supplies had to be loaded onto a raft.*

*Champ, E21EIC, hands a bag of basic supplies to a flood victim. More photos of RAST's disaster assistance efforts are online at <http://www.qsl.net/rast/text/Suzuki4x4team>.*



*When you're 2500 miles from anywhere, is it even worth the effort to operate with low power? WD9F says yes!*

# QRP in Paradise

BY WOODY HESTER,* WD9F

My son and his family, including three of my eight grandchildren, are currently stationed on Oahu, so my wife and I go there to visit for a couple of weeks every six months. What a hardship! As an avid QRP nut who loves portable operating, I jumped at the chance of getting on the air from exotic Hawaii. Oahu has many wonderful parks with lots of picnic tables and trees (see photo A). Since that's my favorite portable operating venue stateside, it seemed like a natural, but I was in for some surprises and a big QRP challenge.

I did know that the Hawaiian Islands sit in the middle of the Pacific Ocean, virtually isolated from the rest of the world. Everyplace is at least 2500 miles away and that is serious DX for a QRPer. To get a sense of just how far away everything is, check out fig. 1, a custom azimuth projection made using software created by Joe Mack, NA3T, and Michael Katzmann, NV3Z, and hosted by Mark Downing, WM7D, at <www.wm7d.net/azproj.shtml>. The map is a dead giveaway that Hawaii is not a place to expect QSOs on a watt or two with a bedspring antenna.

***"The Hawaiian Islands are at least 2,500 miles from everywhere. While not exactly a walk in the park for the QRPer, fun can be had with a little planning and perseverance"***

## Trip #1: "Big Guns"

My first trip came immediately on the heels of a very busy few weeks at work. I spent less time planning than I should have. For gear I decided to take my FT-817ND; LDG Z11 tuner with a 4:1 balun; end-fed half-wave antenna (EFHWA) for 15, 20, and 30 meters; some lightweight antenna line; and my Palm Mini Paddles (see photo B). I planned to pick up a 12-volt gel cell on the island. I carefully packed my gear in checked baggage, included a copy of my FCC license and a letter to the TSA describing what the gear was all about, and everything got through just fine.

The FT-817 and the Z-11 combo proved to be a mistake. While it gave me lots of flexibility re: operating bands and antenna, the setup required too much power. I could only operate a short time before needing to recharge the 5-amp-hour battery I picked up, even at reduced power (2.5 watts). Because my operating time was limited, because of the power challenge, because I had not carefully considered optimum operating times relative to propagation, and maybe because I oriented the antenna as a sloper instead of a vertical, I didn't make a single contact on my first trip. My dreams of handing out KH6 QRP QSOs to stateside hams were dashed, but I learned a lot.

One of the amazing things I learned is that when you turn on the rig in Hawaii, you simply don't hear anything—no noise

*e-mail: <fghester@yahoo.com>

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*Photo A– I love to operate from parks, whether I'm at home or in Hawaii! (All photos courtesy of the author)*

and sometimes no signals at all, even on an open band. For Hawaiians, nothing on a wide-open band happens a lot. You simply cannot use band activity to judge band conditions. Being a Midwesterner, this was totally foreign in my experience of 35 years on the air. In fact, the first time I turned on my rig I actually thought I had forgotten to connect the antenna. As it turns out, that's just the way it is. The islands are not densely populated with hams and there isn't much out there to generate noise.

Another surprise was that feral chickens, which are numerous on the islands, were fascinated with my counterpoise. One big rooster (photo C) seemed very sure that mine needed to be re-arranged, and I spent more than a little time running him off.

## Trip #2: Better Planning, Better Results

For my second trip, I planned a lot more carefully. I studied the power requirements of my entire arsenal of portable QRP rigs, I looked carefully at propagation to determine optimum operating times, and because I had established the goal of making stateside contacts, I settled on 20 meters exclusively. It's


*Photo B– Equipment on our first trip included my FT-817 and LDG autotuner, but they turned out to need a lot of power from my gel-cell battery. I made no contacts on this trip.*

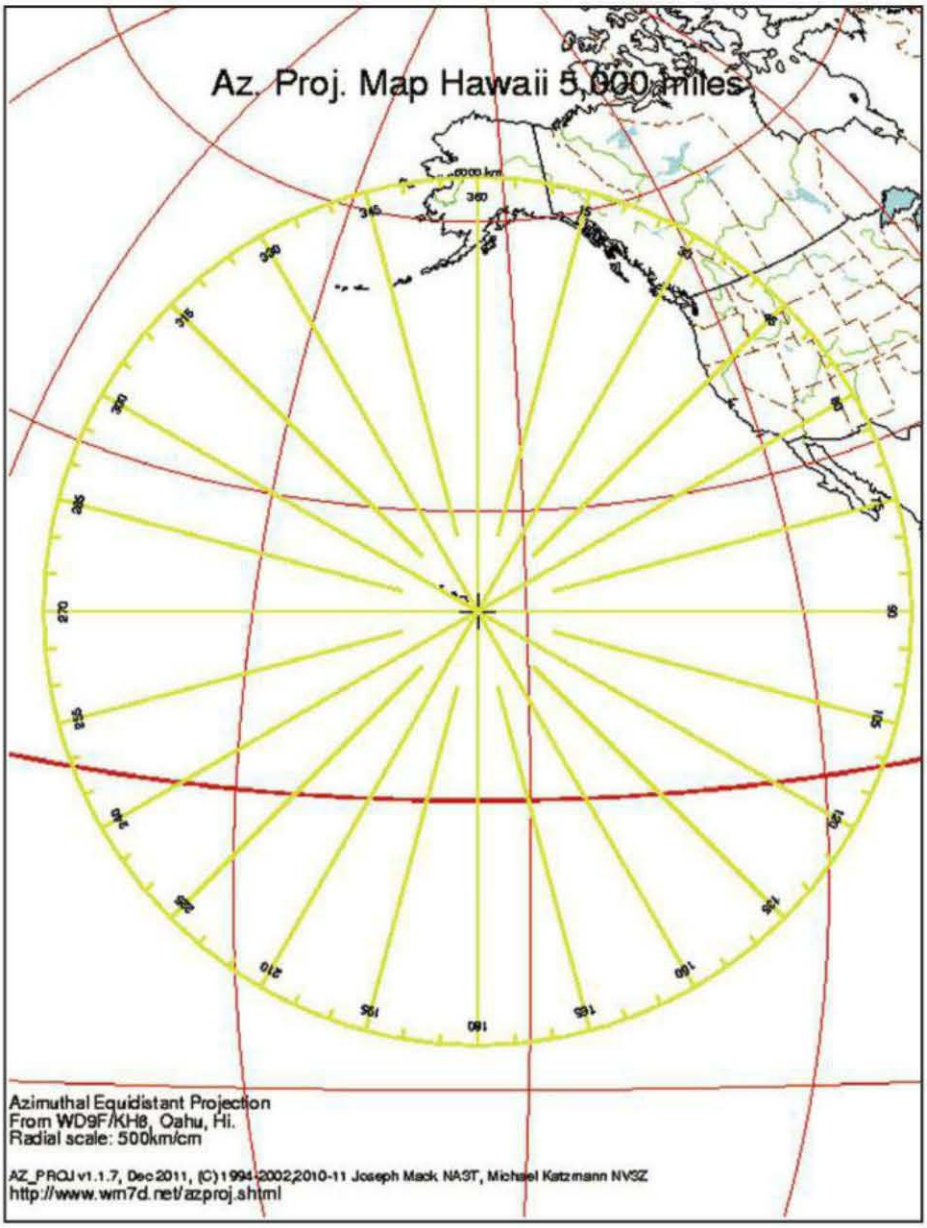


*Fig. 1– This customized azimuthal projection from <www.wm7d.net/azproj.shtml> shows just how far away Hawaii is from the rest of the world!*

almost always open, and looking at my own stateside log, most of my contacts with Hawaiian hams have been on 20 meters. Finally, I resolved to use the Four State QRP Group's QRP spotting page <www.qrpspots.com>, to shamelessly spot myself when operating. Kudos to Terry Fletcher, WAØITP, and the 4SQRP gang for this awesome QRP tool.

For gear, I took my Hendricks PFR-3 with internal AA batteries and a built-in manual tuner (photo D). This rig draws very little current relative to the FT-817/Z11 combination and still puts out a full 5 watts. For an antenna, I took a 20-meter end-fed wire with counterpoise and, of course, my Palm mini paddles and ear buds. All of this took much less luggage space than my first trip.

Knowing that a very low takeoff angle would be best, I wanted my 33-foot EFHWA (end-fed half-wave antenna) to be as close to vertical as possible. To get the wire well up in a tree at the park, I used a half-full plastic water bottle as a throwing tool. I attached some light throwing line to the bottle by inserting one end of it in the bottle and screwing on the lid. While the throwing activity got some attention from a park ranger, once I explained what I was doing, he thought it was cool. I threw the water bottle over a high branch almost directly above my operating position so that the antenna was very close to vertical. The quarter-

*Photo C– You've heard of frequency cops? Well, this rooster was a "counterpoise cop," constantly trying to get me to move my counterpoise wire.*

wave counterpoise was placed on the ground running away from the station and staked down with a nail. Compared to my first trip, this one was a raving success with two solid QSOs.

It was early afternoon Hawaii time, making it early evening on the U.S. West Coast. After several CQs, I was answered by Bob, K9RHY, in San Diego. He gave me a 569 report. Bob was running a TS-950 at 100 watts into a four-element beam. That beam helped us a lot. He was 599 to me and the only signal I could hear in that segment of the band. We had a nice QSO.

After several more CQs, my second contact was with an Irish ham named Leo who was operating mobile while vacationing in California and using the call W6/EI6D/M. Leo gave me a 459 report and he was 559 to me. We had a solid QSO.

I was thrilled to make two Qs in a couple of hours of operating. I had proven that it could be done. When I got home, I made up special QSL cards for Bob and Leo, and both responded with nice return cards.

## Trip #3: Less is More

Because we planned on being in Hawaii for less time on the third trip, I originally intended to take no gear at all. However, at the last minute I threw in my AT Sprint II with internal AAA batteries, a 20-meter EndFedz resonant antenna, my Palm mini paddles, and the ear buds (photo E). Even if they never got used, they were no hassle to take.

Well, I did manage to find a couple of hoursmid-morning in Hawaii, making it mid-day to early afternoon across the rest of the U.S. I oriented the End Fedz antenna as a vertical *(Bonus: The EndFedz 20 needs no counterpoise, so take that, Mr. Rooster!)*, used my cell


*Photo D– On the second trip, my station was built around my Hendricks PFR-3 transceiver with built-in manual tuner. It used much less power and got me two QSOs.*

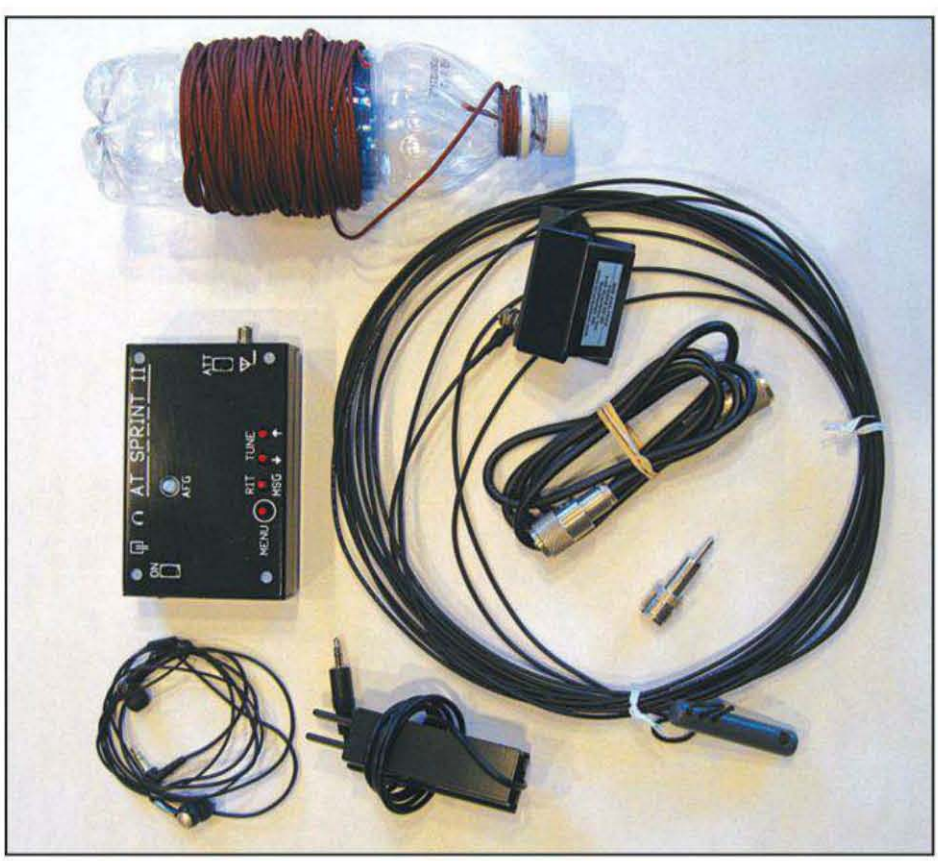


*Photo E– For trip #3, I packed an AT Sprint II transceiver and a 20-meter EndFedz resonant antenna, which didn't need radials. This smallest setup netted four QSOs, proof yet again that "less is more."*

phone to post myself on <www.qrpspots.com>, flung my 2.5 watts of RF into the ether, and made four QSOs in a couple of hours. Stations worked and reports received were: Bill, N7MOB, in WA 329; Gordon, AD7JY, in WA 339; Steve, NU7T, also running QRP in NV 339, and Bob, KE7GKM, in ID 339. Bob was QRP portable 10 miles northeast of Boise with his K2 and a dipole at 5W. All were 539 or better to me and good copy. Another small batch of special QSL cards was sent (photo F), and I got nice return cards. What a blast!

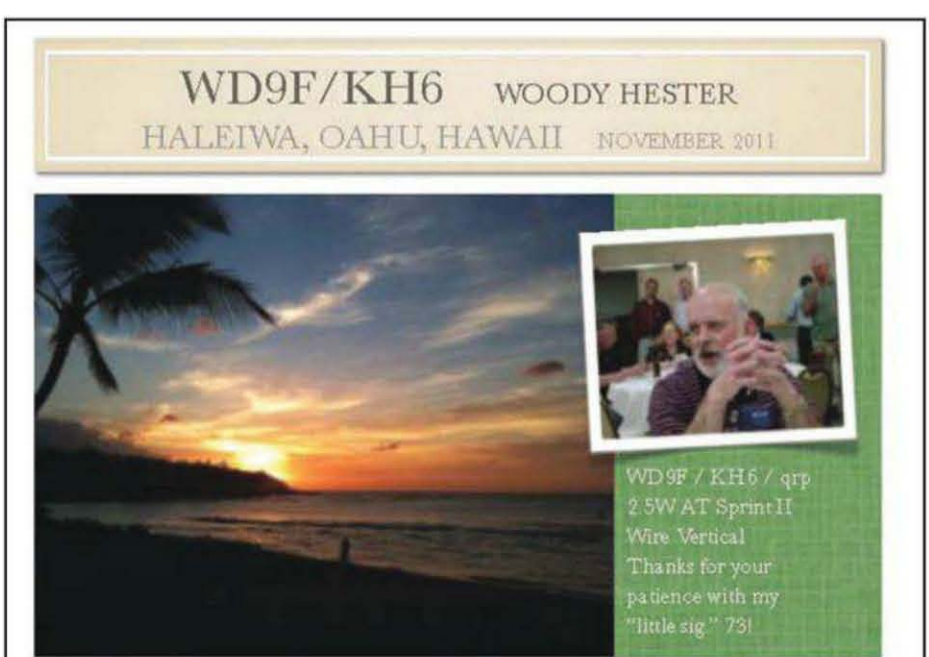


*Photo F– QSL card from my most recent trip to Hawaii, last November. Only four people got one!*

The irony of all this is that planning and "less is more" turned out to rule the day. I wasn't successful at all with the biggest package of gear, and I had most success with the smallest, after a few lessons learned, some planning, and a healthy dose of perseverance. That, it seems, is what QRP is all about. Less is more, skill not power, and perseverance. QRP forever!

## Heading for the Hills

For my next trip in the spring, I think I'm going to take the PFR-3 again. Its low power consumption and full QRP gallon make it pretty attractive. I think 20 meters will be the workhorse, and I'll use the EndFedz 20 as a vertical. Finally, I plan to get up into the mountains on the windward (eastern) side of the island. Launching my little sig from the heights, looking directly at the U.S. over the Pacific, is bound to be better than sea level on the leeward (westward) side of the island. I'll self post on <www.qrpspots.com>, too, so watch for me.

No matter what, Hawaii is just an awesome place to launch some RF. My thanks to all of those who have endured my little sigs from paradise!

*When W4FSV asked members of his club who would be interested in building a very low-power CW rig as a club project, more than two dozen signed up, including several who had never used either a soldering iron or a telegraph key.*

# The "Splinter" QRPp Trans-Receiver: One Club's Answer to Having Some Fun

BY WILLIAM F. MINIKIEWICZ,* W4FSV

For the past 44 years I have been an avid builder and QRP operator. Recently, I was asked to develop a simple construction project that could be built during Saturday workshop sessions held by the Columbia (SC) Amateur Radio Club. The club's leadership hoped to give members, especially new hams, a practical way to learn electronics and kit-building skills, culminating in a useful take-home item.

Originally, I developed a simple code practice oscillator, since many of the club's newest members were "no code" hams. After realizing that a CPO would interest just a small sub-group of the membership, we decided to expand the project into something with broader appeal. After several months of breadboard prototyping, the "Splinter" was born—a combination receiver and separate transmitter (or a *trans-receiver*) for QRPp (very low power) operation on 40 meters. The name was derived from the small wooden breadboard that was used to develop the prototype.


*The "Splinter" is a combination receiver and QRPp transmitter for 40 meters. Each of the builders got to decorate his/her own wooden base for the radio. (Photos courtesy of the author)*

## If You Design it, Will they Build it?

Once satisfied with the final circuit (see "Under the Hood" sidebar for circuit description), I took a few weeks to test its performance. Does the Splinter work? Oh yeah. During the test period I worked ten states, Cuba, England, Italy, and had a very nice 5-7-9 QSO with Romania ... 10,424 miles per watt!

*120 Banks Ln., Swansea, SC 29160
e-mail: <w4fsv@arrl.net>

The prototype was now ready for an introduction at the next club meeting. The club's board of directors asked me to "show and tell" the little radio to everyone present and offer it as a club project to be built in a series of three monthly Saturday workshops.

I felt a little nervous anticipation as the club president asked for a show of hands to indicate interest in the project. I would have been happy if five or six fellow members indicated interest; after all, most of the members are relatively new hams who have very limited kit-building experience and most are not CW operators. A moment passed, and then to my astonishment 27 hands were waving affirmatively before me. Pleased with the approval, I now realized that the real test was yet to come.

## If They Build Them, Will They Work?

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**Super-clean** modular construction makes service quick and easy.

***Fully Protected!***

**The** ALS-1300 is fully protected to prevent amplifier damage if you: switch to a band different from your transceiver, use the wrong antenna or have overly high SWR, if the heat sink temperature exceeds a safe level, if the dual 600 Watt modules are significantly RF unbalanced. Whenever the amplifier faults, it is automatically bypassed.

**If** output forward or reflected power exceeds a safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to the transmitter.

***Fully Metered!***

**Two** accurate Cross-Needle meters use *LEDs* with adjustable brightness for backlighting -- no more burned-out meter lamps.

**The** left meter continuously monitors DC current of both 600 watt amplifier modules.

**The** right meter is a multi-meter. Read antenna SWR, forward, reflected output power simultaneously (has adjustable PEP meter hold time) . . . amplifier balance . . . ALC between amplifier and transceiver . . . DC drain voltage of each power amplifier.

**LEDs** show which band is selected (manually bandswitched or automatically with optional ARI-500 Radio Interface) . . . ALC activity . . . when the amplifier is keyed . . . high SWR . . . power amplifier fault.

**The** desktop size amplifier is a compact 10½Wx6¾Hx19D in. Weighs just 23 lbs.

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**The** *hash-free* fully regulated 50 VDC, 50 Amp switching power supply is wired for 220 VAC but can be rewired for 110 VAC. Includes six foot cable to ALS-1300. Draws 12 Amps at 220 VAC, 25 Amps at 110 VAC. Has inrush current protection, current-limited outputs, exceptional filtering and RFI suppression. Works on 50-400 Hz, 200-260/ 100-135 VAC making it ideal for remote DX-peditions. 10Wx6½Hx9½D inches. 12 pounds.

***Options***

**MOD-10MK $39.95**, low-pass filter assembly gives you 12 and 10 Meter operation. Requires FCC ham license.

**QSK-5, $359.95**, pin-diode T/R switch gives lightning fast silent QSK operation.

**Here's what they say . . .**

*I have had my amp now for a few days and WOW! I picked the amp up at the factory and Mike was very helpful in showing me the ins & outs of the amp. Mine is S/N 8 and these amps are in high demand. It will truly talk 1200 watts all night long and never get warm. Thanks to Ameritron for the way they treat their customers and taking time that I was satisfied. N5SBZ*

*I've been using SN3 for about six weeks now. No processors or digital read-outs, but very easy to use and it puts out 1200 watts on most bands with no problem. I have been operating QSK as the internal relays are plenty fast enough. AD5X*

*I have had this fine amp now for a week and have made a number of QSO's (20). It can make the difference, and has in a number of occasions, getting thru the QRN and making a contact. Some of my QSO's have lasted up to 1 hour and there has not been a single problem...runs cool and gives me excellent results. KB4KKX*

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*Craig Scott, AE6E, inspects his work on a circuit board.*

table were employed. Several experienced hams served as building "Elmers" and did an excellent job, teaching and coaching along the way. By the end of the first three-hour workshop, even first-time builders could adequately solder, identify components, and make voltage and resistance checks. Best of all, every circuit board now had a working sidetone oscillator.

The second building workshop session was held at a different and larger location. We learned from the first session that builders need elbow room. We also learned that parts bins located on a table in the middle of the room improved traffic flow, allowing more builders to access the inventory at the same time. This was important, because we also learned that builders

### "Under the Hood": The Splinter's Circuitry

The Splinter is a combination QRPp transmitter and separate 40-meter direct-conversion receiver that features an antenna attenuator and bandpass filter ahead of the popular SA612AN mixer/oscillator. The local oscillator frequency is controlled by a 1N4001 diode functioning as a varicap and resulting in a tuning range of about 75 kilohertz. The resultant output of the mixer is followed by a two-stage audio amplifier using a 2N3904 and the TL431 shunt regulator along with some extra R-C filtering. The output easily drives MP3-type earbuds or even a small speaker. Sidetone is provided by a twin-tee oscillator capacitively coupled directly to the input of the phones. The usual downside of the twin-tee is low audio, but by changing the normally balanced values of the resistors in the "tee" circuit, the output was significantly increased.

The transmitter is a simple two-transistor type derived from the famous OXO design described by GM3OXX. I used a 2N2219A as the final and directly key the positive voltage to both the oscillator and final transistors. Thanks to John Crockett, W3KH, and the great lab equipment at South Carolina Educational TV, we were able come up with low-pass filter components resulting in 45-dB harmonic suppression, more than enough to comply with FCC regulations. My original five-component design was only a little better than half as good.

The Splinter also features a VXO, a "spot" switch, two-position crystal switch, and a built-in key! T-R switching is provided by a simple but effective slide switch, and the R. F. output is a nominal 450–500 milliwatts.

All 85 components mount on a 2" × 4" double-sided circuit board. What makes the project really neat is the final touch ... the personal touch. After the board is built and tested, it is mounted on a 3" × 3" decoratively routed wooden breadboard. The builders get to finish their boards any way they choose, and our builders came up with some very attractive and interesting finished paint schemes.

More information about the Splinter and complete kits, including all parts, is available at <www.breadboardradio.com>.

*Ammon, age 9 (no call yet), and sister Madelyn, 13, KJ4IJB, display their progress.*



*Cliff Inabinet, KF4UOR, shows off his Splinter.*

develop skills at different paces. Originally, we tried to keep everyone on the same page, but this actually caused frustration for slow builders and boredom for advanced builders. Additionally, five new kit builders showed up and required a little extra help to catch up. Toward the end of the day, several of the more advanced builders were finished with their circuit boards. A few of them stayed on to help others make progress. Most builders ended this workshop session with working receivers and had only the relatively simple transmitter to finish.

The final building workshop was held at the same location as the second. There was plenty of anticipation, as everyone knew that this day would end with their prize in hand. As expected, by noon the transmitters were coming off the assembly lines, and one by one finished Splinters were making their way to the final testing and alignment station. Only a few of the builders had minor construction problems that needed to be corrected.

## Success!

In the end, every Splinter built at the workshops was completed successfully. Still, much more needs to be said about the project. I am inspired by the enthusiasm and support of the builders, especially the newer hams who dared to go where they have never been before. The youngest builder was nine years old and the oldest was over seventy. Our club is now scheduling Morse code classes and a 2-meter code practice net. Soon the ether will be glowing with QRPp, so give a listen for those weaker, but workable signals. It just might be a Splinter!

**True or False?**

- *You need "power and a tower" to effectively work DX.*
- *QRP is only for CW operators.*
- *The best antennas are commercially manufactured.*

*If you answered "true" to any of these questions, then read on, my friend…*

# A QRP Superstation: You Can Do It!

**BY R. SCOTT ROUGHT,* KA8SMA**

In our hobby, QRP has elevated me to a new level of excitement and has reminded me time and time again that the need for "power and a tower" is one of ham radio's biggest misconceptions. Granted, power is nice to have (when necessary) and a tower (if you can afford the investment) can be a great help when working a DX pile-up, but you can do just about as much with a fraction of the power and antenna height. The satisfaction in receiving "You're 5-by-5 in the clear" from a station in Asiatic Russia when there are virtually no sunspots is pretty gratifying, especially when using a roof-mounted homebrew two-element beam and only a few watts output.

I took an interest in QRP in the early 1990s. The idea to "keep it simple" took hold of me and I began building QRP transceiver kits and playing the "miles per watt" game. I was pleasantly surprised with results of the QRP kits, but the only drawback was that due to their simplicity I was confined to using only CW. I enjoy CW, but really wanted to try SSB at QRP levels. Just as I began researching various designs, parts, etc., for constructing a QRP SSB transceiver, Yaesu introduced the FT-817, a highly portable all-mode QRP transceiver. What more could I ask for? With a "honey do" list from my XYL longer than my arm and little time to begin working

*1181 Smith Road, Traverse City, Michigan, 49696
e-mail: <rsrought@charter.net>


*Photo A– QRP station mounted on a wooden cutting board. This arrangement makes it easy to operate it from home or just pick it up and take it to a remote location.*

# MFJ 160-6 Meter Antenna

***Self-supporting 43 foot vertical -- no guy wires required . . . 1500 Watts . . . exceptional performance . . . low-profile . . . includes base mount and legal limit balun . . . assembles in an hour . . .***

MFJ-2990
**$359.95**

New!

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

***Exceptional Performance***

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

***With an automatic antenna tuner there's no fuss -- just talk!***

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

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

***Fully self-supporting, Extremely low wind loading, Very low visibility . . .***

**With** just 2 square feet wind load, the fully self-supporting MFJ-2990 -- *no guy wires needed* -- has the lowest wind-loading and lowest visibility of any vertical antenna! The key is a six foot section of tapering diameter *stainless steel* whip that flexes in strong wind instead of stressing the bottom sections. Its 2-inch O.D. and .120 inch thick walled tubing bottom section makes it incredibly strong -- it'll stay up!

**Weighs** just 20 pounds -- you can easily put it up by yourself because its corrosion resistant *6063 aircraft aluminum* tubing and stainless steel construction make it light *and* super-strong.

***Assembles in an hour***

**You** can easily assemble it in an hour! Ground mounting lets you completely hide its antenna base in shrubbery. Includes ATB-65 high-strength antenna mount. Requires ground system -- at least one radial. More extensive ground system will give much better performance.

***Great for Stealth Operation in antenna restricted areas***

**This** very low-profile antenna is perfect for stealth operation in antenna restricted areas. Hide it behind trees, fences, buildings, bushes. Use it as a flagpole. Telescope it down during the day. Put it up at night and take it down in the morning before the neighbors even notice!

**Quick** and easy installation makes it great for DXpeditions, field day and other portable and temporary operations.


## MFJ *Automatic* Tuners

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**For** legal limit 1500 Watt SSB/CW amplifiers. Auto-ranging LCD and Cross-Needle SWR/Wattmeter, antenna switch, amp bypass, matches 12-1600 Ohms, 1.8-30 MHz.

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on another radio project, I took the plunge and purchased the FT-817.

I have been nearly 100% QRP for the past several years and put my trusty Kenwood TS-530s on the shelf. I do admit there have been times I fired-up the TS-530s, but this was more for burning the dust off the finals and cleaning out the cobwebs as opposed to a desire to make contacts with more than a few watts. I've become so accustomed to making QSOs at QRP levels that I feel I am "cheating" if I use much more power. My intent is not to offend anyone who does not operate QRP, but I have found that you do not need to run "power" to have fun and make lots of contacts, regardless of the number of sunspots. In fact, during the recent lull in the sunspot cycle, I was regularly making SSB DX contacts at QRP levels, even when the "big guns" were having difficulty making contacts outside North America. Of course it depends on how you define "difficulty." After making thousands of contacts in my ham career, I have learned that a lot of hams will cry difficult conditions if they receive signal reports of less than 5-by-9, especially when they are running at higher power levels.

## Sharp Operating Skills... A Necessity for QRP

It probably goes without saying, but unless the ham gods are looking directly down on you, you're not going to break a pile-up or work a rare DXpedition on your first or second call. As any seasoned operator will tell you, a DX pile-up sometimes can be a frustrating experience for anyone, regardless of the amount of power being used or the type of radiator at the end of the feed line. The good news is that after you've been in the QRP game awhile, you'll be able to compete with the larger stations without too much difficulty. There are some "big guns" on the air with whom only a few of us can compete in terms of real estate or bank accounts, but I can assure you that with a little persistence and some sharp operating skills, you won't be left out in the cold.

One of the most important operating skills I have learned from operating QRP is *clear speech*. Enunciation is key when making low-power SSB contacts, especially when working DX and the operator on the other end speaks English as a second language (or barely at all). Using phonetics for your call sign can be a helpful aid in allowing the receiving station to get your callsign right the first time and pick you out of a pile-up. One important note: Don't succumb to creating your own phonetic alphabet as some operators have done. Use the ITU phonetic alphabet all DX operators know. I have heard a lot of cute phonetics over the years that may grab the attention of English-speaking stateside hams, but hams in distant places may become confused when they hear non-standard phonetics.

When running low power, you are sometimes fighting overwhelming conditions to snag a contact with a DX station, especially the rare ones. Again, be sure to speak slowly when the DX station returns your call. Believe me, the excitement of connecting with a ham in the Ascension Islands (ZD8) with only a few watts will get your heart pounding no matter how many contacts you've made in your ham career.

An absolute must when operating low power is to sign "QRP" at the end of your callsign. Signing "QRP" will distinguish you from other stations when more than one station is calling and will increase your odds of the receiving station picking you out of the pile-up. Additionally, it may prompt the receiving station to ask if there are any other QRP stations

on frequency that would like to make a call, which helps out your fellow QRP enthusiasts who are also trying to make the contact.

## Make Your QRP Station Permanent, Yet Portable

When I set up my QRP station, I wanted the ability to *easily* transport it from the shack to my back deck for an afternoon of casual operating or to a remote operating location. In order to minimize the amount of equipment to be disconnected and set up elsewhere, I mounted the entire station (rig, antenna tuner, external speaker, gel cell battery, mic, etc.) on a wooden cutting board equipped with a built-in carrying handle (photo A). The gel cell is mounted inside a plastic project box that is screwed to the cutting board, and an external speaker is bolted to the top of the project box. I also wired a switch box to the cutting board for switching among the external speaker, headphones, and a wall-mounted speaker that I use when I'm in the ham shack. Clear zip ties were used to secure the rig and tuner to the cutting board by drilling holes through the bottom of the board adjacent to the equipment. Although the zip ties secure the equipment to the board, Velcro® was placed beneath the rig and tuner to help keep them from sliding.

In order to eliminate the hassle of disconnecting/reconnecting wiring from the back of the rig and antenna tuner every time I moved my station, I installed a junction box behind the rig, where the antenna and ground connections for the station are made.

This setup allows the entire QRP station to be removed from the shack in a matter of seconds. The added bonus is that this setup keeps all of my QRP equipment together in one tidy package with no setup needed when I reach my destination. This is especially helpful in a motivational sense, since before I had the station mounted on the cutting board, I often did not have the gumption to disassemble/reassemble the station for just an afternoon outing. Now, as my XYL says, there is no excuse to not take the rig.

## An Effective Radiator

As many hams are aware, an efficient antenna is the heartbeat of any station. To ensure I get the most mileage per watt, I built a homebrew two-element beam. This should go without saying, but constructing your own antenna is just as effective as purchasing one. You may need to search for parts and use some ingenuity during assembly, but don't let anyone make you believe that a well-constructed homebrew antenna is inferior to one that is commercially manufactured.

After reviewing the *ARRL Antenna Book*, past articles in print, and a variety of on-line information, I chose a beam design by Gary Hanson, KJ5VW (http://uts.cc.utexas.edu/~hansongr/Miniyagi.htm). The beam's small footprint, ability to be turned with a light-duty rotor, and ability to be roof-mounted on a heavy-duty tripod appealed to me. Best yet, my XYL (to my surprise) did not have an issue with my mounting this contraption on our roof.

Since living in northern Michigan a few miles from Lake Michigan presents some unique antenna challenges, I needed to make the beam as robust as possible. KJ5VW's design is basically a wire mounted on a wooden frame constructed of dowels for portable use. I wanted to use this design and make the beam a permanent fixture on the roof, but needed to toughen-up the frame in order for it to withstand harsh northern Michigan winters.

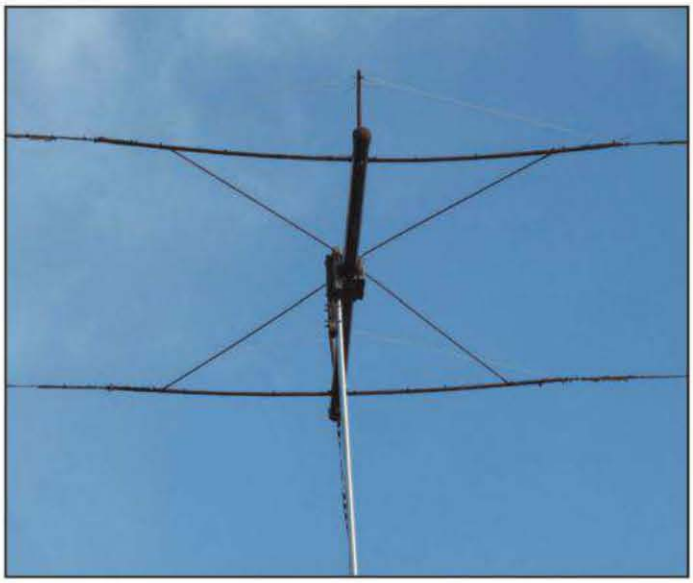


*Photo B– PVC beam at 34 feet.*

*Photo C– Ladder line and mast configuration.*

I constructed the beam's frame using schedule 40 4-inch diameter PVC for the boom and 1-inch diameter PVC and fiberglass rods (0.25-inch diameter orange driveway markers) for the cross arms (photo B). I have read that PVC material for larger antenna arrays is not a good choice, but I found that if you don't make the antenna too large (which is why I settled for a two-element beam) and provide enough support to keep the elements from "flopping" in the wind, there will be few problems when erected. I've had my PVC beam in the air for over two years and it has survived several ice storms, wind gusts in excess of 85 mph (those were nervous nights for me), heavy snow, and daily baking in the sun during the summer. It is important to note that when working with PVC and fiberglass exposed to the sun, all exposed surfaces need to be painted. In other words, spray-painting your PVC antenna frame will make it last longer. The paint you apply to the frame will add a layer of protection that will help prevent the sun from breaking down the polymers in the PVC. This is what ultimately weakens your antenna frame over time. If you are interested in my PVC frame design, drop me an e-mail and I will forward you my design and bill of materials.

## Climbing the Ladder (Line)

Since successful QRP operation relies on an efficient antenna system, after constructing the beam I spent some time trying to get the best match possible to the feed line (RG-8U coaxial cable). After an afternoon of pruning and making adjustments, I could not achieve an acceptable match. I recalled reading in the *ARRL Handbook* about a ham who fed a four-band cubical quad with 450-ohm ladder line. With a long run between his rig and the antenna, he also had problems matching the quad to coaxial cable. In order to solve the problem, he removed the matching network from the antenna and fed it directly with ladder line; the tuner in the shack took care of the rest.

I tried this approach with my new beam to determine how it would react. I removed the matching network from the beam and direct-fed it with 14-gauge 450-ohm ladder line; the difference was night and day. Stations that I was receiving at S-5 on coax were S-9+ with the ladder line. I made a few contacts to check out the beam and was more than satisfied with the results. Granted, I did not receive an S-9 signal report with every contact, but receiving S-5 signal reports on SSB from stations in Europe with only a few watts was good enough. What made this more interesting was that it was occurring in 2009, during the bottom of the solar cycle. Hams on the receiving end could not believe I was running QRP. I view this awakening as my graduation from coaxial cable to ladder line.

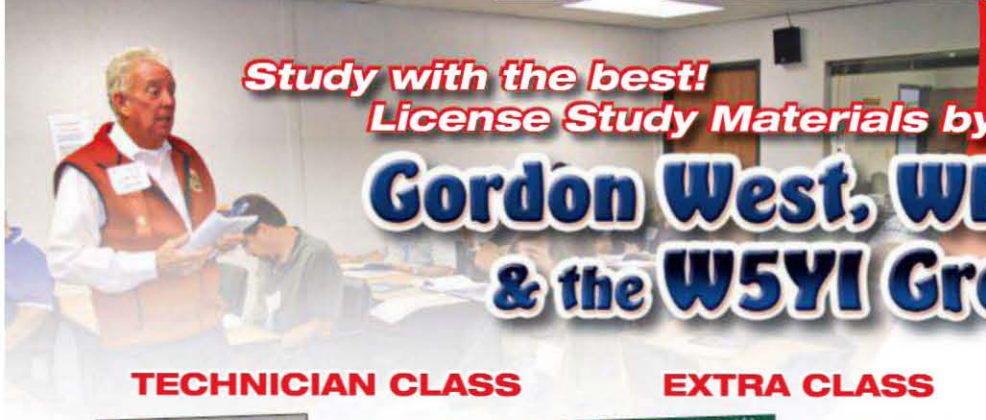
I ran the ladder line from the end of the boom (beneath the connection to the driven element) directly to the top of my roof-mounted tripod (which supports the antenna mast), which, in turn, is lag-bolted into roof trusses. The ladder line is not attached to the mast and I use a 2×2 piece of wood to keep the ladder line away from the metal tripod and avoid detuning issues with the ladder line (photo C). The ladder line lies on my rooftop and is fed through the side of the house directly into the shack. I do have to tweak the tuner from time to time since the ladder line is occasionally affected by snow, ice, and rain, but these adjustments are not often necessary.

## Big Results with Little Power

Since putting up the beam in 2009, I've worked nearly 100 countries, and in April 2011 I worked RI1ANC, the Russian base at Vostok, Antarctica, with 3 watts. Countries that I worked years ago with 100 watts are being duplicated with only a few watts, even during periods of low sunspots. I never imagined working locations such as New Zealand, Asiatic Russia, Ethiopia, South Africa, and Christmas Island on SSB at QRP levels.

