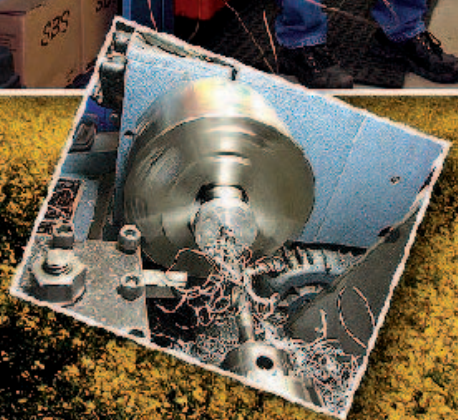
QST

DEVOTED ENTIRELY TO AMATEUR RADIO

July 2011 WWW.ARRL.ORG

VE6AB Bonds with His Beautifully Crafted 75 Meter Mobile Antenna



QST reviews:

Inside:

$4.99 US $6.99 Can.

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Official Journal of ARRL The national association for AMATEUR RADIO

Field Gear That Goes The Distance!

FT-450D
HF/50 MHz 100 W Easy to Operate All Mode Transceiver

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

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-897D
HF/VHF/UHF Portable Operation Powerful Transceiver

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

FT-817ND
The Ultimate Backpack, Multi-Mode Portable Transceiver

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

YAESU
Choice of the World's top DX'ers℠
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10900 Walker Street Cypress, CA 90630 (714) 827-7600

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http://www.vertexstandard.com

NEW COMPACT HF TRANSCEIVER WITH IF DSP

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

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

HF/50 MHz 100 W All Mode Transceiver

FT-450D

With Built-in Automatic Antenna Tuner

NEW **Illuminated Key buttons**

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

NEW **Foot stand**

NEW **Classically Designed Main Dial and Knobs**

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

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

MOS FET RD100HHF1

■ **Large informative Front Panel Display, convenient Control knobs and Switches**

■ **The IF DSP guarantees quiet and enjoyable high performance HF/50 MHz operation**

Handy Front Panel Control of Important Features including:

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

More features to support your HF operation

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

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http://www.vertexstandard.com

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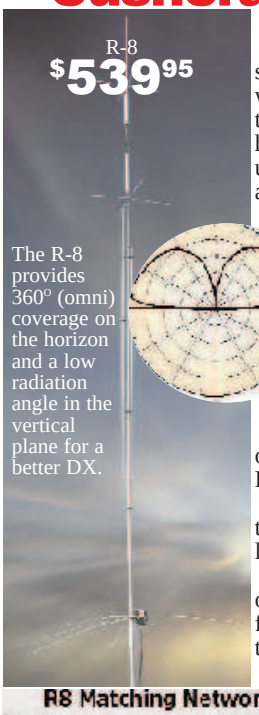
Cushcraft R8 *8-Band Vertical*



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!

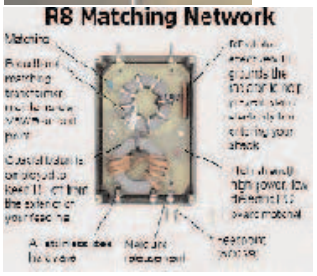
Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

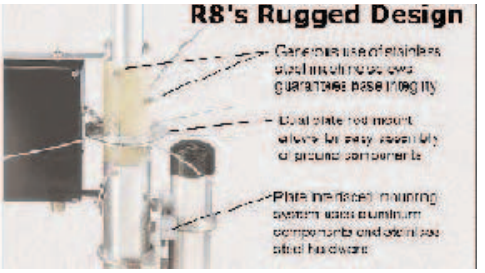
Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

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.





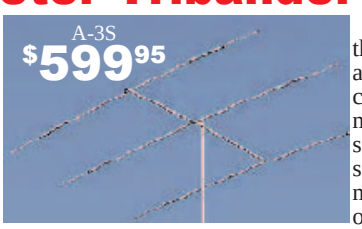
MA-5B *5-Band* Beam

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



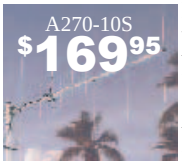
Only the best tri-band antennas become DX classics, which is why the Cushcraft World-Ranger A4S, A3S, and A3WS go to the head of the class. For more than 30 years, these pace-setting performers have taken on the world's most demanding operating conditions and proven themselves every time. The key to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

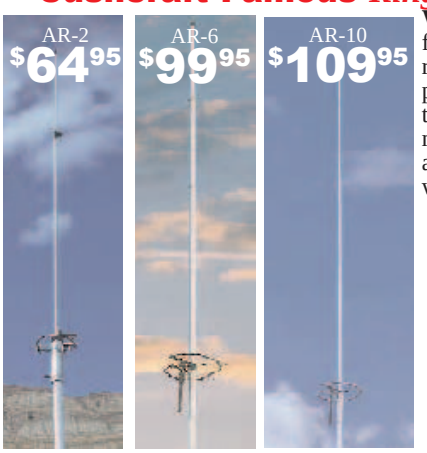
Cushcraft Dual Band Yagis

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!

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

Cushcraft
Amateur Radio Antennas
308 Industrial Park Road, Starkville, MS 39759 USA
Open: 8-4:30 CST, Mon.-Fri. ***Add Shipping.***
• **Sales/Tech:** 662-323-5803 • **FAX:** 662-323-6551
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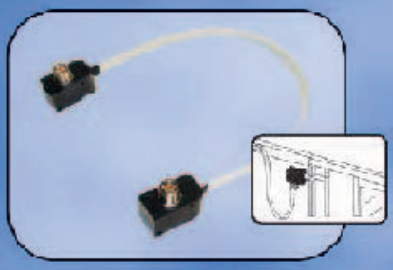
Life is a JOURNEY. Enjoy the ride!



NEW! COMET CTC-50M
Window Gap Adapter!

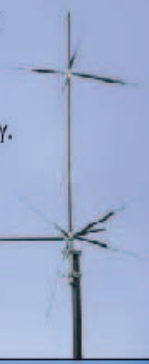
Max Power: HF 100W PEP
VHF: 60W FM
UHF: 40W FM
900MHz - 1.3GHz: 10W
VSWR: <500MHz 1.3:1
>500MHz 1.5:1
Impedance: 50Ohm
Length: 15.75"
Conn: 24k Gold Plated SO-239s

MALDOL HVU-8
Ultra-Compact 8 Band Antenna!

Unique ground radial system rotates 180 degrees around the base if building side mounting is required.

Max Power: HF 200W SSB/100W FM
6M - 70cm: 150W FM
TX: 80/40/20/15/10/6/2M/70cm
Impedance: 50 Ohm
Length: 86" approx
Weight: 5 lbs 7oz
Conn: SO-239
Max Wind Speed: 92MPH

Each band tunes independently.
Approx 2:1 band-width:
80M 22kHz
40M 52kHz
20M 52kHz
15M 134kHz
10M 280kHz



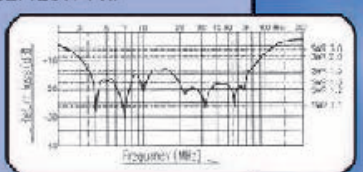
COMET CHA-250B
Broadband HF Vertical!

3.5 - 57MHz with SWR of 1.6:1 or less!

- *NO ANTENNA TUNER NEEDED*
- *NO RADIALS*
- *NO TRAPS*
- *NO COILS*

If you suffer in an antenna restricted area, must manage with space restrictions or you simply want to operate incognito you will be forced to make significant antenna compromises. The CHA-250B makes the most of the situation, making operating HF easy!!

Max Power: 250W SSB/125W FM
TX: 3.5– 57MHz
RX: 2.0 - 90MHz
Impedance: 50Ohm
Length: 23'5"
Weight: 7lbs 1 oz
Conn: SO-239
Max Wind Speed: 67MPH



NEW! COMET H-422
40/20/15/10M compact, broadband, rotatable dipole!

Assemble in either a "V" or horizontal ("H") configuration.
CBL-2500 2.5kW balun and heavy duty hardware included.

Max Power: 1000W SSB / 500W FM
SWR: Less than 1.5:1 at center frequency
Rotation Radius: "V" 12' 5" "H" 17' 5"
Length: "V" 24' 5" "H" 33' 10"
Weight: 11 lbs 11 ozs
Wind load: 3.01 sq feet
Max Wind Speed: 67 MPH

COMET and Maldol

For a complete catalog, call or visit your local dealer.

Or contact NCG Company 15036 Sierra Bonita Lane, Chino, CA 91710
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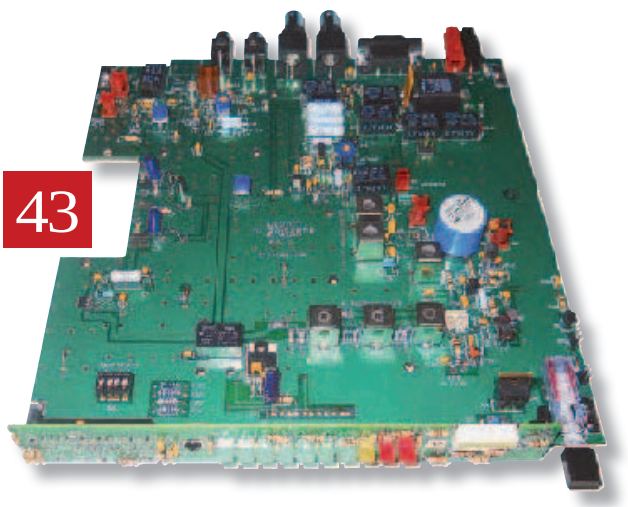
This Month in QST

July 2011 ■ Volume 95 Number 7

Technical



News and Features

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

Radiosport

60

Our Cover
For many hams, 75 meters is the "money band." Jerry Clement, VE6AB, of Calgary, Alberta, Canada, needed a way to combine his desire to cash in on 75 meters — where all the "non-stop" Amateur Radio action takes place in Alberta — with his need to be mobile throughout the week. A machinist by trade, Clement designed, machined and installed the antenna on his truck, where it banks space with his other mobile antennas. Ride along with Clement as he describes his project, beginning on page 39.

Departments

July 2011 ■ Volume 95 Number 7

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Introducing the Yaesu FT-950 transceiver for DX enthusiasts
Superb receiver performance
Direct lineage from the legendary FT DX 9000 and FT-2000

HF/50 MHz 100 W Transceiver

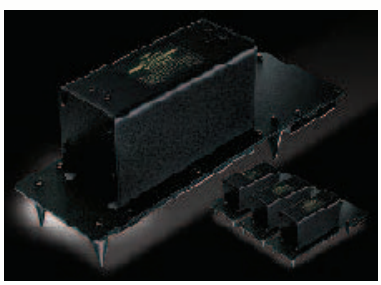
FT-950

- Triple-conversion super-heterodyne receiver architecture, using 69.450 MHz 1st IF
- Eight narrow, band-pass filters in the RF stage eliminate out of band interference and protect the powerful 1st IF
- 1st IF 3 kHz Roofing filter included
- High-speed Direct Digital Synthesizer (DDS) and high-spec Digital PLL for outstanding Local Oscillator performance
- Original YAESU IF DSP advanced design, provides comfortable and effective reception. IF SHIFT / IF WIDTH / CONTOUR / NOTCH / DNR
- DSP enhancement of Transmit SSB/AM signal quality with Parametric Microphone Equalizer and Speech Processor
- Built-in high stability TCXO (±0.5 ppm after 1 minute@77 ° F)
- Built-in automatic antenna tuner ATU, with 100 memories
- Powerful CW operating capabilities for CW enthusiasts
- Five Voice Message memories, with the optional DVS-6 unit
- Large Multi-color VFD (Vacuum Fluorescent Display)
- Optional Data Management Unit (DMU-2000) permits display of various operating conditions, transceiver status and station logging.
- Optional RF μ -Tune Units for 160 m, 80/40 m and 30/20 m Bands

Optional, YAESU Exclusive, Fully-Automatic μ -Tuning Preselector System!

Fully automatic, Ultra-sharp, External μ -Tuning Preselector (optional) features a 1.1" (28 mm) Coil for High Q

On the lower Amateur bands, strong signal voltages impinge on a receiver and create noise and intermod that can cover up the weak signals you're trying to pull through. YAESU engineers developed the μ (Mu) Tuning system for the FT DX 9000/FT-2000, and it is now available as an option for the FT-950. Three modules are available (MTU-160, MTU-80/40, MTU-30/20); these may be connected externally with no internal modification required! When μ -Tuning is engaged, the VRF system is bypassed, but the fixed Bandpass Filters are still in the received signal path.



Optional External Data Management Unit (DMU-2000) Provides Many Display Capabilities

Enjoy the ultimate in operating ease by adding the DMU-2000! Enjoy the same displays available with the FT DX 9000 and FT-2000: Band Scope, Audio Scope, X-Y Oscilloscope, World Clock, Rotator Control, Extensive Transceiver Status Displays, and Station Logging Capability. These extensive functions are displayed on your user-supplied computer monitor.

Shown with after-market keyer paddle, keyboard, and monitor (not supplied).

DMU-2000
Data Management Unit (option)

"The Best of the Best Just Got Better"
Introducing the new FT-950 Series with PEP-950 (Performance Enhancement Program)

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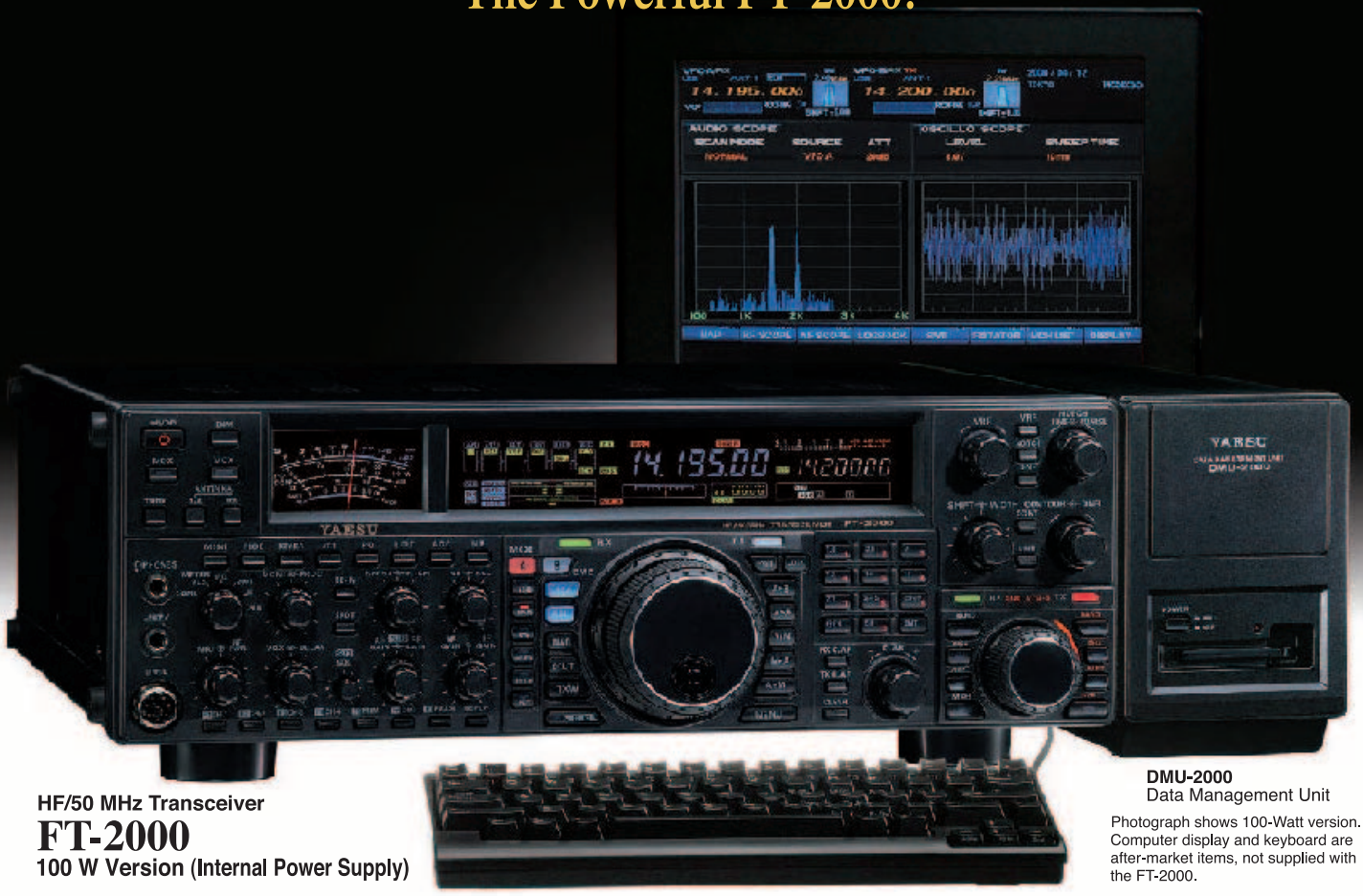
The radio... YAESU
Choice of the World's top DX'ers

Loaded with Leading-edge Performance Capabilities. . .
The First Triumph in the 2nd Generation of the FT DX 9000 Lineage:
The Powerful FT-2000!



HF/50 MHz Transceiver
FT-2000
100 W Version (Internal Power Supply)

DMU-2000
Data Management Unit

Photograph shows 100-Watt version. Computer display and keyboard are after-market items, not supplied with the FT-2000.

HF/50 MHz Transceiver
FT-2000D
200 W Version
(External Power Supply)

Options

SP-2000
External Speaker with Audio filters

RF μ-Tune Kits

160m Band RF μ-Tune Kits A	80/40m Band RF μ-Tune Kits B	30/20m Band RF μ-Tune Kits C

- Up to three μ-Tune Kits may be connected.
- μ-Tune Kit is included in purchase price of μ-Tune Unit.

"The Best of the Best Just Got Better"

Introducing the new FT-2000 Series with PEP-2000 (Performance Enhancement Program)
Contact Dennis Motschenbacher K7BV at k7bv@vxstdusa.com for details

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Advanced Dual Band Mobile Radio
5.2” x 1.6” Large dot matrix (264 x 64 dots) LCD display
GPS / APRS® / Bluetooth® Features
FTM-350AR

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

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

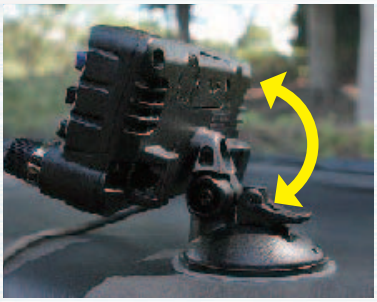
FTM-350AR NEW

220 MHz 1 W (USA version only)

New Features of The FTM-350AR

1. New Vacuum Cup-Mounting Bracket with Angle Adjustment

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



2. Expanded APRS® functions

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

*APRS® is a registered trademark of Bob Bruninga WB4APR
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Public Service
Advocacy
Education
Technology
Membership

A Change of Perspective

"Every once in a while an event happens that forces our perspective on things to change. When it comes to Amateur Radio and emergency communication issues the first two events that come to mind are 9/11 and hurricane Katrina. But other events large and small can have quite an impact on us."

I have been involved with Amateur Radio emergency communications for over two decades and have worn many different hats to many different events; disasters natural and manmade, in the field and in emergency operations centers. Each experience has had its own valuable lessons.

In April I was invited to speak at a homeland security conference at the University of Mississippi; the topic "Amateur Radio and Homeland Security." During the week on the Ole Miss campus, the southeast was hit by a massive tornado outbreak. Twice, while on campus, sirens sounded and cover had to be taken due to tornadoes in the immediate area. The area worst hit by these storms was Alabama. The National Weather Service estimates the storm produced 305 tornadoes and 326 fatalities (236 in Alabama alone). One of the hardest hit cities was Tuscaloosa, Alabama.

On the Saturday following the Tuscaloosa tornado contact was made with the Alabama Section Manager and Alabama Section Emergency Coordinator. They reported how Amateur Radio was helping with the response and that they still needed assistance with additional operators and equipment. Being only a couple hours away by car I decided to pay a short visit to the amateurs assisting and see what else might be needed.

The damage and devastation in Tuscaloosa was beyond description. Neighborhoods and shopping areas looked as though a bomb had gone off. Responders on scene came from every possible level: federal, state, local and NGOs. People were searching, not only for material items that may have survived but for family and friends. Many were still missing even days after the storm.

Among those helping with the recovery effort were local Amateur Radio operators, the Tuscaloosa Amateur Radio Club in particular. They were helping with communications as well as search and rescue. Many were directly impacted by the storm. They came together to help one another and their community; for that they deserve great thanks. Similar scenes were occurring throughout Alabama and the Southeast as Amateur Radio clubs, ARES groups, and individuals assisted their neighbors and communities. MFJ also provided assistance with 440 MHz Yagis that were needed to set up radio links between sites in Tuscaloosa.

This leads me to another observation from my time there. Since hurricane Katrina more effort has been made to harden communications systems, both commercial and Amateur Radio. We have put great effort into repeater systems and networks that depend on Internet connectivity; in other words systems dependent on infrastructure. What happens when the infrastructure is down? The value of Amateur Radio is clearly seen in such times. Without the need of Internet, cellular or landlines we can still provide communications via UHF, VHF and HF. This was the case in Tuscaloosa. Sites were linked together locally via UHF simplex. HF nets were active passing health and welfare traffic and connecting impacted areas around the state.

At times we can forget that we too may be the victims of disaster. Natural, and even manmade, disasters know no boundaries or jurisdictions and show no bias on who they impact. Likewise, for Amateur Radio operators, disasters do not care if you have DXCC, built a transceiver from a kit, finished first in the world in CQWW, or prefer QRP over QRO. Disasters can impact anyone.

Observing the devastation in Tuscaloosa I recalled a valuable lesson learned during hurricane Gustav. While assisting an emergency operations center in Louisiana it became apparent that such a disaster could affect my home just as easily as it did those I was assisting. No matter where we live we are not immune from disaster.

During events such as this amateurs may reach out to other amateurs for assistance. When we receive that call it is a time to act and help our fellow amateur. It is not the time to let politics come into play, look for glory and recognition, show off our latest toys or take charge. It is not a time to let the walls that we create get in the way. You know these walls: "I'm just into" DXing, or contesting, or ragchewing, or…well fill in the blank. It is a time to humbly ask "How may I help? What do you need?"

We must remember that no matter what our interest is in Amateur Radio, we may one day find ourselves being impacted by disaster and making that call for help.

Mike Corey, W5MPC
ARRL Emergency Preparedness Manager

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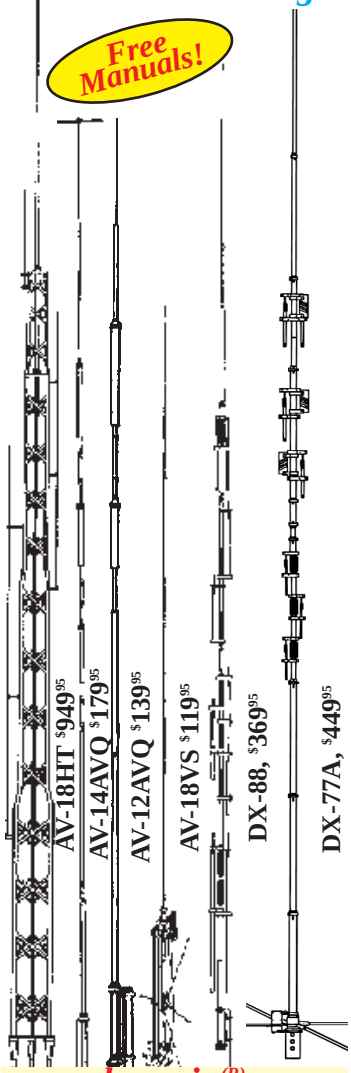

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AV-12AVQ	$139.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$119.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"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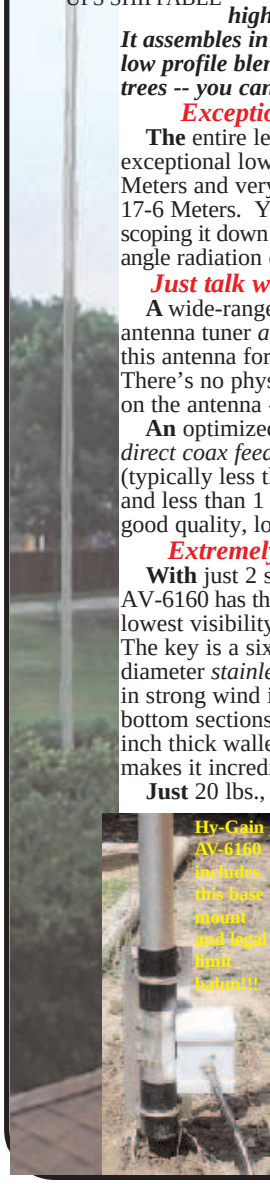

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

- From May 20-22, a "cast of thousands" invaded Dayton, Ohio for the 2011 Dayton Hamvention®, highlighted by ARRL EXPO. You'll find complete coverage of Hamvention and the ARRL National Convention in the August issue.
- Ham radio operators responded quickly and effectively in the wake of the devastating tornadoes and thunderstorms that struck Alabama and other southern states in late April.
- FCC Commissioner Meredith Baker has announced her intention to resign effective June 3.
- The annual Military/Amateur Radio Crossband Communications Test was held May 14.
- Technical papers are due July 31 for the *Conference Proceedings* of the 30th Annual ARRL/TAPR Digital Communications Conference.
- The governments of Maine and Puerto Rico proclaimed Amateur Radio Day in commemoration of World Amateur Radio Day.
- The 2011 4A4A DXpedition to Revillagigedo has been approved for DXCC credit.
- Effective May 1, 2011, the ARRL began a new partnership to offer the ARRL-sponsored Equipment Insurance and Club Liability Insurance plans.
- The winner of the *QST* Cover Plaque Award for April 2011 is Lou Burke, W7JI, for his article "The W7JI Low or Lower Power 40 Meter Transmitter."
- The FCC gave radio amateurs a partial victory in response to the ARRL's challenge, in a *Petition for Reconsideration*, of a rules waiver that permits the certification and licensing of the Recon Scout — a remote-controlled, maneuverable surveillance robot operating in the 430-448 MHz band.

