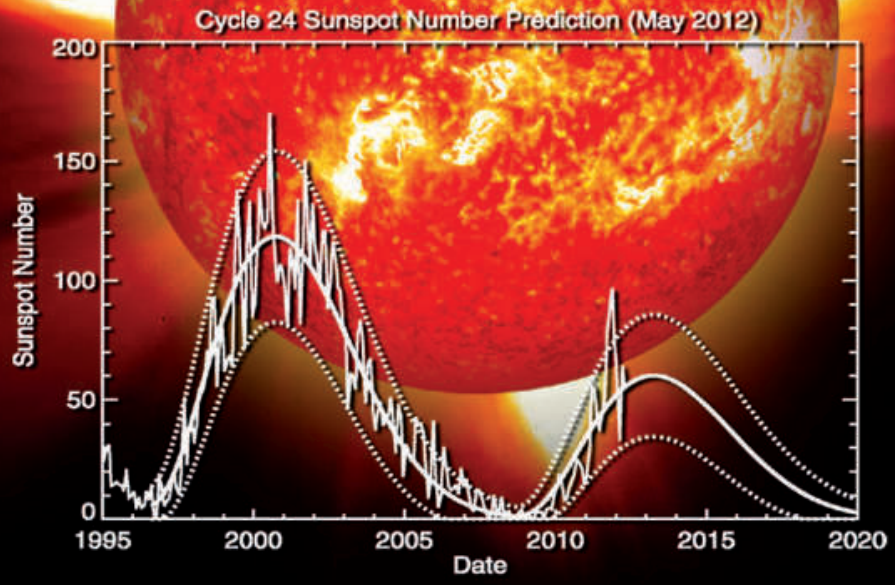
QST

DEVOTED ENTIRELY TO AMATEUR RADIO

July 2012 WWW.ARRL.ORG

QST reviews:

Inside:



Ol Sol Bestows HF Propagation —*for Now*

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Official Journal of ARRL The national association for AMATEUR RADIO®

The radio... YAESU

HF/50 MHz 100 W Transceiver

FT DX 3000

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

The amazing Crystal Roofing Filter performance

The Down conversion 9 MHz 1st IF frequency receiver construction, can realize narrow 300 Hz (optional), 600 Hz and 3 kHz bandwidth roofing filters.

Outstanding receiver performance, the heritage of the FT DX 5000!

The high dynamic range IP3 performance that was realized and proven in the FTDX5000.

IF DSP provides effective and optimized QRM rejection

Independent Frequency display

The newly developed LCD has a wider viewing angle and higher contrast.

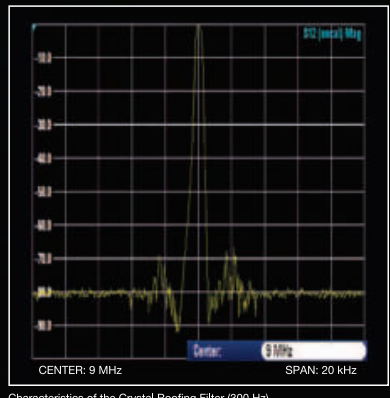
4.3-inch Large and wide color LCD display with high resolution

High Speed Spectrum Scope built-in

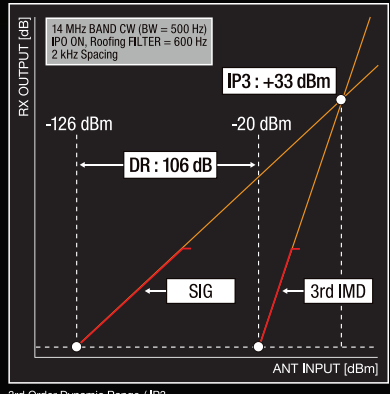
AF SCOPE display and RTTY/PSK encoder/decoder (optional)

Other features

The specialized Receiver amplifier for 50 MHz is built in / Three antenna connectors are provided / The "ANT-3" terminal may be assigned to "RX-only" / Signal output for an external receiver and the 9 MHz IF output are furnished / High speed Automatic antenna tuner built in / Optional μ-tune unit available / USB interface equipped



Characteristics of the Crystal Roofing Filter (300 Hz)



3rd Order Dynamic Range / IP3

YAESU
The radio

YAESU USA
6125 Phyllis Drive, Cypress, CA 90630 (714) 827-7600

For latest Yaesu news, visit us on the Internet:
http://www.yaesu.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.

The FTDX3000 has not been approved by the FCC. This product may not be sold or leased, or offered for sale or lease until FCC approval has been obtained.

The radio YAESU ...

The Dawn of a New Era
Dynamic Range 112 dB/IP3 +40 dBm

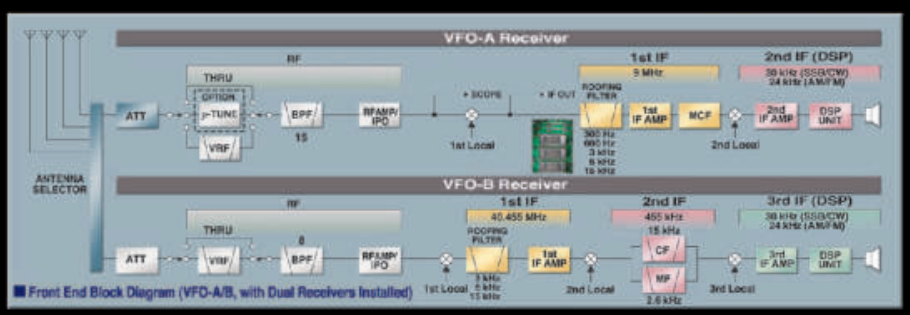
The New Premium HF/50 MHz Transceiver
FT DX 5000 Series

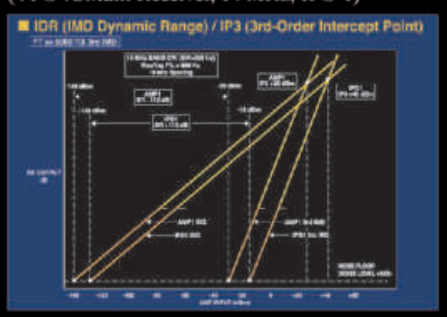
Two Totally Independent Receivers - The VFO-A/Main Receiver utilizes Super Sharp Roofing filters to give you the highest performance and best flexibility

The tight shape factor 6 pole crystal filters and D Quad Double Balanced Mixer design afford incredible improvement in 3rd – Order dynamic range and IP3 performance

Superb 3rd-Order Dynamic Range and 3rd-Order Intercept Point (IP3)

You will be pleased with the astounding 112 dB dynamic range and superb IP3 + 40 dBm at 10 kHz separation (CW/500 Hz BW). Experience the unmatched close-in dynamic range of 105 dB, IP3 +36 dBm at 2 kHz separation (CW/500 Hz BW)! (VFO-A/Main Receiver, 14 MHz, IPO-1)





HF/50 MHz 200 W Transceiver NEW
FT DX 5000MP

Station Monitor SM-5000 included
± 0.05ppm OCXO included
300 Hz Roofing Filter included

HF/50 MHz 200 W Transceiver NEW
FT DX 5000D

Station Monitor SM-5000 included
± 0.5ppm TCXO included
300 Hz Roofing Filter optional

HF/50 MHz 200 W Transceiver NEW
FT DX 5000

Station Monitor SM-5000 optional
± 0.5ppm TCXO included
300 Hz Roofing Filter optional

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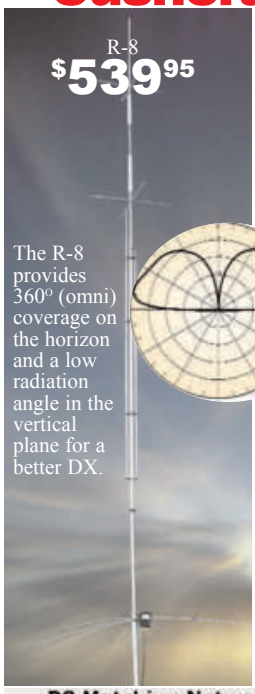
Cushcraft R8 *8-Band Vertical*

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



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

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

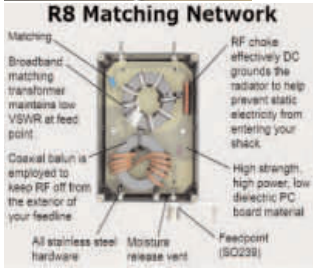
Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

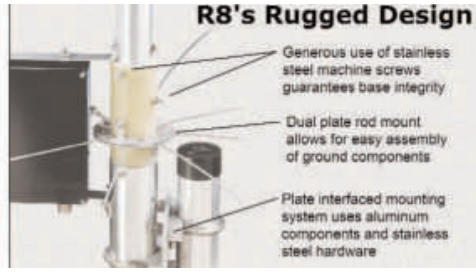
Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

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

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

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





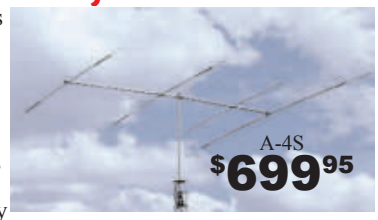
MA-5B *5-Band* Beam

Small Footprint -- Big Signal

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

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

Cushcraft 10, 15 & 20 Meter Tribander Beams



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

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

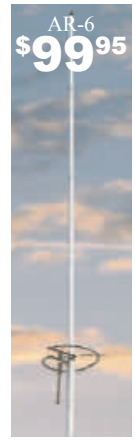
The 3-element A3S/A3WS and 4-element A4S are world-famous for powerhouse gain and super performance. **A-3WS**, **$499.95,** 12/17 M. **30/40 Meter** *add-on kits* available.

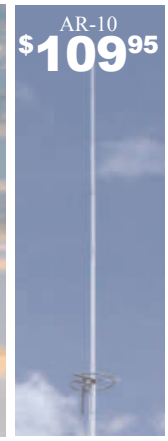
Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

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

Cushcraft Famous *Ringo* Compact FM Verticals





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

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Life is a JOURNEY. Enjoy the ride!

The engineering staff at COMET Antenna Company presents three new products!

CMX-2300 *TWIN Cross-Needle SWR/Power Meters*

Left Side Meter 1.8-200MHz: Max Power 3kW
Right Side Meter 140-525MHz: Max Power 200W

Average and PEP power selector switch
FWD, REF, SWR readings displayed simultaneously.
Separate ANT/TX connectors allow both meters
to be used at the same time - Low loss circuitry - Illuminated

CHV-5X *40/20/15/10/6M Rotatable Dipole*

HOA antenna restrictions? Limited space? Want to operate with a low profile? Need a small, multi-band HF/6M antenna for portable/ emergency use?... The CHV-5X is a great choice! Lightweight, compact, rotatable half-wave center fed dipole. Assembles in several configurations: “V”, “horizontal”, or as a “ground plane”. Each band tunes independently with sliding tuning stubs

Length: Approx 13 ft (assembled horizontally)

Weight: 5 lbs 14ozs (inc mounting plate and balun)

Max Power: 40/20M: 150W SSB 15/10/6M: 220W

CAA-500 *Cross Needle SWR and Impedance Analyzer*

Dual cross-meter real-time analog display of SWR and total impedance with high accuracy.

Seven frequency ranges (Including 222 MHz!) extending up to 500 MHz!

Thumb-wheel frequency adjustment for effortless sweeps of antenna operating range.

Two antenna jacks, "SO-239" and "N" (above 300 MHz).

Internal battery power or external DC (8 - 1 6 Volts).

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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COMET™

Our mission: **To promote and advance the art, science and enjoyment of Amateur Radio.**

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News and Features

Our Cover

K9LA tells us that as sunspots ebb and flow during solar cycle 24, we need to enjoy the enhanced conditions on HF now because they won't last. Carl's article begins on page 33. [NASA photo]

Radiosport

Columns

Departments

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Volume 96 Number 7

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FT-270R

...when we say submersible, we mean submersible!

The 16-key FT-270R includes direct keyboard frequency entry and direct DTMF input, along with quick one-touch access to YAESU's exciting and fun WiRES-II™ VoIP Internet Linking system!

Submersible, Rugged, High Performance, Compact, FM Mono-Band 2 Meter Handheld

The FT-270R is a high-performance FM hand-held providing up to five Watts of RF power, along with big audio output (800 mW) and unmatched protection against the elements!

Protected against water ingress to IPX7 specifications (submersion for up to 30 minutes at a depth of 3 feet), the FT-270R features long operating time, thanks to the supplied 1400 mAh NiMH Battery Pack.

- 5 Watts Output
- Submersible!
- Large Backlit LCD Display
- Outstanding Receiver Audio
- 1400 mAh Battery Pack
- Power Saving Circuit Design
- Expanded Receiver Coverage
- User Password
- 200 Memory Channels
- Keyboard Frequency Entry
- Weather Broadcast Channels
- EAI (Emergency Automatic ID) Feature

Yaesu Submersible HT's

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Heavy-Duty FM Dual Band Mobile with Exceptionally Wide Receiver Coverage*

*108 to 520 MHz/ 700 to 999.99 MHz (Cellular blocked)

- Large Backlit LCD Display for easy operation
- Stable RF Power (50 Watts VHF / 45 Watts UHF)
- Reliable performance in harsh environments
- 5 ppm Frequency Stability (-4° F to +140° F)
- 1000 Memory Channels for serious users
- Yaesu Unique Power Saving Circuit Design Minimizes Vehicle Battery Drain

Actual Size

NEW 2 m/70 cm DUAL BAND FM TRANSCEIVER

FT-7900R

2 m/70 cm DUAL BAND

Size: 5.5" (W) x 1.6" (H) x 6.6" (D) / Weight: 2.2 lb

• Separation Kit for Remote Mounting (optional separation kit YSK-7800 requires)

50 W 10 m/6 m/2 m/70 cm* Quad Band FM Mobile

FT-8900R

*70 cm 35 W

QUAD BAND DUAL RECEIVE

50 W 2 m/70 cm* Dual Band FM Mobile

FT-8800R

*70 cm 35 W

DUAL BAND DUAL RECEIVE

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HF/VHF/UHF Portable Operation Powerful Transceiver

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- 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
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- Classically Designed Main Dial and Knobs
- Dynamic Microphone MH-31 A8J Included

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It Seems to Us

David Sumner, K1ZZ – dsumner@arrl.org
ARRL Chief Executive Officer

Lessons From Dayton

"The annual Dayton Hamvention® is the largest and most diverse gathering of radio amateurs in the world. As such it's a good 'barometer' for Amateur Radio."

Judging from this year's event, the outlook for Amateur Radio is as warm and sunny as the weather that graced southwestern Ohio over Hamvention weekend. The parking lots were fuller and the flea market bigger than last year; indoor exhibit space was sold out. The affiliated events — held in conjunction with but not a formal part of Hamvention — continue to grow and multiply. For many attendees "Dayton weekend" has become four days long, even five in some cases.

But it's not simply a matter of numbers. Amateur Radio is not a mass-participation activity and never will be; that's not our goal. In the entire population, the good prospects for Amateur Radio are a minority. Saying so is not elitist; it's simply a fact.

More important than the head count is that this year, many Dayton attendees commented that they felt a positive energy in the gathering. People were excited about what they were doing in Amateur Radio and wanted to share that excitement — that passion — with others. No matter what interests you right now, you could find others with the same interest and who wanted to learn more. Being immersed in such a positive environment is bound to get you fired up!

We bring ARRL EXPO to Dayton every year because it offers the best opportunity to showcase the League's wide range of programs and services to the largest number of members and other amateurs. But the information flow is not one-way. We also come to Dayton to learn. Being there gives us the opportunity to hear what's on members' minds and — best of all — what you are doing to promote and advance Amateur Radio in your communities.

Working with a team of experts who serve on the ARRL Public Relations Committee and with volunteers in the Field Organization, Media & Public Relations Manager Allen Pitts, W1AGP, has been using a series of themes to explain what we do to the general public, directly and through the media. From your feedback it is clear that the latest theme, "The DIY Magic of Amateur Radio," resonates with many members. Many of you are excited about building, either once again or for the first time, and are discovering the myriad of reasonably priced kits and other products aimed at the Do It Yourself market.

For the ARRL, sharing a message with members is pretty easy. We have *QST* going out every month, now in a digital as well as a paper edition. We have the website. We have e-letters and e-mail. But how do we reach those who might like to join our ranks if only they knew what Amateur Radio had to offer them? How do we penetrate the fusillade of media messages that constantly bombard everyone? That's much more difficult than preaching to the choir.

At the national level the ARRL works hard to build a positive awareness of Amateur Radio and achieves some success. We know this because Amateur Radio is a part of the popular culture, popping up regularly in movies and television shows. But people don't often decide to join our ranks based solely on that exposure. It takes personal contact to turn "I might like to do it" into "I'm doing it" — but venturing outside the comfort zone of family and friends may not be easy.

It was exciting to learn in Dayton what some outstanding local radio clubs are doing "to promote and advance the art, science and enjoyment of Amateur Radio" in their communities. Those 12 words are in quotes because they constitute the Core Purpose of the ARRL as adopted by the Board of Directors. Some clubs are partnering with DIY clubs, particularly those with an electronics or computer bent. Others are joining up with amateur astronomers, in at least one case collaborating on the construction of a radio telescope. Such cross-fertilization enriches both groups.

Still other clubs, recognizing that boring or contentious business meetings cause the death of more social groups than any other disease, have found ways to minimize the time spent on the necessary but mind-numbing details of governance while maintaining transparency — a tricky balance to achieve but well worth the effort. As a result they are able to focus their meetings on learning and doing.

It was refreshing to talk to club leaders who recognize the peril of having too little demographic diversity — that is, having a club with members who are all about the same age. In that case it will be difficult to attract younger members and it is almost inevitable that the club will shrink over time and eventually disappear.

A challenge facing many clubs is how to keep members involved once they are unable or reluctant to drive at night. These older members have a wealth of experience to share, but they may need a helping hand — or more specifically, a ride — and don't want to ask for one. In Dayton we heard about clubs that excel not only in extending a welcome to newcomers, but also in making sure that their veteran members don't fade away prematurely.

The ARRL National Convention is coming up October 12-14 in Santa Clara, California and will also feature ARRL EXPO. It won't be as big as Dayton by any means, but based on past Pacificons it will offer just about as wide a range of opportunities to learn. The West Coast often leads the way in Amateur Radio; for example, the trend toward greater involvement by women and families first became evident in California some years ago.

What lessons will we learn this year in Santa Clara? We can't wait to find out!

David Sumner, K1ZZ

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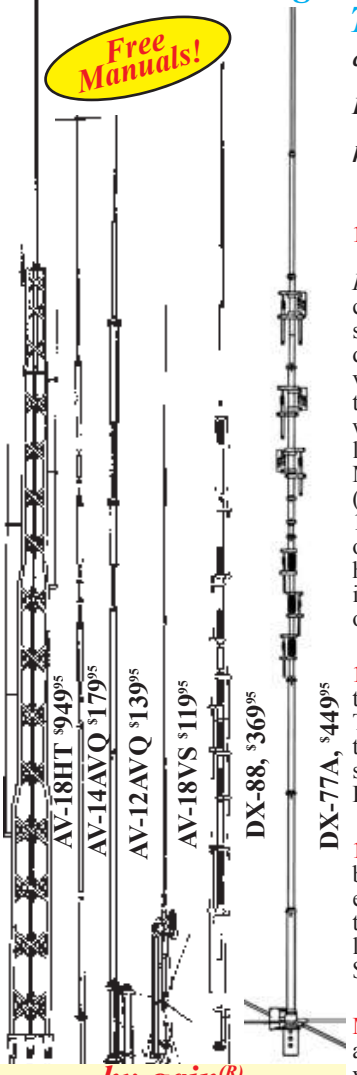
Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . 1500 Watts . . . Low SWR . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connect . . . Two year limited Warranty . . .

Free Manuals!



hy-gain® Classics

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

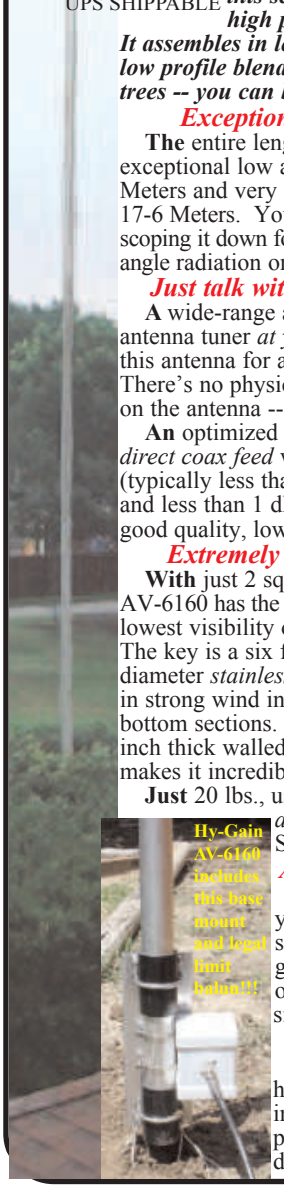
Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$179.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$139.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80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

Hy-Gain 160-6 Meters Self-Supporting Vertical

Full 1500 Watts, 43 feet, includes base mount

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

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



Exceptional Performance

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

Just talk with automatic tuner!

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

An optimized balun design allows *direct coax feed* with negligible coax loss (typically less than 1/2 dB 60-6 Meters and less than 1 dB 160-80 Meters with good quality, low-loss coax).

Extremely low wind loading

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

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

Assembles in an hour

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

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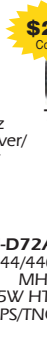

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In Brief

- The ARRL has provided the FCC with detailed comments that document Amateur Radio's emergency communications capabilities and our need to communicate free from the burden of CC&Rs.
- Ohio now has a strong "PRB-1" law protecting the rights of Amateur Radio operators to communicate.
- ARRL President Kay Craigie, N3KN, is inviting ARRL members to provide suggestions for the upcoming Centennial celebration.
- The new digital edition of *QST* debuted in late May.
- ARRL EXPO at the Dayton Hamvention featured a wide array of activities for all visitors. A brief report is on page 64 of this issue.
- Now that two new commissioners have been sworn in, the FCC is once again up to full strength.
- The ARRL UHF-Microwave Band Plan Committee has released for comment its draft band plan for 13 cm (2.3/2.4 GHz). The amended draft band plan for 902-928 MHz (33 cm) has also been released.
- Heathkit Educational Services has again shut its doors.

Media Hits

Allen Pitts, W1AGP – apitts@arrl.org
Media & Public Relations Manager

- April began with a string of sad news stories. Bill Isles, KDØIIF, was struck by lightning and in the *Huffington Post, New York Daily News, Chicago Tribune,* Kansas.com and on KAKE-TV, but he'll be okay. The Lower North Folk Fire (CO) destroyed large areas, but a tip of the hat to Jack Ciaccia, WMØG, for sending in excellent information about ham radio activities in in a very timely way. It's appreciated! Too often we get information at HQ that is days old and no longer news. "Amateur Radio Plays a Major Role in Alerting the Local Area of Severe Weather" headlined *The State Journal-Register* (IL) but then they had a whole series of tornadoes. The saddest story of all was remembering the *Titanic* disaster. Exhibitions with Amateur Radio involvement were reported in the *Washington Post,* BBC*, Los Angeles Times, PC Magazine* and many more places around the country.
- On a brighter note were the actions of the Calhoun County Amateur Radio Association who, working together with the Red Cross, gave away hundreds of free weather radios to Calhoun County (AL) residents. Tracy Stephens, KI4OZG, worked hard as a PIO on that event. The cover of *JP Magazine* for April featured W6MKE's jeep with its ham license plate prominently displayed. The National Geographic Channel's program "Anatomy of a Tornado" complimented hams and SKYWARN® actions several times. The *Pontiac Daily Leader* (IL) had Dick Zehr, W9OQI, hooking a ham radio up in a room in a nursing home, "Zehr brings Ham radio to Good Sam-Flanagan." Jim Wilson, K5ND, of the BSA wrote "Amateur radio fans: Have a Field Day!" for the Scouts' leadership publication.
- One of the nicest compliments came through msnbc.com as they reported on the troubling rocket launch by North Korea. "Far more authoritative than anything we report will be the post-launch detection of the satellite's radio beacon by amateur radio operators in the outside world."
- I am not sure what "The Big One" is, but we're ready for it according to *Bend Bulletin* (OR), *Washington Examiner* (DC), NECN-TV (MA), *Lewiston Morning Tribune* (ME) and several others who published versions of Nathan Lee, KD7IBA's interview "Ham radio operators prepare for the Big One."
- I am also sure an unnamed ham didn't know how big it was when a kid knocked on his door as reported in the May *Guitar World* magazine. "There was a guy in the apartment building that had an antenna on the roof. I followed the wires to his window and knocked on that apartment's front door. He let me in, and he was a ham radio operator. So that's what I did the rest of the summer until school started. And I've been a ham radio operator since 1961," said Joe Walsh, WB6ACU.
- A major indirect media hit happens every year thanks to Pacific Division Director Bob Vallio, W6RGG, and the Las Vegas Radio Amateur Club who have a booth at the National Association of Broadcasters convention. Bob takes care of all the arrangements while James Bilan, W7UXB, is the club contact for the members who man the booth. John Marino, KR1O, is the NAB person who makes it all possible for us and, together with Bob Heil, K9EID, and BSW (Broadcast Supply Worldwide), hosts an incredible ham operator reception party each year.
- Need a "hook" to keep the summer hits coming? Celebrate "Non-dependence Day." While the country celebrates gaining its independence, we celebrate our non-dependence on commercial infrastructure.
- Looking for more media hits? Go to **www.arrl.org/media-hits** to see the whole list. For Field Day tips, see **www.arrl.org/field-day-info**.

2012 Hamvention

The Dayton Hamvention® serves as a magnet for hams around the world. The theme of this year's event, which ran from May 18-20, was "Internationally Connected." Once again, the size and scope of the ARRL EXPO exhibit impressed visitors looking to meet an ARRL volunteer or staff member, renew their ARRL membership or purchase a book or item of clothing. An article on page 64 of this issue provides a glimpse of Hamvention 2012. A more comprehensive report appears in the July digital edition.

Eager visitors entering Hara Arena, site of the 2012 Dayton Hamvention. [S. Khrystyne Keane, K1SFA, photo]

Inside HQ

Harold Kramer, WJ1B – hkramer@arrl.org
ARRL Chief Operating Officer/*QST* Publisher

Come On Over!

Heading toward the Northeast this summer? If so, we'd love to see you in Newington.

It's summertime and that's when the majority of our visitors stop by ARRL HQ for a tour. Newington is a only few miles southwest of Hartford. However, we are not easy to reach by public transportation, so plan to visit us by car. We're about 20 minutes south of Bradley International Airport. You'll find directions and information about visiting us at **www.arrl.org/visit-us**.

Tours begin in the Administration Building that's located in the rear of the parking lot. Tours are given as visitors arrive between the hours of 9 AM to noon and from 1 PM to 4 PM, Monday through Friday. You do not need to be a licensed amateur or an ARRL member to take a tour. Groups of 10 or more should contact ARRL Membership Manager Diane Petrilli, KB1RNF, **dpetrilli@arrl.org** to make the arrangements in advance.

Penny Harts, N1NAG, will usually greet you in the front lobby. The tour itself will be given by one of our 20 knowledgeable and experienced volunteer tour guides. Depending on how much time you have, tours can be as short as 15 minutes but average about an hour. The tour guide will ask you what areas you want to see and what your Amateur Radio interests are. While you are at HQ, you can drop off your QSL cards for the Bureau or with the Awards Department, with the appropriate fees.

W1AW is one of the most popular areas for visitors. Station Manager Joe Carcia, NJ1Q, usually handles the W1AW tours himself. Any licensed amateur can operate W1AW, within the restrictions of their license class, between 10 AM and noon and then from 1 PM to 3:45 PM. You need to have your license or a copy with you. There are three guest operating positions at W1AW that have been upgraded during the last few years with the latest transceivers, so there is something for everyone to try out.

The ARRL Lab is also a popular tour stop. It recently added a new display called "The ARRL Evolution of Amateur Radio Exhibit, Understanding the Past to Develop the Future." This display features equipment from 1900 to about 1980. It features three operable stations that represent different eras of Amateur Radio history. The display currently features a typical Novice station of the late 1960s and an original 1907 Spark Transmitter/Galena Crystal Receiver. Yes, it works, but no antenna is allowed!

The Lab also has modern displays of technology including a D-STAR repeater system (2 m/70 cm/23 cm and 23 cm data link), and a Software Defined Radio transceiver display. In addition, visitors enjoy seeing the shielded screen room where Amateur Radio equipment is tested for *QST* Product Review.

Hams who are interested in DXing like to visit the Outgoing QSL Bureau. Bureau Coordinator Rose-Anne Lawrence, KB1DMW, conducts this part of the tour. Visitors are always interested in the workings of the "The Buro" and how to make proper submissions of their own QSL cards.

Whatever area of ARRL HQ you are interested in seeing, we'll try to meet your interests. Enjoy the tour.

The Evolution of Amateur Radio exhibit.

Space Day 2012

A robust ham radio contingent was on hand for this year's Space Day, held in early May at the National Air and Space Museum Steven F. Udvar-Hazy Center in Chantilly, Virginia. We had all sorts of hands-on displays. We showed ARRL's operating OSCAR 1 using an AMSAT-UK dongle as a receiver to show how small receivers can be made nowadays. And we had a CubeSat model to show how amateur satellites have advanced through the years. The combined AMSAT/ARRL display was near the tail of the retired shuttle *Discovery*. — *Perry Klein, W3PK*

At Space Day 2012, from the left: Terek Edelbi from SpaceQuest; Mark Kanawati, N4TPY; Don Sylvain, WA3WOD; David Bern, W2LNX; Tom Clark, K3IO; Perry Klein, W3PK; Phil Barsky, K3EW; Sharon Davis, N1SMM; Bob McGwier, N4HY. Not in photo: Frank Bauer, KA3HDO; Dan Schultz, N8FCV, and Bob Bruhns, WA3WDR, of SpaceQuest. [Hayat Bensaid photo]

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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.

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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.

ARRL Group Benefit Programs* — www.arrl.org/benefits

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- **The ARRL Visa Signature® Card**
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- **MetLife® Auto, Home, Renters, Boaters, Fire Insurance and Banking Products**
  ARRL members may qualify for up to a 10% discount on home or auto insurance.

* ARRL Group Benefit Programs are offered by third parties through contractual arrangements with ARRL. The programs and coverage are available in the US only. Other restrictions may apply.

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QEX – *A Forum for Communications Experimenters* – **www.arrl.org/qex**
NCJ – *National Contest Journal* – **www.arrl.org/ncj**
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"Of, by, and for the radio amateur," the ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

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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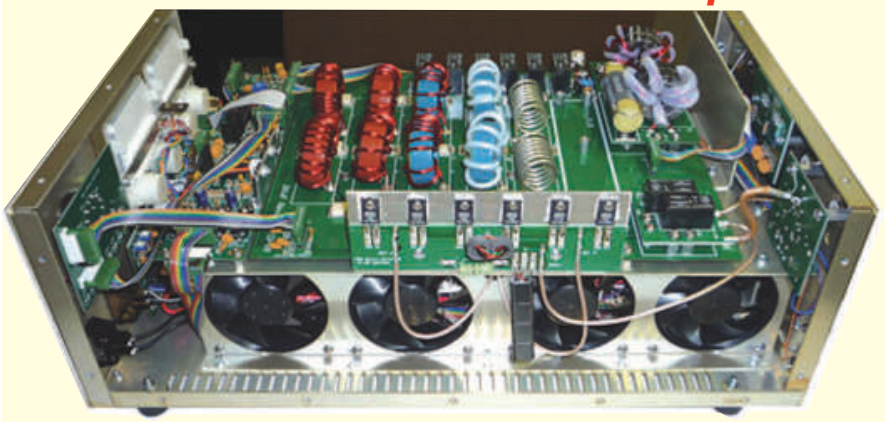
Inside the ALS-1300 Solid State Amplifier



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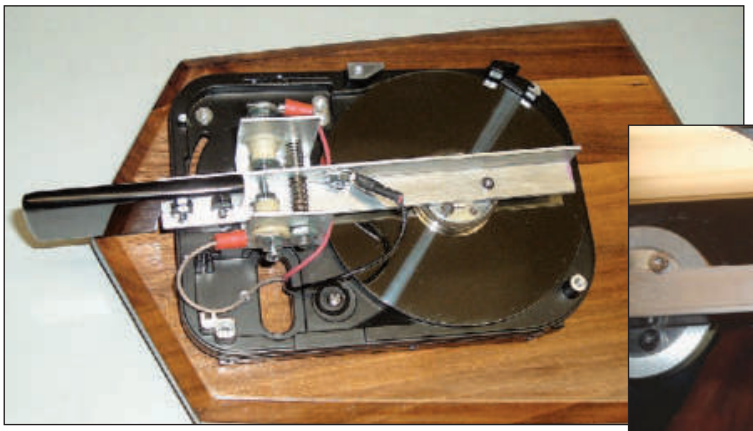
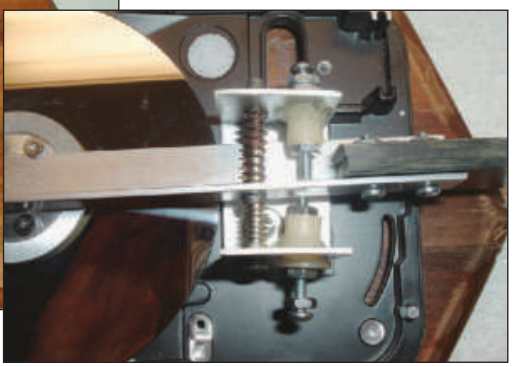
Homebrew Keyer Paddle

In my work as a software developer I go through quite a bit of computer equipment in the normal course of business. I can't bring myself to trash old disk drives, mainly because I am fascinated by the precision with which these devices are made. I finally figured out something to do with these relics, and my homebrew single lever keyer paddle is the result. All components came from the junk box and the cost was zero dollars.





Old disk drive finds a new home: Bill Merideth, KC5SB, found a useful way to save an old drive from the trash heap. [Bill Merideth, KC5SB, photos]

The lever is made from a scrap piece of half inch aluminum angle. Spring and contact assembly is made from scrap aluminum sheet and the springs are from old ballpoint pens. The base is an award plaque that was liberated from a trash can some years back. I knew it would come in handy someday!

Add assorted nuts, bolts and washers, and you can come up with a very serviceable keyer paddle with a velvet smooth action due to the excellent bearings in the drive motor. The drive motor rests in its original location in half of the drive case, and the paddle lever is attached to the motor with original motor screws. The drive platter is unnecessary but I left it in because it looks cool.

You could mount the motor and contact assembly directly to the base and eliminate drive case and platter for a more compact unit. — *Bill Merideth, KC5SB*

Vertical Dipole Propagation

After seeing the 2 meter vertical dipole antenna made out of tape measure elements in the January 2012 issue of *QST*, I just had to schedule this for a club project. Our tape measure Yagi project was such a success that I knew this one would be, too.

We had 11 people come out. Everyone had a great time putting them together and all were pleased with the performance of the antenna. — *Derek Wooley, KD5UBL, President, Cleveland (TN) Amateur Radio Club*

Eleven members of the Cleveland (TN) ARC enjoyed putting together their own 2 meter vertical dipoles. The original construction article, by John Portune, W6NBC, appeared in the January 2012 issue of *QST*. [photo courtesy Derek Wooley, KD5UBL]

Repurposing an Old Tube

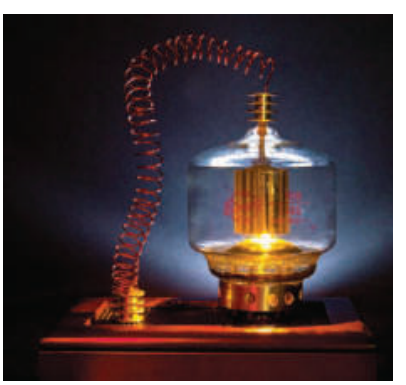
I always wanted to turn a defective transmitting tube into a display for my ham shack. Here is how I did it.

I already had a 10 mm hole saw that is impregnated with diamond grit, designed for cutting holes in ceramic tiles or glass. I placed the tube into a metal pot and submerged the tube in water. I then placed this assembly in my drill press, although you could also use a cordless drill. The secret is to use a slow cutting speed and keep the surface of the cutting area submerged in water. Proceed slowly, and you will be rewarded with a hole cut in the bottom of the tube.

The next step was to clear the inside of the tube of any cuttings from the drilling operation, and to clean the inner surface of the tube. I used a mixture of water and alcohol.

Next, I placed a small light bulb up through the center of the tube, allowing it to appear as though it is functioning as it was originally designed.

Make sure the tube is completely dry inside before placing any heat within the tube. I used compressed air to clear the tube of any remaining alcohol.



Tube light: Jerry Clement, VE6AB, turned an old transmitting tube into a unique shack accessory. [Jerry Clement, VE6AB, photo]

The power source for the 12 V light is a small 12 V rechargeable gel-cell battery located in the wooden box that the tube is mounted on. — *Jerry Clement, VE6AB*

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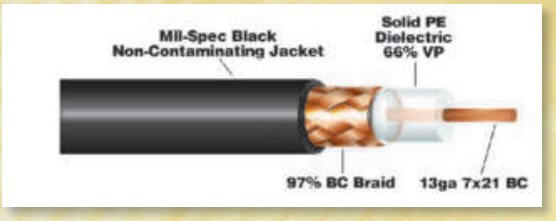

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• 1.4dB @ 50MHz	1.5kW	73%

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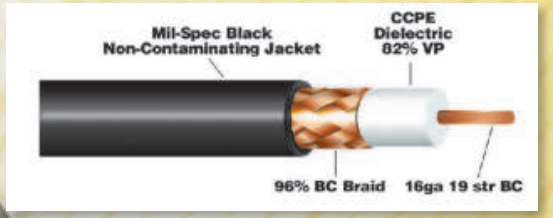
2213A-PL-50	50	$57.95
2213A-PL-75	75	$80.95
2213A-PL-100	100	$99.95
2213A-PL-150	150	$144.95



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Attenuation per 100ft	Power Rating	Efficiency%
• 0.9dB @ 10MHz	2.16kW	80%
• 1.4dB @ 30MHz	1.24kW	69%
• 2.1dB @ 50MHz	0.96kW	62%

Part #	Length/Ft	Price/ea
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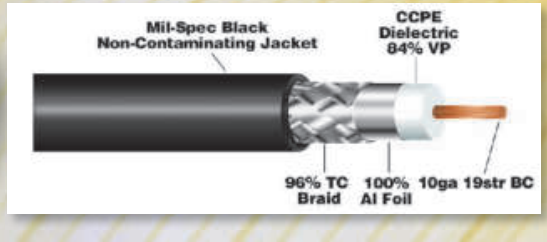
218XA-PL-6	6	$10.95
218XA-PL-18	18	$14.95
218XA-PL-50	50	$26.95
218XA-PL-75	75	$35.95
218XA-PL-100	100	$44.95
218XA-PL-150	150	$62.95



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• 1.8dB @ 150MHz	1.22kW	65.4%
• 3.3dB @ 450MHz	0.69kW	47.3%

Part #	Length/Ft	Price/ea
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25400F-PL-6	6	$14.95
25400F-PL-18	18	$26.95
25400F-PL-35	35	$43.95
25400F-PL-50	50	$58.95
25400F-PL-75	75	$83.95
25400F-PL-100	100	$100.95
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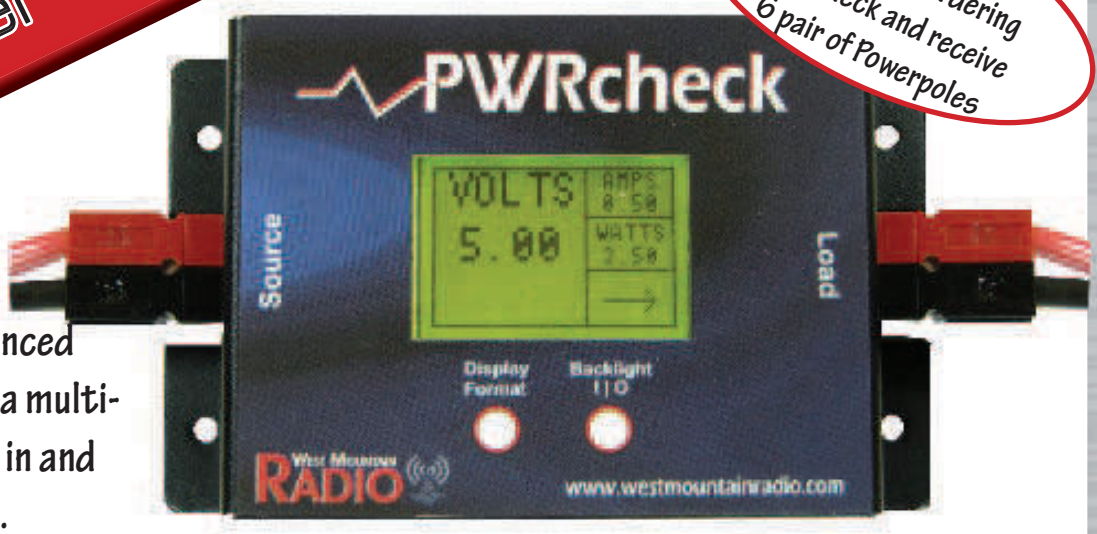

PWRcheck is an advanced monitoring tool with a multitude of applications, in and out of the ham shack.

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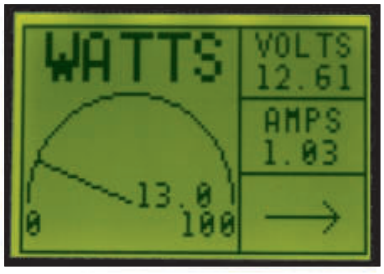
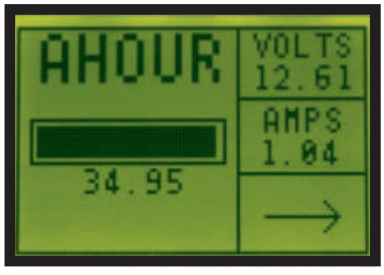


Continuous high-side monitoring of voltage, current and power. Analog scale or digital readout.



Amp-Hour gauge shows approximate battery capacity remaining. Battery size is user definable.

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Letters from Our Members

On(line) Cloud Nine

As a US ham who lives outside the Continental USA, I was very excited to learn that the ARRL will be offering *QST* in a digital format ["Inside HQ: Changes are Coming to *QST*," Mar 2012, page 13]! By the way, I received the March issue on May 1, which is early for me. Although the speed of viewing at my school is slow, due to the school's network restrictions, the ability to read *QST* at home — *on time* — is greatly appreciated. Thank you!

Rich Walrath, NØPQB/HL1ZAR
Seoul, South Korea

Keeping Track of Digital Modes

Thank you for the Special Digital Issue of *QST*. I especially enjoyed the article by *QST* Editor Steve Ford, WB8IMY ["Who's on JT65?" May 2012, page 44]. It should be noted that JT65-HF runs just fine under the *Wine Windows* emulator on *Linux*. If you use *Fldigi* and *Fllog* for PSK, FSK, RTTY and the like, and then set to write to the same file as JT65-HF, you can keep a combined log of the various digital modes. This greatly simplifies uploading to Logbook of The World. It should be noted that *Airmail* also runs under *Wine*, so you can also send Winlink e-mail using a *Linux* platform.

I am doing all of these things using a 30 year old transceiver, a 20 year old TNC, a home-brew soundcard interface and a 10 year old computer running *Ubuntu 10.04 Linux*. At 8 years old, my VHF transceiver is the only "new" thing in my ham shack.

Larry Mundinger, KG4Q
St Augustine, Florida

QSL Cards Keep Memories Alive

The article by T. J. "Skip" Arey, N2EI ["The QSL Card — Still Relevant, Still Fun," May 2012, pages 71-72] hit the nail right on the head. I have many QSL cards that I will always treasure: My first HF QSO on 10 meters with N3NNQ (SK), my first DX contact, my first CW QSO, the card that documents my contact with NA1SS and many, many more. Logbook of The World is great for award confirmations and number hunters, but there is room for both QSL cards and LoTW in this great hobby of Amateur Radio. Hey Skip, by now you should have my QSL card as a thank you for the great article that was long overdue!

Irv McWherter, K3IRV
ARRL Life Member
Lillington, North Carolina

I loved the article by N2EI. I prefer to send my domestic cards as a postcard for 32 cents vs 45 cents. I don't understand when I get cards back in envelopes. Why didn't the other ham send it for the low postcard rate? I do understand the contest folks wanting self-addressed, stamped envelopes for contacts during a contest. But for ragchews, or for those of us that have only six or so contacts in a contest, it's not really a problem to send it for 32 cents. And as the article pointed out, it is fun to send and receive these specialized postcards!

Dave Johnson, NØLVA
Albuquerque, New Mexico

Flying High with Morse Code

When I passed my Novice test back in 1977, CW was a requirement. Rarely, if ever, was the key used, but boy did it pay off in a strange twist of fate. At the ripe young age of 70, I decided to go for a pilot's license; in the process, I had to learn how to use an omnidirectional bearing selector (OBS) and VHF omnidirectional radio range (VOR) for navigating. A VOR is a ground based directional antenna array system that transmits a signal that the OBS can read. You basically dial in the VOR's frequency until you get the direction desired, and then you are guided by a pointer. But how do you know you have the correct VOR? You know because each VOR sends out a specific three letter designation in Morse code! Boy, did I impress my flight instructor by not having to look at the charts to figure out the dots and dashes. It is always interesting when you can apply a skill to other applications in life.

Charles Burke, WA2SLK
Farmingdale, New Jersey

Remembering a Fellow Ham

I was saddened to read on the ARRL website about the passing of Robert Shrader, W6BNB [**www.arrl.org/news/robert-l-shrader-w6bnb-qst-author**]. I had the pleasure of chatting with Bob a few times over the past decade. Never one to stop with the usual QTH, RST, rig or weather exchanges, QSOs with Bob were always fascinating, especially when we started talking about his life. And, of course, they always ended too soon when one or both of us had to get off the radio.

Bob was a true gentleman, on — and I'm certain — off the air. His fist was still solid and armchair copy even into his 90s, yet he was always friendly and patient, willing to share information whenever I asked. I recall during one QSO asking him what a sideswiper/Cootie key was. He explained what it was and how it operated, then switched over to his own key for a demonstration.

I'm amazed at all this man accomplished with his life: Maritime and police department radio operator, author, fire department chief and more. I doubt Bob could ever say even for a minute that he was bored! I encourage everyone to read the article on this fine ham. He will definitely be missed.

Joe Falletta, W6UDO
San Diego, California

Gray — and Green!

I read with great interest the article by Rick Lindquist, WW3DE ["A Touch of Gray," May 2012, page 70]. My story could be called "A Touch of Gray — And Green!" At 65 years old, I've been retired for two years, but have been licensed only a little more than a year. I was first exposed to ham radio back in 1956 when I was 9 years old. A ham neighbor invited the neighborhood kids over to his shack to observe and listen as he made DX contacts all over the world. I was amazed and fascinated then, but I never pursued the hobby; I kind of forgot about it, actually.

In 2010, I was attended a training session on disaster response and our instructor suggested that it would be a good thing for us, as disaster responders, to become licensed ham radio operators. It was like he lit a fuse in me. I suddenly became obsessed with getting my license and getting on the air. I did it and I have been enjoying Amateur Radio ever since. I'm not sure if there are very many other "green/grays" out there, but I bet there are some.

Mark Larson K7OWG
La Grande, Oregon

Golden Memories

I really enjoyed the short piece by Eric P. Nichols, KL7AJ ["Who Was Bill Orr, W6SAI?" May 2012, page 73]. Back in 1978 when I was a young Novice, Bill responded to my CQ on 40 meters and we had a great CW QSO. At the end of the conversation, he asked me to send over a photo of myself at the operating station. He ended up publishing that picture in his Novice column in *Ham Radio* magazine the next month. As a young Novice — and a beginner in electronics — I thought that was really pretty cool and it made me feel very welcomed in the hobby.

As I have gotten older, I realize the dedication and patience it took for Bill, a truly gifted engineer and writer with a knack for explaining difficult topics, to come "up to the Novice bands" and chat with the newbies. Many thousands of contacts later, the one I had with Bill back in 1978 is still remembered fondly, and his QSL card is proudly displayed in my shack.

Steven Strauss, NY3B
Orefield, Pennsylvania

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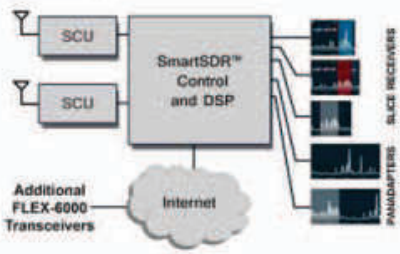

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This Month's Focus: Antennas for the Ham with Space Constraints or CC&R'S


Robert Fanfant, N7QT

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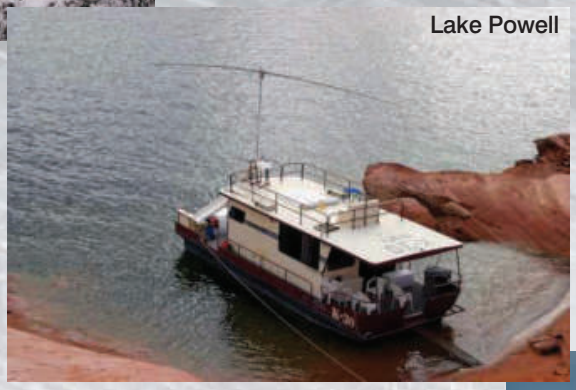
Lake Powell

Dipole 20m-6m

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SmallIR Vertical 20m-6m

Our most portable antenna

- 1 x 18 ft adjustable element
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Peter I DXpedition

DB11

- 20m-6m
- Includes 3x 19 ft elements
- 11 ft boom
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- 13.9Mhz – 54Mhz continuous frequency coverage
- Includes basic SDA100 electronic controller

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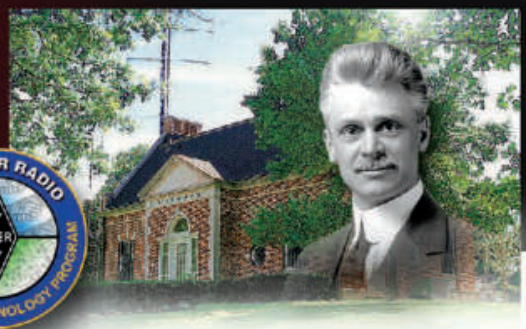

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Our Recent Solar Minimum and Sunspot Cycle 24 Progress

Cycle 24 is in full swing, but we'd better take advantage of it soon.

Carl Luetzelschwab, K9LA

After several years of listening to band noise, the higher frequency bands (15, 12 and 10 meters) really opened up last fall and winter to provide us with a look at what it can do when the sunspots get going. I hope you participated in last year's CQ World Wide DX Contests in October and November 2011, the ARRL's 10 Meter Contest (December 2011), and the ARRL DX Contests in February and March 2012. The higher bands were loaded with world-wide strong-signal DX (although 10 meter propagation for the ARRL DX Contests was not as good as the other three contests).

Listening to band noise on the higher bands is nothing new if you've been a ham for a couple of solar cycles. The higher bands are great around solar maximum, but signals are few and far between at solar minimum. It's interesting to note that we've been extremely spoiled in our lifetimes. The duration of solar minimum periods in our lifetimes, defined herein by when the smoothed sunspot number was below 20, has been around 2 years up until the minimum between cycles 23 and 24. In my book 2 years of solar minimum is a small price to pay for the many years of great 10 meter openings around solar maximum.

We've Become Spoiled with the Help of Old Sol

The solar minimum period between cycles 23 and 24 was extremely unusual for our lifetimes. Figure 1 shows solar minimum periods (smoothed sunspot number (SSN) below 20) between cycles 18 and 19, between cycles 19 and 20, between cycles 20 and 21, between cycles 21 and 22, between cycles 22 and 23 and between cycles 23 and 24.

For the record, February 2006 was when the SSN dropped below 20 as we headed into solar minimum after cycle 23. So based on our past history, we expected cycle 24 to rise above 20 around February 2008. But in February 2008 we hadn't even reached solar minimum yet. This didn't happen until December 2008.

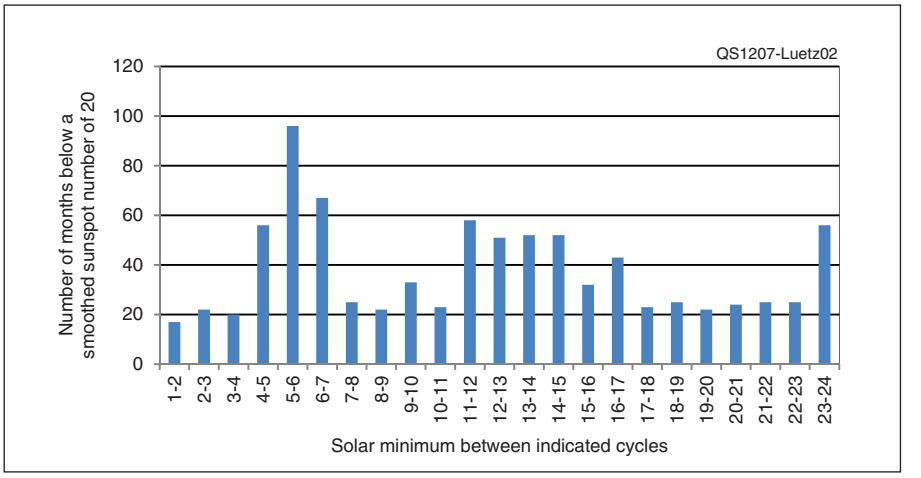

Figure 2 — Duration of solar minimum for all recorded history.

The Past is Prolog

Lest we think the Sun is doing something unusual, all we have to do is look at all solar minimum periods in recorded history. Figure 2 does this. It uses the same criteria (how long the smoothed sunspot number was below 20), but the duration data is now plotted in months as vertical bars.

Now we realize that the Sun didn't really do anything unusual between cycles 23 and 24. We've had long solar minimum periods before. In fact, the data is cyclic in nature. Our recorded history started with several short-duration solar minimum periods, then we had several long-duration periods, then again some short-duration periods, and so forth. Based on the cyclic nature of the data, right now it looks like we're headed for several long-duration solar minimum periods.

Now let's look at the maximum smoothed sunspot number for all 23 cycles. Figure 3 gives this data.

Cycle 19, the highest level in our recorded history, stands out nicely. Stories of world-wide 10 meter propagation using low power and minimal antennas around the maximum of cycle 19 are legendary. Note that this data is also cyclic in nature. Our recorded history started with several high activity solar

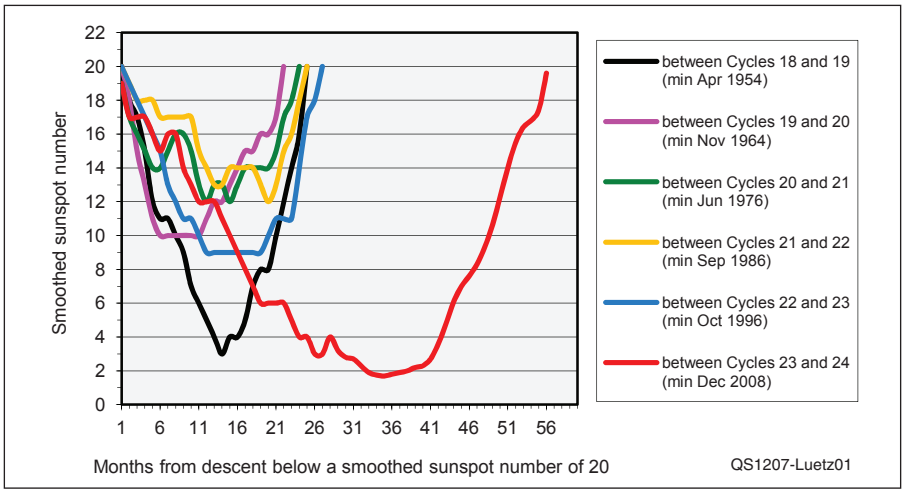

Figure 1 — Recent solar minimum periods.

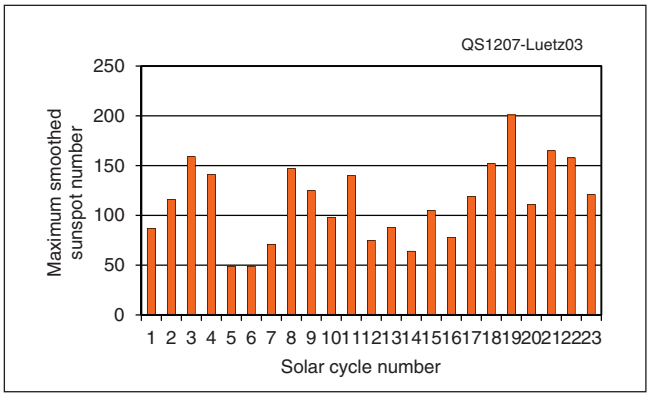

Figure 3 — Maximum smoothed sunspot numbers.

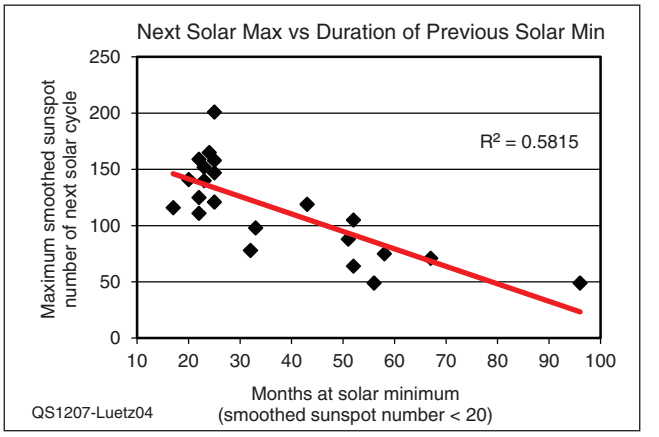

Figure 4 — Solar maximum versus solar minimum.

cycles, then we had several low activity solar cycles, then again some high activity cycles and so forth. Based on the cyclic nature of this data, right now it looks like we're headed for several low activity solar cycles. By the way, the average maximum smoothed sunspot number of all cycles is around 114.

What's Next in the Sunspot Theatre

The data in Figure 3, along with the solar minimum duration data of Figure 2, raises an interesting question. It looks like the next maximum is big when the previous minimum duration is short, and vice versa. So is the maximum smoothed sunspot number of a solar cycle correlated to the previous solar minimum period? That's easy to evaluate. We can do a scatter diagram of the maximum smoothed sunspot number versus the duration of the previous solar minimum period. Figure 4 does this.

Indeed, there appears to be some correlation between these two parameters as indicated by the R^2 value of the red trend line (R^2 = 0.5816) in the upper right corner of the plot. A perfect correlation would have $R^2 = 1$ with all the data points on the red trend line. No correlation would have $R^2 = 0$ with the data points widely scattered about the red trend line.

With the data in Figure 2 (56 months between cycles 23 and 24) and the plot of Figure 4, we can come up with our own prediction for cycle 24. Eyeballing where 56 months falls on the trend line suggests cycle 24 will have a maximum smoothed sunspot number of around 90 or a bit lower.

And that's about what solar scientists are now predicting for cycle 24. Early on, prior to the long-duration minimum period, solar scientists could not agree on what cycle 24 was going to do. There was one faction that said it was going to be a very high solar cycle, as were cycles 21 and 22 (refer back to Figure 3). The other faction said it was going to be an average or below average solar cycle, such as cycles 20 and 23. The result of this disagreement was that two predictions were carried for a long time — a very high prediction and a much lower prediction.

But when our recent solar minimum period lasted so long, many of the high-cycle faction came over to the low-cycle side. Figure 5 is the latest cycle 24 prediction from NASA's Marshall Space Flight Center (MSFC) in Huntsville, Alabama (**solarscience.msfc.nasa.gov/predict.shtml**).

The MSFC predicts a nominal maximum of 63 in early 2013 (about 1 year away), with an uncertainty of about plus and minus 27. In other words, the maximum could be anywhere from 36 to 90. The prediction from ISES (the International Space Environment Service) at **www.swpc.noaa.gov/SolarCycle/** is similar.

It's interesting to note that there are over 60 predictions in the scientific literature, and they range from 40 to 185. Why are there so many predictions over such a wide range? It's because solar scientists still don't fully understand the processes inside the Sun that generate solar cycles. So instead of having an accurate model of what's happening, solar scientists are forced to use different methods to come up with their predictions.

Cycle 24 is What it Will Be

So how's cycle 24 doing? The best I can say is that cycle 24 is pretty much doing as predicted, following the smoothed trend line with significant variations. Figure 6 shows sunspot data beginning in January 2006, with the monthly mean sunspot numbers as vertical bars (red for cycle 23 sunspots and blue for

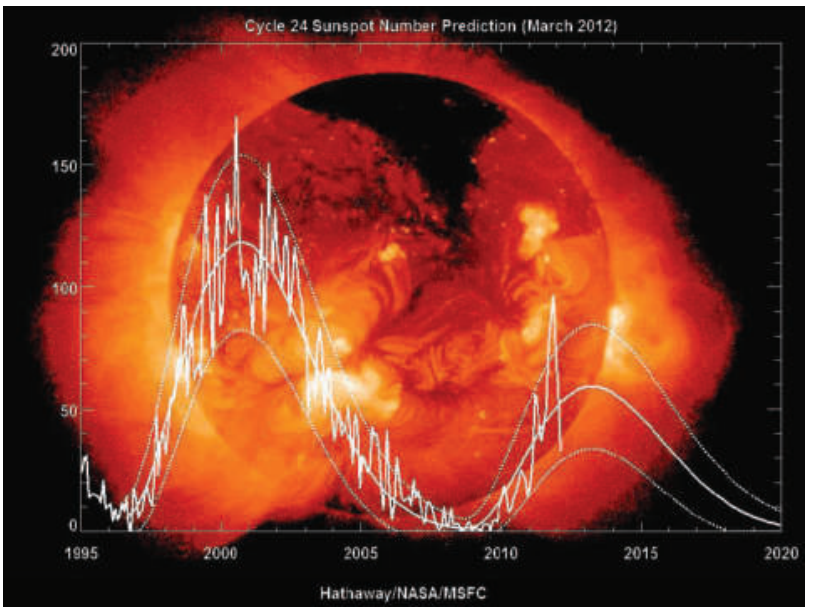

Figure 5 — The MSFC prediction as of February 2012. [Photo and plot courtesy of NASA]

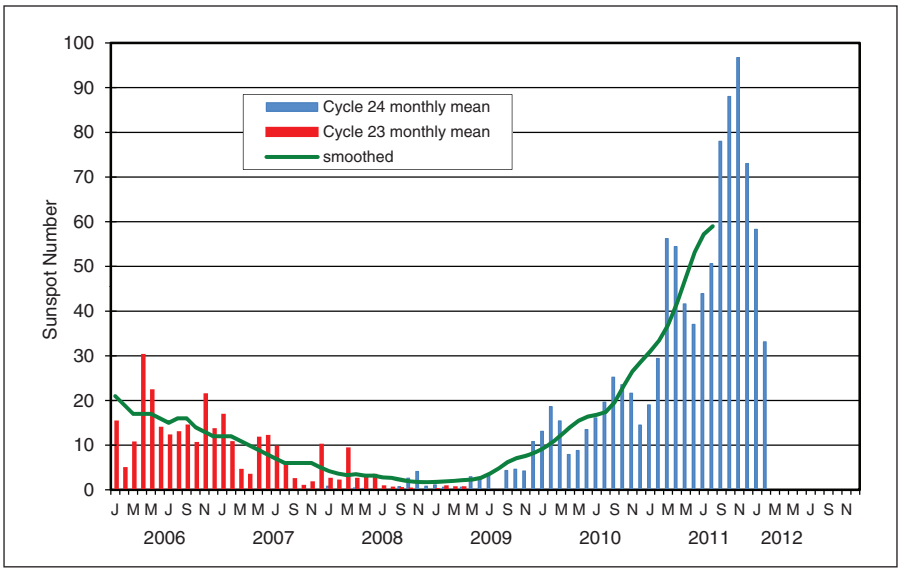

Figure 6 — Sunspot cycle 24 status.

cycle 24 sunspots) and the smoothed sunspot number as the green line. As a side note, the monthly mean and smoothed 10.7 cm solar flux parameters are following similar trends. I chose to present the current data in terms of sunspot numbers to distinguish between cycle 23 sunspots and cycle 24 sunspots.

Solar scientists can tell the difference between old cycle sunspots and new cycle sunspots by the solar latitude at which the sunspots emerge and by the polarity of their magnetic fields. If you look closely, you'll also see an overlap between cycles 23 and 24 — there were sunspots from both cycles for a 16 month period from January 2008 to April 2009 — which is not unusual for a solar minimum period.

It's interesting to note that our latest data has the smoothed sunspot number at 59.0 for August 2011. If the MSFC nominal prediction of a smoothed sunspot number of 63 comes true, then we should start seeing cycle 24 continue to level off in the next several months. Also note that the uncertainty of the MSFC prediction will allow a higher cycle, so let's keeps our fingers crossed that their high-side prediction of 90 is more likely.

The good news in all this is that the smoothed sunspot number continues to rise (so far, at least), and it went through 50 in the summer of 2011. That's a notable value, as 10 meters generally offers worldwide openings when the smoothed sunspot number is above about 50. We've passed that value, and that's why the higher bands last fall and winter were so good. But don't dally around thinking "I'll get on later — no hurry." If this does turn out to be a below-average solar cycle (and all the evidence appears to be pointing in that direction), take advantage of the higher bands now.