Operating QRP has also made me realize there is one international gesture that I often hear when making low-power contacts—the unmistakable congratulatory laugh from the operator on the other end of the QSO when I tell him my working conditions are 3 watts into a homebrew two-element beam at 34 feet.

If you haven't tried QRP, you need to! The spark you get after making a QRP DX contact—whether it's via CW, SSB, or any other mode—will provide you with a lifetime of pleasure and memories.



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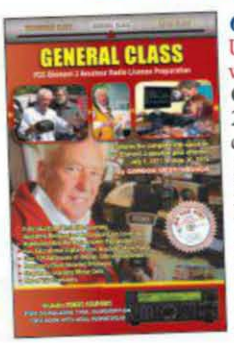


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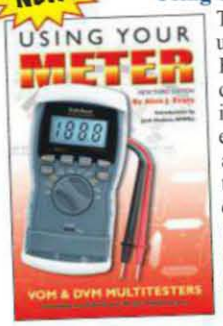


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CQ

*If a compact and portable QRP transceiver is on your wish list for operating low power CW at home or "on the trail," MFJ's new 9200 is worth your consideration.*

## CQ Reviews:

# MFJ-9200 "QRPocket" CW Transceiver

**BY RICH MOSESON,* W2VU**

When I first saw the prototype of the MFJ-9200 at the 2011 Charlotte Hamfest, my immediate reaction was, "I've got to have one of these." Which was kind of strange, since it's a QRP (low-power) CW-only transceiver in a small package that makes it ideal for portable use … and I've never been a QRP operator, my CW skills are shaky at best and my two attempts at operating HF portable in the past resulted in a grand total of zero contacts. So why did I want this radio?

I wanted it because I saw it as a way to becoming and doing all those things I wasn't. I was looking for a way to re-energize my CW operating, and reading Cam Hartford, N6GA's "QRP" columns here in *CQ* and Richard Fisher, KI6SN's, "Trail-Friendly Radio" columns in *WorldRadio Online*, had me itching to give those things a try. The folks they were writing about were all having so much fun, and I wanted in on it! The '9200 looked like a ticket to adventure that was right in my price range for a holiday gift.

Nine long months later, I was opening the box. The MFJ-9200 (photo A) is capable of operating on up to six bands (80, 40, 30, 20, 17, and 15 meters), but only one at a time. The radio comes with one band of your choice included, and you can purchase additional band modules (photo B) at minimal additional cost. I got my radio with modules for 40, 20, and 17 meters.

The '9200 is built into a compact case measuring 4.8"W × 3.15"D × 1.34"H. The controls and readout are all on the top, to maximize convenience for field operation where the rig is placed on the ground in front of you. On the top, you'll see a power switch, a multi-function readout (more on that later), a tuning control, a volume control, and several buttons. The buttons include:


*Photo A– The MFJ-9200 is a compact, portable, multi-band QRP transceiver.*

- "Mem/VFO," which, logically, switches you between memory and VFO tuning (there are eight programmable memories for each band; each module comes pre-loaded with popular QRP frequencies and I haven't yet seen the need to change any of them);
- "RIT/Mode," which is a dual-function control. A quick click turns on and off the Receive Incremental Tuning—in 10 Hz increments—permitting you to listen comfortably to someone who may be a little bit off your operating frequency or to tune away from a loud adjacent station. Holding down the button longer switches the receiver between CW and SSB modes. Yes, the transmitter is CW-only, but the receiver has a wide tuning range and the SSB setting enables a wider receive filter (2.5 kHz) if you'd like to listen to the phone portion of the

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

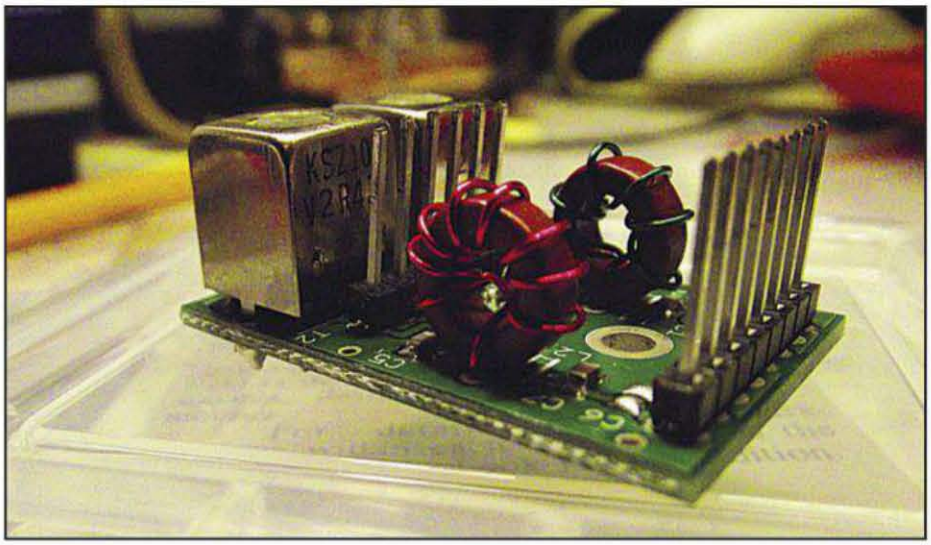

*Photo B– A band module for the 9200. Changing bands requires you to open the case, remove the current band module, and plug in the new one. Watch to make sure all the pins slide into their proper sockets.*

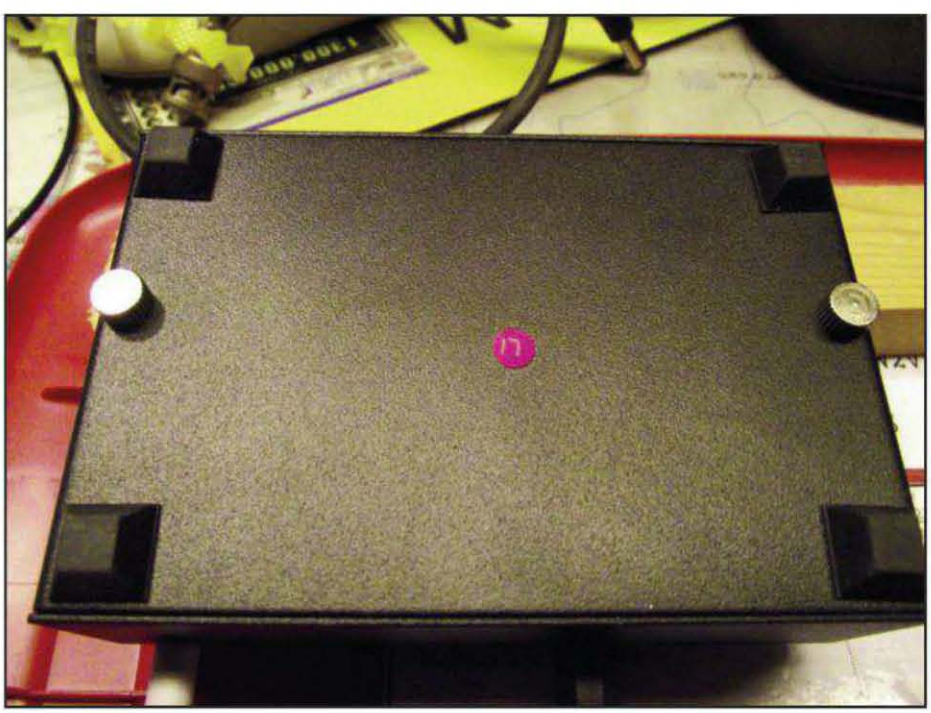

*Photo C. The thumb-screws on the bottom of the rig need to be removed in order to change band modules. Don't lose 'em!*

band. The 600-Hz narrow filter in CW mode, by the way, is superb, especially considering the radio's price range;

• "Call," which sends a pre-programmed CQ message after you've plugged in your callsign (the instructions tell you how);

• "BL," which switches on and off the backlight on the display; and

• "ATT," which switches in and out an attenuator circuit (approximately 20-dB), so a really strong signal won't blow your ears out.

The tuning knob is also a push-button switch, allowing you to switch between the default 1-kHz tuning steps and either 100 Hz steps for precisely tuning in a station or 100 *kHz* per click for rapid QSYing. Plus (and this isn't in the instructions), if you press the knob to change tuning steps when you're in memory mode, it changes the step *and* puts you into VFO mode. This is very handy for tuning from a memory setting, especially if you're already hearing a signal close by. The radio powers up in

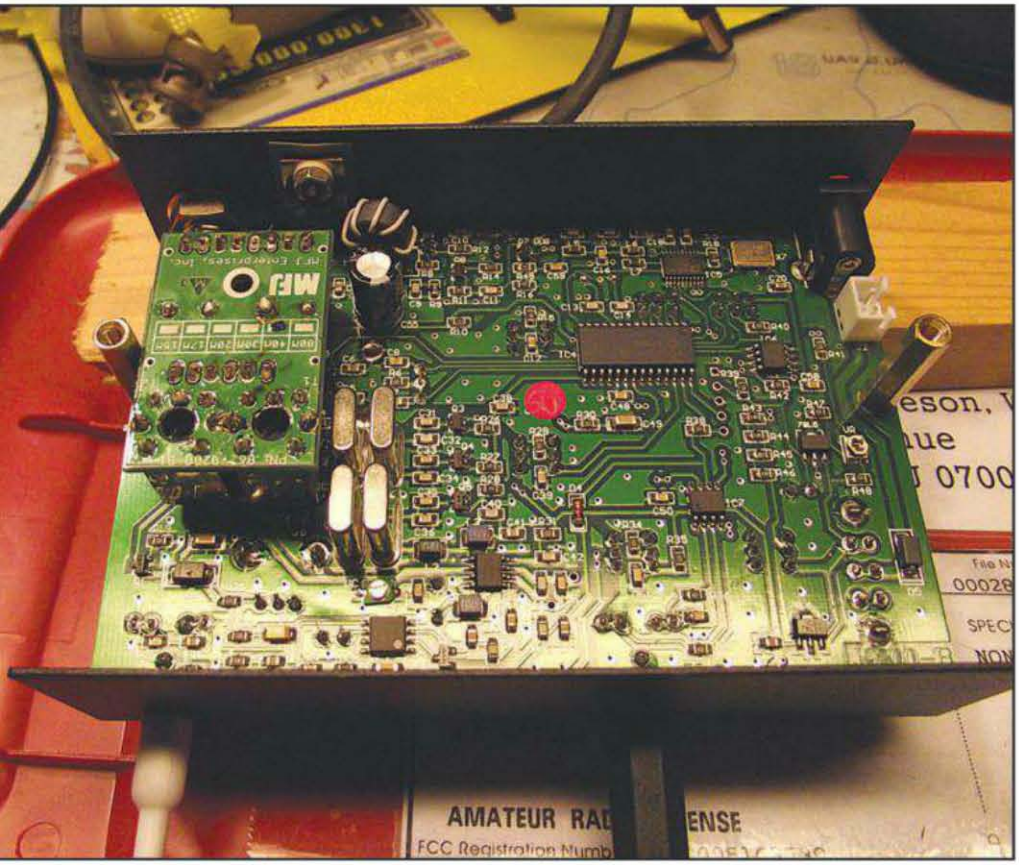


*Photo D– Interior of the 9200. The removable band module is on the left.*

memory mode and 1-kHz tuning steps. I like to tune around using 100-Hz steps, so pressing down on the tuning knob after power-up puts me directly into VFO mode with 100-Hz tuning.

The front and rear panels have jacks for connecting the radio to the outside world—power and antenna (a BNC connector) on the back, and key/paddle and headphone/speaker jacks on the front. The bottom has two thumb screws which you need to remove in order to change band modules (see photos C and D).


*Photo E– My dollar-store storage/carrying case for the 9200 and accessories.*

I could instantly see myself losing those screws while doing a band change out in the woods or in a park, so one of the first accessories I bought was a plastic box at a nearby dollar store (photo E). Not only does it hold the radio, extra band modules (I bought little plastic boxes for each of them), cables, paddles, and headphone/speaker, but the underside of the lid serves as my operating position (photo F), and when I drop the thumb screws, they nearly always stay inside the lid. I'm using a set of "Bulldog" paddles with suction cups, and they stick nicely to the plastic lid as well. (I've also taped in a copy of my FCC license, in case I need to explain myself to any law enforcement folks who wonder what I'm doing.)

The 9200 has a built-in keyer, so a small set of paddles is all you need for sending. It will also accommodate a hand-key, and even knows the difference. When you power up, it will send an "A" in CW (for "automatic") if you have paddles plugged in; if it's a hand key, you'll get an "M" for "manual." You should power down while switching between paddles and a hand key, since the rig only checks for key type at power-up and if you plug in a hand key when it's looking for paddles, it will send a string of dashes until you unplug the key or turn the radio off and back on.

The keyer speed is adjustable from 3-45 wpm. You change the speed by holding down the "call" button until you hear the letter "S" in code. The dot paddle is then used to increase the speed, while the dash paddle will decrease it. Changes may be saved by again pressing "call" and hearing an "E" to confirm your "exit" from the setting mode. The keyer's default speed is about 12 words-per-minute. It's a speed that has felt very comfortable to me as a sporadic CW operator, so I have not tried changing it.

The LCD display provides a tremendous amount of information for such a tiny screen (photo G). On power-up, it tells you what band you're on (and if you haven't properly installed your current band module—or forgotten to plug one in—it will tell you that, too, displaying "Band - ???"), while the audio tells you what sort of key it's seeing. During normal operation, the display shows you its mode setting (see "RIT/Mode" button info above), your current memory channel or VFO, and the frequency. Every few seconds, the mode display alternates with a reading of your input voltage. When you switch between tuning

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*Photo F– The lid of the carrying case also serves as a portable operating table (and it catches the thumb-screws when I drop them while changing bands!).*


*Photo G– The LCD display provides you with a wide array of information. In this photo, it tells you that you're in CW receive mode, on memory channel 3, which is 7030.0 kHz.*

steps, the display flashes for a few seconds underneath the digit that will now change when you turn the dial. When the RIT is activated, the display shows you how many Hz above or below your VFO setting you've moved. One other bit of info from the LCD display: If you're tuned outside an amateur band and try to transmit, you will see "TX ERROR" on the screen. There is also a backlight for operation in low-light settings, although it will use up your power more quickly if you're running off a battery. (Current draw on receive without the backlight is around 40 mA; the backlight doubles that.)

## Setting Up the 9200

Getting the 9200 ready for action is easy. The power cord supplied with the rig has a 2.1-mm plug on one end and pigtails on the other, so you can solder on your preferred power connector. Virtually everything in my station uses Anderson PowerPoles™, so I wired a PowerPole connector to the end of the cable and made up a second cable with a PowerPole on one end and a 9-volt

battery holder on the other. Now I can easily switch between my "big" 12-volt power supply at home and a 9-volt battery in the field. The radio also knows how much power you're feeding it and adjusts its output power accordingly. (Note to "true" QRPers: When operating off an AC power supply providing 14+ volts DC, the 9200 puts out 8–10 watts. So if you want to keep your output to the "official" QRP level of 5 watts, you'll need to reduce your power input to the 9–12 volt range.) Once your power cable and feedline are set up, just plug them in, along with a key and earbuds, and the band module of your choice, and you're ready to roll!

Speaking of band modules, there is a bit of tuning required to align a new module the first time you use it. No fancy tools or test equipment are required, though; just a tuning tool or non-conducting screwdriver and your ears. The straight-forward instructions walk you through the process—finding a weak signal on the band and then adjusting the slugs in each of two transformers to peak the signal. It's pretty easy, especially if you've ever had to tune up the finals in a tube transmitter or amplifier.

One accessory I've added is a little amplified speaker that I picked up on sale for $10 at my local office supply store (photo H). Called "Teeny Tweakers," it's made by Grandmax <www.grandmax.com> and has a USB-rechargeable battery. Designed for MP3 players and the like, it works great with the 9200 and is small enough to fit into my dollar-store carrying case, so I don't have to wear earphones all the time. Plus, it lights up when it's turned on and alerts you when it's time to recharge.

## On the Air

The MFJ-9200 is a pleasure to operate. The receiver has a built-in 700-Hz offset so you can have a pleasing CW tone and still be right on frequency. The narrow CW filter and RIT make it easy to pull out a single signal on a crowded band. On the transmit side, the rig has full break-in keying (QSK), although you cannot "break" the automatic CQ sequence once it begins.

Once on the air, I quickly made a contact in Florida (from New Jersey) on 17 meters, followed over the next several days by additional contacts on 20 and 40. Most of my contacts so far have been on 40, and my best "DX" to date has been Minnesota on both 17 and 20 meters. Signal reports have been uniformly excellent in terms of signal quality and readability and about what I'd expect in terms of signal strength (average S5–S7) for roughly 10 watts into a multiband vertical (my home HF antenna is a Cushcraft R8).

Bottom line: I am having a ball with this little radio. I'm active on CW again, I'm learning to appreciate the power of QRP, and by the time you read this, I hope to have taken it on at least one expedition to someplace beyond the boundaries of my ham shack.

The MFJ-9200 retails for $249.95 with one band module of your choice included. Additional band modules are $29.95 each. For more information, or to order, see your local MFJ dealer or go to <www.mfjenterprises.com>. You may also call MFJ at (662) 323-5869.




*Photo H– The "Tiny Tweakers" amplified speaker that I picked up at a local office supply store (left) provides enough volume to let me operate without using headphones.*

BY IRWIN MATH,* WA2NDM

# Is Anyone Out There?

While preparing last month's column we began to think about the various unknown properties of transmission in and beyond the THz region. You will remember that at the beginning of radio (as we know it) the frequencies above a MHz or so were considered useless and relegated to the amateurs. It took our ranks (as well as many avid experimenters) to achieve trans-atlantic communications on the frequencies well below 200 meters (which we then lost, but that is another story). As a result, I would like to pass on the results of a couple of experiments I performed that might perhaps goad you into experimenting in this region.

As regular readers of this column are aware, my company is involved with the design and manufacture of fiber-optic transmission equipment. These transmitters and receivers use optical wavelengths between 850 nm and 1550 nm, well within the THz region but lower in frequency than visible light. Our various modulation schemes, however, involve turning a laser (or LED) on and off for digital modulation (basically CW, but at rates that could go as high as a GHz) or varying its intensity (essentially AM) for non-sampling analog signals. There is no finesse or true FM yet (which in the optical world would amount to "color modulation"). I wonder if the technologically more advanced civilizations that are most assuredly "out there" use something along those lines and unique propagation modes that allow extreme distances to be covered. It certainly seems like a reasonable assumption, so as a result let's look at how we might proceed to search in this region.

Fig. 1 is our first experiment. Here we have coupled a laser to an optical fiber (which is really just a waveguide for light) and the output of the fiber to a lens assembly which focuses the resulting beam onto a photodiode. In a similar manner, we have coupled a second laser to another lens assembly and directed its output beam onto the same photodiode. The output from the photodiode therefore is the sum and difference of the frequencies (wavelengths) of the two lasers (as well as their individual frequencies). The sum and the individual frequencies are obviously well beyond the range of the photodiode, but since the lasers are basically at the same frequency, the difference can be in the MHz or GHz region, one we (and the photodiode) can readily deal with. If we then modulate one of the lasers with audio, the photodiode should reproduce the audio.

This, by the way, is without any specific AM detection circuitry, but simply because of the fact that the result will be the difference between laser frequency 1 and laser frequency 2. The problem is that the lasers are not at all stable in the kHz range. As a result, one can only get slight occasional bursts of audio with this arrangement, since the lasers drift rather rapidly with respect to each other. To reiterate, this sporadic output is, of course, the difference frequency. But what about the sum? It still exists, but it is well into the THz region. The problem now is to build a practical detector for it. None of the common electronic components we currently possess will work beyond a few hundred GHz, so it seems that we are stuck (for the moment).

To double the frequency of a laser (like any electromagnetic radiation generator) one usually needs a non-linear device. In the case of low-frequency RF this is a job that can often be accomplished with a diode. In the optical region certain nonlinear crystalline materials such as lithium niobate (LiNbO3) exist and can be (and in fact are) used for this purpose. LiNbO3 is rather expensive and somewhat rare. However, a couple of companies occasionally do have small samples available. If you search the web you should be able to find them. Because this material is non-linear it can be thought of as an "optical diode."

*c/o CQ magazine

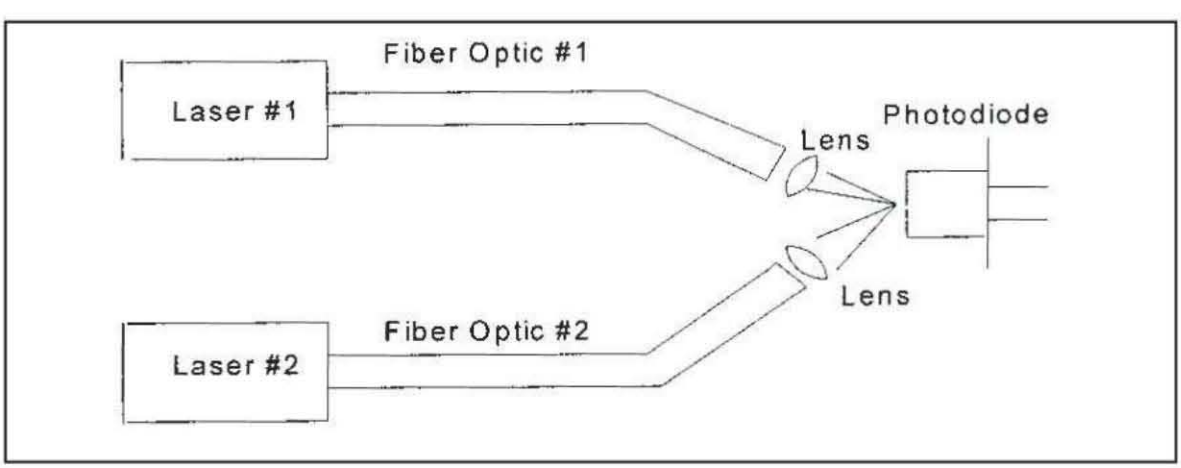


*Fig. 1– Experiment 1 (see text).*

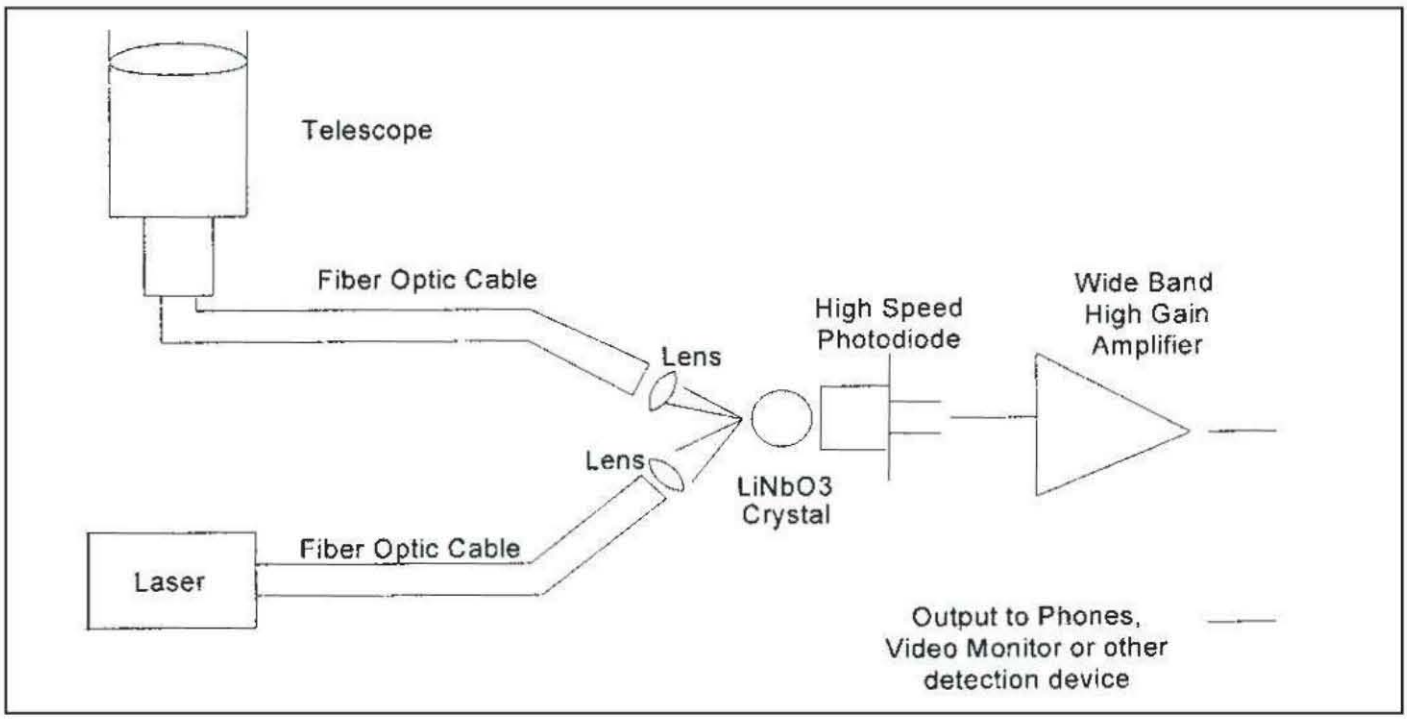


*Fig. 2– Experiment 2 (see text).*

This leads us to experiment 2, as shown in fig. 2. Here we used a laser as a sort of optical local oscillator coupled to a small piece of LiNbO3 through a short length of optical fiber and a lens. Coupled to the same piece of LiNbO3 is another optical fiber and lens. The far end of this fiber is at the focus of a large, long focal-length lens assembly. This entire arrangement is in essence an optical super-heterodyne receiver. The long focal-length lens assembly is really a telescope, and in fact, for our experiments we actually used a 6-inch Newtonian telescope which we had built many years ago when the astronomy bug bit. Also coupled to the LiNbO3 crystal is our high-speed photodiode. The basic theory of this arrangement was that if a signal was received (from "out there"), it would mix with the output of the laser and produce an intermediate (IF) frequency that could be detected by the photodiode and then amplified by a high-gain, wide-band amplifier). Again, the frequency stability of the laser was marginal, but we had to at least try!

Believe it or not, we actually scanned the sky with this arrangement for a while and for the most part received nothing more than static or occasional bursts of noise. Last April 1st (by coincidence), however, momentarily we did actually get something (which was clearly a signal of sorts), but it was not intelligible (to us) and unfortunately we could not repeat the results even though we tried again for several days. I don't know what we actually stumbled upon or whether the timing was "just right," but perhaps you will be luckier than we were.

I also don't know if LiNbO3 is necessarily the best crystal to use, and I encourage you to experiment with others such as quartz, various precious and semi-precious stones, or whatever you might have or imagine. Who would have thought that lead sulfide (galena) could detect radio waves in 1800?

There is definitely something or someone out there, of that I am convinced. The first person or group to intercept extraterrestrial communications could easily be someone within our ranks who is not afraid to experiment, tinker, and dream! It is now exactly one year since my "first result" and another April 1st has come. Don't you think it's your turn?

73, Irwin, WA2NDM

## What You've Told Us...

Our January survey asked about the first sunspot cycle you remember, your favorite HF bands, your activity on 10 meters and your thoughts about trying a possible new 500-kHz band that was pending before this year's World Radiocommunication Conference.

The largest number of survey respondents (31%) remember back to solar cycle 19 (1954–64), although among our online respondents, the greatest number first remembered Cycle 20 (28% online; 22% overall). This was followed by Cycles 21 (1976–86) and 22 (1986–96), each with 12% overall, the current Cycle 24 (10%), Cycle 23 (1996–2008) with 7%, Cycle 18 (1944–54) with 4% and Cycle 17 or earlier with 1%. Interestingly, none of the online respondents are old enough to have remembered anything before Cycle 19.

We next asked about your current favorite HF bands and there were no surprises here, with 20 meters leading the way at 25%, followed by 40 (21%), 10 (18%), 17 (12%), 80/75 (10 %), 15 (9%), a tie between 160, 30 and 12 meters (6% each), and finally, 60 meters (1%).

Our third question asked how recently you'd been on 10 meters, and 16% of you said "today." The highest response was "within the past week" (32%, & 48% if you add in the "today" votes), followed by the past month (25%), the past year (9%), 1–5 years ago (6%), never (5%), more than 10 years ago (4%), and 6–10 years ago (2%).

Finally, we asked how likely you are to want to try to get on the new 500-kHz band, assuming it gets all the necessary regulatory approvals. Forty-one percent of you said either "very likely" (16%) or "somewhat likely" (25%). In addition, 11% said "somewhat unlikely," 24% answered "very unlikely" and 21% responded "would need to learn more first."

This month's free subscription winner is Charlie Friderici, KC2KVZ, of Niskayuna, New York.

# Reader Survey April 2012

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

Since this is our QRP Special, we thought we'd ask a few questions about your attitudes and activity in the realm of low-power operating.

**Please answer by circling the appropriate numbers on the reply card. You may also take this survey online at <www.surveymonkey.com/s/CQApr12> [From the digital edition, just click on the link].**

**1. Do you consider yourself to be a QRP operator?**
Yes ....29
No ....30

**2. What is your general attitude toward QRP operating?**
Love it! ....31
I enjoy it when I do it ....32
Great for others but not for me ....33
Life's too short for QRP ....34
Hadn't thought about it ....35

**3. Approximately what percentage of your operating time (if any) is devoted to low-power operating?**
100% ....36
76–99% ....37
51–75% ....38
26–50% ....39
1–25% ....40
0% ....41

***Please answer the following questions only if you operate QRP at least occasionally:***

**4. On what mode(s) do you operate QRP? (Select all that apply)**
CW ....42
Digital (e.g., RTTY, PSK-31) ....43
SSB ....44
FM ....45
Other ....46

**5. From where do you operate QRP? (Select all that apply)**
Home ....47
Vacation home/hotel ....48
Car/Truck ....49
Boat/Airplane ....50
Remote location "off the grid" ....51
Other ....52

**6. What type(s) of antenna do you use for your QRP operating? (Select all that apply)**
Home antenna ....53
Mobile antenna ....54
Portable antenna/homemade ....55
Portable antenna/purchased ....56

**7. What type of rig do you use *most often for QRP operating? (Select one)***
Scratch-built QRP rig ....57
QRP kit ....58
Commercial QRP rig ....59
"Regular" (100W) rig with power turned down ....60

Thank you very much for your replies. We'll be back next month with more questions.

# our readers say

*We had quite a bit of feedback to February's editorial on the fifth anniversary of the elimination of the Morse code test from all levels of amateur license exams in the U.S. Here is a sampling, starting with a couple of notes from members of a fairly new organization called CWops…*

Editor, *CQ*:

Enjoyed your editorial in the recent *CQ* magazine. As an avid CW enthusiast, I am encouraged with much of what you had to say. … I am a member of an organization called The CW Operator's' Club, or CWops for short. The club is relatively young (2009) with over 1000 members, all committed to "Celebrating the Unique Art Form of Morse Code." This covers the spectrum of applications of CW … from contesting, DXing, and DXpeditions to rag chewing and traffic handling. Ours is a true commitment to growing the CW community.

Your editorial was excellent. You backed up statements with facts and statistics. Your views emphasized that CW is, indeed, not dead.

Alan Pike, W4MQC
CWops #182

Editor, *CQ*:

We at CWops club applaud Rich Moseson's editorial "No-Code Plus Five Years: An Assessment." We agree with his assessment that CW is alive and well and needs only a little bit of "Elmering" to thrive. The fact that in the two years that CWops has existed we've gained a membership of over 1,000 hams, each of whom is capable of operating at 25 wpm or greater, is evidence of this. Our membership is worldwide with more than 70 countries represented.

Some of our members are contesters, many chase DX, several like to handle traffic (and listening to a good CW traffic handler is really like listening to music), and others like nothing better than a good ragchew. Each one of them, in his or her own way, is dedicated to our club's motto of "Celebrating the Unique Art Form of Morse Code."

The "hiccup," as W2VU puts it, "is in the conversion of CW learners to comfortable CW operators." To help overcome this hurdle, CWops has created the *free* CW Academy (see <www.cwops.org/cwacademy.html>). No-code hams who want to learn CW, or hams who want to improve their CW skills, can register for the Academy on our website <www.cwops.org> and will be assigned a CWops member as a mentor and on-air contact. We're also promoting the use of sub-bands, similar to the Novice bands of the old days, to encourage on-air contacts between our CW rookies. This is in addition to providing resource pages on the CWops website for learning the code and using it on the air.

CW is FUN, and like W2VU, we firmly believe that its future is bright.

Pete Chamalian, W1RM
President, CWops

Editor, *CQ*:

I am writing in response to your editorial in the February issue of *CQ* magazine. I was very intrigued with the title and I read your editorial with great interest.

I recently returned to CW after being away for a number of years. I too have noticed a lack of slow-speed operators. I find this unfortunate, since I was hoping to make some slow-speed contacts while sharpening my skills. I looked for information on where the slow-speed operators may hang out and I read about FISTS but there was something missing.

When the Novice sub-bands were around, I listened intently every evening to find someone to talk to. I knew where to find them and it was a comfortable "home" for myself and other Novices. We didn't have to feel intimidated by the faster operators since they were lower in the band. It was truly a safe haven for those wishing to start out. So I went searching for the Novice bands of the old days only to realize that they were gone … forever. This is unfortunate, but I feel there is a solution.

Hams have always followed their own unofficial band plans. It does not take too much research to find the DX window, the RTTY portion of the band, or other special-interest portions of any given band. So why don't we establish an unofficial slow-speed sub-band? Kind of like the Novice bands of days gone by. Just for people who want to start out on CW or hone their skills. The allocations could even mirror the old segments used by Novices.

If FISTS, *CQ* magazine, QRZ.com, and maybe a few other key players were to get the word out, I'm sure it would catch on. It might be just what is needed to overcome the sparse number of slow-speed operators on the bands, as WZ8C mentioned in your editorial.

If by chance you think this is a good idea, let me know. If you tell me the frequencies, I'd be happy to hang out on 80 or 40 and wait for a few interested CW operators to talk to!

73, Joe Frank, WD2F

*W2VU replies:* Thanks for the suggestion, Joe. It appears that this is also a goal of the CWops group (see above). We would definitely support the concept of adding "slow code" segments to the voluntary band plans that guide much of our operation.

Editor, *CQ*:

Greetings from southern Arizona. As (*CQ* Publisher) Dick Ross may remember, in 1965 I wrote an op-ed piece for *CQ* in which I advocated a temporary, non-renewable, no-code license. That earned me a couple of death threats (literally) but fortunately for us, Dick and I are still here.

So, as you wrote, is CW. As you and Nancy say, however, many new hams simply don't use it, or don't use it very much. Actually, I think the problem is broader than that. It's not that they don't use CW; it's that they don't use HF at all.

Brian Summers, VE7JKZ, addresses this in a letter in the February issue of RSGB's *RadCom*. He mentions three reasons: antenna restrictions, RFI issues with close-in neighbors, and rising noise levels. From my experience here in Arizona, I can confirm his observations. Lots of people take our club's licensing classes, some even going all the way to Extra. But very few actually go (and stay) on HF. Generally they are those who, like me, are fortunate enough to live on large lots in areas with no HOAs or CC&Rs affecting antennas. We all need to keep working on these issues.

73, Ray Soifer, W2RS

Editor, *CQ*:

Thanks for an upbeat report on CW. It's been a hard sell in our club, but we keep trying.

One thing that really bothers me is that "CW sound" is not heard at our hamfests these days. Even the QRP CW clubs at the hamfests many times don't have keys or oscillators on hand to encourage the use of CW. We need to let CW be heard again at our hamfests! I have vowed to carry my little MFJ CW tutor in my pocket set at full volume during the next hamfest I visit!

73, George Averill, K4EOR

*W2VU responds:* You will find the sounds of CW at many of the larger hamfests, but this is all part of a larger problem I've been banging on for years — we need more *activity* of all sorts at our hamfests. They are far too passive to properly convey the fun and excitement of our hobby.

Editor, *CQ*:

I just read an article of yours entitled "No-Code Plus Five Years: An Assessment." Since I am on the code side using CW for more than 90% of my QSOs, I'd like to add a comment: A CW test (for) licensing is a great filter for all those who think amateur radio is just another gadget. The question is, "Do we need those gadgeteers or not?"

The survival of amateur radio and CW do not depend on having (or not having) a code test, but they do depend on how many people have the itch to work new things and find new thrills. On the other hand, the survival of companies selling amateur radio gear and gadgets does depend on gadgeteers. So, take your pick. CU AGN

73, Babis Platsis, SV7BAY

*W2VU responds:* The amateur radio hobby will not survive without the amateur radio industry. Very few of us today are capable of designing and building the full-featured transceivers that grace most of our shacks. But this is not an "either/or" situation. A certain percentage of the "gadgeteers," as you call them, will become the innovators of the future. But we won't have them unless something has drawn them to ham radio to begin with. Our challenge is to make sure that all newer hams learn of the boundless opportunities our hobby offers - regardless of their interests—and to provide the encouragement and mentoring needed to bring out the unique gifts that each amateur may bring to ham radio.

*Professor Heisseluft discovers new corporation formed to assist radio amateurs in filing for vanity call signs.*

## *A CQ Exclusive:*

# Vanity4Hams, LLC Guarantees You *Any* Vanity Call Sign Currently Held by an Individual, Bar None, in Just Over Two Years

**BY PROFESSOR EMIL HEISSELUFT***
**Lauton Institute, Grossmaul-an der Donau, Austria**

*Nearly 80,000 radio amateurs have replaced their sequentially assigned call signs with vanity call signs since the Federal Communications Commission (FCC) initiated procedures for such exchanges in 1996. Yet the thirst for vanity call signs remains unsatiated, with amateurs forced to comb through Commission databases as well as obituaries in search of the data needed to confirm the death of a preferred call sign holder before filing for his or her own vanity call sign. Now, Professor Heisseluft has discovered a new company that is dedicated to assisting amateurs realize their dreams without having to go through the hassle normally associated with such efforts. To date, this company's methods have been applied successfully to a number of cases that were tested on a proof-of-concept basis. Those radio amateurs helped speak glowingly of the results.—W2VU*

In 1996, the FCC amended its Rules and Regulations to codify procedures governing the vanity call sign system. Since that time, nearly 80,000 licensees have replaced their sequentially issued amateur radio call signs with vanity call signs. Why have they done so? For a variety of reasons. In some cases, it was simply a matter of a licensee wanting a call sign more befitting his or her class of license. In other cases, it had to do with the types of operations in which they were engaged.

For example, one Amateur Extra Class licensee new to amateur radio, who asked not to be named, told me: "At first, I was a laughingstock. After I passed all of the exams for an Extra Class license in one sitting, I was issued a sequential two-by-two call sign! I couldn't show my face at club meetings without everyone making fun of me. I had to have a vanity call sign to save my dignity."

Others, particularly contesters, told me they absolutely had to have short call signs in order to speed exchanges and improve their scores. This was especially for those who used CW. One contester, who now scores among the top five con-

*Photo 1– The staff of Vanity4Hams, LLC, includes (left to right, top to bottom): President Louie M., aka "Louie the Lip"; CEO Eddy V., aka "the Godfather"; Corporate Secretary Gail S., aka "the Scribe"; and Executive Assistant Sandra P., aka "the Enforcer." All are studying for their Novice class Amateur Radio licenses.*[5]

**e-mail: <heisseluft.emil@mashuga.orf.ar>*
**Professor Heisseluft currently is in Europe, taking a well-deserved vacation on the French Riviera. Mail may be conveniently sent to the professor c/o CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801.*

testants *worldwide* (single-operator, all-bands, single-transmitter) in all CQ and ARRL DX contests told me: "The sequential call sign I originally was issued by the FCC was killing my scores! It took far too long to send. And when it came to repeats? Oy! If I didn't have my new one-by-two call sign, Emil, I'd be chopped liver."

