SPECIAL EMERGENCY COMMUNICATIONS/PUBLIC SERVICE ISSUE

# QST

DEVOTED ENTIRELY TO AMATEUR RADIO

September 2011 WWW.ARRL.ORG

**QST reviews:**



**Inside:**



## Ham Radio Operators Prepare for—and Respond to—Disaster

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Official Journal of ARRL The national association for AMATEUR RADIO®

SEPTEMBER 2011 QST Vol 95 No 9

HF/VHF/UHF Portable Operation

# FT-897D

**100 W All Mode Transceiver**
**HF/50/144/430 MHz**


# When it's crunch time... the features you need.

**TXCO**

**DSP**

**60 m Band**

- Battery-Powered Field Operation
- DC 13.8V Mobile Operation
- Base Station Operation
- Rugged, High-Output Power Amplifier
- Built-in Digital Signal Processing
- Outstanding Features for the CW Expert

The FT-897D is a rugged, innovative, multiband, multimode portable transceiver for the amateur radio MF/HF/VHF/UHF bands.

The new FT-897D version includes coverage of the U.S. 60-meter (5 MHz) band, along with the 0.5 ppm TCXO Unit, at no additional charge!

YAESU
*Choice of the World's top DX'ers*
Vertex Standard US Headquarters
10900 Walker Street Cypress, CA 90630 (714) 827-7600

**Vertex Standard US Headquarters**
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**http://www.vertexstandard.com**

# Field Gear That Goes The Distance!

## FT-897D

HF/VHF/UHF Portable Operation Powerful Transceiver

- The Ultimate Emergency Communications Radio
- Rugged, Innovative Multi-Band
- Operates on the SSB, CW, AM, FM, and Digital Modes
- Wide Frequency Coverage
- 20 Watt Portable Operation Using Internal Batteries
- 100 Watts When Using an External 13.8-Volt DC Power Source

## FT-817ND

The Ultimate Backpack, Multi-Mode Portable Transceiver

- Self-Contained
- Battery-Powered
- Covering the HF, VHF, and UHF Bands
- Provides up to Five Watts of Power Output
- SSB, CW, AM, FM, Packet, or SSB-based Digital Modes like PSK31

## FT-857D

The World's Smallest HF/VHF/UHF Mobile Transceiver

- Ultra-Compact Package
- Ideal for Mobile or External Battery Portable Work
- Wide Frequency Coverage
- Optional Remote-Head
- High Performance Mobile Operation

## FT-450D

HF/50 MHz 100 W Easy to Operate All Mode Transceiver

- Illuminated Key Buttons
- 300Hz / 500Hz / 2.4 kHz CW IF Filter
- Foot Stand
- Classically Designed Main Dial and Knobs
- Dynamic Microphone MH-31 A8J Included

YAESU

*Choice of the World's top DX'ers*℠

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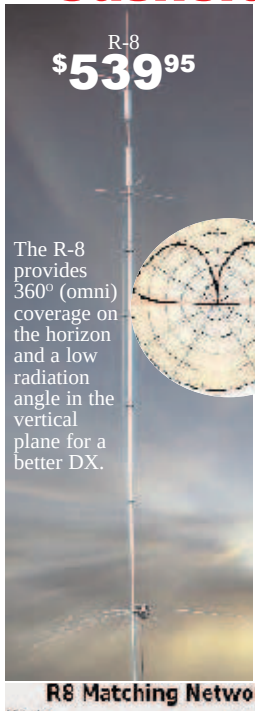
10900 Walker Street, Cypress, CA 90630 (714) 827-7600

http://www.vertexstandard.com

# Cushcraft R8 *8-Band Vertical*




The R-8 provides 360° (omni) coverage on the horizon and a low radiation angle in the vertical plane for a better DX.

***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!

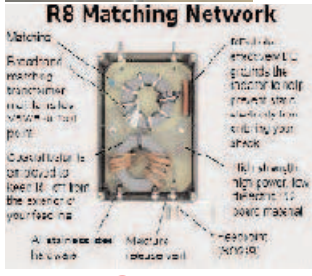
**Rugged Construction:** Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

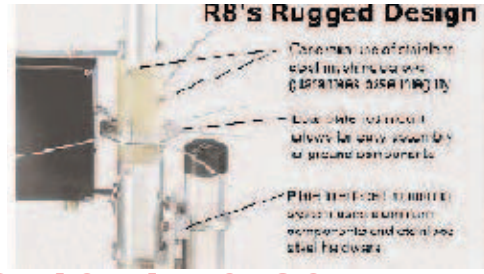
**Compact Footprint:** Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

**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.



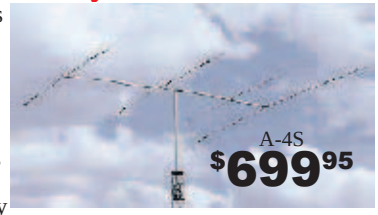

# MA-5B *5-Band* Beam

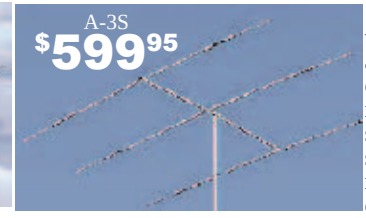
## *Small Footprint -- Big Signal*


**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



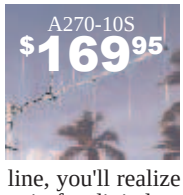

**Only** the best tri-band antennas become DX classics, which is why the Cushcraft World-Ranger A4S, A3S, and A3WS go to the head of the class. For more than 30 years, these pace-setting performers have taken on the world's most demanding operating conditions and proven themselves every time. The key 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.

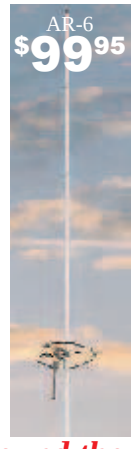
# Cushcraft Dual Band Yagis

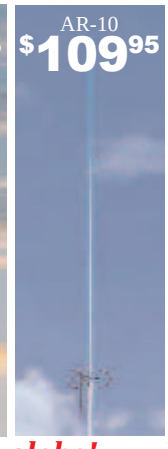
***One Yagi for Dual-Band FM Radios***




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!

***Free* Cushcraft Catalog**
***and Nearest Dealer . . . 662-323-5803***
***Call your dealer for your best price!***

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# Life is a JOURNEY. Enjoy the ride!

**Maldol** MH-511 TRI-BAND 6M/2M/70CM HT ANTENNA • Length: 4" • Conn: Male SMA

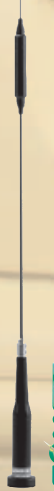


**Maldol** MH-510 TRI-BAND 6M/2M/70CM HT ANTENNA • Wavelength: 6M 1/4 wave top-load • 2M 1/4 wave • 440MHz 1/2 wave • Length: 20.75" • Conn: Male SMA



**COMET** HT-224 TRI-BAND 2M/220/70CM HT ANTENNA • Wavelength: 2M 1/4 wave • 220MHz 1/2 wave • 440MHz 1/2 wave • Length: 11.5" • Conn: Male SMA

**Maldol** MH-610 TRI-BAND 2M/220/70CM HT ANTENNA • Wavelength: 2M 1/4 wave • 220MHz 1/2 wave • 70cm 5/8 wave • Length: 14" • Conn: Male SMA

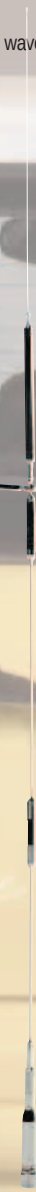


**COMET** SBB-224 / SBB-224NMO TRI-BAND 2M/220/440MHz WITH FOLD-OVER • Wavelength: 146MHz 1/4 wave • 220MHz 5/8 wave • 446MHz 5/8 wave x 2 • Length: 36" • Conn: PL-259 or NMO style • Max Pwr: 100W

**Maldol** EX-510B / EX-510BNMO TRI-BAND 6M/2M/440MHZ WITH FOLD-OVER • Wavelength: 52MHz 1/4 wave • 146MHz 1/2 wave • 446MHz 5/8 wave x 2 VSWR • Length: 37" • Conn: PL-259 or NMO style • Max Power: 50W FM

**COMET** SB-15 TRI-BAND 6M/2M/440MHZ WITH FOLD-OVER • Wavelength: 52MHz 1/4 wave • 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

**COMET** UHV-4 QUAD-BAND 10M/6M/2M/440MHZ WITH FOLD-OVER • Wavelength: 10M & 6M 1/4 wave • 2M 1/2 wave • 70cm 5/8 wave x 2 • Length: 55" • Max Power: 10M 120W SSB 6M2M/70cm 100W FM • Conn: PL-259 • 10M and 6M bands have individual tuning stubs



**COMET** UHV-6 HF/6M/2M/440MHZ MOBILE ANTENNA *80/*20/*17/40/15/10/6/2M/70cm Mobile antenna with fold-over hinge• Wavelength: 2M 1/2 wave • 70cm 5/8 wave x 2 • VSWR: HF 1.6:1 or less, 6M-70cm 1.5:1 or less • Length: 44" (min), 78"(max) • Max Pwr: HF 120W SSB, 6M 200W SSB/100W FM, 2M/70cm 100W FM • **L-14 optional 20M coil *L-18 optional 17M coil *L-3.5 optional 80/75M coil • Features: • 6M/2M/ 70cm operation is constant. You CHOOSE the HF coils you want to add, up to four stock or optional. One vertical, the rest horizontal. • Easily mounts to standard trunk/door mount in minutes • Economical • Fold-over hinge built in• Select the duplexer or triplexer for your specific radio(s). CF-706A, CF-530, CFX-514N • Conn: PL-259

*UHV-6 in fold-over position.*
Fold-over hinge included for easy entry to garage, parking structure, drive-thru etc... SB-15 / UHV-4 / UHV-6 / HMC-6S fold-over hinge has a threaded collar to lock the hinge vertically in place. It can't fold-over by itself at highway speed!

**Maldol** HMC-6S *40/20/15/10/6/2/440MHZ MOBILE ANTENNA WITH FOLD-OVER Wavelength: HF 1/4 wave • 2M 1/2 wave • 70cm 5/8 wave x 2 • VSWR: HF-6M 1.6:1 orless 2M/70cm 1.5:1 or less • Length: 66" • Max Power: HF 120W SSB 6/2/70cm 150W FM*HMC-7C optional 40M coil • Conn: PL-259

*MINI COOPER SHOWN WITH CP-5M UNIVERSAL LIP MOUNT ON THE DOOR EDGE.*

All the mounts attach to van doors, truck side doors, SUV doors, etc... and require no holes. Includes 16' 6" deluxe cable assy w/18" mini RG-1888A/U type coax for weather seal entry.

Choose a mount depending on the antenna size and vehicle mounting location space.

*For Small Antennas & Limited Space*

MODEL / ANT CONN / COAX CONN

**Maldol** EM-5M SO-239 / PL-259

Footprint: 1.1"x .75"
Max Antenna: 40"

*For Medium Size Antennas*

MODEL / ANT CONN / COAX CONN

**COMET** CP-5M SO-239 / PL-259
**COMET** CP-5NMO NMO / PL-259

Footprint: 3.4" x 1.25"
Max Antenna: 60"

*For Tall or Multi-band HF Antennas*

MODEL / ANT CONN / COAX CONN

**COMET** HD-5M SO-239 / PL-259
**COMET** HD- 5 3/8-24 3/8-24 / PL-259

Footprint: 3.75" x 1.1 "
Max antenna: 80"

COMET and Maldol Mobile

For a complete catalog, call or visit your local dealer.
Or contact NCG Company. 15036 Sierra Bonita Lane, Chino, CA 91710
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# This Month in QST

September 2011 ■ Volume 95 Number 9

## Technical




## News and Features



**Interested in Writing for *QST*?** www.arrl.org/qst-author-guide e-mail: qst@arrl.org

# Radiosport





**Our Cover**
This month, *QST* celebrates those who apply their communications skills to provide support to law enforcement, emergency management agencies and their local communities. *Top right:* In April, more than 250 hams volunteered at Course Net Control during the 114th running of the Boston Marathon. Photo by Harold Kramer, WJ1B. *Lower left:* Mickey Gillespie, KJ4KZT, of Vestavia, Alabama, relays damage reports following the massive April tornadoes that hit Tuscaloosa and other parts of Alabama. Photo by Roger Smith. See the article that begins on page 63.

# Departments




September 2011 ■ Volume 95 Number 9

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# A TECHNOLOGY BREAKTHROUGH

## New Advanced VX-8 Series GPS/APRS® Handheld Transceivers
## Choose the Yaesu that meets your APRS® operating preferences in the field

**50/144/(222)*/430 MHz**
**FM 5 W/AM 1W (50 MHz) Triple Band Handheld**
**VX-8DR** * 222 MHz/1.5 W (USA version)
(7.4V 1,100 mAh Lithium Ion battery/FNB-101LI and battery charger/NC-86A included)


Actual Size

**144/430 MHz**
**FM 5 W Dual Band Handheld**
**VX-8GR**
(7.4V 1,100 mAh Lithium Ion battery/FNB-101LI and battery charger/NC-86A included)


Actual Size

## VX-8DR NEW

**All-in-one Prestigious Tri-band Transceiver**
**Bluetooth® for hands-free Operation with optional accessories**
**Waterproof/Submersible IPX 7 rated - 3 ft for 30 minutes**

Optional GPS and antenna unit for GPS/APRS® operation

Attached to the radio (microphone input) using the optional GPS Antenna Adapter CT-136

The optional GPS Antenna Unit FGPS-2 attached to the optional speaker Microphone MH-74A7A

Bluetooth®

## VX-8GR NEW

**144/430 MHz Dual Band Transceiver with GPS unit included**
**Built-in GPS Antenna - Waterproof**
**Wide Band Receive for 108-999 MHz (Cellular blocked – US Version)**

### Supports APRS® communication by the Built-in Worldwide Standard AX.25 Data TNC

**The VX-8 series radios are compatible with the world wide standard APRS® (Automatic Packet reporting System) using the GPS system to locate and exchange position information.**

- SmartBeaconing™ Function
- Memories to list 50 stations
- Memories to store 30 APRS® messages
- DIGI-PATH routing indication function
- 8 DIGI-PATH routing settings
- GPS Compass Display - "Heading Up" or "North Up"
- APRS® Symbol Icon pre-set function
- Clearly displayed APRS® Beacon Messages
- Selective Message Received indicated by Flashing LED



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# Advanced Dual Band Mobile Radio
# 5.2” x 1.6” Large dot matrix (264 x 64 dots) LCD display
# GPS / APRS® / Bluetooth® Features

# FTM-350AR

**New Vacuum Cup-Mounting Bracket permits Angle Adjustment**
**New APRS® Operation Capability, and newly Expanded User Friendly Functions**


144/(220)*/430 MHz 50 W FM Dual Band Transceiver

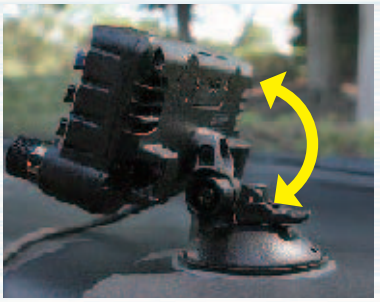
## FTM-350AR NEW

220 MHz 1 W (USA version only)

## New Features of The FTM-350AR

### 1. New Vacuum Cup-Mounting Bracket with Angle Adjustment

The new MMB-98 Mounting bracket allows easy installation of the radio control display to your Dashboard by placing the vacuum mount in the desired location and pressing a lever. You may then adjust the display to the optimum viewing angle.



### 2. Expanded APRS® functions

- Uses the worldwide-accepted GPS NMEA data format
- Navigation to another APRS® BEACON station is possible, even if the beacon station is moving.
- Waypoint data (Data in/out) is available from the ACC connector on the rear of the main unit.
- Sub-Band APRS® operation may be active in the background, even when operating in Mono-Band Display mode.
- Newly added Voice Alert function
- Re-allocated often used keys to more convenient positions for easier operation
- Programmable keys on the DTMF Microphone provide direct access to APRS® functions

*APRS® is a registered trademark of Bob Bruninga WB4APR
*SmartBeaconing™ from HamHUD Nichetronix

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http://www.vertexstandard.com

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

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Choice of the World's top DX'ers℠

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Cypress, CA 90630 (714)827-7600

# NEW COMPACT HF TRANSCEIVER WITH IF DSP

**A superb, compact HF/50 MHz radio with state-of-the-art IF DSP technology, configured to provide YAESU World-Class Performance in an easy to operate package.**
**New licensees, casual operators, DX chasers, contesters, portable/field enthusiasts, and emergency service providers- YAESU FT-450D...This Radio is for YOU!**


Compact size: 9" X 3.3" X 8.8" and Light weight: 7.9 lb

HF/50 MHz 100 W All Mode Transceiver

# FT-450D

With Built-in Automatic Antenna Tuner

NEW **Illuminated Key buttons**

NEW **300 Hz/500 Hz/2.4 kHz CW IF Filters**

NEW **Foot stand**

NEW **Classically Designed Main Dial and Knobs**

NEW **Dynamic Microphone MH-31A8J Included**

■ **Large informative Front Panel Display, convenient Control knobs and Switches**
■ **The IF DSP guarantees quiet and enjoyable high performance HF/50 MHz operation**


Handy Front Panel Control of Important Features including:

- **CONTOUR Control Operation**
  The Contour filtering system provides a gentle shaping of the filter passband.
- **Manual NOTCH**
  Highly-effective system that can remove an interfering beat tone/signal.
- **Digital Noise Reduction (DNR)**
  Dramatically reduces random noise found on the HF and 50 MHz bands.
- **IF WIDTH**
  The DSP IF WIDTH tuning system provides selectable IF passband width to fight QRM.
  SSB - 1.8/2.4/3.0 kHz, CW - 300 Hz/500 Hz/2.4 kHz
- **Digital Microphone Equalizer**
  Custom set your rig to match your voice characteristics for maximum power and punch on the band.
- **Fast IF SHIFT Control**
  Vary the IF SHIFT higher or lower for effective interference reduction / elimination.

■ **The rugged FT-450D aluminum die-cast chassis, with its quiet, thermostatically controlled cooling fan provides a solid foundation for the power amplifier during long hours of field or home contesting use.**

MOS FET RD100HHF1

### More features to support your HF operation

●10 kHz Roofing filter ●20 dB ATT/IPO ●Built-in TCXO for incredible ±1 ppm/hour (@+77°F, after warm-up) stability ●CAT System (D-sub9 pin): Computer programming and Cloning capability ●Large, Easy-to-See digital S-meter with peak hold function ●Speech Processor ●QUICK SPLIT to automatically Offset transmit frequency (+5 kHz default) ●TXW to monitor the transmit frequency when split frequency operation is engaged ●Clarifier ●Built-In Electronic Keyer ●CW Beacon (Up to 118 characters using the CW message keyer's 3 memory banks) ●CW Pitch Adjustment (from 400 to 800 Hz, in 100 Hz steps) ●CW Spotting (Zero-Beating) ●CW Training Feature ●CW Keying using the Up/Down keys on the microphone ●Two Voice Memories (SSB/AM/FM), store up to 10 seconds each ●20 second Digital Voice Recorder ●Dedicated Data Jack for FSK- RTTY operation ●Versatile Memory System, up to 500 memory channels that may be separated into as many as 13 Memory Groups ●CTCSS Operation (FM) ●My Band / My Mode functions, to recall your favorite operating set-ups ● Lock Function ●C.S. Switch to recall a favorite Menu Selection directly ●Dynamic Microphone included ●IMPORTANT FEATURES FOR THE VISUALLY IMPAIRED OPERATOR – Digital Voice Announcement of the Frequency, Mode or S-meter reading

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# Our Future in Emergency Communications

*"Dramatic advances in telecommunications technology may suggest a diminishing role for Amateur Radio in future disaster communications scenarios, but while our role may change it will not disappear."*

You would have to be living in a very deep cave not to know that information and communications technologies (ICTs) that were barely imaginable a generation ago are now available to nearly everyone, at a cost that most people can afford. We must admit that when compared to smartphones and tablets, most Amateur Radio equipment looks pretty crude and its capabilities may seem rather limited.

Public safety communicators are in the same boat with us. A young police officer who manages his or her personal life by smartphone is likely to be underwhelmed by the communications gear he or she gets to use on the job. Most emergency 911 call centers cannot receive photos and videos — images that literally could save lives — from mobile phones.

There are other challenges facing the public safety community. An age-old problem, highlighted in the recommendations of the 9/11 Commission, is that First Responders from different agencies often lack communications interoperability. They are unable to talk to one another and thus to share information at critical moments. And of course, in these times of shrinking budgets at all levels of government the issue of funding is very difficult indeed.

The Digital Television Transition and Public Safety Act of 2005 cleared 24 MHz of spectrum above 700 MHz for interoperable public safety use, split between narrowband and broadband networks. When first offered by auction for commercial use, an adjacent 10 MHz of spectrum — the so-called D Block — failed to attract adequate bids. Now the question is whether another auction should be held, with the proceeds possibly used to fund the buildout of the public safety network within the existing allocation, or whether the D Block should be reallocated to public safety in order to double the amount of broadband spectrum.

The latter alternative poses another question: how to offset the loss of revenue that an auction would generate. The answer proposed by Rep. Peter King in his bill, H.R. 607, is for public safety to give up all of its allocations between 170 MHz and 512 MHz and to auction that spectrum instead. As you know if you read this page in the May 2011 issue of *QST*, Mr. King's solution included auctioning 420-440 MHz and 450-470 MHz, most of which is not even public safety spectrum. The ARRL has made it clear that not only is this utterly unacceptable, it doesn't make any sense at any level. Fortunately, the committees of jurisdiction in both the House and Senate have a better grasp of spectrum issues than does the sponsor of H.R. 607.

Whatever happens with regard to the D Block it appears that the public safety community is moving toward putting its radio communications eggs in one basket, namely the band above 700 MHz. Perhaps the most surprising aspect of the H.R. 607 debacle is that some public safety advocates have promoted the bill, which suggests that they either didn't read it or don't understand its consequences. Aside from the enormous cost of mothballing existing VHF and lower UHF equipment, much of which was just purchased in order to meet an imminent FCC narrowbanding mandate, public safety communications is not "one size fits all." The needs of police and fire departments in a major metropolitan area are quite different from those of a sheriff or fire chief in a sparsely populated county. The complex, infrastructure-dependent communications tools that are appropriate for one should not, and need not, be forced upon the other.

Back to Amateur Radio. While in normal times we may be unable to match the ICT offerings of commercial providers such as Verizon and AT&T, their impressive networks are not immune to failure or overload. They rebound very quickly from most disruptions, but after a major disaster their customers may be cut off for days. Clearly, in the context of public safety such outages would be intolerable — yet the blueprint for the nationwide interoperable broadband network appears to draw heavily from the commercial model. The more heavily public safety communicators rely on infrastructure, the more likely it is that their systems will fail — and at the worst possible time. It may not happen very often, but it will happen.

FEMA Administrator Craig Fugate knows this. He said so on May 3, right after returning from tornado-stricken Alabama, at an FCC forum on earthquake communications preparedness. In remarks quoted on page 66 of last month's *QST* he urged his audience to recognize that their communications systems will fail and to include Amateur Radio in their plans, because "…when you need Amateur Radio, you really need them."

The challenge for us is to be ready when needed, even if that's not very often. Being ready means building and maintaining relationships with those who will need us, even if they doubt they will. It means recruiting good people to our ranks, for in most places there are not enough of us to cover every contingency. It means training, not only in how to set up and operate our equipment under difficult conditions but in how to work with served agencies and with one another. It means being ready to go, fully equipped, on short notice.

Finally, it means that we must not become infrastructure-dependent ourselves. Our community has embraced the Internet, as we should. The Internet enriches and enhances our Amateur Radio experience. But we should never forget that we don't need it to communicate. A radio, a battery and a piece of wire are all we need — that and the skills we gain and sharpen as active radio amateurs.

**David Sumner, K1ZZ**
**ARRL Chief Executive Officer**

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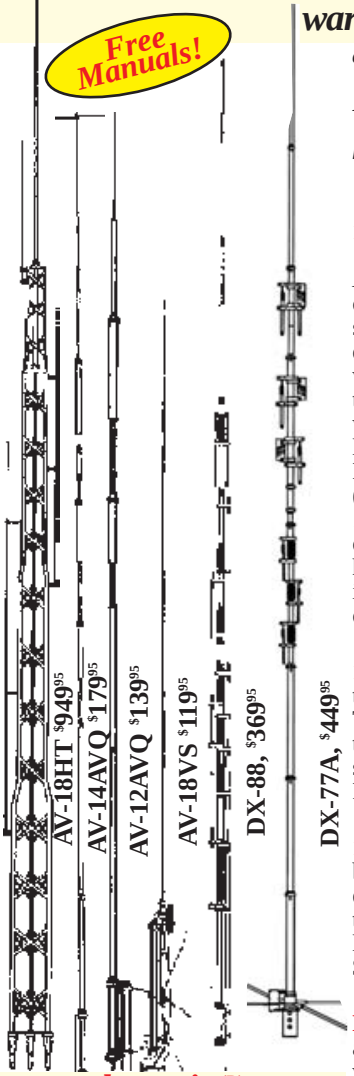


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**AV-12AVQ, $139.95. (10, 15, 20 Meters). 13 ft., 9 lbs.** **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with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

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| 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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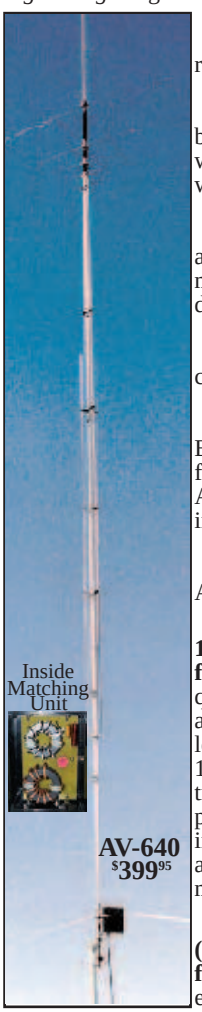


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# This Just In

**Joel P. Kleinman, N1BKE**
jkleinman@arrl.org

## In Briefs

- The ARRL Board of Directors held their Second 2011 Meeting in Windsor, Connecticut July 15-16. A full report will appear in the October issue.
- The newest DXCC entity is the Republic of South Sudan (prefix block to be determined).
- The FCC and ReconRobotics have entered into a *Consent Decree* resolving an FCC investigation into whether the company had unlawfully marketed a radio-frequency transmitter.
- The National Weather Service and the ARRL have updated their *Memorandum of Understanding* (*MoU*). See Happenings, this issue, for details.
- The ARRL Executive Committee has awarded equipment and resources grants valued at nearly $5000 to six schools.
- The FCC has issued a *Citation* to New Generation Hobbies of Woodbridge, Ontario for marketing unauthorized radio frequency devices in the US that operate on restricted frequencies.
- The Space Weather Prediction Center has decided to maintain its geophysical alert broadcasts on WWV and WWVH.
- Major Rick Shirran VE3NUZ, of Toronto, Ontario, has been appointed Director of SATERN, the Salvation Army Team Emergency Radio Network.
- Europe's largest ham gathering, Ham Radio 2011, took place in June in Friedrichshafen, Germany.
- When 23,000 people in Lincoln, Nebraska lost their digital phone service in late June, local Amateur Radio operators were called in to help provide them with a connection to the 911 dispatchers.

## Media Hits

*Allen Pitts, W1AGP*
*Media & Public Relations Manager*

- June was an exceptionally good month for promoting Amateur Radio. While references in "Mr. Popper's Penguins" and "Super 8" helped and the activities following the tornado outbreaks calmed down, this year's Field Day set new PR records. We collected over 35 pages (in small type) just listing headlines and links from all the media hits achieved by clubs and PIOs — hundreds of them! There were over 300 more from the ARRL national wire release. We also noted that there seemed to be a lot more local television news hits than before — a trend we expect to continue.
- Proclamations came in from Governors or state legislators in TX, NC, MN, ID, RI, NH, WA, PA, SC, LA, IN, NM, OH, GA, MA, CO and CA.
- Obviously we cannot list them all here, but most are listed on our website at **www.arrl.org/media-hits**. Some of the hits were huge ones, such as the morning drive time on WOR Radio in New York with the John Gambling Show. Some places had multiple hits, such as Beaumont, Texas. Some reporters apparently didn't quite "get it," such as South Cobb (GA) *Patch's* short piece "Breaker Breaker." But most of the media hits were good, solid local hits done by hundreds of local clubs and PIOs in their own communities.
- For example, the Livingston Amateur Radio Society had a successful Field Day. The local newspaper, *The Livingston Parish News*, came out, interviewed folks and took some pictures. The results were two pictures of hams operating on the front page of the paper plus a full page article with pictures on page B1 and concluded on page B7 in three columns. As John King, K5PGW, humbly wrote, "The article should be sufficient to interest the public in becoming Amateur Radio Operators."
- Livingston can be proud of their results, but they are far from unique this year. There were hundreds of them. These local hits in regional papers not only bring Amateur Radio to the attention of the community, it puts a face and a name to the hobby, turning it from an abstract into a neighbor. We all know that "it takes a ham to make a ham," and this is an excellent way to initiate those personal connections that end up in licensing classes.
- There also were very few derogatory "old radio" comments this year — and this is a very good change. The few comments seen along these lines all went on to discuss the reliability of tried-and-true ham radio as opposed to newer, and more fragile, systems. But few reports had our radios quite as old as the *Alexandria Times* which had us spreading "awareness of how the centuries-old technology can be vital in emergencies."
- While the preponderance of copy discussed our emergency communications work, a growing percentage highlighted the hobby, friendships and hands-on learning that goes with Amateur Radio. For example, *EE Times* questioned, "Do ham radio operators make good engineers, or do good engineers make good ham radio operators?"

Either way, it was a great month for Amateur Radio.

STEVE FORD, WB8IMY

**At the 2011 Second Meeting of the ARRL Board of Directors, from the left: Directors Brian Mileshosky, N5ZGT, Rocky Mountain Division; Greg Sarratt, W4OZK, Southeastern; Dick Norton, N6AA, Southwestern, and David Woolweaver, K5RAV, West Gulf. A meeting report will appear in next month's issue.**

## Ron Tomo, KE2UK, Receives 2010 Humanitarian Award

Ron Tomo, KE2UK, of North Bellmore, New York, received the 2010 ARRL International Humanitarian Award at a ceremony in April in East Meadow, New York. Tomo, who serves as Vice President and Chief Information Officer of NuHealth, a regional health-care organization, has used his communications skills to serve the public in a variety of ways, from the Vietnam War through the 2010 Haiti earthquake.

The ARRL International Humanitarian Award is conferred upon an amateur or amateurs who demonstrate devotion to human welfare, peace and international understanding through Amateur Radio. The ARRL established the annual prize to recognize Amateur Radio operators who have used ham radio to provide extraordinary service to others in times of crisis or disaster.

SHELLEY LOTEBNBERG

**From the left: CDR Wayne Spivak, US Coast Guard Auxiliary District Commodore's special assistant for public affairs, First Coast Guard District, Southern Region; Joyce Birmingham, KA2ANF, ARRL Hudson Division director; Tomo, and Mike Lisenco, N2YBB, ARRL New York City/Long Island section manager.**

## Tennessee State Convention Draws Crowds to Knoxville

More than 500 amateurs from Tennessee and surrounding states waltzed their way to the 45th annual Knoxville Hamfest/ARRL Tennessee State Convention in June. Hosted by RACK (Radio Amateur Club of Knoxville), it featured forums, prizes, VE testing, good food and a great opportunity to meet other hams. The ARRL Forum featured David Norris, K5UZ, vice director of the ARRL Delta Division; Glen Clayton, W4BDB, Tennessee section manager, and Chuck Skolaut, KØBOG, of the ARRL HQ staff.

COURTESY KØBOG


**At the ARRL booth at the Tennessee State Convention: Lowell Bennington, WD4DJW; Glen Clayton, W4BDB; David Norris, K5UZ, and Chuck Skolaut, KØBOG.**

# Inside HQ

## WAC Award and A-1 Operator Award

Along with the DXCC and WAS Awards that I discussed last month, we offer other contact based operating awards. One of these is the Worked All Continents Award (WAC). While the ARRL administers this award program, WAC is actually sponsored by the International Amateur Radio Union (IARU). WAC is one of the oldest and longest running awards in Amateur Radio. Rummaging through the ARRL archives, I discovered that the first WAC Certificate was issued in April of 1926. While it is not as popular as DXCC or WAS, we still issue about 300 WAC Awards a year.

The Worked All Continents award is issued for working and then confirming contacts with six continents: North America, South America, Oceania, Asia, Europe and Africa. Antarctica was not included when the award began since there was no Amateur Radio activity there at that time. WAC Awards are available for individual bands and modes and there are also multi-band WAC Awards.

WAC is often the first DX award that a new ham earns since it only requires six paper cards. It was the first operating award that I earned and the certificate is still hanging proudly in my shack. Incidentally, we redesigned the WAC certificate a few years ago and the new version looks great. Similar to our other award programs, cards can be mailed to HQ or checked by a DXCC Card Checker in the field. The only other condition is that US applicants must be ARRL members and international applicants must belong to an IARU member society. More information is available at **www.iaru.org/wac** or **www.arrl.org/wac**.

What award requires just one contact and no card? It's the ARRL First Contact Award. Our first contact as a licensed Amateur Radio operator is one of the most memorable experiences of our life. It's a "wow" moment whether contact is made with a station thousands of miles away or, like my first QSO, my friend just across town. To celebrate this experience, we offer the First Contact Award. To apply, simply fill out the form on our website at **www.arrl.org/first-contact** and we will mail a first contact certificate to the person that you have designated.

The DXCC, WAS and WAC awards are based on making and confirming on-air contacts with other amateurs. In addition, we offer an operating award that is not tied to making specific QSOs but to an operator's overall ability. This is the A-1 Operator Award, which began back in 1933. To become a member of the A-1 Operator Club, you must demonstrate that you are an outstanding operator. To become a member, you must be nominated by two existing members and meet the specific guidelines for nominees. Today there are about 5680 A-1 Operators on the roster. If you know someone who is an excellent operator, you can nominate him or her to be a member of the A-1 Operator Club. Information can be found at **www.arrl.org/a-1-op** and the club roster can be found at **www.arrl.org/a-1-operator-club-roster/1**.

**73,**

**Harold Kramer, WJ1B**
**ARRL COO/Publisher *QST***
**wj1b@arrl.org**

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- **Customized ARRL.org home page**
  Customize your home page to see local ham radio events, clubs and news.
- **ARRL Member Directory**
  Connect with other ARRL members via a searchable online Member Directory. Share profiles, photos and more with members who have similar interests.

### ARRL Technical Information Service — www.arrl.org/tis

Get answers on a variety of technical and operating topics through ARRL's Technical Information Service. ARRL Lab experts and technical volunteers can help you overcome hurdles and answer all your questions.

### ARRL as an Advocate — www.arrl.org/regulatory-advocacy

ARRL supports legislation and regulatory measures that preserve and protect access to Amateur Radio Service frequencies. Members may contact the **ARRL Regulatory Information Branch** for information on FCC rules; problems with antenna, tower and zoning restrictions; and reciprocal licensing procedures for international travelers.

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Awards – **www.arrl.org/awards**
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QSL Service – **www.arrl.org/qsl**
Logbook of the World – **www.arrl.org/lotw**

### Community

Radio Clubs (ARRL-affiliated clubs) – **www.arrl.org/clubs**
Hamfests and Conventions – **www.arrl.org/hamfests**
ARRL Field Organization – **www.arrl.org/field-organization**

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### Quick Links and Resources

***QST*** – ARRL members' journal – **www.arrl.org/qst**
***QEX*** – *A Forum for Communications Experimenters* – **www.arrl.org/qex**
***NCJ*** – *National Contest Journal* – **www.arrl.org/ncj**
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**ARRL – The national association for Amateur Radio™**
225 Main Street
Newington, CT 06111-1494 USA
Tel 1-860-594-0200, Mon-Fri 8 AM to 5 PM ET (except holidays)
FAX 1-860-594-0259
e-mail **hqinfo@arrl.org**
Web site – **www.arrl.org**

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The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communication in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every three years by the general membership. The officers are elected or appointed by the directors. The League is noncommercial, and no one with a pervasive and continuing conflict of interest is eligible for membership on its Board.

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A *bona fide* interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters: ARRL, 225 Main Street, Newington, Connecticut 06111-1494.

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## Officers

**Founding President (1914-1936)**
Hiram Percy Maxim, W1AW

**President**
KAY C. CRAIGIE,* N3KN
570 Brush Mountain Rd
Blacksburg, VA 24060
540-552-3903; n3kn@arrl.org

**First Vice President**
RICK RODERICK, K5UR*
PO Box 1463, Little Rock, AR 72203
501-988-2527; k5ur@arrl.org

**Vice President**
BRUCE FRAHM, KØBJ
1553 County Rd T, Colby, KS 67701
785-462-7388; k0bj@arrl.org

**International Affairs Vice President**
JAY BELLOWS, KØQB
1925 Bidwell St,
West St Paul, MN 55118
651-238-4444; k0qb@arrl.org

**Chief Executive Officer**
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**Controller**
Diane Middleton

**Information Technology Manager**
Michael Keane, K1MK

*Executive Committee Member

## Atlantic Division

**Bill Edgar, N3LLR**
22 Jackson Ave, Bradford, PA 16701
(814-362-1250); **n3llr@arrl.org**

*Vice Director*: **Tom Abernethy, W3TOM**
PO Box 73, Accokeek, MD 20607
(301-292-6263); **w3tom@arrl.org**

## Central Division

**George R. Isely, W9GIG***
736 Fellows St, St Charles, IL 60174
(630-584-3510); **w9gig@arrl.org**

*Vice Director*: **Kermit Carlson, W9XA**
1150 McKee St, Batavia, IL 60510
(630-879-0983); **w9xa@arrl.org**

## Dakota Division

**Gregory P. Widin, KØGW**
13457 Sixth St N, Stillwater, MN 55082
(651-436-8811); **k0gw@arrl.org**

*Vice Director*: **Kent R. Olson, KAØLDG**
148 Ironwood Dr, Horace, ND 58047;
(701-298-0956); **ka0ldg@arrl.org**

## Delta Division

**Mickey D. Cox, K5MC**
754 Cheniere Drew Rd, West Monroe, LA 71291
(318-397-1980); **k5mc@arrl.org**

*Vice Director:* **David A. Norris, K5UZ**
640 Josephine Dr, Batesville, AR 72501
(870-793-6431); **k5uz@arrl.org**

## Great Lakes Division

**Jim Weaver, K8JE**
5065 Bethany Rd, Mason, OH 45040-8130
(513-459-1661); **k8je@arrl.org**

*Vice Director:* **Gary L. Johnston, KI4LA**
3056 Hergott Dr, Edgewood, KY 41017
(859-391-6399); **ki4la@arrl.org**

## Hudson Division

**Joyce Birmingham, KA2ANF**
235 Van Emburgh Ave, Ridgewood, NJ
07450-2918 (201-445-5924); **ka2anf@arrl.org**

*Vice Director*: **William Hudzik, W2UDT**
111 Preston Dr, Gillette, NJ 07933
(908-580-0493); **w2udt@arrl.org**

## Midwest Division

**Cliff Ahrens, KØCA**
65 Pioneer Trail, Hannibal, MO 63401
(573-221-8618); **k0ca@arrl.org**

*Vice Director:* **Rod Blocksome, KØDAS**
690 Eastview Dr, Robins, IA 52328-9768
(319-393-8022); **k0das@arrl.org**

## How to Find an ARRL HQ Staff Member

Can't find the department you're looking for? Call 860-594-0200 or e-mail **hq@arrl.org**. Sending e-mail to any ARRL Headquarters staff member is a snap. Just put his or her call sign (or first initial and last name) in front of **@arrl.org**. For example, to send to Allen Pitts, W1AGP, Media Relations manager, use **w1agp@arrl.org** or **apitts@arrl.org**. If all else fails, send a message to **hq@arrl.org** and it will get routed to the right person or department.

## New England Division

**Tom Frenaye, K1KI***
PO Box J, West Suffield, CT 06093
(860-668-5444); **k1ki@arrl.org**

*Vice Director:* **Mike Raisbeck, K1TWF**
85 High St, Chelmsford, MA 01824
(978-250-1235); **k1twf@arrl.org**

## Northwestern Division

**Jim Fenstermaker, K9JF**
10312 NE 161st Ave, Vancouver, WA 98682
(360-256-1716); **k9jf@arrl.org**

*Vice Director:* **Grant Hopper, KB7WSD**
PO Box 3318, Everett, WA 98213
(425-238-1433); **kb7wsd@arrl.org**

## Pacific Division

**Bob Vallio, W6RGG***
18655 Sheffield Rd, Castro Valley, CA 94546
(510-537-6704); **w6rgg@arrl.org**

*Vice Director:* **Jim Tiemstra, K6JAT**
13450 Skyline Blvd, Oakland, CA 94619;
(510-569-6963); **k6jat@arrl.org**

## Roanoke Division

**Dennis Bodson, W4PWF**
233 N Columbus St, Arlington, VA 22203
(703-243-3743); **w4pwf@arrl.org**

*Vice Director:* **Dr James Boehner, N2ZZ**
525 Barnwell Ave NW, Aiken, SC 29801-3939
(803-641-9140); **n2zz@arrl.org**

## Rocky Mountain Division

**Brian Mileshosky, N5ZGT***
PO Box 20186, Albuquerque, NM 87154-0186
(505-463-9468); **n5zgt@arrl.org**

*Vice Director:* **Dwayne Allen, WY7FD**
82 Wenger Dr, Devils Tower, WY 82714
(307-756-9439); **wy7fd@arrl.org**

## Southeastern Division

**Greg Sarratt, W4OZK**
230 Latigo Loop, Huntsville, AL 35806;
(256-337-3636); **gsarratt@arrl.org**

*Vice Director:* **Andrea Hartlage, KG4IUM**
PO Box 608, Grayson, GA 30017
(404-509-4054); **kg4ium@arrl.org**

## Southwestern Division

**Richard J. Norton, N6AA**
21290 West Hillside Dr, Topanga, CA 90290
(310-455-1138); **n6aa@arrl.org**

*Vice Director:* **Marty Woll, N6VI**
21301 Candice Pl, Chatsworth, CA 91311-1404
(818-773-9655); **n6vi@arrl.org**

## West Gulf Division

**Dr David Woolweaver, K5RAV***
2210 S 77 Sunshine Strip, Harlingen, TX 78550
(956-425-3128); **k5rav@arrl.org**

*Vice Director:* **John Robert Stratton, N5AUS**
PO Box 2232, Austin, TX 78768-2232
(512-282-7851); **n5aus@arrl.org**

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**www.arrl.org/sections**

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*Delaware:* Frank T. Filipkowski, Jr, AD3M, 1130 N Hilton Rd, Oak Lane Manor, Wilmington, DE 19803-5216 (302-656-0409); **ad3m@arrl.org**

*Eastern Pennsylvania:* Eric Olena, WB3FPL, 284 Blimline Rd, Mohnton, PA 19540 (610-775-0526); **wb3fpl@arrl.org**

*Maryland-DC:* James E. Cross III, WI3N, 16013 Dorset Rd, Laurel, MD 20707-5314 (301-725-6829); **wi3n@arrl.org**

*Northern New York:* Thomas Dick, KF2GC, 11 Jenkins St, Saranac Lake, NY 12983 (518-891-0508); **kf2gc@arrl.org**

*Southern New Jersey:* George Strayline, W2GSS, 10 E Pacific Ave, Villas, NJ 08251-2630 (609-741-8322); **w2gss@arrl.org**

*Western New York:* Steve Ryan, N2ITF, 3036 Route 394, Ashville, NY 14710-9734 (716-763-7555); **n2itf@arrl.org**

*Western Pennsylvania:* John Rodgers, N3MSE, 803 S Main St, Butler, PA 16001 (724-287-0424); **n3mse@arrl.org**

### Central Division (IL, IN, WI)

*Illinois:* Tom Ciciora, KA9QPN, 1887 Irene Rd, Sandwich, IL 60548 (815-498-4929); **ka9qpn@arrl.org**

*Indiana:* John Poindexter, W3ML, 204 S Main St, Knox, IN 46534-1620 (574-772-2772); **w3ml@arrl.org**

*Wisconsin:* Donald Michalski, W9IXG, 4214 Mohawk Dr, Madison, WI 53711 (608-274-1886); **w9ixg@arrl.org**

### Dakota Division (MN, ND, SD)

*Minnesota:* Richard H. "Skip" Jackson, KSØJ, 1835-63rd St E, Inver Grove Heights, MN 55077 (651-260-4330); **ks0j@arrl.org**

*North Dakota:* Lynn A. Nelson, WØND, 6940 4th St SW, Minot, ND 58701 (701-839-8200); **w0nd@arrl.org**

*South Dakota:* Scott Rausch, WAØVKC, 15362 Canyon Trl, Piedmont, SD 57769-7286 (605-787-7566); **wa0vkc@arrl.org**

### Delta Division (AR, LA, MS, TN)

*Arkansas:* Dale Temple, W5RXU, 5200 Timber Creek Circle, North Little Rock, AR 72116 (501-771-1111); **w5rxu@arrl.org**

*Louisiana:* Gary L. Stratton Sr, K5GLS, 8424 Kaw Court, Shreveport, LA 71107 (318-309-0023); **k5gls@arrl.org**

*Mississippi:* Malcolm Keown, W5XX, 64 Lake Circle Dr, Vicksburg, MS 39180 (601-636-0827); **w5xx@arrl.org**

*Tennessee:* Glen Clayton, W4BDB, 238 Old Parksville Rd NE, Cleveland, TN 37323; (423-472-7751); **w4bdb@arrl.org**

### Great Lakes Division (KY, MI, OH)

*Kentucky:* Jim Brooks, KY4Z, 7099 Louisville Rd, Cox's Creek, KY 40013 (502-349-2099); **ky4z@arrl.org**

*Michigan:* Dale Williams, WA8EFK, 291 Outer Dr, Dundee, MI 48131 (734-529-3232); **wa8efk@arrl.org**

*Ohio:* Frank J. Piper, KI8GW, 496 Hillview St, Pickerington, OH 43147-1197 (614-589-4641); **ki8gw@arrl.org**

### Hudson Division (ENY, NLI, NNJ)

*Eastern New York:* Pete Cecere, N2YJZ, 329 W Saugerties Rd, Woodstock, NY 12498 (845-246-4359); **n2yjz@arrl.org**

*NYC-Long Island:* Mike Lisenco, N2YBB, 1635 E 46th St, Brooklyn, NY 11234-3604 (917-865-3538); **n2ybb@arrl.org**

*Northern New Jersey:* Richard Krohn, N2SMV, 23 Sweetmans Ln, Manalapan, NJ 07726; **n2smv@arrl.org**

### Midwest Division (IA, KS, MO, NE)

*Iowa:* Tom Brehmer, NØLOH, 1114 East Tenth St, Muscatine, IA 52761 (563-263-3097); **n0loh@arrl.org**

*Kansas:* Ronald D. Cowan, KBØDTI, PO Box 36, LaCygne, KS 66040 (913-757-3758); **kb0dti@arrl.org**

*Missouri:* Dale C. Bagley, KØKY, PO Box 13, Macon, MO 63552-1822 (660-385-3629); **k0ky@arrl.org**

*Nebraska:* Art Zygielbaum, KØAIZ, 6601 Pinecrest Dr, Lincoln, NE 68516-3573 (402-421-0839); **k0aiz@arrl.org**

### New England Division (CT, EMA, ME, NH, RI, VT, WMA)

*Connecticut:* Betsey Doane, K1EIC, 92 Mohegan Rd, Shelton, CT 06484-2448 (203-929-7759); **k1eic@arrl.org**

*Eastern Massachusetts:* Phil Temples, K9HI, 125 Coolidge Ave, Apt 803, Watertown, MA 02472-2875 (617-331-0183); **k9hi@arrl.org**);

*Maine:* William Woodhead, N1KAT, 68 Madison St, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**

*New Hampshire:* Alan K. Shuman, K1AKS, PO Box 681, New Boston, NH 03070-3520 (603-487-3333) **k1aks@arrl.org**

*Rhode Island:* Bob Beaudet, W1YRC, 30 Rocky Crest Rd, Cumberland, RI 02864 (401-333-2129); **w1yrc@arrl.org**

*Vermont:* Paul N. Gayet, AA1SU, 11 Cherry St, Essex Junction, VT 05452 (802-878-2215); **aa1su@arrl.org**

*Western Massachusetts:* Ed Emco, W1KT, 37 Bullard Ave, Worcester, MA 01605 (508-853-3333); **w1kt@arrl.org**

### Northwestern Division (AK, EWA, ID, MT, OR, WWA)

*Alaska:* Jim Larsen, AL7FS, 3445 Spinnaker Dr, Anchorage, AK 99516-3424 (907-345-3190); **al7fs@arrl.org**

*Eastern Washington:* Mark Tharp, KB7HDX, PO Box 2222, Yakima, WA 98907-2222 (509-965-3379); **kb7hdx@arrl.org**

*Idaho:* Edward Stuckey, AI7H, 2300 W Polo Green Ave, Post Falls, ID 83854-9680 (208-457-0354); **ai7h@arrl.org**

*Montana:* Doug Dunn, K7YD, 216 Fiddle Creek Rd, Livingston, MT 59047-4116 (406-686-9100); **k7yd@arrl.org**

*Oregon:* Bonnie Altus, AB7ZQ, 7770 Harmony Rd, Sheridan, OR 97378 (971-237-0711); **ab7zq@arrl.org**

*Western Washington:* Jim Pace, K7CEX, PO Box 1602, Centralia, WA 98531 (360-508-8437); **k7cex@arrl.org**

### Pacific Division (EB, NV, PAC, SV, SF, SJV, SCV)

*East Bay:* James Latham, AF6AQ, 1798 Warsaw Ave, Livermore, CA 94550-6140; (925-447-6136); **af6aq@arrl.org**

*Nevada:* Joe Giraudo, N7JEH, 720 Holyoke Dr, Spring Creek, NV 89815-5306 (775-738-7110); **n7jeh@arrl.org**

*Pacific:* Bob Schneider, AH6J, PO Box 131, Keaau, HI 96749-0131 (808-966-8146); **ah6j@arrl.org**

*Sacramento Valley:* Ronald D. Murdock, W6KJ, 998 Bogue Rd, Yuba City, CA 95991-9221 (530-674-8533); **w6kj@arrl.org**

*San Francisco:* Bill Hillendahl, KH6GJV, PO Box 4151, Santa Rosa, CA 95402-4151 (707-544-4944); **kh6gjv@arrl.org**

*San Joaquin Valley:* Dan Pruitt, AE6SX, 4834 N Diana St, Fresno, CA 93726 (559-779-2974); **ae6sx@arrl.org**

*Santa Clara Valley:* Phil Steffora, K6TT, PO Box 657, Los Altos, CA 94023-0657 (650-793-4970); **k6tt@arrl.org**

### Roanoke Division (NC, SC, VA, WV)

*North Carolina:* Bill Morine, N2COP, 101 Windlass Dr, Wilmington, NC 28409-2030 (910-452-1770); **n2cop@arrl.org**

*South Carolina:* Marc Tarplee, N4UFP, 4406 Deer Run, Rock Hill, SC 29732-9258 (803-327-4978); **n4ufp@arrl.org**

*Virginia:* Carl Clements, W4CAC, 4500 Wake Forest Rd, Portsmouth, VA 23703 (757-484-0569); **w4cac@arrl.org**

*West Virginia:* L. Ann Rinehart, KA8ZGY, 1256 Ridge Dr, South Charleston, WV 25309 (304-768-9534); **ka8zgy@arrl.org**

### Rocky Mountain Division (CO, NM, UT, WY)

*Colorado:* Jeff Ryan, KØRM, 9975 Wadsworth Pky K2-275, Westminster, CO 80021 (303-432-2886); **k0rm@arrl.org**

*New Mexico:* Donald D. Wood, W5FHA, 9100 Wimbledon Dr NE, Albuquerque, NM 87111 (505-828-0988); **w5fha@arrl.org**

*Utah:* Mel Parkes, NM7P, 2166 E 2100 North, Layton, UT 84040 (801-547-1753); **nm7p@arrl.org**

*Wyoming:* Garth Crowe, N7XKT, 1206 Avalon Ct, Gillette, WY 82716-5202 (307-686-9165); **n7xkt@arrl.org**

### Southeastern Division (AL, GA, NFL, PR, SFL, VI, WCF)

*Alabama:* David Drummond, W4MD, 5001 Lakehurst Dr, Northport, AL 35473 (205-339-7915); **w4md@arrl.org**

*Georgia:* Gene Clark, W4AYK, 1604 Lynwood Lane, Albany, GA 31707 (229-888-1090); **w4ayk@arrl.org**

*Northern Florida:* Paul L. Eakin, KJ4G, PO Box 625, Panacea, FL 32346 (850-591-0442); **kj4g@arrl.org**

*Puerto Rico:* Roberto Jimenez, KP4AC, PO Box 360536, San Juan, PR 00936-0536 (787-567-7373); **kp4ac@arrl.org**

*Southern Florida:* David Fowler, K4DLF, 2702 Starwood Ct, West Palm Beach, FL 33406-5145 (561-676-3007); **k4dlf@arrl.org**

*Virgin Islands:* John Ellis, NP2B, PO Box 24492, Christiansted, St Croix, VI 00824 (340-773-9643); **np2b@arrl.org**

*West Central Florida:* Dee Turner, N4GD, 10132 64th St N, Pinellas Park, FL 33782 (727-548-7474); **n4gd@arrl.org**

### Southwestern Division (AZ, LAX, ORG, SDG, SB)

*Arizona:* Thomas J. Fagan, K7DF, 10650 E Bridgeport St, Tucson, AZ 85747-5925 (520-574-1129); **k7df@arrl.org**

*Los Angeles:* David Greenhut, N6HD, 21781 Ventura Blvd, #243, Woodland Hills, CA 91364 (818-992-5507); **n6hd@arrl.org**

*Orange:* Carl Gardenias, WU6D, 20902 Gardenias St, Perris, CA 92570 (951-443-4958); **wu6d@arrl.org**

*San Diego:* Stephen M. Early, AD6VI, 4724 Maple Ave, La Mesa, CA 91941 (619-461-2818); **ad6vi@arrl.org**

*Santa Barbara:* Robert Griffin, K6YR, 1436 Johnson Ave, San Luis Obispo, CA 93401-3734 (805-543-3346); **k6yr@arrl.org**

### West Gulf Division (NTX, OK, STX, WTX)

*North Texas:* Jay Urish, W5GM, 1711 Buckeye Dr, Flower Mound, TX 75028-1259 (972-691-0125); **w5gm@arrl.org**

*Oklahoma:* Kevin O'Dell, NØIRW, 1405 N 7th St, Perry, OK 73077-2206 (580-220-9062); **n0irw@arrl.org**

*South Texas:* Lee H. Cooper, W5LHC, 2507 Autrey Dr, Leander, TX 78641 (512-260-7757); **w5lhc@arrl.org**

*West Texas:* Bill Roberts, W5NPR, 34 Sunny Glen, Alpine, TX 79830 (432-837-2741); **w5npr@arrl.org**

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# Up Front in QST

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## Learning Code in the WWII Era: A Rhythm, a Song and a Cadence

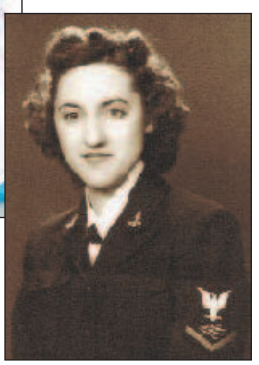
*Jerry DeHaven, WAØACF*

*Di di di dit - di dit* means "Hi." The United States was at war in the 1940s and communications was a critical skill needed all over the world. Thousands of military personnel took their communications training at the Naval Air Technical Training Center (NATTC) in Memphis, Tennessee. Gretchen Niederwimmer from Coleridge, Nebraska joined the Navy in June 1943 and after her training was assigned to NATTC to teach Morse code and other communication skills to Navy recruits.

Many of the instructors were women, known as WAVES (Women Accepted for Volunteer Emergency Service). Like their male counterparts, the WAVES sang songs as they marched between classes, going to the mess hall or to the barracks. After a captain suggested that she think of Morse code in musical terms with a cadence like marching, Gretchen got the "swing" of it. The WAVE instructors had many songs to sing, but one in particular had the phrase, "For you will come to know, mates, bye and bye, that Di di di dit - di dit means Hi."

After her honorable discharge from the US Navy, Gretchen went on to Capital University on the GI Bill. She married Harold Wernecke in 1947 and moved to Texas. I met her during a visit to Round Rock, Texas and presented her with a J-38 key and a code practice oscillator in memory of the thousands of men she helped train during WWII at the NATTC. A rhythm, a song and a cadence helped many people learn Morse code, thanks to instructors like Gretchen. She never forgot *Di di di dit - di dit*.

**The author presents Gretchen with a J-38 key and code practice oscillator during a visit to her home.**



**As a WAVE instructor, Gretchen Niederwimmer taught many Navy recruits the Morse code during WWII.**

DAVE BERMAN, WA2PAY


**Dave Berman, WA2PAY, has seemingly found the answer to poor band conditions: "I am a pharmacist and came across these pills in my practice. Would it be unfair to use these to obtain my DXCC?"**

## One Take on the ARRL Homebrew Challenge

My brother Scott Zehr, K9GKC, and I decided to build the TAK-40 CW transceiver after reading about it in the May 2008 issue of *QST*. We found it to be an interesting project, but in need of some improvements. We received a lot of help from Jim Veatch, WA2EUJ, the author, and we spent a lot of additional time chasing down remaining problems. We installed the DDS-60 digital VFO at Jim's suggestion and we added new BFO and CW oscillator circuits. With these improvements the little rig really came to life.

When the 50 W amplifier designed by Donald Huff, W6JL, in the Homebrew Challenge II was published in June 2010, we built that also.

So far I've been able to work all 50 states and 108 DXCC entities. I've used CW, SSB, PSK31, RTTY and JT65, and have made a few contacts using other digital modes.
— *Grant Zehr, AA9LC*

GRANT ZEHR, AA9LC

**Two Homebrew Challenge projects: The 40 meter 5 W transceiver and the 50 W amplifier have a place of honor at AA9LC.**

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# CORRESPONDENCE

## FCC SOLVES INTERFERENCE MYSTERY

♦ With all the complaints of late about the government, I would like to share a positive experience I recently had with the FCC regarding a 75 meter electronic interference issue. It first manifested itself over the winter, wiping out critical portions of the band — including the DX window at 3.790 MHz — spreading for more than 4 megahertz up in frequency in 10 kilohertz widths. I tried finding the source myself, but to no avail. I then tried to get help from the local cable company and they couldn't locate it, either. I then filed a complaint with the FCC on their website. I completed the form, provided the details and wondered if I'd ever hear from them.

Less than three weeks later, I received an e-mail from Jim Roop, the District Director at the FCC's Enforcement Bureau in Chicago. He wanted to talk to me further about the problem and asked me to call him. I shared more of my research data on exact frequencies of interference, duration and efforts undertaken to identify the problem. Jim confirmed the interference a week later after one of their investigative vehicles drove through the area, quickly locating the exact home with the problem. The FCC contacted the homeowner, gained access and identified the problem as an arcing condition within the older residence's load center. Within a few days, an electrician fixed the problem and the interference was eliminated.

The positive story in this was the great service, diligence and follow through of Jim and his team: great communication, validation of the problem and quick execution. The FCC is working on amateurs' behalf to eliminate valid and identified problems. My thanks to the FCC for making 75 meters enjoyable once again and for helping a nearby resident avoid a potential electrical disaster.

PAUL HAVLIK, WD9IOK
Mundelein, Illinois

## RATTED OUT

♦ A couple of months ago, I picked up an old Heathkit SB-101. It didn't work well, so I turned it over to a friend for alignment and fixing. He did a terrific job and assured me it put out a solid 100 W. I took it home all excited about getting it on the air, only to find that it would not load up correctly. I only worked a handful of QSOs, all of which returned RSTs that would make respectable baseball batting averages, but dismal signal reports. No one could hear me. Over the next month I tried everything to get the darn rig to load up to its full potential. No luck.

I then decided to check my 20 meter inverted V antenna, crammed in the attic of our two-story condominium. We recently had a problem with rodents in our attic, but I thought it was solved. When I went up to the attic to check things out, I found a rat had chewed through the outer insulation of the RG-8/U in several places. Only the center conductor made contact, and just barely at that. Can you believe it? The two 25 foot sections of coax I use to get from the rig to the antenna were connected by only the slimmest of margins. And yet, the old SB-101 still loaded up (poorly, to say the least) and managed to work a handful of QSOs. That is a testament to the ruggedness of these old tube radios. I have indeed learned the lesson that there is no substitute for a dummy load and a wattmeter. Had I had them, I would have isolated the problem from the very start. Rats!

DAVE RIZZO, WB6WFV
Fullerton, California

## WHAT I LEARNED FROM THE NTS

♦ I've known about ham radio for about 18 years. For many years, I never missed a Dayton Hamvention. Except I wasn't a ham; I went to Dayton for the computer aspect of the show. But as time passed, I attended less and less. The need to make the yearly pilgrimage to Dayton became less exciting as the Internet grew and cheap computer parts became widely available.

Recently, I decided to learn something new. Thinking back to fond memories of Hamventions past, I decided I would study to get my Amateur Radio license. I didn't have an Elmer, so the journey would be a solo one. I read, studied and read some more hoping to pass the test. Then the big day came and I tested. I anxiously awaited to find out the results. I passed! I went home proud, but unsure what to do next. After a week or so I decided to buy a handheld transceiver. Now what?

Luckily, I live in an area with a strong daily National Traffic System (NTS) net on 2 meters. I found information about the local net and decided this is where I would enter my ham radio adventure. After listening in and overcoming the initial butterflies, I checked in. It's been an amazing experience ever since. This simple decision has taught me things about ham radio I doubt I could have picked up on my own.

The biggest lesson I've learned this past year is that hams are a very welcoming group of individuals. It's dumbfounding to me how the community opens its arms to beginners. At every step of the way during my NTS journey, the hams I encountered were eager to show me the ropes and to answer even the most basic questions.

I've learned that the use of the proper phonetics makes copying transmissions incredibly easier in the face of noise, static and voice inflections. You old timers and HF hams know this intrinsically. FM tricks you into not immediately seeing the value of this practice, due to its clarity. But one bad night of interference on a repeater and this is a lesson that will never be forgotten.

Another simple but useful lesson is to monitor the input of the repeater to determine if the transmitting station coming into the machine clearly. Reading about the reverse function on your radio doesn't teach you value of when to use it. This simple trick has helped identify weakness in my own antenna setup.

And last but not least, practice. Practice allows you to become more proficient with traffic handling. Practice reveals weakness in your understanding of how things work. Practice prepares you for when things are not perfect.

It's amazing to think a year has passed already. Amateur Radio is incredibly diverse and I look forward to the many years of learning new little lessons. I hope each and every ham still enjoys all the little lessons learned year after year.

TONY SIRIANNI, KD8OEE
Powell, Ohio

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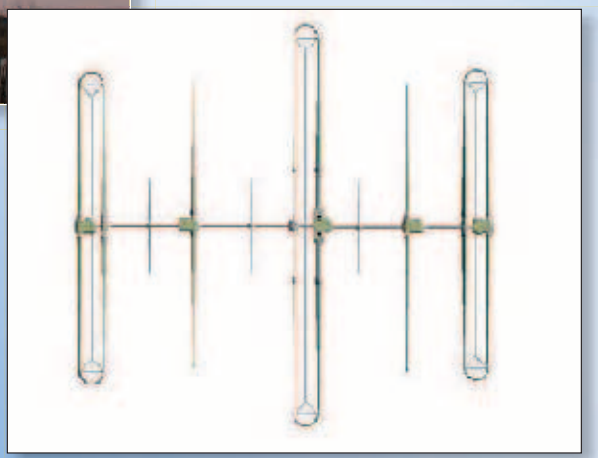

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ADS#28011

# Optimizing Amateur Radio Resources for Major Disasters

*How a single radio operator can provide emergency HF e-mail service to three hospital EOCs at once.*

**Victor Cid, W3CID, and Andrew Mitz, WA3LTJ**

Hams have a long history of technical development for disaster preparedness. The National Library of Medicine (NLM), part of the National Institutes of Health (NIH), has tapped a technically savvy group of hams in the Washington, DC area to develop last resort e-mail communications for three area hospitals. This ambitious project has created a new approach to providing e-mail service to large groups of users during major disasters.

## BHEPP — a Unique Partnership

The project began in Bethesda, Maryland where you will find three very different major hospitals across the street from one another. The Bethesda Hospitals' Emergency Preparedness Partnership (BHEPP) was created in 2004 by the National Naval Medical Center (NNMC), the "flagship" hospital of the Navy, the National Institutes of Health Clinical Center (NIHCC), a world-famous research hospital, and the Suburban-Johns Hopkins Hospital, an acute care hospital with a regional trauma center. BHEPP is the first military-civilian-federal partnership in the US.[1] The Partnership received funding to conduct a series of research, development and infrastructure projects. The NLM, the world's largest medical library and a leading medical-informatics research facility, joined the partnership in 2008 and leads the implementation of the projects. After recruiting a team of ham and MARS radio experts, the project leaders set out to develop the BHEPP MARS/Winlink2000 Emergency Radio e-mail System (BMERS).

## Could It Be Done?

Could a single ham (or MARS) radio operator with a single Winlink 2000 station provide emergency e-mail service to not just a fully staffed emergency operations center (EOC), but to three large EOCs at once? After many months of research and development, these hams found the answer and have a prototype system to prove it.

## EmComm and HICS

As ARRL Emergency Preparedness Manager Mike Corey, W5MPC, will tell you, if you are going to provide emergency communications (EmComm) for an agency, you had better understand how that agency operates. Health facilities such as the BHEPP hospitals use the Hospital Incident Command System (HICS) to manage emergencies.[2] This system provides an organizational and operational model that the hospitals train for and activate in case of an emergency. If the HICS is activated during an emergency, each

[1]Notes appear on page 34.

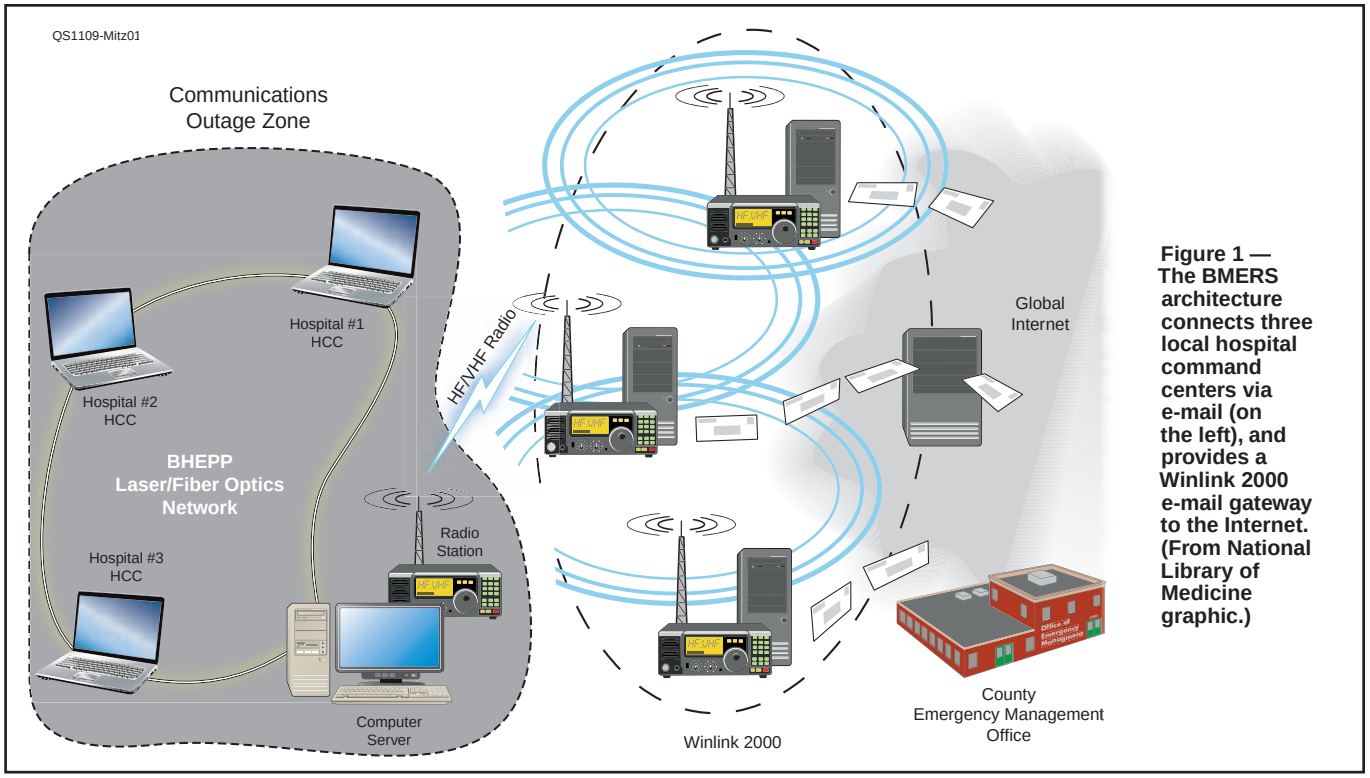



**Figure 1 — The BMERS architecture connects three local hospital command centers via e-mail (on the left), and provides a Winlink 2000 e-mail gateway to the Internet. (From National Library of Medicine graphic.)**

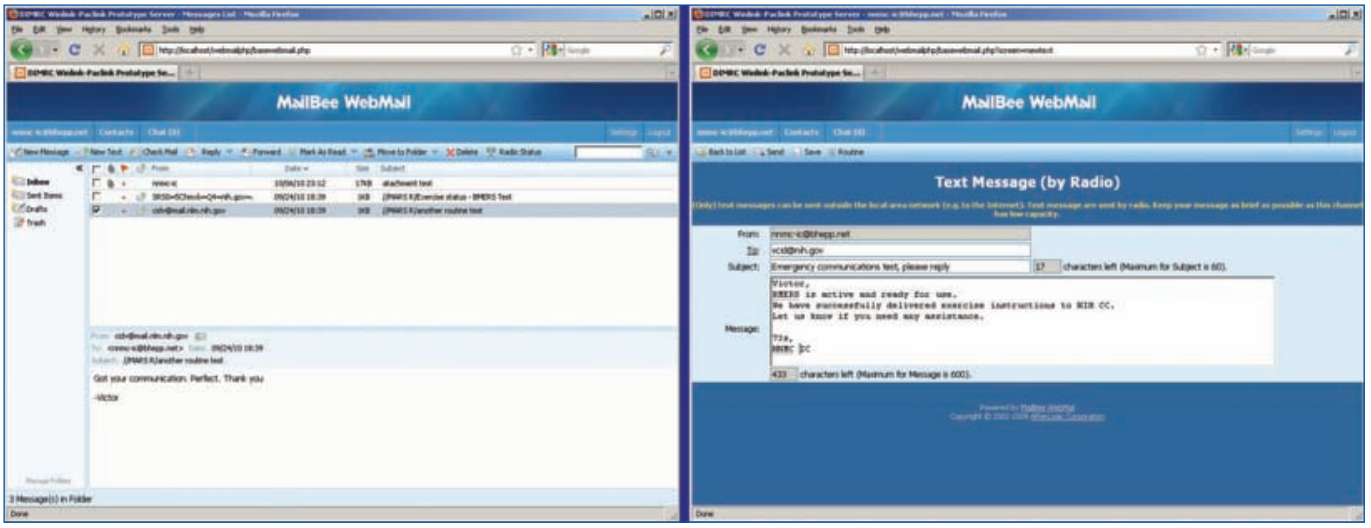



**Figure 2 — The e-mail interface with a traditional web mail mailbox on the left and the "text message" interface on the right. Most users are allowed WL2K Internet e-mail access only through the text message interface.**

hospital implements a Hospital Command Center (HCC, the hospital equivalent to an EOC), in which people trained on HICS perform specific roles and functions to manage the emergency.

The BHEPP hospitals have an emergency plan that uses HICS for sharing resources and information, and managing patient surge. For example, stable patients occupying beds at Suburban Hospital can be transferred to the NIHCC to make room at Suburban for new trauma patients. Communications among the three hospitals and with county, state and federal agencies is critical. The BHEPP Communications/Information Management Plan only works if they can communicate during an emergency.

At the beginning of the project the hospital emergency directors emphasized accurate and timely information exchange between the hospitals. There are multiple BHEPP projects and several pertain to the electronic capture and exchange of patient, logistic and other data. The hospitals made it clear at the project's inception that our job would be to provide e-mail if a widespread disaster destroyed or saturated Internet access. They envisioned an event as widespread and disruptive as Hurricane Katrina.[3]

## The Team

When BHEPP asked the NLM to propose a last-resort emergency communications system, it was clear from the start that the solution had to include radio amateurs. The NLM approached the NIH Radio Amateur Club (NIHRAC), and through them the larger Amateur Radio community. By the end of this project we had professional and volunteer resources from the US Navy, NIH, a large local radio club (Montgomery Amateur Radio Club, MARC) and the Army branch of the Military Auxiliary Radio Service (Army MARS). Along the way, two team members got their first ham radio licenses just before or during the project, several members got their first MARS licenses, and both radio clubs hosted BHEPP and Army MARS presentations. The cross-fertilization of EmComm resources was a major success, but what about the project? Could we find a technical solution to servicing the e-mail needs of three major hospitals at once?