Media Hits

Allen Pitts, W1AGP
Media & Public Relations Manager

- April 2011 looked like it would be an average month for Amateur Radio PR work. While there was the annual World Amateur Radio Day, which was picked up in several places such as RJ Harris' Show on WHP 580 AM in Pennsylvania, nothing unusual was happening.
- Ellwood Brem, K3YV, had a nice essay, "Friendships transmitted worldwide," published in the *Centre Daily Times* (PA). "I delight at talking on my short-wave radio to people all over the world. Regardless of country, we're all friends in the ham-radio world." David Jordan, AA4KN, did a very nice piece on the National Public Radio (NPR) system, "Celebrating a Space Pioneer." "I'm a ham radio operator. My call is AA4KN, and I'm a member of AMSAT, which stands for the Radio Amateur Satellite Corporation." Other interesting space related stories came out of Arizona State University. Lucy Hawking (daughter of Stephen) had a contest where children write welcoming messages to aliens. The winning entries were passed to hams who bounced their messages off the moon to the delight of both the kids and media.
- Even the weather related stories were fairly normal. Julio Ripoll, WD4R, was awarded the Distinguished Service Award at the National Hurricane Conference held in Atlanta and the Southern New England SKYWARN program was featured on The Weather Channel's Weatherview segment on April 23.
- Any emergency related issues seemed far away in Japan as VOA news correspondent Steve Herman, W7VOA, commented about their situation. "Yes, there was extensive use of ham radio. Handheld transceivers were sent & temp licenses authorized for non-hams — unprecedented in Japan."
- *Then came the first alerts.* Throughout the South, media were passing warnings and watches — and getting information from hams. Many papers and newscasts noted the hams' work. For example, the *Tifton Gazette* (GA), page headlined "Severe weather expected here" told how "The work of storm spotters and ham radio operators are requested by the NWS for tonight into Thursday morning." Similar warnings and calls for amateur operators came from Alabama media such as the *Anniston Star*. "Storms expected in eastern Alabama later today could bring damaging winds, hail, local flooding and tornadoes. At the Calhoun County Emergency Management Agency, officials are calling in extra help from local HAM radio operators and the Calhoun County Civil Defense..."
- We had already been working on an NPR story about HR-607 and the potential loss of 70 cm frequencies. In many ways, that story was already "in the can" and done when it was noted that Alabama ARES was using the 440 band heavily in recovery efforts. The HR-607 story was also to air *immediately* after an NPR story about Alabama's tornadoes. We contacted NPR reporter Joel Rose again and pointed out these coincidences to him — and he connected the two stories seamlessly! The presentation of our HR-607 concerns flowed immediately following new script praising the Alabama ARES response with the words, "The problem is, those same frequencies are used by ham radio operators, too." Well done, Joel!

Next Up: Hamvention and the NatCon

Details about the two big ARRL EXPO events — 2011 Hamvention and the 2011 ARRL National Convention in Plano, Texas will be online and in next month's issue of *QST*.

MARIA SOMMA, KB1FM

Nathan McCray, K9CPO, an instructor with the ARRL Education & Technology Program, holds a CubeSat aloft at Hamvention 2010.

Aviation Museum Special Event: **Station N4A helped celebrate 100 years of naval aviation from May 1-May 15 from the Naval Aviation Museum in Pensacola, Florida. Hanging in a place of honor is "Que Sera Sera," a famous WWII DC3/C-47 warbird. Built in 1943, it was the first plane to land at the South Pole back in 1956. —** ***Don Watson, W5TNA***

Inside HQ

2011 The General Class Question Pool

This month the new Element 3 General Class Question Pool debuts. Some folks believe that the Question Pools are created by the FCC or the ARRL. They are not. They are created by a group of dedicated amateurs who serve on the Question Pool Committee (QPC). The QPC is comprised of five members chosen from the 14 member National Conference of Volunteer Examiner Coordinators (**www.ncvec.org**), the group that has overseen Amateur Radio examinations since the FCC deregulated the licensing process in 1984. Current members of the QPC are Roland Anders, K3RA, of Laurel ARC VEC; Chairman; Larry Pollock, NB5X, W5YI-VEC; Jim Wiley, KL7CC, Anchorage ARC VEC; Michael Maston, N6OPH, SANDARC-VEC; and Perry Green, WY1O, Assistant Manager of the ARRL VEC.

As an adjunct professor who has taught electronics, I know that it is difficult to create multiple choice tests that accurately measure proficiency of knowledge. Because the subject matter in Amateur Radio exams is so diverse, it takes the QPC almost a year of weekly teleconference meetings to develop the questions. According to Perry Green, "The questions in the new pool are primarily based on the QPC's experience with previous, well-edited, question pools. We also try to create questions that relate to what an Amateur Radio licensee needs to know to operate their station properly and safely. For this reason, in recent years, the QPC has focused on questions that are more practical than theoretical."

The FCC requires that the Element 3 test include 35 questions drawn from the question pool. As Maria Somma, AB1FM, our VEC Manager, points out on page 72 of this issue, there are 456 questions in the new General pool.

While the Committee members each have expert level knowledge about Amateur Radio, they also rely on outside resources. The ARRL contributes its knowhow to the Question Pool by using the resources of it its regulatory branch, editorial staff, ARRL Lab, the ARRL RF Safety Committee and other specialists.

You can also provide input. The QPC is happy to consider your comments at any time. You can e-mail them to **qpcinput@ncvec.org**.

While I hear the comment, on occasion, that the Amateur Radio exams have been "dumbed down," I don't believe it. After looking over some of the older license manuals in the ARRL Library, the current exams seem more comprehensive and less arbitrary than they were in the past. Since the new pool has now been released, this is a good time to upgrade your license. More than 29,600 amateurs have passed the General exams given by the ARRL VEC during the previous Question Pool cycle. Now a new cycle, and a new pool, brings renewed opportunity for you!

73,

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

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Quick Links and Resources

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Sloth Bear on the Air

B. L. Arasu Manohar, VU2UR, Indian Coordinator for WFF

Man has been living from times immemorial with the Earth's various fauna and flora. Man eventually started building towns, which resulted in a loss of forest land. By the 19th century, the idea of conservation was taking shape and in the 20th century many worldwide bodies like the World Wildlife Fund came into existence.

The main difference between the Worldwide Wildlife Fund and the World Flora and Fauna (**www.wff44.com/en**) is the latter's use of Amateur Radio. World Flora and Fauna (WFF) amateurs make worldwide contacts from designated Flora Fauna areas of every country. Awards for various contact levels are available through the WFF44 program.

For the 2010 Wildlife Week, our group, led by Lion, VU2JHM, planned an activity from Daroji Sloth Bear Sanctuary. WFF44 graciously assigned a new reference number, VUFF-101, for this sanctuary. We obtained permission for the DXpedition and the Ministry of Communications and Information Technology assigned the special event call sign VUØWFF. Four operators participated: Ajoy Lion, VU2JHM; Arasu Manohar, VU2UR; Laxman Lakshmanan, VU2LX, and Ramesh Kumar, VU2LU.

The Daroji Sloth Bear sanctuary had three places for camping with electric power. The Jungle Lodges and Resorts, (our QSL sponsor; **www.junglelodges.com**) and the Forest Rest House had offered us free accommodation. Unfortunately, both places had limited power.

We ended up at the Kannada University Campus, Hampi, where the power situation was better. We erected two inverted Vs for 40 and 20 meters, which could also be used for 17 and 15 meters with a tuner. The arms of the 40 meter dipole were spread east-west and the 20 meter dipole ran north-south. The equipment consisted of a Yaesu FT-757GX transceiver, FC-700 antenna tuner with an FT-840 transceiver for standby, all loaned by the Lions Club of Bangalore North.

As soon as we started operating we found that the location was ideal for Amateur Radio. The best band was 21 MHz, which was open around the clock. These good conditions brought us over 2200 successful two-way contacts to over 80 countries.

We operated "*bear*-foot," running only 40 W, and had a few contacts to the United States, Canada, South America and Antarctica's Progress Base too. The majority of the Europeans were from Russia, Ukraine, Poland, Germany and Italy.

Photos of the Daroji Sloth Bear Sanctuary can be viewed at **picasaweb.google.com/lionajoy/VU0WFFDarojiSlothBearSanctuary?feat=directlink**.

44/73 and we hope we have more contacts from other VUFF sites with you.

COURTESY B. L. ARASU MANOHAR, VU2UR

Ajoy Lion, VU2JHM; Arasu Manohar, VU2UR, and Laxman Lakshmanan, VU2LX, holding the banner announcing their WFF operation at the Daroji Sloth Bear Sanctuary.

RANDY TATE, KJ4UBM

They Start 'Em Young in NC

Possibly America's youngest ARRL Public Information Officer (PIO) met a group of ARRL officials at the Charlotte, North Carolina Hamfest on March 12, 2011. Christopher Tate, KJ4UBL, earned his Technician license in 2010 and now at age 11 he's a General and enjoys CW. Christopher was recommended for the job by North Carolina section Public Information Coordinator Woody Woodward, K3VSA. Having had several on-air contacts with Christopher, NC Section Manager Bill Morine, N2COP, agreed with Woodward that Christopher will be an excellent spokesperson for Amateur Radio, and especially youth in ham radio.

With young PIO Christopher Tate, KJ4UBL, are (l-r) Dr Jim Boehner, N2ZZ, Roanoke Division Vice Director; Mary Hobart, K1MMH, ARRL Chief Development Officer; KJ4UBL; NC Section Manager Bill Morine, N2COP, and SC Section Manager Marc Tarplee, N4UFP.

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CORRESPONDENCE

MORSING AROUND

♦ I'm writing this letter about the use of Morse code on the wheels of the next Mars rover ["Happenings: New Mars Rover to Feature Morse Code," Jun 2011, pages 77-79]. This is not the first association of Morse code with the Mars Landers. As an engineer for the Naval Air Warfare Center at China Lake, I worked in conjunction with JPL on testing the EDL (Entry, Descent and Landing) systems for the Mars Exploration Rover (MER) and the Mars Pathfinder.

On MER, I developed various systems for the testing of the JPL Lander systems during air drops. We needed to understand the health of the data collection and firing circuits in the test vehicle without connection to the test vehicle and the sunlight precluded easy use of LEDs. To do this, I used a PIC and speaker. The test vehicle would happily send out information — such as status, voltage and condition — in Morse code, which was easily heard outside the test vehicle body; for fun, I also included my call sign. That's when I found out that one of the JPL engineers had been a Novice years before and could still copy code well enough to understand what I had done.

On Mars Pathfinder, I had to sync several different data systems together. While the data rate was slow, the nature of the systems precluded normal syncing methods. So I impressed CW on the data stream, indicating the time followed by a sync pulse, and I did the same for various video systems. We were then able to manually sync the data after the test. So while CW didn't fly to Mars, it was critical for success.

MIKE HERR, WA6ARA
Ridgecrest, California

A PIO CAN BE VITAL TO CLUB'S SUCCESS

♦ After a year as member of the Nevada County [California] Amateur Radio Club, I thought that our public events could find a larger audience if the public was more aware of them. So with the help of the ARRL website at **www.arrl.org/public-information-officer**, I dove head-first into the role of our club's Public Information Officer (PIO). To get off to a good start, I contacted the editor of the local newspaper and the announcer for the local radio station. I quickly developed a working relationship with them, as I found out that they needed me as much as I needed them. I also found that I could do almost everything via e-mail.

As a result, our club enjoys above-average attendance at public events. Not only have we have exceeded expectations for club events, attendance at our monthly club meetings has significantly surged. And in doing all of this, we have helped to introduce many people to the wonder of Amateur Radio.

With the help of ARRL PR tools, I have been able to demonstrate the huge advantage that in having a designated Public Information Officer, a club can add so much more to its events. If you have someone in your club who can give just a couple of hours a month — using the amazing tools from the ARRL — it can make a serious difference.

RICHARD MILLER, KI6UOV
Colfax, California

Editor's Note: If you are interested in becoming a Public Information Officer, please contact your Section Manager. Find a listing of all Section Managers on page 16 of this issue or online at **www.arrl.org/sections**.

RE-VISITING OLD FRIENDS

♦ Have you ever flipped through your decades-old high school yearbook and looked at the pictures of your classmates? Some of them would have been your immediate friends and still very familiar after all these years. Others you may have forgotten, but are able to recall when you see their faces. And then there are the others whom you can't remember ever knowing.

I had a similar experience a few days ago with the arrival of a 1962 RCA Transmitting Tubes manual that I purchased off an online auction site. It really took me back to my early days in ham radio and Navy electronics. I found close friends, such as the 807 and its cousins, the 1625 and 6146. The Big Man on Campus was the 861 who usually had his shadow, the 860, tagging along behind. Who could ever forget the 2E26? There were other old pals like the 813 and the 866A. Others had slipped my mind, such as the 4X150A and the 833A. But who was the 5713? I'm sure he must have been around, but I can't recall ever knowing him.

The yearbook gave us not only names and faces but also described our activities: drama club, student council, varsity basketball. The tube manual provides similar information: The 5893 is a plate-pulsed oscillator, the 810 is both an audio power amplifier and an RF power amplifier, the 4604 is also an RF power amplifier, but because of its quick-heating filament, is ideal for push-to-talk mobile equipment.

Some of our best pals aren't in the yearbook because they went to different schools. Where is the 6L6, the heart of thousands of one-tube Novice transmitters? You'll find him over in the Receiving Tubes manual.

Like most classes, though, there are a few old friends that we are still in touch with. The 811 is still very much with us, appearing in several modern linear amplifiers. It was a real pleasure to re-connect with old friends of the vacuum tube variety. Now I will have to see if I can dig up an old yearbook.

BOB CLINTON, WØBUX
Mayfield, East Sussex, England

BATTERY BEWARE

♦ Jim Talens, N3JT, mentions the danger of dropping a wrench across the terminals of the batteries, but in Figure 4, his batteries have no safety covers on the terminals. ["An Emergency Backup Solar Power System," May 2011, page 37-40]. This is, or should be, a "Safety 101" topic when dealing with automotive, marine and large storage batteries and systems. At the least, the positive terminal should have a boot covering it, preventing accidental contact by metallic objects and the resulting short circuit and possible explosion, fire and personal injury.

BARCLAY THOMAS, WU1B
Haddam, Connecticut

DON'T BE CRAZY LIKE A FOX

♦ I would like to comment regarding the article by Mark Spencer, WA8SME ["Transmitter for Fox Hunting," May 2011, page 33-36], particularly the ETP pictured in Figure 6. In the age of Homeland Security and "if you see something, say something," a third party finding a hidden device such as depicted in Figure 6 could result in a call to 911 and a response by the bomb squad. The consequence would be a lot of unhappy emergency responders, a "fox" destroyed by a water cannon or the like — and a confused group of fox hunters.

I would like to suggest that persons engaged in fox hunting use great discretion in hiding their transmitters. Transmitters should be clearly labeled as Amateur Radio transmitters with a call sign and an immediate contact telephone number. If the fox were hidden in a public place, it would be prudent to advise your local 911 center or public safety agencies in advance of what you were doing. If practical, it would be advisable to have a representative in the immediate area to intervene in the event that the transmitter was first found by a non-participant.

BILL BLEYLE, K2SYR, ARRL Life Member
East Syracuse, New York

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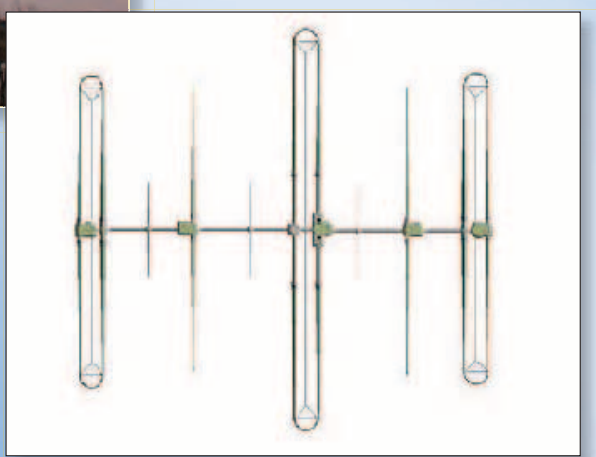

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Custom Open-wire Line — It's a Snap

Snap-on plastic spacers speed line fabrication and work very well.

J. Barry Shackleford, W6YE

During the past 80 years, *QST* has published a wide variety of techniques for homebrew open-wire transmission line construction.[1-35] They range from wire spreaders made of glass toothbrush holders to pieces of PVC pipe and include the Amateur Radio urban legend of hair curlers.[1,11,35] Ask any long-time amateur what life was like before coax and you'll be treated with stories of boiling wooden dowels in paraffin on the kitchen stove.[36,37] While all the methods are far too numerous to detail here, I have annotated each reference in the Notes section to describe the spreader material and means of affixing it to the feed line.

With so many methods already described, the question arises of why yet another open-wire homebrewing scheme? If you review the reference annotations, you will see that some are perhaps tedious to implement, some appear to be heavy while others use materials that are hard to obtain, or no longer available.

The method I describe here is one that I use to feed antennas at my station. It uses readily available, light weight plastic. The spreaders are easily constructed. Assembly involves simply snapping the spreader onto the feed line. The longer the feed line to be constructed, the more significant these features become.

Before getting into spreader construction and feed line production, let's look at a few technical issues concerning open-wire feed line.

Open-wire Feed Line

The principal advantage of open-wire line is its extremely low loss. This low loss enables nonresonant antennas to be fed efficiently across multiple bands with the aid of an antenna tuner. Some might consider the need of an antenna tuner to be a significant disadvantage, but you may wish to balance that against the effort involved in repeatedly hauling an antenna up and down in order trim or add a few inches while in pursuit of a 1:1 SWR, an effort further compounded by multiple resonant antennas on a single coax feed line.

The purpose of this article, however, is

[1]Notes appear on page 36.

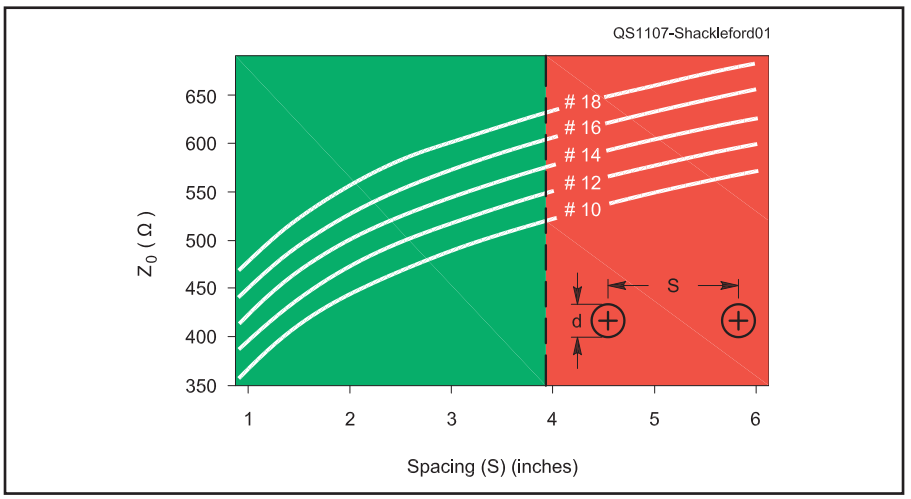

Figure 1 — Characteristic impedance (Z_0) of open-wire feed line as a function of wire spacing (S) for five wire sizes. Vertical dashed line indicates maximum wire spacing for the 10 meter band. Red region is too wide for 10 meters.

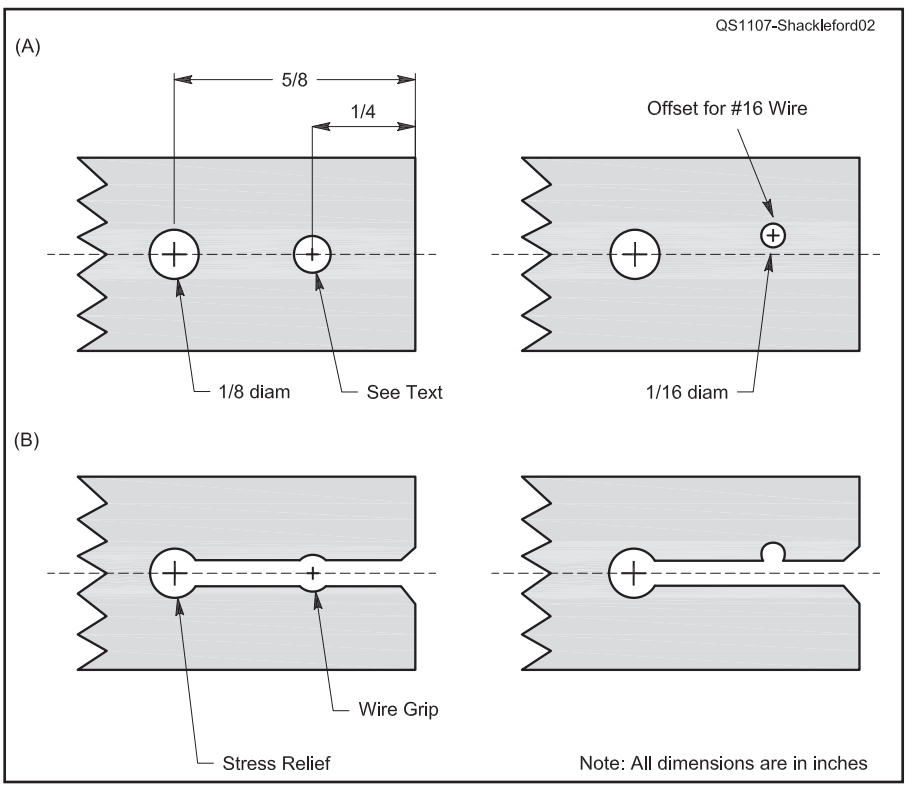

Figure 2 — Spreader end detail. At (A) is placement of stress relief and wire grip holes. The wire grip hole is sized for a firm grip. At (B) is appearance after cutting slot and filing end notch.

Figure 3 — Note saw kerfs serving as gutters to keep debris from getting between piece and fence.

Figure 4 — Marked side of spreader is held against fence and pushed to stop. Note finger guard.

Figure 5 — Hand saw cutting jig. Top fence also serves as saw guide. Stack of spreaders is compressed by wedge.

not to extol the virtues of open-wire line — this case has been well presented in recent *QST* articles as well as those available in the online archive.[38-42] Before heading out to the garage to start making spreaders, however, let's consider the design parameters for open-wire transmission line.