These and other amateurs with whom I spoke in preparing this article—men and women alike—*to a person* decried the draconian procedures governing the vanity call sign system, which were, by the way, amended by the Commission in 2010.[1] Over and over again they asked if there were not an easier way for amateurs to obtain vanity licenses . . . or if help were not available so that others did not have to go through what they did to get their vanity call signs. Now, I'm happy to report, help is on the way. But before I reveal what I have uncovered, let me review the current practices and procedures for obtaining a vanity call sign.

## Current Vanity Call Sign Practices and Procedures

Of interest to us here, of course, is the reissuance of call signs that can be made available when the holder has died. This is addressed in US Title 47 CFR §1.948(g).[2] I would note, to save you time, that the information of interest can be found in §97.19 of that chapter. What we are concerned with, my dear friends, is the laborious process that many of you would have to go through to find the vanity call sign you seek . . . something called "Silent Key Callsign Harvesting."

There is a Web site already dedicated to the harvesting effort. It was developed by AE7Q and can be found at the URL in the notes section at the end of this article.[3]

Basically, the process comprises seven major steps, each spelled out in great detail:

1. Search for likely candidates
2. Verify deceased status
3. Obtain proof of death. Currently, the FCC is known to accept:
   a. A certificate of death, or
   b. Newspaper obituary notices.
   (Social Security Death Index listings are no longer accepted; see "Washington Readout," March 2012 *CQ*)
4. Send a notice of cancellation to the FCC
5. Wait until the FCC cancels the call sign. ***Do not*** call the FCC to find out

about when it will cancel the call sign! The relatively prompt cancellation processing it does is a favor to the Amateur Radio community; please don't abuse it by calling them. Generally, the FCC cancels a call sign within one to two weeks after your request, although it is not uncommon to happen on the same day.

6. Wait another 30 days after the effective date of the cancellation.

7. Make sure that ***two years and one day*** have elapsed since the date of death, and then file your application.

The author, AE7Q, also provides a message board[4] for those seeking help or wishing to provide help to others.

Now, there is no question that the process outlined here is comprehensive and viable. It has undoubtedly helped thousands of radio amateurs over the last several years secure their vanity call signs. But the process, as you see, is highly labor intensive. It begs for an innovative approach to relieve the administrative burden from the amateur's shoulders.

## Vanity4Hams, LLC Enters the Picture

Recognizing that tens of thousands of radio amateurs are forced to use cumbersome, sequentially issued FCC call signs every day, many of which are unsuited for contest work because of their awkward prefixes and suffixes, a group of New Jersey entrepreneurs, demonstrating the best of American business inguinity and initiative, recently formed Vanity4Hams, LLC. The group is shown in photo 1.

The company's headquarters, shown in photo 2, are located in a low-rent district to minimize overhead costs and reduce client fees to a minimum. This building is adjacent to the company's other facility, which houses its trash hauling and waste disposal business. (See photo 3.)

## How Vanity4Hams, LLC Functions

This is how Vanity4Hams's new system works. A radio amateur seeking a *specific individual's vanity call sign* completes a simple form specifying the call sign desired. This form is submitted to Vanity4Hams together with a signed but undated FCC application for a vanity call sign desired. Funds in the amount of US$10,000 cash in unmarked $20 bills must accompany the form. Then, shortly after a period of two years has elapsed, Vanity4Hams will submit the application to the FCC on behalf of the

*Photo 2– Vanity4Hams' corporate headquarters are designed to minimize overhead expenses, thereby reducing costs to its clients. Damage to the building's façade was the result of a recent exchange of gunfire between corporate personnel and personnel from the Bureau of Alcohol, Tobacco, and Firearms and Explosives (ATF), who were mistaken for rival "businessmen." The building will be repaired this summer.* [6]

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**Simply** place in window sill and close window. One cut customizes it for any window up to 48 inches. Use horizontally or vertically. Connectors are mounted on inside/outside stainless steel plates and attached to a 4 foot long, 3½ inch high, ¾ inch thick *pressure-treated* wood panel. Has excellent insulating properties. Weather-sealed with a heavy coat of long-lasting white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Includes window locking rod.

**Inside**/outside stainless steel plates ground all coax shields. Stainless steel ground post brings ground in.


## *MFJ-4603 Universal Window Feedthru Panel*

MFJ-4603 **$89.95**

**Four** 50 Ohm *Teflon*(R) SO-239 coax connectors lets you feed HF/VHF/UHF antennas at full legal power limit.

**A** 50 Ohm *Teflon*(R) coax *N-connector* lets you use any antenna up to 11 GHz, including 450 MHz, UHF, satellite, moon bounce and 2.4/5.8 GHz Wi-Fi antennas.

**A** 75 Ohm, 1 GHz *F-connector* makes it easy to bring in television, Satellite, HD, cable TV and FM radio signals.

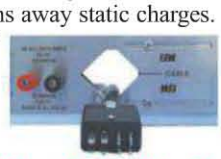
**A** pair of high-voltage *ceramic feedthru insulators* lets you bring in 450/300 Ohm balanced lines directly to your antenna tuner.

**Has** random/longwire antenna *ceramic feedthru insulator*.

***5-way** binding posts* lets you supply 50 Volts/15 Amps DC/AC power to your outside antenna tuners/relays/switches.

**Stainless** ground post brings in ground connection, bonds inside/outside stainless steel panels together and drains away static charges.

**MFJ's** exclusive *Adaptive Cable Feedthru*™ lets you bring in rotator/antenna switch cable, etc. without removing connectors (up to 1¼X1⅝ in). Adapts to virtually *any* cable size. Seals out rain, snow, adverse weather.



### *3 Coax, Balanced Line, Random Wire*

**Best Seller!** 3 *Teflon*(R) coax connectors for HF/VHF/UHF antennas. Separate high voltage *ceramic* feed-thru insulators for balanced lines and longwire/random wire, Stainless steel ground post.

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**6** high quality *Teflon*(R) coax connectors for HF/VHF/UHF antennas. Stainless steel ground post. Full 1500 Watt legal limit.

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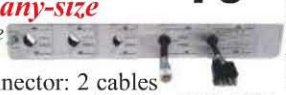
### *4 Balanced Line, 2 Coax*

**4** pairs of high-voltage *ceramic* feed-thru insulators for balanced lines and 2 coax connectors.

**New!** MFJ-4600 **$79.95**

### *5 Cables, any-size*



**5** *Adaptive Cable Feedthrus*™. Pass any cable with connector: 2 cables with large connectors up to 1¼x1⅝ inches and 3 cables with UHF/N size coax connectors. Seals out weather.

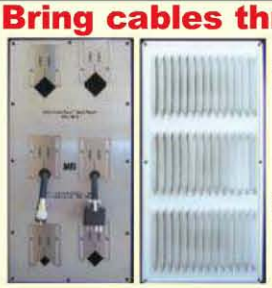
MFJ-4604 **$99.95**

### *All-Purpose FeedThru/CableThru*™

***Stacks** MFJ-4603 **and** MFJ-4604!* Gives you every possible cable connection you'll ever need through your window without drilling holes in wall -- including UHF, N and F coax connectors, balanced lines, random wire, ground, DC/AC power and cables of any size for rotators, antenna switches, etc.

MFJ-4605 **$159.95** **New!**

## Bring cables thru eave of your house



MFJ-4616 shown with standard full-size vent (not included) it replaces. For *6 Cables*

**$26.95**

MFJ-4613 shown with standard half-size vent (not included) it replaces. For *3 Cables*

**$14.95**

**Replace** your standard air vents on the eave/sofitt of your house with these *MFJ AdaptiveCable*™ *Air Vent Plates* and…

**Bring** in coax, rotator, antenna switch, power cables, etc. *with connectors* up to 1¼x1⅝ inches!

**Sliding** plates and rubber grommets adjust for virtually any cable size to seal out adverse weather, insects and varmints. Use existing vent hole, mounting screws and screw holes.

## *AdaptiveCable*™ Wall Plates

MFJ-4614 *For 4 Cables* **$34.95**

**Bring** nearly any cable -- rotator, antenna switch, coax, DC/ AC power, etc. -- through walls *without removing connectors* (up to 1¼x1⅝ inches). Sliding plates and rubber grommets adjust hole size to weather-seal virtually any size cable.

**Includes** *stainless steel* plates for each side of wall, sliding plates, rubber grommets, weather stripping and screws.

MFJ-4612 *For 2 Cables* **$24.95**

MFJ-4611 *For 1 Cable* **$14.95**

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*Photo 3– Vanity4Hams also engages in the trash hauling and waste disposal business, a useful adjunct to its amateur radio vanity licensing business.*[7]

applicant for the *specific vanity call sign requested.*

It's that simple. As Eddy, "the Godfather," told me, "Bada-bing bada-boom, no questions asked. Success is guaranteed."

## Test Cases

To date, Vanity4Hams has submitted nine applications, all of which have been granted. In fact, "the Godfather" gave me two testimonials from satisfied users that, he said, I was free to use in this article *as long as I withheld his clients' names and call signs.* Here's what they had to say:

I never dreamed that I could have the one-by-two call sign that Vanity4Hams was able to obtain for me in just over two years' time. *This is a call to die for!* The man who previously held the call was, as best I could tell, in his early 30s. Based on a picture I saw of him in *CQ* magazine, he was in the best of health. It's just terrible what happened to him on that trip to Machu Picchu, Peru.

*Mary P. (last name and call sign withheld by request)*

Wow! If anyone had told me that I could have that beautiful, short—CW-wise—one-by-two call sign for use in contests, I would not have believed him in a million years ... especially given the fact that it was once held by one of the world's top CW DX contesters. It was such a shame when he died so unexpectedly. Fortunately, Vanity4Hams was right on top of the situation. It had my application delivered to the FCC office in Gettysburg, PA, by courier just minutes after the doors opened on *the very day* applications for the call sign I wanted were first accepted. Vanity4Hams, you're the best!

*Steve J. (last name and call sign withheld by request)*

Some amateur radio operators worry that even though they have paid Vanity4Hams's fee, others seeking the same call sign will force the assignment of the call to be resolved through a lottery, and they will lose. Combing through the FCC's databases, however, I uncovered only one instance where this happened—that is, where the assignment of a vanity call sign went to someone other than a Vanity4Hams client. But wait, strange as it might seem, the person who won that particular lottery was killed in a skydiving accident one month after receiving his new call. And the person wasn't even a skydiver! Even stranger, on the second submission there was no competition, and the Vanity4Hams client's application was approved. Since then there *never* has been *any* competition for a vanity call sign cited on an application couriered to the FCC by Vanity4Hams.

## Summary

It certainly appears as if good old American ingenuity has once again triumphed, this time for the benefit of all US radio amateurs. Now those hams seeking vanity call signs no longer need be bothered with having to go through the laborious task of documenting the death of the former licensee holding the vanity call sign they seek. Instead, a simple application to Vanity4Hams, LLC, plus the payment of US$10,000 in cash, guarantees the assignment of *that specific call sign,* in just over two years.

***Note added as we go to press:*** *CQ* has learned that federal authorities have opened an investigation into the activities of Vanity4Hams, LLC based on a Whistleblower complaint filed with the Federal Trade Commission (FTC) in late March 2012. A spokesperson for the government who is not authorized to speak on the record and declined to be quoted directly stated that the complaint, which charges the company with false advertising, resulted from the fact that the preferred one-by-two call sign the whistleblower received began with a "W" instead of an "N." Vanity4Hams claims it was a clerical error, and it will be "corrected" shortly.

## Notes

1. http://www.k6arp.org/arrl/new-fcc-rules-for-vanity-and-club-station-call-signs/
2. http://edocket.access.gpo.gov/cfr_2008/octqtr/47cfr1.948.htm
3. http://ae7q.com/text/SilentKey.php
4. http://www.ae7q.net/board/phpBB/
5. Photo used under license from BIGSTOCK®, www.bigstockphoto.com
6. Ibid.
7. Ibid.

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- *2,000 Memories per Antenna*
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- *6 to 800 ohm range (15 to 150 on 6M)*


M-1000 Meter sold separately

## NEW! AT-1000ProII

**Building on the success of the AT-1000Pro, LDG Electronics has refined and expanded its flagship 1KW tuner with optional external 4.5" analog meter.** The new AT-1000ProII keeps many of the same features of the previous model, but simplifies the operation. With the two-position antenna switch, there are 2,000 memories that store tuning parameters for almost instantaneous memory recall whenever you transmit on or near a frequency you've used before. Includes six-foot DC power cable.

***Suggested Price $539.99; Optional M-1000 external analog meter $129.99***

## AT-600Pro

The AT-600Pro handles up to 600 watts SSB and CW, 300 on RTTY (1.8–30 MHz), and 250 watts on 54 MHz. Matches virtually any kind of coax-fed antenna and will typically match a 10:1 SWR down to 1.5:1 in just a few seconds. You can also use it with longwires, random wires, and antennas fed with ladder line just by adding a balun. Two antenna ports with a front-panel indicator, and separate memory banks for each antenna. LED bar-graph meters shows RF power, SWR and tuner status, tactile feedback control buttons and an LED bypass indicator. Operates from 11–16 volts DC at 750 mA. Includes six-foot DC power cable. ***Suggested Price $359.99***

- *RF Sensing*
- *Tunes Automatically*
- *No Interface Cables Needed*

## AT-100ProII

This desktop tuner covers all frequencies from 1.8–54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch with LEDs, allowing you to switch instantly between two antennas. The AT-100ProII requires just 1 watt for operation, but will handle up to 125 watts. Includes six-foot DC power cable.

***Suggested Price $229.99***

- *RF Sensing*
- *Tunes Automatically*
- *No Interface Cables Needed*

## AT-200ProII

The AT-200ProII now includes LEDs to show antenna position and if the tuner is in bypass. A two-position antenna switch stores 2,000 memories per switch. Handles up to 250 watts SSB or CW on 1.8 to 30 MHz and 100 watts on 54 MHz. Rugged and easy to read LED bar graphs simultaneously show RF power and SWR. Includes a six-foot DC power cable.

***Suggested Price $259.99***

**Your Favorite Dealer has LDG tuners in stock NOW!**
**Don't Miss Out — Call or visit them TODAY!**

## Z-100Plus

Small and simple to use, the Z-100Plus sports 2,000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six-foot DC power cable.

***Suggested Price $159.99***

## Z-11ProII

Designed from the ground up for battery operation. Only 5" × 7.7" × 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 through 6 meters. The Z-11ProII uses LDG's state-of-the-art, processor-controlled, Switched-L tuning network. It will match dipoles, verticals, inverted-Vs, or virtually any coax-fed antenna. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. Includes six-foot DC power cable. ***Suggested Price $179.99***

radio not included

## Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). 2,000 memories cover 160 through 6 meters. Also functions as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the Tune button on the tuner. Powered by four AA internal alkaline batteries (not included), so there are no additional cables required.

***Suggested Price $129.99***

## IT-100

Matched in size to the IC-7000 and IC-706, for either manual or automatic tunes, and status LEDs. Control the IT-100 and its 2,000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. For your Icom radio that is AH3 or AH-4 compatible. ***Suggested Price $179.99***

radio not included

## AT-897Plus for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment, takes power directly from the CAT port of the FT-897, and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier.

***Suggested Price $199.99***

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*This year's CQ World Wide Foxhunting Weekend will be May 12–13. Get ready for adventure, intrigue, and a lot of fun!*

# Transmitter Hunting Season is Here!

## *Announcing:*

## The 2012 CQ World-Wide Foxhunting Weekend, May 12–13

BY JOE MOELL,* KØOV

What do a lawn sprinkler pipe, a power-pole transformer, and a baby carriage have in common? A soda can, a 2 × 4 pine stud, and the top part of a bikini swimsuit also share this distinction.

If you know the answer, you probably have done some hidden-transmitter hunting. Clever ham radio operators have used all of these as places to put little transmitters for radio direction finding (RDF) contests, which they call foxhunts, bunny hunts, and T-hunts. By hiding in plain sight with transmitters that don't look like transmitters, they make the hunt participants rely on their direction-finding equipment and not just on their eyes to find the object of their search.

Every weekend, hams set out in vehicles equipped with RDF gear seeking sources of RF that their fellow hams have put in unusual places. They don't know where they will end up nor what they will find when the get there. Is this the ultimate ham radio adventure?

Although they can take place on any band, nearly all mobile hunts nowadays are on 2 meters. Most often they are on a simplex frequency, but sometimes they will be on a repeater input to arouse the curiosity of the system's users. Occasionally there are awards for the winners, but most of the time the skillful (or lucky) winner's prize is the opportunity to confound fellow hunters by being the hider next time.

### Start Simply

There is a "learning curve" to transmitter hunting. Most clubs start out with very simple hunts so that everyone can optimize their RDF gear and learn the basic techniques. Perhaps the hider will park at a local restaurant, sit in a vehicle, and make frequent transmissions for the hunters to track. If they are having trouble, some clues may be in order. When everyone has arrived, it's time to go in and talk about the hunt over pizza or ice cream.

Some T-hunters prefer to go it alone, but I think that mobile hunting is most fun when it is a social activity with several people in the car. The driver concentrates on that task while a passenger gets RDF bearings. That person, or perhaps another passenger, plots the bearings and tries to figure out where the hider is.

For many clubs the winner is the team that arrives first, but here in southern California most hunts are scored by mileage. Everyone gathers at a hilltop start point and odometers are read. At the end, the team with fewest elapsed miles wins.

*Here's Patty Sanderson, wife of Matt, KC9SEM, turning the beam just before a mobile T-hunt in Chicago last April. On her lap is two-week-old Jacob, who was born just a few hours after Patty finished a T-hunt in March. (Photo by Mike Brost, WA9FTS)*

*P.O. Box 2508, Fullerton, CA 92837
e-mail: <homingin@aol.com>
Web: <www.homingin.com>
ARRL ARDF Coordinator and Moderator of the annual CQ World-Wide Foxhunting Weekend. He also writes the "Homing In" column in* CQ VHF *magazine.*

This encourages safe driving and careful bearing-taking. It also makes the job of the team's navigator more important. (Out here, that person is usually called the "navi-guesser.")

After a few simple hunts, the teams will become more proficient at RDF and the hiders can unleash their full creativity. For instance, a 19-inch metal sprinkler riser can be an excellent 2-meter transmitting antenna. I know, because I tracked down one on a Fullerton Radio Club hunt one Sunday afternoon. In a park with dozens of such risers, which one is it?

Another Fullerton Radio Club legend is the "fake pole pig" hunt by Ken Diekman, now K6KRD. He put a transmitter in a paint can painted to look like a pole-top power transformer. He also made a 38-inch wooden crossarm with wires attached to form a 2-meter horizontal dipole. He then climbed an empty wooden pole in a new construction area and mounted the "transformer" and crossarm atop it. The signal was strong and everyone got to the vicinity in short order, but figuring out the exact hidden transmitter location was quite another matter.

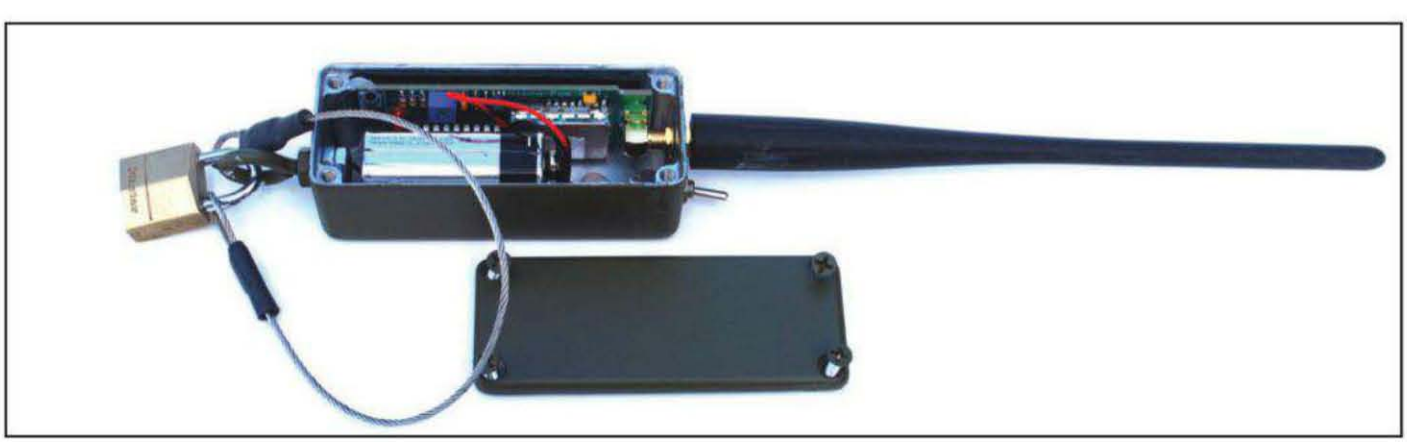
Hunts like this require a fox transmitter that automatically transmits the proper on/off sequence with suitable audio, such as random tones. An unattended fox (or "T") frees the hider to move around, drawing attention away from the transmitter's location. The hider can enjoy the spectacle of the hunters scurrying to locate it.

There are many ways to homebrew a fox controller, but for one that's almost ready to plug-and-play with your handheld or mobile rig, consider PicCon by Byon Garrabrant, N6BG. This was the first product of Byonics, his company, and it has become the most popular controller for both mobile T-hunting and on-foot ARDF (Amateur Radio Direction Finding). PicCon has fully programmable transmit on/off timing and a delay feature to start transmissions automatically at hunt time.

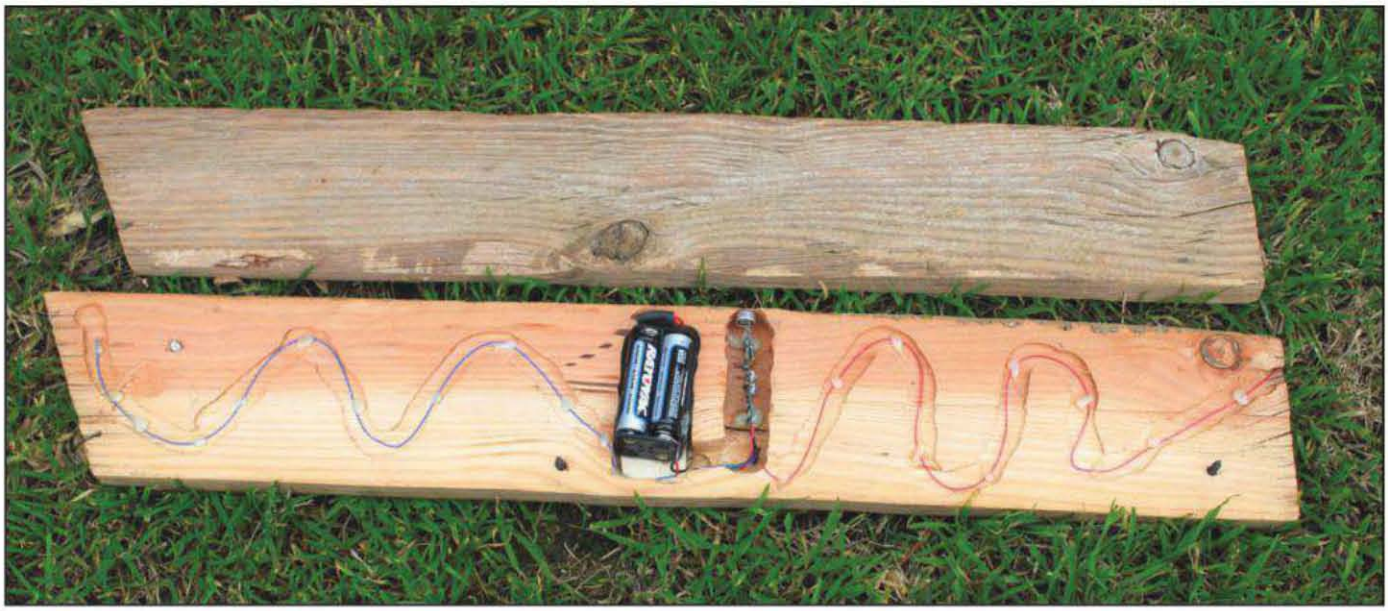
For Byonics' latest foxhunting product, Byon teamed with Allen Lord of VHS Special Services to create Micro-Fox 15, a complete transmitter and controller on a 1" × 3" circuit board. Micro-Fox is rated at 15 milliwatts output and covers the entire 2-meter band.[1] Byon and Allen have on the drawing board an amplifier to raise power to a half-watt or more.

A Micro-Fox and battery will easily fit inside a soda can or a short length of

*If you're going to put on a foxhunt in Salt Lake City during February, you may encounter some fresh snow. Hider Larry Jacobs, WA7ZBO, put his five little transmitters in plastic tubs to keep them dry. John Hardy, K7ALA, is hunting with a measuring-tape Yagi, resistive attenuator, and handheld. This hunt was part of the 2011 annual Utah VHF Society Meeting. (Photo by Larry Jacobs, WA7ZBO)*



*The Byonics Micro-Fox fits nicely into this die-cast metal box from LMB. I added an eye bolt to secure the package with piano wire and a small padlock to prevent theft. (Photo by Joe Moell, KØOV)*



*Tom Curlee, WB6UZZ, and I carefully sliced open this piece of weathered 2 × 4 pine and put a tiny 2-meter transmitter inside. For the hunt, we put this "Stud-T" back in the pile of old boards where I found it. (Photo by Joe Moell, KØOV)*

2 × 4 (see photos). The bikini top? You can use your imagination, but for the full story of that hunt, you will have to come to one of my foxhunting presentations at a ham convention or club meeting.

## On the Trail of the Fox

A growing number of hams prefer transmitter hunts that are all on-foot. What a great way to involve kids and grandkids, because no driver's license is needed. A cookout and foxhunt at a local park makes a great ham club activity on Foxhunting Weekend or any other. Tiny transmitters can be concealed under rocks or up in trees. You might even find one inside a fake boulder or tree limb.

In another kind of on-foot foxhunting everyone follows an internationally agreed-upon set of rules requiring the transmitters to be set up in a special orienteering course with orange-and-white flags, unique registration punches, or electronic scoring. See the sidebar for more about the rules of this organized worldwide sport, which is called radio-orienteering and ARDF.

With practice and perseverance, you could win medals and other honors in ARDF, no matter what your age. National championships take place annually in about two dozen countries around the world. USA's this year will be on the first weekend in June in the mountains east of San Diego, California. In addition to formal competitions on separate days on the 2-meter and 80-meter bands, there will be a "training camp" where beginners can get lots of RDF practice as well as individual instruction, if needed.

Leading the organizers for this year's national championships is Marvin Johnston, KE6HTS, who was on USA's first team to the World Championships back in 1998. He has been on our team several times since, either as a competitor or a member of the international jury. Marvin chaired the organizers of the USA championships in 2004 and 2007.

Our national championships are open to anyone who can run or walk through the forest for five to ten kilometers while carrying RDF gear. A ham license is not a requirement (after all, competitors use only receivers; only the "fox" needs to be a licensed ham). Expect to meet beginners and experts from all over the world, because foreign competitors are welcome and expected. More informa-

*Five ARDF Team USA hopefuls prepare their orienteering maps just before the 80-meter foxhunt at the 2011 USA Championships near Albuquerque, New Mexico. Clockwise around the table are Karla Leach, KC7BLA; Dale Hunt, WB6BYU; Matthew Robbins, AA9YH; Bill Smathers, KG6HXX; and Bob Frey, WA6EZV. (Photo by Joe Moell, KØOV)*

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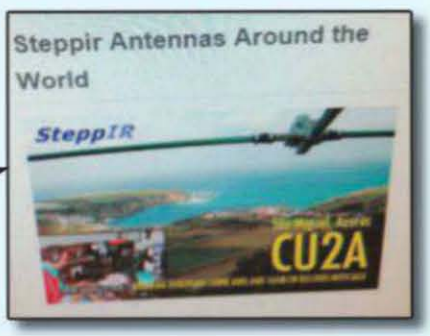


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### Radio Foxhunting with International Rules

Around the USA and the world there are wide differences in the guidelines and rules for transmitter hunts in vehicles. Each group develops the kind of mobile contests that suit the skill and temperament of the local T-hunters, as well as the geography and climate of the region.

However, roll-your-own rules won't work when radio-orienteers gather from all parts of the country and the globe to test their skills on foot in the forest. As interest in ARDF spread through Europe three decades ago, a committee of the International Amateur Radio Union (IARU) was formed to standardize the rules. That made it possible to hold the First World ARDF Championships in 1980. As the sport has grown in popularity, the rules have kept up. Their purpose is to ensure that winners have the ideal combination of direction-finding skill, orienteering ability, and physical stamina.

After its start on 80 meters with just three age/gender categories, championship ARDF now has six age categories for men and five for women. Now 60-year-olds don't have to compete against 20- or 40-year-olds. Having more categories also means that more gold, silver, and bronze medals are available to be won.

At national and world championships, there are separate hunts during separate days on 80-meter CW and 2-meter AM. Each takes place in a large forested area. Five transmitters are on the air with distinct identification. Fox #1 is on for 60 seconds, then it goes off and #2 comes on for a minute. The cycle continues until #5 has finished, at which point #1 begins again.

Competitors receive a detailed color orienteering map of the forest just before they set out on the course. They must navigate from the starting corridor to each of the required fox transmitters (five, four, or three, depending on category) and then to the finish line, using the map and their own RDF gear. Scoring is done first by number of transmitters found and then by elapsed time. There is a time limit, usually about three hours. If you stay out in the forest longer, you are disqualified.

During championship foxhunts, each person competes as an individual. No teaming or human assistance is permitted on the courses. GPS help for navigation isn't allowed either. Competitors may not make transmissions except in emergencies.

ARDF World Championships take place every even-numbered year in a country that is selected by the ARDF Working Group of IARU. Each participating country may send three competitors in each of the age/gender categories. The next World Championships will be in the mountains of Serbia this September. After this year's national championships in June, invitations for membership in ARDF Team USA will be given to the best performers in each category in those championships near San Diego and in the 2011 USA championships near Albuquerque.

tion and registration forms are available at the event website[2], where you will also find lodging suggestions and technical details such as transmitter frequencies.

## Get Ready for the Big Weekend

As Foxhunting Weekend Moderator, I have the pleasure of getting reports and photos from hams who have discovered a new way to enjoy their hobby. What's more, the skills they learn are very important when it's time to find sources of interference, either accidental or intentional. Some of them are now helping Civil Air Patrol and search/rescue agencies, using RDF to track downed aircraft and persons in distress.

For many clubs, the CQ World-Wide Foxhunting Weekend kicks off a season of regular transmitter hunts. For others, it's a once-a-year event, like Field Day. *CQ* doesn't impose any specific rules or offer any prizes for Foxhunting Weekend. That's up to you and your fellow hometown hams. You don't even have to schedule it on May 12–13. Any weekend in the spring will be fine!

Your hunt can be for mobiles or all on foot. Use the international rules or make up your own. If your club has always had one kind of hunt on Foxhunting Weekend, why not try something different this year?

Some hams prefer formal transmitter hunts with carefully crafted boundaries, specifications for signal parameters, time limits, and so forth. Others are completely content just to have one or more signals to hunt—no need for any regulations they say. Talk it up on the local repeater and see what your friends have in mind.

Planning hunts and building gear can be almost as much fun as the actual transmitter tracking. There are plenty of resources to help you, including a book[3], an instructional DVD[4], and lots of websites with photos and videos. *CQ* and *CQ VHF* magazines have featured transmitter hunting on a regular basis over the years, so dig into that stack of back issues.

Start your search at my website[5], which has the announcement of this year's CQ World-Wide Foxhunting Weekend, an article on mobile T-hunting that you can put in your club's newsletter, and ideas for RDF equipment that will make a foxhunter out of anyone with a 2-meter handheld.

Every member of your club is a potential participant in the CQ World-Wide Foxhunting Weekend. Better yet, include the whole community, especially young people. Invite a Scout troop to experience on-foot transmitter tracking or to ride along with the mobile hunters. Look for opportunities to incorporate foxhunting into Scout activities such as Camporees, Scout-O-Ramas, and Jamboree-On-The-Air.

## Safety First

Whatever your club's RDF contesting style, be sure to keep safety in mind. Don't put transmitters where someone might get hurt getting to them. Make sure that all transmitting and receiving antennas are eye-safe. Always be mindful of your own physical limitations and never take chances behind the wheel or in the forest.

Afterwards, write up the results and send them to me. The list of information in a complete CQ Foxhunting Weekend report is posted with the announcement at my website. We need details of date, location, hiders, and winners. Readers also want to know what was unique about your hunt and what lessons (positive and negative) you learned from it.

Take lots of photos for your club newsletter and please send some to me for a follow-up article. Although digital files are best by far, sharp 5" × 7" prints might be usable. Resolution of 640 x 480 is the bare minimum. A camera of four to ten megapixels will give images that will make the editors much happier and will be more likely to be used.

In next month's issue of *CQ magazine* I will be back with stories and photos from last year's CQ World-Wide Foxhunting Weekend. That will give you plenty of ideas for challenging and inventive hunts of your own. Meanwhile, start talking up the CQ World-Wide Foxhunting Weekend and making plans for your club's participation.

## Notes

1. Complete reviews of PicCon and Micro-Fox are in the "Homing In" column of *CQ VHF* magazine for Summer 2011.
2. <http://www.homingin.com/farsnews.html>
3. <http://www.homingin.com/THRDFS info.html>
4. <http://www.arvidnews.com/ardf/ index.html>
5. <http://www.homingin.com>

BY FREDERICK O. MAIA,* W5YI

# RF Safety In (and Outside of) the Ham Shack

It has been a while since we discussed radio frequency, or RF, radiation. We still get inquiries about what some of the terms mean and the responsibilities of the amateur community to comply with the RF exposure rules.

Amateur transmitters, like all radio transmitters, send information from one place to another by scattering electromagnetic waves into space. Electromagnetic radiation consists of waves of electric and magnetic energy moving together through space at the speed of light. The electromagnetic "spectrum" includes all of the various forms of electromagnetic radiation ranging from extremely low frequency (ELF) signals (with very long wavelengths) to X-rays and gamma rays, which have very high frequencies and correspondingly short wavelengths. (A wavelength is defined as the distance in meters between corresponding points of two successive electromagnetic waves at a specific frequency. Wavelength and frequency are inversely proportional.)

In between these extremes lie radio waves, microwaves, infrared radiation, visible light, and ultraviolet radiation. Radiofrequency (RF) electromagnetic fields (EMFs) can range from low frequency, such as 60-Hz electric-power-line frequency fields, to microwave radio energy, which is much higher in frequency.

Most EMFs to which we are exposed are manmade, but some can occur naturally, such as the magnetic field of the Earth itself and the electric fields associated with high-voltage lightning strikes. Even static electricity caused by walking on a dry carpet and discharged when we touch a conductor has an associated EMF.

## Radio Waves Can Heat Tissue

The energy associated with electromagnetic radiation depends on its frequency (or wavelength). The higher the frequency (and shorter the wavelength), the higher the energy. Both RF and 60-Hz fields are classified as *nonionizing* radiation because the frequency is too low for there to be enough photon energy to ionize atoms.

Ionization is a process by which electrons are stripped from atoms and molecules, producing molecular changes that can lead to significant genetic chromosome damage in biological tissue. Of the various forms of electromagnetic radiation, X-radiation and gamma radiation represent the greatest relative hazard. Nuclear weapons, for example, produce enormous amounts of ionizing radiation.

Microwave radiation is a form of RF radiation that occupies the upper part of the RF electromagnetic spectrum above 300 megahertz. The most familiar use of microwave radiation is in household microwave ovens, which rely on the principle that microwaves generate heat throughout an object rather than just at the surface. Therefore, microwave ovens can cook food more rapidly than conventional ovens.

Another use of microwaves is the transmission of radio signals (such as cell phones and Wi-Fi networks). Many uses have been developed for RF energy, but carrying telecommunications is the most common. Radio basically works by impressing intelligence on a radio wave, sending it into space, and separating the wanted information from the radio wave at the receiving end.

## Measuring Radio Frequency Radiation

Since radio frequency radiation has both an electric and a magnetic component, it is often convenient to express intensity of a radiation field in terms of units specific to each component. The unit "volts per meter" (V/m) is used for the electric component, and the unit "amperes per meter" (A/m) is used for the magnetic component. We often speak of an electrical and magnetic "field strength" at a measurement location.

Another commonly used unit for characterizing an RF electromagnetic field is "power density." Power density is defined as the magnitude of the electromagnetic energy as a point in space measured in power per unit of area.

Power density is most accurately used when the point of measurement is far enough away from the RF emitter to be located in what is referred to as the "far field" zone of the radiation pattern. Power density is usually measured in milliwatts per square centimeter (or $mW/cm^2$). A location in closer proximity to the transmitter is in the "near field."

## Health Effects of RF Exposure

During recent years the public and the news media have increasingly been concerned with the possible dangers of electromagnetic fields and non-ionizing radiation. It has been known for some time that high intensities of RF radiation can be harmful due to the ability of RF energy to rapidly heat biological tissue. Exposure to RF power densities on the order of 100 milliwatts per square centimeter ($mW/cm^2$) or more can result in heating of the human body and increase the body temperature. This property is put to use in some medical procedures.

*1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

Two possible harmful effects are RF burns and excessive RF exposure. RF burns occur when a person touches a live antenna or feed line that has high power going through it. This is similar to being burned by touching a stove, except that the burn is deeper. Tissue damage results primarily because of the body's inability to cope with or dissipate excessive heat. The extent of the heating depends on several factors, including the power level and frequency of the radiation, size of the person exposed, duration of exposure, and the efficiency of heat dissipation. The biological effects that result from heating of tissue by RF energy are often referred to as "thermal" effects.

## Absorption of RF Energy

In addition to intensity, the electromagnetic frequency of RF radiation is important in determining the relative hazard. At a distance of several wavelengths from a source of radiation, the human body will absorb RF energy at a maximum rate when the frequency of the radiation is between about 30 and 300 megahertz.

This includes the amateur 6-meter, 2-meter, and $1^1/_4$-meter bands. Because of this "resonance" phenomenon, the RF safety guidelines take this frequency dependence into account. Therefore, the most stringent standards are in this frequency range of maximum absorption.

As a rule, the thermal effects of RF energy generally are not a major concern for most radio amateurs or their neighbors because of our relatively low power levels and the two-way (intermittent, low duty cycle) nature of most transmissions. Very few amateurs operate their stations "key down" for extended periods of time.

## Amateur Radio Essentially is Safe

In 1990, officials from the FCC and the Environmental Protection Agency conducted a field survey of typical amateur radio stations in southern California. The general conclusion was that the greater majority of amateur operations do not produce electromagnetic fields strong enough to pose a health hazard.

The levels of RF radiation routinely encountered by amateur radio operators are far below the levels necessary to produce significant heating and increased body temperature. However, there are certain isolated situations where the RF safety standards may be exceeded and people could be exposed to potentially harmful levels of RF radiation.

## FCC Radio Frequency Safety Rules

The FCC is responsible for licensing or authorizing most of the transmitting devices in the United States. The National Environmental Policy Act of 1969 (NEPA) requires agencies of the federal government to evaluate the effects of their actions on the quality of the human environment. One of several environmental factors addressed by these requirements is human exposure to RF energy emitted by FCC-regulated transmitters and facilities.

Between 1985 and the late 1990s, the Commission used the RF protection guidelines recommended in 1982 by the American National Standards Institute, a private organization that sets standards for industry. These ANSI guidelines incorporate data showing that the human body absorbs RF energy at some frequencies more efficiently than others.