The authors lead the team in their pursuit of this goal. Victor Cid is in the Disaster Information Management Research Center at NLM. Andrew Mitz is an NIH engineer/scientist and president of the NIH Radio Club. James Sears, WA3MEJ/AAT3OK, the Army MARS Maryland State Director at the time, served as the MARS liaison and provided endless hands-on experience. Captain Mary Chaffee, K1MWC, was the NNMC project manager, a health professional and a well-published emergency management expert who kept the project on track. Shawn Moozoun was an administrative support contractor whose interest in every technical detail helped nail down the core architecture of the project.

## Selecting a Platform

The team received substantial funding for a 1 year research effort. In the first months the team explored a number of emergency communications options that included satellite and other commercial alternatives. Winlink 2000 (WL2K) was the technology of choice.[4,5] We determined that WL2K over HF offered the best method to supply e-mail to the BHEPP EOCs if other services have failed. Even though WL2K relies on a volunteer based infrastructure, it has demonstrated its effectiveness time and again during real disasters.[6] E-mail would not only enable the hospitals to optimize the available radio resources, but also exchange information efficiently and accurately. Implementation and recurring costs of the solution were also important decision factors; we had to develop an effective solution that was affordable both to install and to maintain. We also wanted a solution that other organizations could reproduce for their own use.

## Army MARS Involvement

There was no question that we needed Army MARS support for key resources, such as access to MARS-only WL2K RMS stations and the engineering knowhow to design and build resilient radio stations. Seasoned Army MARS operators always bring practical communications experience based on real life emergency support. The MARS Radio Service frequencies can be used for tests and drills much more freely than the Amateur Radio Service bands. As this project was being developed, the use of amateur frequencies during exercises for the government by their employees was mostly excluded under FCC Part 97.113 regulations. During the first year, Army MARS and NIH established a Served Agency Agreement and several MARS call signs were assigned to NIH.

## This Is Harder Than We Thought!

We started with a great deal of enthusiasm and, admittedly, some bravado. Reality, however, quickly intervened. WL2K was designed to be used primarily by one remote user for Internet e-mail access via an HF or VHF radio link. *Paclink*, the main client software tool for accessing WL2K, allows the sharing of a single transceiver link among a few users across a Local Area Network. However, the WL2K model assumes that the users are licensed operators sending and receiving a relatively small number of electronic messages, all of them transmitted through the radio link. This

model works well in many places, such as a Red Cross shelter. But linking hospital HCCs/EOCs together is a different matter. The hospital workers must exchange a great volume of e-mail traffic among themselves. Only a select few e-mails should get transferred over the radio network. The shared use of the radio link must be carefully managed as a scarce resource. We realized that adapting the WL2K model to the needs of the multi-hospital community was going to be the central challenge of our project.

**Figure 3 — Andy, WA3LTJ, helps test the BMERS portable station during a drill. The power generator and wi-fi bridge (on a tripod) are visible on the left.**

The BHEPP hospitals did have one very special resource. As a result of another R&D project conducted by NLM, BHEPP had created a private fiber optic network (called BHEPPnet) linking the hospitals' HCCs together. BHEPPnet was designed to remain in operation even if the Internet and other networks were not available. With this local hardwired network in place, we set out to find some way to build a BHEPPnet e-mail server and seamlessly link it to a Winlink 2000 Internet gateway.

## The Solution — BMERS

After about a year of development, the team came up with two solutions, one portable and one infrastructure based. The infrastructure based solution allows HCC staff to access the e-mail service via any computer connected to the private laser network. The portable solution provides a deployable radio station with emergency power that can supply e-mail services on demand to a single HCC or to an emergency response team in the field. Either station can be managed by a single MARS or Amateur Radio operator at a location optimized for the operating location (for example, near a good antenna site).

At the core of BMERS is a specially configured Internet (web) e-mail server (Figure 1). On a moment's notice, the BMERS e-mail system can be booted up, providing user accounts and web e-mail access to any laptop or other computer plugged into the BHEPPnet optical network. All the e-mail accounts in the server are pre-configured based on hospital-specific HICS roles.

Users can exchange unlimited e-mails (with or without attachments) with each other and among the hospitals via web mail by taking advantage of the high-speed laser network access to the web e-mail server. E-mails addressed outside of the BHEPPnet are rejected. However, each user account has a special button on the web mail page for sending a message over the Internet. This link provides access to the WL2K service, as described below.

All e-mail traffic sent by radio goes through a single "winlink.org" e-mail account, which acts as a gateway between the BHEPP users and WL2K. This architectural approach required extensive web server configuration, but it enables the system to handle an unlimited number of local user accounts. The user's e-mail address is automatically embedded in the body of the outgoing messages. Instructions are added to the message telling the recipient how to reply. When people who received these BHEPPnet messages through the Internet reply properly, the return message is received through WL2K and automatically ends up in the original user's mailbox. This automatic delivery of e-mails between individual BMERS users and Internet users removes the radio operator from the mail delivery loop.

Automatic routing is the key to needing only one operator to service three HCCs/EOCs. Before the development of this routing system, emergency communications among local users was handled separately from e-mail sent through the Internet. This separation was critical, since all e-mail on the WL2K system goes out over the air. With manual routing, the operator of the WL2K radio station has to be on site to interact with the users. Messages were copied from one e-mail system to the other, often using *Windows* "cut-and-paste." Incoming and outgoing messages were tracked manually, with the operator responsible for all bookkeeping. The operator was responsible for making sure that messages received from Winlink were properly routed to their intended local customers.

With the operator taking such a direct role in message handling, the operator needed to keep track of who is performing what role in the HCC/EOC. The operator had to track all changes of staff in the HCC/EOC to locate the proper recipient of incoming messages.

BMERS provides an integrated communications service, for both local and remote communications, that requires little operator intervention. The operator's main role is to ensure that the radio connections with the WL2K system are established when needed. Message routing is automatic. No message transcription is necessary. "Hot wash" (post exercise review) is greatly simplified due to the automatic message logging capabilities of the system. The message addressing is all role based, meaning that the operator does not need to track EOC personnel or staff changes.

The address book of every user account includes the e-mail addresses of all the HCC roles from the three hospitals that are making use of the system. By not requiring the radio operator at the HCC/EOC, the radio system can be moved to an optimal location. Our infrastructural radio station is at the NIH Radio Club station, separate from the three HCCs and right underneath our antenna farm.

## Bandwidth Catastrophe Prevention

Removing the radio operator from the routing loop has a cost. Users must somehow be forced to limit the size and distribution of Internet messages to avoid unnecessary radio traffic. BMERS was developed for major regional Internet outages, so the main focus has been on HF operations. VHF and UHF operations can move messages at a higher data rate, but the concept of bandwidth catastrophe discussed here is still the same. The bandwidth offered by a HF radio link is extremely limited, even when using the fastest amateur HF protocol available, PACTOR III.

Even under excellent propagation conditions, it is difficult to transfer more than a few hundred characters per second or the equivalent of around 14 pages of single spaced text each minute. Under more realistic conditions, the throughput is a few pages of text per minute, not counting the time it takes to establish a connection between the emergency radio station and a remote WL2K RMS server station. Large graphics sent in one e-mail can tie up the HF channel for minutes at a time. It is easy to see that some sort of bandwidth management is essential. If the operator is handling each and every message, he/she can manually regulate the amount and type of traffic that gets sent out. On an automatic system, a different mechanism for bandwidth discipline is needed.

Before we explain the techniques used by BMERS, consider that one poorly composed e-mail can bring the entire system to its knees with no simple mechanism for recovery. For example, if a user sends a single message to a dozen Internet recipients and asks them to acknowledge the message's arrival, a dozen replies that copy the original message will produce 12 times the original radio traffic. Once the message leaves the local network, there is no way to stop the multiple replies

from queuing on the Internet side of the radio link. The incoming flood of traffic can potentially choke the radio system for many hours, especially if some e-mail replies include fancy multimedia components now common on the modern Internet. There is nothing the radio operator can do to clear the incoming e-mail queue, except wait for all the e-mails to be downloaded.

We needed to implement automatic bandwidth usage control mechanisms in the software. BMERS restricts the message format and addressing format of Internet e-mails. Internet e-mails from local users are not allowed to include multiple destination addresses. The internal e-mail interface looks like common web mail services, such as Hotmail or Gmail, but the user can access Internet e-mail only via a special button on the web mail page. The Internet e-mail composing interface is cleverly designed to resemble a text messaging or Twitter interface. It allows users to send text-only messages of limited length (currently 650 characters), no attachments, and it displays a character counter that is decreased as text is entered.

Only a single Internet recipient is allowed. Also, the messages are automatically stripped of unnecessary characters and a note is added to the message explaining the recipient how to reply properly. Large e-mails or long Internet recipient lists are impossible through this interface. This approach practically eliminates accidental e-mails from local users across the HF radio link. Should it become necessary to send a large or widely distributed e-mail, there is one user account on the system that provides unrestricted Internet e-mail access. Only specially trained personnel are permitted access to this account.

If, for any reason, an overload of incoming traffic does occur, there is one extraordinary measure that can be used to recover. The system can be rapidly reconfigured to use an alternative Amateur Radio or MARS call sign that points to a different winlink.org account. Moving to a new account switches to an entirely new e-mail box on the central mail server (CMS). All old e-mails are abandoned and this new gateway e-mail address is used, but local accounts remain the same. The NIH Radio Club has three MARS call signs and three Amateur Radio call signs expressly for this purpose.

## Software Components

The standard WL2K *Paclink* program is used to handle the packet modem and radio. An open source mail server application, *hMailServer*, handles the routing of local and Internet e-mail messages and performs a number of required checks and transformations on them. The user interface is provided by an Apache web server and an extensively customized copy of the AfterLogic *Webmail Pro* application (Figure 2). The version of *Webmail* used was donated by AfterLogic to the WL2K community and we modified it to accommodate the additional functionality needed. The web server can also be used by the hospital HCCs/EOCs or the radio operator to broadcast information to the local user community. The same software configuration is used for both the infrastructural and the portable solutions.

## Infrastructural Solution

The laser network connects the hospitals' HCCs together forming a common local area network (called BHEPPnet). A dedicated fiber optic connection links the NIH Radio Club station to BHEPPnet. The club station has the server and radios. Users at the HCCs just point their web browsers to the mail server and login to their e-mail accounts assigned by the Incident Commander according to their designated HCC roles. The radio station has large multiband antennas for WL2K operations. Volunteer Amateur Radio and/or MARS operators, many of them club members, have access to the station for training, drills and regular radio club activities. Thus, the equipment is readily available for both training and emergency operations. Employees of NIH or the other BHEPP organizations may be restricted under Part 97.113 of FCC regulations, whereas non-employee volunteers are not.

When BMERS is in operation, users at the hospitals can communicate with the radio operator at the NIH Radio Club using e-mail. The operator can make radio and e-mail queue information available automatically to the users via the web server used by the web mail program.

## Portable Solution

While developing this system we decided to build a portable, ruggedized version of BMERS (Figures 3-5). The computer server, which is also the operator's console, is a ruggedized laptop running Microsoft *Windows XP Pro*. Power can be provided by a gas generator, batteries or the power grid. We implement an Ethernet local area network (LAN) around the radio rig, providing HCC or disaster response personnel with wireless and wired connectivity to the e-mail service. A high-gain Wi-Fi bridge is also available to extend the LAN inside a building or to a far-away location.

The portable station has many potential uses. For example, if an HCC/EOC is forced to relocate after building damage, the portable station can be set up in a field or on a parking garage, and beam the network connection into the temporary HCC/EOC site.

## Hamspeak

**HF** — High frequency, the portion of the radio spectrum extending from 3 to 30 MHz, also called *shortwave* and including the 80 through 10 meter amateur bands. HF is above MF (300 kHz to 3 MHz, and includes the 160 meter amateur band) and below VHF (30 MHz to 300 MHz, which includes the 6, 2 and 1¼ meter amateur bands).

**MARS** — Military Auxiliary Radio System. Organizations providing non-operational communications support, such as health and welfare traffic, to each of the US military services. MARS operators are generally also licensed Amateur Radio operators using their own equipment on special frequencies just outside the amateur bands. They have special MARS licenses and assigned call signs and operate under MARS procedures.

**PACTOR** — Amateur digital communications protocol that features an error correcting mechanism.

**UHF (ultra high frequency) —** The radio frequencies from 300 to 3000 MHz.

**VHF (very high frequency) —** Radio frequencies from 30 to 300 MHz. Included in this range are the 6, 2 and 1¼ meter amateur bands.

**Wi-Fi bridge** — Packet routing equipment used to interconnect personal computers and other systems on a local area network using a wireless link to some or all nodes. The wireless link provides short range connectivity using radio operating in the UHF region under the protocol standardized by IEEE 802.11.

**Winlink 2000** — Worldwide Amateur Radio based radio messaging system that provides noncommercial Internet connectivity to remote users.

## System Testing

The portable solution has been successfully tested in a number of exercises, including a demonstration during the Collaborative Multiple-Agency Exercise in October 2009 (CMAX-09).[7] At the time of this writing, the fixed station has been tested only from within the NIH Radio Club room and not from the hospital HCCs/EOCs. The installation of the network connection between the BHEPPnet laser network and the NIH Radio Club station is just now being finished.

## Current and Future Activities

The BHEPP community is funding a number of enhancements to the two BMERs solutions. New software features will allow better message traffic control. Users will be able to communicate via instant messaging with each other and with the radio operator, and additional automatic system reports will be available to users and the radio operator. The operator will be able to easily and

**Figure 4 — Front of the BMERS portable station. The HF rig (a Kenwood TS-480SAT) and PACTOR modem (SCS PTCII) are on the left. A UHF/VHF rig (IC-208H) and packet modem (Kantronics KP3-C+) are on the right.**

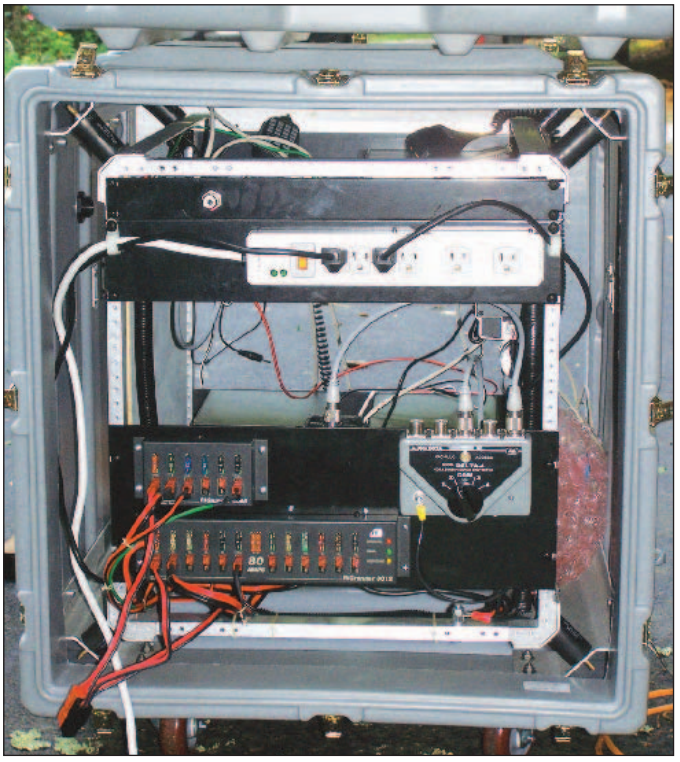


**Figure 5 — Back of the BMERS portable station. Note the ruggedized, waterproof carrier. The station runs on either 120 V ac using a pair of built-in Astron 25 A switching power supplies, or 12 V dc with a 250 W inverter for ac accessories.**

rapidly switch the system between ham and MARS operation, and easily configure many system parameters via a custom management user interface.

A new, more compact and flexible portable radio station will be easier to deploy. An innovative power system is being built to allow for an unprecedented flexibility in the types of power sources available to the radio station. The new power system will automatically switch from battery to generator, or even solar power, depending upon which source is available. It can also provide power to local users. The base station is being rebuilt for greater reliability and to support more users.

The BHEPP laser network is being extended to the NIH Radio Club via a private fiber optics link for maximum reliability. Training materials and activities are being planned to enable hospital personnel to use and manage the system. Future research and development could explore ways to increase the throughput of the radio system, and could make it easier to use BMERS with different computer operating systems and radio equipment.

The BHEPP community will again include the BMERS in their next annual CMAX drill, but this time the communications system will play a much larger role during the simulated disaster. We expect to publish more technical details of the system we developed, and make the software and the documentation available to the ham community in the future. Stay tuned for more.

## Acknowledgments

This research was supported by the Department of the Navy, the National Naval Medical Center, the Intramural Program of the National Institutes of Health, the National Institute of Mental Health and the National Library of Medicine.

### Notes

[1]For more information about BHEPP, see **www.bethesdahospitalsemergencypartnership.org/**.

[2]HICS is described at **www.emsa.ca.gov/hics/**.

[3]R. Lindquist, N1RL, "The Katrina Chronicles 1," *QST*, Nov 2005, p 43, and "The Katrina Chronicles 2," *QST*, Feb 2006, p 50.

[4]R. MacDonnell, VEØRDM/VK4BDM/YJ8DM, "Squeezing More from Winlink 2000," *QST*, Jun 2006, pp 28-31.

[5]For more information about Winlink 2000, visit **www.winlink.org/**.

[6]**www.winlink.org/node/12**

[7]For more information about CMAX-09, see **www.navy.mil/search/display.asp?story_id=49042**.

*Photos by W3CID*

*ARRL member and General class licensee Victor Cid, W3CID, is a senior computer scientist with the National Library of Medicine (NLM), Office of the Disaster Information Management Research Center. NLM is part of the National Institutes of Health (NIH), the medical research agency of the Department of Health and Human Services.*

*He got his ham ticket in January 2008, mainly because of his work on this project, but has been a fan of ham radio since his early years, having participated on a few Jamborees on the Air at CE3BSC, the official radio station of the Boy and Girl Scouts of Chile. Victor is also an auxiliary operator with Army-MARS (AUX3AH), and a member of the NIH Radio Amateur Club (NIHRAC). He has great interest in digital modes and stealth antennas (as many other hams, he lives in a community with antenna restrictions). Victor holds degrees in computer science and telecommunications management. Victor can be reached at 6701 Democracy Blvd, Suite 1030 MSC 4876, Bethesda, MD 20892-4876 or at* **vcid@nih.gov**.

*ARRL member and Amateur Extra class licensee Andy Mitz, WA3LTJ, is a research scientist at the National Institutes of Health (NIH) and the president of the NIH Radio Amateur Club. At the NIH he applies electrical engineering to brain research problems. He describes his work environment as "smart people doing good things with very cool toys." Andy earned his first license in 1968 and immediately became an avid ARRL Field Day operator. He still enjoys Field Day competition as well as casual HF DXing and public service. However, it is more common to find him in his basement shop restoring old radios or trying out new technologies. Over the years, he has built lots of radios, antennas, test equipment, automated lab instruments and mechanical gizmos. Ham radio and technology have changed a lot over the years, Andy notes, and his philosophy is to embrace those changes. Andy can be reached at 4207 Ambler Dr, Kensington, MD 20895-4002 or at* **arm@nih.gov**.

# An Emergency Radio Package — or The Radio in a Box II

*This compact package makes EmComm readiness easy.*

**Geoff Haines, N1GY**

Several years ago, I constructed a "Radio in a Box" for use while engaged in ARES® deployments and also for use when I just want to go do a little ham radio operating at the beach. I chose an ICOM IC-706 MkIIG as the transceiver and added an LDG automatic antenna tuner and an MFJ 4125 switching power supply. These were mounted on a pallet made of ABS sheet and aluminum. The whole thing was packaged in a suitcase-like container that also had space for the HF antenna, the coax and all the little parts that complete any ham radio station, including a laptop computer. I still use it frequently, but lately I began to see a need for something a little more suited to the kinds of ARES® deployments we see more often here in the southern US.

## Another Box?

I wanted to have, in one package, a dual band VHF/UHF radio, battery power and the paperwork that is necessary for most deployments. I also wanted to include the antenna, but as it turned out that would have to be a second, although relatively small, package. I also wanted to build it as inexpensively as possible — using materials and equipment I already had on hand. This sounds, at first glance, like a tall order, but it turned out to be relatively easy.

## Radio Equipment

The first order was to select the radio. I already had a Yaesu FT-7800R that was underutilized in my radio room. It covered the 146 and 440 MHz FM bands that I needed and had plenty of memory. The second task was the power source. As luck would have it, I happened to have a pair of 12 V, 7 Ah gel cell batteries on hand. By using both in parallel, I would have 14 Ah of suitable power for the FT-7800R. I also had on hand a 1 A wall wart that was rated at 13.5 V dc and specifically designed for charging and maintaining gel cell batteries. This would make charging the batteries easy. As the batteries approach 13.5 V charge, the current flowing from the wall wart's transformer switches to a "float" mode to keep the batteries topped up. The next item on my list was a way to monitor the battery voltage. I decided that a simple 0 to 15 V dc voltmeter would suffice. Indeed, the FT-7800 I used for the project displays the input voltage on initial start-up, so the voltage meter is in some ways "just because I had one to put in."

## The Container

Now that I had the major components, the next thing was to find a container to put it all in. I searched the workshop cabinets and found an unused tool box of about 9 × 18 × 9 inches. It even was bright orange, a good color for emergency gear.

I now have all of the major components and I still haven't spent penny one. Just by looking around my house and shop, I found I already had most of the materials to build the project (see Figure 1).

By trying various layouts of the radio, power and meter, I came up with a design that makes the package easy to set up and use. The batteries were placed at the opposite ends of the box and secured with simple aluminum straps that bolt through the sides and back of the box. One end of each strap is secured with a wing nut to make changing out the gel cells relatively easy when the time comes.

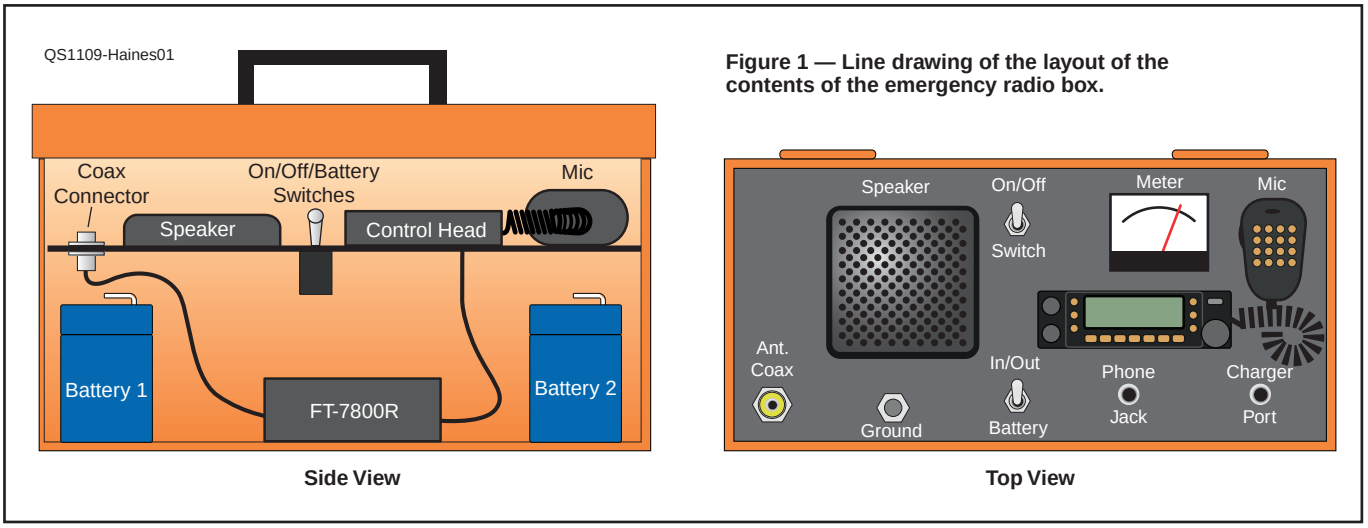



**Figure 1 — Line drawing of the layout of the contents of the emergency radio box.**

**Figure 2 — View of the front (top) panel made from ABS plastic along with some of the ancillary components that are carried in the container. Under the cable in the lid are frequency lists, message forms and equipment manuals.**

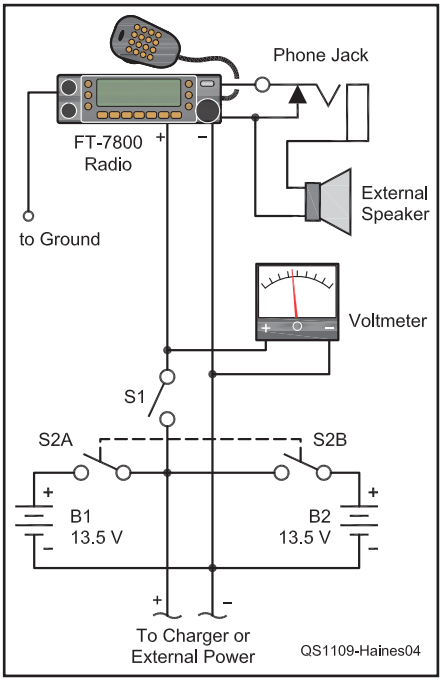



**Figure 3 — Wiring diagram showing interconnections of the system components and feeds.**

The main body of the radio was secured to the bottom of the box by sandwiching the mounting bracket between the box bottom and a scrap of ABS sheet that was then bolted to the box bottom. My reason for doing it this way was that otherwise the radio would have to be removed from the bracket to bolt the bracket in place directly. Once the bracket was secured, it would then be difficult to reinstall the radio in the bracket because of the limited space available on either side of the bracket. The control head was screwed to the top panel and connected to the main body by a six conductor cable with RJ-12 connectors at both ends. It turned out to have the perfect configuration for the FT-7800R and needed no modifications at all.

The top panel was constructed from a scrap piece of the same ABS plastic sheet (see Figure 2). This stuff is fantastic. It comes in sheets up to 4 × 8 feet and is about ⅛ inch thick. The normal users of this stuff are sign makers. Check with your local signage shops and they probably will sell you some leftovers at a reasonable price. By the way, when I say signage shops, I am not talking about the kind that can print stick-on or magnetic signs with a computer. I mean the people who make the big signs that stand outside a restaurant or a hotel. Check your local industrial park for these companies.

I cut the top panel to size and rounded the corners slightly to fit the interior of the tool box. I cut and drilled a suitable sized hole to mount a speaker. The speaker was wired through a ⅛ inch mono jack that will automatically route the receive audio to the earphones if they are plugged in. Otherwise the audio goes to the speaker. A mounting bracket for the FT-7800R's control head was screwed to the top panel and a switch to control the dc power to the radio was also installed. Finally a pass-through UHF connector was mounted to the top panel and a short coax jumper was connected from it to the main body of the radio. This brings the connection point for the coax to the antenna out to the top panel, making it easier to set up in the field.

## Making it Play

After mounting all of the major components, it was then time to wire them all together. The two batteries were wired in parallel with a double-pole double-throw (DPDT) switch that removes the batteries from the circuit if the radio is being run on external power. Overcharging of the batteries is thus avoided. The wiring then runs through the POWER switch to the radio. Another pair of wires was run to the top panel to allow the wall wart to be connected for recharging the batteries. This pair of wires was eventually run through the side wall of the box to allow recharging without having to open the box. Another pair of wires was run to the meter to allow monitoring of the battery voltage. Since these wires are connected to the circuit after the POWER switch for the radio, the meter only monitors the voltage while the radio is in use. Finally, a single wire was run from the case of the radio through the top panel. This allows for the grounding of the transceiver when in use. All of the necessary connections where any component might have to be removed or replaced were made with Anderson Powerpole connectors using the standard ARES format. The grounding connection uses a single Powerpole connector with a green housing. The others use the standard red and black housing colors and all use 30 A rated connectors (see Figure 3).

In order to mount the top panel to the tool box, I purchased some aluminum angle stock at the local home improvement store, along with some blind pop-in rivets and some stainless steel bolts, nuts and screws. By cutting the aluminum angle to appropriate lengths, a narrow shelf was installed about where a tool tray used to fit inside the box. The angle stock was secured with the pop rivets and the top panel was placed onto this shelf and secured using self tapping sheet metal screws. These can be removed easily with a suitable nut-driver to gain access to the interior of the box. Insetting the top panel in this way not only protects the radio control head and speaker but allows for the storage of the antenna coax and paperwork in the lid of the box.

The term *top panel* may be a little confusing. When the box is stored, it is indeed on top; however, when in use the box is usually laid over so the panel is now on the front of the box, just as the radio would normally be used at home or in the car. This way the radio display will be easier to read and adjust. Another point is that the radio is set up with a hand mic and an external speaker for normal use. In a high-noise environment, a headset can be used in place of the hand mic, or earphones can be used to keep the receive audio intelligible. The various components that are mounted on the top panel were identified with small labels as to their function and the proper setting for the desired function.

## You Need More than Radios

With the project almost complete, attention turned to the material that would be stored with the radio. These include the operator manual for the radio, shelter and frequency lists and several copies of the

message forms that we use in our local ARES group. Your list may be different, and I suspect that all our lists of paperwork will evolve with changes in operational procedures. Also stored in the lid is a 75 foot run of RG-8X coax. This should allow optimum placement of the antenna high enough and far away enough from the operator.

The charger wall wart was also placed inside the lid along with a ground wire that can be clamped to a pipe or ground rod or plugged into any convenient electrical outlet. The plug for this function has had the neutral and hot blades removed, leaving only the safety ground prong to be plugged into the outlet. A flexible handle was secured to the plug to facilitate unplugging when desired. Also connected to the wire in a Y configuration with the plug is a medium size clamp, kind of like a super size alligator clip, to attach the wire to a pipe or ground rod.

Once the package was constructed and tested, there was one last thing to do. Since this package is likely to be loaned out to other operators when needed, it was important to make sure that it came back to its owner when the mission was completed. To ensure this, I painted the lid of the box with my name, call sign, and both my home phone number and my cellular number. I also lettered the lid with "VHF/UHF" to indicate the bands covered by the radio (see Figure 4).

## Antenna System

This setup has everything included in the box except the antenna and some kind of antenna support. If one were to use a roll-up twin lead J-pole type antenna, it could be carried in the box as well. Since tall trees are less common in my area, I chose to go with a portable antenna and support that while collapsible and portable, would not fit inside the box. For the antenna itself, I modified the design of the off-center-fed sleeve dipole, about which I have written before, to allow the upper element to be removed for storage. This makes the antenna a two-piece package about 26 inches long (see Figure 5).

For the antenna support mast I used an aluminum telescopic mast made up of 24 inch sections left over from an earlier mast project. The sections vary from ¾ to 1½ inch diameter in ⅛ inch increments. They are clamped to each other with hose clamps. The mast is over 10 feet tall if fully extended. The antenna is designed to slip over the top section when deployed making the total length of the antenna and support almost 15 feet. The bottom of the mast can easily be secured to almost anything — a chair, a tripod or even simply poked into the soil at the site (see Figure 6). I plan to find some kind of base that will be a small enough package to add it to the mast/antenna lash up.

I built two bases. The one for pavement is an H frame that will support the mast and antenna with a weight on top of the legs of the H (see Figure 7). The one for soft ground is a kind of *lawn dart* cobbled up from some surplus pipe fittings. It will be simply driven into the ground and the antenna mast slipped over it as shown in Figure 8. As with the radio in a box, the out of pocket cost of the antenna and mast was $0.


**Figure 4 — The outer surface of the box is clearly marked with the name and call sign of the owner, along with other information. The telephone numbers have been obscured in this picture.**

**Figure 5 — The OCF sleeve dipole all packed up and ready to go. One could easily substitute most homebrew or commercial antennas.**

**Figure 6 — The antenna and supporting mast set up on unpaved ground. The mast is simply slipped over the *lawn dart* mentioned in the text and shown in Figure 8.**

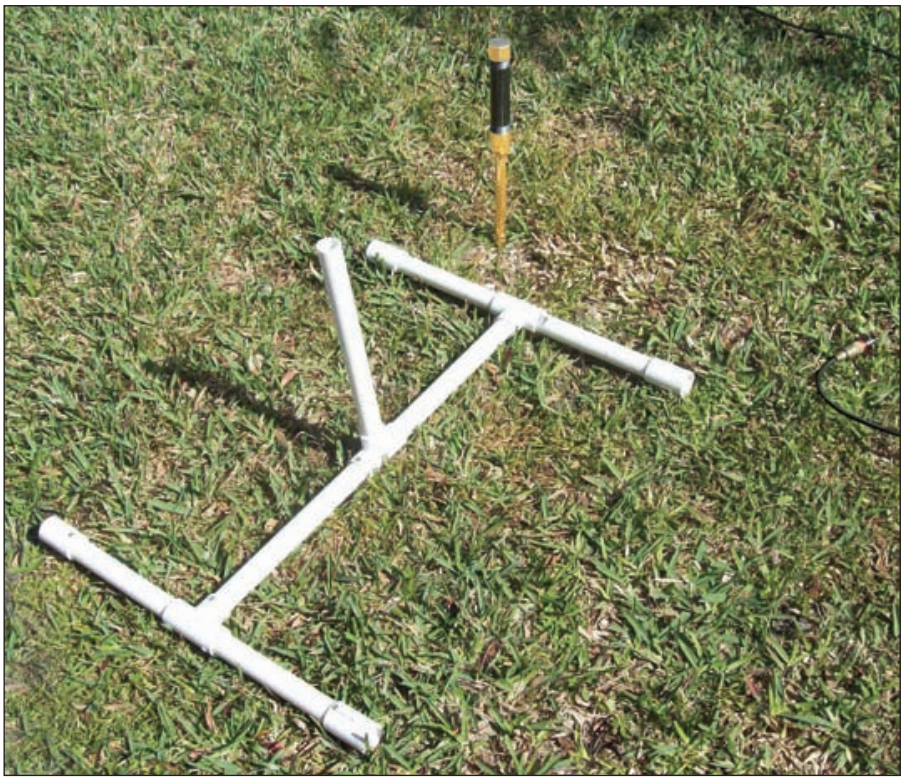


**Figure 7 — The base for paved surfaces. The H frame can be secured with a moderate amount of weight, such as a tool box or sandbag.**

**Figure 8 — The lawn dart made from surplus pipe and fittings. It can be driven into the ground with a heavy foot or a short handled sledge hammer.**

## Now I'm Ready!

I thoroughly enjoyed building this emergency radio package and the cost was amazingly low, primarily because I used components I had on hand. If one had to purchase all of the components for this project, it could get a bit pricey, but by making use of components already in the house, the cost gets much more favorable. This is one of the reasons, as the Technical Coordinator for my section, I counsel my fellow hams in our section never to throw any aluminum tubing away. Even if the old antenna is totally shot, the aluminum tubes that make up the antenna are very useful for other projects. The same goes for those scraps of PVC pipe left over from the last plumbing repair.

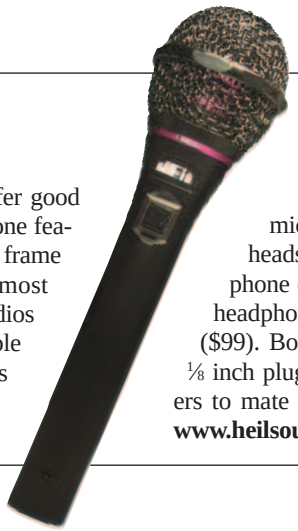
The result is a handy package for deployment in or after a disaster. I keep the radio box in my vehicle, along with the mast and antenna, easily available when the local ARES® Emergency Coordinator calls our group out to support the community after some form of disaster or special event.

*An ARRL member, Geoff Haines, N1GY, has been licensed since 1992 and holds an Amateur Extra class license. He retired after a career in respiratory care. He currently holds several ARRL appointments in the West Central Florida Section, including Assistant Section Manager, Technical Coordinator and Net Manager among others. He is a past president of the Manatee Amateur Radio Club and a member of several ham radio clubs both in Florida and Connecticut. In his spare time, he enjoys designing small projects such as antennas and accessories suitable for the new ham. He also finds time to update his website,* **www.n1gy.com**, *on a regular basis. Recently, his wife Audrey also became licensed as KJ4YMX. Geoff can be reached at 904 52nd Avenue Blvd, W Bradenton, FL 34207, or* **n1gy@arrl.net**.



# New Products

### HEIL GENESIS SERIES MICROPHONE



♢Heil Genesis Series products are designed to offer good performance at lower prices. The HM-12 microphone features a new microphone body design and an open frame full range dynamic element said to work with most transceivers. The HM-12 interfaces to popular radios using the standard Heil Sound CC-1 connecting cable system. Price: $70. The HB-1 Economy Boom is an articulated steel arm capable of supporting up to a 2.5 pound microphone. It fits all standard Heil mic boom mounts and hardware and is shipped with a brass lined C clamp. Price: $70. The FS-3 single channel footswitch has a ¼ inch male plug that interfaces with all Heil adapters and mic cables. Price: $25. The Pro Micro is a lightweight headset using the Heil HC-6 enhanced response microphone element. There are two models, the PMS-6 single headphone ($79) and the dual headphone model PMD-6 ($99). Both models have a 6 foot cable that terminates in ⅛ inch plugs for headset and mic and use Heil AD-1 adapters to mate with various radios. For more information, visit **www.heilsound.com**.

# New Car RFI? Buyer Beware

*That shiny new car may not be quite the mobile platform you were hoping for.*

**John Perone, W8RXX**

If you plan to install Amateur Radio equipment in a new or used vehicle, first check the frequencies you plan to operate for RFI. Most of us are aware of having difficulties with low band equipment in vehicles, but I recently experienced interference to 2 meters.

It was time to purchase a new car for my wife. She had previously owned two models of a popular family sedan in the past. Both of these cars had her trusty dual band (2 meters and 70 cm) mobile radio installed and it had operated successfully in each.

After a bit of test driving we decided another of the same model was to join our family. We purchased a V-6 version. It had plenty of engine power and was fun to drive, but I digress.

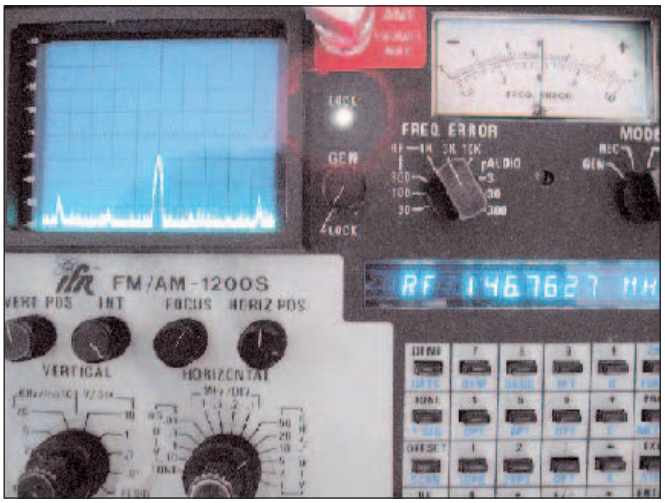



**Figure 1 — The offending signal at 146.7627 MHz 30 dB above the noise.**

## A New Transceiver for the New Car

With the new car it was time to purchase a 21st century radio. A beautiful new dual band transceiver was selected to replace the old veteran. The radio body was carefully installed under the passenger seat, the control head mounted in the center console, and the coax cable routed to the rear deck of the car for connection to the antenna. The complete hidden wire installation took a couple of hours.

Finally, it was time to check radio performance. All was going well until the engine was started. I checked our local repeater on 146.76 MHz and found a very objectionable heterodyne. Other frequencies were fine. How could this be?

Upon further investigation the heterodyne was present at times without the key in the ignition. Just opening the car door resulted in RFI for a few seconds.

Figure 1 shows the offending signal at 146.7627 MHz 30 dB above the noise. The signal was picked up by a 2 meter flexible antenna connected to the spectrum analyzer and lying on the dash where the measurement was taken.

I should mention that the 146.76 repeater in Central Ohio is a high profile repeater that is used for NWS weather spotting as well as other public safety nets. This heterodyne was unacceptable for our car.

I used my 2 meter handheld radio to check for interference. I just opened the squelch control and manually scanned the band. On other vehicles I found different RFI frequencies. I have heard of hams requesting to place their low band radios on the seat, plugging into the power outlet, connecting a short wire antenna, and tuning to their favorite bands before purchasing a vehicle.

My first thought was the manufacturer had used an inexpensive TV color burst crystal somewhere in the car. Many hams who operate on a 146.76 MHz repeater have heard the harmonic problems that a 3.58 MHz. crystal can cause. Many early CPUs, in all types of electronics, incorporated it (41 × 3.579545 = 146.76134). This was not my source of interference, however.

## I Take Action

After speaking to factory tech reps and much online research, interesting things were discovered. Three CPUs in the car operate at different clock speeds and are multiplexed onto a data bus. Two of the CPUs are attached directly to the back of the fuse panels located in the panels by our feet. This makes it impossible to place toroids or other filters on them. The third is located beside the battery under the hood. A product of this multiplexed bus is generating the RFI signal. The good old days of simple cars are gone.

I contacted my local dealer promptly explaining the problem. I was fortunate to find the assistant sales manager formerly was a radar technician and understood my problem. The dealer assisted in checking other vehicles in their inventory, as now they were interested in the problem. The dealer contacted the manufacturer explaining the issue and including my spectrum analyzer photos. After a short time I was told by the manufacturer, "nothing is wrong with your car." This is not what I wanted to hear.

## The Solution to My Problem

How did I solve the problem? I got rid of the car. I must give credit to my local dealership. They allowed me to trade for a different vehicle without taking a loss. I guess this is why we have bought three cars from them in the past. Interestingly, the replacement car generates a signal on 146.785 MHz. Since this is not a local repeater frequency, it is not an issue for us.

## Avoiding the Problem

The moral of this story is that, even if you have had good luck with RFI from cars in the past you can't assume that new models will behave the same way. While car shopping, take along a radio that covers the bands of interest and listen carefully while trying each accessory. [On my wife's car, the air conditioning compressor emits strong 2 meter RFI every time it starts up. — *Ed.*]

*ARRL member and Amateur Extra class operator John T. Perone, W8RXX, was first licensed as WN8VPZ, receiving his Novice class license in 1967 while attending high school. He is a retired manufacturers' representative who worked in the broadcast and CCTV industry.*

*John's Amateur Radio interests include maintaining the Central Ohio Radio Club repeaters and operating on the HF bands. He is an ARRL VE and an OO. Other interests include maintaining his commercial-instrument pilot rating. You can reach him at 3477 Arica Rd, Galena, OH 43021, or at* **w8rxx@arrl.net**.

# Add 6 Meters to Your Triband Trap Yagi

*This approach is almost painless, stealthy and gets the job done.*

**Joel R. Hallas, W1ZR**

Back in the 1950s, HF transceivers were just starting to replace separate receivers and transmitters and our DX bands were 20, 15 and 10 meters. The triband trap Yagi became a very popular antenna for those who wanted to work DX but couldn't swing separate monoband Yagis for each band. Many amateurs also operated on 6 meters in those days, but the equipment was usually separate from the HF gear — the focus of VHF specialists, in many cases.

Fast forward to 2011 and almost all current "HF" transceivers also cover MF (160 meters) and VHF (at least to 6 meters), with similar performance, power and features as on the HF bands. A look on the towers of many amateurs will yield a view of the same type (or even the same) trap tribander from the '50s.

## That Was the Situation at W1ZR

In my case, the triband Yagi was a relic from the '80s I obtained for a price too good to pass up. I didn't actually have a tower to put it on, and after getting the neighborhood acclimated to the driven element tied to the top of my chimney for a few years, I took the plunge and sunk a pipe mast next to the chimney, put on a rotator, and — one piece at a time — the Yagi grew in place of the solo driven element.

During the same period, I retired my old 160-10 meter transceiver to replace it with a modern unit that covered 160 through 6 meters. Now my radio had outpaced my antenna farm. I could operate 6 meters using my 100 foot center fed Zepp, but I had nulls every few degrees all the way around — something had to be done.

## The Mast Thickens

My challenges were twofold. First, because my rotator was mounted on top of a mast, rather than inside a tower, I had to derate the rotator's wind load capability by 50%, and avoid any bending moments resulting from loads above the rotator. That put the tribander right above the rotator. To add 6 meters, my first thought was to investigate the low wind load Moxon we reviewed in 2004, secured a few feet above the tribander.[1] Unfortunately, my modeling indicated that installing them just a few feet apart would result in significant degradation of the gain and pattern of both antennas — back to the drawing board.

I had been very pleased with the results of my 40 and 20 meter skeleton sleeve dipole described in a recent *QST* article — could I use the same technique to add 6 meters to my Yagi?[2] *EZNEC* modeling indicated that it could indeed work — and work very well.[3]

This gave me two significant advantages:

- I had sidestepped the wind loading and bending moment concerns. The added elements were right above the rotator and the thin elements were largely in the shadow of the tribander's elements or boom, depending on relative wind direction.
- Perhaps even better — I did not need an additional feed line. The HF feed line, going to the split driven element, would also feed power to the 6 meter Yagi. This occurs through parasitic coupling, so no connection to the tribander is required.

## The Details

Before I proceed, I should give credit where due. Following publication of my two band "skeleton sleeve" dipole article, I found that the parasitic coupling to a single element was presented in an antenna article in *The ARRL Antenna Compendium, Volume 5* by Gary Breed, K9AY, also the developer of the low frequency receiving loop that bears his call letters.[4] Gary called it a *coupled resonator* antenna — perhaps more descriptive a name. There's nothing new under the sun — it would seem.

### *Design Approach*

The usual issue with Yagi design is that there are many variables as well as many objectives. The primary variables are element length and spacing while the objectives are generally forward gain, front-to-back ratio (F/B) and bandwidth. They tend to fight each other to some extent, and others may find different combinations that are better in one respect or another.

My goal was to achieve reasonable Yagi performance with elements comfortably between those of the tribander. Using *EZNEC* modeling, I was able to find a set of dimensions that were predicted to work well starting from the National Bureau of Standards (NBS) baseline of 0.2 λ parasitic element spacing.[5] The modeled forward gain was within about 1 dB of a similarly sized three element Yagi in the same space but without the tribander — not a bad trade, in my view.

The loss in a mismatched transmission line is a particular problem at VHF, so it is important to match to whatever impedance the Yagi offers. In a traditional VHF Yagi, the low impedance is generally transformed to a matched value through an adjustable matching arrangement. For the coupled resonator with no direct connection this is accomplished, as predicted by Breed's formula, by adjusting the spacing between the HF driven element and our coupled resonator. I found that adjusting the center-to-center spacing from about 4 inches (the minimum possible with the mounting hardware) to the 10 inches shown, I could increase the impedance of a single element coupled resonator from 45 to 120 Ω. The same adjustments resulted in a reduction of element resonant frequency

[1]Notes appear on page 42.

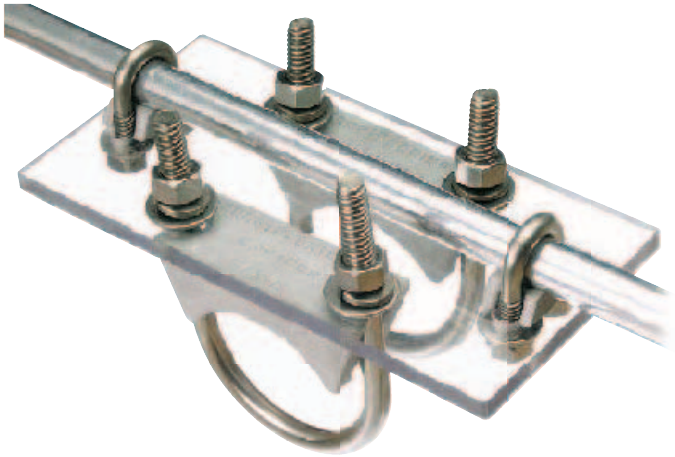


**Figure 1 — I used the DX Engineering (www.dxengineering.com) stainless steel saddle clamps, as well as their telescoping aluminum tubing and stainless element clamps. Lower cost non-stainless hardware could be used if the budget is tight.**

from 50.2 to 49.2, so retrimming is required. By using the 10 inch spacing for the three element case, the low impedance of the Yagi configuration was transformed to close to the desired 50 Ω (see Table 1).

### A Few Caveats

This project was initiated on a trap tribander with a split dipole feed. Although this is the arrangement of many such Yagis, other configurations will be encountered. Some may include a shunt transmission line section across the feed or other matching arrangements. They may also work but I haven't tried them. If you're not sure, try it with just the driven element before you commit to the whole project.

**Table 1**
**Measured SWR at Antenna**

| *Frequency* | *SWR* |
|---|---|
| 50.0 | 1.2 |
| 50.1 | 1.1 |
| 50.2 | 1.1 |
| 50.3 | 1.2 |
| 50.4 | 1.6 |

### Elements

For elements, I selected aluminum tubing in diameters of ½ and ⅜ inches and a wall thickness of 0.058 inches. These telescope nicely. For the center of each element, I used a 3 foot section of ½ inch tubing with the ends slit and compressed on the smaller section on each side using stainless hose type clamps of the appropriate size. I obtained my tubing and clamps from DX Engineering, which offers the tubing in 3 foot and 6 foot lengths. The 3 foot, ½ inch tubing is available with one end pre-slit for a slight additional charge, and they may offer it with both ends slit by the time you read this. I had reasonable luck slitting the other end using either a band saw or a hacksaw with the tubing in a vise. The outer ⅜ inch sections were made from 6 foot lengths, two required per element — each cut to 4 feet 4 inches long.

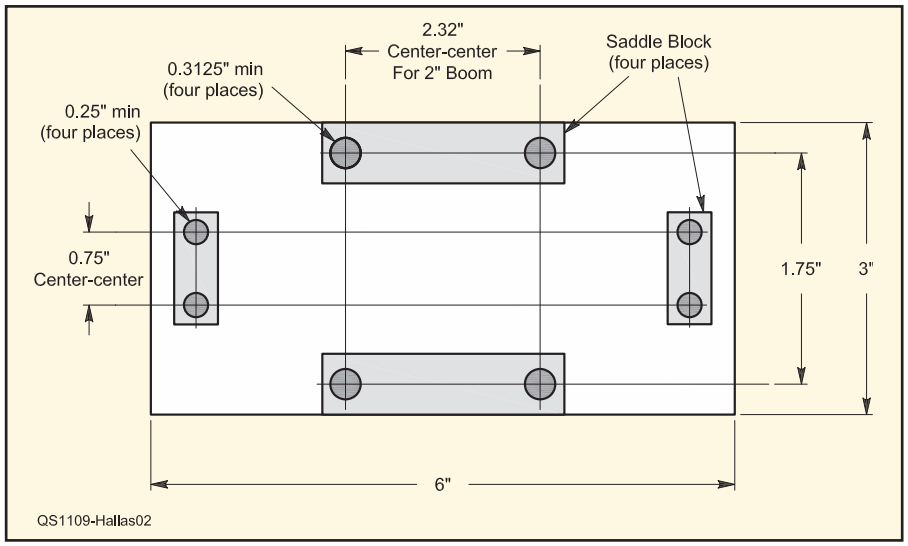



**Figure 2 — Dimensions of the construction lines and hole locations for the 3 × 6 inch pieces made from the McMaster-Carr polycarbonate sample pack. The dimensions assume a 2 inch boom and ½ inch inner element section. For a different size boom, obtain correctly sized saddle clamps and lay out accordingly.**

### Element Mounting

I chose to mount the elements insulated from the boom to avoid having to make the required correction for all metal construction. I used a 3 × 6 inch piece of ¼ inch polycarbonate for each insulator. I would guess other materials could be used, but polycarbonate comes highly recommended and was readily available.[6,7]

To mount the insulator to the boom, and to the elements, I choose stainless steel saddle clamps also from DX Engineering. These clamps are very nicely constructed (see Figure 1). Although they are more expensive than the hardware store variety, I thought they were worth it. For those on a tight budget, less expensive clamps may work fine for many years, but will make for tougher disassembly.

Once you have the clamps selected, carefully lay out the insulator for drilling. Figure 2 indicates the construction lines that I laid on the handy paper that came applied to the McMaster-Carr polycarbonate. It is important that the holes be lined up quite closely. If the clamps for one side or the other aren't parallel, the tubing may bind. If misaligned, the 6 meter elements will not be parallel to the HF elements.

If your shop gear and skills are up there with Barry Shackleford, W6YE, you could make the holes just a bit larger than the U bolts. For me, using a hand drill and a vise, I found I had to open them up just a bit with a rotary grinding tool.

### Mounting the Elements

Figure 3 shows the dimensions of the 6 meter elements on the Yagi. Note that I have referenced them all to the center of the HF driven element. This should allow for some differences between tribanders. For the record, my tribander is a Wilson Electronics SY33. This looks a lot like the very popular Mosely TA-33, but has slightly wider element spacing.

Table 2 provides a summary of dimensions for the NBS 0.2 λ spacing case that I used. In case your tribander has a shorter boom, I have also included dimensions for a version with 0.2 λ reflector spacing and 0.15 λ director spacing. EZNEC modeling predicts that this version has about 0.5 dB less gain than the larger version. I haven't actually tried the shorter version.

## Performance

Modeling is fine, but on-air measurements remove any guesswork. I made measurements of W1AW (50 air miles away) code practice on 20, 15 and 10 meters before and after adding the 6 meter elements and found no difference. I asked W1AW Station Manager Joe Carcia to put a signal on a clear 6 meter frequency. I was very pleased; gain was at least as good as *EZNEC* predicted (see Figure 4). My F/B was not as good, perhaps due to reflections from multiple antennas.

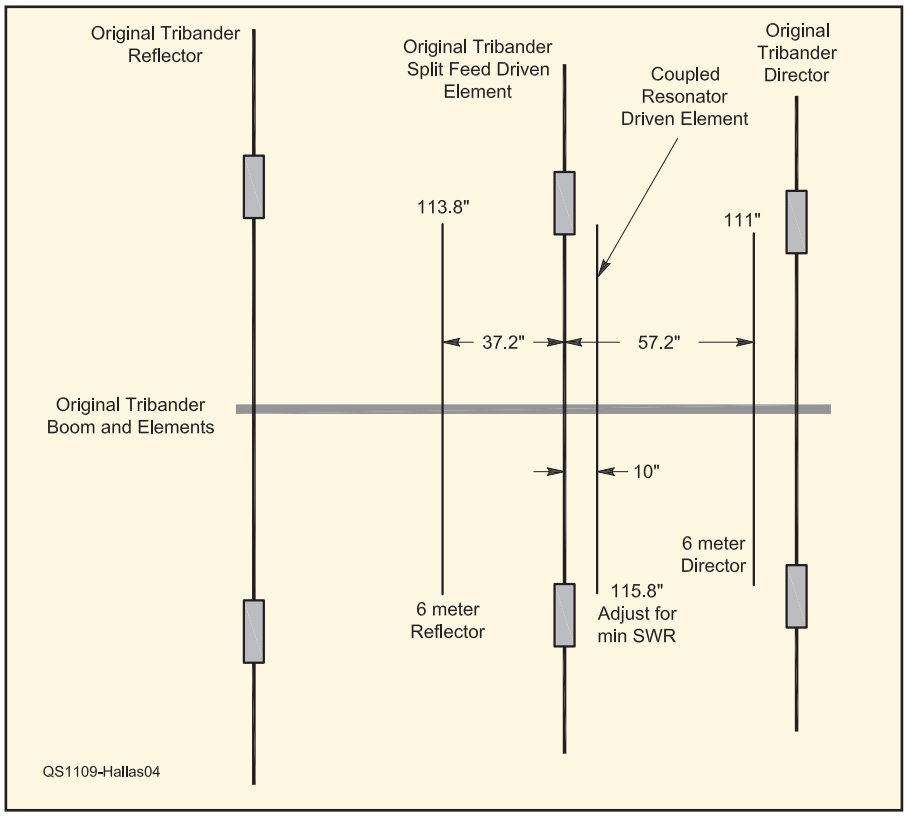



**Figure 3 — Dimensions of the elements and spacings referenced to the center of the tribander driven element. The element length shown, assume insulated elements, ½ inch diameter, 3 feet long center element sections, the remainder ⅜ inch telescoped aluminum.**

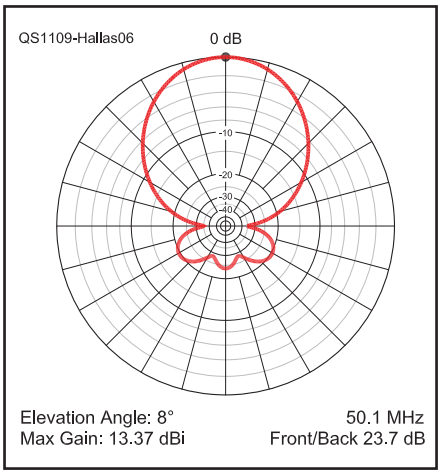



**Figure 4 — *EZNEC* model results showing azimuth pattern including front-to-back ratio.**

**Table 2**
**6 Meter Element Dimensions (inches)**

Reference is center of triband Yagi driven element.

| *Element* | *Element Length* | *Each 0.375 inch End-Section Length* | *Distance (c-c) to Reference* |
|---|---|---|---|
| *Single Element Rotatable Dipole* | | | |
| Driven Element | 113.5 | 38.75 | 5 |
| *Three Element Yagi — NBS Version (0.2 λ Spacing)* | | | |
| Reflector | 113.8 | 38.9 | 37.2 |
| Driven Element | 115.5 | 39.75 | 10 |
| Director | 111 | 37.5 | 57.2 |
| *Three Element Yagi — Compact Version (0.2 λ Reflector Spacing, 0.15 λ Director Spacing)* | | | |
| Reflector | 114.0 | 39.0 | 37.2 |
| Driven Element | 115.2 | 39.6 | 8 |
| Director | 111.2 | 37.6 | 45.6 |

After adjustment of the driven element length, the SWR was also quite close to the predicted values. I also made use of near (N2GHR/B at 24 miles) and distant (NL7XM/B, 108 miles and K2ZD/B, 118 miles) beacons to verify sensitivity and pattern as I made adjustments — thanks for having those signals out there!

## A Few Observations and Suggestions

While this design was focused on the three element Yagi and tribander shown, other arrangements are equally feasible. In particular, the single coupled resonator element is a natural for those using a rotatable multiband, or single band, dipole. For that case, a center-to-center spacing of about 5 inches should give a good match.

I think a two element 6 meter Yagi with driven element and director would also perhaps work well, just down about 1 dB in forward gain from mine, but with less F/B.

Make sure you carefully look over your antenna system before you fire up on 6 meters. If your tribander has been there since the '50s, chances are good that there is a low-pass filter in the line that cuts off at 30 MHz. Don't ask me how I know that it needs to come out! Similarly, while my coax surge arrestors are rated into the VHF range, not all are. Check yours and see before you push power down the line.

I also noticed that the usual cable run from the transceiver through my bypassed HF only amplifier and bypassed high power HF tuner changed the SWR significantly and added a bit of loss, even with everything "bypassed." No doubt this was due to wire lengths in the equipment — they weren't designed to pass 6 meter signals, after all. Make sure you make all measurements and adjustments directly at the coax to the antenna with no HF gear in the line.

**Notes**

[1]C. Greene, K1JX, "Short Takes — Par Electronics SM-50 6-Meter Stressed Moxon Antenna," *QST*, Mar 2004, p 66.

[2]J. Hallas, W1ZR, "Getting on the Air — A Folded Skeleton Sleeve Dipole for 40 and 20 Meters," *QST*, May 2011, pp 58-60.

[3]Several versions of *EZNEC* antenna modeling software are available from developer Roy *Lewallen, W7EL, at* ***www.eznec.com***.

[4]G. Breed, K9AY, "The Coupled-Resonator Principle: A Flexible Method for Multiband Antennas," *The ARRL Antenna Compendium, Vol 5,* pp 109-112. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 5625. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/; pubsales@arrl.org**.

[5]P. Viezbicke, *Yagi Antenna Design*, NBS Technical Note 688, Time and Frequency Division, Institute for Basic Standards, National Bureau of Standards (now NIST), Boulder, Colorado 80302, 1976.

[6]J. Wonoski, N1KHB, "An Ideal Plastic for Amateur Radio Projects," *QST*, Oct 2009, pp 42-44.

[7]McMaster-Carr offers a "polycarbonate sample pack," consisting of a single 6 × 6 inch sheet at ¼ inch thickness for $2.65. Cut in half, this makes two element insulators. Two sheets provide enough for three, plus one to help you remember to measure twice and cut once. See **www.mcmaster.com/#polycarbonate-sheets/=bz5b3e**.

*Joel R. Hallas, W1ZR, is the Technical Editor of* QST. *You can reach Joel at* **w1zr@arrl.org**.

# Yet Another Crystal Calibrator — The YACC-1-2-3

*This low cost, low power calibrator can generate signals at five handy frequencies.*

**Robert Miller, KE6F**

Over the decades the venerable crystal calibrator has seen a variety of designs, configurations, technologies and applications. From the early days, fundamental 100 kHz crystal oscillators relied on high harmonic content to provide marker frequencies throughout the HF ham bands. More recent designs embraced digital logic to provide marker tones of both 25 and and 100 kHz and perhaps other signals as needed for specific applications. A recent article in *QST* exemplifies a quite effective discrete digital logic approach.[1]

This article takes the crystal calibrator design one more step forward in that it embraces microcontroller technology to derive marker signals of 12 and 1 MHz as well as 100 and 25 kHz and even 1 Hz. While this offering of marker signals is not spectacular, that it's done with a single chip and a 50 cent computer crystal and runs on less than 15 mA at 3 V dc might make it interesting to some folks.

Those in need of a low cost calibrator for that aging receiver or low power (QRP) transceiver should find it particularly useful. The cost of materials to build the unit, including a circuit board, programmed microcontroller chip, crystal, regulator device and a few bypass capacitors and resistors is less than $25.[2] Surface mount technology (SMT) parts are used in the construction, but they are large enough to facilitate the use of conventional soldering techniques. A soldering reference is included at the end of this article.[3] The completed unit less power supply is approximately ¾ × 1 inch. The board I used is double sided with plated through holes as noted in layout prints in Figure 1.

While the YACC-1 worked as designed, the added complexity of that unit made it less attractive although a prototype board run was made on this design. The YACC-2 and YACC-3 proved to be more versatile and provide solutions for both current solid state radio design as well as radio designs from antiquity.

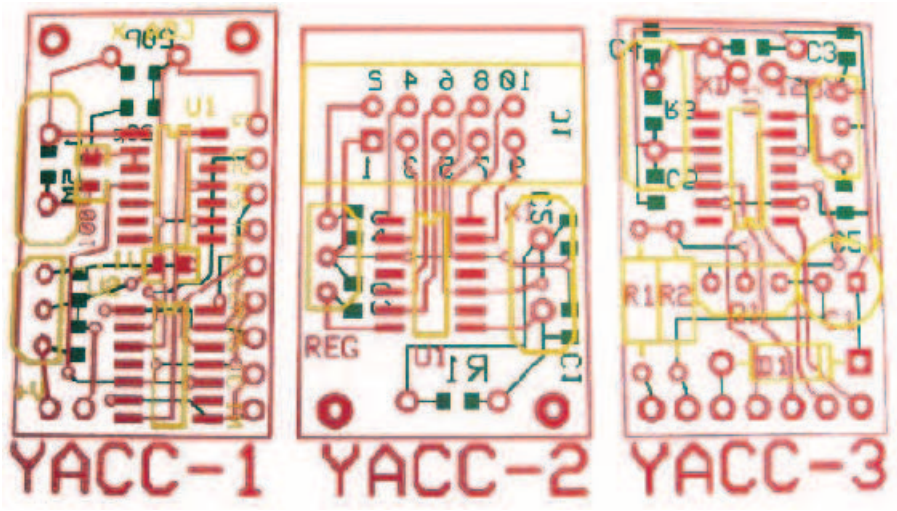



**Figure 1 — YACC-1, YACC-2, YACC-3 PCB layouts (enlarged, not to scale).**

## Hamspeak

**B+** — One of the voltages used in the operation of vacuum tube equipment. In early radio receivers, letter codes were used to identify the dry battery packs that were used before ac power was common. The A battery provided power for tube filaments (typically 1.5 to 6 V), the B provided the high voltage for the anode (22.5 to 150 V), while the C provided grid bias (typically –1.5 to –6, although often derived from interior circuitry instead). The designations continue to this day.

**Crystal oscillator** — Circuit that generates a signal at a precise fixed frequency. The crystal is one of quartz, sliced and ground until it responds to electrical stimulation by mechanically vibrating at the desired frequency (the *piezoelectric* effect).

**HF ham bands** — Amateur bands in the HF (3 to 30 MHz) region of the spectrum. These are also called the shortwave amateur bands and are characterized by their operation making use of ionospheric propagation resulting in long range communication, depending on conditions. Bands included are 80/75, 60, 40, 30, 20, 17, 15, 12 and 10 meters.

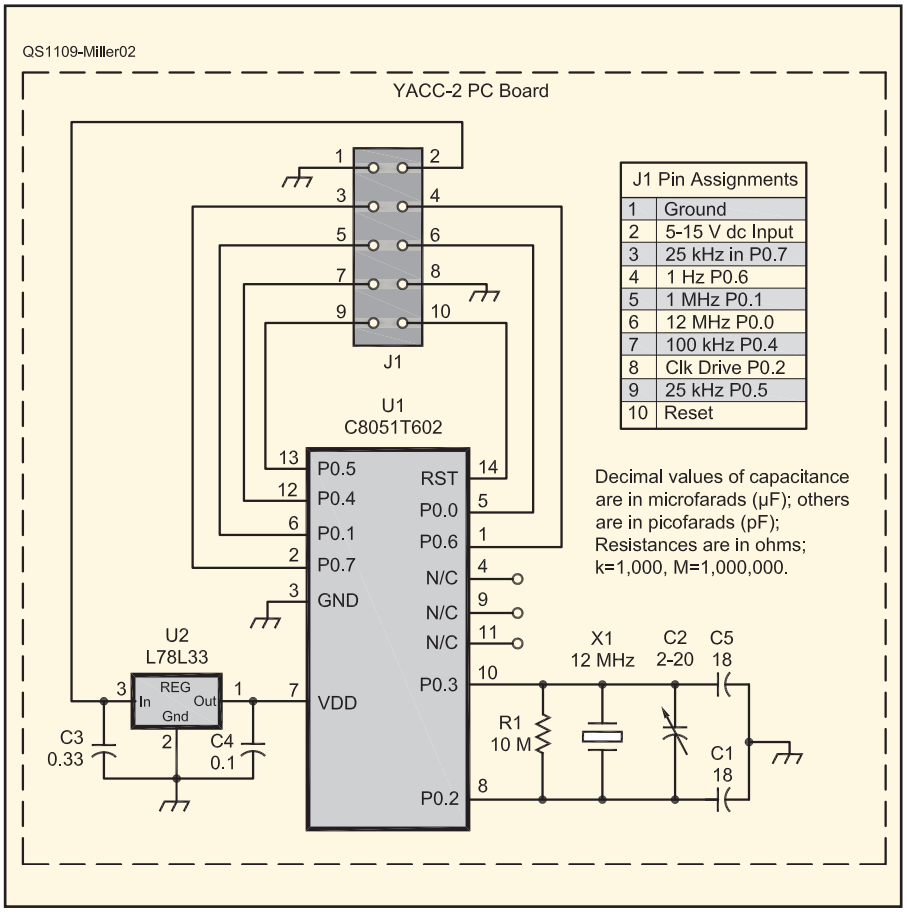
**Microcontroller** — Miniature computer system, usually on a single large integrated circuit.

**Regulator—**A device (such as a Zener diode) or circuitry in a power supply for maintaining a constant output voltage over a range of load currents and input voltages.

**Surface mount technology (SMT)** — Kind of electronic components, passive or complex integrated circuits, that mount to printed circuit boards through adhesive and direct solder connections rather than the earlier technology of wires mounting through holes in the board. They are well suited to precision automated assembly and are much more compact than earlier technology. See **www.dprg.org/tutorials/1999-07a/**.

**Voltage divider** — Simple electrical circuit consisting of two resistors in series. A voltage applied to the entire network (R1 + R2) will result in a voltage across a single resistor that is a fraction of the total voltage. For example, the voltage across R1 will be equal to R1/(R1 + R2).

[1]Notes appear on page 46.




| J1 Pin Assignments | |
|---|---|
| 1 | Ground |
| 2 | 5-15 V dc Input |
| 3 | 25 kHz in P0.7 |
| 4 | 1 Hz P0.6 |
| 5 | 1 MHz P0.1 |
| 6 | 12 MHz P0.0 |
| 7 | 100 kHz P0.4 |
| 8 | Clk Drive P0.2 |
| 9 | 25 kHz P0.5 |
| 10 | Reset |

**Figure 2 — Schematic and parts list of the basic YACC-2 unit. Parts are available from Mouser at www.mouser.com, or in a package from the author.**

**C1, C5 — 18 pF, NPO, 805 size SMT capacitor.**
**C2 — 2-20 pF trimmer capacitor.**
**C3 — 0.33 µF, 805 size SMT capacitor.**
**C4 — 0.1 µF, 805 size SMT capacitor.**
**J1 — 2 × 10 IDP indexed connector.**
**R1 — 10 MΩ, 805 size SMT resistor.**
**U1 — C8051F602 SOIC CPU.**
**U2 — L78L33, TO-92 voltage regulator integrated circuit.**
**X1 — 12 MHz crystal, HC49 package.**

## The Microcontroller Solution

The first model of the microcontroller based calibrator (YACC-1) used a Silicon Labs C8051T602 microcontroller chip (T602). This chip is a one-time programmable (OTP) device and costs less than $1 in single unit quantities. A separate 74HC04 inverter chip was employed as a 12 MHz crystal oscillator to drive the counters in the T602. A variable trimmer capacitor in the 74HC04 oscillator circuit allowed the 12 MHz oscillator to be calibrated. The T602 unit is based on the Intel 8051 core, but it has additional features to include a set of flexible counter schemes, schemes that make the calibrator system easy to implement. By taking advantage of these counters it was possible to generate the signals noted in the beginning of this article with minimal software involvement. All signals are concurrent and, with the exception of a regenerated 12 MHz clock, can be turned off by a switch closure on one of the T602 port pins.

The YACC-2 was designed to reduce the unit to a "one chip to orbit" solution. One of the shortcomings of the T602 microcontroller is that the chip does not support an external crystal by itself. To overcome that limitation the Silicon Labs C8051F302 chip was used in the YACC-2 design. This chip is nearly a functional equivalent to the T602, but it incorporates a flash memory scheme that is reprogrammable. Most important, it can support an external crystal with its internal oscillator system allowing the 74HC04 to be removed from the design.