The characteristic impedance (Z_0) of open-wire line is a function of the wire diameter (d) and the center-to-center spacing of the two wires (S) and is given by the equation

$$Z_0 = 276 \log (2S/d) \quad \text{[Eq 1]}$$

The equation can be rewritten to solve for the spacing given the wire diameter and the desired characteristic impedance:

$$S = (d/2) \times e^{(0.0083427 \times Z_0)} \quad \text{[Eq 2]}$$

or:

$$S = (d/2) \times 10^{(Z_0/276)} \quad \text{[Eq 2A]}$$

Figure 1 is a plot of the characteristic impedances for five wire sizes ranging from #10 to #18 AWG over a spacing range of 1 to 6 inches. A rule-of-thumb for open-wire feed-line design limits the spacing of the two wires to less than 1/100 the wavelength of the highest frequency fed.[43] For the 10 meter band the widest spacing that obeys this rule is 10 cm or about 3.9 inches. This limit is shown by a dashed vertical line on the plot.

Spacers or Spreaders

Whatever you call them, chances are that you will need a lot, so the insulators that keep the two wires of the feed line a fixed distance apart should be inexpensive, lightweight and easy to make. Also, the spreaders should grip each wire firmly to minimize pivoting about the grip point. Pivoting will cause the wire spacing and characteristic impedance to change. Last, but certainly not least, consideration should be given to minimizing the tedium of feed line production.

Figure 2 shows the end detail of a spreader design that addresses these issues. The spreaders are made from half-inch wide, 1/8 inch thick acrylic plastic blanks. A 1/8 inch diameter stress relief hole is drilled 5/8 inch from each end along the centerline of the blank. Along the same centerline, a wire grip hole is drilled 1/4 inch from each end of the blank. A slit sawed along the centerline from the end to the stress relief hole creates a strong spring clamp that will grip the feed line tightly. The size of the grip hole is best determined experimentally since it will vary with wire size and insulation characteristics. This is not to say that wire insulation is necessary, but if you are like I am, you will probably buy a 500 foot spool of THHN insulated, stranded wire at a home store for both your antenna and feed line.

Hamspeak

Characteristic impedance (Z_0) — Property of an electrical transmission line, based on its relative dimensions and materials. If the transmission line is terminated in its Z_0, it will appear to have that same impedance at any length. This is not the case for any other terminating impedance.

Kerf — Width of the cut made by a cutting device such as a saw.

Open wire transmission line — A pair of conductors used for carrying energy between locations, such as between a transmitter and antenna. An open wire line has two constant-spaced conductors with air in between. In contrast, coaxial cable is *concentric* line with one conductor surrounding the other.

Spreaders — Structural element of open-wire transmission line that holds the wires in the correct relative position.

SWR — Standing wave ratio. Measure of how well a load, such as an antenna, is matched to the design impedance of a transmission line. An SWR of 1:1 indicates a perfect match. Coaxial cables, depending on length, type and frequency can often work efficiently with an SWR of 3:1, sometimes higher. Solid state transmitters frequently require an SWR of 2:1 or less for proper operation.

THHN insulated wire — Wire designed for ac power distribution in buildings. THHN stands for thermoplastic high heat-resistant nylon coated, describing the composition of the insulating material. The wire itself comes in a number of sizes and can be found either solid or stranded. It is frequently used for antenna construction because of its low cost. The insulation results in an antenna that needs to be a 1 or 2% shorter than one made with bare wire.

For thinner wire such as #16 AWG, I find that drilling a 1/16 inch grip hole just off the centerline holds better because the width of the saw kerf tends to obliterate a small hole drilled on center.

Blanks

The spreader blanks are made from 1/2 inch strips cut from the acrylic sheet. If you have a table saw or band saw with a fine-tooth blade, this is an easy operation. You can also ask your plastic supplier to cut the strips for you. If those options are not workable, you can cut the plastic by first scoring it with an inexpensive scoring tool available from your plastic supplier and then snapping it as described below.

Cutting narrow strips of plastic by scoring requires several steps. First, a metal straight edge is clamped to the plastic sheet. Use two pieces of 1/2 inch wide wood or metal to act as

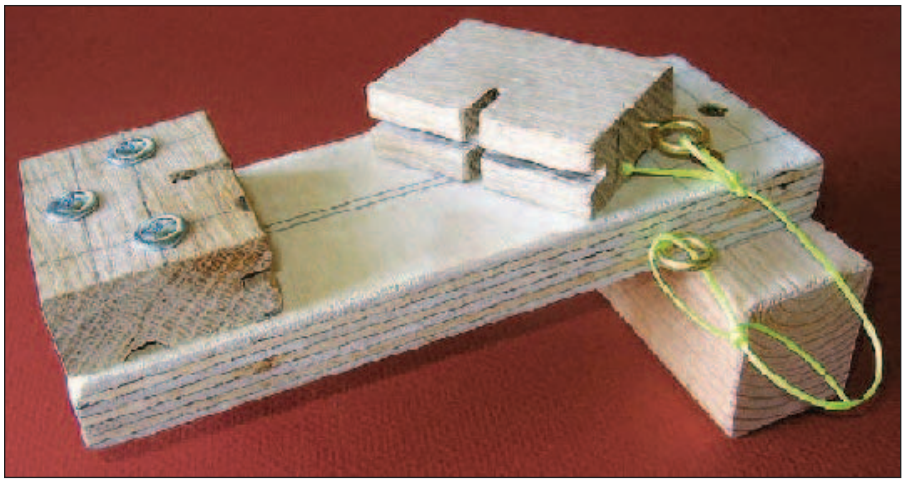

Figure 6 — Fixed and free attachment blocks are part of assembly jig. Wires run through horizontal kerfs while spreader goes between vertical kerfs. Wires are set by either squeezing blocks together or tapping the free block with a hammer.

Figure 7 — Feed line production in full swing.

gauge blocks to set the straight edge before clamping it. This is more accurate than trying to measure with a ruler. After clamping the straight edge, take several light passes with the scoring tool. It may help to score in each direction to insure that the ends are scored as deeply as the middle.

Breaking a narrow piece along the scored line requires that boards be clamped above and below the plastic along each side of the scored line (four boards in all). I suggest using ¾ × 1½ inch boards and putting one C-clamp every 12 inches. Clamp one side to a table and bend the other side away from the scored line. It should snap with a clean fracture. Beveled boards on the side away from the scored line allow clamping closer to the line and should produce better results.

After enough strips have been cut to yield at least a 10% surplus of spreaders, assemble them into stacks for cutting to length. Use tape to keep the bundles together while cutting. Now, take a marker pen and put a reference mark on one edge of all of the spreaders. This is the side that will go against the fence while drilling and cutting so even if the jig setup is slightly off the centerline, or there is some width variation, the wire-grip holes and the end-slits will still be aligned.

Drilling, Cutting and Assembly Jigs

Taking a few minutes to construct drilling and cutting jigs will pay off in faster, more uniform production and operator safety. It's easy to lose focus while performing 100 or more repetitive operations at a stretch. So take a short break every 5 minutes and consider adding further safeguards to keep fingers away from powered cutting edges.

Generally, I would prefer to drill multiple blanks taped together as a unit, yielding a number of holes for one drilling operation. Plastic tends to melt while drilling, however, and the extra effort of clamping, backing out the bit multiple times and applying lubrication is more effort than it's worth for me.

Ask any long-time amateur what life was like before coax and you'll be treated with stories of boiling wooden dowels in paraffin on the kitchen stove.

I find that throughput is actually greater drilling a single, unlubricated blank at a time with the drilling jig shown in Figure 3 while the drill press runs continuously. I place and hold the blanks to the fences by hand and then flip them end-for-end to drill the other hole, keeping the marked edge against the fence. Initially, the jig is aligned by putting a pointed rod in the chuck and bringing the tip down to surface of a spreader blank scribed with layout lines. (Hint: Turn off the drill press work light and illuminate the spreader from the side. The light refracted by the scribed lines will make them highly visible.) After alignment, securely clamp the jig to the drill press table.

Cutting the end slots with a band saw is quick work and requires only a simple jig like the one shown in Figure 4. As with the drilling operations, the band saw runs continuously and the spreader is flipped end-for-end after the first cut, keeping the marked edge against the fence.

Cutting the spreaders by hand requires that they be grouped together so that a number of saw teeth are in contact with the plastic while cutting. I tested this method using both a dovetail saw with 15 teeth per inch (also called a *15 point* saw) and an *11 point* back saw.

My suggested jig, shown in Figure 5, has a ¼ inch plywood face that aligns the saw with the spreaders' centerline and also keeps the group of spreaders square to the cut. A clamping fence at 90° to the alignment fence also has a saw kerf to help guide the saw. I also included a wedge against a post to aid in holding the spreaders while cutting.

My band saw produces a 1/16 inch wide kerf, which allows #14 AWG THHN insulated wire to slide in to the wire grip hole without unduly flexing the plastic. If your hand saw produces a significantly narrower kerf, the plastic may crack as the wire is snapped in. Aside from changing saws, this can be compensated for by moving the stress relief hole farther away from the spreader edge. Also, a more pliable plastic such as polycarbonate might be tried. I have not tested this and I'm not sure how tightly it would grip the feeder wires. After cutting the slots, file or grind a V notch on each spreader end to ease entry of the feed line.

Attachment of the feed line to the

spreader is aided by a wood block with two perpendicular saw kerfs (Figure 6). The longer kerf along the edge of the block aligns and holds the feed line. The second kerf, cut across the first, serves as an alignment stop for snapping the spreader onto the line. The depth of the kerf is such that the wire grip hole aligns with the depth of the first kerf.

Two attachment blocks working in opposition form an open-wire line assembly jig (Figure 6). One block is fixed and the other is free to move. A piece of wire screwed to the base and extending to the side serves as a spacing aid (Figure 7).

Feed Line Production

Feed line production (Figure 7) begins by stretching out two parallel wires under equal tension. Wire that has been tightly wound on a spool may have a tendency to curl. This can be removed by stretching.[44]

Attach a spreader to the feed line by first putting each of the feed lines into the wire alignment kerfs of both the fixed and free attachment blocks. Next, place a spreader in the alignment-stop kerfs while applying light pressure to push the free block toward the fixed block. Now, tap the free block with a small hammer to set both of the feed lines into the spreader. Thinner wires can be set by simply squeezing the blocks together. After setting the wires, advance the jig up the line and repeat. You'll be done before you know it!

Notes

[1]W8BRD, "Strays — Glass Toothbrush Holders as Spacers," *QST*, Feb 1932, p 88.
[2]W6AM, "Strays — Johnson No. 132 Insulator," *QST*, Jun 1939, p 100.
[3]W2GPO, "Strays — Wire Threaded Through Spreader and Fixed with Solder Drop on Each Side of Spreader Hole," *QST*, Jul 1939, p 37.
[4]O. Snyder, W8QZP, "Hints and Kinks — An Efficient and Easily-Made Feeder Spreader," *QST*, Dec 1939, p 49. Glass tubing with bonding wires held in tubing ends with sealing wax, bonding wires twisted around feeder wires.
[5]W9OGN, "Experience Speaks," *QST*, Feb 1940, p 37. Wooden feeder spreaders double-dipped in paraffin.
[6]W7DES and W7KK, "Hints and Kinks — More on Homemade Feeder Spreaders," *QST*, Apr 1940, p 59. Glass tubing with melted end wings to aid in tying to feed line. Also, corks threaded onto feed line and plugged into glass tubing ends.
[7]F. Sutter, W8QBW, "Hints and Kinks — Glass-Tubing Feeder Spreaders," *QST*, Jan 1941, p 86. Glass tubing ends heated and crimped to accommodate feed line.
[8]D. Huntington, W6SKW, "Hints and Kinks — Another Glass-Tubing Feeder Spreader," *QST*, Jul 1941, p 41. Wire loops sealed into glass tubing ends for tieing to feed line.
[9]O. Shepherd Jr, W1IJ, "Hints and Kinks — Tension for Building Spaced Feeders," *QST*, May 1944, p 53. Tensioning feed line during construction by attaching to car bumper.
[10]H. Husting, W9RSR, "Hints and Kinks — Useful Feeder Support," *QST*, Dec 1947, p 49. Open line supported by glass insulator, feed line threaded through insulator ends.
[11]W6MVX, "Strays — Plastic Hair Curlers from a Home Permanent Kit," *QST*, Jan 1948, p 41.
[12]D. Langbell, VE6EL, "Hints and Kinks — Plastic Spools as Feeder Spreaders," *QST*, Sep 1952, p 66. Polaroid film spools.
[13]J. Andrews, W9YWE, "Hints and Kinks — Feeder-Spreader Hints," *QST*, Apr 1953, p 71. Wooden dowels dipped in paraffin with end holes for threaded feed line.
[14]D. Angel, W8DBF, "Hints and Kinks — Inexpensive Feeder Spreaders," *QST*, Jan 1955, p 52. Plastic clothespins with feeder threaded through end holes.
[15]G. Fry, K2CW, "Hints and Kinks — Another Source of Feeder Spreaders," *QST*, Sep 1956, p 61. Bakelite Polaroid film spools.
[16]P. Holden, "Hints and Kinks — Bamboo Feeder Spreaders," *QST*, Nov 1956, p 46. Split bamboo strips tied to feeder wires.
[17]W8ZBC, Strays, *QST*, Jul 1957, p 37. Plastic bait casting plug bodies.
[18]M. Billings, W2BIV, "Hints and Kinks — Transmission Line Spacers," *QST*, Mar 1962, p 59. Old toothbrush handles, ends grooved with heated wire.
[19]A. Brogdon, K3KMO/W4UWA, "Hints and Kinks — Transmission Line Spreaders," *QST*, Jul 1962, p 52. Polaroid film spools.
[20]A. Golfman, WN2HDQ, "Hints and Kinks — "Plastic Tubing Spreaders," *QST*, Nov 1963, p 64. Polyethylene tubing with end slits leading to holes to retain feeder wire.
[21]B. De Bragga, W1YNP/6, "Hints and Kinks — Open-Wire Line Spacers," *QST*, Mar 1966, p 45. Rigid poly golf club sheaths.
[22]W1KLK, "Hints and Kinks — Spreaders for Open-Wire Line," *QST*, Aug 1970, p 53. Ceramic insulators wit feed line threaded then fixed with soldered wire wraps.
[23]A. Marsh, W3MJ, "Hints and Kinks — Antenna Insulators and Spreaders from Plastic Clorox Bottles," *QST*, Feb 1973, p 47. Plastic from bleach bottles cut and drilled at ends to accept threaded feed line.
[24]J. Kilgore, W2EIF, "Hints and Kinks — A Source for Feeder Spreaders," *QST*, Jul 1973, p 54. Plastic Romex wire staples with feed line threaded through attachment holes.
[25]B. Fisher, WB2EUH, "Hints and Kinks — Open-Wire-Spreader Source," *QST*, Aug 1976, p 43. Fiberglass sail battens.
[26]T. Colbert, WA8MLV, "Hints and Kinks — Plastic Film Spools as Wire Spreaders," *QST*, Aug 1986, p 38. Feed line threaded through spools and fixed with wire twisted on either side of spool.
[27]J. Jarnefeld, WØTOY, "Hints and Kinks — Another Source of Spacers for Open-Wire Line," *QST*, Aug 1986, p 38. Sections of plastic coat hanger with feed line tied to filed end groves.
[28]D. DeMaw, W1FB (SK), "Antenna Hardware You Can Build," *QST*, Apr 1987, pp 36-39. Plastic tubing and rod and even hair curlers as spreaders secured to feed line with soldered wraps.
[29]R. Measures, AG6K, "Hints and Kinks — Constructing Ladder (Open-Wire) Transmission Line," *QST*, Feb 1990, pp 35-36. ABS rod stock or sections of ABS pipe flattened in kitchen oven, fixed to feed line by heating wire with torch and melting it into the ABS.
[30]G. Yingling, W2UW, "Hints and Kinks — Kinky Wire Aids Building Open-Wire Feed Line," *QST*, Sep 1994, p 94. Solid feed line threaded through PVC pipe sections and fixed by kinking wire inside pipe.
[31]M. McMullin, W6DSY, "Hints and Kinks — Open-Wire Spreaders with a Twist," *QST*, Sep 1995, p 94. Tie-wire threaded through plastic rod and wrapped around feed line.
[32]P. Johnson, W7KBE, and B. Schetgen, KU7G (SK), "Hints and Kinks — Make High-Quality Ladder Line at Home," *QST*, Aug 1996, p 69. G-10 circuit board or PC board with foil stripped off fixed to feed line with wire ties.
[33]K. Orton, VE7BLU, "Hints and Kinks — Ladder-Line Spacers," *QST*, Apr 1996, p 80. Vinyl siding cut into strips with end slots leading to holes to accept and fix feed line.
[34]H. Horiike, JA3JNA, "Hints and Kinks — Make Your Own 300 Ohm Open-wire Feed Line," *QST*, Nov 2006, p 69. Conversion of 300-ohm twin lead to ladder line by cutting out sections of insulating material.
[35]H. Schlotfeld Jr, ACØAX, "Hints and Kinks — Make Your Own 600 Ω Ladder Line," *QST*, Dec 2006, pp 55-56. PVC pipe sections with feed line threaded through drilled end-holes and fixed with hot melt glue.
[36]G. Badger, W6TC, "Easy to Make 4:1 Coreless Baluns," *QST*, Apr 2010, pp 33-36.
[37]J. Petrak, W6JPE, Personal communication.
[38]J. Hallas, W1ZR, "Getting on the Air — Your Second Antenna," *QST*, Jul 2008, pp 69-70.
[39]J. Hallas, W1ZR and B. Allison, WB1GCH, "Getting on the Air — A Closer Look at Window Transmission Line," *QST*, Nov 2009, pp 66-67.
[40]S. Ford, WB8IMY, "The SWR Obsession," *QST*, Apr 1994, pp 70-74.
[41]P. Danzer, N1II, "Open-wire Feed Line — A Second Look," *QST*, Apr 2004, pp 34-36.
[42]D. Walraven, K5DVW, "Understanding SWR by Example," *QST*, Nov 2006, pp 37-41.
[43]J. Hallas, W1ZR, The Doctor is In, *QST*, Apr 2010, pp 60-61.
[44]B. Shackleford, W6YE, "Homebrewing Air Core Inductors," *QST*, Jan 2010, pp 36-38.

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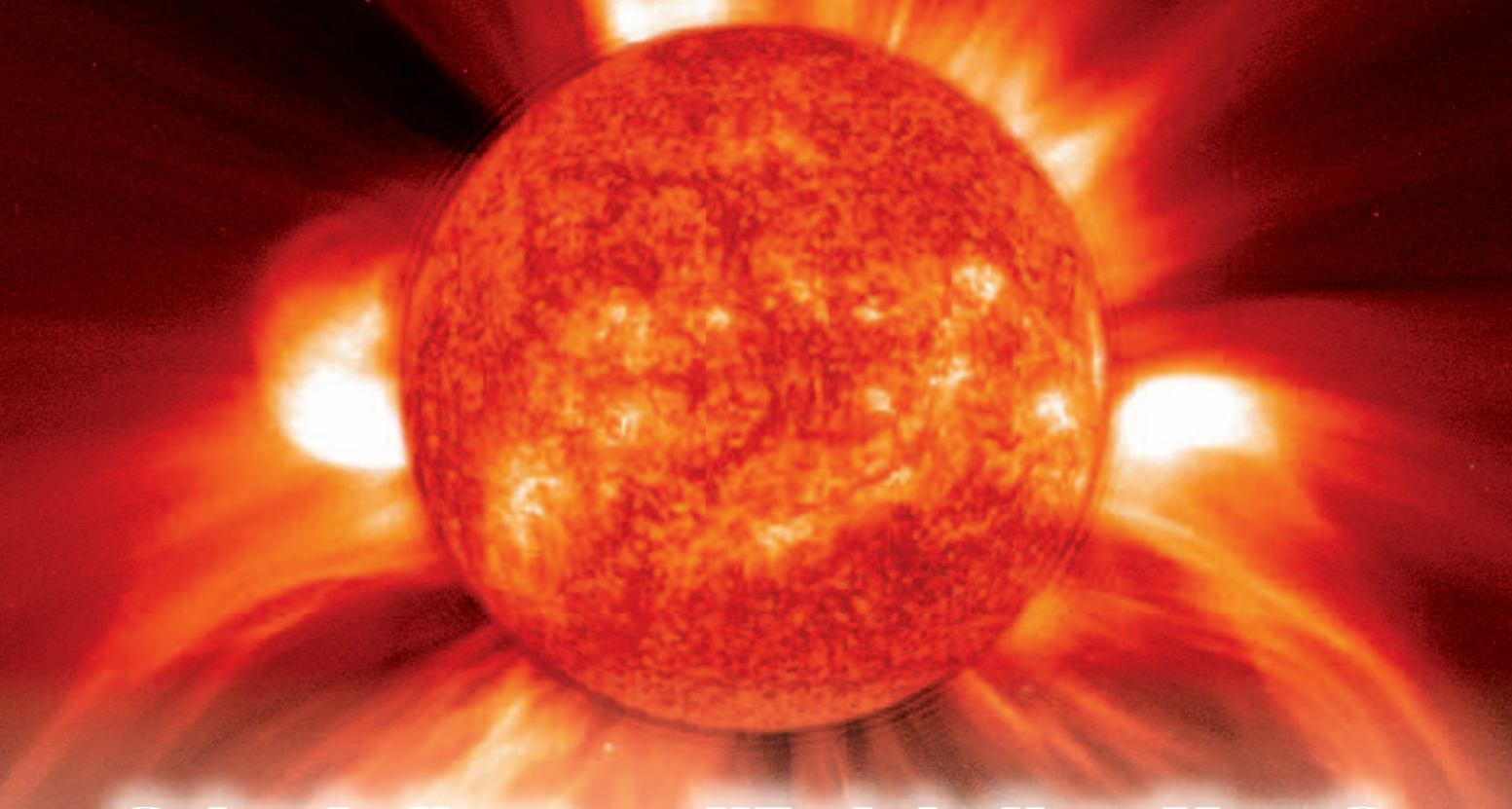
Feedback

◊ In "A Compact 40 Meter Receiver" [February 2011 *QST*, pp 37-40], the varactor tuning diode, D1 in Figure 1, is shown connected backwards. Other corrections are noted in "Feedback" for April 2011 and a corrected schematic is on the QST-in-Depth website at **www.arrl.org/qst-in-depth**.

◊ In the 2010 ARRL 160 Meter Contest Results [June 2011 *QST*, pp 89-90], the Frankford Radio Club's score in the Club Competition table was significantly reduced. FRC actually submitted 43 logs for a score of 4,683,109 points and was the winner of the Medium Club competition. The ARRL Contest Branch regrets the error.

◊In "Hints and Kinks" [Jun 2011, p 63] there was an error in the parts list for the "No Holes SUV Mount." The stainless steel (SS) threaded rod should be ½ inch OD, not ¾; the SS tube should be ¾ inch OD, not ⅝ inch. Also, the four SS flat washers and two SS nuts and lock washers should be resized to fit the ½ inch rod and the K-400 mount.



Solar Indices — What do they Mean?

Hams love sunspots, but the relationship works better if we can figure what they will do for us.

Joel R. Hallas, W1ZR

In March we discussed the long awaited start of sunspot cycle 24 — and now it may be really starting to heat up, although perhaps not quite as well as we hoped.[1] One indication of that is the change in reported Sun activity presented in the form of a number of *indices*. While we can enjoy the benefits of increased solar activity whether we watch the numbers or not, using the numbers can help us predict what will happen rather than waiting to observe what's happening.

What the Numbers are All About?

Scientists have tried to evaluate Sun activity for centuries. Initially, the only available technique was to visually count and record the observed spots (*never* look directly at the Sun). Continuous records of daily activity are available going back to 1818, with average values available well into the previous century. This is the data that permits the curve fitting and extrapolation that are used to predict long term trends and cyclic activity. For our purposes, we are more interested in predicting what will happen in intervals on the orders of days — what we can expect in next weekend's DX contest — for example. Data that can assist in this effort includes:

Daily Sunspot Number — This number is based on the area of the Sun's surface covered in spots and spot groups (see Figure 1) converted to an equivalent number of spots so the number can be used to compare with earlier data. International solar observatories and standards bodies, including our own NOAA, have developed a number of computational techniques. Often data is reported in terms of *smoothed sunspot numbers* (SSN) that use averaging techniques to make the numbers more consistent. The number can range from 0 during times of inactivity up to 100 during moderate activity and well above 100 in high activity periods. One of the most active periods in the 1950s had sunspot numbers up to 250.