ARRL Life Member Carl Luetzelschwab, K9LA, received his Novice license (WN9AVT) in 1961, and picked K9LA in the mid 1970s when the FCC first allowed Extras to select 1×2 call signs. Carl graduated from Purdue University with BSEE (1969) and MSEE (1972) degrees, and professionally is an RF design engineer (mostly power amplifiers) for Raytheon (formerly Magnavox) in Fort Wayne, Indiana. Carl enjoys writing and speaking about propagation, contesting (he was *NCJ* Editor from 2002-2007), DXing (he's at the Top of the Honor Roll), and playing with antennas. You can reach him at **k9la@arrl.net**.

In The May/June 2012 Issue:

■ Glenn Elmore, N6GN, and John Watrous, K6PZB, introduce us to the principle of the surface wave transmission line (SWTL). This single-conductor transmission line carries RF signals for long distances with very low loss, with proper impedance matching. The authors describe the construction of two signal launchers that can be used with the line. One operates over a frequency range from 144 MHz through 3 GHz or higher and the other operates from 400 MHz through 3 GHz or higher. The launchers use a conductive outer cone and a Klopfenstein-taper center conductor at both ends to match the impedances between the transmitter and the antenna to the feed line.

■ John E. Post, KA5GSQ, describes the construction and operation of temperature and pressure sensors built by high school students in an intense 4 day science and engineering camp he taught at Embry-Riddle Aeronautical University. The students launched the sensors, along with Amateur Radio APRS position-beacon trackers on a high-altitude balloon flight.

■ Rudy Severns, N6LF, concludes his series of articles that provide us with "A Closer Look at Vertical Antennas with Elevated Ground Systems." This time Rudy examines elevated radial systems for multiband antennas. He looks at the effects of height on the radial systems and also compares symmetrical and asymmetrical radial fans. If you are interested in vertical antennas with elevated radials, you will not want to miss these articles!

■ John Stephensen, KD6OZH, describes his results from experiments with several mixers in "IMD in FET and Diode Mixers at 70 cm." John built a dual FET mixer as well as a quad FET mixer using a Peregrine Semiconductor PE4140 CMOS silicon on sapphire IC. He also built a diode mixer for comparison, using a Mini-Circuits SYM-30DHM packaged mixer.

■ Maynard Wright, W6PAP, looks at conditions for the reversibility of an impedance matching L network in "More *Octave* for L-Networks."

■ Ray Mack, W5IFS, continues to explore the Texas Instruments TMS320C5535 eZDSP board in his "SDR: Simplified" column. This month Ray leads us through the operation of a finite impulse response (FIR) filter. In the files available for download from the *QEX* files website, Ray has included his *C* language version of a BASIC program by Bob Larkin, W7PUA, that comes with *Experimental Methods in RF Design*. This program calculates the coefficients for a finite impulse response (FIR) filter.

QEX is edited by Larry Wolfgang, WR1B, (**lwolfgang@arrl.org**) and is published bimonthly. The subscription rate (6 issues) for ARRL members in the US is $24. For First Class US delivery, it's $37; in Canada and internationally by airmail it's $31. Nonmembers add $12 to these rates. Subscribe to *QEX* today at **www.arrl.org/qex**.

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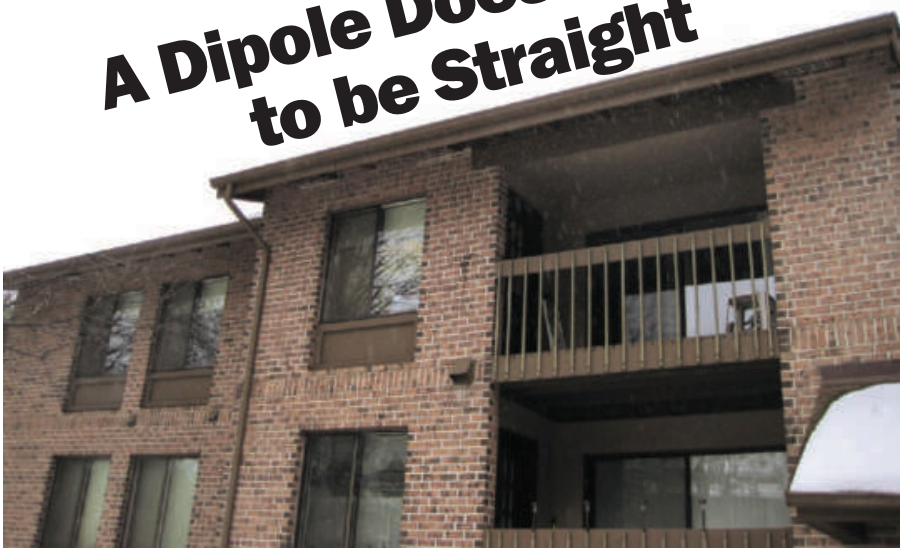
A Dipole Doesn't Have to be Straight



There's always a way to put some kind of antenna into service.

Jeffery Brone, WB2JNA

You can get on the air, and do pretty well, even if you live in an apartment. Here's one ham's solution. After stringing up dipoles in my apartment and then taking them down (sometimes) when I was done, I got the urge to put up an antenna that could just stay up and be ready to use whenever I wanted.

I was lucky. I lived on the third floor — the top floor at that — and had a balcony. So one day I asked my building manager if I could run a wire out my window to the balcony. He just said that was okay with him. Hooray! That was all I needed — I will now explain.

Half A Dipole (Outside) is Better than None

A wire out a window that's secured at the balcony, or even at another window in the apartment, can easily constitute one half of a dipole. In my case that half was almost 35 feet. I ran another 35 feet of wire around the apartment, tacked up along the ceiling and corners, resulting in a full size dipole for 40 meters (see Figure 1).

The wire is #22 or #24 AWG, which is virtually invisible. I fed it through a tuner with my own version of 3 feet of ladder line (really just two wires running parallel, about 2 inches apart) and it loads up on all bands — 40 through 10 meters (see Figures 2 and 3). I tried to keep the wire at least a few inches away from the walls as much as possible to avoid inadvertent coupling.

It Beats the Competition

At times I have set up a textbook 20 meter dipole run from my balcony and out to a tree in front of my apartment, just for experimentation. The half indoor/outdoor antenna performs better (at least on 20 meters). Perhaps because it's essentially up about 25 feet at all points. Perhaps it works better because it uses a longer length of wire. Whatever the reason, it seems to work better.

I use it to work regularly into Europe on 40 through 15 meters with about 15 W output on CW. It also works

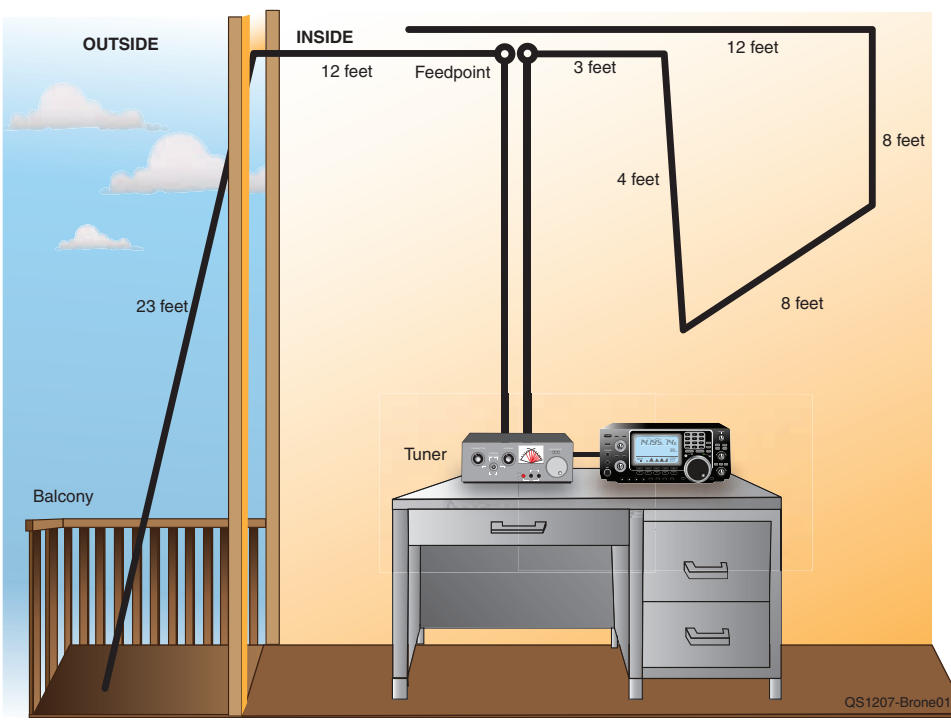


Figure 1 — My dipole is anything but straight — but it still gets me on the air.

on SSB, of course, though results are not as good for DX. My best DX on CW was Chagos Island, south of India. I also regularly hit western Africa and South America, especially during DX contests, and have worked into Australia and Japan.

I have no illusions that it works as well as the same length antenna up 50 feet, outdoors and in the clear, but that arrangement is not possible at this time. This seems to be the next best choice, and it really does get out. I also have no worries about icing on the wire or the wind blowing it down.

Common Sense Applies

There are some common sense rules to follow with this type of antenna. Try to minimize folding the wire back on itself when running it around walls and corners. If the two halves of the dipole can run in approximately opposite directions to each other that might be best. Experiment with different positions and lengths of the wire to find what works best and use fairly low power to minimize RFI and exposure to RF [be sure to evaluate your RF exposure to make sure you are within compliance limits — *Ed.*]. Being on the top floor helps. Imagine how well this would likely work if I were on the top floor of a very tall high rise. Also I'm sure that the antenna being half outdoors is beneficial. Experiment with the configuration of the wires to get the best results.

Figure 3 — My antenna tuner can match the antenna to my radio on all bands of interest.

Perhaps we can call the following 10 rules of stealth/apartment/restricted antennas:

- Something for an antenna is better than nothing.
- More wire is usually better than less, unless the antenna is only meant for one band.
- Balanced (center fed dipole or vertical) is better than unbalanced (end fed wire), all other things being equal.
- All other things are seldom equal. Try different arrangements. Read up on the subject.
- Get a tuner. A low priced manual one is okay (see Figure 3). You'll want it for some bands and will appreciate the flexibility it gives you.
- Get a dummy load, too.
- Keep the power low for safety and less RFI.
- CW and digital modes produce more contacts than SSB.
- Listen, listen, listen.
- Put up the best antenna you can manage, then get on the air and have fun!

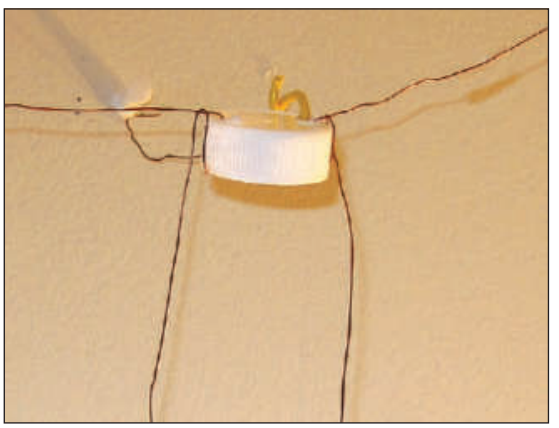


Figure 2 — The center of my dipole is fed with a short length of open wire line — made from the ends of the antenna wire.

ARRL member and Amateur Extra class operator Jeff Brone, WB2JNA, got interested in Amateur Radio at the age of eleven and has been a ham for 42 years. He enjoys experimenting with limited space antennas and especially enjoys operating CW. He works in customer service and, when not on the radio, likes music, astronomy and creative writing. You can reach Jeff at 5 Meadow Grass Ct, Apt 1, Cockeysville, MD 21030-5264 or at **jeffbrone@netzero.com**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

New Products

Digital Remote/Meter Panel for N8XJK Boost Regulators from TG Electronics

The R-2 Remote/Meter Panel from TG Electronics is designed to allows operation and monitoring of the N8XJK series of boost regulator from up to 20 feet away. The R-2 requires 100 mA from the battery.

It has input and output voltmeters (0-20 V), an on/off switch for the boost regulator, plus indicator LEDs. The R-2 can be built with the flanged lid on the top, bottom or back of the unit to suit mounting needs. Price: $79.95. For more information, or to order, visit **www.tgelectronics.org**.

bhi Mini Switch for DSP Speaker

The Mini Switch from bhi Ltd enables the user to connect two radios to a bhi DSP noise canceling speaker or to a GAP Hear-It DSP speaker or inline unit. The switch measures 2.1 × 1.75 × 0.75 inches and is supplied with 3.5 mm mono connectors, hook-and-loop pads for mounting, and instructions for use. For more information and pricing, see **www.gapantenna.com**, **www.w4rt.com** or **www.bhi-ltd.com**.

SDR Upgrade for Analog HF Radios

Bring the benefits of digital processing to your veteran HF transceiver.

Alex Schwarz, VE7DXW

Most modern commercial HF transceivers use digital signal processing (DSP) to enhance performance. DSP, particularly if the processing is at intermediate frequencies, offers super sharp filtering at as many bandwidths as desired, without the need for additional crystal filters. In addition, DSP can provide far more effective noise rejection than other techniques and can perform many of the modulation and demodulation tasks previously performed by analog circuitry.

Those with older transceivers still have equipment that may be more than adequate in terms of RF processing. This SDR IF and audio upgrade allows the older, but effective, RF stages of earlier transceivers to be coupled to a DSP back-end to provide an optimum mix of technology, while preserving the look, feel and investment of earlier radios. This project will result in an adapter that can plug into a crystal filter socket, digitize the IF signal and demodulate it using software and then play the audio through the computer speakers or connected headphones.

Project Objectives

This group effort first established a set of objectives for this project. The objectives included:

- To create a software and hardware interface that is usable for different models of radios (Yaesu FT-817, '857, '897 as well as ICOM IC-703, '706 and '7000 transceivers have been tested to date. The software is designed to support up to 47 different models) and meets the specifications in Table 1.
- To provide a software package that can be used by developers. *MDSR* software release V2.4 will have an external frequency counter input for radios that do not have a computer aided transceiver (CAT) interface.
- To upgrade an older analog radio to SDR capability at low cost.
- To use software for the demodulation and modulation of USB, LSB and CW (AM and FM planned for the future) with a standard soundcard serving as the analog to digital converter.
- To write software that runs on *Windows* based platforms (*Windows 2000, XP, Vista and Windows 7*) and can be quickly installed and configured by any amateur.
- To ensure that the required hardware is simple and easily reproducible, and to require a minimal amount of measurement equipment (the *MDSR* software is used as the measurement tool for setup).

Table 1
Technical Specifications of LIF Receive System

Input frequency	455 kHz (±10 kHz)
Maximum input level	1 mV to 20 mV_{PP}
Maximum conversion gain	55 dB
Output level for S-9	0.7 V_{PP}
Low frequency IF bandwidth	±10 kHz
Low frequency IF center frequency	12-15 kHz for optimal performance
SSB demodulation bandwidth	1.8, 2.4, 3.2 kHz
CW demodulation bandwidth	300 to 800 Hz
BFO frequency resolution	1 Hz (ideal for FSK)
Spectrum analyzer display range	±10 kHz
USB, LSB demodulation bandwidth	Selectable 1.8, 2.4, 3.2 kHz
CW demodulation bandwidth	300 to 800 Hz

Creation of 12 kHz Low Intermediate Frequency (LIF) Receive System

How to Extract the 455 kHz IF Signal From a Radio

Since the early days of superhets, 455 kHz has been a common IF and is still frequently encountered as the second IF frequency in many HF radios. Most HF radios also provide one or more option slots for multi-pole crystal filters for SSB and CW. In the receive flow, the signal is filtered to select the USB or LSB portion of the IF spectrum before it is demodulated. While the radio is in transmit mode, the SSB is filtered into USB or LSB using the steep slope of typically the same filter to remove the unwanted sideband.

This has to be taken into account when the IF is sent from the optional filter port to the LIF converter, which only works for receive signals. A low quality crystal filter is placed into the signal path between the output and input of the option filter just to keep the AGC working. Note that transmitting is only possible if the transmit chain has its own filter.

It might seem counterproductive to disable the transmit, but in doing so, the user gains the flexibility of digital filters and signal processing. This makes the reception of shortwave signals much clearer.

MSDR version 2 allows the use of the radio's hand mic

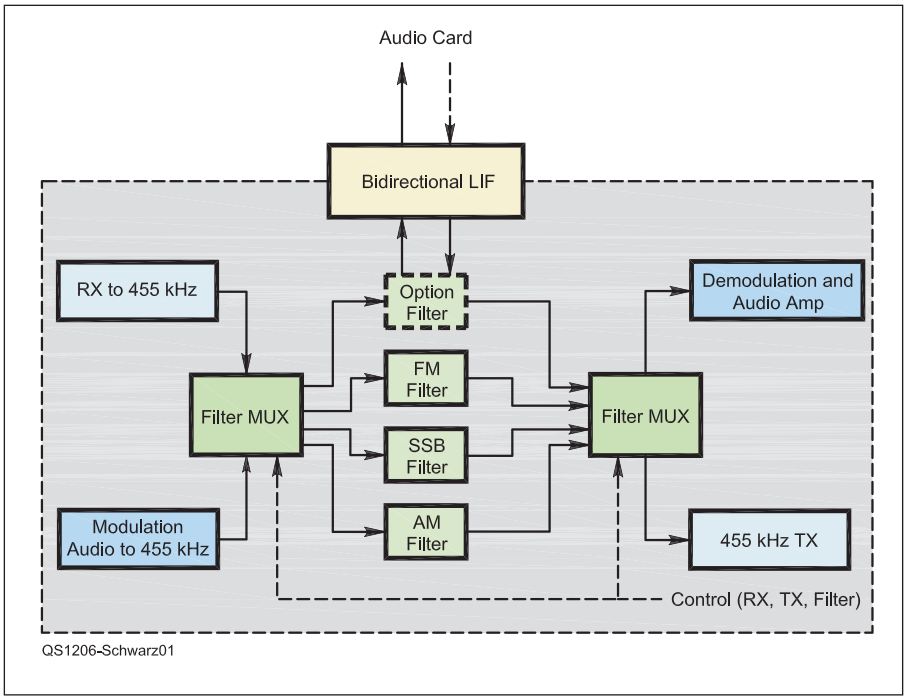


Figure 1 — Signal flow diagram of the LIF processor.

for voice. For the FT-817 this requires the presence of an optional filter. The software supports individual mode setups that allow the transceiver to switch modes simultaneously with the software and the regular hand microphone can be used to switch to transmit. This is called "Lock to TXCR." More details on this can be found in the software manual that is part of the software download.

Most HF radios provide one or more option slots for high quality, multipole crystal filters for SSB and CW. This is the perfect spot for the LIF extraction without having to modify the radio. This port is bidirectional. This means that when the radio is in transmit mode, an external applied IF will be upconverted to the transmit frequency. Bidirectional operation is called *Bi*LIF and requires additional upconverter hardware.

The transmit pass is unaffected if the built-in SSB filter is set to be used in transmit only. Some radios use the option filter for RX and transmit exclusively, when it is selected. In this case the 2 pole filter cannot be used and an expensive option filter has to be installed.

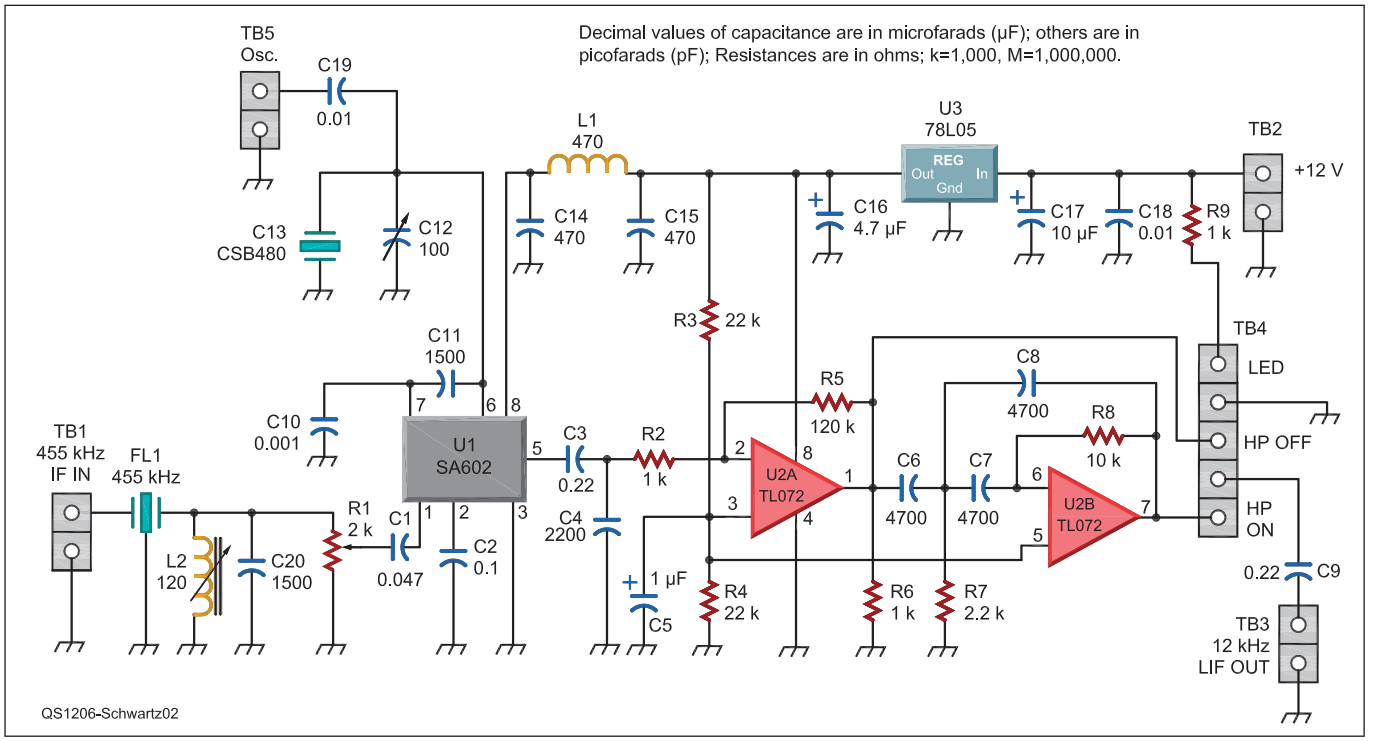


Figure 2 — Schematic diagram and parts list of the DSP processor with 8 kHz HP filter. Digi-Key parts are available at **www.digikey.com**. DERF Electronics parts are available at **derf.com**.

C1 — 0.047 µF monolithic capacitor.
C2 — 0.1 µF monolithic capacitor.
C3, C9 — 0.22 µF monolithic capacitor.
C4 — 0.22 µF monolithic capacitor.
C5 — 1 µF monolithic capacitor.
C6-C8 — 4700 pF monolithic capacitor.
C10 — 0.001 µF monolithic capacitor.
C11, C20 — 1500 pF monolithic capacitor.
C12 — 100 pF trimmer capacitor.
C13 — CSB480 Murata ceramic resonator (Digi-Key 490-1188-ND).
C14, C15 — 470 pF monolithic capacitor.
C16 — 4.7 µF tantalum capacitor.
C17 — 10 µF tantalum capacitor.
C18, C19 — 0.01 µF monolithic capacitor.
FL1 — 455 kHz Murata ceramic filter (DERF Electronics SFU455Y).
L1 — 470 µH inductor.
L2 — 120 µH variable inductor (Digi-Key TK5117-ND).
R1 — 2200 Ω trimming resistor.
R2, R6, R9 — 1 kΩ, ¼ W resistor.
R3, R4 — 22 kΩ, ¼ W resistor.
R5 — 120 kΩ, ¼ W resistor.
R7 — 2.2 kΩ, ¼ W resistor.
R8 — 10 kΩ, ¼ W resistor.
U1 — SA612 Philips Gilbert cell mixer oscillator (DERF Electronics SA612AN).
U2 — TL072 low noise dual op amp (DERF Electronics TL072CN).
U3 — 78L05 5 V voltage regulator IC.

The signal flow diagram (Figure 1) shows how the LIF board is connected and how it affects the performance of the radio. It will operate normally (in receive and transmit) if the standard IF filter is selected in the option menu. If the unit is set to utilize the option filter, the signal will be routed to the sound-card and will be demodulated with the *MDSR* software.

Schematics of LIF Converter

Figure 2 is a schematic diagram of the LIF processor. An SA602 Gilbert cell is used as the converter. A ceramic crystal filter oscillator (465 kHz) provides the local oscillator (LO) injection signal of 467 kHz. The output is amplified by a TL072 with gain of 40 dB that results in an overall gain of about 55 dB. There is a dual pole 455 kHz filter in front of the mixer to protect the Gilbert cell from cross-modulation. This converter works with any radio using a 455 kHz IF system that provides a 1 to 20 mV signal for a S-9 meter reading at the optional filter port. The second op amp in the TL072 package is used to provide a 7 kHz high pass filter. This filter can be bypassed if required.

PCB and Implementation

The prototype of this converter was built for use in the Yaesu FT-817, but now a lot of amateurs have built the LIF converter and it is designed to work with many different radios. There is space for the LIF converter to fit inside the FT- 897. For radios that have less space, an external metal project box can be utilized.

The LIF PCB (see Figures 3-5) is designed so that it will plug into the BiLIF upconverter assembly once it is available, like a mother and daughter card assembly.

To deliver the 455 kHz IF to the LIF converter a RG-174 coax cable is connected to the option filter port for the Yaesu radios or a port is soldered onto the PCB. IF port installation guides are available in PDF format from the MDSR website.

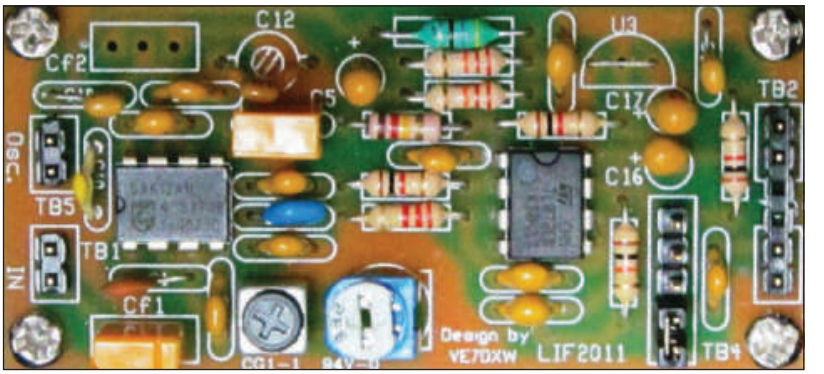


Figure 3 — The LIF to computer interface happens on this compact PC board.

Figure 4 — PCB assembly built into a box for use with a transceiver.

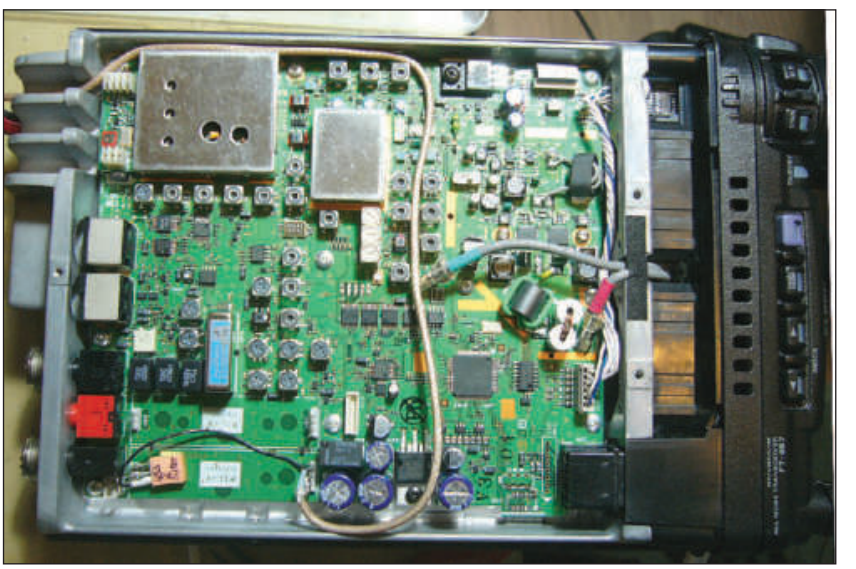


Figure 5 — This prototype was installed by VA7MP into a diecast aluminum enclosure for use in a Yaesu FT-857/897 series transceiver.

Alignment

For the next step, the *MDSR* software must be installed and configured on the computer. Installation and setup instructions are available in the help menu and the included PDF files can be found in the MDSR directory after installation. The only adjustment that the LIF unit requires is the gain (see Figure 6).

The 0 dB point of the audio card is 0.7 V_{P-P}. This is important so that AM and SSB signals are not clipped. To adjust the gain, connect an oscilloscope or an AF audio meter to the output of the converter. Disable the receive RF amplifier in the radio. Set the demodulation to AM, which does not use the option filter. Tune the receiver to a stable AM station and reduce the incoming RF gain until the S-meter on the radio reads S9. Now set the unit to USB mode utilizing the option filter. Adjust P1 until the maximum output does not exceed 0.7 V_{P-P} (0.5 V_{RMS}).

Strong local AM signals above S9+6 dB will be clipped by the audio card. When this happens, the gain control of the radio has to be turned down to keep the S-meter at or below S9. Short bursts of SSB signals above S9 will not cause noticeable distortion. During the reception of FM signals the output can be higher without degrading the performance of the radio.

There is no frequency adjustment on the LIF PCB. It has been replaced by adjusting the *MDSR* software. To adjust all the different modes and settings, consult the PDF documentation. Before the transceiver can be adjusted, the CAT control has to be working and the current frequency has to be seen in

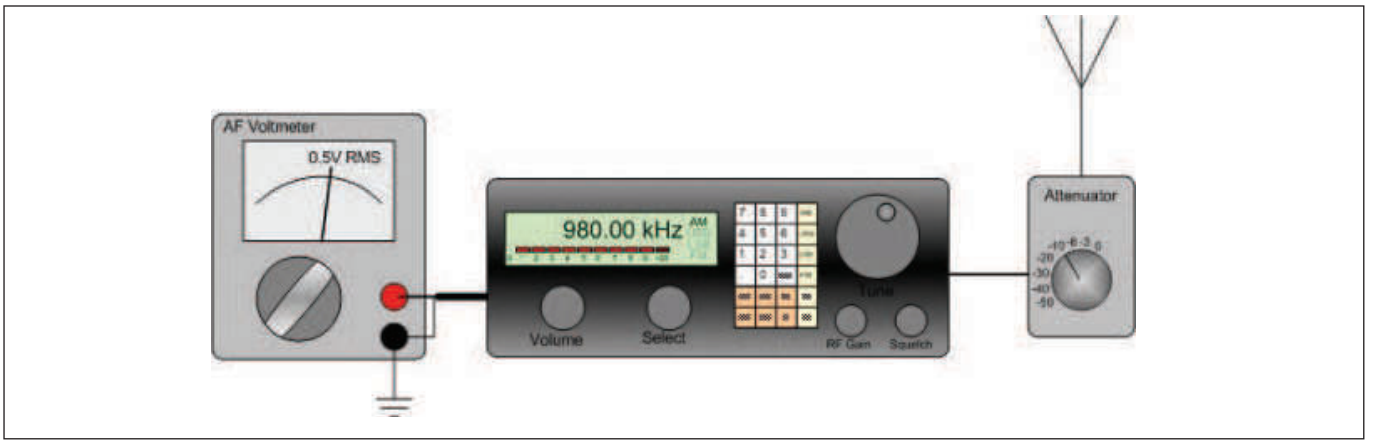


Figure 6 — Test setup used for DSP adjustments.

the frequency window. For more information, training manuals can be viewed on YouTube. The links are listed on the website or can be found in the Yahoo user group in the files section.

Adjusting the Audio Settings in Windows

As a final step, unplug the AF voltmeter and plug the output into the line input of the computer. (If there is no line input available the microphone input can be used.) If the hiss is too loud, after pressing the START button in the MDSR graphic user interface, go to SETUP then AUDIO SETTINGS and reduce the input gain. In this window, the left and right channel designation can also be changed if necessary.

In Windows, click START, CONTROL PANEL, SOUNDS AND AUDIO DEVICES. In the SOUNDS AND AUDIO DEVICES PROPERTIES, select the AUDIO tab. Under SOUND RECORDING, make sure to select the audio card that the LIF converter is plugged into and then click on VOLUME and then the ADVANCED button. In RECORDING CONTROL, select the LINE IN (microphone) check box and set the VOLUME to 70%. In ADVANCED, make sure that the +20 dB boost is not checked and close the window. In VOLUME CONTROL PANEL mute the microphone. If this is not done, a hissing sound will be heard. The hissing sound is the 12 kHz output of the converter.

Conventional Demodulation versus Digital Demodulation

USB and LSB Demodulation

The USB signal is extracted before it is demodulated. Since the mechanical filter is fixed in its frequency, only USB demodulation is possible (digital filters do not have this limitation). In order to provide LSB and USB demodulation, the LO (local oscillator) is shifted by about 3 kHz to utilize the other filter slope. This shift will detune the MDSR when the mode changes because the demodulator expects a fixed IF. The "Lock to TXVR" mode in *MDSR* software automatically shifts the soundcard BFO to keep the receiver and transmitter synchronized.

The transceiver is used in the transponder mode and the demodulation mode is only selected by the software in the full MDSR receive-transmit version. To allow for MDSR receive and transceiver internal modulation operation, the "Lock to TXCVR" mode is used. This requires the *MDSR* software to have an individual tuning profile for each mode and that the software and the transceiver are locked in modes. This setup is described in the MDSR manual that is included in the software.

CW Demodulation

This is a sub form of USB demodulation with a narrower filter to reduce interference and suppress noise.

The version of this article in the *QST* Digital Edition includes a description of the bidirectional upgrade that provides transmit and spectrum analyzer capability. Operating PC software is on the QST-in-Depth website at **www.arrl.org/qst-in-depth**.

Acknowledgments

Special thanks to Guy Roels, ON6MU (**guy.on6mu@skynet.be**) for providing the inspiration for the LIF converter on his website (**users.belgacom.net/hamradio/index.htm**).

Thank you also to the North Shore Amateur Radio Club for the opportunity to present the MDSR project and all the specialized test equipment that was used to make sure the MDSR development can meet the technical requirements. Special thanks to Adam Farson, VA7OJ/AB4OJ, and David Shipman, VE7AM.

Thanks to Alex Shovkoplyas, VE3NA, for the use of the *Omni-Rig* universal CAT control software.

Amateur Radio operators contributing to the MDSR project are listed in Table 2 in the digital edition.

Alex Schwarz, VE7DXW, is an Advanced amateur and a graduate of the Höhere Technische Lehranstalten (Higher Technical Institute), Innsbruck, Austria. He moved to Vancouver (Canada) in 1990 and has since been involved in professional communication systems and digital point to point wireless network systems. In 2005 he started work in the Biomedical Engineering Department at Children's and Women's Hospital in Vancouver. He can be reached at 3287 Mountain Hwy, North Vancouver, BC V7K 2H4, Canada or at **alexschwarz@telus.net**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

Making the 43 Foot Vertical Monopole Play Nicely on Higher Frequency Bands

Exploring methods to tame the 43 footer on the bands above 20 meters.

Joel R. Hallas, W1ZR

In a recent *QST* article I described the performance of the popular 43 foot monopole on various bands.[1] I noted there that it was designed as the optimum single element monopole for low angle radiation on 20 meters, but could also work on other bands. I also noted that its low angle performance was good for its size on 20 meters and on the lower frequency bands, although matching was sometimes a challenge. I also made the observation that on the bands higher in frequency than 20 meters, the peak radiation was at higher than optimum angles for long range communication.

How Far From Optimum Is It?

Perhaps a useful comparison would be to look at the signal intensity and peak elevation angle of the 43 foot (⅝ wave on 20 meters) on different bands and compare the results to ⅝ and ¼ wave antennas cut for the bands in question. Based on *EZNEC* modeling, the ⅝ wave performance will be similar to the 43 footer on 20 meters, while the ¼ wave will have its peak elevation 9° higher at 24°.[2] The peak gain will be about 0 dBi, the intensity at 5° will be –6.1 dBi, 10° will be –2.3 dBi and at 15°, corresponding to the peak of the ⅝ wave, 0.72 dBi. The comparison is shown in Table 1.

It is interesting to note that, with the exception of 15 meters, the 43 foot monopole has an intensity at 5° elevation on the higher bands quite comparable to an ¼ wave monopole tuned for the band — this in spite of shorter antenna's cleaner looking pattern. Figure 1 shows the elevation pattern of the ¼ wave 10 meter monopole compared to the 43 footer on 10 meters. At the intermediate angles, the ¼ wave has more of an advantage. A ⅝ wave antenna tuned for the band will offer significant improvement, as shown.

So, What Can We Do?

I looked at a number of possible approaches to improving the performance of the 43 footer on the higher bands. It is important to mention that the 43 foot vertical, as any monopole fed against ground, requires a good radial ground system to be efficient. The radials can be on or under the ground, or can be elevated. If you're not familiar with the requirements for such a system, please look over the excellent *QST* article by Rudy Severns, N6LF, on the subject.[3]

I thought I was on to something when I determined, through modeling, that a ¼ wave coupled resonator would provide a pattern similar to a stand-alone ¼ wave monopole. While the pattern looked nicer, as noted previously and confirmed on the air by *QST* Editor Steve Ford, WB8IMY, the improvement in signal strength at DX locations was not noticeable. Attempts to use either coupled resonator or parallel elements of other then ¼ wave (½ or ⅝ wave, for example) did

[1]Notes appear on page 43.

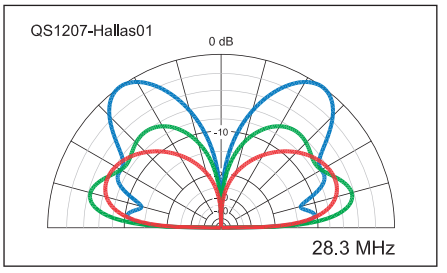


Figure 1 — Elevation pattern of a 10 meter ¼ wave monopole (red) compared to the pattern of a 43 foot monopole on 10 meters (blue). Note that while the peak elevation angle of the 43 footer is much higher, the intensity at 5° elevation is not very different. The 10 meter ⅝ wave antenna (green) offers significant enhancement compared to either the 43 footer or the ¼ wave monopole.

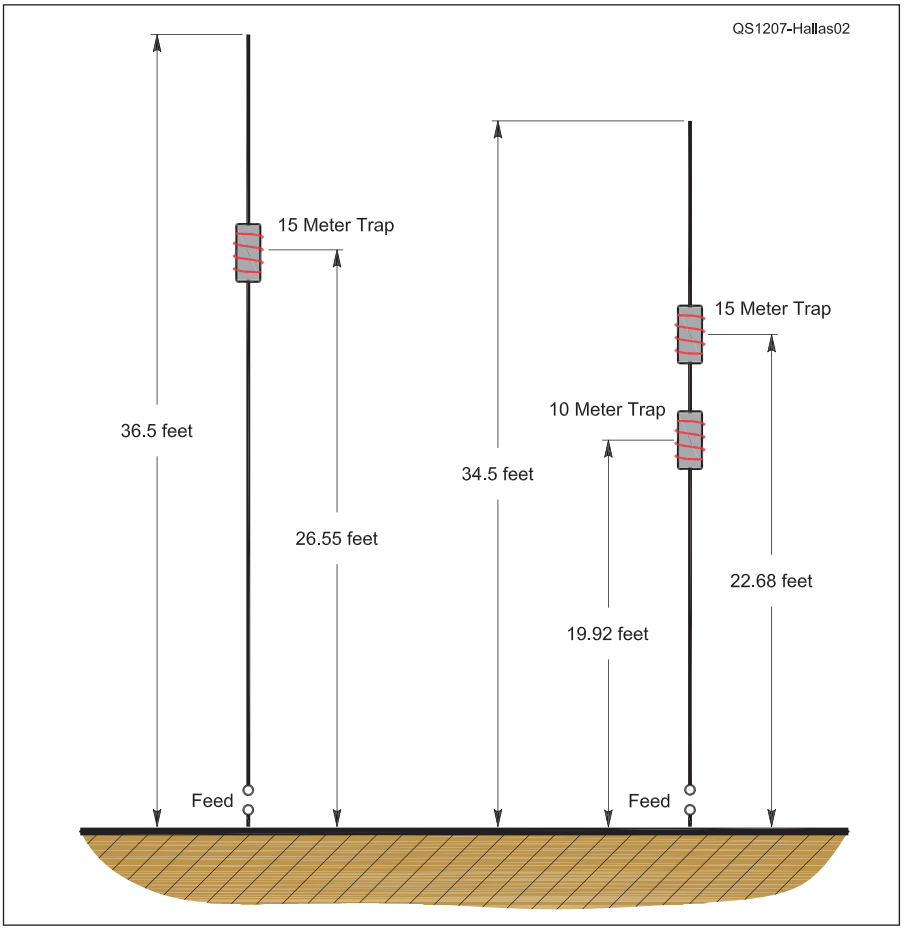


Figure 2 — Dimensions of the trap monopoles described in the text. While other materials can be used, the dimensions and data in Table 3 are based on #12 AWG copper wire and commercial Unadilla traps. The antennas are fed against a ground system, either buried or on-ground radials, or resonant elevated radials for each band.

Table 1
Gain and Angle of Peak Gain of 43 Foot Monopole on Upper HF Bands Compared to ¼ and ⅝ Wave Monopoles on Each Band

		43 Foot Monopole Gain (dBi) at Elevation Angle				Increase with ¼ Wave (dB)			Increase with ⅝ Wave (dB)		
Band (Meters)	Peak El Angle (°)	Peak Gain Max	5°	10°	15°	5°	10°	15°	5°	10°	15°
20	15	1.1	–2.9	0.4	1.1	–3.2	–2.7	–0.4			
17	42	4.1	–6.3	–3	–1.7	0.2	0.7	2.4	3.4	3.4	2.8
15	35	4.1	–7.9	–4.1	–1.8	1.8	1.8	2.5	5	4.5	2.9
12	30	4.1	–7.0	–3.8	–1.2	0.9	1.5	1.9	4.1	4.2	2.3
10	54	5.8	–5.6	–5.2	–6.9	–0.5	2.9	7.6	2.7	5.6	8

All antennas #12 AWG copper wire over typical ground, conductivity 0.005 S/m, relative dielectric constant 13.

Table 2
Length of ⅝ Wave Radiators

Band (Meters)	Length (feet)
20	43.5
17	34.0
15	29.1
12	24.7
10	21.7

not yield much benefit because, unlike the case with parallel dipoles, the impedances on the two bands were similar and the currents were not driven to the desired element. I did, however, find two potential solutions that may be helpful.

Switched ⅝ Wave Verticals

Because the ⅝ wave antennas are not resonant, they don't couple well. This is a disadvantage if you are trying the coupled resonator approach, but allows the elements to be near each other without significant interference. By having the ⅝ wave elements for a few bands aligned together and mechanically connected for the desired band, performance like that of the single band monopole can be realized. Table 2 provides the lengths for ⅝ wave radiators for each band.

Trap Isolated ⅝ Wave Antennas

Just as we can use traps to isolate sections of a dipole, we can use traps to separate the ⅝ wave antennas from one another. My modeling indicates that by putting a 15 meter parallel tuned trap at the ⅝ point, about 26½ feet up, and shortening the total length to 36½ feet due to the trap's loading inductance on 20 meters, we will have an antenna that will act like a ⅝ wave on 10 and 20 meters, within a dB or less.

The one limitation of this approach is that each trap reduces the physical length of the ⅝ wave radiator for each lower frequency band as well as adds some loss. The result is that while adding a single trap is not a bad deal, trying for a five band antenna will result in reduced performance, particularly on 20 meters — the band we started out optimizing for.

Figure 2 shows my optimized directions for ⅝ wave trap monopoles for 15 and 20 meters, a good choice since, as shown in Table 1, 15 meters has the poorest performance from the 43 footer. I have also shown a two trap version for 20, 15 and 10 meters. I used the parameters of the commercially available Unadilla traps, the only manufacturer I'm aware of that sells traps.[4] Although homebrew traps could also be used, the dimensions will be optimum if you tune them with 31 pF of capacitance, the value used by the commercial traps.

Table 3
Modeled Performance of the Trapped ⅝ Wave Radiators

Version	Gain at Elevation Angle (dBi)		
20 and 15 Meter	**5°**	**10°**	**15°**
20	–3.9	–0.4	0.4
15	–3.5	0	0.9
20, 15 and 10 Meter	**5°**	**10°**	**15°**
20	–4.5	–1.0	–0.2
15	–4.4	–0.8	0.3
10	–3.6	0.0	1.2

Notes

[1]J. Hallas, W1ZR, "The 43 Foot Vertical Monopole — What's the Magic?" *QST*, Jun 2012, pp 30-31.

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

[3]R. Severns, N6LF, "An Experimental Look at Ground Systems for HF Verticals," *QST*, Mar 2010, pp 30-33.

[4]**www.unadilla.com**. While the website lists the price for (matched) pairs of traps, the manufacturer states that they will sell single traps per band at 50% of the pair price plus a 10% restocking charge to cover their costs of breaking up a prepackaged set.

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

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

New Products

DX Engineering Complete Coax Cable Prep Tool Kit

The DXE-UT-KIT2-D kit provides all seven of DX Engineering's cable tools and accessories together with a convenient carrying case. It features a rugged, lockable enclosure fitted with a precut foam insert location for each tool and spare connectors. The DXE-CNL-911 coaxial cable cutter provides a flush cut to start cable preparation. Cable stripping tools DXE-UT-808X and DXE-UT-8213 accommodate most popular varieties of cable, removing the outer sheath and preparing cable for insertion of the coaxial fittings. Premium quality cutting blades assure clean cuts and long life. DXE-170M precision shear side cutters can be used to remove any excess shield wire. The DXE-UT-80P and DXE-UT-80N connector tools aid in attaching the PL-259 and Type N coaxial connectors prior to soldering, providing a visual guide at the end to verify strands are fully into center pin. Included cable strippers prepare RG-8X, Belden 9258, LMR-240, RG-8, RG-213, 9913F7 and LMR-400 (not LMR-400UF). Spare blades for both cable prep tools are provided. Price: $174.95. For more information or to order, visit **www.dxengineering.com**.

Mark J. Wilson, K1RO, k1ro@arrl.org

Alinco DJ-G29T Dual Band Handheld Transceiver

Here's a combination you don't see every day — 1.25 meters and 33 cm.

Reviewed by Bob Allison, WB1GCM
ARRL Test Engineer
wb1gcm@arrl.org

In the April 2010 issue of *QST*, I reviewed the Alinco DJ-G7T triband handheld.[1] One of the reasons it captured my interest was that in addition to 2 meters and 70 cm, it included the 23 cm (1240 MHz) band — a region of spectrum unknown to me at that time. I appreciated the inclusion of 23 cm, especially popular in metropolitan areas where congestion on 2 meters and 70 cm can keep many hams in the listening mode.

Most VHF+ FM gear covers 2 meters and/or 70 cm. A few manufacturers produce 1.25 meter (222-225 MHz) transceivers or multiband units that give hams more room to spread out and enjoy a rag chew, run a local net or provide emergency communications. Until now, manufacturers have overlooked the 33 cm (902-928 MHz) amateur band. As is the case with 1.25 meters, the 33 cm band is not a worldwide amateur allocation and so the market for ham gear is more limited than the market for 2 meter or 70 cm gear. The Alinco DJ-G29T reviewed here is a rare radio indeed — a dual band handheld that covers the 1.25 meter and 33 cm bands. This dual band combination is a first, and to my knowledge it's the first amateur FM transceiver to include 33 cm.

In 1985, the FCC allocated 902 and 928 MHz to ISM (industrial, scientific and medical) devices on a primary basis and to the Amateur Service on a secondary basis. Amateurs could use the band as long as they accepted interference from primary devices and did not cause interference to primary users (see the accompanying sidebar, We Are Not Alone).

Without readily available equipment, amateurs got on 33 cm with converted FM gear designed for commercial services or with transverters for all modes. Fortunately, tech savvy hams have done a marvelous job of converting commercial repeaters to amateur use on this band.

[1]B. Allison, WB1GCM, "Alinco DJ-G7T Triband Handheld Transceiver," Product Review, *QST*, Apr 2010, pp 53-55.

Bottom Line

The Alinco DJ-G29T covers the 1.25 and 33 cm bands — a unique combination. With this radio, amateurs can access the 33 cm band without having to convert commercial service transceivers.

Out of the Box

In appearance, the DJ-G29T is a dead ringer to the DJ-G7T. It comes with a drop-in charger, a 1200 mAh Li-ion battery, a belt clip and a hand strap. Like the DJ-G7T, the DJ-G29T is rated to withstand submersion in 3 feet of water for 30 minutes, although we didn't test that and Alinco doesn't recommend doing it on purpose. This handheld, with its polycarbonate body, felt comfortable in my hands and offers a good balance of size and weight. The 1.5 × 0.75 inch green, backlit LCD is easy to read with display icons that are large and easy to understand.

The DJ-G29T sports a 6.5 inch flexible antenna with an SMA connector. Adjacent to the antenna is a jack for an optional speaker/mic that has a heavy duty screw-down cover and rubber gasket to keep out moisture when not in use. Concentric knobs, one set for each receiver (main and sub), are used mainly for tuning (inner knob) and volume control (outer knob). Along the left side of the case are the power button, monitor button (momentarily opens the squelch) and PTT switch. The right side has an external power jack that accepts 9 to 16 V dc.

I was pleased that the DJ-G29T's power switch protruded slightly, making the button easy to press. This is an improvement over the DJ-G7T power switch; I found that one slightly recessed and difficult to press. The power switch must be *pressed and held* for a solid two seconds before the unit powers up, so it's difficult to turn it on accidentally. The belt clip, consisting of a cloth strap and buckle, is inconvenient, at best. It flopped around a bit but could be adjusted to fit a wide belt. The strap has enough play to make wearing the radio possible for a person of my size.

Lab Testing

The DJ-G29T's sensitivity is right in the same range as other VHF/UHF handheld transceivers I've tested. This radio does not have a wideband receiver — coverage includes only 216 to 250 MHz and 902 to 928 MHz. There is no FM broadcast band, weather band or public service band reception to keep the user company when the amateur bands are quiet. I found no interaction between the main and sub receivers while both receivers were tuned to the same band. (I've observed interaction with some other dual banders.) Though capable of higher audio output, each receiver measured just slightly lower than 400 mW output at 10% THD. That's still plenty of power to drive a small 8 Ω speaker from

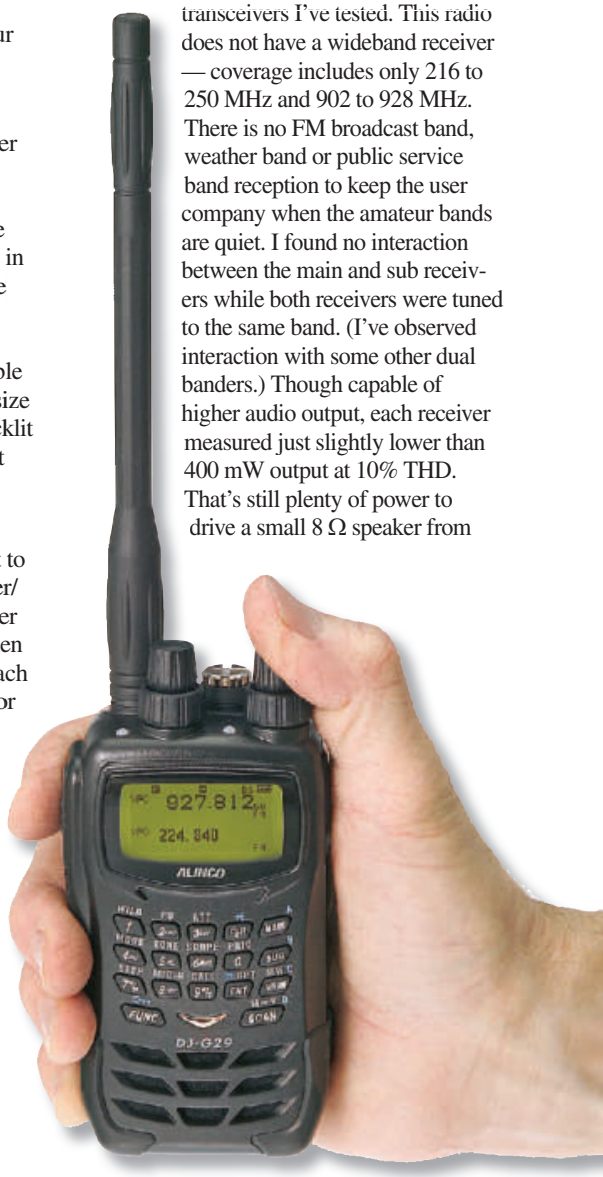


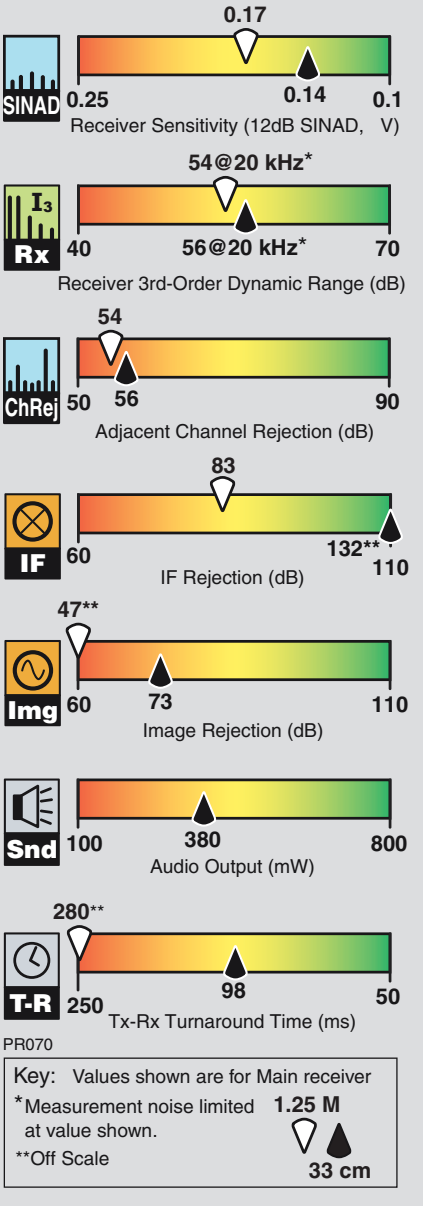
Table 1
Alinco DJ-G29T, serial number M000579

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: Receive, 216-249.995, 902-927.995 MHz; transmit, 222-224.995, 902-927.995 MHz.	Receive and transmit, as specified.
Mode of operation: FM.	As specified.
Power requirements: Receive, 200 mA (dual receive), 150 mA (single receive), 56 mA, (average dual receive), 50 mA (average, single receive); transmit, 1.7A with 7.4 V dc battery pack or 9-16 V dc, external power.†	Receive, with 8.3 V dc battery power (full charge): 325 mA dual receive (rx), 285 mA single rx (max vol, lights on); 127 mA, dual rx, 82 mA single rx (standby, lights off); 37-103 mA, dual rx, 44-71 mA single rx (battery save). Receive, with 13.8 V dc external power: 341 mA dual rx, 300 mA single rx (max vol, lights on). Transmit, battery power (high/med/low) at 8.3 V dc (full charge): 223 MHz, 1.21/0.56/0.41 A 902 MHz, 1.22/0.81/0.72 A Transmit with 13.8 V dc external power: 223 MHz, 1.24/0.64/0.48 A 902 MHz, 1.30/0.83/0.65 A
Receiver	**Receiver Dynamic Testing**
Sensitivity: Main band 0.18 µV (223 MHz), 0.22 µV (902 MHz); sub band, 0.18 µV (223 and 902 MHz).	For 12 dB SINAD: Main rx, 0.17 µV (223 MHz), 0.14 µV (902 MHz); Sub rx, 0.18 µV (223 MHz), 0.14 µV (902 MHz).
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 223 MHz, 54 dB*; 902 MHz, 56 dB*,**. 10 MHz offset: 223 MHz, 66 dB; 915 MHz, 65 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	223 MHz, 77 dB; 902 MHz, 80 dB.**
Adjacent-channel rejection: Not specified.	20 kHz offset: 223 MHz, 54 dB; 902 MHz, 56 dB.**
Spurious response: Not specified.	IF rejection, main rx: 223 MHz, 83 dB; 902 MHz, >132 dB. Sub rx: 223 MHz, 87 dB; 902 MHz, >134 dB. Image rejection, main rx: 223 MHz, 47 dB; 902 MHz), 73 dB. Sub rx: 223 MHz, 56 dB; 902 MHz, 59 dB.
Squelch sensitivity: Not specified.	At threshold, 223 MHz, 0.1 µV (min), 0.4 µV (max); 902 MHz, 0.1 µV (min), 0.36 µV (max).**
Audio output: At 10% THD, 400 mW into 8 Ω load (external speaker).	380 mW at 10% THD into 8 Ω (external speaker); THD at 1 V RMS, 1.0%
Transmitter	**Transmitter Dynamic Testing**
Power output: External dc power, 223 MHz, 5//1/0.3 W; 902 MHz, 2.5/1/0.3 W (hi/med/low). Battery power (EBP-73), 223 MHz 5/0.8/0.3 W, 902 MHz, 2.5/0.8/0.3 W (hi/med/low).	Battery power (8.3 V dc, hi/med/low): 223 MHz, 4.2/0.8/0.38 W; 902 MHz, 1.6/0.6/0.44 W. External power (13.8 V dc, hi/med/low): 223 MHz, 5.0/1.0/0.43 W, 902 MHz, 2.0/0.7/0.34 W.
Spurious signal and harmonic suppression: ≥60 dB.	Typically: 223 MHz, >70 dB, 902 MHz, 69 dB; meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal: 223 MHz, 70 ms (dual rx), 56 ms; 70 ms (single rx), 902 MHz, 152 ms (dual rx), 146 ms (single rx).
Receive-transmit turnaround time ("tx delay"): Not specified.	223 MHz, 560 ms (dual rx), 280 ms (single rx), 902 MHz, 294 ms (dual rx), 98 ms (single rx).

Size (height, width, depth): 4.5 × 2.4 × 1.2 inches (w/o protrusions); antenna, 6.5 inches. Weight: 9.6 ounces (with battery and antenna).
Price: DJ-G29T, $360; ERW-7 USB cable, $50 and EDS-10 adapter cable, $15.

†EBP-73 7.4 V, 1200 mAh Li-ion, wall adapter and EDC-173T charging stand supplied. Available options: extra EBP-73 battery, $55; EDH-35 battery case for 4 AA cells, $25; EDC-36 cigarette lighter dc power cable with filter, $25.
*Measurement was noise limited at the value indicated.
**Main and sub band had virtually the same performance

Key Measurements Summary



the speaker/microphone jack.

The transmitter easily passed the FCC requirements for spurious emission suppression. The receive-transmit turnaround time ("tx delay") is worth noting. On the 1.25 meter band, in dual receive mode, the turnaround time measured 560 ms — the user must pause a bit after pressing the PTT switch before speaking. It's about half that delay in single receive mode.

With a fully charged battery, the DJ-G29T did not reach its specified high power RF output level of 5 W (1.25 meters) and 2.5 W (33 cm). Our unit delivered 4.2 W and 1.6 W respectively. With a 13.8 V dc external supply

this improved to 5.0 and 2.0 W.

Alinco offers the EDH-35 AA cell battery case (nonrechargeable batteries only), which operates the transceiver with a specified RF output of 2 W and 1.5 W for 1.25 meters and 33 cm respectively.

Setting it Up

Before starting out, it's always a good idea to read the manual first. After doing so, you may wonder why I suggested it in this case. At times I had to read and re-read the instructions to understand a function. Patience and practice is needed to comprehend the instructions. After flipping through the manual several times, the glue in the binding let go and pages detached. The US distributor kindly sent me a PDF version.

When first attempting to program the transceiver manually in the VFO mode, I kept getting a TX DISABLED error message on transmit after dialing in a 1.25 meter repeater pair. I soon discovered that the factory default setting for the repeater offset is –5.000 MHz! [Alinco is now aware of this and plans to correct it in future releases. — *Ed.*] Once I adjusted it to the ±1.6 MHz offset standard on 1.25 meters I was in business. I found it easiest to program repeater pairs with the AUTO repeater shift off.

There are more than enough memory channels in the DJ-G29T — 500 of them, plus one call channel per band, 50 programmed scan pairs, 100 dual memory channels, 100 priority channels and more. While many of us wonder how we will ever use that many memory channels, in California alone the *ARRL Repeater Directory* lists more than 5 pages of 1.25 meter repeaters and a couple pages of 33 cm machines.

Although we ordered the optional ERW-7 PC interface cable, Alinco's free *Windows* programming software was not yet available and we weren't able to try this feature. Alinco indicated that the software should be available for download from their website by the time this review is published. Another option is third party software for the DJ-G29T available from RT Systems (**www.rtsystemsinc.com**).

On the Air

Audio quality out of the fairly large 1¼ inch internal speaker was good. Transmitted audio quality reports on 1.25 meters were good as well. Microphone gain is adjustable by pressing FUNCTION and then MIC and selecting one of four levels.

The squelch control for each receiver is not obvious, but is easily adjusted by pressing down on the main or sub receiver tuning knob. The squelch range of 0.1 µV to 0.4 µV (–127 to –115 dBm) was usable, but a bit narrow. I would prefer to see the squelch open at 1 µV when it is set to maximum. The DJ-G29T has a four position attenuator with a maximum attenuation of 15 dB.

At my Coventry, Connecticut, home there are several 1.25 meter repeaters to work through, but there are no 33 cm repeaters nearby. So off I went on a field trip. Fellow Lab Engineer Mike Gruber, W1MG, and I delivered the ARRL's 1907 spark station to the *Titanic* Historical Society Museum in Indian

We Are Not Alone

Amateurs share some bands with other radio services. In the 70 cm band, for example, the Amateur Service is *secondary* to the *primary* Government Radiolocation (Radar) Service. In fact, radio amateurs are secondary users in most of our UHF and higher frequency bands. It is our responsibility to avoid causing interference to the primary users.

Most amateurs have seen the following FCC label on many consumer electronic devices, including radios and television sets:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15 of the FCC rules pertains to unlicensed devices capable of generating RF above 9 kHz. These rules protect licensed radio services, including Amateur Radio, from harmful interference. If and when harmful interference occurs, the burden falls on the operator of the Part 15 device to correct the problem, or (upon notification by a Commission representative) cease using the device until it is corrected. Harmful interference in this case, as defined by the FCC, is any emission, radiation or induction that seriously degrades, obstructs or repeatedly interrupts a radiocommunication service. It is also important to note that these rules do not protect a Part 15 device from interference caused by a licensed radio service.

While the vast majority of home consumer electronic devices are Part 15, there are a few exceptions. Most noteworthy are Industrial, Scientific and Medical (ISM) devices that operate under Part 18 of the FCC rules. These are consumer devices that convert RF energy directly into some other form of energy, such as heat, light or ultrasonic sound. Some common household Part 18 devices include microwave ovens, electronic fluorescent light ballasts, CFLs and ultrasonic jewelry cleaners. Part 18 devices are also prohibited from using the RF for purposes of communications or transmitting data.

Part 18 and the 902 MHz Amateur Band

Part 18 specifies a number of bands for ISM devices, in some cases overlapping amateur spectrum. The entire segment from 902 to 928 MHz is both an amateur and ISM band. The Amateur Service is not protected from ISM devices operating in this or any other ISM band. From Part 97: *§97.303(e) Amateur stations receiving in the 33 cm band, the 2400-2450 MHz segment, the 5.725-5.875 GHz segment, the 1.2 cm band, the 2.5 mm band, or the 244-246 GHz segment must accept interference from industrial, scientific, and medical (ISM) equipment.*

As previously noted, Part 18 devices are unconditionally prohibited from using RF for purposes of communication or transmitting data. However, Part 15 devices can legally operate at higher power levels in an ISM band. They can also use RF for purposes of communication. Unlike devices operating under Part 18 however, there is one important distinction. The Amateur Service *is* protected from interference caused by Part 15 devices.

Additional Considerations

Additional restrictions apply in some areas of the country when using the 33 cm band:

- In parts of Colorado and Wyoming amateurs may not transmit in certain portions of the band.
- Amateurs in some areas of Texas and New Mexico are prohibited from using this band.
- Hams living within 150 miles of White Sands Missile Range are limited to 150 W PEP.

Amateurs in these areas are responsible for knowing the boundaries of the restricted areas and observing all applicable rules. See the latest edition of the *ARRL Repeater Directory* for more information and boundary details.† — *Mike Gruber, W1MG, ARRL Laboratory Engineer*

†*The ARRL Repeater Directory,* 2012-2013 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL in either desktop-sized edition, order no. 5485, or pocket-sized edition, order no. 5347. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

Orchard, Massachusetts (W1MGY) for the 100th anniversary of the *Titanic's* sinking. While there and in nearby Springfield I tried a couple of 33 cm repeaters. Although I could access them, I wasn't able to strike up a QSO. Wishing to try 33 cm again, Senior Lab Engineer, Zack Lau, W1VT, loaned me his homebrew transverter. With it and a 2 meter handheld I was to confirm operation and audio quality (good) in a local simplex QSO with W1MG.

The 33 cm band has one advantage of propagation over the lower frequencies: At UHF and microwaves, metal objects such as buildings or water towers are large enough to make efficient reflectors. During my years in television broadcasting, I had some challenges while trying to get a video signal from our "live cam" 2.3 GHz transmitter to the receiver location atop Rattlesnake Mountain. Quite often I could not hit the microwave receiver directly, but I could get a usable signal by aiming the transmit antenna at a tall building or other large object.