The cost of the more capable microcontroller went from $1 to almost $3. Adjusting for the cost of the 74HC04 and its bypass

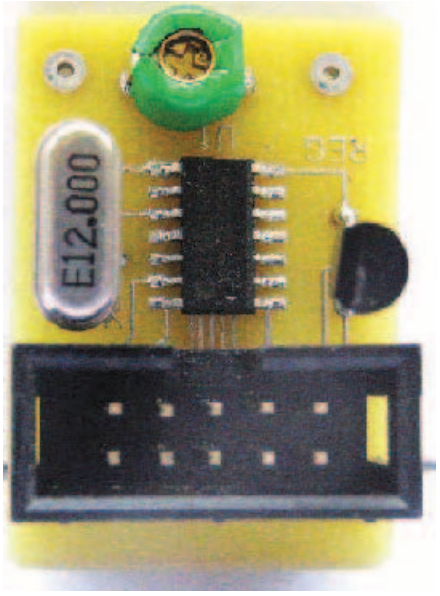



**Figure 3 — The YACC-2 board, compact and ready for inclusion in other projects.**

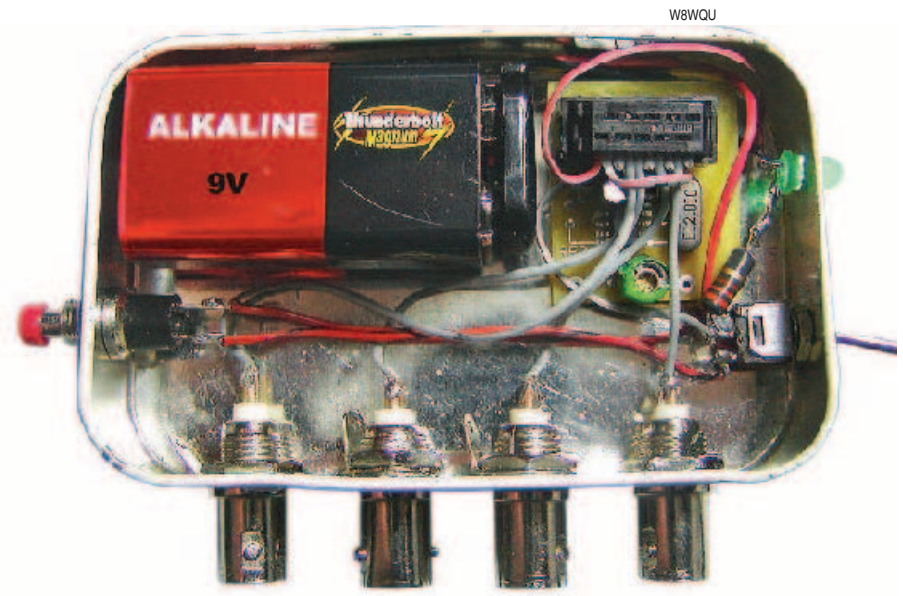



**Figure 4 — Jerry, W8WQU, installed his YACC-2 in the ubiquitous Altoids tin. He named the result the *Pocket YACC*.**

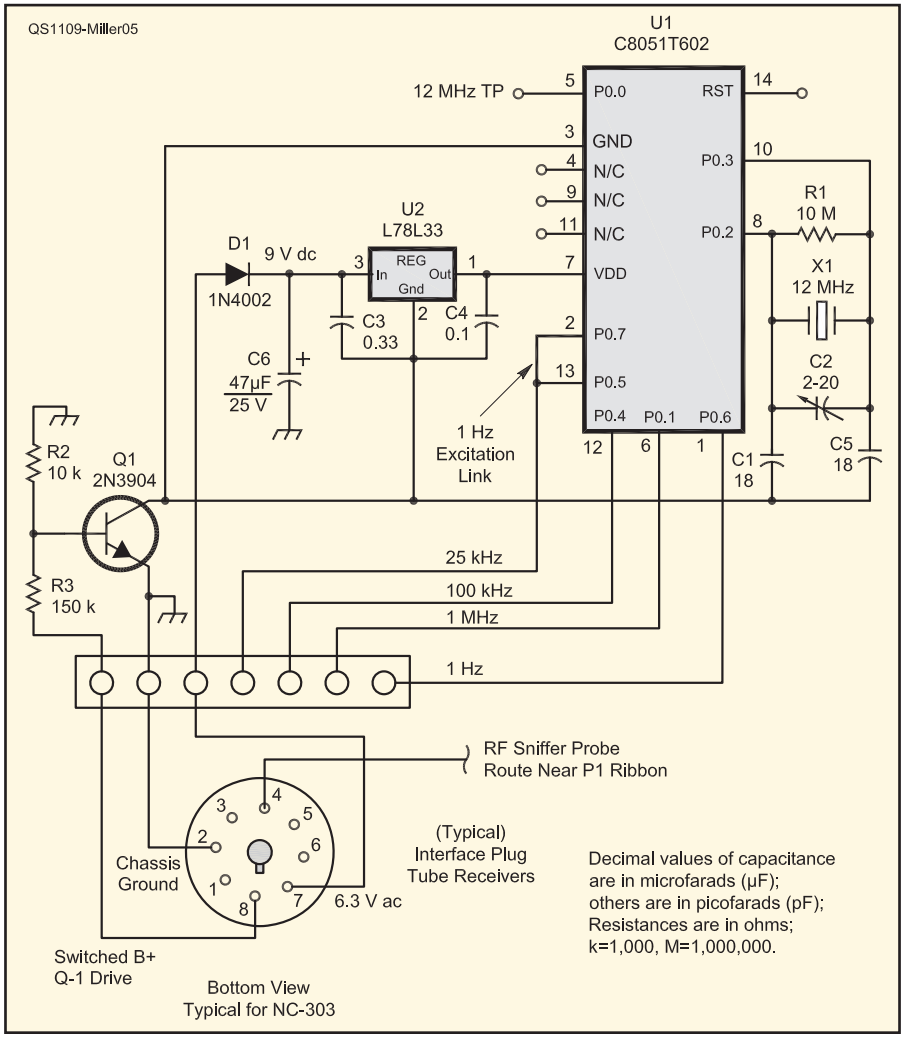



**Figure 5 — YACC-3 schematic, The connections correspond to an NC-303 interface plug. Parts required in addition to those of the YCCC-2 are below:**

**C6 — 47 µF, 25 V electrolytic capacitor.**
**D1 — 1N4002 diode.**
**Q1 — 2N3904, TO-92 transistor.**
**R2 — 10 kΩ, ¼ W, leaded resistor.**
**R3 — 150 kΩ, ¼ W, leaded resistor.**

capacitor, the overall financial impact was considered to be within reason. All Silicon Labs microcontrollers come equipped with an internal oscillator system that oscillates around 24.5 MHz, but that internal clock is not accurate enough to use as a calibrator for Amateur Radio use.

The YACC-2 provides the same signals as the former YACC-1 — a regenerated 12 MHz, 1 MHz, 100 kHz and 25 kHz. An optional 1 Hz signal was added to the YACC-2 repertoire. The current drain on the 3 V dc rail is approximately 12 mA. Intermittent use of the unit suggests that it could be powered from a lithium cell for years. One could just bypass the onboard 3.3 V regulator and power the unit directly from the cell. Other direct power schemes were also tested including D cells and watch batteries. Merely applying a voltage between 4 and 24 V dc to the unit turns it on. The 1 Hz feature is derived by feeding the 25 kHz signal back into an unused port pin and calculating the 1 Hz signal in software. The schematic is shown in Figure 2.

**Figure 6 — Note coupling wires from YACC-3 board to yellow sniffer wire coming from pin 4 of the octal plug. Once finished and calibrated, the YACC-3 module is cemented inside the case with E6000 adhesive.**

The YACC-2 unit can be used in a variety of applications to include a stand-alone unit in a modern receiver design as illustrated in Figure 3. Or it can be used as a piece of portable test equipment as Jerry, W8WQU, has done in Figure 4.

## Tube Gear Installations

Many vacuum tube receivers, such as my National NC-300/303, as well as those from other manufacturers, sold their calibrators as accessory modules that plugged into octal sockets. These units received their operating power from the receiver via this connector and a front panel switch routed B+ in the neighborhood of 150 V dc to the calibrator when needed. The YACC-2 can also be adapted for tube equipment using the power and control circuits developed for the YACC-3

The YACC-3 was developed to serve in the role of the former tube modules (many were not purchased with these receivers or were lost). All that's necessary is to house the YACC-3 module in a plastic relay case from a recycled plug-in relay. See Figure 5 for the YACC-3 schematic.

Power for the YACC-3 is derived from the host receiver's 6.3 V ac filament power that is available at the calibrator socket. The 6.3 V ac is rectified by a 1N4002 half wave rectifier and filtered to around 9 V dc by a 100 µF electrolytic. This arrangement provides more than enough energy for the YACC-3's onboard 3.3 V dc regulator. The B+ circuit that is operated by the receiver's CALIBRATOR ON switch is also available on the calibrator socket. This voltage is reduced through a voltage divider consisting of a 150 kΩ and 10 kΩ resistor pair. With a typical 150 V dc level, the divider provides around 10 V dc that is connected to the base of a 2N3904 NPN transistor. The transistors collector is connected to the YACC-3's ground return and the transistors emitter is connected to the receiver's ground term on the calibrator socket.

When the calibrator switch on the receiver is engaged, the transistor is turned on providing an operate path to ground for the YACC-3. If the receiver's calibrator switched B+ is in the 250 V dc region it would be wise to raise the larger divider resistor value to 220 kΩ. A short sniffer wire is connected to the calibrator socket term that coupled the output of the original tube unit to the front end of the receiver. A word of caution here is important. Although this unit is a tiny solid state gadget, the introduction of a 150 to 250 V power source into that unit makes it a lethal device and extreme caution should be

observed when working on this unit while in the receiver.

Short leads connected to the output terminals on the YACC-3 will provide adequate signal strength for the receivers being equipped. The sniffer wire shown in Figure 5 was wrapped around short leads attached to the various YACC-3 output terminals. This arrangement was installed in a surplus plug-in relay cube as noted in Figure 6. Tests performed on my NC-303 were quite satisfactory and the added marker at 25 kHz greatly improves the dial tracking accuracy compared to the original 100 kHz arrangement. Please note that the unit generates symmetrical square waves which are rich in odd harmonics, but with little even harmonic content. That will be noticed as fairly weak markers at even intervals. A post amplifier driven into distortion could remedy this deficiency.

Some receivers may energize the calibrator by sending a ground to the original oscillator. Careful inspection of the candidate receiver's calibrator OPERATE function should be done to ensure both proper operation of the YACC-3 and its survival.

The NC-303 interface noted in Figure 5 can be used as the scheme for other tube receivers. A great source of this data can be gleaned from the boat anchor manual archive (BAMA) website that contains a wealth of data on most radio equipment from the vacuum tube era.[4] Among those researched include the Drake 2A and 2B, most of the National units, Hammarlund receivers, and WRL Galaxy 3, 5 and GT550 transceivers. Be sure the operate scheme uses a switched B+ to energize the original calibrator. A few used ground start schemes that will require a different switching arrangement.

### The Finalities

The YACC units filled a number of voids in my amateur hobby operation. To begin with, they provided me with the opportunity to explore development and application of inexpensive microcontrollers in which the cost of a connector often exceeds the cost of the CPU. With the help of my long time colleague, Bob Nash, KD6CDO, driving the software side of the project, the development time was reduced to a few days rather than weeks. Finding cost effective calibrators for my collection of boat anchor radios was another goal reached. And as Jerry, W8WQU, noted — the YACC-2 unit makes for a nice portable signal generator. Such a unit can be taken to the local swap meet to determine whether a scope, receiver or meter is functional.

Frequency calibration is straightforward. While I used a rubidium based system to calibrate and measure the performance of the YACC-1, YACC-2 and YACC-3 units, a simple netting of the unit's 1 MHz output with WWV is more than adequate for most applications. The adjustment scheme employed with these units makes frequency setting any closer than 1 Hz at 1 MHz problematic. Frequency stability in a household environment is surprisingly good given the inexpensive crystals used. Overall the stability and accuracy of the units are far better than the many 100 kHz calibrators used in radios from antiquity. Bench testing at an ambient temperature of 25°C ± 3° caused a shift of a few Hz. This should be more than adequate for radios whose dial accuracy, under the best condition, is measured in kHz increments.

Complete kits of parts to include circuit board (double sided and plated through holes), a programmed soldered-to-board CPU, resistors-capacitors, crystal, and connector/cable if applicable are available from the author at cost, plus small box priority USPS shipping

**Notes**

[1]M. Bryce, WB8VGE, "A Universal Frequency Calibrator," *QST*, Nov 2009, p 35.
[2]A complete parts kit is available by mail from the author at his cost plus postage. The firmware is available on **www.arrl.org/qst-in-depth**.
[3]L. Wolfgang, WR1B, "Solder Surface Mount Components," *QST*, Jan 2010, p 32.
[4]The Bama Site can be reached at **bama.edebris.com/manuals/**.

*Photos by the author except as noted.*

*Robert Miller, KE6F, was first licensed as WA6MGG in 1959. He acquired his Advanced class license in 1967 and his Amateur Extra in the early '70s along with a call sign change to KE6F. He is an ARRL member and has been active in every phase of the hobby during the past 50 years.*

*He holds an MA in History and a BA in Social Science from California State University, Sacramento. Most of his working career has been within the telecommunications industry. He spent 12 years with the Western Union Telegraph Company in their Microwave and Space Communications group, spent the next 24 years with a local power utility in their telecommunications engineering group and a final four year stint supervising their communications maintenance group.*

*Bob held an FCC First Class Radiotelephone license (while they were being issued) and currently holds a Second Class Radiotelegraph license with Ship Radar endorsement. Bob is also a retired member of the California Army National Guard after spending many years as a battalion communications sergeant. He enjoys power boating, and water sports, reading and writing. He has published articles in* QST, QEX, CQ *and* Communications Quarterly *magazines as well as numerous newspaper articles. You can reach Bob at 9655 Appalachian Dr, Sacramento, CA 95827 or at* **millerke6f@aol.com**.


## Feedback

◊ In "2011 ARRL DX CW Contest Results" [Aug 2011, pp 78-81] the operator of D4C was incorrectly listed as YL2GM. The correct operator was YL2KL. In addition, the declared winner of the Seventh Call Area, Single Operator, High Power CW plaque was K7RL, not KO7AA.

## New Products

### ISOTRON 80/40 METER LIMITED SPACE ANTENNA

◊The Isotron ISO-4080 from Bilal Company measures 32 × 16 × 30 inches and is intended for operation on 3.5-4.0 MHz and 7.0-7.3 MHz. Maximum power rating is 1000 W PEP or 300 W CW/AM/FM/RTTY. Coaxial T connectors and jumpers are required (not included). Price: $209.95. For more information, or to order, visit **www.isotronantennas.com**.

### SOLDERBUDDY HOBBYIST HAM

◊The SolderBuddy Hobbyist HAM provides a stable platform for soldering connections to these connectors: ¼ inch phone plug, 5.5 mm coaxial plug, 3.5 mm mini phone plug, phono (RCA) plug and jack, DIN connector and 8 pin mic plug. It also includes a vise to hold PL-259 connectors and other odd sized items. Price: $37.50. Other versions are available. For more information, or to order, visit **solderbuddy.com**.

# Yaesu VX-8GR Dual Band Handheld Transceiver

*Reviewed by Howard Robins, W1HSR*
QST *Contributing Editor*
**w1hsr@arrl.net**

The original Yaesu VX-8R handheld transceiver covered four bands — 50, 144, 222 and 440 MHz — and offered options such as a GPS receiver and Bluetooth headsets.[1] The VX-8R has been replaced by the VX-8DR, a four-band radio with upgraded features, and the VX-8GR reviewed here has been added to the product line. The VX-8GR is a dual band (144/440 MHz) transceiver with wideband receive capability and 5 W output. It includes an internal GPS receiver system and Automated Packet Reporting System (APRS) capability.[2] The 'GR drops 6 and 1¼ meter operation, the AM/FM broadcast band, VOX and the optional Bluetooth features found on the other models.

The VX-8GR also includes an extensive memory and scanning suite (900 regular channels, 57 marine channels and 10 weather channels plus frequency skip and band edge memories). Receive and transmit battery saver and automatic power off features help to conserve battery power. The VX-8GR has two independent receivers so you can listen to both bands at the same time, or two frequencies on the same band simultaneously.

I tested just about every feature and will elaborate on many of them in this review. Check out the VX-8R review for background.

## Description

The VX-8GR is a ruggedly built, compact, weather resistant radio. It measures about 2½ inches wide by 4¼ inches tall by 1 inch deep, and it weighs in at just over ½ pound with the battery and antenna attached. The top has an SMA ANTENNA connector, GPS receiver antenna, a single twist DIAL control for adjusting volume and channel/frequency/option control, a white LED light and a place to thread a tether. On the left side there are four buttons: PTT, MONI/T-CALL (temporarily disables the squelch), VOL and F/W (activates alternate key functions/writes to memory).

The right side has the following ports that are covered with rubber flaps: MIC/SP (external mic/speaker, four conductor, 3.5 mm), DATA (three conductor, 2.5 mm), and a 4-14 V EXT DC input.

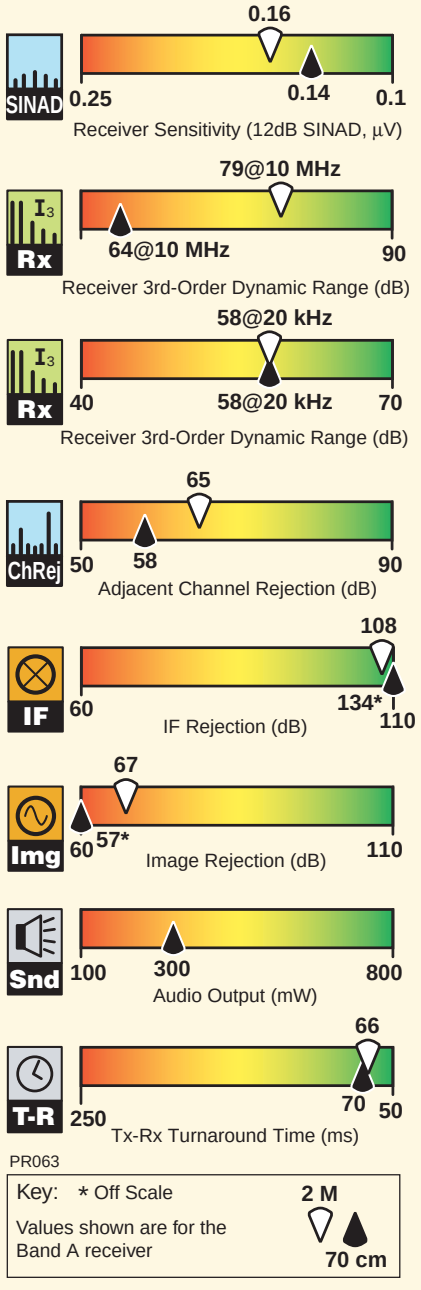
On the face there is an LCD that measures about ⅝ × 1 7/16 inches, PWR on/off pushbutton, internal speaker and mic and an 18 button keypad (Figure 1). The high resolution LCD is quite good. All four lines of information used in some displays are quite readable. On the back, the battery has a pair of holes to attach the belt hook. The battery also has three silver colored contacts for an optional drop-in charger.

Included in the box are the flexible antenna, NC-86B, wall charger, FNB-101LI, Li-ion battery (7.4 V, 1100 mAh), belt clip, operating manual and a plastic cap to cover the holes in lieu of using the belt clip.

[1]B. Price, N4QX, "Yaesu VX-8R Handheld Transceiver," Product Review, *QST*, Jul 2009, pp 41-44. Past *QST* reviews are available to ARRL members at **www.arrl.org/product-review**.

[2]APRS is a software program and registered trademark of Bob Bruninga, WB4APR.

## Key Measurements Summary




## Bottom Line

Yaesu's VX-8GR dual band handheld incorporates GPS and a slew of features into a rugged, compact package. With so many features in a small package, it will be most appropriate for advanced amateurs wanting to explore and master APRS and GPS technology.

Mark J. Wilson, K1RO ♦ Product Review Editor ♦ k1ro@arrl.org

## Menu System

*Short* presses of the MENU button on the VX-8GR cycle through GPS, APRS STATION LIST, APRS MESSAGE LIST and RADIO displays. Once one of the APRS or GPS functions is displayed, pressing and holding the MENU button for one second brings up 27 APRS and GPS settable options (APRS/GPS SET MODE). These are in alpha order — scroll through them with the DIAL twist knob or the up/down arrow buttons.

While in the NORMAL radio display mode, pressing and holding the MENU button for one second brings you into transceiver SET MODE. In this mode there are 100 settable options for the transceiver that are also in alpha order. Scroll through them with the DIAL knob. When you get to the desired menu item, a short press of the MENU button opens the option list for that item.

The MENU button and DIAL knob or UP/DOWN arrow buttons are used to select and set most user options. Many of the buttons, however, have one, two or three functions. The following are just a few examples. Pressing and holding the UP or DOWN arrows changes what is displayed.

- Pressing the F/W key and then the MODE key activates the CTCSS (continuous tone coded squelch system) or DCS (digital coded squelch) operation. The MODE key is also used to toggle APRS beacon modes.
- The V/M key is used to toggle between VFO and MEMORY mode. In the APRS station list and message list, the V/M button is used to delete an entry.
- The BAND key is used to change bands. It's also used to backspace if a mistake is made while entering data and to select items on the APRS station list and message list.

While this scheme works, and can be learned, I found that after some time passes between uses, I had to get reacquainted with this system by resorting to the manual for a refresher. I didn't find it intuitive, so I suggest keeping the manual, or a cheat sheet, handy.


**Figure 1 — The VX-8GR keypad. Each button performs many functions.**

**Table 1**
**Yaesu VX-8GR, serial number 0G040147**

| Manufacturer's Specifications | Measured in ARRL Lab |
|---|---|
| Frequency coverage: Receive, Band A, 108-800 MHz, (cell blocked); Band B, 108-580 MHz; transmit,144-148 MHz, 430-450 MHz. | Receive, Band A, 108-728.990, 758-773.990 MHz, 803-999.990 MHz; Band B, 108-579.995 MHz; transmit, as specified. |
| Modes: FM narrow, data, AM (receive). | As specified. |
| Power requirements: With FNB-101 LI battery pack, receive, 200 mA (mono band), 240 mA (dual band), 85 mA (mono band, standby), 120 mA (dual band, standby), 35 mA (mono band, saver on), 42 mA (dual band, saver on); transmit 1.7 A (144 MHz, 5W), 1.9 A (430 MHz, 5 W) at 7.4 V dc; 4-14 V dc (external power).† | Receive, battery power, 450 mA (max volume, no signal, lights on, dual band), 330 mA (max volume no signal, lights off, dual band), 277 mA (standby, lights on dual band), 240 mA (standby, lights on, single band) 53 mA (power save); transmit, 146 MHz, 1.5 A (high), 1.1 A (L3), 0.83 A (low 2), 0.45 A (L1); 440 MHz, 1.9 A (high), 1.3A (L3), 0.93 A (L2), 0.42 A (L1) at 8.4 V dc (full charge); 1.4 A (high power) at 13.8 V dc. |
| **Receiver** | **Receiver Dynamic Testing** |
| AM Sensitivity: 10 dB SINAD, 1.5 μV (108-137 MHz). | For 10 dB S+N/N, Band A, 120 MHz, 0.58 μV; 146 MHz, 0.45 μV, 223 MHz, 0.91 μV, 440 MHz, 0.45 μV, 902 MHz, 0.64 μV; Band B, 120 MHz, 0.56 μV, 146 MHz, 0.5 μV, 223 MHz, 0.93 μV,440 MHz, 0.48 μV. |
| FM sensitivity: 12 dB SINAD, 0.2 μV (137-140 MHz), 0.16 μV (140-150 MHz), 0.2 μV (150-174 MHz), 1.0 μV (174-222 MHz), 0.5 μV (300-350 MHz), 0.2 μV (350-400 MHz), 0.18 μV (400-470 MHz), 1.5 μV (470-540 MHz), 3.0 μV (typical, 540-800 MHz), 1.5 μV (typical 800-999.990 MHz) at NFM (cellular blocked). | For 12 dB SINAD, Band A, 146 MHz, 0.16 μV; 162.4 MHz, 0.16 μV, 223 MHz, 0.3 μV; 440 MHz, 0.14 μV, 902 MHz, 0.21 μV. Band B, 146 MHz, 0.18 μV; 162.4 MHz, 0.21 μV; 223 MHz, 0.36 μV, 440 MHz, 0.19 μV. |
| FM two-tone, third-order IMD dynamic range: Not specified. | Band A, 20 kHz offset: 146 MHz, 58 dB, 223 MHz, 67 dB, 440 MHz, 58 dB, 902 MHz, 63 dB. Band A, 10 MHz offset: 146 MHz, 79 dB, 223 MHz, 75 dB, 440 MHz, 64 dB, 902 MHz, 65 dB; Band B, 20 kHz offset: 146 MHz, 60 dB 223 MHz, 62 dB, 440 MHz, 58 dB*, Band B, 10 MHz offset: 146 MHz, 75 dB, 223 MHz, 69 dB, 440 MHz, 61 dB. |
| FM two-tone, second-order IMD dynamic range: Not specified. | Band A, 146 MHz, 91 dB; 440 MHz, 84 dB. Band B, 146 MHz, 82 dB; 440 MHz, 82 dB. |
| Adjacent-channel rejection: Not specified. | 20 kHz offset: Band A, 146 MHz, 65 dB, 223 MHz, 65 dB, 440 MHz, 58 dB, 902 MHz, 52 dB; Band B, 146 MHz, 62 dB, 223 MHz, 66 dB, 440 MHz, 56 dB. |

## APRS Functions

APRS can only be activated on the VX-8GR's B band where the built-in terminal node controller (TNC) is "hardwired." I set up all the required parameters, including MYCALL, DIGI-PATH, SYMBOL, BEACON RATE, and so forth via the menus and was quickly on the air. There are 46 symbols or station icons supported. When an APRS beacon is received, an alert tone is sounded and the beacon information is added to the station list (Figure 2). There are nine distinct melodies that alert various APRS signals. The main radio display is not interrupted when beacons are received. Pressing the MENU key two times brings up the station list for record selection and details.

There is capacity to store information for 50 received stations. The 51st station will replace the oldest on the list. Received beacon filters can be set for Status, Mic-E (Mic encoder), Object, Position, Weather, Item and Other.

### *Beaconing Method Options*

Beaconing can be set to occur manually (by button press), automatically on a preset interval (for example every 30 seconds or every hour via 10 settable periods), or by using SmartBeaconing.[3] There are three preset but adjustable SmartBeaconing types

[3]SmartBeaconing from HamHUD Nichetronix, **www.hamhud.net/hh2/smartbeacon.html**.

| Receiver | Receiver Dynamic Testing |
|---|---|
| Spurious response: Not specified. | IF rejection, Band A, 146 MHz, 108 dB, 223 MHz, 101 dB, 440 MHz, >134 dB, 902 MHz, 128 dB; Band B, 146 MHz, 128 dB, 223 MHz, 119 dB, 440 MHz, 130 dB. |
| | Image rejection, Band A, 146 MHz, 67 dB, 223 MHz, 43 dB, 440 MHz, 57 dB, 902 MHz, 18 dB; Band B, 146 MHz, 68 dB, 223 MHz, 50 dB, 440 MHz, 54 dB. |
| Squelch sensitivity: Not specified. | At threshold, Band A, 146 MHz, 0.12 µV, 0.48 µV (max), 440 MHz, 0.12 µV, 0.36 µV (max); Band B, 146 MHz, 0.18 µV, 0.51 µV (max), 440 MHz, 0.1 µV, 0.36 µV (max). |
| Audio output: 0.2 W (battery), 0.4 W (13.8 V dc) at 8 Ω. | 0.3 W at 10% THD into 8 Ω (external speaker, battery power); 0.385 W with external 13.8 V dc supply. THD at 1 V RMS, 2.7%. |
| **Transmitter** | **Transmitter Dynamic Testing** |
| Power output: VHF, 5 W (high), 2.5 W (L3), 1.0 W (L2), 0.05 W (L1). | 146 MHz, 5.1 W (high), 2.4 W (L3), 1.0 W (L2), 0.1 W (L1); 440 MHz, 5.2 W (high), 2.4 W (L3), 0.95 W (L2), 0.02 W (L1), at 8.4 V dc (full charge). With 13.8 V dc, 146 MHz, 5.2 W (high), 2.5 W (L3), 1.1 W (L2), 0.11 W (L1); 440 MHz, 5.4 W (high), 2.5 W (L3), 0.95 W (L2), 0.02 W (L1). |
| Spurious signal and harmonic suppression: >60 dB (high, L3, L2), >50 dB (L1). | 146 MHz, >66 dB (L2), 440 MHz, >68 dB (L2), >70 dB (high), L1 as specified. Meets FCC requirements. |
| Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified. | Squelch on, S9 signal, 146 MHz, 66 ms, 440 MHz, 70 ms. |
| Receive-transmit turnaround time ("tx delay"): Not specified. | 146 MHz, 75 ms, 440 MHz, 118 ms. |

Size (height, width, depth): 4.3 × 2.4 × 1.3 inches, incl projections; weight, 8.8 ounces.

Price: $375. ADMS-VX8GR programming software (*Windows*) with USB cable, $50.

†FNB-101LI 7.4 V, 1100 mAh Li-ion battery supplied. Replacement battery, $60; FNB-102LI 7.4 V, 1800 mAh Li-ion battery, $70; EDC-5B cigarette lighter adapter, $25; EDC-6 dc power cable, $8; CD-41 rapid charger, $35; FBA-39 battery case (3 AA cells, transmit power limited to 1 W), $30.

*Measurement was noise limited at the value indicated.

— Type 1 (for vehicle), Type 2 (for bicycle), and Type 3 (for walking). SmartBeaconing causes positions to be beaconed based on speed of movement and turn angle. You can set the low and high speed thresholds and beacon rates for each. For example, you can set beaconing to occur every 30 minutes for speeds below 2 MPH, and in a nonlinear fashion increase the beacon rate to every 120 seconds for speeds between 2 and 12 MPH and higher. In addition, you can set position beaconing to occur when a combination of settable turn angles and speeds are measured on the GPS receiver. SmartBeaconing is a complex topic to explain. Interested readers may learn more about it from the web page referenced in Note 3.

### *APRS Message Handling*

The message list has capacity for a total of thirty messages — both send and receive on the same list. Several message group filters can be set up in advance to filter what messages and bulletins you wish to receive. You can set up as many as seven preset message texts of up to 16 characters in length to select and send. There is, however, no provision to send an automatic reply message.

I tested sending and receiving messages with my portable packet station (KPC-3 TNC, Yaesu FT-1500M, and a netbook computer running *UI-View32*). It worked flawlessly at both ends. I set up, selected and sent one of my preset message phrases, and it was received as sent. I also created a new message using the keypad and the DIAL control on top. That was pretty easy to do. Using the DIAL control, as you move one character position to the next the last character used remains in the buffer. So, you are not always starting at the beginning of the character set. I find this efficient. Keypad entry is typical, each push of a given key cycles through the character set for the key,


**Figure 2 — The APRS Station List is easy to read on the high resolution LCD.**

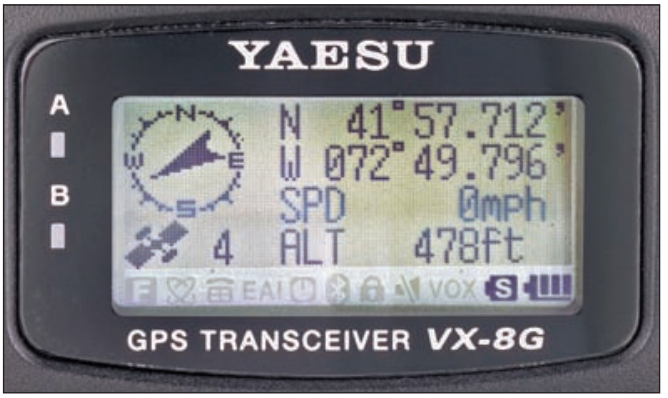



**Figure 3 — The GPS screen shows position (latitude and longitude), altitude and number of GPS satellites received (in this case, four). You can scroll down to see the current time. If you are moving, it also displays speed and direction.**

for example 2 – A – B – C. Even though this was easy to do, I would not want to be in the field using this as my sole means of communications. Texting is not my forte under any circumstances.

Message and bulletin group filtering is supported, so you can set the VX-8GR so that only group members can exchange messages.

## GPS Receiver System

Through the menu system, it is quite simple to turn on the GPS receiver, set the display to reflect NORTH UP or HEADING UP, TIME ZONE, meters or feet for ALTITUDE and other display units (for example, km/h, mph, or knots). Figure 3 shows a sample GPS display. The GPS Map Datum can be set to the WGS-84 standard or one of several Tokyo options. There is no waypoint storage.

### *Serial Interface*

The DATA jack serial interface can be used to communicate with a PC using the optional CT-143 data cable. The VX-8GR can input external GPS information or output the internal GPS or waypoint information. You can select to output waypoint data in NMEA6, 7, 8 or 9 formats. Waypoint output data can be augmented with mic-e, position, weather, object and item beacon information.

I set speed to 9600 bps and outputted GPS NMEA GGA and RMC sentences to my computer using the CT-143 and a serial-to-USB adapter. Using *HyperTerminal*, a *Windows* terminal program on on my PC, I was able to read that data.

The DATA jack is also used for cloning (copying memories and settings from one radio to another) using the optional CT-144 clone cable.

## Optional Desktop Software

After getting the VX-8GR, I discovered that RT Systems had produced *ADMS-VX8G* memory management software and a USB computer interface cable for the VX-8GR.[4] I always like to have computer software that supports a multifunction radio, especially one with voluminous channel capacity and many settings. When I received this software, I "read" the radio and saved all the settings. I was very pleased to find that this software supports the many features that are included in the handheld as well as its channel capacity. The software gives you the opportunity to map imported data to the appropriate fields for the radio.

I was able to adjust various parameters for APRS, import repeater list files from ARRL *Travel Plus for Repeaters*, import other delimited (.csv) file and then write all that back into the transceiver.

I was also able to use the USB interface cable to read GPS output data using *HyperTerminal*. This cable eliminates the need for a serial-to-USB adapter that is required with the optional Yaesu CT-143 data cable.

Such software is a requirement for me for several reasons. First, it is a convenient way to backup and restore your radio's settings. If there is ever a firmware update needed, the last step in the typical update procedure is to reset the radio. So, having everything backed up makes it convenient to restore settings and data after an upgrade. Second, it gets tedious to enter too much information into the radio via its keypad. Yes, it can be done and is okay for a few channels, but not for 900 channels. Third, there are more than 125 settable options in the menus. I find it more practical to have a visual page display with all the options available for a given feature. This assures that all the available options are considered.

## Emergency Features

Emergency Automatic ID (EAI) uses a preset transmitted CTCSS tone pair, which when received by the VX-8GR, causes it to automatically transmit a 0.5 second beep tone every 2.5 seconds until a timer expires. In addition to the tone pair, there is a special EIA memory channel. You can program your call sign (or any other string of characters) in the CW ID parameter and it will be transmitted with the initial remote activation and every 10 minutes thereafter. This feature can be used in search and rescue situations; however, everyone must use the same tone pair and frequency.

Distinct from EAI, the emergency channel feature uses the transceiver's UHF home channel. Pressing and holding the HM/RV key for one second causes the VX-8GR to switch to the home channel, emit a loud alarm sound, and flash the LED light. You can transmit on the home channel by pressing the PTT, and two seconds after releasing the PTT the alarm sound and light resume. The idea is that you can arrange to have another station monitor the home channel, and if you get into trouble you can call for help and the alarm and flashing LED will help them find you.

## Other Included Features

The VX-8GR includes a number of features also found in other current model Yaesu VHF/UHF transceivers. These features have been described in detail in previous reviews.[5]

- Enhanced Paging and Code Squelch (EPCS) — EPCS uses a dedicated microprocessor and paging memory to provide paging and selective calling features.
- Memory bank operation — There are 24 banks available, and the same channels can be assigned to as many banks as you need.
- Automatic Range Transponder System (ARTS) — The ARTS feature uses DCS signaling to alert stations with this capability that they are within simplex communication range of each other.
- CW training features — The rig plays strings of Morse code characters for learning CW and increasing your code speed. You can practice with alpha characters, numbers, symbols or mixed groups. Speed and pitch are settable from menus.
- WiRES — Wide-Coverage Internet Repeater Enhancement System, a Yaesu linking system that is similar to EchoLink or IRLP.
- Weather band/weather alert — The 10 NOAA weather channels are pre-programmed into memories. When activated, weather alert checks the weather channels for activity and monitors for NOAA's 1050 Hz tone alert.
- Password protection — Allows you to create a password that effectively locks down the radio until you enter the proper characters.
- Spectrum analyzer — Uses the LCD to display activity on channels above and below the operating frequency.

## Final Thoughts

The VX-8GR is a very feature rich dual band handheld transceiver that is a good alternative for those who don't need the 50 and 222 MHz coverage of the VX-8DR. Overall, receiver performance was a bit better than the original VX-8R we tested.

While I have reviewed several radios from Yaesu and others over the last several years, I found myself struggling to explore and test this radio's features. I found that there is just too much packed into this package, which makes the menu system and multiple key functions unwieldy. Sometimes the old saying "less is more" is true

The internal GPS receiver and APRS features work well and are smoothly integrated. The GPS receiver would be more useful if it included waypoint storage; without that, its use is pretty much limited to APRS positions.

*Manufacturer:* Vertex Standard, 10900 Walker St, Cypress, CA 90630; tel 714-827-7600; **www.yaesu.com**.

[4]The *ADMS-VX8G* software is available from Yaesu dealers or **www.rtsystemsinc.com.**

[5]See the following *QST* Product Reviews of Yaesu transceivers: FT-2900R, Sep 2010; FT-250R and 270R, Jun 2010; FT-1900R, May 2010.

# Ameritron ALS-1300 HF Power Amplifier

*Reviewed by Phil Salas, AD5X*
QST *Contributing Editor*
**ad5x@arrl.net**

As power FETs continue to improve and drop in price, and vacuum tubes and related components continue to increase in price, we're starting to see more solid-state high-power amplifiers entering the market. Ameritron has had their ALS-600 (600 W) and ALS-500 (500 W) solid-state amplifiers available for quite awhile. These amplifiers continue to evolve; as an example, both now support automatic band switching. But many in the ham community are interested in higher power solid-state offerings. Enter the Ameritron ALS-1300, a 160 through 10 meter, 1200 W output solid-state amplifier — just one dB down from full legal limit.

**Table 2**
**Ameritron ALS-1300, serial number 23667X**

| Manufacturer's Specifications | Measured in ARRL Lab |
|---|---|
| Frequency range: All amateur frequencies in the range of 1.8 to 21.450 MHz. | 160, 80, 40, 30, 20, 17, 15, 12, 10 meters.* |
| Power output: 1200 W PEP. | As specified.** |
| Driving power required: 90 W nominal. | 65 to 100 W typical. |
| Spurious and harmonic suppression: Not specified. | –49 dBc, worst case***; typically –54 to –65 dBc. Meets FCC requirements. |
| Third order intermodulation distortion (IMD): Not specified. | 3rd/5/7/9th: 38/43/54/49 dB below PEP (14 MHz, 1200 W output). |

Primary power requirements: 100-135 V ac at 25 A max or 200-260 V ac at 12 A max.

Size (HWD): Amplifier, 6.8 × 10.5 × 19 inches; power supply, 6.8 × 10.5 × 13.3 inches.

Weight: Amplifier, 23 lbs, power supply: 15 lbs.

Price: $2400. ARI-500 amplifier-radio Interface, $120; QSK-5, QSK PIN diode TR switch, $360.

*Optional MOD-10MK ($40) installed at the ARRL Lab for 12 and 10 meter operation.
**During high duty cycle modes the power output is reduced by 15 to 20% after 30 seconds of key down operation to avoid transistor stress at elevated temperature.
***30 meters, at 200 W PEP (maximum US) output.

## Amplifier Overview

The ALS-1300 (Figure 4) is a basic amplifier. There are no internal microprocessors, and all metering is via analog meters. It consists of two separate units: the ALS-1300 amplifier itself, and the separate ALS-1300SPS 50 V dc, 50 A switching power supply. The amplifier and power supply can be separated by up to 6 feet with the supplied cable, permitting the power supply to be placed out of the way. Both units are compact and lightweight, making this amplifier/power supply combo convenient for portable and DX operations. The amplifier specifications and ARRL Lab measurements are shown in Table 2.

The ALS-1300SPS power supply (Figure 5) consists of two identical 50 V, 25 A switching power supplies mounted back to back as can be seen in Figure 6. A back panel-mounted single 4 inch fan provides cooling. A step-start circuit provides inrush current protection to reduce the stress on power supply components.

The ALS-1300 RF section uses eight MRF-150 RF power MOSFETs operating at 50 V to provide 1200 W typical output power. The FETs are arranged as two 600 W amplifiers with four FETs each (Figure 7). The two amplifiers are then combined to achieve the full 1200 W output power level. The four FETs on each amplifier section are mounted on a 6 × 7 inch heat sink. Four 3 inch temperature-controlled fans provide amplifier cooling. The two 600 W amplifiers are individually powered by the two switching power supplies in the ALS-1300SPS.

The ALS-1300 includes effective protection circuitry to prevent damage. High heat sink temperature, an amplifier/transceiver band mismatch or a high SWR resulting in reflected power in excess of 130 W cause the amplifier to fault. (At 1200 W output, 130 W of reflected power corresponds to a 2:1 SWR.) RF balance between the two 600 W amplifiers is monitored and the ALS-1300 faults if significant unbalance occurs between the two (this normally indicates a hard failure within one amplifier or power supply section). A fault automatically bypasses the amplifier. After clearing the fault, normal operation is accomplished by simply switching from OPERATE to STANDBY and then back to OPERATE.

Monitoring of amplifier status and performance is available with just a glance at the ALS-1300 front panel. LEDs indicate the selected band, ALC action, TX keying, SWR and PA fault conditions.

Two LED backlit cross-needle meters provide amplifier metering. The left meter simultaneously monitors the FET drain currents of the two amplifier modules. The right meter monitors the following parameters, selected by the MULTIMETER switch:

REF: Amplifier forward and reflected

**Figure 4 — The Ameritron ALS-1300 RF deck.**

**Figure 5 — The ALS-1300SPS power supply.**

### Bottom Line

The Ameritron ALS-1300 delivers the goods and provides a good value for those interested in a solid state near legal limit linear power amplifier for 160 through 10 meters.

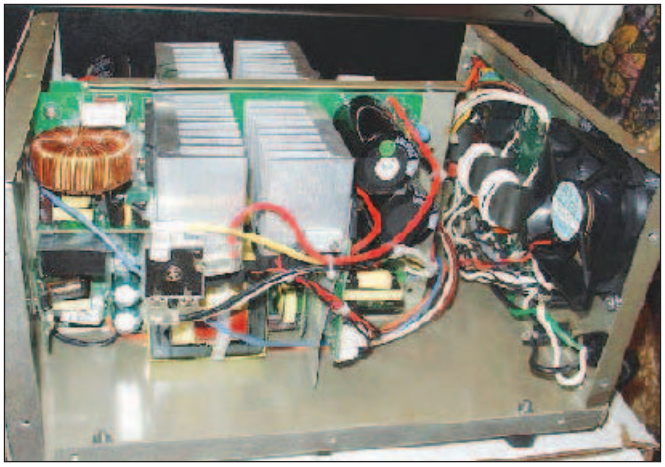


**Figure 6 — The ALS-1300SPS power supply consists of two separate 50 V, 25 A switching power supplies, one for each RF module in the amplifier.**

**Figure 8 — Rear panel of the ALS-1300.**

power and SWR.

PAB: Power amplifier balance. A zero reading indicates perfect amplifier balance.

ALC: If ALC is used, this displays ALC activity between the amplifier and transceiver.

HV1: Drain voltage applied to one of the two internal power amplifiers.

HV2: Drain voltage applied to the second internal power amplifier.

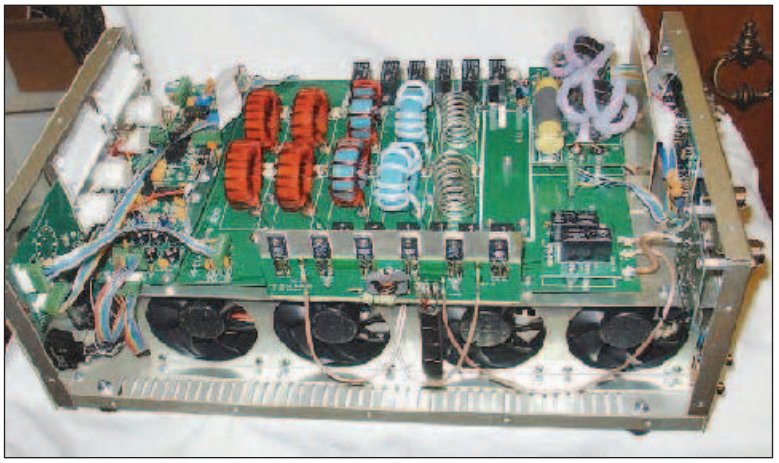


**Figure 7 — Internal view of the ALS-1300. Note the four cooling fans.**

## Amplifier Connections

The ALS-1300 comes wired for 240 V ac operation, and includes a NEMA 6-15P (15 A, 240 V) ac cable. You can operate the amplifier from 120 V ac, but this requires a 20 A circuit (at least). You'll also want a wire from the amplifier to your station's single-point ground, RCA-type ALC and relay cables for transceiver interfacing, and cables with PL-259 connectors for RF input and output.

If you use the optional ARI-500 auto bandswitching interface (discussed in the next section), two interface cables will plug into the REMOTE A/B RJ45 jacks. Figure 8 shows the ALS-1300 back panel connectors.

The RELAY input can be keyed directly from most (but not all) transceivers without requiring a special interface. The TR relay connection is grounded to transmit and the transceiver must be able to switch 12 V dc at 15 mA. With a typical relay enable/disable time of 5 ms, full CW break-in (QSK) operation is supported. And indeed, I operated QSK up to my maximum CW speed of about 35 WPM. Further, I looked up the specs on the TR relays and found they have a lifetime of 10 million operations. This is five times the typical life-time of vacuum relays used in many QSK amplifiers. The TR relay sub-board is easily replaced should either of the relays ever fail.

## A Few Options

Three options are available for the ALS-1300. The MOD-10MK ($39.95) enables 12/10 meter operation. While current FCC rules permit an amplifier to be sold with 12 and 10 meter capability, the amplifier must not transmit on the 11 meter CB band. Some other amplifiers use an internal frequency counter and microprocessor controller to inhibit operation below 28.0 MHz. As the ALS-1300 has no internal means of determining the actual frequency being transmitted and shutting down when out of band signals are detected, Ameritron cannot ship domestic amplifiers with 10/12 meters enabled. However, properly licensed Amateur Radio operators can modify their equipment, so you can purchase the MOD-10MK with proof of your license and install the filter yourself. Installation requires mounting the filter in place with five mounting screws and changing a jumper on a PC board. It takes longer to remove and reinstall the cover than it does to install the MOD-10MK!

A second option is the ARI-500 amplifier-radio interface. This unit provides automatic band switching by reading band data from most modern transceivers. A transceiver-specific cable connects your transceiver to the ARI-500, two RJ45 cables connect the ARI-500 to the ALS-1300, and the ALS-1300 BAND switch is then set to REM (remote).

And finally there is the QSK-5 PIN diode TR switch for the serious QSK (full break-in) CW operator. For occasional QSK operation, the internal relays work just fine and should give long life. If you use full break-in a lot, however, the silent-operating QSK-5 will be more to your liking.

## Conclusion

If you've been looking for a near-legal-limit solid-state HF amplifier, the Ameritron ALS-1300 is worth a look. With 1200 W of output power, well-protected no-tune operation, compact and lightweight packaging, and the ability to add automatic band switching and PIN diode TR switching, the ALS-1300 should provide most of what an HF amplifier user needs.

*Manufacturer:* Ameritron, 116 Willow Rd, Starkville, MS 39759; tel 662-323-8211, fax 662-323-6551; **www.ameritron.com**. QST

# TECHNICAL CORRESPONDENCE

## AN EMERGENCY BACKUP SOLAR POWER SYSTEM (May 2011)

◊The article by Jim Talens, N3JT, in the May 2011 issue of *QST*, described the use of solar power technology as a backup for the important circuits in the home — including the ham station.

I've been working with alternate energy, and specifically photovoltaic systems, for over 30 years. I've seen some good systems and I've seen some that make me shudder. The system that N3JT presented in the May 2011 issue didn't make me shudder but it did inspire me to write this note.

I appreciate the amount of time and energy Jim used to assemble his emergency power system; I believe he should have taken it a few steps further. As the system is shown in the block diagram of Figure 1, Jim's system is simply not safe. It would not pass an electrical inspection.

While I'm pleased to see Jim put in the required 300 A class "T" fuse for the inverter, he stopped short. Specifically, Jim needs to add a dc rated disconnect switch between the dc source and the inverter.

The bare exposed battery connections shown in Figure 4 are not safe. A battery combiner box should be installed and all the parallel battery connections be done in the combiner. The batteries need to be inside a "battery coffin" to keep cats, kids and critters away from the exposed terminals. That infamous "Jesus fuse" should be in the battery box. After all, fuses don't protect the equipment — they protect the wires.

The regulations are quite clear and I suggest Jim take a peek at the National Electrical Code (NEC). Of particular interest are sections:

- 690.13 subset D1, D2, D3 and D4
- 690.31 section B
- 690.71 section 2

These deal with the dc side of the system. What I don't see in the diagram (or was not in the text) is a means to disconnect the solar array from the controller.

While the Xantrex inverters do have an internal fuse on the ac output side, Jim may have violated the NEC by not installing ac-rated disconnects and fuses on the output side of the inverter.

There must be some sort of transfer switching so he doesn't back feed the grid. Turning off fuses in the main breaker box before firing up the inverter doesn't count.

The coiled orange extension cord shown in Figure 4 looks like it may be wired directly to the inverter, and that would be an issue. Where's the overload protection?

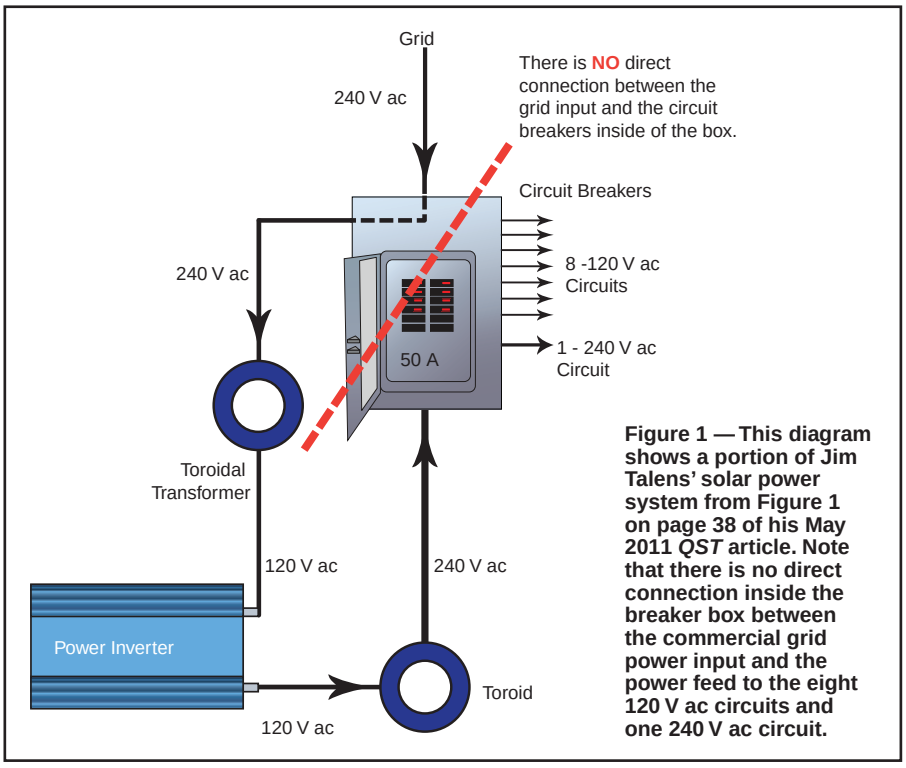



**Figure 1 — This diagram shows a portion of Jim Talens' solar power system from Figure 1 on page 38 of his May 2011 *QST* article. Note that there is no direct connection inside the breaker box between the commercial grid power input and the power feed to the eight 120 V ac circuits and one 240 V ac circuit.**

As noted in the article by both the author and the editor, the amount of current during a short circuit of the batteries can be almost unlimited for several seconds. There's more than enough current to melt steel. A misplaced rake, garage clutter, a shovel, a critter dragging a discarded aluminum pie plate across any of the battery connections, and the result would be a fire. I can see a child's toy, exposed battery terminals and an accident.

I'm not saying that's going to happen — it may never happen — but it's possible. As humans we can't "what if" enough scenarios to predict a life-changing event. That's why, as hams, we should follow the codes and regulations designed to keep our homes and families safe. You can burn your house down just as easily with 24 V dc as you can with grid power.

Another possible concern is that Jim does not seem to have provided a way to bypass his system if something happens to the inverter. What if the inverter fails?

Jim's system is good. With a bit more work, it would be great, and it would be safer. — *Respectfully submitted, Mike Bryce, WB8VGE, 955 Manchester Ave SW, N Lawrence, OH 44666;* **prosolar@sssnet.com**

◊The article by Jim Talens may inspire others to install emergency backup power systems for their homes. Hopefully they will be as well-thought-out and implemented as the system Jim describes.

A very significant safety issue exists in how the house power panel is transferred between the commercial grid and on-site power sources. At no time should the commercial grid and the on-site power be connected together (paralleled). The reason for this is two-fold. Should the on-site system be paralleled with the grid, when the grid comes alive it is very likely that the two sources will not be in phase (the two wave forms do not reach their maximums and minimums at the same instant in time) resulting in severe damage to the home system and possible personal injury.

If the on-site system is powering the home and connected to the unenergized grid, it can feed power back onto the grid and energize the circuit in the street to its normal operating voltage, creating a hazardous condition for workers or other home owners. In a properly designed system, this situation is avoided by using a transfer switch to tie the power sources and the house panel together. The transfer switch will switch between the two power sources, but never allow both to be connected at the same time. This feature is included in Jim's system but is not shown specifically in the system diagram.

Systems that allow on-site generation to be fed back to the commercial grid incorporate

Larry D. Wolfgang, WR1B ♦ Senior Assistant Technical Editor ♦ tc@arrl.org

additional devices and circuitry to handle interruptions, connection and disconnection with the grid.

If you plan a system as sophisticated as Jim's or simply want to tie in your 3 kW generator to pick up the refrigerator during an outage, the same concerns apply. Contact a qualified electrician to install the appropriate equipment as required by local codes, and keep the lights on safely. — *73, Gary Meyn, K1YAN, 8 Charlotte Dr, Plymouth, MA 02360*; **k1yan@arrl.net**

◊ *N3JT responds:* I am glad to hear that my system did not make Mike Bryce, WB8VGE, shudder! He points out a number of concerns, most of which I did not feel a need to address in my particular installation, although others may choose to pay attention to his comments.

The article generated considerable interest, with a number of hams now considering tailored versions of this system. Probably the most common comment I received had to do with the dangers of back feeding the ac grid when the power goes out.

The heart of the backup system lies in the Xantrex power inverter. The inverter I used contains internal protections so that it is impossible to impose voltage on the grid when grid power is off. That's one of the benefits of this inverter design! (The block diagram of Figure 1 is a simplified diagram, and does not show all of the actual wiring in my system.) The inverter also monitors voltages and currents, switches the source of power to the loads from grid to battery when commercial power is interrupted, turns on the natural-gas-powered generator when battery voltage drops, and so on. Within milliseconds of a grid failure, the inverter automatically activates and draws power from the batteries.

Perhaps a few additional comments about my system will help answer some of the questions and concerns. My batteries and inverter installation are inside my garage, and there is no danger of children or anyone else coming into contact with the system wiring. It would not be a huge project to build an enclosure around the batteries, were it desired.

The system block diagram of Figure 1 in the article is technically correct, but does not show any of the internal wiring in the circuit breaker box. The grid feed shown coming into the breaker box connects only to my power inverter. There are no direct connections from the grid feed to the eight 120 V ac circuits or the 240 V ac circuit being fed from that breaker box. The grid feed goes through the inverter, and then goes back out to the circuits powered by my system. The automatic transfer switch in the inverter will change from feeding those circuits off the grid to feeding them from the batteries and inverter output or the generator. See Figure 1 of this Technical Correspondence for a clarification in the wiring of my system that may not have been clear in the original article.

Mike Bryce, WB8VGE, queried, "What happens if the inverter fails?" In that case, the nine circuits powered by the backup system would be unpowered, with or without the presence of commercial power to the house. It is one thing to have a failed backup system during a power outage, but it would be embarrassingly ironic to have a dark house when all the neighbors have power! Because power to the nine backed-up circuits passes through the inverter, failure of the inverter (or even a need to service it) would result in loss of supply voltage to the house refrigerator, freezer and ham station. While Xantrex reliability is legendary, we all know that anything can fail (and likely will do so at the most inopportune time!) so it does make good sense to provide a means of bypassing the inverter.

Mike made design of the bypass circuitry easier by forwarding to me a Xantrex-produced diagram of a bypass box, including the parts list. Basically, it consists of two circuit breakers and an interlock bypass rocker that serve as switches to provide three options: (1) normal inverter operation, essentially implementing the system as designed, (2) bypassing the inverter entirely so that the grid is the power source and (3) turning off both grid and back-up sources (to isolate the loads for troubleshooting). The basic operation of that bypass switch box is outlined in the diagram of Figure 2 here. I decided to add that pair of circuit breakers right away as you can see in Figure 3.

The power cables I use contain #6 conductors, which means it was difficult to produce the short bends required to access the junction boxes. It was also challenging to fit the various cable clamps inside the fairly restricted space of the standard 4 × 4 × 1½ inch junction boxes used to interconnect the toroid transformers. In fact, squeezing the various taped wire clamps into these boxes proved barely possible, so I replaced the original junction boxes with their bigger 4¾ × 4¾ × 2 inch brothers! Now the junction box covers are not like jack-in-the-box arrangements from the stiff wires underneath!

It is not possible to simultaneously switch both inverter and grid to the loads thanks to an interlock bypass rocker that assures only one switch can be activated at a time, though both can be deactivated. Now if my inverter or other part of my backup system fails, I will be able to switch to grid power and keep everything running.

The Xantrex SW4024 inverter that I used in my system is out of production, although some units may be available on the used market or through sources such as eBay. The web URL given in Note 11 of the article for information about the SW4024 inverter is no

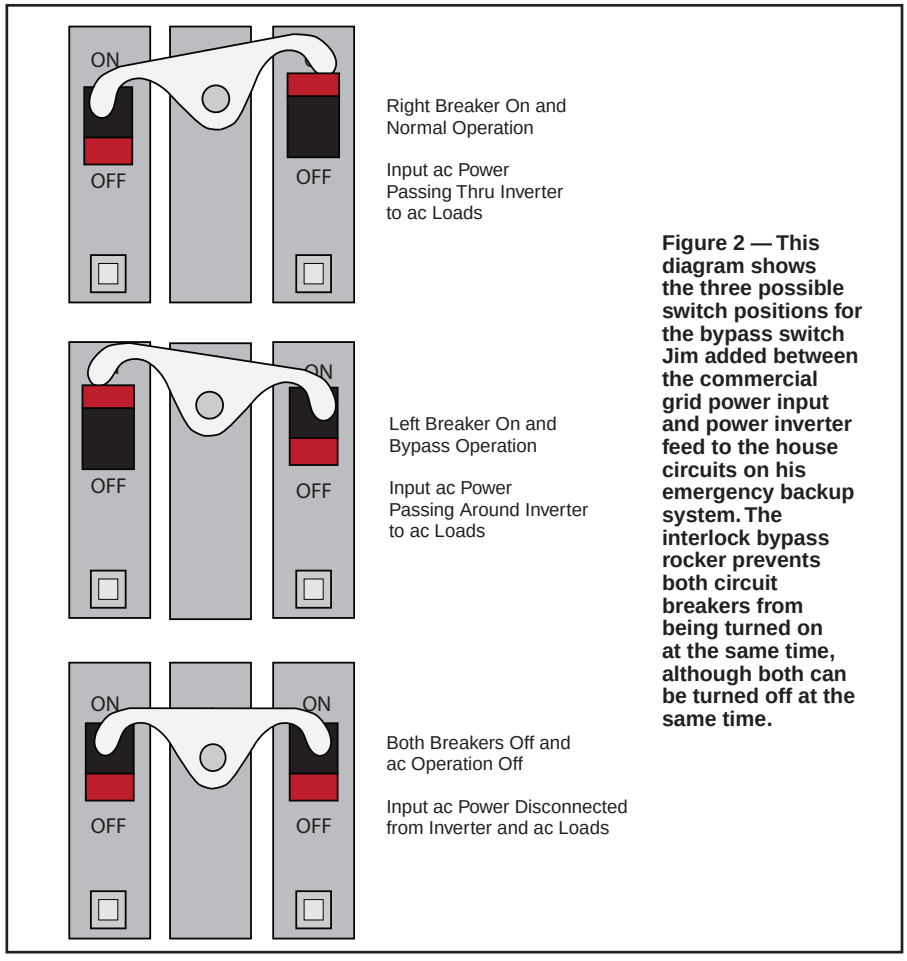



**Figure 2 — This diagram shows the three possible switch positions for the bypass switch Jim added between the commercial grid power input and power inverter feed to the house circuits on his emergency backup system. The interlock bypass rocker prevents both circuit breakers from being turned on at the same time, although both can be turned off at the same time.**

longer valid. There are a number of similar units currently available, such as the Xantrex XW4024. Xantrex markets their products through a network of dealers. Some examples are Schneider Electric (**www.schneider-electric.com**), Eco-Direct (**www.ecodirect.com**) and The Solar Panel Store (**www.solarpanelstore.com**). — *73, Jim Talens, N3JT, 6017 Woodley Rd, McLean, VA 22101*; **n3jt@arrl.net**

## A GRID-TIE ALTERNATIVE

◊Jim Talens, N3JT, described an excellent design for a home emergency backup power system in the May 2011 issue of *QST*. I do not want to in any way diminish his outstanding contribution to ham radio in his article. Many hams will find this system is exactly what they are looking for. I do feel, however, that some elaboration is needed with respect to today's solar power initiatives.

Solar power and emergency backup are not synonymous. Jim's excellent article shows how a large battery backup system can provide seamless operation of home and ham shack emergency power needs during typical grid power outages. This is a ham's dream and his engineering is right on for such an effort. The system can provide about 12 kWh for about a 4 hour outage, at a cost of about $10,000.

Readers should carefully consider, however, that emergency backup power systems have practically nothing to do with the economics of solar power. First, amortizing the $10,000 cost over 2 outages a year for 5 years equates to a cost of about $1000 for each outage to replace about $2 worth of electricity. Many hams might consider it a more economical approach to have a $200 portable generator and $6 of gas to accomplish the same emergency power requirement.

Jim is right on in including solar panels in his design because the time for economical solar power has arrived! But the economics of solar power has nothing to do with batteries or emergency power. Solar power is economical when it runs maintenance free every day, generating rated power into the homeowner's grid. When there is excess power, the meter is pushed backwards, giving a full 15 cents credit per kWh every day the sun shines, and a few cents even on cloudy days. Jim's two panels could generate up to about $60 a year of electricity and pay for themselves in under 10 years if plugged into a small UL® approved 500 W grid-tie inverter legally connected to the grid.

In emergency backup battery systems such as described in the article, however, the solar panels are generating practically zero useful power 99.9% of the time. They only charge against the self-discharge losses and only when the batteries have been used, and then only for a few hours a year. The total useful solar electricity generated in this system is only worth the $2 used during the two outages per year.

I am writing this letter to help other hams avoid the confusion about solar power that kept me out of solar power for too long. Coming from our background as communicators during emergencies, we always think in terms of batteries and staying on the air first. But this not only has nothing to do with the economics of solar power, it clouds our decision making when investing in home solar systems. Saving large-scale home solar energy in batteries has four major cost prohibitions that make it quite impractical for any homeowner that has access to the grid:

1) The high expense and lifelong maintenance requirements of battery systems.

2) The loss of up to 40% of power in battery charge/discharge losses.

3) The loss of half or more of all excess solar power every day the batteries are fully charged.

4) Batteries cannot store up the excess solar power generated in the summer for use in the winter when there is much less sunlight available.

Adding up the above energy and monetary losses make large-scale battery storage systems impractical for economical home solar systems (that have grid access). The economics of modern home solar have nothing to do with battery storage. It comes from grid-tie, where all solar energy produced every day is fed into the grid at the customer's existing billing rate. Every dime of solar energy is returned to the owner. The grid-tie system is completely maintenance free, has less than 5% total system losses, and stores up every penny of excess solar energy (in the grid) for later use, anytime of the year.

Yes, grid-tie solar systems go out when the grid goes down 0.1% of the time, but the other 99.9% of the time, the solar investment is producing max power and paying for itself. On the other hand, to provide the $2 worth of electricity needed per year during the eight hours of outages, a small portable generator or even a $99 inverter connected to your car's 12 V system can provide this need. I have more details about this on my website at **www.aprs.org/off-grid-maybe.html**.

Hams who are considering home sized solar power should carefully separate their 99.9% long term economical renewable energy considerations from their 0.1% backup emergency power requirement. The two are completely independent and have totally different economical solutions.

One final note: If you think the up-front cost of home solar is big, you should look at what you are currently paying for 10 years of electricity. At $200/month, in 10 years you will have spent $24,000 and have nothing to show for it. On the other hand, with the 50% government incentives presently in place, that same $24,000 will buy a $48,000 system that can generate all the power you need for the rest of your life and you will *own* the full equity in the system. Today's solar panels will still be producing 80% of their rated power after 25 years.

If you have not looked at solar recently, or have been misled by your own battery thinking, you should look again at home grid-tie solar systems. Prices have dropped by a factor of 10 in the last decade and the 50% incentives will not be around long! — *73, Bob Bruninga, WB4APR, 115 Old Farm Ct, Glen Burnie, MD 21060*; **wb4apr@arrl.net; www.aprs.org/alternative-energy.html**

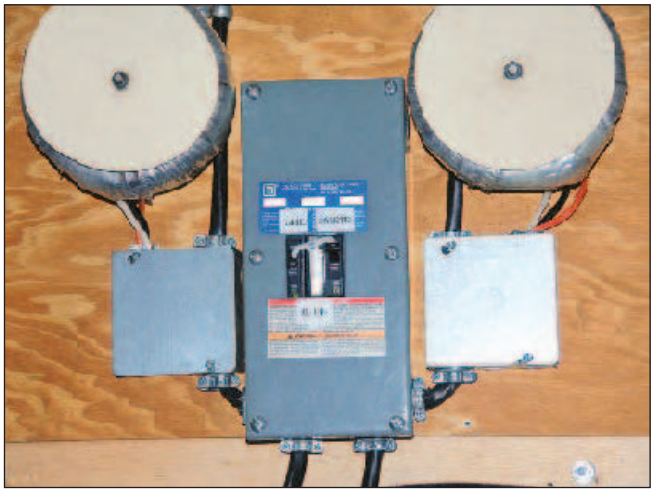


**Figure 3 — This photo shows the bypass switch circuit breakers and box that N3JT added to his solar power system.**

Technical Correspondence items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given idea will work for your situation, we make every effort to screen out harmful information.

Materials for this column may be sent to ARRL, 225 Main St, Newington, CT 06111; or via e-mail to **tc@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing a work, please send the author(s) a copy of your comments. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

W1ZR

# THE DOCTOR IS IN

**Q George, AJ4QY, asks: I was building a preamp from an article in *QEX*. I was surprised to see two capacitors in parallel from the power supply side of the voltage regulator to ground (see Figure 1). One is an electrolytic and one a ceramic. The article says that the ceramic "shorts RF to ground" and it is ⅒ the value of the electrolytic. Is the ceramic capacitor really needed? Wouldn't the higher capacitance electrolytic also provide a short to ground for the RF, in addition to its functioning as a filter for the dc supply?**

A Good question — and from the schematic it sure looks that way. The problem is that capacitors are not just capacitors, but act like a series RLC circuit. As such they have a resonant frequency, above which they act as an inductor rather than a capacitor and do not provide the desired bypass function in that region.

The construction of a ceramic capacitor is basically a wire lead going to a metal plate on each side of the ceramic substrate. The inductance is primarily just that of the two leads in series. With short leads their resonant frequency is usually into the VHF range.

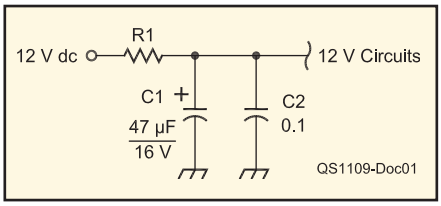



**Figure 1 — Typical bypass capacitor arrangement. The electrolytic filter capacitor provides a low impedance path for low frequencies while the ceramic capacitor filters the highs.**

**C1 — Electrolytic capacitor, typically 10 to 100 µF, working voltage higher than applied dc level.**

**C2 — Ceramic capacitor, typically 100 pF to 0.1 µF depending on frequencies involved.**

**R1—Resistor, typically less than 100 Ω, not always used. This can improve the filtering at the cost of reduced voltage and regulation.**

An electrolytic capacitor, on the other hand, is usually constructed of long foil tapes with a dielectric between. The tapes are rolled up and put into the can or capsule. The inductance of these includes the wound-up tape conductors, resulting in a much lower resonant frequency — not useful for bypassing RF.

The electrolytic, often 100 to 1000 times the value of the ceramic capacitor, is thus needed to provide the high capacitance required to effectively filter 60 and 120 Hz hum or AF signals, while the ceramic won't do much for those signals, but will help eliminate RF up to near its much higher series resonant frequency.

**Q Terrence, N8NYP, asks: Should I be concerned about using a lead acid battery in my shack for primary power? How about the sulfuric acid fumes they give off?**

A While the sulfuric acid can be a problem if the battery is tipped or bursts, a potentially more serious problem for a regular lead acid battery used indoors is the explosive hydrogen gas that is released during the charge cycle. Confined spaces indoors can turn the gas into a bomb that can be detonated by a spark. Thus flooded cell batteries are only suitable for indoor use if positive ventilation is provided.

AGM or gel cell batteries, on the other hand, are *recombinant*. That is, as the battery is charged almost all the hydrogen and oxygen that would otherwise be released at the electrodes, instead recombines to form water replenishing the electrolyte. They have other advantages as well — they don't spill and they don't freeze. I use a pair on my sailboat and leave them aboard all winter and they have been going for years.

The only problem is that they are somewhat more expensive than flooded cell batteries. Also they aren't available with the kind of cold cranking amperage needed by large engine starting motors. They do crank over my two cylinder diesel without problem — but might have a problem turning over a cold V-8.

**Q Ron, WAØAJF, asks: How do I know before purchasing a transceiver how long the company will support that particular model? I just found out the company that made my faithful high-end solid state transceiver will no longer support it. This is very disappointing, considering how much the rig cost.**

A Something to keep in mind is that the manufacturer is at the mercy of chip and other part manufacturers. It is still possible to buy unused old stock 6L6 vacuum tubes (even though no longer produced), but not many old chips. This is particularly the case now as most manufacturers are moving to lead free SMD parts due to environmental regulations in many parts of the world. The old parts are often no longer available, even if the manufacturer wanted to keep supporting your radio.

Two approaches occur to me, neither of which will likely be completely satisfactory, but might be worth a try. First, ask the manufacturer about their product plans, and see if they are willing to share. They will certainly support your radio as long as it stays in production. Next, you could research how long other models have been supported — but that might not take into account the part availability problem.

All is not lost, however. Most major-manufacturer equipment is supported by third party, unaffiliated, repair shops that specialize in a particular manufacturer's gear. They tend to stock up on parts and pieces while they are available and thus can support a radio much longer than the manufacturer is able to.

**Q Marcus, KI6WDX, asks: What kind or type of antenna do I need to work the 60 meter band? Nearly every commercial wire antenna I've looked at seems to skip this one band.**

A The five shared 60 meter SSB channels have only been available since 2003, so many traditional multiband designs don't fit. On the other hand, a 60 meter half wave horizontal dipole will work fine, as will an inverted V. Of course a center fed Zepp fed

Joel R. Hallas, W1ZR ♦ *QST* Technical Editor ♦ jhallas@arrl.org

with window line and a tuner works well there also — as well as on any bands higher in frequency than its half wave resonance.

Before you fire up on 60 meters, make sure you understand the special rules for this band. Remember to reduce power to 50 W out (if you use a dipole or equivalent) and stay exactly at the assigned channel frequency so you're legal. These channels are shared with US government users and they have priority, so if you hear a non-amateur station there, or someone requests that you stop transmitting, change frequencies or cease operating immediately. Some articles available on the *QST* archive website (**www.arrl.org/arrl-periodicals-archive-search**) are recommended before you start.[1,2]

**Q Tom Webb, W4YOK, asks: Some ads for multiband antennas boast "no lossy traps." Are traps really lossy? It's hard for me to see why a trap consisting of a few turns of large diameter wire and air dielectric capacitors would be particularly lossy.**

A I have modeled a number of trap designs over the years. The largest part of the loss of a standard trap is in the inductor which, depending on Q, will have some effective resistance. I usually assume a reasonable Q of 100 in my modeling,

Although it is tough to know exactly what the manufacturer's exact parameters are, assuming a Q of 100, my modeling typically indicates a loss of less than 1 dB. Other types of multiband antennas may have losses due to other factors.

I think traps are a reasonable trade-off compared to the extra weight and wind load of separate elements in a multiband Yagi — but other designs may have slightly higher efficiency. Another plus to having separate elements for different bands, rather than using traps, is that the element to element spacing with separate elements can be optimized for each band.

Of course this discussion assumes that all is operating as intended — fill the trap with water or spider nests and all bets are off — not a problem with multiple elements for each band. Each trap also adds multiple connection points each of which can degrade over time. For what it's worth, I use a trap type HF Yagi since I find it a reasonable compromise.

**Q Dan, K5PSO, asks: I am planning to build a 17 meter full wave square loop antenna on an X frame. Since it will not be very high, I would like vertical polarization for low angle radiation. If I feed it at a bottom corner will that be vertically polarized, or does it have to be fed in the center of one of the vertical wires? I plan on using open wire feed with a tuner.**

A For vertical polarization you need to feed the center of one of the vertical wires. If fed in the corner it will result in *skew* polarization — halfway between horizontal and vertical. It will work that way, but for your low antenna, you will be better off with all vertical — if you are looking for DX. The main radiation will be in both directions broadside to the loop.

**Q Richard, WH7ZB, asks: Without the availability of sophisticated measuring equipment, it has been proposed to use an RF current meter to measure the output of antenna A versus antenna B while changing only the antenna tuner feeding the meter and antenna. Others suggest using a field strength meter as a better measurement technique, suggesting that receiving from a distant station, using only the S-meter of a receiver as a field strength meter. Which is the better approach?**

A Making an accurate assessment of the relative performance of two antennas can be tricky. The key is to make sure you are just measuring the difference in the antennas and not a number of other factors that could also come into play.