Solar Radio Flux — While much of the ionizing radiation from the Sun is attributable to sunspots, a more direct measure of one form of the radiation is taken by measuring the intensity of radio signals at a wavelength of 10.7 cm (2800 MHz) emanating from the Sun. While these signals are only one portion of the total radiation, they pro-

[1] **www.aavso.org/dances-wolfs-short-history-sunspot-indices**

Lead photo — This Large Angle and Spectrometric Coronagraph (LASCO) image, taken January 8, 2002, shows a widely spreading coronal mass ejection (CME) as it blasts more than a billion tons of matter out into space at millions of kilometers per hour. LASCO is one of a number of instruments aboard the Solar and Heliospheric Observatory (SOHO) satellite. (Courtesy SOHO/LASCO Consortium)

SOLAR AND HELIOSPHERIC OBSERVATORY (SOHO) SATELLITE/LASCO CONSORTIUM

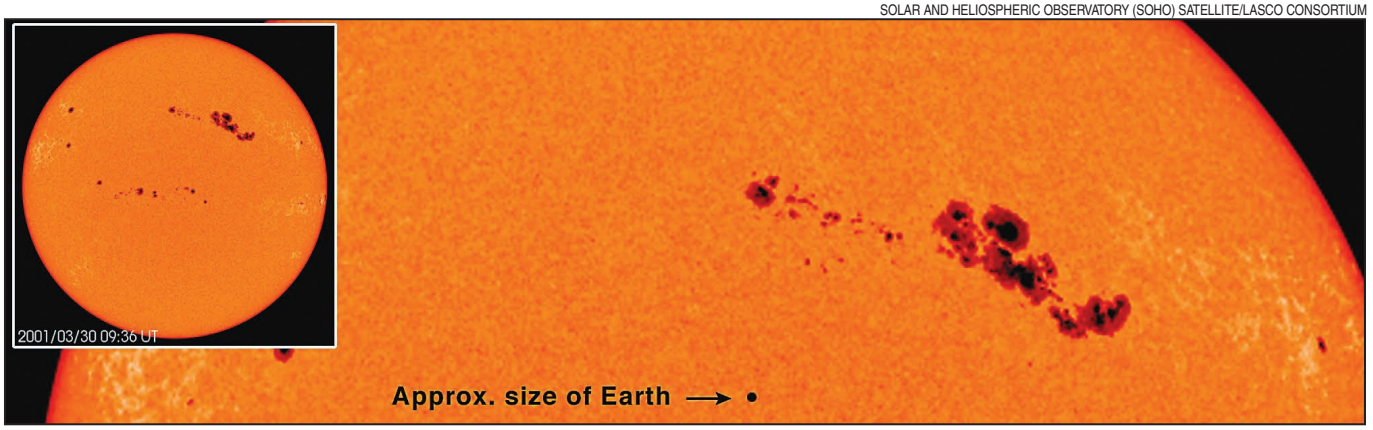


Figure 1 — The largest sunspot group observed during the last solar cycle. On March 30, 2001, the sunspot area within the group spanned an area more than 13 times the entire surface of the Earth. It was the source of numerous flares and coronal mass ejections, including the largest flare recorded in 25 years on April 2, 2001.

vide a good indication of overall solar activity. The solar flux unit numbers are higher than the sunspot numbers, but the shapes of the curves correlate well. The numbers range from a low of about 60 to about 300.

Geomagnetic Indices — An increase in solar activity not only increases the ionospheric ionization level, but also results in some effects that tend to reduce radio communications capability. These occur through magnetic disturbances resulting in increased noise levels and sometimes increased absorption. These are generally the result of *coronal mass ejections* (CME) as shown in the lead photograph on the previous page.

There are two indices, the A and K, that are measures of this effect. In addition, high levels of x-ray emission from a solar flare can heavily ionize the ionosphere's D layer, resulting in almost total absorption of HF signals and a radio blackout. Since the x-rays travel at the speed of light, they arrive at the same time as the visible flare. Since there is no warning time, the effect is called a *sudden ionospheric disturbance* or SID.

The *K index* is a short term (3 hour average) logarithmic measure of the horizontal component of the Earth's magnetic field — perpendicular to the usual field between the Earth's poles. A coordinated average of the K values from observatories around the world is called the *planetary K index* or Kp. Values of Kp range from 0 through 9. The effect on HF radio communication is summarized in Table 1. The NOAA Space Weather Prediction Center issues K index *warnings* when they predict a value of 4, 5, 6, 7 or greater while K index alerts are issued if the Boulder measured K index reaches 4, 5, 6, 7, 8 or 9 in a 3 hour period.

The A index is a linear measure of similar magnetic activity averaged over an entire day rather than a 3 hour interval. The values during a storm may be as high as 100, with a severe geomagnetic storm reaching 400. Values of A index that correspond to K index values are also shown in Table 1.

Table 1

Effect of Magnetic Conditions on HF Radio Communication

K	*A*	*Observed Conditions*
0	0	Undisturbed or quiet
1	3	Quiet
2	7	Unsettled, some degradation
5	48	Minor magnetic storm
6	80	Major storm
7	140	Larger storm
9	400	Major storm with likely HF blackout

Where Do You Find Them?

ARRL members can subscribe to the weekly propagation forecast bulletin by Tad Cook, K7RA, via e-mail. It's free — just sign on to the ARRL web page, click EDIT YOUR PROFILE, then EDIT E-MAIL SUBSCRIPTIONS and click on the PROPAGATION bulletin near the bottom of the list. You will get a weekly e-mail from Tad with up to the minute data, as well as a commentary on what to expect. You can also obtain the weekly bulletins from 1995 to the present directly from the ARRL website at **www.arrl.org/w1aw-bulletins-archive-propagation**.

The solar flux index and K index are also available from a number of Internet locations on a daily basis including **www.swpc.noaa.gov/index.html**, **www.n3kl.org/Sun/noaa.html** and **www.wm7d.net/hamradio/solar/index.shtml**.

What Can You Do With Them?

In general, the higher the SFI, the better the HF propagation — the higher the A and K indices the worse the HF propagation. The actual effect for you will depend in large measure on your geographical latitude, so you can't make a detailed prediction by just looking at the numbers. Of course, an extreme blackout in progress trumps everything else.

Keep in mind that predictions are educated guesses just like weather forecasts; some bands are likely to be open to some areas much of the time — especially as we get further into cycle 24. No matter what the predictions, it is worth checking how well the HF beacons are coming in, just in case.[2] A recent DX contest coincided with the prediction of a major CME event — it didn't wipe out W1ZR!

Use Predictive Software

Listening, as described above, will tell you what's happening at the moment you're at the radio, but often it's nice to know ahead of time when a good path to a particular location is likely to be available. This allows you to plan your operating schedule along with your other activities. Unlike listening, which provides the real story, propagation forecasting can only provide a probabilistic prediction — much like weather forecasting. Still, having an idea of the most likely time to make a contact can save a lot of wasted effort.

There are a number of propagation prediction programs available — just try a Google search on "propagation prediction software," and you'll get a bunch.

[2]S. Sant Andrea, AG1YK, "Use Beacons to Spot Band Openings," *QST*, Nov 2010, p 75.

Joel R. Hallas, W1ZR, is QST *Technical Editor. He can be reached at* **w1zr@arrl.org**.

Gain Twist 75 Meter Mobile Monobander

This well crafted design might provide some ideas for your next mobile antenna.

Jerry Clement, VE6AB

Figure 1 — The author machines the pieces for his new antenna.

For some time now, I have been giving some thought to building a high performance 75 meter antenna for my mobile. I have had good success with my present commercial motorized HF mobile antenna, modified by adding a homebrew capacitance hat. There are times, however, when the bands are in poor condition and I wished that I could change from my multiband antenna to a specialized antenna for the band I needed.

A Design Comes Together

I gave some thought to what bands I would build such an antenna for, and realized that there actually is only one band that I wanted my antenna to perform better on. The band that I had in mind was 75 meters. The reason for this is because in Alberta, my home province, the majority of hams monitor the 75 meter band. They usually gather on 3.7 MHz, where there is nonstop action throughout the day. I realized that while I am mobile, and that is on most days, since my work takes me away from home 5 days a week. On weekends, travel photography assignments result in me being mobile and more than likely to be found working 75 meters. So with a list of goals that I wished to achieve, I came up with a design that I felt would prove to be a good performer on 75 meters for those times when the bands were in poor condition.

A common denominator of all my mobile HF antennas has been a capacitance hat. I had come to realize that such a hat should be part of any efficient 75 meter mobile antenna. After building, using and testing every configuration I could imagine, I settled in on an arrangement that I call a *gain twist* capacitance hat. All of my mobile antennas have required a loading coil as part of the overall antenna assembly, however, knowing that the loading coil is the most inefficient part of the antenna, I then spent much of my time trying to eliminate at least a part of it.

The loading coil is inefficient because its resistance is in series with the antenna radiation resistance, a small value on an antenna that is a small compared to a ¼ wave monopole. All other things being equal, the more inductance that is required will result in more resistance. The capacitance hat comes into play by electrically lengthening the antenna by adding capacitance above the loading coil. The larger the capacitance hat, in terms of effective surface area, the greater the capacitance. The greater the capacitance, the smaller the amount of inductance needed in the loading coil for a given resonant frequency.

Once I had acquired the necessary materials, I locked myself in my machine shop where I went to work sculpting stainless steel, polycarbonates, Delrin and copper into a working 75 meter antenna (see Figure 1). One of the requirements for all my mobile HF antennas is that they have been capable of being fastened to a mount that is solidly mounted to the frame of my pickup. The top of this mount, the feed point for these antennas, terminates slightly lower than the roof of the cab (see Figure 2).

Making it All Come Together

Mounting Location

The mounting position of any HF antenna plays a big part as to the success of an efficient antenna system on a mobile. It is important that the antenna coil be clear of the

truck body. In addition, keep in mind the fact that when you transmit, the complete antenna from the feed-point of the antenna — not just the coil and whip protruding from the body of the antenna, is radiating outward. You can buy the best antenna that money will buy you, however, it will be money poorly spent if the antenna is mounted low on the vehicle, with unwanted coupling between the antenna mast and its coil with the body's sheet metal of your vehicle.

My previous antennas have been fastened to the mount on my F-150 pickup with the usual ⅜ × 24 threaded stainless steel stud and a mating surface of 2 inches square. This was adequate for my earlier antennas, however, as my HF mobile antennas have increased in size, this mounting arrangement has remained the same. I realized as I designed the various components of my antenna that the ⅜ × 24 threaded stud for the base would prove to be adequate at best, with an antenna that by my estimation would weigh 8 pounds. With that in mind, I changed from the standard stud size, to one of ½ × 20. Of course, good quality high grade stainless steel fasteners are used throughout.

Figure 2 — The new monobander mounts in place of the previous antenna — above the metal of the truck body.

The Vehicle is Half the HF Mobile Antenna

The antenna that resides on your vehicle is only half of a successfully designed antenna system. My 2004 Ford F-150 pickup truck has a body that sits on a frame. This required bonding to eliminate noise and increase the effectiveness of the vehicle body as a ground system.

I used flat 1 inch wide tinned copper braided ground straps with eyelets at either end to bond the various components of my F-150 together. This braid has a lower impedance than round wire, providing more effective bonding. One of the problems I initially experienced was ignition noise on my HF radio. The engine of my F-150 came with a ground strap that was about ¼ inch wide. By adding an additional 1 inch wide strap from the engine to the frame, I got rid of 2 S-units of noise.

I also bonded the exhaust system near the engine to the frame and again at the rear of the exhaust system to the frame. Other areas that I bonded together included the hood to the body, and all of the doors to the body. Another source of noise proved to be the gap between the rear of the cab and the truck box. I eliminated another S-unit of noise by adding two ground straps across this gap. Ground straps were also added from the front and rear of the truck box to the frame, as well as the tailgate to the box, as it was not grounded properly either. It is important that you keep these ground straps as short as possible, and do take care when drilling holes in the body so you do not drill into any electrical harnesses that may not be visible.

I used quality stainless steel fasteners along with stainless steel serrated washers for attaching the ground straps. Don't forget that your antenna is only one half of a dipole. In the case of a mobile antenna, the missing half is the vehicle and its capacitance to the ground under the vehicle. The single biggest factor with respect to efficiency for any mobile especially on 75 meters, is ground loss. Maximizing this half of the antenna system is essential, and this is accomplished through bonding.

Hamspeak

Capacitive hat — Disk or set of radial rods at the end of an antenna element designed to electrically lengthen the antenna.

Loading coil — Inductor inserted in series within an antenna element to make it electrically longer.

The Gain Twist Hat

I chose my gain twist capacitance hat because the design allows for a lot of wire to be added to maximize the surface of the capacitance, without the diameter becoming overly large. Since I am proficient at welding, I was familiar with stainless steel TIG welding rods that are used as a filler rod in the welding process. These rods are available from your local welding center in various diameters and come in a 36 inch length. They also are available in various grades. The grade of choice for antenna building and in this case, my gain twist capacitance hat, is grade 316. My selected diameter is 3⁄32 inch, as this diameter in grade 316 has proven to have a high tensile strength without adding too much weight. The cost is quite reasonable at approximately $8 per pound, which will buy you eight rods, the exact number required for my gain twist capacitance hat.

You may find the appearance of my antenna somewhat unorthodox, but it does make it easy to spot in a parking lot. My friend Brian Hind, VE6XX, maintains that for 75 meter mobile, the bigger and uglier the antenna, the better the performance. I discovered that there is a lot of truth in the bigger part, although I believe ugly is not a firm requirement.

Lower Mast

For the mast section below the loading coil, I used a 24 inch length of 1 inch diameter, 0.125 inch wall stainless steel tubing in grade 304. I machined grade 304 stainless steel inserts that were then pressed into place to complete the mast.

Loading Coil Fabrication

The loading coil assembly has a Delrin, a thermoplastic used for fabrication of precision parts, core that measures 1.5 inches at its largest diameter by 12 inches in length. This Delrin core was drilled and tapped to accept ⅝ × 11 threaded stainless steel inserts on both ends. I choose this thread size because ⅝ × 11 stainless steel bolts in a 2 inch length can be found at home supply stores. These bolts need some machine work to be completed before they can be screwed into place in the ends of the Delrin core, with a hole ½ inch deep drilled in the head of each bolt and tapped to accept a ⅜ × 24 stainless steel stud. The surface of each bolt head is machined flat so that once the completed loading coil is assembled with the mast and the upper capacitance hat assembly, everything is square. To my eye, there is nothing that looks worse than the vari-

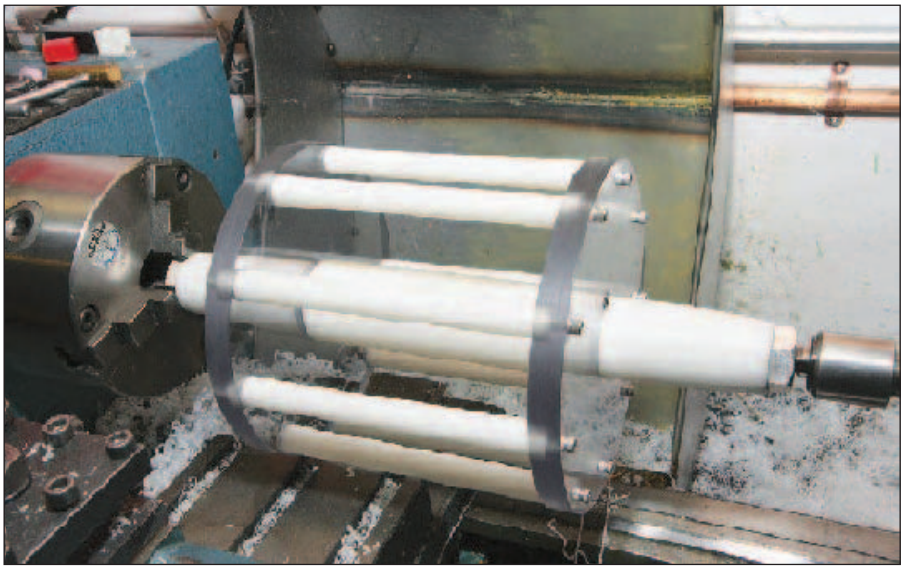


Figure 3 — Loading coil form on lathe before the wire is wound around it.

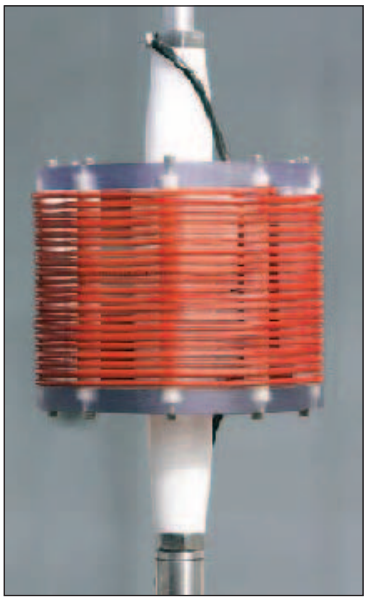


Figure 4 — Completed loading coil assembled on antenna.

ous parts of the completed antenna not square with one another.

Once the stainless steel bolts have had the necessary machine work completed, the secret to keeping them tight in the Delrin is to tap the holes at either end of the Delrin core approximately ¾ of the depth required. This way, the bolts are held extremely tight once they are screwed into place. With time spent referring to *The ARRL Handbook*, I chose 6 inches for the loading coil diameter, to achieve the maximum reasonable Q for a 75 meter loading coil.[1] I machined the end caps for the coil form from ½ inch thick polycarbonate sheet.[2]

I happened to have some ½ inch Delrin material on hand, and used this material to join the machined end caps together that make up the coil form. I went with a wire diameter of #12 AWG solid copper with a pitch of 5 turns per inch on the coil form. Having a lathe available for this phase of the construction proved highly beneficial. Once the coil form was mounted between centers in the lathe, the winding of the coil was a simple matter (see Figure 3). With the lathe set at its lowest speed, it was just a matter of keeping tension on the required 20 turns of wire (resonant on 3.7 MHz) as the wire was fed onto the coil form. The completed coil is shown in Figure 4.

This #12 AWG solid copper insulated house wire is available from home supply stores. The insulation keeps the wire from oxidizing and getting ugly. I have since discovered a source of large diameter polycarbonate thin wall tubing that I will use in the construction of any future loading coils

Figure 5 — The author gives a final in shop inspection to the completed antenna.

[1]Notes appear on page 42.

that I build, allowing for the loading coil to be totally enclosed.

Upper Mast

With the loading coil completed, it was a simple series of steps to complete the construction of the upper mast. It is built from 6061-T6 high tensile aluminum alloy, and measures 0.625 in diameter, with a length of 26 inches, and the ends turned and machined as well as threaded ⅜ × 24 (see Figure 5). To be honest, I initially had the upper mast section below the capacitance hat cut too short. The result was a issue with the capacitance hat located too close to the loading coil, and this became apparent upon the initial testing with my antenna analyzer.

Capacitance Hat

While developing my gain twist capacitance hat, I discovered that the more extreme the angle I put on the elements between the upper and lower hubs, the more capacitance that was observed with my antenna analyzer. This resulted in less required wire loss. I was able to see the results while running tests with my friend Egon Backe, VE6EGN, located 200 miles away from my location, and more so as the distance increased, with Don Jordan, VA7DJ, who is located on Vancouver Island, 600 miles from my location. In fact, the farther away from my location that I ran these tests as to the added angle that I put on the elements of the capacitance hat, the more apparent became the increase in signal.

Of course, there was a limit, and once that limit was reached, the gain began to decrease. Another critical measurement proved to be the distance between the upper and lower hubs of the capacitance hat, with my finished gain twist capacitance hat measuring 14 inches from the top hub to the bottom hub. This gives my capacitance hat a finished overall diameter of 27 inches. I saw some improvement upon relocating the capacitance hat farther away from the loading coil, however, my final design that you see here, proved to be the winning combination. Fabrication details are shown in annotated photos on the QST-in-Depth website.[3]

I should also add that my antenna is properly matched with a shunt coil located at the feed point of the antenna (see Figure 6). I have this coil mounted in a gray PVC box and the coil is grounded to the antenna mount. This PVC electrical box keeps the shunt coil from being damaged and out of the weather. This also makes for a cleaner look of the overall antenna assembly and mount. The bandwidth has proven to be quite good with 20 kHz being the working range without retuning. I also use an MFJ-909 located at my radio stack that allows me to add capacitance, while tuning for some of the other 75 meter frequencies I work.

Figure 6 — Detail of base connection arrangement. The shunt matching inductor is in the gray PVC electrical box.

It Plays as Well as it Looks!

I have been using my antenna for some time now, and I am pleased to say that I have achieved all the goals that I initially set out to achieve. I not only have a high performance 75 meter antenna that outperforms my multiband antenna on 75 meters and receives consistently good reports on the air, but the antenna also looks good on my F-150. Probably the best compliment I receive is the fact that a number of hams have asked me for the dimensions of my antenna so they may build their own gain twist 75 meter monobander.

Notes

[1]*The ARRL Handbook for Radio Communications,* 2011 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 0953 (Hardcover 0960). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop**; **pubsales@arrl.org**.

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

[3]**www.arrl.org/qst-in-depth**

Photos by the author.

International ARRL member Jerry Clement, VE6AB, has been a licensed Amateur Radio operator since 1992. Jerry is also a machinist, and worked in that industry for a number of years, including owning and operating a machine shop. Jerry then moved to the field of refrigeration systems where he specializes in automated controls. In his present employment he provides technical support to agricultural clients located throughout Western Canada.

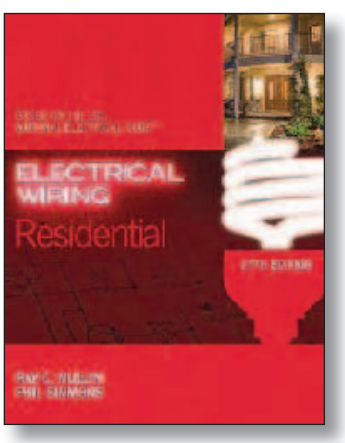
As an HF mobile enthusiast, he is focused on building mobile antennas in his home machine shop. These antennas are then installed on his vehicle for evaluation of their performance, before he moves on to his next antenna project. He also enjoys working through Amateur Radio satellites with antennas built in his shop.

When he is not working on Amateur Radio antenna projects, he builds working scale models in his shop. These have included a 1:4 scale Chevy small block V8, a 1½ inch scale Shay logging steam locomotive and the very unusual and innovative Newtonian telescope that was featured in Sky & Telescope *magazine. Jerry also is a photographer, and when not doing event work, enjoys photographing landscapes, wildlife and nature scenes. You can reach Jerry at 3812 14 Ave NE, Calgary, AB T2A 7L6, Canada or at* **stormchaser@shaw.ca**.

New Books

ELECTRICAL WIRING RESIDENTIAL

◊*Electrical Wiring Residential*, 17th edition, by Ray C. Mullin and Phil Simmons is based on the 2011 National Electrical Code. This well illustrated book covers the basics of residential wiring in new and existing homes. Of particular interest to radio amateurs are the sections covering grounding and bonding safety. 752 pages. ISBN-13: 978-1435498266. Publisher: Delmar Cengage Learning. Price: $99.95. Available through **www.amazon.com** and other booksellers.



Electronic Kits Still in the Picture

Many remember the 1950s, '60s and '70s when kits were in most ham shacks. We don't have to look back; there are still many radio kits available.

Mark A. Lacy, W5TXR

I was 12 years old when I ordered my first Heathkit with the money I saved delivering newspapers in the very small town of Converse, Texas. It was an SW-717 general coverage (550 kHz to 30 MHz) receiver and when it arrived it felt like Christmas! Ever since junior high school in 1972, I was hooked on kit building and looked forward to getting the next issue of Heathkit, Lafayette Electronics and Radio Shack catalogs.

The SW-717 was hooked up to a long wire antenna put up in our back yard. It worked very well and gave me countless hours of listening pleasure. I lived very near to an Air Force base during the Viet Nam conflict, allowing me to hear some really cool stuff on HF radio. This was followed by many visits to the USAF MARS station on Randolph AFB.

I've built many Heathkit products, mostly test and Amateur Radio equipment, most of which I still have to this day. Unfortunately, my SW-717 was stolen during a move.

At the age if 13 or 14, out of necessity, I found myself working on TVs, eight track and cassette tape players and radios the neighbors would bring over. I had a shop set-up in our garage for my kit building, homebrew projects and for electronic repairs. Those successful repairs enabled my addiction to the Heathkit Builder's Syndrome! The only known cure at that time was an empty savings account!

Kit Technology Has Come a Long Way

Over the years kits have transitioned from tubes to transistors, to integrated circuits and now some use surface mount technology (SMT). Figures 1 through 3 show a modern kit, a 222 MHz transverter from Elecraft. I still like working with vacuum tubes. There is nothing like the smell of a hot 5Y4 rectifier tube, a couple of 6V6 power pentodes and a 12AT7 dual triode all glowing in the morning.