I noticed the same effect on 902 MHz while I was in downtown Springfield, Massachusetts. While surrounded by tall buildings, I was still able to access a 33 cm repeater in an adjacent town. I can thus see the 33 cm band as useful in an urban setting.

In Conclusion

It's nice to see Alinco take a chance and produce a handheld for something other than the mainstream bands. The DJ-G29T has features similar to the DJ-G7T and other popular handheld transceivers and works well. It should be of interest to anyone with 1.25 meter or 33 cm activity in their area. Used with the DJ-G7T, access to all five ham bands from 2 meters to 23 cm can be worn on one belt.

US distributor: GRE America, 425 Harbor Blvd, Suite B, Belmont, CA 94002; tel 650-591-1400, fax 650-591-2001; **www.greamerica.com** or **www.alinco.com**.

See your July edition of digital *QST* for a video overview of the Alinco DJ-G29T.

WaveNode WN-2d Station Monitoring System

Reviewed by Joel R. Hallas, W1ZR
QST Technical Editor
w1zr@arrl.org

The WN-2d is the third iteration of WaveNode's Station Monitoring System that we've reviewed in *QST*.[2,3] As you might expect, each builds on the earlier versions with the addition of new features or capabilities. All share the architecture of a single processing unit supporting up to four inline forward and reflected power sensors. While the WN-1 provided all processed data via software running on a PC, the WN-2, added a monochrome LCD screen that showed peak and average power and SWR along with an output power bargraph. The WN-2 used the same software suite as the WN-1, but now the unit could function without a PC.

The WN-2d Standalone Display

The WN-2d carries the independence theme a bit further with an enhanced display that adds two rows of brightly colored tuning bars extending across the width of the control unit above an LCD screen similar to the one on the earlier WN-2.

The top display (see lead photo) provides a relative forward power indication over 16 green segments with full scale shown as 100%. Left to its own devices, 100% corresponds to 2000 W, changeable only by using the PC software. The next row is 16 segments that show SWR ranging from 1:1 to 10:1. Segments below 2:1 are green, while above they are bright red. The LCD has a row of legends followed by an indication of forward peak and average power, SWR and an indicator of which of up to four sensors is being monitored. Each sensor is monitored every 50 ms, so results can usually follow a quick CW dit, or two.

Pushing the SELECT button cycles the display through each of up to four sensors. Each sensor can monitor different parts of a single RF chain (transceiver and amplifier output, for example) or different radio systems operating on different antennas or different bands. For this review, we used two sensors — the HF-1 (0-2 kW, 1.8-60 MHz) and UHF-1 (140-460 MHz) shown in Figure 1. The website lists conflicting power ratings for the UHF-1, but WaveNode confirmed that this sensor is rated for 300 W continuous at 144 MHz and 150 W at 222 and 440 MHz. Other sensors are rated for various power levels and frequency ranges from HF through 1.3 GHz, including 2 kW single band sensors for 2 meters and 70 cm. See the WaveNode website for details.

The SELECT button also goes through two positions in which each display shows the values of two of the four auxiliary (AUX) inputs. The AUX inputs can monitor any function that can output a dc voltage between

Bottom Line

The WaveNode WN-2d provides useful accuracy and a lot of flexibility in terms of what you can measure and how you can display it. I found it a useful tool and a good adjunct to equipment in my station.

[2]J. Hallas, W1ZR, "WaveNode WN-1 Station Monitoring System," Product Review, *QST*, Oct 2004, pp 71-74. Product Reviews mentioned here are available to ARRL members online at **www.arrl.org/product-review**.
[3]J. Hallas, W1ZR, "WaveNode WN-2 Station Monitoring System," Product Review, *QST*, Aug 2007, pp 71-73.

0 and 20 V. This could be used to monitor your dc power system, for example, or could be scaled through a divider from some higher voltage signal to monitor anything in the shack that can be represented by a voltage. The AUX inputs are accessible via a rear panel (see Figure 2) ribbon cable connection, along with four LOGIC outputs (more later).

In addition, the SWR is monitored to alarm at a default level of 3:1. Upon exceeding that level, a relay is set and held. Both normally open and closed relay contacts are available on a rear panel connector. These contacts can be used to keep a power amplifier from keying if the SWR is too high, for example. The front panel RESET button restores normal operation.

The rear panel also has jacks for an optional interface for one or two Yaesu DXA series antenna rotators. Antenna position indication and rotator control are handled from a screen in the WaveNode software.

Figure 1 — The two remote sensors we tested. Up to four can be monitored simultaneously. The HF-1 (left) covers 1.8 to 60 MHz at up to 2 kW peak and is equipped with UHF connectors. The UHF-1 (right) covers 140 to 460 MHz (see text) and has Type-N connectors. Connector type may be specified at time of order.

Figure 2 — Rear panel of the WaveNode WN-2d stand-alone unit. Up to four power sensors can be plugged in at once, along with auxiliary inputs and logic outputs.

The WN-2d PC Software

While the standalone version is certainly a useful device, the power and versatility of the package really comes through after setting up the supplied *Windows* software on a PC. The software installs easily from the supplied CD. The standalone unit connects to the PC via a standard USB cable. The one supplied included ferrite cores at each end for RFI suppression, but it was too short for my installation. I used a standard USB printer cable without RFI suppression and had no problems although they could be moved to the longer cable if needed. There are two USB driver versions included — one for *Windows 2000*, *Windows XP* and *Windows Vista*, and the other for *Windows 7*. As noted in the manual, the correct driver should be specified at the time of installation.

The TOP SCREEN

The TOP SCREEN (see Figure 3) comes up as soon as the software starts. It provides all the basic real time (as opposed to statistically collected) information from up to four sensors and the auxiliary inputs, AUX 1 to AUX 4. Power and SWR data are displayed graphically as well as numerically, while the four aux levels are shown numerically. The full scale value of each of the sensor power graphs on the top screen can be cycled through 20 W, 200 W, 2000 W, USER or AUTO. The AUTO selection picks among the 20 W, 200 W, 2000 W full scale range depending on the power detected. The full scale value of each sensor's power graphic can be set using the CONFIGURATION menu and that becomes the USER setting.

The TOP SCREEN is used to set the SWR alarm threshold (see upper right), as well as to declare which of the four sensors will be monitored for the SWR alarm. One sensor choice is NO, useful for taking untuned antenna data, for example. The length of time the SWR must exceed the threshold before triggering an alarm is also selectable on this screen, presumably in seconds. Note that after making a change, you must click on the number window so it changes back to blue before the change takes effect.

Setting the Values

A wide range of options can be selected using the CONFIGURATION FILE EDITOR menu (see Figure 4), found under the FILE tab on the TOP SCREEN. Here you can set the display to show your call letters (who can resist that, even though my call letters are one on the few things I can still always remember), set the full scale of each of the sensor bars, set the

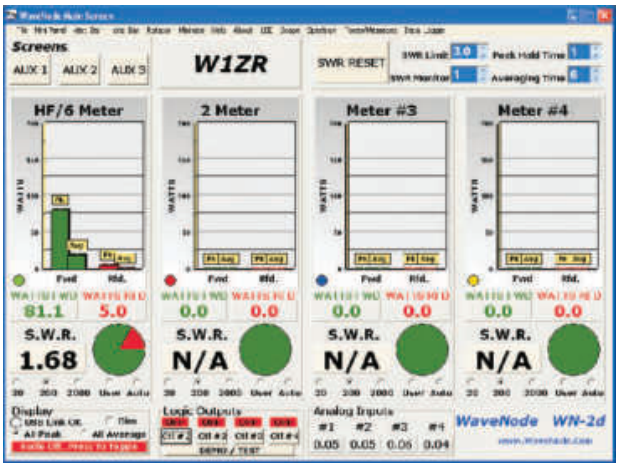


Figure 3 — This is the TOP SCREEN that comes up as soon as the software starts. It provides numerical and graphical indication of both peak and average forward and reflected power for all four sensor inputs. In addition, it provides the data for the four AUX inputs and the switches for the logic outputs. The SWR threshold is set in the upper right.

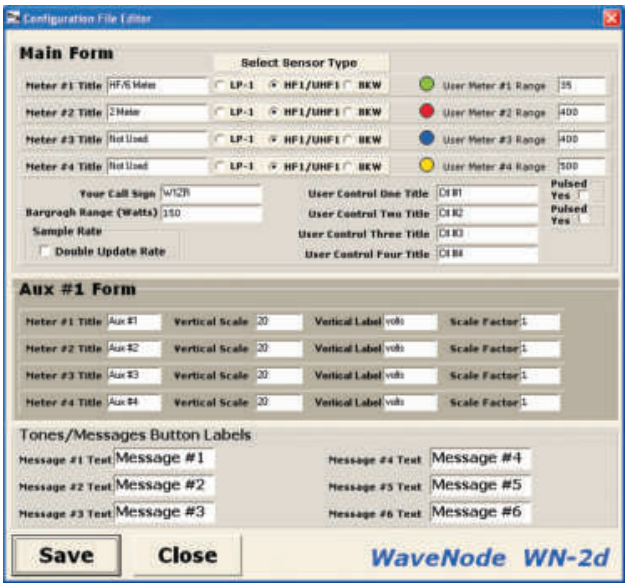


Figure 4 — The CONFIGURATION FILE EDITOR menu, found under the FILE tab on the TOP SCREEN. Here you can set the display to show your call letters, and set the scale ranges for each of the graphs, including the POWER bar on the stand-alone console.

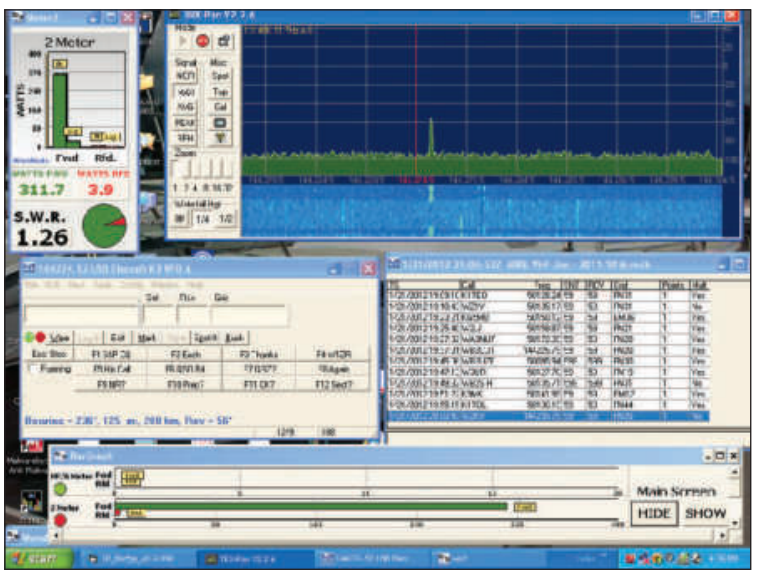


Figure 5 — The W1ZR computer desktop during the January ARRL VHF Contest. In addition to the two logging screens from the *N1MM Contest Logger* and the *TRXPAN* panadapter screen, I have a small *WaveNode* single panel screen in the upper left, and two of the four bargraphs from the horizontal display along the bottom.

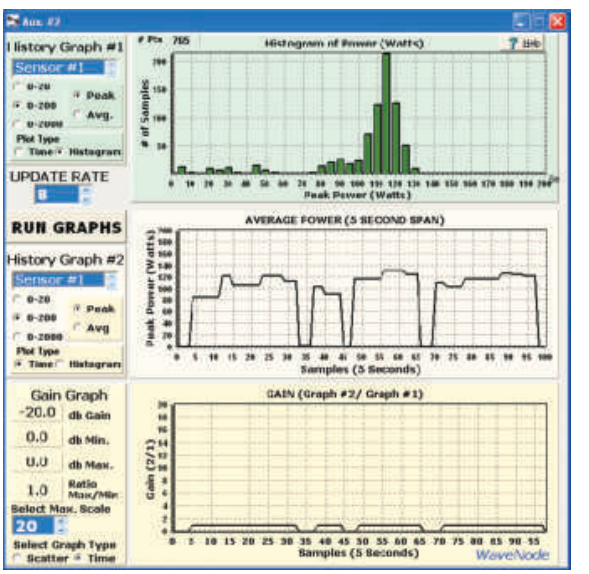


Figure 6 — The display provided after clicking AUX 2 offers some interesting data.

power level that will be 100% on the stand-alone display and set any scale factors for the aux inputs.

Cutting Back on Real Estate

While the full size TOP SCREEN is useful for getting used to the program features or for making specific measurements, it is probably more than you want open during other operations while you have logging, rig control or DX spotting software windows open on your PC desktop. *WaveNode* has provided a number of smaller screens that can be called upon to allow you to keep track of your power readings without taking up a lot of screen space.

If you click on the panel associated with a particular sensor on the TOP SCREEN, just that panel becomes available and it can be moved to a convenient location on your desktop. Want it smaller? Just click again and it gets smaller. In addition, there are a number of special compact screens — a numerical summary and horizontal or vertical bar graphs showing each power measurement. Figure 5 shows my computer desktop during the January 2012 ARRL VHF Sweepstakes. In addition to the two logging screens from the *N1MM Contest Logger* and the *TRXPAN* panadapter screen showing the output of the Telepost LP-PAN panadapter, I have a small *WaveNode* single panel screen

Table 2
WaveNode WN-2d Station Monitoring System

Manufacturer's Specifications

Frequency range	1.8-60 MHz, 140-460 MHz with HF-1 and UHF-1 sensors; other frequency ranges available.
Power range	0-2000 W (HF-1 sensor, s/n 101098); 144 MHz, 0-300 W, 222 and 440 MHz, 150 W (UHF-1 sensor, s/n 100761). Other power levels available.
Accuracy	±5% from 5-2000 W; ±1 W below 5 W input.
Power requirement	11-16 V dc (wall supply provided).
Current consumption	127 mA (idle, no measurement), 290 mA (maximum) at 13.8 V dc.
PEP measurement	Active.

Measured in ARRL Lab

Actual Forward Power			**Indicated Power**			
Frequency (MHz)	*2*	*14*	*28*	*50*	*144*	*432*
5 W CW	4.1	4.7	4.8	5.2	4.6	5.8
5 W 50%	4.3	4.8	5.0	5.2	4.6	5.8
100 W CW	93	103	108	116	100	–
50 W CW	–	–	–	–	–	58
100 W 50%	95	107	112	120	100	–
50 W 50%	–	–	–	–	–	58
100 W Two-Tone	–	102	–	–	–	–
300 W CW	–	–	–	–	278	–
300 W 50%	–	–	–	–	278	–
1 kW CW	940	1001	–	1150	–	–
700 W CW	–	–	770	–	–	–
1 kW 50%	1010	1010	1000	1179	–	–
1 kW Two-Tone	–	1040	–	–	–	–
Actual SWR			**Indicated SWR**			
1:1 SWR	1.0:1	1.0:1	1.0:1	1.1:1	1.1:1	1.1:1
2:1 SWR	2.0:1	2.0:1	2.1:1	2.1:1	2.1:1	2.1:1
Insertion loss (dB)	<0.1	<0.1	<0.1	<0.1	0.1	0.4

Price: WN-2d with one sensor, USB cable and wall power supply: $450.

in the upper left, and two of the four bar-graphs from the horizontal display along the bottom.[4] The vertical display is similar.

Computed and Statistical Data Displays

In addition to the real time data displayed on the TOP SCREEN and its derivatives, there are quite a few screens that can be used to make statistical and other calculations based on the accumulated data.

In the upper left of the TOP SCREEN display are buttons that get you to the AUX 1, AUX2 and AUX3 screens. Each of these gets you to a display of processed data that you may find useful. The AUX 1 button gets you to a screen that provides a running display of transmitted energy in watt-hours. This may be important for power management at a broadcast station, but I'm not sure it will be of particular interest to amateurs.

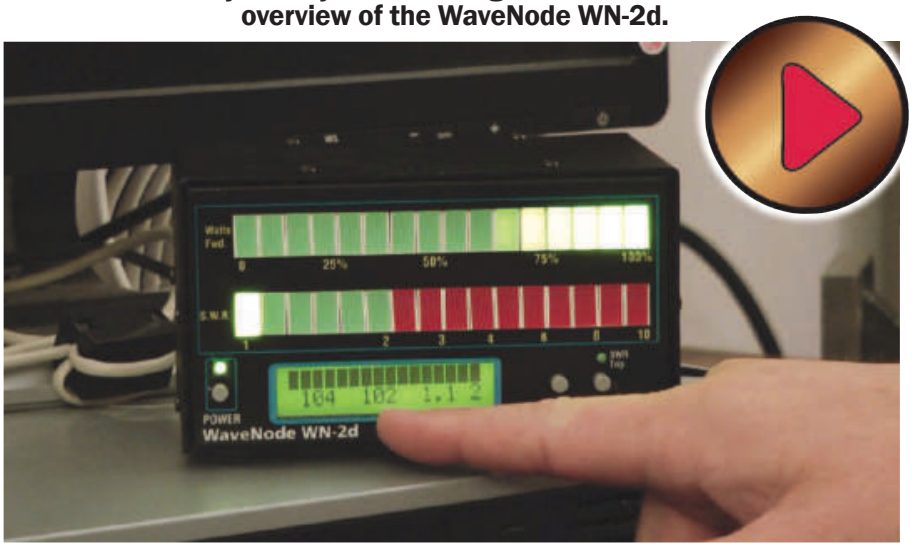
The AUX 2 screen, on the other hand, provides a number of useful outputs. Figure 6 shows this screen with its three graphs. The first provides a histogram showing the number of samples taken of peak power (average power can also be selected) during, for example, a speech transmission. This can be helpful in determining the effect of speech compression. The second graph shows a similar plot but of average power readings over a 5 second span. A comparison of the two shows why the usual average power meter doesn't tell the story of the output of an SSB transmitter. The third screen can show the gain of an amplifier in the system, but requires two sensors in the same frequency range, which we didn't have. If an amplifier is linear, the samples should all result in the same gain. Any compression, due to overdrive perhaps, will result in samples showing lower gain.

The AUX 3 screen makes it possible to generate a semi-automatic plot of the SWR as seen by one or more sensors. If you select a frequency range and the increment, the *WaveNode* software will prompt you with a frequency. You manually set your transmitter there (listening first, and making sure it is in a range you are allowed to transmit on, of course) hit the key and the SWR is recorded. Then it gives you the next prompt. Note that this shows the results from a single sensor. If you had the sensors on the input and output of your linear, the single screen could show plots of both the input SWR of your amplifier over the band as well as the SWR response of your antenna system, for example.

There are other screens available from the top bar of the TOP SCREEN. One is a time domain oscilloscope-like display of the RF envelope, while another displays the actual spectrum of the detected modulating frequencies.

Manufacturer: WaveNode, PO Box 111404, Campbell, CA 95011; tel 408-933-8059; **www.wavenode.com**.

See your July edition of digital *QST* for a video overview of the WaveNode WN-2d.



[4]J. Hallas, W1ZR, "TelePost LP-PAN Software Defined IQ Panadapter," Product Review, *QST*, Feb 2009, pp 44-47.

Larry D. Wolfgang, WR1B, tc@arrl.org

A Fair Comparison Between Solar Power and Electric Utilities

Gimme an X, Gimme an O (Dec 2010)

One of my astute readers, Richard Wheeler, AI6RW, caught an error in my December, 2010 *QST* article. Figure B in the "Switchable Sense HF Receiving Antenna" sidebar shows an "X-O" switching scheme. I had inadvertently "cross-bred" a couple of different methods, resulting in a moderately egregious error. The two 2:1 splitter/combiner blocks should be the PIN switches (at the top), and there should only be one 2:1 mixer at the bottom.

The PIN diode switches are a bit pricey, and can be replaced with standard coaxial relays, but I like the PIN diode switches.

Figure 1 is my revised schematic for the X-O Switch. The Mini-Circuits PIN diode switches are a bit pricey for a lot of hams. These can be replaced with standard coaxial relays, but I like the PIN diode switches because you can do really fast X-O switching, which is necessary for some experiments. The 2:1 combiner can be any of a number of available combiners, either from Mini-Circuits or other suppliers. The coax lines between the Ts and the antennas, and between the switches, should be as close to the same length as possible.

Thanks to everyone who has shown interest in my X-O articles! The feedback has been most gratifying. — *73, Eric Nichols, KL7AJ, PO Box 56235, North Pole, AK 99705*; **kl7aj@arrl.net**

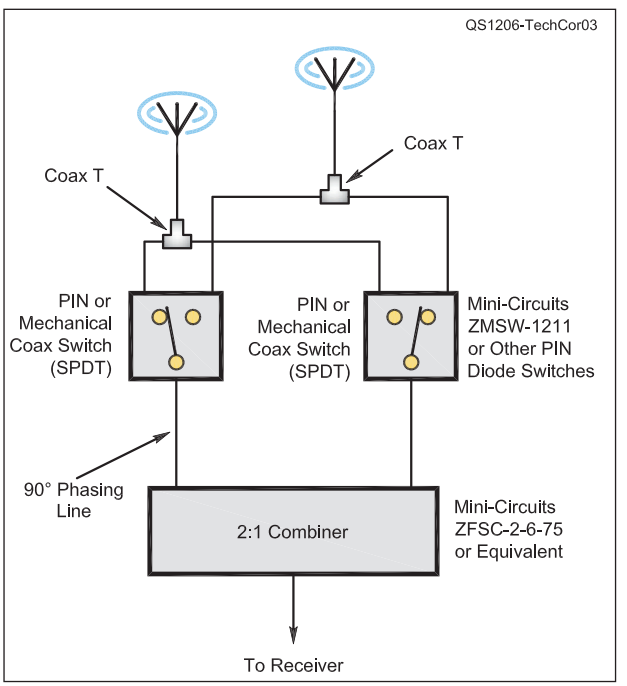


Figure 1 — This is the corrected schematic diagram for the simple X-O switch that goes with the "Switchable Sense HF Receiving Antenna" sidebar for Eric Nichols' December 2010 *QST* article, "Gimme an X, Gimme an O."

Solar Power (Oct 2011)

In his editorial, "It Seems to Us — Power," in the Oct 2011 issue of *QST*, Dave Sumner, K1ZZ, made reference to a May *QST* article where the claim was made that "solar power is not yet an economic way to reduce your utility bill." While that may have been true 2 or 3 years ago, 2011 is the year when solar power did become cheaper than most utilities in most states. Right now, in Maryland, you can have a grid-tied solar system installed on your roof with a no-money-down lease, and pay (slightly) less per month for electricity than you currently pay to the utility.

If, instead of leasing the array, you purchase it and take the nearly 50% incentives available in many states, your amortized cost for electricity per month can be less than half of what you currently pay the utility per kilowatt hour (and it won't ever go up). People think the up-front cost of solar is high, but they have not considered how much they are going to spend just for electricity in the next 10 years. They should multiply their utility bill times 12 months and then multiply that times 10 years. Then they will see that they will pay far more than the purchase of a solar system. Utility bills will only go up. Locking in your solar grid-tie power forever at half of today's rate, while taking advantage of the nearly 50% incentives still in effect is a great investment.

For example, I have in hand a written estimate from Solar-City for a 9 kW array. I can get it for no money down, and pay around 13 cents per kWh for electricity for 20 years compared to today's 14 cent rate, which I can expect to increase to over 30 cents per kWh by then.

The savings are even more dramatic, however, if I pay the full lease up front for $14,000. Then I pay nothing per month for 20 years of power, which is equivalent to only 6 cents per kWh for 20 years compared to the utility's 14 cents today and increasing by a few percent every year to 30 cents per kWh.

In many states now it cannot be stated that solar costs more than the utility. It costs less. It is like renting or buying a house. Sure, rent is usually cheaper, but in the end you have nothing to show for it and pay more in the long run. With purchase, you end up with a house, and you own the equity, which will continue to grow.

Oh, with a solar lease, the idea of not owning the array at the end of 20 years is of little concern. With prices falling by a factor of 5 every decade, the cost of solar will be so cheap by then that the leasing company would be better off leaving it on your roof than paying wages to have it removed. Yet, it will still be producing 80% of what it does today. — *73, Bob Bruninga, WB4APR, 115 Old Farm Ct, Glen Burnie, MD 21060;* **wb4apr@arrl.net**

Convenient Large Battery Over-Current Protection and Simple Terminal Cover

Many of us use stand-alone, high current batteries as a standby power source in the shack or for field operations. For safety reasons it is important to protect a high current battery from overheating and possibly exploding if its terminals become

Figure 2 — An automotive-style circuit breaker can be mounted directly to the positive battery terminal, eliminating the need for a fuse at the connection point. A plastic container bolted to the breaker provides a convenient way to protect the terminal, breaker and wiring from a tool or metal object falling against the terminal and causing a short circuit.

Figure 3 — Here you can see the plastic container rotated into position to cover the battery terminal, protecting it from an accidental short circuit.

If a circuit breaker is used in place of a fuse, then no replacement fuse need be found and no tools are needed.

shorted. A common solution includes an appropriately sized fuse placed as close as practical to the positive terminal of the battery and some means of insulating the terminal and its connections. If the fuse opens due to a fault, then a suitable replacement fuse must be located, tools may be needed and access to the battery terminal may not be convenient. If a circuit breaker is used in place of a fuse, then no replacement fuse need be found and no tools are needed. If tripped, the circuit breaker can be cooling while you disconnect power, look for the reason for the short and determine if damage occurred to wires, insulation or other circuit components. So how can we easily connect an appropriate circuit breaker to the battery?

A flat battery terminal with a hole for a bolt to pass through (also called a "flag," "L-blade" or "nut and bolt" terminal) allows a practical method of adding a common, stud mount automotive circuit breaker by bolting it directly to the positive battery terminal. An example of such a common breaker is the Cooper Bussman CB123-HB Type, available in current ratings from 10 to 50 A. I drilled a new hole in the positive flat terminal on my battery to accommodate the separation of the circuit breaker studs. To make the power connection to the load, a spade terminal can be bolted easily to the other stud terminal on the circuit breaker. See Figure 2, which also shows a wire and Anderson Powerpole connector from the breaker load stud.

A protective, insulating cover for the battery terminal can be made from a common clear plastic food storage container. I used a 2.3 oz (68 ml) container that was sold ten to a bag at the local dollar store. The insulated, lengthwise bracket on the breaker allows a cover to be bolted to it and over the entire breaker and battery terminal. By mounting the container to the circuit breaker with one bolt as shown in Figure 2, the container is hinged and can easily flip up and down. See Figure 3 for the closed position. The extra hole in the front of the plastic is from a poor first guess as to where to drill the bolt hole, but now serves as easy access for a meter probe to measure battery voltage. — *73 Doug Hart, AA3S, 6289 Beechwood Dr, Columbia, MD 21046;* **aa3s@arrl.net**

How High Should Your HF Vertical Be? — Part 2, Ten Meters (Nov 2011)

The *QST* article "How High Should Your HF Vertical Be?" did a great job for answering the question for 40 meters.[1] The sunspots are finally back, however, and 10 meters is *hot*! The 10 meter band is at the edge of VHF, and radio waves work slightly differently up there.

First of all, *ground mounted* verticals "radiate equally *poorly* in all directions."[2] This is because ground losses, ground proximity effects, and low angle ground reflection factors all add up to inhibit 10 meter radiation. The main exception is that vertical antennas at low elevations work very well over salt water.

Secondly, give or take a few dB, *elevated* 10 meter verticals radiate *as well as horizon-*

[1]Joel Hallas, W1ZR, "How High Should Your HF Vertical Be?" *QST*, Nov 2011, p 51.

Give or take a few dB, *elevated* 10 meter verticals radiate *as well as horizontal antennas* at the same height. That means that you should try to mount your vertical as high as you can.

tal antennas at the same height. That means that you should try to mount your vertical as high as you can. A 100 foot high antenna (vertical or horizontal) is optimum for the 5° radiation angle typical of 10 meter DX. (A 200 foot high antenna would be optimum for a 2.5° angle, but this would have a null at 5°.) Since antennas at half these heights are only down 3 dB, 100 foot towers make sense for the best equipped stations and 50 foot towers are not far behind. My more modest 32 foot vertical dipole (measured at the current maximum about 8 feet down from the top) is a decent DX antenna.

There is an interesting exception to the optimum height question. Namely, the radiation from an elevated vertical antenna overlooking a freshwater pond will be almost independent of antenna height. This is because fresh water has a Brewster angle of 6.3°, which is very close to typical 10 meter DX radiation angles. There is no vertically polarized ground reflection when the radiation angle equals the Brewster angle. (See Note 2 for information about the Brewster angle.)

If you want to investigate further, I suggest using a small angle approximation to the Fresnel vertical reflection factor.

[2]C. J. Michaels, W7XC, "Some Reflections On Vertical Antennas," *QST*, Jul 1987, pp 15-18.

Fresnel Reflection Factor (for vertical polarization):

$$R = \frac{k \sin A - \left(k - \cos^2 A\right)^{1/2}}{k \sin A + \left(k - \cos^2 A\right)^{1/2}}$$

where k is the dielectric constant of the ground and A is the radiation angle.

At small angles, cos A ≈ 1.
Thus:

$$R \approx \frac{\sin A - \left(\frac{(k-1)}{k^2}\right)^{1/2}}{\sin A + \left(\frac{(k-1)}{k^2}\right)^{1/2}}$$

At large values of k, the $((k - 1) / k^2)^{1/2}$ term becomes approximately $(1 / k)^{1/2}$. The Brewster angle B = arctan $(1 / k)^{1/2}$, and at small angles, the arctan of an angle is approximately equal to that angle, measured in radians. Thus:

$((k - 1) / k^2)^{1/2} \approx B$.

Furthermore, at small angles, sin A ≈ A, if A is measured in radians.

Using the approximations cos A ≈ 1, sin A ≈ A, and $((k - 1) / k^2)^{1/2} \approx B$, the Fresnel vertical reflection factor simplifies to:

$R \approx (A - B) / (A + B)$

where R is the vertically polarized ground reflection factor, A is the radiation angle, and B is the Brewster angle.

This approximation works well on 10 meters because the A and B angles are 30° or less. Furthermore, the ground conductivity can be neglected and the dielectric constant becomes the dominant factor.

For a typical 5° radiation angle and a 15° Brewster angle (characteristic of "average soil"), R = (5 – 15) / (5 + 15) = – 0.5. This means that at low antenna heights, the signal intensity will be (1 – 0.5 = 0.5), or –6 dB (referred to the same antenna in free space). As the antenna is raised, the extra path length causes a phase shift that reduces the signal cancellation and eventually enhances it. For a 5° radiation angle, complete enhancement occurs at 100 feet, where the gain becomes (1 + 0.5 = 1.5), or +3.5 dB. At approximately 40% of the optimum height, there is neither cancellation nor enhancement, and the gain becomes zero dB.

This tells me that an elevated antenna at a 5° radiation angle over average ground gains 6 dB as the antenna is raised 40 feet, or 0.15 dB per foot as the antenna is raised to modest heights. I got nearly the same dB per foot at 2.5°. When I used a 30° Brewster angle (typical of the city), however, there was a 0.3 dB per foot gain (for both 5° and 2.5° radiation angles). Therefore, raise those 10 meter verticals high! — *73, Lew Smith, N7KSB, 4176 N Soldier Trail, Tucson, AZ 85749;* **n7ksb@arrl.net**

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.

New Products

PicoKeyer Chip from HamGadgets for the RockMite Transceiver

The HamGadgets PicoKeyer-RM is a drop-in replacement keyer chip for the Small Wonder Labs RockMite and HiMite transceivers. All of the features of the stock keyer chip supplied with the transceiver are retained and new features are added, including two 100 character Morse code message memories. The user has the option of adding an analog speed control for the keyer with a minimum of additional parts. Several more advanced features are also provided, such as automatic numbering for contesting, adjustable weight, dot/dash paddle swapping and support for keying modes such as Ultimatic and semi-automatic "bug" operation. Embedded commands can be used within a stored message. Some of the functions include repeating words, changing the sending speed, allowing the operator to manually insert information such as a signal report, automatically repeating the message at regular intervals and chaining the two memories together. Price: $6.95. For additional information, see **www.hamgadgets.com**.

10 Meter Vertical Antenna from MFJ

The MFJ-1790 10 meter vertical antenna features a lightweight 11 foot radiator and two 6 foot radials made of aluminum. Weighing less than 3 pounds, it's designed for easy portable operation or for stealth operation in an antenna restricted neighborhood. An included mast bracket can be turned horizontal or vertical to attach to an existing mast or pole or to a balcony railing. The vertical fits masts 1.5 to 2 inches OD with the included U-bolts. It's rated to cover the entire 10 meter band (28.0 to 29.7 MHz) and handle 300 W PEP. Price: $69.95. For more information, to order, or for your nearest dealer, call 800-647-1800 or see **www.mfjenterprises.com.**

Strays

Have a *QST* Delivery Issue?

If your copy of *QST* does not arrive by the end of the month before the issue date, please contact the ARRL Circulation Department at **circulation@arrl.org**, tel 860-594-0200. Also contact them if your address changes or your copy of *QST* arrives in damaged condition.

Joel R. Hallas, W1ZR, w1zr@arrl.org

A Wedge that Brings Things Together

Q Walter, WB6JTJ, asks: My wife Pat is going to get her ham license. Once she gets her license, can she obtain her own EchoLink account and access it from my computer? Will she be able to use her own call sign?

A Yes, you can have two different hams using the same computer with their own call signs. Check in with the excellent EchoLink frequently asked questions (FAQ) at **www.echolink.org/faq_installation.htm**. Item #12 of the Echolink FAQ provides the following Q & A:

12. My spouse and I are both hams, and we want to share the computer on which EchoLink is installed. How do we switch back and forth between our two call signs? Should we install the software again?

There is no need to install EchoLink a second time. There are two different ways to share the program among two or more users:

1. Each time you want to switch call signs, start the program and choose SETUP from the TOOLS menu. Choose CHANGE CALLSIGN and enter the new call sign (and the password, if different).

2. Set up two different profiles, and switch between them using the PROFILES function on EchoLink's FILE menu. For more information about Profiles, see the online HELP.

Q Cory, WA3UVV, was admiring the 1928 vintage Vibroplex Lightning Bug in my office and told me that he had wondered for years what the strange plug on the attached cord was designed to connect to. "What does the mating socket look like?" he asked.

A The unusual plug is called a *wedge*, and bugs were generally supplied with a cord and wedge for many years. I remember that in the late '50s they were standard equipment, but appear to no longer be available from Vibroplex.

In the early days of telegraphy, the typical wire-line, railroad or shipboard telegraph station was equipped with a straight key, usually held to the desk by bolted down "legs." Operators who had mastered the use of a semi-automatic key (bug) generally owned their own, had it set up the way they liked it and brought it with them for their shift — hoping to avoid the dreaded "glass arm" syndrome.

Figure 1 — Close-up view of a Vibroplex wedge. Note that the two leaf spring contacts are separated by an insulator.

They would insert the wedge (see Figure 1) into the space between the contact strap and the base of the key and could then use the bug in parallel with the straight key without making changes to the station wiring, sometimes hidden below the desk.

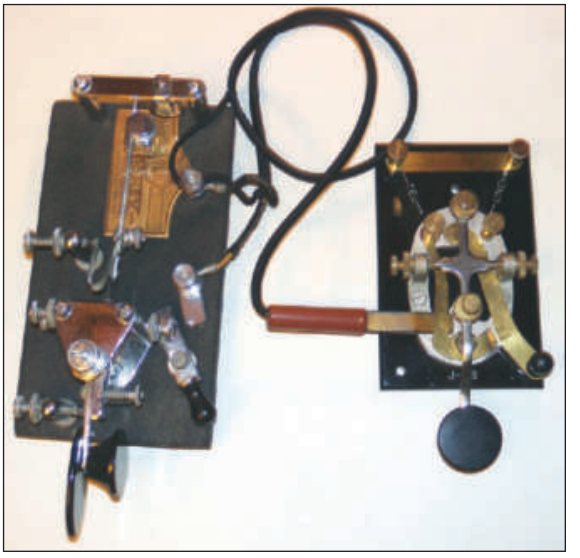


Figure 2 — A circa 1956 Vibroplex Lightning Bug attached to a WWII vintage J-38 straight key using the cord and wedge. Note that the rope made from the cotton covering is used to provide strain relief under the bug terminal.

Figure 2 shows a circa 1956 Lightning Bug from my station with an original cord and wedge. The wedge is inserted between the contact strap and base of a WWII-vintage J-38 straight key.

Q Art, K4FTO, reports that he is having trouble with his 30 foot base-loaded vertical made of #16 AWG wire with a capacitance hat on top. While using the appropriate loading inductances to resonate the antenna on the 160 and 80 meter bands, the lowest SWR he can get is 2.0 to 2.5:1. If he uses this vertical with no inductor and a series capacitor on 40 meters, the SWR at resonance is 1.1:1. He is compensating for the mismatch by using a tuner in the shack. He asks: Can you suggest a way to reduce the

Table 1
Modeled Impedance of 30 Foot Monopole with 8 Foot Diameter Top Hat

Frequency (MHz)	Resistive Part (Ω)	Reactive Part (Ω)	Coil Resistance (Ω)	SWR if Resonated	Mismatch Loss (dB)*
1.85	12.2	*j*1030	10	4.1:1	0.22
3.7	13.4	*j*370	3.7	3.7:1	0.39
7.15	57	–*j*166	N/A	1.14:1	0.00

*Loss in 100 feet of RG-213.

high SWR at resonance on the two lower frequency bands?

A What you are observing is exactly as expected. The impedance of a short vertical tuned with a loading coil is considerably less than 50 Ω (see Table 1). The SWR takes into account the resistance of the loading coil under the assumption that the Q is 100. Your lower measured SWR is likely due to a combination of loss in the coax, if you are measuring at the station end, and the effect of additional ground loss resistance.

On these low bands, with usual lengths of good coax, the coax loss is still quite reasonable, so if your tuner at the radio can deal with the mismatch, it's not a bad situation to leave as is.

If you need to have a close match, perhaps the easiest way is to put the end of your loading coil to ground (see Figure 3) and then connect your coax between ground and a tap on the coil. As you move the tap up the coil, the Z should get higher. You may need to tweak the coil turns a bit.

Another way is to have a low SWR on the coax is to have a remote autotuner at the antenna base. This may be able to also serve the loading coil function, depending on the tuning range of the tuner. By having your tuner at the antenna base, you will eliminate any mismatch loss from the coax, but as shown in the table, it's probably not worth the trouble for any reasonable length of good coax.

Q Bob, N9XAW, asks: Older tube transmitters had GRID, PLATE and TUNE controls. Newer technology eliminated the need for them. Now we push TUNE and it is all done for us. With the older radios is there a need for a separate antenna tuner or did the TUNE control do that for us? I remember we built tuners to help with the receiver but I don't remember a separate tuner for the transmitter.

A Modern solid state radios are designed to work into a 50 Ω load with a specified maximum SWR, typically 2:1. There are no adjustments to the amplifier, although many radios have a built in antenna tuner that can match some impedance variation with the push of a button. If there is no tuner provided, a mismatched load at full power will result in higher current or voltage stress on the final amplifier components. Most modern radios automatically reduce power to protect the amplifier components, but some rely on fast acting circuit breakers.

In the vacuum tube days, it was a different situation. In the days before coaxial cable (and before television was popular) the typical transmission line was open wire or twisted pair connected to a link coupled tuned resonant circuit at the output of the transmitter, usually with different plug-in coils for each band.

By adjusting the variable capacitor, some adjustment could be made to compensate for reactance in the load. In addition, some had an adjustable link that could be moved closer or farther from the axis of the inductor to change the amount of coupling. This arrangement could compensate for some changes in antenna characteristics, but an additional dedicated antenna tuner with adjustable coil taps for different impedances was often provided to deal with nonresonant or other mismatched antenna loads.

Figure 4 — A 1950s vintage E. F. Johnson "Matchbox" antenna tuner designed to work with vacuum tube transmitters of its day. This capable tuner could match balanced or unbalanced loads on the ham bands of its day.

After WWII, coax became a popular antenna feed line and by the 1950s most HF transmitters (and later transceivers) used an unbalanced pi-network circuit at the output. This made bandswitching feasible and provided some range of compensation for impedance differences, but it was really designed just for unbalanced loads of 50-75 Ω. Some transmitters advertised being able to operate into loads of "30 to 600 Ω," although the circuits were not optimum when tuned that far from their design point.

An antenna tuner or balancing arrangement was needed to feed balanced loads, and a tuner was definitely needed for some loads, particularly those found in nonresonant systems. While many amateurs of the period used homebrew antenna tuners, similar to those used before the war, by the mid '50s, E. F. Johnson introduced their very popular "Matchbox" series of antenna tuners (see Figure 4). They were parallel tuned circuits, similar to the earlier type, but now bandswitched. In addition a unique differential capacitor arrangement provided a variable impedance matching function similar to the adjustable tap positions. The Matchbox tuners also had a special link designed to match the 300 Ω balanced input circuits of the receivers of the day. You can read more about this and other aspects of antenna tuners in a recent ARRL publication, *The ARRL Guide to Antenna Tuners*.[1]

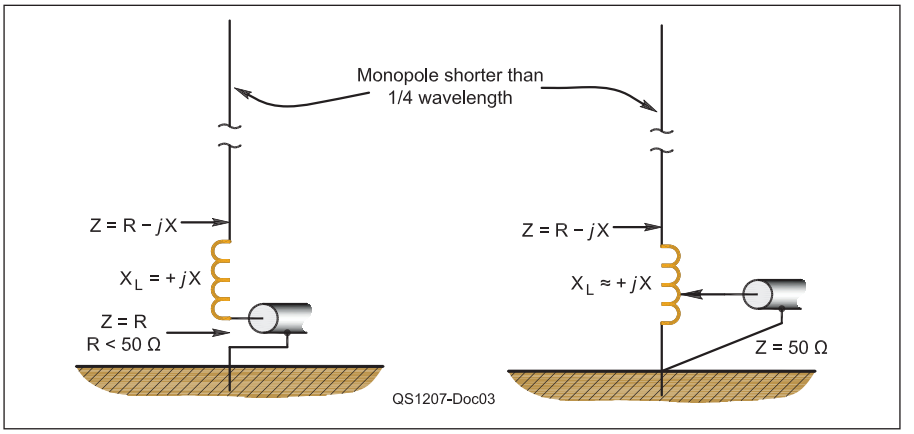


Figure 3 — On the left is the arrangement that makes use of a loading coil to cancel the capacitive reactance of an electrically short monopole to provide a resistive load, generally significantly less than 50 Ω. On the right, a similar coil is used but connected to ground. The coax is tapped on the coil until a 50 Ω point is found, resulting in a good match. This also avoids static buildup and may be beneficial in lightning areas compared to the other arrangement. It does require three rather than two connections, somewhat complicating band changes.

[1]J. Hallas, W1ZR, *The ARRL Guide to Antenna Tuners*. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 0984. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

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**.

Paul Wade, W1GHZ, w1ghz@arrl.org

Parabolic Dish Focusing

A properly focused parabola will really dish out your signal.

A parabolic dish is a reflecting lens. To get best performance from a dish antenna, it must be properly focused — the phase center of the feed antenna must be at the focal point of the parabola.

The phase center is the point from which an antenna appears to radiate. For small cylindrical feed horns, the phase center is usually at the center of the aperture — the opening at the front of the horn. Tapered horns typically have the phase center a bit inside the horn. You can find details for many feed antennas in the *W1GHZ Microwave Antenna Book — Online* at **www.w1ghz.org**.

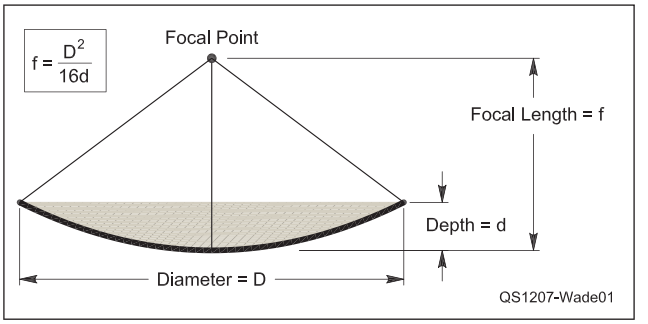


Figure 1 — This diagram shows how to determine the focal point for a parabolic dish.

After focusing, the next most important consideration is matching the feed to the f/D of the reflector, so that the reflector is optimally illuminated. The f/D is the ratio of the focal length f of the dish to the diameter D — all dishes with the same f/D have the same geometry, regardless of size and require the same feed illumination. My website has data for a number of popular feeds. For conventional dishes, the typical f/D ranges from 0.25, a very deep dish, to about 0.5, a shallow one.

While a parabolic reflector is very broadband, good multiband feed antennas are rare. One problem is that the phase center moves with frequency, so that the dish is only properly focused on one band.

Focus Adjustment

I frequently hear from hams who are trying to adjust the focusing of a dish with a signal source in the backyard. My response is that this just doesn't work — they are too close to focus properly. Perhaps you are old enough to remember cameras that weren't smarter than the photographer and had to be focused manually; for distant objects, there was an infinity setting. Since we would like to adjust our dish antennas to work distant stations, we must focus them to infinity, not to a short distance like a backyard.

How far away must the signal source be for proper focusing? The minimum length for an antenna range is the Rayleigh distance:

Rayleigh distance = $2D^2/\lambda$

where D is the diameter of the dish and λ is the wavelength. For a modest sized 2 foot dish at 10 GHz, the Rayleigh distance is about 85 feet. To focus to infinity a longer distance is required — some folks at JPL suggest 50 times the Rayleigh distance, so the source would need to be nearly a mile away.[1]

Kent, WA5VJB, suggested that this might be overkill — we are hams not NASA and can compromise. I did some calculations for shorter focusing distances and found that focusing at the Rayleigh distance would result in an error in feed placement, which would reduce the antenna gain by roughly 1 dB. To make the error small enough not to affect gain, you need a focusing distance of at least five times the Rayleigh distance.

[1]W.A. Imbriale, P.G. Ingerson and W.C. Wong, "Experimental Verification of the Analysis of Umbrella Parabolic Reflectors," *IEEE Transactions on Antennas and Propagation*, Sep 1973, pp 705-708.

Calculating the Focal Point

Setting up a good antenna range this long is rather difficult. For most microwavers, it would be better to carefully calculate the focal point of the parabolic dish and place the feed at that location. For a conventional prime-focus dish, calculate the focal point by measuring the depth d of the dish in the center (see Figure 1). Then the focal point distance above the center is:

$f = D^2 / 16d$

where D is the diameter of the dish and d is the depth in the center.

The depth is easily measured by placing a straightedge across the dish and using a T-square to measure d (see Figure 2). Many dishes have a hole in the center, like this one, but the parabolic curve is fairly flat in this region, so eyeballing should be close enough. This dish measured 29.75 inches in diameter with a depth of 4.75 inches, so f = 11.65 inches and the f/D = 0.39.

Offset dishes are a little trickier. For oval ones, you calculate the focal distance using measurements of the large and small axis, and the depth of the deepest point. My web page shows the calculations, as well as the focal point for some common satellite TV offset dishes. There is also my *HDL_ANT* program to do the calculations for the oval dishes and curve-fitting for other shapes.

Figure 2 — The depth of a parabolic dish is easily measured using a straightedge and a T-square.

For offset dishes, either the calculations or the program gives the distance from the top

Figure 3 — A piece of string is all that is needed to position a feedhorn at the focal point of an offset-fed dish.

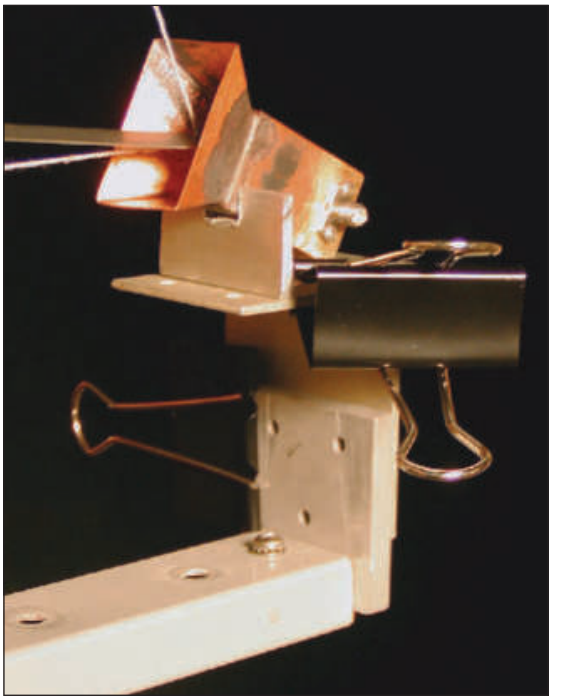


Figure 4 — Ordinary paper clamps are perfect for clamping the feedhorn in place temporarily while adjusting its position.

and bottom edge of the dish to the focal point. This allows the use of string with these lengths marked to place the feedhorn at the focal point, as shown in Figure 3. Simply tie a knot in the string, mark the top and bottom lengths from the knot and tape those marks to the top and bottom of the dish. When the string is pulled tight, the knot is at the focal point.

To get best performance from a dish antenna, it must be properly focused...

The phase center of the feed should be placed at the focal point of the dish, within a ¼ wavelength for maximum performance. Once the feed is at the focal point, point it at the center of the reflector, whether conventional or offset. This is much less critical, so don't obsess here. It is more important to mount the feed securely, so that vibration from transport or wind does not change the focus.

Offset feeds usually end up mounted at an odd angle, so I usually clamp the mounting brackets together until everything lines up, as shown in Figure 4, then mark holes for drilling. For small microwave feedhorns, binder clips from the stationery store work well.

Focusing On the Sun

There is one convenient signal source that is distant enough for good focusing — the sun. The sun puts out broadband noise that is easily detected on a good microwave system, but a fairly broadband receiver with an averaging detector is needed to get stable readings. What we measure is the small difference between noise from the sun and noise from cold sky. Figure 5 shows measurements I made by moving an offset dish feed in and out from the calculated focal point, taking a reading at each position — the calculated position is very close. We will discuss making sun noise measurements in a future "Microwavelengths."

A dish with a smooth surface can also focus sunlight to give a good indication of the focal point. Satellite TV dishes typically have a rough surface to prevent focusing sunlight on the feed — we receive roughly 1 kW per square meter from the sun, so a small dish could focus several hundred watts on the feed and melt it. This is a problem for the satellite TV dishes when the sun moves through the beam for a few days near the equinox in spring and fall.

Microwave Update 2012

Microwave Update, the premier amateur microwave conference, will be held this year in Santa Clara, California, on October 18-21. You can find details at **www.microwaveupdate.org**. Hope to see you there.

Photos by P. Wade, W1GHZ.

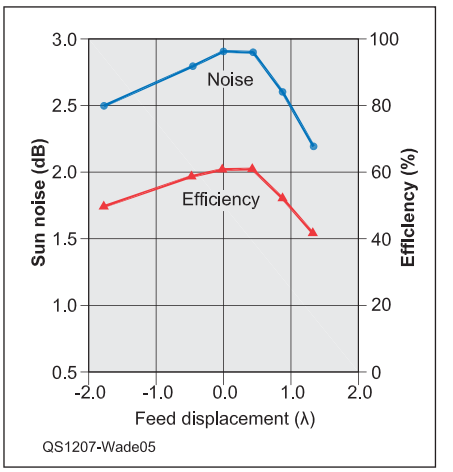


Figure 5 — Sun noise measurements can be used to optimize the feed position.

Strays

QST congratulates...

ARRL member Tim Arimond, NØBYH, who has been awarded the Boy Scouts' District Award of Merit for his efforts to promote Amateur Radio to Boy Scouts in the Minneapolis-St Paul area. — *Nick Heille*

ARRL member John D'Ausilio, W1RT, of Easton, Connecticut, the recipient of the 2012 Rover Recognition Award. The Mount Airy VHF Radio Club bestows the award to honor the efforts of rover stations in VHF, UHF and microwave contesting. — *Rick Rosen, K1DS*

H. Ward Silver, NØAX, n0ax@arrl.org

Experiment 114

Recording Signals

In Hands-On Radio Experiment 112, we went on the hunt for a cure to my sufferin' stove for RFI caused by my transmitted signal.[1] As hams know, however, RFI works both ways — a ham can receive interference from external sources, too. Tracking down the source of RFI to your operating can be at least as difficult as solving an RFI problem to an appliance in your home. This month, we'll do a neat science experiment with a free software tool you can use not only for RFI hunting but for other jobs as well.

Noise Signatures

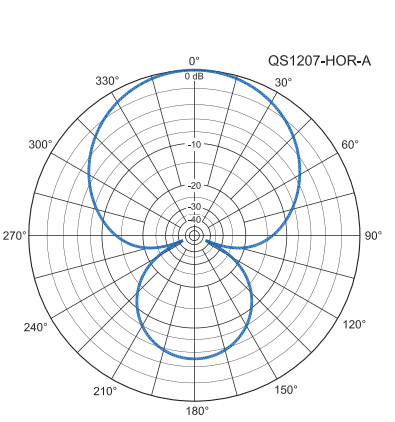
When you are receiving an interfering noise signal, one of the first steps in identifying the source is to determine its *signature* — the signal's combination of amplitude and frequency that is almost always unique to that particular noise source. When you tell your tale of woe to your friends, the first question will almost always be, "What does it sound like?" Is it a buzz, a tone, a wide-band rasp…or what? This gives important clues as to what is causing the noise. The frequencies on which you hear the noise are also clues.

Another part of the signature that can be just as important is the signal's behavior in time. For example, does the noise pulse regularly or is it present all the time? Does it appear throughout the day? Does the amplitude vary? All of these are also important clues. For example, HF operators in rural and suburban areas are often quite familiar with the pop… pop…pop… of an electric fence charger.

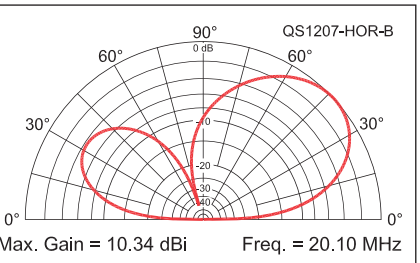
Sitting at the radio for hours listening to noise is not very exciting, despite what is depicted in the movie *Contact*. Yet it might be very important to learn that your noise comes and goes at regular hours — such as when a local street lamp turns on and off at dusk and dawn. The solution is a data recorder.

By Jove, You've Got It!

I found out about this month's software gadget in the course of helping the St Charles High School Radio Club, (KDØQLW), set up their Radio Jove Project equipment to listen to noise from the planet Jupiter.[2] This experiment involves building a two dipole array for 20.1 MHz (see the digital edition for a photo of the antenna and club members), connecting a radio, and listening to the receiver's output noise as Jupiter moves through the beam of the array while the Earth rotates. If you have a directional antenna for 15 meters (or can build the two dipole array) you can hear the noise, too. Figure 1 shows the *EZNEC* azimuth and elevation pattern of the array.



Max. Gain = 10.34 dBi Freq. = 20.1 MHz



Max. Gain = 10.34 dBi Freq. = 20.10 MHz

Figures 1A and B — The two-dipole array pattern is quite broad with a beamwidth of 92° at an elevation angle of 42°. As a result, the antenna does not need to be precisely aligned. See the Radio Jove project documentation for construction and installation instructions. The patterns were computed by *EZNEC*'s free demo package (**www.eznec.com**) — an *EZNEC* model for the antenna is available on the Hands-On Radio website.

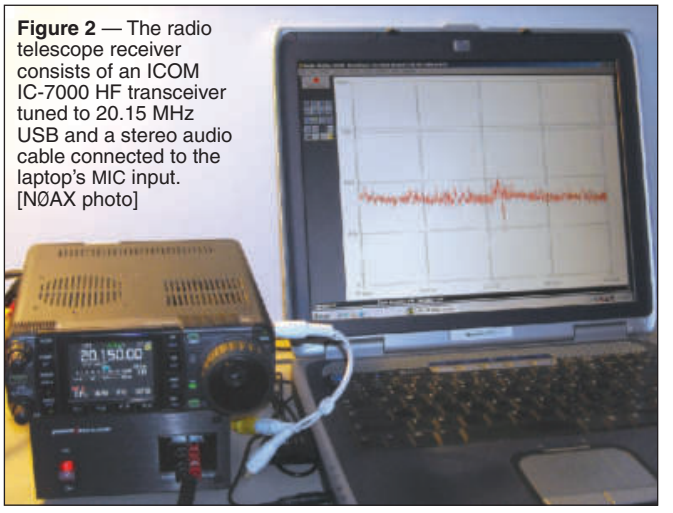


Figure 2 — The radio telescope receiver consists of an ICOM IC-7000 HF transceiver tuned to 20.15 MHz USB and a stereo audio cable connected to the laptop's MIC input. [NØAX photo]

Jupiter is a powerful source of noise at HF and was one of the first radio sources identified in the sky by radio astronomers. The noise can be received below 35-40 MHz down to frequencies below 15 MHz, at which the signals are either absorbed or reflected by the ionosphere. Frequencies around 20 MHz are usually recommended — just tune your receiver to a clear frequency around 20 MHz and…then what?

Jovian noise is just like terrestrial noise — crackly pops and crashes that you might hear from any thunderstorm. Listening by ear, there is no obvious signature of either amplitude or frequency so you must use time as your meter stick. The Radio Jove project directs the experimenter to a free program called *Radio-SkyPipe II* (**radiosky.com/skypipeishere.html**) that uses a PC sound card to record the output of a receiver, graph it on a strip-chart like display, and save the data to a file. Once the data is

[1]All previous Hands-On Radio experiments are available to ARRL members at **www.arrl.org/hands-on-radio**.

[2]**radiojove.gsfc.nasa.gov**

recorded, you review it to find the slow rise in noise level from Jupiter passing in front of your antenna.

Taking Measurements

Radio-SkyPipe II couldn't be easier to set up and install. Download and run the self-installing package from the website — you're ready to go. You will be prompted to enter your location (this is an astronomy tool, after all) and select your sampling rate and signal source. The default settings worked fine for me. I purchased the upgrade to the *Pro – Home Use* version so that I could work more easily with the data files. I'm using a slow, old laptop for recording and it seems to handle this simple task just fine.

Connecting the radio is also quite simple — use a plug-to-plug stereo audio cable from the headphone jack to the sound card's MIC input jack. Most readers will have a radio that can receive near 20 MHz or just outside the 15 meter band. Tune to a clear frequency free of local carriers or birdies and plug in the audio cable. Click the START CHART button and the red trace will begin crawling across the display at 10 samples/sec. In the OPTIONS menu, select the STRIP CHART tab and un-check Y AXIS AUTOSCALE. Right-click on the Y axis and click SET YMIN TO 0. This fixes the vertical scale at 0 to 10000, which is convenient for displaying noise measurements.

Adjust the receiver volume so that the background noise level is around 4000. You'll see the trace move up and down as the volume is adjusted so that the system looks somewhat like that in Figure 2. Point your antenna due south and wait for Jupiter to pass slowly by.

The time at which Jupiter crosses the north-south meridian over your location — called the *transit* — can be found on the Naval Observatory's website (**aa.usno.navy.mil/data/docs/mrst.php**). If you have a medium-to-low local noise level and your antenna is not completely blocked to the south, you'll see a gradual rise and fall in the noise level. After Jupiter passes by, click STOP CHART and save the file to your hard drive. After the file is saved, you'll see the entire session on the display. Maximize the window and use the control buttons at the left to move around. There are extensive on-line Help files available to get you started viewing data. Congratulations — you're a radio astronomer just like Grote Reber, W9GRZ back in the 1930's![3]

Table 1
Jupiter Transit

ST. LOUIS, MISSOURI
Location: W 90°15'00.0", N38°37'48.0", 100m
(Longitude referred to Greenwich meridian)

Time Zone: 5h 00m west of Greenwich

Date	Rise Az	Transit Alt.	Set Az.
2012 Apr 10 (Tue)	07:43 69	14:36 67S	21:31 291
2012 Apr 11 (Wed)	07:39 69	14:33 67S	21:28 291
2012 Apr 12 (Thu)	07:36 69	14:30 67S	21:25 291
2012 Apr 13 (Fri)	07:33 69	14:27 67S	21:22 291
2012 Apr 14 (Sat)	07:29 69	14:24 67S	21:19 291
2012 Apr 15 (Sun)	07:26 69	14:21 67S	21:17 291
2012 Apr 16 (Mon)	07:23 69	14:18 67S	21:14 291

Each column contains time and azimuth angle for rise and set or elevation angle and S for South for transit.

Figure 3 shows a portion of the strip chart I obtained on April 11, using the student's dipole array. It covers approximately 2 hours centered on the observed transit time. The 2 hour time period corresponds to 30° of the Earth's daily rotation. (360° × 2 hours / 24 hours = 30°) The Naval Observatory transit times (see Table 1) put the actual transit time at 14:33 (2:33 PM), which is 1933 UTC at my location in St Charles, MO. The slight rise in noise level was observable for a little more than an hour (≈16° of rotation).

The peak of the noise was later than predicted, however. I took data for several days — stopping and starting the chart twice a day — and saw a similar increase in noise level about the same time, shifting a little bit earlier each day, so I am confident that the noise was from Jupiter. I attribute the timing skew to partial blockage of the antenna beam by the house so that the signals were received best after the planet's transit. An open site with no obstructions and lower background noise would allow better observations but this was fine for a first run.

[3]**en.wikipedia.org/wiki/Grote_Reber**

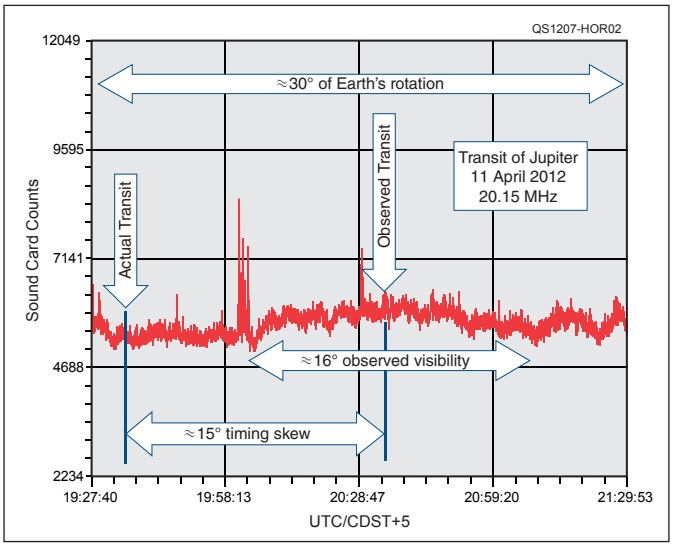


Figure 3 — This portion of the 11 April strip chart clearly shows the gentle rise in background noise as Jupiter passes by in the early afternoon. Blockage from buildings to the south and southeast results in the shift of the received peak later (westerly) in the day.

RFI Sleuthing

As you sort through the charts you collect, you'll no doubt notice other interesting phenomena. You'll see large static crashes and periods of high noise levels. You may see bursts of noise and on/off patterns, as well. In my data, it's clear that noise in my neighborhood builds quite a bit in the late afternoon and early evening as folks drive their cars home from work and begin to run their appliances and gadgets. A neighbor's motorcycle leaves a distinctive peak on the trace from ignition noise, for example.

I've been chasing a loud noise source that seems to appear only in the evenings and nearly wipes out 40 meters. My mobile rig is on my workbench listening and recording so that I can find out when it appears and when it goes away. Maybe that will help me determine what is generating it.

The *Radio-SkyPipe II* software can be used to record any audio signal your sound card can accept as input. You can adjust the sampling parameters to record faster or slower, set up automatic sampling, and so forth. The *Pro* version has a squelch-like option to log only when the input signal is above a specified level. Once you get this software running, I am confident that you'll find it a valuable addition to your electronics and radio toolbox!

Steve Ford, WB8IMY, wb8imy@arrl.org

Voice Recognition for FM Repeaters

As an owner of an Apple iPhone 4S, I must say I'm awfully impressed with Siri, the built-in voice-recognition "assistant." Recently I needed to let my doctor know that I was stuck in traffic and was going to be late for my appointment. I didn't have the office number programmed into my phone, but thanks to Siri that wasn't a problem. With a tap of the button, I asked Siri to find his telephone number on the Web and place the call. Within 30 seconds I was talking to the doctor's receptionist!

If Apple can do this with iPhones, why can't we do something similar with FM repeaters? The answer is *we can.*

Steve Lampereur, KB9MWR, points out that version 11 of Google's *Chrome* browser includes support for speech recognition. If one explores the *Chrome* source code, it isn't difficult to uncover how this is implemented. As Steve describes, audio is collected from the microphone, encoded in FLAC format and then passed via an HTTPS POST to a Google Web service. The service quickly responds with a bit of JSON (JavaScript Object Notation) code that can be turned into audible speech. Hams familiar with *Asterisk* have been experimenting with this aspect of the Google Speech system with clever results.

Steve has already set up a speech recognition system on a repeater in Green Bay, Wisconsin. "You ask, 'What time is it?' The repeater recognizes the word 'time,' does a time lookup and then speaks it back," Steve says. "You ask, 'Where is KB8ZXE?' and the repeater recognizes the words 'where' and 'KB8ZXE' and passes a query to APRS.fi and reports back that he was last reported 2.1 miles Northeast of Green Bay."

You can learn more, and hear examples, at **http://kb9mwr.blogspot.com/2012/02/ham-radio-voice-recognition.html**.

A COM Port Too Far

I recently spoke with a ham who was frustrated with a piece of *Windows* software. He wanted to use the software to program his transceiver's memory channels, but the software setup menu needed to know which COM port it should use to communicate with the radio.

Unfortunately, the software had been written back in the days when computers communicated with the outside world through a limited number of serial ports. Today, serial ports have gone the way of the dinosaurs and have been replaced by USB ports. Normally this isn't an issue. If you need a traditional serial connection, you pick up a handy serial-to-USB adapter. When you plug in the adapter, *Windows* creates a *virtual* COM port through which the software can communicate. All is well … or maybe not.