The use of an antenna current meter is a good way to compare different ways of putting power into a single antenna — such as to compare two tuner settings. In that case, the setting with the most current going to the antenna will result in the strongest transmitted signal. Unfortunately, it can't be used to compare two antennas, because the impedances will generally be somewhat different. The one with the lower impedance will show the most current, but that doesn't mean it will be a better radiator.

A measurement of field strength made by a station multiple wavelengths away can give a good indication of relative power being put out by your station — but only if the antennas have the same elevation response. That usually means that the antennas have the same polarization, are at the same height and are pointed in the same direction.

A comparison of how well you receive a signal on the two antennas can be worthwhile, but only if both your antennas point at the station. The result will only be valid for that distance and azimuth, however. It is thus best to make the comparison on stations at different distances so you see how they compare at different arrival angles.

Since most S-meters are not accurately calibrated, the best way to measure the gain difference is to use a step attenuator to set both for the same S-meter response. The difference in attenuator settings for the same S-meter reading is the difference in signal strength. Be careful not to accidentally transmit through your receiving attenuator!

## Hamspeak

**Electrolytic** — A kind of capacitor in which the insulation is a form or electrolyte. Usually found in polarized high value capacitors.

**Field strength meter** — Device that measures the strength of electromagnetic radiation. In some cases a calibrated system, generally in µV/M, but more often provides an uncalibrated indication of relative signal strength.

**Preamp** — Low level amplifier at the beginning of a series of cascaded amplifiers.

**Q** — Measure of quality of a capacitor or inductor. A dimensionless unit that can be calculated by dividing the reactance at a frequency by the resistance, or other loss quantity. Higher Q results in sharper tuning of resonant circuits.

***QEX*** — Magazine published every other month by ARRL. *QEX* is *the* technical publication for Amateur Radio operators. It includes articles on specialized technical and experimental topics of interest to amateurs.

**RLC circuit** — Electrical circuit consisting of a resistor (R), inductor (L) and capacitor (C).

**S-meter** — Signal strength meter for a receiver. The basic calibration is in "S-units" from S-1 (faint, barely perceptible signal) to S-9 (extremely strong signal), the "S" of the RST (readability, signal strength, tone) reporting system. The nominal, but rarely followed, standard calibration is 50 µV at the antenna terminals for an S-9 and a reduction of 1 S-unit for every 6 dB (¼ power) reduction in input signal. Many receiver S-meters have S-9 at mid range and show DECIBELS ABOVE S-9 in the upper half.

**Voltage regulator** — Circuit that provides a fixed output voltage from an input voltage that varies or with a varying load. Generally the output voltage is somewhat less than the minimum input voltage. For low power systems, the regulator is generally on a single inexpensive integrated circuit (IC).

**Yagi** — Multielement directive antenna array in which one or more elements are driven by connection to a transmission line and the others are parasitically coupled. Yagis are generally characterized by high gain for their size accompanied by narrow operating frequency range.

[1]R. Lindquist, N1RL, and E. Hare, W1RFI, "60 Meters — Frequently Asked Questions," *QST*, Aug 2003, pp 44-46.

[2]L.B. Cebik (SK), W4RNL, "Power and Antenna Gain on 60 Meters," *QST*, Feb 2004, pp 36-42.

**Do you have a question or a problem? Ask the Doctor! Send your questions (no telephone calls, please) to "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org.** QST

# Hakko FX-888 Soldering Station and FX-8801 Soldering Iron

*Bob Allison, WB1GCM*
*ARRL Test Engineer*
**ballison@arrl.org**

Most of the soldering stations I've used are fairly simple. I started out as a young lad with a 30 W soldering pencil; always on and always hot! It was good enough to get me through my first Heathkit project (a DX-60B). In a more professional environment, I've used adjustable, regulated soldering *stations*, designed to keep the soldering tip close to the desired melting temperature. While I enjoyed their use on the job, I considered them a bit too pricey for my home work bench. Lured by a low price, I bought a soldering station that had a simple temperature control that turned out to be unpredictable, making small part work tricky. To make matters worse, the RF hash it generated obliterated HF reception. After difficulties with installing a roofing filter with small surface mounted parts and solder connections, I decided it was time to consider a better soldering station. Not long afterwards, a HAKKO FX-888 soldering station and FX-8801 soldering iron was dropped off at the Lab for the purpose of this very column.

## Compact and Stylish

The HAKKO FX-888 soldering station and the 65 W Hakko FX-8801 soldering iron is an impressive combination. Its stylish design adds a modern look to my workbench. The station's colorful, compact 4 by 5 inch base takes up little bench space while its 3 pound weight and rubber feet keep it firmly in place. The comfortable 1½ ounce soldering iron plugs into the station via a 4 foot cord and 6 pin DIN connector and firmly sits in an all metal holder that features a removable base, making cleaning easy. A sponge and cleaning wire are included.

The front panel of the FX-888 shows temperature in Fahrenheit and Celsius scales. According to the manufacturer's specifications, the temperature range is 400° to 900° F with an idle temperature stability of plus or minus 1.8° F. A ceramic element enables the iron to heat up quickly; from cold to its highest temperature in less than a minute. A red LED below the temperature control extinguishes when the desired temperature is attained but will also flash on and off if the temperature exceeds 900° F.

Overall, the FX-888 has two features you would expect from a device made for commercial use: a lockable temperature knob and the ability to calibrate the temperature setting. If you happen to have a calibrated "tip thermometer" (I don't), calibration adjustments can be made using a special tool (included). As with other commercial grade soldering stations, a wide variety of optional tips are available (29). Though the quality suggests commercial grade, the price of this soldering station will delight any hobbyist on a budget. Prices vary between $80 and $95 on the web. And best of all, the Hakko generates *no* RF hash.

The station is designed to prevent electrostatic discharge by grounding of the iron and soldering station. Hakko states that the handle and other plastic parts are not insulators, but conductors that are designed to draw away static charges, but warns not to work on live electrical parts. Grounding of the soldering station and iron is accomplished via a three conductor power cord and plug.

The FX-888 manual is something you will definitely want to read carefully and file away. Besides the exploded parts diagram and a complete parts list, there are useful sections on maintenance and troubleshooting. A chart of the various tip styles is also included. I would expect Hakko, established in 1954, to have parts available for years to come.

## A Pleasure to Use

Using the FX-8801 soldering iron is a pleasure. Solid, yet light weight, I found the iron handle comfortable. The hard rubber grip has a texture like stone. The pliable 4 foot rubber cord offered no resistance when the iron was placed in the holder. The weight of the station and sturdiness of the holder prevented mishaps while knocking about my bench. Most notable was the temperature consistency over an afternoon of soldering: perfect. While the conical shaped tip it came with is good for most jobs, I'd choose one of the optional tips for surface mounted parts.

*Distributed in the United States by American Hakko Products Inc, 28920 Avenue Williams, Valencia, CA 91355; tel 661-294-0290;* **www.hakkousa.com**. *Average retail price range: $80 to $95. Available from Amazon.com and many other retail outlets.*

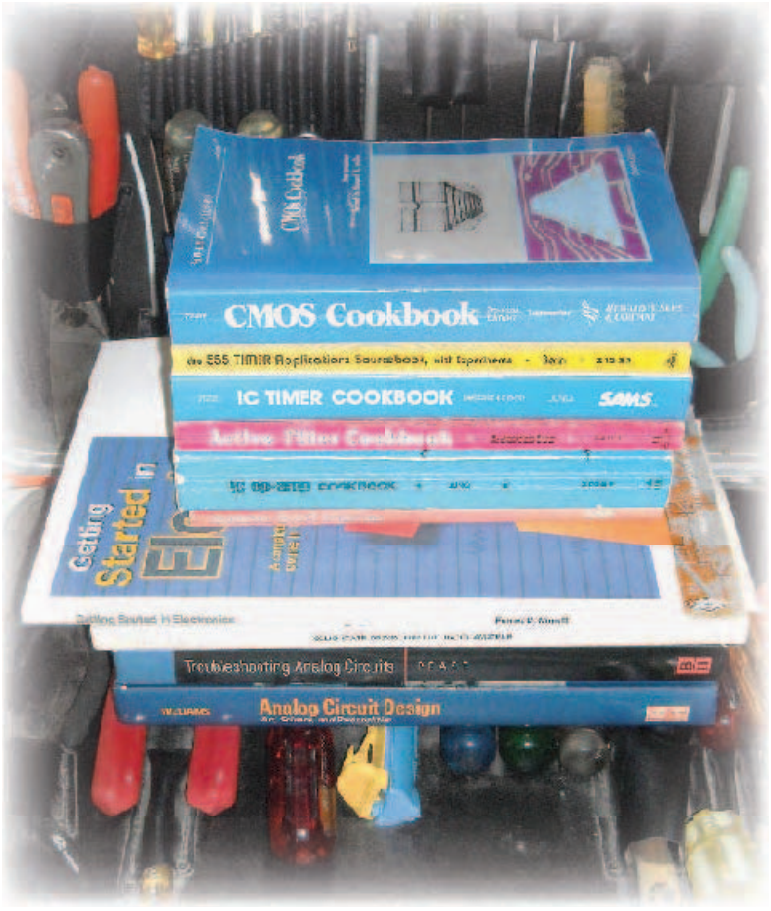
NØAX

# HANDS-ON RADIO

## *Experiment 104*
## Words to Watch For

At the end of nearly every "Hands-On Radio" column are one or more references or suggestions for follow-up reading that expand on the topic at hand. Behind most of those references lies a seasoned author, providing clear explanations that encourage the reader to go further and dig deeper. The recent and completely unexpected passing of two of these authors, both highly respected by your columnist and many others, prompted me to list of a few favorites. Perhaps some of my readers will find them as valued as I do.

The first of the giants to fall was Jim Williams, staff scientist for Linear Technology and author of dozens of technical articles over a span of more than 35 years.[1] Most hams can instantly identify with Jim's practical down to earth approach to "the art, science, and personalities" of circuit design, the subtitle of *Analog Circuit Design*, his collection of essays from fellow analog travelers — especially since he was a self-taught individual for the most part.[2] I know that I am not alone in having saved every article that I noticed was written by Jim on any topic, regardless of whether or not it pertained to my technical specialty.[3] They were simply fun to read because I reveled in his enjoyment and craft of the work. Read his classic essay "Max Wien, Mr. Hewlett, and a Rainy Sunday Afternoon" from the collection to experience the sheer savor of what we all search for on our own rainy Sunday afternoons.




Still contemplating a post-Jim Williams world, I was even more shocked to learn of the death of Bob Pease in a car accident on the way home from Jim's memorial service![4] This simply could not be — but it was. Anyone who has ever used a National Semiconductor op amp or voltage reference (among many other products) has been touched by Bob's work, which spanned the era of vacuum tubes to nanoengineering. His "What's All This…" and "Pease Porridge" columns in *Electronic Design* attracted legions of engineers.[5] In common with Jim, he also contributed a classic book on electronics, *Troubleshooting Analog Circuits*, that speaks with the authority of someone who has done battle with legions of bugs, large and small.[6] His autograph reads, "...may all your Troubles be Middle Sized: so you can find 'em!" Jim and Bob filled a library between them with articles, columns, applications notes, data books and other contributions.

Enough with the remembrances! The point of this column is not so much to remember Williams and Pease — many words do that job elsewhere and more personally. The point of this column is to also identify some of my favorite authors in the worlds closer to Amateur Radio and its many practitioners. So many of us rely on the guidance of others and loan their treasured books, growing a little more worn with each project and bearing the brown badges of honor from an errant soldering iron. Here are some of my guides — I owe them a lot.

### Bill Orr, W6SAI

No list of influential ham radio authors could possibly leave out Bill Orr, in whose honor the ARRL's Bill Orr, W6SAI, Technical Writing Award is dedicated. The many

[1] **en.wikipedia.org/wiki/Jim_Williams_%28analog_designer%29**
[2] J. Williams, *Analog Circuit Design*, Butterworth-Heinemann, 1991.
[3] Jim Williams archive at *EDN*, **www.edn.com/article/472111-Jim_Williams.php**.
[4] **en.wikipedia.org/wiki/Bob_Pease**
[5] **www.national.com/rap**
[6] R. Pease, *Troubleshooting Analog Circuits*, Butterworth-Heinemann, 1991.

H. Ward Silver, NØAX ♦ 712 Jefferson St, St Charles, MO 63301 ♦ n0ax@arrl.org

editions of his *Radio Handbook* provided friendly competition to *The ARRL Handbook* with complementary coverage and presentation of mutual subjects from a different perspective. Other major Orr titles on my bookshelf include: *The Beam Antenna Handbook*, *The Quad Antenna Handbook*, *The VHF-UHF Manual*, *Wire Antennas* and *The W6SAI HF Antenna Handbook*. Amplifier builders continue to refer to his many technical notes about Eimac tubes and his byline is seen in archives of *QST* articles and *Ham Radio* and *CQ* magazine columns.

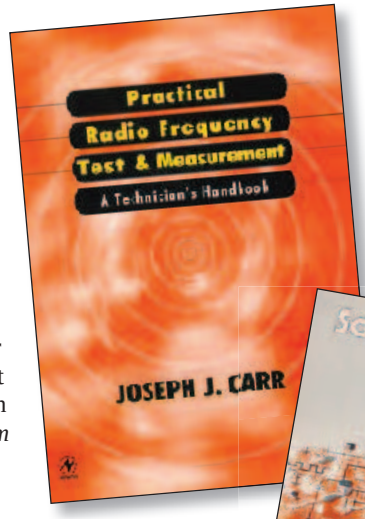



**Figure 1 — Joe Carr, K4IPV's (SK), series of "Practical" handbooks present detailed information on radio related topics from the perspective of practical applications.**

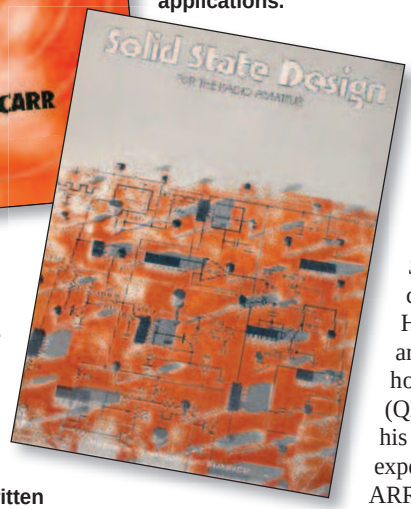



**Figure 2 — A highly sought after text among home brewers, Doug DeMaw, W1FB's (SK), text written with co-author Wes Hayward, W7ZOI, covers radio circuit design from the ground up. The successor publication is *Experimental Methods in RF Design*, ARRL order no. 9239.**

### Don Lancaster

If you are an active builder or want to be, you'll no doubt have at least a couple of Don's "Cookbooks" on your shelf. And if you are like me, they will be well used. His *Active Filter Cookbook*, *TTL Cookbook* and *CMOS Cookbook* are three must-haves for the electronic hobbyist. Don's style is direct and hands-on with few digressions — and a very clear way of visually grouping and presenting material so that it is easily grasped.

### Walter Jung

Walter Jung extends the cookbook style another layer deeper in his widely read *Op Amp Cookbook*, first published in 1974 and now in its third edition. Far more than a collection of op amp circuits, the book opens up the op amp itself, explaining the subtleties of how this circuit behaves (and misbehaves). Supported by this detailed description of the op amp's inner working, the book continues with a smorgasbord of op amp circuitry: filters, signal conditioning, audio processing, regulators, oscillators and much more.

A member of the Analog Devices team, Jung also wrote the *Op Amp Applications Handbook*, free for downloading in PDF format from the Analog Devices website.[7] While you're shopping, keep an eye out for his *IC Timer Cookbook*, an endless source of ideas and how-to information on the venerable 555 IC timer and its variants.

### Shelf Stackers

Another series of prolific electronics authors churned out volume after volume of basic electronics how-to books that you will find in libraries everywhere. Three of my favorite such authors are Joe Carr, K4IPV (SK), Howard Berlin and Forrest Mims III.

Joe Carr's many books dealt mainly with radio related topics: antennas, receivers, measurements, power supplies and other topics. The two still in print (*RF Components and Circuits* and *Practical Radio Frequency Test & Measurement*) are more detailed than the bench top guidebooks with which his writing career began.[8]

Howard Berlin has a long list of publications dealing with electronics, some of which include: *555 Timer Applications Sourcebook*, *Design of Phase-Locked Loops*, *Guide to Complementary Metal Oxide Semiconductors*, *Digital Electronics*, *Design of Active Filters*, *Instrumentation and Measurements* (partial titles). Nearly all of them emphasize "with experiments" to let you know that the information in the book can be replicated on your workbench — no excuses!

There are volumes of Forrest Mims III (**www.forrestmims.org**) books on any electronics topic you care to name. I first encountered his books when I became interested in digital design and quickly discovered his tutorials were useful and interesting to read. His compilations of circuits in the *Notebooks* series and *Circuits and Projects* series are huge time savers when you need a starting point for a project — each one verified to work as designed.

All three of these authors are well represented at every used bookstore in the land as well as on the hamfest table. Whenever you wander the aisles of a flea market, don't pass up those piles and boxes of books — do a little prospecting for the gems you're sure to find. Even if you already have a copy or a later edition, spend a couple of bucks collecting them to give away to someone else just getting started.

### Doug DeMaw, W1FB

My goodness, where would ham radio be without Doug DeMaw? Most regrettably a Silent Key, Doug basically raised a generation of us with article after article in *QST*, supporting *The ARRL Handbook* and creating timeless classics such as *Solid State Design for the Radio Amateur*, co-authored with another titan, Wes Hayward, W7ZOI. Copies of that book are worth their weight in gold amongst homebrewers such as the low power (QRP) community. He also went out of his way to provide in-person support. An experimenter would do well to browse the ARRL's online *QST* archives (available to ARRL members) for articles with "Part" (for multipart tutorials) or "Basics" in the title and DeMaw as the author. (A search on "DeMaw" alone turns up 640 entries!)

### George Grammer, W1DF

Unknown to most hams today, George Grammer's call sign was a fixture in *QST* for many years with feature articles and Technical Correspondence items. His "Simplified Design of Impedance Matching Networks, Parts I-III" beginning in the March 1957 issue are as useful in explaining basic concepts today as they were a half century ago. Another prolific writer, with 438 entries in the archive, his instructional articles are easier to find if you start with the older issues and work your way toward the present. You can find long-delayed echoes of W1DF in the "Electrical Fundamentals" chapter of every *ARRL Handbook*.

### To the Giants

I know that I have omitted many excellent authors, including those who are busy writing today. They deserve your support and thanks. In closing, I relay the opening quote from Jim Williams' second volume of essays, *The Art and Science of Analog Circuit Design*:

"MIT building 20 at 3:00 A.M.

Tek[tronix] 547 [oscilloscope], pizza, breadboard.

That's Education."

Yes, Mr Williams truly "got it" and I hope you do, too.[9]

[7] **www.analog.com/library/analogdialogue/archives/39 05/op_amp_applications_handbook.html**

[8] J. Carr, *RF Components and Circuits*, ARRL order no. 8759, and *Practical Radio Frequency Test & Measurement*, ARRL order no. 7954. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop**; **pubsales@arrl.org**.

[9] J. Williams, *The Art and Science of Analog Circuit Design*, Butterworth-Heinemann, 1995.

AG1YK

# HINTS & KINKS

## CONVERT TODDLER TRANSPORT TO TOWER TOTE

♢I have been operating from some nice places for the 10 GHz and Up contest for the past few years, but until recently I have had to use loaner stations. I finally got my own transverters to use so I don't have to worry about damaging someone else's equipment.

The problem has been toting all that equipment. Some locations require me to carry the equipment to a distant site. One such site is affectionately called "Sackrider Hill." This site is a good quarter mile hike traveling uphill over an unimproved path that is actually a rainwater runoff. Carrying about 50 pounds of equipment (depending on the battery used) up this hill isn't easy. Usually it requires making numerous trips back and forth between the site and your car.

I started thinking about an easier way to move my equipment to these distant sites. I think I came up with an interesting solution.

I had a toddler bike-carrier frame (see Figure 1) that attaches to a bicycle and totes your toddler in comfort as you ride along. I paid $30 for it at a bike shop 2 years ago. I thought of using it for carrying equipment around during special events or when I wanted to operate in some of the more scenic spots of Michigan. If you look around, you may find someone who is discarding theirs. Look for one that lets you remove the wheels. This way it sits on the ground adding more support.

To convert the frame I took an 8-foot 2 × 4 and cut it so that I had two pieces that would fit across the front and the back of this carrier. Then I used U-bolts to anchor it to the frame. Next I drilled three holes for ¼ inch hex bolts, washers and nuts to attach my 3 foot tripod.

The frame has a cross piece that is bent up in the center with a hole for supporting the toddler enclosure. There I placed a 2 inch PVC cap with a ¼ inch hex bolt, washer and nut as a support for the base of the mast. Those 4 foot antenna supports you find on sale at Dayton and other swaps fit in this nicely and it keeps the mast from slipping out from under you.

Figure 2 shows the finished setup with a surplus DIRECTV dish and my 10 GHz Down East Microwave (**www.downeastmicrowave.com**) transverter. When this picture was taken the wind gusts were around 15-20 mi/hr and it wasn't moving. The pipe used as the mast is a surplus piece of galvanized gas pipe that I had been given.

So far it is a sturdy setup with plenty of flexibility for other things like the state QSO Party, a trip to a scenic operating position or on top of a mountain that you can only access by foot or bicycle. My plans are to add a battery box for an undetermined size battery and "maybe" an operating table or storage box. I may add outriggers to improve stability. The main idea was to keep it as mobile as possible but still be able to carry it on a car bike rack or stow it in the car if need be. The total cost for this including the frame and tripod has been about $65. — *73, James French, W8ISS, 1811 Horger St, Lincoln Park, MI 48146,* **w8iss@wideopenwest.com**

JAMES FRENCH, W8ISS

**Figure 2 — The completed portable antenna system ready to head for the hills.**

JAMES FRENCH, W8ISS

**Figure 1 — The toddler transporter ready to be repurposed for hauling ham equipment.**

## SLINGSHOT TIPS

♢A slingshot is one of the easiest ways to get a line over a tree limb but they don't come with instructions books. After hours of trial and error, I came up with an easy, surefire way to use a slingshot and get the line over a tree limb. Any good adult type slingshot will work; most have pretty much the same pull. These are our three easy suggestions.

First, use at least a 1 oz fishing weight and you can use a 3 oz; it will not hang and it will come down. Use what is commonly called "builder or mason line" from a hardware store; it is a fairly stout line. Be sure you have enough line to go all the way up and down with some extra.

Second, loosely unwind the line into a box; we used a simple plastic fishing box. Anchor the other end of the line so the whole thing doesn't go over the tree limb.

Third, the real secret is not to hold the slingshot right side up but *upside down*. Position yourself over the box and slightly back, this allows the line to hang down and come straight out of the box. When you pull the slingshot all the way back with the

Steve Sant Andrea, AG1YK ♦ Assistant Editor ♦ h&k@arrl.org

fork pointing up the line tends to tangle in the slingshot as it comes out. With the fork upside down it will never hang up.

Finally, do wear safety glasses and watch where you shoot. A 3 oz fishing weight launched from a slingshot could do serious harm. — *73, Stewart Nelson, KD5LBE, 8 Deerwood Dr, Morrilton, AR 72110-4416,* **kd5lbe@arrl.net**

## PORTABLE WITHOUT THE PIZZA

◊Many hams have taken magnetic-mount antennas beyond the top of a vehicle, placing them in attics or using them for emergency or public service events to replace a flexible antenna. I hear operators say "I have it on a pizza pan." But is that pan 1 meter in diameter to provide the proper ground plane?

After building a 2 meter ground-plane antenna for a club presentation, I realized that four radials are sufficient and you don't need the rest of the pizza pan. I found a steel can lid an inch larger than my 4 inch diameter mag-mount. The lid center should be flat, without ridges, because the magnet has to capacitively couple to the ground plane. I soldered four ½-meter #20 AWG solid-copper radials to the edge every 90° cutting opposing radials (equally) to be 1 meter across (see Figure 3) . If used on a supporting surface, smaller or stranded wire would do; otherwise, use #20 AWG solid or larger for freestanding applications.

My radials are flexible enough to bend for "pack and go" and then reshape for use. Try bending the radials down 45° to tune as with a ground-plane antenna. — *73, Kenneth Yee, K3YEE, 1713 Evelyn Dr, Rockville, MD 20852,* **k3yee@arrl.net**

## BAYONET BULB GRIPPER

◊Have you ever had a difficult time trying to remove a burned-out lamp from a bayonet socket? Some pilot lamp fixtures don't provide enough space to get a good grip on the bulb to enable you to "press-in, turn counterclockwise and remove the defective bulb." It may also be as difficult to replace the bulb in the same fixture or get the bulb into a tight location in a crowded radio cabinet.

I have found an easy way to accomplish the removal or replacement of those bayonet socket lamps. The rubber grippers that are found on common ballpoint or gel pens are just the right size to snugly fit the commonly used numbers 44, 47, 53, 1814 and 1820 lamps.

I recovered rubber grips from Uni-Ball and Pilot brand pens. I'm sure there are other brands that are similar in size and would work just as well. For smaller sized lamps I frequently use rubber fuel-line tubing designed for lawn-mower engines that I purchase from a local lawn equipment repair shop. The soft rubber of the grips really does make lamp removal and replacement an easy task. — *73, Lawrence Stark, K9ARZ, 1875 Chandler Ave, St Charles, IL 60174-4601,* **k9arz@arrl.net**

KENNETH YEE, K3YEE

**Figure 3 — With the radial adapter attached the mag-mount is freed from your car's roof and can be placed on any convenient surface or hung from a tree.**

## ADDING 6 METERS TO THE R7000

◊The Cushcraft R7000 vertical antenna has four radial rods just below the bottom trap to enhance 10 meter operation. I decided to try adding another set of rods below them to see if 6 meter operation would be possible — and it was. The SWR is 1.5:1 and the center frequency is about 50.3 MHz with very broadband performance. I made the modification as follows:

I obtained a 4 foot long, ¼ inch diameter aluminum rod from my local hardware store. After cutting it in half, I made two right-angle bends about a ½ inch on either side of each rod's center, giving the rods the look of an elongated "Z" (see Figure 4). I used a hose clamp to attach the two Zs to the antenna about 82 inches above the base radials (see Figure 5) so as to resemble the 10 meter rods, which are located above the new 6 meter rods. — *73, Neil Klagge, WØYSE, 1102 E 3325 N, Layton, UT 84040,* **w0yse@arrl.net**

## TROUBLESHOOTING WITH A PAINTBRUSH

◊I was pulling out my hair working on a pesky intermittent problem in a solid-state receiver. I had worked for over 3 hours trying to locate a loose connection on the circuit board. All the connections looked good when examined with a powerful magnifier but the signal was popping in and out at the slightest touch anywhere on the board. I walked away from it and after a while I had an idea.

I found a small paintbrush we bought for the grandkids and tried brushing each component. In about 5 minutes I had located the problem. It was a tiny capacitor that was not soldered to the board. Turning the board over I found that the solder had flowed right over the lead on the capacitor so it appeared to be soldered but was not. Resoldering the capacitor cured the intermittent problem thanks to a little kid's paintbrush. [For more troubleshooting information have a look at "Troubleshooting Radios" by Mal Eiselman, NC4L.][1] — *73, Bob Sumption, W9RAS, 61250 Cass Rd, Cassopolis, MI 49031,* **w9ras@arrl.net**

NEIL KLAGGE, WØYSE

**Figure 5 — A close-up of the 6 meter rods attached to the R7000 with a hose clamp.**

[1]M. Eiselman, NC4L, "Troubleshooting Radios," *QST*, May 2009, pp 30-33.

"Hints and Kinks" items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

*QST* invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters, 225 Main St, Newington, CT 06111, or via e-mail to **h&k@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments. QST

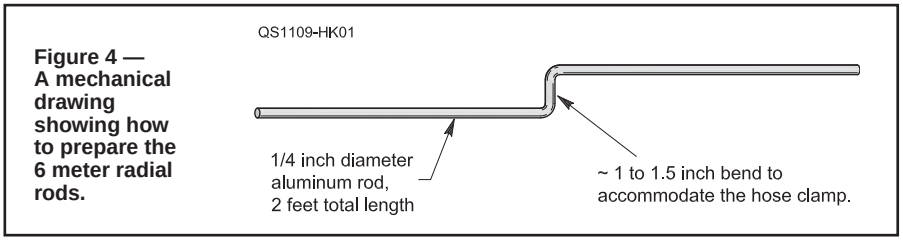



**Figure 4 — A mechanical drawing showing how to prepare the 6 meter radial rods.**

# Alabama Slammer

*Eleven frantic days of EmComm following the devastating tornado events in Alabama.*

**David Gillespie, W4LHQ**

In the midst of a tornado event of generational scale I took a few breaks from operating at the county operations center to record some observations. Here are some of my thoughts and a few lessons learned during the Alabama disaster response.

### April 27, 2011

Local hams were on station hours before two lines of violent storms slammed Alabama. The first storm arrived at 5 AM and the second almost 12 hours later. We operated from the first warnings and continued to pass traffic for 11 days. In the first 36 hours our EOC station logs alone had more than 1000 pieces of traffic. We had medical rescue requests; delivery, navigation and injury reports; shelter communications, and thankfully lots of welfare "we're okay" messages to pass.

It took almost 11 days until reliable communications were restored to all affected areas, and in many cases that was only cell service provided by "COWs" — mobile "Cell on Wheels" trucks. Hard lines were still not back to 100% as of May 31. [As of late June, many hard line services had not yet been restored as the utility companies implement plans to upgrade the destroyed infrastructure. — *Ed.*] The Jefferson County ARES® group operated stations at shelters, command posts, distribution points, temporary medical triage stations, feeding stations, temporary operations headquarters, the Red Cross and portable kitchens. ARES operated in the field with search and rescue and chainsaw teams as well as delivering supplies, food and medicine.

***"I have been impressed at the patience and professionalism of all our volunteers, both ARES members and nonmember hams who simply wished to help."***

In the chaos of an event of this scale I have been impressed with the patience and professionalism of all our volunteers, both ARES members and nonmember hams who simply wished to help. We had a primary ARES net running on a local club repeater (W4CUE) and when the traffic got heavy we used additional repeaters and created a few localized simplex nets for specific teams. There is no question that we pushed our operators and equipment up to and past their limits and in the process found out just how much we can do.

We operated on HF, but more than 95% of our operations were on the 2 meter band — the gold standard for emergencies. We had hams in the field operating as relay stations; others put up tactical repeaters for short-term operations and still others manned mobile rigs and set up their radios to act as dual-band repeaters to ensure we could reach as many of the affected areas as possible. Within 12 hours we had manned seven served agencies and had hams providing communications all across the middle part of the state.

Alabama has seen its share of tornado events and a few hurricanes in the recent past, and each event reveals new opportunities to learn, grow and get better as a response community. The practice we gained from training and the experience our operators have from their past disaster deployments paid off in lives saved and in countless other ways.

### What's Next?

Each day since the event I have had the chance to be on the air with hams all across the area who seemed to have but one question: "What do we need to do next?" Hams have met virtually every need from the smallest requests for information to a welfare traffic relay from a survivor to a family member in another state. Even hams whose homes were completely destroyed were on the air providing situational reports that helped shape the response efforts of the state and federal agencies.

As this is written in June, we are far from seeing the end of the recovery efforts. Our work in communications is slowing down as the infrastructure is returning some capac-

**Mickey Gillespie, KJ4KZT, sends in damage assessments in Tuscaloosa.**

ROGER SMITH

MICKEY GILLESPIE, KJ4KZT


**For disaster victims the Red Cross is often the pot of gold at the end of the rainbow. Ham radio's long time partnership with the Red Cross ensures that the right type of help goes where it is needed most.**

MICKEY GILLESPIE, KJ4KZT

**ARRL Ham Aid kits on the road in Alabama. Go to www.arrl.org/arrl-donation-form to help support the Ham Aid fund.**

ity to the area. There are portable cell towers that have been brought in as well as portable shower units and mobile clothes washing centers. Tire repair crews are busy fixing the endless stream of flats the recovery trucks suffer as they travel through the damaged areas.

In my other life I am an architect and I wear a disaster assessment volunteer hat (helmet actually). Those duties, in combination with the radio work, gave me an interesting perspective on the storms, their aftermath and mitigation strategies we need to employ going forward. In Alabama the death toll was more than 200 and across the southeast it approached 400. In Jefferson and adjacent Tuscaloosa counties there were more than 12,000 structures damaged by the storms and each had to be individually inspected for safety under the direction of the local building officials. As part of an inspection team I was able to provide assistance communicating inspection results to the command center. Quite a few of my fellow architects were impressed and asked about getting their ticket. We completed those inspections in 6 days with the help of almost 200 local architects and engineers who, like hams, asked what they could do to help.

We had actually discussed a few of the lessons learned at a Net Control Station class we held in conjunction with our neighboring Shelby County ARES group just a few weeks before the storms. With the added benefit of our experience with the tornado events, some of our valuable lessons were:

### *Short and Sweet*

Communications during an emergency have to be direct and to the point. Besides getting more traffic passed in a given period of time, this can make a big difference for operators who are on battery power. We suggest that operators go through their message before they push the PTT switch or, as Joe Friday might suggest, "Just the facts, ma'am."

### *Good NCOs are Infectious*

Net control operators are without question a vital link in the overall network of operators. We strive to have clean, easy-to-understand operators who can juggle a flood of information while keeping a cool head. Good operators are infectious. The NCO sets the tone and in most cases other stations copy their professional manner. Lead by example.

### *Professional Amateurs*

It's never over until all the paperwork is done. There is a reason phrases become clichés. They are usually true. Station logs and formal messages belong to the served agencies to which our service is provided. A few pages of yellow notebook paper with coffee stains are not how we want to present our abilities as communicators. In our case we were debuting a new emergency station log that, while much better than previous logs, was not perfect. We updated the design during the event and pushed that out as a PDF to our operators.

### *Lots of Listeners*

Is there anybody out there? I have had several conversations with safety officers at local hospitals regarding the activation of the ARES net. We have eight local hospitals with fully functional emergency ham stations. In almost every case, the stations were activated for monitoring by the emergency managers at the facilities to maintain situation awareness of the changing needs of the disaster. It's a reminder to hams that while we may be the only ones talking on the radios, we are not the only ones listening.

### *Be Not Afraid*

One lesson we learned without really trying was to be fearless in terms of getting the job done. We didn't act reckless. We were just unafraid to fail. Our operators were willing to try most anything to get the message through and when one idea didn't work, they quickly switched gears and tried another approach. According to our Emergency Coordinator Hub Harvey, N4HUB, being fluid is one of our hallmarks, because sometimes flexible is too stiff.

There were occasional frayed nerves, spots of frustration, fatigue and more but I couldn't be any prouder of my fellow hams in their response to this devastating event. I always keep in mind that all disasters are local and every emergency response requires communications. From the hams in the field with handheld transceivers to the county AECs and ECs, to our state EC and section manager the entire ARRL community stepped up and provided exactly what was needed "when all else fails."

*David Gillespie, W4LHQ, an ARRL member, became a ham in 1995, following in the footsteps of his grandfather Dr William Riheldaffer (SK), the original W4LHQ. Dr Riheldaffer also shared his public service dedication with David.*

*David is currently the AEC for Jefferson County responsible for the ARES hospital program. Very active in emergency communications, he has obtained a variety of ARRL and FEMA credentials as well as an Advanced Level Emergency Manager designation conferred by the Alabama Association of Emergency Managers.*

*David is a member of the American Institute of Architects Disaster Team for Alabama and participated in a multicounty assessment program following the storms of April 27. He is also participating in recovery planning efforts supported by the national AIA for rebuilding efforts across the state. He can be reached at 7105 Elliott Ln, Leeds, AL 35094-3769,* **w4lhq@arrl.net.**

# EMCOMM-1 — Customized Communications

*A Florida ham builds an emergency communications van (ECV) that outpaces many governmental vehicles costing magnitudes more.*

**Rick Palm, K1CE**

I was tired after two long 12 hour work shifts over the weekend and, frankly, had to drag myself down to the Flagler County EOC for our monthly ARES® meeting. I exchanged handshakes with the usual suspects before the meeting commenced. I found an empty chair and was half dozing when I was jolted awake by the first stunning photos on the meeting room's projection screen, photos of the finest Amateur Radio-based emergency communications vehicle I had ever seen. The presentation on the vehicle's mission, construction, demonstrations and activations was under way by owner and designer Mike Lee, WB6RTH, the District Emergency Coordinator (DEC) for the East Coast ARES District here on the upper east coast of Florida. Flagler County is located between historic St Augustine and famous, funky Daytona Beach. The area is a potential ground zero for natural disaster, especially hurricanes.

Lee is one of the more interesting ham radio characters I have ever met (and I've met quite a few). An IT consultant and manager for a large local data processing firm, his title belies what lies beneath, which is a total, almost maniacal devotee of public service via Amateur Radio. He is a veteran radio amateur with a long history of public service through ARES, including an all-nighter in front of a 220 MHz FM rig handling hundreds of frantic health-and-welfare inquiries in the immediate aftermath of the devastating Loma Prieta earthquake that struck the San Francisco area in 1989. Lee relayed messages up and down the famous Condor repeater system. Tears still come to his eyes when he talks about it. I quickly discerned that he has absolutely no ego.

Lee never does anything halfway; it's all or nothing. A manifestation of this characteristic, and his zeal for public service, is the incredible EMCOMM-1 Amateur Radio emergency communications van. Here's a passenger's-eye view.

## Mission Objectives

Lee stated, "The mission of the EMCOMM-1 van is to provide interim communications capability to any public service group or agency on a short-term basis until an event is resolved or permanent communications are reestablished." Operators of the van also work to "assist agencies and individuals in restoring communications systems (RF and wired) through diagnosis, repair and installation."

The van is made available to served agencies and public service groups such as ARES and RACES, as needed.

## Initial Considerations

The first item Lee had to consider for the project, like most projects, was cost. How much was the van going to cost to build and then maintain over time? How was it to be funded, titled and operating expenses distributed? Who would pay for deployments? Lee's goal was not to underestimate these expenses, nor be overly optimistic.

Ultimately, Lee was able to complete the entire project for $65,000 bumper to bumper. But, he also had to factor in maintenance and costs such as oil and fuel, tires, RF equipment upgrades and so forth. Uncontrolled and unplanned expenses could limit putting the vehicle on the road or limit the mission or scope of the ECV.

**EMCOMM-1 in net control mode during a bike event. Here, Jeannie, N4WFM, and Bob, WN1B (sitting) consult on an issue that requires changes to the course and notification to the field units.**

**The well thought out interior not only provides space for a wide array of equipment but room for the several operators who would be required to operate all that hardware.**

Another major consideration was insurance. Coverage could be a limiting factor in deployments to potentially hazardous disaster areas. Lee thought to check on insurance options first, before starting the project, as "this could have been a show-stopper."

Lee was also concerned with where the vehicle would be stored and what access rights and permissions would be needed. He would sign memoranda of understanding (MOU) in advance with agencies or groups like ARES that would be using the vehicle, for the assumption of responsibility for loss or damage. Finally, he needed to consider who would make the final decisions regarding the use of the ECV on a deployment. Being privately owned by a single individual, that decision was simple — but such might not be the case if it were club owned or shared with a number of partners.

All of the cost estimates and written agreements with contractors were secured first, before any commitments were made — Lee did not want the project started, stopped and restarted again. As a professional project manager, he knew what needed to be done to guide it to completion smoothly.

## Owners and Participants

EMCOMM-1 is owned by Lee and was designed from scratch by Lee and Fred Jones, KE7APH. It took 12 weeks to finish the interior after the chassis was delivered. The van became Lee's primary ham shack and is a constant work-in-progress.

Lee debunks the old myth about communication vans, that high capability has a high price tag — *not*! The project proved that you can do a lot with a (relatively) small budget.

## Chassis Design

A standard, generally available chassis was chosen, diesel-powered for compatibility with FEMA and military fuels. Other considerations included domestic servicing and spare parts availability; a high gross vehicle weight rating (GVWR) for permanent and temporary loads; high fuel economy, which diesel fuel provides; stand-up height inside, to eliminate the need for crouching; high reliability, and easy maintenance. The size of the vehicle was considered for airlift capability, in that it had to fit within an unmodified C-130 airframe.

The Dodge Sprinter was selected. This version was manufactured by Mercedes-Benz and features a turbo diesel engine with 24 mpg fuel economy. It is supported by the Dodge Commercial Dealer network, so maintenance is a nonissue. Rear doors open and fold back for wide clearance.

## Communications Requirements

In planning for communications hardware and software, Lee wanted the ability to have multiple stations on all bands, simultaneously. He wanted voice, data and video modes on all appropriate bands. He also wanted wide spectrum-scanning and recording capabilities for event forensics. The ability to bridge the radios for impromptu crossband and repeater operation was a requirement, as was the deployment of EMCOMM-1 portable repeaters on site.

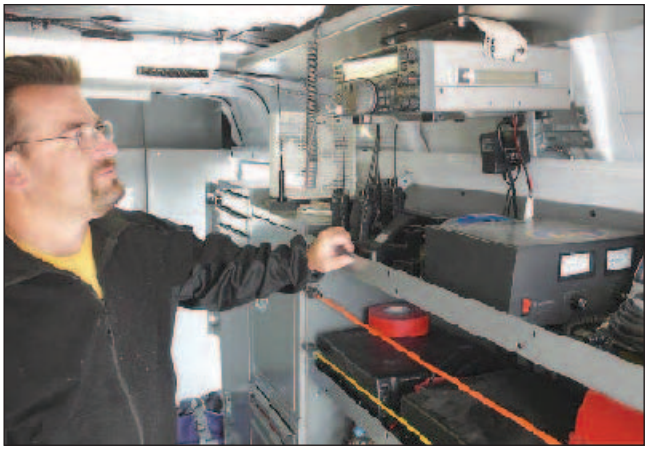
## Power Requirements

For 12 V dc distribution, Lee chose 460 Ah of battery power with Lifeline (AGM) Batteries (**www.lifelinebatteries.com**). All distribution is made via Powerpole strips and connectors (**www.powerwerx.com**). Battery charging is accomplished via a Trace 2 kW sine wave inverter/charger.

For 120 V ac distribution, stand-alone operation is accomplished with the same Trace 2 kW sine wave inverter. Shore power is provided via an industry standard RV connector. A transfer switch with affinity to generator power is employed. All ac distribution is done via a Square-D power panel. Ground fault circuit interrupter (GFCI) outlets are on all junction boxes with exterior proximity. An MQ diesel generator provides 15 kW of 120/220 V ac for 96-plus hours continuously on internal fuel tanks, with provisions for in-operation refueling. A distribution system for support groups is also installed, for powering of local clusters of radio operators or emergency services workers.

## RF Maintenance and Repair Requirements

To meet one of the mission objectives of being capable of repairing served agency radios, repeaters and other systems and equipment in the field, Lee stocks in the van multiple Yaesu UHF repeaters with duplexers, service monitors and antenna analyzers

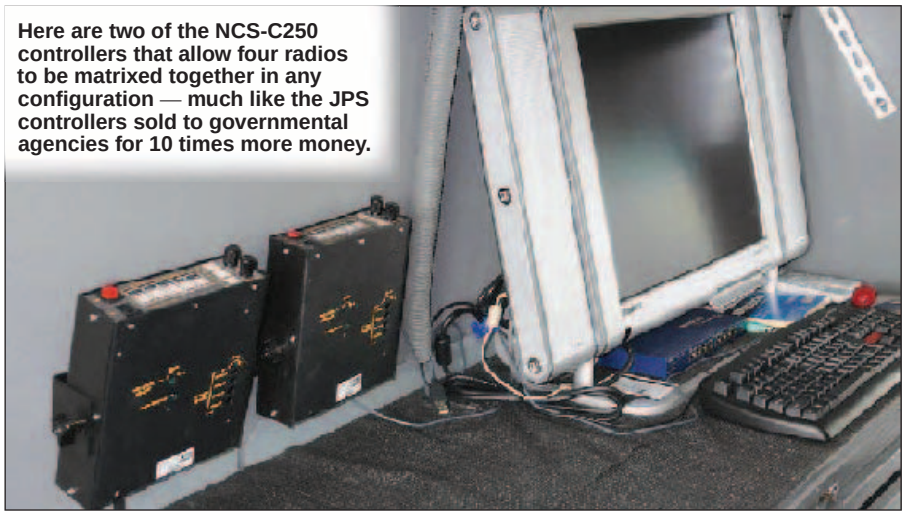


**Ed Winchester admiring the TS-570D HF radio installed on EMCOMM-1. The unit also has a Kenwood TS-480 for Pactor/WL2K coupled to an SCS Pactor controller. Below the radio is storage space for a wide range of supplies such as handheld transceivers, a spare power supply and cables together with several shelves and storage lockers for other spares and tools.**

## The Technology

Lee ultimately had the following installed: Kenwood TS-570 and TS-480 HF transceivers with SGC tuners; multiple ICOM commercial mobile VHF/UHF transceivers for public service and General Mobile Radio Service (GMRS) use; an ICOM V-8000 high power 2 meter rig; multiple Kenwood D-700 mobile transceivers for 2 meter/440 MHz (Voice and Data) operation; an ICOM IC-2820 D-Star radio; an ICOM IC-910H (satellite radio) with V/U/L bands installed for satellite operation; SCS/PTC-IIpro multimode controller with Pactor capability for *Winlink* (**www.winlink.org**) on HF and VHF; Bearcat 780 and ICOM IC-8500/SDR-14 scanners with recording function; multiple NCS-C250 Mobile Multi-Switcher interoperability controllers from New Communications Solutions (**www.ncsradio.com**), and multiple Yaesu VXR-7000 repeaters with transmit/receive duplexers.

As far as onboard computing was concerned, Lee installed the following: wired and wireless LANs — 10/100 Mbit/s hub and printer server; wireless bridging to a DataStorm satellite system onboard his 42 foot motor coach and a bridging capability for Verizon wireless broadband. Computers — two dedicated Dell computers for logging, Packet/Pactor and Radio programming software, and all operator manuals online in PDF format. Two 24 inch LCD flat panel primary computer displays with an ATV tuner display in split-screen mode were installed. A Samsung laser printer and DVD writer for downloading of video and still images were installed as well.



**Here are two of the NCS-C250 controllers that allow four radios to be matrixed together in any configuration — much like the JPS controllers sold to governmental agencies for 10 times more money.**

such as the Aeroflex IFR-1900 and IFR-500 communications testing units, an Anritsu SiteMaster Cable/Antenna Analyzer, a Riser-Bond 1205C Metallic Time Domain Reflectometer, a Polyphaser Lightning Suppressor Tester, Bird-43P and Telewave-44A wattmeters (multiple), a Rhode & Schwarz Spectrum Analyzer and Tracking Generator, a Tektronics TDS-2002 Color Dual-Trace Scope, a large selection of connectors for coax and Heliax (¼ to 2½ inch), Fluke digital voltmeter and a variety of hand and power tools, connectors and cable.

## Operator Comfort and Safety

Operator comfort and safety were priorities. The van is capable of holding stored food and water for 5 days for two staff operators. Air conditioning is supplied when running on shore or via the generator rig. There is an extensive first-aid kit, including oxygen.

For safety, radiation detectors, megaphones, night vision equipment and an Iridium satellite phone are all aboard. Bolt cutters, breaching tools and significant self-defense capability are all included.

## Construction

It took a Herculean effort of time and labor by Darryl Dudas of Commercial Van Interiors of Las Vegas, Nevada, to design and build the radio mounting racks, in-wall ac distribution system, interior lighting and power distribution. The work is of the finest and most rugged quality I have ever seen. Shelving and cabinetry were manufactured by Adrian Steel. All components are commercially available off-the-shelf, so the entire vehicle can be replicated by local government agencies wishing to have an inexpensive, self-contained ECV.

## EMCOMM-1 in Real Life

Lee's stories of EMCOMM-1 deployments were mesmerizing and in some cases, richly entertaining. For example, the account I enjoyed the most was when a major FEMA exercise was conducted at Hoover Dam, just outside of Las Vegas, with a corresponding array of hugely expensive (millions of dollars huge) mammoth governmental communications and command center vehicles surrounding the dam, top to bottom, and back in Las Vegas. One exercise goal was to test radio communication efficacy and efficiency. As it turned out, government systems on site could not relay a transmission from the bottom of the dam to the command post location — hundreds of feet above the dam and about 3 miles away. Damn!

An operator in EMCOMM-1, situated at a public parking lot just above the dam, was able to use a simple repeater to relay the message effortlessly from bottom to top and back to the city of Las Vegas, 20+ miles away. Officials on site were duly impressed. One official stated that the problem is that the Federal government simply cannot build anything small and effective. They build things so large and complicated that they get in the way of themselves and compromise mission or exercise requirements. The official wanted to know if Lee could sell him a dozen of his EMCOMM-1s.

Another more recent use of EMCOMM-1 in northeast Florida was as the command post and net control center for the MS-150 Multiple Sclerosis bike event in early October 2010, which had over 2500 riders. In this case, EMCOMM-1 served as the portable command center for all communications supporting the event, with two simultaneous net control stations sitting side-by-side in order to manage traffic on two repeaters (St Johns and Daytona net controls). The ability to have multiple net control stations *and* the ICS command staff in the same place, listening to the same traffic, is not to be underestimated, since situational awareness is vastly increased.

## Bottom Line

Government disaster agencies might think about outfitting their fleets with more vehicles like EMCOMM-1, which provide more function over form, are more maneuverable and are easier to deploy, maintain and operate efficiently than the mammoth vehicles they tend to employ.

Having more vehicles also spreads the risk. With more vehicles fanned out geographically, some are more likely to survive a natural disaster or terrorist action than one or two larger, centralized vehicles on a few sites.

*Photos by Mike Lee, WB6RTH.*

*Rick Palm, K1CE, an ARRL Life Member, had a 20 year career at ARRL headquarters before retiring in 1999 and is currently the editor of the ARRL ARES E-Letter. He is currently a Registered Nurse on the Intensive Care Unit at the city hospital in Daytona Beach, Florida. His greatest enjoyment in ham radio is his work as an ARRL Volunteer Examiner. He can be reached at 31 Burning Ember Ln, Palm Coast, FL 32137-8810,* **k1ce@arrl.net**.

## Postscript from Michael Lee, WB6RTH

EMCOMM-1 was built as a prototype to prove to local governmental agencies that "*Bigger* is not always *better*." Where many municipalities might spend $1 million on a vehicle and only get the benefit of an air-conditioned conference room with some communications capability, EMCOMM-1 is all about flexible, rapidly deployable communications — no frills.

For the same cost as a $1 million "Mobile Command Post," an agency could reap the benefit of 16 copies of EMCOMM-1. It also demonstrates that virtually any smaller jurisdiction can get huge benefits from a modest investment — that it does *not* take $1 million in order to have great function. After all, these are *your* tax dollars at work — unfortunately, often wasted on vehicles that do not fulfill the original mission. Most of us as individuals would never invest in these multimillion dollar vehicles — they just aren't cost effective — so we built EMCOMM-1 to prove that there *are* alternatives.

# Extra Crisp

*Efficiency is key when communicating in an emergency.*

**Steve Sant Andrea, AG1YK**

"Net control this is AG1YK in Cold Stone. The situation is out of control here. Without warning the wind shifted and the fire dropped down on the town. Everyone thought the town was safe so many residents remained behind. We have lots of injured. The town has been completely destroyed. We need people to get them out. The local fire and police are trying to search the wreckage. The ARES operators who were deployed are supporting firefighting efforts. I'm the only one here. AG1YK back to net control."

Well, what did you think of that report? Do you think it will bring to the town of Cold Stone the kind of support it needs? In other words, was this transmission an effective emergency communication?

In any EmComm situation, you may be called upon to shadow an official, work with a search team, do damage assessment or a variety of other tasks. Whatever your actual assignment, the information you would be handling concerning injured people and destroyed property is critical for Incident Command (IC). Our job as communicators is to pass along situational information clearly and accurately. Without accurate and timely information IC can't form a clear picture of the resources needed to deal effectively with the situation.

## Know Your Message

The first step in the process is understanding what the information is that needs to be transmitted. This information may come from an official or from your own observations, depending upon your assigned task. But remember, no matter who provides the information it is you, the operator, who creates the message.

If the message content is coming from an official, take the time to go over it with him or her to ensure you understand what needs to be sent. Break the information down into its essential points. Once you and the official agree that it is in as simple a form as possible, you're ready to prepare the actual message.

Depending on the nature of the information, you could use the standard NTS message format or, if you are sending a large group of data, then a table or *Excel* spreadsheet sent digitally might be more appropriate. The essential point is to keep the message as short as possible so it will use the least amount of repeater, net and battery time. Think about what are the fewest words to communicate the message accurately.

JOHN GERHART, WA3DIT


When you have a clear idea, write it down. This serves two purposes. When you see it in writing, it gives you a different perspective on the message and how well it communicates the information. It also provides you with a written record of the communication, which could be important during debriefing.

## Manual Methods

When handling a message by voice or CW, use the shortest, simplest words possible. You want to minimize the need for phonetic spelling on voice. If a message contains many long complex words, it should be handled digitally if that option is available — but what if it's not?

If you have to send a list involving complicated words by voice, then obviously you are going to have to use phonetics. The problem there is that everyone has their own version of the phonetic alphabet. This creativity can be fun on the air when bandying our calls about, but in an emergency we need to use the standard phonetic alphabet. You should keep a copy of it in your go kit so it will always be available for reference when time is tight. When preparing for your next exercise, go to the drug list at **www.webmd.com**, make a list of four or five tongue-twisters and practice sending them using standard phonetics.

When using CW, if you have to send some medicinal alphabet soup, slow down your speed. If you're not using full break-in, pause at the end of each item to allow the other station to request a repeat. In transmitting emergency traffic some of the lesser used symbols such as the fraction bar or parenthesis may be needed. Make sure you include them, along with a medicine list, in your exercises. Finally, take care in using the Morse abbreviated numbers. As with phonetics, these should only be used if all parties in the communication understand that DAH DIT DIT DIT is a seven and not a B. If there is any question, use the standard Morse character.

## Standard Procedures

Speed is necessary but accuracy is vital. To paraphrase that old saying: "It's better to take the time to do it right than waste time doing it over." Standards take more time but they help us move information accurately by removing the ambiguity.

The Group One ARRL Numbered Radiograms are one standard that can help shorten many typical emergency messages. They can be used with any mode, phone, CW or digital, but there is a method for their use. Some require a fill and a few several fills. What's the procedure? Send ARL, the number, then the first fill and then the second. You have probably spent a lot of time on the first part of disaster planning, setting up a disaster communications plan. The next step is to practice creating and moving messages through that system as quickly *and* accurately as possible.

During an emergency our communication channels are extremely valuable and their value is measured in seconds. Keeping our messages brief and our procedures sharp will keep our communications extra crisp.

*Steve Sant Andrea is an assistant editor at QST. He can be reached at* **ag1yk@arrl.org.**

QST

# Teaching Teens Amateur Radio Using Cowboy Ethics

*Cowboy ethics help high school hams build an EmComm team.*

**Devon Day, KF6KEE**

Teaching emergency Amateur Radio to teenagers is challenging. It is not just about using a radio or about operating procedure. The process is more complex than that. Students need to know how to conduct themselves during an event where their communication skills might be needed.

I read about a teacher at Cherry Creek High School in Colorado named Ann Moore. After reading the book, *Cowboy Ethics — What Wall Street Can Learn from the Code of the West*, Ann decided to try to teach the principles of cowboy ethics. The result was more than she expected. Students with diverse backgrounds and even learning disabilities came together with a new view of their own world. After talking to Ann on the phone, I was convinced I could teach the 10 cowboy ethics in urban Wilson High School located in Long Beach, California.

I am the advisor for the Wilson High School's Amateur Radio Emergency Communications (AREC) team. I decided to put cowboy ethics to the test. Once the team assembled, I put up an overhead of the 10 cowboy ethics and began to relate each to their job as EmComm operators.

## 1 Live Each Day with Courage

I went on to explain that, in the event of a real disaster, we would all have to work calmly and dig deep to stay focused and do our communications job to the best of our ability. We are the only high school in Long Beach Unified School District with a student emergency radio team as part of the school emergency plan. In addition, I went on to compliment the team members who have failed their ham radio exams, but returned home and continued studying. That takes courage. The students kept working toward their goal without fear of failure.

## 2 Take Pride in Your Work

This ethic provided a great opportunity to talk about equipment that had been hastily put away and now needs repair. Last year our mobile radio station was packed up with bottles of water left inside. Equipment could have been destroyed but fortunately was not. In addition, transcribed messages need to be done neatly and accurately. When covering an event, the student team must represent the school with pride. This is demonstrated by their professionalism during an operation.

## 3 Always Finish What You Start

Again, students began to understand that they cannot just leave one person hanging while they take off for their next engagement. This has been an ongoing problem and now has been addressed. Each team member now understands that they need to pull their own weight.

## 4 Do What Has to Be Done

Not all aspects of Amateur Radio are fun. The cleanup, the organization and replacement of used supplies is tedious but necessary.

## 5 Be Tough, But Fair

Both Wilson AREC Team Captain Max Chang, KJ6EMB, and I agree on this one. With 17 students on the team, this is the largest Amateur Radio team our school has ever had. People are going to have to wait their turns, be patient and take orders.

**Chip Margelli, K7JA, designed a mast launcher for military masts like the one the Wilson AREC team uses. Margelli demonstrated it and we built one the next day. Here Philip Scholnick, KJ6MCD, and Carina Ochoa, KJ6MCB, are using the Margelli mast launcher for Field Day 2011.**

**Wilson AREC team members work on the mobile radio station featuring 2 meter/1¼ meter and 2 meter/70 cm mobile radios. With a 50 A power supply and Powerpole connectors the radios can be easily interchanged. The station can be powered by ac, a 100 Ah gel cell, the team's generator or a car battery with jumper cables and Powerpole connectors. From the left are Corleone Ham, KJ6DXN; Philip Scholnick, KJ6MCD; Max Chang, KJ6EMB, and Kevin Keo, KJ6LNZ.**

### 6 When You Make a Promise, Keep It

This one is pretty easy to understand. For the radio club, it has to do with commitment and money. If you borrow money for equipment or books, pay it back. If you say you will participate in an event, be there on time.

### 7 Ride for the Brand

Knowing that some information passed on the radio is confidential is really important. Wilson's Amateur Radio operators always have to protect the best interests of the school. Students need to conduct themselves in a professional manner. They need to dress in a professional way. They must not repeat confidential information. Next year's student emergency radio program completely depends on the choices this year's team makes.


**Students worked through the night to help the Santa Ana Response Team with Field Day 2011 and demonstrated many of the cowboy ethics they learned in class. It was a fantastic Field Day. Pictured from left to right are, in Row 1 sitting, Max Chang, KJ6EMB; Philip Scholnick, KJ6MCD; Corleone Ham, KJ6DXN; Row 1 standing, Derrick Brown, Jimmy Draper, KJ6ELZ; Carina Ochoa, KJ6MCB; Sarah Carner, KJ6LNY; Joshua Martinez, KJ6NBC; Brandon Silvi, KJ6EMD; Javier Ruiz, KJ6MCE, Devon Day, KF6KEE, and Kevin Keo, KJ6LNZ.**

### 8 Talk Less, Say More

In the case of emergency radio, this is a perfect ethic to live by. We talked about how important it is to keep a frequency clear for emergency traffic — that it is more important to transcribe during an emergency than to give information that is speculation. This was a great time to emphasize that our job is to pass directed information from school administrators rather than to pass our assessment.

I talked about the importance of transcribing all transmitted information (including noting the time and date a transmission occurred). In the case of student radio operators passing emergency traffic, all messages are to be written and initialed by the administrator in charge. If the students are participating in an actual disaster, things could get too intense. In that case the student operator would simply show the administrator how to use the radio and let the administrator pass the emergency information to the City of Long Beach EOC. If an unlicensed administrator does take the microphone, a licensed student or adult would remain at the radio to act as control operator.

### 9 Remember That Some Things are Not for Sale

For the past 6 years, Wilson's Amateur Radio team has expanded due to the support of the radio community and outside donors. Elmers have taught the students and the advisor for free. Members of Wilson High School's parent radio club, Associated Radio Amateurs of Long Beach (**www.aralb.org**), have been a constant source of support and advice. The ARES® emergency coordinator for sub area 3, Bill Bradley, WD6FON, is actively working to bring more area schools into the ARES® network for the City of Long Beach and is actively involved in the Wilson High School radio team. In addition, Long Beach Community Emergency Response Team (CERT) Director of Education Sibyl Keirns, KA6RXX, has taken the entire team under her wing to teach emergency radio procedure.

These important community trainers volunteer their time and expertise to the Wilson radio operators. Many skills were acquired from the generosity of radio instructors who allowed us to participate in their radio courses through scholarships. This also includes Gordon West, WB6NOA, who offers scholarships to the Wilson AREC team so they can upgrade to the next license. In addition, the Long Beach Yacht Club has offered the use of their private repeater in order for the AREC team to practice drills. Shoreline Yacht Club has offered free license classes and the use of their radio room. The RMS *Queen Mary* management team extended free admission to the Wilson AREC team so the Wilson HS radio team could utilize the equipment in the W6RO wireless room as they practiced HF radio under the guidance of W6RO seasoned operators.

The ARRL has supported me through Education & Technology Program grants and two ARRL Teachers Institutes (**www.arrl.org/education-technology-program**). The information I gained has launched circuit board construction, robot and antenna projects and a new language arts-technology pilot class. What the students at Wilson High School have gained cannot be assessed with a monetary value. Community service has no price tag; it is its own reward. Amateur Radio operators have a long tradition of serving as volunteers. Wilson High School's success in radio is the result of this generosity.

### 10 Know Where to Draw the Line

We interpret this ethic to mean that when anybody is out of line, step up. No innocent bystanders are allowed. As old-fashioned as cowboy ethics sounds, there is a place for them in an urban setting. When students cross the line for misunderstanding any of the previously mentioned ethics, team members must address the problem. Staying quiet (an urban trait) when a team member is making a mistake is not good for the team. Each team member is held responsible for the ethics of the entire team.

After I went through the 10 cowboy ethics with my radio team, I scanned the room. Twelve serious faces returned my stare. The Wilson Amateur Radio Emergency Communications team understood these Cowboy Ethics. Urban kids were able to relate to ethics of rural cowboys whose handshake was their contract.

If you ask a Wilson AREC team member why they joined the team you will be surprised by the number one response: "Radio sounded like fun." It is a lot more fun when each team member knows what they need to do to make the whole team work well. Trust grows with sound ethics. Teens, who know they can trust one another, can do amazing things.

*Photos courtesy of Devon Day, KF6KEE.*

*Devon Day, KF6KEE, an ARRL member, is an English teacher at Wilson High School in Long Beach, California. She is a National Board Certified teacher who has worked with students and ham radio for 11 years. She holds a General class license. Devon is a Freedom Writer Teacher and is included in the book* Teaching Hope *about teaching "at risk" children.*

*Wilson High School was built in 1925. It has produced Amateur Radio operators from the 1940s to the '70s. These operators continue to stay in contact with Devon's radio operators and lend support through donations of equipment and continued encouragement.*

*Devon credits her skill with Amateur Radio to a huge support system in Southern California and through mentors from ARRL who have always been there to lend assistance. Devon Day can be reached at Wilson High School, 4400 E 10th St, Long Beach, CA 90804,* **dday@lbschools.net**.

# 2010-2011 School Club Roundup Results

*School power! A look back at the Fall 2010 and Spring 2011 SCRs and a look ahead to the next ones in October 2011 and February 2012.*

**Lew Malchick, N2RQ**
n2rq@arrl.net

Although many consider School Club Roundup (SCR) as a contest, it is more an operating event similar to Field Day. Its main objective is to get young people introduced to Amateur Radio and on the air. The October 2010 and February 2011 SCR sessions achieved their goals. Hundreds of youthful operators were reported, averaging about 10 per entry. There were reports of great propagation conditions by some, and terrible conditions by others, with causes ranging from local noise to solar flare events. All of these provided teachable moments. How does the Sun affect radio signals? How can local noise sources be found and what can be done about them? Complete results are online at **www.arrl.org/school-club-roundup-scr**.

## The Numbers

There was a slight decrease in entries year over year with October dropping by 3 to 40 and February to 46 from 47. However, there were 511 reported operators in February, up from 452 last year. There were changes in the distribution of entries in different categories. Elementary schools have dropped to 1 in October and 2 in February. This represents a drop by two-thirds compared to the previous year. Middle school entries by contrast have been steady or increasing with 14 in February 2011 compared to 11 in 2010 and 9 in October 2009 and 2010. College/University, which had grown significantly in recent SCR sessions, hit a bump in February 2011 with only 6 entries, down from 14. By contrast, high school participation has been increasing, with 15 entries in October 2010, 2 more than 2009, and 16 entries in February 2011, up 6 from 2010.

W9GRS (Glen Raymond School Science Club) and K4WBM (William Byrd MS ARC) ranked 1 and 2 in the Middle/Intermediate school category in both the October and February sessions. Among high schools, K5LBJ at the Liberal Arts & Science Academy High School had an outstanding score, topping 133,000 points in October. WB4HS (William Byrd HS) moved up from second in October to lead in February, but only earned 91,494 points. This may be an indication of the effects of propagation changes during the SCR sessions.

Participation distribution is interesting. We received entries from 28 states and Belgium. States with the most entries include California, Georgia, New York, Oklahoma, Texas and Virginia.

RONNY RISINGER, KC5EES

**From the left, Liberal Arts & Science Academy (LASA) senior Autumn Kervella operates K5LBJ during the October SCR, while her sister, senior Hannah Eddolls, logs contacts.**

## SOME SOAPBOX COMMENTS

### October 2010

We had very bad power line noise at the station so it was pretty much a bust for us. Enjoyed working the handful of stations we could hear. The utility company is working on the noise problem, so hopefully February will be better. — *K3NEM*

This was our best October event yet. The ionosphere sure helped. All William Byrd Middle School Ham Club members operated. For many other students it was their first time on the air. In all, 46 students participated. — *K4WBM*

This was a record-breaking year for our club. We contacted more people (577) and more countries (13) than ever before. The SCR has inspired my students to even think about entering Sweepstakes Phone. Thanks to all who helped us have so much fun this year. — *K5LBJ*

The conditions were great, the amateur community was great, many hams took the time to visit with the students, and the entire school had a wonderful experience. What a great way to introduce amateur radio to young students. Computer skills, maps skills, communication skills, math skills, electronics, and handwriting were all part of the experience. And the parents were thrilled to see their children's excitement. — *Bruce Weaver, K3LTM (at KB3BRT)*

### February 2011

Had a great time! TX's: Kenwood TS570D, TMD700, ant 3el/3b Yagi & dipoles 80/40m, GP VHF/UHF. — *ON4HTI*

Our score was just OK but our student participation was the best ever. Much of the credit goes to Iva Daniels, a retired teacher, who worked with the staff and got the kids in. Iva now pursues her ham license. One hundred and six Individual students made 136 visits to the radio room. 97 students made one or more on-the-air contacts. — *K4WBM*

We had a great time operating in the 2011 February edition of SCR! We had a great time taking advantage of the X Class Solar Flare event as a teachable moment and understanding its effects on radio propagation (or in this case, lack of propagation, hi hi). The students dealt with the noise on phone for a bit but then decided to head to digital and were able to pick up a few that way. — *W9GRS*

The Long Island Mobile Amateur Radio Club (LIMARC) is helping to sponsor future SCRs. US postal correspondence should go to SCR c/o LIMARC, PO Box 392, Levittown, NY 11756-0392. Donations may be made via PayPal to **LIMARC@optonline.net**. We expect this new relationship will improve administration of the SCR. Watch for changes in the format for electronic entry submission.

The next SCR sessions are scheduled for October 17-21, 2011 and February 13-17, 2012. Join our yahoo group, **SCR-L@yahoogroups.com**. Download free logging software: *SCR-LOG* from **home.earthlink.net/~scr-log/**; *Log It* from **www.asu.edu/clubs/amateur_radio_society/logit/**.

More info is available at **www.arrl.org/school-club-roundup** or write to us at **SCR@limarc.org** or Lew at **n2rq@arrl.net**.

# 2011 JOTA 54 — Welcome Gals and Guys!

*The next Scouts Jamboree On The Air will be October 15 and 16.*

**Debra Johnson, K1DMJ**

Though JOTA is primarily promoted by Boy Scouts in the US, it is a worldwide scouting event that includes Boy Scouts, Girl Scouts and Guides. Last year Amateur Radio clubs in North Carolina and Montana made special efforts to include Girl Scouts in their JOTA activities. Though the Girl Scouts do not have a program like the Boy Scouts Radio Merit Badge that focuses on radio education, it's clear that the lucky girls who had the opportunity to participate in JOTA were given a great introduction to the activity that so many Boy Scouts and today's hams enjoy. Here are some of those stories as told by hams who were onsite at two 2010 JOTA activities hosted for Girl Scouts.

## 2010 JOTA

As the sun crept higher and higher into the central Montana sky, so did a triband beam aided by the 7 AM set-up crew from the Great Falls Area Amateur Radio Club. With overnight temps at the freezing mark, metal tower and beam parts were... well...*freezing*! By 10 AM, however, when our guests started arriving, the outdoor temperatures were cool but comfortable, and thanks to a very efficient furnace, the interior of the communications van was toasty warm. With that, the 2010 JOTA operations were under way. Our club played host to the area Girl Scouts, while the Boy Scouts attended a separate JOTA encampment elsewhere in the city, hosted by another club. Westgate Mall was kind enough not only to let us set up outside in their parking lot but also provided a large meeting room where several equipment and publications displays, as well as an EchoLink computer, had been set up.

Brief explanations about Amateur Radio as a hobby and as an emergency service were the first order of business for the girls. Following their introduction to what Amateur Radio is all about, some went to the EchoLink station and others visited the Communications Van, where HF propagation conditions cooperated to allow each young lady the opportunity to visit with other Scout groups across the nation. Some of the girls went "off script" and asked some very intriguing questions, some of which were directed to the adult hosts of the distant stations. Although the attendance was thin and sporadic, the day's experience was rewarding for the Girl Scouts and the adults involved in providing it. — *as reported by Cameron Smith, N7NBB*

On October 16, 2010 during the Jamboree On The Air (JOTA), Shelby Amateur Radio Club (SARC) members demonstrated Amateur Radio to the Union County Girl Scouts at Camp Occoneechee, Lake Lure, North Carolina. Ben Melvin, KM4C, Emergency Coordinator for Cleveland County, did a great job organizing the event. The girls, all from Union County, and the Hornets' Nest Council Girl Scouts, enjoyed a day of talking to Boy Scouts and Amateur Radio operators all over the country. Daisies, Brownies, Juniors and Seniors were on hand to talk on the ham radio, an activity they had a choice to sign up for at their Camporee.

One Senior Girl Scout, Christa Shirlen of Troop 91, even opted to miss her "Challenge" for an opportunity to talk on the radio. She said she could do her Challenge anytime but when would she get a chance to talk on a ham radio again! Christa and a few other older girls seemed very interested in obtaining their license. Said volunteer June Melvin, WA4JNJ: "I thought it was going to be hard to get the girls interested in ham radio but boy was I wrong. When they came up, all you had to do was ask who wanted to talk on the radio and hands would go in the air. They were so excited to grab hold of the microphone and talk to some other Scouts or just anyone who would talk with them. They would exchange names and QTH and then the questions from the other end of the radio would begin. They loved telling the people about themselves and what they were doing." — *as reported by Susan Melvin, K4ZXN*

*Debra Johnson, K1DMJ, is Manager of the ARRL Education Services Department. She can be reached at* **djohnson@arrl.org**.

## 2011 JOTA: Peace, Environment and Natural Disasters

JOTA is an international scouting event organized by the World Scouting Bureau. While JOTA officially starts at 12 midnight Friday night/Saturday morning and goes until midnight Sunday local times, there will be plenty of stations on the air Friday evening. The official Scouting frequencies will be the center of operations. A listing of those frequencies, information about third party traffic restrictions and other details can be found on the ARRL website at **www.arrl.org/jamboree-on-the-air-jota**, or the Boy Scouts of America JOTA site at **www.scouting.org/jota.aspx**. For more information on the 2011 World Scouting Bureau's theme for this year's event, *Peace, Environment and Natural Disasters*, visit **scout.org/en/information_events/events/jota/the_54th_jota_2011**.

CAMERON SMITH, N7NBB

**Kira Nader (left) and Madisyn Smith hold the coiled section of a 20 meter dipole they built themselves at the Girl Scout JOTA Workshop. Moments later, others in the troop hoisted the antenna up the tower, and the girls made many contacts. As a group, the Girl Scouts did the math to figure out the length, then measured and cut the wire, soldered and installed connectors.**

TODD VICKERY, WA4TV

**Danielle Reich talking to Susan Melvin, K4ZXN, on the Shelby Amateur Radio Club's D-STAR repeater during Camporee At Occoneechee, Lake Lure, North Carolina.**

# 2011 Simulated Emergency Test

*Test your preparedness October 1-2.*

**Steve Ewald, WV1X**

ARRL's Simulated Emergency Test (SET) is October 1 and 2, 2011. This nationwide exercise is the chance to test your emergency operating skills and the readiness of your communications equipment and accessories in an emergency-like deployment. ARRL Field Organization Leaders at the section and local levels and many other volunteers that are active in public service and emergency communications are developing emergency-like scenarios in consultation with a variety of agencies for whom radio amateurs are known to provide service during emergencies.