Many low-power transmitters—including those of the

# THE HISTORY OF M2 ANTENNA SYSTEMS, INC.

M2 Antenna Systems, Inc is a woman owned business that started in 1984 as a small typesetting business. It was originally a partnership between Myrna, K6MYM and Mike, K6MYC (hence the M2 name). When "desktop publishing" came along, Myrna decided it was time to sell the antiquated photographic and word processing equipment. (good thing!). At that time Mike and other owners of KLM Electronics had sold KLM and Mike was consulting. Soon an opportunity came along to "get back into the antenna business". A 150 foot dish project launched the Staal team of Mike, Matt and Kenny back to what they do best. Soon a huge project came along to provide the Trucking industry with instantaneous communication and location data using Meteor scatter techniques. Rapid growth motivated the company to move from the high dollar Silicon Valley to business friendly Fresno California and M2 was off and running.

Mike, the M of KLM has been designing and building antennas since 1971. He became a ham in 1956 and always had a great interest in antennas. He began moon bouncing as a pioneer in 1964 and has been active ever since.

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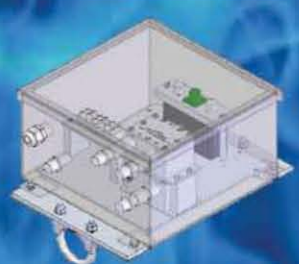

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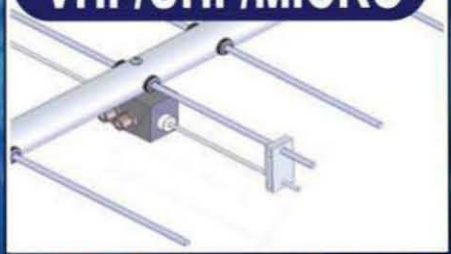

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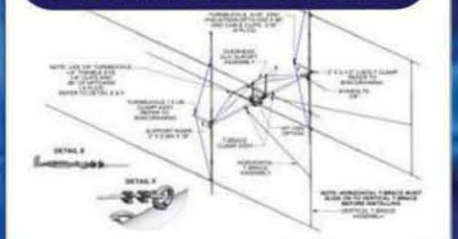

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Amateur Radio Service—were "categorically excluded" from RF safety evaluation based on calculations and measurement data indicating that they would not cause exposures in excess of the guidelines under normal and routine conditions of use.

## The 1992 RF Exposure Guidelines

In response to new health and safety information, ANSI adopted an updated RF exposure standard in 1992, designated ANSI/IEEE C95.1-1992, to replace its 1982 standard.

In some respects, the 1992 ANSI/ IEEE standard is more restrictive in the amount of environmental RF exposure permitted, although for some situations recommended Maximum Permissible Exposure (MPE) levels are similar to the 1982 limits. The 1992 ANSI/IEEE standard also extends the frequency range under consideration to cover frequencies from 3 kHz to 300 GHz.

## Controlled and Uncontrolled Exposures

The 1992 ANSI/IEEE standard also specifies two tiers of exposure criteria, one tier for "controlled environments" (usually involving workers) and another, more stringent, tier for "uncontrolled environments" (usually involving the general public). The 1982 ANSI standard specified only one set of exposure limits, regardless of whether the individual exposed was a worker or a member of the general public.

"Controlled environments" involve people who are aware of the RF safety risk, while the more stringent "uncontrolled environment" applies to people who have no control over their exposure.

The FCC ruled that the "controlled" exposure limits would apply not only to occupational workers, but to amateur radio operators and members of their immediate households. The "uncontrolled" RF exposure limits apply not only to the general public, but in the case of amateur radio installations, to neighboring residences as well. The regulations require amateurs to evaluate their stations for both controlled and uncontrolled exposure areas.

Most amateur transmissions are back-and-forth two-way communications. Therefore, normally a station is transmitting only about half of the time—or a 50% duty cycle. The "controlled" and "uncontrolled" RF exposure limits are further time-averaged over 6- and 30-minute time periods. Thus, this is permissible to exceed the recommended limits as long as the average exposure over the time period does not exceed the limits. The premise of time averaging is that the human body can regulate the thermal load caused by high, localized RF exposures for short periods of time.

## Maximum Permissible Exposure (MPE)

The current Maximum Permissible Exposure (MPE) requirements are presented in a rather complicated table contained in FCC Rule Section 1.1310. This table (which is not part of the Amateur rules but applies to amateur transmissions) indicates MPEs for radiated electric fields, magnetic fields, and power density by frequency band. It is very difficult to understand.

Further information on evaluating compliance with these MPE limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation." There is a section dealing specifically with amateur radio. You can easily find it on the web using a search engine.

Amateur stations may legally transmit with up to 1500 watts on many bands throughout the radio spectrum using a wide

variety of emissions ... some with high duty cycles such as FM and RTTY. While most amateur stations transmit for short periods of time at power levels considerably lower than the maximum allowed, the possibility still exists for human exposure to RF radiation to be in excess of the new guidelines. Therefore, the blanket RF safety evaluation exemption that previously applied to the amateur service was lifted.

The most stringent power density allowed is in the 30–300 MHz VHF range where a maximum "controlled environment" exposure limit of 1.0 milliwatt per square centimeter is permitted, averaged over a6-minute time period. A power density of 0.2 milliwatt per square centimeter is the maximum permitted in "uncontrolled environments" averaged over a 30-minute time period.

All amateur transmitters fall under the new rules regardless of power, operating mode, or station configuration. However, the FCC assumes that certain stations are safe without a formal evaluation. These are base-station amateur stations radiating less than 50 watts PEP at the transmitter output and push-to-talk hand-held, mobile, or portable transceivers.

Amateurs radiating more than 50 watts output are required by Section 97.13(c) to evaluate their station parameters (including power output, antenna gain, frequency, distance from the antenna to the populated environment, and duty-cycle of the communications) to assure that the MPE is not exceeded. Most amateur stations already meet the MPE limits described in the guidelines, especially when you consider the time-averaging aspect.

Most hams need only perform a "routine analysis" of their station operation, which can be done merely by comparing their station configuration to a similar station shown in a chart, and will not need to make any technical adjustments whatsoever. Assuming a 50% duty cycle, even a transmitter running a kilowatt into a three-element triband (14, 21, and 28 MHz) Yagi antenna need only be 35 to 40 feet from a neighbor's residence to comply with the new RF safety standards.

There is no special amateur station evaluation paperwork that needs to be sent to the FCC to prove that you have completed the required RF exposure evaluation. Only a short statement included on the amateur radio application (Form 605) needs to be signed when you qualify for a new license or renew your current one.

The FCC relies upon amateur licensees to demonstrate their knowledge of the RF exposure guidelines through questions on license examinations and certify that they have read and understand the RF safety rules when applying for or renewing their station licenses. Amateur stations were required to come into compliance with the new RF guidelines effective January 1, 1998.

## Determining RF Field Strengths

Basically there are three ways to determine if your station exceeds the maximum permissible exposure levels:

1. Using electronic instruments that measure field strength;
2. Performing mathematical calculations based on generic formulas provided by the FCC ;and
3. Using tabular charts and computer programs that determine "worst case" estimated distances between typical transmitting antenna systems and the neighboring environment.

Nearly all radio amateurs use this third method, since it is the least expensive and easiest to implement. The theory is that if your station can pass the "worst case" test, then it complies with the RF exposure guidelines. You may begin operating as soon as you determine that your station complies. There's no need for FCC approval before operating and no records to submit.

In short, there is no universal consensus about safe energy levels, and even if there were, electromagnetic radiation is difficult to measure. One of the best ways to deal with RF energy is to minimize the potential health hazards as much as possible.

## Minimizing Exposure to RF Radiation

Amateurs should follow a practice of "prudent avoidance"—that is, to minimize exposure to RF energy whenever it is practical to do so. Some amateur operating practices are safer than others. Here are some suggestions:

- You should radiate as little RF power as possible. FCC rules have always required radio amateurs to use the least amount of transmitter power necessary to perform their communications.
- Make it a practice to operate without your linear amplifier whenever possible!
- Never use an amplifier that has its shielded metal cover removed. The cover keeps RF energy from escaping into the environment.
- Keep transmissions short to minimize the duty cycle, especially when operating on VHF/UHF/microwave frequencies.
- Always point your handheld transceiver as far away from your eyes as possible, since the eye lacks sufficient blood flow to dissipate any excessive heat load.
- Transmitting antennas should be mounted as far away from residences and populated areas as possible—and the higher the antenna the better.
- Since feed lines can radiate, route open-wire line (or even coaxial cable if the standing wave ratio is high) away from populated areas.
- Do not transmit when people are near a ground-mounted or mobile antenna. Vertical antennas a best installed on monopoles, towers, or roofs and not at ground level.
- A good rule-of-thumb to follow is to allow at least 35 feet distance between the antenna and the environment if 100 watts or more is being transmitted. Allow even a greater distance if you transmit with high-gain antennas at the high-energy VHF/UHF/microwave frequencies!
- Don't transmit if anyone is within five or six feet of a whip antenna.
- Be careful when using indoor antennas, including those mounted in attics, because they can generate substantial RF fields.
- Use low power (10 watts output or less whenever possible) and keep your transmissions short when someone might be near the antenna.
- Minimize the use of high-power VHF/UHF or microwave transmitters and high-gain directional antenna arrays such as those used during moonbounce or weak-signal communications in a residential environment.
- Never look into the open end of an activated waveguide or stand in front of a high-gain VHF-UHF-microwave antenna array when the transmitter is on.
- Always use the lowest power level possible when using a hand-held transceiver and point the antenna as far away from your head—and especially your eyes—as possible.
- Amateurs can also minimize the amount of RF energy radiated into the surrounding environment by changing frequency bands and using lower duty-cycle emission types such as single sideband and CW.
- It is also a good idea to have your antennas in a fenced-in area and to post signs warning people to keep away.

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That's it for this time. We'll be back next month with more timely information for the radio amateur. 73, Fred, W5YI

public service

BY RICHARD FISHER,* KI6SN

# Cluster of Winter Tornadoes Whips Hams into Action

## *Arkansas SKYWARN® Team Wrestles with 'Unlucky 7' Twisters*

Dense fog hung in a chilly sky over Little Rock, Arkansas the early morning of January 22, a pall of drizzle and temperatures in the high 30s, Danny Straessle, KE5WLR, remembers. That is hardly the weather to trigger a severe weather warning for later in the day, or so some longtime residents thought.

Around 4 p.m., however, the fog began to lift as temperatures climbed. Dangerous storms were forming in central Arkansas. As the state's SKYWARN® Program Coordinator, Straessle received a call from the National Weather Service Little Rock Forecast Office (see photo B).

An ominous posting on the Arkansas SKYWARN® Facebook page reported: "As of 4:22 p.m. the temperature at Little Rock has jumped to 63, with a dew point of 61. And, according to radar, convection is starting to develop. This could be the start of the action this evening."

*Oh, baby.*

Straessle (photo C) is responsible for scheduling net control operator shifts at NWS Little Rock and quickly summoning a team, headed for the Weather Forecast Office. Around 5:30 p.m., Daryl Stout, AE5WX (photo D), brought up the Weather Watch Net, a pre-net for Arkansas SKYWARN®. A few severe thunderstorm warnings were issued and Stout took several check-ins as certified amateur radio storm spotters began to fan across the area.

"By the time the Arkansas SKYWARN® net control team was in place shortly before 6 o'clock," Straessle said, "the first tornado warning was issued and a quick and seamless transition was made from one net to the other."

Daryl, KE5WLR, and Shane Lee, KF5FBR, were at the microphone, assisted by Mona Blacklaw, KM5ONA.

"As darkness fell, activity picked up," Straessle said. Most of the action was south and east of Little Rock in less-densely populated areas of the Delta region of the state. "Because of this, it was extremely difficult to see storm development and more so dangerous to try to spot it."

Arkansas SKYWARN® relied upon certified amateur radio storm spotters from the area to be "the eyes and ears of the National Weather Service," KE5WLR said. "Troy Singleton, N5ARK, was the most valuable player of the entire night. He was raised in southeast Arkansas and knew the area like the back of his hand, which was instrumental in his safe navigation of the farm roads in the area to safely spot developing tornadic supercells."

APRS played a significant role in helping the team at the NWS Little Rock office pinpoint Troy's *exact location* when making his reports. "Although Troy knew the area well, it helped on the net-control end to explain to NWS forecasters where his reports originated —*and* it allowed monitoring stations to follow along, too," Straessle said.

"At times this was the only information coming from that area of the state, and the National Weather Service Little Rock Forecast Office was very thankful to have reports come in from Troy. Also in the area, and a little farther to the east in Arkansas County, were members of the Grand Prairie Amateur Radio Club. *(**IN DEPTH:** Pictures and narrative of the GPARC tour of the NWS Little Rock office: <http://on.fb.me/A06C9L>.—ed.)*

Weather reports were collected through a simplex net and relayed to club president Randy Geater, K5NDX, who in turn relayed to Arkansas SKYWARN® at the National Weather Service."

At one point a tornado headed toward Randy and his crew and they took shelter in the county sheriff's bunker for about 20 minutes, KE5WLK reported. The twister "was completely rain-wrapped and all they could see was power flash after power flash as the tornado took down high-voltage transmission

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*Photo A– A church built in 1852 and 2.8 miles west-northwest of Kingsland in Cleveland County, Arkansas, was leveled when an EF2 tornado (winds 111–135 mph) tore through the region in January. (Courtesy of National Weather Service)*

*Photo B– National Weather Service Meteorologist Willie Gillmore watches storms developing in Grant County on the evening of January 22, which prompted Arkansas SKYWARN® to swing into action. The NWS Little Rock Operations Center has six workstations, tenabling meteorologists to track multiple storms simultaneously. (Courtesy of NWS)*

lines." *(It appears the tornado staring down Randy and spotted by Troy was on the ground for 19 miles: <http://1.usa.gov/xxxnbs >, photo E.—ed.)*

The storms moved quickly through the Little Rock County Warning Area and were out of the state by 10 p.m. "The Arkansas SKYWARN® net was brought to a close shortly before then."

About 60 certified amateur radio storm spotters checked into the net. "And while the storms tracked through areas of the state in counties where the amateur radio population is practically nil," Straessle said, "those from neighboring areas stepped up and provided a public service when it was needed most."



*Photo C– Danny Straessle, KE5WLR, Arkansas SKYWARN® Program Coordinator. (Courtesy of KE5WLR, QRZ.com)*

*Photo D– Around 5:30 p.m., Daryl Stout, AE5WX, shown here at his home station, brought up the Weather Watch Net, a pre-net for Arkansas SKYWARN®, taking a few check-ins "as certified amateur radio storm spotters began to fan across the area." (Courtesy of AE5WX, QRZ.com)*

## Unlucky 7 Tornadoes: The Tale of the Tape

The National Weather Service documented at least seven tornados in the storms that ripped through Arkansas on January 22.

**Tornado No. 1**
*Path:* 19.2 miles *(see photo E in main text)*
*Rating:* EF2, winds 111–135 mph
*Damage:* **Calhoun County:** Damage was mostly limited to timber. **Dallas County:** Significant damage to houses northwest of Fordyce, Fordyce Country Club (photo G), and electrical power transmission towers. **Cleveland County:** Church in North Kingsland, built in 1852, destroyed *(see photo A in main text).*

**Tornado No. 2**
*Path:* 16.9 miles
*Rating:* EF2, winds 111–135 mph
*Damage:* **Jefferson County:** Trees down, grain bins destroyed (photo H), damage to metal buildings, farm machinery overturned. **Arkansas County:** Trees down. Mobile homes damaged.

**Tornado No. 3**
*Path:* 14.4 miles
*Rating:* EF2, winds 111–135 mph
*Damage:* **Arkansas County:** Steel transmission towers blown down (photo I), damage to farm outbuildings, numerous trees down, travel trailer blown over, elevator blown off grain bins.

**Tornado No. 4**
*Path:* 9.4 miles
*Rating:* EF1, winds 86–110 mph
*Damage:* **Arkansas County:** Trees, power lines, and power poles blown down; carports and sheds blown away. Large limb crushed cab of a pickup truck. House had windows blown out and pieces of wood wedged into its siding. Mobile home destroyed with its contents blown into a nearby field. Metal buildings damaged or destroyed. Roof blown off tractor shed.

**Tornado No. 5**
*Path:* 5.8 miles
*Rating:* EF1, winds 86–110 mph
*Damage:* **Monroe County:** Trees and power poles down. Irrigation pivot flipped over. Large storage shed tossed over a farm building.

**Tornado No. 6**
*Path:* 3.8 miles
*Rating:* EF1, winds 86–110 mph
*Damage:* **Jefferson County:** Flying shed damaged roof of farm shop. Empty 12,000-gallon fuel tank blown into a field. Irrigation pivot overturned and torn apart. Trees down. Foundation of concrete block house damaged.

**Tornado No. 7**
*Path:* .75 miles
*Rating:* EF1, winds 86-110 mph
*Damage:* **Lonoke County:** Irrigation pivot flipped over, landing in nearby ditch. Tree limbs snapped off.

*Photo G– Much of the bathhouse at the Fordyce County Club was blown into the pool. (Courtesy of NWS)*

*Photo H– An EF2 tornado destroyed grain bins along Arkansas Highway 88 at Sweden in Jefferson County, Arkansas. (Courtesy of NWS)*

*Photo I– A large electrical power line transmission tower lies on its side in Arkansas County after storms ravaged the area. (Courtesy of NWS)*

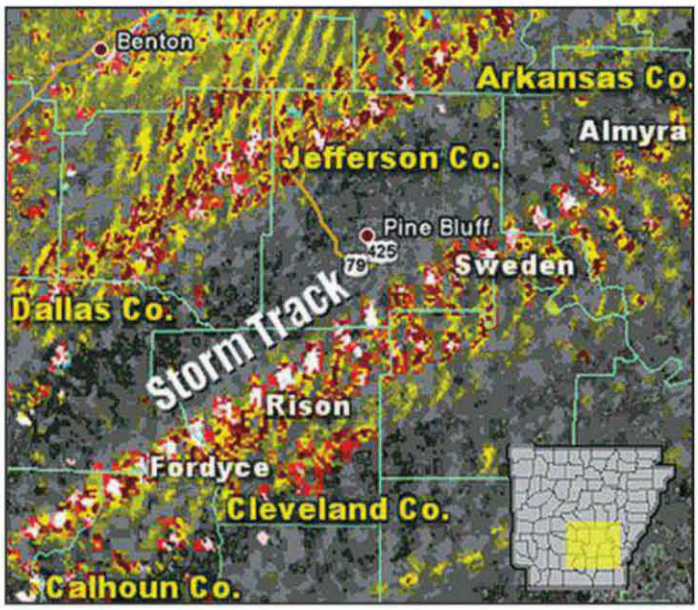


*Photo E– "One storm in particular had a history of producing tornadoes," noted the NWS. "The first tornado (rated EF2) was confirmed from 3.0 miles west-southwest of Thornton (Calhoun County) to 4.9 miles southwest of Rison (Cleveland County). The path was just over 19 miles." (Courtesy of NWS)*

The following day, a damage assessment team from the NWS rated at least one of the several tornadoes as an EF2—111 to 135 mph winds. Later it was determined that three of the seven twisters reached EF2. *(**SEE:** "'Unlucky 7' Tornadoes: A Tale of the Tape."—ed.)*

"While this event occurred in the middle of winter, it was not unusual," according to NWS Little Rock, "especially when *La Niña* conditions exist (http://bit.ly/xXA2zZ). Fifty-six tornadoes were spawned on January 21–22, 1999. The same *La Niña* pattern was in place when a long-track tornado ripped through seven counties in the north on February 5, 2008, a 122-mile path. By the way, 1999 and 2008 were the most active tornado years on record in the state."

The Arkansas SKYWARN® net is streamed live on a RadioReference feed provided by the Central Arkansas Radio Emergency Net (CAREN Club) at <http://bit.ly/jk012v>.

Accounts of the role amateur radio played during this severe weather event were chronicled on the Arkansas SKYWARN® Facebook Fan page: <http://on.fb.me/xsYWTq>.

"Although there are numerous social media sites in the state covering weather, Arkansas SKYWARN® takes an approach that not only serves amateur radio operators but exists to educate the general public about the role radio amateurs play in saving lives and property." *(**VISIT:** Arkansas SKYWARN® at: <http://www.arkSKYWARN.org>.—ed.)*

"We didn't get it as bad as Alabama," KE5WLR noted, "but we *did* have several tornadoes, and I am proud to say the amateur radio population rose to the occasion in a sparsely populated area of the state and provided information when it was needed most."

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This month we highlighted the storms in Arkansas in January and how ham radio played an important part in providing a vital service. If you have a story to tell, please e-mail me at <ki6sn@cq-amateur-radio. com>. "When all else fails" . . . amateur radio comes through.

73, Richard, KI6SN


*Photo F– A video posted on YouTube by Basehunters storm chasers shows the unpredictability and confusion that accompanies severe weather, especially when it occurs at night: <http://bit.ly/xHyVoS>. (YouTube screen grab)*

learning curve

BY RICH ARLAND,* K7SZ

# *QRP Special*
# A QRP (Low Power) Primer

Welcome to the first of what I hope will become an annual QRP issue of *CQ* magazine! This month we are going to explore one of the most challenging, technically enticing, fastest growing, and *definitely* the *most fun* aspects of the ham radio hobby: low-power communications, more commonly called "QRP." I know the magazine has a "QRP Guy" in the person of Cam Hartford, N6GA, so what am I doing writing about QRP? Well, it seems that Cam convinced our fearless leader Rich Moseson, W2VU, that it would be a stellar idea for me to do a primer on QRP for this issue! Thanks, Cam. Yours is coming, pal. Just wait!

Seriously, I have been playing the QRP game since 1965, when I first joined the QRP Amateur Radio Club International (QRP ARCI: <http://www.qrparci.org/>), the largest QRP club in the world. It wasn't back then, of course, as the ideas presented by its founder, Harry Bloomquist, K6JSS, were pretty radical at the time. The club was formed to promote the intelligent use of RF power, specifying that members use only enough power to make and maintain contact (in keeping with the FCC rules of the day, which are still in force today). Initially, members promised not to use more than 100 watts of RF *input* power when they operated. It wasn't until the latter part of 1979 into 1980 that the club membership voted to limit RF *output* power to no more than five watts, falling in line with other international QRP organizations such as the G-QRP Club in England and the VK-QRP Club in Australia. I am happy to report that in 2011 the QRP ARCI celebrated its 50th anniversary and continues to serve the QRP community and QRPers the world over.

What exactly is QRP? Glad you asked! The three letters, Q-R-P, originally were used on CW to tell another station to "Please reduce your power," or as an interrogative, "Shall I reduce power?" Somewhere back in the day, QRP became the abbreviation for low-power communications utilizing five watts output or less. So when you hear a ham talking about QRP, he/she is talking about full-blown ham radio done at or below the five-watt level!

OK, I know what you're thinking: "How can anyone use only five watts and effectively communicate?" Fair question, so let's clarify things a bit.

First of all, the FCC mandates that all CB transceivers use no more than four watts of RF output power in order to be legal in the U.S. If you can "shoot skip" (work stations well outside the normal 10–15-mile CB coverage area) with a CB set, you can also do it with five watts using a CW/SSB QRP ham transceiver.

To satisfy all you math geeks out there, follow this exercise: When working with RF power measurements, it is handy to work in decibels, or dB. Three decibels (3 dB) equals an increase or decrease of a factor of two. In other words, if you have a 10-watt transmitter and *increase* the output by 3 dB, your power output will be equal to 20 watts. Conversely, if you lower your RF power output from 100 watts down to 50 watts, you have experienced a 3 dB *decrease* in output power.

Now a word from our S-meter! Each S-unit on the meter is supposed to equal a change in signal strength of 6 dB or a factor of four (4 … ×2 for each 3-dB change). Therefore, if we assign S-9 as an indication of the strength of a received 100-watt signal and that signal drops one S-unit (from S-9 to S-8), you will have a decrease in power from 100 to 25 watts! Don't take my word for it. Use the dB formula:

dB = 10 log (P1/P2) or 10 log (100/25)
= 10 log (4) = 10 (0.6) = 6 dB

Extrapolating further, we can then determine that a 12 dB drop in power (two S-units) will equal $^1/_{16}$ the power of a 100-watt signal! Are things

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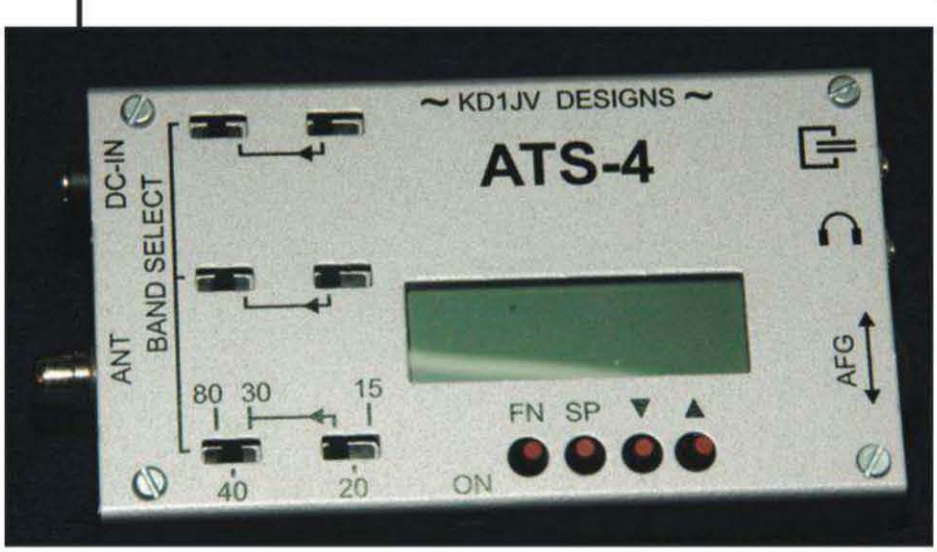
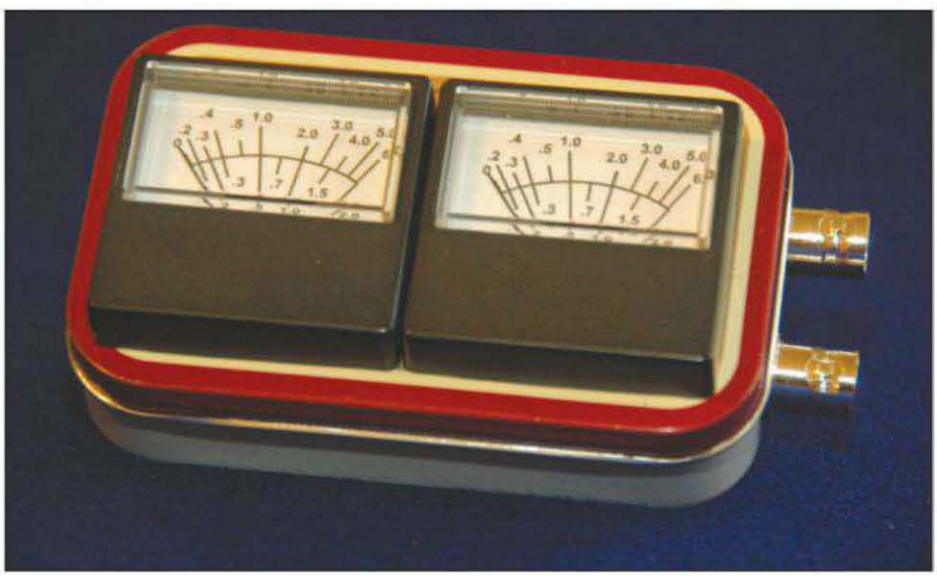



*The ATS-4 kit is the brainchild of Steve "Melt Solder" Weber, KD4JV. It is a high-performance five-band HF transceiver that is the ultimate in portability and performance. There is even an optional add-on CW/PSK decoder!*

**Power vs. S-Units**

| S-Meter Reading | Power Level (W) | S-Meter Reading | Power Level (W) |
|---|---|---|---|
| S-9 | 100.00 | S-9 | 1000.00 |
| S-8 | 25.00 | S-8 | 250.00 |
| S-7 | 6.50 | S-7 | 65.00 |
| S-6 | 1.56 | S-6 | 15.60 |
| S-5 | 0.39 | S-5 | 3.90 |

*Table I– Comparative power levels of different S-meter readings, starting with a 100-watt signal equaling S-9 (left column) and a 1000-watt signal equaling S-9 (right column).*



*The North Georgia QRP (NoGA) group has several kits. Shown here is their HF SWR/Power meter kit which fits into an Altoids® tin.*

becoming clear now? I hope so, because what we have just gone over is at the heart of how and why QRP works.

Now back to our 100-watt transmitter/transceiver. Let's assume that your 100-watt signal arrives at my receiver with a signal strength value of S-9. If you decrease the power by a factor of one S-unit (6 dB), your RF output power is now at 25 watts. Dropping the output to S-7 will give you an RF output of 6 watts! We are now within range of QRP (5 watts). Using the aforementioned dB formula, we find that dropping the output from 100 down to 5 watts actually equals a loss of 13 dB, or slightly more than two S-units (see Table I). If you can't copy a signal slightly less than S-7, you need to find another hobby!! This is "how and why" QRP works.

There are those hams out there in radioland who say "Life's too short for QRP." These folks either do not fully understand the mechanics of QRP or they have rejected the idea based upon misinformation. There is possibly a third reason: They tried QRP once and had little or no success. To these folks, I simply say give it an honest try using proven techniques and re-evaluate your findings. One thing is certain: Sloppy operating habits and inefficient station design (including antennas and feed lines) won't cut it at QRP power levels.

Admittedly, QRP operation is not for everyone. Although we've shown that it is certainly possible to communicate effectively with five watts or less, there is also the matter of mindset. You have to get your mind around the idea that first, it is possible for people to communicate at these power levels, and second, *you* can be one of them! This is where faith in your operating skills and your gear enters the picture.

## QRP Operating Modes

While CW is the QRPer's mainstay operating mode, SSB and data modes such as PSK31, JT-65, Radio Teletype (RTTY), and Olivia can also yield many QRP QSOs.

Why is CW generally preferred? There are several reasons. Among them is the fact that CW is very easy to generate. After all, what you really are doing is just turning the transmitter on and off using a key, right? Another fact is that CW is roughly seven times more effective than single sideband (SSB) under similar band conditions. Essentially what this means is that your CW signals are seven times more likely to be heard than a similar SSB signal with identical band conditions.

While many of us prefer CW, we don't really burn up the airwaves with high-speed Morse. Quite the contrary: Most of the CW QSOs done at QRP levels are done around 15–18 words per minute (wpm), which is not all that fast, and plenty of folks go more slowly as well. With just a little effort you can learn the Morse code and be up to a reasonable level of proficiency in a few weeks. No, really . . . you can. There are programs on the internet, many of them freeware, that can teach you the International Morse code, and all you have to do is devote a couple of 30–45-minute practice sessions to the project each day.

## Hardware for QRP

Now that we have covered the bare essentials regarding how/why QRP works and the modes of operation, let's take a look at the hardware used to generate our low-power signals.

QRP CW rigs are extremely easy to construct. Oh . . . one thing I need to ensure you realize is that QRP and building your own gear go hand-in-hand. As a matter of fact, one of the main motivators for people flocking to QRP is the massive number of kits available to QRPers. QRPers want to build things. While Heathkit shut its doors in the mid 1990s, others have stepped up to provide us with many innovative kits to keep us busy. QRP life is good!

On the other hand, you don't need to build your own rig to have fun with QRP. You don't even need to buy a dedicated QRP rig. You can throttle back your current HF transceiver or use an RF attenuator to drop your rig's output down to QRP levels and not spend a dime! Neat, huh?

As an alternative, you can lurk on the various internet auction sites and find a used commercial transceiver auch as the Ten-Tec Argonauts or the Heathkit HW-8 or 9 transceivers for a decent price. There are also several excellent commercially built QRP rigs on the market at reasonable prices. Or, you can really be daring and buy a QRP radio kit, assemble it, and use it on the air. What better way to partake of the QRP experience than by using homebrew

| Band (m) | CW (MHz) | SSB (MHz) |
|---|---|---|
| 160 | 1.810 | 1.910 |
| 80 | 3.560 | 3.985 |
| | 3.710 (Novice/Tech) | |
| 40 | 7.030 (Europe) | 7.285 |
| | 7.040 | (US) |
| | 7.110 (Novice/Tech) | |
| 30 | 10.106 | |
| 20 | 14.060 | 14.285 |
| 17 | 18.096 | |
| 15 | 21.060 | 21.385 |
| | 21.110 (Novice/Tech) | |
| 12 | 24.906 | |
| 10 | 28.060 | 28.385 (Novice/Tech) |
| | 28.110 (Novice/Tech) | 28.885 |

*Table II– Informal QRP Calling Frequencies (MHz), courtesy NJ QRP Club. Complete listing, including more European calling frequencies, are at <http://www.njqrp.org/data/qrp_freqs.html>.*

gear? Talk about pride in accomplishment! Also, let's not forget the "fun factor." What could be more fun than chasing DX or contesting and busting some pileups with a station you've assembled yourself! Heady stuff, that!

As for a source of QRP kits, just Google the internet and stand back! Some of my favorite kit producers are, in no particular order: Elecraft (http://www.elecraft.com/), American QRP Club (http://www.amqrp.org/kitskits. html), W1REX's QRPME (http://www.qrpme.com/), Kanga US (http://www.kangaus.com/), Oak Hills Research (http://www.ohr.com/), KD1JV Designs (http://kd1jv.qrpradio.com/), Wilderness Radio (http://www.fix.net/~jparker/wild.html), and Hendricks QRP Kits (http://qrpkits.com/index.html), just to name a few. The kits sold by these manufacturers are designed to easily be built and their customer support is great.

All you'll need to build most of these kits are the basic tools for a well-stocked electronics workbench, including: soldering iron/station, solder, solder wick or de-soldering tool, wire strippers, small wire cutters and needle-nose pliers, screwdriver set, hobby knife, nut-driver set, and high-intensity lamp. Kits are not hard to build, especially those from the manufacturers outlined in the previous paragraph whose manuals and instruction sheets are extremely well done. The key to building any kit is to take your time, read and then re-read the instructions/manual, and solder properly. More kit problems are traced to poor soldering technique than anything else.

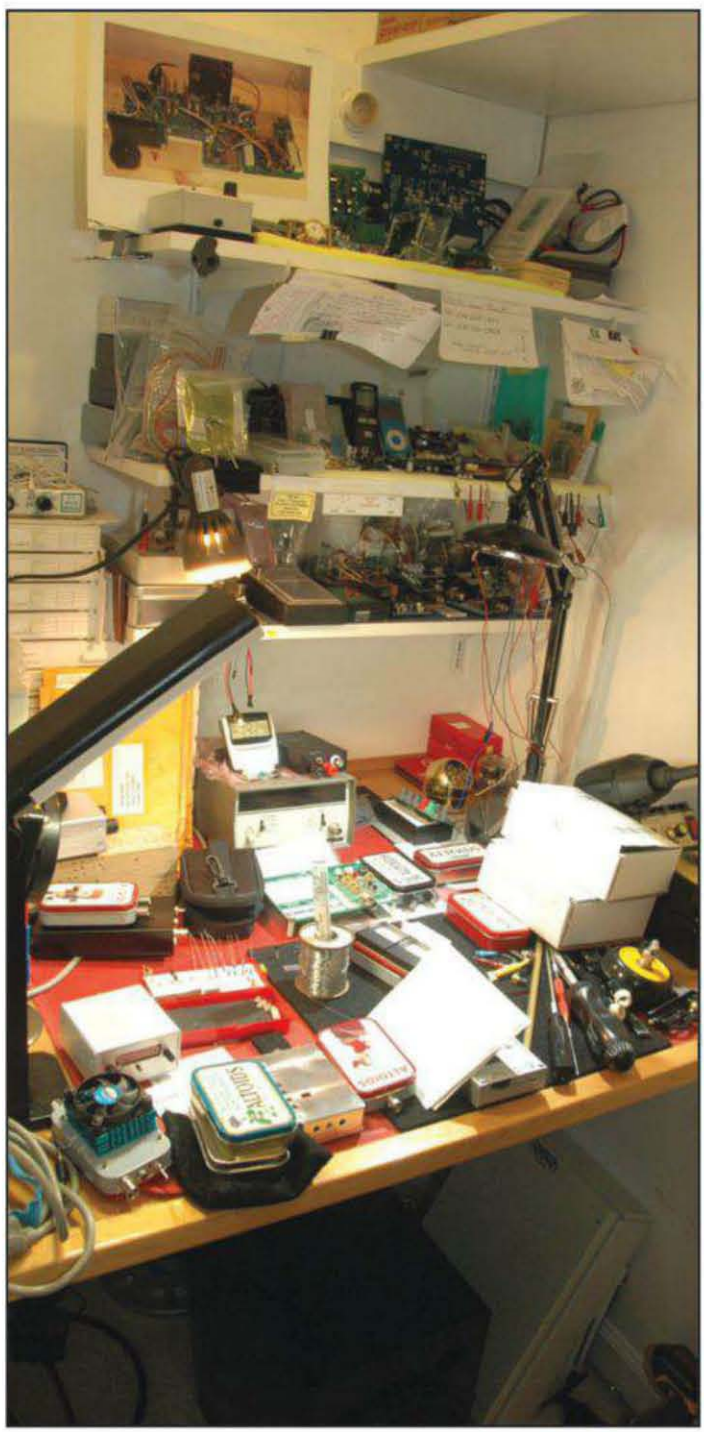
If you need help or advice, there are many user internet groups that are QRP radio specific. Log onto Yahoo and do a search on QRP radios and/or a specific radio model and you are sure to find a group that will provide a treasure trove of information for the budding QRP kit-builder.

## QRP Operating Techniques

So far we've covered "how and why" QRP works, and we've briefly discussed the modes and hardware needed to get our collective feet wet in QRP. Now let's look at some operating practices that will definitely increase your chances of success.

To "CQ" or not "CQ," that is the question (with apologies to William Shakespeare). It's a fair question. My advice is to call stations with fairly strong signals that are calling "CQ" already, and leave your own "CQing" for a time when you are more comfortable as a QRP operator. The reason is simple: The station that is calling "CQ" will be listening for a return call. In addition, he/she immediately will recognize his/her own callsign, so the chances of your slightly weaker signals being heard are much better than if you are pumping away sending "CQ" and getting no response.

Also be sure to pick a station that is transmitting at a CW speed that you are comfortable copying. When using phone (SSB), pick a nice strong signal not affected by atmospherics such as fading (QSB) or interference (QRN). It's also a good idea to pick a station in the non-crowded portion of the band (low QRM) to further enhance your chances of getting into the other guy's log. In addition, there are frequencies around which QRPers tend to gather (see Table II), giving you a better chance of meeting a kindred spirit.



*Now this is a real QRP workbench! It happens to belong to Chuck Nolin, WA6LTV, a prolific homebrew fanatic! Chuck does outstanding work as witnessed by his string of first-place finishes in QRP homebrew contests.*

By picking and choosing your contacts, your successful QSO rate will skyrocket!

If you are using CW, do your best to send flawless code. Remember the FISTS motto: "Accuracy transcends speed." Live by it! There is no excuse for sending sloppy CW, not with all the digital technology that is currently available. Learn your craft. 'Nuff said.

On phone, use standard phonetics for your call. "Kilowatt Seven Sticky Zipper" is cute, but "Kilo Seven Sierra Zulu" is not only better, it's *standard*. It can be "deciphered" by most of the non-English speaking world that inhabits the ham bands. Remember, DX operators are a diverse group and English is not always their primary, or possibly even their secondary, language. Standard phonetics will go a long way toward successful QRP operation.