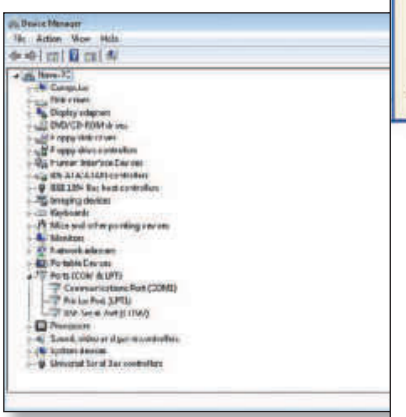


Figure 1 – The list of active ports in *Windows* Device Manager, including a USB Serial Port.

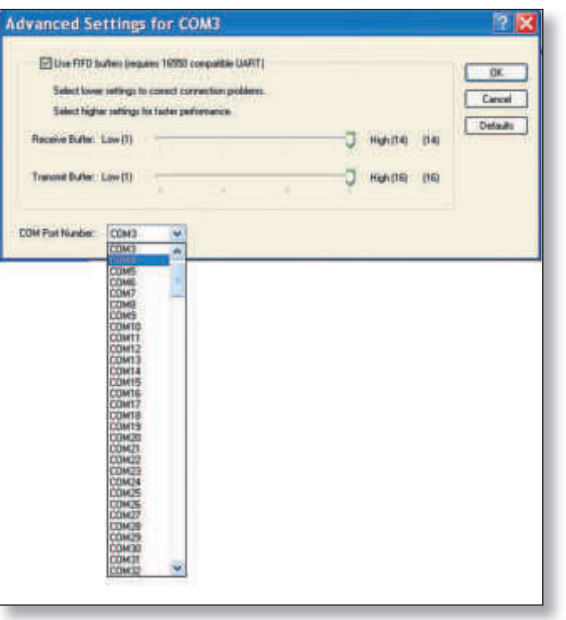


Figure 2 – By clicking on the *Advanced* button under Port Settings you can access the menu that allows you to change the COM port number.

His particular piece of software used a drop-down menu to present the list of COM ports it would recognize. The list consisted of COM 1, COM 2, COM 3 and COM 4. The serial-to-USB adapter, however, was communicating through virtual COM port 11. My friend was out of luck (he used a stronger, unprintable term).

Fortunately, there is a solution.

The first step in the journey is to go to *Windows* Control Panel and find *Device Manager*. In Device Manager, hunt for the word *Ports* in the device list and click the little arrow beside it. See Figure 1 and you'll notice a USB Serial Port, which is already set to COM 2 because, as it turns out, I had a similar software issue on my station PC that I resolved in the same way. For now let's assume the USB Serial Port is COM 11 or something similar.

Double click on the USB Serial Port and then click the *Port Settings* tab. A new window pops open and you'll see a button labeled *Advanced* (don't let that scare you). Click on *Advanced* and you'll be greeted with yet another window (Figure 2). In this window you'll find a drop-down menu that will allow you to renumber the port. If your software needs to "see" COM 4 and you don't see COM 4 elsewhere in the Device Manager Ports list, select COM 4 in the drop-down menu and then click OK (and keep clicking OK all the way back out to Device Manager).

What was once virtual port COM 11 is now virtual port COM 4. Select COM 4 in the software menu and you're all set. (And so was he.)

Steve Ford, WB8IMY, wb8imy@arrl.org

Pixel Technologies RF PRO-1B Active Receiving Loop

Joel R. Hallas, W1ZR
QST Technical Editor, **w1zr@arrl.org**

The Pixel Technologies RF PRO-1B is a small receive-only loop antenna with an effective range of 50 kHz to 30 MHz. It is an *active antenna*, so called because it includes a low noise, high gain preamplifier located at the antenna to make up for the relatively weak signals captured by the small structure. This is a well-established technique, often seen in the form of small-for-the-frequency whip antennas. In contrast to active whips, the shielded loop offers directivity and the capability to reject some kinds of noise.

What's in the Box?

First there is the loop itself, about 39 inches in diameter and constructed in a shielded enclosure, reminding me a bit of a hula hoop of the '50s (see Figure 1). Mounted just below the loop, on a common mounting bracket, is the preamplifier. It connects to the loop through a supplied 1 foot long RG-6 coax cable fitted with weatherproof TV type F connectors.

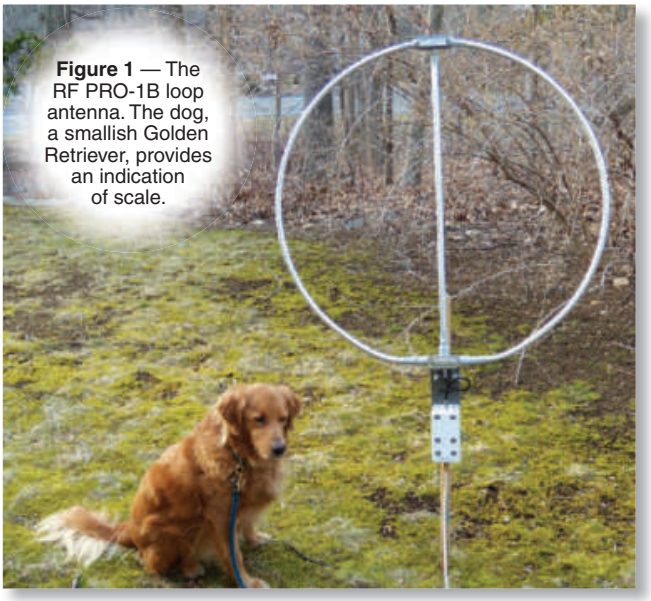


Figure 1 — The RF PRO-1B loop antenna. The dog, a smallish Golden Retriever, provides an indication of scale.

In the carton you'll also find a control box. This unit resides at the radio and inserts 20 V dc, supplied by a provided wall wart supply, into the coax to power the preamplifier. The control box serves as a junction point for a supplied coax jumper that goes to the receiver and it provides a power switch and connector for a transmit/receive relay that removes power from the preamp during transmit (more later).

When we purchased our loop, it did not include the coax that goes from the preamplifier to the radio. The manufacturer now provides the required RG-6 cables, with installed waterproof connectors, in four optional lengths at a very reasonable cost.

So Where Do You Put It?

The RF PRO-1B loop receives vertically polarized waves from the direction of the plane of the loop (notice that this is 90° from the direction a large loop, such as a quad loop, receives). As an antenna responding to vertically polarized waves, height isn't of primary importance, so it can be mounted near the ground.

The azimuth pattern is bidirectional with fairly wide lobes, but with deep nulls perpendicular to the plane of the loop. So, unless you're interested in receiving from particular fixed directions, a rotator is desirable. We didn't have a rotator available, so I temporarily mounted the antenna on the long handle of a garden tool and manually turned the loop until its optimum receiving pattern was focused on Europe and South Asia.

When using a separate receiving antenna you want to avoid coupling too tightly to the antenna you're using for transmitting — especially if you are running a lot of power. The manufacturer notes that with a vertically polarized transmitting antenna 25 feet from the loop and radiating 1500 W, the preamp has about a 20 dB safety margin. The loop's preamp may well survive this onslaught, but while doing so it could still pass a 30 dBm (1 W) signal back to your radio. That might be enough to exceed the safe input limit of your transceiver's front end. We verified in the ARRL Lab that the preamplifier can indeed put out 1 W if driven by a strong signal. It's worth noting that the Lab also confirmed that the preamp met its specified gain of 30 dB from 0.1 to 30 MHz with 1 dB of gain compression at an input of 1 dBm.

To help avoid receiver damage, the control box includes relays that remove power from the preamplifier and grounds the preamplifier input if keyed from the transceiver TR line. This worked fine when connected to my K3's amplifier keying line. We measured the response time and found that the preamplifier was fully online 8 ms after key closure. When the keying line opened, the preamp was off within 1.6 ms.

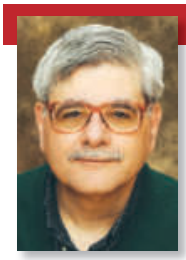
So How Does it Play?

I connected the antenna to the AUX RF antenna input jack of my Elecraft K3 transceiver so I could operate in diversity mode. The signal from the subreceiver with loop antenna was in my right ear, while the audio reaching my left ear came from signals supplied by switchable horizontal and vertical full-size antennas on various bands.

On 160 through 30 meters the loop seemed stronger. Signal levels were lower on 20 meters and above, especially compared to my three-element Yagi, but signal-to-noise levels were about the same (assuming the signals came from the loop's favored directions). Only at 10 meters did my Yagi have the edge across the board.

The RF PRO-1B loop should provide a good receiving solution for our forthcoming allocation at 630 meters, as well as an excellent way to reduce strong signals by using the loop's deep nulls, which are much deeper than what you might normally experience with a Yagi antenna. If I lived near a powerhouse like ARRL Headquarters station W1AW, this antenna would be my first line of defense! The RF PRO-1B loop would also be a superb antenna for long distance MF listening.

Manufacturer: Pixel Technologies, 13200 W 43rd Dr, Unit 201, Golden, CO 80403; tel 303-526-1965; **www.pixelsatradio.com**; **doug@pixelsatradio.com**. *Price: RF PRO-1B with RG-6 amplifier-to-radio cable and installed waterproof connectors; 50 feet of cable, $447; 100 feet, $455; 150 feet, $463; 200 feet, $471.*



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

Hearing Better, Low Cost Radials

Low Cost Radial Ring

I was given an older HF trap vertical antenna by a friend, along with some used coax. Knowing the importance of a good ground system, I scrounged enough house wire for 32 radials. But how to connect them at the base of the antenna?

Wandering the plumbing aisle of my local home improvement store I found a stainless steel sink strainer for less than $7 that looked promising. The inner diameter of the tailpiece connection matched the outer diameter of the 1½ inch galvanized water pipe I'd be using as the antenna mount and the outer rim would accommodate the connection points for the radials. I grabbed a stainless steel hose clamp on the way to the checkout and headed back to the shop.

Using a hacksaw I removed the "cross" in the bottom of the strainer, cut four slots in the tailpiece connection so it could be compressed around the mast and removed the burrs with a file. Using a drawing program, I created a paper template of 32 holes for attaching the radials. The holes were marked on the rim of the strainer and drilled.

The strainer was clamped to the antenna mounting pipe with the hose clamp. I inserted a short length of copper braid under the clamp and connected it to the coax shield at the base of the antenna (see Figure 1). Each radial wire was then attached with a stainless steel screw and nut, stretched into place and held down with a couple of landscape staples.

I assembled the antenna to the recommended starting dimensions and then tuned the traps to resonance using an antenna analyzer. On-air performance of this antenna system has been excellent, thanks in large part to the ground system. — *73, Ray DuFlon, KE6PXU, PO Box 188, Pescadero, CA 94060*, **ke6pxu@gmail.com**

Cure T-90A Wobbles

My ICOM IC-T90A has given me good service for many years. But the large triband antenna flexing on the small SMA antenna connector has been the Achilles' heel of this radio. I have repaired it several times now and had to replace the SMA connector once. It is not too hard to get into the radio but desoldering is required on the function pot and two small chassis-to-circuit-board shields. When that is done, you can remove the circuit board to access the solder point for the SMA connector. The center pin of the SMA connector is "blob" soldered to the circuit board and you will frequently find this joint broken. Cleaning out the solder joint and soldering several small wire strands to the circuit board and the SMA center pin make a flexible connection that allows any antenna movement to flex the wire instead of the circuit board.

When my flexible connection failed, I decided to investigate the SMA connector motion. There is a flexible weather seal inside the radio on the antenna connector that will not allow it to be tightened securely, no matter how much you tighten the jam nut on the outside. The real problem seems to be the antenna itself. It will screw down on the SMA connector only so far, making the slim SMA nut the sole security. Also, the SP/MIC connector weather seal, which is very close to the antenna base, may contribute to the problem (see Figure 2).

The fix was simple. Add a washer or washers as necessary between the antenna base and the SP/MIC jack seal to allow the antenna to compress more tightly. This will eliminate the antenna wobble that shakes the SMA connector, breaking the solder joint. If you repair your radio, I would remove the internal weather seal so the SMA nut on the outside will pull the connector base tightly against the inside of the chassis. [Note that changing the factory weather seals will affect the "splash resistance" rating of the T-90A. — *Ed.*] — *73, Charlie Liberto, W4MEC, 619 Hidaway Cove, Hendersonville, NC 28739*, **w4mec@arrl.net**

Hearing Loss Help

Like all people, hams can lose much of their hearing as they age and with it the comprehension of high-speed code diminishes. I have gone through 40 years of progressive hearing loss that is presently bordering on a loss of over 90 dB. I have tried various headphones, hearing aids and combinations of the two.

Luckily I came upon an arrangement that works well even for my level of hearing loss. The hearing aid is completely eliminated and only a set of special phones plus an amplifier are used. The phones are a dynamic type made by Sennheiser (**www.sennheiserusa.com**). Widely used by audiologists for testing hearing loss and in locations of high ambient noise, they are capable of being driven to very high levels without distortion (113 dB/1 V RMS). They have the highest gain allowed by present US standards if operated at a maximum of 0.5 W input power.

The headphone jack on my rig requires amplification to drive the phones to their maximum limit. The MFJ Model 616 (**www.mfjenterprises.com**) speech intelligibility unit I already use is capable of putting out about 2 W per channel. If the headphone jack on the MFJ is used, a pair of attenuators in series with the jack to reduce the volume must be bypassed, this is a simple procedure explained in the MFJ manual. Any other

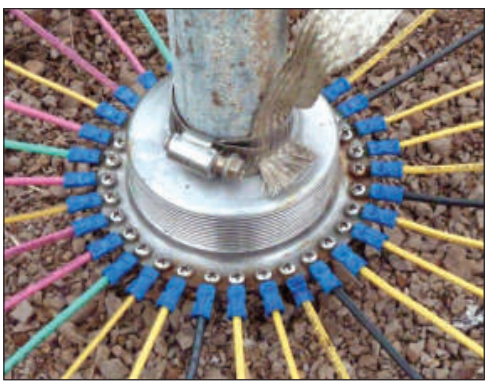


Figure 1 — The sink strainer radial ring, hose clamp and braid installed at the antenna base. The ground braid connects to the coax shield. [Ray DuFlon, KE6PXU, photo]

Figure 2 — The addition of a washer to the SMA connector can help provide mechanical support to the T-90A antenna connector. [Charlie Liberto, W4MEC, photo]

amplifier could be substituted but be careful not to exceed 0.5 W into the phones. Such levels could damage the phones and possibly accelerate long-term hearing loss. [As hearing loss is a medical issue, we strongly advise the reader to speak with their hearing specialist before adopting this method. — *Ed.*]

The 616 has the advantage of shaping the frequency response to suit the individual's hearing response. I purchased a new pair of Model HD 280 Sennheisers on the Internet for under $80 shipped, although they can also be purchased from Sennheiser America for about $100. They have an impedance of 64 Ω. This arrangement should help comprehension for all but the most advanced hearing loss cases. — *73, Fred Ryan, W3NJZ, PO Box 406, New Alexandria, PA 15670-0406*, **fredmerkr@comcast.net**

Paper Roll Coil Forms

Powdered iron toroids are very much a part of modern equipment construction and have contributed enormously to the miniaturization of much of today's gear. As useful as these items are, they do have some drawbacks.

First of all, they are not commonly available at the corner hobby store. Secondly, they do not lend themselves to adjustment of coupling when auxiliary windings are added. Finally, to those of us of frugal sensibility, they cost money!

Cylindrical plug-in coil forms, once a mainstay of the ham's parts pantry, have become hard to find. Searching for a substitute for a vintage project, I happened upon some discarded cores from paper rolls used in credit card terminals.

One variety is made from a milky plastic similar to polyethylene. These rigid cores are of a lightweight honeycomb construction and are very easily worked with a small drill or even a sharp awl or pin. Much less material is contained within the field than would be the case with the popular PVC piping and mine passed the "microwave oven" test (30 seconds in the microwave with a cup of water) with flying colors. Sharp peaks at resonance suggest reasonable Q, at least at HF. A second type is black. I suspect these may contain carbon — perhaps useful for winding chokes but not for high Q requirements. As a final bonus, either type core can be end mounted using coarse-thread self-tapping screws or with hobby cement.

Figure 3 shows the white cores in use in a vintage regenerative receiver, one as a coil form in a regenerative circuit with a "tickler" winding (center). [1] It also illustrates two different mounting possibilities. Not plug-in, but perhaps some clever experimenter will solve this dilemma as well. — *73, Bill Higgs, NT4C, 12304 Old Henry Rd, Louisville, KY 40223-2232*, **bill@lizcurtishiggs.com**

Figure 3 — The author's two-tube regenerative receiver using three paper roll coil forms. [Bill Higgs, NT4C, photo]

Mount That Mic

For a number of years, I have placed my 2 meter microphone in a center console cup holder. Usually, I end up chasing it around the floor shortly after driving the car. My solution was to make a small removable flat surface with a RadioShack microphone clip (see Figure 4). The holder stays in place by means of a small brace. The surface is made from particleboard (4 × 2.5 × 0.25 inches). The brace is pine (3 × 1 × 0.75 inches). The brace length is the same as the diameter of the cup holder and its vertical edges are beveled for a snug fit in the round opening. Three wood screws hold the metal clip, flat surface and brace together (see Figure 5). — *73, Tom Hart, AD1B, 54 Hermaine Ave, Dedham, MA 02026*, **tom.hart@verizon.net**

Figure 4 — The microphone holder sitting in the center console. [Tom Hart, AD1B, photo]

Figure 5 — This is a side view of the microphone holder showing the microphone clip on top, next the particleboard and finally the pine brace shaped to fit the cup holder. [Tom Hart, AD1B, photo]

Window-mount Antenna

As you know, it is often impossible for amateurs living in an apartment to install a 2 meter antenna on the outside of their building. Most of the time, they have to be satisfied with a handheld, a radio with a magnetic-mount antenna on top of the fridge or some other metallic object. Being in this situation, I made a small dipole antenna using telescoping antennas I took from old, broken FM radios (see Figure 6).

The antenna is mounted on a roughly 3 × 5 inch piece of Plexiglas with two suction cups. With my radio placed close to a window, I attached the antenna to the window in the vertical position and adjusted the two elements for 2 meters — about 19 inches. The antenna gives very good results. — *73, Yvon Laplante, VE2AOW, 304-1100 Curé Poirier Est, Longueuil, QC J4J 5M2, Canada*, **yvonlaplante2@videotron.ca**

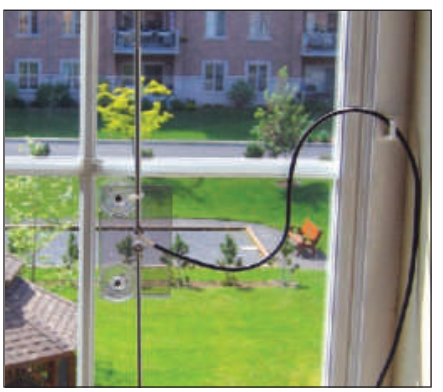


Figure 6 — The homebrew window-mount antenna attaches to any window using suction cups. [Yvon Laplante, VE2AOW, photo]

"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.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

[1] "A Two-Tube Regenerative Receiver," *The Radio Amateur's Handbook* (West Hartford, CT, 1941), pp 109-113.

ARRL EXPO at the 2012 Dayton Hamvention®

Fun for All Ages!

S. Khrystyne Keane, K1SFA

When Hara Arena — home of the Dayton Hamvention® for the past 48 years — opened its doors at 9 AM on Friday, May, 18, thousands of hams swarmed in, eager to see the latest and greatest that Amateur Radio has to offer. With the introduction of three new transceivers this year, as well as hundreds of vendors — both new ones and old friends — there was a definite buzz in the air, especially within the ARRL EXPO.

ARRL EXPO — located in the Ball Arena Hall of the large Hara Arena — included more than 20 exhibits staffed by ARRL program representatives. Among the new booths for 2012 was an exhibit introducing a new member benefit: the digital edition of *QST*. Laptops, tablets and iPads were on hand at the booth so hams could explore the online edition of *QST* that was introduced in late May.

There's always something for everyone, young and not-so-young, at Hamvention and ARRL EXPO. Young hams — and prospective young hams — had a blast within the ARRL Youth Lounge. Organizers planned loads of fun activities, including scavenger and fox hunts, games, crafts and other ways to experience ham radio. Other youth-oriented and education exhibits — including a scouting booth organized by active Boy Scouts and scout leaders, as well as an exhibit featuring kits, projects and displays for the ARRL Education and Technology Program — also featured ways for young people to get involved with Amateur Radio.

Television producer John Amodeo, NN6JA, was a special guest at the ARRL EXPO and Hamvention. Amodeo is best-known among the Amateur Radio community for his current ABC television production, *Last Man Standing*, starring comedian Tim Allen as main character Mike Baxter. Allen's character was introduced as ham radio operator KAØXTT during episodes that aired in January. Amodeo has used Facebook and other social media outlets to give the Amateur Radio community an insider's look at the planning of the show. His Saturday morning presentation — Ham Radio in Hollywood — offered Hamvention goers a personal perspective about how the media portrays Amateur Radio.

New to ARRL EXPO in 2012 was the DIY Stage. Visitors watched how "makers" and "hackers" are using Amateur Radio in a myriad of Do It Yourself projects on the DIY Stage, learning from hams who are doing-it-themselves. Amateur Radio innovators demonstrated a variety of creative projects and cool technology on the stage, located in the center of ARRL EXPO.

The Dayton Amateur Radio Association (DARA) has sponsored the Dayton Hamvention since its beginnings in 1952. A big supporter of the ARRL Education and Technology Program, DARA presented the ARRL with a generous check to fund a session of the 2012 Teachers Institute on Wireless Technology.

QST Technical Editor Joel Hallas, W1ZR (left) was honored by the Dayton Hamvention with the 2012 Technical Excellence Award. Hamvention Awards Chairman Frank Beafore, WS8B, presented Hallas — joined by his wife Nancy, W1NCY — with the award in a ceremony on the arena floor.

One of the highlights of any ARRL EXPO is the chance to meet the ARRL's leadership team. Here, ARRL Chief Executive Officer David Sumner, K1ZZ (left), ARRL President Kay Craigie, N3KN, and ARRL International Affairs Vice President Jay Bellows, KØQB (second from right) meet with a visitor during the three day Hamvention.

Hams of all ages enjoyed the kit building area within ARRL EXPO. Visitors could choose to build a 24 hour digital clock kit, a Morse code practice oscillator and key kit, a four band shortwave regen receiver kit or a sound card interface kit, all under the guidance of ARRL volunteers and staff.

New Equipment for 2012

One of the many reasons that amateurs make the trek to Dayton each May is to look over the new gear. This year, three manufacturers — FlexRadio, Kenwood and Yaesu — introduced full size HF transceivers: The Flex-6500 transceiver, the Flex-6700 transceiver, the Kenwood the TS-990 and the Yaesu FTDX-3000. In addition to these transceivers, there were many low power radios, VHF/UHF units, antennas and accessories of all sorts to be found inside Hara Arena and outside in the world famous Hamvention flea market.

Watch for more information on the 2012 Dayton Hamvention — including a look at the new products — in the digital edition of the July 2012 issue of *QST*. Be sure to check out the 2012 Dayton Hamvention photo album on the ARRL Facebook page at **www.facebook.com/ARRL.org** for lots of photos, too!

All photos by S. Khrystyne Keane, K1SFA.

S. Khrystyne Keane, K1SFA, is the ARRL News Editor. She can be reached via e-mail at **k1sfa@arrl.org**.

A Transceiver Comes Home

After 32 years, a "Project Goodwill" transceiver finds its way back to ARRL Headquarters.

Figure 1 — The "mysterious" Project Goodwill transceiver.

Steve Ford, WB8IMY

The year was 1980. Disco was slowly fading from the music scene, the Mount St Helens volcano was erupting, Jimmy Carter was in the last year of his presidency … and 600 transceiver kits began their journeys to parts unknown.

This scattering of radios was known as *Project Goodwill*, an effort by the International Amateur Radio Union (IARU) to get transceivers into the hands of budding amateurs in Third World countries throughout Asia and Africa. The 20 meter CW rigs generated 4 W RF output from VXO-controlled transmitters in a range from 14.020 to 14.080 MHz. Their direct-conversion receivers spanned 14.000 to 14.350 MHz. Both were based on designs crafted by Jay Rusgrove, W1VD, and published in the April and December 1978 issues of *QST*.

Project Goodwill kits were not only relatively easy to build, they were *free*. The funds were provided by clubs and individuals, mostly in North America. All the labor that went into assembling the kits was furnished by clubs such as the United Radio Amateur Club of San Pedro, California and individuals such as Pete Smith, N4ZR.

The Project Goodwill package contained the transceiver kit, complete with a case and knobs, a dipole antenna, a pair of headphones and a Morse code key. All the recipient had to do was build the kit, attach a 12 V dc power source and take to the airwaves.

ARRL Headquarters is the IARU secretariat, so it served as the support hub for the Project Goodwill. This was long before the Internet and cellular telephones, so builders were told to send their questions by postal mail to "PO Box AAA, Newington, CT 06111 USA." The address was stamped onto the rear panel of each case.

By late 1980 the Project Goodwill kits had arrived at their destinations and many were eventually heard on the air. Thanks to the increasing affordability of more sophisticated equipment, however, it wasn't long before the Goodwill transceivers fell silent. This was expected. After all, the "seeds" had served their purpose.

Autumn 2011

Blair Shaw, VE6AGH, is a radio restorer who is always on the lookout for unique equipment. One day he was rummaging through a barn in Athol, Idaho when he came across a rig he had never seen before. Blowing away the dust he glimpsed the IARU diamond symbol and a reference to a post office box in Newington, Connecticut. The owner of the barn was a ham who had died not long ago, but the surviving family knew nothing about the radio.

Blair brought the transceiver to his friend, Ken Kopp, KØPP, in Anaconda, Montana. Ken stared at the oddball rig and shook his head. "I haven't a clue," he said. "I didn't know the IARU had ever made transceivers."

That conversation led to a telephone call to me here at ARRL HQ (I know Ken through our work together on the *ARRL Repeater Directory*; he is the Montana frequency coordinator). After listening to the description I was every bit as puzzled as Ken. I had never heard of an ARRL or IARU-branded transceiver (and neither of us remembered Project Goodwill). To borrow from Winston Churchill, the little radio was a riddle, wrapped in a mystery, inside an enigma.

Homecoming

In early 2012 a package showed up in my office. Not knowing what else to do, Ken had decided to box up the rig and send it home. I felt like Indiana Jones as I gently lifted the radio out of the packing material. In my outstretched arms I beheld an "ancient" artifact of unknown origin. There were no venomous snakes, cryptic inscriptions or booby traps, though.

I quickly snapped a photo, which you can see in Figure 1, and placed the image on the Headquarters network with a note to David Sumner, K1ZZ, ARRL CEO. His tenure at Headquarters began in the 1970s and from the types of components used, I could tell that the radio must have been built around that time.

Minutes later he popped into my office. "That's a Project Goodwill transceiver! How did it get back here?"

Despite our best investigative efforts, Dave's question is still unanswered to this day. One possibility is that it was built from a kit that never left the States. Another is that it may have been brought back to the US by an aid worker or missionary. Ken tends to believe the latter. "The interior contained bits of soil and plant material that didn't look like anything common to Idaho," he said.

So who built the rig? We'll never know. I'd like to think it inspired someone to explore Amateur Radio and maybe even pursue a telecommunications career in his or her country.

For now, the lonely transceiver, model 20M-B, serial number 430, rests on the bookshelves of my office. Soon it will travel back to the northwest and into the tender care of QRP enthusiast Al Keenan, KD7KD. Perhaps, in time, its signal will grace the airwaves once again.

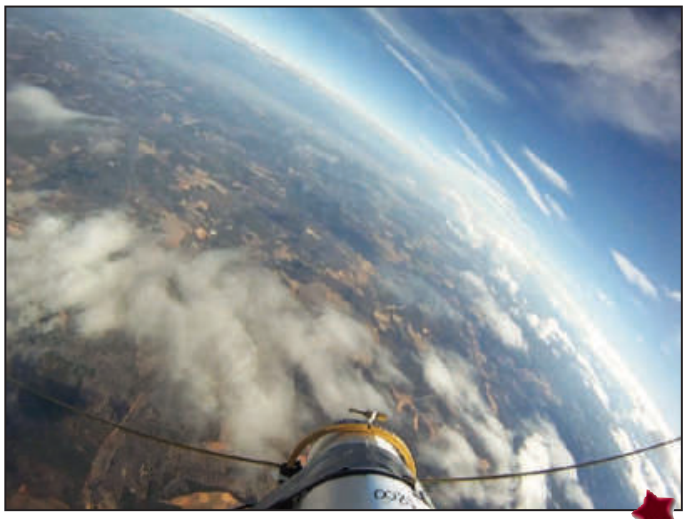
Steve Ford, WB8IMY, is the Editor of *QST*. You can contact him at **sford@arrl.org**.

2012 *QST* Video Contest Winners

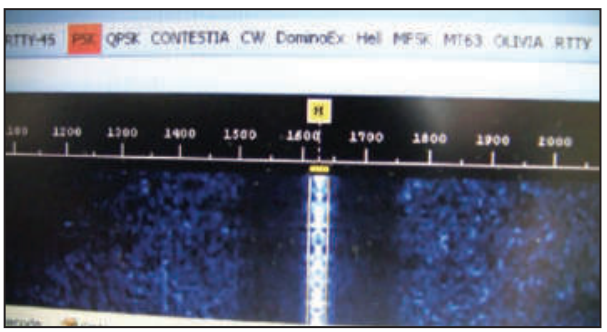
The votes have been tallied and the winners chosen!

Steve Ford, WB8IMY, *QST* Editor

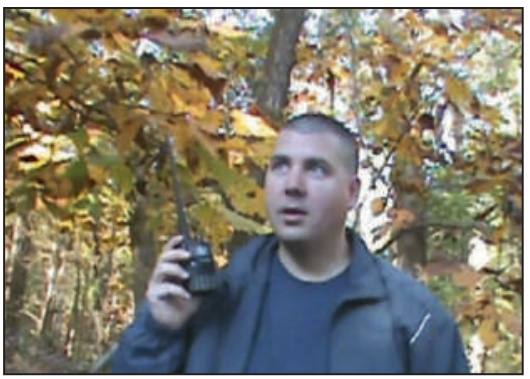
In mid-April the *QST* editorial and production staff took their seats in a darkened room at ARRL Headquarters. The doors closed and an LCD projector whirred to life. In front of each person was a voting form and a pen. Their assignment was to view and judge the qualifying entries for the 2012 *QST* Video Contest.



First Place, Amateur: Erin King, AK4JG
Erin, along with her mentor and members of the Columbus Georgia Amateur Radio Club, sent a weather balloon and a high-definition video camera to an altitude of over 90,000 feet. They tracked the balloon across the Georgia countryside using APRS and managed to recover the payload from the branches of a towering pine tree. The resulting video is nothing short of spectacular.



Second Place, Amateur: Jim Wright, N2GXJ
Jim's video, "Discovering the Fun" does an outstanding job of capturing the thrill of obtaining an Amateur Radio license and then discovering the pleasures of HF digital operating with PSK31. When Jim unfurls his ARRL DX Century Club certificate at the end of the video, you can't help but smile.



Third Place, Amateur: Jared Gohlke, N4JMG
Jared chronicles a Rowan Amateur Radio Society transmitter hunt among the woods and cotton fields of North Carolina. The result is both informative and humorous. After watching this video you may want to try a "foxhunt" of your own!

Professional: Gary Pearce, KN4AQ
Gary Pearce, KN4AQ, is a professional videographer and the creative force behind Amateur Radio Video News (ARVN) at **http://arvideonews.com/**. Gary took his equipment and crew to the 2012 Orlando Hamcation for a glimpse of one of the most popular Amateur Radio gatherings in the southeastern United States.

It wasn't an easy task. We received nearly 30 entries and many were top notch. It was obvious that the authors had put a great deal of effort into their creations.

But in the end there could be only four prize winners:

1st place, amateur: $500

2nd place, amateur: $250

3rd place, amateur: $100

Professional: $500

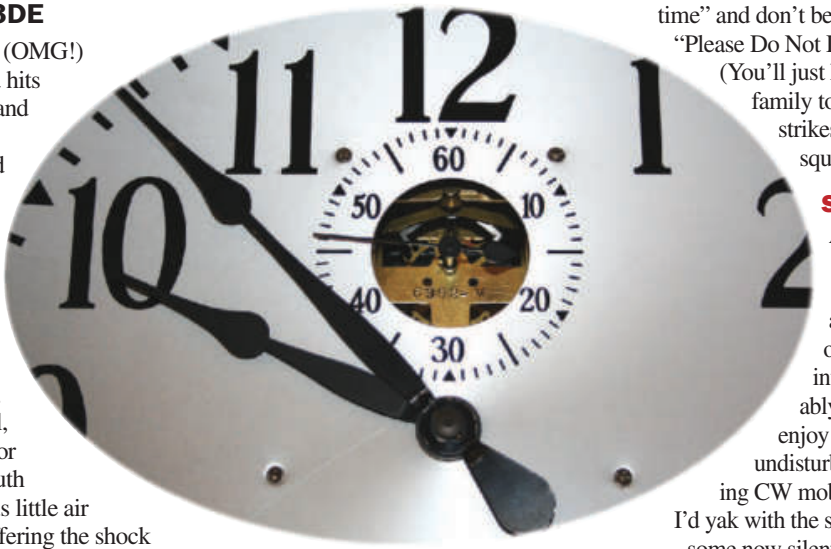
If you receive the digital version of *QST*, you can click on the images and enjoy the winning videos right away. Otherwise, see the winners on the ARRL Web at **www.arrl.org/winners**.

Making Time for Ham Radio

Baby, baby, baby you're out of time.

Rick Lindquist, WW3DE

Over the nearly half century (OMG!) since the Rolling Stones had hits with "Time is on My Side" and "Out of Time," time-saving technology has let us expand our increasingly complex schedules to fill those salvaged seconds, minutes and hours. But, is time on *your* side when it comes to ham radio? Handling a barrage of calls, texts and mostly meaningless e-mails, picking up the kids at school, shopping, taking the car in for service and coaching the youth soccer league leaves precious little air time for the ham already suffering the shock of $4-plus gasoline. While you're juggling such personal and work-related tasks, the hours and days swoosh by!



[Rick Lindquist, WW3DE, photo]

Experts at the Mayo Clinic say that effective time management lets you get more done in less time and is better for your health. A little on-the-air sojourn just might relieve the stress. You can adapt some commonsense time-management tips, so you're not out of time for ham radio.

Plan and Prioritize

"The best-laid schemes o' mice an' men gang aft agley," wrote Scottish poet Robert Burns. Keeping a calendar or running schedule of activities does help you to focus. Spelling it all out makes it easier to see where you might pencil in some time for hamming. Assuming you really *want* to operate and just never seem to get around to it, this might work for you.

While plotting your day, list your priorities. Is there something you might be able to do without? How about attaining that next level of "Angry Birds" or sucking down that triple latte at the coffee shop?

Set objectives. Aiming for DXCC (or Honor Roll)? Maybe you're trying to work all 40 CQ zones (WAZ) or 3000+ US counties, trying to set a new "Miles per Watt" record or angling to slip in a few minutes of chat time with old friends. Each particular activity may not only define its own priority but a most-likely time of day. If you're trying to grow your DXCC entity count in Oceania on the low bands, getting on right around sunrise may work best.

Even retirees need to think about what makes the most sense in terms of budgeting time on the air. While some just prefer to ragchew endlessly on 75 (not that there's anything wrong with that), others have, like, *lives*, not to mention ham radio goals. Having something to shoot for often is the best incentive to get on the air, and it can make your operating far more memorable.

A little on-the-air sojourn just might relieve the stress.

Decide What You Really Want to Do

Time management gurus suggest saying "no" to nonessential tasks. For the time-starved ham, this might translate into time-shifting that TV show, so you can work the hottest DXpedition. Delegate the dog walking, cat box cleaning, car washing or lawn mowing to a "subordinate." Efficiency experts suggest working on your *least* favorite activity for a set period. For example, spend just 10 minutes trying to break that DX pileup before moving on to something more gratifying. Return to it later when the crowd starts to thin and the "DX police" have scattered.

Cut the Static

With only so many minutes in a day or week to get on the radio, you not only need to consider how you'll spend that time, but how to make the most of it. Limit distractions. Let family members know you need some "me time" and don't be shy about posting a "Please Do Not Disturb" sign on the door. (You'll just have to trust the rest of the family to let you know if disaster strikes while you're beeping or squawking away.)

Stick to a Schedule

A good friend of mine gets on the air at roughly the same time each evening for a set period, just to ragchew on CW. His wife has bought into this plan, so he's reasonably certain that he'll be able to enjoy the hobby undistracted and undisturbed. For years when operating CW mobile during my commute, I'd yak with the same gang of old timers — some now silent keys — who still gather daily. You too can take ham radio with you and fit in some operating time on the fly or even on vacation.

Time-managing your hamming doesn't need to suck *all* the spontaneity out of it. Take advantage of serendipitous occasions when ham radio becomes the obvious better choice. If, say, Snooki or any of the Kardashians pop up on TV or you planned to mow the yard, but it rained overnight, these are perfect occasions for firing up the rig.

Be Ready

An extension of wise time management is making sure all systems are "go" when you're ready to flip that power switch. You may need to schedule additional time blocs to swap out that flaky feed line or to replace the faulty low-pass filter in your transceiver (you *did* order one, right?) Be sure you're not over-tired or getting out of shape. Consider that a better use of your time might be a brisk walk or jog. These might not constitute operating *per se*, but routinely postponing such necessary adjunct activities might put you off the air altogether.

Remember: You can't create minutes, but you *can* change your behavior. Okay, now I gotta set time aside for 40 meters, but first I need to make it out of the "Poached Eggs" level of "Angry Birds."

Rick Lindquist, WW3DE, is the managing editor of *National Contest Journal*. He can be reached at **ww3de@arrl.org**.

2011 Simulated Emergency Test Results

Mike, KT1Q, maintains contact on the K1SV repeater (145.835 MHz) from Carpenter Hill in Bennington, Vermont, as part of District 5's SET. [photo courtesy Robin Conway, N1WWW]

A toxic cloud, winter winds and wildfires bring realism to SET "disasters."

Steve Ewald, WV1X

The 2011 ARRL Simulated Emergency Test again demonstrated that Amateur Radio operators are prepared to provide an effective and efficient response to emergencies — whatever they are and whenever they occur.

The following summaries are representative of the many detailed reports we received. These stories — and the statistical reports that follow — help demonstrate your overall commitment to emergency communications as an individual Amateur Radio operator. It also includes all who are active members and leaders of the ARRL Field Organization, ARES®, RACES, SKYWARN, National Traffic System and many other allied groups who have been called to serve.

A Beautiful Day for a Science Fair

Ronald Huss, KC8YVF
EC, Saginaw Co, Michigan

It's a beautiful Saturday morning in October as the chemistry department from the local high school in Saginaw, Michigan, prepares for a community exhibit and fair. Dozens of parents and students arrive just before 10 AM and congregate in the cafeteria. The exhibits show many projects the students have worked on during the semester and everyone is enjoying the day.

Some of the students are performing a live demonstration when something goes wrong. The chemicals overheat and an explosion sends a cloud of gas throughout the cafeteria. Many people, overcome by fumes, began collapsing on the floor. Some make it out of the building gasping for air, an emergency alarm is sounded and 911 is called.

Within moments, the first police officer arrives and is overcome by the fumes. As additional police, fire rescue units and the hazmat team arrive, the evacuation and decontamination of the victims begins. The local hospitals are notified of the number of victims and the EOC is activated to coordinate the efforts. Buses are brought in to transport the walking wounded to the hospitals. Amateur Radio is requested.

Ron Huss, KC8YVF, EC of Saginaw County ARES, begins the call-up and members of the ARES team report to the Red Cross. Assistant EC Dave, N8ERL, assigns operators to the incident scene, hospitals, EOC and other locations to provide communications and tracking of the buses. The health department is contacted to analyze the effects of the chemical exposure and advise the hospitals.

As the buses arrived at one local hospital, two students disappear and are feared lost in a nearby wooded area. A police search and rescue team is dispatched to the scene. Amateur Radio provides search communications. The search locates one student nearby. As darkness falls, the command center receives a message that the second student has been located.

The simulated emergency exercise took place over a 2 day period. It involved over 20 Amateur Radio operators from both Saginaw and Midland counties and many local served agencies. Saginaw County ARES serves a community of 200,000 residents and is supported by the Saginaw County Emergency Management department and the Saginaw County Emergency Preparedness council.

2011 SET Top Ten

Section	Points
ARES Activity	
Georgia	5878
Alabama	3054
Wisconsin	2933
Michigan	2767
South Texas	2588
Ohio	1687
Indiana	1540
Connecticut	1465
Western Pennsylvania	1318
Southern Florida	1076
Section/Local Nets	
Wisconsin	1984
Georgia	1845
Connecticut	1779
Ohio	1149
Michigan	661
Southern Florida	554
Western New York	461
Vermont	366
Western Pennsylvania	302
West Virginia	292

Winter Blast Exercise

Marina Zuetell, N7LSL
Assistant Section Emergency Coordinator, Western Washington Medical Services Communications

The "Winter Blast" scenario was designed to test response plans for inclement weather events. It focused on issues related to snow, transportation, power outages and reverse surge. Most hospitals in King County (Washington State) participated in the exercise and supported the King County Healthcare Coalition at a regional level.

On October 18, 2011, at 7 PM, the scenario began with a storm front hitting the Pacific Northwest. It brought winds up to 50 mph and below freezing temperatures. It had been raining for several days and snow was expected as well as power outages throughout the Puget Sound area. By 8 PM, winds reached 60 mph and 30% of the county was without power with several hospitals using generators.

During the exercise, 29 Amateur Radio operators supported 10 hospitals, the Puget Sound Blood Center, the Crisis Clinic and the Seattle EOC. The radio message traffic was very good at those hospi-

George Deaton, N8NPW, operates from the Red Cross EOC in Saginaw to support the chemical explosion drill. [photo courtesy Ronald Huss, KC8YVF]

tals that were participating. The equipment all seemed to work fine and the equipment inventory (which was one of the event's objectives) was mostly successful.

Wildfire SET

Hubbard H. Harvey, Jr, N4HUB, EC, Jefferson County

In Jefferson County, Alabama, the winds were strong, but the sky was blue as people tried to put the horror of April 27, 2011 storms out of their minds. After all, this was no ordinary Saturday. October 1, 2011, was to be a day without the sounds of chainsaws, heavy equipment and carpenters rebuilding neighborhoods. The universities of Alabama and Auburn's football teams were playing on national television that afternoon. Like many others, Jim was spending the weekend relaxing at Tannehill State Park in Southwestern Jefferson County, dreaming of another BCS Championship for Alabama. As his mind wandered, he didn't notice the ember blown from his campfire into the nearby woods.

The low humidity of an unusually dry fall combined with drought conditions to create the perfect storm. As the fire quickly got out of hand, the Jefferson County Emergency Management Agency and local public safety crews responded. With winds reaching 40 mph, the simulated fire quickly spread north and east into the area of dry trees left by the April 27 storms. The projected course of the fire took it directly into some of the most populated areas of Bessemer and Birmingham. Jefferson County ARES (JeffCoARES) Amateur Radio volunteers were prepared and responded immediately as critical communications infrastructure became inoperable. As the fire destroyed homes and businesses, it also cut off major roadways, limiting the ability of first responders to get ahead of the raging inferno. ARES leadership worked with the State Forestry Commission and numerous disaster relief agencies to coordinate staging areas for equipment and supplies.

Southern Baptist Disaster Relief deployed feeding units, chain saw teams and others to church staging areas outside the projected path of the wildfire. Amateur Radio operators deployed to each of these locations to provide communications to the effort. Local community centers, such as fire stations, churches, schools, etc, became makeshift shelters (for people and pets), supply depots and centers for reliable communications through ARES.

The Healthcare Community Amateur Radio Club (HCARC) provided their station at UAB Hospital (University of Alabama at Birmingham) to serve as the Emergency Communications Center. JV Martin, W4JVM, JeffCoARES AEC and David Gillespie, W4LHQ, AEC served as net control stations from this location. Alex Davies, W4AVD, AEC, deployed to the Jefferson County EMA/EOC. The Birmingham Amateur Radio Club (BARC) provided equipment, repeaters and personnel. The Sylvan Springs Amateur Radio Club (SSARC), Cahaba Radio Club and the North Shelby Baptist Church Disaster Relief Ministry (NS4BC) all provided much needed operators and equipment. When the day was done, over 100 ARES volunteers had provided communications support to over 80 served agencies in 82 communities. Thankfully, the Jefferson County ARES Wildfire SET 2011 was just a drill.

2012 SET On the Schedule

October 6-7, 2012, is the main weekend for this year's SET, although many sections and local Emergency Coordinators have the option of conducting their exercises on a different date, if needed. Please contact your local ARRL Field Organization leaders to find out specific dates, times and potential plans for the Simulated Emergency Test in your area. Thank you!

For an explanation of SET scores, log onto **www.arrl.org/public-service-field-services-forms** and click on SET SCORE CARD.

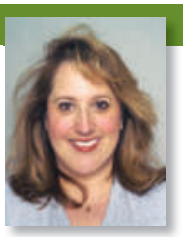
ARES Activity

Area	Reporter	Points	Section Points
Atlantic Division			
Eastern Pennsylvania			**915**
Montgomery Co	NE3I	915	
Maryland-DC			**161**
Anne Arundel Co	N3SEO	161	
Southern New Jersey			**249**
Cumberland Co	N2MHO	185	
Atlantic Co	N2JVM	64	
Western New York			**286**
Chenango Co	K2DAR	286	
Western Pennsylvania			**1318**
Cambria Co	K3WS	272	
South Zone, Dist 2	KA3UDR	262	
Erie Co	WX3E	230	
Beaver Co	N3TN	108	
Indiana Co	KB3JOF	94	
McKean Co	KB3SVH	92	
Blair Co	KA3EJV	91	
Huntington Co	N3OGT	91	
Washington Co	N3IDH	78	
Central Division			
Illinois			**507**
Will Co	N9JH	125	
Lake Co	K9DRW	115	
Hancock	KA9FAG	112	
Williamson	WA9APQ	96	
Piatt Co	KA9SZW	59	
Indiana			**1540**
Wayne Co	W1IDX	235	
Vanderburgh Co	WB9EFH	218	
Tippecanoe Co	N9GKE	210	
Clark Co	N9TV	170	
Allen Co	KB9WWM	113	
Howard Co	N9LRO	109	
Gibson	N9LJA	95	
Starke Co	KC9ISJ	81	
Hamilton Co	WAØJTL	79	
Whitley Co	KA9HLE	71	
Jackson	KC9MVK	64	
Harrison	W9WXN	60	
Shelby Co	KB9ZYC	18	
Jennings Co	KC9RLC	17	
Wisconsin			**2933**
Dunn Co	KB9ULF	680	
Racine, Kenosha Co	KB9MMA	644	
Milwaukee	WB9ODQ	222	
Polk Co	KC9NVV	178	
Ozaukee Co	AB9ON	166	
East Central	N9TBM	152	
Jefferson Co	KC9IKI	139	
Brown Co	N8KQS	122	
Douglas Co	WØNWO	115	
Pepin Co	WB9NTO	108	
Fond du Lac Co	W9GPI	106	
Walworth Co	KC9KSN	102	
Washington Co	WB9BVB	87	
Price Co	AG9G	46	
Kewaunee Co #2	W9JFM	44	
Kewaunee Co #1	W9JFM	22	
Richland Co	W9MZ	written report	
Dakota Division			
South Dakota			**569**
Sullivan Co	W1KRT	147	
Pennington Co	WAØVKC	116	
Meade Co	NØMHJ	72	
Custer Co	WØFUI	68	
Lawrence Co	KCØZDA	68	
Butte Co	KGØGG	64	
Yankton Co	WAØGMH	34	
Delta Division			
Arkansas			**93**
Pope Co	W5RZ	93	
Louisiana			**103**
Allen Co	W5ELM	103	
Mississippi			**850**
DeSoto Co	KD5VMV	237	
Lauderdale Co	AE5FE	214	
Jasper Co	WV1Q	160	
Itawamba Co	KB5NMB	129	
Panola Co	KE5WUN	110	
Tennessee			**992**
Jefferson Co	W4DOD	281	
Bradley, Polk Co	KD5UBL	278	
Marion, Sequatchie, Bledsoe Co	KE4IDH	144	
DeKalb Co	KC4GUG	136	
Gibson Co	WØSPZ	84	
District 9	KJ4HKE	69	
Great Lakes Division			
Kentucky			**645**
Hardin Co	W8WN	437	
Jessamine Co	KA3WOD	208	
Michigan			**2767**
Muskegon Co	K8COP	365	
District 8	WW8O	355	
Saginaw Co	KC8YVF	345	
Mecosta Co	KB8TYJ	306	
Allegan Co	AB8SF	274	
Monroe Co	K8MLH	231	

Area	Reporter	Points	Section Points
Branch Co	WB8R	219	
Benzie Co	K8BTE	196	
Grand Traverse Co	K8RCT	178	
Hillsdale Co	KC8RYF	93	
Livingston Co	N8WWX	91	
Ontonagon Co	KC8OCK	80	
Presque Isle	WB8TQZ	34	
Ohio			**1687**
Erie Co	K8HLH	417	
Greene Co	W8LLY	286	
Seneca Co	WB8REI	277	
Huron Co	KB8DNA	175	
Shelby Co	N8KZL	136	
Guernsey Co	W8FHF	134	
Miami Co	WB8PMG	105	
Tuscarawas Co	KD8EKN	80	
Summit Co	AI8P	77	
Hudson Division			
Eastern New York			**116**
Albany Co	K2QY	116	
New York City/Long Island			**516**
Babylon	W2HCB	425	
Huntington	WB2ULA	91	
Northern New Jersey			**208**
Monmouth Co	N2SMV	147	
Englewood	W2CC	61	
Midwest Division			
Iowa			**179**
Mills Co	WØZWV	117	
Des Moines Co	NØEJD	62	
Kansas			**133**
Riley, Clay, Geary Co	WØPBV	133	
Missouri			**382**
Jackson Co	KØUAA	207	
St Louis Co	KCØQMU	175	
Nebraska			**112**
Lancaster Co	KØGND	112	
New England Division			
Connecticut			**1465**
SKYWARN (N CT)	K1SJW	554	
Region 5 DEC	K1DAV	170	
Region 4 DEC	K1EMD	163	
Region 2 DEC	WA1SFH	154	
Region 5 EC	KB1TOR	152	
Region 5 Danbury	W1QH	139	
SKYWARN (E CT)	KB1DGY	66	
Region 3 EC	KB1PRP	36	
Bethel	KD1YV	31	
Maine			**252**
Washington Co	N1DP	131	
Androscoggin	N1OXA	121	
New Hampshire			**419**
W Rockingham Co	KA1UVH	310	
Merrimack Co 3	K1PJS	109	
Mt Washington Valley	KB1IIR	81	
Rhode Island			**101**
South Kingstown	W1XX	101	
Vermont			**372**
District 1	W4YFJ	149	
Bennington Co	N1GWL	68	
Addison Co	N1WWW	55	
District 8	WK1L	34	
Rutland Co	N1UKK	26	
District 2	K3BRJ	22	
District 8	KA1ZQX	18	
Northwestern Division			
Western Washington			**907**
Pacific Co	N7CVW	423	
Dist M, Medical Svcs	N7LSL	270	
Grays Harbor Co	N7UJK	214	
Pacific Division			
Nevada			**134**
Southern Nye Co	KC6ILH	134	
Pacific			**473**
Hawaii Civil Defense	AH6RH	366	
Maui Co	KH6H	107	
Sacramento Valley			**658**
Section wide	WD6FXR	658	
Santa Clara Valley			**554**
Monterey Co	W6DNE	248	
San Mateo Co	W6LJB	201	
San Benito Co	W6TST	105	
San Joaquin Valley			**57**
W Kern Co	W7FYV	57	
Roanoke Division			
North Carolina			**912**
Cleveland Co	K4ZXN	566	
Pitt Co	KG4CZV	211	
Buncombe Co	K4BNP	135	
South Carolina			**368**
Berkeley Co	K4AOC	156	
Anderson Co	N4SZ	117	
Abbeville Co	KL7FO	95	
Virginia			**535**
Prince William	KG4GIY	224	
City of Hampton	KC4F	180	
York Co; Poquoson City	WB4UHC	131	
James City Co	KC4CMR	113	
Norfolk City	W4NMH	107	
West Virginia			**186**
Kanawha Co	KB8YZT	186	
Rocky Mountain Division			
New Mexico			**125**
Santa Fe Co	N4VIP	125	
Wyoming			**54**
Weston Co	KD7ZUP	54	
Southeastern Division			
Alabama			**3054**
Jefferson Co	N4HUB	2166	
Tuscaloosa Co	WS4I	512	
Butler/Lowndes Co	W4WE	211	
Talladega Co	W4LVT	165	
Georgia			**5878**
Hall Co	AA4BA	1924	
N Fulton Co	W4UOC	533	
Crawford Co	WB4NKH	513	
Houston Co	KJ4PEI	349	
Lauren Co	KF5TA	331	
Chatham Co	K4GTM	293	
Clayton/Henry Co	AJ4GT	271	
Gwinett Co	WB4QDX	268	
Thomas Co	N4KXL	265	
Newton Co	WA4UJC	211	
Gordon Co	AF4DN	201	
Butts Co	K3GWK	193	
Washington Co	K4GK	155	
Putnam/Greene Co	KF4EOH	109	
Liberty Co	KT4KH	94	
Troup Co	AD4GS	79	
Morgan Co	KM4LS	53	
Dodge Co	KC5AVR	36	
Northern Florida			**84**
Escambia Co	AJ4NA	84	
Southern Florida			**1076**
Palm Beach Co	WA4AW	554	
Broward Co	KJ4AWB	522	
Southwestern Division			
Orange			**282**
San Bernardino Co	KJ6KMN	163	
Riverside Co	KI6WNF	146	
West Gulf Division			
North Texas			**372**
Wichita Co	KE5KNV	372	
Oklahoma			**233**
Altus	W5DRN	98	
Beckham Co	KA5BSA	91	
Rogers Co	AD5PE	44	
South Texas			**2588**
Travis Co	AC5YK	273	
Travis Co	K5FX	265	
Williamson Co	K5HTK	235	
Arkansas, San Patricio Co	K5BV	215	
Webb Co – Dist 13	KE5CVT	171	
Nueces Co	W2MY	144	
NE Harris Co	KE5MSE	134	
Cameron Co	K5REW	131	
Leon Co	W5UOK	108	
Waller Co	W5KAM	101	
Live Oak Co	W5IM	89	
Burnet, Llano Co	KA5GIL	87	
Galveston Co	WB5UZZ	86	
Harris Co	KE5FGA	80	
Dist 14 – SW	AE5JY	72	
Liberty Co	N5WWS	67	
Bexar Co	K5AUW	65	
Hidalgo Co	N5SIM	64	
Atascosa Co	KF5DZI	52	
Kerr Co	WB2PCV	50	
Jasper Co	K5DDM	42	
Guadalupe Co	N5RXS	28	
Willacy Co	KBØVWG	19	
Dist 10	KW5AS	10	
West Texas			**162**
Brewster Co	N5DO	162	

Section/Local Nets

Area/Net Name	Net Mgr	Points	Section Points
Atlantic Division			
Southern New Jersey			**41**
NJ Phone Net	W2CC	41	
Western New York			**461**
OCTEN	KA2ZNZ	162	
CARES	K2DAR	156	
Western District Net	KB2DQ	109	
NYS/M	WA2IAX	34	
Western Pennsylvania			**302**
Cambria Co	KB3WDN	123	
Regions 1-4	W3KWH	67	
Beaver Co	N3TN	53	
Indiana Co	KB3JOF	33	
Blair Co	KA3EJV	26	
Central Division			
Illinois			**55**
Lake Co	K9DRW	55	
Indiana			**125**
Wayne Co	W1IDX	95	
Harrison Co	W9WXN	30	
Wisconsin			**1984**
Wood Co	N9VC	415	
RCARS	KB9MMA	385	
ARES/RACES Net	W9HDG	246	
Dunn Co	KB9ULF	160	
Polk Co	KK9MC	108	
Badger Emerg Net	WD9FLJ	97	
Eau Claire	W9RLL	84	
OZARES	AB9ON	79	
Jefferson Co	KC9IKI	65	
NW WI ARES/RACES	W9WS	64	
Milwaukee ARES	WB9ODQ	57	
Walworth Co	KC9KSN	52	
Washington Co ARES	AB9VH	52	
Kewaunee Co #2	W9JFM	48	
Brown Co	KC9OIS	42	
Kewaunee Co #1	W9JFM	20	
St Croix Co	N9XYX	10	
Delta Division			
Mississippi			**55**
S Central SKYWARN	WV1Q	55	
Tennessee			**253**
Jefferson Co	K2HYQ	157	
DeKalb Co	KC4GUG	96	
Great Lakes Division			
Michigan			**661**
Saginaw Valley ARA	KC8YVF	187	
MI VHF Tfc	AC8AR	139	
Benzie Co ARPSC	K8BTE	96	
QMN	K8AE	78	
Monroe Co	K8MLH	70	
SEMTN	WB8WKQ	48	
Michigan Digital Tfc	N8FVM	30	
GLETN	K8VFZ	13	
Ohio			**1149**
OSSBN	WB8SIQ	552	
NW OH ARES	N8TNV	165	
ARES/FARA	N8FMJ	137	
Shelby Co	KC6NLX	102	
Huron Co	KB8DNA	100	
Clark Co	N8NSD	57	
Seneca Co	WK8REI	36	
Hudson Division			
Northern New Jersey			**41**
NJ Phone Net	W2CC	41	
Midwest Division			
Kansas			**114**
KS Sideband/ Phone Net	NØKFS	114	
Missouri			**143**
Jackson Co	KØUAA	72	
St Louis Co	KBØH	71	
Nebraska			**102**
E Nebr 2 Mtr	KNØRKY	102	
New England Division			
Connecticut			**1779**
CT Packet, 2	K1HEJ	307	
CT Packet, 1	K1HEJ	254	
WESCON- Special 1	KB1NMO	111	
WESCON-Special 3	KB1NMO	107	
Region 2, Net 1	WA1SFH	96	
Region 2, Net 3	WA1SFH	93	
WESCON	KB1NMO	88	
WESCON-Special 2	KB1NMO	85	
Nutmeg VHF	KB1RGQ	65	
CPN, 1	N1DIO	61	
CPN, 3	N1DIO	61	
CPN, 2	N1DIO	54	
Region 2, Net 2	WA1SFH	53	
Region 2, Resource	K1EIC	53	
Nutmeg VHF, 2	KB1RGQ	52	
CPN, Regular	N1DIO	28	
ECTN, Special	W1MCT	27	
ECTN, 2	W1MCT	21	
ECTN	W1MCT	18	
CN	WA1GGN	14	
Maine			**185**
ME EmComm	K1HZU	185	
New Hampshire			**276**
W Rockingham Co	KA1UVH	145	
Merrimack Co	K1PJS	131	
Vermont			**366**
VEPN	W4YFJ	109	
440 Net	K1WAL	106	
Bennington Co	KB1ODM	38	
VT ARES 40 M	WK1L	34	
Addison ARES 2 M	WA1NRA	32	
Mt Mansfield VHF	W1OKH	28	
VT ARES 2 M	KA1ZQX	19	
Northwestern Division			
Western Washington			**25**
Auxiliary EmComm	W7EOC	25	
Pacific Division			
Pacific			**221**
Hawaii SCN-HF	AH6RH	116	
Hawaii SCD-VHF	AH6RH	90	
Hawaii SCD-UHF	AH6RH	15	
Roanoke Division			
North Carolina			**196**
Shelby ARC VHF	N4HAW	196	
West Virginia			**292**
Kanawha ARES	W8GT	292	
Southeastern Division			
Alabama			**80**
Talladega Co	KI4TEC	80	
Georgia			**1845**
ARES Statewide HF	K4GK	1546	
Easter Co	W4WQK	141	
SCARC POD	AF4FS	87	
Newton Co	WA4UJC	71	
Southern Florida			**554**
Palm Beach Co	WA4AW	554	



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FCC Now at Full Strength

With the addition of Jessica Rosenworcel and Ajit Pai, the Commission is now at its full complement of five commissioners.

Six months after President Barack Obama nominated Jessica Rosenworcel and Ajit Varadaraj Pai to the Federal Communications Commission, the Senate confirmed their appointments on May 7. Rosenworcel, a Democrat, fills the seat vacated by Michael Copps, who retired from the Commission earlier this year; her term runs through June 30, 2015. Pai, a Republican, replaces Meredith Attwell Baker, who left the FCC in June 2011; his term runs through June 30, 2016.

FCC Commissioner Jessica Rosenworcel

Rosenworcel and Pai were sworn into office on May 14 by FCC Chairman Julius Genachowski, bringing the Commission to its full strength for the first time since the summer of 2010. Their nominations had been held up since December 2011 in an unrelated dispute between the FCC and Senator Chuck Grassley (R-Iowa) over agency approval of LightSquared's wireless application. When Grassley received the sought-after documents two weeks ago, he lifted a hold on the nominations.

The FCC had been down two commissioners since Baker and Copps left the Commission, leaving the agency with only three: two Democrats and one Republican. Only three sitting Commissioners may be members of the same political party. Until the arrival of Rosenworcel and Pai, Chairman Genachowski and Mignon Clyburn were the only Democrats, while Robert McDowell was the lone Republican.

"I want to congratulate Ajit Pai and Jessica Rosenworcel on their Senate confirmation and welcome them to the Commission," said FCC Chairman Genachowski in a written statement. "They bring deep knowledge of our sector and proven track records of accomplishment. President Obama made an outstanding choice in their nominations, and I look forward to working with them."

Rosenworcel is the Senior Communications Counsel for the US Senate Committee on Commerce, Science, and Transportation, working for Senator Jay Rockefeller IV since 2009, and previously for Senator Daniel K. Inouye from 2007-2008. Before joining the Committee, she worked at the FCC from 1999-2007, serving as Legal Advisor, and then Senior Legal Advisor to Commissioner Copps (2003-2007), Legal Counsel to the Bureau Chief of the Wireline Competition Bureau (2002-2003) and as an Attorney-Advisor in the Policy Division of the Common Carrier Bureau (1999-2002). From 1997-1999, Rosenworcel was a communications associate at Drinker Biddle and Reath. She received a BA from Wesleyan University and a JD from New York University School of Law.

FCC Commissioner Ajit Pai

Pai is a partner in the Litigation Department of Jenner & Block LLP. Immediately prior to joining Jenner & Block, he worked in the Office of the General Counsel at the FCC where he served as Deputy General Counsel, Associate General Counsel and Special Advisor to the General Counsel. Previously, Pai served as Chief Counsel to the US Senate Judiciary Committee's Subcommittee on the Constitution, Civil Rights and Property Rights, and as Senior Counsel at the Office of Legal Policy at the US Department of Justice. Pai also served as Deputy Chief Counsel to the US Senate Judiciary Committee's Subcommittee on Administrative Oversight and the Courts, and as Associate General Counsel at Verizon Communications. He began his career as a law clerk to Judge Martin L.C. Feldman of the US District Court for the Eastern District of Louisiana, and then as an Honors Program trial attorney in the Telecommunications Task Force at the Antitrust Division at the Department of Justice. Pai holds a BA from Harvard University and a JD from the University of Chicago.

Some ARRL Card Checkers Can Now Check Cards for 160 Meters, Deleted Entities

Acting on a recommendation by ARRL Membership and Volunteer Programs Manager Dave Patton, NN1N, the ARRL's Programs and Services Committee (PSC) adopted new rules for ARRL field card checkers. ARRL card checkers now may check QSL cards for those entities deleted from the DXCC list and those who hold 160 Meter DXCC can check cards for 160 meters. In addition, the PSC decided not to change the process by which card checkers are appointed.

Prior to April 16, 2012, these cards could only be checked at ARRL Headquarters. According to Patton, the reason for this was that some QSL cards for 18 MHz can be altered to show 1.8 MHz without the alteration being detected, making the time of the QSO significant. Some cards for deleted entities date back prior to 1960, making it difficult, at times while in the field, to determine for which entity the card ought to count. Deleted entities do not count for the DXCC Challenge or for the Honor Roll, but do count toward all-time totals.

Old rule [Section IV, Rule 1 (a)]:

1. Entities Eligible for Field Checking:

a. All current entities dating back to November 15, 1945 can be checked. Cards for deleted entities and cards indicating

160 meters must be submitted to ARRL HQ.

New rule [Section IV, Rule 1 (a)(i-iv)]:

1. Entities Eligible for Field Checking:

a. All entities dating back to November 15, 1945 can be checked as follows:

i) Cards for deleted entities may be checked by all DXCC card checkers.

ii) If the DXCC card checker cannot determine the entity of a QSL for a QSO with a deleted entity, the card checker may photograph both sides of the card and e-mail those images to the DXCC desk for final entity determination. The card checker must certify on the application that those images are made by him/her and are a true representation of the card. HQ will assign the final entity name as determined to the applicant's DXCC.

iii) Cards for 160 meters may be checked by DXCC card checkers who have themselves earned DXCC on 160 meters. Those card checkers who do not have 160 meter DXCC may not check cards for QSOs on 160 meters.

iv) All other bands (other than 160), modes and all entities may be checked by all DXCC Card Checkers.

Benefits of these rules changes include:

- Further improvement in member/customer service at ARRL Headquarters.
- Improvement in applicants' experience with DXCC participation.
- Improvement in QSO-validity review by allowing experienced DXers who are card checkers to review the 160 meter data.
- Enhancement of the use and value of the new Online DXCC web tool.