To find out how you can step up and be a part of the local or section-level activities, your Section Manager contact information is found on page 16 of *QST*. Additional contact information may also be found on the Section web pages at **www.arrl.org/groups/sections**.

The Amateur Radio Emergency Service® (ARES®), the National Traffic System (NTS), the Radio Amateur Civil Emergency Service (RACES), and members of the ARRL Field Organization will participate and practice emergency operation plans, nets and procedures.

## Building Relationships

The ARRL Simulated Emergency Test is an ideal opportunity to demonstrate the capabilities of Amateur Radio and to improve them when necessary by experimentation. Community and public service agency officials will learn first-hand by taking a role in the SET and by providing an objective evaluation afterwards from their perspective.

The ARRL has long-standing relationships with several national organizations including the American Red Cross, the National Weather Service, the Federal Emergency Management Agency and the Salvation Army (among several others). More information on these and other national served agencies may be found at **www.arrl.org/served-agencies-and-partners**.

## National Preparedness Month

Once again this year, ARRL is a National Preparedness Month Coalition Member. National Preparedness Month (NPM) is in September, and this is a nationwide effort to encourage Americans to take simple steps to prepare for emergencies in their homes, businesses and schools. The US Department of Homeland Security is working with a wide variety of organizations (including ARRL) to highlight the importance of emergency preparedness and promote individual involvement through events and activities across the nation. We encourage you to consider this year's Simulated Emergency Test and all preparations for it as a demonstration of Amateur Radio's readiness and as an active participant in National Preparedness Month (NPM). More information on NPM is at **www.ready.gov/**.

## SET to Go!

In consideration of local and section-wide schedules with agencies and many others, ARRL Field Organization Leaders have the option of conducting their local or section-wide SET on another weekend in the fall season. Check with your local ARRL Field Organization leadership for the exact date in your area. Your help is needed, and the ARRL SET is a great way to get involved in emergency communications.

Information about specific SET guidelines and reporting forms for these ARRL Field Leaders are forthcoming and are also posted on ARRL website at **www.arrl.org/public-service-field-services-forms**.

EDDIE LARY, WS4I

**The Tuscaloosa County (Alabama) ARES participated in the 2010 Simulated Emergency Test. Dennis South, KD4IDD (left), and Bob Hudson, KF4UCY, conduct a VHF net during the SET.**

### Additional 2010 SET Results

The following 2010 SET reports were submitted properly and on time, but did not appear in the results article in July 2011 *QST*, pp 64-66.

**ARES Activity**

| *Area* | *Reporter* | *Points* |
|---|---|---|
| **Michigan** | | |
| Calhoun Co | KC8QNQ | 1596 |
| **Alabama** | | |
| Butler/Lowndes Co | W4TDE | 209 |

### Amended 2010 SET Top Ten

**ARES Activity**

| *Section* | *Points* |
|---|---|
| Georgia | 4965 |
| Connecticut | 4393 |
| Wisconsin | 4356 |
| Alabama | 3997 |
| Indiana | 3846 |
| Michigan | 2974 |
| South Texas | 1532 |
| North Carolina | 1518 |
| Eastern Pennsylvania | 1478 |
| Illinois | 1368 |

# Registration Now Open for New Online *Introduction to Emergency Communication* Course

**Debra Johnson, K1DMJ**

GREG SARRATT, W4OZK


**Those with online EmComm course experience will be in demand for all types of disaster preparedness exercises — and the real thing, should it occur.**

Part of ARRL's Amateur Radio Emergency Communications (AREC) training program, this course replaces ARRL's previous Emergency Communications Level 1 course (EC-001). It includes updated content from the former Level 1 course, as well as some content previously included in the former Level 2 course.

Last year the ARRL Amateur Radio Emergency Communications training program was restructured to offer two courses rather than three. In the new program, the *Introduction to Emergency Communication* course is the foundational course, designed for any ham volunteer who wants to serve as part of an ARES® response team. The second course in the newly configured program is *Public Service and Emergency Communication Management for Radio Amateurs* (course number EC-016). This course is designed for hams who are serving in ARES leadership and management roles. Both courses require completion of certain FEMA courses as prerequisites. These requirements ensure that ARRL's training aligns with the training of the partner agencies ARES volunteers will be assisting.

Hams who have previously taken courses in the ARRL's AREC series will find updated content and new information in these courses. As with any area of knowledge, processes, technology and relationships change over time. If you are new to ARES or have been involved for years but simply would like a refresher, consider enrolling in *Introduction to Emergency Communication* (EC-001) today. If you are taking on more responsibility or are in a leadership role, the management course (EC-016) is for you!

If you have previously completed the former Level 1, 2 and 3 courses you likely have a good handle on what is covered in the new EC-001. In that case, you may want to augment your training by taking additional FEMA courses. The more knowledgeable our team of volunteers, the better we'll be able to work together and with other agencies when we're needed most.

You can review course descriptions, prerequisites and find cost and registration information for both ARRL Amateur Radio Communication Courses on the ARRL website at **www.arrl.org/online-course-catalog**.

ARES clubs are encouraged to hold field classroom instruction and offer field exams for ARES members to complete the *Introduction to Emergency Communication* course and earn the course completion certificate. More details on can be found at **www.arrl.org/emergency-communications-training**. QST

## Strays

### SDR CLUB

◊I have started the Software Defined Radio Club (**www.softwaredefinedradio.co.uk**) to create a global community dedicated to SDR technology. Membership is free. — *Adrian Lane, 2EØSDR,* **adrian@2e0sdr.com**

### *QST* congratulates…

◊the Amateur Radio Volunteer Corps of Puerto Rico, WP4OOGK, and its leader, Jorge Acevedo, WP3VT, who have been honored by the Government of Puerto Rico and the Agency for Emergency Management and Disaster Management. The Corps is a group of Amateur Radio operators and CERT (Community Emergency Response Team) instructors who create local CERT groups to respond to emergencies and disasters.

◊Larry Cicchinelli, K3PTO, whose book, *Assembly Language Essentials*, has been published by Circuit Cellar. For more information, see **www.qsl.net/k3pto**.

◊Assistant Section Manager for Youth Corey Bulock, KD8BOQ, of Holt, Michigan, who was honored recently by the United Way in Lansing for his extensive community volunteer work. Corey was awarded the Capital Area United Way Youth Volunteer of the Year Award. — *tnx Dale Williams, WA8EFK*

# ARRL, National Weather Service Update
## *Memorandum of Understanding*

CARTER CRAIGIE, N3AO

**ARRL President Kay Craigie, N3KN, signs the updated *Memorandum of Understanding* between the ARRL and the National Weather Service at the NWS office in Blacksburg, Virginia. With Craigie are NWS Meteorologist-in-Charge David Wert, KB2FZO (left), and NWS Warning Coordination Meteorologist Phil Hysell, KI4CKP.**

The National Weather Service (NWS) and the ARRL have updated their *Memorandum of Understanding* (*MoU*). The updated *MoU* serves "as a framework within which volunteers of the ARRL may coordinate their services, facilities and equipment with the NWS in support of nationwide, state and local early weather warning and emergency communications function." In May, ARRL President Kay Craigie, N3KN, signed on behalf of the ARRL, and in June, NWS Office of Climate, Water and Weather Services' Director Dave Caldwell signed on behalf of the NWS. The ARRL and the NWS have had a formal working arrangement since 1986.

The NWS, in the *MoU*, acknowledges that Amateur Radio operators can be of valuable assistance in early severe weather warning and tornado spotting. Through its SKYWARN program, the NWS recognizes that Amateur Radio operators have assisted as communicators and weather spotters since the program began in the late 1960s. "In areas where tornadoes and other severe weather have been known to threaten, the NWS recruits volunteers and trains them in proper weather spotting procedures," the *MoU* states. "These dedicated citizens help keep their local community safe by conveying severe weather reports to their local NWS forecast office. SKYWARN spotters are integral to the success of our nation's severe weather warning system."

"All the National Weather Service personnel I've met throughout the country have told me how much they respect and depend on the Amateur Radio SKYWARN volunteers in their forecast areas," Craigie said. "This year's weather disasters underscore the importance of amateurs becoming trained severe weather spotters and participating in SKYWARN. It's a pleasure for me to work with the National Weather Service, both as an ARRL official and as a local SKYWARN volunteer."

Through the *MoU*, the ARRL will encourage its Field Organization, including ARES®, to "contact and cooperate with National Weather Service Warning Coordination Meteorologists for the purpose of establishing organized SKYWARN networks with radio amateurs serving as communicators and spotters." The ARRL will also encourage its Section management teams "to provide specialized communications and observation support on an as-needed basis for NWS offices in other weather emergencies, such as hurricanes, snow and heavy rain storms, and other severe weather situations." In turn, the NWS will work with ARRL Section ARES® volunteers to establish SKYWARN networks, and/or other weather emergency and alert systems.

"The relationship between the National Weather Service and the ARRL has been a model partnership for many years," said ARRL Emergency Preparedness Manager Mike Corey, W5MPC. "The renewal of this *MoU* emphasizes the value of Amateur Radio to the NWS mission."

You can find links to all *Memoranda of Understanding* between the ARRL and its served agencies, including the National Weather Service, at **www.arrl.org/served-agencies-and-partners**.

### ARRL HOSTS RFI WORKSHOP FOR UTILITY COMPANIES

In June, the ARRL hosted a two-day RFI workshop for utility company employees. Led by Mike Martin, K3RFI, owner of RFI Services, the workshop was geared for those technicians, linemen and engineers who are responsible for solving RFI and TVI problems. Four participants from around the country made their way to Newington to take part in classroom and field instruction to learn how to best locate and solve these interference problems.

ARRL Laboratory Manager Ed Hare, W1RFI, said he appreciates the opportunity for the ARRL to work directly with companies like RFI Services and the electric utilities they serve. "A major key to resolving RFI problems is for utility staff to use the correct equipment and techniques to correctly identify power-line noise," he explained. "The utilities that send staff to this training course are trying to do things right. Opening up the ARRL's facility to the course and having utility staff attend sends a message that good communication is possible and is an important part of the efficient resolution of power line noise complaints."

Beginning in 2002, Martin — an ARRL Member — has presented his RFI workshop at ARRL Headquarters every few years. Participants learn about the most common kinds of interference and how to locate them using equipment and techniques, how to identify noise from outside sources and how to track down difficult-to-find noises affecting BPL systems. In addition, the workshop covers finding noises emanating from the customer.

"Mike Martin's power line RFI workshop

S. Khrystyne Keane, K1SFA ♦ ARRL News Editor ♦ k1sfa@arrl.org

was a real eye-opener and time well spent," said ARRL Lab Test Engineer Bob Allison, WB1GCM. "Learning the causes of RFI, including the equipment and the techniques used to locate problematic sources, will help me inform our members about this topic when they call the Lab for help. This training is a wise investment for all power companies, where their best interest would be served by eliminating harmful interference sources, as well as finding possible hardware failure before power is interrupted to customers."

Martin's RFI Services is dedicated exclusively to RFI locating and training. For more than 25 years, he has been locating interference sources and training utility companies, solving hundreds of complaints a year. Martin tests RFI locating equipment and makes recommendations to the manufacturers on how to improve their equipment. Together with ARRL Lab Engineer and RFI guru Mike Gruber, W1MG, and Jody Boucher, WA1ZBL, Martin wrote the chapter of the latest edition of *The ARRL RFI Book* that deals with resolving power line noise complaints.

"Mike has more than 30 years of experience as an RFI investigator — more than anyone I know," Gruber said. "The techniques Mike teaches are often borne from that experience. The ability to identify noise sources quickly and accurately is essential for utilities to economically meet their obligations under Part 15 of the FCC's rules. Mike's RFI workshop is the gold standard for learning how to do it right with real hands-on experience."

## RECONROBOTICS PAYS $17,500 TO END FCC INVESTIGATION OF RULES VIOLATIONS

On July 13, the FCC announced that its Enforcement Bureau and ReconRobotics have entered into a *Consent Decree*. This resolves an FCC investigation in response to a complaint filed by the ARRL. In 2010, the ARRL alleged that ReconRobotics had violated Section 302a(b) of the Communications Act of 1934 as amended and Section 2.803 of the Commission's rules regarding the manufacturing, marketing, distributing and selling of radio frequency transmitters. In the complaint the ARRL alleged that ReconRobotics had unlawfully marketed the Recon Scout — a remote-controlled, maneuverable surveillance robot operating in the 430-448 MHz band — to public safety agencies and certain security personnel prior to the grant of a necessary waiver. The FCC granted a waiver to ReconRobotics in 2010 allowing public safety licensees to operate the device in a portion of the 70 cm band. To date, no license applications have been granted by the Commission for the device and the ARRL has petitioned to deny all applications filed.

"After reviewing the terms of the *Consent Decree* and evaluating the facts before us, we find that the public interest would be served by adopting the *Consent Decree* and terminating the investigation," the FCC stated. With the announcement of the *Consent Decree*, and subject to the payment of $17,500, the FCC declared that the investigation into whether ReconRobotics' marketing of its device is terminated.

On March 15, 2010 — in response to an ARRL complaint alleging that ReconRobotics had unlawfully marketed the Recon Scout surveillance device before receiving an equipment certification from the FCC — the FCC issued a *Letter of Inquiry* to ReconRobotics. The *Letter of Inquiry* directed ReconRobotics to respond to a series of questions regarding the manufacturing, marketing, distributing and selling of the Recon Scout. According to the *Consent Decree*, ReconRobotics responded to the *Letter of Inquiry* on April 23, 2010 and at that point, both ReconRobotics and the FCC entered into settlement discussions.

The FCC agreed to terminate its investigation "[i]n express reliance on the covenants and representations in this Consent Decree and to avoid further expenditure of public resources. In return, ReconRobotics agreed to the terms, conditions and procedures of the *Consent Decree*," including the payment $17,500 to the United States Treasury within 30 days after the effective date of the order.

The FCC further agreed that as long as no new evidence is presented, it will not use anything it discovered during its investigation against ReconRobotics "to institute, on its own motion, any new proceeding, formal or informal, or take any action on its own

## THE REPUBLIC OF SOUTH SUDAN IS THE NEWEST DXCC ENTITY

At 10:18 AM (EDT) on July 14, the UN General Assembly welcomed the Republic of South Sudan as its 193rd member state by a vote of acclamation. Immediately following the General Assembly meeting, the new country's flag flew for the first time in front of the UN, ceremoniously marking the Republic of South Sudan's membership in that organization. According to the DXCC rules, one of two things must happen before a new entity is added to the DXCC list: The proposed entity must either be added as a member of the United Nations or receive a prefix block from the International Telecommunication Union. With the admittance of the new country to the UN, per Section II, 1(a) of the DXCC rules, the Republic of South Sudan is now a DXCC entity. The DXCC Desk will begin immediately accepting contacts for this new entity, with a start date of July 14, 2011.

According to DXCC Manager Bill Moore, NC1L, the Honor Roll numbers move from 340 to 341 for the Top of the Honor Roll, and for Honor Roll it becomes 332. "The deadline for the Honor Roll and annual listings is December 31, so you must submit the new entity to DXCC by then in order to retain your Honor Roll status," Moore explained. "For Logbook of The World (LoTW), you may submit all your QSOs with the Republic of South Sudan stations anytime. There is no need to hold them out of your log or do anything differently from what you already have been doing. You do not need to assign country names or identifiers. After we issue certificates to the Republic of South Sudan license holders, LoTW will make matches and assign the correct entities automatically."

As of press time, the International Telecommunication Union has not announced a prefix block for the Republic of South Sudan.

COURTESY UNITED NATIONS


**The precise border between Sudan to the north and the Republic of South Sudan is still fluid and will be worked out in the coming months.**

motion against ReconRobotics, or any party engaged in the evaluation of ReconRobotics's products, concerning the matters that were the subject of the Investigation" or "take any action on its own motion against ReconRobotics with respect to ReconRobotics's basic qualifications, including its character qualifications, to be a Commission licensee or to hold Commission licenses or authorizations."

**The Recon Scout — manufactured and marketed by ReconRobotics — is a remote-controlled, maneuverable surveillance robot designed for use in areas that may be too hazardous for human entry. In 2010, ReconRobotics was granted a waiver by the FCC for the device to operate between 430-448 MHz, a portion of spectrum available to the Amateur Radio Service on a secondary basis.**

In addition to the $17,500 payment, per the *Consent Decree*, ReconRobotics agreed to create and maintain a Compliance Plan by August 12. This Compliance Plan establishes how ReconRobotics will comply with the Communications Act and the FCC rules and orders concerning the manufacturing, marketing, distribution and selling of radio frequency devices. As part of the Compliance Plan, ReconRobotics must implement a training program for all employees and will designate a Compliance Officer who will be responsible for ensuring that the Compliance Plan is administered properly. ReconRobotics will also file periodic compliance reports with the Commission.

"The ARRL is pleased that the Commission has now addressed these clear and repeated violations over time of the FCC's equipment authorization rules and the Communications Act by ReconRobotics," said ARRL Regulatory Information Manager Dan Henderson, N1ND.

## MEET THE ARRL SECOND CENTURY CAMPAIGN COMMITTEE

In April, David W. Brandenburg, K5RQ, of Osprey, Florida, agreed to chair the ARRL Second Century Campaign. This multi-million dollar campaign will focus on building the ARRL Endowment to further secure resources to fund the League's commitment to the future. One important focus of the campaign includes the development of a robust national program geared toward young people, enabling them to experience and develop skills in scientific and technological discovery through Amateur Radio.

Introduced at the Annual ARRL Donor Reception — held in Dayton just prior to the Dayton Hamvention — Brandenburg shared the vision of the campaign to the more than 150 guests. He told of the impact that Amateur Radio has had on his personal and professional life and why he decided to accept the leadership of the Second Century Campaign. Brandenburg then introduced the members of the Second Century Campaign Committee: Mike Valentine, W8MM, of Cincinnati, Ohio; Bob Allphin, K4UEE, of Marietta, Georgia; Frank Donovan, W3LPL, of Glenwood, Maryland; Ken Byers, K4TEA, of Atlanta, Georgia, and L. Dennis Shapiro, W1UF, of Chestnut Hill, Massachusetts. During Hamvention, Glenn Johnson, WØGJ, of Bemidji, Minnesota, also joined the committee. ARRL President Kay Craigie, N3KN, and Vice President Rick Roderick, K5UR, are also on the Second Century Campaign Committee, as are ARRL Chief Executive Officer David Sumner, K1ZZ, Chief Financial Officer Barry Shelley, N1VXY, and Chief Development Officer Mary Hobart, K1MMH. All members of the committee serve in a volunteer capacity.

Attendees at the reception noted that Brandenburg's remarks mirrored their own experiences, giving them pause to think about how much Amateur Radio has meant to them and how they can join him in supporting the ARRL's future. The first working committee meeting was scheduled to be held August 11 at ARRL Headquarters.

The Second Century Campaign is planned to last through ARRL's centennial year in 2014. More information on this important initiative will be announced soon. For more about this exciting endeavor, see **www.arrl.org/attachments/view/News/59167**.

# FCC News

♦**FCC Issues Citation to Canadian Company for Marketing Unauthorized Devices in US**: On July 6, the FCC issued a *Citation* to New Generation Hobbies of Woodbridge, Ontario, Canada, for marketing unauthorized radio frequency devices in the United States that operate on restricted frequencies. This is in violation of Section 302(b) of the Communications Act and Sections 2.803 and 15.205(a) of the FCC's rules. In the *Citation*, the FCC advised New Generation Hobbies to "take immediate steps to come into compliance and to avoid any recurrence of this misconduct." The FCC acted in response to a complaint alleging that New Generation was marketing certain video transmitters that operate on restricted frequencies in the 2.4 GHz band. In September 2009, the FCC sent a *Letter of Inquiry* to New Generation. At that time, the FCC Spectrum Enforcement Division observed that New Generation was marketing two 2.4 GHz transmitters on its website: the LawMate 500 mW 2.4 GHz transmitter and the LawMate 1 W 2.4 GHz transmitter. The Amateur Radio Service is allocated portions of the 2.4 GHz band on a primary basis. For more on this matter, please see **www.arrl.org/news/fcc-issues-em-citation-em-to-canadian-company-for-marketing-unauthorized-devices-in-us**.

# In Brief

- **NASA Astronauts Get Their Tickets**: In June, several NASA astronauts sat for their Technician license exam, following a class taught by Nick Lance, KC5KBO, at Johnson Space Center in Houston. Four astronauts — Michael Hopkins, KF5LJG, Takuya Onishi, KF5LKS, Gregory Wiseman, KF5LKT, and Jeremy Hansen, KF5LKU — are now licensed amateurs. Hopkins is scheduled to head to the International Space Station in 2013 as part of Expedition 37. Additionally, Astronaut Kjell Lindgren, KO5MOS, upgraded from Technician to General. "The ARISS Team is thrilled to see such great interest by our astronauts who are looking forward to supporting Amateur Radio educational activities through the ARISS platform," said ARRL ARISS Program Manager Rosalie White, K1STO. "Kudos to the ARISS Houston contingent who continues to help increase the number of astronauts who are Amateur Radio operators!"
- **Space Weather Prediction Center to Continue Broadcasts on WWV and WWVH**: In April 2011, the Space Weather Prediction Center (SWPC) informed the public that as of September 6, 2011, it would no longer broadcast its geophysical alert message on WWV and WWVH. But in June, the SWPC announced on its website that it will continue to broadcast these messages. The geophysical alert messages on WWV and WWVH inform listeners of current and predicted space weather storms, solar flux, and the mid-latitude A and K indices.

# The Haiti Project — A Post-Catastrophe Personal Radio System

*Peyton Barnes, MD, KE5ZDZ*
**skaevola@hotmail.com**

At 2153 GMT on January 12, 2010, 10 miles from Port-au-Prince, Haiti, and 6.2 miles beneath the earth's surface, great plates of earth's crust suddenly lurched past each other. In Port-au-Prince the earth quaked for over a minute, and people fled their homes for the safety of open ground, carrying what they could and not knowing when they could return.[1]

In the aftermath, Father John Henault was able to make ham radio calls from Haiti on 14.300 MHz for two days. After that, he was out of power and off the air. In the first 24 hours after the quake, only two other hams made contact from within Haiti.[2]

## A Better Personal System

Could a ham radio system be designed for the post-catastrophe environment, transportable with one hand, and yet able to contact the outside world 1000 miles away, to function "when all else fails…"[3] and for as long as necessary? The purpose of this project is to create such a system. In what follows, I offer my choices for: radio, bands, antenna, battery, power source and storage case.

I explain my reasons for each selection, and report on tests of the system's performance. Costs and construction details are furnished as appendices. Hams with more knowledge and experience will no doubt make better, more sophisticated choices, and I hope that they will share them with us.

[1]Esa, Haiti Earthquake Planning 2010, **earth.eas.int/ew/planning/pl_haiti_earthquake_planning_jan10.htm**. p 1-10.
[2]A. Pitts, W1AGP, "Amateur Radio and the Haitian Earthquake, *QST*, Apr 2010, pp 72-73.
[3]ARRL, Ham radio motto, "When all else fails, ham radio."

## Radio

There are single-band HF radios and CW-only radios that are very inexpensive, small and light. But initially I had no idea whether there was a best band or mode to use. The requirement for self-contained power implies a battery and thus the need to use low power (QRP) to increase operating time. The many large ham antennas in the United States that were aimed at Haiti after the 2010 earthquake and that presumably would be aimed at any future disaster area might make QRP a feasible option.

***"In a Catastrophe, everything is broken." — General Russel Honoré."[4]***

I decided on a full-featured QRP transceiver covering all HF bands and also including AM band reception (to receive local emergency bulletins). I wanted both CW (Morse code) and SSB (voice) capabilities, since I did not know which would be best. And I wanted a radio with a reduced learning curve. So as an ICOM user, I chose an ICOM 703 Plus, a model designed for QRP and highly recommended for its features and quality.

## Bands and Frequencies

Each band has its advantages. Lower frequencies offer better refraction in the ionosphere, but they also require a longer and higher antenna and often need more power since signal absorption increases as the square of the decrease in frequency.[5] On the other hand, as the frequency increases, the ionospheric refraction effect also decreases, limiting transmitting distance to line of sight. So where between these extremes would be the right balance?

The first clue was that Father John's successful call was on 20 meters.[6]

DX contesting data provided the second clue. While these contests often allow all ham bands, over half of contacts are usually on either 20 meters or 40 meters.[7] The ARRL (American Radio Relay League) Propagation tables provided a third clue, showing that for Kingston, Jamaica, (the nearest tabulated site to Haiti) 20 meters and 40 meters provide good access to the United States and to South America over most of the day and night.[8] Also, the ARRL sets aside emergency frequencies on both of these bands.[9] Based on these considerations, I focused on 20 meters and 40 meters.

## Antenna

The antenna has to fit within the system's case, ruling out even collapsible masts. A horizontal dipole strung between two trees seemed the easiest to erect. However, a horizontal dipole is directional, having nulls off each end. A dipole can also be erected vertically, providing a lower elevation angle and omnidirectional horizontal radiation, but that requires a higher suspension point or else a system of ground radials.

I first tried a G5RV Jr. antenna because it offered a range of bands from 10 meters to 40 meters, but its balun and ladder line added a lot of bulk and a concern about decreased

[4]R. Honoré, General US Army, *Survival,* Simon and Schuster, 2009.
[5]J. Hallas, W1ZR, "Receiver Sensitivity — Can You Have Too Much?" *QST*, Jun 2010, p 43.
[6]See Note 2.
[7]Quick Stats, *QST*, Oct 2010.
[8]D. Straw, N6BV, "Propagation Tables for Kingston, Jamaica, Sep 2010," ARRL.
[9]F. Kalt, W2XN, personal communication.


**Figure 1 — Endfed Z antenna, coax and ropes**

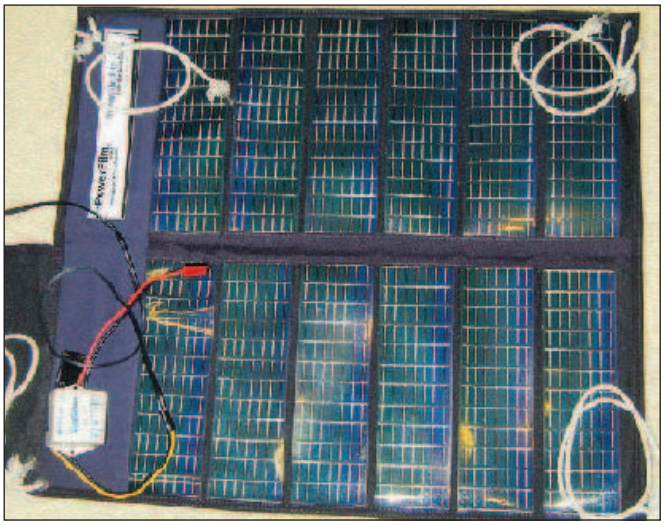


**Figure 3 — Solar panel and charge controller deployed.**

efficiency. I also experimented with a zip cord dipole mounted on the ceiling of my garage office.

Finally I chose an Endfed Z 40/20/10 meter antenna, its length tuned for 20 meters and 40 meters, and designed for QRP work. The Endfed Z dipole (for Zeppelin) antenna was originally designed to be used hanging down vertically from a dirigible in flight, giving a really high suspension point! Physically, it is a thin, 39 foot long, straight wire, divided into a long section (for 20 meters) and a short section on the other side of a small coil (for 40 meters). At the other end of the long section is a small box with a place to attach coax. I used a 30 foot long RG-8 coax, since field tests showed that I could consistently get an antenna up 20 feet. No balun, ladderline or antenna tuner was needed, making it possibly more efficient and more compact. Experimental data will be presented later, under "Trials of the System."

My antenna installation system consisted of four 100-foot-long, ¼-inch diameter nylon ropes, two with pulleys on one end (see Figure 1). A roll of lightweight string and a 2 ounce fishing net weight serve to lob a line over tree limbs. One configuration of the deployed antenna system is shown in Figure 2.

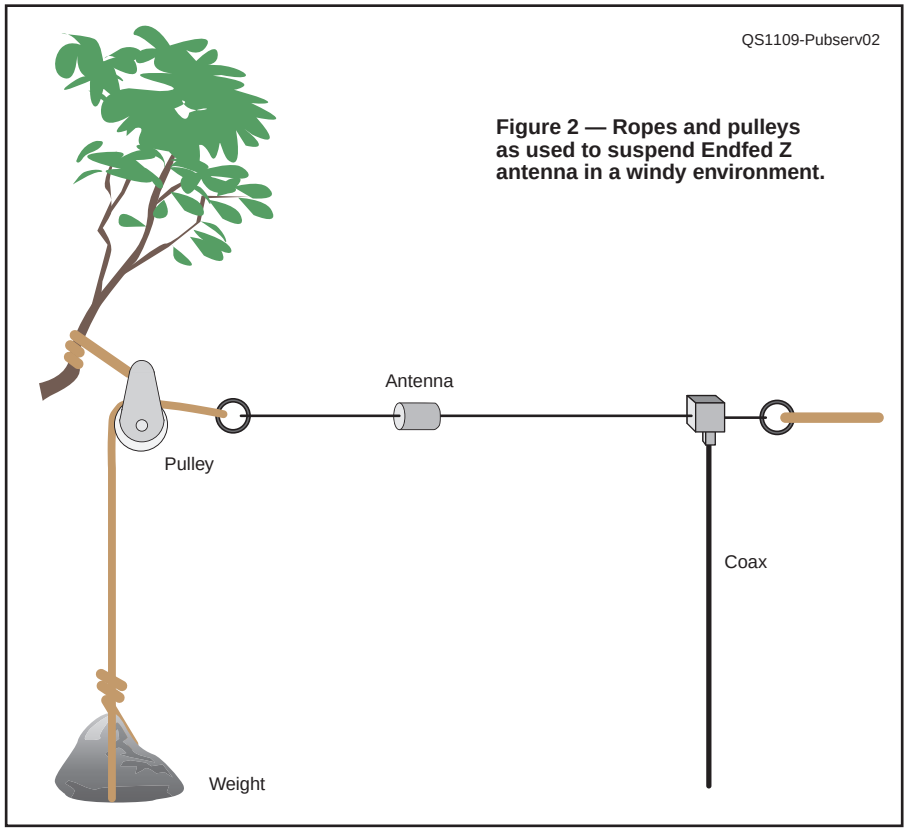



**Figure 2 — Ropes and pulleys as used to suspend Endfed Z antenna in a windy environment.**

## Power Storage

A battery allows operation at any hour. I chose a 7.5 amp-hour, 12 volt sealed gel battery. Used in home burglar alarm systems, it is very rugged, temperature-tolerant and operates in any position. It provides roughly 80 Wh of power, allowing for approximately two hours of operation at 10 W (assuming 80% listening, 20% transmitting time).

## Power Source

A rigid solar panel will recharge a battery but is bulky and heavy. I found a collapsible 10 W solar panel that folds up into a flat packet of 10 × 4 inches (see Figure 3). Ten hours of sun furnish approximately 80 Wh and a 50 W charge controller prevents overcharging.

## Accessories

- Microphone.
- Straight key — simple, rugged.
- Ear buds — serve as earphones but take up less space.
- LED light attached by Velcro to the inside of the case.
- Atomic clock with rechargeable AAA batteries— provides day, date and time.
- Battery charger, 12 V — to recharge clock batteries.
- Cell phone charger — Even in major disasters, cell phones have been known to work.

## Case

The case has to be tough, waterproof, have a strong carrying handle, and serve as the ham shack in an outdoor environment.

**Figure 4 — Interior view of radio system case.**

**Table 1**
**Selected SSB Trials at Various Power Settings**
See Appendix 1 at **www.arrl.org/public-service-field-services-forms** for full list

| Transmitting Power* | Origin | Contact Site | Range |
|---|---|---|---|
| 10 W | Houston | Maui, Hawaii | 3900 miles |
| 5 W | Houston | Michigan | 1000 miles |
| | | California* | 1375 miles** |
| 2.5 W | Houston | Tennessee | 650 miles |
| | | Phoenix AZ | 1061 miles |
| 1.0 W | Houston | Br West Indies | 1604 miles |
| 0.5 W | Houston | Tucson, AZ | 961 miles |

*As per the MAXPOWSET setting of the radio with HF POWER = H(igh)
**Marginal contact

Emcomm boxes, Pelican cases and Igloo coolers were all considered. EmComm boxes are heavy, often not waterproof, and/or not a convenient shape. Pelican cases are very strong and waterproof but are expensive. Igloo coolers are light, strong, waterproof, and have a good carrying handle.

I chose an Igloo Island Breeze 18 quart cooler. Its lid can serve as a small desktop and molded grooves in the interior serve as shelf supports (see Figure 4). I did not make any penetrations of the outer shell, leaving it watertight and still usable as a cooler.

For construction details, see Appendix 3: Modifications of the Case and Other Details at **www.arrl.org/public-service-field-services-forms**.

## Wiring

All components are connected by a 4-way Anderson Powerpole. The solar cell panel with charge controller charges the battery, and the battery powers everything else.

## Range

Haiti sits in the middle of a large body of water, between the Atlantic Ocean and the Caribbean Sea, and about 1000 miles from the United States, Central America and South America. This distance became my minimum range requirement.

## Experimental Antennas and Sites

I trimmed the Endfed Z antenna segments to resonant length guided by the radio's SWR metering feature. Mike Davidson, N5MT, tested this antenna as well as my ceiling-mounted zip cord dipole with his antenna analyzer and we shortened the ceiling dipole to make it resonant for 20 meters. His measurements showed the Endfed Z to be resonant on 20 meters and 40 meters when strung out my garage office window and down the driveway to a tree at a height of 14 feet. This is lower than the recommended minimum height for either 20 meters or 40 meters, but is a height attainable with my simple installation equipment. The antenna ran from my garage in a north-south direction between my house and that of my neighbor to the west, thereby hemmed in on three sides by buildings. Thus it was a compromised installation.

## Trials of the System

I had read of powerful transmitters with linear amplifiers feeding huge rotatable arrays on tall masts. Would a mere 10 W and a low slung dipole even be heard on the next block? I banked on there being large antennas on tall masts manned by dedicated hams able to hear my small signal. A series of trials at various transmission power levels were carried out. Once a contact was achieved at 1000 miles, the power was turned down to the next level. A summary of these trials is given in Table 1.

## Discussion

These results support the hypothesis that a low-power self-sustaining radio system using a suboptimal antenna installation could communicate from Haiti to the countries surrounding the Gulf of Mexico and the Caribbean Sea.

In particular:

- A range of at least 1000 miles was achieved at the 10 W, 5 W, 2.5 W and 1 W power levels using SSB alone. This suggests that a smaller, lighter radio and battery might suffice, and that CW might not be required for this application. Fred Kalt, W2XN, reviewed this article and suggested that using CW tends to increase battery life and that it might be needed during unfavorable band conditions. In support of his point, on some days I could not hear or reach anyone, even at 10 W. On other days, with more favorable band conditions, the bands were crowded with overlapping transmissions and I was able to make multiple long-distance contacts.
- Successful contacts had a roughly east-west orientation from Houston, consistent with a north-south oriented horizontal dipole that has nulls off each end (north and south). A Haitian might seek out a site allowing an east-west antenna orientation to contact the United States or South America.
- A simple antenna, installed at low height and in a compromised location, achieved the 1000 mile objective.
- Mike Davidson, N5MT, reviewed this article and pointed out that having a separate antenna tuner would increase the flexibility of the system, allowing the use of its antenna in conjunction with other radios.

My thanks to Mike Davidson, N5MT, Fred Kalt, W2XN, and Gene May, WB8WKU, for reviewing this article. Their suggestions and improvements are much appreciated.

This paper is dedicated to all those hams whose large tall antennas, high quality radios and personal dedication make it possible for even a small ham voice to be heard "When all else fails" and "everything is broken."

*Photos by Peyton Barnes, KE5ZDZ*

### Trial Data, Costs and the Case

The author has prepared three Appendixes: *Antenna Trial Data, Costs* and *Modifications of the Case*. They can be found on the ARRL website at **www.arrl.org/public-service-field-services-forms**.

# CONTEST CORRAL

in association with the *National Contest Journal*

# SEPTEMBER 2011

| Start and Finish | HF | VHF+ | Contest Title | Phone | CW | Digital | Exchange | Sponsor's Website or Contact |
|---|---|---|---|---|---|---|---|---|
| Sep 2, 0200Z - Sep 2, 0300Z | 1.8-14 | | SNS and NS Weekly Sprints | | ✘ | | Serial, name and S/P/C | **www.ncccsprint.com/rules.html** |
| Sep 3, 0000Z - Sep 4, 2400Z | 3.5-28 | | All-Asian DX Contest | ✘ | | | RS and age ("00" for YL) | **www.jarl.or.jp/English** |
| Sep 3, 0000Z - Sep 3, 2400Z | 3.5-28 | | Russian Radio RTTY WW | | | ✘ | RST and oblast or WAZ zone | **www.radio.ru/cq/contest/rule-results/index2.shtml** |
| Sep 3, 1100Z - Sep 3, 1700Z | 28 | | DARC 10-Meter Digital "Corona" | | | ✘ | RST and serial | **www.darc.de/referate/ukw-funksport** |
| Sep 3, 1200Z - Sep 4, 0400Z | 1.8-28 | 50+ | Colorado QSO Party | ✘ | ✘ | ✘ | Call sign, name and county or S/P/C | **www.ppraa.org/coqp** |
| Sep 3, 1300Z - Sep 4, 1300Z | 1.8-28 | | IARU Region I Field Day | ✘ | | | RS and serial | See IARU Society Web pages |
| Sep 3, 1300Z - Sep 3, 1600Z | 7 | | AGCW Straight Key Party | | ✘ | | RST, serial, category, name, age | **www.agcw.org** |
| Sep 3, 1800Z - Sep 4, 1800Z | 1.8-28 | 50+ | QCWA Fall QSO Party | ✘ | ✘ | ✘ | Call sign, year lic'd, name, chptr or S/P/C | **www.qcwa.org/qso-party.htm** |
| Sep 4, 1800Z - Sep 5, 0300Z | 1.8-28 | 50+ | Tennessee QSO Party | ✘ | ✘ | ✘ | RS(T) and county or S/P/C | **www.tnqp.org** |
| Sep 5, 2300Z - Sep 6, 0300Z | 1.8-28 | 50 | Labor Day Sprint | | ✘ | | RST, S/P/C, MI QRP nr or power | **miqrp.org** |
| Sep 6, 0200Z - Sep 6, 0400Z | 3.5-28 | | ARS Spartan Sprint | | ✘ | | RST, S/P/C and power | **www.arsqrp.blogspot.com** |
| Sep 9, 8 PM - Sep 10, 2 AM | 3.5 | | 070 Club KA3X Memorial Sprint | | | ✘ | Call sign, RST and S/P/C | **www.podxs070.com** |
| Sep 10, 0000Z - Sep 11, 2400Z | 3.5-28 | | Worked All Europe DX Contest | ✘ | | | RS and serial | **waedc.de** |
| Sep 10, 1500Z - Sep 11, 0300Z | 3.5-28 | 144 | Arkansas QSO Party | ✘ | ✘ | ✘ | RS(T), county or S/P or "DX" | **www.arkanhams.org** |
| Sep 10, 1600Z - Sep 10, 2400Z | 3.5-28 | 50,144 | Ohio State Parks On the Air | ✘ | ✘ | ✘ | "Ohio" or S/P/DX and Park ID | **parks.portcars.org** |
| **Sep 10, 1800Z - Sep 12, 0259Z** | | **50+** | **ARRL September VHF QSO Party** | ✘ | ✘ | ✘ | **Grid square** | **www.arrl.org/contests** |
| Sep 10, 1800Z - Sep 12, 0259Z | | 50+ | QRP ARCI VHF Contest | ✘ | ✘ | ✘ | Grid square | **www.qrparci.org** |
| **Sep 11, 0000Z - Sep 11, 0400Z** | **3.5-14** | | **North American Sprint** | | ✘ | | **Call signs, serial, name and state** | **www.ncjweb.com** |
| Sep 11, 0000Z - Sep 11, 2359Z | 1.8-28 | 50 | SKCC Straight Key Weekend Sprint | | ✘ | | RST, QTH, name, member number | **www.skccgroup.com/sprint/wes** |
| Sep 11, 1300Z - Sep 12, 0700Z | 1.8-28 | 50,144 | Classic Exchange | | ✘ | | Name, RS, S/P/C, type of equipment | **www.classicexchange.org** |
| Sep 14, 1300Z - See website | 3.5-14 | | CWops Monthly Mini-CWT Test | | ✘ | | Name and member number or S/P/C | **www.cwops.org/onair.html** |
| **Sep 17, 6 AM - Sep 18, 12 Mid** | | **10G+** | **ARRL 10 GHz and Up Contest** | ✘ | ✘ | ✘ | **6-character grid locator** | **www.arrl.org/contests** |
| Sep 17, 0000Z - Sep 17, 2359Z | 3.5-28 | | Connecticut QSO Party | ✘ | ✘ | ✘ | RS(T) and CT county or S/P/C | **www.ctqp.org/2011.html** |
| Sep 17, 1200Z - Sep 18, 1200Z | 1.8-28 | | CIS DX PSK Contest | | | ✘ | RST and DXDA code | **www.eupsk.com** |
| Sep 17, 1200Z - Sep 18, 1200Z | 3.5-28 | | Scandinavian Activity Contest | | ✘ | | RST and serial | **www.sactest.net** |
| Sep 17, 1300Z - Sep 18, 2100Z | 3.5-28 | 50+ | South Carolina QSO Party | ✘ | ✘ | ✘ | RS(T) and county or S/P/C | **w4cae.org/scqp/scqsoweb.html** |
| Sep 17, 1600Z - Sep 17, 1800Z | 1.8-28 | | Feld-Hell Hell on Wheels Sprint | | | ✘ | RST, S/P/C, Feld-Hell member nr | **www.feldhellclub.org** |
| Sep 17, 1600Z - Sep 18, 2400Z | 1.8-28 | 50 | Washington State Salmon Run | ✘ | ✘ | ✘ | RS(T) and county or S/P/C | **www.wwdxc.org** |
| **Sep 18, 0000Z - Sep 18, 0400Z** | **3.5-14** | | **North American Sprint** | ✘ | | | **Call signs, serial, name and state** | **www.ncjweb.com** |
| Sep 18, 1300Z - Sep 19, 0700Z | 1.8-28 | 50,144 | Classic Exchange | ✘ | | | Name, RS, S/P/C, type of equipment | **www.classicexchange.org** |
| Sep 18, 1700Z - Sep 18, 2100Z | 3.5-28 | | BARTG Sprint 75 | | | ✘ | Serial | **www.bartg.org.uk** |
| Sep 19, 7 PM - Sep 19, 11 PM | | 144 | Fall VHF Sprint | ✘ | ✘ | ✘ | 4-character grid square | **www.svhfs.org** |
| Sep 19, 0100Z - Sep 19, 0300Z | 1.8-28 | | Run For the Bacon | | ✘ | | RST, S/P/C, Flying Pig nr or power | **www.fpqrp.org/pigrun** |
| Sep 22, 0030Z - Sep 22, 0230Z | 3.5-14 | | NAQCC Monthly QRP Sprint | | ✘ | | RST, S/P/C and NAQCC mbr nr or power | **naqcc.info** |
| **Sep 24, 0000Z - Sep 25, 2400Z** | | **2.3G+** | **ARRL EME Contest** | ✘ | ✘ | ✘ | **Call signs, sig rpt, acknowledgment** | **www.arrl.org/contests** |
| Sep 24, 0000Z - Sep 25, 2400Z | 3.5-28 | | CQ WW RTTY Contest | | | ✘ | RST, CQ zone and State/VE area (US/VE) | **www.cqwwrtty.com** |
| Sep 24, 1400Z - See website | 1.8-28 | 50,144 | Texas QSO Party | ✘ | ✘ | ✘ | RS(T), county or S/P/C | **www.txqp.net** |
| Sep 27, 7 PM - Sep 27, 11 PM | | 222 | Fall VHF Sprint | ✘ | ✘ | ✘ | 4-character grid square | **www.svhfs.org** |
| Sep 27, 0000Z - Sep 27, 0400Z | 3.5-28 | | Fall QRP Homebrewer Sprint | | ✘ | | RST, S/P/C and power | **www.njqrp.org** |

**All dates refer to UTC and may be different from calendar date in North America. Times given as AM or PM are local times and dates.**

**Refer to the contest websites for full rules, scoring information, operating periods or time limits and log submission information.**

**No contest activity occurs on 60, 30, 17, 12 meters. Serial = Sequential number of the contact. S/P/C = State, Province, DXCC Entity. XE = Mexican state.**

**Publication deadline for Contest Corral listings is the first day of the second month prior to publication.**

**Check for updates and a downloadable PDF version online at www.arrl.org/contests**

# 2011 ARRL DX Phone - —-

## "Now THAT'S what I'm talking about!" — *N1UR*

**Ward Silver, NØAX**
n0ax@arrl.net

During February's ARRL DX CW contest on February 19, my band partner Doug, K1DG and I were sitting at the 15 meter position of the K3LR multi-multi station waiting for the band to pop open... and waiting…and waiting. It felt so close! Recent rumblings on the solar surface gave every indication that there would be a dramatic increase in activity…but when? The answer to my grumbles was not long in coming. On March 1, the solar flux suddenly jumped from 98 to 111 and kept rising right through the ARRL DX Phone contest on March 5 and 6, all the way to 155 — a level not seen since January 2005 and comparable to the contest weekend in 2003! Furthermore, the A index was only 5 and the average K index just over 1 making for a stable ionosphere and sustained DX openings with an average sunspot number of 116. Welcome back, ol' Sol!

How did that play out on the bands? With word spreading rapidly the week before the contest, schedules were rearranged to operate in the contest and submitted log totals set another all-time mark at 3343 — 1812 logs were from W/VE stations and 1531 DX logs. This is a solid 5% increase from last year which was also a record. Club log submissions jumped by 10% as well, to a total of 76 with the increase in the Medium and Local categories — the heart and soul of the ARRL-Affiliated Club Competition.

The wide-open bands kept more butts in more chairs with the result being a 24% increase in QSOs reported by W and VE stations (a total of 676,546). DX logs contained 812,262 QSOs, a 17% increase. (Those missing 135,716 QSOs are in un-submitted logs — it's never been easier to submit a log so why not give it a try next year if you're a non-submitter?)

Clearly, there were a lot more stations on the air. Three DX stations reported single-band QSO totals over 3000 QSOs: HK1K had 3022 QSOs on 20 meters and PJ4G reported 3459 on 15 meters and 3345 on 10 meters. From the W-VE end, the team at K3LR logged 2480 DX stations on 20 meters and 2684 on 15 meters — the first year in quite a while that Tim's 15 meter team surpassed 20 meter totals! Tim's minions also found another four DXCC entities on the airwaves this year, pushing the single-band bar to 149.

The changing solar tides are reflected in the year-to-year changes in single-band log submissions shown in Figure 1. There were more single-band logs than ever (247) and the big increase this year was — no surprise — 10 meter logs which went from 13 in 2010 to 60 in 2011. Stations that may have stayed on 20 meters for the past few years are now venturing up to 15 and 10 meters. For those of you chasing your DXCC Challenge band-entities, the trends are good if you need higher totals on the higher bands!

*"Big News: 15 Meters Crosses the Rockies!"*
*— VE7XF*

The big headline may have been 10 meters this year but the real news was on 15 meters as we learned last year. Even a middling opening on 15 changes the complexion of the contest dramatically. As operators at smaller stations know well (or quickly learn), it is a lot easier to make DX contacts on 15 and 10 meters because a multiband antenna can be more effective as wavelength falls (and electrical height rises).

With such good 15 meter conditions this year, operators were encouraged to participate for longer periods and that benefited all bands. The wide-open spaces (comparatively) of 15 meters — an extra 100 kHz of General

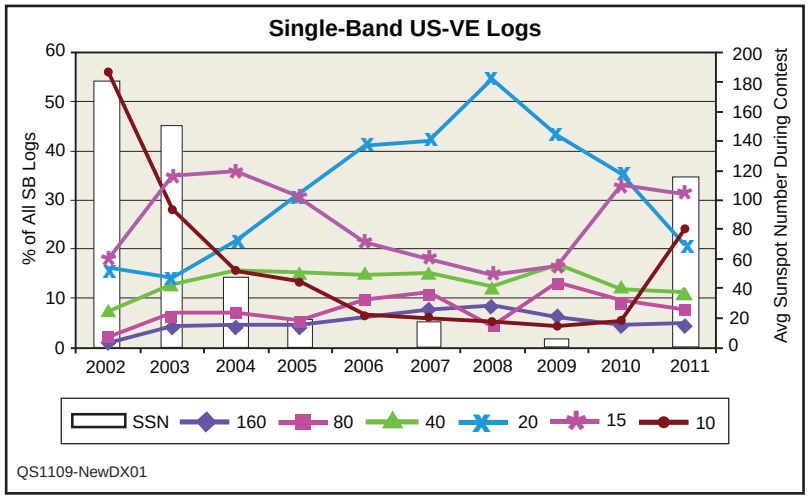



**Figure 1 — Single-Band entries from W-VE stations from 2002 through 2011 illustrate the link between sunspots and high-band activity.**

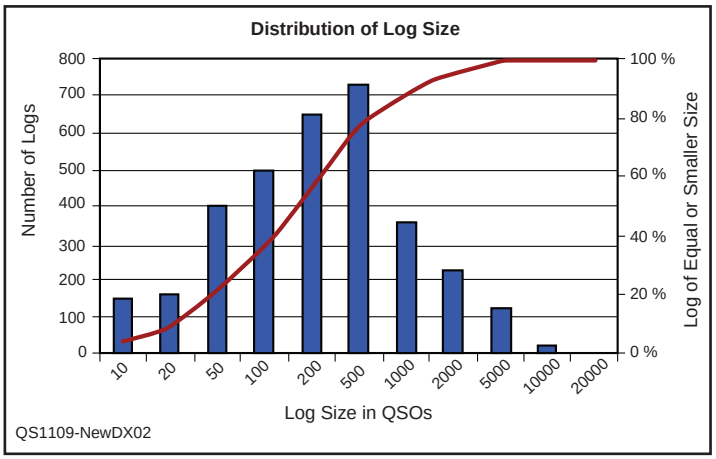



**Figure 2 — The distribution of log sizes clearly shows the importance of smaller logs. 56% of all logs have 200 or fewer QSOs, making up the majority of contest QSOs.**

## New Records for 2011

**W-VE Records**

| Category | Call | Call District | New Record | Old Record | Year Set |
|---|---|---|---|---|---|
| SOHP | WØUA | Ø | 3,051,360 | 2,721,510 | 1991 |
| SOLP | N1UR | 1 | 2,665,065 | 1,717,380 | 2009 |
| SOQRP | VA3DF | VE | 556,842 | 294,120 | 2010 |
| SOAHP | W2RE | 2 | 5,128,875 | 4,846,485 | 2002 |
| SO40 | W6YI | 6 | 238,140 | 207,648 | 2010 |
| SO40 | N7DD | 7 | 245,784 | 210,936 | 1998 |
| M2 | WE3C | 3 | 10,543,338 | 9,557,757 | 2000 |
| **MSHP** | **K1LZ** | **1** | **6,780,420** | **6,730,380** | **2000** |
| MSHP | NK7U | 7 | 2,878,722 | 2,537,115 | 1981 |

**DX**

| Category | Continent | Call | New Record | Old Record | Year Set |
|---|---|---|---|---|---|
| SOLP | EU | IR1Y | 1,635,375 | 1,579356 | 1992 |
| **SOQRP** | **SA** | **P4ØA (KK9A, op)** | **3,073,275** | **1,584,360** | **2004** |
| SO15 | EU | CR2A (OH8NC, op) | 604.083 | 495,432 | 1982 |
| SO15 | OC | KH7Y | 501,120 | 433,608 | 1988 |
| SO20 | AF | EF8R (EA8CAC, op) | 463,512 | 298,758 | 1999 |
| SO40 | NA | ZF2AH | 458,607 | 431,100 | 2010 |
| **SO40** | **SA** | **HK1T** | **495,954** | **364,008** | **1986** |
| SO160 | EU | CR2X (OH2BH, op) | 76,797 | 62,034 | 2009 |

***Bold** indicates an all-time record for the category*

## Active Winning Streaks

**W-VE**

| Call (@QTH) | Number | Category |
|---|---|---|
| WE3C | 4 | M2 |
| N1UR | 3 | SOLP |
| W5PR | 3 | SO10 |
| W2MF | 3 | SO160 |
| W2RE | 3 | SOAHP |
| K1LZ | 3 | MSHP |

**DX**

| Call (@QTH) | Number | Category |
|---|---|---|
| W2SC (@8P5A) | 2 | SOHP |

phone band compared to 20 meters — made operating a *lot* more fun for the Little Pistol and casual operator just looking to put a few contacts in the log and hand out some points. I certainly hope the ARRL QSL Bureau staff has their calendars clear for some overtime!

Just how important are the logs from Little Pistols and part-time or casual operators? They are *very* important as Figure 2 shows. Nearly 56% of all logs received — W/VE and DX — contain 200 or fewer QSOs! Every QSO is important and we would like to have YOUR contacts in the database next year.

### Extended Results

Look to the online extended version of these results (**www.arrl.org/contests**) for more commentary and the following features:

- Accuracy rankings and charts
- A PDF file of Top Ten call signs since 2002
- Changes in QSOs and multipliers as a percentage of the 2002 totals
- DX entries tracked by category from year to year

You'll also find a Regional Analysis write-up for your Division or Continent written by a volunteer author from the area. There's also a close look at the results from the Caribbean's annual festival of DXing frenzy.

The complete Soapbox comments of all stations from the popular 3830 score posting website and from submitted logs are included, as well. It is fun to browse through all the entries as each comment builds up a Seurat-like image of the contest, point by point.

### Records

*"Best. Score. Ever." W2IRT (SOAHP)*

Talk about going out with a bang. John, KK9A has been filling contest logs as P4ØA as an SOLP entry. In 2010 he had a string of six straight wins — the second-longest since 2002. All good things must come to an end and John has closed down his "Iguana Village" Aruba QTH. He decided to make one last go of it as a SOQRP entry. And what a go! John smashed the old 1993 all-time SOQRP record with a monster score of 3.073 Mpoints — a leap of around 50%. John,

## Category Abbreviations

Contest results are easier to read if you know the abbreviations for the different categories. You'll find the complete description for all of these in the contest rules:

- SO: Single Operator
- HP/LP/QRP: High Power, Low Power, QRP
- AB: All Band
- SB: Single Band
- A or U: Assisted or Unlimited (see note below)
- MO: Multioperator
- MS: Multioperator, Single-Transmitter
- M2: Multioperator, Two-Transmitter
- MM: Multioperator, Multiple Transmitters

These abbreviations are usually combined, such as SOAB-LP for a Single Operator, Low Power entry. (Usually the "AB" is omitted and you can assume that SO-LP is the same.) A band number will be added to a Single Operator, Single Band entry, such as SO-10 or SOSB-15.

A or U indicates that the operator made use of information from the call sign spotting networks — it doesn't refer to "assistance," meaning physical help with operating, for example.

## Affiliated Club Competition

| | Score | Entries |
|---|---|---|
| **Unlimited Category** | | |
| Frankford Radio Club | 222,644,199 | 157 |
| Yankee Clipper Contest Club | 220,000,884 | 184 |
| Potomac Valley Radio Club | 148,744,419 | 167 |
| Northern California Contest Club | 47,472,297 | 105 |
| Contest Club Ontario | 47,102,589 | 85 |
| Society of Midwest Contesters | 42,565,110 | 98 |
| Minnesota Wireless Assn | 41,706,240 | 102 |
| Florida Contest Group | 39,551,604 | 109 |
| Arizona Outlaws Contest Club | 27,078,405 | 76 |
| Tennessee Contest Group | 17,700,834 | 58 |
| **Medium Category** | | |
| North Coast Contesters | 55,761,960 | 20 |
| South East Contest Club | 41,091,723 | 36 |
| Central Texas DX and Contest Club | 29,904,333 | 24 |
| Hudson Valley Contesters and DXers | 26,781,951 | 42 |
| Carolina DX Association | 26,587,443 | 47 |
| Mad River Radio Club | 22,610,499 | 29 |
| Rochester (NY) DX Assn | 21,284,007 | 19 |
| Alabama Contest Group | 21,086,385 | 40 |
| Southern California Contest Club | 20,769,429 | 48 |
| Willamette Valley DX Club | 13,620,084 | 41 |
| Maritime Contest Club | 13,548,855 | 16 |
| Mother Lode DX/Contest Club | 13,322,766 | 21 |
| Western Washington DX Club | 11,255,679 | 29 |
| Order of Boiled Owls of New York | 10,714,053 | 15 |
| CTRI Contest Group | 10,326,021 | 18 |
| Grand Mesa Contesters of Colorado | 10,103,217 | 30 |
| North Texas Contest Club | 8,770,320 | 21 |
| Louisiana Contest Club | 7,705,062 | 10 |
| Contest Group Du Quebec | 6,959,382 | 14 |
| BC DX Club | 4,985,082 | 5 |
| ORCA DX And Contest Club | 4,689,927 | 20 |
| Utah DX Assn | 4,648,368 | 22 |
| Western New York DX Assn | 3,457,692 | 8 |
| Eastern Iowa DX Assn | 2,528,781 | 13 |
| Spokane DX Association | 2,299,668 | 19 |
| Kentucky Contest Group | 2,167,770 | 6 |
| Allegheny Valley Radio | 1,711,800 | 7 |
| Missouri DX and Contest Club | 1,157,106 | 4 |
| Central Arizona DX Assn | 943,650 | 3 |
| Texas DX Society | 845,952 | 8 |
| Saskatchewan Contest Club | 786,900 | 4 |
| West Park Radiops | 778,974 | 17 |
| Alberta Clippers | 672,552 | 3 |
| Northern Rockies DX Association | 308,445 | 5 |
| Mississippi Valley DX/Contest Club | 256,983 | 4 |
| Nacogdoches ARC | 190,251 | 3 |
| **Local Category** | | |
| Iowa DX and Contest Club | 8,411,946 | 4 |
| Southwest Ohio DX Assn | 5,447,451 | 7 |
| Central Virginia Contest Club | 4,439,466 | 7 |
| Blue Ridge ARC | 2,154,801 | 8 |
| Delaware-Lehigh ARC | 1,977,900 | 6 |
| Central Oregon DX Club | 1,780,032 | 3 |
| Hilltop Transmitting Assn | 1,679,754 | 6 |
| Delara Contest Team | 1,616,862 | 7 |
| Kansas City DX Club | 1,331,142 | 9 |
| Bergen ARA | 1,310,979 | 8 |
| Bristol (TN) ARC | 872,265 | 9 |
| Portage County Amateur Radio | 593,886 | 7 |
| Wireless Association of South Hills | 572,778 | 3 |
| Meriden ARC | 548,004 | 7 |
| Metro DX Club | 530,250 | 8 |
| Fort Wayne Radio Club | 460,614 | 7 |
| Northern Arizona DX Assn | 459,918 | 4 |
| Albuquerque DX Assn | 408,231 | 4 |
| New Mexico Big River Contesters | 366,024 | 3 |
| Salt City DX Assn | 352,980 | 3 |
| South Jersey DX Assn | 310,530 | 6 |
| Skyview Radio Society | 256,965 | 8 |
| Southeastern DX Club | 240,543 | 3 |
| Southern California DX Club | 234,567 | 7 |
| South Texas DX and Contest Club | 137,430 | 5 |
| Saginaw Valley ARA | 122,568 | 5 |
| Utah Contest Club | 115,713 | 3 |
| Granite State ARA | 24,447 | 3 |
| Great South Bay ARC | 17,439 | 3 |
| Hays-Caldwell ARC | 3,294 | 3 |

we'll miss you on the bands!

The New Record for 2011 table contains another pair of all-time records set this year — the MSHP title is now held by the K1LZ team who inched by the 2000 record set from W3BGN. (I am assuming MS records from before this year were set using High Power.) The HK1T record on SO40 is also a new all-time record, eclipsing N6TJ's mark set at 9Y4AA in 1986.

Excluding the flood of new records from 2011's new LP categories, the mother lode of 2002 still remains the biggest year for records. That could change if we get a sustained period of solar flux in the 150-180 range and quiet ionospheric conditions!

The oldest record broken this year is the 7th district MS 1981 record now held by MSHP entry NK7U from Joe's Baker City, OR QTH. Several other old-timers are under new ownership as well: OH8NC operated CR2A to a new European SO15 record last set in 1982, the 1998 SO40 record is now held by N7DD, and IR1Y took the 1992 SOLP record for EU.

The oldest surviving record is still the KØRF MM record set from Colorado in 1979. At 4.03 Mpoints, it is the smallest of the US district MM records and should be reachable with the great new technology available to station builders. Nevertheless, that it has stood so long is a tribute to the KØRF station that set the record — and continues to set records such as the new SOHP 10th-district record set by WØUA at the station this year, another that had lasted twenty years.

What would a table of records be without some close calls, too? Some records may not have been broken but they were seriously challenged. These are shown in the online version of the article's Record table. Do you think you are record-breaking material? If so, have a look at the K5TR Contest database (**www.kkn.net/~k5tr/scoredb**) where more than 400,000 published scores have been entered by volunteers for you to pick out a target.

## New Categories

Two old categories, Single-Op, Assisted (SOA) and Multioperator, Single Transmitter (MS), each split into a pair of High Power and Low Power categories this year — certainly an opportunity to set a record! Seriously, the concern when creating Low Power categories is that the High Power leaders, sensing a new competitive opportunity, will enter and dominate the new category, squeezing out the stations the new category was intended to feature. I'm pleased to report that this was not case — not one of the Top Ten in the new Low Power categories can be found in last year's High Power Top Ten. That's not to say no High Power station "dialed it down" and entered as Low Power this year — you'll surely recognize the call signs of the category winners — but my point is that stations that usually operated with low power were indeed the ones competing for top honors in general. Let's meet the winners, shall we?

### Propagation Indices for ARRL DX Phone

| | Flux | | Planetary Ap | | Estimated K | |
|---|---|---|---|---|---|---|
| Year | Sat | Sun | Sat | Sun | Sat | Sun |
| 2002 | 191 | 183 | 5 | 10 | 1.6 | 2.5 |
| 2003 | 138 | 147 | 14.5 | 11 | 2.8 | 2.6 |
| 2004 | 105 | 106 | 5 | 6 | 1.8 | 1.8 |
| 2005 | 81 | 84 | 10 | 36 | 2.5 | 4.3 |
| 2006 | 75 | 74 | 2 | 1 | 0.9 | 0.5 |
| 2007 | 73 | 73 | 2 | 3 | 0.5 | 0.8 |
| 2008 | 69 | 69 | 19 | 8 | 3.3 | 2.0 |
| 2009 | 69 | 69 | 1 | 8 | 0.3 | 2.6 |
| 2010 | 78 | 77 | 3 | 4 | 0.8 | 1.0 |
| 2011 | 135 | 143 | 5 | 5 | 1.1 | 1.2 |

### Accuracy Leaders

#### W-VE

**Single-Op (Non-assisted)**

| Call | Category | QSOs | Error % | Index |
|---|---|---|---|---|
| VY2ZM (K6AAX, op) | SOHP | 3766 | 0.9 | 13.486 |
| VC3E (VE3AT, op) | SOHP | 3274 | 0.6 | 13.455 |
| KC1XX (WA1Z, op) | SOHP | 3228 | 0.7 | 13.439 |
| K5ZD (KM3T, op) | SOHP | 3501 | 1.1 | 13.434 |
| W9RE | SOHP | 2752 | 0.5 | 13.390 |
| *Single-Op (Assisted)* | | | | |
| W2RE | SOAHP | 3541 | 0.7 | 13.479 |
| AA3B | SOAHP | 2623 | 0.5 | 13.369 |
| K3WW | SOAHP | 3097 | 1.5 | 13.341 |
| N3RS | SOAHP | 2078 | 0.5 | 13.268 |
| K1KI (KM1P, op) | SOAHP | 2083 | 0.7 | 13.249 |
| *Multiop* | | | | |
| K3LR | MM | 7894 | 0.6 | 13.837 |
| W3LPL | MM | 6994 | 0.9 | 13.755 |
| WE3C | M2 | 5889 | 0.4 | 13.730 |
| K1TTT | MM | 4672 | 0.8 | 13.590 |
| K1LZ | MSHP | 4086 | 0.9 | 13.521 |

#### DX

| | | | | |
|---|---|---|---|---|
| *Single-Op (Non-assisted)* | | | | |
| 8P5A (W2SC, op) | SOHP | 9292 | 0.5 | 13.918 |
| P49Y (AE6Y, op) | SOHP | 7816 | 0.3 | 13.863 |
| PJ2T (K6AM, op) | SOHP | 8230 | 1 | 13.815 |
| KP2M (N2TK, op) | SOHP | 7004 | 0.4 | 13.805 |
| TO7A (UT5UGR, op) | SOHP | 9100 | 1.7 | 13.789 |
| *Single-Op (Assisted)* | | | | |
| ZX2B (PY2MNL, op) | SOAHP | 3857 | 0.4 | 13.546 |
| LU4DX | SOAHP | 3707 | 0.6 | 13.509 |
| EC2DX | SOAHP | 3195 | 0.7 | 13.434 |
| PY1NX | SOALP | 2934 | 0.6 | 13.407 |
| GW9T (MWØZZK, op) | SOAHP | 3296 | 1.2 | 13.398 |
| *Multiop* | | | | |
| PJ4G | M2 | 12197 | 0.6 | 14.026 |
| TI5N | MM | 10992 | 0.7 | 13.971 |
| CE4CT | M2 | 7515 | 0.6 | 13.816 |
| VP5H | MSHP | 7512 | 0.6 | 13.816 |
| LP1H | M2 | 7820 | 0.8 | 13.813 |

On the W-VE side of things, our first overall SOALP winner is Alexey Yushin, VE2XAA (also UX3UA) a member of the Contest Groupe du Quebec. Alexey is active in many contests and makes a lot of people happy with the Quebec multiplier. His efforts paid off this year! His antenna farm consists of a single tribander and rotatable dipole at about 15 meters in height plus wires.

In the MSLP category, Jim WØUO decided to change his usual CW-only contest style and put together a five-operator team effort, including three who were new to DX contesting. I'd say they learned pretty quickly! The team (WØUO, W5AO, K5ANR, KE5SCG, and KF5BHG) put together a very good score of 943 kpoints that would have placed within the top twenty scores in MSHP.

Outside the US and Canada, the SOALP category attracted a lot of attention, too. Our initial winner comes from South America — Soni, PY1NX. Soni's 2.09 Mpoints would have finished #6 in the SOAHP listings so this was quite a good score from his home station. Soni had big numbers on 15 and 40 meters plus a handful of 80 meter QSOs and multipliers that kept him in the first spot.

You'll recognize the call signs of both team members in the MSLP top spot — veteran contesters Carl AI6V and Robert W5AJ shared the operating duties at P4ØV to just squeak by the WP3C and KP4WW team with nearly 5.5 Mpoints. What made the difference — aside from contesting savvy — was "10 meters as good as it was in the old days down here," according to Carl. That one band and 2240 QSOs was the key to their being able to out-score a team far closer to North America and whose QSO totals were higher on every other band!

## Staying Power

There is no FCC limit on "staying power" — the ability to produce year after year, contest after contest. The Active Winning Streaks table shows only one DX streak remains. The WE3C crew is establishing their hold on the Multi-Two category with another convincing win. Ed, N1UR once again submitted the top SOLP score and has 5 of the last 6 wins in the category.

Several notable runs have come to an end, as well. While the VY2ZM call sign

### Accuracy Records

**Top Index by Year**

***Max W-VE Index 13.837***

| W-VE | Call | Category | QSOs | Error % | Index | Year Set |
|---|---|---|---|---|---|---|
| SO | VY2ZM | SOHP | 4084 | 0.5 | 13.561 | 2010 |
| SOA | W2RE | SOAHP | 3541 | 0.7 | 13.479 | 2011 |
| MO | K3LR | MM | 7894 | 0.6 | 13.837 | 2011 |

***Max DX Index 14.026***

| DX | Call | Category | QSOs | Error % | Index | Year Set |
|---|---|---|---|---|---|---|
| SO | 8P5A (W2SC, op) | SOHP | 9292 | 0.5 | 13.918 | 2011 |
| SOA | J7N (K3TEJ, op) | SOA | 4684 | 0.8 | 13.591 | 2010 |
| MO | PJ4G | M2 | 12,197 | 0.6 | 14.026 | 2011 |

PY1NX

**Soni, PY1NX, put together a very nice effort on 15 meters to capture the initial SOALP win for South America and Brazil.**

is once again at the top of the W/VE SOHP listing, the usual "K1ZM — op" is not. Jeff yielded the operator's chair to son Pat who kept the plaque in the family by taking the top spot. Dad's streak may have ended at eight but we have yet to see who can beat the Prince Edward Island station.

Always present on 10 meters, Juan, LU1HF relinquished his run of five straight years of dominating 10 meter scores from Argentina. Another South American streak that ended was PP5JR's run of four consecutive SO15 wins as ZX5J. Sergio was still a strong second to the record-setting score of CR2A (OH8NC, op) and we suspect that Sergio will be a fixture in the Top Ten for years to come!

Another streak has begun and this one is going to be hard to sustain. Having won 7 of the last 8 years in ARRL DX Phone, for the second straight year the K3LR multi-op station has taken *both* modes of the ARRL DX contest. With competition in Multi-Multi so intense, it will be hard for Tim to maintain this level of performance with W3LPL and other top stations on his tail!

## Westerners in the W/VE Top Ten

*"WOW! What just happened?"*
*— NØMA (M2)*

One of the benefits to better conditions on 15 and 10 meters is the geographic spread of Top Ten spots in the W/VE All-Band categories. For example, from about as far southwest as a fifth-district station can be and not become "a seven," Steve, N2IC muscled his way into the SOHP Top Ten in 6th place — no mean feat from anywhere on the continent! The key? Big 15 meter totals including the highest 15 meter multiplier total (118) of any single-op station, including the single-band entries! Elsewhere in the SOLP and SOQRP categories, you'll see new western calls like N7ZG (9th in SOLP) and NN7SS (8th in SOQRP).