If you have never had the opportunity to build a kit I would recommend that you give it a whirl.

Essential Guidelines for the Future "Kit Master"

Kit Selection. Consider a kit that you will actually use and enjoy. Look for reviews and articles on the kit you are interested in constructing. Know exactly what you are getting into when you order a kit. Don't get in over your head! Before you order, download the construction/assembly and the operator's manual and review them before you buy.

Kits are like software never buy version 1.0 of anything. When a new kit comes out wait and see how the kit does. Look for reviews from other kit builders.

Soldering. Your ability to solder and desolder well is first and foremost for most kits. This means using the correct soldering iron, or better a soldering station with temperature adjustment (see Figure 4), correct tips for each job and the proper size and chemistry of solder (see Figure 5). Heat is the enemy of electronic components. Overheating, cold solder joints, unintended solder bridges, loose flecks of solder and feed-through failure can all ruin your kit building day.

Your Abilities and Experience. Consider your current kit building abilities, skill level and experience. Consider your technical expertise, and availability of the proper tools, test equipment and safety equipment from start to finish. Can you read and understand schematics? Errors in kit manuals are uncommon but do occur and your ability to read a schematic can help you keep the maker honest.

Don't be too proud to ask for technical assistance from the manufacturer or another kit building wizard. If you are not up for the challenge of the desired kit, have a knowledgeable friend/ham operator complete the project. Or, consider a "builder for hire" option.

Some kits have surface mount (SMT) components. Some manufacturers offer the kit with the SMTs already installed. This option would be a wise choice even for the most experienced technician.

Stay Alert. Don't try to work on your kit if you're tired or distracted. Trying to do precision work requires concentration. All it takes is one diode or capacitor installed backward then you have made more work for yourself later.

Receiving and Assembling Your New Kit

When your long-awaited kit is delivered, inspect the exterior of the box for damage. When you open your kit do a complete inventory of parts and manuals. Make sure everything is accounted for, including any options you elected to order.

Make sure that any and all ESD (electrostatic discharge) sensitive devices are packaged in proper ESD protective packaging and are not just loose in a bag or box. This can include the mother board and sub boards, particularly until all connections are completed.

Non-sensitive parts such as resistors, coils, capacitors and toroids can be neatly organized by placing them into Styrofoam blocks for easy access and identification. Also it will keep those small parts from falling victim to gravity and becoming part of the carpeting. Observe the polarity and orientation while

Figure 1 — First step — open the box. This is an Elecraft XV222, 222 MHz transverter kit — appropriate for an experienced kit builder.

Figure 2 — Make sure you identify all the parts and that everything on the packing list is there, before you go on.

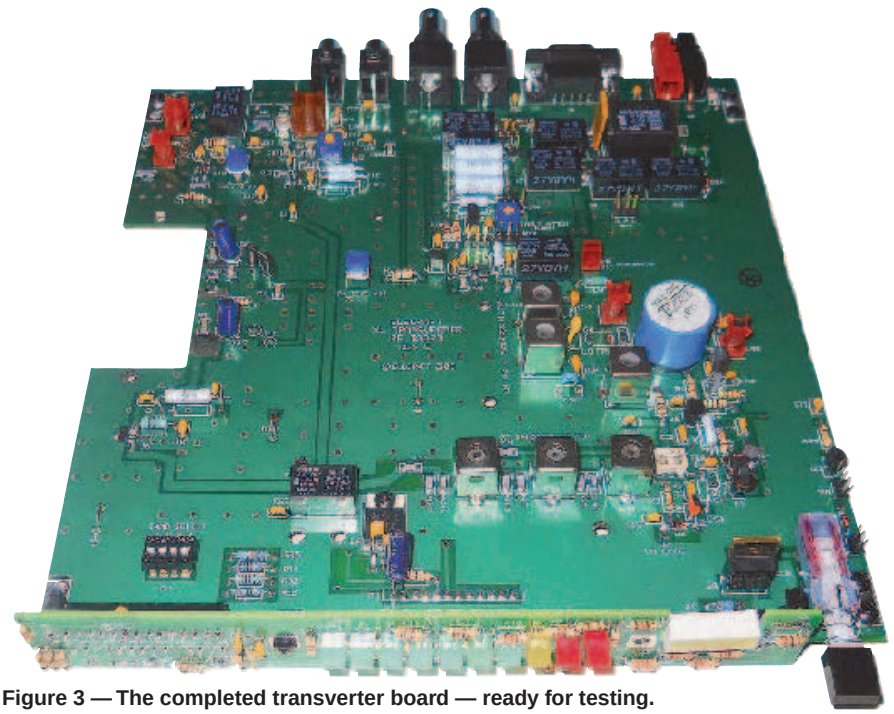


Figure 3 — The completed transverter board — ready for testing.

Figure 4 — A temperature controlled soldering station, such as this Weller WESD51, is highly recommended for kits that require soldering of solid state devices.

installing components and parts.

Plenty of light is needed for kit building. I have found that besides normal room light an inexpensive desk lamp with a 100 W equivalent compact fluorescent lamp (or a full spectrum lamp) works well and makes it easier to read color codes.

While soldering or desoldering do so in a well ventilated area. I use a school bus defroster fan mounted on a small piece of wood. It works very well. You can pick one up at an auto parts store.

If you don't know your resistor and capacitor value codes and schematic symbols you can download a chart (**www.jaycar.com.au/images_uploaded/rescode.pdf**) and keep it handy. While installing resistors and capacitors, double check the values before you install and solder. Kit construction is good practice in learning schematic symbols, resistor color codes and capacitor codes.

Your kit parts and board should be laid out on and constructed on a properly grounded antistatic mat. The antistatic mat is usually constructed of a single layer of homogeneous static dissipative vinyl material. Surface resistivity should be on the order of 10^8 to 10^9 Ω. You should be wearing the matching antistatic wristband. Safety glasses are recommended too. The clipped off lead of a resistor or diode could fly up and get you in the eye. Solder can splatter and get in your eye too. Protect your eyes!

Antistatic wristbands are specially designed with a built-in resistance on the order of 5 to 10 MΩ. The resistance allows for safe static discharge. Without the 5 or 10 MΩ resistor, if you come into accidental contact with ac power or with high voltage in your kit, you become part of the low resistance path to ground.

Let's Talk Solder

Solder is an alloy or mixture of tin and lead

— typically 60% tin and 40% lead. It melts at a temperature of about 365°F. Coating a surface with solder is called "tinning" because of the tin content of solder. Lead is poisonous and you should always wash your hands thoroughly after using solder. Solder for electronics use contains tiny cores of flux. The flux is corrosive to clean the metal surfaces as the solder melts. This is why you must melt the solder actually on the joint, not on the iron tip. Without flux most joints would fail because metals quickly oxidize and the solder itself will not flow properly onto a dirty, oxidized, metal surface.

Common solder alloys, tin and lead respectively:

- 63/37% melts at exactly 361.4°F (this is my preference).
- 60/40 melts over a range of 361-375°F.
- 50/50 melts over a range of 365-419°F.
- Lead-free solder alloys melt at around 485°F depending on their composition.

For environmental reasons, lead free solders are becoming more widely used, and are required by the laws of many countries. Unfortunately, most lead free solders make it more difficult to create reliable solder joints so I recommend avoiding them if you can.

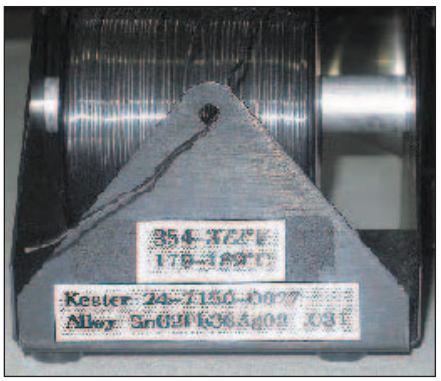


Figure 5 — Not all solder is created equal. Avoid lead-free solder — unless the kit manufacturer recommends it. Different tin-lead alloys have different melting points — make sure that you get the one that is appropriate for your kit (see text).

Test Equipment and Tools

A digital multimeter can be a life saver while kit building or homebrewing. The multimeter can be used to measure the value of a resistor with colors difficult to read. It can also be used to measure the output voltage of a regulator or to identify a transistor type or to determine the cathode or anode of a diode.

You will also need a selection of insulated, electronic size hand tools. Many kits will identify exactly the types and sizes needed. You can expect to need a set of small slotted and Phillips screwdrivers, needle nose pliers, diagonal cutters and wire strippers. You may also need a jewelers size screwdriver set, crimpers, torx driver set, nutdriver set (English and metric), conductive SMD tweezer set and a clip-on heat sink.

A circuit board holder is like having another set of hands. They are kind of expensive but may be well worth the price. Also very useful, especially with advanced years, is a magnifying bench lamp. Table 1 lists some sources of tools, test equipment and soldering supplies.

Desoldering

From time to time, it will be necessary to undo a soldered connection. The trick is to do so without damaging the component or the board it is soldered to. There are two simple choices here and both are good. For desoldering you can use a copper braid product that absorbs melted solder. This is marketed as SolderWick. The other choice is a hand operated vacuum device called a solder sucker. With either method, first remove the component, then the solder.

SolderWick works very well. Just heat the joint and apply the wick. After the solder flows into the wick, remove it and after it cools, cut off and discard the soldered portion. The solder sucker is like a soldering iron with a heat proof tube next to the tip. The tube is connected to a rubber bulb. To use, squeeze the bulb to remove the air and hold it, heat the joint and, with the tip still applied to the joint, release the bulb to suck out the solder. With either technique, multiple applications are usually required.

There is nothing like that feeling you get when your kit is completely assembled, aligned and working properly. It's a sense of pride and accomplishment like no other. Why not give it a try? Table 2 lists the kit providers I am aware of.

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Table 1

Sources of Tools, Test Equipment and Soldering Supplies

Source	*Website*	*Phone*
Allied Electronics	**www.alliedelec.com**	866-433-5722
Digi-Key	**www.digikey.com**	800-344-4539
Jameco Electronics	**www.jameco.com**	800-831-4242
Stanley Supply Services	**www.stanleysupplyservices.com**	800-225-5370

Table 2

Author's Alphabetical List of Kit Providers

Company	*Contact*
Antique Electronic Supply	**www.tubesandmore.com**
Carl's Electronics	**www.electronickits.com**
Communications Concepts	**www.communication-concepts.com**
Crystal Radio Supply	**www.crystalradiosupply.com**
Dan's Small Parts and Kits	**www.danssmallpartsandkits.net**
Down East Microwave	**downeastmicrowave.com**
The DZ Company	**www.dzkit.com/default.htm**
Elecraft	**www.elecraft.com**
Electronics USA	**electronicsusa.com**
Emtech	**emtech.steadynet.com**
FAR Circuits	**www.farcircuits.net**
Fox Delta	**www.foxdelta.com**
Hendricks QRP Kits	**www.qrpkits.com**
HF Projects	**www.hfprojectsyahoo.com**
K1EL Ham Radio Kits	**k1el.tripod.com**
Kits and Parts dot com	**kitsandparts.com**
Milestone Technologies	**www.mtechnologies.com**
Mini-Kits	**www.minikits.com.au**
NØXAS HamGadgets	**www.hamgadgets.com**
North Country Radio	**www.northcountryradio.com**
Ramsey Electronics	**www.ramseyelectronics.com**
Small Wonder Labs	**www.smallwonderlabs.com**
Spectrum Communications	**www.spectrumcomms.co.uk**
TAPR Kits	**www.tapr.org**
Ten-Tec	**www.tentec.com**
Vectronics	**www.vectronics.com**
Xtal set	**www.midnightscience.com**

Kenwood TH-D72A Dual Band Handheld Transceiver

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

My adult working life began in 1969 in a digital integrated circuit development lab at Bell Telephone Laboratories in Allentown, Pennsylvania. So I have more than a casual interest in how the technology has evolved. I suppose I should not be so impressed with this handheld when I think about all the things my smart phone can do. I am impressed though. Kenwood has essentially put TM-D710A mobile radio functionality plus a GPS receiver system into a rugged, weather resistant package that runs for a long time on a rechargeable Li-ion battery, fits in your hand and can be worn on your belt.[1] It's a big step forward from the older TH-D7A that I used previously.[2]

In addition to being a great sounding, true dual band radio (can operate on two bands at a time) with wideband receive capability, the TH-D72A includes an internal GPS receiver, Automated Packet Reporting System (APRS) and a fully functional 1200 and 9600 baud packet radio terminal node controller (TNC).[3] Digipeater, EchoLink, Sky Command II and weather alert are also included capabilities. The 'D72A includes a feature called Advanced Intercept Point (AIP), which helps eliminate interference and audio distortion caused by intermodulation from nearby signals.

The TH-D72A has all the features normally found in a modern dual band handheld, and they work well and are easy to use. Most hams will buy this radio for the unique APRS and packet features, and I'll concentrate on those areas in this review.

Description

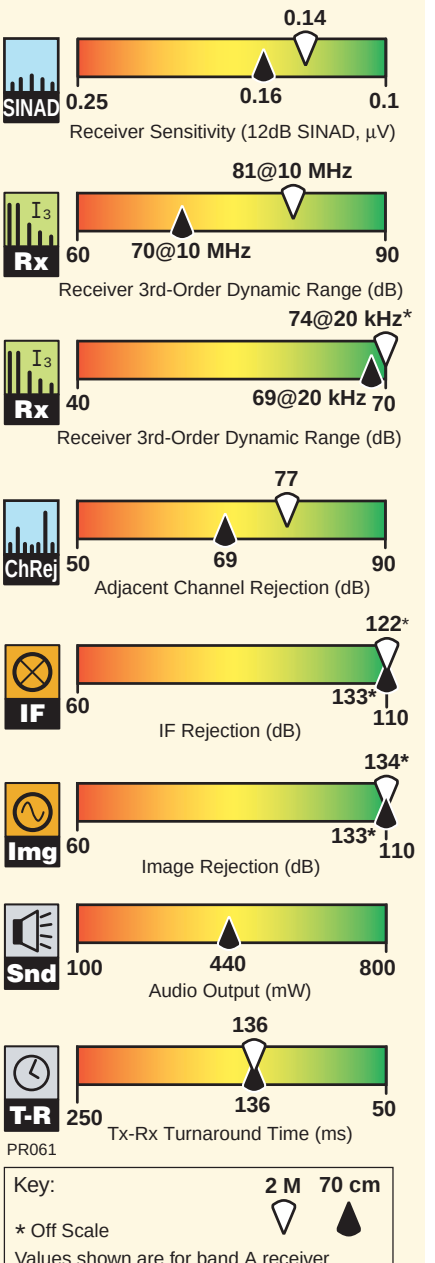
The TH-D72A top panel has a male SMA ANTENNA connector, GPS receiver antenna, concentric twist controls for VOLUME and for channel/frequency/option control. On the left side are buttons for PTT, LAMP and MONITOR/SQUELCH. The right side has the following ports that are covered with rubber flaps: earphone (2.5 mm), microphone (3.5 mm), mini-USB, APRS COM (2.5 mm) and 13.8 V dc input. On the face are a POWER switch and an 18 button keypad. The four position jog control is used to index through and select menu options (Figure 1). The high resolution LCD is quite good. Even the smaller font used in some displays is easily readable.

Included in the box are the antenna, wall charger, USB interface cable (A – Mini B type), PB-45L 1800 mAh Li-ion battery, belt hook, instruction manual and a CD with detailed information on all the features and options.

MCP-4A Desktop Software

MCP-4A desktop software, USB drivers and firmware updates are available for free download from the Kenwood website. The software interfaces with the 'D72A via its USB port. Such software is almost a neces-

Key Measurements Summary



Bottom Line

Kenwood's TH-D72A seamlessly folds APRS operation and a packet TNC into a full featured, easy to use dual band handheld.

[1]H. Robins, W1HSR, "Kenwood TM-D710A Dual Band Mobile Transceiver," Product Review, *QST*, Feb 2008, pp 45-48. Past *QST* reviews are available to ARRL members at **www.arrl.org/product-review**.

[2]H. Robins, W1HSR, "Kenwood TH-D7A(G) Dual Band Handheld Transceiver," Product Review, *QST*, Apr 2008, pp 45-47 and S. Horzepa, WA1LOU, "The Kenwood TH-D7A Dual-band H-T," *QST*, Aug 1999, pp 58-62.

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

sity to manage any radio with 1000 memory channel capacity and so many features and options. It is good to be able to back up all settings and channel information.

MCP-4A will import repeater list files from ARRL *Travel Plus for Repeaters*. I tested this with an older version and it worked flawlessly. *MCP-4A* software also communicates with the GPS via the USB port. There will be more about GPS later.

If you perform a firmware update, do not forget to back up all of your settings before you start. The last step in the update process is to do a total system reset.

Menu System

Very much like the TM-D710A, the TH-D72A has a tiered menu system to adjust settings. All user settings can be entered or modified by *MCP-4A* software via the USB port or by keying in on the transceiver itself. There are four major areas available for programming: 1XX – Radio, 2XX – GPS, 3XX – APRS and 5XX – Sky Command. (Note that there is no 4XX range addressed in the user documentation.) Pressing the MENU key on the radio brings up the main menu display with these four selection items. You can scroll through these with the jog control or one of the twist knobs. Pressing the jog control down or up indexes through the options; pressing to the right selects the options. The menu items/options are not necessarily in alphanumeric order, but rather in some logical order for their use. This tiered system, along with the jog control, makes managing so many settings on a handheld very easy.

APRS

Much of the functionality in the TH-D72A is the same as the TM-D710A, so I will focus here on what is different and particular to the handheld.

Pressing the TNC (2) button on the keypad toggles through APRS12, PACKET12 and NO TNC. With APRS12, the internal GPS locked on position, and BCON displayed (BEACON button pressed to turn on beaconing), the radio transmits that position. Station ID icons are supported for 57 stations, versus about 30 on the ’D710A (others have been added in subsequent firmware updates).

Station List

There is capacity to store information for 100 received stations. New data replaces old for the same stations on the Station List and the 101st station will replace the oldest on the list. Repeatedly pressing the LIST key cycles through different display options. The first press displays the last *three* stations received — call sign and secondary station identifier (SSID). The next press displays the last *five* received stations, SSIDs and their equipment (for example, W1HSR-6 TH-D72) using a reduced font size. The third press of the LIST key displays the last five received stations’ call sign, SSID, time heard and QSY frequency indicator (eg W1HSR-6 16:04F — the F indicates that there is a QSY frequency in the Status text field; more on this later).

You can use the jog control to navigate the station list. There are nine pages of information for each station that can be viewed with the push of the jog to the right. You can back up by pushing the jog to the left. Pushing the

Table 1

Kenwood TH-D72A, serial number B0B00353

Manufacturer’s Specifications	*Measured in ARRL Lab*
Frequency coverage: Receive, Band A, 136-174 MHz, 410-470 MHz; Band B, 118-174 and 320-524 MHz; transmit, 144-148 MHz, 430-450 MHz.	As specified.
Modes: FM, Data	FM, FM narrow, data.
Power requirements: With PB-45L battery pack, receive with no signal, 100 mA (single band), 150 mA (dual band), 135 mA (TNC on, no signal), 30 mA (battery saver on); transmit, 2.0 A (high), 0.8 A (low), 0.5 A (eco low) at 7.4 V dc (nominal voltage); with external 13.8 V dc, 1.6 A (transmit, high power).†	Receive, battery power, 325 mA (max volume, no signal, lights on, dual band), 150 mA (standby, lights on dual band), 30 mA (power save), 133 mA (TNC on, no signal); transmit, 2.0 A (high), 0.7 A (low) 0.4 A (eco low) at 8.4 V dc (full charge). 1.4 A (high power) at 13.8 V dc.
Receiver	***Receiver Dynamic Testing***
FM sensitivity: 12 dB SINAD, < 0.18 µV (Band A), < 0.22 µV (Band B).	For 12 dB SINAD, Band A, 146 MHz, 0.14 µV; 440 MHz, 0.16 µV; Band B, 146 MHz, 0.15 µV; 440 MHz, 0.15 µV.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: Band A, 146 MHz, 74 dB, 440 MHz, 69 dB; 10 MHz offset: 146 MHz, 81 dB, 440 MHz, 70 dB; Band B, 146 MHz, 73 dB*, 440 MHz, 69 dB*, 10 MHz offset: 146 MHz, 79 dB, 440 MHz 70 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	Band A, 146 MHz, 89 dB, 440 MHz, 99 dB, Band B, 146 MHz, 89 dB, 440 MHz, 98 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: Band A, 146 MHz, 77 dB, 440 MHz, 69 dB; Band B, 146 MHz, 73 dB, 440 MHz, 68 dB.
Spurious response: Not specified.	IF rejection, Band A, 146 MHz, 122 dB, 440 MHz, >133 dB; Band B, 146 and 440 MHz, 121 dB. Image rejection, Band A, 146 MHz, >134 dB, 440 MHz, >133 dB; Band B, >133 dB.
Squelch sensitivity: < 0.13 µV.	At threshold, Band A, 146 MHz, 0.14 (1.4 µV max), 440 MHz, 0.15 (1.6 µV max); Band B, 146 MHz, 0.13 (1.4 µV max), 440 MHz, 0.13 (1.4 µV max).
Audio output: 0.3 W.	0.44 W at 10% THD into 8 Ω (external speaker). THD at 1 V RMS, 1.9%.
Transmitter	***Transmitter Dynamic Testing***
Power output: VHF, 5 W (high), 0.5 W (low), 0.05 W (economy low).	146 MHz, 5.3 W (high), 0.6 W (low), 0.1 W (eco low); 440 MHz, 5.3 W (high), 0.5 W (low), 0.1 W (eco low) at 8.4 V dc (full charge).
Spurious signal and harmonic suppression: >60 dB (highest transmit power).	146 MHz, >70 dB, 440 MHz, >70 dB, meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 136 ms.
Receive-transmit turnaround time (“tx delay”): Not specified.	70 ms.
Size (height, width, depth): 5.5 × 2.3 × 1.6 inches, including projections.	
Weight, 13.1 ounces.	
Price: $500.	

†PB-45L 7.4 V, 1800 mAh Li-ion battery supplied. Replacement battery, $90; PG-3J cigarette lighter adapter, $40; PG-2W dc power cable, $20; KSC-32 rapid charger, $65; BT-15 battery case (6 AAA cells), $35.
*Measurement was noise limited at the value indicated.

Figure 1 — The jog control at the upper left of the keypad is used to navigate through the menus.

jog up or down will display the same page for stations above and below on the list, respectively.

The list is easily and quickly sorted by call sign, date/time or distance. Filtering by station type — weather, mobile, digipeater and so on — is also a quick menu selection.

Voice Alert

Common practice among many APRS users is to set up their radios to send a 100 Hz tone with beacons and set CTCSS to the same tone. This squelches the receiver normally and only opens it to allow packet clatter to be heard when stations are within simplex range of one another. This is a settable menu option called Voice Alert on the ’D72A. The idea is if you are close enough for the tone to open squelch, you are close enough for simplex voice communication. This could be used in conjunction with the QSY function described next.

QSY Function

The TH-D72A has an implementation of Automatic Frequency Reporting System (AFRS) that embeds your non-data band frequency and other parameters (tone frequency, shift and more) into a *Status Text* (see **www.aprs.org/freq/AFRSspec.txt**). When this QSY frequency information is received at another ’D72A or ’D710A, it is indicated on the Station List (Figure 2). On the TH-D72A, while viewing the Station List, pressing MENU and selecting TUNE will tune the non-data band to the QSY frequency, tone and shift (if provided) of the selected station. I tested to see what the ’D710A would do with the additional information received from the ’D72A. My ’D710A did, in fact, tune to the received QSY frequency and the associated tone and shift set automatically.

Beaconing Method Options

Manual, PTT, TX Interval Time, Decay Algorithm, Proportional Pathing and SmartBeaconing are supported.[4] SmartBeaconing causes positions to be beaconed based upon speed of movement and turn angle. You can set the low and high speed thresholds and beacon rates for each. For example, you can set beaconing to occur every 30 minutes for speeds below 5 MPH, and in a nonlinear fashion increase beacon rate to every 60 seconds for speeds between 5 and 60 MPH and above. In addition, you can set position beaconing to occur when a combination of settable turn angles and speeds are measured on the GPS receiver.

There is a page dedicated to Smart Beaconing in the APRS menu of the *MCP-4A* software that graphically displays the effects of your settings. When SmartBeaconing is turned on, the TX Interval Time, Decay Algorithm and Proportional Pathing features will not operate.