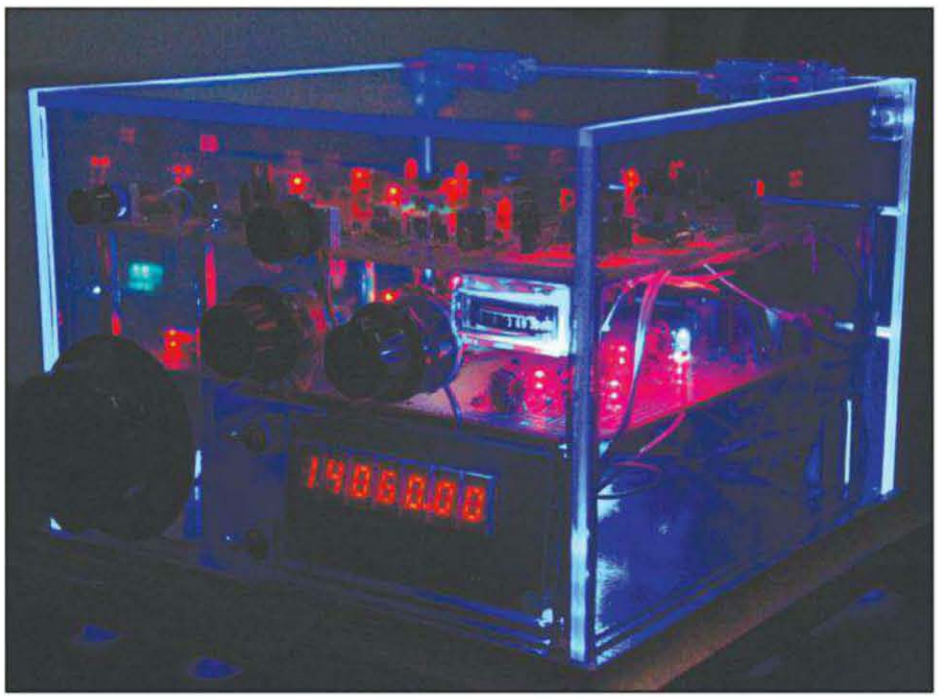
While we've been spending a lot of time discussing CW and phone tactics, don't forget the digital side of the hobby. PSK31, JT-65, and RTTY, along with other digital modes, are made for QRP operation. It takes very little RF energy to engage in a PSK31 contact. With advances in computer sound cards over the last several years, combined with the explosion of digital communications software that will run on laptops, assembling a QRP digital station is ultra-simple. The SDR Cube, a standalone digital station, is a great solution for the digital QRPer who wants a small station footprint and a rig to take on the road. The SDR Cube is the brainchild of George Heron, N2APB, who regularly thinks outside the box. The "Cube" is approximately four inches on a side and contains the hardware/firmware which when combined with a Softrock RF deck yields a very compact, ultra-portable digital QRP station.

Software Defined Radios (SDRs) have allowed QRPers to push the envelope when it comes to adding operating features that were unavailable for low-end radios until only recently. Among the most prominent in the SDR group is the SDR Cube, the Flex Radio Systems 1500 SDR transceiver, and the Elecraft K3. Do your homework and find a SDR that fills your requirements at a price you can comfortably afford. Technology can sometimes be very expensive, so before you plunk down the plastic, talk to members of your local ham club and find out their preferences and the pros and cons of various SDR rigs. Also don't forget to read the product reviews in *CQ*, *QST,* and on internet sites such as eham.net. The more information you amass before buying, the more likely you will end up with a radio set that you can live with and enjoy for a long time. The one thing SDR technology has done is make obsolete planned obsolescence! Simply upgrading the software in your SDR gives you a whole new radio. Ain't technology wonderful?

## The QRP Bookshelf

One way to improve your operating abilities is to read. That's right—read. The ARRL publishes several titles that should be the first books you reach for when you need information on ham radio in general and QRP in particular.

*The ARRL's Low Power Communications, the Art and Science of QRP*, written by some guy named Arland, is now out in its fourth edition. All self-aggrandizing aside, this is currently the only book published in the U.S. that deals exclusively with QRP. I have been extremely blessed (not to mention lucky) to have authored all four editions. Feedback from the readership goes into the next edition because that is the only way to stay abreast of the changing face of QRP. The ARRL also offers several other excellent titles: The *ARRL*



*Shown here is one of Chuck Nolin's creations, an "illuminated" receiver with digital readout. Talk about a unique piece of gear!*


*Here I am at the controls of K7SZ at the Bent Dipole Ranch in beautiful downtown Dacula, Georgia. In the background, left to right: SDR Cube transceiver kit, Elecraft K3 transceiver kit, Elecraft P3 panoramic adapter kit, and a finally a MFJ switching power supply. (Photo by Mike Boatright, KO4WX)*

*Handbook*, the *ARRL Antenna Book*, and the *ARRL Operating Manual* are three books that absolutely need to be on your shelf. While these are not totally QRP-related, they are "go to" volumes you will repeatedly use in your pursuit of amateur radio.

Bob Locher, W9KNI's excellent book *The Complete DXer*, and his equally popular "*A Year of DX*," are also must-have volumes for your QRP bookshelf. Both of these books place you at Bob's elbow when he is trolling the bands working DX. While I understand that not everyone wants to become a DXer, Bob's operating style can be directly translated to the QRP side of the hobby. Learning how to read the bands, use

propagation information, and select the best antenna all have a place in the QRPer's toolkit. Bob shares all this information in his books and they are tremendous reads. Do yourself a favor and pick up one or both at the next hamfest. You won't be disappointed.

Various QRP clubs offer books and primers all designed to help the QRP newbie get comfortable in the hobby. In particular, the G-QRP Club in England (http://www.gqrp.com/) has some great publications, as does the VK-QRP Club in Australia (http://vkqrpclub.org/). These are available on the internet and/or directly from the clubs.

As long as we are talking about clubs, I am a very strong believer in QRP clubs. I wholeheartedly endorse joining your national organization, such as the QRP ARCI (www.qrparci.org) or the G-QRP-Club, the VK QRP Club, The American QRP Club (http://www.amqrp.org/), The JARL QRP Club (http://www.jaqrp.org/), QRP-Canada (http://www.qrp-canada.com/wp/), the Russian QRP Club (http://www.qrp.ru/modules/news/), etc.

I also recommend joining a local or regional QRP group: the North Georgia QRP Club (NoGA, <www.noga.org>), 4 States QRP Group (http://www.4sqrp.com/index.php), Arizona ScQRPions QRP Club (http://www.azscqrpions.com/), KnightLites QRP Association (http://www.knightlites.org/), St. Louis QRP Society (http://slqs.net/), Michigan QRP Club (http://www.qsl.net/miqrpclub/), and Hawaiian QRP Club (http://www.chem.hawaii.edu/uham/hiqrp.html) are just a few. Hit the internet and you will find a plethora of QRP organizations to join.

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Alas, we're out of room for this month's column, yet we have barely scratched the surface of low-power communications, and specifically QRP. Speaking from personal experience, I have devoted most of my amateur radio career to QRP, and, contrary to popular belief, I don't know it all! Every time, *every time*, I get on the air I learn something new. That's what keeps me involved with the QRP facet of our radio hobby. I hope that this primer has whetted your appetite to try under-five-watts ham radio. Remember, it's the operator, *not* the equipment, that makes the difference, especially in QRP.

One of my favorite quotes comes from Howard S. Pyle, W7OE (SK): "Power is no substitute for skill!" Now those are words to live by.

Vy 73, Rich, K7SZ

BY CAM HARTFORD,* N6GA

# QRP Special
## A Big World of Little Radios

Hello and welcome to *CQ*'s first annual QRP Special! When our editor, Rich Moseson, W2VU, first gave us the schedule of special-focus issues for 2012, I was pleased to see an issue was to be devoted to QRP. One thing I struggle with is trying to cover all of the many facets of QRP operation in only six columns per year. While QRP is just one of the many activities to be found within the great world of ham radio, it is a varied and diverse world within itself. Just as in the wider universe of ham radio, there are QRP DXers, contesters, SSBers, Digi-ops, homebrewers, kit-builders, to-the-fielders, peak baggers, park-bench operators, fox chasers, net QNIers, and ragchewers. While there's not enough room in this issue to cover all of these activities, we're going to hit on quite a few. And keep an eye out for the June issue, the special focus of which is "Taking it to the Field." We already have some great QRP items lined up for that issue.

### 20 Years of Mite

I thought it would be appropriate to feature a classic QRP design in the annual QRP issue of *CQ*, so when I opened up an e-mail from John, N2EIK, it looked like he had been reading my mind. John sent along some pictures of his updated version of the Michigan Mighty Mite. I did an online search to find out what I could about this little rig and came up with literally hundreds of hits. Just to confirm the "classic" status of this rig, I dug into the archives and found that my predecessor, Dave Ingram, K4TWJ, had featured it in his column of March 1992, almost exactly 20 years ago! We have a winner!

*1959 Bridgeport Ave., Claremont, CA 91711
e-mail: <qrp@cq-amateur-radio.com>


*Photo A– N2EIK's upgraded Michigan Mighty Mite.*

According to K4TWJ, the rig originally appeared in an article by Ed Knoll, W3FQJ. Dave wrote, "Later, it was resurrected and featured in 'The Five Watter' newsletter produced by the Michigan QRP Club…" There's no mention of it, but I suspect that's where it was rechristened as the Michigan Mighty Mite.

The MMM started life as a very simple rig—a transistor, a crystal, four discrete parts, and a coil wound on a plastic film can. Who could ask for anything less? The one that K4TWJ featured in his column was built by KY8I on a piece of perfboard and had flying connectors. Some of the others I found on Google were a little more substantial, being built on a base of oak with real hardware screwed down to the wood and sporting very fancy right-angle wiring—real breadboard works of art.

With N2EIK's urgings, the MMM now plays legally in the 21st century, but it didn't start out that way. In John's words: "I stumbled upon 'minimalist QRP.' The idea is to build a transmitter (or transceiver) with the barest of essentials. I found references to the Michigan Mighty Mite and thought it was the silliest idea in the world. I built one a-la breadboard, using a Kenwood rig for receive and phased 1/4-wave verticals, and made my first QSO to WA4YHA @ 441 miles. I thought I was putting out about a watt. Later on I tested the setup using an Oak Hills Research QRP wattmeter and found the actual output is 250–300 mW! Waaay cool!"

So John was hooked. And although he thought the "minimalist" concept was good for starters, he felt he could make some improvements, starting with a low-pass filter to clean up the output. He continues: "Since then I have added a few 'refinements' to the transmitter—harmonic filtering, a buffer for key-clicks, relative output meter, two crystals, and an etched (printed circuit board). Just a short stretch from 'minimal' but still a mere handful of parts."

You can see the finished rig in photo A. There definitely is a PC board, and the filter parts can be seen towards the right end of the board. The separate crystals for 7040 and 7030 are mounted on the switch. The power output meter isn't calibrated to any scale, it's just a relative indication that something is headed toward the antenna. The pickup that drives the meter consists of ten turns on a toroid with the antenna lead passing through the middle.

Taking a look at the schematic, fig. 1, I think in my junque box I have all of the parts needed to put one together—all except for the 35-mm film canister, maybe, but there should be plenty of pill bottles around. This sounds like a fun little weekend project and should help fill some of the time while waiting for delivery of that other "minimalist" QRP rig I've ordered from Elecraft.

Just to maintain a little perspective, John finished off with this thought: "I enjoy contesting and have a big AL-1500, but nothing really revs me up better than making a several-hundred-mile QSO on 1/4 of a watt." I'll second that thought. What area of endeavor within the ham radio hobby allows you to

dip into the parts-on-hand inventory and come up with a functional rig in a few hours? Why QRP, of course!

## QRP with Daft/Silly Antennas

Occasionally something jumps out of an e-mail group and grabs my attention. One day there was this on the GQRP Yahoo group from Andy Foad, GØFTD: "I've almost exclusively worked HF QRP CW this last 12 months, using silly antennas like a homebrew Miracle Whip-type antenna, or a piece of wire about 5m long thrown over the wardrobe in the bedroom ! ... I wonder if anyone else plays QRP but with daft antennas, you know the type that no one would usually think of as being serious?"

Silly antennas can be a thing of beauty. Over the years I've loaded aluminum door frames, garden chairs, and the like. I've even had a few accidental Qs using the dummy load for an antenna. I'm embarrassed to say it worked better than a few of my own designs! I sent Andy a query and he replied with this:

"I have always been curious to see what could be achieved with low power and discreet setups, so when the FT-817 came along it provided me with a way of easily doing so. I made a strap-on box [which contained] a simple L match for the 1.5m whip, and for my own AM listening to broadcasts I made a simple pre-amp to connect small loops to, and a dummy load all in the same box so that I could get the best out of all my FT-817 had to offer."

Photo B shows Andy's FT-817 with his tuner/preamp/antenna mount box attached.

"I really wanted to see how well I could do with tiny antennas even on the low bands, so I made a Miracle-Whip-type antenna to work all bands from 160m upwards, just for a test. Well at 160m, there's only a few microwatts radiating, so I've only managed one mile of DX, and but 50 miles on 80m.

"It's far easier to work QRP/daft antennas on 30m and above, I find. From the beach I can work the whole planet on 5w from 30–10m very easily!"

Photo C is Andy's setup at the beach. A little salt water never hurts!

"Spurred on by this I started using the FT-817 indoors with just pieces of wire or simple loop antennas stapled to the walls," Andy continued. "Great success, but essential to use an ATU actually at the feedpoint of each antenna. With 3m loops, or about 25ft of wire thrown over the wardobe and dangling about, it's proved so easy to make QSOs generally up to 3000 miles, again on 30–10m."

"I recently had a 500-milliwatt day just to see what I could work. I had easy QSOs on 30/20/17/15m CW at this level. Conditions were very poor last week for 10/12m, but I managed to make a few QSOs to W8 land with a whopping 5 watts instead.

"On WSPR I use my FT-817 and with the wardrobe wire system I can be heard across the globe up to 12,000 miles. In fact, I went down to 500mw for a few days and the same stations were still reporting me except for the VKs (12,000 miles)."

Meanwhile, he returns to the silly antenna thread: "I did once tune up a stainless steel kitchen sink (still in our kitchen!) to work someone about 10 miles away on 28 MHz, but I never took it any further, as someone complained that I was getting in the way! I have also used the copper piping feeding the radiator heating system in a small apartment block to get onto an 80m net to work around G-land. It worked fine on transmit, but receive was very noisy.

"The key to success in QRP seems to be using CW, and being realistic about the best bands to operate from. Ten MHz and up work best, and expect up to 3000 miles to be the typical maximum for QRP stuff unless operating under special circumstances, like a beach."

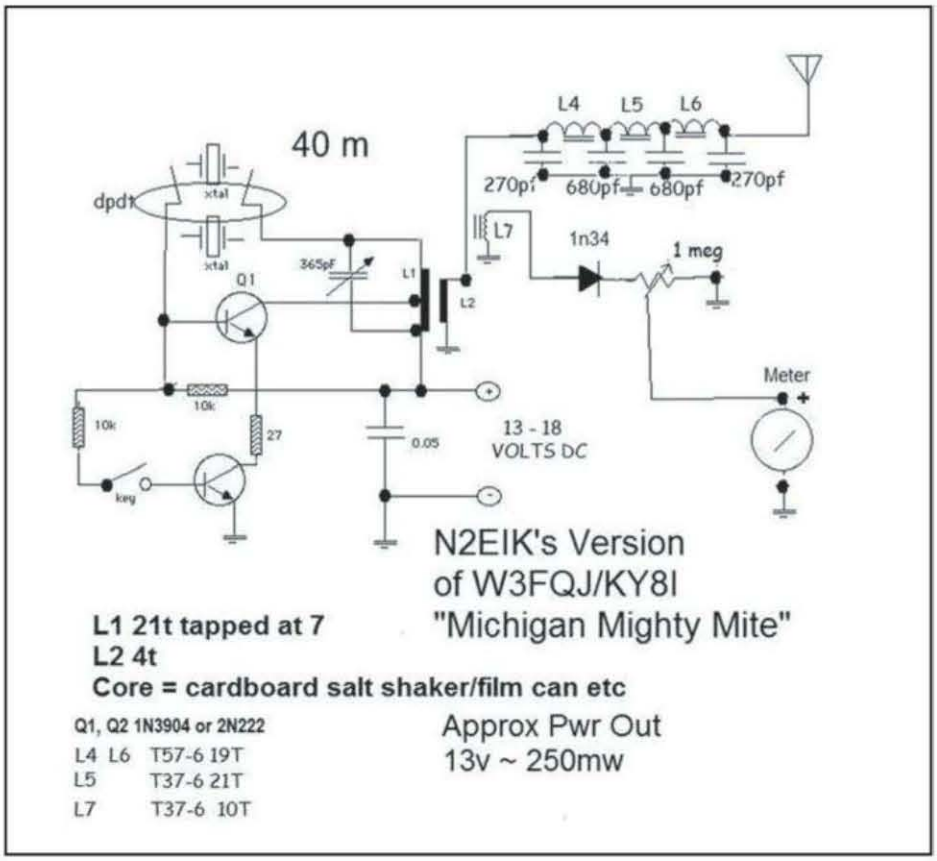


*Fig. 1– Schematic of N2IEK's upgraded Mite.*

Judging from Andy's success, I'd have to say that running QRP with silly or daft antennas can certainly result in lots of QSO fun. Adding in a few sunspots and some salt water can certainly up the hit ratio!

## QRP Under Less Than Ideal Circumstances

We're going to slide away from silly/daft antennas, but not too far. Whereas GØFTD found some fun using oddball antennas, some folks are forced into using less-than-optimal radiators by circumstances beyond their control. An example is Peter Moury, AK3X, who sent the following report:

"In November 2001 I found myself with no place for a permanent antenna. Several times I tried portable operation from my car using an end-fed wire to a tree, fed through an Emtech ZM-2 tuner. Although this worked, it was time-consuming to set up, and not good for nighttime operations, which is mainly when I had time available. A friend loaned me a Hustler mobile antenna system with all the resonators for 40 through 10 meters, including the 30- and 17-meter WARC bands. Skeptically, I built a bumper mount and gave it a whirl.

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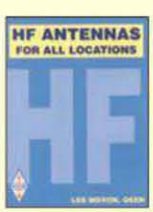

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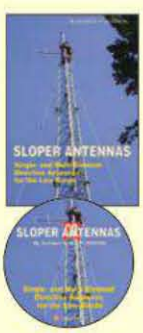

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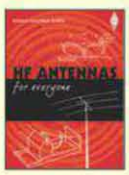

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"I was pleasantly surprised at how well it seemed to work, and was astounded at the improvement that resulted when I put a good ground strap from the mount to the car body. Even though the antenna was grounded through the bumper, a separate strap from the base to an interior bolt in the trunk brought the system to life. When I got a new car, I built a clip-on mount that attaches to the luggage rack on the roof and is grounded through a short strap through an open window to an existing bolt holding the handhold to the inside of the roof, over the rear door. I was initially grounding to a door hinge, and thought all was well, especially when I worked 7X4AN on 40 meters. However, I discovered that I was only grounding to the rear passenger door and not the entire body!"

Many of us, at one time or another, have been forced to use something like what Peter was using. Living in an apartment or a condo is the most prevalent reason to have to resort to a temporary antenna. So how did it work out for Peter?

"How did it work? Well, in addition to lots of domestic QSOs and two-way QRP contacts, I also worked a total of 126 DXCC entities, mostly between November 2001 and the end of 2003. The bands were very good during this cycle, and it never ceased to amaze me at the contacts I successfully completed. By far, 30 meters was the best band for DX, with 112 "countries," followed by 93 on 20 meters, 49 on 15, 49 on 40, and 36 on 17 meters. Since then the total worked has slowly increased to 133 worked from the car."

Wow, to have worked that many from a mobile installation probably meant he was running some serious power, no?

"Radios used were nothing special, a trio of Small Wonder Labs DSW rigs for 40/30/20 meters (~3 watts), an MFJ Cub for 17 (~1.2 watts), and a KD1JV MS-15 for 15 meters (~4 watts). I set up the rig in a small clear plastic "briefcase" that sits on the passenger seat, and get power through a fused cigarette-lighter plug. The setup also includes my trusty Whiterook MK-44 paddles and a Nye Viking Speed X straight key."

OK, no big power, no big antenna, just sunspots, persistence, and QRP doing its thing. As has been said before in this column, "QRP rocks!"

## Update: Ten-Tec HB-1B

Ten-Tec has introduced an updated version of its imported QRP transceiver. The rig was originally sold by YouKits as the HB-1A and was a three-bander. Then Ten-Tec started importing it and sold it as a two-bander called the R4020


*Photo B– Andy, GØFTD's, FT-817 with tuner/pre amp/dummy load/antenna mount attached.*

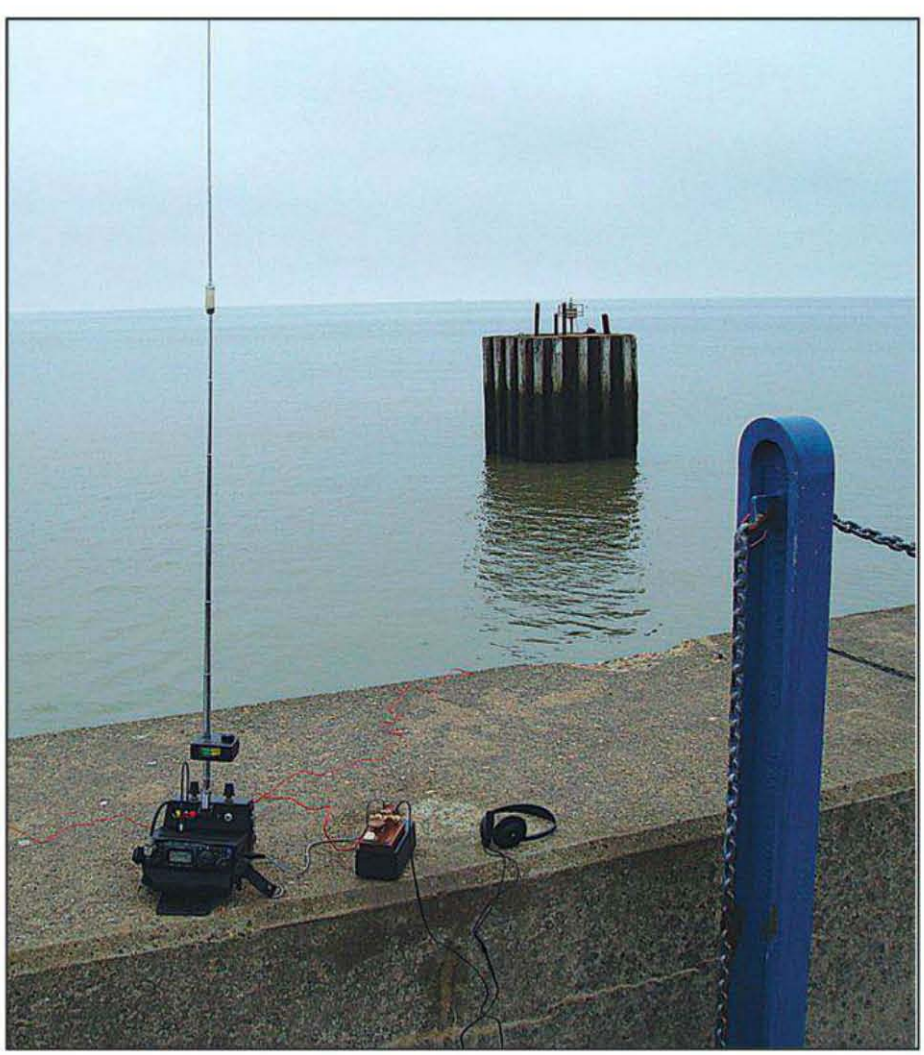


*Photo C– Here's GØFTD's setup for working DX from the beach.*

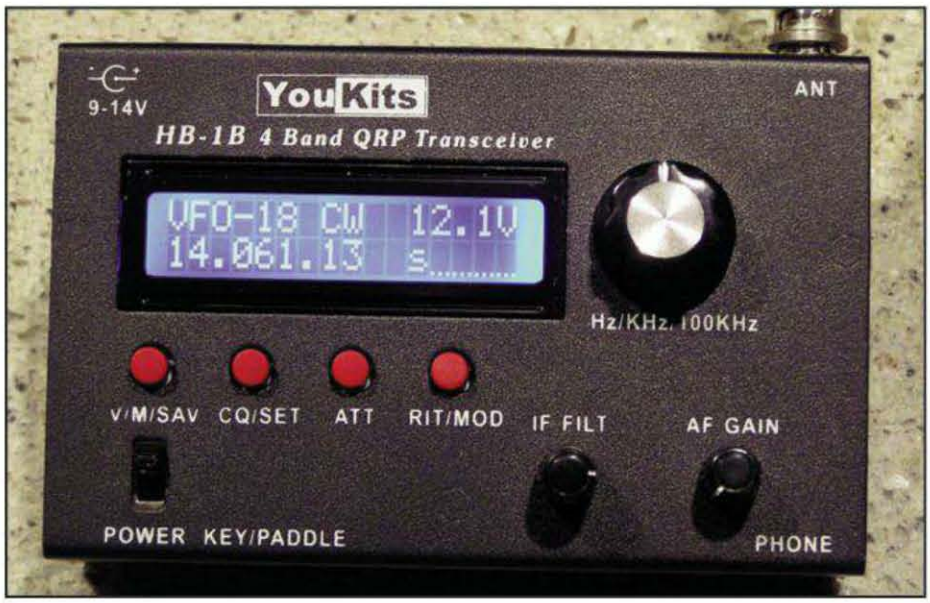



*Photo D– The updated HB-1B from YouKits, by way of Ten-Tec.*

or R4030, depending on which two bands the purchaser chose. This latest iteration is now being sold by Ten-Tec as the HB-1B (photo D). It's a four-band rig that transmits CW on 80, 40, 30, and 20 meters and has a general-coverage receiver that covers from 3.2 to 16 MHz continuously. All of the band-switching components are built into the box, so unlike the very similar MFJ 9200, this rig doesn't use plug-in band modules.

In my review of the R4020 in the August 2011 issue of *CQ*, I listed several things I liked about the rig, among them the use of a DDS VFO, smooth break-in, and a good-sounding transmit signal. The HB-1B retains these good features as well as adding a few improvements. Coincidentally, these improvements addressed some pet peeves I had. Could someone have been listening?

The first thing I noticed about this rig is that a slower tuning rate has been added to the VFO. Whereas in the previous rig, the slowest rate was 100 Hz per click of the encoder, this rig features 10 Hz per click. This rate is vastly easier for fine tuning.

The next thing I noticed was that the encoder feels more refined. In my previous review, I noted that the encoder was "very heavily detented, feeling something like a 20-position rotary switch." I don't have the two units side-by-side so I can't make a direct comparison, but this one just feels better. For all I know, it might be the same part. Memory fades with time, but my fingers say this one is slicker.

In addition, the earlier unit had four positions of IF selectivity which you had to access by a series of button pokes. The new one has an infinitely-variable bandwidth controlled by a pot, the range being from 400 to 3000 Hz. This is roughly the same range the earlier rig had, but just giving the pot a twist is a more convenient way to go about changing the bandwidth. With the button-poking scheme the bandwidth you want will invariably be at the other end of the menu and you'll have to go once around the barn to get where you want to go. It's a small inconvenience, but one that can be a frustration in the heat of battle!

The break-in in this rig is quite smooth, free of clicks, pops, and thumps, but it's a little slow for my taste. Compared to the Ten-Tec rigs that are designed and built on Dolly Parton Parkway, you wouldn't mistake this T/R changeover for QSK, but it is smooth enough that you could use this rig for long periods of time without suffering from T/R fatigue.

In conclusion, it's a distinct improvement from the previous model. Kudos to YouKits for improving an already good thing and to Ten-Tec for bringing it to us.

## Sign-off

Thanks to all those who sent in material for this "QRP Special." Unfortunately, I wasn't able to get it all in the space allowed for this month, but it will definitely appear in future issues as we keep exploring the great big, exciting world of little radios!

Tnx es 72/73, Cam, N6GA

BY JOE EISENBERG,* KØNEB

# QRP Special
# A QRP SWR/Watt Meter Kit and an Add-on Audio Filter Kit

With springtime here, antenna work is on the minds of hams everywhere! Thus, here is a good kit to help with your spring antenna work. Plus, in keeping with this issue's QRP theme, it is designed specifically for use with low-power transmitters.

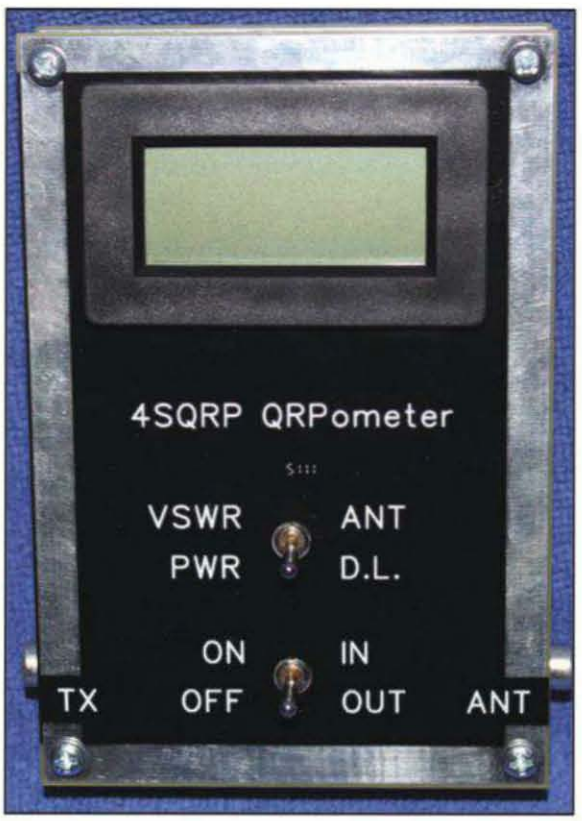
## The 4SQRP QRPometer

The Four-State QRP Group has just released the 4SQRP QRPometer, designed by David Cripe, NMØS. This kit is useful for measuring low-power transmitter output accurately as well as reading the VSWR on your antenna system with digital precision. The QRPometer measures RF power output from 10 mw to 10 w in addition to SWR. The unique thing about this kit is that it provides a load for the low-power transmitter to be tested into, eliminating the need for a low-power dummy load when testing QRP transmitters. That load is eliminated when placed into the VSWR mode, allowing the RF to pass through to the antenna. This feature protects your low-power transmitters from high SWR damage during power measurement, as most kit transmitters have no VSWR protection for the finals. The meter can be left in line in the VSWR mode for normal use.

## Building the QRPometer

The QRPometer has no toroids to wind and only four wires to connect the display to the main board. There are two circuit boards, one of which becomes the front panel. The kit is assembled kind of like a sandwich, with the two PC boards making up the circuit and the case. The display is large and easy to read at a distance. The meter is powered by a single 9V battery, with its snap connectors soldered directly to the board. I followed a build process that placed the most numerous parts first. There are 47 resistors in this kit, so I did all of the resistors first. I placed the resistors in descending order of the quantity of parts of their value. The most common resistor in this kit is the 100K resistor, of which there are 11, so I placed all of this value of resistor first, and followed that by the next most numerous, the eight 100-ohm resistors. The last resistors I placed were those that were the only resistors of that value. By following this procedure, I was able to balance the parts list after each component was used up.

I followed by double-checking my resistor placement and then installing the capacitors in similar fashion, followed by the diodes, and ICs. Finally, I added the jacks, switches, and display. Be sure to follow the directions carefully when mounting the switches so they line up with the front cover. With just four wires to connect, the display is very easy to work with. I used a piece of ribbon cable to make the connection from the main board to the display.



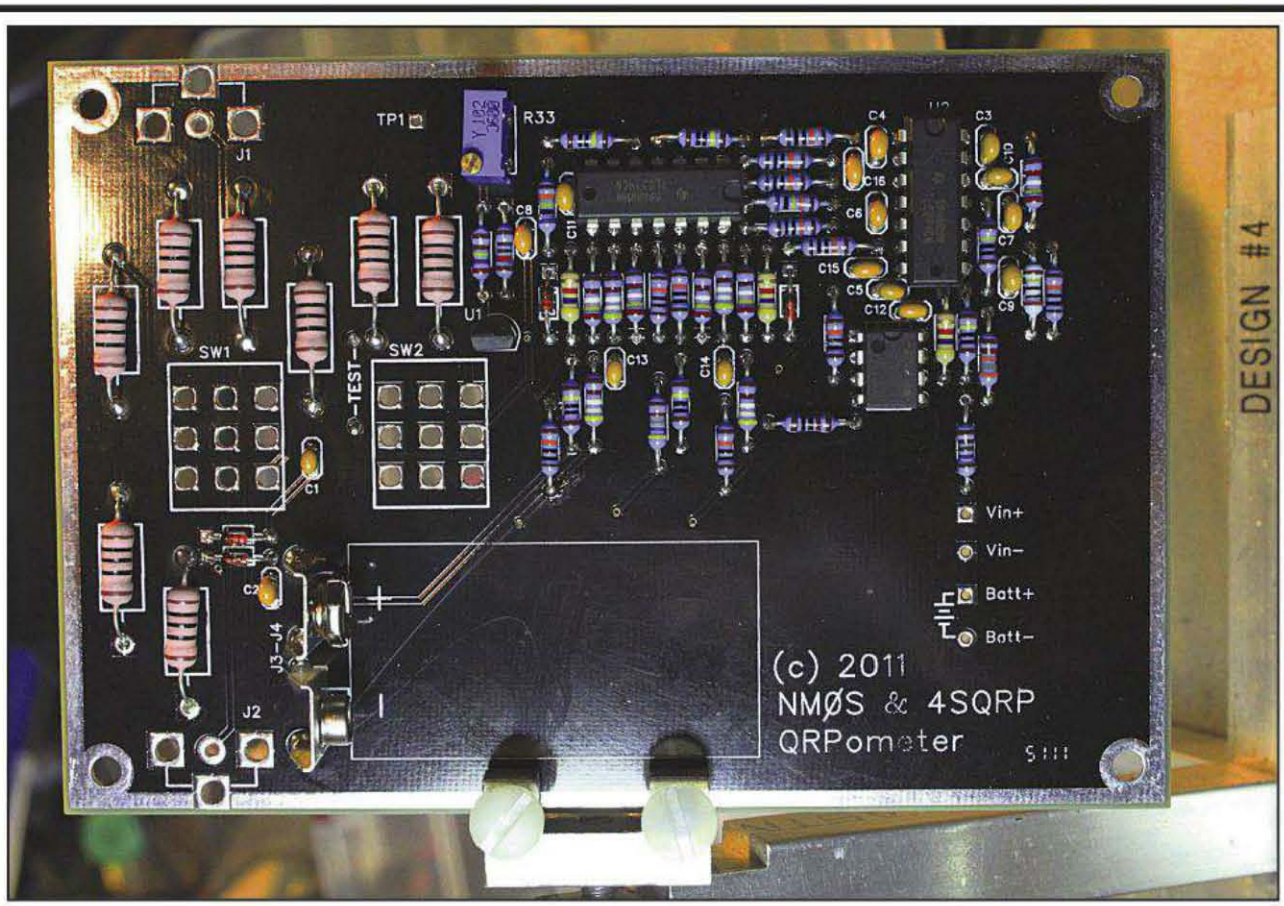

*Four States QRP Group (4SQRP) QRPometer assembled and ready to go. (All photos by KØNEB)*

Calibration is very easy and is accomplished by placing a jumper wire on the back of the board to place it in test mode. There is a 10-turn pot that sets the supply voltage to precisely 5.00VDC, and the calibration pot on the back of the display is set for 1.00VDC to set the VSWR part of the circuit. After calibration, the test jumper is cut from the back of the board and the meter is ready to use. The kit is available from the Four-State QRP Group at <http://www.4sqrp.com>.

## Elecraft AF-1 Audio Filter Kit

When we think of Elecraft kits, we usually think of the K1, K2, and the modular K3 and KX3 kits. However, Elecraft also makes a line of affordable smaller kits that are very useful additions to your shack. One of these is the AF-1 Audio Filter kit. Many of the lower-cost receiver/transceiver kits available today lack the selectivity that would normally be expected in a radio that costs a great deal more. The AF-1 incorporates high-quality tunable audio filtering to accomplish this task and allows you to use any of a number of inexpensive receivers and still be able to pick out signals like the big rigs! The

*7133 Yosemite Drive, Lincoln, NE 68507
e-mail: <k0neb@cq-amateur-radio.com>




QRPometer board with most components, except switches and jacks, mounted.


*Finished Elecraft AF-1 audio filter kit enclosed in the W8FGU clear Lexan case. See text for details.*

AF-1 is usable on SSB, CW, and many of the digital modes. It is powered by a 9V battery or an external 12VDC supply.

Elecraft does not supply a case for this kit, but an excellent one is available from David Van Walleghan, W8FGU, at <http://w8fgu.home.comcast.net/~w8fgu/index.html>. David makes a whole line of Lexan® cases for the Elecraft line of mini-module kits. These clear cases allow display of your handiwork while protecting your kits from damage. Since this kit has the dial markings and input/output jack markings on the board, the clear case allows for a clear view, making labeling on the outside unnecessary. If you decide to use one of these cases, I highly recommend that you carefully read the case directions before beginning work on the kit itself in order to make the modifications and choices needed in order for the kit to best fit into the case. There are a couple of minor things you need to observe to have the best results when mounting the AF-1 in the Lexan® case. The case comes already assembled and ready for your finished kit to fit inside. All that is needed is to open it, mount the board, and close it up! This case is well worth the $29.95.

The AF-1 builds easily. This kit, including the case, cab be built in one evening. The instructions have you mounting the resistors first, followed by the capacitors and so forth. The manual has the resistors mounted from left to right, filling the board as you go. The other parts are also ordered to be installed from left to right, a great way to be sure you have placed them correctly. The largest part is the rotary switch used to both turn the filter on and off and change the filter modes. The switch mounts easily by just tack-soldering one pin and then reheating that pin to place it firmly in position. The rest of the pins are soldered after you are certain the switch is solidly in the correct position. There is one simple PC board mod that needs to be made, but only if the board is a "Rev A" board, and the mod is not hard to make. This mod makes a necessary modification to allow for use of a monophonic audio input without causing a short if a stereo input cable is used. Many test points are provided on the board for troubleshooting if necessary.

Elecraft makes a whole line of these mini-module kits and most are even quicker to assemble. Hats off to Elecraft for an easy-to-build and useful kit! You can get the AF-1 at <http://www.elecraft.com> for $59.95. Be sure to get one of the matching cases for a professional look.

## And Finally...

After a long kit-building session, it is easy to overlook turning off your soldering iron. For safety's sake, make sure that turning off your iron is the very first thing you do when you're done building. A few of the newest soldering station offerings from Hakko have a timer so that the iron turns off by itself after a period of non-use. However, it still is always the best idea to turn your iron off immediately after using it.

Until next time . . . 73 de KØNEB

## *Looking Ahead in* CQ

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

- Flight of the QRP Bird...
- Getting High With Ham Radio
- Operate Digital Modes Without a PC
- The Extraordinary Solar Cycle 19

### *Upcoming specials:*

- Take it to the Field (June)
- Emergency Communications (October)
- Technology (November)

Do you have a ham radio story to t ell? Something for one of our specials? See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/ guide.html>.

BY DON ROTOLO,* N2IRZ

# Build Something and Save the World

Ah, April and springtime are finally here! It's time for thoughts to turn to the Dayton Hamvention® <http://www.hamvention.org/> and all that surrounds it. For me, Dayton represents two 10-hour drives a few days from each other, a good chance to exercise the automobile fleet, as well as an opportunity to get those many "unobtanium" <http://en.wikipedia.org/wiki/ Unobtainium> components I'm missing for the various winter projects I've yet to complete. Sure, I can buy most of it new on the internet, but that means top dollar prices, and being a cheap . . . er, fruga . . . ham, I'd rather go bargain hunting. Not to mention those parts that are really unobtainable elsewhere, as well as those I didn't know I needed until I saw them.