On the Single-Band leader boards for 10 and 15 meters, the story continues — more calls from longitudes and latitudes normally out-of-the-running on those bands. From Illinois, WB9Z grabbed the #4 position and

## W/VE

### Single Operator, High Power

| | |
|---|---|
| VY2ZM (K6AAX, op) | 5,142,882 |
| K5ZD (KM3T, op) | 4,665,339 |
| KC1XX (WA1Z, op) | 4,245,120 |
| VC3E (VE3AT, op) | 4,199,481 |
| W9RE | 3,692,127 |
| N2IC | 3,408,000 |
| K8PO | 3,279,780 |
| AA1K | 3,179,655 |
| W3BGN | 3,172,680 |
| K3CR (LZ4AX, op) | 3,083,421 |

### Single Operator, Low Power

| | |
|---|---|
| N1UR | 2,665,065 |
| N1PGA | 1,497,999 |
| N5AW | 1,249,620 |
| W6AAN | 1,202,385 |
| N4TZ | 1,094,700 |
| N2RJ | 1,021,500 |
| N4XL | 993,114 |
| NA4K | 817,848 |
| N7ZG | 634,368 |
| W2TF | 586,704 |

### Single Operator, QRP

| | |
|---|---|
| VA3DF | 556,842 |
| N5DO | 294,600 |
| N1TM | 253,440 |
| KA1LMR | 214,866 |
| NT4TS | 184,008 |
| NDØC | 153,624 |
| W6QU (W8QZA, op) | 140,580 |
| NN7SS (K6UFO, op) | 109,890 |
| KS4X | 109,350 |
| KT8K | 85,977 |

### Single Operator Assisted, High Power

| | |
|---|---|
| W2RE | 5,128,875 |
| K3WW | 4,491,954 |
| AA3B | 3,659,964 |
| N3RS | 2,793,150 |
| K1ZZ | 2,634,615 |
| W1GD | 2,507,466 |
| K1KI (KM1P, op) | 2,418,792 |
| W2IRT | 2,112,480 |
| K2SG | 2,065,653 |
| K3PP | 2,056,626 |

### Single Operator Assisted, Low Power

| | |
|---|---|
| VE2XAA | 1,304,478 |
| KS1J | 1,009,785 |
| KT4ZB | 1,009,014 |
| K4YA | 954,180 |
| KØKX | 942,645 |
| K1LD | 829,170 |
| KA2D | 763,962 |
| W3KB | 687,960 |
| KØRI | 684,294 |
| NK3Y | 605,283 |

### Single Operator, 10 Meters

| | |
|---|---|
| W5PR | 200,100 |
| N8OO | 133,440 |
| W4SVO | 117,468 |
| WB9Z | 112,497 |
| K4WI | 103,284 |
| W4IX | 93,240 |
| W2RR (WA2AOG, op) | 54,312 |
| W3EP | 42,432 |
| N4FCG (N4BP, op) | 39,312 |
| K7BG | 35,568 |

### Single Operator, 15 Meters

| | |
|---|---|
| K5GO | 557,994 |
| N4PN | 537,855 |
| N2PP | 518,814 |
| KU2M | 459,540 |
| K5TR (WM5R, op) | 455,544 |
| N1SV | 443,850 |
| N8II | 417,060 |
| N6BV | 327,849 |
| K5RQ | 287,565 |
| VE3DZ | 242,256 |

### Single Operator, 20 Meters

| | |
|---|---|
| K2TR | 768,996 |
| VE6WQ | 274,215 |
| WR2G | 235,200 |
| W9EXY | 134,805 |
| K2RD | 119,301 |
| WA7AR | 109,470 |
| K1QS | 94,944 |
| WA8RCN | 91,125 |
| AC5O | 88,218 |
| K6HNZ | 86,400 |

### Single Operator, 40 Meters

| | |
|---|---|
| N7DD | 245,784 |
| W6YI | 238,140 |
| W5WMU | 170,286 |
| WDØBGZ | 67,977 |
| K9WZB | 65,658 |
| K9OM | 40,740 |
| K8DJC | 38,010 |
| WB2REM | 22,848 |
| VA3XH | 22,572 |
| KD2JA | 22,506 |

### Single Operator, 80 Meters

| | |
|---|---|
| AA1BU | 139,107 |
| K1UO | 139,062 |
| K2XA | 119,271 |
| W4QNW | 30,870 |
| WA4TII | 18,810 |
| NA8V | 13,260 |
| AA2DS | 11,232 |
| KØKT | 10,731 |
| K9IDQ | 10,488 |
| AA1O | 10,062 |

### Single Operator, 160 Meters

| | |
|---|---|
| W2MF | 16,317 |
| K1HAP | 5,145 |
| K5RX | 4,752 |
| W3GH | 4,182 |
| KM1R | 3,960 |
| AG4W | 3,762 |
| W2VO | 2,604 |
| N2GC | 1,440 |
| W4LJM | 756 |
| VE3EDY | 462 |

### Multioperator, Single Transmitter, High Power

| | |
|---|---|
| K1LZ | 6,780,420 |
| K9RS | 4,516,239 |
| WW4LL | 3,638,160 |
| NØNI | 3,471,144 |
| N1FD | 3,302,028 |
| NK7U | 2,878,722 |
| NN2W | 2,579,634 |
| K3MD | 2,579,310 |
| W3MF | 2,096,640 |
| W2XL | 1,806,399 |

### Multioperator, Single Transmitter, Low Power

| | |
|---|---|
| WØUO | 943,008 |
| KØUK | 633,327 |
| NO2J | 73,542 |
| W3WN | 30,495 |
| K2DV | 11,880 |
| W4AAZ | 4,743 |
| K1DM/3 | 3,078 |
| VE2CJR | 1,875 |
| K8DAC | 1,764 |
| KDØHMH | 936 |

### Multioperator, Two Transmitter

| | |
|---|---|
| WE3C | 10,543,338 |
| W4RM | 6,818,952 |
| KB1H | 5,884,245 |
| KØTV | 4,620,486 |
| W6WB | 3,765,801 |
| K8AZ | 3,404,037 |
| K2AX | 3,040,884 |
| NØIJ | 2,687,550 |
| KY5R | 2,532,591 |
| VE3RM | 2,346,258 |

### Multioperator, Multi-Transmitter

| | |
|---|---|
| K3LR | 15,844,323 |
| W3LPL | 13,070,880 |
| K1TTT | 7,359,555 |
| K1RX | 5,790,540 |
| WØAIH | 4,681,152 |
| NE3F | 3,214,995 |
| WG3J | 1,949,799 |
| KBØHH | 468,180 |
| KRØVER | 7,128 |
| VE7DXG | 1,824 |

## DX

### Single Operator, High Power

| | |
|---|---|
| 8P5A (W2SC, op) | 9,440,100 |
| TO7A (UT5UGR, op) | 9,377,979 |
| PJ2T (K6AM, op) | 8,512,776 |
| P49Y (AE6Y, op) | 8,044,440 |
| KP2M (N2TK, op) | 6,719,814 |
| V26M (N3AD, op) | 6,080,832 |
| KH6YR (K1YR, op) | 5,078,376 |
| PZ5P (RX3APM, op) | 4,868,394 |
| V48M (W2OX, op) | 4,674,402 |
| AY5F (LU5FC, op) | 3,355,848 |

### Single Operator, Low Power

| | |
|---|---|
| HI3TEJ | 5,193,981 |
| V31AM (N2ZN, op) | 4,498,002 |
| J88DR (G3TBK, op) | 4,143,993 |
| VP9/W6PH | 3,656,340 |
| J7Y (K1LI, op) | 2,684,352 |
| PY2NDX | 1,978,728 |
| YV5KG | 1,835,856 |
| TG7/N6HD | 1,760,388 |
| IR1Y | 1,635,375 |
| PY2NY | 1,047,252 |

### Single Operator, QRP

| | |
|---|---|
| P4ØA (KK9A, op) | 3,073,275 |
| F5BEG | 119,196 |
| PU5ATX | 94,710 |
| DL8LR | 85,386 |
| IK1BBC | 36,408 |
| JR4DAH | 35,154 |
| LU1VK | 34,821 |
| IV3AOL | 33,327 |
| EI4II | 26,820 |
| JH1APZ | 23,400 |

### Single Operator Assisted, High Power

| | |
|---|---|
| ZX2B (PY2MNL, op) | 2,743,902 |
| EC2DX | 2,582,901 |
| GW9T (MWØZZK, op) | 2,580,336 |
| LU4DX | 2,410,644 |
| IR1G (IZ1LBG, op) | 1,807,650 |
| WP4SK | 1,470,660 |
| AY8A (LU8ADX, op) | 1,342,980 |
| EA7RU | 1,328,880 |
| EA5BY | 1,042,302 |
| 9A3XV | 984,060 |

### Single Operator Assisted, Low Power

| | |
|---|---|
| PY1NX | 2,090,772 |
| PY2SEX | 1,731,828 |
| YW5T (YV5JBI, op) | 1,162,935 |
| HH2/PY1ZV | 987,840 |
| YV5EAH | 616,476 |
| KP2DX (KP2BH, op) | 585,972 |
| EF1W (EA1WS, op) | 506,760 |
| PY2VZ | 332,856 |
| LU7YZ | 328,383 |
| DK5DQ | 314,400 |

### Single Operator, 10 Meters

| | |
|---|---|
| PW5G (PP5WG, op) | 535,320 |
| LR2F | 486,540 |
| ZW5B (PY5KD, op) | 444,240 |
| PW2D (PY2ZXU, op) | 402,984 |
| PY2ZEA (OH2MM, op) | 362,880 |
| PP5KR | 308,334 |
| EF8S | 284,085 |
| PY5ZD | 222,642 |
| LU6FOV | 207,816 |
| EA8TL | 202,950 |

### Single Operator, 15 Meters

| | |
|---|---|
| CR2A (OH8NC, op) | 604,083 |
| ZX5J (PP5JR, op) | 537,840 |
| KH7Y | 501,120 |
| WH7Z (WØCN, op) | 367,920 |
| OQ4U | 367,200 |
| 9A3TR | 352,980 |
| HK1R | 345,960 |
| E71A | 318,600 |
| TM7F (F6GLH, op) | 317,139 |
| TM4W | 307,800 |

### Single Operator, 20 Meters

| | |
|---|---|
| HK1X | 546,987 |
| EF8R (EA8CAC, op) | 463,512 |
| YV5EED | 434,700 |
| TM1W (F1HAR, op) | 430,050 |
| LN9Z (LB1G, op) | 397,110 |
| XP1A (OX3KQ, op) | 388,260 |
| KP2CW (K6VVA, op) | 386,745 |
| PR2B (PY2LSM, op) | 368,820 |
| TF3W (TF3CW, op) | 356,220 |
| 9A7V | 352,098 |

### Single Operator, 40 Meters

| | |
|---|---|
| HK1T | 495,954 |
| ZF2AH | 458,607 |
| TM9R (F5FLN, op) | 289,041 |
| S51YI | 265,530 |
| EA7KW | 250,560 |
| YT8A (YU1EA, op) | 211,410 |
| HA6P | 194,076 |
| HC2AQ | 179,655 |
| II6A (IK6CWQ, op) | 169,344 |
| JH8JWF | 129,450 |

### Single Operator, 80 Meters

| | |
|---|---|
| CT3DZ | 182,352 |
| EE8W (EA8AH, op) | 166,344 |
| GM3PPG (G4BYB, op) | 164,502 |
| XE2S | 124,080 |
| SN3A (SP3GEM, op) | 84,177 |
| YU1WS | 63,597 |
| F8ARK | 56,631 |
| HG6A | 29,400 |
| OK1GTH | 19,437 |
| RCØF | 17,487 |

### Single Operator, 160 Meters

| | |
|---|---|
| KV4FZ | 83,790 |
| CR2X (OH2BH, op) | 76,797 |
| HQ9R (WQ7R, op) | 37,812 |
| I4FYF | 5,976 |
| EA1DVY | 5,625 |
| SP6HEQ | 1,260 |
| EU3AR | 390 |

### Multioperator, Single Transmitter, High Power

| | |
|---|---|
| VP5H | 7,483,938 |
| PJ7DX | 6,662,250 |
| TM6M | 4,987,800 |
| CS2C | 4,843,458 |
| LS1D | 3,938,517 |
| ED5T | 3,372,780 |
| OE3K | 3,049,725 |
| IO5O | 2,772,900 |
| HB9CA | 2,531,232 |
| HQ2W | 2,256,741 |

### Multioperator, Single Transmitter, Low Power

| | |
|---|---|
| P4ØV | 5,498,106 |
| WP3C | 5,467,380 |
| HI3K | 4,933,440 |
| LU1UM | 1,253,358 |
| XE2AU | 683,754 |
| HH4/AF4Z | 406,992 |
| KG4AN | 395,460 |
| PR5A | 284,139 |
| S5ØXX | 270,546 |
| IQ1CN | 208,656 |

### Multioperator, Two Transmitter

| | |
|---|---|
| PJ4G | 12,474,567 |
| TI8M | 7,190,730 |
| PT5T | 6,523,902 |
| LP1H | 6,335,424 |
| CE4CT | 5,962,656 |
| RL3A | 1,668,501 |
| EA3EZD | 1,337,928 |
| JA1YPA | 1,210,140 |
| ED5K | 570,150 |
| JA1ZGP | 179,265 |

### Multioperator, Multi-Transmitter

| | |
|---|---|
| TI5N | 11,044,164 |
| C6ANM | 5,198,094 |
| 9A1A | 4,809,360 |
| JA3YBK | 1,732,200 |
| DR1A | 726,645 |
| CE3PCG | 509,949 |
| E71AVW | 12,696 |

## W/VE Regional Leaders

Table lists Class, Call and Score (C= Single Op, High Power, B = Single Op, Low Power, A = Single Op, QRP)

**Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)**

| | | |
|---|---|---|
| A | N1TM | 253,440 |
| A | KA1LMR | 214,866 |
| A | WB7OCV | 53,424 |
| A | N8HM | 10,950 |
| A | WBØIWG | 9,936 |
| B | N1UR | 2,665,065 |
| B | N1PGA | 1,497,999 |
| B | W6AAN | 1,202,385 |
| B | N2RJ | 1,021,500 |
| B | W2TF | 586,704 |
| C | VY2ZM (K6AAX, op) | 5,142,882 |
| C | K5ZD (KM3T, op) | 4,665,339 |
| C | KC1XX (WA1Z, op) | 4,245,120 |
| C | K8PO | 3,279,780 |
| C | AA1K | 3,179,655 |

**Southeast Region (Delta, Roanoke and Southeastern Divisions)**

| | | |
|---|---|---|
| A | NT4TS | 184,008 |
| A | KS4X | 109,350 |
| A | K4WY | 52,170 |
| A | WX4RM | 29,670 |
| A | K7SZ | 13,359 |
| B | N4XL | 993,114 |
| B | NA4K | 817,848 |
| B | W4PFM | 388,620 |
| B | W6DVS | 331,200 |
| B | N2WN | 303,456 |
| C | K4AB | 2,350,926 |
| C | K1TO | 2,279,070 |
| C | N4NW | 1,461,600 |
| C | KZ2I | 1,241,136 |
| C | WX4G | 976,626 |

**Central Region (Central and Great Lakes Divisions; Ontario Section)**

| | | |
|---|---|---|
| A | VA3DF | 556,842 |
| A | KT8K | 85,977 |
| A | W9AQ | 10,584 |
| A | VA3RKM | 6,396 |
| A | K9WIS | 3,276 |
| B | N4TZ | 1,094,700 |
| B | VA3SWG | 585,552 |
| B | KD9MS | 452,790 |
| B | K9JE | 287,646 |
| B | N4NTQ | 209,745 |
| C | VC3E (VE3AT, op) | 4,199,481 |
| C | W9RE | 3,692,127 |
| C | K8GL | 1,571,388 |
| C | N8BJQ | 1,421,970 |
| C | K9CT | 1,398,441 |

**Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)**

| | | |
|---|---|---|
| A | N5DO | 294,600 |
| A | NDØC | 153,624 |
| A | KKØQ | 43,056 |
| A | NØUR | 20,196 |
| B | N5AW | 1,249,620 |
| B | KØBJ | 340,095 |
| B | VE5ZX | 300,000 |
| B | WBØSOK | 263,562 |
| B | KYØK | 247,050 |
| C | N2IC | 3,408,000 |
| C | WØUA | 3,051,360 |
| C | NR5M | 2,414,313 |
| C | KØSR | 1,318,740 |
| C | VE4EAR | 1,093,935 |

**West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT Sections)**

| | | |
|---|---|---|
| A | W6QU (W8QZA, op) | 140,580 |
| A | NN7SS (K6UFO, op) | 109,890 |
| A | K6MI | 16,611 |
| A | N6LB | 2,967 |
| A | KJ6AGX | 75 |
| B | N7ZG | 634,368 |
| B | N6RV | 497,016 |
| B | K7ACZ | 263,886 |
| B | K7JE | 233,625 |
| B | AA6K | 217,728 |
| C | K6NA | 1,920,996 |
| C | WC6H (NU6S, op) | 1,885,290 |
| C | VE7CC | 1,714,911 |
| C | K6XX | 1,548,000 |
| C | K7RL | 1,132,461 |

you'd have to go back to 2005 before a 9th-district call sign made the 10 meter Top Ten. *Zut alors!* Not content to leave the sweet stuff to somebody else, K7BG is in the 10th position from Montana! No sneaking in through lack of interest, either — the Ten Top Ten and beyond were full of competitive scores this year.

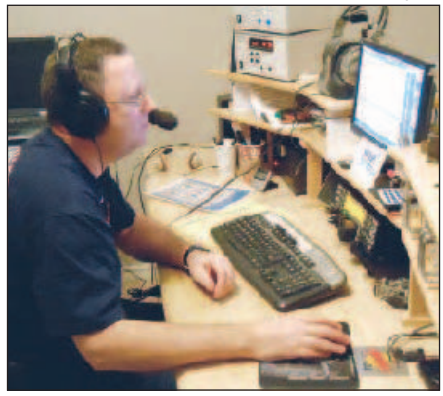
One band down, the competition heated up "considerable" with K5GO taking the number one position from his NW Arkansas QTH. 15 meters was *muy caliente* this year with nine stations in the Top Ten completing a single-band DXCC. On 20 meters, the competition was just crazy — the Top Ten very nearly represents a clean sweep of all districts and Canada: 2, VE, 2, 9, 6, 7, 1, 8, 6, 1. It's up for grabs, boys and girls — go for it! In another sign of the improving solar times, the MM team at WØAIH continue their relentless march to the top, moving up another place to 5th due to — you guessed it — big scores on 15 and 10 meters.

### Club Competition

What a difference a year makes! Last year, the Yankee Clipper Contest Club dominated the Unlimited category with 203 logs and 234 Mpoints. That obviously caught the attention of the Frankford Radio Club who pumped up their score with another 17 logs and grabbed the gavel from the grasp of YCCC by just 1% of the total score, 222 to 220 Mpoints. The Northern California Contest Club traded places with Contest Club Ontario and another paper-logsheet-thin margin, 47.4 to 44.1 Mpoints.

In the Medium category, the North Coast Contesters seemingly have a lock on the top spot…or do they? The South East Contest Club made a big-time run at the top spot this year moving from tenth to second place and nearly quadrupling their total score. Watch out NCC! The Local category gavel will go to a gregarious new group — the Iowa DX and Contest Club — and welcome to the new Blue Ridge ARC, too, placing 4th in this first ARRL Club Competition appearance.

K5ANR



**CW specialist Jim, WØUO, decided to enter a phone contest as a team and snagged the first ever W-VE MSLP title. Team member John, KF5BFG, is shown here handling the operating duties.**

### By a Nose

Who says log checking doesn't matter? Send in your log, no matter how small! Here are just two of the top-placing races that were close enough for the log checking razor's slice to make the difference. In one of our new categories, SOALP competitors KS1J (1,009,785) and KT4ZB (1,009,014) were only 771 points apart — a minuscule separation of 0.07%. Over in the other new category of MSLP, P4ØV lost 59,109 of 5,557,215 claimed points while being pursued by WP3C who lost 57,846 of 5,525,226 points, leaving only 30,726 points between them — a nasal whisker of only 0.56%!

### Accuracy

We've listed the top five Accuracy Indexes achieved by SOAHP/LP, SOHP/LP and MO stations. (See the sidebar for an explanation of the index.) While the order generally tracks number of QSOs, some entries with a smaller, but slightly more accurate, log are rated higher than a larger one. Since starting to track the index last year as shown in the Accuracy Index, we have our first-ever index greater than 14 (14.026 by the PJ4G M2 team)! Tracking your own Accuracy Index from year to year is a great way of improving your operating skills.

### DXing

The top DX count band bonanzas for multi-op and single-op are really starting to heat up on the high bands. This is quite a change from last year when the top W-VE multiplier total on 10 meters was 30! It's an open

### Error Rate and Accuracy Index

Error rate is calculated in percent as the number of "bad" QSOs — those listed in your Log Checking Report with a busted call (B), a miscopied exchange (X), or "Not In Logs" that can't be found in the other station's log (N) — divided by the total number of verified-good QSOs after duplicates have been removed from that log.

Error Rate (%) = 100% × (B+X+N) / QSOs

The Accuracy Index is a measure calculated so as to reward lower error rates for large logs. That is, for two logs with equal error rates, the log with more verified contacts has a higher accuracy index. The higher the index, the more accurate the operator(s).

Accuracy Index = log (QSOs) + 10 × (1 - Error Rate in % / 100)

question whether there will be good enough 80 meter conditions deep enough into the new solar cycle for one of the top stations to bag a 5-Band DXCC — top-mult-sweeping-K3LR is only four DXCC entities away from "hitting for the cycle" and I know Tim is already furrowing his brow trying to figure out from where those QSOs will come!

160: K3LR (MM) 59, W2MF (SO-160) 49
80: K3LR (MM) 96, AA1BU (SO-80) 89
40: K3LR (MM) 119, W5WMU (SO-40) 101, 6 stations made DXCC
20: K3LR (MM) 149, K2TR (SO-20) 123, 37 stations made DXCC
15: K3LR (MM) 140, N2IC (SOHP) 118, 78 stations made DXCC
10: K3LR (MM) 108, W5PR (SO-10) 92, 2 stations made DXCC

On the DX side, which stations had the highest overall multiplier total? Not surprisingly, the station had to be close enough to North America for the low bands to be productive while not so close that 10 and 15 meters skipped over large areas. Thus, all of the top multiplier magicians are found in the Caribbean or near the north shore of South America.

| | |
|---|---|
| TO7A (UT5UGR, op) | - 349 (SOHP) |
| PJ2T (K6AM, op) | - 348 (SOHP) |
| P49Y (AE6Y, op) | - 344 (SOHP) |
| PJ4G | - 343 (M2) |
| 8P5A (W2SC, op) | - 340 (SOHP) |

## Some Simple Requests

After the statistics and stories, I'd like to relay a simple request: Make sure your station information is correct before sending in your Cabrillo-formatted log! The log checkers have a big enough job to do, so make it easy for them to get your score in the right category and location by double-checking the information in the header and in the exchange for each contact. This information should be updated by using your logging software's configuration options so that the information is correct every time. You can also use a plain-text editor (such as *Notepad* — free with the Windows operating system) to change and save the Cabrillo log file before emailing. The ARRL contest email-handling robot will respond with the QTH (and category) you sent with the log — be sure it's correct! If not, edit and resubmit your log with the correct information.

*"DX Stations — QRZ is not your call sign!" — KM3T, op at K5ZD*

Stations running a pileup, we encourage you to give your call signs frequently — and those of you who don't know who you are. The seconds ticking by while you "assume" everyone is logging your call correctly are incredibly frustrating from the other end. You are losing QSOs and you are wasting time logging unnecessary QSOs from duplicate contacts and from busted spotting network calls. Don't depend on the spotting network to do your CQing for you! It is no coincidence that the top scoring stations give their calls every time or go no more than two or three QSOs without identifying.

Audio quality is also something many stations can improve. Turn down the compression and the microphone gain — watch that ALC meter! I was operating at W1AW on Sunday afternoon during a 10 meter opening and it was hard to make out many call signs because of poor audio. One particular instance was notable: I was struggling to understand phonetics from the several stations calling when one station with beautiful clear audio dropped in his call. The difference was stunning. No repeats or requests for confirmation were needed — he was in and out of the pileup in seconds while others were still trying to get through. That's the way it should be done — it doesn't matter how loud you are if the station on the other end can't understand you!

## Concluding Remarks

*"Just a girl and her radio." N7RQ (SO15)*

After the DX Phone weekend was over, I sent an email about conditions to Doug K1DG and suggested we'd been just a little early. "No," he replied, "the band was late!" Maybe so — whatever the reason, we all enjoyed having such good conditions on 15 and 10 meters during the phone weekend. Next year — even with a slowing solar cycle predicted — should be even better. Get the ARRL DX contests (18/19 Feb and 3/4 Mar) on your calendar now, polish up those high-band antennas, and get ready for a healthy dose of radiosport! QST

### Sponsored Plaque Winners

Thanks to the generous sponsorship of numerous clubs and individuals, we are pleased to announce the winners of a sponsored ARRL DX SSB plaque. The ARRL wishes to thank the plaque sponsors for their continued commitment to the ARRL Plaque Program. Without their support and dedication, the Plaque Program would not be possible.

| *Plaque Category* | *Plaque Sponsor* | *Winner* |
|---|---|---|
| W/VE Single Operator High Power Phone | Frankford Radio Club | VY2ZM (K6AAX, op) |
| W/VE 1.8 MHz Phone | Butch Greve, W9EWC Memorial | W2MF |
| W/VE 3.5 MHz Phone | Jeffrey Briggs, VY2ZM | AA1BU |
| W/VE 21 MHz Phone | Northern Illinois DX Association | K5GO |
| W/VE 28 MHz Phone | Ralph Fontaine AF7DX | W5PR |
| W/VE Single Operator Low Power Phone | Dauberville DX Association | N1UR |
| W/VE Single Operator QRP Phone | Jeffrey Briggs, K1ZM | VA3DF |
| W/VE Single Operator Assisted, High Power Phone | Pete Carter, K3VW Memorial | W2RE |
| World Single Operator High Power Phone | North Jersey DX Association | 8P5A (W2SC, op) |
| World 1.8 MHz Phone | Fred Race, W8FR, In Memory of ZL2BT | KV4FZ |
| World 7 MHz Phone | Jim Rafferty, N6RJ Memorial - Cayman ARS | HK1T |
| World 28 MHz Phone | North Shenandoah DX Association NS4DX | PW5G |
| World Single Operator Assisted, High Power Phone | Southern California DX Club | ZX2B (PY2MNL, op) |
| Asia Multioperator Single Transmitter, High Power Phone | Yankee Clipper Contest Club | RWØCWA |
| North America Multioperator Single Transmitter, High Power Phone | Nick Lash, K9KLR | VP5H |
| World Multioperator Two Transmitters Phone | W6NL and K6BL | PJ4G |
| W/VE Single Operator High Power Combined Score | National Contest Journal | K5ZD (KM3T, op) |
| W/VE Single Operator Low Power Combined Score | In Memory of Fred Gern, K2FR - Rochester DX Association, Inc | N1UR |
| Japan Single Operator Low Power Phone | Western Washington DX Club | JH4UYB |
| Seventh Call Area Single Operator High Power Phone | Willamette Valley DX Club | K5RR |
| World Multioperator Unlimited Combined Score | Jim Lawson - W2PV Memorial - Schenectady ARA | 9A1A |
| World Multioperator Unlimited Phone | Stanley Cohen, W8QDQ | TI5N |
| World Single Operator Low Power Combined Score | C. Sharp, K5DX Memorial by the Texas DX Society | J88DR (G3TBK, op) |
| Canada Single Operator Low Power Phone | Contest Club Ontario | VA3SWG |
| New England Division Single Operator Low Power Phone | CTRI Contest Group | N1UR |
| Great Lakes Division Single Operator Unlimited, High Power Phone | Northern Ohio DX Association | N8TR |

Unsponsored plaques may be purchased by the plaque winner. If you wish to purchase an unsponsored plaque or order a duplicate plaque, contact ARRL Contest Branch Manager Sean Kutzko, KX9X, at 860-594-0232 or by e-mail at **kx9x@arrl.org**. The cost for plaques is $75 (includes shipping).

COURTESY JOHN BAYNE, KK9A

**Enjoying the traditional All-Aruba post-contest dinner are (left to right) Carl, P49V; John, P4ØA; Robert, P4ØP; Sue, P4ØYL; Cristina, P43C; Jean-Pierre, P43A, and Andy, P49Y.**

W3UR

# HOW'S DX?

# Amateur Radio's Top DXer

As of October 10, 2010 there are 340 entities on the current ARRL DXCC list and 60 entities on the deleted list, for a grand total of 400 "countries." This month let's take a quick look at the top position on the DXCC Mixed list. As of press time, one single Amateur Radio DXer is at the top of the list with an amazing 397 countries confirmed.

John L. Dack, W7KH, of Seattle, Washington is the Top DXer in the world, with 397 countries confirmed at the ARRL DXCC Desk. It all began in 1938. Two of his neighbors were Amateur Radio operators and this sparked the young man's interest in getting his license. He received his W7GUV ticket when he was 17. His older brother was also licensed shortly before him as W7GOY.

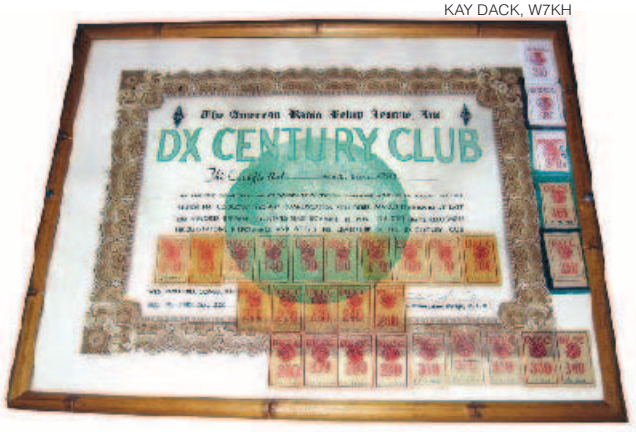
"DXing is in the eye of the beholder," says John. During this period there was lots of activity on the Amateur Radio bands. John remembered working Mexico, and this may have been the beginning of his interest in working DX, as he felt "like he had just worked Tibet," which later he did. Having been licensed during the end of the Great Depression, John and his family didn't have a lot of money. He started off with homebrew antennas and eventually had a 40 foot wood tower to support them.

During World War II John served in the United States Army Signal Corps. After the war he began installing Bell Labs stations in London, Paris and Algiers. Subsequently, he worked for another 42 years in communications.

KAY DACK, W7KH

**John, W7KH (ex W7GUV), has worked 397 out of the 400 possible countries and by the looks of things he's ready for the next new one, South Sudan.**

KAY DACK, W7KH




**Here is the W7GUV (now W7KH) DXCC #250 dated August 2, 1948 with endorsement stickers up to 390. Does Bill Moore, NC1L, need to order a 400 sticker?**

Once WWII was over and John got back on the air, it was tough to work DX. But in 1964 he bought a Hy-Gain 203B, 3 element, 20-meter beam and mounted it on a 50 foot tower. This would be the antenna he used to work many of those 397 countries. He only missed three countries, and that was probably because of work. John did not work Daman and Diu (CR8), the Portuguese enclaves on the western coast of India. This was the rarest of all DXCC entities with perhaps only 65 DXCC holders ever claiming it! He also missed French Indo-China (FI8) and Manchuria (C9). W7KH did work the four new PJ entities and has had them credited at Newington.

He does not chase band countries, "as life is something more than ham radio." His current station is an ICOM IC-746 Pro transceiver, a solid state amplifier and a 4-1000 tube amplifier. He's still using the 47 year old 203B, and has since put up monobander antennas for 15 and 10 meters. Despite being 90 years old, he seems to still be on top of his game and gets on the air about twice a week. There are no computers at W7KH and John still gets his DX news from the paper version of *QRZ DX*. All of his logs are still done with paper and pencil.

John can sometimes be found on CW, although he has some coordination issues with his sending hand. Most of his time is spent on phone. He's one of the founding members of the Western Washington DX Club and was good friends with Bill Bennett, W7PHO. John is excited about the possibility of working the next new one — South Sudan. So don't be surprised to hear W7KH going for #398. Congratulations John on being "The Top DXer in the World."

## 4W6A — East Timor


Steve Telenius-Lowe, 9M6DXX, gives us the full details of a DXpedition to East Timor during the second half of September: "Everything is on schedule for the 4W6A DXpedition. All the team members have now booked and paid for their air tickets from the UK, Malaysia and Australia to Dili, East Timor. A boat has been chartered to take the team and their equipment from Dili to Atauro Island, the site of the DXpedition, and back again. The accommodation on the island has been booked and the team members are now also booking their overnight transit stops in Bali, Darwin and Dili.

"The DXpedition will be operating from generators, which will be hired and picked up in Dili the day before the start of the operation. The generators have been booked and arrangements have been put in place for sufficient fuel to be transported to the island for our use whenever necessary.

"It is hoped to be able to use an Internet connection on the island and, if this proves to be reliable, logs will be uploaded to Club Log (**www.clublog.org**) and Logbook of The World on a daily basis.

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

"The team is very grateful to the LA DX Group, CDXC (Chiltern DX Club), The UK DX Foundation, the Oceania Amateur Radio DX Group and the Northern Ohio DX Association, who are the first four DX associations to have offered sponsorship to the 4W6A DXpedition. Thanks also go to Tony Burt, VK3TZ, of Rippletech Electronics (**www.rippletech.com.au**), who is kindly loaning three monoband vertical antennas for use on the DXpedition.

"We are also very grateful to a growing number of individuals who have also made donations toward the cost of shipping equipment to East Timor, the boat charter, the hire of the generators and the cost of fuel. All sponsors are listed, with thanks, on the 4W6A website at **www.4w6a.com/sponsors.html**. If you or your DX club also wishes to help, there is a "Donations" page on the 4W6A website. Payments may be made by credit or debit card and you do not need to have a PayPal account yourself in order to make a donation.

"4W6A will be QRV from Atauro Island (IOTA OC-232), Timor-Leste (East Timor), from 16-26 September 2011. Activity will be on all bands 10-160 meters, using CW, SSB and RTTY. The QSL manager is MØURX, direct (SAE plus one IRC or $2), via the bureau or LoTW. The entire log will be uploaded to LoTW as soon as possible after the end of the operation or, if possible, even during the DXpedition. QSLs may also be requested using the QSL request form on the website."

## ADDITION OF SOUTH SUDAN TO DXCC LIST

On July 14 the United Nations General Assembly welcomed the Republic of South Sudan into the United Nations as the 193rd member. This qualified South Sudan, under the DXCC rules [Section II, 1(a)] as a new DXCC Entity. Effective immediately, the DXCC Desk will be accepting QSLs from South Sudan for contacts made on July 14, 2011 or after. As of press time no ITU prefix has been assigned for the fledgling nation.

There are now 341 countries on the current DXCC list. That means you need to have 332 confirmed to remain on the DXCC Honor Roll. "The deadline for the Honor Roll and annual listings is December 31, so you must submit the new entity to DXCC by then in order to retain your Honor Roll status," says Bill Moore, NC1L, DXCC Manager.

ALEX KASEVICH, W1CDC

**Alex, W1CDC, was back in Guyana as 8R1A in May of this year. Here he is working 17 meter CW using an FT-450D into a G5RV. He plans to go back soon using a multiband vertical setup in the salt water and will be on the air even more.**

## DX GATHERING

The Seventh annual W4DXCC will be held the same weekend as the Ten-Tec Hamfest on September 23-24 at the MainStay Suites in Pigeon Forge, Tennessee. The event is sponsored by the Southeastern DX and Contesting Organization (SEDCO). Complete details can be found at **www.w4dxcc.com**.

## DX NEWS FROM AROUND THE GLOBE

*3D2R — ROTUMA ISLAND*

In early June an international team announced plans for a DXpedition to Rotuma Island (3D2R) beginning in late September. Hrane Milosevic, YT1AD, has obtained the 3D2R call and needed landing permit and the group has the official approval from the Rotuma Island Council. On September 24 the team of 19 operators plans to meet in Fiji and set sail with an expected arrival 3 days later. Plans are to focus on the low bands and to "satisfy the need for EU operators" from September 27-October 7. They have a web page at **www.yt1ad.info/3d2r/index.html**.

*FP — ST PIERRE ET MIQUELON*

A group of 5-7 members of the Cambridge University Wireless Society (G6UW and M4A) will be QRV from Miquelon September 23-30 on 80-10 meters, possibly with some 160 meter operation. Look for FP/G3ZAY, FP/G4EAG, FP/MØTOC, FP/MØBLF and FP/MØVFC. There may be one or two additional operators. QSL information to be announced later.

*HUNGARIAN DXPEDITION TO THE PACIFIC*

Hungarian operators HA5UK and HA5AO are planning to be operating from several Pacific Islands during October and November. The first stop will be on Tarawa, Western Kiribati as T3ØHA from October 1-10. Next it's on to Banaba Island for activity as T33HA from October 10-29. Then from November 1-12 they will be signing T2HA from Tuvalu Island. Their final destination will be Fiji as 3D2UK November 14-20. Activity from all islands will be on 1.8-28 MHz on CW, SSB and RTTY.

*JW — SVALBARD*

JW9DFA will be on from Spitsbergen September 14-19. Operator LA9DFA says he will be on HF and possibly 6 meters, mostly CW, with some RTTY and SSB. He expects to have the call sign JW3C for use in the Scandinavian Activity Contest on CW, September 17-18. QSL to LA9DFA via the bureau or direct or LoTW.

*T32 — EAST KIRIBATI*

As a reminder, a large British-led international team of operators from the Five Star DX Association will be QRV from Christmas Island, East Kiribati as T32C from September 28-October 26. The around-the-clock DXpedition team will be QRV on all bands and modes. They have a website at **www.T32C.com**.

*T6 — AFGHANISTAN*

Eric, K9GY, has been in Afghanistan since mid-May and expects to remain at Camp Phoenix, Bagram Airfield for a 1 year work assignment. It took 2½ months but he is now properly licensed as T6MO and plans to be QRV on all bands except 30 meters, as the Afghanistan Telecom Regulatory Authority (ATRA) does not allow activity on 10 MHz. QSL via K9GY and LoTW. T6SH is Steve, W6EOD, operating in the Garmsir District of Helmand Province, Afghanistan until November. He's equipped with an Elecraft KX1, 100% QRP, to a "random wire vertical," with a "jumper dipole" planned for the future. He's on 40 and 20, CW only. He can only log with paper and pencil, so LoTW and eQSL are out, he says. QSL via K1BV.

*YJ — VANUATU*

Jay Sewell, W5SL, of the Central Texas DX and Contest Club is planning a DXpedition to Vanuatu (YJ) just after the September equinox. Plans are to have a total of 8-12 operators for an all band and mode operation September 28-October 14. Plans are to have Spiderbeams, verticals and dipoles, with a 400 W maximum limit. Stay tuned for more details on this one.

*YJ — VANUATU*

YJØVK will be the call sign of an international team operating from Vanuatu September 30-October 12. Team members include VK3QB, VK3HJ, VK3BUF, VK3JDI, VK3GK, NQ7R, N6MUF and MØHLT. They have a website at **yj0vk.vkham.com**. QSL via VK2CA.

*ZK2 — NIUE ISLAND*

ZK2V on Niue Island will be QRV starting October 15. Keith, GM4YXI/GM5X, will join Chris, GM3WOJ/GM2V, there for 2 weeks. Chris will be single operator all band for the CQWW SSB Contest. Chris will continue on the island solo for several additional months, from a new location. He will make a special effort on the low bands with special antennas Chris hopes will overcome local static on 160 and 80, "which made these bands difficult in 2009." Watch **www.zk2v.com** for updates.

## WRAP UP

That's all for this month. A special thanks to 9M6DXX, Central Texas DX and Contest Club, G3ZAY, GM3WOJ, KE3Q, N6PSE, T6MO/K9GY, T6SL/W6EOD, W1CDC and *The Daily DX* for helping to make this month's column possible.

Send your DX news, photos and club newsletters to **Bernie@dailydx.com**. Until next month, see you in the pileups! — *Bernie, W3UR*

NØJK

# THE WORLD ABOVE 50 MHz

# June $E_s$ Fires Up 6 and 2 Meters

June turned out to be an outstanding month for sporadic E ($E_s$) on both 6 and 2 meters. Due to the extraordinary DX, I will focus this month's column "on the bands" with commentary mixed in.

## ON THE BANDS

**6 meters**. As I complete this column I just worked PV8ADI on 50.100 MHz from my station in Kansas. It was a nice signal from Brazil over 5000 km away, peaking to 599 on my attic dipole. Six meters is an amazing band. As this is written, I am leaving for Bermuda tomorrow. I will have an update on that operation and coverage of the "PJ" DXpeditions in next month's column.

On June 5 KØHA in Nebraska logged EA8BLL and EA8/DL3CGS. That afternoon he found JE1BMJ. On June 9 Colorado and New Mexico had contacts into Germany and OY3JE spotted to Texas and Arizona. NØKE in Vail, Colorado worked "Max," DK1MAX, near Munich.

June 10 was a good day, with Europe working North America in the morning and both PJ4E and PJ2/K8LEE working all across the eastern and mid USA in the afternoon, giving many a new DXCC counter. Earlier in the day Russ, K4QI, reported a good $E_s$ opening to Europe with "the usual" contacts and a nice one to UT5URW and to KO5O. Of note, Russ heard A92IO solid on CW for around 10 minutes starting at 1520 UTC. He received an e-mail from A92IO reporting that he heard Russ, but European interference kept them from completing a contact. K5SW in Oklahoma also worked into Europe with ON4IQ logged at 1520 UTC. NØKE in Colorado worked DK1MAX and OY3JE was spotted in Arizona and Texas.

Starting around 2000 UTC 6 meters opened to northern South America from much of the USA. K5SW worked PJ2/K8LEE at 2019 UTC followed by PJ4E at 2035 UTC for new DXCC. Both PJs ran large pileups and did a great job.

You don't always need a large Yagi or big amplifier to work a new one on 6. Here is my story of working the two PJs. I had a late lunch with my daughter and did not get home until about 2145 UTC. I saw the PJs' spot on my BlackBerry. There were local thunderstorms about and I had to be at work at 2300 UTC. There was not enough time and it was not safe to set up portable since I had just a few minutes at the radio with the dipole, then shower and off to work.

DX SHERLOCK

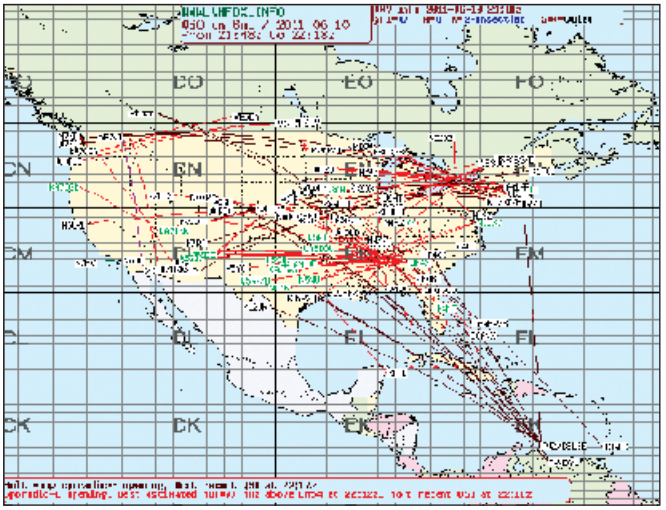


**Figure 1 — DX Sherlock map (www.vhfdx.info) showing PJ2/K8LEE activity on June 10, which included a contact with NØJK. Map used with permission from EA6VQ.**

I found PJ4E on 50.103 MHz peaking up to a 579. He was saying "up" but responded to my call just above his frequency. He gave me a 559. PJ2/K8LEE was on 50.107.8 MHz. He was not as loud and there was more fading. Finally, he peaked up and after several calls I worked him at 2210 UTC (see Figure 1). He was giving out 599 reports and his grid. That gave me two new ones on 6 meters with the dipole in 15 minutes. It can be years between working a new DXCC on 6 meters. Sometimes it is better to be on at the right time with a simple antenna. This was one of the best openings for many to PJ2 and PJ4 in June.

Finally on June 10 Larry, NØLL, also worked another "rare one" on 6 meters — NDØB (EN07). He needs only four more grids for the Fred Fish Memorial Award (FFMA)! [For more information about the FFMA go to **www.arrl.org/ffma**. — *Ed.*]

Ed Kelly, VP9GE, from Bermuda made contacts in 39 grid squares between 0000-0100 UTC June 11. His best ODX was 2550 km to EN40.

Transatlantic propagation occurred again on June 11. W5UWB noted contacts from EL17 south Texas to OE5MPL, G4IGO and G4FUF around 1345 UTC via ionospheric scatter propagation (ISCAT), a new digital mode developed by Joe, K1JT (**www.physics.princeton.edu/pulsar/K1JT**), that seems particularly appropriate for weak multihop $E_s$.

### *The June VHF QSO Party*

There were outstanding $E_s$ conditions both days of the 2011 June VHF QSO Party (June 11-12). The band was open from the start of the contest well into Saturday evening, then all day Sunday. Numerous stations made over a thousand 6 meter contacts. NØLL reported an all time personal best 6 meter total. I was pleased to see good DX

**This Month**

| | |
|---|---|
| September 10-12 | ARRL September VHF QSO Party |
| September 17-18 | 10 GHz and Up Contest |
| September 24-25 | Excellent EME conditions* |
| September 24-25 | International EME Competition (2.3 GHz +) |

*Moon data from EA6VQ

Jon Jones, NØJK ♦ 9356 E Wilson Estates Ct, Wichita, KS 67206-4417 ♦ n0jk@arrl.net (316-425-5326)

activity in the contest, with VP5CW, HI3TEJ, many XEs, NP2X, KP4s, YN2R and others. VP5CW was booming into the Midwest Sunday morning around 8:30 AM local. Ted, HI3TEJ, made over 580 contacts.

Perhaps the most interesting contest DX report was from Tim Havens, NWØW. On June 11 during the contest between 2245 and 2337 UTC Tim worked 23 JAs including JE1BMJ at 2245 and JL8GFB at 2309.

"I began hearing 49.749.9 MHz video at 325 degrees running between S0-2 (S2 being the strongest I've ever heard it) and at the same time I was hearing three or four VE4s. This is the same pattern that occurred last year around this same time. I saw that JE1BMJ was sending CQ on 50.085.5 MHz. I also saw that K5RK spotted hearing him. So I landed the VFO on the same frequency, and within about 15 minutes of listening I heard the first faint white noise changes — and *suddenly* the signal went from S0 to 559. When I worked Han, JE1BMJ, he said I was so loud that I was distorting his audio recording of me and that I was literally a true 599. He was between 559 and 579 on peaks here in EM47."

Who would imagine a "JA run" during the June VHF contest? Tim, NWØW, is an astute observer and noted that he heard Asian TV video and VE4s as a pattern occurring with past openings he has had to Japan. Keeping detailed notes of conditions, beacons, TV carriers, etc, when you work DX on 6 meters can help you in predicting future openings.

On June 15 Ed, VP9GE, was on from 2240-2340 UTC and made 79 contacts into 41 grids. Ed plots his contacts (see Figure 2), which helps to visualize $E_s$ zones.

Rare grids were active during the contest. Justin, K9MU, and John, W9JN, operated as KØW during the June contest from EN38. They worked 260 grids on 6 meters. Other operators were WB9E, KC9TVG and K9DRO. They also operated "rover-style" from the EN27/28 grid line. They were very

ED KELLY, VP9GE

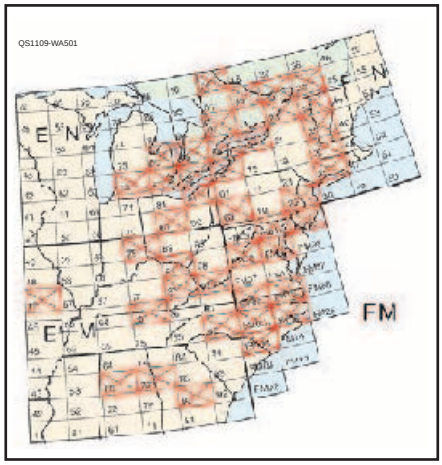



**Figure 2 — Ed Kelly, VP9GE, operating from Bermuda, kept track of the 41 grids he contacted as the $E_s$ event progressed.**

loud to Kansas Saturday afternoon on $E_s$. They even worked N8JX via aurora. With interest in the FFMA increasing, their activity was appreciated by many.

On June 18, N3DB called a CQ and ran over 112 European stations. His catch for the day included four GMs, one GJ, four 9As, two S5s, 40 DLs, two OKs, 17 PAs, eight YUs, one E7, 12 OZs, one LA, one OE, two EAs, five Fs, one CT, two SMs, one HA, three Is, one EI, one YO, one SP, one ON and one G.

On June 19 Joe, CT1HZE, had a good transatlantic opening. He worked 175 W/VE stations (amazing) from the W1, 2, 3, 4, 5, 8, 9, Ø; VE1, 2, 3 and VO1 call districts. On June 20, great conditions were again reported by CT1HZE. Another 150 W/VE logged, and at 1040 UTC he heard the 4 meter WE9XUP beacon for about 15 minutes. He had more trouble with the two PJ countries, taking 10 days to work them. He had only a 1 minute opening to PJ4E.

June 21 was a big day for Dave, V25DR, who made many contacts into the Midwest from Antigua. He was quite strong on SSB to Kansas at 1810 UTC, and made many contacts to Arizona and California. Great job.

On June 25, PJ6D hit the airwaves from Saba Island and had a great opening to the Heartland. Bill, KØHA (EN10) NE reported working PJ6D and PJ76 around 1505 UTC. I did not hear them at that time. PJ6D finally appeared in KS around 1700 UTC, and I logged him at 1704 on CW. They faded out, then returned stronger on SSB at 1816 UTC. I worked him on both modes with a simple inside dipole from EM28. Other "little pistol" stations in the Kansas City area worked them as well. Great job by Dick, K5AND; Pat, W5OZI, and George, K5TR. A full report on the PJ6D and PJ76 activities will be in next month's column. PJ6D had made well over 1000 contacts on 6 meters by the end of June. Check out his website at **dkhanson.com/pj6**. I could hear the pileup calling PJ76, but I had no copy on Jimmy. He remained elusive by the column deadline.

While the Midwest was busy chasing PJ6D and PJ76, Dave, N3DB, worked I, CT, DL, EA, 9H, OE, S5, ISØ and G. That afternoon Dave had 49 MHz TV videos "I assumed were from Murmansk area, so I began to CQ: That brought in 4 OHs, 2 SMs, 1 EI and oddly enough an EA. I also heard, but didn't work, some JAs that evening."

June 29 turned out to be another huge day on 6, with strong polar openings to Europe from the East Coast to the Midwest and a major JA to East Coast opening. It appeared to be a strong band of E-layer ionization across the arctic from northern Europe to Japan. What I found most interesting was that 6 meters was open to Europe and Japan at the same time for stations in the East and Midwest.

Rare Iceland was represented by TF/DL3GCS, who was worked as far west as Iowa (N3SL) and Arkansas (K5UR) around 2230 UTC. Tim, NWØW, logged SM5EDX at 2246 UTC from EM47.

Also rare, JW7QIA worked W2, 3, 4 and 8 as far south as Florida. At the same time, there was a major opening from VE1, 2, 3; W1, 2, 3, 4, 5, 8 and Ø to Japan. Fred, K3ZO, in Maryland reported working JH4IUO and JH6CDI around 2230 UTC. Other JAs heard were JA1BK, JE1BMJ, JHØINP and JH7MSB. This may be an all time record duration opening between Japan and W1 on 50 MHz (including F2).

N3DB reports working four JAs during the big opening to Japan; three answered his CQ. Al, K3TKJ, ran a JA pileup from Maryland and logged over 30 JAs — amazing! Dave also picked up JW7QIA on the 29th.

The month ended on June 30 with a strong opening from CU2JT and the Canary Islands to the Midwest. Bill, KØHA, reports the CU2JT and the EA8s were the strongest he has heard them this season. They peaked around 2200-2330 UTC. Band open again from the East Coast to Japan. I heard JE1BMJ weakly from Salina, Kansas at 2355 UTC.

### 6 Meter Firsts

Ed Stallman, N5DG, claims a "6 meter first" with Saba Island. He worked PJ6D on June 23 at 1457 UTC on 50.106 MHz. Congratulations to Ed.

Bob Magnani, K6QXY, worked Li, BA4SI, on June 29 at 2326 UTC for another "6 meter first." Well done! KR7O worked BA4SI just 2 minutes later at 2328 UTC.

### East Coast USA to China?

K3CB (FM18) spotted hearing BA4SI the following morning at 1643 UTC in the midst of an East Coast to Europe opening.

**2 Meters**. 'Twas the night before the ARRL June VHF Contest (June 10) at about 2330 UTC and Mike, N1JEZ, files this report: "I was in East Burke, Vermont listening to one of the FM stations that I work for as an engineer (WVTI, 106.9 MHz, VPR Classical) when all of a sudden it was completely wiped out by a station doing a car dealer commercial in Lawrence, Kansas. [Probably KTPK 106.9 MHz Topeka — *NØJK*]

"I quickly drove up to my camp in FN44ar where I was going to operate the contest and fired up 2 meters. From FN44ar, I worked WØRT (EM27), W6ZI (EM26), NØIRS (EM29) and K5SW (EM25).

"There were two other stations close by me that also worked stations — Chip, W1AIM, and Larry, K1LPS. It was interesting that at times, I could hear and work a station and neither Chip nor Larry heard them. Then the condition would reverse. They are both about 10-15 km away from me."

On the heels of the PJ opening June 10, 2 meter $E_s$ appeared. At least two $E_s$ centers were observed. One supported contacts from

the Midwest to Florida, the other from the Midwest to New England and the northeastern states. W3EP in CT reported working KS and NE stations including NØLL (EM09). Larry, NØLL, made around 30 2-meter $E_s$ contacts and also noted two distinct $E_s$ centers.

On June 10 John, WØZQ, MN worked WB3JVD, WV; WB2RVX, NJ; K4HJF, VA; N3JTN, MD; K9OYD, VA; N3NWJ, PA; K4RTS, VA; K3ARM, DE (rare); K2PQI, WV, and W4TJ, VA around 2349 UTC. June 22 saw K5SW (EM25), AA5JG (EM04) and others working Arizona via $E_s$ around 1945 UTC. NQ7R (DM42), W7IXA (DM43) and KA7CVJ (DM43) were among those participating from the west. On June 23, W7GJ, MT, reported $E_s$ to K7ICW (DM62) and was heard by N5JEH at 0226 UTC.

**Tropospheric ducting**. Not many reports of tropo this month.

### NJØW "Mega Rover" Expedition

David, NJØW, embarked on a mega multigrid rover expedition (**www.6t6kix.com/pages/ham/nj0w.htm**) to activate rare grids this summer on 6 meters. He planned activity in nearly 100 grids. (A "reverse" 50 MHz VHF/UHF Century Club?) I talked to him June 28 on 6 meters while he was on the DN53/54 grid line. He had a nice signal into Kansas and he told me he will make notes about his trip. I plan to feature his activity in a future column. This was a great way for those chasing the FFMA award to pick up rare grids.

### Burwood Island (EL58) Activation

The K5N operation to activate Burwood Island (EL58) was canceled due to high waters from the Mississippi River. Refer to the "DXpeditions" link on **www.kcvhfgridbandits.com** for more information.

# ARRL VEC Volunteer Examiner Honor Roll

The ARRL VEC Honor Roll recognizes the top 25 Volunteer Examiners according to the total number of exam sessions they have participated in since their accreditations. Since each session requires an average time commitment of 2-4 hours or more, the thousands of hours these VEs have invested is extraordinary! Whether you are one of our VE Teams that test once a week, once a month or once a year, we want to express our warmest appreciation to all volunteers for their generous contribution to the ARRL VEC program.

If you are an ARRL VE, you can see your session stats online at **www.arrl.org/ve-session-counts**.

If you're not a VE, become one! See **www.arrl.org/become-an-arrl-ve**.

| *Examiner* | *Sessions* | *Accreditation Date* | *Examiner* | *Sessions* | *Accreditation Date* |
|---|---|---|---|---|---|
| Sammy Neal, N5AF | 511 | 20-Nov-84 | John Hauner, KØIH | 299 | 11-Jan-85 |
| Harry Nordman, ABØSX | 465 | 9-Jan-02 | David Fanelli, KB5PGY | 297 | 1-Oct-91 |
| Kevin Naumann, NØWDG | 372 | 17-Nov-02 | Richard Morgan, KD7GIE | 291 | 11-Aug-00 |
| David Bartholomew, ABØTO | 370 | 22-Mar-02 | Daniel Calabrese, AA2HX | 289 | 1-Nov-91 |
| Royal Metzger, K6VIP | 368 | 29-Apr-85 | Jeanette Nordman, ABØYX | 287 | 21-Aug-03 |
| Franz Laugermann, K3FL | 365 | 1-Dec-91 | Gary Mangels, AD6CD | 282 | 30-Jul-97 |
| Karen Schultz, KAØCDN | 364 | 6-Sep-84 | Michael Faucheaux, N5KBW | 279 | 15-Jul-96 |
| John Moore III, KK5NU | 346 | 21-May-95 | Frankie Mangels, AD6DC | 278 | 14-Oct-97 |
| John Mackey Jr, KSØF | 331 | 1-Oct-90 | Robert Hamilton, NØRN | 277 | 19-May-87 |
| Paul Maytan, AC2T | 325 | 6-Sep-84 | Loren Hole, KK7M | 275 | 6-Sep-84 |
| William Martin, AIØD | 318 | 1-Nov-84 | Adolph Chris Koehler, K5VCR | 274 | 29-Sep-95 |
| Victor Madera, KP4PQ | 314 | 1-Mar-92 | Roy Johnson, N1IKM | 272 | 24-Jul-95 |
| Gerald Grant, WB5R | 305 | 4-Jan-85 | | | |

## Sean's Picks

*Contest Manager Sean Kutzko, KX9X*

All dates/times are in UTC.

- **State QSO Parties this month:** Arkansas, Colorado, Connecticut, South Carolina, Tennessee, Texas, Washington (Salmon Run)
- **QRP contests this month:** MIQRP Labor Day Sprint (Sep 5-6), ARS Spartan Sprint (Sep 6), QRP ARCI VHF Contest (Sep 10-12), Flying Pigs Run for the Bacon (Sep 19), NAQCC Monthly QRP Sprint (Sep 22), NJQRP's Fall QRP Homebrewer Sprint (Sep 27).
- **All-Asian DX Contest, Phone (Sep 3-4):** It's DX, it's all of Asia! Point the beams to the west and work a ton of DX. Exchange is a signal report and your age; to show chivalry isn't dead, YLs may sign 00.
- **Worked All Europe DX Contest, Phone (Sep 10-11):** One of the best events on the calendar. EU operators can ask you for "QTC," or a list of other QSOs in your log. This makes the contest unique in the pack. Try this one — it is a lot of fun.
- **ARRL September VHF QSO Party (Sep 10-12):** 6 meters and up is the place to be for the last big VHF contest of the calendar. Exchange is your 4-digit grid square. Technicians can have a good time with this one, operating from your car as a Rover or from your favorite hilltop.
- **North American Sprint, Phone (Sep 18):** 4 hours of SSB intensity. You can only make a maximum of 2 QSOs on the same frequency before you must QSY. Everybody stays moving in this event.
- **CQ WW RTTY Contest (Sep 24-25):** The first "WW" of the season! Everybody works everybody in this 48 hour RTTY fest. Getting on RTTY has never been easier; a PC and a soundcard interface will make you QRV. Give it a try and have a great time!

## September 2011 W1AW Qualifying Runs

W1AW Qualifying Runs are 10 PM EDT Friday, September 2 (0200Z September 3) and 7 PM EDT (2300Z) Wednesday, September 14 (10-40 WPM). The West Coast Qualifying Run will be transmitted by station K6KPH on 3581.5, 7047.5, 14,047.5, 18,097.5 and 21,067.5 kHz at 2 PM PDT (2100Z) Saturday, September 10. Unless indicated otherwise, speeds are from 10-35 WPM.

## In the September/October "Contesting 101"

**"Basic Troubleshooting & Technical Skills."** Kirk, K4RO, introduces ops to some things to do when things go wrong in the heat of battle. Contesting 101 can be found in the *National Contest Journal*, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

# SPECIAL EVENTS

***Contact these stations and help commemorate history. Many provide a special QSL card or certificate!***

**Aug 13, 1400Z-2000Z, N3QC**, Clearfield, PA. Quad-County Amateur Radio Club. Super 322 Drive-in/Car Show. 14.250 7.250. Certificate. QCARC, 3319 Allport Cutoff, Morrisdale, PA 16858. **qcarc.org**

**Aug 13, 1700Z-2359Z, NI6IW**, San Diego, CA. USS *Midway* (CV-41) Museum Radio Operations Room. US Coast Guard Birthday 1790, Navy Dental Corp Birthday. SSB 14.320 7.250 PSK31 14.070 D-STAR 012C 2 m 70 cm SOCAL rptrs. QSL. USS *Midway* Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101-5811. **kk6fz@arrl.net**

**Aug 20-Aug 21, 1600Z-2100Z**, KU2US/W2COP, Rochester, NY. Charlotte-Genesee Light House US-320. 14.260 7.250. QSL. Ken Villone, PO Box 185, Conesus, NY 14435.

**Aug 26-Aug 28, 1400Z-2000Z, WØN**, Gardner, KS. Santa Fe Trail Amateur Radio Club. Kansas Sesquicentennial QP. 21.340 14.240 7.240. QSL. Lon Martin, 20900 W 52nd St, Shawnee, KS 66218-94. **ksqsoparty.org**

**Aug 27-Aug 28, 1500Z-0300Z, K5SRC**, Stillwater, OK. Stillwater Amateur Radio Club. Payne County Fair. 14.270 7.260 3.885. QSL. Nelson J. Ehrlich, 1716 Summit Ridge Dr, Stillwater, OK 74074. *Monitoring freqs Aug 26 - Aug 27 2000Z-0300Z; QSL requests will be honored.* **wb5ona@arrl.net**

**Sep 2-Sep 3, 2300Z-1900Z, WA5HOT**, Brady, TX. Heart of Texas Ham Operators Group. World Championship Barbecue Goat Cookoff. 14.213 7.213 3.813. Certificate. Heart of Texas Ham Operators Group, 1103 S China St, Brady, TX 76825. **www.hothog.org**

**Sep 3-Sep 5, 1900Z-1900Z, K7RDG**, Paradise, AZ. Cochise Amateur Radio Association. Ghost Town of Paradise. 21.315 18.115 14.315 7.230. Certificate & QSL. Cochise ARA, PO Box 1855, Sierra Vista, AZ 85636. *32nd Anniversary.* **www.k7rdg.org**

**Sep 3-Sep 11, 1400Z-0200Z, K4S**, Martin, TN. Weakley County TN ARES. 18th Annual Tennessee Soybean Festival. Various times, modes and bands through the week from various QTHs. QSL. Roger Elmore, KJ4AJP, 426 Jowers Rd, Martin, TN 38237. Schedule at **ares.mambm.com/event**

**Sep 5, 1215Z-1800Z, K1R**, Northfield, MA. 72 Rag Chew Net. Labor Day. 7.271 (1215Z-1000Z) 7.272 (1000Z-1800Z). Certificate. Robert Lobenstein, WA2AXZ, 1985 East 36 St, Brooklyn, NY 11234. **www.ragchewers.net**

**Sep 8-Sep 11, 0800Z-2000Z, NA1RL**, Hebron, CT. Newington Amateur Radio League. Hebron Harvest Fair. 28.350 18.150 14.250 7.250. QSL. Richard Lawrence, KB1DMX, 335 Lloyd St, Newington, CT 06111. *No SASE needed.* **www.narl.net**

**Sep 9-Sep 10, 2200Z-2200Z, W5CCH**, Oklahoma City, OK. Oklahoma City-County Health Department Amateur Radio Club. Operation Pigeon Link. 14.265 7.265 PSK 14.070.15. Certificate. Dave Cox, Oklahoma City-County Health Department, 921 NE 23rd St, Oklahoma City, OK 73105. **www.occhd.org/w5cch**

**Sep 9-Sep 11, 1500Z-0200Z, K4Y**, Tompkinsville, KY. Monroe County Amateur Radio Group. Old Mulkey Meeting House Special Event. 28.415 14.280 7.230 3.945. Certificate & QSL. 3rd Annual Old Mulkey Meeting House State Park, 38 Old Mulkey Park Rd, Tompkinsville, KY 42167. **kd4qhg@yahoo.com**

**Sep 9-Sep 11, 2300Z-2300Z, NØL**, Lincoln, NE. Lincoln Amateur Radio Club. Guardians of Freedom Airshow. 28.450 21.365 14.330 7.282 3.982. QSL. Lincoln Amateur Radio Club, PO Box 5006, Lincoln, NE 68505. *Operating times: Sep 9 2300Z - Sep 10 0300Z, Sep 10 1400Z - Sep 11 0300Z and Sep 11 1400Z to 2300Z.* **k0kkv.org**

**Sep 10, 1300Z-2100Z, W8Z**, Zanesville, OH. Muskingum Valley Ham Radio Club. The Home Depot Air Show. 7.250 146.610 W8ZZV Repeater. Certificate & QSL. Jim Mayercak, WX8J, 971 Somers St, Zanesville, OH 43701. **www.qsl.net/n8hr/index.html**

**Sep 10, 1700Z-2359Z, NI6IW**, San Diego, CA. USS *Midway* (CV-41) Museum Radio Operations Room. First Nuclear Powered Aircraft Carrier USS Enterprise (CVAN-65) Launched 1960; US Air Force Birthday 1947. SSB 14.320 7.250 PSK31 14.070 D-STAR 012C 2 m 70 cm SOCAL rptrs. QSL. USS *Midway* Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101-5811. **kk6fz@arrl.net**

**Sep 10-Sep 11, 0200Z-0400Z, N1Y**, Hancock, NY. Symbol Technologies Amateur Radio Club. Always Remember 10th Anniversary of the Attacks of 9/11/2001. 50.135 14.070 7.240 3.911 D-Star REF10C. QSL. STARC, One Motorola Plaza, B-13, Holtsville, NY 11742. *Reading one name of the fallen with every QSO.* **w2sbl@motorolasolutions.com**

**Sep 10-Sep 18, 0000Z-2359Z, K8H**, Delaware, OH. Delaware Amateur Radio Association. 26th All-Horse Parade. 21.340, 21.040 14.340, 14.040 7.240, 7.040 3.840, 3.540. Certificate. *Online Special Event certificate only, for details see* **www.k8es.org**

**Sep 10-Sep 18, 0000Z-2359Z, K4MIA**, Loxahatchee, FL. PBSE Radio Society. National POW/MIA Recognition Day. 21.300 18.150 14.265 PSK 14.070 7.185. QSL. Michael Bald, 6758 Hall Blvd, Loxahatchee, FL 33470. *May operate from 68-16425 UH1H Huey helicopter at VA Hospital; please take time to honor our POWs/MIAs on Friday, Sep 16.* **qrz.com/db/k4mia**

**Sep 11, 0800Z-1400Z, N4Y**, Rock Hill, SC. Bethesda Volunteer Fire Department Amateur Radio Club. York County, SC 9/11 Monument Dedication. 14.240. QSL. Bethesda Volunteer Fire Department, PO Box 8022, Rock Hill, SC 29732.

**Sep 11-Sep 12, 1100Z-0100Z, K4AF**, Arlington, VA. Pentagon Amateur Radio Club. Pentagon Tenth Anniversary Commemoration of 9-11 Attacks. 21.290 14.240 7.190 3.815. QSL. Pentagon Amateur Radio Club, PO Box 2322, Arlington, VA 22202. *Honoring all those lost on 9-11. Active frequencies posted during event.* **www.k4af.org**

**Sep 12-Sep 16, 0700Z-2100Z, GB5SCT**, Honiton, England. RSGB. St Cyrus Shutter Telegraph – Over 200 Years. 14.200. QSL. Via bureau or John Wakefield, 'Oakhurst,' Lower Common Rd, West Wellow, Romsey, Hampshire SO51 6BT, England. **www.qrz.com/db/gb5sct**

**Sep 16-Sep 17, 1400Z-2100Z daily, W5O**, Hershey, PA. Class of 1961, Milton Hershey School. 50th Reunion. 18.150 14.250 7.250. QSL. Fred Weaver, PO Box A, Zuni, VA 23898. **www.qrz.com/db/kg4bki**

**Sep 17, 0200Z-0900Z, W2GLQ/W2A-W2E**, Nutley, NJ. Nutley Amateur Radio Society. The Hudson Lights. 21.300 18.155 14.250 7.250. Certificate & QSL. Dave Calo, KD2C, 10 Lynwood Rd, Verona, NJ 07044. *Six lighthouses on the NY-NJ Hudson River.* ***W2A** Statue of Liberty ARLHS USA 810 with Robbins Reef ARLHS USA 695;* ***W2B** Little Red ARLHS USA 408;* ***W2C** Tarrytown ARLHS USA 836;* ***W2D** Stony Point ARLHS USA 293;* ***W2E** Esopus ARLHS USA 276.* **www.qrz.com/db/w2glq** *or* **www.nutleyradio.org**

**Sep 17-Sep 18, 1300Z-2100Z, K4EG**, Burlington, NC. Alamance Amateur Radio Club. Carousel Festival, Celebrating 101 Years of the Dentzel Carousel. 14.275 7.200. QSL. Carousel Festival, c/o K4EG, PO Box 391, Elon, NC 27244.

**Sep 17-Sep 24, 1100Z-2200Z, N7O**, Hilltown, PA. Philadelphia Glider Council. 70th Anniversary 7.200 3.900. QSL. All QSLs by e-mail only. *70 years as a glider club and 100 years of aviation.* Web cam **www.pgcsoaring.org/index.php**. **N7O@juno.com**

**Sep 18-Sep 19, 1300Z-2100Z, W4CA**, Roanoke, VA. Roanoke Valley Amateur Radio Club. Blue Ridge Bonanza. 14.298 14.228 7.293 7.193. Certificate. Roanoke Valley Amateur Radio Club Inc, W4CA, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

**Sep 23-Sep 25, 1700Z-1700Z, W1Y**, Meredith, NH. Merrimack Valley YMCA and WA1VKO. Celebration of Camp Kitchen Renovations. 21.300 14.200 7.225 3.850. QSL. Michael Murphy, WA1VKO, Box 1024, East Hampstead, NH 03826. *Operating from Bear Island, Lake Winnipesaukee, NH. US Islands NH 17L.*

**Sep 24, 1200Z-2000Z, W8BAE**, Galion, OH. CCARC. Crawford County Amateur Radio Club. 50th Anniversary. 14.235 7.200 7.060 14.070 PSK. Certificate. Keith A. Moore, 331 S Market St, Galion, OH 44833. *Certificate can be downloaded*. **www.w0sjs.com/w8bae/**

**Sep 24, 1330Z-1830Z, NC4AR**, Thomasville, NC. Tri-County Amateur Radio Club. Everybody's Day. 7.210 145.29, 53.010, Linked. Certificate. NC4AR, PO Box 747, Trinity, NC 27370. *Oldest Festival in North Carolina.*

**Sep 24-Sep 25, 1500Z-2130Z, N4WIS**, Virginia Beach, VA. USS Wisconsin Radio Club. USS *Wisconsin* Final Decommissioning Special Event. 14.264. QSL. N4WIS-USS *Wisconsin* Radio Club, PO Box 6682, Virginia Beach, VA 23456. **www.n4wis.org**

**Special Events Announcements**: For items to be listed in this column, use the ARRL Special Events Listing Form at **www.arrl.org/special-events-application**. A plain text version of the form is available at that site, or you may request a copy by mail or e-mail. Off-line completed forms can be mailed, faxed or e-mailed.

Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; a special event listing for **Nov** *QST* would have to be received by **Sep 1**.

You can view all received Special Events at **www.arrl.org/special-event-stations**.

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

# ARRL Foundation Presents the 2011 Scholarship Winners

The ARRL Foundation is proud to present the winners of the scholarship awards for the 2011-2012 academic year. The value of the 67 scholarship awards for 2011 totals $81,950! These scholarship winners join the 2011 Goldfarb Scholarship winner, Peter Yao, AC8EF. The Board of Directors offers its heartiest congratulations to each of these bright young hams who represent the future of Amateur Radio. The application period for the 2012 Scholarship awards opens October 1, 2011.