"These new rules are a good step forward for the DXCC field card checking program," said ARRL Delta Division Director and PSC Chairman David Norris, K5UZ. "It will add additional flexibility to the program and increase the value of the services that we provide to our members. In the past, it has been difficult for hams with QSL cards for 160 meters to get their cards checked. Now that card checkers can check cards for 160 meters in the field, the DXCC program should see an increase in the number of confirmed 160 meter QSOs."

FCC News

FCC Seeks Higher Vanity Call Sign Fee

The FCC released a *Notice of Proposed Rulemaking* on May 4, seeking to raise the fee for Amateur Radio vanity call signs. Currently, a vanity call sign costs $14.20 and is good for 10 years; the new fee, if the FCC plan goes through, will go up to $15 for 10 years, an increase of 80 cents. The FCC is authorized by the *Communications Act of 1934 (as amended)* to collect vanity call sign fees to recover the costs associated with that program.

The vanity call sign fee has fluctuated over the 14 years of the current program — from a low of $11.70 in 2007 to a high of $70 (as first proposed in the FCC's 1994 *Report and Order*). The FCC said it anticipates some 14,300 Amateur Radio vanity call sign "payment units," or applications, during the next fiscal year, collecting $214,500 in fees from the program.

The vanity call sign regulatory fee is payable not only when applying for a new vanity call sign, but also upon renewing a vanity call sign for a new term. The first vanity call sign licenses issued under the current Amateur Radio vanity call sign program that began in 1996 came up for renewal six years ago. Those holding vanity call signs issued prior to 1993 are exempt from having to pay the vanity call sign regulatory fee at renewal, as Congress did not authorize the FCC to collect regulatory fees until 1996. Such "heritage" vanity call sign holders do not appear as vanity licensees in the FCC Amateur Radio database.

Amateur Radio licensees may file for renewal only within 90 days of their license expiration date. All radio amateurs must have an FCC Registration Number (FRN) before filing any application with the Commission. Applicants can obtain an FRN by going to the ULS and clicking on the "New Users Register" link. You must supply your Social Security

Heathkit Educational Systems Closes Up Shop

For the second time since 1992, Heathkit Educational Services (HES) has shuttered its doors. Rumors of the legendary kit-building company's demise were posted on QRZ.com, with several readers bringing the news to the attention of the ARRL. In August 2011,

Heathkit announced it was returning to the kit building business, and in September, that it would once again be manufacturing Amateur Radio kits. The ARRL tried to reach Heathkit to confirm that the company is still in business, but their phone and fax numbers have a continuous busy signal, and e-mails to the company have gone unanswered.

On LinkedIn, a popular networking site, HES Chief Executive Officer Lori Marciniak listed her employment ending at Heathkit as of March 2012. While, Heathkit's Marketing and Sales Director Ernie Wake listed his employment ending in April 2012. An unsubstantiated report on Wikipedia states that "[in] December 2011, Heathkit Educational Systems laid off most employees and in March 2012, the company indefinitely suspended operations."

Tom Ferriter, of Technical Education Products, was an outside sales representative for HES, based in Hampden, Massachusetts. "Heathkit is telling us that they have temporarily closed, but that they are hopeful that they will be able to reorganize," he told the ARRL. "While they're not telling us too much, they did say that they were having poor sales for a myriad of reasons and are hopeful that they will be able to refinance the company and negotiate with the bank to refinance some of the debt."

BSA to Offer Morse Code Interpreter Strip

For many years, Boy Scouts and Scouters have been able to earn an interpreter strip to wear on their uniforms. This strip — worn on the uniform above the right pocket — denotes proficiency in a foreign language or sign language. Each language has its own strip (with the name of the language embroidered in that language), and some Scouts and Scouters wear more than one strip. Now those hams involved with the Boy Scouts can show their proficiency in Morse code with a Morse code interpreter strip (with M-O-R-S-E spelled out in Morse code).

According to BSA Director of Communication Services Jim Wilson, K5ND, the idea for a Morse code interpreter strip came about during meetings preparing for the 2012 Jamboree on the Air (JOTA). "One of the ideas presented was a variation on an interpreter strip for Morse code," Wilson told the ARRL. "We played around with it a bit and then approached the BSA Awards Committee with the idea. They liked it, so we decided to explore the idea a bit more. We looked at the existing requirements for interpreter strips to see how they could be adapted for code. The BSA approved the strip in April, but we decided to wait until the strips were available before we announced it." Wilson also serves as the BSA's National JOTA Organizer and is President and Trustee of K2BSA, the BSA Headquarters Amateur Radio station in Texas.

The requirements to earn the Morse code interpreter strip are in line with the requirements of interpreter strips for other languages:

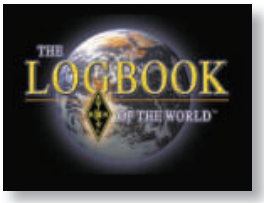
- Carry on a five-minute conversation in Morse code at a speed of at least five words per minute, and
- Copy correctly a two-minute message sent in Morse code at a minimum of five words per minute. Copying means writing the message down as it is received, and
- Send a 25 word written document in Morse code at a minimum of five words per minute.

"Together, Amateur Radio and Boy Scouting is a wonderful thing," Wilson told the ARRL. "The new Morse code interpreter strip is a nice recognition of the special skill of Morse code and its use in emergency communications. From my perspective, the strip gives us more buzz on things happening in Amateur Radio. In the past couple of decades, the BSA has seen a tremendous increase in the number of Radio merit badges that have been awarded. In 1991-2000, we awarded 20,000 Radio merit badges. But in 2001-2010, we awarded 54,000! The interest in this badge has grown by leaps and bounds, indicating not only a keen interest in the art and science of radio, but in technology, too."

Beginning with the 2013 National Jamboree, Wilson said that they will be teaching the Radio merit badge in four hours: "We will be teaching the badge every hour, on the hour. Scouts will spend 90 minutes in a classroom environment, 30 minutes on the air and then back to the classroom for another 90 minutes. In four hours, they will have their badge." K2BSA has operated at every National Jamboree since 1977 and will be at the 2013 National Jamboree at the Summit Bechtel Reserve in West Virginia.

"The sole purpose of any interpreter strip is to serve as an immediate, visual cue to others that the wearer is able to perform as an interpreter when needed, not to award the ability to converse in another language," Wilson explained. "This is also why it is placed on the uniform near the nameplate. When you wear the strip, whether it says Español, Français, Italiano, Signing or Morse, a Scout or Scouter is showing to the world that he or she has that proficiency to be tapped as an interpreter when needed."

Logbook of The World Marks 50,000 Users



On May 1, Dragan Pavlovic, YT3PDT, completed his registration process for Logbook of The World (LoTW), becoming the 50,000th person to take advantage of the ARRL's online QSL confirmation system. According to ARRL Membership and Volunteer Programs Manager Dave Patton, NN1N, there are more than 3500 individuals from outside the US in the process of obtaining a digital certificate, and more than 1800 individuals inside the US who have started the certificate process, but not yet finished.

"Radio amateurs around the world consider LoTW to be the 'must have' awards and electronic confirmation system," Patton said. "We look forward to planned improvements and upgrades, and we are gratified that so many people have helped the system grow and become more and more useful."

Section Manager Nomination Notice

To all ARRL members in Eastern Massachusetts, Missouri, Nebraska, New York City/Long Island, Northern New York, South Carolina, Southern New Jersey, West Central Florida, and Western Pennsylvania: You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. It is advisable to have a few more than five signatures on each petition. A sample nomination form is available on the ARRL website at **www.arrl.org/section-terms-nomination-information**. Nominating petitions may be made by facsimile or electronic transmission of images, provided that upon request by the Membership and Volunteer Programs Manager, the original documents are received by the Manager within seven days of the request.

We suggest the following format:

(Place and Date)

Membership and Volunteer Programs Manager, ARRL
225 Main St
Newington, CT 06111

We, the undersigned full members of the _____ ARRL Section of the _____ Division, hereby nominate _____ as candidate for Section Manager of this Section for the next two-year term of office.

(Signature___ Call Sign___ City___ ZIP___)

Any candidate for the office of Section Manager must be a resident of the Section, an Amateur Radio licensee of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a nominating petition. Petitions must be received at Headquarters by 4 PM Eastern Time on September 7, 2012. If more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before October 1, 2012, to full members of record as September 7, 2012, which is the closing date for nominations. Returns will be counted November 20, 2012. Section Managers elected as a result of the above procedure will take office January 1, 2013.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 2013. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the January 2013 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Membership and Volunteer Programs Manager. — *David Patton, NN1N, Membership and Volunteer Programs Manager*

Call for Nominations for ARRL Director and Vice Director

Attention: Full ARRL members in the Central, Hudson, New England, Northwestern, and Roanoke Divisions! You have the opportunity and duty to choose a director and a vice director to represent you for three-year terms beginning January 1, 2013.

The ARRL is governed by its Board of Directors. A voting director is chosen by ballot by the full (licensed) members in each of the 15 ARRL divisions. Vice directors, who serve in the absence of the director from a Board meeting and succeed to the position of director should a vacancy occur, are chosen at the same time. Elections are held in five divisions per year. It only takes 10 full members in a division to nominate a candidate for either office.

This year for the first time, ARRL members in divisions where there are contested elections **will be able to vote electronically**. Members with valid email addresses in their membership Profiles will be sent instructions on how to vote by email. Members without email addresses or whose emails bounce, or who request a paper ballot, will be sent a ballot by postal mail as in the past. Additional information will be provided later in *QST* and on the ARRL website.

Qualifications

The eligibility of nominees for the positions of ARRL director and vice director will be reviewed by the Ethics and Elections Committee, composed of three directors not subject to election this year: Greg Widin, K0GW (chair), Bob Vallio, W6RGG, and Bill Edgar, N3LLR. A nominee must be at least 21 years old and must have been licensed and a full member of the ARRL for a continuous term of at least four years immediately preceding nomination. Each nominee must provide information concerning his or her employment, ownership and investment interests, and other financial arrangements so the Committee can determine whether the nominee has a pervasive and continuing conflict of interest that would render him or her ineligible to serve (see Article 12 of the ARRL Articles of Association and Bylaw 45, available at **www.arrl.org/general-information**).

The qualifications for director and vice director are identical. All the powers of the director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve.

Nomination Procedure

Step 1: Obtain official nominating petition forms. Any full member residing in a division where there is an election may request an official nominating petition package. The request must reach the ARRL Secretary *no later than noon EDT on Friday, August 10, 2012.* If you are seriously considering running or nominating someone to run, don't wait until the last minute to request the forms; the deadline for submitting a completed petition form is just one week later.

Step 2: Obtain signatures and complete questionnaire. Only the official form may be used. The petition form has two sides. To be valid, a nominating petition must name the candidate and must bear the signatures of 10 full members of the division. The candidate must complete the other side, providing the information required to determine eligibility, certifying its accuracy, and agreeing to assume the office if elected.

Step 3: Submit petition form. The completed form must reach the Secretary *no later than noon EDT on Friday, August 17, 2012.* The submission may be made by facsimile or electronic transmission of images (i.e. a PDF or JPEG attachment to an email) provided that upon request, the original documents are received by the Secretary within seven days of the request. A person who is nominated for both director and vice director may choose to decline the nomination for director; otherwise the nomination for director will stand and that for vice director will be void.

On Monday, August 20, 2012, the Secretary will notify each candidate of the name and call sign of each other candidate for the same office. Candidates then will have until Friday, August 31, 2012 to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

Balloting

If there is only one eligible candidate for an office, he or she will be declared elected by the Ethics and Elections Committee. If there is more than one eligible candidate for an office, the full members in that division who are in good standing as of September 10, 2012 will have the opportunity to cast ballots. Balloting will begin no later than October 1, 2012 and will conclude at noon Eastern Time Friday, November 16, 2012. The candidate receiving the most votes will be declared the winner.

Members who are eligible to vote and for whom the ARRL has a valid email address will be sent instructions on how to vote electronically. All other members who are eligible to vote will receive ballots by USPS. The election will be conducted by Survey & Ballot Systems of Eden Prairie, MN, which has more than 20 years of experience with association elections. Whether cast electronically or on paper, all votes will be by secret ballot. A representative of the Ethics and Elections Committee will be present to observe the tabulation of results.

Absentee Ballots

A full member who is residing temporarily outside his or her home division, including overseas, may arrange to vote in the home division by notifying the Secretary prior to September 10, 2012, giving their current mailing address as reflected in the ARRL membership records (i.e. *QST* mailing address) and the reason why another division is considered home. Members with overseas military addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal addresses.

The Incumbents

The incumbent directors and vice directors, respectively, in the five divisions in which elections will be held this year are:

Central: George R. Isely, W9GIG and Kermit Carlson, W9XA

Hudson: Joyce Birmingham, KA2ANF and William Hudzik, W2UDT

New England: Tom Frenaye, K1KI and Mike Raisbeck, K1TWF

Northwestern: Jim Fenstermaker, K9JF and Grant Hopper, KB7WSD

Roanoke: Dennis Bodson, W4PWF and Dr. James Boehner, N2ZZ

For the Board of Directors:
May 11, 2012
David Sumner, K1ZZ
Secretary

Rick Palm, K1CE, k1ce@arrl.org

ARES®, EmComm and Mental Health Risks

Emergency work can have life-changing effects.

Some of the following may be as difficult for you to read as it is for me to write. I've never discussed the events of 1978 and their impact on my life with anyone until now. Thirty-four years ago I was an idealistic, impressionable, indeed vulnerable student at the University of Lowell (now the University of Massachusetts) and a radio amateur of only 2 years. My operating time was limited owing to college demands, but I found joy on my morning and afternoon commutes to and from campus in ragchewing with friends on Boston's venerable 146.04/64 MHz repeater.

It was the home repeater of the zany, loosely organized Heavy Hitters, a diverse consortium of mostly young hams who held a traffic net at 10:30 every night and then jabbered away well into the wee hours. It was an innocent time of no cares in the world, with our whole lives ahead of us. My priorities were coeds, friends, beer, ham radio and, last and least, classes and studying.

Ham radio operators provided communications support for multiple jurisdictions and disciplines...

It happened on an Indian summer day in the fall of 1978, with the leaves starting to turn their rustic colors at the onset of the glorious foliage season. It was a day like any other, when an announcement came over the repeater that a massive search effort was underway in the rural town of Webster, Massachusetts, on the shore of, and this is no joke, Lake Chargoggagoggmanchaugga-goggchaubunagungamaugg. Ham radio operators were needed to provide communications support for multiple jurisdictions and disciplines, including being imbedded with field search teams. A beautiful working class community, Webster is located near the tristate corner of Massachusetts, Connecticut and Rhode Island, with rugged terrain, lakes and rivers, which all needed to be searched.

Vanished

The subject was Andrew Amato, a 4 year old child wearing dungarees and a white Mickey Mouse T-shirt who had vanished. From the Webster Police Department's website (**www.websterpolice.com/missing.shtml**): "Amato played in the woods behind Ash Street Trailer Park with his sister and cousin during the morning hours of September 30, 1978. Amato stumbled and fell down. Crying, he got to his feet and started to run around in circles. The other children ran for help. Amato disappeared by the time they returned to the woods. It is possible that Andrew walked out to Route 52 and was abducted by a passing motorist."

The turnout of radio amateurs was huge. Ralph Stetson, WA1QQV, now KD1R, coordinated our effort out of his RV. Stetson had a military background and was a natural leader who led by example to put our ragtag team together to get the job done. I played hooky from school to help support the search effort not so much out of a spirit of public service, but to see my friends and "play radio" in the field.

Each of us was assigned to the various disciplines of emergency management, law enforcement, search and rescue (SAR) and fire departments from numerous local, state and federal jurisdictions. We were an early interoperability solution to these entities and functions.

I spent several days *in situ* and was assigned two jobs: to search on foot various ground grids and a sweep of a polluted river in Scuba gear, as I was also a certified diver. I learned a lot about SAR methodologies; for example, protocols that called for each searcher not to be out of sight of the next searcher in a line of searchers using a compass to cover a grid so that not one inch of ground would be missed. It was methodical and efficient. Search dogs were also employed. There were a few areas of disturbed earth discovered during searches. These were called in to net control and relayed to officials. Forensic personnel were deployed to each discovery site to apply special techniques for assessment.

A photographer for a regional newspaper took a photo of me in my torn jeans and jacket, exhausted after hours in the woods, with my Drake TR-33C 2 meter radio. It made the front page. The horror of a child's abduction and possible murder had not yet sunk in, but it had been my first personal lesson in life on man's capacity for inhumanity.

On my last day, a day that I will never forget, unfortunately, I was deployed as a radio operator and diver/searcher with a team of police divers to sweep a polluted river. We were to shuffle our feet and legs in a certain way to maximize the chances of bumping into something. I will spare readers the details, but a find unrelated to the Amato search was my second lesson on man's capability for monstrosity of the week. I spent

Rick, K1CE, is shown resting with his Drake TR-33C 2 meter radio in the 1978 photo taken during the search for Andrew Amato. [photo courtesy *Worcester Telegram & Gazette*]

the evening at the local hospital getting a tetanus shot, discarded my good wetsuit and started to contemplate the hell that I had gotten myself into.

Innocence Lost

I had to get back to school and left Webster and my fellow radio amateurs on the communications team. According to the Webster police, a suspect soon emerged. They were never able to tie their suspect to the case. A few years ago, the man died. Police are still looking for Andrew Amato.

In the aftermath, I had difficulty concentrating on my school work not really knowing why. I had flashbacks, bad dreams and my view of the world changed with innocence lost. Events of the fall of 1978 have bothered me throughout my entire life and still do. The point is: ARES work is stressful both physically *and* psychologically. There are risks associated with Emcomm work and each radio amateur should have a realistic expectation of what they may encounter in the field. Sooner or later, as I wrote in this column for January 2012 *QST*, field Emcomm operators will witness in person the human destruction and devastation that the rest of the population sees only through the buffer of the Internet and TV news. ARES Emergency Coordinators should constantly evaluate the physical *and* mental well being of their operators — *and themselves*.

I had flashbacks, bad dreams and my view of the world changed with innocence lost.

Post Traumatic Stress Disorder

Post Traumatic Stress Disorder (PTSD) is an anxiety disorder that affects people who have been through a dangerous event. Some people can also get PTSD after someone else experiences danger or is harmed. PTSD can cause many symptoms: Flashbacks — reliving the trauma over and over, bad dreams and frightening thoughts. Re-experiencing symptoms may cause problems in a person's everyday routine. They can start from the person's own thoughts and feelings. Words, objects or situations that are reminders of the event can also trigger re-experiencing. Get help from a mental health professional, which is what I did. — *Rick Palm, RN, K1CE*

A Quick-Deploy, Portable, Three Band Station-In-A-Box and Antennas

Niko Gershon, AA2NI

We all hope that we are never called to deploy in real emergencies. But, if we are called, are we ready? It's a relatively simple thing to operate and provide Emcomm locally if all we need is some VHF/UHF systems. Most of us can manage this with a handheld transceiver or a mobile FM radio operating off a battery pack or car power system. But if the situation calls for HF operations or if we need to set up a fixed station covering all three spectrum regions — HF/VHF/UHF — the problems and challenges can multiply. For rapid deployment and operability, we need radios and power supplies in a compact, portable to-go box and an easily transportable, quickly erectable antenna system for all three frequency regions. Here are some ideas.

My solution is to incorporate the radios and power supplies into a stand-alone box, pre-wired for power, with two coax antenna connections and a fan for ventilation. Although my box is constructed of wood, in a flat configuration, other materials and plans would work as well. Our flat layout provides some separation of the radios, allowing for ease of operation by two operators if desired.

The box contains a Kenwood TS-450S transceiver with built-in tuner, a Yaesu FT-7800 dual-band VHF/UHF transceiver, a 29 A/12 V switching power supply, fuses, power and fan switches and an LED light for low-light or no-light operations.

If 110 V power, is available, it can drive the power supply. If there is no ac power available, a direct connection for 12 V from a battery is provided. Ground connections in the box are wired to a rear panel terminal for a ground rod connection. RF and ac connectors for both antennas are also found on the back panel of the box.

The author's station-in-a-box offers quick and easy deployment and efficient operability. [Niko Gershon, AA2NI, photo].

Antennas

The two antennas are mounted on a single, heavy duty 12 foot tripod. The tripod is secured with tent stakes on grass or anchored with weights (I use old brake drums) on hard surfaces. The first antenna is a J-pole for VHF/UHF, mounted vertically above the center support. The second antenna is an HF inverted-V design, with its apex at the center of the vertical support. A telescoping pole or other support could also be used. The center connector of the V is a 1:1 balun and the two wire arms are each connected to a reel of wire mounted on wheeled supports. The proper lengths for various frequencies are marked on the reels, which are self-supporting. Enough wire is available to allow for 80 meter operation if desired.

On arrival at the operating location, the box is set out, the antenna tripod is erected, the HF antenna is set for the proper operating frequency and power is applied. From start of setup to on the air takes about 15 minutes. The unit and antennas have been road-tested during Field Day operations.

Niko Gershon, AA2NI, an ARRL® member, holds an Amateur Extra class license and is an electrical engineer, a former Lieutenant in the Israeli Signal Corps and holds the Israeli call 4X1NG. He is active in RACES and a VE who teaches a Technician license class to prospective hams. Contact him at **aa2ni@arrl.net**.

Contest Corral – July 2012

Check for updates and a downloadable PDF version online at www.arrl.org/contests

Refer to the contest websites for full rules, scoring information, operating periods or time limits, and log submission information.

Start - Finish Date-Time				Bands HF / VHF+	Contest Title	Mode	Exchange	Sponsor's Website
1	0000Z	1	2359Z	1.8-28 / 50-144	Canada Day Contest	Ph CW	RS(T), Province/Territory or serial	www.rac.ca/service/contesting
2	0000Z	8	2400Z	28 / -	Ten-Ten Spirit of 76 QSO Party	Ph CW Dig	Call, name, member number, S/P/C	www.ten-ten.org
2	1600Z	2	See web	3.5 / 50, 144	OK1WC Memorial Contest	Ph CW	RS(T) and serial	www.hamradio.cz/ok1wc
3	0200Z	3	0400Z	3.5-28 / -	ARS Spartan Sprint	CW	RST, S/P/C, and power	www.arsqrp.blogspot.com
4	2300Z	5	0300Z	1.8-28 / 50	MI QRP July 4th Sprint	CW	RST, S/P/C, and QRPMI number or power	www.miqrp.org
6	0200Z	6	0300Z	1.8-14 / -	SNS and NS Weekly Sprints	CW Dig	Serial, name, and S/P/C	www.ncccsprint.com/rules.html
6	2000 EDT	6	2400 EDT	3.5-28 / -	FISTS Summer Sprint	CW	RST, S/P/C, name, FISTS number or pwr	www.fists.org
7	8 PM	8	2 AM	7 / -	070 Club Firecracker PSK31 Sprint	Dig	RST and S/P/C	www.podxs070.com
7	0000Z	8	2400Z	1.8-28 / -	Venezuelan Indep Day Contest	Ph CW Dig	RS(T) and serial	www.radioclubvenezolano.org/concurso.htm
7	1100Z	8	1059Z	3.5-28 / -	DL DX RTTY Contest	Dig	RST and serial	www.drcg.de
8	0000Z	8	2359Z	1.8-28 / 50	Straight Key Weekend Sprintathon	CW	RST, QTH, name, member number	www.skccgroup.com
8	1100Z	8	1700Z	28 / -	DARC 10-Meter Digital Corona	Dig	RST, serial	www.darc.de/ukw-funksport
8	2000Z	8	2359Z	1.8-28 / -	QRP ARCI Summer Homebrew	CW	RST, S/P/C, QRP number or power	www.qrparci.org/contests
11	1300Z	12	See web	1.8-28 / -	CWops Monthly Mini-CWT Test	CW	Name and member number or S/P/C	www.cwops.org/onair.html
14	**1200Z**	**15**	**1200Z**	**1.8-28 / -**	**IARU HF World Championship**	**Ph CW**	**RST and IARU zone**	**www.arrl.org/contests**
14	1200Z	15	1200Z	3.5-28 / -	DMC RTTY Contest	Dig	RST and serial	www.digital-modes-club.org
15	2000Z	15	2159Z	14 / -	CQC Great Colorado Gold Rush	CW	RST, serial, category, CQC member nr	www.cqc.org/contests
16	0100Z	16	0300Z	1.8-28 / -	Run For the Bacon	CW	RST, S/P/C, Flying Pig nr or power	www.fpqrp.org
19	0030Z	19	0230Z	3.5-14 / -	NAQCC Monthly QRP Sprint	CW	RST, S/P/C, and NAQCC mbr nr or power	naqcc.info
21	0000Z	22	2400Z	- / 144	144 MHz Digital EME Championship	Dig	TMO or RST and R	www.DUBUS.org
21	1600Z	21	1800Z	28 / -	Feld-Hell Ten Meter Sprint	Dig	RST, S/P/C, Feld-Hell member nr	sites.google.com/site/feldhellclub
21	1800Z	22	2100Z	- / 50,144	CQ WW VHF Contest	Ph CW Dig	4-digit grid square	www.cqww-vhf.com
21	**1800Z**	**22**	**0600Z**	**3.5-28 / -**	**North American QSO Party RTTY**	**Dig**	**Name and S/P/C**	**ncjweb.com/naqprules.php**
22	0900Z	22	See web	3.5-7 / -	RSGB Low Power Contest	CW	RST, serial, power	www.rsgbcc.org
28	1400Z	29	See web	3.5-28 / -	MARAC US Counties QSO Party	Ph CW	RS(T), state, county abbreviation, or "DX"	www.marac.org
28	1200Z	29	1200Z	3.5-28 / -	IOTA Contest	Ph CW	RS(T), serial, IOTA number if island	www.rsgbcc.org
28	1600Z	29	1600Z	3.5-28 / 50,144	New Jersey QSO Party	Ph CW	Serial and NJ county or S/P or "DX"	www.njqp.hamshack.info

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. No contest activity occurs on the 60, 30, 17 and 12 meter bands. 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 date (May 1 for July *QST*) — send information to contests@arrl.org. Listings in blue indicate contests sponsored by ARRL or *NCJ*. The latest time for a valid contest QSO is the minute listed in the "Finish Time" column.

Strays

Rewarding Technical Writing

Funded by the continuing generosity of Steven Cornell, K4AHA, since 2003, the Bill Orr, W6SAI Technical Writing Award is issued annually by the ARRL Foundation. The *QST* editorial staff submits to the ARRL Foundation Board of Directors its nomination of the *QST* author who, in the previous year, displays the outstanding ability to write technical information in an easily understood style, worthy of the Bill Orr "stamp of approval." The ARRL Foundation Board of Directors approves the nomination and arranges for the personalized plaque to be awarded to the recipient.

Past recipients of the award include Ward Silver, NØAX (2003), Paul Danzer, N1II (2004), Phil Salas, AD5X (2005), Richard Campbell, KK7B (2006), Jim DeLoach, WUØI (2007), Larry Scheff, W4QEJ (2008), Bob Schroeder, N2HX (2009), Eric Nichols, KL7AJ (2010) and Kai Siwiak, KE4PT (2011). More information about the Bill Orr, W6SAI Technical Writing Award can be found on the web at **www.arrl.org**.

2012 ARRL RTTY Roundup Results

"Twenty years from now you will be more disappointed by the things you didn't do than by the ones you did do." —*Mark Twain*

Jay Townsend, WS7I, ws7i@arrl.net

The Sun has no equal in giving radiosport a jump-start and 10 meters is back, kicking up RTTY Roundup participation with a solid ten percent increase in submitted logs and 150,000 more QSOs this year. In fact, the 2012 RTTY Roundup set a record with 1803 logs submitted as this fast-growing contest mode continues along its upward path. Propagation conditions for most of the world were not very impressive. The DX wasn't there unless you were on the East Coast but the activity on 10 meters was certainly very good.

Three SOHP entries were submitted from the W6YX Stanford University Radio Club station. They all used separate antennas — and some heavy-duty filtering — to avoid interaction and keep the QSOs flowing. Left to right are N6DB, ND2T and K6UFO. [KG6NUB photo]

US and Canadian Highlights

In the write-up, I like to highlight a station operator who is either a first-time RTTY operator or someone who has made a special achievement. This year it's Dave, WV9E from Wisconsin who writes, "First attempt at a RTTY test. It was a blast. Ended up with about 75 Qs and a few DX entities. South Africa on 15 was the highlight of the test for me."

Single Operator, Low Power (SOLP)

This category continues to dominate, making up roughly 54 percent of this year's RTTY Roundup logs. Don, AA5AU who had a few more than 500 QSOs in 1989 cranked up the Q total to 2,169 this year to win the NM7M Memorial Plaque.

Once again we had a nice geographic distribution in the Top Ten finishers with stations scoring well from the eastern shores to the western shores and from Montana to Arizona. Even the Midwest's black hole was represented by two Minnesota stations.

Mark, N2QT operated SO2R and finished in second place. Pete, K2PS gave out DC on 10 meters where he always likes to operate. I'm glad 10 was open so we could work him.

Single Operator, High Power (SOHP)

Unlike the low-power group, winners in SOHP were determined by the multipliers they snagged. Balancing rate and multipliers is always a tough call — strategy, propagation, and station location create a moving target in the RTTY Roundup.

Winning the Rush Drake W7RM Memorial Plaque was Rick, KI1G. Mike, K4GMH was the overall QSO leader in SOHP but off the pace on mults. KI1G was 4th in QSOs but nailed the highest number of mults with a contest-leading 141. Both Nevada's W7RN operated by Jeff, WK6I; and Lee, VE7CC on the Northwest Coast just couldn't get enough multipliers with poor over-the-pole conditions.

Multioperator, Low Power (MOLP)

Big changes in MOLP occurred in 2012 as scores were up considerably from last year and there were many new calls in the Top Ten. In fact, the only repeating station was W1SLF. Getting "in the box" now takes nearly twice the score of previous years.

In MOLP we now see many teams of two to four operators as compared to previous years in which the norm was a single operator using the spotting network. Earl, N5ZM and his partner Glenn, N5RN were once again leaders into the clubhouse and won the category.

Multioperator, High Power (MOHP)

Big aluminum farms dominate this category and a large number of records were set. Another impressive finish for the NØNI team secured the victory. It was a very tight race for second and third by the WØSD and NR5M teams, respectively. WØSD claimed 53 more QSOs but three fewer multipliers. Log checking didn't change that a bit and the experienced hands at WØSD nailed second place.

Would you believe three Multioperator, High Power entries from the same station? Of course it was the Stanford University Radio Club, W6YX. They had three teams: W6YX ran 1.5 kW,

Sponsored Plaque Winners

Thanks to the generous sponsorship of numerous clubs and individuals, we are pleased to list the winners of the sponsored RTTY Roundup plaques listed below:

Plaque Category	*Plaque Sponsor*	*Winner*
W/VE Single Operator High Power - W7RM Award	Spokane DX Association	KI1G
W/VE Single Operator Low Power - NM7M Memorial	Jim Reisert, AD1C	AA5AU
W/VE Multioperator High Power	John Lockhart, WØDC	NØNI
DX Single Operator High Power	The NN6NN RTTY Team	P49X (WØYK, op)
DX Multioperator High Power	Paolo Cortese, I2UIY Memorial by WØYK	PJ2N
Delta Division Single Operator High Power	Roland Guidry, NA5Q	K4RO
Pacific Division Single Operator High Power	Northern California Contest Club	W7RN (WK6I, op)
Roanoke Division Single Operator High Power	Mark Sihlanick, N2QT	K4GMH
Central Division Single Operator Low Power	Society of Midwest Contesters	KD9MS
Midwest Division Single Operator Low Power	In Memoriam of Larry Lindblom, WØETC by Bob Ruvolo, KI6DY	NTØF
New England Division Single Operator Low Power	CTRI Contest Group	K1RO
Southeastern Division Single Operator Low Power	Alabama Contest Group	KC4HW
Atlantic Division Multioperator High Power	In Memory of Tony Furfari, K3IEX,	K3MJW
Roanoke Division Multioperator Low Power	Dominion DX Group, K4VAC	AA4NC

To inquire about purchasing an unsponsored plaque, or for information on plaque sponsorship, please contact ARRL Contest Branch Manager Sean Kutzko KX9X at **kx9x@arrl.org** or by calling (860) 594-0232. Plaques cost $75, which includes all shipping and handling.

Top Ten by Category

Single Operator

W/VE — Low Power

AA5AU	274,944
N2QT	204,078
KØTI	182,684
NØAT	153,700
KC4HW	152,915
KB7Q	142,596
WØBR	141,480
NTØF	135,035
W3LL	129,413
W7ZR	128,968

W/VE — High Power

KI1G	317,814
AA3B	310,863
K4GMH	303,530
W7RN (WK6I, op)	284,548
N2WK	278,256
W1UE	271,416
VE7CC	271,084
WØLSD	244,156
K4RO	230,736
K6LL	225,810

DX — Low Power

VP9/WW3S	181,475
P4ØYL (AI6YL, op)	177,480
HI3TEJ	158,704
ZX2B (PY2MNL, op)	151,293
HI8PLE/7	129,472
J39BS	115,024
EO3Q (UR3QCW, op)	107,055
UA6CE	97,818
F5BEG	82,500
OQ6A (ON5MF, op)	78,540

DX — High Power

P49X (WØYK, op)	420,250
EO4M (UR5MW, op)	206,844
OL8M (OK4RQ, op)	188,160
SN7Q	181,760
9A5W	170,434
UW8I (UT2IZ, op)	169,645
YV5KG	167,388
KH6ZM	163,822
DL4MCF	160,644
PZ5RA	145,092

Multioperator

W/VE — Low Power

N5ZM	177,580
K9OM	148,302
KØDU	144,368
WW4LL	125,388
K9NR	122,148
AA4NC	113,407
W1SLF	102,144
W4GAC	99,216
KU1YL	96,530
N9LAH	96,096

W/VE — High Power

NØNI	283,276
WØSD	252,830
NR5M	251,235
K1SFA	221,128
WA5ZUP	208,940
NK7U	206,700
W4UH	205,692
NR4M	199,101
VA2UP	183,662
W4RM	178,486

DX — Low Power

XE2K	163,215
EA1DR	129,840
HG7T	105,534
LZ9R	81,848
OH8KTN	72,080
UT8EL	60,970
DF9ZP	59,300
XE2FGC	59,285
US4LPY	59,136
IW1QN	51,393

DX — High Power

PJ2N	279,554
LS1D	186,690
S53M	171,703
EI7M	171,520
S5ØXX	162,274
IQ1RY	155,610
UW4I	143,262
EA5CEF	117,058
OH1F	102,358
EA1AKS	100,800

ND2T hovered around 1 kW, and N6DB worked the event at 500 W. Three sets of equipment and antennas let them compete within the rules.

W/VE Records

With all the activity it was a record-setting year and very few early records remain. Three new W/VE all-time records were set, the first by SOLP winner and long-time holder of the world Single Operator, Low Power record Don, AA5AU. Two other records were established in the high power arena. A new record in Single Operator, High Power was set by Rick, KI1G and the NØNI team from Iowa set a world record in Multioperator, High Power. Over 34 new division records were set and 80 new section records were set!

Canadians set new records from both ends of their country. Lee, VE7CC of British Columbia set one for SOHP and Fabi, VA2UP established a new record for SOLP from Quebec.

Affiliated Club Competition

Club action makes for a lot of fun on the bands and the Northern California Contest Club (NCCC) got the message with a nearly 50% increase in logs over 2011. This resulted in a win for the NCCC in the Unlimited Club class and a major milestone as the three-million point mark was passed. The Minnesota Wireless Association (MWA) moved down a spot into second place.

The Potomac Valley Radio Club (PVRC) took top billing among Medium Clubs with a very nice score of 2.5 million. A tight race ended with the Florida Contest Group (FCG) edging out the Arizona Outlaws Contest Club (AOCC) for second and third.

In the Local Club class the Orleans ARC again won the gavel with a total score nearly 50% higher than the Spokane DX Association (SDXA) which moved into second place this year. Last year's Local winner, the Dominion DX Group, was in third place this time out.

DX Highlights

One world record and nine continental records were set this year by DX stations. Sixty-nine countries around the world saw new records established. Several stations changed power levels to set a different record in their country.

The Caribbean and South America had propagation into North America and could reach out and work Africa and Europe for the multipliers. The first six scores in the SOLP Top Ten box are all from those areas. The top score out of Europe was Ruslan, EO3Q from the Ukraine who set a new country record. Another new record was set by Julio, NP3CW who "came back to RTTY contesting after [having] been distant for many years." Steve, ZC4LI set a new Asia continental record this year, too.

P49X (operator WØYK) led the SOHP group once again, setting a world record. As in previous years, the Europeans took the next five spots — quite a switch from the SOLP category. Max, KH6ZM set a new Oceania all-time record in SOLP as more hours on the high bands seemed to have helped him. Norman, 5B4AIF was in with a new Asia all-time record giving out the appreciated Cyprus multiplier.

Hector, XE2K moved into MOLP after last year's victory in Multioperator, High Power and took home the honors. The rest of the Top Ten were all from Europe as KP2D was missing this year. Oscar, EA1DR set a new Spanish record and placed second.

South America struck this year as PJ2N set a new South American MOHP record and was just a little off the pace from the NØNI team for the world record. LS1D was in second with all the Europeans filling in the rest of the box.

Affiliated Club Competition

Club	*Logs*	*Score*
Unlimited Club Category		
Northern California Contest Club	73	3,715,609
Minnesota Wireless Assn	59	2,389,349
Medium Club Category		
Potomac Valley Radio Club	49	2,500,870
Florida Contest Group	17	1,230,065
Arizona Outlaws Contest Club	24	1,205,840
Society of Midwest Contesters	23	1,193,563
Yankee Clipper Contest Club	30	1,183,320
Willamette Valley DX Club	15	907,438
Tennessee Contest Group	17	841,847
Frankford Radio Club	10	836,306
CTRI Contest Group	9	727,796
Alabama Contest Group	13	705,458
Grand Mesa Contesters of Colorado	8	634,243
Contest Club Ontario	17	599,454
Western Washington DX Club	7	432,763
Hudson Valley Contesters and DXers	7	378,939
Central Texas DX and Contest Club	4	376,193
Louisiana Contest Club	6	375,065
Contest Group Du Quebec	4	328,387
Southern California Contest Club	11	297,448
South East Contest Club	7	168,559
Rochester (NY) DX Assn	4	139,591
Carolina DX Association	5	124,257
Saskatchewan Contest Club	3	122,575
Kentucky Contest Group	3	108,200
Allegheny Valley Radio Assn	3	96,460
Order of Boiled Owls of New York	3	95,524
North Coast Contesters	4	65,471
Western New York DX Assn	3	59,829
Mad River Radio Club	3	23,594
Local Club Category		
Orleans County Amateur Radio Club	10	936,547
Spokane DX Assn	8	641,772
Dominion DX Group	7	635,799
ORCA DX And Contest Club	7	388,698
Lone Star DX Assn	5	286,524
Boeing Employees ARS - St Louis	4	281,927
Midland ARC	3	255,440
Metro DX Club	4	218,379
Bergen ARA	4	203,967
Bristol (TN) ARC	7	144,283
Black Diamond Amateur Radio Club	3	76,371
Sterling Park ARC	5	43,468
Nanaimo Amateur Radio Assn	3	36,991
Gloucester Co ARC	3	30,798

Looking Ahead to Next Year

Next year will be the 25th running of the RTTY Roundup. It's hard to believe that so much time has passed in RTTY radiosporting. Mike, AB1OD summed things up nicely, "Man, this RTTY stuff is addictive!" Will the 4000-QSO barrier be challenged in 2012? Will 10 meters still be a factor? Will we once again get some serious openings around the world? Use the rest of this year to plan your strategy for the next Roundup on January 5-6 in 2013.

Acknowledgments

Sean, KX9X, is the ARRL Contest Branch Manager who gets me the data and tables from the log checker and he always does a great job. It was nice to see my editor, Ward, NØAX, in the contest this year. As always, my initial editor is Betsy, WV7Y — my bride of many years. Ken, WM5R does the records for RTTY Roundup and is always improving them.

Extended Version Online

If you'd like an extra helping of LTRS and FIGS, check out Jay's extended version of this article at **www.arrl.org/contest-results-articles** for more analysis and more photos. If you own a smartphone, just scan this QR code.

2011 ARRL 10 Meter Contest Results

"Hey , look, it's a DX Contest again!" — *Ray, WQ5L*

Scott Tuthill, K7ZO, k7zo@cableone.net

The 39th annual ARRL 10 Meter Contest was held December 10-11, 2011. After tantalizing us in 2010 with what might be, the band broke wide open for deserving operators worldwide. Conditions were the best since just after the peak of the last solar cycle in 2002. What an on-the-air party!

Activity...WOW, ACTIVITY!

The 2011 contest attracted operators like no other 10 Meter Contest in history. An absolutely unbelievable 5361 logs were entered this year! This count more than doubled last year's total of 2474 and was 70% higher than the previous record in 2002. The 10 Meter Contest exceeded the ARRL DX Phone all-time mark of 3343 logs by more than 2,000! Continuing the comparison, all the logs submitted for the 2011 ARRL DX Phone contest contained 1.49 million QSOs across all six bands. Submitted 10 Meter Contest logs contained 1.95 million QSOs as a single-band contest. The average log contained 363 QSOs this year compared to 153 in 2010.

The record breaking D4C team. From left to right: Max, IZ4DPV; Fabio, I4UFH; Donato, IK2EGL, and Giorgio, I2VXJ. [I4UFH photo]

Another notable milestone was achieved with the 2011 edition. For the first time ever the 2692 DX logs submitted exceeded the 2,669 from W/VE/XE! DX logs more than tripled from 2010 driven by a genuine explosion from Europe where logs entered jumped from 380 in 2010 to 1763 in 2011. Solid growth continues from Asia as well where logs entered increased from 191 to 550.

For 2011 the big category news was the creation of the Multioperator, Low Power (MOLP) category. Filling the role of both a true Multioperator category as well as a Single-Operator Mixed-Mode Assisted category it proved to be quite popular with 512 logs submitted worldwide. From first impressions it looks like we have a real winner here. When combined with the Multioperator, High Power (MOHP) category it propelled total Multi-operator entries ahead of total Single-Operator, Mixed Mode entries. During the previous 38 runnings of this contest the Multioperator category was always a distant last place to the other three.

Looking around the world, logs were received from more than 230 different DXCC entities and W/VE/XE sections. This is truly a global contest. More logs were received from those quintessential contesters in Japan with 267, more than any other location. They were closely followed by Germany's 242 logs and European Russia's 239 logs. Looking for the most active W/VE/XE sections, honors go to Virginia with 106 logs received followed by Minnesota with 92.

Of particular interest in Asia were the 50 logs received from China — up from 5 in 2009 and 8 in 2010. Their activity now exceeds that from many stalwart European countries such as Portugal, Hungary, Switzerland, Norway and Finland. With 1.3+ billion citizens, might China someday become the #1 contesting country? Since the ban on Amateur Radio in China was lifted in 1992 the number of licensed operators climbed to 500 in the year 2000, 3500 in the year 2003 and shot up to 20,000 in 2010. Though they still only have as many hams as Ontario or North Carolina, the trend is strong.

Who were the most energetic and active contesters? Which operators sit down, keep their butts in the chair, and make a large number of contacts? Looking at those entities from which five or more logs were received, the honors go to none other than Cuba. The five logs submitted from Cuba averaged 1272 QSOs each — a great effort from CM8AKD, CO2CW, CO6LC, CO8CY and CO8ZZ. If you wanted to work Cuba and you were within propagation range I bet they were in your log. In second place were the 11 stations from Ireland that averaged 894 QSOs each followed by a tie for third place between 6 stations from Saskatchewan and 11 from Alberta who averaged 847 QSOs each. If you live in Saskatchewan or Alberta and it is the second weekend in December it is probably not a bad day to spend some time on the radio!

New Continental Records

Continent	Category	Call	New Record
Africa	SO PH LP	EA8MT	610,450
Africa	SO CW LP	EA8CN	618,552
Africa	MO HP	D4C	4,351,000
Asia	SO PH HP	B7P	624,660
Asia	MO LP	4Z5MU	1,092,180
Europe	SO CW HP	EF5Y (EA5GTQ, op)	1,130,112
Europe	MO LP	EA6BF	783,272
Europe	MO HP	EI7M	2,859,864
N America	MO LP	TI5N	2,565,348
Oceania	SO PH QRP	VK4ATH	21,080
Oceania	SO CW HP	ZM1A (ZL3CW, op.)	1,428,336
Oceania	MO LP	V63QQ	590,006
S America	SO CW LP	CE2/VE7SV	1,328,000
S America	MO LP	PY1GQ	1,676,196
S America	MO HP	CW5W	3,615,656

Records, Records and More Records

Not only did operators have fun in 2011 but they set records all over the place. Wow, were there records set! Driven by the triple factors of more sunspots, the new MOLP category and the continuing benefit of 32 new XE multipliers, a total of 432 new all-time

Mexican Activity Update

The 2011 10 Meter Contest was the second under the new rules that made the 32 Mexican states multipliers. This 2010 rules innovation met with enthusiastic response from XE operators and over 100 unique XEs were active with 26 states on the air. Fifty logs were submitted up from just six in 2009. Through the tireless efforts and promotion of Hector, XE2K, Joaquin, XE1R, and his XE1RCS bulletin as well as Grupo DXXE, XE participation continued to grow in 2011. More than 110 unique XEs were active in the contest and from 30 of the 32 states. Without a doubt these operators were a major factor in the many new records set in 2011. Comments by several operators setting new records noted the impact of the XE multiplier. They really changed the dynamics of this contest. It's always fun to be "the new kid on the block"!

New W/VE/XE Division Records

Division	Category	Call	New Record
Atlantic	MO LP	KO3T	574,864
Atlantic	SO CW HP	KD4D	1,248,000
Atlantic	SO PH QRP	KE2OI	142,296
Central	MO LP	KF9US	90,948
Central	SO PH QRP	WB9FOL	30,806
Dakota	MO LP	KØRC	353,212
Delta	MO LP	NO4Q	159,120
Delta	SO CW QRP	K4LTA	161,600
Delta	SO MX LP	N8OO	1,719,968
Delta	SO MX QRP	KS4X	119,574
Great Lakes	MO LP	AA8IA	132,300
Hudson	MO LP	KD2RD	1,326,080
Hudson	SO CW LP	W2ID	597,104
Hudson	SO MX HP	N2NT	2,737,742
Midwest	MO LP	WØIW	105,450
Midwest	SO CW QRP	W7FB	175,740
Midwest	SO PH QRP	NØNI	127,676
New England	MO HP	K1LZ	3,635,992
New England	MO LP	W1WBB	585,752
New England	SO MX HP	KM3T (@KC1XX)	3,018,720
Northwestern	MO LP	W7TVC	733,176
Northwestern	SO MX QRP	W7YAQ	310,232
Pacific	MO LP	K6EI	178,064
Pacific	SO CW LP	KH6ZM	749,320
Pacific	SO PH QRP	K6OO	84,390
Roanoke	MO LP	K4FPF	161,024
Roanoke	SO MX LP	N8II	1,368,380
Rocky Mountain	MO LP	K5WO	289,280
Rocky Mountain	SO CW HP	N2IC	1,322,980
Southeastern	MO LP	N4CJ	568,920
Southeastern	SO CW HP	K1TO	1,409,952
Southwestern	MO LP	N6MA	66,368
West Gulf	MO HP	NR5M	3,000,024
West Gulf	MO LP	WDØGTY	57,456
Canada	MO HP	VE5MX	1,717,056
Canada	MO LP	VA7BEC	591,840
Canada	SO CW HP	VY2ZM	1,638,972
Canada	SO CW LP	VA2WA (VA2WDQ, op)	772,680
Canada	SO MX HP	VY2TT (K6LA, op)	2,392,420
Canada	SO PH QRP	VX4MM	93,956
Mexico	MO HP	XE2X	392,524
Mexico	MO LP	XE2AU	163,200
Mexico	SO CW HP	XE1MM	525,600
Mexico	SO CW LP	XE1AY	134,048
Mexico	SO CW QRP	XE3WMA	2,944
Mexico	SO MX HP	XE2K	740,520
Mexico	SO MX LP	XE1L	122,944
Mexico	SO PH HP	XE1CWJ	321,216
Mexico	SO PH LP	XE1B	518,256
Mexico	SO PH QRP	XE2JA	95,892

records were set at the DXCC entity and W/VE/XE section level. Looking at it another way, almost 1 in every 12 logs contained a record score and 1 in every 5 DXCC and W/VE/XE section records was set in 2011! Comparatively only 34 such records were set in 2010. (Thanks to the efforts of Ken, WM5R a full set of contest records is available at **www.arrl.org/contests**.) Of these 432 records, 226 were DX entity records and 206 were W/VE/XE section records. There were 149 High Power records, 221 Low Power records (117 of these being initial records in the MOLP category) and 63 QRP records set. Mexican operators continue to participate in increasing numbers with 40 new XE records in 2011. There are now records in 68 of the 352 possible entry categories in XE, up from 28 last year.

Within W/VE/XE a total of 50 division records were set. Seventeen of these were the initial records in the new MOLP category and 10 were from Mexico where operators set new records in every category except Single-Op, Mixed Mode, QRP. What a great effort from XE in the second year of the contest with the new rules! (See the sidebar "Mexican Activity Update.") Division records were sprinkled across all the operating categories though no new records were set in the Phone-Only Low or High Power categories outside of Mexico.

Even with this big batch of new records there are still some old ones out there to aim at. Three records still remain from 1988, now the oldest ones on the books in W/VE/XE. Who will take the challenge next year and set new records for Atlantic Division Single-Op, Phone-Only, High Power held by W3LPL (WA8MAZ, op); Hudson Division Single-Op, Phone-Only, Low Power held by N2BJ, and Northwestern Division Single-Op, Mixed-Mode, High Power held by NL7GP?

In addition to the 50 division records there were four new W/VE/XE category records set, the first since 2002. Congratulations to KM3T at KC1XX on setting a new Single-Op, Mixed-Mode, High Power record, VY2ZM on setting a new Single-Op, CW-Only, High Power record and K1LZ for setting a new Multioperator, High Power record. KD2RD came out on top of all entrants in the new MOLP category and now holds that record.

On the DX front 15 new continent records were set, the first since 2007. Five of these were the initial records in the new MOLP category. There are still a few old continental records out there to aim at if that is your goal. The oldest is a 1975 Antarctica record held by the South Pole club station, KC4AAC (K1KI, op) in the Single-Op, Mixed-Mode, High Power category.

Extraordinary People Doing Extraordinary Things

In most events there are always a small number of participants who stand above others by their will and determination to excel. With the good conditions for the 2011 contest these efforts resulted in new all-time category records. Let's take a look at two of operations that led to new all-time world records and one that led to a W/VE/XE record.

The D4C story — Fabio, I4UFH thought 2011 would be a good opportunity to go after the world Multioperator, High Power record set by VP5K in 2000. As he said "I love the ARRL 10 Meter Contest for more than 20 years and already hold many records. There is no contest as the ARRL 10m Contest!!" Fabio invited some friends — Giorgio, I2VXJ; Donato, IK2EGL, and Max, IZ4DPV — to the D4C station at Monte Verde in the Cape Verde Islands.

To say that the D4C station is ideal for a 10 meter contest is a vast understatement. Monte Verde is the highest point on the island of São Vicente. The station rests on the top of this 750 meter mountain with clear shots in all directions. Effectively, their antennas are in "free space" with takeoff angles as low as they can be. As Fabio remembered: "Our 4 antenna system beamed over 360 degrees worked like a charm, two interlocked radios have done the job! Everything was as expected, great sunshine days, no Murphy visit, a short Friday/Monday trip." When the contest was over they racked up a post log-checking score of 4,351,000, beating the previous VP5K record by a healthy 260,000 points or 6%.

The CE2/VE7SV story — Well-known contester and DXpedition participant Dale, VE7SV may or may not have had in mind setting an all-time world record in the Single-Op, CW-Only, Low Power category. As the contest date approached he didn't even have a working antenna. Only through the efforts of delivery boy Scott, KØMD did Dale get the parts needed to fix his 3-element SteppIR Yagi. What Dale *did* have going for him was that his antenna was located 250 feet above the ground on the top of a 20 story apartment building in Renaca, Vina del Mar, Chile. This building was located in turn near the beach and well above it so that his antenna was 600 feet above sea level. As at D4C there

Top Ten

USA

Mixed Mode, QRP

K9OM	490,732
W7YAQ	310,232
WA6FGV	298,016
W7IV	263,700
W2MF	253,572
W6AQ	192,780
K7XC	163,184
N6WG	145,140
KS4X	119,574
WB2AMU	107,670

Mixed Mode, Low Power

N8OO	1,719,968
N8II	1,368,380
N1UR	1,255,872
KU2M	1,121,328
K2PS	914,746
N5DO	885,204
N7ZG	824,724
N6ZFO	781,776
KØTT	767,980
K7SS	714,776

Mixed Mode, High Power

KM3T	3,018,720
N2NT	2,737,742
NQ4I (VE7ZO, op)	1,920,036
K6LL	1,702,350
WØAIH (NE9U, op)	1,696,320
K3ZO	1,657,136
K1UO	1,606,500
KF6T	1,501,464
WB9Z	1,443,204
WC6H	1,375,776

Phone Only, QRP

KE2OI	142,296
NØNI	127,676
K6OO	84,390
K6MI	80,408
KB5KYJ	66,000
N8XA/P	63,896
W8QZA	61,824
WA7PVE	44,160
WWØWB	36,696
WB7OCV	33,200

Phone Only, Low Power

K7ULS	321,624
KTØDX	294,128
N7FLT	278,576
AC5O	271,880
W1TJL	224,640
N7XS	218,622
N9ISN	215,320
KC6AWX	200,376
N9TGR	199,836
W3PAW	193,980

Phone Only, High Power

KK1KW (WW1WW, op)	771,426
W5PR	690,018
K5TR (WM5R, op)	649,428
NA3D	600,372
W6YI	573,540
W1SJ	564,062
WO4DX	529,104
K4NV	520,880
K8CC (N8NX, op)	456,030
KQØC	445,516

CW Only, QRP

KR2Q	333,792
W6JTI	265,024
KØLUZ	252,720
NØUR	249,260
AA1CA	231,648
W7FB	175,740
KE5AKL	169,988
K4LTA	161,600
K3TW	161,092
K2SM	150,800

CW Only, Low Power

WA1Z	812,000
W3BGN	799,488
KH6ZM	749,320
W2ID	597,104
N4WW (N4KM, op)	550,400
WD4AHZ	516,880
NA8V	495,040
WQ5L	493,120
K9WZB	491,616
N4ZI	491,040

CW Only, High Power

K1TO	1,409,952
NN1N	1,347,720
N2IC	1,322,980
W1WEF	1,307,496
K8AZ (K8NZ, op)	1,262,400
K1RM	1,256,736
W5KFT (K5PI, op)	1,253,904
KD4D	1,248,000
K5NA	1,202,624
NY3A	1,197,364

Multioperator, High Power

K1LZ	3,635,992
NR5M	3,000,024
W2RE	2,865,160
K1WHS	2,734,200
NX5M	2,512,200
K9CT	2,483,824
K3WW	2,169,680
WX3B	2,143,854
W6YX	2,087,120
KØDU	2,084,064

Multioperator, Low Power

KD2RD	1,326,080
W7TVC	733,176
W1WBB	585,752
KO3T	574,864
N4CJ	568,920
K4MM	489,632
KA2D	396,312
K4ABB	372,292
K2DFC	363,636
KØRC	353,212

Canada

Mixed Mode, QRP

VE6BIR	59,128
VE3XTI	39,840

Mixed Mode, Low Power

VE3CX	257,174
VE4YU	234,472
VE3IAE	221,078
VE7WO	203,294
VX2AWR (VE2AWR, op)	189,810
VE5UO	186,456
VE9ML	182,972
VE5SF	159,160
VE1ZA	122,472
VE1JS	115,920

Mixed Mode, High Power

VY2TT (K6LA, op)	2,392,420
VX6WQ	1,817,202
VA2EW	1,513,920
VE3KZ	1,161,072
VE3MMQ	929,106
VE3FGU	738,344
VE6TL	317,408
VE4EAR	246,344
VE2FXL	19,716
VE2DC	12,596

Phone Only, QRP

VX4MM	93,956
VA7IR	75,844
VE3HG	13,300
VE3FCT	7,896
VE6SKY	5,304

Phone Only, Low Power

VA3YP	264,186
VE4TV	190,512
VE8GER	108,758
VA3PC	99,990
VE3VE	70,512
VE3TU	57,428
VE1SQ	41,412
VE3JOC	23,246
VA3GD	21,700
VE7WWW	20,634

Phone Only, High Power

VO1KVT	403,182
VA6UK	143,528
VE3CR	125,240
VA3ZDX	108,192
VE2JM	89,792
VE3KPP	67,404

CW Only, QRP

VY2OX	74,456
VA3RJ	18,096
VE6EX	15,504
VA3RKM	9,324
VE2KOT	7,424
VE3MO	4,428
VE3WZ	2,280
VA3WR	1,872
VE3IGJ	640

CW Only, Low Power

VA2WA (VA2WDQ, op)	772,680
VE3DZ	681,408
VO1TA	515,280
VE3KI	400,384
VE3ZT	320,032
VE1RGB	230,520
VA3EC	227,772
VE7JKZ	192,192
VA7RN	171,976
VA7DZ	160,704

CW Only, High Power

VY2ZM	1,638,972
VE9AA	1,062,560
VE5UF	865,032
VE3EY	813,852
VE3EK	768,600
VE7XF	593,400
VY2SS	558,240
VE6WP	369,228
VA7ST	348,288
VE2SG	313,200

Multioperator, High Power

VE5MX	1,717,056
VE1OP	1,231,808
VE3EJ	715,350
VA3DX	628,002
VE6AO	607,260
VE3RZ	420,966
VE3MM	309,684
VE7AX	174,150
VE9HF	74,592
VE3MV	56,358

Multioperator, Low Power

VA7BEC	591,840
VE6FI	217,516
VE3XAT	167,272
VE4EA	134,160
VE3AD	107,748
VE7IO	94,612
VE3CWU	77,376
VE2EBK	74,688
VA3DF	65,730
VO1HP	35,984

Mexico

Mixed Mode, QRP

No Entries

Mixed Mode, Low Power

XE1L	122,944
XE2GG	109,968
XE2YWH	84,224
XE1SVT	63,744
XE1FZE	42,624
XE2HWB	26,480
XE1RZL	21,888
XE3DX	480

Mixed Mode, High Power

XE2K	740,520
XE1GRR	36,448

Phone Only, QRP

XE2JA	95,892
XE1RCS (XE1ODG, op)	34,128
XE1AKM	992

Phone Only, Low Power

XE1B	518,256
XE3N	279,628
XE2O	150,660
XE1ZTW	69,168
XE1AO	61,992
XE1J	43,540
XE1GZU	20,488
XE3OAC	8,282
XE1AJ	6,640
XE2PXT	420

Phone Only, High Power

XE1CWJ	321,216
XE2HUQ	175,120
XE1EE	132,430
XE1R	82,056
XE1MW	76,800
XE1OGG	55,176

CW Only, QRP

XE3WMA	2,944

CW Only, Low Power

XE1AY	134,048
XE1CT	82,896
XE2MX	30,444

CW Only, High Power

XE1MM	525,600
XE2S	279,444

Multioperator, High Power

XE2X	392,524
XE2B	93,744

Multioperator, Low Power

XE2AU	163,200
XE2FGC	39,312
XE2CRH	39,308
XE2VHF	38,482
XE2WK	960
XE2MVS	416
XE1BRX	220

DX

Mixed Mode, QRP

ON6AB	261,416
EA1GT	130,626
CT2IOV	123,970
UX1UX	116,340
UX8ZA	84,660
SP3PL	73,632
4M2L (YV5YMA, op)	69,388
RT4W	65,846
JM2RUV	61,200
9A2EY	55,610

Mixed Mode, Low Power

PY2EX	1,578,528
EA8OM	835,176
C4Z (5B4AIZ, op)	826,084
DL4MCF	581,240
RL6M	579,006
7Z1SJ	564,596
JA6WFM	562,536
CR5A (CT1FFU, op)	537,358
RA1AL	480,110
OR2F	479,520

Mixed Mode, High Power

ZM2V (AI6V, op)	1,735,344
VP5CW (W5CW, op)	1,661,868
NH2DX (KG6DX, op)	1,640,640
ZF2AH	1,506,816
EA6SX	1,474,908
VK4CT (VK4EMM, op)	1,470,016
UW1M (UR5MW, op)	1,331,652
3G3FZ (CE3FZ, op)	1,240,492
OE8Q (OE8SKQ, op)	1,159,380
JT5DX (JT1CO, op)	1,016,024

Phone Only, QRP

KP4KE	282,274
TG9ANF	266,304
R7NA	100,416
LU1VK	34,768
R2AD	29,952
I5KAP	25,792
CT2JBG	22,512
SN5R (SP5XMU, op)	22,080
JR6HMJ	21,616
VK4ATH	21,080

Phone Only, Low Power

HI3TEJ	790,152
EA8MT	610,450
PU2LEP	449,334
CO6LC	324,104
IQ9BT (IT9SPB, op)	317,966
CM8AKD	284,160
VK4LAT	261,632
LW7DUC	249,776
CA3SOC	238,290
LU6FOX	232,078

Phone Only, High Power

LP1H (LU5HM, op)	1,192,794
CE3CT	1,133,508
V25R (K6IF, op)	1,127,232
GW9T (MWØZZK, op)	884,722
CT3FQ	835,536
PQ5B (PP5JD, op)	792,582
GM5X	750,708
ZX2B (PY2MNL, op)	718,740
TMØT	709,770
B7P	624,660

CW Only, QRP

EU1AA	181,280
JA1YNE (JR1NKN, op)	170,016
AY9F (LU5FZ, op)	149,380
RU7A	126,080
US5VX	104,580
PY4ZO	100,584
UA6LCJ	85,008
YO8DDP	79,800
DF1DX	73,272
UA9AB	67,584

CW Only, Low Power

CE2/VE7SV	1,328,000
KP2MM (N2TTA, op)	730,592
GIØRQK	678,368
YT9A	662,088
EA8CN	618,552
ZL1GO	502,500
9A3VM	491,064
HG0R (HA0NAR, op)	460,256
XR3A (CE3DNP, op)	434,436
RW9QA	415,800

CW Only, High Power

LU1HF	2,001,136
CE1/K7CA	1,597,280
ZM1A (ZL3CW, op)	1,428,336
EF5Y (EA5GTQ, op)	1,130,112
PY2ZEA (OH2MM, op)	1,057,536
G3TXF	1,046,900
ZC4LI	968,772
HA1AG	943,020
EI7KD	917,280
JF1SQC	870,756

Multioperator, High Power

D4C	4,351,000
CW5W	3,615,656
EF8R	3,565,078
PY2NDX	3,420,348
HK1NA	3,306,360
LS1D	3,235,680
CX5BW	3,123,778
EI7M	2,859,864
PJ2T	2,758,288
CR6K	2,717,242

Multioperator, Low Power

TI5N	2,565,348
PY1GQ	1,676,196
ZY2C	1,292,830
4Z5MU	1,092,180
LU5DX	1,040,160
EA6BF	783,272
YT2F	764,568
LU2EE	641,240
EF1D	615,660
V63QQ	590,006

is something magical about 10 meter antennas high above the ground. As Dale described it: "The pile-ups to Europe were crazy…many times I had to QSY and often ran with the attenuator on trying to copy anything from the mess calling....but what a rush." When the final bell rung Dale had made over 2100 QSOs with low power and a 3-element antenna! His post log-checking score of 1,328,000 beat the previous record held by K1TO by 110,000 points or about 9%.