Almost as fun as Dayton was the Maker Faire <http://makerfaire.com/> last fall in New York on the old World's Fair grounds in Flushing Meadows, home of the Hall of Science ARC <http://www.hosarc.org/portal/>. It was fun not because of the myriad components one could buy—there were no fleamarket-type vendors there—but because of the emphasis on building stuff yourself.

That brings us to this month's topic: *building.* Almost a lost art, folks don't build much anymore. Oh sure, there are pockets of dedicated builders (or, in the new parlance, "Makers"), but not like it was even as recently as the 1970s. It's something I think we've almost lost and are poorer for it. That doesn't mean there isn't any experimenting (the popularity of the Arduino <http://www.arduino.cc/> is a testament to that), there just isn't as much fabrication going on. A young ham recently expressed great disappointment that he could not find a source for a particular inductor and wondered if anyone could help. Even when given specific instructions for fabricating the simple air-core coil he needed from magnet wire, he was still unsure. "Do you mean I can actually make one? Will it work?" was his response.

This lack of building skills doesn't confine itself to electronics, either. I work with a local FIRST Robotics team <http://www.team1676.com/> consisting of high school students who design and build a 150-lb. tele-operated robot to play a specific game. Teams have just six weeks from the day the game is announced to design, construct, program, and de-bug a complex machine, a task that would challenge a team of experienced engineers and technicians. Also, most alarming is that we get kids who have never drilled a hole, tightened a screw, or stripped a piece of wire.

I'm doing my small part to try and change that. Most of the kids on the team end up in an engineering or science curriculum in college, even those who had decided to become tax accountants or fashion majors. When they leave, they have a profound understanding of technology and fabrication techniques, including working a metal lathe and dealing with electrical wiring carrying 120 amps without exploding (much). Considering that there are over 2000 such teams, FIRST Robotics <http://www.usfirst.org/> has been-changing society for over twenty years now.

At Maker Faire we saw lots of technology on display: Accessible technology. Little kids learning to solder. Maker Bots fabricating usable objects from (almost) thin air. Vendors excited about their science curricula for the schools. Science presented as fun and exciting. And building things! The majority of the vendors were promoting products that let you build something, or create something, using your brain.

## Heathkit is Back!

Did you hear that Heathkit <http://www.heathkit.com/> is back in business? In the town right next to Benton Harbor, Michigan no less. Its focus today is on education, mostly self-education, and the current offerings reflect that. While the com-

*Hands-on electronics was a major focus of the World Maker Faire in New York City last fall. Here, young people learn about making circuits using Play-Doh®-like material at "The Squishy Circuit Project" booth (<http://www.stthomas.edu/SquishyCircuit>). The salt and moisture in the clay provide a conductive path. (W2VU photos)*

*P.O. Box 114, Park Ridge, NJ 07656
e-mail: <n2irz@cq-amateur-radio.com>

*A group of kids learns to solder at the Sparkfun Electronics booth at the Maker Faire. There was nearly always a line to try out Sparkfun's "Learn to Solder" activity.*

pany is not yet selling the kinds of radio kits many of us associate with the brand, it has a few handy gadget kits along with some serious hands-on educational courses.

Heathkits are what educated the practicing engineers of today—at least the older ones. Not only did you end up with a nice, functional product with respectable specifications, you learned how it worked and how to fix it when it broke. More importantly, though, you started looking at objects in your world not as magical boxes, but as made objects, the result of some person's efforts, efforts that you could reproduce if you put some effort into it. Here is a quote from the late Steve Jobs, from an interview in the April 1995 edition of *Computerworld* <http://www.computerworld.com/s/article/9220609/Steve_Jobs_interview_One_on_one_in_1995>:

> Heathkits were really great. Heathkits were these products that you would buy in kit form. You actually paid more money for them than if you just went and bought the finished product if it was available. These Heathkits would come with these detailed manuals about how to put this thing together and all the parts would be laid out in a certain way and color coded. You'd actually build this thing yourself.
>
> I would say that this gave one several things. It gave one an understanding of what was inside a finished product and how it worked because it would include a theory of operation. But maybe even more importantly it gave one the sense that one could build the things that one saw around oneself in the universe. These things were not mysteries anymore. I mean you looked at a television set you would think that "I haven't built one of those but I could. There's one of those in the Heathkit catalog and I've built two other Heathkits so I could build that."
>
> Things became much more clear that they were the result of human creation, not these magical things that just appeared in one's environment, that one had no knowledge of their interiors. It gave a tremendous level of self-confidence, that through exploration and learning one could understand seemingly very complex things in one's environment.

That sums up nicely what I have tried to do with the FIRST Robotics team—let the kids see that there's nothing they can't build, if they really want to. One of my favorite sayings is "Someone, somewhere, built that. If they can, so can I."

## Ramsey Electronics

Ramsey Electronics <http://www.ramseyelectronics.com/> is a well-known kit company. I have built several of its kits over the years, and every one is a good educational experience. I am certain that the philosophies of kit instructions came from their Heathkit experiences, because the styles are very similar: A focus on educating as well as clearly directing kit assembly.

Ramsey sells a lot of ham radio related kits, from code practice oscillators to QRP radios, and when its catalog arrives in the mail, it generates a flurry of excitement in my house. Because I travel a lot for work, my next purchase will be its passive air-band monitor so I can listen to the air-traffic-control transmissions without interfering with the plane's avionics.

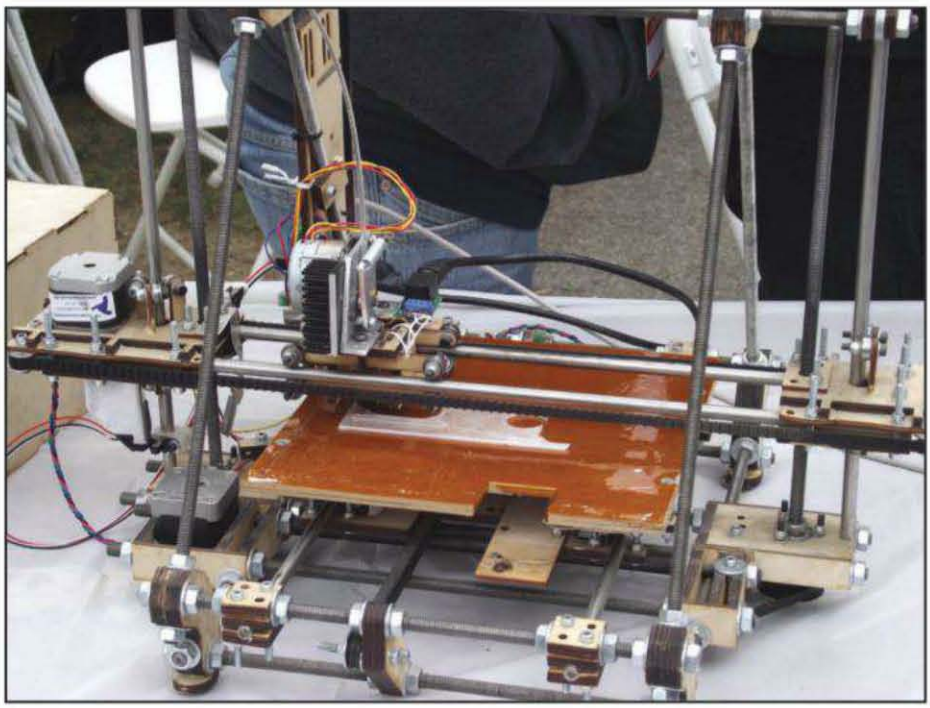
## And There's More . . .

There are several other companies that sell electronic kits, and these are a great way to build up some confidence in building things. That's the point of a kit: To guide you through the assembly and alignment process, with the goal of some kind of useful end-product. But a benefit that might be hidden to many is the confidence you get when it works. That, hopefully, will embolden you to try designing and building something yourself. And not necessarily electronic things. I've written about my metalworking machines before, and on occasion I do useful things with them. Same with the woodworking tools.

If you could watch over my shoulder, you'd more than likely call it "tinkering" rather than building, although I was pretty happy with the fireplace mantle I built over New Year's break. My coffee grinder died the other week, and I spent about an hour disassembling it to find that a shear pin—which is supposed to break if the motor gets overloaded, like a mechanical fuse—broke. I found a piece of an old tapered whip antenna that fit in the hole perfectly, cut it to size, and was fully caffeinated in short order.

That means if you have a widget that's broken, take it apart to see if you can fix it. You know it's broken, so there's no downside. If you have kids, especially in the 5–8-year-old range, it would be a crime if you didn't do something like that with them at least once a month. If you don't have young kids, see if you can borrow some from the neighbors. Let them take that widget apart to see what they might see. *(Caution: Some electronic equipment can be dangerous due to charged capacitors. Be careful what you let kids touch!)*

Isn't that what hams do? Show others how wonderful our hobby is? And make no mistake, our hobby is *not* just about radios and antennas and contacts. It also is about a creative and versatile spirit, one that can get things done "when all else fails." Teaching that kind of spirit, a confidence that any obstacle can be overcome, it what it's all about. It starts with



*A 3-D printer made by TechZone Communications "builds" … well … something or other at the company's Maker Faire display.*

an understanding and appreciation for technology.

## Digital Ham Radio

What does all this have to do with Digital ham radio? After all, that's what this column is supposed to be about. Well, the truth is, not much, but yet again everything. Quoting Priya Natarajan <http://www.astro.yale.edu/priya/>, a professor of astronomy and physics at Yale University: "...[S]tudents may have dexterity with the equations they're required to know, but they lack the capacity to apply their knowledge to real-life problems." Putting that another way, she says that the students are plenty smart but don't have any practical experience.

Why should we care? Because that kid you see today might be the one who invents a machine or technology that saves your life 30 years from now, just like Dean Kamen <http://www.ideafinde.com/history/inventors/kamen.htm> did 30 years ago with the wearable insulin pump for diabetics. Considering how your health has changed in the last 30 years, don't you want to edge those odds in your favor just a little?

Our modern world depends on technology to maintain our high standard of living—not to mention our hobby—but we need to remember that it was people who built that technology, people with practical knowledge.

How do we fit into all this? We're technology people, but we're also tinkerers. We are the ones who have the knowledge, experience, and junk boxes to help our youngsters learn to tinker, solve problems, and apply what they learn in school to real-life problems. Don't just Elmer someone to get his ((or her) ham ticket. Elmer him to gain useful skills. I can't count how many of my fellow students of Electrical Engineering I taught how to solder . . . honest: a hundred graduating EEs who had never picked up a soldering iron.

I can't say what exactly you should do. It's up to you. But find something, anything, that just might help a kid get some practical knowledge.

## Summary

I've been writing about digital radio since 1996. Some months I get the luxury of straying off-topic a little. I haven't received any hate mail (lately), so I figured it's about time to generate a little. If you didn't like this month's column, send me an e-mail (or a postcard) telling me where to go; just be sure to include something you *do* want to hear about, if you would be so kind.

It's a short column this month (robot season is in full swing and work has me traveling a lot), so until next time, find something to build, show a kid how you did it, and maybe save the world.

73 de Don, N2IRZ

magic in the sky

BY JEFF REINHARDT,* AA6JR

# It's Doo-Dad Season! Dayton Hamvention® Next Month

Oh yeahhh. . . .It's doo-dad season in ham-land. Spring seems to bring out the best in terms of manufacturers who want to please ham radio operators with new offerings designed to entice us to open our hearts and wallets in a quest to own the newest, latest, upgraded thingamabob to come along.

Now here we are, perhaps anticipating a tax refund check from Uncle Sam or sitting on a pile of cash gleaned from the load of revenue derived from our hard labors, a spring garage sale, or those returned soda cans.

Just to ice the cake, as sure as the swallows return to San Juan Capistrano every March, hams begin to plan for their annual mid-May migration to Dayton, Ohio for the Dayton Hamvention® using aircraft, wheeled vehicles of every description, and perhaps the random pogo stick to fly, roll, or bounce into the Hara Arena and its nearby environs to pay homage, and perhaps some cash, to the *objects d' art* that generally have wires of some type attached.

In the days and weeks leading up to this ritual of spring, the smart ham will study the ads in the April and May editions of *CQ*, along with catalogs strategically mailed or items listed on the internet by suppliers of radio gear just prior to the gathering of some 20,000 or so radio aficionados from the U.S. and around the world in that most unlikely convention center. (Dayton, Ohio? Really? Dayton?) Yeah, I've had to explain why I'm headed to Dayton in May to many a non-ham friend. Being well-prepared, you roll into town Thursday night, deciding to take in the town and get an early start on Friday's search for goodies that will enliven your shack.

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## The Great Mystery of Dayton

How can a financial institution call itself "Fifth Third Bank"? Why not "One and Two-Thirds Bank"? Or


*One of the "highlights" of Dayton last year was a sewer-line break right in the middle of the huge outside flea market. It took quite a while before anyone realized there was a problem. Better to be parked in the mud!*

"One Point Six Six Six Bank"? And who let them sponsor a baseball field with a name like that, let alone an ATM? Seriously, what's next? "Restaurant 3.14" where the only entrée is pi?

### Dayton After Dark

ZZZzzzZZZzzzZZZzzzz. There are probably several reasons why Hugh Hefner never chose to open a Bunny Club in Dayton. No doubt it was a victory for the art of market research which was still in its infancy at the time.

Hopefully, those ZZZzzzzs you hear are coming from *your* room. Welcome to Motel 5.5—where they don't leave the lights on for anybody.

### Dayton, the Next Morning

That free breakfast in the motel may stay with you for a while.

### Dayton, Later that Morning

Fortunately, Hara Arena has many restrooms. I won't tell you where the best ones are. That knowledge was gleaned over several years of attendance—and several free motel breakfasts.

### Dayton, a Bit Before Noon

It's time to get serious about shopping in the 6,000-acre outdoor flea market. The only problem is, perhaps a whole lot of hams got the bargains before you did. They started shopping at 4 AM when you were turning over for the second time at Motel 5.5, which is across the freeway from a Fifth Third Bank branch. And now it's starting to rain—a lot—and you're at the far end of the flea market. I think that part of the lot is called "Indiana."

### Dayton, a Bit After Noon

The 30-minute line you endured for the barbecue-sauce-covered something-or-other sandwich was worth the wait, and much of the cash you brought to buy gear, to fill the emptiness created by the free motel breakfast moving along. The rain intensifies, giving a much-needed shower to some of the attendees and filling the arena with that strange wet-clothing scent you hadn't inhaled since your elementary school days. Memories of your strict third-grade teacher are suppressed by the sight of stacks of gear in familiar brown boxes just waiting to find a home.

First, though, you stop by the *CQ* booth to renew your subscription, get a new one, or buy a book, all of which is an awesome display of your excellent taste, class, intelligence, and your ability to take advantage of a good bargain. Say "hi" to Managing Editor "Red" (Red, K2RED, is a lady); *CQ* Editor Rich, W2VU; other CQ Communications staff (there are four magazines!); plus authors and awards and contest managers; and be sure to give compliments on the excellent stable of writers for the magazines. Sadly, most of the time we writers are not in the arena; we're outside, in the stable. You know—the one in the rain.

You then move on to the manufacturers' booths to get the lowdown on the new stuff, improved old stuff pretending to be new stuff, and perhaps the stuff you bought a few years ago but never took the time to read the manual. Ask the reps about a feature you'd like to have in a radio, only to find it's already in your radio but was never used and be amazed that it was there all along and easy to access!

Keeping your cool, you say "cool," and move along with a knowing nod.

## Dayton, Late Afternoon

OK, it's coming up on decision time. You've kicked the tires at all the manufacturer's booths. You've asked all the questions, picked up a bagful of product spec sheets, sent some junk food down to the boiler room while you sat on a bench digesting the data, and now it's time to price shop among the dealers. This burns off a few of the calories (but not all) accumulated from the snack outlets, but hey, a workout's a workout.

And there they are … rows and rows of brown boxes filled with trinkets that turn 12 DC volts into years of enjoyment. What's the manufacturer's "coupon" on this one? Is there a "Dayton Special" that might include a discount, accessories, a massage, valet parking at the Waffle House? Hmm … This dealer has knowledgeable hams working the counter and charges low prices. That dealer charges more but there are other pluses to consider.

Leaving Hara, you find the parking field where the overpriced space you rented for your car may now be an ocean of mud. Lucky for you, the guy who took a Jackson off you for the space just happens to have a tow truck, but it will take another Jackson to pull your car off its axles and back onto its tires. Cash only.

## Dayton, Saturday Night

I believe the franchise restaurant was invented in Dayton, perhaps just before the Wright Brothers opened their bicycle shop. Once Wilbur & Orville tried the food at restaurants along the I-75 corridor, they invented the airplane, thinking that eventually airline food would look good in comparison to what is served on the ground at some places in Dayton (and elsewhere on the ham show cuircuit, too). That includes the airlines that have dropped serving food.

Perhaps while you're waiting for a table at a more upscale restaurant, you may spot some of the manufacturers' reps you spoke to at the show. Leave them alone. They're hungry, tired, their legs are sore, and they are only interested in having a conversation with Jack Daniels to relieve the pain in their feet. I don't think Jack was a ham radio operator, but after a few, he offers up a good QSO.

## Dayton, Sunday Morning

If you look around, there are church services available in Dayton. Most of them are attended by residents praying they were somewhere else. I once saw a Trinity church located next to a Fifth Third Bank and at the same moment the calculator in my i-Phone broke. Perhaps it was a coincidence.

Deciding to forego the free motel breakfast, you hit the Fifth Third Bank ATM (do you get one-and-two-thirds more money from it?) and spring big for breakfast at the Waffle House. It's well worth it, and it will fix you up with your annual cholesterol total early in the year so you can stop counting and enjoy the next eight months free from the effort of totaling your allowable grams.

Then off to Hara Arena to shop for last-minute bargains and wait in vain for your ticket number to be called in the raffle. Then it's time to rescue your car before it completely succumbs to the mud and head back onto the highway for the long road trip home (or off to the airport to wait on line at security while all the "weird" ham radio items are checked to make sure nothing is a danger to security on the plane you are taking home).

Fun? Heck, yeah, it's fun! I can't wait 'til this year! In the meantime, I'll be telling everyone of my adventures by putting a little "Magic In The Sky."

73, Jeff, AA6JR

# New Goodies for Springtime

BY JOHN WOOD,* WV5J

While stand-alone ham gear is probably the most enjoyable item for your "What's New" columnist to research, test, and write about, other items on the periphery of our fine hobby include a multitude of products that serve numerous useful purposes while never earning quite the attention they may be due. Such is the story of some of the items we'll examine in this, the April 2012 edition of *CQ*'s well-established "What's New" column.

## A Portable Solar Case

Take, for example, the first item on our list, a portable solar case (photo A), called that because it comes with a solar cell that can produce a voltage and current sufficient to charge its own internal polymer battery.

Described by its supplier, Eceen Electronic Limited, as an eco-friendly product, the company's new solar charging case's panel has an output of up to 1.35 watts and a battery capacity of 2000 mAh. It also comes with a four-LED display that can indicate battery charging capacity and charging information.

Once charged, this polymer battery can then provide a steady charging current and voltage that can recharge your phone, MP3 player, or other communication device. The internal polymer battery can also be charged by a wall outlet through the use of an AC adapter or USB charging cable (provided).

Made of EVA, this solar charging case comes in four different colors—blue, green, red, and black—and at $6\frac{3}{4}$ inches by $4\frac{5}{8}$ inches by $1\frac{1}{8}$ inches, it provides a protective zippered cocoon for your iPhone or other similar-size electronics. It also comes with a hook so it can be attached to a belt loop, backpack, or whatever you wish.

As indicated by the company's website at <www.eceen.com>, Eceen also sells solar bags, a solar radio, a solar torch, a solar clock, and a solar camping light, among other items.

## An MFJ 10-Meter Vertical Antenna

Returning to the more conventional amateur radio equipment, how does the possibility of working the world from your back yard sound? Well, according to our friends at MFJ Enterprises, MFJ's new 10-meter vertical antenna is all you need for your HF rig to work outstanding DX.

The MFJ-1790 (photo B), at a suggested retail price of $69.95, can empower you to take advantage of the 10-meter band openings which are early indicators of the coming solar cycle.

For now, MFJ is declaring the 10-meter band to be wide open and is providing you all the antenna you need to work the world from your back yard or on a mountaintop camping trip. MFJ's new 10-meter antenna also gives Technician class licensees the opportunity to move from operating only on the 2-meter and 440-MHz bands and get a taste of real DX on the HF bands.

This 11-foot vertical antenna lets you work all the DX you can handle! The MFJ-1790 features a lightweight 11-foot radiator and two 6-foot radials both made of aluminum. Weighing less than 3 lbs., it's easy to take on your next hiking or camping adventure and easy to put up and take down for stealth operation in your perhaps antenna-restricted neighborhood.

MFJ-1790 has a super low angle of radiation to focus your signal directly where you want it, and it reduces QRM/noise so you can relax and get great DX with ease.

An included mast bracket can be turned horizontal or vertical, and lets you attach it to an existing mast or pole with ease in the most difficult of areas such as on an apartment balcony.

At your option, you can go truly portable with the MFJ-1919 ($89.95) or MFJ-1919EX ($139.95) heavy-duty tripods. The MFJ-1919 extends to 7.8


*Photo A– The solar case from Eceen Electronic Limited not only protects your personal portables, it also can charge them with its built-in solar panel.*

*1870 Alder Branch Lane, Germantown, TN 38139
e-mail: <wv5j@cq-amateur-radio.com>

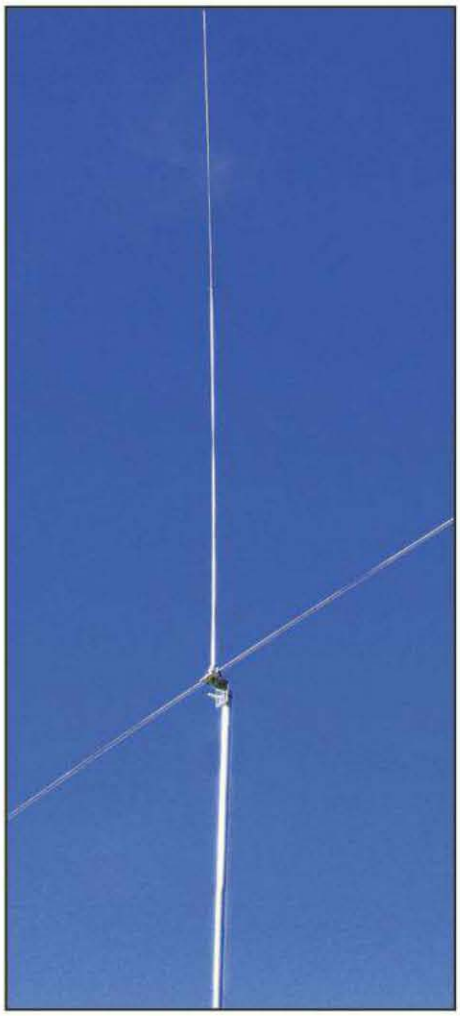


*Photo B– MFJ's 10-meter vertical antenna is easy to set up and easy to use to explore DX on the 10-meter band.*

feet but collapses to 54 × 6 inches. The MFJ-1919EX includes an 18-foot extended and 5-foot collapsed fiberglass mast.

MFJ recommends you use mast size 1.5–2.0 inches with included u-bolts. The MFJ-1790 covers the entire 10-meter band (28.0–29.7 MHz), and handles 300 watts PEP SSB.

There are also MFJ adventure accessories, such as the MFJ-9410X ($289.95), a 10-meter adventure radio with dynamic microphone, and the MFJ-5818X ($16.95), 18 feet of RG8X coaxial line terminated with PL-259 connectors.

The MFJ-1790 is protected by MFJ's famous NoMatterWhat™ one-year limited warranty. MFJ will repair or replace your MFJ antenna no matter what for one complete year.

To order, receive a free catalog, or for your nearest dealer, call 1-800-647-1800; write to MFJ, 300 Industrial Park Road, Starkville, MS 39759; or go online to <http://www.mfjenterprises.com>; or fax 1-662-323-6551.

*Photo C– DX Engineering is making antenna tubing available out of high-strength Type 6063-T832 seamless drwan aluminum*

## DX Engineering Aluminum Tubing

Antenna builders can now choose from a wide variety of tubing and accessories from DX Engineering. The featured custom-made, high-strength Type 6063-T832 seamless drawn—not extruded—aluminum tubing is available in 3 and 6 foot lengths (photo C). Type 6063 alloy resists general corrosion, including stress corrosion cracking and has an excellent surface appearance.

The 0.058-inch wall tubing is available in 1/8-inch increments from 3/8-inch to 2 1/8-inch O.D., slit or no slit, smoothly telescoping from one size to the next on vertical or Yagi antenna elements. Precise ID and OD dimensions ensure an exact fit.

Three-foot lengths are ideal for fast taper, low-wind resistance applications, while the 6-foot slow taper lengths provide greatest bandwidth. Most sizes are available with a slit on one end for use with DX Engineering's marine-grade stainless-steel element clamps. Optional UV-rated black vinyl caps, designed to fit over the tubing ends, seal out moisture.

Larger sizes from 1.5 to 3.0 inches O.D. are also available in 0.120-inch heavy-wall 6061-T8 aluminum, which ensures maximum strength for long assemblies, such as antenna booms.

Prices range from $1.45 to $103.95 depending on size and wall thickness. For more information or to order, visit <www.dxengineering.com>.

## Take Charge Power Strips

If you've learned to live with the smart phone, perhaps you're ready to accept the "smart" power strip that can provide surge protection that turns off your peripheral items (printers, monitors, anything with a transformer) when you turn off your computer or when it goes into sleep mode.

The Smart Strip (photo D), one of the Take Charge PowerSavers, eliminates phantom current to these peripherals until you turn your "master" device back on. With a Smart Power Strip, the manufacturer estimates that consumers will save an average of $50 per year off their electric bills.

Leaving electronics—such as cell phones, laptops, iPods, cordless drills, and digital cameras—plugged in not only needlessly drains energy, but also reduces battery life. With Take Charge, you don't have to unplug. By turning off the power after a timed charge, Take Charge PowerSavers automatically eliminate the power drain, lengthen the life of your batteries, reduce your electric bill by up to 8–10%, and shrink your carbon footprint for many devices.

According to Denny Miller, CEO of Take Charge, "If every household in the state of Iowa used one of these smart power outlets, the potential energy savings would be over $60 million and the carbon footprint would be reduced accordingly. If everyone in the United States used a Take Charge PowerSaver, energy savings would translate to a total of over 6-billion dollars annually."

In addition to making an impact on the environment, Miller and his partner are dedicated to helping the local Davenport economy. They will use a local company, X-Pac, as their main distribution cen-


*Photo D– Take a look at the Take Charge power strips which give you control and also save energy.*

ter and hope to create new job opportunities in the Davenport community.

The Take Charge PowerSavers are available in three models which are cETL- approved for use in your home or business. The UTC4W offers three timer-controlled outlets in a convenient wall tap unit with one "always on" outlet. The UTC4S has three timer-controlled outlets with one "always on" outlet in a strip form with 2-foot cord. Each product has the 3-hour timer and LED indicator lights with one-touch timer start buttons. The UTC8MS offers eight outlets with two "always on" outlets and one master outlet that controls "five controlled" outlets in a strip form. The control outlet automatically senses power consumption and will turn on/off-connected peripherals.

All Take Charge PowerSavers offer surge protection and come with a plugged-in Connected Equipment Protection Policy. The policy covers properly connected equipment up to $50,000.

Available in the United States in March 2011, the UTC4W and UTC4S will be offered at the MSRP price of $19.95 and $24.95, and the UTC8MS has a MSRP of $29.95.

## Book Corner

***Explore Digital Radio Below 30 MHz.*** If you're ready to explore digital radio below 30 MHz, now there's a guide book to show you how to do it. The ARRL has put together step-by-step directions for hams who want to use a few watts to work the world digitally in its new book, *Explore Digital Radio Below 30 MHz* (photo E).

Priced at $25.95, this guide will show the reader how to set up and operate his or her own HF digital amateur station using modes such as PSK31, RTTY, and JT65, as well as MFSK, Olivia and PACTOR.

***Emergency Power for Radio Communications.*** The ARRL is also making available its second edition of *Emergency Power for Radio Communications* (photo F). Priced at $27.95, this book provides the reader with all the answers to the inevitable question, "When all else fails, how will you communicate?"

With this guide, you'll learn about all of the various ways of providing power for all communication applications, from charging batteries to keeping the lights on. You'll know the tools for emergency or backup power, energy independence and portable energy, and you'll know how to pick the power source that keep your station on the air. You'll also learn about emergency lighting, solar power, charge controllers for photovoltaic systems, gas, wind and water generators, load sizing, battery systems and storage, systems for emergency power, inverters, station instrumentation, safety, emergency practices, plus emergency power projects.

**2011 ARRL Periodicals on CD-ROM.** If you'd like to catch up on all of the articles you might have missed dur-

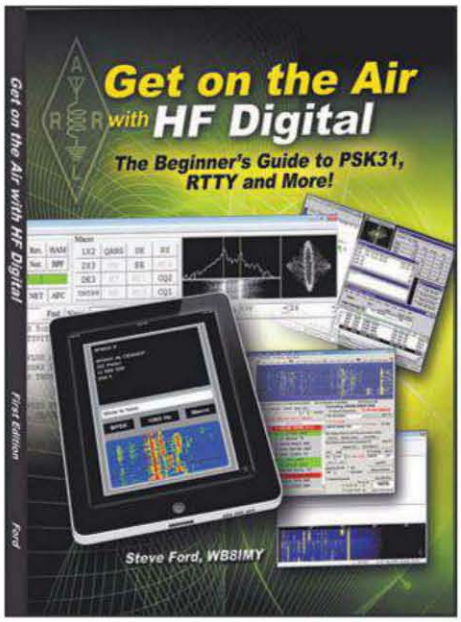



*Photo E– If you're ready to explore digital radio below 30 MHz, the ARRL now offers a guide book,* Explore Digital Radio Below 30 MHz*, to show you how to do it.*

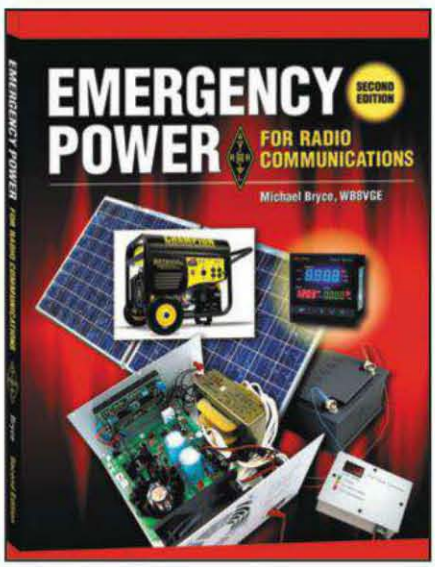
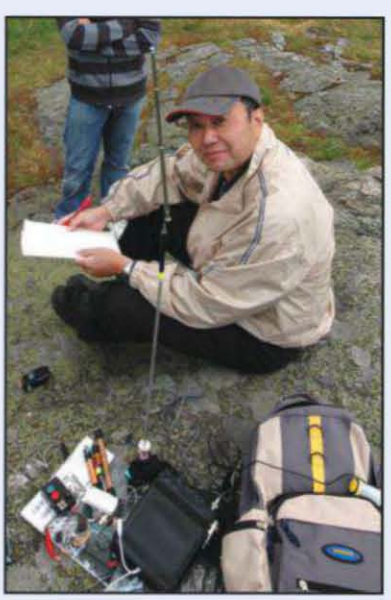



*Photo F–* Emergency Power for Radio Communications *provides the reader with all the answers to the inevitable question, "When all else fails, how will you communicate?"*

## *On the Cover*



Hiroyuki Nagasawa, 7K1PYG, lives in Tokyo, Japan, but due to his scientific work on developing new semiconductor materials, he is often in Stockholm, Sweden. This is where Hiro was caught in action with his extremely low-power portable outfit. In the heart of Stockholm, the local clubs held a Field Day event and he was certainly the visitor who attracted the most attention. All of his equipment fits in a small bag, and that includes the radio, the antenna, the batteries, and the keyer *(see above; unfortunately, our address box covered the gear on the cover.—ed.)*.

The radio produces about 2.5 watts output, and the antenna is a telescoping whip with optional coils for different bands. I actually watched as Hiro made a QSO with this setup on 18 MHz CW. The small black box with two buttons is a memory keyer of his own design. As a true QRP enthusiast, Hiro has also developed a dedicated low-power logging system using PIC microcontrollers and consuming only 0.6 watt. It is very compact and works as a keyer as well. Additional information is available to the public on the web at <http://7k1pyg.blogspot.com/>. Full construction description and the software are at <http//7k1pyg.web.fc2.com/HomeBrew/PICLOG/PICLOG_Top.htm>.

Recent solar activity and good propagation on 28 MHz will yield many exciting DX contacts for Hiro. His favorite mode of transportation is bicycle, so it is not improbable to hear him operating bicycle mobile. Oh, and the really big tower in the background around our logo is Stockholm's 500-foot TV transmission tower. *(Cover photo and "On the Cover" text by Henryk Kotowski, SMØJHF)*


*Photo G– The 2011 ARRL Periodicals on CD-ROM contains all of the articles published in* QST, QEX, *and the* National Contest Journal *during 2011*

ing 2011 when you didn't read thoroughly *QST, QEX* and the *National Contest Journal*, here's your chance. Now on book stands and available from the ARRL is the 2011 ARRL Periodicals on CD-ROM (photo G), which contains all of the articles published in those three periodicals during 2011.

Or is it just one article your interested in reading? If it was published during 2011 in these ARRL periodicals, you can find in on this CD-ROM and that includes all of the great building articles found in *QST*, the technical articles found in *QEX,* and the informative articles found in the bimonthly *National Contest Journal*.

Price for this CD-ROM is $24.95. and like all of the ARRL books mentioned here, they are available at the ARRL website <www.arrl.org> or by calling 860-594-0200.

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Well, that wraps it up for the April edition of "What's New." And don't forget that May is Dayton Hamvention® month, so if you have the time, be sure to join 20,000+ of your ham buddies for three days of emersion in your favorite hobby at Hara Arena. If I don't see you there, it's not because I didn't look for you! 73, John, WV5J

***Note:** Listings in "What's New" are not product reviews and do not constitute a product endorsement by* CQ *or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

BY JOE LYNCH,* N6CL

# Will the Transistor be Replaced by a Spoonful of Sugar?

## *The History of the Transistor*

The transistor (which is a portmanteau word for the term "transfer resistor") was actually invented by Julius Edgar Lilienfeld, who filed patents for the field-effect-type transistor in the 1920s in Canada and the U.S. His U.S. patent for the FET-like transistor was granted on January 28, 1930. Unfortunately, Lilienfeld's ideas found little practical application in his day.

It would not be until after World War II when development of semiconductors took off. Between mid-November and just before Christmas in 1947, John Bardeen and Walter Brattain of ATT's Bell Labs worked on using germanium as a semiconductor. Carrying out a critical experiment on December 16, 1947, they found that connecting two gold-tipped wires to a crystal of germanium produced a signal with gain, meaning the power output was greater than the power applied to the crude semiconductor.

William Shockley, the Solid State Physics Group leader at Bell, recognized the potential in what Bardeen and Brattain had observed. Together, the three of them worked on further developing the semiconductor, eventually coming up with the first bipolar point-contact transistor.

More information on the point-contact transistor can be found at: <http://en.wikipedia.org/wiki/Point-contact_transistor>. For their efforts they were awarded the 1956 Nobel Prize in Physics "for their researches on semiconductors and their discovery of the transistor effect." See: <http://www.nobelprize.org/nobel_prizes/physics/laureates/1956/>.

Through the ensuing decades multiple types of transistors have been developed. They generally fall into the two groups that Lilienfeld discovered (field-effect), and Bardeen, Brattain, and Shockley jointly discovered (bipolar junction), with some transistors either combining features of both groups or being designed as belonging to one or the other group (insulated gate bipolar and diffusion, to name a couple).

### A Spoonful of Sugar

The major problem with transistors is what makes them work, their impurities. Writing in the *IEEE Spectrum 2.12* magazine, authors Chun-Yung Sung and Ji Ung Lee commented on this dilemma:

> From the outside, transistors seem so simple and straightforward. But inside, they're actually a mess. If you could watch them working at the level of atoms, you'd see the electronic equivalent of a game of bumper cars. Electrons moving through even the best transistor channel can't go in straight lines. Instead they're buffeted continually by a host of imperfections and vibrations, which together put a strict limit on speed and generate a lot of heat in the process.
>
> The good news is that it doesn't have to be that way. By a quirk of quantum mechanics, electrons moving through atom-thick sheets of carbon—known as graphene—don't suffer much at all from these sorts of collisions. Instead they behave like massless particles, speeding along in straight lines for long distances just like photons do (p. 34).

What is graphene? From its name, one can see a connection to graphite, which is an allotrope of carbon. What makes it unique compared to graphite is that it is defined as a one-atom-thick planar of bonded carbon atoms that are packed in a honeycomb crystal lattice. Hanns-Peter Boehm, a German chemist, considered to be the pioneer in graphene research, coined its name in 1962. The Nobel Prize in Physics 2010 was awarded jointly to Andre Geim and Konstantin Novoselov "for groundbreaking experiments regarding the two-dimensional material graphene" (see: <http://www.nobelprize.org/nobel_ prizes/physics/laureates/2010/).

Initially, graphene was very expensive to produce. However, a group of Rice University faculty and students experimented with making those one-atom thick layers of carbon. For one of the experiments, Zhengzong Sun, a fourth-year graduate student, first experimented with Plexiglas®. Using pressure and hydrogen and argon gas over its surface reduced it to pure carbon, and the resultant film into graphene.

Then, trying other carbon sources, Sun used 10 mg of sucrose (roughly a couple of tablespoons full

### VHF Plus Calendar

| | |
|---|---|
| Mar. 31 – Apr. 1 | Second Weekend of DUBUS EME Contest |
| Apr. 6 | Full Moon |
| Apr. 7 | Moon perigee |
| Apr. 13 | Last quarter Moon |
| Apr. 20–21 | The Southeast VHF Society Conference |
| Apr. 21 | New Moon |
| Apr. 21 | The *Lyrids* meteor shower |
| Apr. 22 | Moon apogee |
| Apr. 28–29 | Third Weekend of DUBUS EME Contest |
| Apr. 29 | First quarter Moon |

*—EME conditions courtesy W5LUU*

*e-mail: <n6cl@sbcglobal.net>*

of table sugar) and subjected it to the same pressure, and hydrogen, and argon gas experiment. It quickly formed into graphene. Sun went on to succeed in experiments of doping the graphene. More on the experiments can be found on their Rice University website: <http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=15057>. Their research appears as a *Nature* Letter in the November 25, 2010 issue entitled: "Growth of graphene from solid carbon sources," by Zhengzong Sun, Zheng Yan, Jun Yao, Elvira Beitler, Yu Zhu, and James M. Tour.

### Graphene Properties

Sun and Lee (see above) explain how graphene is different from CMOS semiconductors:

Graphene's symmetrical two-dimensional crystalline structure is responsible for most of its unique qualities. Electrons surrounding each carbon atom can take on only a limited set of energies; each electron occupies a level that corresponds to an allowed quantum state. Like all materials with a periodic arrangement of atoms, these allowed electrical states overlap in space and meld to form a new spectrum of allowed states—a band structure. In an ordinary semiconductor, electrons that are stuck to atoms are confined to the valence band, and those that are free to move around the lattice occupy the conduction band. But in graphene, these two bands actually touch, and they take on a highly unusual property (p. 34).