Quick Beacon is another option. When METHOD is set to any value other than Manual, you can manually transmit a beacon by pressing F, BCON (6).

Message Handling

The TH-D72A has eight user programmable preset phrases, versus four on the ’D710A. In addition you can set up an automatic reply message. These phrases and messages can be created using the *MCP-4A* software, or on the handheld itself via the keypad and menus.

I tested sending and receiving messages with my portable packet station and it worked flawlessly at both ends. I sent a message to the ’D72A and it sent back the automatic reply message that I had set up. Then I replied to the message using preset phrases, and they were received. I also created a new message using the keypad and the twist control on top. That was pretty easy to do. Using the twist control, as you move one character position to the next, the last character used is in the buffer, so you are not always starting at the beginning of the character set. I find this efficient.

Message and Bulletin Group filtering is supported, so you can set it up so only group members can exchange messages.

APRS Serial Port Interface

I tested the TH-D72A with my AvMap G5 GPS receiver using the APRS serial port and an interface cable that I use with my TM-D710A. There are port settings that can be made using the keypad in menu mode or via the MCP-4A software and the USB port and cable. I set the baud rate to 9600, input to GPS and output to waypoint. Waypoint can be set to NMEA, Magellan or Kenwood. I used Kenwood and nine character length. Once all these settings were loaded, simply pushing F (function) and MARK/GPS (1) toggled between the internal and external GPS. In external GPS mode the icon on the LCD changes from iGPS to GPS. After satellites were located and my position was known, the GPS icon changed from static to flashing — the G5 and ’D72A were talking to each other and the ’D72A transmitted a position beacon. The communication is bidirectional as received positions appeared on the G5 screen and accumulated in its APRS Contacts list.

This interface can also be used with Davis and Peet Brothers weather stations via menu selection. A wiring diagram is provided in the documentation to support these connections.

GPS Receiver System

I am an avid power walker and wear a Garmin GPS watch to capture my treks and record my stats for later review. I am able to export a file that can be imported into Google Earth. Once I have done that, I can share my treks with my friends. So, one of the first things I wanted to learn was if I could use the TH-D72A’s internal GPS receiver in similar fashion. The answer is yes! In addition to providing position information to the internal APRS, there is full flexibility as to what you can do with the GPS receiver data.

Before I left for my walk, I went into the

[4]Beaconing options are described very well with tables in Kenwood TH-D72_10_APRS_E.pdf, which is part of the Owner’s Manual on CD and available for free download from **www.kenwoodusa.com/Support/Amateur_Radio**. *SmartBeaconing* is from HamHUD Nichetronix, **www.hamhud.net**.

Figure 2 — Station list with QSY frequency information (see text).

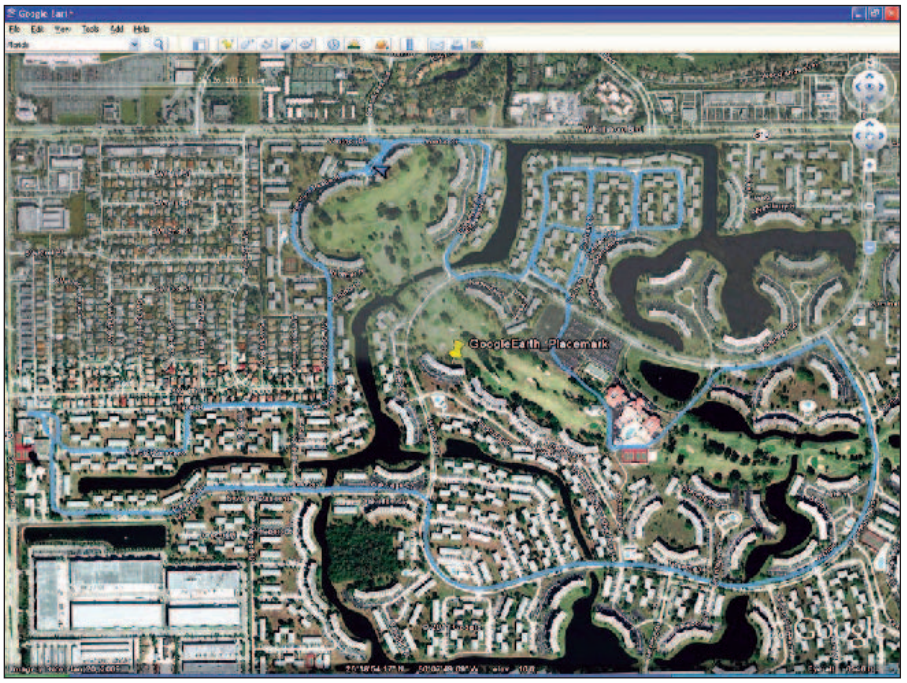


Figure 3 — The TH-D72A recorded my walk for display on Google Earth.

GPS menu and set LOG SETUP to use time as the RECORD METHOD and INTERVAL to every 10 seconds. You can use DISTANCE with intervals from 0.01 to 9.99 miles. You can, alternatively, use BEACON as your log record method (a waypoint would be recorded each time an APRS beacon is transmitted). A little quirk mentioned in the documentation is that the GPS logger cannot be turned on while the APRS COM port input is ON. This became an issue as I tested the 'D72A with the AvMap G5 before I tested logging. I had to turn OFF the APRS COM port input. Simply pressing F, 2 starts and stops the log. The iLOG icon appears in the GPS position on the LCD when the log is on. Up to 5000 track points can be recorded.

The *MCP-4A* desktop software uses the USB port to read GPS logger data from the 'D72A. Once the data is read, it can be stored in various standard formats that can be imported. In my case, I saved the data as a .gpx file that instantly imported into Google Earth. I was able to share this file with friends so they could also view my trek on Google Earth. Clicking on that file brings up my trek on Google Earth (Figure 3). You have the option of clearing the track log or letting it accumulate.

You can manually enter or save marked waypoints as target points. Up to five such points can be saved and used as a navigation tool. By this I mean that the radio with the GPS locked on your position can tell you distance and direction to the target.

The TH-D72A's real time clock is set by the GPS, and there is a menu item to set your local time zone.

Packet TNC

I put the TH-D72A into PACKET12 mode by pressing the TNC (2) button on the keypad. PC access to the internal TNC is via the USB port, so I used *HyperTerminal* on my PC running *Windows XP Home Edition*.

The *Packet* PDF file that comes as part of the instruction manual CD does not tell you how to physically connect to the TNC via USB or serial port. Also, that PDF document includes a list of the commands that the TNC is supposed to respond to. I tried to set up the internal mailbox, but none of the mailbox commands worked. I sent e-mails to Kenwood Support concerning these issues and received responses from them within a few hours. Unfortunately, they told me that the command list was copied from the TM-D710A user manual, and that the TH-D72A does not have a packet mailbox.

I was able to connect to the internal TNC and found a fairly robust AX.25 command set. I tested the switch from 1200 to 9600 baud and observed that the icon on the LCD did change from PACKET12 to PACKET96 with the parameter change. I had no way to actually test 9600 baud packet with another node.

I was unable to find an actively working packet node of any type where I was doing this review, but I was able to connect to my portable packet station, automatically go into CONVERSE mode and send and receive text on both packet terminals. This worked well. I was also able to connect to the PBBS in the KPC-3 TNC and leave a test message.

I have a bit of experience with interfacing radios and TNCs with computers. This was by far the easiest to make work. There are no mic and speaker connections or audio levels to adjust, no special interface cables — just a standard USB interface cable and readily available PC terminal software.

Battery Power Conservation

There are several strategies available to extend the life of a charge. Radio options include automatic power off timer and battery saver mode, which will turn the receiver circuit off for a settable period from 0.03 to 5 seconds if squelch is closed and no key is pressed for more than 10 seconds. RF power output can be set to Economy Low (0.05 W), Low (0.5 W) and High (5.0 W)

GPS options include GPS off, GPS-only mode and GPS battery saver mode. Battery saver turns the GPS off if position data is not determined during the maximum catching time (approximately 5 minutes). Also, when there are many satellites in range and the GPS is stabilized and position data can be determined, the GPS power source repeatedly turns on and off. Off time is user settable to 1, 2, 4 or 8 minutes, or Auto. When set to Auto, the GPS off time starts at 1 minute for the first time, then progresses to 2, 4 and 8 minutes each additional time. The GPS off time remains at 8 minutes thereafter. After having determined your position for the duration, however, if the GPS cannot pinpoint your location, the GPS off time will restart at 1 minute.

APRS beacon rates, whether controlled by an algorithm or SmartBeaconing, will affect the life of a battery charge. I set the 'D72A to beacon a position every five minutes at high power and with the internal GPS receiver on all the time. I started with a fully charged battery and let it run until it shut itself off. It ran like that for 17 hours. It took six hours to fully recharge the battery with the supplied wall transformer. Thanks to AC4XQ and K4ABB for digipeating and igating my beacons for all that time.

Bottom Line

The TH-D72A is an impressive work of art. It might seem pricey, but when you consider all that you are getting — true dual band radio, GPS receiver system, 1200 and 9600 baud TNC, computer interface cable and great software — there's really nothing else to buy. It is an amazing package.

Manufacturer: Kenwood USA Corp, 3970 Johns Creek Ct, Suite 100, Suwanee, GA 30024; tel 310-639-4200, fax 310-761-8290; **www.kenwoodusa.com**.

Down East Microwave L222-28 1¼ Meter Transverter

Reviewed by H. Ward Silver, NØAX
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I'm a budding VHF+ contester with one of the now-ubiquitous HF/VHF/UHF transceivers (an IC-7000) that covers all amateur bands from 160 meters through 70 cm. Except, that is, for the 1¼ meter band of 222-225 MHz. ARRL VHF+ contests have a four band "Limited Rover" category (**www.arrl.org/general-rules-for-arrl-contests-above-50-mhz**) that dangles the tantalizing 1¼ meter carrot before the noses of Missouri mules like me who have the "easy three" — 6, 2 and 70 cm — but haven't made the leap to a fourth band. So when the ARRL asked if I'd like to give the 25 W version of the Down East Microwave (DEM) L222-28 transverter a try, it was an easy "yes." Not one to leave any cookies in the jar, I suggested adding a four-band antenna to the review, the Tennadyne T-28 described in the accompanying review. Done — with the January ARRL VHF Sweepstakes contest coming up, it was game on!

L222-28 Transverter Overview

The L222-28's standard version has a

Bottom Line

The Down East Microwave L222-28 transverter is a fine solution for amateurs looking to expand station coverage to the 1¼ meter band. It can be adapted to interface with a variety of radios and receives and transmits well.

Table 2

Down East Microwave L222-28 1¼-Meter Transverter, serial number 1015

Manufacturer's Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive and transmit, 222-223.7 MHz.	As specified.
Power requirements: Transmit, 6 A maximum, 13.8 V dc; Receive, not specified.	Transmit, 3.85 A (at 25 W output); receive, 520 mA at 13.8 V.
Modes of operation: CW, SSB, AM, FM, PSK	As specified.
Receiver	**Receiver Testing**
Conversion gain: 17 dB minimum.	28 MHz, 18.6 dB; 29.7 MHz, 17.3 dB.
Noise figure: <1.0 dB.	0.8 dB.
Image rejection: Not specified.	103 dB.
Third-Order Output Intercept: Not specified.	+9 dBm.
Transmitter	**Transmitter Testing**
Frequency accuracy: Not specified.	28.000 MHz in = 222.000004 MHz out (0.018 ppm error)
Frequency drift: not specified.	After one hour in standby, five cycles of 30 s key down, 30 s key up; 0.04 ppm or 9 Hz. After 10 minutes key down, 0.09 ppm or 20 Hz.*
Transmit RF input: 10 mW maximum.	Adjustable, see text.
Transmit RF output: 25 W.	As specified.
Power output drift: not specified.	After one hour in standby, five cycles of 30 s key down, 30 s key up; 0.4% or –100 mW. After 10 minutes key down, 1.2% or –300 mW.*
Spurious and harmonic suppression: Not specified.	73 dB; meets FCC requirements.
Intermodulation distortion (IMD): Not specified.	3rd/5th/7th/9th order, –23/–43/–54/–62 dB below PEP
Size (HWD): 4.2 × 6.9 × 11 inches, including protrusions; weight, 4.6 lb.	
Price: $479.	

*These are new measurements described on the QST-in-Depth website at **www.arrl.org/qst-in-depth**.

Figure 4 — The L222-28 transverter features a simple front panel and an oversized heat sink. The power meter is an LED bar-graph style.

Figure 5 — The rear panel of the L222-28 features an AUX connector with all control signals so that no additional connectors are required if the configuration is changed.

25 W output for an IF drive level of 10 mW (gain is adjustable internally) or an external low-power HF transceiver can also be used. On receive, better than 1.0 dB noise figure and 17 dB of conversion gain help you hear weak signals without the need for a preamp. The unit operates from 12 V dc and draws 6 A, maximum. The transverter's enclosure is topped with an oversized heat sink and cooling fan (see Figure 4) — you can run this unit hard at full-power and it should be able to dissipate the heat easily. The transverter seemed to be rugged enough for rover use. The transverter is available as a kit as well as fully assembled (the model tested). ARRL Lab measurements can be found in Table 2.

Interfacing and Using the L222-28

The L222-28 can be configured to split the receive and transmit inputs and outputs or combine them into a common signal path (standard). Keying requires the usual switch-to-ground PTT signal (positive keying is also supported) and four-step sequencing is also provided. An option for RF sensing is provided and a negative voltage ALC output is available on the rear-panel AUX connector to control transceiver output power. Figure 5 shows the connections available. DEM includes a useful selection of connectors and adapters for both control and RF connections — I appreciate that gesture.

As a rookie transverter user, I made pretty much every configuration mistake you could make. I could sense the L222-28 patiently waiting for me to get the interface configuration right, sighing deeply and drumming its fingers on the shelf. Involving both radio and transverter, this process was not trivial and while a setup process is given in the manual, it's not all that easy to figure out. DEM offers a helpful page on transverter interfacing on their website. (See the section "Manual and Examples.") The user's manual is essentially drawing-free (block diagrams needed) and the technically dense text assumes a familiarity with VHF/UHF operation that I don't yet have. Nevertheless, I persevered and then I got it — the combination of rig settings and IF connections got 'er done and at the next tap of the key paddle, the L222-28's power meter LEDs blinked red and my wattmeter needle jumped up-scale. I was on 1¼ meters CW and SSB!

Once you get the transverter and radio hooked up correctly, operation is automatic. You take care not to overdrive the transverter and it pretty much does the rest. The transverter's model number, 222-28, describes the frequency conversion process: to operate on the 222.1 MHz calling frequency required that I set the radio to 28.1 MHz. The unit can withstand high SWR (although probably not indefinitely at full-power input) — also personally verified. SSB and CW reports were good — both strength and quality. (I had an odd monitor feedback problem at first but that turned out to be a radio configuration error.)

Manual and Examples

The manual for the transverter is okay — it has have enough information to get you from the cardboard box to putting out a signal but in a dense format that assumes a lot of the new user or builder. Equipment such as a transverter that is used in association with other gear can be very hard to install correctly — sometimes (luckily, not in my case) leading to accidental damage. I realize that the manual cannot contain an example of every possible radio interface but manufacturers should encourage their users to post descriptions of their successful configurations on the company website or in a free Yahoo or Google group. By definition, transverter customers need this information — make it easy for them to find it…without having to spend time searching the Internet.

Summary

If you are considering adding 222 MHz to your rover or base station, the L222-28 is a solid package, ruggedly built, that works well with modern HF transceivers. It has enough interface options to adapt to a variety of radios and is robust enough to deal with life in the ham shack. If I decide to get serious about VHF+ contesting, I'll seriously consider buying one for 222 MHz.

Manufacturer: Down East Microwave, 19519 78th Terrace, Live Oak, FL 32060, tel 386-364-5529; **www.downeastmicrowave.com.**

Tennadyne T-28 VHF/UHF Log Periodic Antenna

Reviewed by H. Ward Silver, N0AX
ARRL Contributing Editor
n0ax@arrl.org

The T-28 delivers useful performance over four-and-a-half octaves of frequency — from 50 MHz to 1300 MHz — on a single structure. (See Table 3 for specifications.) The log-periodic's usual crisscross transmission line that drives the array of 28 elements is integrated into the supporting double-boom — a pair of square tubes to which the elements are mounted. In fact, with its 12 foot boom and turning radius of 7.5 feet, the T-28 looks just like a super-sized version of a standard TV antenna and that's what the neighbors will think it is when you put it up. Whether you enlighten them is up to you, of course. In fact, the T-28 *can* be used as a TV antenna if you used an appropriate diplexer or antenna switch. It might require a bit more rotator than the standard TV antenna (I'm using a Ham-IV) but a sturdy installation is in everyone's interest, if you get my drift. I'm sure the armchair lawyers are already wondering about antenna restrictions and TV reception and that sort of thing.

Table 3
Tennadyne T-28 Specifications

Frequency coverage:	50-1300 MHz.
Boom length:	12 feet.
Half-power beamwidth:	50 degrees.
Front-to-back ratio:	up to 45 dB.
Weight:	17 pounds.
Wind load:	3 square feet.
Turning radius:	7.5 feet.
Typical max SWR:	1.75:1.
Feed point impedance:	50 Ω.
Price: $415.	

Bottom Line

The Tennadyne T-28 log periodic is ruggedly built and will get you on six amateur bands with some gain and a single feed line.

This is not a high gain antenna — the specifications claim 6.3 dBd and that's about right from what I observed on the air. The front-to-back ratio was observed to be anywhere from 3 to 5 S units (18 to 30 dB at 6 dB per S unit) during the contest. (Tip — do not try to do a product review and make a decent contest score at the same time!) All in all, it was a *lot* better than a dipole or whip and not as good as long-boom Yagis on taller towers.

Assembling and Installing the T-28

Figure 6 shows the parts that you get when you open the box and sort them out — there are lots of pieces, including small ones. The smaller tubes are not bagged — count them before beginning and be sure you have retrieved all 56 element halves from the packing. Read through the instructions completely before beginning and practice with the elements, clamps and inserts to be sure of correct assembly. Make sure you understand

the process of alternating elements between booms. (See the comments below on Manuals and Examples.)

I recommend that you assemble the antenna either indoors (measure the exterior door first — do not ask me how I know to do this) or in the garage or somewhere over a smooth surface on which a 6-32 nut can be seen after you drop it. (Tennadyne kindly supplied some extra hardware for the inevitable, "Oops!") Because there are so many elements of not-so-different lengths, I also recommend that you pair them up and sort by length so that you minimize the chances of installing them out of order. (Don't ask me how I know to do this, either.)

Start with the small elements to learn the right technique of inserting the element through the boom, then the screw through the element, and getting the Nylok nut started on the screw. Both 3/8 and 5/16 inch nutdrivers are required for this operation and a punch awl is handy for lining up element holes inside the boom. A portable workbench with a vise to hold the boom while you work makes things easy. Once each individual boom is assembled, double-check that you have the right element in the right place before final assembly and attachment of the feed line. Figure 7 shows the partially completed antenna.

Mounting the antenna on the mast is straightforward and can be done by one person. The antenna weighs less than 20 pounds but it is unwieldy and with so many elements, you have to hold it above your head while attaching the boom-to-mast hardware. The mounting point is not at the balance point — there is more weight towards the front of the antenna — so if that is important (perhaps you have a lightweight mast) you'll want to add some weight in the hollow booms at the rear. Metal rod or bar works well and can be secured with a screw through the boom.

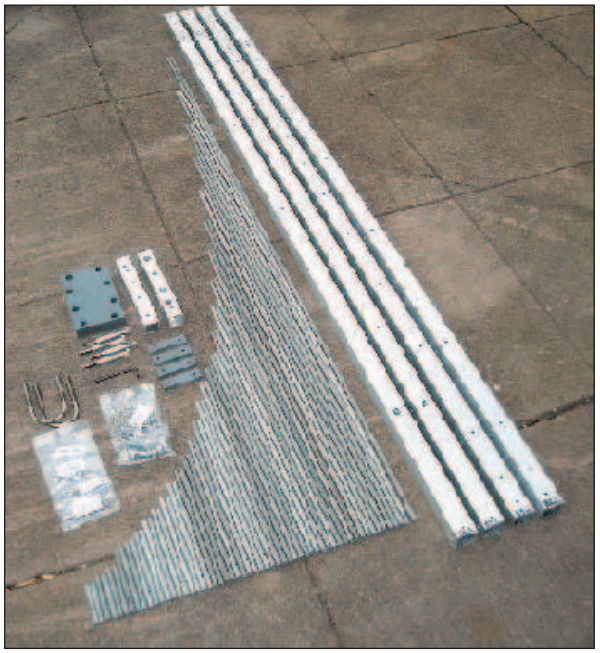


Figure 6 — The parts and pieces received from Tennadyne. Assemble the antenna over a smooth surface to prevent losing any dropped pieces.

T-28 Performance

Up in the air with plenty of time before the VHF Sweepstakes, I was able to give the antenna a spin. Initially, the SWR seemed a little high, particularly on 6 meters when the antenna was aligned with the rearward elements parallel to a nearby wire doublet — hardly a surprise. In the final installation, I found it necessary to have the antenna at least 3 feet above the composition roof and clear of the doublet before SWR stabilized on the 2 meter through 70 cm bands. I used a Bird wattmeter to measure the SWR on 6, 2, 1¼ meters and 70 cm with the following results averaged across each band through 50 feet of RG-213 coaxial cable:

Frequency	*Average SWR*
50-54 MHz	1.4:1
144-148 MHz	1.8:1
222-225 MHz	1.7:1
430-450 MHz	1.9:1

(I do not have equipment for 902 and 1296 MHz at the moment.) The specification is for a peak SWR of 1.75:1 and these figures are within the range of measurement error of meeting that spec.

Once the antenna was installed sufficiently above the roof (and with additional clearance from the wire doublet) it played well and continues to play well. Figure 8 shows the antenna against a high January sky. I received good signal reports and could work any station I heard. Swinging the beam back and forth confirmed the expected directivity. We've had several episodes of high wind or storms and I've noticed nothing amiss with the antenna.

I recently noticed an unexpected feature while working in the backyard garden. What was that faint calliope music and where was it coming from? As it turns out, the open-ended elements were resonating in the breeze with different notes sounding as the wind speed and direction varied! You get free wind-chimes with the antenna — if that might be a problem, a piece of sponge or foam inserted into the end of each element will eliminate it.

Manual and Examples

As with the L222-28 transverter, the manual is okay but assumes a lot of the builder. In particular, for this complex antenna with many opportunities to get things wrong, why not supply a step-by-step checklist? A text paragraph with several steps may contain the necessary information but a checklist augments the graphics by 10 dB! Putting supplementary information online would cost nothing and avoids adding paper pages.

Summary

The T-28 log periodic is a good single-antenna compromise to getting on the VHF and UHF bands without breaking the budget. It's not a high-performance, tight-pattern band-burner but it gets you on six amateur bands with some gain and a single feed line. Giving the evaluation unit a permanent home on my roof was an easy decision!

Manufacturer: Tennadyne, PO Box 352, Alto, MI 49302; 616-622-4968; **www.tennadyne.com.** QST

Figure 7 — Be sure to alternate the elements as described in the manual.

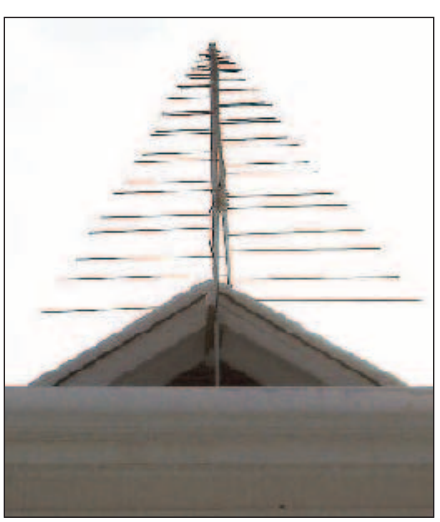


Figure 8 — The T-28 at about 35 feet looks a lot like a TV antenna while doing an effective job on six amateur bands.

TECHNICAL CORRESPONDENCE

MORE ON A HIGH POWER RF SAMPLER (MAY 2011)

◊ARRL Lab Engineer Zach Lau, W1VT, pointed out an error in the May 2011 Technical Correspondence letter from Tom Thompson, WØIVJ. On page 53, in the text describing Figure 4, we incorrectly listed the wall thickness of the hobby brass tubing that Tom used to build his sampler as 0.14 inch. Of course that specification should have been 0.014 inch! I apologize for any confusion and inconvenience this may have caused our readers.