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Potomac Valley Radio Club	33,186,960	130
Yankee Clipper Contest Club	28,654,372	78
Florida Contest Group	24,608,646	83
Northern California Contest Club	20,299,126	66
Minnesota Wireless Assn	14,453,608	83
Society of Midwest Contesters	13,038,478	54
Medium Category		
Frankford Radio Club	13,258,284	31
Arizona Outlaws Contest Club	13,048,014	44
Central Texas DX and Contest Club	11,199,744	21
Contest Club Ontario	10,612,610	43
Southern California Contest Club	7,472,480	30
Grand Mesa Contesters of Colorado	7,439,444	19
Alabama Contest Group	7,227,460	29
Tennessee Contest Group	6,984,066	41
Hudson Valley Contesters and DXers	5,550,942	23
Mad River Radio Club	5,350,674	15
Western Washington DX Club	5,096,476	22
Maritime Contest Club	4,800,072	12
South East Contest Club	4,521,596	24
Carolina DX Association	4,457,550	20
Willamette Valley DX Club	4,454,032	20
Mother Lode DX/Contest Club	4,242,378	12
ORCA DX and Contest Club	3,380,924	14
Order of Boiled Owls of New York	3,046,704	9
Saskatchewan Contest Club	2,741,248	3
Contest Group Du Quebec	2,627,380	13
CTRI Contest Group	2,566,664	15
North Coast Contesters	2,477,072	5
Northern Rockies DX Association	2,277,084	3
Spokane DX Association	2,220,038	11
Western New York DX Assn	1,850,700	8
Lone Star DX Assn	1,609,164	7
Hampden County Radio Assn	1,546,158	18
Rochester (NY) DX Assn	1,437,270	9
North Texas Contest Club	1,436,724	5
Kentucky Contest Group	1,264,876	4
Louisiana Contest Club	1,142,182	5
Utah DX Assn	1,140,548	7
Allegheny Valley Radio Association	1,048,578	4
Bristol (TN) ARC	451,102	11
West Allis RAC	443,982	11
Mississippi Valley DX/Contest Club	309,088	5
Six Meter Club of Chicago	86,688	6
Pacific Northwest VHF Society	55,724	3
Local Category		
Central Virginia Contest Club	4,359,656	10
Midland ARC	1,255,800	4
Kansas City DX Club	1,176,590	9
Hilltop Transmitting Assn	1,145,576	5
599 DX Association	1,141,616	6
Delara Contest Team	939,460	7
Lincoln ARC	764,918	5
Bergen ARA	753,702	8
Northeast Wisconsin DX Assn	684,290	3
Iowa DX and Contest Club	575,440	3
New Mexico Big River Contesters	455,756	3
Metro DX Club	394,192	3
Meriden ARC	358,964	4
Sterling Park ARC	333,944	9
West Park Radiops	282,488	7
Badger Contesters	268,626	7
Gloucester Co ARC	216,488	5
Granite State ARA	205,664	6
Low Country Contest Club	172,588	4
Murgas ARC	152,960	3
Portage County Amateur Radio Service	104,884	7
Heartland DX Association	92,520	6
Southern Berkshire ARC	62,770	5
Raritan Bay Radio Amateurs	44,878	5
Pueblo West Amateur Radio Club	34,904	4
Hays-Caldwell ARC	6,504	3

The KM3T story — Dave, KM3T had an opportunity to operate from KC1XX for the contest and knew he was going to go full-bore in the Single-Op, Mixed-Mode, High Power category. KC1XX may not be on a mountain like D4C nor on top of apartment near a beach like CE2/VE7SV but whatever disadvantage that may be is made up by throwing aluminum at the problem. Dave had at his selection seven different 7-element beams including a rotating 4-stack as well as a few other antennas here and there. As Dave related: "It was great to hear the massive amount of activity this weekend from Europe, USA, and South America. Europe starting coming in via a southerly scatter path Saturday morning between about 1120Z and 1140Z, then the path went direct. The EU opening seemed better and deeper on Sunday with many more Russian stations and some goodies like 4K4K and 9K, 4X4, etc." When the contest was over Dave suspected if his log survived log checking it would be a new record. Well it did survive and it was a new record. His post log checking score of 3,018,720 beat the prior record held by KQ2M by 271,000 points or almost 10%.

Hams Just Want to Have Fun

There are also participants who just do it for the fun. That is one of the great things about contesting — you can choose your own level of participation and commitment. Several great examples of the spirit and fun of contesting from the 2011 contest were:

Operating as the GM3W team, Ian, GM3SEK and his wife Nadine, MMØMNW invented a "Mr & Mrs" section to the Multioperator, High Power category. Ian did the CW operating and Nadine did the Phone operating. They ended up with 1205 QSOs and 196 multipliers and had enough fun that they are planning on the same format in 2012.

For Larry, KD6SXF the 2011 ARRL 10 Meter Contest was his first contest ever! As he described it: "I only operated about 4.75 hours, but I was exhausted! I wonder how so many hams are able to stay on the air hour after hour."

Finally there was the fantastic statement from Mike, AB1OD who was operating in the contest near the first anniversary of getting his ticket: "If you had told me this time last year that I'd be having this much fun sitting at a computer and a radio, I would have questioned your sanity. My, how things change." A graduate of the ARRL Rookie Roundup, since the 2011 ARRL 10 Meter Contest through mid-April 2012 he has participated in no fewer than 21 other contests by a count of his 3830 score postings.

Club Competition

Club competition continues to be a popular and fun aspect of this contest. Seventy clubs submitted 1217 logs meaning almost half of W/VE operators were also part of a club entry!

In the Local Club category the Central Virginia Contest Club took top honors among the 26 clubs. Their 10 members combined for more than 4 million points and ended the streak of the Midland Amateur Radio Club of Midland, Texas who won the category in three of the last four years.

In the popular Medium Club category the 31 members of the Frankford Radio Club bested the 44 members of the Arizona Outlaws Contest club by less than 2%! This was a great rebound from the Frankford club as they placed 8th last year and another heartbreaker for the Arizona club who also finished second in 2010.

In the Unlimited Club category the 130 members of the Potomac Valley Radio Club who bested second-place Yankee Clipper Contest Club by a wide margin. The PVRC's success formula looks like just overwhelming their competition with the sheer number of members. Congratulations to all the clubs and their organizers.

Summary

The 2012 ARRL 10 Meter Contest will be held on December 8 and 9. We'll see you on the band in December!

Extended Version Online

Look to the online extended version of this article at **www.arrl.org/contest-results-articles** for lots more commentary, many more action photos, and the following features and analysis:

- A short history of the contest
- What did *CW Skimmer* spots tell us about propagation?
- How well did this author's pre-contest predictions hold up?
- Is there a magic mix of Phone and CW for multimode categories?
- A photo study of Kevin, K7ZS's remote operation.
- A contest summary from Mexico by Hector, XE2K
- Line scores and the all-time record tables.

If you own a smartphone, just scan this QR code.

2012 ARRL® January VHF Sweepstakes Results

Fireworks in January!

Kevin Kaufhold, W9GKA, kkaufhold@yahoo.com

The summer months are usually known for dramatic activity on the VHF and above bands but the 2012 January VHF Sweepstakes weekend surprised almost everyone with an exceptional amount of enhanced propagation that equaled or surpassed a summer run on the bands in some areas. Not only was there an abundance of sporadic E (E-skip or E_s), but aurora (Au), transequatorial propagation (TEP) and even F2 and Au-E_s were evident in many areas. Many participants felt that this year's contest had some of the best January propagation in many years.

6 Meter Conditions

For many operators the fireworks on 6 meters occurred right from the start of the contest. In the midsection of the nation, Larry, NØLL, made 186 contacts on 6 meters from his Midwest location and even worked HKØNA on 6 meters for DXCC entity #130. Congrats Larry! Jon, NØJK, had strong E_s from eastern Kansas to the mid-Atlantic region and even had a run going using a 2 element Yagi with 10 W. The band opening moved to the southwest after 2+ hours with Mexico coming in very loud.

Duffey, KK6MC, got in on the fun while roving across four grids between Flagstaff and Phoenix with W7QQ. They had numerous E_s contacts on Saturday afternoon, some to the same stations as they moved between grids. The opening was so intense that many contacts occurred while driving through hilly terrain. Another opening into the Pacific Northwest hit on Sunday afternoon throughout California. Traveling the same route as last year, the KK6MC score tripled. Pete, WA7JTM, indicated that this was his best E_s opening in a January contest — ever! That says a lot since he has operated in contests going back to the 1960s.

Five inches of snow and sleet fell in many areas of the Northeast 12 hours before the contest. As a result, activity at times was lower than usual and several rovers got a very slow start, but numerous stations got in on the fun anyway. Joe, K1JT, reported isolated E_s openings into the south at the start of the contest and again on Sunday from 1830-2335 UTC, both into the Southeast and to the Midwest. Stan, KA1ZE/3, worked several well-known stations in the upper Midwest on Saturday, including WØUC, W9JN, WØZQ, KØKP and NØAKC. Interestingly, Stan made those QSOs from Clearwater Beach, Florida, remotely controlling his station in Pennsylvania.

N4QWZ in Tennessee's EM66 grid worked into South America, making contact with LU5, ZP5 and YV5 for the first time in his long radio career. Stations in CO2 and C6 were also worked. All contacts were on CW. While the Caribbean contacts were likely E_s, the South American stations were probably contacted via TEP.

From EM31, Marshall, K5QE, had an exceptional E_s run, working almost everything and everyone early Saturday afternoon in the EN and FN fields then switching into the DM field by 2156 UTC of the first day. In fact,

Top Ten

Single Operator, Low Power

K2DRH	151,392
WA3NUF	147,618
N3RG	103,704
N3LL	103,032
AF1T	98,942
WB2SIH	82,296
N4TWX	66,125
K1KG	61,149
N4QWZ	58,108
N1DPM	40,152

Single Operator, High Power

K1TEO	375,386
K3TUF	332,536
K3IPM	103,562
WØUC	81,016
W5PR	80,475
WA3DRC	72,624
W4ZRZ	64,533
WB2RVX	63,300
K4QI	61,608
WØGHZ	58,195

QRP Portable

N3AWS	7,398
N8XA	6,400
WØPV	5,289
W9SZ	2,187
WD5AGO	1,680
WB2AMU	980
AE6GE	945
K2UNK	528
K4RSV	384
KL3JI	160

Limited Multioperator

W3SO	143,202
K2LIM	134,568
K1JT	64,365
W9RM	56,092
W4NH	54,080
W1QK	40,034
WY3P	35,966
KØSIX	27,166
W3HZU	26,270
N4BRF	10,318

Multioperator

K5QE	812,224
N3NGE	535,050
K3EOD	137,772
W3SZ	79,280
KBØHH	70,596
N3YMS	66,700
N1JEZ	40,479
N4QV	29,488
WB3IGR	25,270
N4JQQ	22,750

Rover

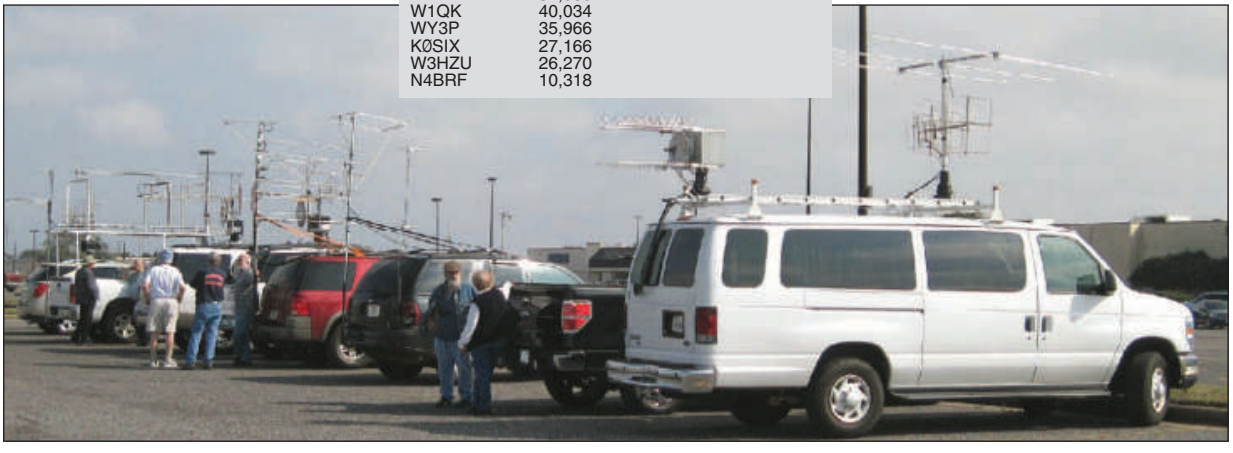
K5ME	379,000
W5FWR	356,345
KF5KEY	351,840
AE5P	317,515
K5TRK	305,800
K5FAY	292,930
W5TV	184,052
K1DS	134,246
NN3Q	40,068
VE3OIL	33,902

Limited Rover

WK5F	22,750
KK6MC	12,920
ABØYM	12,814
K9JK	9,400
N2ZBH	9,316
WØBL	9,080
WB8BZK	8,080
WA4JA	3,634
K6BRW	3,480
N4TZH	3,108

Unlimited Rover

KRØVER	15,120
K2TER	14,014



The Nacogdoches ARC put together a huge rover effort to win the Medium Club gavel — and succeeded. See the online article for more about this team operation. [Wayne Overbeck, N6NB, photo]

others in the Northwest reported Marshall's signals being extremely solid for much of Saturday. One of the K5QE operators, N5NU, ran a 200 contact hour on Saturday. Marshall's multioperator station had 158 grids on 6 meters alone!

Aurora and Exotic Forms of Communication

Au was strong in the upper plains and Midwest. Paul, WØUC, (EN44) not only ran 6 meter E_s, but had one of his longest Au sessions ever during a contest. Paul's first 6 meter Au run was on Sunday from 2026Z-2044Z. The buzz then returned on 6 meters from 2244Z-0130Z with contacts on 2 meters as well between 2301-0122Z. Gary, WØGHZ, also made some Au contacts from EN34 from 0043Z-0113Z on Saturday. Jim, K8MR, had aurora contacts with VE2 and VE3 as well as with WØUC and W9JN. Steve, VE3SMA (EN93) also reported working WØUC and W9JN on Au at around the same time.

K1JT, K5QE, and several others made contacts off the Moon once again this year. Many others ran meteor scatter on 6 and 2 meters. 10 GHz was well represented, too. One exceptional, 165 mile 10 GHz CW contact between Jon, WØZQ, and Jim, KØAWU, is even available online at **nlrs-10ghz.blogspot.com**.

Category Activity

Category	2012 Logs	2011 Logs
SOLP	471	420
SOHP	148	154
SO-Portable	16	22
MO-Limited	23	28
MO-Unlimited	46	32
Rover	39	30
Rover-Limited	22	19
Rover-Unlimited	2	5

2012 Results — Aggregate Activity

As the graph shows, log submissions were up this year some 8% over 2011 with 767 logs entered compared to 710 last year. With the enhanced propagation, aggregate scores surged some 24% over 2011 to 10,737,292 points. Total contacts increased 33% to more than 87,000 and total multipliers across all bands jumped 48% to almost 28,000. The chart shows the aggregate volume of contacts made during each contest hour. Note that in several hours on both Saturday and Sunday contestants worked over 3000 stations per hour. That is a lot of activity!

Participation was up in 2012 in many of the categories as shown in the activity table. While there was some movement between subcategories, total Single Operator logs jumped dramatically from 574 to 619; total Multioperator logs increased from 60 to 69 and the Rover category totals (combined) went up from 54 to 63 logs.

Single-Operator Categories

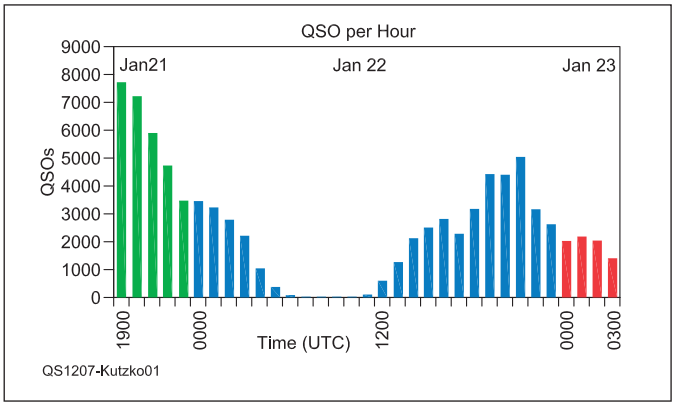
In Single Operator, High Power (SOHP) Jeff, K1TEO, took first place, just shy of 1000 contacts and 375,000+ points. The strong 6 meter conditions helped Jeff's score but making contacts on all bands through 10 GHz was a large factor in his success, too. Notably, Jeff had 17 contacts on 2.3 GHz and 11 contacts on 5.7 GHz. Now that's some all-band capability! Second in SOHP went to Phil, K3TUF, also scoring well over 300,000 points. Phil blanketed all bands, making contacts as high as 24 GHz as well as light.

Single Operator, Low Power (SOLP) continues to be the most popular category in the contest with 61% of all contest logs. First place goes to Bob, K2DRH, at 151,000 points. Bob led the nation in multipliers among the SOLP stations on most of the eight bands on which he was active. Only 4000 points behind, Phil, WA3NUF, captured second place this year with just over 146,000 points. Phil was on more bands and had more contacts than Bob but the difference was 110 more multipliers for K2DRH.

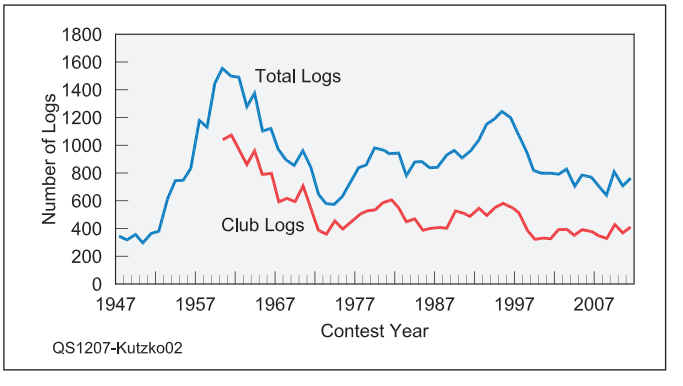
Single Operator, Portable (SOP) stations are a rugged bunch. Not only do they put up with freezing cold, snow and sleet in portable spots but they run only 10 W, use generators or batteries and often make do with makeshift

Affiliated Club Competition

Unlimited Club		
Mt Airy VHF Radio Club	2,416,112	77
Medium Club		
Nacogdoches ARC	3,024,885	15
North East Weak Signal Group	782,902	20
Potomac Valley Radio Club	464,850	36
Florida Weak Signal Society	258,046	10
Northern Lights Radio Society	254,539	15
Society of Midwest Contesters	175,650	13
Contest Club Ontario	161,530	16
Badger Contesters	122,851	21
Florida Contest Group	103,872	7
Yankee Clipper Contest Club	86,541	12
Roadrunners Microwave Group	72,208	3
Arizona Outlaws Contest Club	66,271	4
Tennessee Contest Group	59,164	3
North Texas Microwave Society	48,959	5
Pacific Northwest VHF Society	31,475	11
Rochester VHF Group	29,927	9
Frankford Radio Club	25,508	5
Western New York DX Assn	20,959	3
Carolina DX Association	19,472	5
Grand Mesa Contesters of Colorado	18,016	6
Northern California Contest Club	17,008	7
Six Meter Club of Chicago	14,650	11
South Jersey Radio Assn	14,353	6
Bergen ARA	14,016	12
Central Texas DX and Contest Club	10,758	4
Alabama Contest Group	6,286	3
Minnesota Wireless Assn	5,502	7
Contest Group Du Quebec	4,888	6
Southern California Contest Club	443	3
Alaska VHF-UP Group	310	3
Local Club		
Murgas ARC	51,453	4
Bristol (TN) ARC	47,773	10
Stoned Monkey VHF ARC	34,872	4
Granite State ARA	22,740	4
Eastern Connecticut ARA	18,774	4
Lone Star DX Assn	18,174	3
Raritan Bay Radio Amateurs	12,272	6
10-70 Repeater Assn	9,141	5
Meriden ARC	8,955	4
Burlington ARC	5,655	6
Mobile Sixers Radio Club	5,064	3
Portage County Amateur Radio Service	4,310	3



A chart showing the number of contacts logged during each hour of the contest. The effects of the big 6 meter openings raised activity on both days.



Club logs continue to make up a significant fraction of all submitted logs year after year. In 2012, approximately half of all logs submitted also contributed to a club score.

Regional Leaders

Northeast Region

New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections

WA3NUF	147,618	A
N3RG	103,704	A
AF1T	98,942	A
WB2SIH	82,296	A
K1KG	61,149	A
K1TEO	375,386	B
K3TUF	332,536	B
K3IPM	103,562	B
WA3DRC	72,624	B
WB2RVX	63,300	B
WB2AMU	980	Q
K2UNK	528	Q
WA3WUL	16	Q
KC2UES	8	Q
WA1LEI	6	Q
W3SO	143,202	L
K2LIM	134,568	L
K1JT	64,365	L
W1QK	40,034	L
W3HZU	26,270	L
N3NGE	535,050	M
K3EOD	137,772	M
W3SZ	79,280	M
N3YMS	66,700	M
N1JEZ	40,479	M
K1DS	134,246	R
NN3Q	40,068	R
AA1I	17,976	R
WA1T	11,704	R
K3IUV	7,751	R
N2ZBH	9,316	RL
N2SNL	1,104	RL
K2TER	14,014	RU

Southeast Region

Delta, Roanoke and Southeastern Divisions

N3LL	103,032	A
N4TWX	66,125	A
N4QWZ	58,108	A
W2BZY	36,642	A
KO4MA	31,300	A
W4ZRZ	64,533	B
K4QI	61,608	B
WD4MGB	46,509	B
KI4FIA	34,132	B
KØVXM	32,130	B
N3AWS	7,398	Q
WØPV	5,289	Q
K4RSV	384	Q
W4NH	54,080	L
WY3P	35,966	L
N4BRF	10,318	L
WA4DYD	6,325	L
N4QV	29,488	M
N4JQQ	22,750	M
K1KC	22,320	M
N4PD	3,080	M
W4PK	2,911	M
AG4V	16,665	R
K8GP	11,232	R
WA4JA	3,634	RL
N4ZTH	3,108	RL
KD4RSL	2,414	RL
KD4GCF	288	RL

Central Region

Central and Great Lakes Divisions; Ontario Section

K2DRH	151,392	A
VE3SMA	28,122	A
N9LB	26,235	A
K8MR	20,768	A
VA3ZV	16,730	A
WØUC	81,016	B
K8MD	44,157	B
K9EA	35,595	B
VA3ST	35,100	B
W9GA	23,828	B
N8XA	6,400	Q
W9SZ	2,187	Q
KDØEBT	126	Q
W9RM	56,092	L
N9TF	9,882	L
N8ZM	4,224	L
K8GDT	2,520	L
W9RVG	8,610	M
N2BJ	7,130	M
W8RU	3,686	M
VE3OIL	33,902	R
K9TMS	12,072	R
N9REP	11,400	R
K9BTW	11,160	R
W9FZ	6,253	R
K9JK	9,400	RL
WB8BZK	8,080	RL
VE3RKS	1,856	RL
K9PLS	240	RL

Midwest Region

Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections

WB5ZDP	33,182	A
NØLL	27,306	A
WB2FKO	24,947	A
WAØARM	17,301	A
W6ZI	17,220	A
W5PR	80,475	B
WØGHZ	58,195	B
WØZQ	32,054	B
W3XO/5	31,122	B
WD5K	20,748	B
WD5AGO	1,680	Q
KD7WPJ	108	Q
KØNR	90	Q
KØSIX	27,166	L
NØLD	7,865	L
WØVB	4,743	L
WD5IYF	1,716	L
K5QE	812,224	M
KBØHH	70,596	M
NØGZ	14,268	M
K5GKC	2,838	M
KC5MVZ	2,088	M
K5ME	379,000	R
W5FWR	356,345	R
KF5KEY	351,840	R
AE5P	317,515	R
K5TRK	305,800	R
WK5F	22,750	RL
ABØYM	12,814	RL
WØBL	9,080	RL
AF5Q	777	RL
KE5VIO	192	RL
KE5VIM	192	RL
KRØVER	15,120	RU

West Coast Region

Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT Sections

WA7JTM	27,270	A
NQ7R	24,444	A
WJØF	19,170	A
K6MI	14,300	A
K6TSK	9,894	A
N7CW	38,068	B
W6XI	18,700	B
N7EPD	13,489	B
KC6ZWT	13,048	B
KC6SEH	6,840	B
AE6GE	945	Q
KL3JI	160	Q
WO1S	627	L
W6YX	6,240	M
W6RKC	559	M
KE7SW	450	M
VE6CPP	63	M
KF6I	18	M
K6LMN	3,078	R
K6EU	645	R
KL7YK	580	R
K6GEP	63	R
KK6MC	12,920	RL
K6BRW	3,480	RL
WW7D	2,768	RL
WA7KVC	2,398	RL
K1FJM (N6ZE, op)	910	RL

antennas. First place went to James, N3AWS, from Mississippi who used only 6 meters, making 137 contacts and finishing with 7398 points. Phil, N8XA, worked 6, 2 and 222 from Ohio to take second, while John, WØPV, finished third at over 5000 points, also using only 6 meters from the West Central Florida section.

Multioperator Categories

It is fascinating to watch multioperator stations in action. Being able to juggle many schedules, bands and modes from EME to MS and tropo is truly awe-inspiring to watch. In particular, the Multioperator, Unlimited (MU) is a no-holds-barred, big power spectacular event, typically with many other single operators and rovers in close coordination.

Taking top honors this year is Marshall's, K5QE, Texas team. At 812,224 points, Marshall's was one of two stations in the entire contest to exceed 1000 total contacts reaching 1339 contacts. It was a long-sought goal of his to win the MU category in January from a low population area. Congratulations! Second place went to another great operation at Len's, N3NGE, station in eastern Pennsylvania. His was the other station to go over 1000 contacts and at 1229 it was very close on contacts but over 100 multipliers behind K5QE, finishing at 535,050 points.

The Multi operator, Limited (ML) category is an interesting one, being limited to only four bands but with multiple operators running the bands. ML saw intense competition in 2012. W3SO in Pennsylvania finished with top honors at 143,000 plus points. Around 50% of the station's 676 contacts were on 6 meters. Second place was taken by K2LIM, only 9000 points behind with a few less contacts and multipliers.

The Rover Categories

This year the national rover leaders were a Who's Who from the Nacogdoches Radio Club. The first seven places in the Rover category were from Nacogdoches as was the top place holder in the Limited Rover (RL). First place in the Rover category went to Bob, K5ME, at 379,000 points. Running 11 bands through 24 GHz, Bob made 672 contacts and 125 multipliers. Close behind was W5FWR at more than 356,000. The difference lay in a

6 Meter Propagation Play-by-Play

Along with more photos and graphics and a great club story, the extended version of this write-up at **www.arrl.org/contest-results-articles** provides an extensive "play-by-play" 6 meter propagation report based on a sequence of hourly contact maps. John, K9JK, did a great service in generating the sequence of maps from the ARRL log-checking database. Mid-points between contacts and the likely regions of E layer density are easy to spot. When looking at the maps, it is amazing to realize all this occurred in January, not June!

Jim, KK6MC, and Bill, W7QQ, roved across four grids between Flagstaff and Phoenix, using a Moxon beam for 6 meters and Yagis for 2 meters through 70 cm. [James Duffey, KK6MC, photo]

Division Leaders by Category

Single Operator, Low Power

Atlantic	WA3NUF	147,618
Central	K2DRH	151,392
Dakota	NØKK	12,600
Delta	N4QWZ	58,108
Great Lakes	K8MR	20,768
Hudson	WB2SIH	82,296
Midwest	NØLL	27,306
New England	AF1T	98,942
Northwestern	KD7UO	4,488
Pacific	K6MI	14,300
Roanoke	W3IP	18,848
Rocky Mountain	WB2FKO	24,947
Southeastern	N3LL	103,032
Southwestern	WA7JTM	27,270
West Gulf	WB5ZDP	33,182
Canada	VE3SMA	28,122

Single Operator, High Power

Atlantic	K3TUF	332,536
Central	WØUC	81,016
Dakota	WØGHZ	58,195
Delta	KG5MD	23,280
Great Lakes	K8MD	44,157
Hudson	W2KV	23,302
Midwest	WØLGQ	4,888
New England	K1TEO	375,386
Northwestern	N7EPD	13,489
Pacific	KC6ZWT	13,048
Roanoke	K4QI	61,608
Rocky Mountain	K7ICW	10,728
Southeastern	W4ZRZ	64,533
Southwestern	N7CW	38,068
West Gulf	W5PR	80,475
Canada	VA3ST	35,100

Limited Multioperator

Atlantic	W3SO	143,202
Central	W9RM	56,092
Dakota	KØSIX	27,166
Great Lakes	N8ZM	4,224
Hudson	W2JJ (WA2VUN, op)	7,310
Midwest	NØLD	7,865
New England	W1QK	40,034
Roanoke	WY3P	35,966
Southeastern	W4NH	54,080
Southwestern	WO1S	627
West Gulf	WD5IYF	1,716

Single Operator, Portable

Atlantic	K2UNK	528
Central	W9SZ	2,187
Delta	N3AWS	7,398
Great Lakes	N8XA	6,400
Hudson	WB2AMU	980
New England	WA1LEI	6
Northwestern	KL3JI	160
Pacific	AE6GE	945
Southeastern	WØPV	5,289
West Gulf	WD5AGO	1,680

Multioperator

Atlantic	N3NGE	535,050
Central	W9RVG	8,610
Delta	N4JQQ	22,750
Great Lakes	W8RU	3,686
Hudson	KC2SST	1,456
Midwest	NØGZ	14,268
New England	N1JEZ	40,479
Northwestern	KE7SW	450
Pacific	W6YX	6,240
Roanoke	N4PD	3,080
Rocky Mountain	WØRIC	1,924
Southeastern	N4QV	29,488
Southwestern	KF6I	18
West Gulf	K5QE	812,224
Canada	VE6CPP	63

Rover

Atlantic	K1DS	134,246
Central	K9TMS	12,072
Dakota	KCØP	9,418
Delta	AG4V	16,665
Midwest	WB9QAF	187
New England	AA1I	17,976
Northwestern	KL7YK	580
Pacific	K6EU	645
Roanoke	K8GP	11,232
Rocky Mountain	NØLP	19,760
Southwestern	K6LMN	3,078
West Gulf	K5ME	379,000
Canada	VE3OIL	33,902

Limited Rover

Atlantic	N2SLN	1,104
Central	K9JK	9,400
Delta	WA4JA	3,634
Hudson	N2ZBH	9,316
Northwestern	WW7D	2,768
Pacific	K6BRW	3,480
Roanoke	KD4RSL	2,414
Rocky Mountain	ABØYM	12,814
Southeastern	N4TZH	3,108
Southwestern	KK6MC	12,920
West Gulf	WK5F	22,750
Canada	VE3RKS	1,856

Unlimited Rover

Atlantic	K2TER	14,014
Rocky Mountain	KRØVER	15,120

few fewer contacts and multipliers. KF5KEY was third at 351,000 points. All three of these top Rovers worked from 10 grids with 11 bands of operation.

The RL category saw Bill, WK5F, take the top spot at 22,750 points. Having only the lowest four VHF bands to utilize, he still made 303 contacts. Second was Duffey, KK6MC, who had more than 100 E_s 6 meter contacts in Arizona, totaling almost 13,000 points. Third in this category was ABØYM from Colorado who also obviously benefitted from excellent 6 meter conditions with 65 out of 207 contacts being on 6 meters.

Only two logs were entered in the Unlimited Rover (RU) category. KRØVER in Colorado ran six bands through 1296, garnering 15,000 or so points. K2TER from New York was second, making over one-half of his contacts on 6 meters.

Band Activity

Band	Logs	QSO
6	720	46,408
2	612	20,964
222 MHz	317	5,683
432 MHz	466	8,350
902 MHz	114	1,406
1296 MHz	173	1,883
2304 MHz	78	935
3456 MHz	52	708
5760 MHz	34	432
10 GHz	46	456
24 GHz	14	81
47 GHz	0	0
75 GHz	0	0
119 GHz	0	0
142 GHz	0	0
241 GHz	0	0
Light	19	51
Total		87,357

Club Competition

The Club Competition has been a driving force of the January VHF Sweepstakes since the earliest days of the contest in 1948. This year was no exception with 43 clubs participating, compared with 38 clubs last year in 2011 and up from 27 clubs back in 2000. There were 414 club logs entered this year, accounting for 54% of all logs. Club members also generated the vast bulk of scores at 8,571,134 points, 78% of total points made by all participants.

In the Unlimited Club category, the Mt Airy VHF Radio Club "Pack Rats" posted a huge number of club logs (77) as well as total points (2.4 million) being the only club that amassed over 50 member logs in the contest. Including this year the Pack Rats have won the last 16 consecutive Unlimited Club gavels in the January contest and have won either the Unlimited or Medium club category in almost every year since 1961. No other club can claim that kind of record in any contest, HF or VHF+.

Thirty clubs participated in the Medium Club category. The Nacogdoches ARC engaged in a monumental effort to take the Medium Club gavel with over 3 million points, having increased their logs to 15 this year. The North East Weak Signal Group continued its strong showing from prior years, placing second in the category. Another preeminent club, the Potomac Valley Radio Club, placed third with more logs than any other club except the Pack Rats.

The Local Club category experienced intense competition among 12 club entries. First place went to the Murgas ARC with 51,453 points from four logs. Murgas has also been a perennially active club, having now won eight Local Club gavels in January (at least by the author's count) and even more in September. The Bristol (TN) ARC finished close behind in second place at 47,773 points and 10 logs while the Stoned Monkeys ARC from Illinois was third with over 34,000 points.

Conclusion

Propagation this year was extraordinary, with E_s, Au, Au-E_s, TEP and F2 all contributing to the effort. Most of the contestant's scores were higher than in prior years as a result. The real significance of the 2012 edition of the January VHF Sweepstakes may lie in the increased participation levels. Not only were total points, contacts and multipliers higher but submitted logs, participating clubs and band activity levels were all up. Let's keep the trend going into 2013! See you next year for the VHF Sweepstakes January 19-21!

A special thanks to everyone who provided a log or log extract on E_s or Au contacts: N9LB, W6KBX, K1TEO, K8MRl, WZ1V, AA5JG, NQ7R, W2BVH, K3TD, K3TUD, K5QE, K7XC, K9EA, K9ZM, KA1ZE, KC6ZWT, N3RG, N7DB, NN1N, VE3SMA, NØPOH, WØGHZ, WØUC, N4NH, W9RVG, WAØCNS and WA7JTM.

Extended Version Online

Check out the extended version of this article at **www.arrl.org/contest-results-articles** for more analysis and more photos. If you own a smartphone, just scan this QR code.

2012 ARRL August UHF Contest

More fun in the sun on 222 MHz + up!

1800 UTC Saturday, August 4 – 1800 UTC Sunday, August 5

- 222 MHz and up is the where the action will be for the ARRL August UHF Contest. Head for the hills (and take your antennas with you!), operate from several locations from your car as a rover or use your gear at home. Exchange is simply your grid square. More info on grid squares can be found at **www.arrl.org/grid-squares**.

- All logs must be received by 1800 UTC Tuesday, September 4, 2012. E-mail Cabrillo-formatted electronic logs to **augustuhf@arrl.org**. Paper logs to ARRL August UHF Contest, 225 Main St, Newington, CT 06111.

For complete rules and entry forms scan this code with your smartphone or go online at www.arrl.org/august-uhf

Steve Yates, AA5TB, set up a station in his Fort Worth, Texas game room for the 2011 August UHF Contest, and was able to work stations 230 miles away with a tiny 6 el Yagi. Where there's a will (and a touch of RF), there's a way! [photo courtesy Steve Yates, AA5TB]

Sean's Picks

Sean Kutzko, KX9X
ARRL Contest Manager

All dates/times are in UTC.

- **State QSO Parties this month:** New Jersey
- **QRP Contests this month:** ARS Spartan Sprint (July 3), MI QRP Club July 4 CW Sprint (July 4-5), QRP-ARCI Summer Homebrew Sprint (July 8), NAQCC EU Sprint (July 9), Flying Pigs Run for the Bacon (July 16), NAQCC Straight Key/Bug Sprint (July 19)
- **RAC Canada Day Contest (July 1):** A great event to help our friends up north celebrate their "birthday." Work as many VEs as you can, and be on the lookout for the special RAC stations.
- **IARU HF World Championships (July 14-15):** The great summer HF DX contest. It's only 24 hours long, so there's plenty of time to get in your contest fill and do other things on the weekend. Be sure to listen for the "HQ" stations from around the world, celebrating their country's IARU Member Society.
- **CQ Worldwide VHF Contest (July 21-22):** Sponsored by CQ Magazine, this VHF Contest focuses on 6 and 2 meters, when Sporadic-E propagation is still common. Exchange is simply your grid square. A great event for portable fun from a hilltop or nearby rare grid!
- **North American QSO Party, RTTY (July 21-22):** 12 hours of RTTY fun in North America! Exchange is your name and state. Perfect for first-time RTTY operators, and lots of fun for the experienced ops, too.
- **RSGB IOTA Contest (July 28-29):** IOTA is Islands On The Air. Operators world-wide will activate islands for this contest. See how many you can work, or activate one yourself! For more info on IOTA, visit **www.rsgbiota.org**.

July 2012 W1AW Qualifying Runs

W1AW Qualifying Runs are 10 PM EDT Wednesday, July 11 (0200Z July 12) and 9 AM EDT (1300Z) Friday, July 27 (35-10 WPM). The West Coast Qualifying Runs will be transmitted by station K6KPH on 3581.5, 7047.5, 14047.5, 18097.5 and 21067.5 kHz at 2 PM PDT (2100Z) Saturday, July 21. Unless indicated otherwise, speeds are from 10-35 WPM.

Strays

The Algonquin Amateur Radio Club, N1EM, recently donated five 2012 editions of the "ARRL Library collection" to libraries in the Boston metro west towns of Hudson, Bolton, Stow and Northborough, along with the 1st Lt Charles W. Whitcomb Middle School in Marlborough. Shown (l-r): K1DIN, W1UE, Don Cusson, KB1WTO, KB1WTB, KV1J, WB6VVA, KA1OS, W1SHK, N1ZCD, N1QQP and KA1HIH. [Frank McInnis, K1IX, photo]

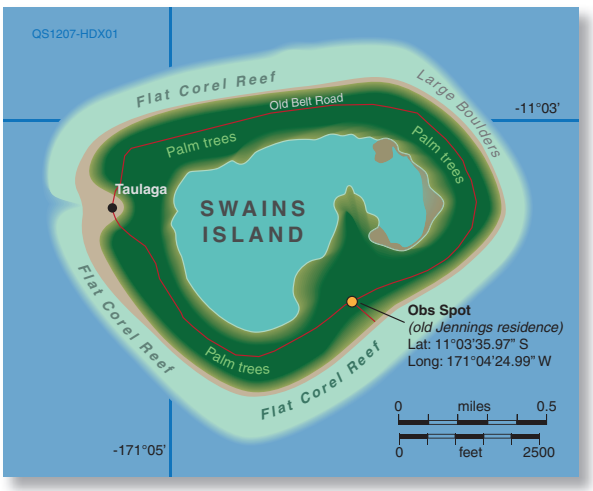
Bernie McClenny, W3UR, w3ur@arrl.org

KH8/S — Swains Island

This most wanted island will be on the air for 2 weeks, giving DXers an opportunity to work it.

Swains Island is located just slightly over 350 kilometers (219 miles) north of Tutuila Island, America Samoa (KH8). It is believed that this island was first discovered in 1606 by the Portuguese navigator Pedro Fernandes de Quiro. It is positioned at 11° 3' South and 170° 55' West and measures 3 kilometers by just less than 2 kilometers with a lagoon located in the middle of the island. The highest point on the island is between 10 and 15 feet above sea level.

The location of Quiros' discovery was in such error that it was later discovered and claimed by a whaling captain W. C. Swain (not Swains) around 1839 or 1840. It was later named Swains Island (not Swain or Swain's). Shortly afterwards British Captain Turnbull made a claim of discovering the island. Turnbull later offered title to an American named Eli Hutchinson Jennings Sr, who accepted. In late 1856 Jennings and his family settled in and began raising coconuts.



Swain's Island is located in the South Pacific between Tokelau and Samoa. It is a small atoll, 460 acres in size with a large freshwater lagoon.

On January 30, 1918 the British Government sent an "official communication" stating "that the island in question is United States territory."[1] On March 4, 1925 the US Congress declared sovereignty over the island annexing it as part of American Samoa, while continuing the ownership of the island by the Jennings family. New Zealand and the United States signed the Treaty of Tokehega on March 25, 1981 confirming American sovereignty of Swains Island, which was later put up for referendum by Tokelau in 2006.

Swains Island and Amateur Radio

The first Amateur Radio operation from Swains Island was an IOTA operation by Lanny Phillips, W5BOS/KH8, which lasted just a few days in September of 1994. The next activation of Swains Island was in early November 2002 for about a week by Mike, KM9D, and Jan, KF4TUG, as KM9D/KH8. These two operations were both well before Swains Island qualified as a separate DXCC Entity.

Astute DXpeditioners no doubt knew it was far enough away to meet the minimum distance to qualify after the DXCC 2000 rules went into effect on March 31, 1998 at 2359Z.

The new distance rule for "point one countries," now called Political Entities, went from the old 225 miles to 350 kilometers since more countries use the metric system than the English system. This was a difference of just 7.6 miles, enough to help create a few new countries shortly after the changes.

The new DXCC rules included criteria that would allow locations with an IARU (International Amateur Radio Union) society to qualify as a "Political Entity." Once the new rules were published and before they went into effect, some of the wise DXpeditioners quickly realized if IARU societies were created in certain locations this could open the door for a few new DXCC Entities.

The first new one was the Chesterfields as a result of New Caledonia's "Association des Radio-Amateurs, de Nouvelle-Caledonie (ARANC)" becoming a member of the IARU on March 23, 2000. A year later the Pitcairn Island Amateur Radio Association (PIARA) was formed and applied for membership in the IARU, which was accepted on November 16, 2001 thus leading the way for Ducie Island to be added to the ARRL DXCC® List. It should be noted that several other possible new ones were "waiting in the wings" under this new found rule.

Unfortunately, a good thing came to an end after the creation of the American Samoa Amateur Radio Association (ASARA), which also tried to become a member of the IARU. However, ASARA was ineligible for IARU membership because American Samoa was already represented in the IARU by the ARRL. At the January 2004 ARRL Board Meeting a change to eliminate the IARU member society criteria was unanimously agreed upon. Despite this a group from ASARA went to Swains Island and operated as KH8SI for 3 days in early March 2005. Needless to say, the operation did not count for a new DXCC Entity.

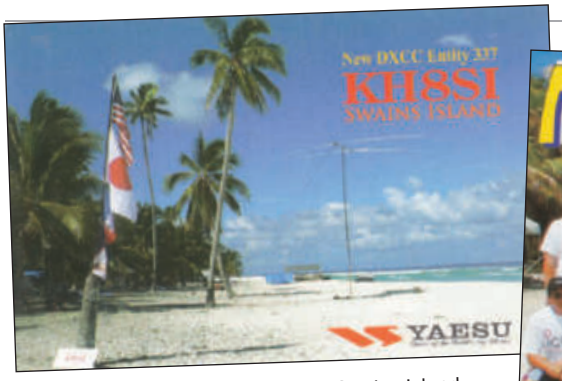
The Game Changes

At the request of the ARRL Board's Programs and Services Committee, the DX Advisory Committee (DXAC) began a study of a Membership Services Department staff proposal entitled "A Proposal to Amend the IARU Provision of the DXCC Political Entity Rule." This caused a change in the DXCC rules replacing the former DXCC Rule, Section II, 1. Political Entities, Paragraph c) with the following new rule effective June 15, 2006:[2]

> c) The entity contains a permanent population, is administered by a local government, and is located at least 800 km from its parent. To satisfy the "permanent population" and "administered by a local government" criteria of this sub-section, an Entity must be listed on either (a) the U.S. Department of State's list of "Dependencies and Areas of Special Sovereignty" as having a local "Administrative Center," or (b) the

[1]Zandt, F. K. (1966). *Boundaries of The United States and the Several States, Geological Survey Professional Paper 909*. United States Government Printing Office, 1976.

[2]DX Advisory Committee Semi-Annual Report, June 30, 2006.



The first approved DXpedition from Swains Island was by KH8SI for 16,392 contacts in just under 5 days of activity.

In early April of 2007 a large international team operated N8S from Swains Island making an amazing 117,205 contacts in less than 2 weeks.

United Nations list of "Non-Self-Governing Territories."

Under the new rules American Samoa was now a "Political Entity" and Swains Island would qualify as a "Geographic Separation Entity" as follows:

> 2bi) The island is separated from its Parent, and any other islands that make up the DXCC entity that contains the Parent, by 350 kilometers or more. Measurement of islands in a group begins with measurement from the island containing the capital city. Only one entity of this type may be attached to any Parent.

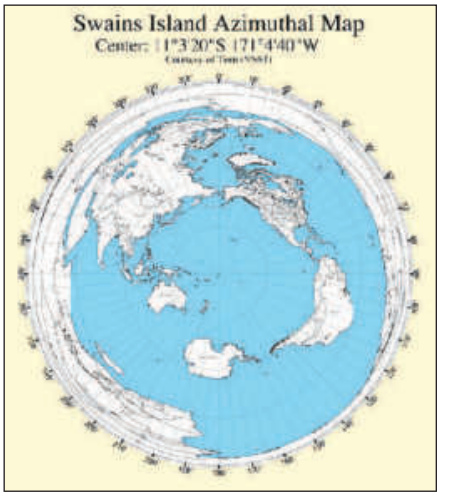
Contacts with "Swains Island on or after 0001 UTC on July 22, 2006," would count for the new Entity.

Kan Mizoguchi, JA1BK/KH6BK, led the first DXpedition. Joining him were Paul Granger, F6EXV/WH7S; John Papay, K8YSE; John Peters, K1ER; Rose Gandy, KS6FO, and Tetsu Tanaka, JH1JGX/AH7C. They were QRV from the island from July 28 to August 2 making 16,392 contacts, of which 7929 were unique stations. The first contact went to Larry Gandy, AH8LG.

In late October of that same year an international team led by Hrane Milosevic, YT1AD; and co-led by Dave Collingham, K3LP, announced their plans for an April 2007 DXpedition to Swains Island. The team also included Krasi, K1LZ; Alan, K6SRZ; Doug, N6TQS; Harry, RA3AUU; Eugene, RK3AD; Vangelis, SV2BFN; Stevan, YZ7AA; Mladen, YU7NU; Miki, YU1AU; Velimir, YZ1BX; Mome, Z32ZM; Roman, URØMC; Viktor, RU4SU; Aleksej, UA4HOX, and Chak, JT1CO. They were QRV from April 4-17 making a record breaking 117,205 contacts.

Another Chance to Work Swains Island

On February 29 of this year Joe Pater, W8GEX, and Craig Thompson, K9CT, announced plans by a multinational team to again activate Swains Island. These were the same guys who led the October 2010 PJ7E Sint Maarten and October 2009 K4M Midway Island DXpeditions. Despite some 125,000 previous contacts made, KH8/S ranks number 31 on *The DX Magazine's* most wanted list and number 30 on Club Log's list (**www.clublog.org**). Plans are to have six fully functional stations running for 14 days on 1.8 through 50 MHz using SSB, CW and RTTY. They expect to arrive on the island and setup on September 4 and plan to begin operations as NH8S the following day.



Here's how the world looks from the remote Swains Island. [Tom Epperly, NS6T]

Team members include AA4NN, DL3DXX, I8NHJ, K5AB, K9CS, K9CT, K9NW, KB8OCP, N2TU, N4HH, N6HC, NA6M, ND2T, NI6T, SM5AQD, W4BUW, W6KK, W8GEX, W8TN and WB9Z. Back home the following will be part of the support team DL9RCF, K6MM, N1DG, N4XP, W6XA, W8CAA and Margarett Blackwell (spouse of AA4NN).

This won't be a cheap DXpedition as the only way to get to the island is via a chartered ship from Pago Pago, American Samoa. Sponsorship by DXers all around the world is sought in order to make this DXpedition a reality. You can learn more on the team website at **www.nh8s.org**. The website has many details about the operation including a log search, which will be linked to Club Log, NH8S suggested frequencies, photos, bios, sponsorships, QSL information and much more. Remember the suggested frequencies are where the NH8S team will be *transmitting*. Most of the time they will likely not be listening on their transmit frequency. Listen carefully to their complete instructions before calling them. The team plans to stop operating on September 18 and tear down the stations the following day, as they will be departing on September 20 heading back to Pago Pago. Send questions to **info@nh8s.org**.

Propagation Help

One of the features of Club Log is the Geo Propagation tab, which gives you an idea of what time on what bands the most people from your area of the world are getting through to the DXpedition station. The logs for NH8S on Club Log will be accessible via their website. Most likely the direct URL will be **www.clublog.org/logsearch/N8S**.

Once the DXpedition has begun to upload their logs to Club Log, DXers will be able to use the data from the logs to determine the best times by clicking on the Geo Propagation tab. You will then see a map of the world. Move your mouse to the approximate location of your station. A text box will show up displaying either your CQ Zone or the name of your country and the total number of contacts the DXpedition has made. Once you click on the map a graph will display GMT times and the number of contacts. You can click on the time of day or the band you are interested in and it will give you an idea of the best times to look for NH8S for your particular area of the world. The more contacts they make the more accurate the forecast will be.

Wrap Up

I am saddened to report that after this article was written Larry Gandy, AH8LG, passed away. He was very supportive of the past DXpeditions to Swains Island. Until next month, see you in the pileups!
— *Bernie, W3UR*

Jon Jones, NØJK, n0jk@arrl.org

NJØW Grid Expedition Creates Excitement on a Slow Spring Day

From aurora to tropo there was plenty to keep the bands hot in April.

April 18 was a sunny but slow day for stateside propagation on the VHF bands. There was no tropo on the upper bands or sporadic E (E_s) on 50 MHz. A good day for a round of golf, perhaps? Not for many 6 meter DXers who were home closely watching the band. Why? They were following Dave's, NJØW, rover grid expedition across Nebraska, South Dakota and North Dakota (see Figure 1). On the 18th, Dave operated from the following grids: DN92, DN93, DN94, DN95, DN96, EN02, EN03, EN04, EN05 and EN06. He made many contacts. What a treasure trove of rare grids for FFMA and VUCC award chasers. Without any E_s or tropo April 18, how was Dave able to do this?

The digital magic of *WSJT*, Joe Taylor's, K1JT, meteor scatter protocol, made Dave's meteor scatter contacts possible. Meteors enter the earth's upper atmosphere constantly. They leave trails of ionization in the E-layer. Most of these meteors are small, the size of a grain of sand or dust. When a larger meteor ionizes, this can cause a "burst" of propagation lasting from 10 to 30 or even more seconds on 50 MHz. The usual distance worked is about the same as one E_s hop, 1000-2200 km. The intensity and duration of the burst decreases with higher frequency. On 144 MHz, the same burst may only be a brief loud "ping."

The smaller meteors leave "under dense" trails, which are heard only as a short weak "ping" on 50 MHz and are inaudible on 144 MHz. During meteor showers contacts are possible on conventional SSB and CW as the meteor bursts are more frequent and stronger. During nonshower periods, meteor scatter is possible on 50 MHz SSB and CW between the high power big antenna stations. It is very difficult to make 144 MHz SSB/CW meteor scatter contacts without a meteor shower unless one is lucky to catch a random large meteor or "blue whizzer."

K1JT's *WSJT* digital mode allows one to utilize the shorter, weaker under dense meteor trails for communication and make contacts using the small "random" meteors. With *WSJT*, a 100 W station with a 3 element Yagi can routinely make 2000 km contacts with similar stations via random meteors just about any time on 50 MHz.

WSJT is a specific digital protocol optimized for meteor scatter at VHF/UHF. The *WSJT* program can decode "fraction-of-a-second signals reflected from ionized meteor trails and steady signals 10 dB below the audible threshold." The mode is FSK-441. It uses four tones and multiple frequency shift keying at a data rate of 441 baud. Complete information on *WSJT* can be found at **www.physics.princeton.edu/pulsar/K1JT**.

Joe cautions, "Be aware, that *WSJT* is a complicated program. It has many operational nuances, especially ones having to do with the correct decoding of received signals. If you are a new *WSJT* user, it is strongly recommended that you work through the decoding tutorial." In past years, grid expeditions depended on E_s or tropo to hand out contacts. Thus, most were scheduled during the early summer months to take advantage of these propagation modes. With *WSJT* meteor scatter, 50 MHz grid expeditions can go out any time of year and be confident they will make contacts.

If you are not set up for *WSJT*, you can still take part in the excitement of chasing rare grids on 6 meters. Grid expeditions such as

Figure 1 — One stop on Dave's, NJØW, rover grid expedition across Nebraska and the Dakotas. [David Schaubert, NJØW, photo]

T6MO 50 MHz from Afghanistan

On April 23, Eric Hall, K9GY/T6MO, in grid MM21 made his first 50 MHz contact from Afghanistan. He worked VK6KP (OG89) at 0843 UTC on CW, then again at 0856 UTC on SSB. The distance is around 8000 km (5000 miles) via TEP. His current station is an FT-857D and a 40-10 meter off-center-fed dipole at 35 feet (see Figure 2). Congratulations to Eric and VK6KP on a great contact.

Figure 2 — Eric Hall, K9GY/T6MO, at the controls of his Afghanistan (MM21) station ready for another 5000 mile contact with the land down under. [Eric Hall, K9GY/T6MO, photo]

NJØW, K7BV, KB8U, KK6MC and K5N make conventional SSB/CW contacts when the band is open for E_s. I worked NJØW/r June 26, 2011 on SSB when he was in DN53/DN54 on E_s. This was during Dave's big "6 Meter Interior-West Grid DXpedition" last summer. Dave activated 95 grids and made 1055 contacts during that trip. K5N made many E_s contacts last December on SSB from DL99/DM90. Despite a number of E_s openings in April, Dave had no significant E_s during his trip. It would have been a bust had it not been for *WSJT*. Bill, NDØB, helped Dave with setting up schedules and support.

With *WJST* meteor scatter, 50 MHz grid expeditions can go out any time of year...

On the Bands

"April Showers" of Aurora, E_s, TEP, Tropo, EME and F2

50 MHz. On April 1, Pat, W5OZI, worked KH7Y, possibly on F2 side-scatter. Ed, N5DG (EM20) worked E51WL North Cook Island on April 3 at 2338 UTC with a 579 signal. He says Warwick, E51WL, is building a kilowatt amplifier.At 0312Z on April 7, Lance, W7GJ, Montana completed an EME contact with Pierre, ZS6A, who was operating an M^2 7 element Yagi and amplifier on the 3DAØFC DXpe-dition. Lance notes the signal degradation was 2.6 dB and the K_p was 2.7. 3DAØFC was –25 dB on JT65A when they worked, but was –21 dB as Lance's moon rose higher. This is Lance's 6 meter DXCC #177 and 6 meter EME DXCC #122.

An aurora opening that was associated with solar winds streaming from a coronal hole sparked geomagnetic activity April 12. N8JX worked VE3EN on aurora at 2125 UTC. About 20 minutes later the F2 MUF rose over 50 MHz and WD5K reported HC1HC very loud into EM12, as did NØRQ (EM13) on 50.110 MHz. HC1HC was also spotted loud to south Texas (W5OZI) and South Carolina (N4AVV). Strong TEP was reported at the same time from South Florida to Argentina and Brazil. AC4TO heard CP6/CE3SX Bolivia at 2156 UTC. The aurora continued that evening for stations in northern tier states such as MN (KØSIX (EM35)), MI (N8CJK, K8MD) and ME (K1TOL). K1TOL heard the VYØSNO/b at 0106 UTC April 13.

An E_s opening occurred the next morning. Bernie, W3UR (FM19) noted VY2OM loud at 1445 UTC. It pays to watch for E_s openings the day after an aurora.

It pays to watch for E_s openings the day after an aurora.

On April 14, WB2GMK, Tampa, FL worked LU9EHF at 2218 UTC. Greg says this was his first DX outside of North America on 6 meters in 50 years of ham radio! He was using a rotatable dipole at 30 feet and a FT-625RD with 150 W amplifier.

A major E_s linked to TEP opening occurred for W2 and W3 call area stations (including VE3) on Sunday April 15. The opening started around 1830 UTC and lasted beyond 2200 UTC. CX8DS, LU6EE, LU2DEK and others were in to the northeast for almost 4 hours. This opening had the hallmarks of classic "E_s – TEP." The footprint in the USA was relatively small, consistent with an E_s link and the location of the E_s cloud may be deduced by paths crossing it at a right angle from Florida to UT1FG/mm and single hop from W2 to HI and KP4 (see Figure 3). Some interesting spots for plotting the E_s cloud were N4QV (EL96), KO4MA (EL88) and KI4FIA (EL99) to UT1FG/mm in FM82 at 2200 UTC. Yuri's activity was helpful in analyzing this particular opening.

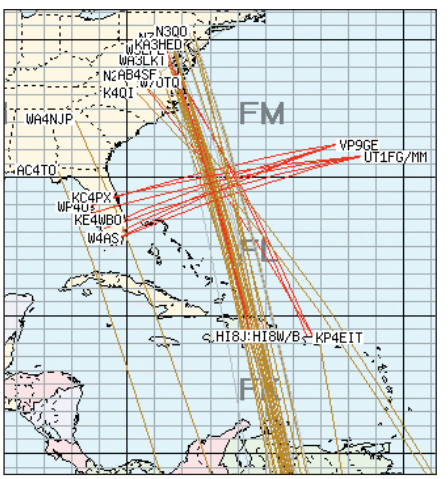


Figure 3 — The mid-Atlantic coast saw a strong E_s-TEP connection to the Caribbean and South America. [DX Sherlock]

W2GPS put his new Elecraft K3 transceiver to good use in the opening. "Sunday afternoon I got back on 6 meters with my new Elecraft K3 into a SteppIR DB19 at 72 feet. There was a sporadic E cloud feeding a transequatorial path from a small area on the East Coast to Uruguay and Argentina. The sporadic E cloud also dropped a path from here to Puerto Rico. I worked CX8DS, CX2TQ, CX3TI, LU9AEA, LU8EEM and KP4EIT in that order. I got the new radio just in time for the sporadic E season!"

From south Texas W5OZI logged HC1HC and LU5FF (FF99) "for a new grid."

Some lucky "2s" and "3s" worked rare Bolivia. Mark, K2AXX, picked up CP6UA for his 6 meter country #146 at 1939 UTC. Enrique posted "TNX QSO Mark 5/5!" Bernie, W3UR, and Dave, N3DB, also logged CP6UA.

Yuri, UT1FG/mm (FL86) was active again the next afternoon and had a strong single hop E_s opening to Florida. KD4ESV, N3LL, WD4AB and others spotted Yuri 59+ around 2200 UTC.

Fred, KH7Y, on the "Big Island" worked 9MØL on April 21 at 0854 UTC. He had copied their beacon for 2 hours until KG6/N2NL worked them on 10 meters and asked for 9MØL to get on 6. Fred worked 9MØL with 539 reports. Later 9MØL worked FK8CP, DU7/PAØHIP, KG6/N2NL and many JAs. KH7Y notes 9M6XRO, KG6DX and DU7/PAØHIP had steady "rock crushing" signals with no "TEP flutter" at this time. Earlier that day Fred worked YN2N, YS1AG and TI7/N5BEK around 2300 UTC.

A geomagnetic storm occurred April 23-25. A "minor" coronal mass ejection swept past the earth and the geomagnetic field tipped south. This allowed the solar wind to pour in and the K_p index went to 5 then 7. It stayed over 5 for many hours. Visual aurora was spotted as far south as Colorado and Kansas and strong radio aurora from 50-432 MHz. Driving from Junction City to Lawrence that evening, I stopped on a hilltop off I-70 in EM19 just south of Manhattan, KS. I heard WDØE (DM79) work NØLL (EM09) at 0043 UTC April 24 and WZ8D (EM89) call CQ. The aurora signals had a sharp peak to the northeast. NØLL reported 6 meter aurora contacts with WZ8D, WDØE, KØGU, KA9FOX, NWØW, KDØUSA, NØSP and KT9T (EN34). Signals were mostly 53A to 56A.

N7DB in Oregon found strong aurora after 0130 UTC April 24. He logged KE7V (CN88) at 0158 UTC. Over the next couple of hours he worked "CN87, DN09, CN79, CN89, DN18, CO70, CO91 and W7MEM (0413Z) in DN17."

The following day April 24, a widespread E_s opening occurred, perhaps sparked by the high geomagnetic activity. K7ICW NM worked K7XC and N6EN (CN81) via E_s. Double hop and triple hop E_s to the Caribbean noted by NWØW (EM47) to VP2ETE, FG5GP, KP4EIT, KP2HC and the FY7THF/b around 1800 UTC. Later Tim copied the CX1CCC/b at 2100 UTC. W5OZI worked PV8ADI, HK3R and

V31AE. Dan, K3ZXL, Florida logged Mike, VP8NO (GD18) who made a welcome appearance at 1950 UTC. VP8NO worked north to N8JX (EN64), K1HTV (FM18), N5DG (EM20) and was heard by VE3FGU (FN04). New Zealand was worked in Florida that evening.

Dave, N9HF (EL99) worked ZL1RS at 0130 UTC April 25. E_s occurred again on April 25. Al, K7ICW, made 22 contacts in 12 states plus 2 DX stations. The big news that day in the Pacific Northwest was ZF1EJ. N7DB reports KB7ME, KI7JA, K7MAC (DN13) and N7EA worked Ethan, likely via triple E_s around 1700 UTC. W4NFJ (EL98) was loud to NØJK (EM28) at 2150 UTC. The E_s supported some TEP links to FK8CP from California, Arizona, New Mexico and Colorado. Arne, N7KA, logged Remi, FK8CP, at 0010 UTC on 50.114 MHz for his 6 meter DXCC #60. Jim, WDØE, tells how he worked Remi at 0027 UTC the 26th:

> I worked FK8CP on 6 meter SSB from DM79, about 35 miles SE of Denver. For an hour before that I watched on DX Sherlock as Remi was worked by a few stations in Southern California. But the E_s between here and California had petered out well before that as the cloud moved west. We heard him in and out of the noise for about 20 minutes total. I've seen many spots for him from all along the southern tier of states but I think I'm as far north in the interior as this E_s/TE link has supported this cycle. We must have been right at the very edge of the E_s distance. I'm using a 5 element Yagi at 40 feet with a low noise mast mounted preamp and 9913 cable. Radio is an IC-756Pro. A THP amplifier gives me about 550 W to the antenna.

An E_s-TEP opening occurred the afternoon of April 30. NWØW (EM47) spotted LU2FE and ZP5SNA at 2115 UTC. Fred, NØXA (EM28) logged LU3ARE (GF05) at 2215 UTC.

144 MHz. A big tropo opening on April 1 from Texas to Minnesota — Gotcha! April Fools' Day!

No joke — JD, NØIRS (EM29) was one of the first to discover a strong opening. He worked KC5GTT (EL09) at 1133 UTC, followed by KE5GNZ (EL17) at 1201 UTC for a distance of 1320 km. I was set up portable by 1320 UTC and worked W5DPP College Station, TX (EM10), K5SM (EM03), WD5IYT (EM10), K5LLL (EM10), WØVB (EN34) and W5EJT (EM12) with 50 W and a 7 element Yagi. I heard both sides of WØVB's contact with K5LLL (1529 km) at 1325 UTC.

The tropo was back the next morning. NØIRS logged KX4R (EM73) at 1032 UTC. KX4R worked K5SM (EM03) at 1112 UTC and NØLL (EM09) 1205 UTC at 1378 km. N4TUT (EL98) was worked by K5SW (EM25) and heard by NØJK (EM28) (1714 km) around 1325 UTC. KØAWU was mobile in EM39 and worked W3XO/5 (EM00) at 1210 UTC, receiving a "3×3" report at 1165 km. KFØM in Wichita EM17 chatted with W3XO/5 and said Bill was "real loud."

Aurora was worked on 2 meters April 24 UTC. One of the longest aurora contacts reported was between NØLL and VA3ST (FN03) at 0024 UTC of 1650 km. Larry also worked NØSP (DM79) and K9VSW (EN35). KB7ME worked VE7SL and W7FI on aurora. Dave, K1WHS (FN43) found aiming his antennas was an issue during the aurora:

> I found that the aiming was critical with my sharp array. Every station seems to have a correct heading and it can vary. I peaked a few VEs at 24 degrees and then others at 305 degrees. I did work a VE2 in FN58 up in the Gaspe, along with K8JA, W8CA, and K8MD. I also worked W9RM. KT1R was on from FN64 and K1GUP in FN54.

Jay, W9RM (EN52) worked K1TEO (FN31), VA3ST (FN03) at 0021 UTC, K9VSW (EN35) and K9MU (EN44).

A big trans-Gulf tropo opening occurred April 27–28. AC4TO said "Fabulous 144 and 432 tropo to Texas from EM70." On the 28th Sam, K5SW (EM25), KC5GTT (EL09), WØBLD (EM37) and K5SM (EM03) reported contacts with WA8ZYT (EL89).

222 MHz. N8PUM (EN66) worked W9RM (EN52) on 222.120 MHz aurora at 2335 UTC the 23rd with strong signals. In addition to N8PUM, W9RM worked K1TEO (FN31), VA3ST (FN03), K9VSW (EN35) and K8DIO (EN91). Jay noted:

> This was a *very* good aurora event, but short lived on 2 meters. The signals were very strong between 2300-0000 UTC and the peak beam heading was easily 20 degrees *south* of a "normal" event, showing the aurora reflection point advanced further down than normal. Estimated Kp was 6-7 between 2100Z and 0200Z and Bz South was occasionally in the –20 to –30 nT range!
>
> Everyone I heard on 222 MHz was very strong. The Doppler on 432 was a problem. My contact with Jeff is only the fourth 432 MHz AU contact I've ever made and much farther than the others.

432 MHz. W9RM (EN52) on 432.120 MHz heard N8PUM (EN66) via aurora on April 24 around 0029 UTC. W9RM worked K1TEO (FN31)! These may be the first stateside 432 MHz aurora reports of solar cycle 24.

NØIRS (EM29) worked K5LLL (EM10) with 59 reports and KFØM (EM17) logged KE5GNZ (EL17) at 1216 UTC on April 1.

WB5AFY (EM04) heard the W4PLB/b (EL98) 599 on 432.307 MHz April 27 on tropo, along with working W7PLS (EL88) and N3LL (EL86) at 1802 km.

902, 1296, 2304 MHz and Up. Al Ward, W5LUA (EM13) worked W4WSR (EM85) NC on 902.1 MHz for his state #23 and 2304 MHz for state #34 during the big trans-Gulf tropo opening April 28. Al logged N2CEI/rover (EM60) on 902 through 2304 MHz. Matt, W3UUM (EL29) also worked N2CEI/r on 1296 MHz with S9 + signals. The day before Al copied the W4PLB/b (EL98) on 1296 MHz! K5LLL (EM10) worked N2CEI (at home) EM80 on 3456 MHz at 0415 UTC the 27th. Bill, W3XO/5 (EM00) caught N4TUT (EL98) on 1296 MHz at 1718 km on the 27th. K5LLL and W5LUA also worked N4TUT on 1296.