A problem with graphene as an alternative to silicon for integrated circuits has been the absence of an energy gap between its conductor and valence bands. Addressing that problem in an article in the February 2, 2012 issue of *Science Express* entitled "Field-Effect Tunneling Transistor Based on Vertical Graphene Heterostructures," L. Britnell, R. V. Gorbachev, R. Jalil, B. D. Belle, F. Schedin, A. Mishchenko, T. Georgiou, M. I. Katsnelson, L. Eaves, S. V. Morozov, N. M. R. Peres, J. Leist, A. K. Geim, K. S. Novoselov, and L. A. Ponomarenko, stated in their abstract:

An obstacle to the use of graphene as an alternative to silicon electronics has been the absence of an energy gap between its conduction and valence bands, which makes it difficult to achieve low power dissipation in the OFF state. We report a bipolar field-effect transistor that exploits the low density of states in graphene and its one atomic layer thickness. Our prototype devices are graphene heterostructures with atomically thin boron nitride or molybdenum disulfide acting as a vertical transport barrier. They exhibit room temperature switching ratios of ~50 and ~10,000 respectively. Such devices have potential for high-frequency operation and large-scale integration.

As indicated by this recent research, strides are being made to adapt graphene to RF applications. Of particular interest for the microwave enthusiast is the ongoing research at IBM. In a letter in the April 7, 2011 issue of *Nature* magazine entitled "High-frequency, scaled graphene transistors on diamond-like carbon," Yanqing Wu, Yu-ming Lin, Ageeth A. Bol, Keith A. Jenkins, Fengnian Xia, Damon B. Farmer, Yu Zhu, and Phaedon Avouris wrote in their abstract:

Owing to its high carrier mobility and saturation velocity, graphene has attracted enormous attention in recent years. In particular, high-performance graphene transistors for radio-frequency (RF) applications are of great interest. Synthesis of large-scale graphene sheets of high quality and at low cost has been demonstrated using chemical vapor deposition (CVD) methods. However, very few studies have been performed on the scaling behaviour of transistors made from CVD graphene for RF applications, which hold great potential for commercialization. Here we report the systematic study of top-gated CVD-graphene RF transistors with gate lengths scaled down to 40 nm, the shortest gate length demonstrated on graphene RF devices. The CVD graphene was grown on copper film and transferred to a wafer of diamond-like carbon. Cut-off frequencies as high as 155 GHz have been obtained for the 40-nm transistors, and the cut-off frequency was found to scale as 1/(gate length). Furthermore, we studied graphene RF transistors at cryogenic temperatures. Unlike conventional semiconductor devices where low-temperature performance is hampered by carrier freeze-out effects, the RF performance of our graphene devices exhibits little temperature dependence down to 4.3 K, providing a much larger operation window than is available for conventional devices.

In Dexter Johnson's blog for Nanoclast dated April 11, 2011, which is on the *IEEE Spectrum* website (http://spectrum.ieee.org/nanoclast/semiconductors/nanotechnology/graphenes-use-in-rf-transistors-gets-a-boost-from-faster-and-easier-manufacturing-technique), he refers to Frank Schwierz, a device physicist at the Technical University of Ilmenau, Germany, who offered some context for the work:

"The approach of the IBM team is very interesting because it is compatible with common semiconductor processing," Schwierz is quoted as saying in the *Chemical & Engineering News* article cited

by Yanqing, et al. At this early stage, before the fabrication method has been optimized, Schwierz is cautious about calling the technique a breakthrough. "But it may turn out to be very useful in the future."

Will the graphene FET replace the silicon-based semiconductor? Not too likely. However, will it open new frontiers of even higher frequency and higher power reliable RF communications—possibly into the terahertz range? As indicated above, the research is under way. Perhaps we amateur radio operators can contribute to the scientific body of knowledge.

## Current Contests

**European Worldwide EME Contest 2012:** Sponsored by DUBUS and REF, the EU WW EME contest is intended to encourage worldwide activity on moonbounce. Information for this contest is available at the following website: <http://www.marsport.org.uk/dubus/>.

**Spring Sprints:** These short-duration (usually four hours) VHF+ contests are held on various dates (for each band) during the months of April and May. Please check <http://www.svhfs.org> for the latest information.

## Conference

**Southeast VHF Society**: The 16th annual conference will be hosted in Charlotte, North Carolina, April 20–21. For information on registering for the conference, please check the society's website at <http://www.svhfs.org/>.

## 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 conference organizer has announced calls for papers for its forthcoming conference:

**Central States VHF Society Conference:** Technical papers are solicited for the 46th annual Central States VHF Society Conference to be held in Cedar Rapids, Iowa. For more information please see the society's website: <http://www.csvhfs.org>.

## Meteor Showers

The *Lyrids* meteor shower is active during April 16–25. It is predicted to peak around 0530 UTC on April 22. This is a north-south shower producing at its peak around 10–15 meteors per hour, with the possibility of upwards of 90 per hour.

A minor shower and its predicted peak is $\eta$-*Puppids* (peak on April 24). Other April minor showers include the following and their possible radio peaks: April *Piscids*, April 20 and $\delta$-*Piscids*, April 24.

For more information on the above meteor shower predictions please see Tomas Hood, NW7US's propagation column, and visit the International Meteor Organization's website: <http://www.imo.net>.

## And Finally . . .

"Just a spoonful of sugar makes the electrons go fast." Or "Just a spoonful of sugar makes the silicon transistor go away." With apologies to Richard M. Sherman and Robert B. Sherman, I borrow a line from the *Mary Poppins*' song "A Spoonful of Sugar" to illustrate what I mean about the remote possibility of the silicon transistor being replaced by a spoonful of sugar.

While present manufacturing techniques have limited the development of graphene-based power FETs, there is still much opportunity for development with low-power applications such as pre-amps. In the meantime, I will be working on an article on graphene for a future issue of *CQ VHF* magazine and possible presentation as a paper at a future VHF-related conference. If you have something to contribute to the body of knowledge, please share it with me at: <n6cl@sbcglobal.net>.

Finally, don't forget to take your medicine with a spoonful of sugar. Who knows, you may be swallowing the next development of a graphene-based FET. Until next month . . .

73 de Joe, N6CL

BY TED MELINOSKY,* K1BV

# New Short-Term Awards for 2012

Each January it seems as if there is a flood of award activity celebrating special events that require contacts during the new year.

The fun of a short-term award lies in the fact that since the time factor to make contacts is limited, the sponsor (we hope) has lined up operators and stations for the event. Secondly, QSL cards are hardly ever required, since there is relatively little time for us to get them, so a log extract is all that's usually needed. Finally, for many countries interesting and rare prefixes are often activated and provide a feast for the WPX hunter. The range of topics being celebrated is wide, indeed. Some others that do not appear in this column Google them to find out more) include:

75th Anniversary of the building of the Golden Gate Bridge (USA May 2012)

650th Anniversary of Navrochat (Russia)

European Union Presidency (Denmark January–June 2012)

20th Anniversary of the 9A Prefix (Croatia 2012)

The Titanic 100th Anniversary Commemoration (Ireland 2012)

The month's column only scratches the surface by listing one very-short-term award and four other awards which have to be completed during the year 2012. If this stimulates your interest, I invite you to visit my home page: <http://www.dxawards.com>. It shows the latest additions to 2012 annual awards and short-time awards. Some of these are incredibly obscure, and some push the limits of weirdness. (What's weird for some of us, though, may be important for someone else.) Some are pretty interesting and will explain the odd prefixes sprinkled throughout the bands. Others are worth pursuing just for the fun of it.

## International Marconi Day Award

2012 marks the 25th anniversary of International Marconi Day. The Cornish Radio Amateur Club of England offers a certificate for working stations that are registered with the group and are operating from one of the many locations utilized by Guglielmo Marconi (1874–1937) for testing the capabilities of this new technology during the pioneering days of radio. The certificate is based on an original Marconi Stock Certificate used in the early 1900s.

During the period 0000–2359Z on 21 April 2012, contact at least 15 of the official award stations operating from fixed locations using CW, digital modes, or mixed modes. The same rule applies for SWLs, using mixed modes, except that only 10 stations have to be heard. A list of the stations that will be active is found on the club's website listed below.

Your application should show the award category that is claimed and must be made in writing, giving a full extract of your log data together with your name and address. If possible, another amateur should certify that the extract represents a true copy of the original log entries. Send this log extract plus fee of $US10 or 12 IRCs to: IMD Awards Manager, Cornish Amateur Radio Club, PO Box 100, Truro, Cornwall, TR1 1XP, England. Internet: <http://www.gb4imd.com/>.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

### USA-CA Honor Roll

**500**

| | |
|---|---|
| SP5AUB | 3558 |
| OE2LCM | 3559 |
| K2HJB | 3560 |
| JA3DAY | 3561 |
| YV5OIE | 3562 |

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.


*To commemorate the 25th anniversary of International Marconi Day, during the period 0000–2359Z on 21 April 2012, the Cornish Radio Amateur Club of England offers a certificate for working stations registered with the group and operating from one of the many locations utilized by Guglielmo Marconi (1874–1937) for testing the capabilities of this new technology during the pioneering days of radio.*

## All Bulgarian Saints Diploma 2012

I call this one the WPX Hunters Bonanza award. Over 80% of the population of Bulgaria is associated with the Bulgarian Orthodox Church. The certificate is a beautiful depiction of a religious theme which began as a series in 2011. I believe that the number in the callsign prefix is the number of years since the death of the saint or number of years since

canonization. Either way, each year guarantees a dozen new prefixes for the award hunter.

This award has been established by the Balkan Contest Club as an annual award to honor the memory of saints of the orthodox faith.

Requirements:

1. European stations need 10 different QSOs (SWL reports).

2. Stations outside Europe need 5 QSOs (SWL reports) with different memorial callsigns dedicated to Bulgarian Orthodox saints.

In 2012 there will be 12 different special callsigns activated by club members for the award:

1. LZ 1818 MOG from Jan. 1–30
2. LZ 1401 SET from Feb. 1–29
3. LZ 1784 SIB from Mar 1-31
4. LZ 1437 MGS from April 1–40
5. LZ 907 SKB from May 1–31
6. LZ 1515 PSB from June 1-30
7. LZ 1822 MIT from July 1–31
8. LZ 916 SS from Aug. 1–31
9. LZ 1737 SSS from Sept. 1–30
10. LZ 1814 MIS from Oct. 1–31
11. LZ 1620 PPZ from Nov. 1–30
12. LZ 1500 PNB from Dec. 1–31

The cost of the award is 10 IRCs (or 5 Euros) and it can also be obtained free of charge in electronic form by e-mail. Send applications to: <lz3ga@abv.bg>.

If a paper version of the certificate is desired, please send fee of 10 IRCs to P.O. Box 36, Karlovo, 4300 Bulgaria, or 5 Euros to the PayPal account via: <lz1zf@abv.bg>.

QSL cards are not necessary, only an extract from the log.

Only memorial callsigns will change, and the certificate can be obtained every year for QSOs within a period from January 01 through December 31 for the relevant year. Internet <http://www.balkanclub.org/awards.htm>; and QRZ page for LZ1818MOG.


ДИПЛОМА
"Всех Святих Българских"
Diploma
"All Bulgarian Saints"
№
Балканския спортен клуб
Balkan Sports Club
LZ1KZA
Издаден на / Issued to:

*This award has been established by the Balkan Contest Club of Bulgaria as an annual award to honor the memory of saints of the orthodox faith.*

## France's 10th Anniversary of the Euro Award

Here's an award dedicated to money. This one celebrates the 10th anniversary of the introduction of the Euro, a new currency in Europe that was effective 1 January 2002, as the official currency of some of the countries of Europe, replacing the Drachma, Mark, Franc, Kroon, Lira, Pesata, Shilling, and more. The Euro Award is sponsored by the Tulle Radio Club.

Travelers in most European countries no longer have to end up carrying small change in multiple currencies sometimes not valid at the next stop. 330-million residents of the 17 countries that use the Euro benefited from the change, even though some of the countries have recently shown financial weakness; this is still being worked out.

Contact or listen to one station from each of the member countries of the Euro zone for a total of 17 countries. Required countries: 5B Cyprus; 9H Malta; CT Portugal; EA Spain; EI Ireland; ES Estonia; DL Germany; F France; I Italy; LX Luxemburg; OE Austria; OM Slovak Rep.; ON Belgium; OH Finland; PA Holland; S5 Slovenia; SV Greece,

TM10E is a special event station commemorating the 10th anniversary of the Euro. Working TM10E gives you a wild card for the Euro Award. A contact with the station TM10E counts as a wild card in case you are missing two countries.

All bands and modes are accepted, except contacts made via repeater. QSOs must take place between 1 January 2012 and 31 December 2012. Applications for the award must be sent before 31 December 2013. Send only a log extract or QSO list; no QSLs are required. A lovely aluminum plaque measuring 23 × 18 cm is available. Cost of the plaque is 20 Euros, 25 IRCs, or $US25. Paypal accepted . Award manager: F5RBB, Verveche Patrice, F5RBB les Gouttes, 19800 Gimel les Cascades, France. E-mail: <f5rbb@wanadoo.fr>.

## Luxembourg's 75th Anniversary of the RL Award

The Luxembourg national society "RL" was founded in 1937 and proudly celebrates its 75th anniversary. It has a total of 383 active members. A special award, available to all amateurs and SWLs, is being offered to celebrate this occasion. Contact club station, headquarters station, and all other LX stations during the period January 1, 2012 to December 31, 2012. Make two-way contacts on the HF bands (160 through 10 meters, and 6 meters). Contacts made via active earth-bound reflectors, repeaters, and EchoLink do not count. There is no restriction on the mode used.

The award is available in three levels:

a. Bronze—100 points.


*The Luxembourg national society "RL" proudly celebrates its 75th anniversary. A special award, available to all amateurs and SWLs, is offered to celebrate this occasion.*

b. Silver—250 points.

c. Gold—500 points.

Point values:

Each contact with the club station LX75RL = 50 points.

Each contact with the Headquarters Station LX75HQ = 50 points. (LX75HQ is only active during the Headquarter contest.)

Each contact with any other LX station = 5 points.

Examples:

LX75RL on 7 MHz CW = 50 points.
LX75RL on 7 MHz RTTY = 50 points.
LX75HQ on 21 MHz CW = 50 points.
LX2A on 28 MHz SSB = 5 points.
LX9UN on 14 MHz = 5 points.
LX1JX on 50 MHz CW = 5 points.
Total Score = 215 points.

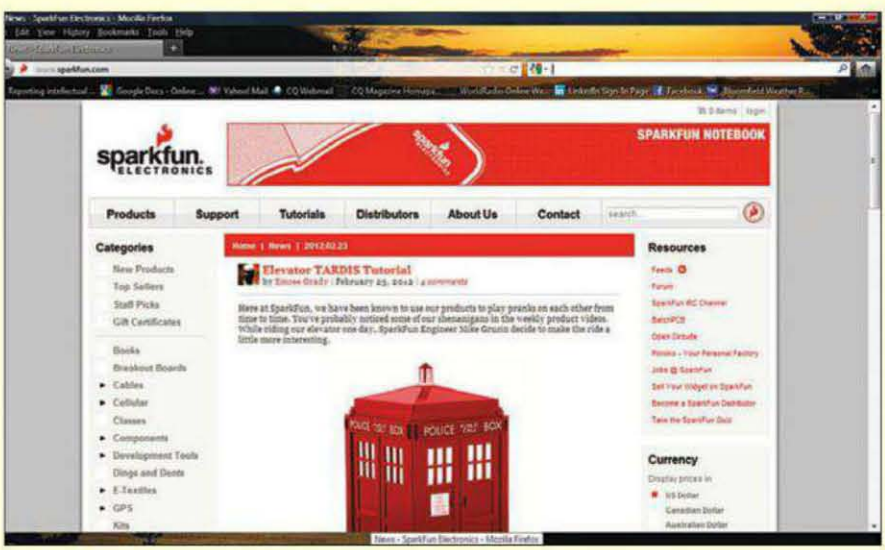
Applicants should submit a list showing the date, station worked or heard, time, frequency, and mode duly certified by two licenced radio amateurs or by the award manager of their society. Use the application form available on the RL website <www.rlx.lu> to apply. The application fee is $US8 or 5 Euros. Send applications to: Reseau Luxembourgeois des Amateurs d'Ondes Courtes, Award Manager, P.O. Box 1352, L-1013 Luxembourg. At the same time, send an e-mail to the award manager (e-mail address to be found on the website) to inform him that you sent your application by mail. The award will not be sent out before fall 2012, but applications may be sent earlier.

We are always interested in learning of new awards for publication in this column. Please contact me with details and a sample of the certificate.

73, Ted, K1BV

## *Oops...*

In February's "What's New" column, Photo B (p. 80) was supposed to be the homepage at <www.sparkfun.com>. Instead, the photo actually showed the accessories that come with the LTA Projects inflatable antenna tower, seen in Photo D. We apologize for the error. Sparkfun's actual homepage is seen here. *(Tnx to W1DTM for the catch)*



BY CARL SMITH,* N4AA

# DXpeditions, LoTW Update for CQ Awards, Anniversary of the *Titanic*

It's been a pretty exhausting few weeks at my QTH the end of January as I write this column. With all of the DXpeditions on the air, and from different directions, the rotor and band switches have been thoroughly exercised. By the time you read this, all of those operations will have ended, but they sure made a big impact on the bands for awhile.

## DXpeditions

Late last year Bill, VK4FW, and his friends made a lot of folks happy from **Tuvalu** as **T2T**, including me. Good job, folks. They also operated for a time from **Fiji** as **3D2T**.

**Malpelo Island** has been in the top tier of Most Wanted for several years now. It appears that the major operation by **HKØNA** will drop Malpelo far down that list for 2012 and beyond. Typically it takes about ten years for any major Most Wanted entity to climb back into the top tier again. I don't have any numbers for HKØNA, but suffice to say, a lot of folks were worked.

A four-man team went to famous **Pitcairn Island** in late January. Here's another one that needed some "attention" for bands and modes. Experienced DXpeditioners Jacques, F6BEE; Vincent, F4BKV; Michel, FM5CD; Gilles, VE2TZT; and Nigel, G3TXF, took a significant amount of equipment and used it well. They spent about 12 days on the island and logged some 53,400 QSOs. The really interesting part of this story is that they uploaded the logs to both ClubLog and LoTW while they were still on the island. We were able to see almost immediately if we were "in the log" and that is amazing. Thank you VP6T Team! You really "made our day."

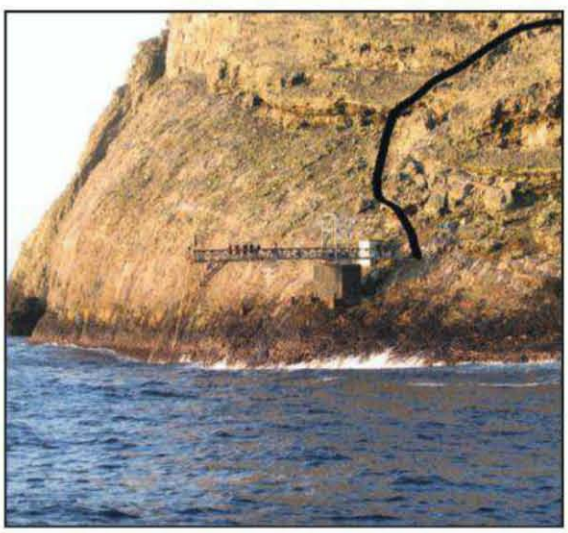
The HKØNA and Pitcairn Island operations were the most visible, but there were others going on as well. We had Vlad, UA4WHX, on the air from **Timor Leste** as **4WØVB**. Then there was the HA team on from **Nauru** as **C21HA**.

A team from Belgium along with PA3EWP went to the **Congo** for about ten days the end of January. They reported a QSO count of 50,545. The log was uploaded to Clublog shortly after the operation ended.

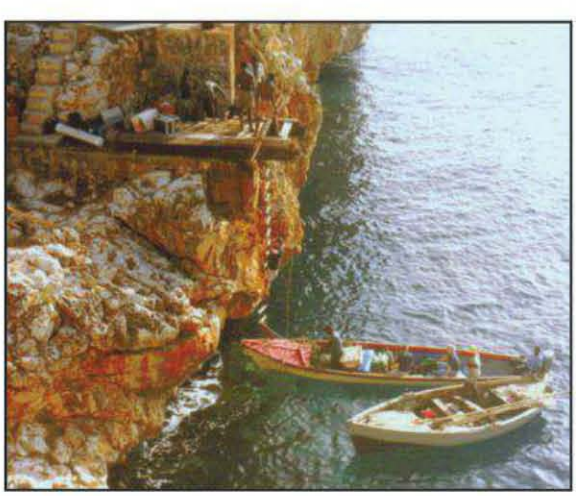
Laci, HAØNAR, went to **Wallis & Futuna** as **FWØNAR** and is busily working the bands as I write this.

Just announced in late January, an operation from **Annobon, 3CØE** is scheduled for mid-February. Obviously, that will be over by the time you read this, but I'll have something to follow up when it is available.

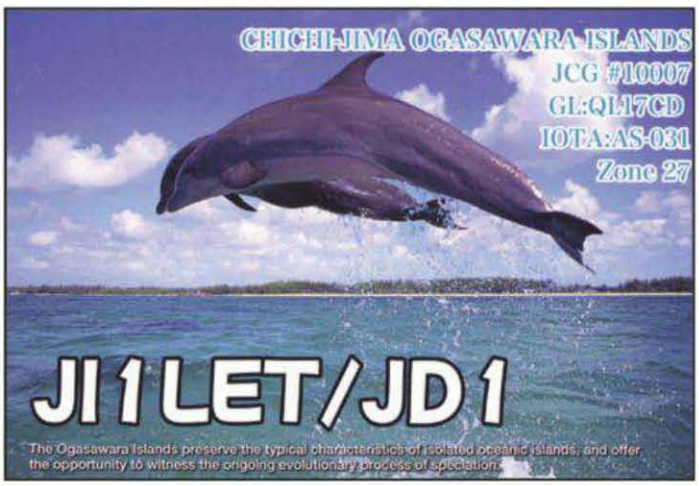
*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>



*All of the personnel and other material for the HKØNA DXpedition had to go up this rope ladder and across the cat walk just to get onto the island. For more photos of the hazards the team faced on Malpelo, see the website: <http://hk0na.com/>. Note the similarity to the access to Navassa in the other photo in this column. (Photo from the HKØNA website)*



*Although somewhat similar in appearance to the "landing site" on Malpelo, this is actually the landing site on Navassa Island. Randy, NØTG remembers it this way: "Twenty years ago this week we activated NAVASSA. . . . I am in the center watching Ron, AA4VK, climb the ladder. Murray, WA4DAN, had already climbed up and was on the island taking this picture. Haitian visitors on the island helped us get everything onto the island. We were lots younger then, hi". (Photo courtesy of Randy, NØTG)*




*QSL card for Koji-san, JI1LET, on Ogasawara. He will return to JD1 in April 2012. He runs 50 watts to a rotating multi-band dipole. (Photo courtesy of Koji, JI1LET)*

If it develops, an operation from **Spratly, 9MØL** is announced for April. At this time few details were available about it other than a website: <http://9m0l.legendchew.com/>.

## Jan Mayen, JX

This one may be hard to work in the future. Recently the Norwegian government declared most of Jan Mayen a nature reserve and banned landings and camping on most of the island. This means that tour operators no longer visit, since the main landing area is part of the reserve. The only places left on the island that could be used as landing and camp sites are in Kvalross-bukta and in Båtvika, in the very extreme (weather-wise) southern part of Jan Mayen. This will mean that most visits to the north part of the island (where previous landings occurred) will soon be impossible.

While radio amateur operations may still be possible from these two locations, which are difficult to get to (rough landing, very strong winds with sand storms, no access to any shelters or resources ,etc.), it now appears JX5O was probably the last major expedition to Jan Mayen and may well be for the coming years. It also seems that only professional, licensed staff members at the Olonkin base will be able to activate the island, with that in itself will be a rare occurrence.

*Note:* The OPDX news reported that Svein, LA9JKA, was expected to be based on the island beginning March 22nd, and is expected to stay until March 2013. QSL only direct to: Svein Rabbevag, Brendlia 12, N-6013 Alesund, Norway. Also, see details on QRZ.com for postage info.

## LoTW Support for CQ Awards

A major announcement for DXers came in late January when the ARRL and *CQ* magazine announced LoTW support for

## The WPX Program

**CW**

3273.....HA6IAY 3274.....WB5JID

**SSB**

3114.....HA6IAY 3116.....WB5JID
3115.....AA4BG

**Mixed**

2181.....NØVPL 2183.....KE5AKG
2182.....JI1DHY

**Digital**

72.....E75DNJ 73.....AE7KL

**CW:** 450 HA6IAY. 60 WB5JID. 2900 K9UQN. 3350 W8IQ. 4600 N6JV.
**SSB:** 400 HA6IAY, W5TTO. 600 WB5JID. 2350 DL8AAV.
**Mixed:**450 KE5AKG. 700 NØVPL. 1800 DH5MM. 3250 K9UQN. 4900 HA5DA.

**160 Meters:** WB5JID, LY3W
**80 Meters:** WB5JID, LY3W
**40 Meters:** WB5JID, LY3W
**30 Meters:** LY3W
**20 Meters:** WB5JID, LY3W
**17 Meters:** LY3W
**15 Meters:** WB5JID, LY3W
**12 Meters:** LY3W
**10 Meters:** WB5JID, LY3W

**Asia:** WB5JID, LY3W
**Africa:** WB5JID, LY3W
**Europe:** WB5JID, LY3W
**Oceania:** WB5JID, LY3W
**North America:** WB5JID, LY3W
**South America:** WB5JID, LY3W

**AWARD OF EXCELLENCE:** WB5JID, LY3W
**160 Meter Bar:** LY3W
**30 Meter Bar:** LY3W
**17 Meter Bar:** LY3W
**12 Meter Bar:** LY3W
**Digital Bar:** LY3W

**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, UTØFJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX, S58MU, UX1AA, AB1J, DM3FZN, AG4W, UA3QNS, RX3AGD.

**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, UR5FEO, N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, S58MU, UX1AA, DM3FZN, AG4W, UA3QNS, RX3AGD.

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. Other electronic QSL confirmation means are not accepted.

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are $6.50 each.

## 5 Band WAZ

**As of February 1, 2012, 8699 stations have attained the 200 zone level and 1758 stations have attained the 150 zone level.**

**New recipients of 5 Band WAZ with all 200 zones confirmed:**
W2LO

**The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):**

N7US, 199 (18)
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)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
N5AW, 199 (17)
JH7CFX, 199 (2)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10)
RX4HZ, 199 (13)
S58Q, 199 (31)
G3NKC, 199 (31 on 10)
K8PT, 199 (26)
N8AA, 199 (23)
HB9ALO (1)
IZ1ANU, 199 (1)
IN3ZNR, 199 (1)
IK4CIE, 199 (1)
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)
W4DC, 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)

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

ER3DX (175 zones)
WA2C (166 zones)

**5 Band WAZ updates:**

HB9ALO (200 zones)
LZ1JZ (200 zones)
K2FF (200 zones)
UT7EC (200 zones)
TF4M (170 zones)
ZL2AL (197 zones)
W2IRT (193 zones)
YO6HSU (164 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, 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>.

*CQ* awards. The full announcement can be found on the *CQ* website (www.cq-amateur-radio.com), so I won't repeat it here. Suffice to say that this is welcome news for DXers worldwide who wish to apply for various awards offered by *CQ*. At the time of this writing the announcement indicated that *only* the WPX award was being implemented initially, but that other awards … such as WAZ … would be forthcoming.

## The 100th Anniversary of the Sinking of the *Titanic*

Here's an interesting item for history buffs. The following announcement comes from the Wey Valley Amateur Radio Group in the UK.

"The sinking of the White Star Line's *RMS Titanic* on April 15, 1912 sent shock waves around the world. Now on the 100th anniversary of that event, those who perished in this disaster will be remembered during many commemorative events.

Within amateur radio we recognise that this event marked the first time that Morse code saved so many lives at sea. Jack Phillips (1887–1912) was the liner's Chief Marconi Wireless Operator. He perished only after sending distress signals in Morse right until the ship foundered, thereby saving hundreds of lives. Jack was from Godalming, Surrey, where his heroism is constantly recalled. A group of local radio amateurs commemorated his heroism on the 90th anniversary of the sinking by setting up a radio station in Godalming with the callsign GB90MGY. The letters 'MGY' were used by *RMS Titanic* for all its radio transmissions. Five years later, the Wey Valley Amateur Radio Group (WVARG), activated a similar commemorative station in Godalming, this time using GB95MGY.

"For the 2012 centenary a much larger project to honour Jack's memory will be mounted in Godalming by the Wey Valley club. From Tuesday 10th April (when *Titanic* sailed from Southampton), until the day of the sinking, Sunday 15th April, two transmitters will be manned continuously, with the special callsign GR100MGY (Godalming Remembers the Centenary of the Titanic Disaster). There will be a short pause in transmissions at 05.47 GMT on the Sunday, the time when distress messages ceased minutes before the liner sank. The transmitters will make contacts around the world, mostly in Morse code, targeting 15,000 two-way exchanges. Each contact may be confirmed with a specially printed card depicting *Titanic* and Jack Phillips.

"We offer our grateful thanks to Charterhouse for providing operating facilities at its excellent Godalming location, to Ofcom for allocating the special callsign, and to Waverley Borough Council and Godalming Town Council for their support and embodying this event in their commemorative programme.

"During Saturday 14th and Sunday 15th April, from 12.00 noon until 4.00 pm, the general public will be welcome to visit the station to observe the trans-


*From November 14–24, 2011, 9N7MD was on the air by the Mediterranean DX Club of Italy. It was a multi-national team with members from Italy, Israel, France, Mexico, Chile, Belgium, Indonesia, and the United States. They left some items for the new club station and to help get those new licensees on the air. Their story will be in an upcoming issue of* The DX Magazine. *(Photo courtesy of Ant, IZ8CCW)*

## The WAZ Program

**6 Meters**
109 ..... PE5T

**15 Meters SSB**
653 ..... K2MHE
654 ..... K3PT

**20 Meters SSB**
1204 ..... K3PT
1205 ..... WB6UQT

**12 Meters CW**
60 ..... IK4WMA
61 ..... K9EU

**17 Meters CW**
83 ..... K9UP
84 ..... IK4WMA

**30 Meters CW**
104 ..... IK4WMA

**40 Meters CW**
285 ..... JG3LGD

**80 Meters CW**
91 ..... HB9ALO

**160 Meters**
395 ..... WØDD (31 zones)
396KH2/N2NL (33 zones)

**160 Meter Updates**
W2YC ..... (40 zones)
UT7EC ..... (40 zones)

**All Band WAZ Mixed**

| | | | |
|---|---|---|---|
| 8871 | AB2SR | 8879 | WB4VMH |
| 8872 | ER3DX | 8880 | STØR |
| 8873 | DL6CNG | 8881 | YV5OIE |
| 8874 | PY3YD | 8882 | PAØJOD |
| 8875 | JA6CMQ | 8883 | TF2JB |
| 8876 | K9AAA | 8884 | JF1NIW |
| 8877 | SA7AUW | 8885 | JJ1NDP |
| 8878 | AJ4FM | | |

**SSB**

| | | | |
|---|---|---|---|
| 5194 | K5YKG | 5197 | WB4VMH |
| 5195 | MUØGSY | 5198 | JF1GYX |
| 5196 | SV8PKJ | | |

**CW**

| | | | |
|---|---|---|---|
| 658 | W1FA | 662 | JQ3MWA |
| 659 | VA5RI | 663 | DJ3XG |
| 660 | PAØQRB | 664 | OK5JM |
| 661 | VA2WT | | |

**RTTY**

| | | | |
|---|---|---|---|
| 223 | N6HY | 225 | YO6HSU |
| 224 | JA1UTZ | 226 | K6OO |

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>.

## CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 341 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. (Stickers for the 340 level are available.) Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochret, MN 56578-99604.

### CW

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NØFW | 341 | N7FU | 341 | DL3DXX | 341 | YU1AB | 340 | W4MPY | 334 | K5RT | 330 | WG5G/QRPp | | RA1AOB | 315 | N3RC | 292 |
| K2TQC | 341 | K4IQJ | 341 | N4NX | 340 | K8LJG | 339 | K5UO | 334 | JA7XBG | 330 | | 326 | WA4DOU | 314 | HB9DAX/QRPp | |
| WB4UBD | 341 | K4MQG | 341 | K4JLD | 340 | KA7T | 339 | N6AW | 334 | K6YK | 330 | OZ5UR | 323 | YO9HP | 314 | | 284 |
| K3UA | 341 | W8XD | 341 | K9BWQ | 340 | K3JGJ | 339 | HB9DDZ | 334 | K8SIX | 329 | K8ME | 324 | ON4CAS | 312 | K7CU | 283 |
| N4JF | 341 | N7RO | 341 | W7CNL | 340 | K7LAY | 338 | W7IIT | 334 | KE3A | 327 | W6YQ | 320 | N2LM | 311 | N2VW | 281 |
| K2FL | 341 | N5FG | 341 | N5ZM | 340 | PY2YP | 335 | G3KMQ | 332 | K6CU | 327 | W9IL | 319 | WD9DZV | 310 | K4EQ | 279 |
| WK3N | 341 | K4CN | 341 | K9IW | 340 | K9OW | 335 | K6LEB | 332 | KA3S | 326 | CT1YH | 318 | KT2C | 307 | 4Z5SG | 277 |
| K9MM | 341 | OK1MP | 341 | W7OM | 340 | K1FK | 335 | N7WO | 332 | IKØADY | 326 | KØKG | 318 | HA5LQ | 302 | WA2VQV | 277 |
| W4OEL | 341 | N4AH | 341 | N4MM | 340 | W6OUL | 335 | W1DF | 332 | EA5BY | 326 | EA3ALV | 317 | K4IE | 296 | | |
| EA2IA | 341 | F3TH | 341 | WØJLC | 340 | K2OWE | 334 | F6HMJ | 331 | | | | | | | | |

### SSB

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| XE1AE | 342 | K4IQJ | 342 | K5TVC | 341 | W7FP | 340 | VK4LC | 336 | KE3A | 334 | W1DF | 328 | RA1AOB | 310 | N3RC | 296 |
| NØFW | 342 | N5FG | 342 | W6BCQ | 341 | W4UNP | 340 | WS9V | 336 | N2VW | 334 | W9GD | 327 | G3KMQ | 310 | K2HJB | 296 |
| K6YRA | 342 | K4CN | 342 | VE2GHZ | 341 | K9IW | 340 | VE3MR | 336 | JA7XBG | 334 | W6OUL | 327 | XE1MEX | 310 | W9ACE | 292 |
| IK1GPG | 342 | OZ3SK | 342 | K2FL | 341 | N7WR | 340 | VE3MRS | 336 | N5YY | 334 | VE7SMP | 327 | AD7J | 310 | W6MAC | 290 |
| K2TQC | 342 | OK1MP | 342 | K9BWQ | 341 | W2FKF | 340 | AA4S | 336 | K5UO | 333 | VE7EDZ | 326 | IØYKN | 308 | N3KV | 290 |
| K4MZU | 342 | N4CH | 342 | W6DPD | 341 | W3AZD | 340 | PY2YP | 336 | K8ME | 333 | WØROB | 325 | XE1MW | 307 | K7CU | 288 |
| DJ9ZB | 342 | DL3DXX | 342 | W7OM | 341 | W7BJN | 339 | K9OW | 336 | K5RT | 332 | W4MPY | 323 | AA1VX | 306 | WD8EOL | 282 |
| WB4UBD | 342 | OZ5EV | 342 | W8ILC | 341 | W2CC | 339 | EA5BY | 336 | WØYDB | 332 | TI8II | 322 | W5GT | 306 | VE6MBT | 280 |
| N4JF | 342 | DU9RG | 342 | W9SS | 341 | K3LC | 338 | XE1J | 336 | WA4WTG | 332 | YO9HP | 322 | K4IE | 306 | WA2VQV | 279 |
| WK3N | 342 | N4MM | 342 | K9HQM | 341 | W4WX | 337 | OE3WWB | 335 | ZL1BOQ | 332 | KW3W | 322 | K4ZZR | 306 | IWØHOU | 278 |
| K4JLD | 342 | KE5K | 342 | KØKG | 341 | IØZV | 337 | N6AW | 335 | W9IL | 332 | N2LM | 321 | HB9DQD | 305 | WA5UA | 276 |
| N7BK | 342 | K5OVC | 341 | KZ2P | 341 | OE2EGL | 337 | IK8CNT | 335 | SV3AQR | 332 | XE1RBV | 319 | AE9DX | 305 | | |
| EA2IA | 342 | K3UA | 341 | YU1AB | 341 | W4ABW | 337 | EA4DO | 335 | CT1AHU | 330 | ON4CAS | 317 | 4Z5FL/M | 304 | | |
| K4MQG | 342 | VE2PJ | 341 | K7LAY | 340 | VE1YX | 337 | CT3BM | 335 | N1ALR | 330 | N8SHZ | 314 | K7SAM | 303 | | |
| K9MM | 342 | N4NX | 341 | K8LJG | 340 | EA3BMT | 337 | K8LJG | 335 | K7HG | 329 | IV3GOW | 314 | I3ZSX | 302 | | |
| K3JGJ | 342 | IN3DEI | 341 | YU3AA | 340 | IKØAZG | 337 | K1UO | 335 | KE4SCY | 328 | W6NW | 312 | 4X6DK | 299 | | |
| N5ZM | 342 | I8KCI | 341 | AB4IQ | 340 | VK2HV | 337 | HB9DDZ | 335 | K6GFJ | 328 | KU4BP | 312 | WD9DZV | 299 | | |
| N7RO | 342 | VE3XN | 341 | 4Z4DX | 340 | W8AXI | 336 | K8SIX | 334 | KD5ZD | 328 | KA1LMR | 310 | K7ZM | 298 | | |

### RTTY

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WB4UBD | 340 | NI4H | 340 | N5FG | 338 | N5ZM | 336 | OK1MP | 335 | K3UA | 333 | WK3N | 328 | K4CN | 326 | K8SIX | 298 |

## CQ DX Awards Program

### CW

1130.....VE3EK

### SSB

2580.....SV8PKJ 2581.....JO1GRR

### Endorsements

### CW

151.....K5ND 250.....VE3EK

### SSB

327.....VE3SMP

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. We recognize 342 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.

missions and to participate in this memorable commemorative event. Further information: Michael Shortland, GØEFO, <michaelgs1@talktalk.net>

"Some fifteen operators will man two 400 watt transmitters on the eight HF bands from 3.5 to 28 MHz , using directional antennas. Only CW will be used except on the open days, 14–15th April, when SSB will help the public to understand the operation. Activity on VHF is also planned. QSL information can be found at: <http://www.QRZ.com>.

"GR100MGY will be located at 0° 37' 18" West, 51° 11' 49" North, Locator IO91qe: Charterhouse, Hurtmore Road, Godalming, Surrey, GU7 2DX."

## More from the UK

Speaking of the UK, two major events are happening in the UK during 2012: the Diamond Jubilee of HRM Queen Elizabeth II and the London Olympic and Paralympic Games.

From May 5 to June 10, all individual and club license holders will have the option to apply for a "NoV" allowing the addition or substitution of the "Q" in place of the Regional identifier in their call. For example, G3VQO could become GQ3VQO, MMØFMF could become MQØFMF, and 2E1ZZZ could become 2Q1ZZZ.

Then, from July 21 to September 9, all individual and club license holders will have the option to apply for a "NoV" allowing the addition or substitution of the "O" in place of the Regional identifier in their call. For example, G3VQO could become GO3VQO, MMØFMF could become MOØFMF, and 2E1ZZZ could become 2O1ZZZ.

The prefix GB2012 will also be available for Special Event stations related to the Olympics, and four "flagship" stations will appear using the form 2012 following by a single letter.

*Note:* As these changes are subject to "NoV," any visitors to the UK operating under CEPT rules will have to use the standard options of M/ or MM/, etc.