Zack and others also raised some questions about the resistor type Tom used, and also wondered how he formed the concave half-round end on the tubing to be soldered to the "top" of the T. Tom answered those questions and provided some additional construction information for those interested in duplicating his sampler. — *73, Larry Wolfgang, WR1B, ARRL HQ;* **wr1b@arrl.org**

Here are some further comments about my RF Sampler Technical Correspondence:

1) The tubing is actually 9/16 inch OD with a 0.014 inch wall thickness.

2) The 15 Ω, 2 W resistor I used is a metal oxide resistor that I obtained locally. It measures 15 Ω with 20 nH of series inductance. Digikey carries a resistor that should work: part no. P15W-2BK-ND. I don't have this resistor but I have some 100 Ω resistors from the same manufacturer that measure 100 Ω with 4 nH of series inductance. The lower inductance should improve the VHF performance of the sampler.

3) The 34.8 Ω, ¼ W resistor is a 1% metal film component, Digikey part no. CMF34.8QFCT-ND.

Construction Steps

Construct the BNC/toroid assembly as shown at the top of Figure 4, on page 53 of May 2011 *QST*. Cut the tube to length so that the flanges on the BNC connectors just fit inside the through tube, and drill a ¼ inch hole in the center of the tube as shown in the Figure 4 photo. Insert the toroid assembly into the through tube and snake the toroid wires through the ¼ inch hole.

Solder the BNC flanges to the tube, filling the slight gap between the tube and the flanges with solder. Solder a ¼ inch wide brass strip to the through tube just below the ¼ inch hole. Cut the strip so it is just slightly longer than the 15 Ω, 2 W resistor. Cut the lead on one end of the 15 Ω resistor to about ⅛ inch and fold the other end 180° so that it is parallel with the resistor body and solder it to the far end of the brass strip.

Next, solder the 34.8 Ω resistor, along with one of the toroid wires, to the ⅛ inch stub of the 15 Ω resistor. Solder the other toroid wire to the near end of the brass strip. Connect the other end of the 34.8 Ω resistor to the BNC connector center pin.

File a notch into the T tube with a small round file, so that the curvature matches the curvature of the through tube, slip it over the resistor assembly and cut it to length so the BNC flange just reaches the end of the tubing.

Solder the tube to the BNC in the same manner as was done with the cross piece, and solder the curved part of the T tube to the through tube, filling in the gaps with solder. — *73, Tom Thompson, WØIVJ, 990 Toedtli Dr, Boulder, CO 80305;* **tlthompson@qwest.net**

DAIWA CN-801 WATTMETER BULB REPLACEMENT

◊Older models of the Daiwa CN-801 series SWR meters have a small light bulb inside the meter assembly to light up the meter face for low-light operating. See Figure 1. That bulb burns out eventually. By replacing the bulb with LEDs, you can extend the life of the meter. It's a bit awkward to replace this bulb. Here are the steps I followed to do it in less than 30 minutes.

Start by removing the case screw on top, and then the two screws on each of the left and right sides. You will need to flex the cover a bit to remove it. Once inside, you may want to label the wire connectors on the circuit board, then disconnect them.

Now locate the screw that goes through the meter retaining plate on the left side of the meter when looking from the rear. You'll need a stubby Phillips screwdriver to get it out, as you can see from Figure 2. Once that is out, remove the meter by slightly moving it to the left while taking care not to break the plastic case tabs on its right side.

Figure 1 — The Daiwa CN-801 SWR/power meter is a versatile instrument. The meter face is illuminated by a small bulb below the bottom of the meter movement.

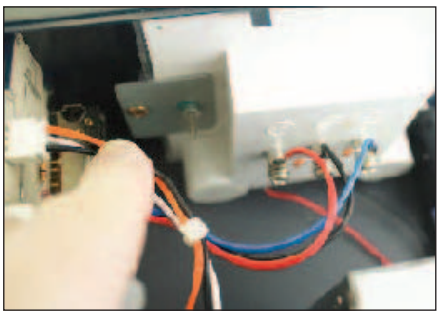


Figure 2 — Inside the cabinet, you will have to remove one Phillips screw to remove the meter movement from the case.

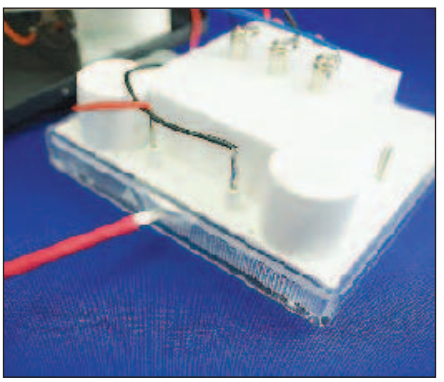


Figure 3 — You may need a thin-blade screwdriver or other tool to gently pry the plastic lens from the front of the meter case.

Notice that red and black power leads go from the back panel to the bottom of the meter — this is the power connection to the light bulb. Carefully remove the meter from the case — you don't need to unsolder anything.

Next, you'll need to open the meter itself. Start by removing the four pieces of transparent tape around the edges. Next, pull the clear plastic face off the back of the meter. You may need a small screwdriver to gently pry it apart at the notches, as shown in Figure 3. As you remove the cover, be careful not to disturb the two meter movements and their needles. Put the cover where it won't get scratched.

Now place the meter on its back, so you can see the long bulb between the two terminals at the bottom. You can see the bulb near the bottom of the meter face in Figure 4. Snip off its wire leads. We'll clean it up later.

I used two white LEDs and a 470 Ω resis-

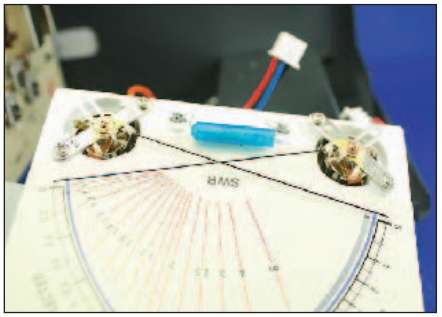


Figure 4 — With the plastic lens removed, you will have to be very careful with the meter movements so you don't damage them or bend the indicators. The bulb is at the bottom of the face plate, just below the double indicator pointers.

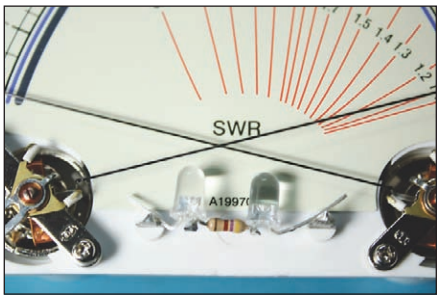


Figure 5 — This photo shows how I positioned the LEDs and resistor to replace the bulb.

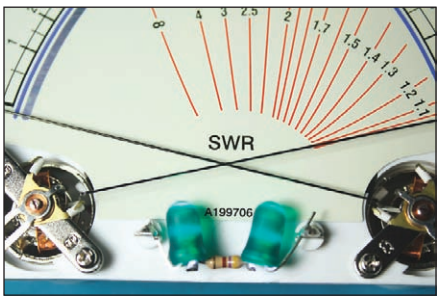


Figure 6 — The white LEDs were a bit too bright for my liking, so I covered them with green translucent covers.

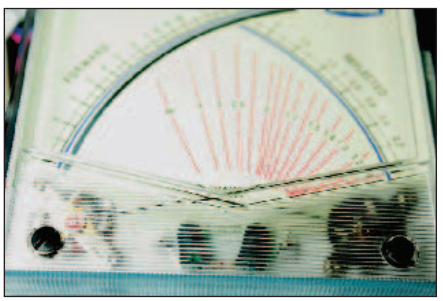


Figure 7 — You can see the LEDs behind the diffuser portion of the front meter cover here. Be sure that the LEDs do not interfere with the meter movements.

Figure 8 — With the LED replacements for the bulb, the meter now has a soft glow that makes the meter easy to read in a darkened shack, without being too bright and causing glare.

tor. I soldered these up first, with the resistor between the cathode of the first LED and the anode of the second LED. Before soldering the remaining LED leads to the terminals, remove the old lamp leads, and then test fit the LED assembly. I bent the leads into a bit of an angled position, and had to put them near the bottom of the meter face, so that they would be hidden by the clear cover. See Figure 5. Solder the positive terminal to the anode of the first LED, and negative terminal to the cathode of the second LED.

I found the white LEDs to be a bit harsh, so slipped on green translucent covers to give it a softer glow, as shown in Figure 6. At this point, you might want to carefully power up the LEDs, to check your aim and see what it will look like.

Test fit the clear meter cover to ensure that the LEDs are hidden below by the diffuse part of the cover. Figure 7 shows how I positioned the LEDs. You may need to adjust their position a bit after soldering them into place.

If you are satisfied, make sure that the two plastic adjusting screws that zero the needles are working. You may have to lift the cover up, then turn them slightly, and ensure they engage. Next, retape the cover, then put it all back together in reverse order. Enjoy your new longer-life lighting. I like the soft glow the LEDs provide, as shown in Figure 8. — *73, Colin Haig, VE3MSC, 295 Alexander Cres, Milton, ON, L9T 7C4, Canada;* **ve3msc@arrl.net**

THE TRUTH ABOUT ERROR DETECTION AND CORRECTION

♢I don't know how many times I've heard an Amateur Radio operator say something like, "We can guarantee your list will be transmitted error free because our system uses error detection and correction." Well, no, if by guarantee you mean 100% certain that the file was received without error.

One example I saw is in the article, "A Digital Simulated Emergency Test," June 2010 *QST*, on page 77. The author states, "If the two checksums are identical we can be 100% certain that the file was received without error."

Error detection/correction can increase the probability of error free transmission, but it can never reach 100%. To see why, all we need do is look at how error detection/correction works. In the most general terms, an error detection/correction method examines the message to be sent and calculates a value based on items in the message. This value is sent along with the message. The receiver applies the same method to the received message to create a value and then compares them.

At this point, error detection and correction diverge. If the values don't match, error detection reports an error while error correction tries to fix it. The first concern is the "Who watches the watcher?" problem. If there is an error in transmission, the error might just as well be in the value. This would cause a false negative. The value is incorrect because of corruption while the message is in fact error free.

The next concern is the "Different messages same value" problem. The value is transmitted error free but the message is corrupted in such a way that when the receiver calculates the value it matches the uncorrupted value. This causes a false positive. The values match but the message is corrupt.

The last concern is the "All messed up correctly" problem. Both the message and the value are corrupted in such a way that the corrupted value is the correct value for the corrupted message. This would cause a false positive. The system reports a correct message when in fact the message is corrupt.

You might complain that the chances of this happening are so small as not to matter. After all, a difference that makes no difference is not a difference at all. Well, as long as the mechanism used to check transmission fidelity is itself transmitted, you cannot be 100% sure. If you tell a served agency otherwise you do them a disservice.

The bottom line is the use of error detection and/or correction can increase the probability that the message received is in fact the message sent but it cannot "guarantee" it. — *Garry Hooghkirk, KDØDHB, 2139 Bel Aire Ave, Duluth, MN 55803;* **qst@hooghkirk.com**

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. QST

W1ZR

THE DOCTOR IS IN

Q Blake, W8MNT, notes: I enjoyed reading the article about sunspots in the March 2011 issue of *QST*, but have a question.[1] Why do sunspots produce a higher ionization level in earth's F2 layer? I have been a ham for over 50 years and never learned the answer to that. I hope you can explain it.

A Sunspots are the result of intense magnetic activity near the surface of the sun. In addition to the visible appearance, they are accompanied by solar flares and coronal mass ejections that emit radiation across the spectrum. Some is into the X-ray region — called *ionizing radiation* for good reason. That portion of the energy coming toward the Earth first encounters the F layer of the ionosphere and results in ionization of the molecules of the ionosphere on the sunny side of the planet.

Q Mike, W4PPL, asks: I am trying to use an old automotive antenna to make a 2 meter mobile antenna similar to the one in the March 2011 issue of *QST*.[2] I have an old piece of coax cable with no markings on it that I would like to use. How can I determine what the characteristic impedance is?

A There are a number of approaches to identifying the characteristics of unlabeled coax — mainly depending on the tools at hand. Before I describe any, I should point out that old "free" coax is often not the bargain it seems. Some old coax may have degraded in a way that will increase its attenuation — a particular problem at VHF and above. Since the usual mobile installation generally requires a fairly short length, you may be better served by spending a very few dollars on a new piece — then you will be sure of what you are getting.

Still, there are circumstances that make it desirable to know the characteristic impedance (Z_0) of coax, so we'll discuss some of the techniques here.

If you have a 50 Ω SWR or power meter and a dummy load, terminate the far end of the coax with the dummy load and measure the SWR at the near end on a few different bands using your transmitter or other power source. If it's 50 Ω coax, the SWR should be 1:1. [Verify that the meter reads 1:1 with the dummy load at the meter without the coax. — *Ed.*] The reason for using a few frequency bands is that if the coax happens to be an exact multiple of an electrical half wavelength, it will see the impedance of the load no matter what the Z_0 of the coax is. You could make the same measurements using an antenna analyzer.

If it isn't 50 Ω, chances are it's 75 Ω — 93 Ω and 35 Ω coax are occasionally encountered, but they're pretty rare.

Another way is to examine the mechanical characteristics. First try to identify the dielectric between the inner and outer conductors. Standard polyethylene is usually a bit yellowish and tough — hard to push a fingernail into. Foam is usually white, softer and more pliant. Next, using a vernier or electronic micrometer, carefully measure the diameter of the inner conductor. Then measure the diameter of the outside of the inner dielectric (same as inside diameter of the shield).

The $Z_0 = V_R \times 138 \times \log_{10} (D/d)$

$V_R = 0.66$ for polyethylene, around 0.85 for foam, depending on composition

D is shield inner diameter, d is inner conductor diameter, both in same units.

Or look at the Belden or Amphenol website and see if you can find a cable with the same insulation and similar dimensions.

Q Pierre, VE2MP, asks: I am new to PSK31 and I want to get a clean signal. I have a dummy load with an RF pickup and a good oscilloscope. I wonder what to look for on the 'scope to be sure I have a clean, undistorted signal

A It's very good of you to think about the quality of your signals before you jump into a new mode! Unfortunately, while a 'scope is a very useful instrument for many tasks, I do not believe that you will be able to resolve the required level of phase shift variation in any normal oscilloscope mode I can think of. Many types of PSK31 software have phase indicators designed to observe the phase shift of a received signal. If you can rig a way to receive your own signal while sending on a dummy load, you can watch that indicator as you adjust your transmitter.

Alternatively, most people find that if they run their transmitter at about 25-50% rated output, with no compression or ALC indication it will put out a good undistorted signal. *QST* Editor Steve Ford, WB8IMY, wrote a short article on the subject a few years back that identifies some accessory devices that can be used for the purpose.[3] Alternately, turn down your MIC GAIN until there is no hint of ALC action when you switch to transmit, and ask other stations if they see any evidence of distortion.

Q Joe, WA7MHB, asks: Your answer concerning circularly polarized antennas (*QST*, Apr 2011, p 55) is very timely for me. I am teaching a class for Amateur Extra class candidates with Earth-Moon-Earth communication one of our projects. We have crossed Yagis for both 2 meters and 70 cm, but need to switch their phases. I know how to work out everything except the ¼ wave, 36 Ω transformer.

Can the transformer be accomplished by simply connecting two ¼ wavelengths of 75 Ω line in parallel? At 70 cm do we need to concern ourselves with maintaining 50 Ω impedance between the two top connectors if we were to use a 3 inch wide box?

A There actually is such a thing as 35 Ω cable available. Its nomenclature is RG-83, and there may be others. See, for example, **www.awcwire.com/Part.aspx?code=460F23F27J42**. Unfortunately, I'm not sure anyone would want to talk to you about an order for 6 feet of it.

A pair of 75 Ω cables in parallel will work fine. I suggest the use of T connectors at each end and make sure they are exactly

[1] J. Hallas, W1ZR, "Getting on the Air — Get Ready for Sunspot Cycle 24," *QST*, Mar 2011, pp 65-66.

[2] D. Palmer, AI4WT and J. Swartz, AF4ZE, "A Factory Style Mobile Antenna Installation," *QST*, Mar 2011, pp 43-45.

[3] S. Ford, WB8IMY, "The Skunk at the Digital Party," *QST*, Dec 2007, p 50.

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

the same length. Don't forget to shorten by the relative velocity factor (see above).

The signals will divide equally between the two cables and all effects take place within — not between — the cables. Any wire length between the end of the cable assembly and the antenna will act like a part of the antenna, typically lowering the resonant frequency.

Q Bill, K4QFE, asks: Can I feed two antennas, one for 2 meters, one for 70 cm with one feed line, as shown in *The 2011 Radio Amateur's Handbook*, Chapter 21, Figure 21.112?[4]

A That phasing harness arrangement (see Figure 1) is designed to split the power between two antennas on the same band to increase the gain and directivity compared to a single Yagi.

In general, it will not work for two bands because you want all the power on a given band to go to/from the correct antenna so your signal ends up in the right place.

[4]*The ARRL Handbook for Radio Communications,* 2011 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 0953 (Hardcover 0960). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop**; **pubsales@arrl.org**.

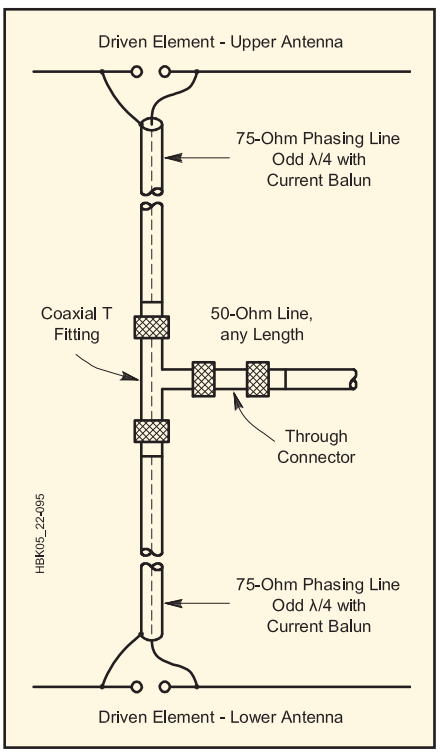


Figure 1 — Splitting the power from or to a single transceiver to a pair of stacked Yagi antennas to increase the gain and sharpen the pattern. To use the arrangement with multiple antennas on different bands, the coaxial T fitting at the split needs to be replaced by a diplexer that sends the energy to the correct antenna for the frequency.

You can achieve what you want if you substitute a diplexer for the coaxial T fitting shown in the figure. A diplexer filters based on frequency and sends the correct signal to the correct antenna. In that case, all the coax is 50 Ω and the lengths are not critical. See the product review of diplexers in December 2004 *QST* — available on the ARRL web page.[5]

Q Dan Shook asks: I'm studying feverishly for my first amateur operator license. I read *QST*, and other materials, cover to cover. I continue to be frustrated by the words in the subject line that refer to bands. At first, I assumed that "...and above" and "...and higher" *always* meant "…and at higher frequencies" when the reference was to "bands." But I'm finding, even in *QST*, inconsistent usage of the subject words.

Sentences often begin by using the word *frequencies* (or *Hz*) and then end by using the word *bands* modified by *higher* or *lower* or *above* or *below*. I understand this usage with all references to frequency. However, some sentences begin by using *meters* (or *cm*) but still end by, again, using the word *bands* modified by *higher* or *lower* or *above* or *below*. In these sentences, sometimes, theory contradicts the usage of "bands" as frequencies.

To complicate matters further, bands seem always to be named by a nominal wavelength. What does it all mean?

A It is, unfortunately, all based on our early roots — before even my time!

In the very early days of radio, wavelength was used to indicate a portion of the radio spectrum. This might have been due to the relationship between antenna size and operating wavelength, since that was one of the early tuning elements. Before the Communications Act of 1934, radio communications were controlled by the Federal Radio Commission — an arm of the ICC. At around that time, channel assignments were specified by the FCC in terms of frequency rather than wavelength.

They are equivalent measures — given a common velocity of propagation — W = C / f, where C is the speed of light in compatible units. Because of the inverse relationship — one goes up while the other goes down — I suspect the source of your confusion.

For many years radio dials included indicators for both wavelength and frequency. Now pretty much everyone has settled on frequency as the description of an exact channel, while a wavelength range or band is used to describe a cluster of channels used by a particular service.

In my experience, and my usage, if I say "20 meters and higher amateur HF bands," I do refer to bands at higher frequency — in this case I mean exactly the 20, 17, 15, 12 and 10 meter bands. The one exception that I'm aware of is the reference to "top band" as a descriptor of our 160 meter MF band. That definitely goes back a long way, to the days when meters was the common unit, but fortunately is an exception.

Because it is confusing — in my opinion it is never out of place to ask someone what they mean!

♢In the May 2011 column, I provided my thoughts on making antenna halyards squirrel proof in response the question from Jack, KC5DHD. My answer was to use wire rope. I have received two other approaches from members that I thought might be of interest.

Jim, W1EQO, notes: I had a problem with them chewing and scratching on my house. They wanted a warm abode for the winter several years ago. Both gray and flying squirrels were involved, making a mess of the space under my eaves. I mixed up some hot pepper oil with the dark stain that I used on the house. I liberally applied the mixture to the scratched area. After a scratch or two each squirrel left never to return.

It would be good to determine if the mixture is compatible with a particular rope. Depending on the chemistry, the oil might dissolve the rope. Hot pepper oil is available at specialty food shops and some supermarkets.

Steve, W6SSP, offers a different approach: My wife is an animal lover and has rescued many squirrels in the neighborhood over more than 20 years, so we've had a lot of experience with these critters. The only reason they will chew on cables, coax or rope is because they are hungry — perhaps starving. Giving each wild squirrel a shelled walnut, pecan, or almost any other hard shelled nut (but not peanuts) every other day or so will keep them happy and well fed.

You won't end up with a ton of squirrels by doing this. They are very territorial and one pair will chase away invaders. Even if (or when) they have a litter, once the babies grow up the parents will chase them off. Shooting resident squirrels won't provide a solution either because another pair will move in eventually. Our experience is with Western grey tree squirrels, but it's likely that other types will behave the same way.

[5]J. Hallas, W1ZR, "Product Review — A Survey of 2 Meter/70 Centimeter Diplexers (Comet CF-4160J; DCI 144-148/438-450-DX-DB; Diamond MX-72D; MFJ 961B)," *QST*, Dec 2004, pp 63-66.

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

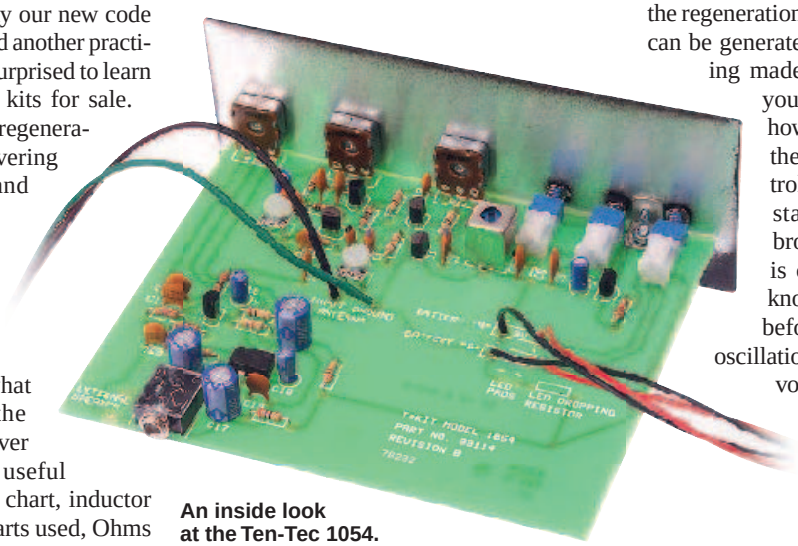
Ten-Tec 1054 Shortwave Receiver Kit

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

What's a low cost electronic kit that can be built in a couple of hours by a novice builder? That's the question I pondered while planning this year's kit building exhibition at the ARRL Expo at the Dayton Hamvention®. Novice builders of all ages have sat in our Expo work area to build small but useful Amateur Radio related kits for the past two years, enjoying the experience of following instructions, soldering and using hand tools while being mentored along the way. To accompany our new code practice oscillator kit, I needed another practical project. I was pleasantly surprised to learn that Ten-Tec offers receiver kits for sale. I picked the model 1054; a regenerative, four-band receiver, covering 5.9-6.4, 6.9-7.4, 8.5-10.2 and 11.5-16.5 MHz.