Here and There

Solar Cycle 24 — will it have a single or double peak? Solar cycles 19, 20 and 21 were single peak. Cycles 22 and 23 had definite double peaks (courtesy Carl, K9LA).

Trivia question: How many 50 MHz stateside stations has FK8CP worked so far in cycle 24?

EME

Joachim, CT1HZE, informs me *DUBUS* and REF will sponsor the 144 MHz Digital EME Championship July 21 (0000 UTC) through July 22 (2359 UTC). The winner will receive a free 1 year subscription to *DUBUS*. Full rules at **www.marsport.org.uk/dubus/EMEContest2012.pdf**.

Special Events

Maty Weinberg, KB1EIB, events@arrl.org, www.arrl.org/special-event-stations

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Jun 15-Jun 24, 0800Z-1800Z, W8O, New Vienna, OH. Highland and Clinton Counties Amateur Radio Associations. Great Ohio Bicycle Adventure/Field Day. 7.255. QSL. John Levo, 21 Highland Dr, Hillsboro, OH 45133. *To recognize the Great Ohio Bicycle Adventure as it passes through Highland and Clinton Counties, Ohio, during the week leading to Field Day.*

Jun 16-Jun 17, 0800Z-2000Z, GBØBON, Market Harborough, England. Welland Valley Amateur Radio Society. 367th Anniversary of the Battle of Naseby. 14.285 10.140 7.140. QSL. Peter D. Rivers, 34 Coales Gardens, Market Harborough, Leicestershire LE16 7NY, England. *Also the third anniversary of GBØBON. History and more info* **www.wvars.com**

Jun 16-Jun 17, 1800Z-1900Z, W3FT, Reisterstown, MD. Baltimore Amateur Radio Club. The War of 1812 Kickoff. 21.360 14.285 7.181 3.840. QSL. Baltimore Amateur Radio Club, c/o W3FT, 12360 Owings Mills Blvd, Reisterstown, MD 21136. *We will run as many bands as we can depending on the conditions.* **www.w3ft.com**

Jun 23-Jun 24, 1800Z-2059Z, KF5NBO, Sachse, TX. Sachse Amateur Radio Association. Sachse Field Day. 145.250 14.130. Certificate. Sachse Amateur Radio Assoc, KF5NBO, 4520 Harvest Ln, Sachse, TX 75048. *Our first club Field Day.* **www.sachseradio.org**

Jun 30-Jul 6, 1300Z-0359Z, K2A-K2M, Various locations. The US Original 13 Colonies Group. Original 13 Colonies Independence Week Special Event. 21.313 14.313 7.213 3.813. Certificate. *See URL for QSL info.* **www.13colonies.info**

Jun 30-Jul 6, 1300Z-0359Z, WM3PEN, Philadelphia, PA. Holmesburg Amateur Radio Club. 13 Colonies Bonus Station. 21.313 14.313 7.213 3.813. QSL. Holmesburg Amateur Radio Club, 3341 Sheffield Ave, Philadelphia, PA 19136. **www.harcnet.org**

Jul 1-Jul 5, 1201Z-1201Z, K2B, Cedar Bluff, VA. KU2US. 13 Colonies. 28.313 14.313 7.213. Certificate & QSL. Dan Starling, 2262 Bandy Rd, Cedar Bluff, VA 24609. **ki4tyk@crawler.com**

Jul 1-Jul 6, 0900Z-2200Z, GB5NTT, Dorchester, England. RSGB. Nettlecombe Tout Shutter Telegraph over 200 yrs. 21.300 14.265. QSL. RSGB or direct to John Wakefield, MØXIG, Oakhurst, Lower Common Rd, West Wellow, Romsey SO51 6BT, England. **www.qrz.com/db/GB5NTT**

Jul 1-Jul 7, 1000Z-0400Z, W8G, Greenville, OH. Oil Field Engine Society. Greenville Farm Power of the Past. 14.250 18.150 7.200. Certificate. Russell L. Farmer, 1231 Banta's Creek Rd, Eaton, OH 45320. *Special event coincides with the Greenville Farm Power of the Past show. Also celebrating our nation's independence. Operating all bands at various times from RV camper portable.* **www.qrz.com/db/w8g**

Jul 1-Jul 29, 0000Z-0000Z, W2S, Lake Pleasant, NY. Speculator Amateur Radio Club. Lake Pleasant, NY 200th Anniversary. 14.290 14.031 7.031 3.955. QSL. W. Thielking, PO Box 122, Lake Pleasant, NY 12108. **www.qsl.net/sparc**

Jul 1-Jul 31, 0000Z-1200Z, CG3B, Niagara-on-the Lake, Ontario. Niagara Peninsula Amateur Radio Club. 200th Anniversary of Friendship and Peace between Canada and USA following the War of 1812. 14.265 14.140 14.070 14.025 7.260 7.025. QSL. Via bureau or direct to David Digweed, VE3FOI, 4117 Hazel Nut Ct, Vineland, ON L0R 2C0, Canada. *Special Operation Jul 1 1400Z to 2100Z. Watch for operations from other sites during Jul. SAE and $2US - US postage cannot be used in Canada.* **www.qrz.com/db/cg3b**

Jul 4, 1300Z-2300Z, W8FY, Van Wert, OH. Van Wert Amateur Radio Club. Holiday at Home. 14.244 7.244 7.044 E-Link node 315705. Certificate. Van Wert Amateur Radio Club, PO Box 602, Van Wert, OH 45891. **www.w8fy.org**

Jul 4, 1600Z-2300Z, W7PX, Missoula, MT. Hellgate Amateur Radio Club. Independence Day at Fort Missoula. 21.310 14.260 14.071 14.030. QSL. HARC, PO Box 3811, Missoula, MT 59806. **www.w7px.org**

Jul 7, 1300Z-2000Z, NY2SF, Cedar Rapids, IA. Lincoln Highway Amateur Radio Group. 99 Years on the Lincoln Highway. 28.370 21.320 14.270 14.050. QSL. NY2SF Lincoln Highway — ARG, 1212 - 20th St SW, Cedar Rapids, IA 52404. *Our nation's first transcontinental highway.*

Jul 7, 1300Z-2000Z, W4LBT, Pembroke, NC. Robeson County Amateur Radio Society. Lumbee Indian Homecoming. 28.335 21.335 14.335. QSL. Rob Gable, NA4EA, 1709 West McRainey Rd, Parkton, NC 28371. **na4ea@hotmail.com**

Jul 7, 1400Z-2200Z, K4F, Smithville, TN. DeKalb/Cannon County Amateur Radio Club. 41st Annual Smithville Fiddlers' Jamboree & Craft Festival. 28.425 21.325 14.280 7.275. QSL. Wm Freddy Curtis, KC4GUG, 288 Dogwood Cir, Smithville, TN 37166-27. **www.dcarc.drivehq.com**

Jul 7-Jul 8, 1500Z-2100Z, N2B, Winona, MN. Winona Amateur Radio Club. 9th Annual Great River Shakespeare Festival. 14.265 7.265. Certificate. Winona Amateur Radio Club — N2B, PO Box 1264, Winona, MN 55987. **www.w0ne.org**

Jul 7-Jul 8, 1600Z-2200Z, WØNOZ, DeSmet, SD. Huron Amateur Radio Association, Inc. Laura Ingalls Wilder Pageant. 14.265 7.265. Certificate & QSL.* Huron ARA, Inc, PO Box 205, Huron, SD 57350. **www.huronarc.info**

Jul 8-Jul 22, 0000Z-2359Z, K4O, San Juan, PR. Puerto Rico Amateur Radio League. Flag Bearing of the Puerto Rico Delegation to the 2012 Summer Olympic Games in London. 14.200. QSL. PRARL — K4O, PO Box 758, Humacao, PR 00792. **www.prarl.org**

Jul 11-Jul 15, 1400Z-0300Z, W3P, Philipsburg, PA. Philipsburg Amateur Radio Association. Philipsburg Heritage Days 2012. 14.250 7.250 7.030. QSL. John Szwarc, N3SPW, PO Box 207, Kylertown, PA 16847. **www.philipsburg-ara.org**

Jul 12-Jul 15, 1800Z-2300Z, NU5DE, McDade, TX. Naturist Amateur Radio Club. Nude Awareness Celebration/Nude Recreation Week. 28.465 21.365 14.265 7.265. QSL. Naturist Amateur Radio Club, PO Box 200812, Austin, TX 78720. **www.nu5de.org**

Jul 13-Jul 14, 0001Z-0500Z, W1E, Burley, WA. Burley Amateur Radio Club. Friday the 13th Special Event Operation. 28.313 14.313 7.233. Certificate & QSL. W1E BARC W7JQ, PO Box 639, Burley, WA 98322. **www.qrz.com/db/w7jq**

Jul 13-Jul 14, 1400Z-2359Z, W8TNO, Pontiac, MI. Oakland County Amateur Radio Society. 75th Anniversary. 14.270 14.045 7.250 7.045. QSL. Joseph Miller, KJ8O, 6928 Forest Park Ct, Troy, MI 48098. **www.qsl.net/w8tno/indexa.html**

Jul 13-Jul 15, 0900Z-0900Z, XM31812, Hamilton, ON. Hamilton Amateur Radio Club. 200th Anniversary of the War of 1812. All bands, all modes, 14.225. QSL. ARS XM31812, 133 Campbell Ave, Hamilton, ON L8H 2G1, Canada. *For schedule visit* **www.wix.com/xm31812/xm31812**

Jul 14, 1400Z-1800Z, W8LBZ, Sandusky, OH. Sandusky Radio Experimental League. 80th Anniversary of Sandusky Radio Experimental League. 7.240. Certificate. Sandusky Radio Experimental League, 2909 W Perkins Ave, Sandusky, OH 44870. **www.w8lbz.org**

Jul 14, 1500Z-2300Z, W5I, Sherman, TX. Grayson County Amateur Radio Club. The Red River Bridge War Special Event. 14.250 7.250. QSL. Grayson County Amateur Radio Club, 1026 Valentine Dr, Sherman, TX 75090. **www.k5gcc.us**

Jul 14, 1600Z-2359Z, NI6IW, San Diego, CA. USS *Midway* (CV-41) Museum Radio Operations Room. Independence Day. SSB 14.320 7.250 PSK31 14.070 D-STAR 012C and 2 m/70 cm SOCAL rptrs. QSL. USS *Midway* Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101. **kk6fz@arrl.net**

Jul 14-Jul 15, 1300Z-2300Z, WØWIT, Forest City, IA. Winnebago-Itasca Travelers Hams. 43rd Annual Winnebago-Itasca Grand National Rally. 14.263 7.253 3.970 147.27+. QSL. Leon Hoke, 1103 Mission Rd, Harrisonville, MO 64701. **www.orgsites.com/witcars**

Jul 14-Jul 15, 1600Z-2100Z, W8MRM, Trenton, MI. Motor City Radio Club. Mid-Summer Festival. 14.240 14.040 7.240 7.040. QSL. Motor City Radio Club, PO Box 1337, Southgate, MI 48195. **w8mrm.org**

Jul 15-Jul 16, 1900Z-0100Z, W5ABD, Harvey, LA. Westside Amateur Radio Club. 60th Anniversary Oldest Continuously Operating Amateur Radio Club in the Metro New Orleans Area. 14.313 7.232. Certificate. Westside Amateur Radio Club, PO Box 2322, Marrero, LA 70073. **www.w5abd.org**

Jul 20-Jul 21, 2300Z-1800Z, W4S, Asheboro, NC. Operation Red Sleigh. Operation Red Sleigh Christmas in July. 21.360 14.260 7.260 3.860. Certificate. Nathan Jackson, 5186 Farlowe Davis Dr, Sophia, NC 27350. *We'll attempt digital modes as propagation and activities allow.* **k4nwj@triad.rr.com**

Jul 20-Jul 22, 1700Z-1700Z, W8M, Marlette, MI. Thumb Amateur Radio Club. Marlette Michigan's 150th Anniversary Celebration. 14.290 7.245. QSL. John Herman, 2676 Lamotte St, Marlette, MI 48453. **www.w8ax.com**

Jul 21, 1400Z-1800Z, NC4MC, Candor, NC. Montgomery Amateur Radio Society. Candor, NC Peach Festival. 14.250 147.090. Certificate. Donald L. Grady, KG4ZRH, 120 Woodline Dr, Troy, NC 27371.

Jul 21, 1600Z-2100Z, WØH, Fargo, ND. Red River Radio Amateurs. *Hjemkomst* 30th Anniversary. 28.425 21.325 14.165 7.185. QSL via LoTW or direct to Red River Radio Amateurs, Box 3215, Fargo, ND 58105. **www.rrra**

Jul 21-Jul 22, 1400Z-1400Z, W2GSB, Southold, NY. Great South Bay Amateur Radio Club. Custer Institute. 14.225 7.175 3.850; 14.070 PSK. QSL. Great South Bay Amateur Radio Club, W2GSB, PO Box 1356, West Babylon, NY 11704. **www.custerobservatory.org**; **www.gsbarc.org**

Jul 21-Jul 28, 1300Z-2300Z, WØR, Sioux City, IA. Team Megacycles. RAGBRAI 40th Annual Bicycle Ride Across Iowa. CW 28.545 21.054 14.054 7.0545; SSB 28.339 21.339 18.138 14.339 7.191; digital. QSL. Michael Nickolaus, 316 E 32nd St, South Sioux City, NE 68776. *Register's Annual Great Bicycle Ride Across Iowa.*

Jul 22-Jul 29, 2200Z-2000Z, W9IMS, Indianapolis, IN. Indianapolis Motor Speedway Amateur Radio Club. Brickyard 400. 21.350 14.240 7.240 3.840. Certificate & QSL. Indianapolis Motor Speedway Amateur Radio Club, PO Box 30954, Indianapolis, IN 46230. **w9ims.org**

Jul 25-Jul 29, 1500Z-0000Z, W9ZL, Oshkosh, WI. Fox Cities Amateur Radio Club Inc. EAA AirVenture 2012. 14.250 7.250 FM 52.550. Certificate. FCARC AirVenture 2012, PO Box 2346, Appleton, WI 54912. **www.fcarc.us**

Jul 27-Jul 28, 1300Z-2000Z, W9A, Berne, IN. Adams County Amateur Radio Club. Swiss Days. 14.270 7.270. QSL. Wayne Steury, N9EGT, 817 West Main, Berne, IN 46711. **wb9kqo.com**

Jul 27-Jul 29, 1400Z-2200Z, KI5UA, Longview, TX. Longview/East Texas Amateur Radio Club Great Texas Balloon Race and National Hot Air Balloon Finals. 14.250 7.250; CW 20 40 m. Certificate. Longview/East Texas Amateur Radio Club, PO Box 5613, Longview, TX 75608. **letarc.org**

Jul 28, 1300Z-1800Z, N5H, Oklahoma City, OK. Central Oklahoma Radio Amateurs. Ham Holiday. 14.265. QSL. CORA, PO Box 1103, Nicoma Park, OK 73066. **www.hamholiday.org**

Jul 28-Jul 29, 1300Z-2100Z, N8M, Detroit, MI. Ford Amateur Radio League. 3rd Annual Maker Faire Detroit. 10 20 40 80m; SSB 28.400 14.250 7.270 3.900; CW 28.170 14.130 7.100 3.55. QSL. FARL, PO Box 2711, Dearborn, MI 48123. *Satellite attempts will be made*. **www.k8utt.org**

Jul 28-Jul 29, 1400Z-1800Z, NØW, Grand Junction, CO. Grand Mesa 100+. 28.345 21.345 14.245 7.245. QSL. Larry Bullard, 2551 Westwood Dr, Grand Junction, CO 81505. **n0wrkradio@gmail.com**

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information. *Note: Some clubs may ask for a nominal fee to cover the cost of the certificate or QSL. Request will be made on air during the event or on the club's website.

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. You may also request a copy by mail or e-mail. Off-line completed forms can be mailed, faxed (Attn: Special Events) 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 **Sep** *QST* would have to be received by **Jul 1**. In addition to being listed in *QST*, your event will be listed on the ARRL Web Special Event page. Note: All received events are acknowledged. If you do not receive an acknowledgment within a few days, please contact us.

Special Events listed in this issue include current events received through May 10. You can view all received Special Events at **www.arrl.org/special-event-stations**.

Convention and Hamfest Calendar

Gail Iannone, giannone@arrl.org

Abbreviations
Spr = Sponsor
Tl = Talk-in frequency
Adm = Admission

Alabama (Cullman) — Jul 28 D F H R S V
9 AM-3 PM. *Spr:* Cullman ARC. McGukin Civic Center, 510 5th St SW. 6th Annual Hamfest. *Tl:* 145.31 (100 Hz). *Adm:* $5. Tables: $10. Charles McBrayer, WB4PED, 614 6th Ave SE, Cullman, AL 35055; 256-708-1000; fax 256-799-9227; **cmcbrayer@corrwireless.com**; **www.qsl.net/cullmanarc**.

Arizona (Williams) — Jul 20-22 D F H Q R S T V
6:30 AM-5 PM. *Spr:* AR Council of Arizona. Bob Dean Rodeo Grounds, 800 Rodeo Rd. *Tl:* 146.78 (91.5 Hz). *Adm:* Free. Tables: $20 per tailgate space. Lee Ilse, KD7OED, 3785 E Mohawk Dr, Sierra Vista, AZ 85650; 520-236-1237; **kd7oed@arrl.net**; **www.arca-az.org**.

Colorado (Monument) — Jul 14 F H V
8 AM-1 PM. *Spr:* Pikes Peak RAA. Lewis Palmer High School, 1300 Higby Rd. *Tl:* 146.97 (100 Hz). *Adm:* $5. Tables: advance $12, door $17. Dan Scott, WØRO, Box 16521, Colorado Springs, CO 80935; 719-635-0871; **megafest@ppraa.org**; **ppraa.org**.

Florida (Milton) — Jul 20-21 D F H R S T V
Friday noon-9 PM; Saturday 8 AM-2 PM. *Spr:* Milton ARC. Santa Rosa County Auditorium,

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

Coming ARRL Conventions

June 30
Eastern Pennsylvania Section, Harrisburg*

July 4-7
Mobile AR Awards Club, Vancouver, WA*

July 20-22
Montana State, East Glacier

July 26-28
Central States VHF, Cedar Rapids, IA

July 27-28
Oklahoma Section, Oklahoma City*

July 27-29
Rocky Mountain Division, Bryce Canyon, UT

August 3-4
Texas State, Austin

August 3-5
Pacific Northwest DX, Clackamas (Portland), OR

August 4
Ohio State, Columbus

August 18
West Virginia State, Weston

August 18-19
Southeastern Division, Huntsville, AL

August 19
Kansas State, Salina

August 24-26
New England Division, Boxborough, MA

August 25
DXCC East, Frederick, MD

August 26
Western Pennsylvania Section, New Kensington

*See June *QST* for details.

4530 Spikes Way. 17th Annual Hamfest, Charity Tables. *Tl:* 145.49, 444.4 (both 100 Hz). *Adm:* $5. Tables: $10. Robert Perry, W5CL, 6646 Elm St, Milton, FL 32570; 850-390-1665; **miltonarc49@yahoo.com**; **miltonarc.org**.

Georgia (Covington) — Jul 21 D H R S T
8 AM. *Spr:* Newton County RC. Newton County Fairgrounds, 3183 Mill St. *Tl:* 146.925 (88.5 Hz). *Adm:* Free. Tables: Free. John Nix, N5EEO, 3479 Monica Ln SW, Conyers, GA 30094; 770-483-7695 (phone and fax); **ednix@bellsouth.net**; **www.ncrcga.org**.

Illinois (Aurora) — Jul 15 D F H Q R S T V
8 AM-1 PM. *Spr:* Fox River Radio League. Aurora Central Catholic High School, 1225 N Edgelawn Dr. *Tl:* 147.21 (103.5 Hz). *Adm:* advance $6, door $8. Tables: $10. Dawn Williams, KC9LQS, 1203 Brandywine Cir, Batavia, IL 60510; 630-531-1670; fax 630-246-6631; **KC9LQS@yahoo.com**; **frrl.org**.

Illinois (Carlinville) — Aug 4 D F H R S T V
7 AM-1 PM. *Sprs:* Montgomery and Macoupin County ARCs. Macoupin County Fairgrounds, IL Rte 4. *Tl:* 145.82, 146.865, 444.25 (103.5 Hz). *Adm:* $5. Tables: $10 (indoor); $5 per tailgate space. Mark Osborn, WA9SXK, 1515 Seymour Ave, Hillsboro, IL 62049; 217-259-2558; **wa9sxk@consolidated.net**; **k9mce.org**.

Illinois (Peotone) — Jul 22
D F H Q R S T V
6 AM-2 PM. *Spr:* Kankakee Area Radio Society. Will County Fairgrounds, 710 S West St. 29th Annual Hamfest. *Tl:* 146.94 (107.2 Hz). *Adm:* advance $6, door $8. Tables: $10 (first table); additional tables $8 each. Craig Cahan, N9FD, 7 Franklin Dr, Manteno, IL 60950; 815-474-2237; **n9fd@arrl.net**; **w9az.com**.

Indiana (Angola) — Aug 4 F T
8 AM-noon. *Spr:* Land of Lakes ARC. Steuben County 4-H Fairgrounds, corner of 200 W and 200 N. *Tl:* 147.18 (131.8 Hz). *Adm:* $5. Tables: $8. Sharon Brown, WD9DSP, 905 W Parkway Dr, Pleasant Lake, IN 46779; 260-475-5897; **sharonbrown1@mchsi.com**; **llarc.tripod.com**.

Indiana (Indianapolis) — Jul 14
D F H R S T
6 AM-3 PM. *Spr:* Indianapolis Hamfest Assn. Camp Sertoma, 2316 S German Church Rd. *Tl:* 146.76. *Adm:* advance $6, door $8. Tables: $15. Bill Akin, K9YDO Box 1672, Noblesville, IN 46060; 317-261-6658; **k9ydo@comcast.net**; **www.indyhamfest.com**.

CENTRAL STATES VHF CONFERENCE

July 26-28, Cedar Rapids, IA
D F H R S

The Central States VHF Society Conference (46th Annual Conference), sponsored by the Central States VHF Society, will be held at the Clarion Hotel and Convention Center, 525 33rd Ave SW. Doors are open Thursday 2-10 PM, Friday and Saturday 8 AM-5 PM. Features include technical presentations; antenna gain and noise figure measurements; Getting Started in VHF/UHF Weak Signal Operations Program; table-top/poster displays; dealer/vendor area, flea market (Friday eve); special guest Dan Henderson, N1ND, ARRL Regulatory Information Manager; Saturday eve banquet; hospitality suite. Registration fee is $50. Contact Bill Caldwell, NØLNO, 4505 Regal Ave NE, Cedar Rapids, IA 52402; 319-378-8636 (leave a message); **wcceec@imonmail.com**; **www.csvhfs.org**.

Iowa (Cedar Rapids) — Aug 5
D F H Q R S T V
8 AM-2 PM. *Spr:* Cedar Valley ARC. Teamsters Hall, 5000 J St SW. *Tl:* 146.745. *Adm:* $6. Tables: $10 (until July 15), $13 (after July 15); Bob Klaus, NØYWB, **n0ywb1@gmail.com**, 319-521-1134. Dave Wilson, KBØDW, 3200 Silverthorne Rd NE, Cedar Rapids, IA 52402; 319-393-3776; **krk9840@msn.com**; **cvarc.rf.org/Summerfest2012.pdf**.

Louisiana (Slidell) — Jul 21 D F H R S V
8 AM-2 PM. *Spr:* Ozone ARC. John Slidell Park Gymnasium, 105 Robert Blvd. *Tl:* 147.27 (114.8 Hz). *Adm:* $5. Tables: 8-ft $7. Ron Riviere, WB5CXJ, Box 3087, Slidell, LA 70458; 985-640-5858; **wb5cxj@live.com**; **w5sla.net**.

Maryland (West Friendship) — Jul 22
D F H Q R T V
6 AM. *Spr:* Baltimore RA Television Society. Howard County Fairgrounds, 2210 Fairground Rd. *Tl:* 147.03. *Adm:* $6. Tables: Bring your own or call to schedule in advance (limited supply). Shane Longo, K2GZL, Box 5915, Baltimore, MD 21282; 815-429-9355; **hamfest@bratsatv.org**; **www.bratsatv.org/hamfest**.

Massachusetts (Cambridge) — Jul 15. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); **w1gsl@mit.edu**; **www.swapfest.us**.

Michigan (Escanaba) — Aug 4 D F H R S
9 AM-2 PM. *Spr:* Delta County ARS. Bay de Noc Community College, 2001 N Lincoln Rd. *Tl:* 147.15 (100 Hz). *Adm:* $5. Tables: First table free, $5 for each additional table. John Anderson, WD8RTH, Box 295, Wells, MI 49894; 906-399-4490; **wd8rth@dcars.org**; **www.dcars.org**.

Michigan (Lansing) — Jul 28 D F H R T
8 AM-1 PM. *Spr:* Central Michigan ARC. Holt Christian Church, 2424 S Washington Rd. *Tl:* 145.39 (100 Hz). *Adm:* Free. Donald McLain, KB8RAD, 4444 Sycamore St, Holt, MI 48842; 517-694-0812; **kb8rad@arrl.net**; **www.centralmiarc.com**.

Minnesota (St Paul) — Jul 28 F R
8-11 AM. *Spr:* Magic Repeater Group. Terry's (NØGOI) QTH, 37 Hatch Ave. Yard Sale. *Tl:* 145.17 (100 Hz). *Adm:* Free. Tables: Free. George Lavallee, NØSBU, 5578 141st St N, Hugo, MN 55038; 651-429-5948; **n0sbu@arrl.net**; **www.magicrepeater.net**.

Missouri (Warrensburg) — Jul 14
D F H R S V
8 AM-1 PM. *Spr:* Warrensburg Area ARC. Y.E.S. Building, 130 SW Hwy 13. *Tl:* 146.88 (107.2 Hz). *Adm:* Free. Tables: $15. Sheri Sisco, KDØCAT, c/o WAARCI, Box 1364, Warrensburg, MO 64093; 660-441-3998; **hamfest@waarci.org**; **www.waarci.org**.

Missouri (Washington) — Jul 15
D F H Q R S T V
6 AM-1 PM. *Spr:* Zero-Beaters ARC. Washington Elks Lodge, 1459 W 5th St and Grand Ave. 50th Annual Hamfest. *Tl:* 147.24. *Adm:* advance $6, door $7. Tables: $15. Bruce Serbus, KDØKCF, Box 277, Gray Summit, MO 63039; 314-954-3199; **kd0kcf@sbcglobal.net**; **www.zerobeaters.org**.

MONTANA STATE CONVENTION

July 20-22, East Glacier
D F H Q R S T V

The Montana State Convention (78th Annual Glacier-Waterton International Peace Park Hamfest), sponsored by the Great Falls Area ARC, will be held at the Glacier Meadow RV Park, US Hwy 2 (Mile Marker 191.5). Doors are open sunup-sundown. Features include vendors; dealer displays; tailgating; transmitter hunts; lots of seminars; meetings; high speed CW contest; old equipment and Beer Bottle auctions; DXCC, VUCC, and WAS field card checking; VE sessions; camping (406-226-4479; **stay@glaciermeadowrvpark.com**); Saturday eve potluck and barbeque dinner (bring a dish to share with everyone and bring your own meat to grill). Talk-in on 146.52. Admission is $23 in advance (pre-registration), $28 (after June 15). Tables are $5 with registration. Contact George Forsyth, AA7GS, Box 1763, Great Falls, MT 59403; 406-868-2212; fax 406-453-8661; **aa7gs@arrl.net**; **gwhamfest.org**.

Nebraska (North Bend) — Jul 14 F H R V
Set up 7:30 AM; public 9 AM. *Spr:* Pioneer ARC. St Charles Parish Center, 8th and Locust Sts. 15th Annual Flea Market. *Tl:* 146.67. *Adm:* $2. Tables: $5. Rich Mehaffey, KBØARZ, 230 W 11th St, North Bend, NE 68649; 402-652-3410; **4randjme@futuretk.com**; **www.k0jfn.com**.

New Jersey (Augusta) — Jul 15
D F H Q R T
8 AM-3 PM. *Spr:* Sussex County ARC. Sussex County Fairgrounds, 37 Plains Rd. *Tl:* 147.3 (151.4 Hz). *Adm:* $7. Tables: $20. Dan Carter, N2ERH, 8 Carter Ln, Branchville, NJ 07826; 973-948-6999; **Hamfest@Scarcnj.org**; **www.sussexhamfest.org**.

New Jersey (Egg Harbor Township) — Jul 21 D F H R S V
9 AM-3 PM. *Spr:* Southern Counties ARA. Shore Mall, 6725 Black Horse Pike. KC2YRV Memorial Jersey Shore Hamfest. *Tl:* 146.745 (146.2 Hz). *Adm:* Free. Tables: Free. Howard Minnichbach, KC2TYZ, 6515 Delilah Rd, Lot 2000, Egg Harbor Township, NJ 08234 609-272-9984; **kc2tyz@comcast.net**; **www.jerseyshorehamfest.com/**.

New York (Alexander) — Jul 21
D F H R S T V
7 AM. *Spr:* Lancaster ARC. Alexander Firemens' Grounds, Rte 98. 32nd Batavia Hamfest. *Tl:* 147.285 (141.3 Hz), 147.255 (107.2 Hz). *Adm:* $5. Luke Calianno, N2GDU, 1105 Ransom Rd, Lancaster, NY 14086; 716-481-5747; **luke48@gmail.com**; **larc.hamgate.net**.

New York (Frankfort) — Jul 7 D F H R T V
8 AM-1 PM. *Spr:* Utica ARC. Herkimer County Fairgrounds, Cemetery St. RadioComm 2012. *Tl:* 146.76. *Adm:* $5. Tables: $6 (free tailgating). Marty Benedict, W2MVB, 315 Marion St, Herkimer, NY 13350; 315-867-0278; **w2mvb@arrl.net**; **www.uticaarc.org**.

New York (Rome) — Aug 4 D F H R S T
8 AM-noon. *Spr:* Rome RC. Erie Canal Village, 5789 Rome-New London Rd. 59th Annual Hamfest. *Tl:* 146.88. *Adm:* $5 (under 13 free). Tables: $5. Jim Gelose, AC2DB, 128 Seventh Ave, Frankfort, NY 13340; 315-717-6684; **jgelose@twcny.rr.com**; **www.romeradioclub.com**.

North Carolina (Cary) — Jul 21
D F H R T V
8 AM-2 PM. *Spr:* Cary ARC. Ritter Park, 301 W Lochmere Dr. 40th Annual Swapfest. *Tl:* 146.88. *Adm:* $4. Tables: $10; tailgate spaces $5 each. Herb Lacey, W3HL, 1022 Medlin Dr, Cary, NC 27511; 919-467-9608; **infoman@bellsouth.net**; **www.qsl.net/n4nc**.

North Carolina (Fayetteville) — Aug 4
D F H R T V
8 AM-noon. *Spr:* Cape Fear ARS. Methodist University (Reeves Auditorium), 5400 Ramsey St. 14th Annual Swapfest. *Tl:* 146.91 (100 Hz). *Adm:* Free. Tables: Free. David Cowart, KR4OE, 637 E Raynor Dr, Fayetteville, NC 28311; 910-624-1394; **kr4oe@nc.rr.com**; **www.cfarsnc.org**.

North Carolina (Waynesville) — Jul 28
D F H R S T V
8 AM-4 PM. *Spr:* Western Carolina ARS.

Haywood County Fairgrounds, 758 Crabtree Rd. 37th Annual Hamfest. *Tl:* 146.91 (91.5 Hz), 147.39 (94.8 Hz), 146.52. *Adm:* advance $5, door $7. Tables: $12. Randy Harris, KI4VLW, 7 W Maple Dr, Asheville, NC 28805; 828-298-6685; **rtsp71@aol.com**; **wcars.org**.

North Dakota (Dunseith) — Jul 13-15
F H Q R S T V
Friday-Sunday all day. *Sprs:* North Dakota and Canadian Amateurs. US Lodge, International Peace Gardens. 49th International Hamfest, camping. *Tl:* 146.52. *Adm:* $13. Tables: Free. Lynn Nelson, WØND, 6940 4th St SW, Minot, ND 58701; 701-839-8200; **w0nd@arrl.org**; **www.mts.net/~holderr/ihf.htm**.

OHIO STATE CONVENTION

August 4, Columbus
S

The Ohio State Convention, sponsored by the ARRL Ohio Section, will be held at the Aladdin Shrine Center, 3850 Stelzer Rd. Doors are open 8:30 AM-2:30 PM. Features include forums and seminars; special guest ARRL President Kay Craigie, N3KN; Wouff Hong ceremony; OSSBN Semi-Annual Meeting; Section Awards Ceremony; information booths by local ham clubs. Talk-in on 146.97 (123 Hz). Admission is $5. Contact Scott Yonally, N8SY, 258 Valley Hi Dr, Mansfield, OH 44904; 419-884-5105; **n8sy@arrl.net**; **www.arrl-ohio.org**.

Ohio (Columbus) — Aug 4 D F H R S T V
8 AM-2 PM. *Spr:* Voice of Aladdin ARC. Aladdin Shrine Center, 3850 Stelzer Rd. *Tl:* 147.24. *Adm:* $5. Tables: Free. James Morton, KB8KPJ, 6070 Northgap Dr, Columbus, OH 43229; 614-846-7790; fax 614-846-2074; **kb8kpj@arrl.net**; **www.aladdinshrine.com/hamfest.htm**.

Ohio (Elyria) — Jul 21 D F H R T
8 AM-1 PM. *Spr:* Northern Ohio ARS. Lorain County Community College, Spitzer Conference Center, 1005 N Abbe Rd. 48th Annual Hamfest. *Tl:* 146.7. *Adm:* $6. Tables: $10. Darlene Ohman, KA8VTS, 4122 Bush Ave, Cleveland, OH 44109; 216-398-8858; **dohman@roadrunner.com**; **www.noars.net**.

Ohio (Randolph) — Jul 29 D F H R S V
8 AM-3 PM. *Spr:* Portage ARC. Portage County Fairgrounds, 4215 Fairgrounds Rd. *Tl:* 145.39. *Adm:* advance $5, door $6. Tables: $15. Joanne Solak, KJ3O, 9971 Diagonal Rd, Mantua, OH 44255; 330-274-8240; fax 330-274-8527; **kj3o@arrl.net**; **www.hamfair.com**.

Ohio (Van Wert) — Jul 22 D F H R T
8 AM-1 PM. *Spr:* Van Wert ARC. Van Wert County Fairgrounds, 1055 S Washington St (Rte 127). *Tl:* 146.85. *Adm:* $5. Tables: $10. Louie Thomas, WD8LLO, 208 N Chestnut St, Van Wert, OH 45891; 419-238-2812; **techserv@embarqmail.com**; **www.w8fy.org**.

Oregon (North Bend) — Jul 21 D F H R S V
10 AM-2 PM. *Spr:* Coos County RC. North Bend Junior High School, 1600 16th St. *Tl:* 146.61, 147.28 (146.2 Hz). *Adm:* $3. Tables: $15. Zane Albertson, WA7OXM, Box 698, Coos Bay, OR 97420; 541-396-5778; **zane.albertson@gmail.com**.

PACIFIC NORTHWEST DX CONVENTION

August 3-5, Clackamas (Portland), OR
Q R S

The Pacific Northwest DX Convention, sponsored by the Willamette Valley DX Club, will be held at the Monarch Hotel and Conference Center, 12566 SE 93rd Ave. Doors are open Friday 5-9 PM, Saturday 8 AM-10 PM, Sunday 8-11 AM. Features include hospitality suites (Friday, 7 PM-midnight, Saturday 10 PM-midnight); technical sessions ("A DX'ers Trip through Europe" by Jim Fenstermaker, K9JF; "40 Years of DXing and Contesting from Alaska by Rich Strand, KL7RA; DXpedition to Ascension Island by Tom Meier, K7ZZ; and more); special guest ARRL MVP Manager Dave Patton, NN1N; DXCC card checking; Saturday banquet (7-10 PM, $27); Sunday breakfast buffet (8-9 AM, $18). Talk-in on 147.14 (107.2 Hz). Registration fee is $75 for full program (includes program, banquet, breakfast); programs only $30. Contact Alan Rovner, K7AR, 18809 NE 21st St, Vancouver, WA 98684; 360-256-7437; **k7ar@arrl.net**; **wvdxc.org**.

Pennsylvania (Erie) — Jul 14 F H R T V
7:30 AM. *Sprs:* Wattsburg Wireless and Union City Wireless Assns. Greene Township Municipal Bldg, 9333 Tate Rd. 11th Annual Hamfest. *Tl:* 146.7 (186.2 Hz). *Adm:* advance $4, door $5. Tables: $5. Frank Henry, KB3NAT, 3835 Old French Rd, Erie, PA 16504; 814-881-3343; **frank.henry@earthlink.net**; **nw-pa-hamfest.com**.

Pennsylvania (Wilkes-Barre/Dallas) — Jul 1
D F H R T V
Set up 6 AM; public 8 AM-3 PM. *Spr:* Murgas ARC. Luzerne County Fairgrounds, Rte 118. 33rd Annual Hamfest/Computerfest, foxhunt. *Tl:* 146.61 (82.5 Hz), 146.52. *Adm:* $7. Tables: advance (by June 19) 8-ft $15 (inside, with electricity), door $20 (very limited number of tables after June 19); outdoor tailgate space (1st free per vehicle, extra spaces $5 each). Herb Krumich, K2LNS, 311 Meadow Run Rd, Wilkes-Barre, PA 18702; 570-829-2695; **wa2fgk@yahoo.com**; or Bill, KB3KUJ, 570-510-1680; **www.qsl.net/k3ytl**.

South Dakota (Jul 28) — F R S T V
10 AM. *Spr:* Deuel County ARC. City Park, 3rd Ave S. *Tl:* 444.3 (136.5 Hz). *Adm:* $5. Tables: Free. Robert Schmidt, NØTAW, Box 427, Clear Lake, SD 57226; 605-695-0219; **n0taw@hotmail.com**; **www.w0gc.org**.

Tennessee (Athens) — Jul 21 D H R T
7 AM-noon. *Spr:* McMinn County ARC. Athens Regional Park, Decatur Pike (State Rte 30). 8th Annual Hamfest, Communications Trailer on display. *Tl:* 147.06, 145.15 (both 141.3 Hz). *Adm:* Free. Tables: $5 per tailgate space (bring your own tables). Scott Duckworth, NA4IT, 423-263-1989; **kg4fzr@yahoo.com**; **www.mcminnarc.com**.

TEXAS STATE CONVENTION

August 3-4, Austin
D F H R S T V

The Texas State Convention (Austin Summerfest 2012), co-sponsored by the Austin ARC and the Texas VHF-FM Society, will be held at the Austin Airport Marriott South, 4415 South IH-35. Doors are open Friday 6-9 PM (registration 5 PM), Saturday 8 AM-5 PM. Features include indoor swapfest; outdoor tailgate swap area; ARRL Forum; special guest Ward Silver, NØAX, sessions (WX, DX, ARES, QRP, Software Defined Radio); annual Texas VHF-FM Society meeting; VE sessions (Saturday, 12:30 PM, all elements; Larry Gunter, WB5BEK, **wb5bek@arrl.net**). Talk-in on 146.34/.94 (107.2 Hz). Admission is $8 in advance, $10 at the door. Tables are $10. Contact Joe Makeever, W5HS, 8609 Tallwood Dr, Austin, TX 78759; 512-345-0800; **w5hs@arrl.net**; **www.austinsummerfest.org**.

Texas (Texas City) — Jul 14
D F H Q R S T V
8 AM-2 PM. *Spr:* Tidelands ARS. Doyle Convention Center, 2010 5th Ave N. Left foot CW contest, Foxhunt. *Tl:* 147.14 (167.9 Hz), 442.025 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $15. Joe Wileman, AA5OP, Box 73, Texas City, TX 77592; 409-945-6794; **aa5op@yahoo.com**; **www.tidelands.org**.

ROCKY MOUNTAIN DIVISION CONVENTION

July 27-29, Bryce Canyon, UT
D F H Q R S T V

The Rocky Mountain Division Convention (*Continuing the Pioneer Spirit of Amateur Radio*), co-sponsored by the Utah Hamfest Committee, the Utah DX Assn, and the Utah VHF Society, will be held at Ruby's Inn, 20 S Main (Hwy 63). Doors are open 8 AM-4 PM daily. Features include dealers, free outside swapmeet area (bring your own table), seminars and forums (DX, D-Star, Emergency Preparedness, and more), DX University presented by the Utah DX Assn, contests (CW, QLF, transmitter hunts, and more), QSL card checking, Wouff Hong ceremony, VE sessions (Saturday, promptly at 2:30 PM, $14 fee; no pre-registration required), Friday BBQ and Eyeball QSO Party ($12), Saturday Pulled Pork Dinner ($16), Sunday Breakfast Buffet (8 AM, $15), RV camping with full hookups. Talk-in on 447.575, 147.16 (100 Hz). Admission is $12 in advance for adults, $5 for youth (before July 13), $15 at the door for adults, $7 for youth. Contact Ray Riding, AC7RR, 77 N Tiebreaker Cir, Grantsville, UT 84029; 435-884-3217; **ac7rr@arrl.net**; **www.utahhamfest.org**.

Virginia (Berryville) — Aug 5
D F H Q R T V
6 AM-4 PM. *Spr:* Shenandoah Valley ARC. Clarke County Ruritan Fairgrounds, Business Rte 7. 62nd Annual Berryville Hamfest. *Tl:* 146.82. *Adm:* $6. Tables: $10 (outside tailgate space). Dave Adsit, KG4BIR, 222 Westmoreland Dr, Stephens City, VA 22655; 540-303-7055; **hamfest2012@comcast.net**; **w4rkc.org/hamfest**.

Virginia (Vinton) — Aug 4 D F H R T V
7 AM-1 PM. *Spr:* Roanoke Valley ARC. William Byrd High School, 2902 E Washington Ave. *Tl:* 146.985 (107.2 Hz). *Adm:* advance $5, door $6. Tables: $16. Phil Roark, K4WFO, 405 Yorkshire St, Salem, VA 24153; 540-387-4487; **k4wfo@arrl.net**; **www.w4ca.com**.

Washington (Chehalis) — Jul 28
D F H R T V
9 AM-1 PM. *Spr:* Chehalis Valley ARS. Southwest Washington Fairgrounds, 2555 N National Ave. *Tl:* 147.06 (110.9 Hz). *Adm:* $3. Tables: $10 (includes one admission). John Ellingson, K7OSK, 18140 Mi Lane SW, Rochester, WA 98579; 360-273-5929; **k7osk@boatanchor.com**; **www.cvars.org**.

Wisconsin (Chippewa Falls) — Jul 21 T
8 AM-noon. *Spr:* Chippewa Valley ARC. Lake Hallie Eagles' Club Parking Lot, 2588 State Hwy 53. *Tl:* 147.375 (110.9 Hz). *Adm:* $5. James Linstedt, W9ZUC, 4321 S Pointe Ct, Eau Claire, WI 54701; 715-833-1740; **jlinstedt@charter.net**; **www.w9cva.org/tailgate.htm**.

John Dilks, K2TQN, k2tqn@arrl.org

Collins 75A-4

A team of vintage radio enthusiasts restores a Collins to factory-new condition.

Even the rear panel looks factory new.

Several years ago I was contacted by someone who was selling an estate in New York State. I was reluctant to go that far from home to look at it but he told me there was a black Collins radio in there and that it was "only" just past the Tappan Zee Bridge; I decided to go. The bridge is about 3 hours from my home, so I arranged to meet him one Saturday in northern New Jersey and follow him over the bridge and to the estate.

At 1 hour past the bridge, I was getting nervous and flashed my headlights. Asking the obvious, he told me it was just a little farther. It was another hour to the estate.

Entering the home and cellar, I found a small station with just a few items of interest. The big ones for me were the Collins 75A-4 receiver, 32S-1 transmitter and a Heathkit SB-220 amplifier. All had been sitting for several years and needed attention. There were also several pieces of older gear. I was told the home was being sold and they wanted everything gone. I had to take it all.

After I returned home, I noticed the front panel of the 75A-4 had an identity number of some sort scratched through the paint and into the metal. I wondered how someone could do that to the front panel of such a nice radio? This would present a restoration problem for me; I'm not much of a metal worker.

Entering the home and cellar, I found a small station with just a few items of interest.

Howard Mills, W3HM

The Collins sat for several more years until I decided it was time to restore it. I heard about Howard Mills, W3HM, and his excellent reputation in restoring Collins radios. So for me I did the unthinkable. I contacted Howard and arranged to meet him at the Berryville (Virginia) hamfest (**www.shenvalarc.org**). There I delivered the 75A-4 to him for a complete restoration. I usually like my radios to look used, but not abused. Most of my collection is this way. This Collins 75A-4 would be the exception.

This is the inside of the Collins after restoration.

About 2 months later Howard notified me that the 75A-4 was ready for pickup. A mutual friend picked it up for me and we met at another hamfest where I received the restored radio. It was shrink-wrapped very well, but I could already tell it looked great. I resisted the temptation to unwrap it right away, in fact, I left it wrapped for another month as I was working in the shack and didn't want to scratch it.

When I finally unwrapped it, the beauty of the once dirty and scratched radio blew me away. It now looked brand new. Howard had taken it completely apart. He had it bead-blasted by Fred Jones, metal restoration and powder coating was by Andrew Losiewocz and Bill Dunlap did the silk screening. All are members of his team.

Howard's next step was to replace the defective electronics with new components. He also added some circuitry upgrades to improve the 75A-4's performance and included some modified schematics to go into the 75A-4's manual. His technical team member is Peter Wittenberg, K2LRC, an expert on the Collins SSB line. You can see the results of their work in the photos.

I knew Peter from before; he had refurbished

The 75A-4 looks right at home with the rest of John's, K2TQN, Collins station.

This is Howard's long row of six large Collins AM transmitters.

a KWM-2A for me. He and Howard also rebuild the large Collins AM transmitters and other Collins radios with the same attention to details as with my 75A-4. They can be contacted at **www.k2lrc.com**.

The Restoration Location

Wanting to see the W3HM operation first hand, I visited him in March. Howard owns a beautiful home on an immaculately manicured property. Besides a 100 foot tower with beams, his station sports a 53 foot hy-gain AV-18HT 80-10 meter vertical in the backyard and several dipoles. Inside he has several ham stations and likes operating SSB, CW and AM.

His shop is in the next room with a fully equipped test bench and rows of storage. Storage for parts, storage for incoming and outgoing restoration jobs and a long row of six large Collins AM transmitters, which are for sale.

Before I left that day, he showed me his collection of E.H. Scott (high-end) broadcast radios, all restored to like-new condition. On my way home I had a lot of time to reflect on W3HM's operation and what I had seen. It was a fun day. I hated to leave without one of his Collins KW-1 transmitters, but that will have to wait. I'm saving up and keeping an open spot in my shack hoping that someday I'll own one. — *K2TQN*

All photos by John Dilks, K2TQN.

This is Howard's AM station. Duane Scott, W3ZG (SK) made the 813 transmitter.

Howard (left) and Peter are shown here working on a Collins R390 module.

This is the station Howard uses when operating SSB.

Maria Somma, AB1FM, ab1fm@arrl.org

New Extra Pool / US License Numbers Up

New Extra Question Pool to Take Effect July 1

Effective July 1, 2012 a new Element 4 Extra class question pool takes effect for examinations. VECs and VEs will have new test designs available for use at exam sessions effective that date.

The newly revised pool released in December 2011 (updated errata sheet issued 2012), by the Question Pool Committee (QPC) of the National Conference of Volunteer Examiner Coordinators (NCVEC) must be in use starting July 1. There are 12 graphics required for this pool and 702 questions in this pool, down from 738 in the previous pool. To view the new Extra class pool and errata sheet visit the NCVEC website at **www.ncvec.org/page.php?id=356**.

With the Extra class exam questions changing July 1, new test designs must be used effective that day. Previous ARRL VEC supplied Extra class test booklets versions (2008 series) and computer generated Extra class tests created from the 2008 question pool are only valid until midnight June 30, 2012. At that time VE Team leaders may destroy the old versions of the Extra exams.

Current Amateur Radio Question Pools

The three current question pools (and any exam designs based on these question pools) are valid as follows:

- Technician class (Element 2) pool is effective July 1, 2010 and is valid until June 30, 2014.

The Technician class question pool contains seven diagrams or symbols.

Questions withdrawn from use: T2C02 and T2C03.

- General class (Element 3) pool is effective July 1, 2011 and is valid until June 30, 2015.

The General class question pool contains one schematic diagram.

Questions withdrawn from use: G0A06.

- Extra class (Element 4) pool effective July 1, 2012 is valid until June 30, 2016.

The Extra class question pool contains 12 schematic diagrams.

Questions withdrawn from use: E2A14 and E6E10.

The 2008 Extra class pool expires June 30, 2012.

All current question pools can be viewed on the ARRL website at **www.arrl.org/question-pools**.

Question Pool Topics

The NCVEC elects and charges a subcommittee of active VEC representatives with developing, maintaining and distributing the exam sets on behalf of all VECs, examiners, candidates and publishers of Amateur Radio training materials. This subcommittee, called The NCVEC's Question Pool Committee (QPC) is responsible for maintaining the exam sets or question pools for each license class level.

Amateur Radio question pools are designed around standard subjects. All VEC exams are created from these pools. Table 1 shows how the questions are distributed among question pool topics for each exam element.

The QPC welcomes comments and suggestions for new questions or changes to the topic areas for any of the pools. Please send your input to the committee using the following e-mail address: **qpcinput@ncvec.org**. You can help shape the next pool!

US License Numbers Up

There are currently over 704,000 licensed Amateur Radio operators in the US. Amateur Radio licenses broke the 700,000 barrier in October 2011 and the numbers continue to progress higher.

Table 2 chronicles the total number of Amateur Radio operators and Amateur Radio clubs licensed by the FCC over the last 40 years.

2012 ARRL National Exam Day Weekends

ARRL sponsored national exam day weekends are held annually on the last full weekends of April and September.

- Fall national exam day weekend is September 29-30, 2012. We thank you for your support of these events.

Table 1
Number of Exam Questions per Topic

Question Pool Topics	Element 2	3	4
Commission's Rules	6	5	6
Operating Procedures	3	5	5
Radio Wave Propagation	3	3	3
Amateur Radio Practices	2	5	5
Electrical Principles	4	3	4
Circuit Components	4	3	6
Practical Circuits	4	3	8
Signals and Emissions	4	2	4
Antennas and Transmission Lines	2	4	8
Electrical and RF Safety	3	2	1
Total Exam Questions	35	35	50
To Pass: Minimum Correct	26	26	37
Maximum Wrong	9	9	13

Table 2
US Amateur Radio License Populations

Year	Novice	Tech/Tech+	General	Advanced	Extra	Clubs**	Total
2012 (thru March)	14,352	343,597	161,220	57,393	127,674	11,120	715,356
2010	15,731	342,191	155,781	59,387	122,951	10,840	706,881
2000*	40,155	319,735	138,625	86,545	97,977	4,745	687,782
1990	87,333	122,344	124,979	105,418	51,948	2,285	494,307
1980	82,479	92,620	121,561	96,509	36,782	2,625	432,576
1970	24,903	87,441	97,280	58,316	13,391	3,650	284,981

*FCC License Restructuring began April 15, 2000.
No new Advanced, Tech Plus or Novice Licenses issued by the FCC.
Technician Plus renewals converted to Technician licenses.
**Estimate

Mary M. Hobart, K1MMH, k1mmh@arrl.org

Jill Niemeier, AC0MX, Awarded 2012 Goldfarb Scholarship

The 2012 William R. Goldfarb Memorial Scholarship has been awarded to Jill Niemeier, AC0MX, of Kennett, Missouri. Jill, who just graduated from Kennett High School, is ranked 3rd in her class and carries a 3.98 GPA. Her accomplishments as a young Extra class Amateur Radio operator include two 1st place awards in the engineering category of the annual Southeast Missouri Regional Science Fair, recognition as "Ham of the Year" by the Bootheel Area Amateur Radio Club, election to the Missouri Girls' State, National Honor Society, president of the Kennett High School Amateur Radio Club and numerous community volunteer activities.

Jill Niemeier, AC0MX, winner of the 2012 William R. Goldfarb Memorial Scholarship.

Jill's Amateur Radio focus has been on a 6 year Emergency Communications project concentrating on a micro-propagation study. Her interest in earthquake response was initiated when she was in middle school when she learned of a historic 1811 earthquake near her home on the New Madrid Fault. The study continued through high school and has resulted in her sharing with ARES® and licensing classes a greater understanding of the limits of radio stations in emergency situations.

Jill will attend the University of Arkansas in the fall to begin her studies in Biology and Biochemistry. She anticipates a career in oncology, saying, "I plan on going into the career field of oncology because I have a major passion for cancer patients and cancer research. Just the idea of being able to help save a cancer-patient's life absolutely thrills me. I also know that there is research that is currently in action using radio waves to try to help find a cure for cancer. Being an oncologist has always been a dream of mine, and someday I hope that I will get to fulfill that dream." Congratulations, Jill!

W1AW Schedule

W1AW's schedule is at the same local time throughout the year. From the second Sunday in March to the first Sunday in November, UTC = Eastern US Time + 4 hours. For the rest of the year, UTC = Eastern US Time + 5 hours.

PAC	MTN	CENT	EAST	UTC	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM	1300		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	1400-1600 1700-1945	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	2000	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	2100	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	2200	DIGITAL BULLETIN				
4 PM	5 PM	6 PM	7 PM	2300	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	0000	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	0100	DIGITAL BULLETIN				
6:45 PM	7:45 PM	8:45 PM	9:45 PM	0145	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	0200	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	0300	CODE BULLETIN				

♦ Morse code transmissions: Frequencies are 1.8025, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.
Slow Code = practice sent at 5, 7½, 10, 13 and 15 WPM.
Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 WPM.
Code bulletins are sent at 18 WPM.

♦ W1AW Qualifying Runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted by K6YR and other West Coast stations on 3590 kHz and other frequencies. See "Contest Corral" in this issue. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Fees: $10 for a certificate, $7.50 for endorsements.

♦ Digital transmissions: Frequencies are 3.5975, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.
Bulletins are sent using 45.45-baud Baudot, PSK31 in BPSK mode and MFSK16 on a daily revolving schedule.
Keplerian elements for many amateur satellites will be sent on the regular digital frequencies on Tuesdays and Fridays at 6:30 PM Eastern Time using Baudot and PSK31.

♦ Voice transmissions: Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ Notes: On Fridays, UTC, a DX bulletin replaces the regular bulletins. W1AW is open to visitors 10 AM to noon and 1 PM to 3:45 PM Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy. In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour and CW on the half hour.
W1AW code practice and CW/digital bulletin transmission audio is also available real-time via the *EchoLink Conference Server* W1AWBDCT. The conference server runs concurrently with the regularly scheduled station transmissions.
During 2012, Headquarters and W1AW are closed on New Year's Day (observed January 2), Presidents' Day (February 20), Good Friday (April 6), Memorial Day (May 28), Independence Day (July 4), Labor Day (September 3), Thanksgiving and the following day (November 22 and 23), and Christmas and the day before Christmas (December 24 and 25). For more information, visit us at **www.arrl.org/w1aw**.

75, 50 and 25 Years Ago

Al Brogdon, W1AB

July 1937

- The cover photo shows two hams checking the plumb of a wooden ladder mast, under construction.
- The editorial discusses the need for band plans for our various ham bands.
- In Part Two of "Recording Ultra-High-Frequency Signals over Long Indirect Paths," Ross Hull describes the receiving and record-analyzing equipment.
- B. S. McCutchen and D. A. Griffin, W2AOE, discuss "The See-Saw Noise Silencer," which applies an electronic gate to improve the signal to noise ratio.
- In "A Fundamental-Reinforced Harmonic-Generating Circuit," John Reinartz, W1QP, tells us how to get efficient frequency multiplication.
- James Millen, W1HRX, describes "A New Kind of Skyhook — The Ladder Mast," featuring simple construction and a tower that's easy to climb.
- In "An Effective Linear Filter for Harmonics," J.N.A. Hawkins, W6AAR, tells how to build a simple transmission line to suppress harmonics.
- In "A Four-Band Portable or Mobile Transmitter," by Frank Jacobs, W2BSL, Frank presents his crystal-controlled rig for 7, 14, 28, and 56 Mc. The rig will operate 'phone, c.w., and m.c.w.
- Harry Gardner, W1EHT, describes "A Simple Bread-Board Crystal-Controlled Transmitter for 56 Mc."

July 1962

- The cover photo shows a compact rig for 3.5 through 28 MHz.
- The editorial introduces the League's new President, Herbert Hoover, Jr, W6ZH, and summarizes his many major accomplishments — as an amateur, an engineer, and U.S. Undersecretary of State. Mention is also made of Herb's father, who was a force for ham radio as U.S. Secretary of Commerce, before he became President of the U.S.
- John Magnusson, WØAGD, discusses "RTTY Test Equipment."
- Edward Scott, W4VSN, and Eugene Banta, W4SGI, give us practical ideas for circularly polarized U.H.F. antennas, in "Using the Helical Antenna at 1215 Mc."
- Ray Rinaudo, W6KEV, tells about using "The Pi-L Plate Circuit in Kilowatt Amplifiers."
- In "V.H.F. Repeater Problems and Possibilities," James Green, K6QNY, discusses the technical and legal hurdles he encountered in setting up a repeater.
- Stewart Lyon, K6UIJ, combines an electronic key, monitor, receiver muter, and grid-block keyer in one small package — "An All-Transistor Keyer and C.W. Control Unit."
- J. M. Filipczak, W2BTM, tells us how we can improve our reception by building a "Nuvistor Converter for 220 Mc."
- John Troster, W6ISQ, tells the tale of a ham with his new bug, in "Love Them Dits."

July 1987

- The cover photo shows a crystal filter described in this issue.
- The editorial, "Pacifica, Howard Stern, and Amateur Radio," reports on the FCC's cracking down on indecent transmissions.
- "Some Reflections on Vertical Antennas," by C. J. Michaels, W7XC, explains the variables in antenna installations, and how we can help our own verticals do their best job.
- Steve Powlishen, K1FO, updates his classic amplifier (*QST,* Oct 1979) with tips on "Improving the K1FO 8874 432-MHz Amplifier."
- Wes Hayward, W7ZOI, tutors us on "Designing and Building Simple Crystal Filters."
- Doug DeMaw, W1FB, tells about his "Low-Cost QRP Power Booster."
- In "The Squawker: A Light Detector," blind ham Butch Bussen, WAØVJR, describes a simple audio oscillator whose audio pitch changes as the ambient light changes. It has many uses for him in his shack, and also is a fun toy!
- German exchange student Christoph Janker, DF3TJ/KF4KT, tells about being involved in the (20-meter SSB) rescue of the crew of the cargo ship *Rhinoceros* ten years ago. Christoph was the first to copy the vessel's distress calls. He alerted the FCC and US Coast Guard. Other hams helped as the propagation paths changed. The *Rhinoceros* sank, but a USCG C-130 dropped life rafts to the 11 crew members. Seven hours later, the freighter *Aquarius* took them on board — no deaths, no injuries. Another happy ending, thanks to ham radio!

Field Organization Reports

APRIL 2012

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**.

553
KT5SR
520
W5KAV
503
W7FQQ
470
KØIBS
381
KI4KWR
355
KT2D
340
KK5NU
338
WB8R
323
KA4IZN
320
K8RDN
315
KA2ZNZ
303
N8OSL
285
KD7THV
KB2ETO
280
N9VC
WE2G
269
KC8QWH
266
K8OLY
265
K2DYB
259
KC8BGK
240
NX9K
WB8RCR
234
W2MTA
230
W8DEC
225
WD9FLJ
K6HTN
223
KC5ZGG
222
K6FRG
205
NX8A
200
KB5SDU
KB2KOJ

186
WS6P
183
K2HAT
180
WA9LFO
K9LGU
KB5PGY
KB2BAA
WA2BSS
WB9JSR
170
KE5HYW
N7CM
165
W5DY
W8DJG
KB1RGQ
160
VE7DXD
K7EAJ
KGØGG
K2ABX
157
K4BEH
155
AG9G
WK4P
152
WA4UJC
145
AE5VY
141
KC8EIA
140
K7BFL
K4GK
W4DNA
137
W7JSW
135
K1PJS
W3YVQ
N2GJ
133
KA8ZGY
130
KØVTT
K6JT
KW1U
WB2FTX
K4IWW
KB8RCR
K2TV
129
W3CB
126
KB1NMO

125
KC5OZT
W4TTO
N5ASU
122
KC2SFU
KD8EBY
120
WB9WKO
KA4FZI
N9VT
W8UL
WA3EZN
NA7G
KK7DEB
N2JBA
WI2G
WB8WKQ
117
WD8USA
115
KJ4JPE
WB8YYS
113
N7EIE
W2DWR
112
KT4YA
111
W5XX
110
W7QM
KE4CB
W7GB
WB8HHZ
N1IQI
K7BDU
K4BG
KB3LNM
N7XG
N7YSS
KK7TN
WB6OTS
N5NVP
KA1G
N9MN
NØMEA
W2EAG
N2WKT
NM1K
K8VFZ
108
N2RTF
105
N8CJS
WM2C
KF7GC
104
KD8HPG

102
N2GS
101
KØLQB
100
N5OUJ
WB8SIQ
WG8Z
WD8Q
N8SY
W8CPG
N7IE
K3IN
AA3SB
WB4FDT
KK3F
N1JX
N3SW
W3TWV
N4ELI
NU8K
WØCLS
WAØVKC
W2DER
KD8QPF
99
N3RB
98
KJ7NO
97
AL7N
K7OAH
95
KB2RTZ
K2GW
KD8CES
N1TF
KI4AAN
92
N2VC
91
KB9KEG
90
NC3F
KE5YTA
N5RL
KB5KKT
N8IO
N8DD
K1YCQ
WB4BIK
N3ZOC
W3GQJ
KJ4HGH
W8IM
KZ8Q
K4JUU
KD8CYK
88
KD8AAD

86
WB8HJJ
KD8LZB
85
W8MAL
84
WØRJA
WØDHG
83
W3CC
82
N1LKJ
80
K5AXW
KC2UMX
WB8KPE
KB7RVF
K8KV
WB4RJW
KØDEU
NIØI
NØMHJ
KFØXO
KCØZDA
KJ4RUD
WB8TQZ
KC8BW
79
KF5IOU
KC2EMW
KBØDTI
77
K7FLI
75
K6RAU
NN7H
74
KC5MMH
K6MA
72
W5GKH
KA8IAF
KD7OED
N2VQA
W8QZ
71
W1PLK
WB3FTQ
70
N2YJZ
KDØAYN
KØDLK
NØDUW
NØDUX
WØFUI
N3NTV
KØPTK
KØRXC
KD7ZUP

The following stations qualified for PSHR in previous months, but were not recognized in this column: (Mar) KO4OL 125, WD8JAW, KC4KBQ 70. (Feb) KO4OL 125, KC4KBQ 82, WD8JAW 65. (Jan) KO4OL 110, KC4KBQ 76. (Dec) KO4OL 110. (Nov) KO4OL 110.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AZ, CO, CT, EB, EMA, ENY, EPA, EWA, GA, IL, LA, LAX, MDC, MI, ME, MS, NC, NFL, NLI, NNJ, NNY, NTX, OH, OK, OR, ORG, SD, SFL, SJV, SNJ, STX, TN, UT, VA, WCF, WI, WNY, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: ENY, EWA, GA, IA, IN, KY, MDC, MI, MN, MT, ND, NM, NLI, NTX, OH, OK, SV, WTX, WV.

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.

KK3F 3319, W5KAV 2698, WB5NKC 1020, WB5NKD 1001, K6HTN 899, WØRJA 847, KW1U 654, WB2FTX 641, WB6OTS 635, K6FRG 633, NX9K 599, WB8WKQ 597, N9VC 588, K7BDU 565, KZ8Q 559, WB9JSR 552, K6GPZ 515.

The following stations qualified for BPL with Originations plus Deliveries: NM1K 101, K8LJG 101.

The following station qualified for BPL in February but was not listed previously in this column: WB9FHP 2062.