**Kevin Ackerman, KJ4AYX**
The Earl I. Anderson Scholarship

**Michael Almeter, W4MJA**
The Northern California DX Foundation Scholarship

**Jessica Amundsen, KC9OJK**
The Six Meter Club of Chicago Scholarship

**Edwin Bittner, WA7JB**
The Dayton Amateur Radio Association Scholarship

**Caitlin Brady, W3CJB**
The YASME Foundation Scholarship

**Alex Brech, KCØYLD**
The Bill Salerno, W4ONV and Ann Salerno Memorial Scholarship


**Nicholas Brennan, KD7YDD**
The Mary Lou Brown Scholarship

**Morgan Burcham, KE5VFK**
The Bill Salerno, W4ONV and Ann Salerno Memorial Scholarship

**Michael Burns. KC2IXA**
The FEMARA Scholarship

**Lisa Capobianco, KB1HZY**
The FEMARA Scholarship

**Amber Clevenger, KC9NYN**
The Dayton Amateur Radio Association Scholarship

**Caroline Crockett, KJ4JHA**
The L. B. Cebik, W4RNL and Jean Cebik, N4TZP Scholarship

**Douglas Dawson, KD5ZBS**
The Fred R. McDaniel Scholarship

**Andrew Deutchman, KC2YZN**
The Androscoggin ARC Scholarship

**Elizabeth Doye, KB9YBN**
The Peoria Area Amateur Radio Club Scholarship

**Frances Doyle, AJ4JQ**
The Gwinnett Amateur Radio Society Scholarship

**Ari Falk, K5ARI**
The General Fund Scholarship

**Matthew Ferranti, KG6WEN**
The YASME Foundation Scholarship

**Thomas Fielitz, KC8YAK**
The Zachary Taylor Stevens Scholarship

**William Freeman, N4NJJ**
The Norman E. Strohmeier, W2VRS, Memorial Scholarship

**Forrest Gasdia, AB1LG**
The Yankee Clipper Contest Club, Inc. Youth Scholarship

**Robert Giuliani, K1RJG**
The FEMARA Scholarship

**Brandon Graham, KB3IGC**
The You've Got A Friend in Pennsylvania Scholarship

**Alexander Haley, KC2RDK**
The Henry Broughton, K2AE Memorial Scholarship

**David Hall, KCØWNP**
The Paul and Helen Grauer Scholarship

**Elizabeth Harper, AK3H**
The K2TEO Martin J. Green Sr. Memorial Scholarship

**Jason Harris, KJ4IWX**
The L. Phil and Alice J. Wicker Scholarship

**Robert Hoops, W3EGL**
The You've Got A Friend in Pennsylvania Scholarship

Mary M. Hobart, K1MMH ♦ Secretary, ARRL Foundation Inc ♦ mhobart@arrl.org

**Jordan Hoover, KC9PXM**
The Scholarship of the Morris Radio Club of New Jersey

**Michael Hughes, KJ4WLW**
The IRARC, Joseph P. Rubino, WA4MMD, Memorial Scholarship

**Noah Jaffe, W4IEI**
The Charles Clarke Cordle Memorial Scholarship

**Stephanie Klimczak, KDØBFH**
The PHD Amateur Radio Association Scholarship

**Tyler Lehman, KC9FKE**
The Chicago FM Scholarship

**Kerry Manderbach, KØXOK**
The Paul and Helen Grauer Scholarship

**Rebecca Mareck, KB3MOG**
The YASME Foundation Scholarship

**Johnathan Mayo, AB3FX**
The Gary Wagner, K3OMI Scholarship

**Andrew McLuckie, K3AWM**
The Northern California DX Foundation Scholarship

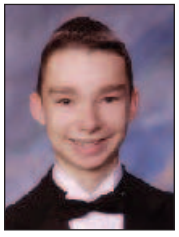
**Karen Nisley, KC2SYU**
The Perry F. Hadlock Memorial Scholarship

**Javen O'Neal, KF7HNI**
The Northern California DX Foundation Scholarship

**Tauni Orton, KI6DGQ**
The Central Arizona DX Association Scholarship

**Kendall Pruitt, KE5VBP**
The Magnolia DX Association Scholarship

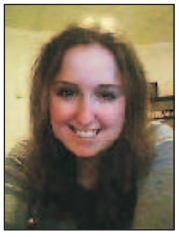
**Christopher Reffett, KJ4ALG**
The L.B. Cebik, W4RNL, and Jean Cebik, N4TZP Memorial Scholarship



**Eric Rice, KG6SIH**
The Charles N. Fisher Memorial Scholarship

**Alyssa Rios, KI6EEK**
The General Fund Scholarship

**Andrea Rollert, KD8FNY**
The David Misek Memorial Scholarship



**Stephanie Schaefer, KC2NSA**
The Donald Riebhoff Memorial Scholarship

**Jeremy Schotter, KC9GIC**
The Earl I. Anderson Scholarship

**James Schwoebel, KJ4PLS**
The Carol J. Streeter Scholarship

**Weston Scow, KE7GEN**
The Charles N. Fisher Memorial Scholarship

**Megan Sergeant, KF5ICI**
The Tom and Judith Comstock Scholarship

**Stephen Simpson, KC8IOY**
The Orlando Hamcation Scholarship

**Jordan Smith, KC8RSW**
The Richard W. Bendickson, N7ZL Memorial Scholarship

**Sarah Stanley, KE5WEJ**
The Dayton Amateur Radio Association Scholarship

**Matthew Suhadolc, KC9TMG**
The Edmond A. Metzger Scholarship

**Joseph Timmerman, KC9BVY**
The Dayton Amateur Radio Association Scholarship

**Samuel Turner, KB1PHP**
The FEMARA Scholarship

**Andrew Watson, KJ4QKI**
The YASME Foundation Scholarship

**John Wheeler, KD7YZD**
The William Bennett, W7PHO, Memorial Scholarship

**Russell Willmot, KC9SVD**
The Earl I. Anderson Scholarship

**Samantha Young, KC9ENB**
The Thomas W. Porter, W8KYZ Scholarship

**Alex Zimmer, KB1NTB**
The FEMARA Scholarship

*Not shown:* Adam Draughon, KF5IXQ, The Mississippi Scholarship; Doniel Gudeman, KE7AVV, The Ted, W4VHF, and Itice, K4LVV Goldthorpe Scholarship; Timothy Kelley, KC2SPY, The Dr. James L. Lawson Memorial Scholarship; Tyler Martinez, KJ4FGD, The Wayne Nelson, KB4UT, Memorial Scholarship; Rebecca Rich, KBØVVT, The Ray, NØRP & Katie, WØKTE, Pautz Scholarship, and Tannel Troxler, KF5IZX, The Louisiana Scholarship.

K2TQN

# VINTAGE RADIO

# Mary Day Lee, an Unusual Elmer

*This month's column is from guest author James E. O'Neal, AG4DH. He has done his own share of research regarding the "Brooklyn radio boys," and has previously published accounts of Ms Lee's accomplishments. Mr O'Neal is a retired broadcast engineer and now serves as technology editor for* TV Technology *magazine. He frequently contributes articles about radio's early years to several publications.*

The use of the term "Elmer" to describe an Amateur Radio mentor or instructor seems to have first appeared relatively recently, but the concept of "Elmering" goes back much further in our hobby.[1] A few years ago, while trying to substantiate the famed Reginald Fessenden's 1906 Christmas Eve broadcast story, I encountered an unexpected case of Elmering involving the very first generation of Amateur Radio operators.

One of the more important items in my search for the truth about the 1906 broadcast was an early radio logbook kept by one Francis (Frank) Hart. This document, which now resides in the Smithsonian Institution, was begun by Hart in the fall of 1906 when he was 14, and spans nearly 3 years, ending when he left home to take his first job as shipboard radio operator.

The logbook was donated to the Smithsonian at the behest of Lloyd Espenschied, one of Hart's boyhood pals. More information began to turn up about Hart and Espenschied, as did names of other young people who grew up in a certain Brooklyn, New York neighborhood early in the 20th century. The common thread was radio. There seemed to be an unusual amount of activity on that front. A newspaper clipping from that era focusing on the potential for interference to commercial and military radio operations alludes to the growth of the Brooklyn amateur community during radio's first decade: "Wireless telegraph officials and operators have been much worried of late by a rapid increase in the number of stations maintained by amateurs in Brooklyn."[2]

## Whetting Their Appetite

I soon began to wonder what was in that community's "drinking water" that spawned such a large interest in radio by young people. My investigation eventually led me to discover that the common factor was a neighborhood learning center, the Brooklyn Children's Museum, an institution that was established in 1899 and is still very active today.[3]

My first assumption was that there was an electrical/wireless program, probably conducted by a "sparks" from the Brooklyn Navy Yard or perhaps by someone moonlighting from an area commercial wireless station — Marconi, Fessenden and De Forest all had fledgling shore stations then.

I chipped off more pieces and found that I was wrong, very wrong. The wireless instructor was a museum staffer and a young woman. Now to put this in perspective, all this was happening when voting rights for women were more than a decade away.

I don't wish to appear sexist, but history teaches us during the early 1900s a woman's place was in the home. (De Forest and one of his wives wound up in the divorce courts when she insisted on pursuing her career as an engineer after they were married.) Oh, it was okay to be a librarian or teacher, or maybe a landline telegrapher or sweatshop worker. But radio? No way. This was a man's field with its high voltage "rock crusher" spark rigs, tall masts to climb, very heavy equipment. Yet, everything pointed to one Mary Day Lee, a Barnard College graduate and then assistant curator at the Children's Museum.

We'll never know when or why Ms Lee became interested in the sciences, especially radio, or even when and how she got to New York (she was born in Richmond, Virginia in 1879, making her 26 when she began mentoring Brooklyn youngsters). A check with Barnard showed that Ms Lee had taken many of the science courses offered, as well as classes in education, but she did not

[1]R. Newkirk, W9BRD, "How's DX?" *QST*, Mar 1971, p 91.

[2]The quote is from a newspaper clipping in the Hart family scrapbook. It was saved without a date or newspaper identification, but most likely appeared in a Brooklyn or New York City newspaper in mid-to late 1907.

[3]J. Dilks, K2TQN, "Vintage Radio," *QST*, Aug 2011, pp 90-91.

PENNSYLVANIA STATE ARCHIVES

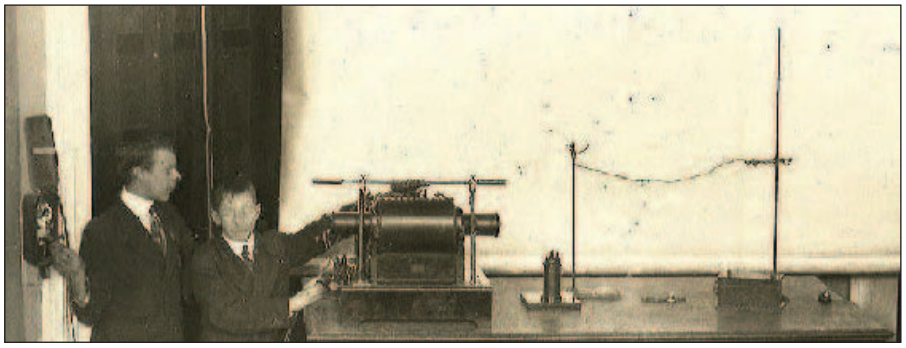
**Mary Day is seen with three of her young protégés in this 1907 photograph. All went on to pursue productive careers in radio engineering. Shown from the left are Austin M. Curtis, Mary Day Lee, Lloyd Espenschied and Frank Hart.**

GEORGE FLANAGAN

**This Bedford Park mansion became the first home of the Brooklyn Children's Museum in 1899. One of the Museum's radio station antenna supports is visible in this photo. It supported a 250 foot antenna suspended 85 feet above ground.**

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

BROOKLYN CHILDREN'S MUSEUM



**Ms Lee's lectures and demonstrations of electrical apparatus were a popular attraction at the Brooklyn Children's Museum. She also frequently lectured on other scientific topics.**

JAMES E. O'NEAL, AG4DH


**Mary Day Lee's final resting place in the White Plains (New York) Rural Cemetery shows that, long before hyphenated last names became popular in marriage, she maintained her identity after her marriage to Henry Weisse.**

BROOKLYN CHILDREN'S MUSEUM

**In 1916, the Museum's station was rebuilt under the direction of Ms Lee to improve its appearance and efficiency. It also operated with a new federally assigned call of "2KP." The reworked station sported a 13.2 kV, 500 W spark coil.**

major in the sciences, as Barnard students didn't have majors back then. Regardless, her studies qualified her to teach or work in a technical field.

## Theory and Practice

Ms Lee was fresh out of college in the fall of 1905 when she began her 17 year association with the Museum. Not long after starting, she constructed a wired telegraph system and began to offer code instruction to neighborhood children.

Surviving documentation reveals that her Museum lectures were so popular that even with a hall seating 60 persons, the talks had to be repeated as many as six times a day to accommodate the number of young people seeking information on the sciences, especially radio.

Her telegraph system soon spread out into the community, with several young people installing interconnecting lines to their homes. Within a short time, this landline operation morphed into a fully fledged wireless station constructed in Lee's office so she could monitor its operation. The station featured a 250 foot long antenna at a height of 85 feet coupled to an "X-Ray" induction coil driven by a mechanical interrupter (commercial power delivered to the Museum was dc). Most likely a Fessenden-style electrolytic detector served as the nucleus of the receiver. The call sign, "CM" (Children's Museum), was self-assigned, which was typical back then.

CM was rebuilt and improved several times, eventually falling in line with regulations and licensing requirements when the government stepped in a few years after Lee started the station. The CM call was dropped in favor of the federally assigned "2KP."

## Radio Silence

The Museum station operated for more than 10 years, with scores of young Brooklynites learning the wireless "ropes" through its operation. This continued until 1917 and the entry of the United States into the World War. Day quickly complied with President Wilson's edict that mandated the shutting down of such stations and the dismantling of their equipment.

Lee continued to teach code and electronics classes and must have experienced gratification upon receiving letters from many of the young men she had previously trained, when they informed her that they had become radio operators in the American Expeditionary Forces sent to Europe.

As far as can be determined, the Museum station was never reassembled and in 1923 Lee, by then married to Henry Weisse, left Brooklyn for White Plains, New York. Her husband had a job there and the distance to Brooklyn made a daily commute impractical. After relocating, she continued her work in education, becoming a teacher in the public school system.

Ms Lee is not remembered in radio histories, but certainly had a large part in shaping many young people for radio careers. Some of her more notable students include the aforementioned Lloyd Espenschied, who made his career at Bell Labs and became coinventor of coaxial cable. Frank Hart worked for several radio companies, including De Forest and American Marconi before eventually becoming manager of the Mackay Radio and Telegraph communications facility on Long Island. Austin Curtis, another of Lee's Museum students, also went to work at Bell Labs and was part of the team that set up the world's first long-distance radiotelephony test in 1915.

Alfred P. Morgan, a name familiar to many in connection with the large number of books he authored popularizing science for young people, was also touched by Ms Lee and reflected his association with her in a 1941 publication, *First Radio Book for Boys*: "I visited the Children's Museum in Brooklyn, where an unusual young woman, Miss Mary Day Lee, a member of the Museum staff, not only encouraged boys to experiment with electricity and wireless telegraphy, but was able to aid and assist them. My hat is still off to the young woman who could discuss with you the fine points of winding a spark coil."

Mary Day Lee Weisse died at the age of 90 on April 17, 1970. Perhaps the concept of "Elmering" should be changed to include "Mary Day Lee-ing" too.

## Acknowledgments

The author wishes to acknowledge the following individuals who assisted in the preparation of this article: his spouse, Pamela A. O'Neal; Jane Johnson, Mecklenburg County (North Carolina) Public Library; George Flanagan, W2KRM; Beth Alberty, Brooklyn Children's Museum; Anne-Rhea Smith, Brooklyn Children's Museum; Miriam Berg Varian, White Plains (New York) Public Library, and Harold Mercer Jr, White Plains (New York) Rural Cemetery.

WB8IMY

# ECLECTIC TECHNOLOGY

# The Mad Scientist in the Attic

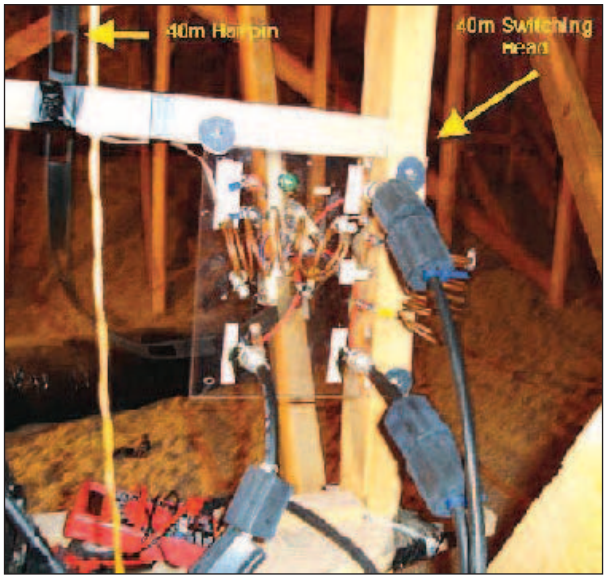
Jeff Blaine, ACØC, is a mad scientist in the most complimentary sense of the term. If you were to drive by his home, however, you'd see nothing out of the ordinary. You wouldn't even guess that an Amateur Radio operator — or a mad scientist — was in residence.

But Jeff is a ham indeed, and a very active one at that. Although he lives in an antenna restricted area, he never allowed that prohibition to stop him from pursuing his particular passion: HF DXing and contesting. Many amateurs use their attics to hide clandestine antennas, but Jeff has taken this approach to the ultimate level. He has turned the attic of his home into veritable HF antenna farm.

ACØC

**One of ACØC's earlier attic experiments — a 20 meter wire beam antenna.**

ACØC




**From his presentation, a portion of ACØC's 40 meter attic array.**

Jeff is fascinated by the challenge of squeezing effective HF antennas into the smallest spaces, and like most similarly "mad" amateurs he is never satisfied. Jeff is forever tweaking his maze of wires, manipulating phase differences, adding new switching arrangements and so forth. He plots his antenna schemes with modeling software and careful analysis.

The result is an attic antenna system with competitive gain on several bands. I discovered Jeff after working him during an HF contest and marveling at his 10 dB over S9 signal — especially when I learned that it was coming from an attic antenna. That's why I asked him to write a sidebar on attic antenna techniques for my ARRL book *Small Antennas for Small Spaces*.

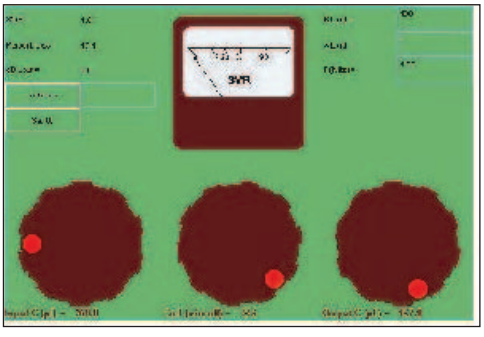
No, Jeff does not live in a mansion with a half acre of attic space. No, his attic is not planted atop a 20 story building. On the contrary, Jeff tends an antenna farm that's sequestered within a modest home. And before anyone asks, yes, he is careful to choose power levels that keep him well within RF Safety compliance.

Jeff's most recent attic experiment involves a 2 element, 40 meter reversible V beam. He has created a presentation outlining his approach and you can download it from the ARRL Web. Just go to the *QST* in Depth page at **www.arrl.org/qst-in-depth** and scroll down to the file QS0911AC0C.PDF.

Even with ever-increasing home antenna restrictions, Jeff's work is proof that it is still possible to enjoy Amateur Radio if you are willing to think outside the box. As Jeff would tell you, something as simple as two wires fed by a remote automatic antenna tuner will put you on the air from your attic in no time — and with a better signal than you might imagine.

## AN ONLINE ANTENNA TUNER

Speaking of antennas, Kevin Schmidt, W9CF, has created a clever *Java* applet that simulates a T-network antenna tuner. Just go to his Web page at **http://fermi.la.asu.edu/w9cf/tuner/tuner.html**. In the upper right corner of the "tuner" you can enter the resistance and impedance values, and the desired frequency. Now click your mouse cursor on the INPUT, COIL or OUTPUT knobs and turn them while watching the SWR meter. (If you are impatient and want to cut to the chase, click the AUTOTUNE button.) When you've achieved your desired SWR, note the capacitance and inductance values beneath the knobs and use them to build a real-world version of the same!




**The W9CF antenna tuner simulation at http://fermi.la.asu.edu/w9cf/tuner/tuner.html.**

Steve Ford, WB8IMY ♦ *QST* Editor ♦ sford@arrl.org

# CONVENTION AND HAMFEST CALENDAR

**Abbreviations**
*Spr* = Sponsor
*TI* = Talk-in frequency
*Adm* = Admission

**Arkansas (Little Rock) — Sep 17**
D F H R S T V
8 AM-3 PM. *Spr:* Central Arkansas Radio Emergency Net (CAREN). Catholic High School, 6300 Father Tribou St. *TI:* 146.94. *Adm:* $5. Tables: $10. Mark Barnhard, KD5AIV, 12563 Southridge Dr, Little Rock, AR 72212; 501-221-3909; **mbarnhard@aristotle.net**; **www.carenclub.com**.

**Colorado (Longmont) — Sep 25 F H R V**
8 AM-noon. *Spr:* Boulder ARC. Boulder County Fairgrounds Exhibit Building, 9595 Nelson Rd. 58th Annual Event. *TI:* 146.7. *Adm:* $5, under 13 free with paying adult. Tables: 6-ft, advance $10, door $15 (plus admission). Michael Derr, W3DIF, 13815 Meadowbrook Dr, Broomfield, CO 80020; 303-404-2161; **mderr44995@aol.com**; **www.qsl.net/w0dk**.

**Connecticut (Newtown) — Sep 11**
D F H R S T
8:30 AM-12:30 PM. *Spr:* Candlewood ARA. Edmond Town Hall, 45 Main St. Western CT Hamfest, batteries. *TI:* 147.3 (100 Hz). *Adm:* $6. Tables: $15 indoor ($8 per tailgate space; includes 1 admission). Joe de Groot, AB1DO, 30 Sunnyview Dr, Redding, CT 06896; 203-938-4880; **ab1do@arrl.net**; **www.danbury.org/cara/hamfest.html**.

## CONNECTICUT STATE CONVENTION

**October 9, Wallingford**
D F H R S T V

The Connecticut State Convention (19th Annual Event), sponsored by the Nutmeg Hamfest Alliance, will be held at the MountainRidge Resort, 350A High Hill Rd. Doors are open for indoor vendor setup and tailgating at 6 AM; public 8 AM-1 PM. Features include the largest flea market in Southern New England; indoor exhibitors; unlimited tailgating space; major vendors (**vendors@nutmeghamfest.com**); new and used equipment; forums; demonstrations; emcomm equipment and vehicles on display; Annual Meeting; VE sessions (Don Mitchell, KE1AY, **dmitchell1273@sbcglobal.net** or **vetest@nutmeghamfest.com**); plenty of free parking; excellent food at good prices. Talk-in on 147.36 (no PL). Admission is $7 (under 12 free). Tables are $30 each (8-ft and chair; includes 1 admission); outside spaces are $20 each (bring your own tables and tents, no electricity outside; includes 1 admission). Contact John Bee, N1GNV, 30 Tremont St, Meriden, CT 06450; 203-440-4468; **info@nutmeghamfest.com**; **www.nutmeghamfest.com**.

## FLORIDA STATE CONVENTION

**October 8-9, Melbourne**
D F H Q R S T V

The Florida State Convention (46th Annual Melbourne Hamfest), sponsored by the Platinum Coast ARS, will be held at the Melbourne City Auditorium, 625 E Hibiscus Blvd. Doors are open for setup on Friday 6-9 PM and Saturday 7-9 AM; public Saturday 9 AM-5 PM; Sunday 9 AM-2 PM. Features include great outdoor tailgate area ($10 per parking space), plenty of indoor commercial booths and swap tables, consignment table, VE sessions, excellent forums and meetings, ARES Badging, ARRL awards checking. Talk-in on 146.85. Admission is $6 in advance (before Sep 30), $7 (after Sep 30); under 13 free. Tables are $20. Contact John Lundberg, W2TX, c/o PCARS Melbourne Hamfest, Box 1004, Melbourne, FL 32902-1004; 321-723-7582; **w2tx@arrl.net** or **hamfest2011@pcars.org**; **www.pcars.org**.

**Florida (Odessa) — Sep 24 D F H R T**
8 AM-1 PM. *Spr:* Suncoast ARC. Gunn Hwy Flea Market, 2317 Gunn Hwy (SR 54). Pasco County Hamfest. *TI:* 146.64. *Adm:* $5 (nonham spouses and under 12 free). Tables: $1. Ron Wright, N9EE, 2265 Evenglow Ave, Spring Hill, FL 34609; 352-683-4476; **mccrpt@att.net**; **groups.yahoo.com/group/sarcmail**.

**Florida (Orlando) — Sep 17 F H R T**
Set up 7 AM; public 8 AM-2 PM. *Spr:* Bahia Shrine AR Unit. Bahia Shrine Center, 2300 Pembrook Dr. *TI:* 147.39 (103.5 Hz). *Adm:* $4. Tables: $6. Robert Chernesky, W1ZGE, 2615 Alena Pl, Lake Mary, FL 32746; 407-302-6910; **cherneskyr@bellsouth.net**; **www.bahiashrine.org/~radio/tailgate.htm**.

**Georgia (Blythe) — Oct 8 D H R S T V**
9 AM. *Spr:* ARC of Augusta. Blythe Area Community Center, 3129 Hwy 88. *TI:* 145.49. *Adm:* $6. Tables: $5. Doug Pugh, KE4JSJ, 1806 Birch Dr, N Augusta, SC 29860; 803-279-6725; **doug9945@yahoo.com**; **w4dv.org**.

**Georgia (Dallas) — Sep 17 F R T V**
8 AM. *Spr:* Paulding ARC. Paulding Meadows Park, 724 Paulding Meadows Dr. 21st Annual Hamfest. *TI:* 146.895 (77 Hz). *Adm:* Free. Tables: Free. Bill Houston, WD4LUQ, 438 Periwinkle Path, Dallas, GA 30132; 770-445-9191; **wd4luq@att.net**; **pauldingarc.com**.

**Georgia (LaGrange) — Oct 8 D F H R S T V**
9 AM-2 PM. *Spr:* LaGrange ARC. Oakside Baptist Church, 1921 Hamilton Rd. *TI:* 146.7 (141.3 Hz). *Adm:* Donation requested. Tables: $10. Anna Pike, KD4PCU, c/o LARC, Box 926, Roanoke, AL 36274-0926; 334-863-6814; **lagrangehamfest@yahoo.com**; **www.lagrangeradioclub.org**.

## W9DXCC CONVENTION

**September 16-17, Elk Grove Village, Illinois**
D H Q R S

The W9DXCC Convention (59th W9DXCC DX Convention and Banquet), sponsored by the Northern Illinois DX Assn, will be held at the Holiday Inn-Elk Grove Village, 1000 Busse Rd (Rte 83). Doors are open Friday eve for registration and Welcome Reception at 7:30 PM, Saturday registration at 8 AM, convention begins at 9 AM. Features include forums and presentations with world-renowned speakers; DXCC, WAS and VUCC card checking; CQ Awards; CW Copying Contest; W9D Special Event Station; Hospitality Suites (Friday and Saturday eves at 10 PM), banquet (Saturday, 6:30 PM; special guest speaker ARRL President Kay Craigie, N3KN). Admission for full convention is $60 in advance (by September 10), $65 after September 10. Admission for convention only is $35 in advance (by September 10), $40 after September 10. Contact Bruce Osterberg, N9BX, 10310 Fox Bluff Ln, Spring Grove, IL 60081; 815-678-0215; **n9bx@mchsi.com**; **w9dxcc.com**.

### Coming ARRL Conventions

**August 12-14**
Pacific Northwest DX, Everett, WA*

**August 20**
West Virginia State, Weston*

**August 20-21**
Alabama State, Huntsville*

**August 21**
Kansas State, Salina*

**August 28**
Western Pennsylvania Section, New Kensington*

**September 7-10**
RV Radio Network Fall Rally, Gordon, WI*

**September 9-11**
Southwestern Division, Torrance, CA*
QCWA, Warwick, RI*

**September 11**
Great Lakes Division, Findlay, OH

**September 16-17**
W9DXCC, Elk Grove Village, IL

**September 16-18**
ARRL/TAPR Digital Communications, Baltimore, MD

**September 17**
Roanoke Division, Virginia Beach, VA

**September 23-24**
SEDCO W4DXCC, Pigeon Forge, TN

**September 24**
Washington State, Spokane Valley

**September 25**
EmComm East, Rochester, NY

**October 8**
Pacific Northwest VHF, Bend, OR

**October 8-9**
Florida State, Melbourne

**October 9**
Connecticut State, Wallingford

**October 14-16**
Microwave Update, Enfield, CT
Pacific Division, Santa Clara, CA

**October 21-22**
Iowa State, Sergeant Bluff
West Gulf Division, Ardmore, OK

**November 6**
Iowa Section, Davenport

*See August *QST* for details.

D = DEALERS / VENDORS
F = FLEA MARKET
H = HANDICAP ACCESS
Q = FIELD CHECKING OF QSL CARDS
R = REFRESHMENTS
S = SEMINARS / PRESENTATIONS
T = TAILGATING
V = VE SESSIONS

Gail Iannone ♦ Convention and Hamfest Program Manager ♦ giannone@arrl.org

**Illinois (Peoria) — Sep 17-18**
**D F H Q R S T V**
Saturday 6 AM-4 PM, Sunday 6 AM-2 PM. *Spr:* Peoria Area ARC. Exposition Gardens, 1601 W Northmoor Rd. 53rd Peoria Superfest. *TI:* 147.075 (103.5 Hz). *Adm:* advance $6 (with 2 stubs), door $8 (with single stub). Tables: $20-$30. John Coker, N9FAM, 133 Vonachen Ct, E Peoria, IL 61611; 309-369-7428; **n9fam@comcast.net**; **www.peoriasuperfest.com**.

**Indiana (Bedford) — Oct 2 D F R T V**
Set up 6 AM; public 8 AM. *Spr:* Hoosier Hills Ham Club. Lawrence County 4-H Fairgrounds, 11261 US Hwy 50 W. 50th Annual Hamfest, chili supper (Saturday, 6 PM). *TI:* 146.73 (107.2 Hz). *Adm:* $7. Tables: $10 per 10-ft space inside. Dave Morthland, WA9JHH, 1424 19th St, Bedford, IN 47421; 812-276-3612; **wa9jhh@gmail.com**; **w9qyq.org**.

**Indiana (Crown Point) — Oct 8 D F H R V**
Set up 6 AM; public 8 AM-1 PM. *Spr:* Lake County ARC. Lake County Fairgrounds, Industrial Arts Bldg, 889 S Court St. All indoors. *TI:* 147.0 (131.8 Hz), 146.52. *Adm:* $5. Tables: $10 (reserve with advance payment, or bring your own tables). Rich Gilles, KA9SVS, 156 S Ridge St, Crown Point, IN 46307; 219-662-0594; **paris156@yahoo.com**; **www.lakenetnwi.net/member/lcarc/index.html**.

**Iowa (Mondamin) — Sep 18 D F H R**
8 AM-noon. *Spr:* Boyer Valley ARC. Mondamin Community Center, 200 Maple St. 13th Annual Flea Market. *TI:* 145.13. *Adm:* $3. Tables: $3. Leo Schwertley, KCØKJR, 1752 260th St, Modale, IA 51556; 712-645-2077; **kc0kjr@arrl.net**; **www.angelfire.com/la2/fbcchurch/bvrctest.html**.

**Iowa (West Liberty) — Oct 2 D F H R T V**
7 AM-1 PM. *Sprs:* Muscatine and Washington Area ARCs. Muscatine County Fairgrounds, 101 N Clay St. 27th Annual Southeast Iowa Hamfest. *TI:* 146.91 (192.8 Hz). *Adm:* $5. Tables: $8. Tom Brehmer, NØLOH, 1114 E Tenth St, Muscatine, IA 52761; 563-263-3097; **n0loh@yahoo.com**; **www.kc0aqs.org/hamfest.html**.

**Kansas (Wichita) — Oct 1 D F H R V**
8 AM-1 PM. *Spr:* Valley Center ARC. Sweetbriar Bingo Hall, 2349 N Amidon. 10th Annual Hamfest. *TI:* 146.94. *Adm:* $2. Tables: $5. Jim Cochran, KØRH, 3600 W 77th St N, Valley Center, KS 67147; 316-755-2283; **k0rh@cox.net**; **vcarc.org.**

**Kentucky (Richmond) — Sep 17**
**D F H Q R S T V**
8 AM-3 PM. *Spr:* Central Kentucky ARS. Madison County Fairgrounds, KY Rte 52. *TI:* 145.37 (192.8 Hz). *Adm:* $6. Tables: $5. Mike Rogers, KE4ISW, 144 Allen Douglas Dr, Richmond, KY 40475; 859-624-9156; **ke4isw@arrl.net**; **www.qsl.net/ckars/hamfest**.

**Maine (Alexander) — Sep 17 D F H R T V**
8 AM-noon. *Spr:* St Croix Valley ARC. Alexander Elementary School, ME Rte 9. *TI:* 147.33 (117.8 Hz). *Adm:* $5. Tables: Free. William "Skip" McGarvey, AA1ZR, 40 Key St, Eastport, ME 04631; 207-853-2951; **aa1zr@arrl.net**; **www.stcroixvalleyamateurradioclub.org**.

## ARRL/TAPR Digital Communications Conference

**September 16-18, Baltimore, Maryland**
**H S**
The 2011 ARRL/TAPR Digital Communications Conference will be held at the Four Points by Sheraton BWI Airport, 7032 Elm Rd, Baltimore, MD 21240; tel 800-368-7764. Technical and introductory sessions Friday and Saturday followed by a Friday evening Social and Saturday evening Banquet. The Sunday seminar focuses on a topic and provides an in-depth four-hour presentation by an expert in the field. Register in advance by calling the Tucson Amateur Packet Radio (TAPR) at 972-671-8277, or online at **www.tapr.org/dcc**.

**Maryland (West Friendship) — Oct 2**
**D F H Q R T V**
8 AM-4 PM. *Spr:* Columbia ARA. Howard County Fairgrounds, 2210 Fairgrounds Rd. *TI:* 147.39. *Adm:* $6. Tables: $20 plus admission; ($10 per tailgate space, plus admission). Dave Prestel, W8AJR, 10160 Tanfield Ct, Ellicott City, MD 21042; 443-812-4403; fax 410-981-5146; **dave.prestel@gmail.com**; **www.carafest.org**.

**Massachusetts (Cambridge) — Sep 18.** Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5PM); **w1gsl@mit.edu**; **www.swapfest.us**.

**Michigan (Adrian) — Sep 18 D F H T V**
8 AM. *Spr:* Adrian ARC. Lenawee County Fairgrounds, 602 N Dean St. 39th Annual Hamfest. *TI:* 145.37 (85.4 Hz). *Adm:* $5. Tables: $10. Brian Sarkisian, KG8CO, 425 Clinton-Macon Rd, Clinton, MI 49236; 517-902-4139; **kg8co@arrl.net**; **www.adrianhamfest.com**.

**Mississippi (Iuka) — Oct 1 F R T**
8 AM-1 PM. *Sprs:* ARRL Mississippi Section and Tishomingo County ARC. Mineral Springs Park, Old Hwy 72 E. ARRL Day in the Park and Swapmeet. *TI:* 146.85 (141.3 Hz). *Adm:* Free. Tables: Free. Malcolm Keown, W5XX, 64 Lake Circle Dr, Vicksburg, MS 39180; 601-636-0827; **w5xx@arrl.org**; **www.arrlmiss.org**.

**Missouri (St Joseph) — Sep 17 D F R V**
9 AM-3 PM. *Sprs:* St Joseph and Plattsburg ARCs. American Legion Post #359, 4826 Frederick Ave. Pony Express Hamfest. *TI:* 146.85 (100 Hz). *Adm:* $5. Tables: $25 (8-ft with 2 chairs); $15 (6-ft with 2 chairs); 1 free admission with table. Tom Kinard, WAØRTU, 16626 Hwy 169, Savannah, MO 64485; 816-662-2068; **wa0rtu@yahoo.com**; **ponyexpresshamfest.webs.com**.

**Montana (Bozeman) — Sep 24 D F H R S V**
Set up Friday 7-10 PM, Saturday 7:30-9:30 AM; registration Saturday 8 AM, doors open 10 AM-4 PM. *Spr:* Gallatin Ham Radio Club. Gallatin County Fairgrounds, W Tamarack St. Limited overnight RV camping (406-582-3270), hidden transmitter hunt. *TI:* 146.88, 447.95 (both 100 Hz), 146.52. *Adm:* $5 (under 13 free). Tables: advance $10 (pre-register), door $15. Rich Michau, KF7LVE, 307 Green Belt Dr, Belgrade, MT 59714; 406-388-6850; fax 406-388-6446; **djsky@bresnan.net**; **www.gallatinhamradio.com**.

**New Jersey (Township of Washington) — Oct 1 D F H Q R T V**
8 AM-2 PM. *Spr:* Bergen ARA. Westwood Regional High School, 701 Ridgewood Rd. *TI:* 146.79 (141.3 Hz). *Adm:* buyers $5, sellers $15. Tables: Bring your own. Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Township of Washington, NJ 07676; 201-664-6725; **k2zo@arrl.net**; **bara.org**.

**New Jersey (Wall Township) — Sep 24**
**D F H R T V**
7 AM-2 PM. *Spr:* Ocean-Monmouth ARC. InfoAge Learning Center, Project Diana Site, 2300 Marconi Rd. *TI:* 145.11 (127.3 Hz). *Adm:* $5. Tables: $10 per space, outside only. Jeff Harshman, N2LXM, 5 The Arborway, Ocean, NJ 07712; 732-996-0637; **n2lxm@arrl.net**; **www.omarc.org**.

**New York (Hicksville) — Sep 25**
**D F H Q R T V**
7:30 AM-1 PM. *Spr:* Long Island Mobile ARC. Levittown Hall, 201 Levittown Parkway. *TI:* 146.85 (136.5 Hz). *Adm:* $6. Tables: $20. Richard Cetron, K2KNB, 198 Haypath Rd, Old Bethpage, NY 11804; 516-694-4937; **k2knb@limarc.org**; **www.limarc.org**.

**New York (Horseheads) — Sep 24**
**D F H R T V**
8 AM-2 PM. *Spr:* ARA of the Southern Tier. Chemung County Fairgrounds, Grand Central Blvd. 36th Annual Elmira International Hamfest/Computerfest, free electronics recycling with paid admission. *TI:* 147.36, 444.2. *Adm:* advance $5, door $6. Tables: $17 (discounts available for early registration). Charlie Santi, 6 Hickory Grove Rd, Horseheads, NY 14845; 607-481-0908; fax 607-739-9817; **ka2bed@arast.org**; **arast.org**.

**New York (Pompey/Syracuse) — Sep 17**
**D F H R S T V**
Set up Friday 4-6:30 PM, Saturday 6:30-7:45 AM; public 8 AM-2 PM. *Spr:* Radio Amateurs of Greater Syracuse. Pompey Hills Fire Department, Henneberry Rd. 56th Annual Hamfest, National Weather Service Demo. *TI:* 147.3. *Adm:* $5 (under 17 free). Tables: 8-ft $10 reserved ($5 if you bring your own; outdoor spaces $5 each). Viv Douglas, WA2PUU, c/o RAGS, Box 88, Liverpool, NY 13088; 315-698-4558; **ragsonline@hotmail.com**; **ragsinreview.com**.

## EMCOMM EAST CONVENTION

**September 25, Rochester, New York**
**R S V**
The EmComm East Convention, sponsored by the Monroe County ARES, will be held at St John Fisher College, 3690 East Ave. Doors are open 9 AM-5 PM. Features include an Amateur Radio emergency communications conference where Amateur Radio operators involved in EmComm can attend training sessions on technical topics, learn from served agencies, and interact with other EmComm operators from all over the area. Special guest from ARRL HQ Mike Corey, W5MPC, Emergency Preparedness Manger. Talk-in on 146.61 (110.9 Hz). Registration is $30 (includes catered lunch). Contact Jeff Wigal, WY7Q, Box 10011, Rochester, NY 14610; 585-210-0426; **info@emcommeast.org**; **emcommeast.org**.

**North Carolina (Winston-Salem) — Oct 8**
**D F H R T**
7 AM-noon. *Spr:* Forsyth ARC. Summit School Eagles Nest, 2100 Reynolda Rd. *TI:* 146.64 (100 Hz). *Adm:* advance $4 (with web coupon), door $5. Tables: $15. Henry Heidtmann, W2DZO, c/o Forsyth ARC, Box 11361, Winston-Salem, NC 27116-1361; 336-245-5740; **swapfest2011@w4nc.org**; **www.w4nc.com**.

**North Dakota (Grand Forks) — Oct 1**
**F H R S V**
8 AM-1 PM. *Spr:* Forx ARC. Zion United Methodist Church, 1001 24th Ave S. *TI:* 146.94. *Adm:* $5. Tables: Free. Karen Noss, NØTKP, 1113 4th Ave N, Grand Forks, ND 58203; 701-775-7781; **klnoss@gra.midco.net**; **www.wa0jxt.org**.

**Ohio (Berea) — Sep 25 D F H Q R S T V**
8 AM-2 PM. *Spr:* Hamfest Assn of Cleveland. Cuyahoga County Fairgrounds, 164 Eastland Rd. Cleveland Hamfest and Computer Show. *TI:* 146.73 (110.9 Hz). *Adm:* $6. Tables: $20. Glenn Williams, AF8C, 513 Kenilworth Rd, Bay Village, OH 44140; 440-835-4897; **af8c@alumni.caltech.edu**; **www.hac.org**.

### Ohio (Cincinnati) — Sep 18
**D F H Q R S T V**

8 AM-2 PM. *Spr:* Greater Cincinnati ARA. Diamond Oaks Career Development Center, 6375 Harrison Ave. Hidden transmitter hunt. *TI:* 146.88, 145.37. *Adm:* $6. Tables: $20 (indoor), $8 (per flea market space). General info: Stan Cohen, W8QDQ, 2301 Royal Oak Ct, Cincinnati, OH 45237; 513-531-1011; fax 513-531-3834; **stanco49@zoomtown.com**; Inside vendors and flea market info: Tom Denham, K8VOE, 513-779-3951; **k8voe@arrl.net**; **www.gcara.org**.

## GREAT LAKES DIVISION CONVENTION

**September 11, Findlay, Ohio**

**D F H R S T**

The Great Lakes Division Convention (69th Annual Event), sponsored by the Findlay Radio Club, will be held at the Hancock County Fairgrounds, 1017 E Sandusky St. Doors are open 8 AM-2 PM. Features include dealers, flea market, tailgating, forums, handicapped accessible, refreshments. Talk-in on 147.15. Admission is $6. Tables are $20. Contact Bill Kelsey, N8ET, 3521 Spring Lake Dr, Findlay, OH 45840; 419-423-5643; **n8et@woh.rr.com**; **www.w8ft.org**.

## PACIFIC NORTHWEST VHF CONFERENCE

**October 8, Bend, Oregon**

**H Q R S T**

The Pacific Northwest VHF Conference (18th Annual Conference), sponsored by the Pacific Northwest VHF Society, will be held at The Riverhouse, 2850 NW Rippling River Ct. Doors are open 7:30 AM-8 PM. Features include a no-host pre-conference dinner (Friday, 6 PM), QSL card checking, forums and presentations, tailgate swapmeet, catered lunch (noon), annual Society Meeting, handicapped accessible, refreshments, no-host farewell breakfast (Sunday morning). Talk-in on 146.94 (162.2 Hz), 144.24. Admission is $40 in advance, $50 at the door. Contact Donald Krug, K7HSJ, 61245 Paulina Ln, Bend, OR 97702; 541-382-7561; **ghcdk@bendnet.com**; **www.pnwvhfs.org**.

### Pennsylvania (Butler) — Sep 11
**F R T**

8 AM-3 PM. *Spr:* Butler ARA. Unionville Fire Department Grounds, 102 Mahood Rd. *TI:* 147.36 (131.8 Hz). *Adm:* $5. Tables: Free. Obie King, AA3EB, 336 Westwood Dr, Butler, PA 16001; 724-287-2682; **okg232@zoominternet.net**; **w3udx.org**.

### Pennsylvania (Newtown) — Oct 2
**D F H R**

6 AM-2 PM. *Spr:* Mt. Airy VHF Club. Middletown Grange #684, Penns Park Rd. 40th Annual Hamarama. *TI:* 146.52. *Adm:* $5. Tables: indoor $15, outdoor $10. George Altemus, KA3WXV, 1561 Tennis Cir, Lansdale, PA 19446; 484-300-8070; **ka3wxv@gmail.com**; **www.packratvhf.com/latest.htm#hamarama**.

### Rhode Island (Slatersville) — Sep 17
**D F H R T**

8 AM-2 PM. *Spr:* Rhode Island Amateur FM Repeater Service. VFW Post 6342, 98 School St. Auction. *TI:* 146.76 (67 Hz). *Adm:* Free. Tables: $5. Rick Fairweather, K1KYI, 106 Chaplin St, Pawtucket, RI 02861; 401-864-9611; **k1kyi@arrl.net**; **qsl.net/riafmrs/Auction.html**.

### South Carolina (Rock Hill) — Oct 1
**D F H Q R T V**

8 AM-1 PM. *Spr:* York County ARS. Faith Assembly of Rock Hill, 2800 Faith Blvd. *TI:* 147.03. *Adm:* $5 (includes 1 tailgate space). Brent Case, K4BSC, 2409 Sweetbriar Ln, Rock Hill, SC 29732; 803-985-4826; **k4bsc@arrl.net**; **www.rockhillhamfest.com**.

## SEDCO W4DXCC Convention

**September 23-24, Pigeon Forge, Tennessee**

**D H Q R S**

The SEDCO W4DXCC Convention (W4 DX and Contest Convention VII), sponsored by the SouthEastern DX and Contesting Organization, will be held at the MainStay Suites and Conference Center, 410 Pine Mountain Rd. Doors are open Friday 2-11 PM, Saturday 11 AM-11 PM. Features include a fellowship of DXers and contesters, dealers, QSL card checking, great speakers, programs, banquet (Saturday eve), handicapped accessible. Admission is $25. Tables are $60 (vendors only). Contact Lynn Lamb, W4NL, 3134 Allen Dr, Maryville, TN 37803; 865-681-2279; **w4nl@charter.net**; **w4dxcc.com**.

### Tennessee (Sevierville) — Sep 23-24
**D F H R S T V**

Friday 2-7 PM, Saturday 9 AM-2 PM. *Spr:* Ten-Tec, Inc. Ten-Tec Factory, 1185 Dolly Parton Pkwy. *TI:* 145.47, 146.94, 443.235. *Adm:* Free. Tables: Bring your own for flea market. Stan Brock, WDØBGS, 800-833-7373; fax 865-428-4483; **sales@tentec.com**; **www.tentec.com**.

### Texas (Belton) — Oct 1
**D F H R T V**

7 AM-2 PM. *Spr:* Temple ARC. Bell County Expo Center, 301 Loop 121. *TI:* 146.82 (123 Hz). *Adm:* $5. Tables: $15/$25. Mike LeFan, WA5EQQ, 1802 S 13th St, Temple, TX 76504; 254-773-3590; fax 254-231-4128; **mlefan@vvm.com**; **www.beltonhamexpo.org**.

## ROANOKE DIVISION CONVENTION

**September 17, Virginia Beach, Virginia**

**D F H Q R S T V**

The Roanoke Division Convention, sponsored by Tidewater Radio Conventions, will be held at the Virginia Beach Convention Center, 1000 19th St. Doors are open 9 AM-5 PM. Features include hamfest and electronics flea market, multiple vendors, tailgating ($30 per space, includes admission; first-come, first-served), forums and programs, VE sessions, DX dinner, handicapped accessible. Talk-in on 146.97. Admission is $9 in advance, $10 at the door. Tables are $40 each. Contact Carl Clements, W4CAC, 4500 Wake Forest Rd, Portsmouth, VA 23703; 757-235-4813; fax 757-673-7426; **w4cac@arrl.org**; **www.vbhamfest.com**.

## WASHINGTON STATE CONVENTION

**September 24, Spokane Valley**

**F H R S V**

The Washington State Convention (35th Annual Spokane Hamfest), co-sponsored by the Kamiak Butte Amateur Repeater Assn, NW Tri-State ARO, Palouse Hills ARC, Inland Empire VHF Radio Amateurs, Spokane DX Assn, University High School ARC, Lilac City ARC, and the Panoramaland ARC will be held at University High School, 12420 E 32nd Ave. Doors are open 9 AM-5 PM. Features include commercial and non-commercial vendors, seminars and displays, "Junque" Auction (3 PM), VE sessions, Club booths and displays, ARRL representatives, no-host post hamfest dinner (Timber Creek Grill Buffet, 5 PM), free off-street parking for cars and RVs, refreshments. Talk-in on 147.24, 146.52. Admission is $5, 18 and under free. Swap tables are $5 before Sep 2, $7.50 after Sep 2; commercial tables are $12 before Sep 2, $15 after Sep 2. Contact Bob Meenach, AC7GP, 4814 W Houston Ave, Spokane, WA 99208; 509-327-3188; **ac7gp@hotmail.com**; **spokanehamfest.com**.

### Wisconsin (Cedarburg) — Sep 24
**D F H R T**

6 AM-noon. *Spr:* Ozaukee RC. Fireman's Park, 796 Washington Ave. *TI:* 146.97 (127.3 Hz). *Adm:* $5 (vendors and buyers). Tables: $7 (free tailgating preferred). Tom Ruhlmann, W9IPR, 465 Beechwood Dr, Cedarburg, WI 53012; 262-377-6945; **teruhlmann@sbcglobal.net**; **ozaukeeradioclub.org**.

### To All Event Sponsors

Before making a final decision on a date for your event, you are encouraged to check the Hamfest and Convention Database (**www.arrl.org/hamfests-and-conventions-calendar**) for events that may already be scheduled in your area on that date. You are also encouraged to register your event with HQ as far in advance as your planning permits. See **www.arrl.org/hamfest-convention-application** for an online registration form. Dates may be recorded up to two years in advance.

Events that are sanctioned by the ARRL receive special benefits, including an announcement in these listings and online. Sanctioned conventions are also listed in the *ARRL Letter*. In addition, events receive donated ARRL prize certificates and handouts.

*For hamfests:* Once the form has been submitted, your ARRL director will decide whether to approve the date and provide ARRL sanction. *For conventions:* Approval must come from your director and the ARRL executive committee.

The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **September 1** to be listed in the **November** issue. Information in this column is accurate as of our deadline; contact the sponsor or check the sponsor's Web site for possible late changes, for driving directions and for other event details. Please note that postal regulations prohibit mention in *QST* of games of chance such as raffles or bingo.

Promoting your event is guaranteed to increase attendance. As an approved event sponsor, you are entitled to special discounted rates on *QST* display advertising and ARRL Web banner advertising. Call the ARRL Advertising Desk at 860-594-0207, or e-mail **ads@arrl.org**.

# 75, 50 AND 25 YEARS AGO

### September 1936


- The cover photo is an upward-looking view of a tall ham tower and antenna.
- The editorial points out that the time to nominate worthy individuals to run as A.R.R.L. Directors is *now!*
- G. W. Kendrick, K4DDH, brings us the latest scientific look at radio, in "The Kennelly-Heavyside Layer — Its Relationship to Our Everyday Communication Problems."
- J. Stanley Brown, W3EHE, presents "Some Trick Crystal Circuits."
- Ross Hull tells us about "Working at One Meter and Below" using the new Western Electric 316A tube.
- Wilbert Smith describes a transmitting automatic audio gain control circuit, in "A Volume-Compressing Method for 'Phone Transmission."
- "The 6L6 as Amplifier and Doubler" gives us information on other uses of the new metal tube.
- Clinton B. DeSoto, W1CBD, discusses "Oscillator-Mixer Design for the Amateur-Band Superhet."

### September 1961


- The cover photo montage is captioned "This was Field Day 1961."
- The editorial, "Amateur License Fees," begins with, "Should we hams be charged a fee by the Government for the issuance of our licenses? ARRL has always answered this question with a resounding NO, and will continue to do so."
- Harold Barber, W6GQK, and Robert Sutherland, W6UOV, collaborate to build a 1-kW amplifier using the new 3-400Z triode, described in detail in "High-Power Zero-Bias Grounded-Grid Linear."
- In "Fixed or Portable for 2 through 160," Edward Noel, W8GRY, tells about his array of plug-in subassemblies that result in a rig that provides 30 watts of 'phone or CW.
- J. R. Popkin-Clurman, W2LNP, describes his 35-cent adapter that will provide "A.M. with Collins S.S.B. Units."
- The "June V.H.F. Party Summary" reports that the "best 50-Mc. Conditions ever send *all* records tumbling!"
- Ed Tilton, W1HDQ, gives us Part III of "A Complete Two-Band Station for the V.H.F. Beginner," describing the modulator, power supply and standing-wave bridge.
- "The Big Wheel on Two," by Robert Mellen, W1IJD, and Carl Milner, W1FVY, describes an antenna that provides omnidirectional coverage with horizontal polarization.
- "The POO-Key Jr," by John Livingston, K2POO, is a simple electronic keyer that uses only one dual-triode tube.

### September 1986


- The cover photo shows a view of the DX tent site of the FOØXX DXpedition.
- The editorial announces that the ARRL Board of Directors has approved the plans to build an Amateur Radio Museum and Visitors' Center by 1989, the 75th anniversary of the League's founding.
- Jerry Pittenger, K8RA, gives us Part 1 of "An All-Band, 1500-Watt-Output 8877 Linear Amplifier," with the caution that "it is a major project requiring dedication and commitment."
- Dennis Bodson, W4PWF, presents Part 2 of "Electromagnetic Pulse and the Radio Amateur."
- Harry Hyder, W7IV, builds "A 1935 Ham Receiver" that uses a type 77 tube and a type 76 in a regenerative circuit.
- "The SIMPLEceiver," a project by Bruce Williams, WA6IVC, is a high-performance receiver built with one transistor and one multipurpose IC, to which you can add an optional single-IC audio stage.
- ARRL Laboratory Supervisor Jon Bloom, KE3Z, presents the first project that uses the ARRL microcontroller board — "An Automatic Rotator Controller."
- Patty Winter, N6BIS, discusses the use of "Packet Radio in Emergency Communications."
- "Happenings," reported by Phillip Sager, WB4FDT, announces, "FCC Proposes Fees; Amateurs Exempted." The column also discusses "ARRL Seeks 18 MHz."
- "How's DX?" by Ellen White, W1YL/4, presents "The Clipperton Diary," telling about the FOØXX operation.

Al Brogdon, W1AB ♦ Contributing Editor

# Field Organization Reports

## JUNE 2011

### Public Service Honor Roll

This listing recognizes radio amateurs whose public service performance during the month indicated 70 or more points in six categories. Details on the program are at this web page: **www.arrl.org/public-service-honor-roll**.

645 W7TVA
640 W5DY
634 KK5NU
598 KD8EBY
562 W5KAV
520 KØIBS
508 W4CAC
394 N8OSL
360 W4DNA
330 KA2ZNZ
325 KT2D
290 N7CM
288 WB9YBI
274 W2MTA
272 KC2PSN
266 KI4GWC WB8RCR
265 K7EAJ
260 K8RDN
255 WK4P
240 WD9FLJ NX8A
239 KB2ETO
225 WB6OTS
215 KB1NMO KB2RTZ
208 KA8ZGY
201 WB9FHP
197 KB2KOJ
195 K7OAH
193 KB8RCR
190 K2HAT
187 W3CB
186 N4HUB
182 W7FQQ
178 WA2BSS
175 KC2SFU K2TV
171 KC5ZGG
170 KK3F
167 K2ABX
165 KF5CRX N5NVP
160 KE5HYW KGØGG K4JUU WD8USA
158 WB4GHU
155 K9LGU KE5YTA
150 N8CJS N2JBA K4IWW
146 KC2SYM
145 N8IO
141 KD8AAD
140 WB2FTX WØLAW KB2BAA K7BFL
139 KD7OED
138 KB1RGQ W4LHQ
136 KA4IZN
135 KØVTT W3YVQ
131 K2GW
130 N9VC N2GJ K6JT KT5SR WM2C
128 W2DWR
126 KB5SDU W2LIE
125 NN7H WA9LFO KF5IOU
124 N9DVL N2RDB
120 K6HTN AG9G KA4FZI WB8HHZ W8UL K4GK WE2G WA9LOU W2EAG WB8WKQ
118 W9WXN KF7GC KM2CMJ
115 KA8IAF
111 WA2AQQ
110 W7QM KE4CB N7XG N7YSS N2GS N3RB KC5OZT AE5VY K4BG K4BEH K1EIC WI2G KØLQB K7BDU N9MN W7GB
107 WX4RON
105 KI4AAN W4TTO
104 KB5PGY
103 W2KFV
101 N7EIE WA4UJC
100 W6WW K4SCL NX9K N1JX
WD8Q WG8Z WB8SIQ KA1G WA3EZN N5OUJ NM1K WA2NDA N3SW W3TWV N2YJZ WB4FDT AA3SB WØCLS NØMEA WAØVKC WX4CB NR2F K4JGA NU8K KT4YA K8VFZ WB6UZX
99 NA7G
97 KD7THV W5GKH N2VC W8CPG
96 N9WLW
95 N2DW W8DJG N2WKT K5MC N5ASU KD8NWE
94 KE5ABO
92 KJ7NO
91 KJ6HWL WD8BCS
90 N8DD KA5AZK WB4BIK N5EEO AA2SV N3KB W9MBT KB3LNM K3IN N3ZOC N4ELI KJ4HGH K1JPG K1REV KZ8Q KI4YV KD8CYK
89 K1STM W3GQJ
88 N7IE KD8LZB
87 KB9KEG W5ESE K1HEJ N5ESE
85 KI4MSG KK7TN W2CC W7JSW
84 KØMEL
83 N2VQA KC2UVQ
82 KO6V W7ELI KØBXF
80 K7MQF WD8DIP KB7RVF NIØI KCØZDA K8KV
79 KK7DEB KD8KWG WDØGUF KC4VA KBØDTI
78 W4BKG
77 W4AVD
72 KC2EMW W8IM
71 KC5MMH NA9L
70 AD4BL KB8HJJ WB8YSS NS7K W5XX W9LW KDØAYN KØDEU KØDLK NØDUW NØDUX NUØF WØFUI KBØJKO N3NTV KØPTK KØOR KØRXC NØUKO KD7ZUP

The following stations qualified for PSHR in previous months, but were not recognized in this column: (May) WB2FTX 140, N2GJ 125, N3RB 105, N2YJZ 100, N1JX 100, W4KLB 100, W2CC 90, N4MEH 90, N2GS 81, WS4P 77. (Apr) W2MTA 233, KJ4HGH 80.

### Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, EB, EPA, ENY, EWA, GA, IL, IN, KS, LA, LAX, MDC, MI, ME, MN, MS, NC, NLI, NNJ, NNY, NTX, OH, OR, ORG, SD, SNJ, SJV, STX, TN, UT, VA, WNY, WCF, WI, WPA, WV, WY.

### Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: EB, EWA, GA, IA, IN, KS, MDC, MI, MN, MO, MT, NLI, NTX, OH, OK, SD, SFL, STX, SV, TN, WTX, WV, WWA.

### Brass Pounders League

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

W5KAV 3751, KK3F 2636, WB9FHP 1509, W6WW 1451, KØLQB 1294, W8UL 1011, W7FQQ 904, WB6OTS 820, K6JT 689, NX9K 661, KZ8Q 682, N9VC 659, K7IFG 629, K1JPG 599, WB8WKQ 570.

Stations earning BPL by Originations plus Deliveries: KØMEL 157, NM1K 105, NØYR 101.

The following stations qualified for BPL in these previous months, but were not recognized in this column: (May) WB2FTX 725, KJ4HGH 103. (Apr) KJ4HGH 115. (Mar) KJ4HGH 128.

# SILENT KEYS

*It is with deep regret that we record the passing of these amateurs:*

KC1AC **Tracy**, Duane E., Augusta, ME
W1AMW **Hosking**, James R., South Windsor, CT
N1BAZ **Reddish**, William M., Sherman, TX
N1CT **Nintzel**, Kevin J., Seymour, CT
K1HAH **Callaghan**, John P., Plainville, CT
W1KKK **Rapelye**, Arthur G., Beverly Hills, FL
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Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation or to ARRL. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Silent Keys Administrator ♦ sk@arrl.org

# Strays

## FCC ARC

◊Nine members of the FCC Amateur Radio Club, WA3FCC, met recently. Open to members of the staff of the Federal Communications Commission, the club has provided technology classes for Commission staff for many years, but its existence was not widely known. Our most recent event was hosting a demo at FCC Headquarters that was well attended; Commissioner Copps stopped by. — *Robert Weller, N6NE, Chief, Technical Analysis, FCC*

## MICROWAVE UPDATE 2011 AND THE 37TH EASTERN VHF/UHF CONFERENCE

◊These events, sponsored by the North East Weak Signal Group at Holiday Inn, 1 Bright Meadow Blvd, Enfield, CT 06082, will be October 13-15, 2011. This year the premier Amateur Radio microwave conference and the Eastern VHF/UHF conference will include tours, hospitality, swap session, equipment for measuring and tweaking, banquet and of course technical presentations. Please visit **www.microwaveupdate.org/** for the latest updates, registration and hotel information. Papers must be submitted by August 30. — *Paul Wade, W1GHZ*, **w1ghz@arrl.net**

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### NEW - UNSLIT TUBING— OR SLIT ONE END EXACT TELESCOPING SIZES!

### 6063-T832 Aluminum Tubing

- Smoothly telescoping sections
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- Better than the other guys - guaranteed lowest price
- Custom made just for DX Engineering
- Use DXE Stainless Steel Element Clamps to assemble slit lengths

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**.058" wall x 36" long**

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| 0.500" O.D. | 1494 | $2.05 | 1241 | $3.75 |
| 0.625" O.D. | 1495 | $2.35 | 1242 | $4.05 |
| 0.750" O.D. | 1496 | $2.65 | 1243 | $4.35 |
| 0.875" O.D. | 1497 | $2.75 | 1244 | $4.45 |
| 1.000" O.D. | 1498 | $2.95 | 1245 | $4.65 |
| 1.125" O.D. | 1499 | $3.25 | 1246 | $4.95 |
| 1.250" O.D. | 1500 | $4.15 | 1247 | $5.85 |
| 1.375" O.D. | 1501 | $4.45 | 1248 | $6.15 |
| 1.500" O.D. | 1502 | $5.25 | 1249 | $6.95 |
| 1.625" O.D. | 1503 | $6.05 | 1250 | $7.75 |
| 1.750" O.D. | 1504 | $6.85 | 1251 | $8.55 |
| 1.875" O.D. | 1505 | $7.65 | 1252 | $9.35 |
| 2.000" O.D. | 1506 | $8.45 | 1253 | $10.15 |
| 2.125" O.D. | 1507 | $9.25 | 1254 | $10.95 |

**.058" wall x 72" long**

| | | | | |
|---|---|---|---|---|
| 0.375" O.D. | 1189 | $2.95 | | NA |
| 0.500" O.D. | 1480 | $4.15 | 1205 | $6.05 |
| 0.625" O.D. | 1481 | $4.75 | 1206 | $6.65 |
| 0.750" O.D. | 1482 | $5.35 | 1207 | $7.25 |
| 0.875" O.D. | 1483 | $5.65 | 1208 | $7.55 |
| 1.000" O.D. | 1484 | $5.95 | 1209 | $7.85 |
| 1.125" O.D. | 1485 | $6.55 | 1210 | $8.45 |
| 1.250" O.D. | 1486 | $7.75 | 1211 | $9.65 |
| 1.375" O.D. | 1487 | $8.45 | 1212 | $10.35 |
| 1.500" O.D. | 1488 | $8.95 | 1213 | $10.85 |
| 1.625" O.D. | 1489 | $9.75 | 1214 | $11.65 |
| 1.750" O.D. | 1490 | $10.65 | 1215 | $12.55 |
| 1.875" O.D. | 1491 | $11.55 | 1216 | $13.45 |
| 2.000" O.D. | 1492 | $12.45 | 1217 | $14.35 |
| 2.125" O.D. | 1493 | $13.35 | 1218 | $15.25 |

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Unslit for booms and HD element designs!

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| DXE-AT1313 | 6' x 2.0" O.D. | $33.00 |
| DXE-AT1314 | 6' x 2.25"O.D. | $37.45 |
| DXE-AT1315 | 6' x 2.5" O.D. | $42.50 |
| DXE-AT1316 | 6' x 2.75" O.D. | $46.95 |
| DXE-AT1317 | 6' x 3.0" O.D. | $51.40 |
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- Eleven telescoping sections from 2" to 7/8" O.D.
- Stainless steel element clamps

| | | |
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- Heat shrink weatherproofing/strain relief
- All assemblies Hi-Pot high voltage tested
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|---|---|---|
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| DXE-213DU006 | 6 ft. | $15.88 |
| DXE-213DU012 | 12 ft. | $20.88 |
| DXE-213DU018 | 18 ft. | $24.88 |
| DXE-213DU025 | 25 ft. | $29.88 |
| DXE-213DU050 | 50 ft. | $52.88 |
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| DXE-213DU100 | 100 ft. | $91.88 |
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**RG-8/U DXE-8U Cable Assemblies with PL-259 Connectors**

| | | |
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| DXE-8UDU006 | 6 ft. | $16.88 |
| DXE-8UDU009 | 9 ft. | $20.88 |
| DXE-8UDU012 | 12 ft. | $24.88 |
| DXE-8UDU018 | 18 ft. | $31.88 |
| DXE-8UDU025 | 25 ft. | $39.88 |
| DXE-8UDU050 | 50 ft. | $61.88 |
| DXE-8UDU075 | 75 ft. | $85.88 |
| DXE-8UDU100 | 100 ft. | $108.88 |
| DXE-8UDU125 | 125 ft. | $139.88 |
| DXE-8UDU150 | 150 ft. | $159.88 |
| DXE-8UDU175 | 175 ft. | $179.88 |
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**RG-8X DXE-8X Cable Assemblies with PL-259 Connectors**

| | | |
|---|---|---|
| DXE-8XDU1.5 | 1.5 ft. | $9.88 |
| DXE-8XDU002 | 2 ft. | $10.88 |
| DXE-8XDU003 | 3 ft. | $11.88 |
| DXE-8XDU006 | 6 ft. | $13.88 |
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| DXE-8XDU075 | 75 ft. | $40.88 |
| DXE-8XDU100 | 100 ft. | $47.88 |
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| | | |
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- Precision, two-step operation
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- For foam or solid dielectric cable preparation

| | | |
|---|---|---|
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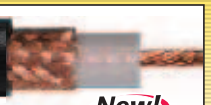

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- Center Conductor 12.5 AWG
  7 Strands of 21 AWG Bare Copper

## DXE-400MAX

New!

- Bonded Aluminum Tape plus Tinned Copper Braid Shield, 95% coverage
- 84% Velocity Factor
- Gas Injected Foam Polyethylene Dielectric,.285" O.D.
- .405" O.D. Black Low Density Polyethylene Jacket
- Center Conductor 10 AWG
  19/.0210" Strands Bare Copper

## DX ENGINEERING IS NOW AN AUTHORIZED DISTRIBUTOR!

ROHN™ Products LLC

**Rohn Commercial Towers**

## Plus Great Customer Service and Fast and Inexpensive Shipping!

*Great for wire antenna spreaders or insulated stacking frames! Build your favorite antenna design!*

### 50 Ft. Telescoping Fiberglass Tubing Mast Kit

- Tubing custom made just for DX Engineering
- Smoothly telescoping sections
- Neutral light gray color
- Uses DX Engineering Stainless Steel Element Clamps to assemble slit lengths

DXE-FTK50 Telescoping Tubing Kit.....**$138.00**

### Telescoping Fiberglass Tubing

- 1/8" nominal wall x 8 feet long

**Unslit Tubing**

| | | |
|---|---|---|
| DXE-FT0500-8 | 0.500" O.D. | **$6.45** |
| DXE-FT0750-8 | 0.750" O.D. | **$8.95** |
| DXE-FT1000-8 | 1.000" O.D. | **$9.95** |
| DXE-FT1250-8 | 1.250" O.D. | **$11.95** |
| DXE-FT1500-8 | 1.500" O.D. | **$18.95** |
| DXE-FT1750-8 | 1.750" O.D. | **$20.95** |
| DXE-FT2000-8 | 2.000" O.D. | **$25.95** |

**Tubing with One End Slit**

| | | |
|---|---|---|
| DXE-FT0750-8S | 0.750" O.D. | **$13.95** |
| DXE-FT1000-8S | 1.000" O.D. | **$14.95** |
| DXE-FT1250-8S | 1.250" O.D. | **$16.95** |
| DXE-FT1500-8S | 1.500" O.D. | **$23.95** |
| DXE-FT1750-8S | 1.750" O.D. | **$25.95** |
| DXE-FT2000-8S | 2.000" O.D. | **$30.95** |

*High power tuner performance at low power pricing!*

LDG ELECTRONICS

### LDG-AT-200PROII 250 Watt Autotuner

The AT-200 features over 16,000 3D memories, automatically storing tuning data for frequencies and bands as you use them. When you transmit on or near a frequency you've used before, the AT-200 can restore the tuning data almost instantly. It learns as you use it, adapting itself to your operating patterns for faster and faster tuning. The 3D memory system allows up to eight antenna settings to be stored for each frequency.

- Up to 250 watts—handles any transceiver
- 1.8 to 30 MHz, 100 watts on 6 meters
- Matches virtually all coax-fed antennas
- Optional LDG remote balun for long wires, etc.

LDG-AT-200PROII.....just **$234.00**

***Many other LDG models in stock at low prices at www.DXEngineering.com***

*Limited Time Offer— FREE Shipping on Comtek Baluns!*

COM-BAL-11130T

New!

COM-BAL-11130E

*Better Performance, Lower Prices—from just $49.95*

### COMTEK W2FMI Series Baluns

Design inspired by Jerry Sevick W2FMI and perfected by DX Engineering's balun R&D department.

- High voltage compensating capacitors for unequalled low SWR—a DX Engineering innovation!
- Large fender washers distribute fastener loading to prevent case deformation
- Special coated toroid core handles close coupling without extra stress
- High, consistent common mode impedance across specified bandwidth—provides isolation where most needed
- Special wire sizing and Teflon-insulated wire sleeves for exact impedance matching and better isolation than Thermaleze wire
- Typical insertion loss: less than 0.2 dB
- Power handling: 3 kW continuous to 5 kW+ intermittent depending on model
- Silver-plated gasketed SO-239 connectors, stainless hardware, weatherproof NEMA box

**1:1 Dual Wire/Single Core, 1.8 to 54 MHz**

| | | |
|---|---|---|
| COM-BAL-11130E | 3 kW, side eyebolts | **$49.95** |
| COM-BAL-11130ET | 3 kW, side and top eyebolts | **$49.95** |
| COM-BAL-11130S | 3 kW, side studs/wingnuts | **$49.95** |
| COM-BAL-11130T | 3 kW, top studs/wingnuts | **$49.95** |

**1:1 Coax/Single Core**

| | | |
|---|---|---|
| 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** |

**4:1 Dual Wire/Single Core**

| | | |
|---|---|---|
| COM-BAL-41130E | 3 kW, side eyebolts | **$59.95** |
| COM-BAL-41130ET | 3 kW, side and top eyebolts | **$59.95** |
| COM-BAL-41130T | 3 kW, top studs/wingnuts | **$59.95** |
| COM-BAL-41130S | 3 kW, side studs/wingnuts | **$59.95** |

**4:1 Dual Wire/Dual Core**

| | | |
|---|---|---|
| COM-BAL-41150T | 5 kW, top studs/wingnuts | **$89.95** |
| COM-BAL-41150S | 5 kW, side studs/wingnuts | **$89.95** |
| COM-BAL-41150E | 5 kW, side eyebolts | **$89.95** |

***Contact DX Engineering Customer Support for recommendations for your application.***

*Autotuned Stealth Antenna*

### A Complete, Engineered System for Antenna-Restricted Areas

- Automatic Bandswitching—tunes for lowest SWR
- 80-10 meter operation with 46 ft. wire antenna
- 40-10 meter operation with a thin 26 ft. wire antenna
- Allows operation in HOA areas
- Handles up to 200 watts SSB/CW
- Single coax cable connection
- Stainless steel mounting plate and hardware—no corrosion
- Requires 12 Vdc for operation
- Includes radial plate, radials & antenna wire

New!

Designed for the Ham with restrictions on visible antennas, the ATSA is engineered for fast, inconspicuous installation and maximum performance. Power is supplied through the coaxial cable, and bandswitching/tuning is automatic and instantaneous. The unique MatchBoxx™ module assures the lowest possible SWR at any frequency. The single antenna wire can be stealthily routed away from the ground-mounted controller package for minimum visual impact. Just "plant" it in the bushes with supplied spikes and lay out the minimum length radials. You can further camouflage the controller with a plastic boulder or other landscaping.

The ATSA is great for EMCOMM—the complete package can be preassembled and deployed anywhere in minutes!

DXE-ATSA-1 Complete Stealth HF Antenna System
***SPECIAL INTRODUCTORY PRICE***.....**$459.00**
DXE-SA80-AOK 80m Optimizer Coil Stealth Add-On Kit....**$49.95**

RTTY & More
PSK-31
SSTV
WSJT

### SignaLink™ From Tigertronics

**TIG-SL-USB**.....**$86.95**

***Then choose a cable for each radio!***

Any Radio Interface Cable*, only **$12.95** when purchased with SignaLink™ unit
.....**YOUR TOTAL $99.90**

***For your complete digital solution!***

**except the special Elecraft K3 cable*

- Easiest installation and setup—Macintosh or PC
- Software CD ROM included
- Built-in low noise sound card
- USB port powered
- Works with ALL radios
- Supports all sound card digital and voice modes
- Requires radio interface cable

LDG ELECTRONICS

# We're #1

***Our customers have always known we're #1. But did you know that LDG was the first company with a "no questions asked" two-year transferable warranty on ALL our products? LDG autotuners also have the highest resale value of any autotuner on the market. Our customers feel good about owning LDG products and so will you!***

## Call us or log-on today!

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

## NEW! AT-200ProII

The AT-200ProII features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and now includes LEDs for the antenna position and if the tuner is in bypass. A function key on the front panel allows you to access data such as mode and status. Includes six foot DC power cable. ***Suggested Price $259.99***

## Z-11ProII

Meet the Z-11ProII, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" x 7.7" x 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 - 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). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function 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.***

## We have a tuner that will work for you!

We make tuners that will work with any transceiver. Don't know which one is right for you? Give us a call or see the Tuner Comparison Chart on our web site for more selection help!

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 and 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***

## 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***

## Z-100Plus

Small and simple to use, the Z-100Plus sports 2000 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***

**LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685** ***Phone 410-586-2177 • Fax 410-586-8475***

# The #1 Line of Autotuners!

*Designed to handle the higher power of the Tokyo Hi Power HL-45B.*

## NEW! Z-817H

The ultimate autotuner for QRP radios including the Yaesu FT-817(D) with addition of the Tokyo High Power HL-45B. Interfaces to the CAT port (ACC) on the back of the radio with the provided cable. One button push on the tuner and the Z-817H takes care of the rest. Will also function as a general purpose antenna tuner with other QRP radios or QRP radios with up to 75 watt HF amps. Powered by four AA internal Alkaline batteries (not included). 2000 memories cover 160 through 6 meters.

***Suggested Price $159.99***

- *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***

## AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes six foot DC power cable.

***Suggested Price $599***

## 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 2000 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***

## YT-100

For Yaesu FT-857, FT-897 and FT-100 (and all D models) an integrated tuner, powered by the interface. Press the tune button on the tuner, and everything else happens automatically. ***Suggested Price $199.99***

## KT-100

For AT-300 compatible Kenwood transceivers (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. ***Suggested Price $199.99***

## YT-450

Designed for Yaesu's newest 100 watt radios. Interfaces directly with the Yaesu FT-450 and FT-950 radios. Press the tune button on the tuner and the rest happens automatically. It will quickly match nearly any kind of coax fed antenna with an SWR of up to 10:1. 2000 memories recall settings in an instant! Seamless connection to a PC.