## Projects Under Way

I would like to make note of two projects that are taking place:

One is the restoration of the club station (HSØAC) of the RAST in Thailand. The station was virtually destroyed by flooding in October 2011. Significant donations to help in the project have been made and are shown on the HSØAC website. For information on how you, too, can help go to: <http://www.qsl. net/rast/>. There also is a story by Charley Harpole, HSØZCW/K4VUD, about the disaster elsewhere in this issue of *CQ,* along with more information on how to help.

The second project is the establishment of a memorial club station in

Kathmandu, Nepal in memory of the late Father Moran, 9N1MM, who worked and lived there for many years. Satish, 9N1AA, is one of the primary "movers" in this project and has worked hard to re-establish the licensing for interested people in the country. In late 2011, a large number of citizens took the examinations and most passed, including many who passed a Morse code exam, too. They are now working to equip the club station, which they expect to be licensed as 9NØMM in honor of Father Moran. Anyone interested in helping to provide equipment for not only the club station, but also for some of the many new licensees, are encouraged to contact me, Carl Smith, N4AA, at <carl_n4aa@charter.net>. I have been the QSL manager for 9N1AA for many years and I have volunteered to manage QSLing for the club station as well as the new licensees.

Until next time, enjoy the chase and Have Fun! 73, Carl, N4AA

### QSL Information

H44MS via DL2GAC
H6VA via TI4SU
H7/AC8W via AC8W
H7/K8DD via K8DD
H7/KB8TXZ via KB8TXZ
H7/N8LJ via N8LJ
H75A via NI5DX
H81L via HP1RCP
HA/DL1DA via DL1DA
HA/ON6UU via ON6UU
HAØKHW via HAØHW
HA13ØHALLO via HA5KHC
HA2ØØCVM via HAØNAR
HA2Ø1ØS via HA1CW
HA3JB/3A via HA3JB
HA5ØØNAR via HAØNAR
HA8ØØNAR via HAØNAR
HA8Ø5BA via HA5BA
HBØ/DF1SR via DL2SBY
HBØ/DJ1AIB via DJ1AIB
HBØ/DJ8NK via DJ8NK
HBØ/DL1DA via DL1DA
HBØ/DL2LRT via DL2LRT
HBØ/DL2SBY via DL2SBY
HBØ/DL3OCH via DL3OCH
HBØ/DL5YL via DL5YL
HBØ/DL5YM via DL5YM
HBØ/HAØET via HAØHW
HBØ/HAØHW via HAØHW
HBØ/HAØKB via HAØHW
HBØ/HA4DX via HAØHW
HBØ/HA4GDO via HAØHW
HBØ/HA4XG via HAØHW
HBØ/HA6NL via HAØHW
HBØ/HA6PS via HAØHW
HBØ/HA6PX via HAØHW
HBØ/HA6ZV via HAØHW
HBØ/HA9AX via HAØHW
HBØ/HB3YDL via HB3YDL
HBØ/HB9AON via DJ2YE

*(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)*

GEORGE TRANOS,* N2GA

# Can You Hear Me Now?

Have you ever wondered why one station consistently gets through the pile-ups while others are left waiting? Even with many stations calling, some people have a knack of making their signals stand out from the crowd. If you're the one obtaining responses regularly, then your equipment and technique are putting you a step above the norm. What's the trick to getting others to hear you? Let's take a look at what works and what doesn't work.

## Let's Get Loud

If you are listening in your room to a song on your stereo and the volume is low, chances are only you will hear it. Turn up the music a bit and others in the house may hear it, too. Turn it up some more, and it might get deafeningly loud inside your house and maybe your neighbors will notice. They might want to come over to join the party, but they might just call the police to complain. The whole point, though, is that the louder you crank up the volume, the more people will hear you.

Amateur radio is like that, too. There are many ways to turn up the "volume" on your signal. One way is to increase your output power. Instead of running 100 watts, use a linear amplifier that can put out 1000 watts or more. This is a substantial increase in power and one that will surely get you noticed. If you double your power, your signal will increase by 3 decibels (dB). Double your power again, and you have increased your power by 6 dB, which is approximately one S-unit for the receiver on the other side of the communication. In the example above, by increasing your power from 100 watts to a kilowatt, you've made almost a two S-unit difference in your received signal. *(See more about power and S-units, in the opposite direction, in this month's "Learning Curve" column elsewhere in this issue—ed.).*

While at first this may appear to be a great way to make yourself heard, there are drawbacks. One thing immediately apparent is that the increased gain is made in one direction only—the transmitter. You will not hear any better by increasing your transmitter power. Others may hear *you* better, but you might get significantly better results by investing in antenna gain before adding higher power output.

## A Two-Way Street

Improving your antenna system will yield gain on both transmit and receive. Directional antennas such as Yagis and quads can provide gain in a specific direction. Effective radiated power (ERP) of a directional antenna can appear to increase the transmitter output power using the antenna gain as a multiplier. Vertical antenna arrays can also increase gain in a desired horizontal direction by concentrating power in that plane and suppressing it at other unwanted angles of radiation. The side benefit of this is that you will hear and be heard better in the favored direction while the other directions are nulled.

Depending upon the antenna, you might be able to rotate the antenna to change its favored direction. Other gain antennas may be fixed on a specific target population or be switched to two (or more) permanent directions. This will allow you to change or peak the signal coming from specific locations. In a contest this is invaluable. By peaking the signal, the station on the other end can hear you better and you'll be more likely to make or maintain contact.

## Antenna Considerations

Many things factor into obtaining the correct directional antenna for your specific needs. You must

### Calendar of Events

| | |
|---|---|
| **All year** | **CQ DX Marathon All Year (http://bit.ly/vEKMWD)** |
| **Mar. 24–25** | **CQ WW WPX SSB Contest (http://bit.ly/hKqJjG)** |
| Mar. 31–Apr.1 | Missouri QSO Party (http://www.w0ma.org/mo_qso_party.htm) |
| Apr. 7–8 | SP DX Contest (http://www.spdxcontest.info/reg/reg_g.html) |
| Apr. 14 | European CW Sprint (http://bit.ly/vRY3rd) |
| Apr. 14–15 | JIDX CW Contest (http://jidx.org/jidxrule-e.html) |
| Apr. 14–15 | Georgia QSO Party (http://georgiaqsoparty.org) |
| Apr. 14–15 | Yuri Gagarin International DX Contest (http://gc.qst.ru/en/section/32) |
| Apr. 15 | ARRL Rookie Roundup, SSB (http://www.arrl.org/rookie-roundup) |
| Apr. 20–21 | Holyland DX Contest (http://www.iarc.org/iarc/en/Contests#holyland) |
| Apr. 21 | European SSB Sprint (http://bit.ly/vRY3rd) |
| Apr. 21–22 | Michigan QSO Party (http://www.miqp.org/Rules.htm) |
| Apr. 21–22 | Ontario QSO Party (http://www.va3cco.com/oqp/rules.htm) |
| Apr. 21–22 | YU DX Contest (http://www.yu1srs.org.rs/dl/yudx/yudxmain.html) |
| Apr. 28–29 | 10-10 Spring Digital Contest (http://bit.ly/ywiHkN) |
| Apr. 28–29 | SP DX RTTY Contest (http://www.pkrvg.org/zbior.html) |
| Apr. 28–29 | Helvetia Contest (http://bit.ly/s4KB2b) |
| Apr. 28–29 | Florida QSO Party (http://www.floridaqsoparty.org/rules.html) |
| Apr. 28–29 | Nebraska QSO Party (http://www.hdxa.net/neqso/index.htm) |
| **May 26–27** | **CQ WW WPX CW Contest (http://bit.ly/hKqJjG)** |

*P.O. Box 657, Copiague, NY 11726
e-mail: <n2ga@cq-amateur-radio.com>

*Phil Lewis, N2MUN, of Lindenhurst, New York, makes himself heard during contests even though he lives on a small suburban lot and doesn't have a massive station.*

decide on which amateur band or bands you would like to use the antenna. The physical size of the antenna must be appropriate to your needs and available space. You must have an antenna support structure that will hold the antenna securely in place and someone to install the antenna safely. Finally, the antenna must be priced to fit your budget.

The type of antenna you choose might be dictated by aesthetic or practical reasons. A Yagi is the most common gain antenna chosen by amateurs, but you might consider a cubical quad, multi-element delta loop, or vertical array instead. The number of elements and element spacing also will help determine the antenna's gain. The front-to-back ratio will show the difference in gain between the maximum forward gain and the gain from the exact opposite direction. The front-to-side ratio will show the difference in gain between the maximum forward gain and the gain from 90 degrees to the side. This should be high, as the signal from the side should be nulled as much as possible.

Multi-band antennas are quite popular. The most commonly used for the amateur HF bands is the triband Yagi (or tribander). This antenna covers three of the more popular HF bands—10, 15, and 20 meters. Most are fed with a single coax feedline. There are many companies that make this type of antenna. Three-element tribanders are common, effective, and reasonably priced. They provide a lot of value for the money. Some multi-band antennas come with multiple feed lines (one per band) and may actually be monoband antennas interlaced on a common boom. These antennas tend to have higher gain but may be more expensive.

In general, buy the biggest antenna

you can physically fit in the space and budget you have available. For the average contester, jumping from a dipole antenna to a directional antenna will be the most effective use of your resources to improve your station effectiveness. With a tribander and 100 watts, most amateurs will be able to work what they hear. This type of station is much more effective in contests than those using strictly dipoles or simple verticals.

## Operating Strategies

Being heard is not all about hardware. The operator can and does play an important role in making a contact quickly. You must hear the station in order to work it, so don't call unless you clearly hear the other station. Listen to the rhythm of the calling station's operator. If he (or she) is running a pile-up, can you hear the stations he is coming back to? Where is he calling in relation to the transmitting station? Is he calling right on frequency or is he offset slightly? Does the desired station change its listening frequency or remain in the same place? What type of response indicates he is ready to receive a call? The answers to these questions will greatly help you get through.

Timing is also crucial to communication effectiveness in pile-ups. If everyone calls at once, you might be more effective if you delay your call slightly so you will be out in the clear after the first wave of callers stop. Calling slightly off frequency can also make your signal stand out. Try to find the unique characteristics of the station and fit into the pattern that it's using.

*This is Phil's main HF antenna, a Force 12 C3SS Yagi mounted on a small roof tower. An antenna like this is a significant upgrade over a dipole. Upgrading wire antennas to a directional beam will make your signal more readable in contests.*

## Now Hear This

Being heard is essential to communication. However, don't be an alligator—all mouth and no ears—as this prevents everyone from making contacts efficiently. Incessant calling is not only annoying but it disrupts other contacts. If you do not hear your callsign, do not transmit on top of an existing exchange! This is rude and poor operating practice. Please be a considerate operator and stand by in a pile-up if the person responds to someone else.

There are many things you can do to make your signal stand out. Build, purchase, or install the best antenna you can. If you have a directional antenna, point it in the direction of the station you want to work. Increase transmitter power (within your desired power category) or use an amplifier (if in the high-power category). Hone your operating skills. Listen first and then transmit at the most opportune time to maximize your chance of the other station hearing you. If you do all of this, you'll get more responses to your calls, make better use of your time, and put more stations in your log. This should help increase your score and more importantly, your enjoyment. Then it will be a lot easier to know, "Can you hear me now?"

73, George, N2GA

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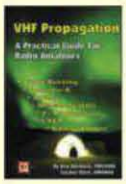


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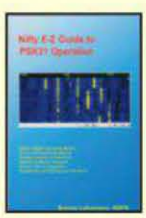

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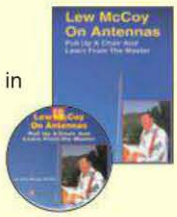


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BY TOMAS HOOD,* NW7US

# The Season of Lights

### A Quick Look at Current Cycle 24 Conditions

*(Data rounded to nearest whole number)*

**Sunspots**
Observed Monthly, January 2012: 58
Twelve-month smoothed, July 2011: 57

**10.7 cm Flux**
Observed Monthly, January 2012: 133
Twelve-month smoothed, July 2011: 115

***Ap* Index**
Observed Monthly, January 2012: 6
Twelve-month smoothed, July 2011: 7

### *One Year Ago:* A Quick Look at Solar Cycle Conditions

*(Data rounded to nearest whole number)*

**Sunspots**
Observed Monthly, January 2011: 19
Twelve-month smoothed, July 2010: 17

**10.7 cm Flux**
Observed Monthly, January 2011: 84
Twelve-month smoothed, July 2010: 80

***Ap* Index**
Observed Monthly, January 2011: 4
Twelve-month smoothed, July 2010: 6

### LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for April 2012

| | Expected Signal Quality | | | |
|---|---|---|---|---|
| Propagation Index..... | (4) | (3) | (2) | (1) |
| Above Normal: 22 | A | A | B | C |
| High Normal: 1, 4-7, 11 24, 28 | A | B | C | C-D |
| Low Normal: 8, 12, 14, 17-21, 23, 25-27 | B | C-B | C-D | D-E |
| Below Normal: 3, 9, 30 | C | C-D | D-E | E |
| Disturbed: 2, 10, 13, 15-16, 29 | C-D | D | E | E |

*Where expected signal quality is:*
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

### HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 2 will be fair (C) on April 1st, and on April 2nd no opening is expected, while on April 3rd expect poor (D) to fair (C) conditions, 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.

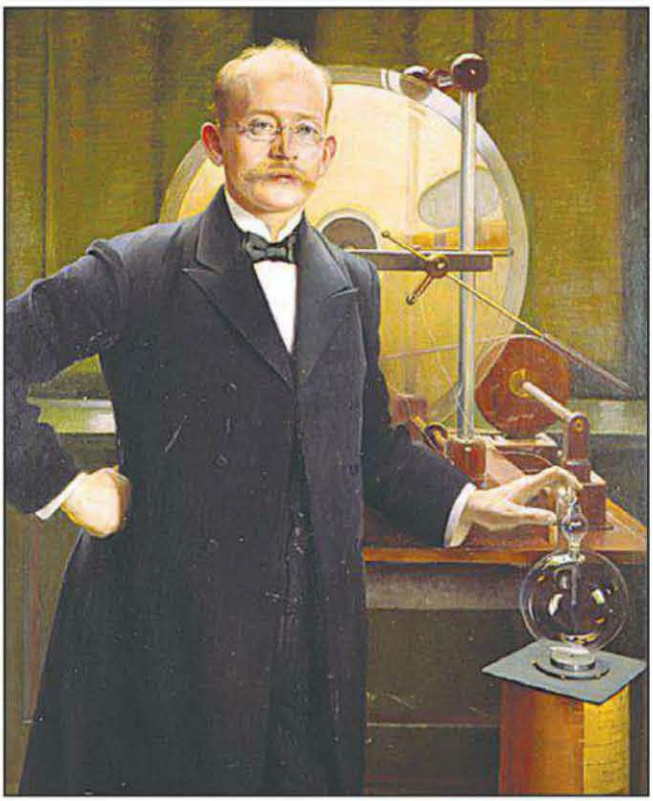
One man's garbage is another's treasure. Space weather and the state of Earth's geomagnetic field might be thought of in the same way. That which degrades HF (high frequency) radio propagation might create conditions for useful VHF (very high frequency) radio propagation. During times of minor to severe geomagnetic storm activity, the ionosphere loses its ability to refract HF. At the same time, however, high geomagnetic activity causes auroral substorms that create areas of ionization capable of reflecting VHF signals.

Auroral observations over the last 100 years reveal that peak periods of radio aurora occur close to the equinoxes—that is, during the months of March and April, and again in September and October. Of the two yearly peaks, the greater peak, in terms of the number of contacts reported, occurs during October. However, some of the strongest levels of geomagnetic storms are in the spring. The yearly minimum activity occurs during the months of June and July, with a lesser minimum during December.

Aurora is a direct result of solar plasma interacting with gases in the upper atmosphere. Geomagnetic storms develop when strong gusts of solar wind or coronal mass ejections (CMEs) hit the Earth's magnetosphere in just the right way (see last month's column for an in-depth look at CMEs). The magnetosphere is filled with electrons and protons that normally are trapped by lines of magnetic force that prevent them from escaping to space or descending to the planet below. The impact of a CME breaks loose some of those trapped particles, causing them to rain down on the atmosphere. Gases in the atmosphere start to glow under the impact of these particles. Different gasses give out various colors. Think of a neon sign and how the plasma inside the glass tube, when excited, glows with a bright color. These precipitating particles mostly follow the magnetic field lines that run from Earth's magnetic poles, and are concentrated in circular regions around the magnetic poles called "auroral ovals." These bands expand away from the poles during magnetic storms. The stronger the storm, the farther these ovals will expand. Sometimes they grow so large that people at middle latitudes, like California, can see these "Northern Lights."

When active aurora is seen in the auroral zone, a strong magnetic disturbance usually is also observed there. These disturbed magnetic fields often are much stronger than those of a geomagnetic storm but are strictly local, fading away quickly as one moves equator-ward. This suggests that the currents disturb the magnetic field flows somewhere nearby—probably near the auroral arcs. The Norwegian physicist Kristian Birkeland (whose portrait appears on Norwegian currency) carefully observed auroral disturbances and concluded that the currents flow parallel to the ground, along the

*e-mail: <nw7us@nw7us.us>



*Kristian Olaf Birkeland (13 December 1867 – 15 June 1917) was a Norwegian scientist. He is best remembered as the person who first elucidated the nature of the Aurora Borealis. In order to fund his research on the aurorae, he invented the electromagnetic cannon and the Birkeland-Eyde process of fixing nitrogen from the air. Birkeland was nominated for the Nobel Prize seven times. (Credits: Asta Nørregaard, 1853–1933, Norwegian Portrait of Kristian Birkeland, industrialist, 1900. Belongs to Hydro company, Oslo/Wikimedia Commons)*

auroral formation. Because electrical currents must flow in a closed circuit, and because these magnetic disturbances seemed to be caused by processes taking place in distant space, Birkeland proposed that the currents came down from space at one end of an arc and returned to space at another end.

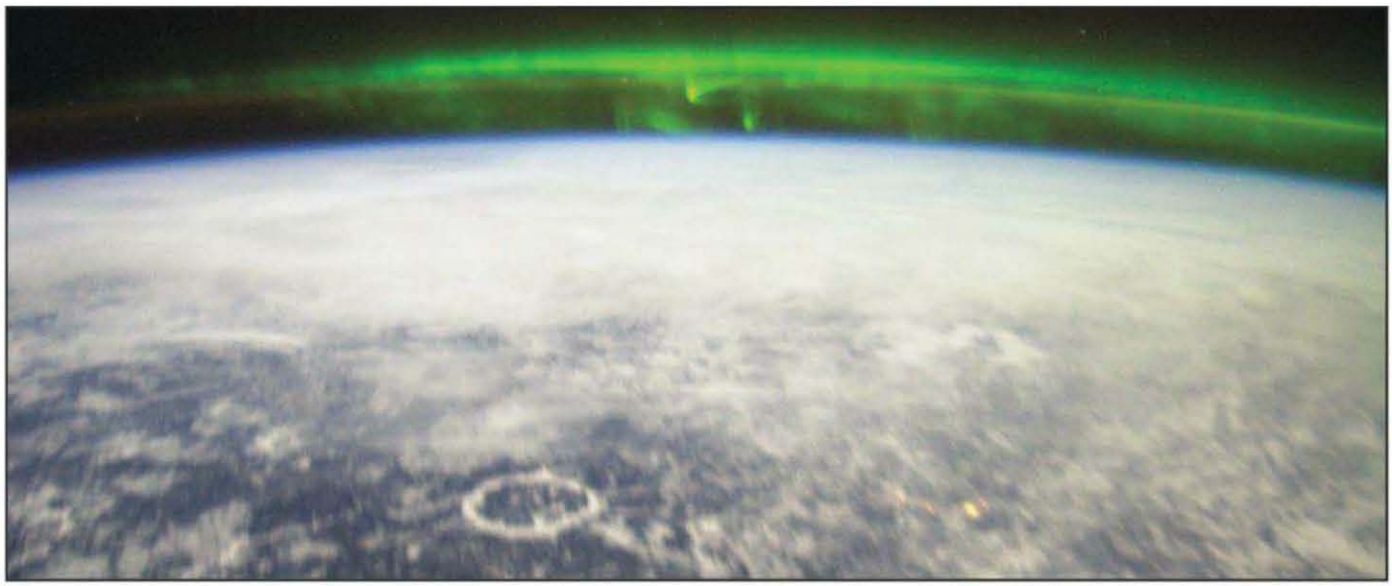
In 1910 Birkeland performed a series of experiments to reproduce many of the characteristics of the aurora that he observed during his expeditions. He placed an electromagnetic sphere, coated with fluorescent paint, inside a vacuum chamber and projected a beam of electrons at the sphere. This enabled him to view the trajectories of streaming electrons. Birkeland was able to accurately reproduce how solar wind would make its way into the Earth's magnetic poles, and was able to simulate the auroral ovals near the Earth's magnetic poles.

Finally, in 1954, auroral electrons were actually observed by sensors aboard a rocket launched into an aurora by Meredith, Gottlieb, and Van Allen, of Van Allen's team at the University of Iowa. The Van Allen team discovered Earth's radiation belts, now called the Van Allen Belts.

Continual research has revealed that aurora is caused by the large-scale interaction between the Earth's magnetic field and the solar wind. The magnetic field around the Earth, called the "magnetosphere," is distorted by a flow of charged particles, mainly protons and electrons, which flow away from the Sun. This flow is called the "solar wind," which also contains magnetic field lines. On the windward side, the side mostly facing the Sun, a bow shock is formed, while on the leeward, opposite side, the magnetosphere is dragged out into a long tail. This magnetosphere acts as a giant shield around the Earth, blocking the solar-wind particles. However, there are distinct regions in the magnetosphere where solar-wind particles may enter the Earth's upper atmosphere. Solar-wind particles can enter directly via the dayside cusps, or, having been trapped in the plasma sheet around the Earth, they can enter via the enclosed magnetic field lines at the polar auroral oval on the night side.

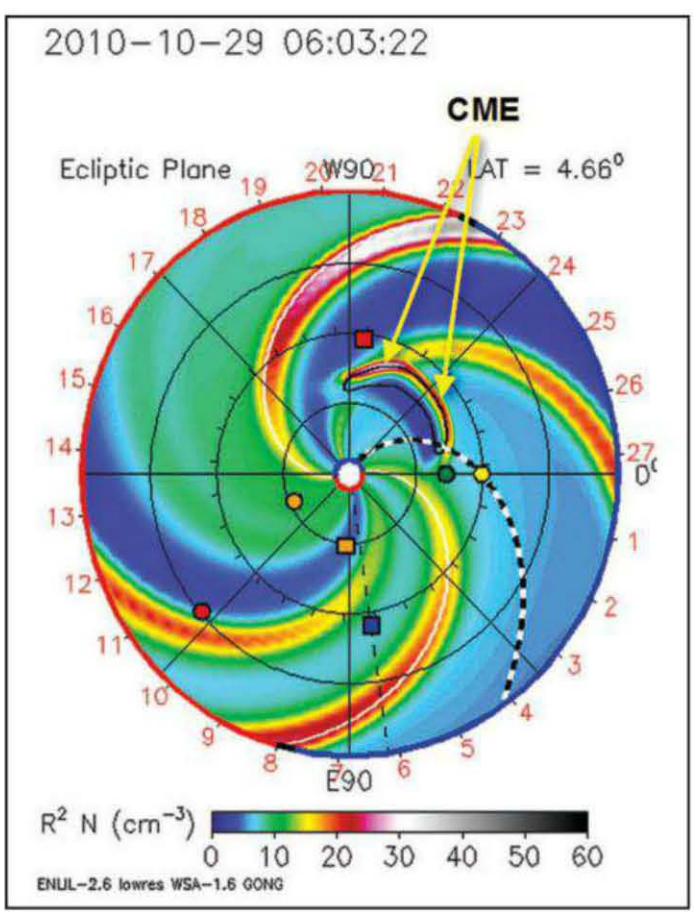
In 1961, Dr. Jim Dungey of the Imperial College, United Kingdom, predicted that cracks might form in the magnetosphere when the solar wind contained a magnetic field that was oriented in the opposite direction of a portion of the Earth's field. He postulated that the two magnetic fields would interconnect through a process known as "magnetic reconnection" and form a crack in the shield through which the electrically charged particles of the solar wind could flow. In 1979, Dr. Goetz Paschmann, of the Max Planck Institute for Extraterrestrial Physics, Germany, detected these cracks using the ISEE (International Sun Earth Explorer) spacecraft. Early in the 2000s, the IMAGE (Imager for Magnetopause to Aurora Global Exploration) satellite, along with the 4-satellite Cluster constellation that flies far above IMAGE, revealed the direct correlation between a proton aurora (non-visible) and the flow of ions through these cracks.

All of this takes place within an area known as the "auroral oval." These are rings of a radius roughly 1500 miles, centered on the Earth's geomagnetic poles (not on the geo-



*The Aurora Borealis (Northern Lights) occurs in the* E *region of the ionosphere, the same region in which sporadic-*E *propagation occurs. (Credit: NASA)*

graphical pole, nor even magnetic poles). The geographic North Pole is located at 90 degrees north latitude and is the point where the lines of longitude converge. The magnetic North Pole is located roughly at 73.5 degrees north latitude and 100 degrees west longitude, near Resolute Bay, Canada.



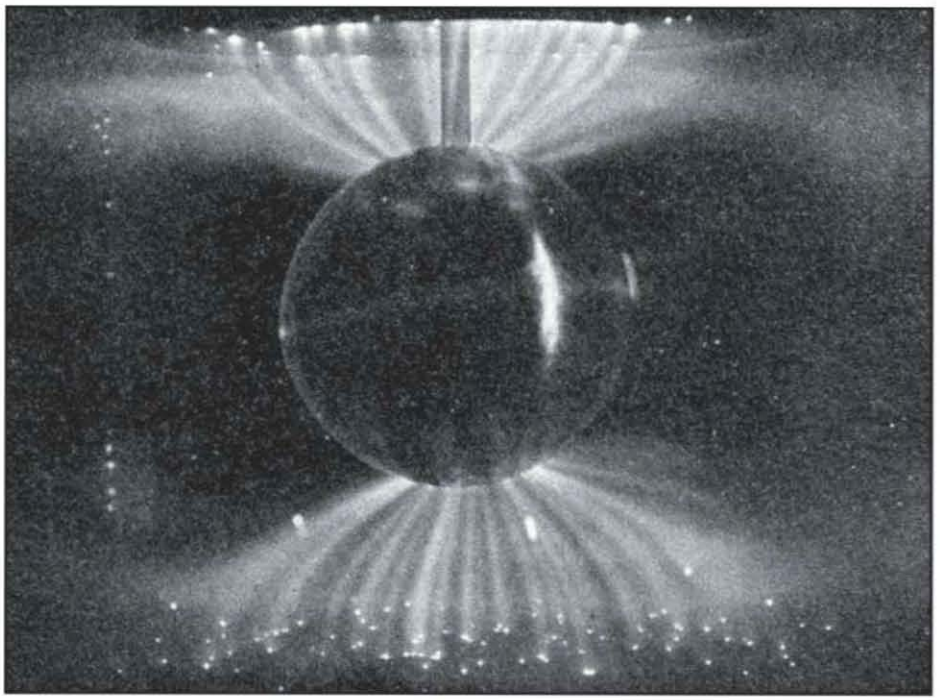

*A snapshot of the special modeling analysis tool that allows scientists to predict the passage of an interplanetary CME (coronal mass ejection). The snapshot is from the perspective of STEREO-A (the "Ahead" spacecraft) and reveals the "Parker Spiral" (see text). (Source: NASA)*

This is the point where magnetic medians converge. The geomagnetic pole, however, which is the center of the auroral oval, is located at the northwest tip of Greenland at 78.5 degrees north latitude and 69 degrees west longitude. It is the northern axis of the mathematical field of closest fit to the actual magnetic field of the Earth. Using this geomagnetic pole, we define a set of latitude and longitude coordinates, known as the geomagnetic coordinates. The auroral oval during average solar activity lies in a ring between about 70 and 75 degrees north geomagnetic latitude, and can grow during geomagnetic storms and shrink during very quiet geomagnetic activity periods, extends farther south on the night side than on the day side. This means that as the Earth rotates beneath the aurora, a given location will be nearer the oval at night than during the day.

In the early 1970s scientists recognized a connection between the component of the IMF (interplanetary magnetic field) that lies along Earth's magnetic axis (known as B sub z [$B_z$]) and Earth's changing seasons: The average size of $B_z$ is greatest each year in early spring and autumn. So why do these storms increase in strength and number during spring and autumn?

Last month we touched on the "Parker Spiral": As the Sun rotates (one full rotation occurs about every 27 days), the plasma spewing out from the Sun forms into this spiral shape known as the Parker Spiral (named after the scientist who first described it). This solar wind carries with it an interplanetary magnetic field, which ever expands away from the Sun in this spiral. Think of one of those rotating lawn sprinklers with jets of water shooting away from the center. You can see a bending or curving of the water lines. As the Earth moves around the Sun, these spiraling solar winds sweep into Earth's magnetosphere. How the magnetic field lines in the solar wind interact with the magnetic field lines of the magnetosphere is the key to geomagnetic storms and aurora.

At the magnetopause, the part of our planet's magnetosphere that fends off the solar wind, Earth's magnetic field points north. If the IMF tilts south (i.e., $B_z$ becomes large and negative), it can partially cancel Earth's magnetic field at the point of contact. This causes the two magnetic fields (Earth's and the IMF) to link (think of how two magnets link with one magnet's south pole connecting with the other's north pole), cre-



*Auroral-like Birkeland currents created by scientist Kristian Birkeland in his terrella, featuring a magnetised anode globe in an evacuated chamber. (Source: from the book "The Norwegian Aurora Polaris Expedition 1902–1903, Volume 1: On the Cause of Magnetic Storms and The Origin of Terrestrial Magnetism," Section 2, Chapter VI, p. 667 [published in 1913], by Kristian Birkeland [1867–1917]/Wiki Commons)*

ating a magnetic field line from Earth directly into the solar wind. A south-pointing $B_z$ opens a window through which plasma from the solar wind and CME can reach Earth's inner magnetosphere, bombarding the gasses of the upper atmosphere.

Earth's magnetic dipole axis is most closely aligned with the Parker spiral in April and October. As a result, southward (and northward) excursions of $B_z$ are greatest then. This is why aurora is most likely and strongest during the equinoctial months. When we are in the peak of a solar cycle and in the year or so after a peak, solar activity is very high. The amount of solar wind and plasma is large at this point in the cycle, causing very dramatic and spectacular auroral light shows.

When the molecules and atoms are struck by solar-wind particles, the stripping of one or more of their electrons ionizes them to such an extent that the ionized area is capable of reflecting radio signals at very high frequencies. This ionization occurs at an altitude of about 70 miles, very near the *E*-layer of the ionosphere. The level of ionization depends on the energy and number of solar-wind particles able to enter the atmosphere.

While correlations exist between visible and radio aurora, radio aurora could exist without visual aurora. Statistically, a diurnal variation of the frequency of radio aurora contacts has been identified and suggests two strong peaks, one near 6 PM and the second around midnight, local time.

VHF auroral echoes, or reflections, are most effective when the angle of incidence of the signal from the transmitter, with the geomagnetic field line, equals the angle of reflection from the field line to the receiver. Radio aurora is observed almost exclusively in a sector centered on magnetic north. The strength of signals reflected from the aurora is dependent on the wavelength when equivalent power levels are employed. Six-meter reflections can be expected to be much stronger than 2-meter reflections for the same transmitter output power. The polarization of the reflected signals is nearly the same as that of the transmitted signal.

The *K*-index is a good indicator of the expansion of the auroral oval and the possible intensity of the aurora. When the *K*-index is higher than 5, most of us in the northern states and in Canada can expect favorable aurora conditions. If the *K*-index reaches 8 or 9, it is highly possible for radio aurora to be observed by stations as far south as California and Florida.

Look for aurora-mode propagation when the *Kp* rises above 4, and look for visual aurora after dark when the *Kp*rises above 5. The higher the *Kp*, the more likely you are to see the visual lights. However, you don't have to see them to hear their influence on propagation. Listen for stations from over the poles that sound raspy or fluttery on frequencies above 28 MHz, possibly up as high as 440 MHz. Sometimes aurora will enhance a path at certain frequencies; other times it will degrade the signals. Sometimes signals will fade quickly and then come back with great strength. The reason for this is that the radio signal is being refracted off the more highly ionized areas that are lit up. These ionized areas ebb and flow, thus the ability to refract changes, sometimes quickly. I've observed the effect of aurora and associated geomagnetic storminess even on lower HF frequencies.

Expect an increase in geomagnetic storms, and auroral activity, as we move from March into April. I have a wealth of links at <http://aurora. sunspotwatch. com/> that provide up-to-the-minute aurora information and data. On my web page you can watch the $B_z$ as it changes from positive (northward) to negative (southward) during the Earth's passage through the solar-wind stream.

## April HF Propagation

As we move into spring in the Northern Hemisphere, we experience great DX openings from around the world on HF. This is because the Sun is mostly overhead over the equator, creating equal day and night periods in both hemispheres. The Vernal Equinox, which will occur at about 0514 UTC on March 20, 2012, marks the day when the hours of daylight and darkness are about equal around the world. This creates an ionosphere of similar characteristics throughout more of the world than is possible during other times when it is summer in one hemisphere and winter in the other, and there are extreme differences in the ionosphere. This equalization of the ionosphere which takes place during the equinoctial periods (autumn and spring) is responsible for optimal DX conditions and starts late in February and lasts through late April. The improvement in propagation is most noticeable on long circuits between the Northern and Southern Hemispheres. During this season conditions are also optimal for long-path as well as short-path openings, and during gray-line twilight periods associated with sunrise and sunset.

Expect fewer openings on the higher shortwave frequencies compared to the

openings seen during the winter months. However, with the sunspot cycle slowly moving to a higher state of activity (ranging from a smoothed sunspot number of just over 110 to 150), the frequencies from 15 to 10 meters should provide occasional *F2*-region openings through the end of April. If openings occur on these higher bands, expect good DX openings from most areas of the world during the hours of daylight. While normal seasonal changes in propagation will result in fewer east-west openings, conditions toward southern and tropical areas are expected to hold up very well. Look for peak signal levels to most areas of the world during the late afternoon hours.

Expect 15, 17, and 20 meters to be excellent bands for daylight DX during April. These bands should be reasonably active, with DX signals from just after sunrise to well beyond sunset. Signals should be strongest to most areas of the world during the afternoon hours, but look for good, solid openings toward the southern and tropical areas well into the early evening hours.

Thirty meters is expected to provide possible 24-hour DX for many days of the month. The strongest signals, with DX openings to just about every area of the world, should occur during a two-hour window after local sunrise and again during the late afternoon and through the evening hours to as late as midnight.

Shorter hours of darkness and increasing static levels in the Northern Hemisphere will result in somewhat poorer DX conditions on the mid to low shortwave bands as we move closer to summer. Nevertheless, strong, stable signals should be possible to many areas of the world on 40 meters during the hours of darkness, but try 60 meters, too. Signals should peak from an easterly direction about an hour or two before midnight and from most other directions about an hour or so before local sunrise at the USA end of the path. Some fairly good DX should also be possible on 80 meters during the hours of darkness. Propagation patterns on 80 meters should be similar to those observed on 40 meters, but openings will be weaker and noisier. There is a chance for some DX openings on 160 meters during the hours of darkness, but expect to encounter increasingly high static levels. Thunderstorm activity is expected to increase during April in the Northern Hemisphere, and this should add to the static levels on all HF bands, but especially on 40 through 160 meters.

Check both long- and short-path openings during the sunrise and sunset periods on all bands between 10 and 160 meters for all paths between the Northern and Southern Hemispheres.

For short-skip openings up to approximately 250 miles, check 80 meters during the day and 160 meters at night. For distances between 250 and 750 miles, 30 and 40 meters should be the best during the day, 40 and 80 meters from sundown to midnight, and 80 meters from midnight to sunrise. For openings between distances of 750 and 1300 miles, try 20 meters during the day, with 30, 40, 60, and 80 meters best during the hours of darkness. Between 1300 and 2300 miles check 15, 17, and 20 meters during the day; 20, 30, and 40 meters from sundown to midnight; and 40 meters from midnight to sunrise. Short-skip openings beyond 1300 miles may also be possible on 10 and 12 meters during most of the afternoon hours.

A seasonal increase in sporadic-*E* ionization usually begins during April and continues through the spring and summer months. Expect an increase in short-skip openings on both 15 and 10 meters during April, as well as possible occasional openings on 6 meters. While sporadic-*E* openings may occur at any time, they tend to peak between 8 AM and noon and again between 5 and 9 PM local time.

## VHF Ionospheric Openings

*Lyrids,* a major meteor shower, should take place April 16–25. Expect it to peak on April 22 at about 0530 UTC. The unpredictability of the shower in any given year always makes the *Lyrids* worth watching, since we cannot say when the next unusual return may occur. If this year's event is average or better (up to 90 good-size meteors entering the atmosphere every hour), it should make possible meteor-scatter-type openings on the VHF bands.

Widespread auroral displays can occur during April, bringing with them unusual ionospheric short-skip openings on the VHF bands. The best times for these to occur are during periods of radio storminess on the HF bands. Look for days with high planetary *K* (*Kp*) and *A* (*Ap*) figures.

## Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for January 2012 is 58.3, quite a dip from December's 73.0. This continues a two-month sharp decline from the steadily rising activity over the previous three months, but is typical of the fluctuation expected during the rise of any solar cycle. The lowest daily sunspot value of 28 was recorded for January 28. The highest daily sunspot count was 95 on January 16. The 12-month running smoothed sunspot number centered on July 2011 is 57.2, up from June's 53.2. A smoothed sunspot count of 81, give or take about 9 points, is expected for April 2012.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 133.1 for January 2012, down from December's 141.2. The 12-month smoothed 10.7-cm flux centered on July 2011 is 115.4, up from March's 110.9. The predicted smoothed 10.7-cm solar flux for April 2012 is 137, give or take about 9 points.

The observed monthly mean planetary *A*-index (*Ap*) for December 2011 was adjusted to 3, and 6 was recorded for January 2012. The 12-month smoothed *Ap* index centered on July 2011 is 7.3, while July's was adjusted to 7.4; these are much the same as the previous few months. Expect the overall geomagnetic activity to vary greatly between quiet to stormy during April; refer to the Last-Minute Forecast for the outlook on conditions during this month.

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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/>.

Remember, "Like" CQ Magazine on Facebook at <http://www.facebook.com/CQMag>. For space weather and radio propagation information on Facebook, please "Like" this columnist's dedicated page at <http://www.facebook.com/spacewx.hfradio>.

Be sure to follow my Twitter account, as well. By doing so, you will receive educational space weather and propagation information, as well as a fair amount of other informative "tweets." You can also interact with me and ask questions, which might become topics of discussion in this column. You can follow @hfradiospacewx for hourly tweets of space weather and radio propagation data such as the 10.7-cm radio flux and so on.

With all the new solar cycle activity, 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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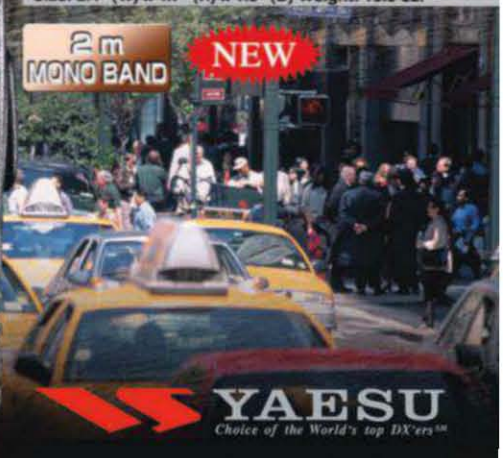

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