Silent Keys

Silent Keys Administrator, sk@arrl.org

It is with deep regret that we record the passing of these amateurs:

W1BYG **Hogg**, Frank W., Stoddard, NH
K1CKL **Blanchard**, Sidney E., Hillsboro, NH
W1DHI **Brienza**, Michael J., Simsbury, CT
N1DT **Tanguay**, Donald V., New Bedford, MA
K1EPP **Silvia**, Alfred Jr, Somerset, MA
WA1FBC **Collins**, Maurice E., Sunapee, NH
WA1FCA **Bell**, Joseph J., Plainfield, CT
W1GMF **Follett**, Gilbert M. Jr, Abington, MA
KA1JKV **Tammany**, Elizabeth M., Rumford, RI
N1KDL **Gianetti**, Beth, Cheyenne, WY
N1LNF **Reid**, John H., Teaticket, MA
K1NAT **Talcott**, Noel A., Bennington, ID
KA1NTG **Olsson**, Frank A., Trumbull, CT
K1OHO **Frank**, Roy W., Alexandria, VA
♦WA1SMI **Isaacs**, Robert S., Ayer, MA
W1SYC **Kiesling**, Paul W. Jr, Alamogordo, NM
KY1U **Gosselin**, Sandra A., Springfield, VT
K1VET **Bertrand**, Ronald P., West Warwick, RI
K1VHE **Kalns**, Rudolph W., Uxbridge, MA
KA1VRP **Firth**, Clifford S., Natick, MA
NR1Y **Rowe**, Robert P., Mystic, CT
KA1YUA **Peach**, Frederick B., Eastham, MA
ex-W2AVS **Wilde**, Arthur E. Jr, Chapel Hill, NC
♦AA2CJ **Baker**, Ralph A., Bath, NY
KA2CON **Manderski**, Joseph G., Hillsborough, NJ
N2DDM **Nycz**, Joseph C., Wayne, NJ
K2DRL **Ford**, Harry S., Nutley, NJ
WB2DXZ **Shepard**, Carl L., Johnstown, NY
N2DZ **Traynor**, Desmond, Port St Lucie, FL
NB2F **Interdonato**, Dominick A., Lodi, NJ
W2FGY **MacMillan**, Joseph W., Cinnaminson, NJ
KB2GOP **Applin**, Clarence R., Oneonta, NY
W2IEC **Marks**, F. R., Binghamton, NY
WA2IGO **Gromann**, John G., West Orange, NJ
KA2JYF **Brennan**, Martin J., Sayville, NY
KC2NB **Fainsbert**, Charles M., Somerset, NJ
N2NTW **Cave**, Allan C. Sr, Vestal, NY
WS2P **Lupo**, Vito J., Landing, NJ
KC2QHK **Rogers**, R. Clifford, Schroon Lake, NY
N2RXO **Collis**, Kenneth A. Jr, Cohoes, NY
♦W2XG **Neal**, Robert F., Bergen, NY
N2YQO **Stamp**, Daniel J., Horseheads, NY
N2YYU **Hart**, Burt E., Red Hook, NY
NE3A **Nord**, Ronald D., Leesburg, FL
N3BHZ **Kellogg**, Robert H. III, Gambrills, MD
K3CJN **Pherigo**, Richard G., Stockton, MD
W3FOO **Hutchison**, Frank P., Bristol, VA
W3GOY **Meyer**, John J., Newtown Square, PA
KB3HNQ **Liller**, Harold K., Waldorf, MD
W3IG **Leake**, Clarence G., Sandy Lake, PA
♦K3KOZ **Reitnauer**, Barry L., Virginia Beach, VA
N3LTZ **Barefoot**, Dorothy F., York, PA
W3OBM **Gabinet**, Albert, Candler, NC
K3OZN **Weller**, Renoux, Oak Crest, MD
KB3QIH **Merchant**, Mike A., Millsboro, DE
KA3TIU **Navarre**, Bruce B., Allentown, PA
W4AGR **Glenn**, Allen W., Valhermoso Springs, AL
W4AKW **Oldham**, Fred A., Port Huron, MI
AA4AX **Moore**, Robert R., Chapel Hill, NC
KF4BEP **Faircloth**, Joseph A., Daytona Beach Shores, FL
WD4BGF **Wiggins**, Lester R. Sr, Gastonia, NC
W4BLD **Kerby**, Robert B., Waynesboro, VA
♦N4BM **McHugh**, Robert B., Wichita, KS
W4DHA **Darden**, Colgate W. III, Lexington, SC
W4DIC **Yount**, Larry H., Hickory, NC
WB4DRE **Wester**, Douglas J., Huntsville, TX
♦W4EYE **Persons**, Louis E., Fort Myers, FL
KI4FEN **Zellers**, Grant A., Hartselle, AL
KJ4FEZ **Shingle**, Gregory S., Bradenton, FL
N4FGU **Glover**, Daniel E., Spartanburg, SC
KB4IL **Franklin**, Samuel C., Wilmington, NC
K4JAS **Glenn**, Forrest E., Melbourne, FL
KC4LDX **Zettlemoyer**, George M. Jr, Boca Raton, FL
KD4LVQ **Geisert**, Jeanne R., Jensen Beach, FL
♦KE4NP **Pier**, Dwayne F., Mount Juliet, TN
KA4OBP **Sander**, Bill Jr, Jacksonville, FL
K4ODI **Harbin**, John R., Macon, GA
W4OPI **Saunders**, Ernest R., Campton, NH
AI4OZ **Sharer**, Donald E., Micro, NC
WA4QNS **Goodman**, Bobby L., Burlington, NC
K4QWK **Gardner**, Grady E. Jr, Laurinburg, NC
W4SIX **Scott**, William S., Reidsville, NC
K4TKJ **Jennings**, Theodore K. II, Melbourne, FL
K4TMM **Mayse**, Thomas M., Elizabethton, TN
KE4TZU **Lovelace**, H. Arthur, Chipley, FL
N4UAL **Palmer**, Jon C., Mobile, AL
W4WJZ **Epps**, John S., Huntsville, AL
WA4WKX **Fleenor**, James E., Abingdon, VA
W4YZX **Cobb**, Grover C., Raleigh, NC
N5BBI **Kilman**, Richard J., San Antonio, TX
WA5BBR **Williams**, James F., Baker, LA
W5CFN **Cron**, Ronald G., Oklahoma City, OK
K5DKW **Gibson**, Farl R., McKinney, TX
W5GK **Flanagan**, Chuck, Kerrville, TX
KE5HLL **McIntosh**, Edward Paul, Lockney, TX
KD5IC **Fill**, William L., Conway, AR
N5KEY **Key**, Michael W., Overbrook, OK
KE5OS **Smith**, Bobby D., Waco, TX
KC5PIE **Ault**, Ronald C., Waco, TX
W5PSA **Fullinwider**, Charles M., Roswell, NM
W5RAY **Wurdelman**, Raymond W., Sartell, MN
W5RI **O'Neal**, Herbert S., Houma, LA
W5RQC **Tobaben**, Eugene J., Allen, TX
K5TY **Anderson**, Howard T., Lakeland, FL
NN5W **Matthews**, Richard A., Pearland, TX
K5ZJA **Smith**, Burnley D., San Antonio, TX
KC5ZNT **Gordon**, William A. Jr, Sibley, LA
ex-W6AG **Blanchard**, Richard B., Escondido, CA
W6BNB **Shrader**, Robert L., Sebastopol, CA
K6CHB **Lee**, Einar N., Roseburg, OR
WH6CSA **Bottrell**, William H., Kailua Kona, HI
WA6DOV **Schaefer**, Virginia A., Benicia, CA
W6FNG **Weeks**, James L., Wrightwood, CA
N6HG **Anderson**, Donald J., Ventura, CA
W6HXQ **Roen**, Clarence A., Redding, CA
W6JN **Kemper**, John P., Torrance, CA
KD6KAJ **Burns**, Roger J., Yuba City, CA
WA6LBA **Richards**, Eugene, Chico, CA
WA6MKC **Guilliams**, Gerald F., McKinleyville, CA
WB6MMM **Cornelius**, Ralph F., Klamath Falls, OR
WA6MOM **Gaul**, Edward R., Los Angeles, CA
W6PZI **Miller**, Clair E., Placerville, CA
♦WA6QOP **Owens**, Shirly D., Modesto, CA
WB6RFU **Lerza**, Philip J., Foster City, CA
W6SNI **Morin**, Edward P. Jr, Santa Barbara, CA
KI6SVG **Harrell**, Richard H., Concord, CA
ex-K6UGX **Healy**, Verlyn K., Idaho Falls, ID
AA6UM **Rhodes**, K. S., Walnut Creek, CA
N6YCG **Wong**, Edwin G., Daly City, CA
WB6ZXD **Heath**, Thomas H. Sr, Hanford, CA
KI7CE **Dorrough**, Jon C., Phoenix, AZ
KE7DH **Hands**, George, Sun City, AZ
♦AJ7E **Exendine**, Earl J., Bellevue, WA
W7EER **Malkovich**, Nick, Butte, MT
KD7EZC **Cambre**, Linda M., Great Falls, MT
N7FZC **Lawson**, Jack L., Boise, ID
N7IOK **Sakir**, Clyde M., Tucson, AZ
AB7IU **Buell**, Alfred L., Winston, OR
KC7NUN **Outcelt**, William E., Las Vegas, NV
♦KL7OK **Morris**, Eugene G., Walnut Grove, CA
K7SVV **McClain**, John W., Tucson, AZ
NV7U **Lencho**, Robert J., Mountain Home, AR
♦KD7UT **Block**, Roger R., Washoe Valley, NV
W7UVU **Kingsley**, William W., Eugene, OR
AE7Y **Hebertson**, Wallace L., Sun City, AZ
KL7YF **Marvin**, Rick, Anchorage, AK
KD7ZU **Southerland**, Ransom R., Springfield, OR
KD8AJW **Kangas**, Michael J., University Heights, OH
K8BHG **Brooks**, Lee R., Bluefield, WV
N8BJ **Johnson**, Byron K., Lavalette, WV
KE8BS **Abell**, Robert E., Galena, OH
WK8C **Kemerley**, Robert D., Upper Sandusky, OH
♦WB8CDA **Fenzel**, Glenn E., Cleveland, OH
N8CSK **Bauman**, Paul J., Canton, OH
K8DEW **Williams**, Donald E., Barberton, OH
WD8DVM **Kenward**, Gerald D., Harrison Township, MI
W8GPB **Tolsma**, Gerald E., Baroda, MI
W8HBI **Check**, Christina, Lodi, OH
WA8HFO **Lewis**, Harry D., Zanesville, OH
KA8IOD **Frost**, Harland G., Swartz Creek, MI
WB8JJI **Horn**, Raymond E., Riverside, OH
KC8JKL **Hughes**, Karen, Belington, WV
WD8KCY **Potter**, Earl A., Benton Harbor, MI
AD8L **Zepp**, Robert E., Brunswick, OH
WA8NPG **Ingraham**, Harold A., Toledo, OH
W8OEY **Fulks**, Charles G., Braceville, OH
W8PAA **Ackerman**, Patricia, Mansfield, OH
AA8QD **Schmidt**, Robert H., Medina, OH
♦W8QS **Park**, Gerald L., East Lansing, MI
KD8RBJ **Mcdonnell**, Robert J., Delaware, OH
WD8SAE **Snyder**, George O., Ashland, OH
W8USU **Kyser**, Gary L., Battle Creek, MI
WA8WGK **Perkins**, John T., Flushing, MI
WB8YMD **Gary**, Francis W., Stow, OH
W8ZDX **Erickson**, Wayne E., Marysville, MI
WA9AJO **Gehres**, De Etta, Chandler, IN
WA9AXA **Koudelik**, Jerome J., Mesa, AZ
W9BAH **Hayes**, Dean S., Addison, IL
WD9CLF **Geimer**, Robert L., Verona, WI
KF9DT **Harrison**, Timothy K., New Haven, IN
K9FFC **Dulaney**, Viril E., Moline, IL
K9FQN **McKinney**, John R., Churubusco, IN
KA9IRC **Carver**, William H., Evansville, IN
W9JQI **Herold**, James D., Richmond, TX
W9KRH **Maltby**, James A., Weeki Wachee, FL
N9KTJ **Becker**, Michael A., Warner Robins, GA
KC9KWV **Alan**, Roger, Greenfield, WI
W9MXU **Linberg**, John H., Rogers, AR
WA9NZB **Villers**, Richard G., Ashwaubenon, WI
W9OBD **Kohler**, Ray, Sycamore, IL
WA9OMU **Driffill**, Eugene, Greenfield, IN
KB9OTB **Piccione**, Angelo, Rockford, IL
♦W9QKF **Ripple**, Sam R., Watseka, IL
WB9RGO **Gorsiski**, Lloyd G., Racine, WI
W9RVH **Rauh**, John R., Metamora, IL
N9RXR **James**, Walter D., Mishawaka, IN
WB9TBS **Young**, Mary K., Cannelton, IN
K9UIA **McCann**, Virgil W., Lincoln, IL
K9URA **Jones**, William E., Michigan City, IN
KØARR **Ladner**, Robert, Topeka, KS
♦WAØASM **May**, Stephen O., Lincoln, NE
WAØCKO **Gilbreath**, William M., Saint Charles, MO
KCØEHX **Wilmot**, Roger L., Omaha, NE
WØGAQ **Besthorn**, Jarrell W., Edgewood, NM
WØMGI **Mahre**, Marvin A., Maplewood, MN
WØNWX **Parsons**, Bryce J., Newton, IA
WØOMC **Pribyl**, Vernon G., Hutchinson, MN
KØRNT **Telkamp**, Ray N., Spearfish, SD
KAØTHX **Story**, Vicki M., Liberty, MO
VE3MQ **Knox**, Douglas D., Windsor, ON, Canada

♦ Life Member, ARRL

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.

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• 65W RF Output Power • 4.5W Audio Output • MIL-STD 810 G Specifications • 207 alphanumeric Memory Channels • Built-in CTCSS/DTCS Encode/Decode • DMS

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Analog + Digital Dual Bander D-STAR

ID-880H

• D-STAR DV mode operation • DR (D-STAR repeater) mode • Free software download • GPS A mode for easy D-PRS operation • One touch reply button (DV mode) • Wideband receiver

IC-V80 2M Handheld Transceiver

• 2M @ 5.5W • Loud BTL audio output • Military rugged • Classic 2M operation

Analog + Digital Dual Bander D-STAR

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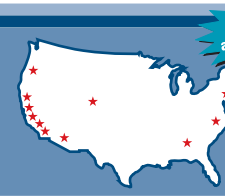

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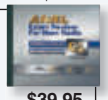

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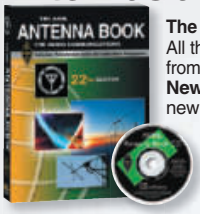

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Continued on page 110

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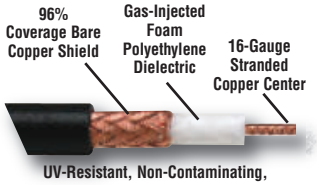

DXE-8X Low-Loss Foam Dielectric Cable (also known as RG-8X or Mini-8)

- Very flexible; ideal for short, in-shack jumper cables
- .242" Type II jacket is non-contaminating and UV-resistant
- Direct-bury

Attenuation/ 100 ft.	Power Rating	Efficiency %
0.6 dB @ 5 MHz	3.0 kW	86%
0.9 dB @ 10 MHz	2.2 kW	81%
1.4 dB @ 30 MHz	1.2 kW	69%
2.0 dB @ 50 MHz	0.9 kW	62%
3.8 dB @ 150 MHz	0.4 kW	42%

Cable Only		
DXE-8X	By the foot	**$.31/ft.**
DXE-8X-1000	1,000 ft.	**$259.99**

Pre-cut Cable with Connectors		
Part Number	**Length/Ft**	**Price**
DXE-8XDU003	3	**$9.88**
DXE-8XDU006	6	**$10.88**
DXE-8XDU012	12	**$12.88**
DXE-8XDU025	25	**$17.88**
DXE-8XDU050	50	**$26.88**
DXE-8XDU075	75	**$35.88**
DXE-8XDU100	100	**$44.88**
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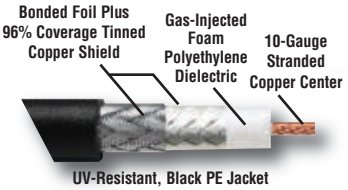

DXE-400MAX Low-Loss Cable

- Low-loss, gas-injected foam polyethylene dielectric bonded tape foil covered by a braided copper shield
- .405" low-density polyethylene jacket is UV resistant, ideal for outdoor use
- Direct-bury

Attenuation/ 100 ft.	Power Rating	Efficiency %
0.3 dB @ 5 MHz	6.9 kW	93%
0.5 dB @ 10 MHz	4.8 kW	90%
0.8 dB @ 30 MHZ	2.8 kW	83%
1.1 dB @ 50 MHz	2.1 kW	79%
1.8 dB @ 150 MHz	1.2 kW	65%
3.3 dB @ 450 MHz	0.7 kW	47%

Cable Only		
DXE-400MAX	By the foot	**$.82/ft.**
DXE-400MAX-500	500 ft.	**$364.99**

Pre-cut Cable with Connectors		
Part Number	**Length/Ft**	**Price**
DXE-400MAXDU003	3	**$11.88**
DXE-400MAXDU006	6	**$14.88**
DXE-400MAXDU018	18	**$26.88**
DXE-400MAXDU025	25	**$33.88**
DXE-400MAXDU050	50	**$58.88**
DXE-400MAXDU075	75	**$83.88**
DXE-400MAXDU100	100	**$100.88**
DXE-400MAXDU150	150	**$158.88**

DXE-213U MIL-Spec Cable

- .405" Type II jacket is non-contaminating and UV-resistant, suitable for outdoor use
- Direct-bury

Attenuation/ 100 ft.	Power Rating	Efficiency %
0.4 dB @ 5 MHz	4.9 kW	90%
0.6 dB @ 10 MHz	3.4 kW	87%
1.0 dB @ 30 MHz	2.0 kW	79%
1.3 dB @ 50 MHz	1.5 kW	73%
2.4 dB @ 150 MHz	0.9 kW	57%

Cable Only		
DXE-213U	By the foot	**$.89/ft.**
DXE-213U-500	500 ft.	**$409.99**

Pre-cut Cable with Connectors		
Part Number	**Length/Ft**	**Price**
DXE-213UDU003	3	**$11.88**
DXE-213UDU006	6	**$14.88**
DXE-213UDU012	12	**$20.88**
DXE-213UDU025	25	**$33.88**
DXE-213UDU050	50	**$57.88**
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DXE-213UDU100	100	**$99.88**
DXE-213UDU150	150	**$144.88**

Gas-Injected Foam Won't Absorb Water.

DXE-8U Low-Loss Foam Dielectric Cable

- .405" high-flex PVC jacket
- Low-loss foam dielectric

Attenuation/ 100 ft.	Power Rating	Efficiency %
0.4 dB @ 5 MHz	5.1 kW	91%
0.9 dB @ 10 MHz	3.1 kW	81%
1.3 dB @ 30 MHZ	1.8 kW	74%
1.4 dB @ 50 MHz	1.6 kW	72%
2.2 dB @ 150 MHz	1.0 kW	60%

Cable Only		
DXE-8UDU	By the foot	**$.79/ft.**
DXE-8UDU-500	500 ft.	**$359.99**

Pre-cut Cable with Connectors		
Part Number	**Length/Ft**	**Price**
DXE-8UDU002	2	**$10.48**
DXE-8UDU003	3	**$11.48**
DXE-8UDU006	6	**$14.48**
DXE-8UDU025	25	**$30.48**
DXE-8UDU050	50	**$50.48**
DXE-8UDU100	100	**$90.48**

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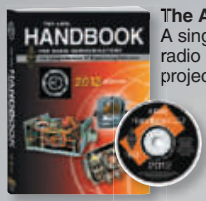

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- Stainless steel flat washers, lock washers, nuts and bolts
- Corrosion-resistant aluminum saddles with as-cast rough finish for secure grip

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- Full 360° grip for specified tubing size

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Dimensions in Inches.

V-Bolt Style, sized to accommodate ranges of tubing sizes

Part Number	Nominal Size	Thread Bolt Size	Price
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Dimensions in Inches.

Clamps with black powdercoated saddles are also available in U-Bolt and V-Bolt styles, designed and sized to fit ½" to 2" tubing.

Super Duty Saddle Clamps

Super Duty Saddle Clamps are designed for maximum clamping strength to control large or unbalanced loads.

- A356-T6 cast aluminum saddle, with rough, as-cast finish for high-torque grip on masts, etc
- Cast stainless reinforcement plate included
- Armor coated bolt sets sold separately

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Dimensions in Inches.

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Securely mount tubing to any flat surface. An insulated mount between tubing and plates, ideal for antenna construction and electrical applications.

- Optional stainless steel reinforcement plates available

Part Number	Tube O.D.	Price
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Dimensions in Inches.

Cushioned P-Clamps

- Provides strain relief of coaxial cable connections
- Grips the cable jacket without nicking or cutting

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V-Bolt Style Saddle Clamps with Stainless Steel Saddles

- Stainless Steel Saddles, serrated to secure hard pipe surfaces
- Stainless steel V-bolts and hardware

Part number	Nominal Size	Price
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Dimensions in Inches.
Also available with a tab and 1/4" hardware for grounding as shown.

Coaxial Cable Grounding Brackets

- Stainless steel bracket supplied with stainless steel V-Bolt and hardware

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- Welded 10-24 stud
- Easy connection to aluminum elements
- Useful for mounting items to round or irregularly shaped structures

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Dimensions in Inches.

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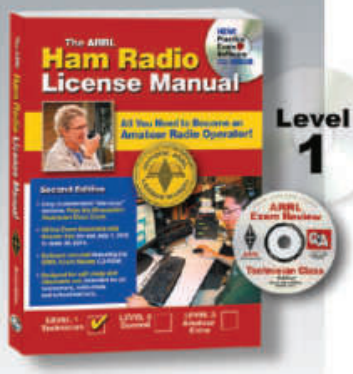

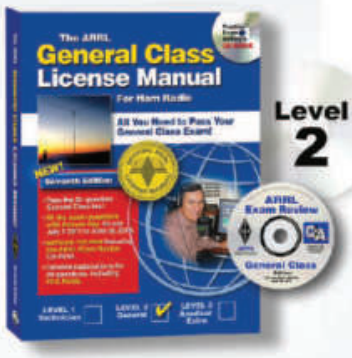

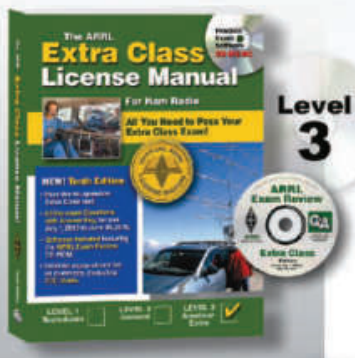

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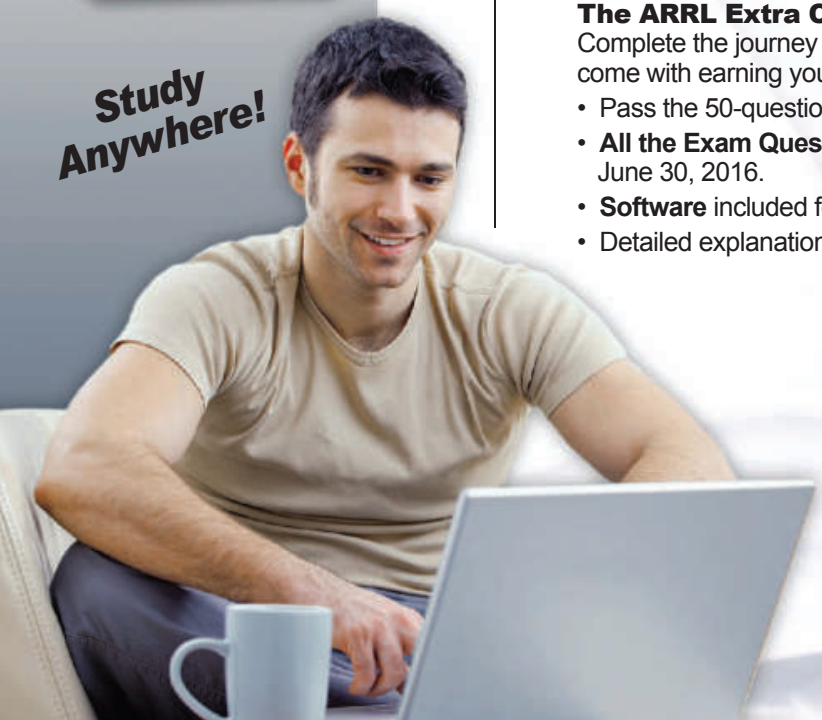

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DX ENGINEERING

ICOM · Cushcraft Amateur Radio Antennas · hy-gain · CQ · HUSTLER · MFJ · AMERITRON · BELDEN · Tigertronics · VIBROPLEX · PLASTI DIP · The BetterRF Company · VECTRONICS ...World Class Quality · PolyPhaser · ROHN Products LLC · JSC WIRE & CABLE · LOCTITE · butternut · MIRAGE Communications Equipment · LDG ELECTRONICS · HEIL SOUND · DIAMOND ANTENNA · BENCHER, INC. · STI · Ten-Tec RADIO · COMTEK SYSTEMS

We Will Beat Any Competitor's Price!

New!

Made in USA

DX Engineering High-Performance 160 Meter Quarter-Wave Vertical

Now, you can have a high-performance vertical antenna specifically for the 160 meter band. Achieve the strongest possible presence at your power level and be really competitive!

This custom-designed capacity hat system integrates with light rope guying, allowing you to get on 160 meters with a BIG signal–from a vertical mono band antenna that is **only 55 feet tall**! Constructed from aircraft-grade aluminum, the massive three inch diameter lower section is secured by a Heavy Duty Plus Stainless Steel Pivot Base, which can be lowered easily with the optional DXE-VRW one man manual winch.

Antenna Features:

- 5 kW SSB and CW rated
- Unparalleled reliability
- A custom designed capacity hat for top performance
- An adjustable matching network for the lowest SWR
- 40kHz SWR bandwidth – CW + DX phone
- The lowest takeoff angle reduces domestic QRM signals

DXE-160VA-1 ..... **$839.00**

DXE-VRW-1 Manual Winch

A great option, this winch allows one person to easily raise or lower a VA-2 or VA-3 vertical antenna.

DXE-VRW-1 Manual Winch..... **$169.99**

65 Ft. Telescoping Antenna Kit

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

DXE-ATK65 Telescoping Antenna Kit **$194.50**

DXE-VE-BASE Fixed Vertical Insulated Base Kit **$99.50**

DXE-VA-BASE HD Vertical Insulated Tilt Base Kit..... **$159.50**

Made in USA

6063-T832 Aluminum Tubing

- Smoothly telescoping sections
- Drawn, not extruded, tubing
- Best quality at the lowest price, guaranteed
- Custom made to DX Engineering's rigid specifications
- For best results, use DXE Stainless Steel Element Clamps to assemble slit lengths

DX Engineering Has Stainless Steel Element Clamps that Fit Exact Tubing Sizes! See DXEngineering.com for details.

Telescoping, High Strength, FiberGlass Tubing

Great for wire antenna spreaders or insulated stacking frames.

- Tubing custom made to DX Engineering's rigid specifications in smoothly telescoping sections
- Neutral, light gray color
- 1/8" nominal wall x 8 feet long
- Available in unslit tubing or one end slit tubing

Made in USA

Unslit End, Telescoping Fiberglass Tubing
available in sizes from 0.500" O.D. to 2.000" O.D. (in .25" increments) ..... **$6.45 to $25.95**

Slit One End, Telescoping Fiberglass Tubing
available in sizes from 0.750" O.D. to 2.000" O.D. (in .25" increments) ..... **$18.95 to $30.95**

50 Ft. Telescoping Fiberglass Tubing Mast Kit

- Includes DX Engineering Stainless Steel Element Clamps
- Tapers from 2.00" to .50" O.D. in seven 8 ft. sections

DXE-FTK50 50 ft. Telescoping Tubing Kit..... **$138.00**

Rohn Commercial Towers

Rohn Commercial Tower products and accessories are now available at DX Engineering. We have the Rohn products – Towers, Masts, and Tower and Installation Accessories – to meet your tower structural needs.

Contact DX Engineering Customer Support for your application.

Made in USA

New!

Phillystran Insulated Guy Lines

PHI-HPTG-12001	3/32" dia.	per foot	**$0.49**
PHI-HPTG-21001	1/8" dia.	per foot	**$0.69**
PHI-HPTG-40001	3/16" dia.	per foot	**$0.99**
PHI-HPTG-67001	1/4" dia.	per foot	**$1.39**
PHI-HPTG-112001	5/16" dia.	per foot	**$2.39**

SignaLink™ USB Unit from Tigertronics

- Easiest installation and setup—for Mac or PC
- Software included on CD ROM
- Built-in low noise sound card
- USB port powered
- Works with ALL radios
- Supports all sound card digital and voice modes, including MT63, EchoLink®, PSK-31, SSTV, CW and RTTY

Made in USA

TIG-SL-USB **$89.95**

- **Requires a radio interface cable**

Any radio interface cable (except the special Elecraft K3 cable), is only **$12.95** when purchased with a SignaLink™ unit

TOTALLY FREE SHIPPING ON COMTEK BALUNS*

COMTEK W2FMI Series Baluns

Better Performance, Lower Prices!

From just $49.95

Made in USA

Design inspired by Jerry Sevick, W2FMI, and perfected by DX Engineering's Balun R&D department.

- Featuring a DX Engineering innovation: High-voltage compensating capacitors for unequalled low SWR
- Large fender washers distribute fastener loading
- Special toroid core handles high power with minimum thermal stress
- High, consistent common-mode impedance across HF spectrum provides isolation where it's needed most
- 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: up to 5 kW+ intermittent depending on model, see website
- Silver-plated gasketed SO-239 connectors, stainless hardware and a 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. **Your COMTEK balun order is shipped free, via UPS ground, anywhere in the contiguous 48 United States.*

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LDG ELECTRONICS

#1 Line of Autotuners!

- *5 to 1,000 Watts PEP*
- *RF Sensing*
- *Auto and Semi Tuning Modes*
- *Two-Position Antenna Switch*
- *2,000 Memories per Antenna*
- *1.8 to 54 MHz range*
- *6 to 800 ohm range (15 to 150 on 6M)*

M-1000 Meter sold separately

NEW! AT-1000Proll

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

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

Z-11Proll

Meet the Z-11Pro II, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" × 7.7" × 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 through 6 meters. The Z-11Proll 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! 2,000 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, 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 2,000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six-foot DC power cable.

Suggested Price $159.99

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 ***Phone 410-586-2177 • Fax 410-586-8475***

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). 2,000 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

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

AT-200ProII

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

Suggested Price $259.99

IT-100

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

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. 2,000 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!

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LDG ELECTRONICS

hy-gain® ROTATORS

. . . the first choice of hams around the world!

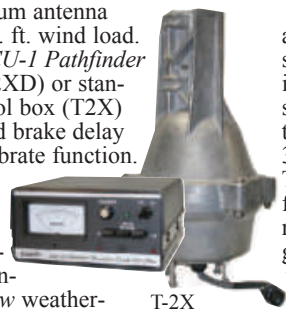
HAM-IV

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

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, DCU-1 **$749.95** 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.

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NEW! Automatic Rotator Brake Delay

RBD-5 **$29.95**

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.

hy-gain®

Antennas, Rotators & Towers

308 Industrial Park Road,Starkville, MS 39759, USA

FT-270R 2M FM HT

• TX: 144-148 • RX: 136-174 • Power: 5/2/0.5W
• Memories: 200 • Extra large LCD display & speaker

VX-6R 2M/440 FM Dual Band HT

• TX: 144-148, 222-225, 430-450 • RX: 0.5-999 (cell blkd)
• Power: 5/2.5/1/0.3W (1.5W on 220) • Memories: 900
• Submersible 3 feet for 30 minutes

VX-8GR 2M/440 FM HT 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-1900R 2M FM Mobile

• TX: 144-148 MHz • RX: 136-174 MHz
• Power: 55/25/10/5W • Memories: 221

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!

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-950 HF/6M Transceiver

• TX: HF/6M • RX: 0.03-56 MHz • Power: 10-100W
• Memories: 100 • Auto Antenna Tuner
• 32-bit Floating Point DSP • Built-in high stability TCXO

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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D-STAR READY RADIOS!

ID-31A 440 FM & D-STAR HT w/GPS

• TX: 420-450 MHz • RX: 400-479 MHz • Power: 5/2.5/0.5/0.1W • Memories: 1252
• D-Star Digital Voice and GPS receiver is built-in • Large Dot Matrix Display and Directional Keypad makes the radio easy to navigate through the menus

IC-80AD IC-92AD HM-189GPS HM-175GPS

IC-80AD 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 • Improved User Interface
• Optional HM-189GPS Speaker Mic adds GPS capabilities

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 • Dual RX
• Optional HM-175GPS Speaker Mic adds GPS capabilities

GPS Speaker Microphones

• Shows your position data on the display and offers a position reporting function in DV mode
• HM-189GPS for IC-80AD and HM-175GPS for IC-92AD

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

ID-1 1.2 GHz D-Star & FM Mobile

• TX: 1240-1300 MHz • RX: 1240-1300 MHz
• Power: 10/1W • Memories: 105
• D-Star 128 kbps Data & 4.8 kbps Voice

IC-718 HF Transceiver

• TX: HF (except 60M) • RX: 0.03-30 MHz
• Power: 5-100W • Memories: 101 • DSP built-in
• SSB, CW, RTTY and AM (2-40W)

IC-7000 HF/6/2M/440 MHz Mobile

• TX: HF/6/2M/440 MHz • RX: 0.03-199, 400-470 MHz
• Power: 2-100W (HF/6M), 2-50W (2M), 2-35W (440)
• Memories: 503 • 41 band-widths with sharp or soft filter shape

IC-7200 HF/6M Portable

• 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 & 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-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
• USB Port for CI-V Format PC Control & Audio In/Out

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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

MFJ-269PRO
$419.95

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-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.

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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** dummy load through your MFJ-949E or direct to your transceiver.

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

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

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-969 **$219.95**

MFJ-941E *super value* Tuner

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-941E **$139.95**

MFJ-945E HF/6M *mobile* Tuner

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-945E **$129.95**

MFJ-971 *portable/QRP* Tuner

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-971 **$119.95**

MFJ-901B *smallest* Versa Tuner

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-901B **$99.95**

MFJ-902 *Tiny Travel* Tuner

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-902 **$99.95**

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

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-16010 **$69.95**

MFJ-906/903 *6 Meter* Tuners

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB.

MFJ-906 **$99.95**

MFJ-903, $69.95, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in.

MFJ-921/924 **$89.95**

MFJ-931 *artificial* RF Ground

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-931 **$109.95**

MFJ-934, $209.95, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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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

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.

MFJ-994B **$359.95**

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

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.

MFJ-998 **$699.95**

300 Watt...*Extra*...Wide Range

SWR/Wattmeter, 10000 VA Memories

Extra *wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

MFJ-991B **$219.95**

200 Watt ...Compact

Digital Meter, Ant Switch, Wide Range

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.

MFJ-929 **$219.95**

200 Watt ...Econo

Small, Ant Switch, 20K VA Memories

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.

MFJ-928 **$199.95**

200 Watt *MightyMite*™

Matches IC-706, FT-857D, TS-50S

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!

MFJ-925 **$179.95**

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/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.

200W...Weather-sealed

for Remote/Outdoor/Marine

MFJ-926B **$279.95**

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.

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MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these highly reliable 15, 22, 30, 40 or 75 Amp MFJ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them with one hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either! These super clean *MightyLites*™ meet all FCC Class B regulations.

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

You won't burn up our power supplies! MFJ Power supplies are *fully protected* with Over Voltage, Over-temperature and Over Current protection circuits.

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

A whisper quiet internal fan efficiently cools your power supply for long life.

22 Amp Continuous

Mighty Lite™

MFJ-4125

Ham Radio's smallest and lightest 22 Amp continuous power supply is also its best selling!

$84.95

22 Amps continuous/25 Amps max at 13.8VDC. 5-way binding posts on front, 5A quick connects on back. 85-135/170-260 VAC input. 2.9 lbs. 5¾Wx3Hx5¾D".

MFJ-4125P, $94.95. Adds 2-pairs *Anderson PowerPoles*™.

22 Amp Continuous

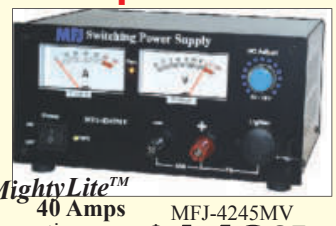
Mighty Lite™

MFJ-4225MV

$99.95

22 Amps continuous, 25 Amps maximum. Like MFJ-4125 but adds Volt/Amp meters, cigarette lighter plug. Adjustable 9-15 VDC Output. 5¼Wx 4½Hx6D in. Weighs 3.7 lbs. Use 85-135 VAC or 170-260 VAC input. Replaceable fuse.

40 Amp Continuous



MightyLite™

MFJ-4245MV

$149.95

40 Amps continuous, 45 Amps max. Adjustable 9-15 VDC output. Volt/Amp meters, cigarette lighter plug, front 5-way binding posts, two rear quick connects. 5.5 lbs. 7½Wx 4¾Hx9D inches. Use 85-135 VAC or 170-260 VAC input. Replaceable fuse.

70 Amp Continuous

MFJ-4275MV

$249.95

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

High Current Multiple DC Power Outlets

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

Versatile 5-Way Binding Posts

MFJ-1118, $84.95. Power two HF and/or VHF rigs and six accessories from your main 12 VDC supply. *Built-in 0-25 VDC voltmeter*. Two pairs 35 amp 5-way binding posts, fused and RF bypassed for transceivers. Six pairs RF bypassed binding posts provide 15 Amps for accessories. Master fuse, ON/OFF switch,"ON" LED. 12½x2¾x2½ in.

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

MFJ-1112, $44.95. 6 pairs binding posts, 15 Amps total.

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

All PowerPoles™

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

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

PowerPoles™ AND 5-Way Binding Posts

MFJ-1129, $114.95. 10 outlets each fused, 40 Amp total. 3 high-current outlets for rigs -- 2 *PowerPoles®* and one 5-way binding post. 7 *switched* outlets for accessories

MFJ-1118 **$84.95**

MFJ-1116 **$59.95**

MFJ-1112 **$44.95**

MFJ-1117 **$64.95**

MFJ-1128 **$104.95**

MFJ-1126 **$84.95**

MFJ-1129 **$114.95**

MFJ-1124 **$64.95**

(20A max) -- 5 *PowerPoles®* and 2 binding posts. Fuses include (1- 40A, 2-25A, 3-10A, 3-5A, 2-1A installed). *0-25 VDC Voltmeter*. Includes extra *PowerPoles®* and fuses, 12½Wx1¼Hx2¾D inches.

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

15 Amp Continuous

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

MFJ-4115 **$59.95**

30 Amps Continuous

Linear with 19.2 lb.Transformer

This heavy-duty linearly regulated MFJ-4035MV has *abolutely no RF Hash*. It delivers 30 Amps continuous, 35 Amps maximum from its massive 19.2 lb. transformer. Front panel adjustable 1-14 VDC output with convenient detent at 13.8 VDC. Volt/Amp Meters. 1% load regulation, 30 mV ripple. Over-voltage/current/temperature protection, 5-way binding posts, 2 pairs of quick-connects and a covered cigarette lighter socket for mobile accessories. Front panel replaceable fuse. 110 VAC input. 9½Wx6Hx9¾D in.

No RF Hash!

MFJ-4035MV **$149.95**

Free MFJ Catalog

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MFJ 160-6 Meter Antenna

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

MFJ-2990
$359.95

New!

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

Exceptional Performance

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

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

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

An optimized balun design allows *direct coax feed* with negligible coax loss (typically less than 1/2 dB 60-6 Meters and less than 1 dB 160-80 M with good quality, low-loss coax).

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

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

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

Assembles in an hour

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

Great for Stealth Operation in antenna restricted areas

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

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

MFJ *Automatic* Tuners

MFJ-998
$699.95

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

MFJ-993B
$259.95

Dual power range -- 300 Watt range matches 6-1600 Ohms. 150 Watt/6-3200 Ohms. Auto-ranging LCD and Cross-Needle SWR/Wattmeter, antenna switch, 1.8-30 MHz.

MFJ *Manual* Tuners

MFJ-989D
$389.95

1500 Watts SSB/CW, 1.8-30 MHz. Active peak-reading Cross-Needle SWR/Wattmeter, balun, dummy load, antenna switch, aircore roller inductor.

MFJ-949E
$179.95

World's most popular tuner! 300 Watts, 1.8-30 MHz. Peak/Average Cross-Needle SWR/Wattmeter, 8 pos. antenna switch, dummy load, 1kV capacitors.

Window Feedthru

MFJ-4602
$69.95

Bring 3 coaxes, balanced line, random wire, ground thru window. Connectors mounted on *stainless steel* panel. 3/4" thick *pressure-treated* weather-proof wood.

Free MFJ Catalog

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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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http://www.mfjenterprises.com for instruction manuals, catalog, info

MFJ Weather-Proof *Window Feedthrough Panels*

Weather-proof window feedthrough panels bring coax, balanced lines, HF/VHF/UHF antennas, random wire antennas, ground, rotator/antenna switch cables and DC/AC power into your hamshack without drilling through walls!

MFJ Weather-Proof *Window Feedthrough Panels* mount in your window sill. Lets you bring all your antenna connections into your hamshack *without* drilling holes through walls.

Simply place in window sill and close window. One cut customizes it for any window up to 48 inches. Use horizontally or vertically. Connectors are mounted on inside/outside stainless steel plates and attached to a 4 foot long, 3 1/2 inch high, 3/4 inch thick *pressure-treated* wood panel. Has excellent insulating properties. Weather-sealed with a heavy coat of long-lasting white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Includes window locking rod.

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

MFJ-4603 Universal Window Feedthru Panel

MFJ-4603 **$89.95**

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

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

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

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

Has random/longwire antenna *ceramic feedthru insulator*.

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

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

MFJ's exclusive *Adaptive Cable Feedthru*™ lets you bring in rotator/antenna switch cable, etc. without removing connectors (up to 1 1/4X1 5/8 in). Adapts to virtually *any* cable size. Seals out rain, snow, adverse weather.

3 Coax, Balanced Line, Random Wire

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

MFJ-4602 **$69.95**

6 Coax

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

MFJ-4601 **$59.95**

4 Balanced Line, 2 Coax

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

New! MFJ-4600 **$79.95**

5 Cables, any-size

5 *Adaptive Cable Feedthrus*™. Pass any cable with connector: 2 cables with large connectors up to 1 1/4x1 5/8 inches and 3 cables with UHF/N size coax connectors. Seals out weather.

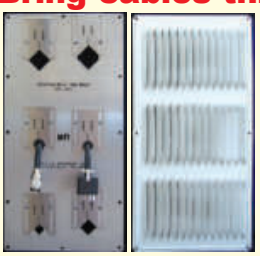
MFJ-4604 **$99.95**

All-Purpose FeedThru/CableThru™

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

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

Bring cables thru eave of your house



MFJ-4616 shown with standard full-size vent (not included) it replaces. For *6 Cables* **$26.95**

MFJ-4613 shown with standard half-size vent (not included) it replaces. For *3 Cables* **$14.95**

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

Bring in coax, rotator, antenna switch, power cables, etc. *with connectors* up to 1 1/4x1 5/8 inches!

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

AdaptiveCable™ Wall Plates

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

Bring nearly any cable -- rotator, antenna switch, coax, DC/ AC power, etc. -- through walls *without removing connectors* (up to 1 1/4x1 5/8 inches). Sliding plates and rubber grommets adjust hole size to weather-seal virtually any size cable.

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

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

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

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New! - PK-232SC with Sound Card, Rig Control, USB - All built-in!

PK-232SC Multimode Data Controller*

Sound Card, Rig Control, USB, Pactor, RTTY, CW Packet & more!

100,000 sold - All-time top selling data controller!

New PK-232SC Now shipping!

- Single USB connection to computer
- USB Sound Card built-in
- 3-Way Rig Control built-in - logic level, RS-232 & USB!
- Computer isolated from radio

The incredible PK-232SC again expands its role in your radio station. Now it connects to your computer with a single USB cable - no audio cables, no RS-232 cables! It has a built-in USB sound card with isolated audio I/O to your radio to prevent ground loops. The new logic level and RS-232 rig control is optically isolated for your Icom CI-V, Yaesu CAT, Kenwood and other radios. You never have enough downstream USB ports so we even added a pair for that new radio with USB rig control and other accessories.

As Always- Upgrade any PK-232 ever made to the PK-232SC!

Customize your PK-232 with our complete line of upgrades and accessories.

Need Software? Download the new Ham Radio Deluxe to sync with Radio Operating Center!

Signal Processing, Antenna Analysis, Data & Remote Control

DSP-599zx Audio Signal Processor*

Now shipping with new bigger & brighter display!

Noise Reduction, precision highpass, lowpass, bandpass & notch filtering for audio, CW & data.

TZ-900 Antenna Analyzer

Once you use the TZ-900 - you'll never want to use any other!

Sweep and analyze antennas in seconds. Zoom, Compare & Store Data. Sunlight-visible color graphics, handheld, rechargable batteries, no computer required.

ANC-4 Antenna Noise Canceller

See & hear a demo on YouTube!

Kill Noise before it reaches your receiver! Great for supressing power line noise, plasma TV noise & many other local electrical noises.

DSP-232+ Multimode Data Controller*

Sound card interface, USB, Pactor, 1200/9600 Packet

PK-96/100 TNC - 1200/9600 Packet*

Available with USB or RS-232

HamLink™ Wireless and USB Remote Control & Audio

HamLinkUSB™ Rig Control Plus

Logic Level plus PTT

PK-232 RS-232-to-USB Adapter*

Use the PK-232 with your new computer!

HamLinkBT-BTH+™ Bluetooth® Adaptor

Use a standard cellphone Bluetooth® headset to keep your hands free for driving and operating. Includes USB rig control for your station. Audio, VOX & PTT - Fixed & Mobile.

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MIRAGE. . .160 Watts on 2 Meters!

Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer. . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

The MIRAGE B-5018-G gives you 160 Watts output for 50 Watts input on all modes -- FM, SSB, or CW!

Ideal for 25-50 Watt 2 Meter mobile or base. Weak signals pop out with its low noise *GaAsFET* preamp and its excellent 0.6 dB noise figure. Selectable 5, 8 or 14 dB preamp gain.

Exclusive MIRAGE *ActiveBias*™ circuit gives *crystal clear SSB* without splatter or distortion.

B-5018-G is legendary for its ruggedness and is fully protected -- high SWR or excessive input power automatically bypasses the B-5018-G to prevent damage.

Heavy-duty heatsink spans entire length of cabinet. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Has adjustable delay *RF sense* Transmit/Receive switch *and* remote external keying. 16-20 Amps at 13.8 VDC.12x3x5½ inches.

B-5018-G **$329.95**

B-1018-G, $409.95. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.25-10 Watt rigs.

B-2518-G, $329.95. Same as B-5018-G but for 10 to 25 Watt mobile or base. 160 Watts out for 25 Watts in.

RC-2, $49.95. Remote Control. On/Off,pre-amp On/Off, selects SSB/FM. With 25 foot cable.

Power Curve -- typical output power in Watts										
B-1018-G	25	50	140	150	160	160	--	--	--	--
B-2518-G	5	7	40	60	80	100	125	160	--	--
B-5018-G	--	2	15	25	40	50	70	100	130	160
Watts In	.25	.5	3	5	8	10	15	25	35	50

35 Watts for 2 Meter HT

For handhelds up to 8 Watts. 35 Watts out for 3-8 Watts in (18 W out/1W in)! 18 dB *GaAsFET* preamp. All modes: FM, SSB, CW. RF sense T/R switch. Reverse polarity protection. Includes mobile bracket, 1 year warranty. 5¼Wx1¾Hx4¾D in.

B-34-G **$129.95**

35 Watts, $109.95, FM only

B-34, $109.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less pre-amp, mobile bracket. 3⅛Wx1¾Hx4¼D in.

MIRAGE Dual Band 144/440 MHz Amp

Boost your *dual band* 144/440 MHz handheld to a powerful mobile/base -- 45 Watts on 2 Meters/ 35 Watts on 440 MHz! Works with all FM handhelds to 7 Watts. Includes *full duplex* operation -- lets you talk on one band, listen on other at same time. Auto band selection, RF sense T/R switch, single connector, reverse polarity protection, 5Wx1¾Hx5D in. Mobile bracket. One year warranty.

BD-35 **$199.95**

100 Watts for 2M HT

100 Watts out for 2-8 Watts in! Great for HTs up to 8W. FM, SSB, CW. 15 dB *GaAsFET* preamp, RF sense T/R, high-SWR protected.

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- ***High Current Roller Inductor***
- ***SSB*Analyzer Bargraph™***
- ***Cross-Needle Meter***
- ***6 Position Antenna Switch***
- ***Built-in 4:1 Balun***
- ***Gear driven Turns Counter***

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a super durable paint that won't scratch or chip.

Attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the front panel. You won't leave a mark!

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Two 4.5 kV transmitting variable capacitors and a massive roller inductor gives you arc-free operation up to 2 kW PEP SSB.

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A sturdy hand cranked roller inductor lets you quickly fly from band to band. A precision 5-digit gear driven turns counter lets you accurately retune.

HFT-1500 **$479.95**

Large comfortable knobs and smooth vernier drives make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

You can tune your SWR down to the absolute minimum! **Why?** Because all network components -- roller inductor and variable capacitors are fully adjustable.

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You can tune any *real* antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, Yagis, quads, long-wires, whips, G5RVs, and more.

*SSB*Analyzer Bargraph™*

Exclusive 21 segment bargraph lets you visually follow your instantaneous voice peaks. Has level and delay controls.

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Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

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A heavy duty two ferrite core 4:1 balun feeds dual high voltage Delrin terminal posts for balanced lines. 5.5x12.5x12 inches. One year limited warranty.

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- Free Programming Software!†

†*www.icomamerica.com/amateur/DSTAR for details about free software*

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- 10 Watt on 23cm (FM, DV, DD)
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- 1052 Alphanumeric Memory Channels
- Li-ion Battery
- Free Programming Software†

†*www.icomamerica.com/amateur/DSTAR for details about free software*

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- 1304 Alphanumeric Memory Channels
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*Frequency specs may vary. Refer to owner's manual for exact frequency specs.

MFJ *Balanced Line* Antenna Tuner

Superb balance . . . Very wide matching range . . . Covers 1.8-54 MHz . . . Cross-Needle SWR Wattmeter . . . Handles 300 Watts . . . Compact size . . .

The MFJ-974HB is a* fully balanced true *balanced line antenna tuner. It gives you superb current balance.

Johnson Matchbox

For decades, the Johnson Matchbox has been the standard of comparison for balanced line antenna tuners. But, it had a severely limited matching range and covered only 80, 40, 20, 15 and 10 Meters.

***The** MFJ-974HB is its successor*. It meets today's needs and even surpasses the Johnson Matchbox outstanding performance.

Everything You Need

The MFJ-974HB gives you excellent current balance, very wide matching range(12-2000 Ohms) and covers 1.8 through 54 MHz *continuously* including all WARC bands, 160 Meters, 6 Meters and the new 60 Meter band. Handles 300 Watts SSB PEP and 150 Watts CW.

Tuning is fast and easy - - just three tuning controls. You can adjust for highly efficient broadband low-Q operation or use higher Q when you encounter extreme loads.

A large three-inch lighted Cross-Needle SWR/Wattmeter lets you read SWR, peak or average forward and reflected power *all at a glance* on 300/60 or 30/6 Watt ranges.

A ground post is provided to ground one output terminal so you can also tune random wires and coax fed antennas.

Compact 7½Wx6Hx8D in. fits anywhere.

Tunes any Balanced Line

The MFJ-974HB tunes any balanced lines including 600 Ohm open wire line, 450/300 Ohm ladder lines, 300/72 Ohm twin lead - - shielded or unshielded.

Superb current balance minimizes feedline radiation that can cause troublesome TVI /RFI, painful RF bites, mysterious RF feedback problems and radiation pattern distortion.

Excellent Balance, Excellent Design

The MFJ-974HB is a *fully balanced* wide range T-Network. *Four* 1000 Volt air variable capacitors are gear driven. A high-Q air wound tapped inductor is used for 80-10 Meters with separate inductors for 6 and 160 Meters. The tuning components are mounted symmetrically to insure electrical balance.

MFJ-974HB
$209.95

A 1:1 *current* balun is placed on the low impedance 50 Ohm input side to convert the balanced T-Net-work to un-balanced operation. An efficient balun is made of 50 ferrite beads on RG-303 *Teflon*™ coax to give very high isolation. It stays cool even at max power.

Balanced Line = Extremely Low Loss

Balanced lines give extremely low loss.

Doublet, horizontal loop, vertical loop, quad, double extended Zepp, Lazy H, W8JK antennas all give efficient multi-band operation when fed with balanced lines.

6-80 Meter Balanced Line Tuner

MFJ-974B
$189.95

MFJ-974B, $189.95. Same as MFJ-974H but for 6-80 Meter operation (no 160 Meters).

160-6 Meters All Band Doublet Antenna

MFJ-1777, $59.95. 102 feet doublet antenna covers 160-6 Meters with balanced line tuner. Super strong custom fiberglass center insulator provides stress relief for 450 Ohm ladder line (100 feet included). Authentic *glazed ceramic* end insulators. Handles 1500 Watts.

MFJ 1500 Watt *Fully Balanced* Antenna Tuner

Fully balanced MFJ-976 handles 1500 Watts legal limit . . . Extra-wide 12-2000 Ohms matching range . . . continuous 1.8 to 30 MHz coverage including all WARC bands . . . Four separate 500 pF in two gangs gives you a total of 2000 pF capacitance . . . Heavy duty 1:1 current balun . . . more!

MFJ-976
$499.95

The MFJ-976 is a 1500 Watt Legal Limit *fully balanced* antenna tuner.

You get *superb* current balance, very wide matching range (12-2000 Ohms) and *continuous* 1.8-30 MHz coverage including all WARC bands. Handles *full* 1500 Watts SSB *and* CW.

You can tune *any* balanced lines including 600 Ohm open wire line, 450/ 300 Ohm ladder lines, 300/72 Ohm twin lead -- shielded or unshielded. Also tunes random wires and coax fed antennas.

MFJ's *fully balanced* extremely wide-range T-network gives you simple, fast three knob tuning. No complicated switching between high and low impedance and switching in additional capacitance of L-networks.

Four separate 500 pF in two gangs gives you a total of 2000 pF for highly efficient low loss operation on 160 Meters.

You get superb 10 Meter performance due to MFJ's low minimum capacitance and exclusive *Self-Resonance Killer*™ high-Q *AirCore*™ roller inductor with silver plated contacts.

Heavy duty 1:1 current balun gives you *superb balance* and stays cool even at 1.5kW.

True *active* peak reading lighted Cross-Needle SWR/Wattmeter lets you read SWR, *true peak* or average forward and reflected power all at a glance on 300/ 3000 Watt ranges. 12Wx6Hx15¾D inches.

Ladder line, Twin lead, Insulators, Copper wire . . .

Super-strong fiberglass 450 Ohm ladder line insulators

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MFJ-16E01, $9.95. Feedpoint *End* Insulator. Double weave ladder line stress relief. Built-in SO-239 connector.

MFJ-16F01, $8.95. *Middle* insulator. High-strength coax connection at mid-point with SO-239, quadruple weave-through ladder line stress relief.

MFJ-16C06, $4.56. Authentic *glazed ceramic* Insulator, 6-pack.

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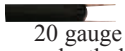
Extremely low loss, open-frame construction. Heavy duty black polyethylene. Solid 18 gauge wire. MFJ-18H050, **50 Ft.**, $19.95. MFJ-18H100, **100 Ft.**, $34.95. MFJ-18H250, **250 Ft.**, $89.95.

300 Ohm Twin-Lead



20 gauge stranded copper wire. Black polyethylene. MFJ-18T050, **50 Ft.**, $24.95. MFJ-18T100, **100 Ft.**, $44.95. MFJ-18T250, **250 Ft.**, $99.95.

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Features:

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±0.5ppm Frequency Stability
Large Monochrome LCD Display
Built-in Automatic Antenna Tuner
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AD/DA Converter
ADC Signal (Noise+Distortion): 100dB
ADC Dynamic Range, S/N: 113dB
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DAC Dynamic Range, S/N: 115dB

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Internal Clock Speed: 333MHz
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Max. Performance: 2000MFLOPS

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Even during long hours of heavy duty use, the IC-7410 provides stable output power.

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A standard type B USB connector is located on the back panel. Use it to control your IC-7410 via PC.

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QST QuickStats

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 April 6 through May 6.

Get on the web and vote today at **www.arrl.org/quickstats**!

When was the last time you inspected your antenna feed lines?

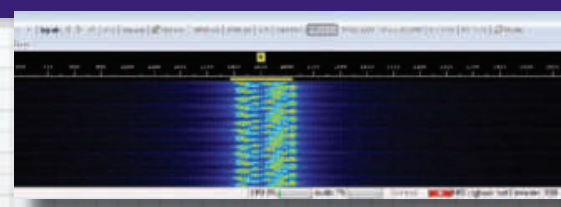
- Within the past month: 50%
- Within the past year: 39%
- It has been a few years: 11%

Do you use software to control your transceiver?

- Yes: 45%
- No: 50%
- My transceiver is software defined! 5%

Have you used your new 60 meter CW or digital privileges?

- Yes, CW only: 2%
- Yes, digital only: 2%
- Yes, CW and digital: 1%
- No: 95%



How many times have you attended the Dayton Hamvention®?

- Just once: 12%
- 2 to 5 times: 12%
- 6 to 10 times: 6%
- 11 to 20 times: 4%
- More than 20 times: 6%
- Never: 60%

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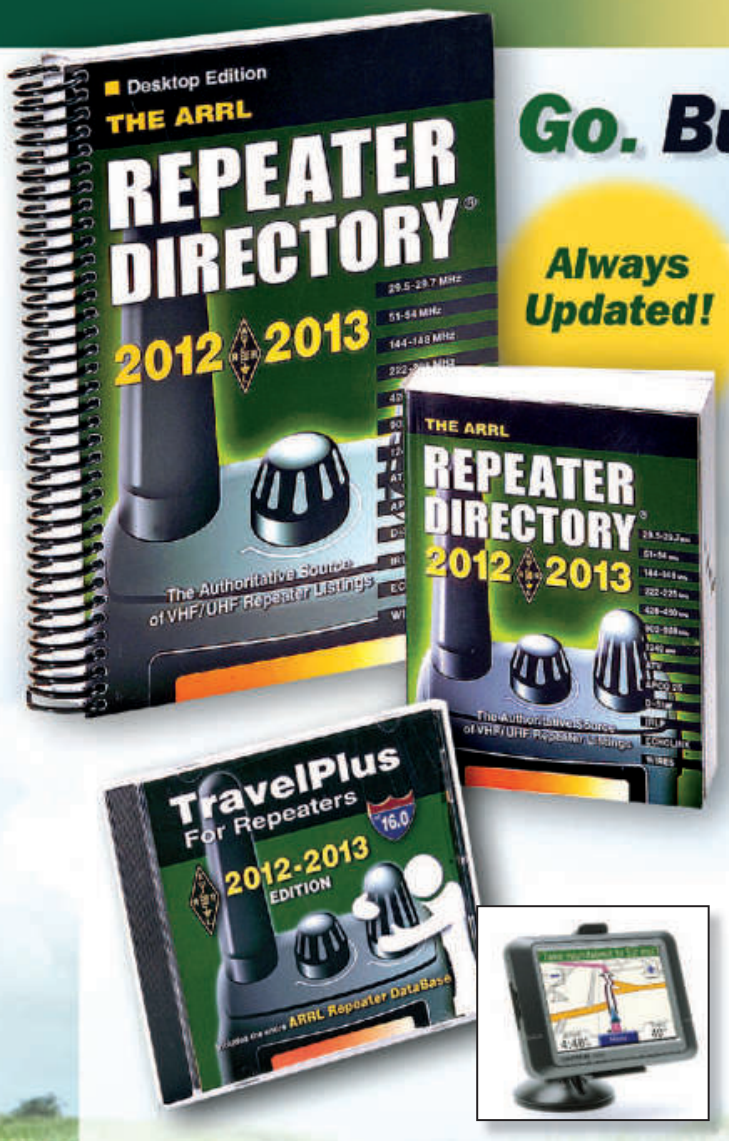

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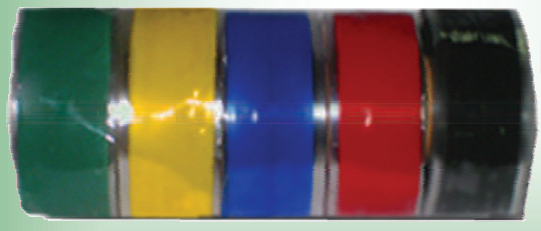

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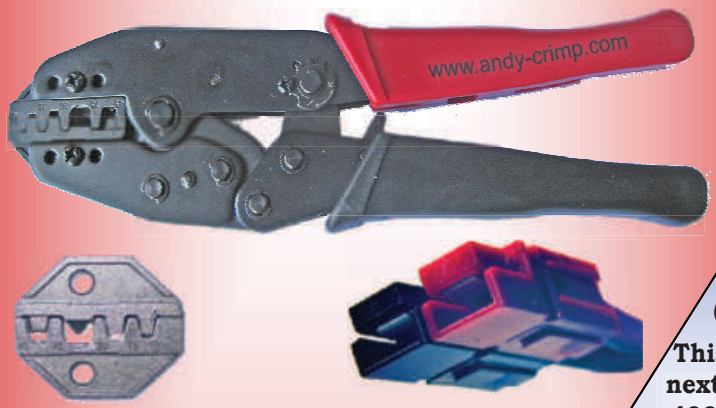

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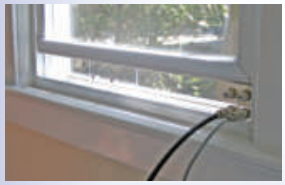

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6m—80m Vertical
No Radials Required

JTV680

$249.95

Specifications:
Transmit: 3.5-57 MHz, Receive: 1.8-90 MHz, Impedance: 50 ohms, Max power: 250 watts, Max wind rating: 90 MPH, Connector: SO239, Length: 23 feet $3^1/_2$ inches, Mast size: $1^1/_4$ – $1^1/_2$ inches, Radials: Not required

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10 meter 5/8 wave vertical

JTV10

$99.95

Field tunable 26-33 mHz, 1200 watts, Connector: SO239, Impedance: 50 ohms, Length 18.75' when tuned to 29 mHz, Maximum Mast size: 1 3/8", Construction: Aluminum

Recommended Coax for JTV10 and JTV680

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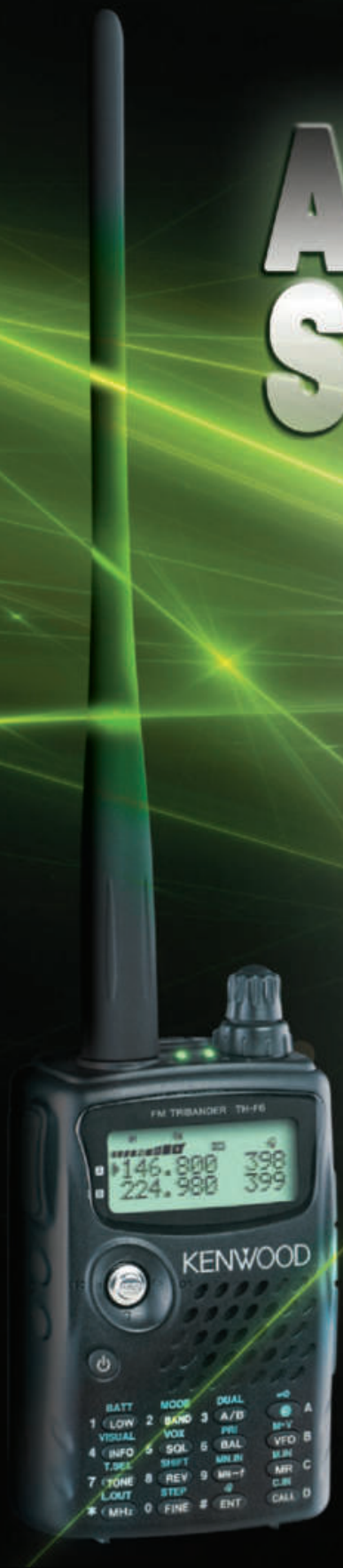

Never before has a compact HT offered as many features, and such high powered performance as the TH-F6A. Arm yourself with one today and gain your own airwave superiority.

- Triband 144/220/440 MHz all at 5W
- Receives 2 frequencies simultaneously even on the same band
- 0.1~1300MHz high-frequency range RX (B band)[1]
- FM/FM-W/FM-N/AM plus SSB/CW receive
- Bar antenna for receiving AM broadcasts
- Special weather channel RX mode
- 435 memory channels, multiple scan functions
- 7.4V 2000mAh lithium-ion battery (std.) for high output[2] and extended operation
- 16-key pad plus multi-scroll key for easy operation
- Built-in charging circuitry for battery recharge while the unit operates from a DC supply
- Tough construction: meets MIL-STD 810 C/D/E standards for resistance to vibration, shock, humidity and light rain
- Large frequency display for single-band use
- Automatic simplex checker
- Wireless remote control function
- Battery indicator • Internal VOX • MCP software

[1]Note that certain frequencies are unavailable. [2]5W output

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NEW! Wouxun KG-UV6D Dual Band
Frequency Range: VHF/UHF
Memory Channels: 199 channels
2.5KHz VFO steps, FCC 2013 narrowband compliant, Frequency Stability: ±2.5ppm
Operating Voltage: 7.4V
Waterproof: IP 55, Standard SMA antenna connector

Wouxun KG-UVD1P Dual Band HT
Dual Frequency, Dual Display
144-148 MHz, VHF(TX)
430-450 MHz, UHF(TX)
136-174 & 400-480MHz
plus FM broadcast(RX)

NEW! – Coming Soon!
Baofeng UV-5R Dual Band HT

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- Frequency: 136-174 / 400-480MHz
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- 128 Channels
- Built-in VOX Function
- 1750Hz Brust Tone
- FM Radio (65.0MHz-108.0MHz)
- LED Flashlight
- Large LCD Display
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Weight(g): 135
Connector: PL-259

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Cord: 4M
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Weight: 168g

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Max.Power(W): 150
V.S.W.R: <1.5
Length (M): 1.04
Weight(g): 350
Connector: PL-259

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Length (mm): 400
Weight: 42g
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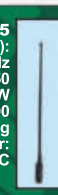

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131' overall length, black jacketed wire, 200 watts

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13.8 VDC at 40 amps continuous, Adjustable output voltage from 9 to 15 VDC

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Output current: 0-30A, 20A cont.

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DC Power Supply
DC 13.8V Output: (9-15V adjustable)
Output current: 0-30A, 25A cont.
Ripple & Noise: <15m Vp-p
See February 2012 QST Product Review, Page 57

QJE PS30SWIII
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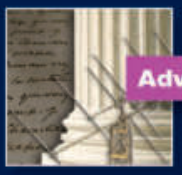

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