***Suggested Price $249.99***

## YT-847

YT-847 Autotuner is an integrated tuner for the Yaesu FT-847. An included CAT/Power cable interfaces with your FT-847. Just press the tune button on the tuner and everything else happens automatically!

***Suggested Price $249.99***

## FREE!

**RBA-1:1 Balun or RU-4:1 Unun**

**When You Buy A S9V 43', 31' or 18' Multiband Antenna**

Purchase an S9V 43', 31' or 18' antenna and fill out the included form. Mail it to LDG Electronics, and we will send you either a 200 watt balun or unun, your choice!

## Antennas!

### S9V 43' $199.99

**80-6 meters** *Fixed Operation*

The S9V 43' is a high-performance lightweight telescoping fiberglass vertical. The best value in high-performance 'tall' verticals!

### S9V 31' $99.99

**40-6 meters** *Fixed or Portable Operation*

### S9V 18' $49.99

**20-6 meters** *Fixed or Portable Operation*

The S9V 31' and 18' are tapered, ultra-lightweight fiberglass vertical antennas. Friction-locking sections and high-tech polymer tube rings allow the antenna to be quickly and safely deployed in practically any environment without tools!

### S9RP $39.99

**Aluminum Radial Plate**

Includes 20 sets of stainless steel nuts & bolts

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

**Visit our website for a complete dealer list www.ldgelectronics.com**

LDG

# hy-gain® ROTATORS

## . . . the first choice of hams around the world!

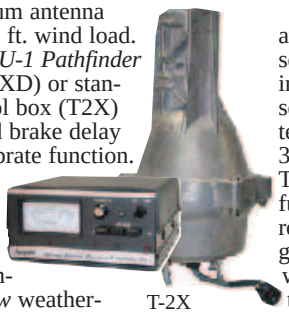
### HAM-IV

HAM-IV
$649.95

***The most popular rotator in the world!*** For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of $2^{1}/_{16}$ inches.

| *HAM IV and HAM V Rotator Specifications* | |
|---|---|
| Wind Load capacity (inside tower) | 15 square feet |
| **Wind Load (w/mast adapter)** | **7.5 square feet** |
| Turning Power | 800 in.-lbs. |
| **Brake Power** | **5000 in.-lbs.** |
| Brake Construction | Electric Wedge |
| **Bearing Assembly** | **dual race/96 ball bearings** |
| Mounting Hardware | Clamp plate/steel U-bolts |
| **Control Cable Conductors** | **8** |
| Shipping Weight | 26 lbs. |
| **Effective Moment (in tower)** | **2800 ft.-lbs.** |

### TAILTWISTER SERIES II



**For** large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, $2^{1}/_{16}$ inch max. mast.

T-2X
$799.95

T-2XD
$1229.95
with DCU-1

| *TAILTWISTER Rotator Specifications* | |
|---|---|
| Wind load capacity (inside tower) | 20 square feet |
| **Wind Load (w/ mast adapter)** | **10 square feet** |
| Turning Power | 1000 in.-lbs. |
| **Brake Power** | **9000** in.-lbs. |
| Brake Construction | Electric Wedge |
| **Bearing Assembly** | **Triple race/138 ball brngs** |
| Mounting Hardware | Clamp plate/steel U-bolts |
| **Control Cable Conductors** | **8** |
| Shipping Weight | 31 lbs. |
| **Effective Moment (in tower)** | **3400 ft.-lbs.** |

### CD-45II

CD-45II
$449.95

**For** antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to $2^{1}/_{16}$ inches. MSLD light duty lower mast support included.

| *CD-45II Rotator Specifications* | |
|---|---|
| Wind load capacity (inside tower) | 8.5 square feet |
| **Wind Load (w/ mast adapter)** | **5.0 square feet** |
| Turning Power | 600 in.-lbs. |
| **Brake Power** | **800 in.-lbs.** |
| Brake Construction | Disc Brake |
| **Bearing Assembly** | **Dual race/48 ball brings** |
| Mounting Hardware | Clamp plate/steel U-bolts |
| **Control Cable Conductors** | **8** |
| Shipping Weight | 22 lbs. |
| **Effective Moment (in tower)** | **1200 ft.-lbs.** |

### HAM-V

HAM-V
$1099.95
with DCU-1

**For** medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

### AR-40

AR-40
$349.95

**For** compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. $2^{1}/_{16}$ inch maximum mast size. MSLD light duty lower mast support included.

| *AR-40 Rotator Specifications* | |
|---|---|
| Wind load capacity (inside tower) | 3.0 square feet |
| **Wind Load (w/ mast adapter)** | **1.5 square feet** |
| Turning Power | 350 in.-lbs. |
| **Brake Power** | **450 in.-lbs.** |
| Brake Construction | Disc Brake |
| **Bearing Assembly** | **Dual race/12 ball bearings** |
| Mounting Hardware | Clamp plate/steel bolts |
| **Control Cable Conductors** | **5** |
| Shipping Weight | 14 lbs. |
| **Effective Moment (in tower)** | **300 ft.-lbs.** |

### HDR-300A

HDR-300A
$1499.95

***King-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

| *HDR-300A Rotator Specifications* | |
|---|---|
| Wind load capacity (inside tower) | 25 square feet |
| **Wind Load (w/ mast adapter)** | **not applicable** |
| Turning Power | 5000 in.-lbs. |
| **Brake Power** | **7500 in.-lbs.** |
| Brake Construction | solenoid operated locking |
| **Bearing Assembly** | **bronze sleeve w/rollers** |
| Mounting Hardware | stainless steel bolts |
| **Control Cable Conductors** | **7** |
| Shipping Weight | 61 lbs. |
| **Effective Moment (in tower)** | **5000 ft.-lbs.** |

### ROTATOR OPTIONS

**MSHD, $109.95**. Heavy duty mast support for T2X, HAM-IV and HAM-V.
**MSLD, $49.95**. Light duty mast support for CD-45II and AR-40.
**TSP-1, $34.95**. Lower spacer plate for HAM-IV and HAM-V.

### Digital Automatic Controller

DCU-1
$749.95

**Automatically** controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

### AR-35 Rotator/Controller

AR-35
$89.95

**For** UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

RBD-5
$29.95

### *NEW!* Automatic Rotator Brake Delay

**Provides** automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.


***http://www.hy-gain.com***
***Nearest Dealer, Free catalog, To Order . . .***
***800-973-6572***
**Voice:** 662-323-9538 **Fax:** 662-323-6551

hy-gain®
***Antennas, Rotators & Towers***
***308 Industrial Park Road,Starkville, MS 39759, USA***


## FT-250R 2M FM HT

• TX: 144-148 MHz • RX: 136-174 MHz
• Power: 5/2/0.5W • Memories: 209

## FT-60R 2M/440 FM HT

• TX: 144-148, 430-450 MHz • RX: 108-520, 700-999 MHz (cell blkd) • Power: 5/2/0.5W • Memories: 1000

## VX-8GR 2M/440 FM HT w/Built-in GPS

• TX: 144-148, 430-450 MHz • RX: 108-999 MHz (cell blocked) • Memories: 1200+ • Power: 5/2.5/1/0.05W
• GPS unit and antenna is built-in for APRS® data


## FT-7900R 2M/440 FM Mobile

• TX: 144-148, 430-450 MHz
• RX: 108-520, 700-999 MHz (cell blocked)
• Power: 50/20/10/5W (2M), 45/20/10/5W (440 MHz)
• Memories: 1055 • YSK-7800 included!


## FT-8800R 2M/440 FM Mobile

• TX: 144-148, 430-450 MHz • RX: 108-520, 700-999 MHz (cell blkd) • Power: 50/20/10/5W (2M), 35/20/10/5W (440 MHz) • Memories: 1000
• Crossband repeat • YSK-8900 included!

## FT-8900R Quad-Band FM Mobile

• Same as FT-8800R but TX: 28-29.7, 50-54, 144-148, 430-450 MHz and RX: 28-29.7, 50-54, 108-180, 320-480, 700-985 MHz (cell blkd) • Power: 50/20/10/5W (10/6/2M), 35/20/10/5W (440 MHz) • YSK-8900 included!

## Quadra System VL-1000

### HF/6M 1KW Linear Amplifier

• TX: 160-15M/6M • Power: 1000W on 160-15M & 500W on 6M (220 VAC), 500W (110 VAC)
• Automatic band change & antenna tuner
• Two input & Four output connectors
• Easily connects to any current Yaesu HF transceiver


## FT-857D 100W HF/VHF/UHF Mobile

• TX: HF/VHF/UHF • RX: 0.1-56, 76-108, 118-164, 420-470 MHz • Power: 5-100W (HF/6M), 5-50W (2M), 5-20W (440 MHz) • Memories: 200 • YSK-857 included!

## FT-897D 100W HF/VHF/UHF Portable

• Similar to the FT-857D but can also operate 20W using optional FNB-78 13.2V @ 4.5 Ah NiMH battery packs

## FT-450D HF/6M Compact Transceiver

• TX: HF/6M • RX: 0.03-56 MHz • Power: 10-100W
• Memories: 500 • Auto Tuner • Same as the FT-450AT with new features: Key illumination, Foot stand, Selectable 300 Hz/500 Hz/2.4 kHz CW IF Filters, Classically designed main dial and knobs, dynamic microphone

## FT-2000 HF/6M Transceiver

• TX: HF/6M • RX: 0.03-60 MHz • Power: 10-100W
• Memories: 99 • Auto Antenna Tuner • 32-bit Floating Point DSP • Dual In-Band Receive • Internal Power Supply
• Optional MTU tune units for 160M, 80/40M and 30/20M bands allowing you to pull through weak signals

## FT-2000D RF output is 200W, PS is external


FTDX-5000MP

## FTDX-5000 Series – Covers HF and 6M;

Three different configurations all running 10-200W on CW, SSB, FM, RTTY & PKT and 5-50W on AM • RX: 0.03-60 MHz • Memories: 99 • The "D" and "MP" model comes with SM-5000 Station Monitor that features an excellent bandscope • The "MP" also comes with high stability ±0.05ppm OCXO & 300 Hz roofing filter

**FTDX-5000** Basic Model & ±0.5ppm TCXO
**FTDX-5000D** With Station Monitor & ±0.5ppm TCXO
**FTDX-5000MP** With Station Monitor, ±0.05ppm OCXO & 300 Hz Roofing Filter

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## Membership Application

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| Regular | $39 | $76 | $111 | Monthly *QST* via standard mail for US members |
| Canada | $49 | $93 | $132 | Monthly *QST* via standard mail for Canadian members |
| Intl *QST* | $62 | $118 | $167 | Monthly *QST* via air mail for international members |
| Intl CD | $39 | $76 | $111 | Annual CD-ROM (*QST*, *NCJ* and *QEX*) for international members |
| Blind | $8 | $16 | $24 | No *QST* delivery, all other member benefits apply |
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Source Code: QST 7/2011


## IC-V82 2M FM HT

- TX: 144-148 MHz • RX: 136-174 MHz
- Power: 7W • Memories: 200
- D-Star upgradable with optional UT-118

## IC-T70A 2M/440 FM Handheld

- TX: 144-148, 430-450 MHz • RX: 136-174, 400-479 MHz
- Power: 5/2.5/0.5W • Memories: 302
- Comes with NiMH Battery and Wall Charger

## IC-92AD 2M/440 D-Star & FM HT

- TX: 144-148, 420-450 MHz • RX: 0.495-999 MHz (cell blkd)
- Power: 5/2.5/0.5/0.1W • Duel RX
- Optional HM-175GPS Speaker Mic adds GPS capabilities


## ID-880H 2M/440 FM Analog & D-Star Digital Dual Bander Mobile

- TX: 144-148, 430-450 MHz • RX: 118-173.995, 230-549.995, 810-999.99 MHz (cell blkd) • Power: 50/15/5W
- Memories: 1052


## IC-2820H 2M/440 FM Mobile

- TX: 144-148, 430-450 MHz • RX: 118-549.95, 810-999.990 MHz (cell blkd) • Power: 50/15/5W
- Packet ready (9600 BPS – 6-pin DIN) • Upgradable D-Star DV (digital voice) & GPS capabilities w/optional UT-123


## IC-9100 HF/6/2M/440 MHz All Mode

- TX: HF/6/2M/440 MHz • RX: 0.03-60, 136-174, 420-480 MHz • Optional 1.2 GHz, 1-10W Operation
- Power: 2-100W HF/6/2M & 2-75W 440 MHz
- Memories: 297 • Optional D-Star Board • Auto Tuner
- Optional 3 kHz & 6 kHz Roofing Filters (first IF)
- USB Port for CI-V Format PC Control and Audio In/Out

## IC-7200 HF/6M Portable Transceiver

- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 201 • Rugged design for outdoor use
- 32-bit IF-DSPs + 24-bit AD/DA Converters
- USB Port for CI-V Format PC Control and Audio In/Out

## IC-7410 HF/6M Transceiver

- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- 15kHz 1st IF Filter and optional 3kHz & 6kHz filters to protect against strong unwanted adjacent signals
- Much faster DSP unit compared to the IC-746PRO
- Automatic antenna tuner • USB connector for PC control

## IC-7600 HF/6M Transceiver

- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 101 • 5.8 inch color screen
- High-resolution real time spectrum scope using a dedicated DSP unit • Automatic antenna tuner

## IC-7700 Multimode HF/6M Transceiver

- TX: HF/6M • RX: 0.03-60 MHz • Power: 5-200W
- Memories: 101 • 7 inch color screen
- Two 32-bit floating DSPs • Power supply built-in
- Three roofing filters • External VGA connector
- Automatic antenna tuner • USB memory drive socket
- Real time spectrum scope

## PW-1 HF/6M 1KW Linear Amplifier

- TX: 160-15M/6M • Power: 1000W (180-264 VAC), 500W (90-132 VAC) • Automatic band change & antenna tuner • Two input & Four output connectors
- Easily connects to any current Icom HF transceiver

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# MFJ-259B *World's* most popular Antenna Analyzer is super easy-to-use!

MFJ-259B
**$289.95**

***The MFJ-259B is the world's most popular Antenna Analyzer and the easiest to use! Just select a band and mode. Set frequency. Your measurements are instantly displayed!***

### Handheld Antenna Lab

**Owning** the MFJ-259B is like having an entire antenna lab in the palm of your hand!

**Measure** SWR quickly or make sophisticated measurements such as Return Loss, Reflection Coefficient, Resonance, Complex Impedance (R+jX), Impedance Magnitude (Z) plus Phase in degrees. Covers 1.8 to 170 MHz -- no gaps.

### Coax Analyzer

**Determine** coax cable velocity factor (Vf), loss in dB, coax length, distance to open or short plus detect wrong coax impedance.

### Frequency Counter

**Measure** frequency of external signals using the separate BNC counter input.

### Signal Generator

**Use** as a signal source 1.8-170 MHz with digital dial accuracy for testing and alignment.

### Inductance and Capacitance

**Measure** Inductance (uH) and Capacitance (pF) at RF frequencies not at audio frequencies used by most L/C meters.

### Digital and *Analog* Meters

**A** high-contrast backlit LCD gives precision readings and *two* side-by-side *analog meters* make antenna adjustments intuitive.

### Smooth, Stable Tuning

**Velvet-smooth** reduction drive tuning and precision *air-variable capacitor* makes setting frequency easy and stable.

### Battery Saver & More

**Battery-saver**, low-battery warning, battery voltage meter and charger are all built in. Use ten Alkaline, NiCad or NiMH AA batteries (not included) or 110 VAC with MFJ-1312D, $15.95. 4Wx6¾Hx2D inches.

### Here's What You Can Do

**Find** true antenna resonant frequency
***Tune*** *antenna quickly for minimum SWR*
**Match** complex loads to your feedline
***Adjust*** *mobile whips without stressing finals*
**Determine** safe 2:1-SWR operating windows
***Adjust*** *tuners without generating QRM*
**Find** exact location of shorts and opens
***Cut*** *stubs and phasing lines accurately*
**Check** cable for loss and contamination
***Find*** *value of unknown coils and caps*
**Test** RF transformers and baluns
***Troubleshoot*** *filters and networks*
**Find** self-resonance and relative Q
***Check*** *patterns and compare gain*
**MFJ-259B** does all this and more!

### MFJ Analyzer Accessories

**MFJ-29C, $24.95.** Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Special foam-filled fabric cushions blows, deflects scrapes and protects knobs and meters from harm. **MFJ-39C, $24.95.** Like MFJ-29C, but for MFJ-269.

**MFJ-66, $24.95.** Plug-in coils turns any MFJ Antenna Analyzer into a sensitive and accurate *band switched* dip meter. 2 coils.

**MFJ-92AA10, $29.95.** Ten MFJ *SuperCell*™ Ni-MH AA rechargeable batteries.

**MFJ-99B, $88.90.** ***Save $7!*** MFJ-259B Deluxe Accessory Pack: MFJ-29C Pouch, 10 Ni-MH batteries, dip coils, AC adapter. **MFJ-98B, $88.90.** Like MFJ-99B but for MFJ-269.

**MFJ-99, $60.85.** ***Save $5!*** Like MFJ-99B, less batteries, for MFJ-259B. **MFJ-98, $60.85.** Like MFJ-99 but for MFJ-269.

**MFJ-99C, $40.90.** ***Save $5!*** AC Adapter and 10 Ni-MH batteries for MFJ-259B/269.

**MFJ-917, $29.95.** Current balun lets you make balanced line antenna measurements on HF with your MFJ Analyzer. **MFJ-7702, $3.95.** MFJ-917 to MFJ Analyzer adapter.

**MFJ-731, $99.95.** Tunable RF filter allows accurate Antenna Analyzer measurements in presence of strong RF fields. 1.8-30 MHz.

**MFJ-5510, $9.95.** Cigarette lighter cord.

# MFJ-269 ...1.8-170 MHz and 415-470 MHz plus 12-bit A/D!

***The MFJ-269 does everything the MFJ-259B does - and much more!***

### Expanded Frequency Coverage

**MFJ-269** adds UHF coverage from 415 to 470 MHz -- right up into the commercial band. With it, you can adjust UHF dipoles, verticals, Yagis, quads and repeater collinear arrays with ease -- plus construct accurate phasing harnesses and timed cables. Also use it as a signal source to check UHF duplexers, diplexers, IMD filters and antenna patterns.

### Much Better Accuracy

**New** *12-bit* A/D converter gives much better accuracy and resolution than common 8-bit A/D converters -- *an MFJ-269 exclusive!*

### Complex Impedance Analyzer

**Read** Complex Impedance (1.8 to 170 MHz)as series equivalent resistance and reactance (Rs+jXs) or as magnitude (Z) and phase (degrees). Also reads *parallel* equivalent resistance and reactance (Rp+jXp) -- *an MFJ-269 exclusive!*

MFJ-269
**$389.95**

### CoaxCalculator™

**Lets** you calculate coax line length in feet given electrical degrees and vice versa for any frequency and any velocity factor -- *an MFJ-269 exclusive!*

### Use any Characteristic Impedance

**You** can measure SWR and coax loss with *any* characteristic impedance (1.8 to 170 MHz) from 10 to over 600 Ohms, including 50, 51, 52, 53, 73, 75, 93, 95, 300, 450 Ohms -- *an MFJ-269 exclusive!*

### Logarithmic Bar Graph

**Has** easy-to-read LCD *logarithmic* SWR bargraph and SWR meter for quick tuning.

**Uses** instrumentation grade N-connector to ensure minimum mismatch on all frequencies. Includes N to SO-239 adapter.

## MFJ-269*PRO*™ *Analyzer*

**Like** MFJ-269, but has extended commercial frequency coverage in UHF range ***(430 to 520 MHz)*** and *ruggedized* cabinet that protects LCD display, knobs, meters and connectors from damage in the field/lab.

MFJ-269PRO
**$419.95**

# MFJ-266 ...Wide range 1.5-185 MHz and 300-490 MHz!

***New!***

MFJ-266
**$349.95**

**The** compact MFJ-266 covers HF (1.5-65 MHz) in 6 bands, plus VHF (85-185 MHz) and UHF (300-490 MHz).

**In** *Antenna Analyzer* mode, you get Frequency, SWR, Complex Impedance (R+jX), and Impedance Magnitude (Z) *all displayed simultaneously* on a high-contrast backlighted LCD (SWR only on UHF).

**In** *Frequency-Counter* mode, the MFJ-266 functions as a 500-MHz counter with up to 100 Hz resolution and measures relative field strength of a signal and its frequency and can be used for tracking measurement interference.

**MFJ-266** also functions as a 10 dBm signal source with digital-frequency readout. It can also measure inductance and capacitance at RF frequencies.

**Features** include solid-state band switching and electronic varicap tuning with a smooth 10:1 lockable vernier tuning drive.

**Use** eight AA *alkaline* batteries or 110 VAC with MFJ-1312D, $15.95. Includes N-to-SO-239 adapter. 3¾Wx6½Hx2¾D inches. 1.3 lbs.

## Free MFJ Catalog

***Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800***

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***MFJ . . . The World Leader in Amateur Radio!***

# MFJ TUNERS

## Ham Radio's *Most Popular* 300 Watt Antenna Tuner

***More hams use MFJ-949s than any other antenna tuner in the world!***

**Why?** Because the world's leading tuner has earned a world-wide reputation for being able to match just about anything.

***Full 1.8-30 MHz Operation***

***Tune your antenna for minimum SWR!*** Works 1.8-30 MHz on dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas . . . Use coax, random wire, balanced lines. Has heavy duty 4:1 balun for balanced lines.

***Custom inductor switch***

**Custom** designed inductor switch, 1000 volt tuning capacitors, *Teflon*(R) insulating washers and proper L/C ratio gives you *arc-free* no worries operation up to 300 Watts PEP transceiver input power.

MFJ-949E $179.95

**The** MFJ-949E inductor switch was *custom* designed to withstand the extremely high RF voltages and currents that are developed in your tuner.

***8-Position Antenna switch***

**Antenna** switch lets you select two coax fed antennas, random wire/balanced line or dummy load through your MFJ-949E or direct to your transceiver.

***Lighted Cross-Needle Meter***

***Full size*** 3-inch lighted Cross-Needle Meter. Lets you easily read SWR, *peak* or average forward and reflected power simultaneously. Has 300 Watt or 30 Watt ranges.

***QRM-Free PreTune™***

**MFJ's** *QRM-Free PreTune™* lets you pre-tune your MFJ-949E *off-the-air* into its built-in dummy load! Makes tuning your actual antenna faster and easier.

***Plus Much More!***

***Full size*** built-in non-inductive 50 Ohm dummy load, scratch-proof Lexan multi-colored front panel, $10^{5}/_{8}$x$3^{1}/_{2}$x7 inches. Superior cabinet construction and more!

**MFJ-948, $159.95.** Econo version MFJ-949E. Has all features except for dummy load.

***No Matter What™* Warranty**

**Every** MFJ tuner is protected by MFJ's famous one year *No Matter What™* limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

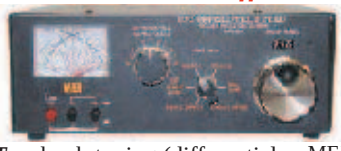
## *More hams use MFJ tuners than all other tuners in the world!*

### MFJ-989D ***Legal Limit*** Tuner

MFJ-989D $389.95

***New***, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. Easily handles *full* 1500 Watts SSB/CW, 1.8-30 MHz, including MARS/WARC bands. Six position antenna switch, dummy load. *New* 500 pF air variable capacitors. *New* improved *AirCore™* Roller Inductor. *New* high voltage current balun. *New* crank knob. $12^{7}/_{8}$Wx6Hx$11^{5}/_{8}$D".

### MFJ-986 Two knob ***Differential-T™***



MFJ-986 $349.95

***Two*** knob tuning (differential capacitor and *AirCore™* roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. $10^{3}/_{4}$Wx$4^{1}/_{2}$Hx15 in.

### MFJ-962D ***compact*** kW Tuner

MFJ-962D $299.95

**A** few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore™* roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. $10^{3}/_{4}$x$4^{1}/_{2}$ x$10^{7}/_{8}$ in.

### MFJ-969 300W ***Roller Inductor*** Tuner

MFJ-969 $219.95

**Superb** *AirCore™* Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune™*, antenna switch, dummy load, 4:1 balun, Lexan front panel. $10^{1}/_{2}$Wx$3^{1}/_{2}$Hx$9^{1}/_{2}$D inches.

### MFJ-941E ***super value*** Tuner

MFJ-941E $139.95

***The*** *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek $10^{1}/_{2}$Wx$2^{1}/_{2}$Hx7D in.

### MFJ-945E HF/6M ***mobile*** Tuner

MFJ-945E $129.95

**Extends** your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

### MFJ-971 ***portable/QRP*** Tuner

MFJ-971 $119.95

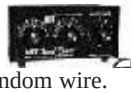
**Tunes** coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

### MFJ-901B ***smallest*** Versa Tuner

MFJ-901B $99.95

**MFJ's** smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

### MFJ-902 ***Tiny Travel*** Tuner



MFJ-902 $99.95

***Tiny*** $4^{1}/_{2}$x$2^{1}/_{4}$x3 inches, full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire.

**MFJ-904H, $149.95.** Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. $7^{1}/_{4}$x$2^{1}/_{4}$x$2^{3}/_{4}$ inches.

### MFJ-16010 ***random wire*** Tuner

MFJ-16010 $69.95

**Operate** all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

### MFJ-906/903 ***6 Meter*** Tuners

MFJ-906 $99.95

**MFJ-906** has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $69.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

### MFJ-921/924 ***VHF/UHF*** Tuners

MFJ-921/924 $89.95

**MFJ-921** covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in.

### MFJ-931 ***artificial*** RF Ground

MFJ-931 $109.95

**Eliminates** RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Creates artificial RF ground or electrically places far away RF ground directly at rig. **MFJ-934, $209.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

### *Free* MFJ Catalog

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# MFJ *IntelliTuner*™ Automatic Tuners

## *More hams use MFJ tuners than all other tuners in the world!*

***World's most advanced Automatic Antenna Tuners feature world renowned MFJ AdaptiveSearch™ and AutomaticRecall™ algorithms -- world's fastest ultra-wide range tuning. Nine World Class models! Choose your features: Digital/Analog/Audio SWR-Wattmeter, Antenna Switch, Balun, Radio Interface, Digital frequency readout, Remoteable, Coax/Balanced Lines/Wire Tuning, Field Upgradeable . . .***

## MFJ-993B 300 Watt *IntelliTuner*™

***The World's Best Selling Automatic Antenna Tuner!***

**The** MFJ-993B *IntelliTuner*™ lets you tune any antenna -- balanced or unbalanced -- *automatically* and *ultra fast*.

**It's** a comprehensive automatic *antenna tuning center* complete with SWR/Wattmeter, antenna switch for two antennas and 4:1 current balun for balanced lines.

**MFJ's** exclusive *IntelliTuner*™, *Adaptive Search*™ and *Instant Recall*™ algorithms give you *ultra fast* automatic tuning with over 20,000 *VirtualAntenna*™ Memories.

**Select 300 Watt** SSB/CW power level and match 6-1600 Ohm antennas ***Or . . .*** select **150 Watt** SSB/CW power level and match *extra wide-range* 6-3200 Ohms!

**You** get a highly efficient L-network, 1.8-30 MHz coverage, Cross-Needle *and* digital meters, audio SWR meter, *backlit* LCD, remote control port, radio interface, heavy-duty 16 amp/1000V relays.

MFJ-993B $259.95

**The** MFJ-993B automatically tunes for minimum SWR and remembers your frequency and tuner settings. The next time you operate on that frequency and antenna, these tuner settings are instantly restored and *you're ready to operate in milliseconds!* 10W x2¾ Hx9D". Use 12-15 VDC/1 amp or 110 VAC with **MFJ-1316, $21.95**. Radio interface cables, remote control available. See ***www.mfjenterprises.com***

### *for 600 Watt amps*

***AL-811/ALS-600/ALS-500***

MFJ-994B $359.95

**For** 600 Watt amps like Ameritron AL-811/ALS-600/ALS-500M. Matches 12-800 Ohms. 10,000 *Virtual Antenna*™ memories. Cross-Needle SWR/Wattmeter. 10Wx2¾Hx9D inches.

***No Matter What*™ Warranty**

**Every** MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

### 1500 Watt *Legal Limit*

***for Ameritron AL-1500/1200/82 amps***

MFJ-998 $699.95

**Roam** the entire HF spectrum 1.8-30 MHz *hands-free* with full *1500 Watt* legal limit on SSB/CW and near-perfect SWR! Lighted LCD/Cross-Needle Meter.

### 300 Watt...*Extra* Wide Range

***SWR/Wattmeter, 10000 VA Memories***

MFJ-991B $219.95

***Extra*** *wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

### 200 Watt ...Compact

***Digital Meter, Ant Switch, Wide Range***

MFJ-929 $219.95

**World's** fastest compact auto tuner uses MFJ *Adaptive Search*™ and *InstantRecall*™ algorithms. 132,072 tuning solutions instantly match virtually any antenna with near perfect SWR.

### 200 Watt ...Econo

***Small, Ant Switch, 20K VA Memories***

MFJ-928 $199.95

**High-speed**, wide matching range and compactness at low cost! Leave in-line and forget it -- your antenna is *always* automatically tuned! 2-position antenna switch.

### 200 Watt *MightyMite*™

***Matches IC-706, FT-857D, TS-50S***

MFJ-925 $179.95

***No*** *extra space needed!* Just set your IC-706/7000, FT-857D, TS-50S on top of this matching low-profile automatic tuner -- it's all you need for a completely automated station using *any* antenna! Just tune and talk!

### *G5RV Antenna*

MFJ-1778 $44.95

**Covers** all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 Meters as Marconi.1500 Watts. Super-strong fiberglass center/feed-point insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

**MFJ-1778M, $39.95.** G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

### 200W...Weather-sealed

***for Remote/Outdoor/Marine***

MFJ-926 $399.95

***Fully*** *weather-sealed for remote Outdoor/Marine use*! Tough, durable, built-to-last the elements for years.

### 200 Watt...Remote

***Coax/Wire Ant, No pwr cable needed***

MFJ-927 $259.95

**Weather** protected fully automatic *remote* auto tuner for wire ***and*** *coax* antennas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.

### *Free* MFJ Catalog

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***or call toll-free 800-647-1800***

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

**MFJ ENTERPRISES, INC.**
300 Industrial Pk Rd, Starkville, MS 39759 **PH:** (662) 323-5869
**Tech Help:** (662) 323-0549
**FAX:**(662)323-6551 8-4:30 CST, Mon.-Fri. ***Add shipping.***



***http://www.mfjenterprises.com for instruction manuals, catalog, info***

# 10 Bands -- 1 MFJ Antenna!

***Full size performance . . . No ground system or radials. Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna . . . Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .***

MFJ-1798
$299.95

**Operate** 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

**Full** size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

**Get** very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

**MFJ's** unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

**It's** easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

**Self-supporting** and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

**Separate** *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

**The** active radiator works as a stub to decouple everything beyond it. In *phase* antenna current flows in all parallel radiators. This forms a very large equivalent radiator and gives you incredible bandwidths. Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

**On** 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

**MFJ's** unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands. Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

**You** don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation. You can mount it from ground level to roof top and get awesome performance.

**The** feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

**Incredibly** strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

**Efficient** high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

## MFJ *6-Band* Halfwave Vertical Antenna

***6 bands: 40, 20, 15, 10, 6, 2 Meters . . .***
***No radials or ground needed***

MFJ-1796
$229.95

**MFJ-1796** is only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments, small lots, trailers. Perfect for field day, DXpeditions, camping.

**Efficient** end-loading, no lossy traps. Entire length always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

**MFJ-1796W, $229.95.** WARC band version for 12, 17, 30, 60 Meters only.

**MFJ-1792, $189.95.** Full size 1/4 wave radiator for 40 Meters. 33 ft., handles 1500 Watts PEP. Requires guying and radials.

**MFJ-1793, $209.95.** Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

## 6-Band, 40-2 Meters ***Rotatable*** Mini-Dipole

***Low profile 14 feet . . .7 ft. turning radius . . . 40, 20, 15, 10, 6, 2 Meters . . . 1500 Watts . . .***

MFJ-1775
$249.95

**MFJ-1775** is inconspicuous and low profile -- not much bigger than a TV antenna and is easily turned by a lightweight rotator like Hy-Gain's *AR-35*.

***It's no Wimp!*** Its *directivity* reduces QRM/noise and lets you *focus* your signal in the direction you want -- work some *real* DX.

**You** can operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters -- and run *full 1500 Watts* SSB/CW on all HF bands!

**Features** automatic band switching and uses highly efficient end-loading with its *entire length* always radiating. With 6 and 2 Meters thrown-in, you have ham radio's most versatile *rotatable* dipole!

**Each** HF band uses a separate, efficient end-loading coil wound on fiberglass forms with *Teflon*™ wire, and capacitance hats at each end (no lossy traps). 6 and 2 meters are *full-length* halfwave dipoles.

***Built-to-last*** -- incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing radiator. Assembles in an afternoon. Adjusting one band has little effect on other bands.

**MFJ-1775W, $249.95.** WARC band version for 12, 17, 30, 60 Meters only.

## MFJ *80/40/20* Meter ***Rotatable*** Dipole

MFJ-1785
$369.95

Now you can operate the *low bands* on 80, 40, and 20 Meters with a true rotatable dipole that'll blend in with the sky! Take advantage of excellent low band propagation during this low sunspot cycle. Handles 1500 Watts SSB/CW. 80/40 meter end-loading coils are wound on fiberglass forms with *Teflon*™ wire, and resonated with capacitance hats to ensure extremely low-losses. Full-size on 20 Meters gives incredible DX. Balun included! 33 foot low-profile, inconspicuous. Easily rotatable with a medium duty rotator like Hy-gain's AR-40.

## *MFJ's Super High-Q Loop™ Antennas*

MFJ-1786
$419.95

**MFJ's** *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

**Ideal** for limited space -- apartments, small lots, motor homes, attics, or mobile homes. Enjoy DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

**Super** easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto tunes to desired band, then beeps to let you know. No control cable is needed.

**Fast**/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

**All** welded construction, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you highest possible efficiency*.

**Each** plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning. Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

**Cover 40-15 Meters. MFJ-1788, $469.95.** Like MFJ-1786 but covers 40 - 15 Meters continuous. Includes remote control.

## *MFJ's G5RV Antenna*

MFJ-1778
$44.95

**Covers** all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 M as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

**MFJ-1778M, $39.95.** G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

***MFJ . . . the world leader in ham radio accessories!***

**Dealer/Catalog/Manuals**
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# September is...

# National Preparedness Month

## "A Time to Remember. A Time to Prepare."

## Get a Kit, Make a Plan, Be Informed.

ICOM®

A public service announcement brought to you by Icom America Inc.

To learn more about how you and your family can prepare for emergencies or get involved visit: **www.ready.gov** or **www.citizencorps.gov**

# MFJ All-Band G5RV Antennas

***Operate all bands through 10 Meters, even 160 Meters, with a single wire antenna!***

MFJ-1778
$44.95

***The famous G5RV*** *antenna is the most popular ham radio antenna in the world!* You hear strong signals from G5RVs day and night, 24/7.

**And it's no wonder . . .** it's an efficient, *all band* antenna that's only 102 feet long -- shorter than an 80 Meter dipole. Has 32.5 foot ladder line matching section ending in SO-239 connector for your coax feedline.

**Use** as Inverted Vee or Sloper, and it's even more compact and needs just one support.

**With** an antenna tuner, you can operate all bands 80 Meters through 10 Meters and even 160 Meters with an antenna tuner and a ground.

**MFJ's** fully assembled G5RV handles 1500 Watts. *Hang and Play™* -- add coax, some rope to hang and you're on the air!

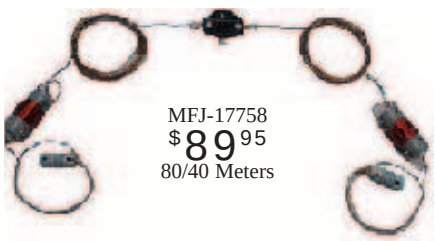
**MFJ-1778M, $39.95.** *Half-size*, 52 foot *G5RV JUNIOR* covers 40-10 Meters with tuner. Handles full 1500 Watts.

## MFJ All Band Doublet

MFJ-1777
$59.95

**MFJ-1777** is a 102 foot *all band* doublet antenna that covers 160 through 6 Meters with a balanced line tuner. Super strong custom fiberglass center insulator provides stress relief for ladder line (100 ft. included). Authentic *glazed ceramic* end insulators. Handles full 1500 Watts.

## MFJ *Dual Band* 80/40 *or* 40/20M Dipoles



MFJ-17758
$89.95
80/40 Meters

**MFJ-17758** is a short 85 foot long *dual band* 80/40 Meter dipole antenna. It's *full-size* on 40 Meters and has ultra-efficient end-loading on 80 Meters. Handles full 1500 Watts. Super-strong injection-molded center insulator with built-in SO-239 connector and hang hole. Solderless, crimped construction. 7-strand, #14 gauge hard copper wire. Connect your coax feedline directly, no tuner needed.

**MFJ-17754, $59.95.** Short coax fed 42 foot long *dual band* 40/20 Meter dipole antenna. *Full-size* on 20 Meters, ultra-efficient end-loading on 40 Meters. Same construction as MFJ-17758.

## MFJ *Single Band* Dipole Antennas

**Ultra** high quality center fed dipoles will give you trouble-free operation for years. Custom injection-molded UV-resistant center insulator has built-in coax connector and hanging hole. Heavy duty 7-strand, 14-gauge hard copper antenna wire. Extremely strong solderless crimped construction. Authentic *glazed ceramic* end insulators. Use as horizontal or sloping dipole or inverted vee. Handles full 1500 Watts. Simply cut to length for your favorite frequency with cutting chart provided.

MFJ-1779A
$69.95
160M, 265 ft.

MFJ-1779B
$49.95
80-40M, 135 ft.

MFJ-1779C
$29.95
20-6M, 35 ft.

## *True* 1:1 Current *Balun & Center Insulator*

MFJ-918
$24.95

**True** *1:1 Current Balun/ Center Insulator* forces equal antenna currents in dipoles for superior performance. Reduces coax feedline radiation and field pattern distortion -- your signal goes where *you* want it. Reduces TVI, RFI and RF hot spots in your shack. *Don't build a dipole without one!* 50 hi-permeability ferrite beads on high quality RG-303 *Teflon*® coax and *Teflon*® coax connector. Handles full 1.5kW 1.8-30 MHz. Stainless steel hardware with *direct* 14 gauge stranded copper wire connection to antenna. 5x2 inches. Heavy duty weather housing.

## RF Isolator

MFJ-915
$29.95

**MFJ-915** *RF Isolator* prevents unwanted RF from traveling on the outside of your coax shield into your transceiver. This unwanted stray RF can cause painful RF "bites" when you touch your microphone or volume control, cause your display or settings to go crazy, lock up your transceiver or turn off your power supply. In mobile installations, stray RF could cause your car to do funny things even blow your car computer. Clear up these problems, plug an MFJ-915 between your antenna and transceiver. 5x2 in. Handles full 1500 Watts. Covers 1.8-30 MHz.

**MFJ-919, $59.95.** 4:1 current balun,1.5 kW.
**MFJ-913, $29.95.** 4:1 balun, 300 Watts.

## Antenna Switches

MFJ-1704
$79.95
4-Positions

**MFJ-1704** heavy duty *antenna switch* lets you select 4 antennas or ground them for static and lightning protection. Unused antennas automatically grounded. Replaceable lightning surge protection. Good to 500 MHz. 60 dB isolation at 30 MHz. 2.5 kW PEP. Less than .2 dB insertion loss, SWR below 1.2:1. SO-239 connectors. Handy mounting holes. 6¼Wx4¼Hx1¼D in.

MFJ-1702C
$39.95
2-Positions

**MFJ-1702C** Like MFJ-1704, but for 2 antennas. 3Wx2Hx2D"

MFJ-1700C
$99.95

**MFJ-1700C** *Antenna/ Transceiver Switch* lets you select one of six antennas and one of six transceivers in any combination. Plug in an antenna tuner or SWR wattmeter and it's always in-line for any antenna/transceiver combination. Has lightning surge protection. Handles 2 kW PEP SSB, 1 kW CW, 50-75 Ohm loads. Unused terminals are automatically grounded. 1.8 to 30 MHz. SO-239 connectors. 4¾W6½Hx3D inches.

MFJ-1701
$69.95

**MFJ-1701** *Antenna Switch* like MFJ-1700C but lets you select one of six antennas only. 10Wx3Hx1½D inches.

## 33 ft. Telescoping fiberglass Mast

***3.8 feet collapsed, 3.3 lbs.***

MFJ-1910
$79.95

**Super** strong fiberglass mast has huge 1¾ inch bottom section. Flexes to resist breaking. Resists UV. Put up *full size* inverted Vee dipole/vertical antenna in minutes and get *full size performance!*

## Make your own antennas

***Dipoles, G5RV, Random Wire, Doublets, Beverage Antennas, etc.***

**MFJ-16C06, $4.56.** 6-pack authentic *glazed ceramic* end/center antenna insulators.
**MFJ-16B01, $19.95.** Custom injection-molded UV-resistant center insulator has built-in coax connector and hanging hole.
**MFJ-18G100, $24.95.** 100 ft. of flexible, 7-strand, 14-gauge solid copper antenna wire.
**MFJ-58100X, $49.95.** 100 ft. 50-Ohm RG-8X with PL-259s on each end.
**MFJ-18H100, $34.95.** 100 feet, 450 Ohm ladder line, 18 gauge copper covered steel.

### *Lightning Surge Protectors*

Ultra-fast gas discharge tube shunts 5000 amps peak. Less than 0.1 dB loss. Up to 1000 MHz. SO-239s. **MFJ-270, $29.95.** 400W PEP. **MFJ-272, $39.95.** 1500W PEP.

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# MFJ *Speech Intelligibility* Enhancer

## *. . . makes barely understandable speech highly understandable!*


MFJ-616
$189.95

***"What did you say?"*** ***Can you hear but . . . just can't always understand everything people are saying?***

**As** we get older, high frequency hearing loss reduces our ability to understand speech. Here's why . . .

**Research** shows that nearly *half* the speech intelligibility is contained in 1000 to 4000 Hz range, but contains a miniscule 4% of total speech energy.

**On** the other hand, the low frequencies, 125 to 500 Hz have most of the speech energy (55%) but contribute very little to intelligibility -- only 4%.

**To** dramatically improve your ability to understand speech, you must:

***First***, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

***Second***, drastically reduce speech energy below 500 Hz where only 4% of speech intelligibility lies.

**The** MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

**A** balance control and separate 2½ Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

**By** boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

**Even** if you *don't* have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more.

**Here's** what *QST* for April, 2001 said *. . . "I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . ."*

**Immuned** to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch. 10Wx2½Hx6D". Needs 12 VDC.

**MFJ-1316, $21.95.** For 110 VAC operation. Provides 12 VDC/1.5 Amps.

**MFJ-72, $69.80.** *All-in-one MFJ-616 Accessory Pack.* Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. ***Save $7!***

***Try it for 30 Days***

**Order** from MFJ and try it -- No obligation. If not delighted, return it within 30 days for refund less shipping.

## MFJ Contest Voice Keyer

***Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Records received audio . . .***

MFJ-434B
$199.95

**Let** this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own natural voice!

**Store** frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" . . . Contest by pressing a few buttons and save your voice.

**Record** and playback 5 natural sounding messages in a total of 75 seconds. Uses *eeprom* -- no battery backup needed. Use your mic or its built-in mic for recording.

**You** can repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes a great voice beacon and calling CQ is *so* easy.

**You** can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

**A** playing message can be halted by the *Stop Button*, your microphone's PTT/VOX, remote control or computer.

**Has** jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

**Your** mic's audio characteristics do not change when your MFJ-434B is installed.

**All** audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

***New!*** **It's** easy to use -- just plug in your 8 pin round or modular mic plug, set the internal jumpers for your transceiver and plug in the appropriate (included) cable for your rig.

**Built-in** speaker-amplifier. Speaker/phone jack. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312D, $15.95. 6½Wx2½Hx6½D in.

**MFJ-73, $34.95.** MFJ-434B Remote Control with cable.

## 60 dB Null ***wipes out*** noise and interference

MFJ-1026
$199.95

**Wipe** out noise and interference *before* it gets into your receiver with a 60 dB null!

**Eliminate** all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

**It's** *more effective* than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

**It** works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

**You** can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

**Use** the MFJ-1026 as an *adjustable phasing network.* You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

**Easy-to-use!** Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

**RF** sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, $15.95. 6½x1½x6¼ in.

**MFJ-1025, $179.95. Like** MFJ-1026 less built-in active antenna, use external noise antenna.

## MFJ ***tunable*** Super DSP filter

MFJ-784B
$279.95

**Only** MFJ gives you *tunable* and *programmable* "brick wall" DSP filters.

**You** can continuously *tune* low pass, high pass, notch and bandpass filters and continuously *vary* bandwidth to pinpoint and eliminate interference.

**Only** MFJ gives you 5 factory pre-set and 10 programmable pre-set filters you can customize. **Automatic** notch filter searches for and eliminates multiple heterodynes. Advanced adaptive noise reduction silences background noise and QRM.

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# MFJ Dummy Load/Wattmeter

## 1.5 kW Dry Dummy Load has built-in precision, true peak-reading SWR/Wattmeter switchable to external antenna!

**World's** most versatile 1.5 kW dummy load has a *built-in* true peak reading SWR/Wattmeter that you can switch and use independently!

**You'll** find tons of uses!

**Tune** up your transceiver, linear amplifier or antenna tuner into a safe 50 Ohm dummy load at *full power*. Then instantly switch to your antenna and monitor SWR, forward and reflected power.

**Use** for testing/tuning transmitters, transceivers, amplifiers, antenna tuners, baluns, transformers, filters, matching networks, coax, stubs, transmission lines and antennas.

**The** 50-Ohm dry dummy load works DC to 60 MHz. SWR is below 1.3:1 at 30 MHz. Can handle 100 Watts for ten minutes or 1500 Watts for ten seconds. Comes with power derating curve.

MFJ-267 $159.95


**Extra-large** three-inch lighted Cross-Needle meter reads SWR (1:1 to 8:1), forward and reflected power *simultaneously*.

**Reads** *true peak* PEP or average power on 300/3000 Watts forward and 60/600 Watts reflected power ranges 1.8-54 MHz.

**High** accuracy comes from a carefully designed directional coupler, an accurate active-peak reading circuit and a precision d'Arsonval meter movement.

**RF** tight perforated aluminum cabinet. 4½Wx3½Hx10½D inches. Uses 12 VDC or 120 VAC with **MFJ-1312D, $15.95.**

## MFJ HF/VHF/UHF Dummy Loads

### *Dry* 300 Watt *HF /VHF* Dummy Load

**Air-cooled**, non-inductive resistor in a perforated metal housing; Has SO-239 connector. Full load for 30 seconds. Silk-screened derating curve to 5 minutes. Handles 300 Watts. SWR is below 1.1:1 to 30 MHz, 1.5:1 from 30 to 650 MHz. Compact 2¼x2¼x7 inches. **MFJ-260CN, $49.95.** With type "N" connector.

MFJ-260C $39.95

### *Dry* 1.5 kW *HF/VHF/UHF* Dummy Load

**Ham** radio's most versatile 50 ohm *dry* dummy load. Works with all radios from 160 Meters through 650 MHz. SWR below 1.3 to 650 MHz and below 1.1 at 30 MHz. Handles 100 watts for ten minutes, 1500 Watts for 10 seconds. 3Wx3H x9D inches. Has SO-239 connector. **MFJ-264N, $84.95.** With type "N" connector.

MFJ-264 $74.95

### *Oil-Cooled 1 KW CW, 2 KW SSB VersaLoad ™*

**Run** 1KW CW or 2 KW PEP for 10 minutes. Run *continuous duty* with 200 Watts CW or 400 watts PEP. Transformer oil not included. Low VSWR to 400 MHz. Under 1.2:1 to 30 MHz. SO-239 connector. Safety vent with cap, carrying handle. 7½Hx6⅝D inches. **MFJ-250, $69.95.** Includes transformer oil (no PCB).

MFJ-250X $49.95

### *3 GHz, 300 Watts Dry Dummy Load*

MFJ-263 $99.95

***New high-tech metal film resistor gives low SWR up to 3 GHz at 300 Watts!*** Mounted on large heavy-duty air-cooled heatsink. SWR is less than 1.1 DC to 1 GHz, 1.2 at 1.5 GHz and 1.5 at 3 GHz. Handles 125 Watts *continuous* and 300 Watts for ten seconds. High quality *Teflon*(R) N connector. 10¾Wx2¼Hx5¼D in. New!

### *MFJ Frequency Counters*

MFJ-886 $129.95

**MFJ-886** covers 1 MHz to 3 GHz with 300 MHz direct count, 0.1 Hz resolution. 4 gate times. 10-digit high-contrast 3/4 inch LCD display. Lock display button. Bargraph shows RF field strength. Includes rechargeable Ni-Cad batteries, charger, telescopic antenna. Black anodized aluminum. 2¾x2¼x1¼ inches.

MFJ-888 $199.95

**MFJ-888**, like MFJ-886, but covers *10 Hz*-3 GHz. Measures frequency/ period, has 50/1M Ohm input, auto hold, LED backlight, beeper. 2¾x4¼x1¼ inches

### *Field Strength Meters*

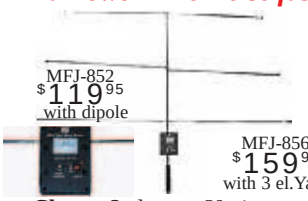
**MFJ-802** shows relative antenna field strength. Use to determine radiation pattern. Has large 3 inch meter. Telescoping *dipole* reduces influence of surrounding objects and is more reliable and repeatable than monopole. Sensitivity control. Jack for remote sensor. **MFJ-802R, $34.95.**

MFJ-802 $49.95

MFJ-801 $29.95

**MFJ-801** has 1¾ inch meter, sensitivity control, 20 inch extended telescoping monopole antenna.

### *Find Power Line Noise fast!*



MFJ-852 $119.95 with dipole

MFJ-856 $159.95 with 3 el.Yagi

**Choose** 3 element Yagi or compact telescoping dipole to quickly pinpoint noise. Walk or drive with these handheld, directional noise finders to search out leaky insulators, loose hardware and corroded ground lines quickly. Track noise directly to pole, transformer, insulator or others. Has field-strength meter, headphone jack to listen or record. Operates in optimum 135 MHz region. Sensitive .3uV receiver, 70 dB AGC.

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| **B-2518-G** | 5 | 7 | 40 | 60 | 80 | 100 | 125 | 160 | 160 | 160 |
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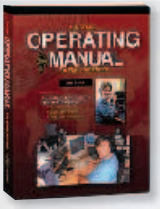

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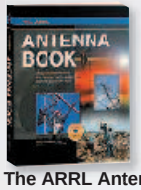

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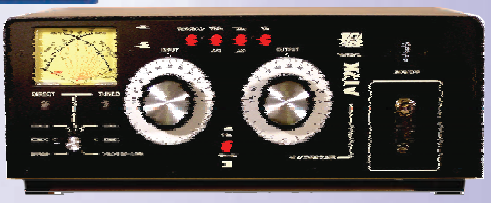

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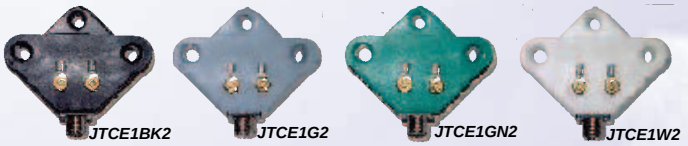

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*ARRL Publications—continued from page 130*

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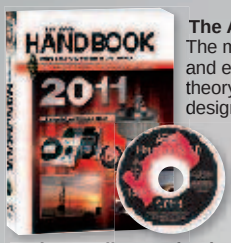


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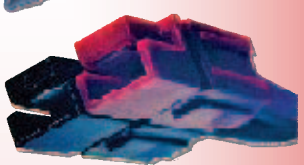

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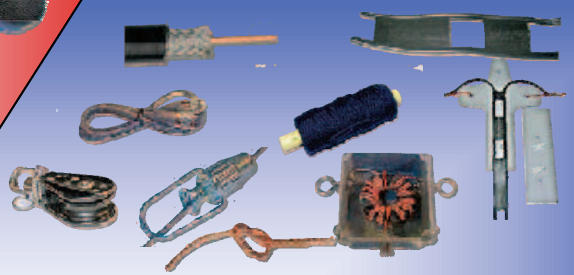

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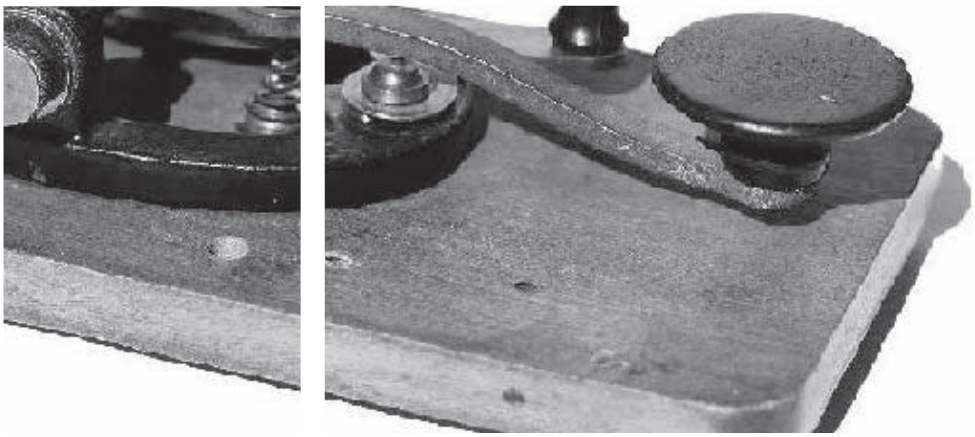

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**sta·tis·tics** (st-tstks) n.
1. (used with a sing. verb) The mathematics of the collection, organization, and interpretation of numerical data, especially the analysis of population characteristics by inference from sampling.
2. (used with a pl. verb) Numerical data.

www.arrl.org/QuickStats

**Online QuickStats Poll Results for June 10 through July 11.**
Get on the web and vote today at **www.arrl.org/quickstats**!

## When was the last time you used Amateur Radio to assist a non-emergency public service event (footrace, parade, etc)?

**Within the past year:** **50%**

**2 to 5 years ago:** **17%**

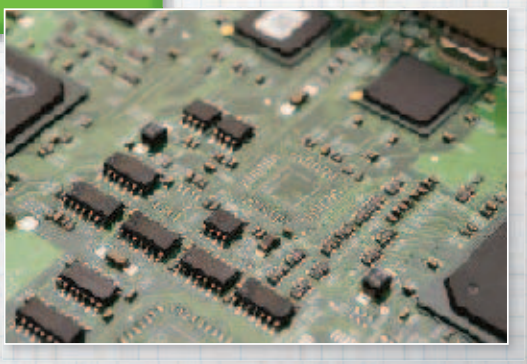
**6 to 10 years ago:** **7%**

**11 years ago or more:** **26%**

## Have you ever built a kit that included Surface Mount Devices (SMDs)?

**Yes, several – 23%**
**Yes, just one – 13%**
**No – 64%**

SMDs



## Do you own a D-STAR or APCO-25 transceiver?

**Yes, D-STAR – 11%**
**Yes, APCO-25 – 1%**
**Yes, both – 1%**
**No – 87%**

## When it comes to QSL cards, do you buy from a printer or make your own?


**I buy mine from a printer – 55%**
**I make my own – 30%**
**I don't exchange QSLs – 15%**

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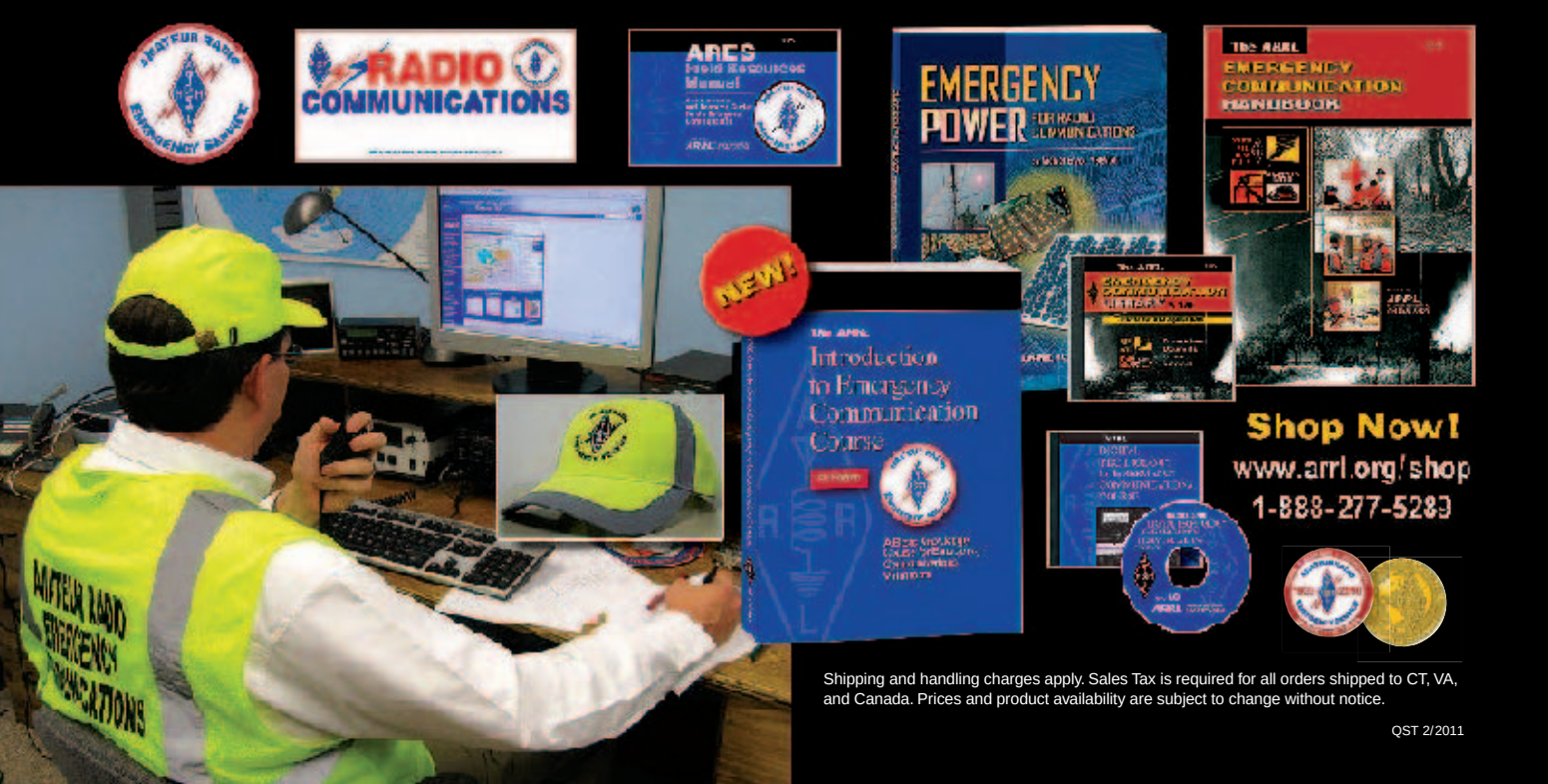


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## 2011 ARRL Photo Contest:

# Thanks to All Who Entered!

This year we received 87 entries in the ARRL Photo Contest, one shy of last year's record. We appreciate each and every one of you who sent in a photo. Although any of the submitted photos may find their way into *QST*, the ARRL Amateur Radio Calendar or other ARRL publications, we are presenting the top vote-getters here.

Hearty congratulations to the overall winner, as selected by the *QST* editorial and production staff — Hans Christian Larssen, LA9AKA. Again this year, two outstanding photos tied for Second Place. The Field Day photo was taken by John Chen, KI6QDF, while the "moon shot" was submitted by Rick Cook, AB4U.

In Third Place is a visually arresting demo of how not to store an old tube. Tom Rauch, W8JI, applied high voltage to a forgotten 3-500Z and lit up his workshop with the resultant plasma display.

Another Field Day photo snared Fourth Place. This photo was taken at the PARK FD site in Plano, Texas. The photographer: Michael Payne, KE5TJL.

Congratulations to the winners of this year's ARRL Photo Contest. The announcement for the 2012 Contest will appear in a spring 2012 issue of *QST*. And thanks to members of the ARRL Production and Editorial staff for serving as judges once again this year.

## Overall Winner!

**HANS CHRISTIAN LARSSEN, LA9AKA**

### Now That's an Aurora

Congratulations to the Overall Winner: Hans Christian Larssen, LA9AKA, an ARRL member from Norway, writes: The picture was taken from my balcony 11th of March this year. It shows a beautiful aurora display above my Vårgårda minitower. Antennas are an Optibeam OB6-6 6 element beam for 6 m and on top a 5 el LFA Yagi for 4 m from Vine antennas. I live at 69 degrees North, in a city called Tromsø, which is in the middle of the aurora belt.

## Second Place Tie!

**JOHN CHEN, KI6QDF**

### 2:45 AM on Field Day Sunday

John Chen, KI6QDF, of Sunnyvale, California, describes his impressive entry: This photo was taken at the 2011 Field Day event held by the West Valley Amateur Radio Association in Rancho San Antonio Park, Los Altos, California. The image was taken at 2:45 AM on Sunday, June 26, 2011 with street lights from the San Francisco Bay area illuminating the sky. Phone and CW tents, along with their antenna setups, are seen in the distance.

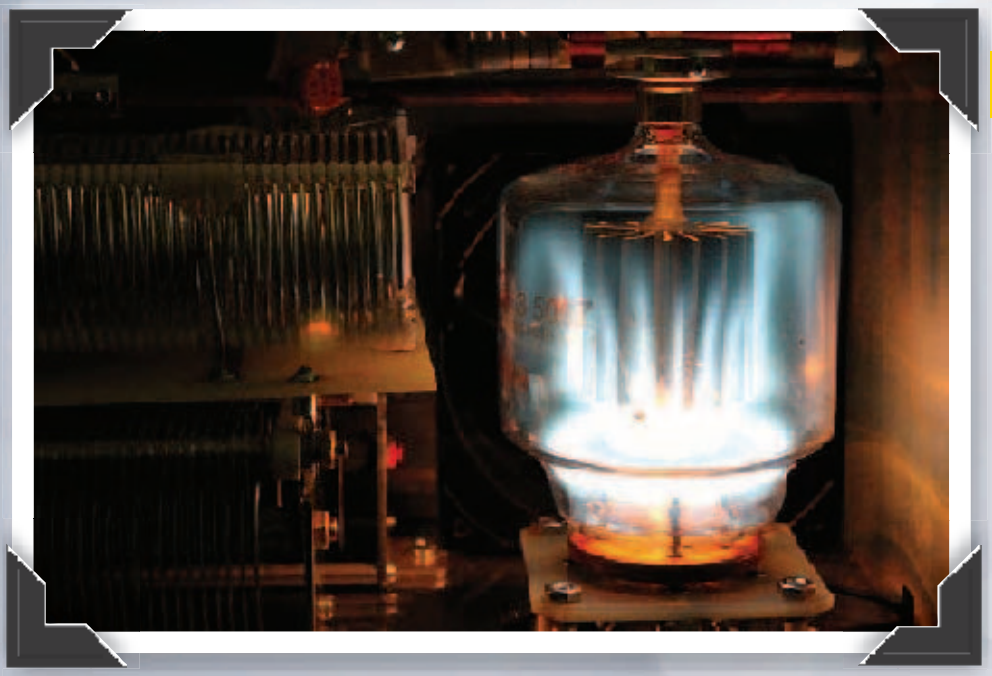
## Second Place Tie!

**RICK COOK, AB4U**

### Thundering Dipole

Tied for Second Place is this entry from Rick Cook, AB4U, who writes: This photo was taken in Kenedy County, Texas last fall. WA5FAC and I had strung a dipole from a mesquite tree in the yard to the corner off the lodge we were visiting. The antenna can be seen in this late afternoon photo with the moon and dramatic thunder clouds in the area. Kenedy County is north of Raymondville in south Texas and is the location for much of the famous King Ranch. This photo was taken on an adjacent ranch.

*Continued on page 152*



## Third Place!

**TOM RAUCH, W8JI**

### Now That's a Glowbug

Tom Rauch, W8JI, of Barnesville, Georgia, shot this 3-500Z tube under plasma conditions in his workshop. The result: Third Place in the contest. As he explains it: As high voltage was applied, the camera was triggered capturing an arc from anode to grid cone. This is a previously good 3-500Z unintentionally stored away in a humid barn, and not operated for 20 years. Large glass tubes should never have extended storage times without periodic cycling into full operation, especially in humid environments. Humidity promotes metal-glass seal deterioration.

## Fourth Place!

**MICHAEL PAYNE, KE5TJL**

### Placid Field Day

This photo was taken at the Plano Amateur Radio Klub 2010 Field Day site on Sunday morning at Russell Park, Plano, Texas. This winning entry was submitted by Michael Payne, KE5TJL, of Frisco, Texas.

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# Ham Ads

Please contact the **Advertising Department** at **860-594-0231** or **hamads@arrl.org** for further information or to submit your ad.

**1.** Advertising must pertain to products and services which are related to Amateur Radio.

**2.** The Ham-Ad rate for commercial firms offering products or services for sale is $2.25 per word. Individuals selling or buying personal equipment: ARRL member 1.00 per word. Non-ARRL member $1.50 per word. **Bolding** is available for $2.50 a word. Prices subject to change without notice. You may pay by check payable to the ARRL and sent to: Ham-Ads, ARRL, 225 Main St., Newington, CT 06111. Or, you may pay by credit card sending the information by fax to 860-594-4285 or via e-mail to hamads@arrl.org. The credit card information we need is: the type of credit card, the exact name that appears on the credit card, the credit card number, the expiration date and the credit card billing address.

**3.** Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham-Ads cannot be supplied. Ads submitted in writing should be typed or printed clearly on an 8 1/2" X 11" sheet of paper.

**4. Closing date for Ham-Ads is the 15th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date.** Example: Ads received July16th through Aug15th will appear in October *QST*. If the 15th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day. Please contact the Advertising Department at 860-594-0209 or hamads@arrl.org for further information or to submit your ad.

**5.** No Ham-Ad may use more than 200 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance etc is not permitted in *QST* advertising.

**6.** New firms or individuals offering products or services for sale must check with us to determine if a production sample (which will be returned) should be submitted for examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must stand by and support all claims and specifications mentioned in your advertising.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The American Radio Relay League does not discriminate in its advertising on the basis of race, color, religion, age, sex, sexual orientation, marital status or national origin. The League reserves the right to decline or discontinue advertising for any other reason.

7. AN IMPORTANT NOTICE TO ALL HAM AD POSTERS AND RESPONDERS, FROM THE ARRL ADVERTISING DEPARTMENT Greetings from ARRL HQ! Please note that we have received reports from many ARRL members who have placed classified ads in these listings, and have received responses from individuals proposing "creative" payment schemes. These particular instances involved offers of overpayments for goods by bank check, followed by instructions to deduct the cost of your item from the overpayment, and to transfer the overage back or to another individual. This is a well-known scam. Unfortunately, we have no control over this and other scams of this type. Once your email address is posted, you are vulnerable to those individuals seeking to provide you with questionable information. See **http://www.arrl.org/news/features/2005/07/15/1/?nc=1** for further details. REMEMBER: TRANSACT CAREFULLY AND PROTECT YOURSELF.

*QST* Ham Ads on the Web – Updated Monthly!
**www.arrl.org/ads/ham-ads.html**

## Club/Hamfests/Nets

ARMS-Amateur Radio Missionary Service Net Christian Fellowship Net - Everyone Welcome 14.307.5 Daily xcpt Sunay 1500-1700Z Website: www.qsl.net/arms

FRIEND OF BILL W – Join HAAM net daily on 14.316 at 12:30 East (09:30 Pac) time w/290 or 340 as alt freq's http:www.qst.net/haam

MARCO The Medical Amateur Radio Council Ltd is a charitable non-profit group of health care professionals who meet weekly at 10:00am Eastern time Sundays for the "Grand Rounds of the Air" net on 14.307 MHz. All interested are welcome. Request info & free newsletter to Danny@w4dan.com or write MARCO, 2712 Bryant Dr, Cleveland, TN 37311. Ph 423-479-6160. Web site www.marco-ltd.org

**Microwave Update 2011** - October 13 - 15, 2011 - Joint Conference Announcement and Call for Papers - Microwave Update 2011 & The 37th Eastern VHF/UHF Conference. Both sponsored by the North East Weak Signal Group at Holiday Inn, 1 Bright Meadow Blvd, Enfield, CT, 06082 USA - This year the premier amateur radio microwave conference and the Eastern VHF/UHF conference will include tours, hospitality, swap session, equipment for measuring and tweaking, banquet and of course technical presentations. Please visit http://www.microwaveupdate.org/ for the latest updates, registration and hotel information. Papers must be submitted by July 15, 2011. Please contact Paul Wade W1GHZ w1ghz@arrl.org as soon as possible for paper and talk arrangements.

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BIGGEST on-line ham classifieds: http://swap.QTH.com

**CALL SIGN DECAL** 1-1/4 white vinyl characters. Interior or exterior window mount. $6.00. Gary Hengstenberger 6880 Rolling Ridge Rd NE Canton, OH 44721 330-354-1755 DCALLKD8PER@HOTMAIL.COM for info. WOUNDEDWARRIORPROJECT.ORG contributor

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# QST Index of



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**QST Advertising Deadlines:**

| Issue | Reservation Date | Materials Due Date |
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| October 2011 | Friday, August 19, 2011 | Monday, August 22, 2011 |
| November 2011 | Friday, September 16, 2011 | Monday, September 19, 2011 |

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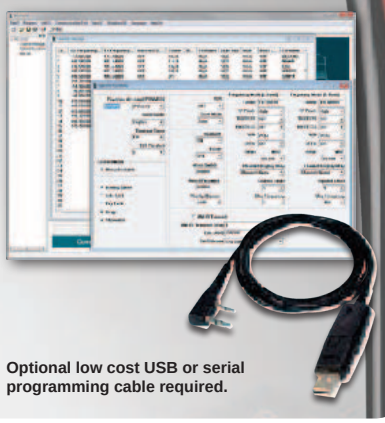

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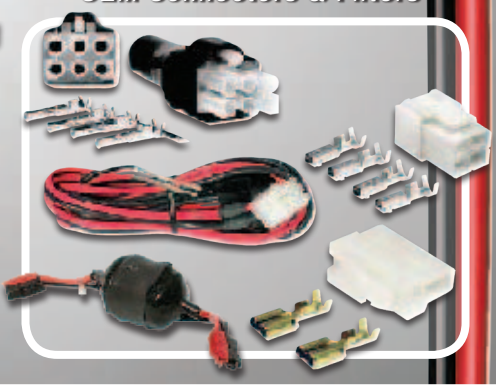

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| 1.750" | .058" | $2.80 |
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| 2.000" | .058" | $3.30 |
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| Hygain, T2X Digital | $1099 |
| M2, OR-2800PX | $1739 |
| Yaesu, G-450A | $289 |
| Yaesu G-550 | $389 |
| Yaesu, G-800SA | $389 |
| Yaesu, G-800DXA | $489 |
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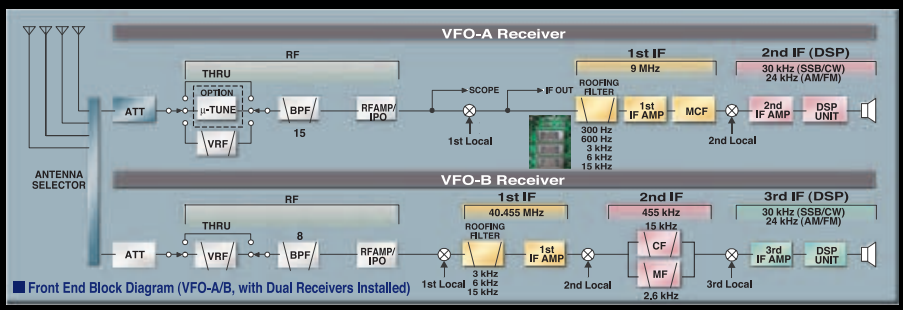
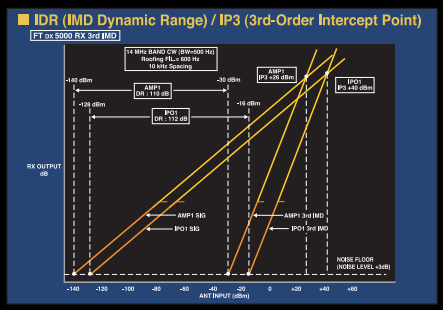


■ Front End Block Diagram (VFO-A/B, with Dual Receivers Installed)

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