The Ten-Tec 1054 receiver in its optional oak accessory cabinet.

The 1054 manual is geared to the beginner; it explains what shortwave radio is, what can be heard on each of the four bands, (logging page included), what regeneration is and how the circuitry works. The back cover of the manual has several useful charts; a resistor color code chart, inductor and capacitor chart for the parts used, Ohms Law and even a chart with the formula for a quarter wave antenna.



An inside look at the Ten-Tec 1054.

Build It and Listen

The completed kit is powered by two 9 V batteries; one for the receiver circuit, the other for the LM386 audio amplifier circuit. All controls are on the front panel. At left there are three push- buttons; one for power on/off and the other two for selecting the frequency range. Three controls dominate the rest of the panel; (varactor) tuning, regeneration and volume.

The 1054 kit has been around for a while and, understandably, some parts are different from the initial design, so Ten-Tec includes an addendum sheet of part corrections and manual instructions. The instructions are clear, starting with taking inventory of all parts and hardware. I always lay out parts neatly on an uncluttered work area. If you've never soldered before, have someone show you, or check out some of the "how to solder" videos on line (don't forget your safety goggles).

About one third of the way into construction, the audio amplifier circuit is completed and a simple test for audio hiss is performed. For listening, an inexpensive set of stereo headphones work best, though there are labeled points on the circuit board for a speaker. I noticed the ⅛ inch headphone jack is wired for a stereo plug. A mono (two conductor) plug could damage the audio circuit. Overall construction time took me about two hours, which included many "What are you doing Bob?" conversations in the ARRL Lab.

The Purpose of the Ten-Tec 1054 kit is for the beginner to experience the joy of kit building. With that in mind, Ten-Tec has left the purchase of knobs, a case, and antenna connections to the builder. I found inexpensive knobs online at Jameco (**www.jameco.com**). A clip lead, cut in half, served as antenna and ground tie points.

Before operating, I strongly suggest trying out the receiver for the first time with headphones *off*, until you get to know how the regeneration control works. Loud squeals can be generated while adjustments are being made. Once you learn the ropes you'll become comfortable with how to tune the radio. Learning the quirks of the REGEN control is key. To listen to an AM station (such as a shortwave broadcaster), all you need to do is carefully tweak the REGEN knob until you find the point just before regeneration breaks into oscillation. Once a station is heard, the volume can be increased. When you're listening to CW or SSB signals, you'll want to turn the REGEN control until the circuit begins oscillating.

Educational and Fun

Please remember, while this is a Ten-Tec, it's not a Ten-Tec Eagle transceiver. The 1054 is a simple regen receiver, which means it is sensitive, but not selective. Even so, I suspect even a veteran ham will get a fair amount of enjoyment from this kit. With a 30 foot piece of wire I listened to many amateur and shortwave stations. In fact, I was pleased enough to purchase the optional solid wood case with speaker. The Ten-Tec 1054 is a perfect "first kit" for a beginner, or a clever, entertaining diversion for the experienced amateur.

Manufacturer: Ten-Tec, 1185 Dolly Parton Parkway, Sevierville, TN 37862; **www.tentec.com***; tel 800-833-7373. $39. Oak accessory cabinet: $39.* QST

Steve Ford, WB8IMY ♦ *QST* Editor ♦ sford@arrl.org

NØAX

HANDS-ON RADIO

Experiment 102
Detecting RF — *Part 1*

RF is all around us with wavelengths from thousands of miles to a few nanometers and yet the only RF we can sense directly is a narrow slice of spectrum from the infrared (as heat) to the ultraviolet (as a sunburn!). For every other type of RF we have to use some kind of technological device to tell whether RF is present and whether or not it is carrying some kind of information we're interested in. That's the subject of this (and next) month's column — detecting RF.

As all hams know, or find out, a sure fire way of detecting RF is for your neighbor to buy a touch lamp or an inexpensive pair of computer speakers. It's guaranteed that they'll come right over and tell you whenever RF is present — yours or not. In these columns, I'll present a survey of more useful techniques, I'll discuss how they work, and I'll present some simple circuits that you can build and use as shack test instruments.

Detect Versus Demodulate

Before we plunge in, there is a small matter of defining what we mean by *detect*. As we learn from **www.dictionary.com**, the definition of *detect* is "to discover the existence of," as in "I detect mold in my QSL collection." The noun form is *detector*, a device that detects. More specifically, the *CRC Comprehensive Dictionary of Electrical Engineering* defines *detector* as "a device that converts RF input signals to a corresponding dc output signal."[1] Notice that it doesn't say anything about the output signal being representative of anything other than the presence of RF.

A *demodulator*, on the other hand, takes things a step further by performing *demodulation*, "the process by which a modulated signal is recovered back to its original form. It is the general process of extracting the information bearing signal from another signal." So a detector simply tells us whether or not RF is present. If we happen to detect a modulated signal and get the modulating information out of the detector, so much the better. A demodulator, on the other hand, must apply some kind of process to extract the modulating information from the modulated signal. We'll focus on the simpler business of detection.

An Early Detector

The best known detector used in the early days of radio was not the cat's whisker crystal detector. It was the *Branly coherer* shown in Figure 1 — a tube of metal powder or filings with electrodes at each end — invented in 1890 by Édouard Branly. If an electromagnetic wave passed an antenna connected to the coherer, the current through the coherer made the filings stick together a little bit and that changed the resistance between the electrodes. The change in resistance could be used to make clicks in headphones or perform some other action an operator could sense.

After the wave had been detected, it was necessary to tap the coherer to loosen up the filings again and prepare the coherer for more current. The Morse receiver of the day used a coherer to drive a relay that caused the received code to be printed on paper tape and also activated a solenoid that would deliver a sharp tap to the coherer with its armature.

Needless to say, this wasn't a very sensitive or selective receiver but it did the job and allowed radio to get started. Interestingly, technology progressed rapidly and better detectors were soon invented before the *Branly effect* — the reason why the coherer worked — was understood. It was not until a century later (approximately 2005) that the nanoscale physics behind it was unraveled.[2]

Metering Waves

Another type of detector that was used long ago and is still useful today is the *absorption wavemeter*, used to determine the presence and frequency of RF. The wavemeter is not called a "frequency meter" because in the early days, signals were referred to in terms of wavelength. Today, we think in terms of frequency.

As shown in the schematic of Figure 2, this is the simplest of instruments. All that's needed is a means of collecting (absorbing) whatever RF is present (the antenna), a calibrated means of discriminating between RF signals of different frequencies (the tuned circuit), and a means of displaying signal strength to an observer (the meter and diode). The coil is generally fixed in value and the capacitor tuned. In many wavemeters used for circuit troubleshooting the coil and antenna are combined, with the coil placed close to the circuit being tested to pick up signals. Essentially, the wavemeter is a crystal radio with a meter replacing the headphones.

To make your own wavemeter, you'll need to wind a suitable coil and find a suitable tunable capacitor. The example shown here is just one of an infinite number of combinations that can work. An 18 µH inductor

BRUNO HENRY, F1JMM

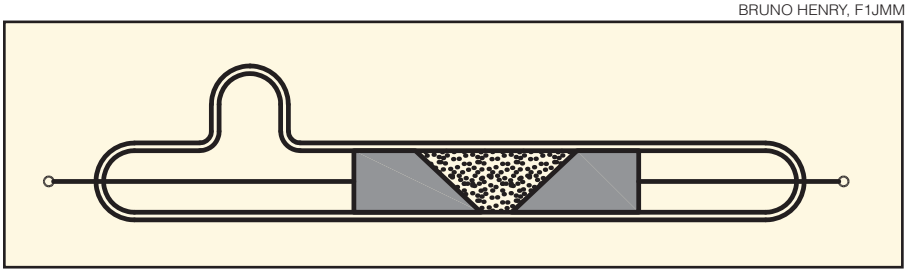


Figure 1 — The structure of the coherer — a sealed glass tube with filings contained between two electrodes.

[1]*Comprehensive Dictionary of Electrical Engineering*, IEEE, 1999.

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

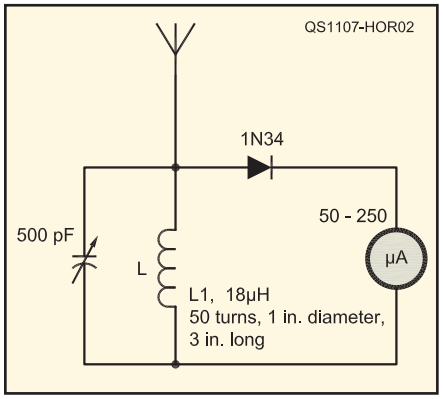


Figure 2 — A simple absorption wavemeter circuit. The tuned circuit acts as a filter to determine signal frequency. Any 50 to 250 μA full-scale meter may be used.

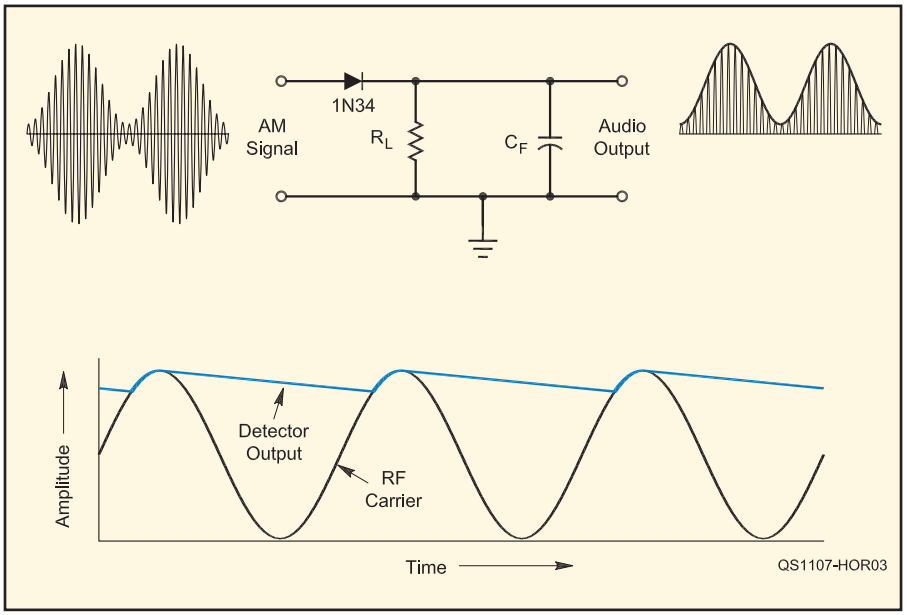


Figure 3 — The simple envelope detector circuit rectifies and filters the incoming modulated RF signal. A low-frequency waveform representing the envelope of the modulated signal is passed to the output.

(50 turns on a 1 inch diameter form, such as a pill bottle, evenly wound over a 3 inch length) in parallel with a 500 pF variable capacitor, can tune to the lowest part of the 160 meter band whose name itself is a nod to our wavelength legacy. A handy online calculator for air wound inductors can be found at **www.crystalradio.net/cal/indcal.shtml** so you can try different inductor values or shapes.

You can find many variations on this simple circuit by searching the Internet for *absorption wavemeter*. A common enhancement to this circuit is adding a diode to form a voltage doubler or using a switch to switch in and out different numbers of turns to change the range of the tuned circuit's resonant frequency. You can calibrate your wavemeter by using a signal generator or your own transmissions.

Envelope Detectors

The rectifier and meter also form a crude *envelope detector* that responds to the peak value of the RF signal. If you tuned the wavemeter to an AM broadcast station or an SSB station transmission, you would see the meter move in sync with the amplitude of the modulating signals. (If you tuned in an FM signal — a *constant-power* signal — the meter would show a steady deflection as long as the transmitter was on.)

Envelope detectors are used to separate the modulating signal from the RF carrier of AM signals. A simple circuit for an envelope detector is shown in Figure 3. Replacing the meter of the wavemeter is the parallel combination of a filter capacitor (C_F) and a load resistor (R_L), forming a low-pass filter. The diode quickly charges C_F to the peak value of the envelope through the forward resistance of the diode, R_d. C_F then discharges slowly through R_L. This difference in charge and discharge time constants allows the output voltage to track the envelope of the AM signal while shunting the RF component to circuit common.

For the envelope detector to work, three conditions must be met. First, in order to be able to reproduce the modulating signal, the cutoff frequency of the low-pass filter formed by R_L and C_F must be higher than the bandwidth of the modulating signal: $1 / (2\pi \times R_L \times C_F) >> BW$. Second, the filter's cutoff frequency has to be much lower than the RF carrier frequency, f_C, so that it is removed from the output: $1 / (2\pi \times R_L \times C_F) << f_C$. Third, the detector's charging time constant ($R_d \times C_F$) must be short enough for the capacitor to charge on RF signal peaks. For small signal diodes, once conduction begins in earnest R_d is around 800 Ω.

To make your own AM broadcast signal envelope detector start by determining the desired modulating signal bandwidth — about 10 kHz — so $R_L \times C_F >> 1 / (2 \times \pi \times BW)$ = 16 μs. The longest RF cycle of the AM broadcast band is 1 / 550 kHz = 1.8 μs. Splitting the difference with a 10 μs time constant allows us to use two common values, C_F = 0.001 μF and R_L = 10 kΩ. The charging time constant is approximately 0.8 μs, shorter than our RF carrier cycle.

Why is a germanium diode used? If the input signal is very small, such as for a crystal radio, a diode with a very low forward threshold voltage should be used. 1N34 or 1N277 germanium diodes begin to conduct in the 0.2 to 0.3 V range while a silicon diode, such as 1N914 or 1N4148 requires 0.5 to 0.6 V. This is why silicon diodes don't work well in crystal radios.

Try building an envelope detector and use an oscilloscope to view the recovered waveform. You can either try receiving a local AM station (an outdoor ham band dipole will probably pick up plenty of signal if the transmitter isn't too far away) or transmit an AM signal on 160 meters at low power while using a long piece of wire as your receive antenna. You can also add a blocking capacitor (0.1 μF will suffice) in series with the output and route the signal into an audio amplifier.

Experiment by varying the values of the low-pass filter while listening to the signal. What happens to the audio quality as the low-pass filter time constant is increased by raising the value of C_F? How large can C_F be and still recover acceptable speech? (Speech has a bandwidth of about 3 kHz.)

More Detectors

You can put the envelope detector to work on your bench as an RF voltage probe for your voltmeter as shown by Monty, N5ESE, at **www.io.com/~n5fc/rfprobe1.htm**. You may also want to reread Hands-On Radio experiment #53 on "RF Peak Detectors" for another application.[3] Next month, we'll detect RF current and sample an RF waveform.

[2]J. Dilhac, "Édouard Branly, the Coherer, and the Branly Effect," *Communications*, IEEE, Sep 2009, pp 20-26.

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

AG1YK

HINTS & KINKS

AN EASY REPLACEMENT FOR BAYONET BULBS

◊When the meter bulb in my Heathkit SB series amplifier burned out I decided it was time for a modern replacement. The LED bulbs that I could find were expensive and did not give the look I wanted. I had recently used Cree LP379PBL1-C0G-03 blue high-intensity LEDs with 120° illumination angles to top light meters in another project and decided to try them. These LEDs are available from Digi-Key (**www.digikey.com**).

[Caution: Be sure to wear eye protection for the following procedure — *Ed.*] Start with a burned out bulb. Remove the solder both on the bottom and side of the base making sure the wires are loose. Wrap the bulb in several layers of paper towel and, being careful not to damage the base, break the glass. Remaining glass and mounting material in the base are removed by very carefully squeezing the base with a pliers until it has all crumbled and fallen out. Do this very carefully so as not to damage the base. Be sure to safely discard the glass shards that result from this process.

Many older radios and Heaths in particular supply either 6.3 or 12.6 V ac to the bulbs. LEDs cannot withstand much reverse voltage so I put one 1N4148 diode in series with the LED and a second in parallel with it. D3 is a protective device and only functions if unexpected circuit conditions allow the reverse voltage to exceed –0.7 V. A resistor in series limits the current to a level suitable to the LED. In the case of my SB-206, which uses 6.3 V ac, a 130 Ω, ¼ W resistor held the average current to around 30 mA and the peak to under 50 mA. For radios that use 12.6 V ac a 300 Ω, ½ W resistor would be more appropriate.

The cathode of one of the 1N4148s is soldered to the LED anode and the resistor to the LED cathode (see Figure 1). A second 1N4148 is soldered across the LED pins with its polarity reversed from that of the LED. Shrink wrap is used liberally to prevent shorts. The remaining lead of the resistor is soldered to the top of the base. The remaining lead of the 1N4148 is passed through the bottom of the base and soldered (see Figure 2). Friction from the various pieces holds everything in place.

The LED replacements are not as bright as the original incandescent bulbs but are bright enough to see the meter well and give a neat looking blue glow. Meter illumination is fairly even, better than the original bulb. Best of all they should run cooler, use less energy and never need replacement. — *73, Bill Ockert, NDØB, 1119 Hwy 30, Cathay, ND 58422*, **nd0b@arrl.net**

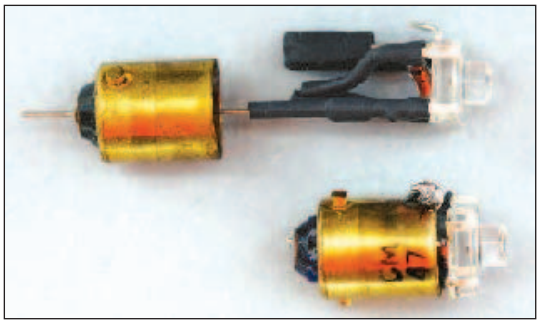


Figure 1 — The updated bayonet bulb. Above is the LED assembly ready to be mounted in the bayonet base. Below is the completed bayonet LED.

BILL OCKERT, NDØB

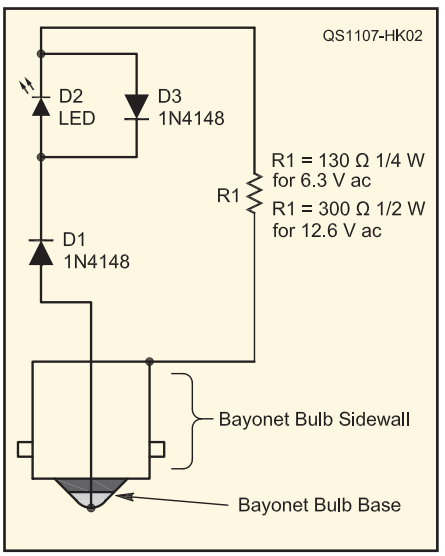


Figure 2 — A schematic of the bayonet LED assembly.

DUAL-CHANNEL CW FILTER

In the old days of very wide receiver passbands we used "Q Multipliers" to peak a CW signal. This gave nowhere near the steep-skirted selectivity of modern DSP (digital signal processing) or SCAF (switched capacitor audio filter) filters, but would lift the signal out of the noise background enough to copy.

Today, many of us are using a very selective filter, which may cause us to miss a call 1 kHz or less away. If you have a good outboard audio filter of any type, it is easy to have the best of both worlds using the technique that follows:

First, obtain a pair of used computer speakers at the local thrift store. Then plug a "Y" splitter into your rig's audio output jack. Connect one lead to the unpowered speaker, the other to your external filter. Plug the powered speaker into your filter.

Select a CW signal to copy and place it in the center of your audio passband. Adjust the volume of the powered speaker until the sound is centered.

You now have a highly filtered, steep-skirted channel and a 2.1 kHz unfiltered channel mixing in the ultimate audio device — your brain. The desired signal will be head and shoulders above the noise but you will still be able to hear off-frequency calls. — *73, Norman Sullivan, NZ5L, PO Box 55, Beach Lake, PA 18405*, **nz5l@arrl.net**

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

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

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

The Call Sign of the Wild

A shack on wheels and homebrew antennas make for a far north radio adventure.

John Reisenauer Jr, KL7JR

The VY1RST antenna farm, which consists of a shortened 40 meter inverted V and a Webster Bandspanner.

The wild and unpredictable conditions prevalent in the Yukon and Northwest Territories make operating a challenge that has always appealed to me. Building my own antennas and testing my ability to surpass the radio challenges that Mother Nature throws at you "up here" is what I thrive on. Having lived "the Alaska dream" twice now, it was time for a change and one last Canadian adventure as I was heading south.

VY1RST at Kluane Lake

My first week out was spent at a favorite place of mine, Kluane Lake, in the southern Yukon along the Alaska Highway. The peaceful solitude of the Yukon was an ideal place to test my 15 meter horizontal inverted V made from CB antennas. Don't laugh — this design was already proven on 20 meters up here last winter. Imagine, portable directivity for less than $50. No coils or baluns either.

The CB antennas — you'll need a pair for a dipole or inverted V — are readily available and fairly easy to tune. Using 10½ inch long whips I measured an SWR of 1.1, an R of 60 and an X of 0 on my MFJ analyzer. The only problem was a lack of propagation on 15 meters every time I checked the bands. I've also experimented with the verticals as vertical dipoles and had good test numbers, too. Even though 15 meters was uncooperative it wasn't a total loss as I was able to test the newest version of my one person antenna raiser (**www.hamuniverse.com/kl7jrantennaraiser.html**). It makes it easy to raise an antenna and a 25 foot mast.

I also concocted a 40 meter version of the design using vertical ham antennas that had an SWR of 1.2, an R of 45 and an X of 0 from 7.190-7.240 MHz. With the height at only 10 feet I worked Tom, W6HMB, and Pat, K6AAX, in California; Frank, N7EKD, in Oregon and Clayton, KL3AB, in Alaska. High winds prevented me from further testing.

Believe it or not, most of the stations I contacted were 59 and I was either 55 or 57 for them. The next day I put the antenna up at about 20 feet and 59 signals were heard from the Midwest and South. Again, high winds prevented me from more testing. Next, I tuned the antenna on 20 meters with my LDG Z-100 autotuner and traded 59 reports with Ed, K6HP, in California. I was pleased with the test results of my inverted V and will take them to another level later as minibeams.

Bring Out the Bandspanner

I dug in to the belly of my motor home and pulled out my old Webster Bandspanner, a 10-80 meter vertical made in the early 1960s. I purchased mine used about 10 years ago and love its solid performance, even though mounting it can be awkward at times. I found a mounting solution at a local discount store. There I found a small metal folding stool. I simply drilled a ½ inch hole in the center of the stool and added a ⅜ inch threaded connector. I drilled two more ¼ inch holes to attach ground radials, which I use whenever possible.

I've used both Outbacker and Hamstick type verticals over the years. When I use the Webster, the antenna requires additional support depending on which type of connector is used. You can mount the stool on your patio, picnic table or right on the ground to launch your signal. With this setup, VY1RST worked Canada, Estonia, Finland, Hungary, Jamaica, Puerto Rico, Russia, United Arab Emirates, and many others over the next couple of days.

Ghost Town Radio

After 4 days at Kluane Lake, I decided to head about 10 miles farther down the Alaska Highway, camp at another favorite spot and try out my modified G5RV. I was parked close to the lake near the old ghost town of Silver City. My antenna looks like a G5RV but is off-center fed and easily loads 10-80 meters. I just used what wire I had available. One leg is about 70 feet long and the other is about 50 feet long with the vertical segment made from 300 ohm twin-lead about 25 feet long. With the apex up at 30 feet and the legs at 15 feet above ground,

Here is the VE8RST G5RV antenna near Ft Liard, Northwest Territories.

The VY1RST and VE8RST mobile shack. It consists of a TS-50 transceiver, LDG Z-100 tuner, 20 A power supply and a Heil microphone. The fan helped keep the author and his rig cool.

The antenna farm of VY1RST consisted of a 40 meter antenna at 20 feet and the Webster Bandspanner. The Hustler 4BTV on the ladder is a backup.

it was the best looking inverted V I ever saw.

Did it work? Seventeen, 20, 40 and 80 meters were the hot bands up here netting me Alaska, Canada, England, France, Hawaii, Italy, Kazakhstan, Sweden and many others over the next couple of days. David Consitt, SM7JKD, said he hadn't heard the Yukon on HF in 40 years. I was pleased to work my old friend Gary, WL7LV, on Prince of Wales Island, Alaska on 20 meters then later on 40 meters for a nice ragchew. The G5RV performed well on all the HF bands except 20 meters where I could only get 50 W out. How will you know if you don't try it?

VE8RST Takes On the Fort

Since Ft Liard, Northwest Territories is only about 100 miles off the Alaska Highway in northern British Columbia, I decided to spend some time there again (I was at Ft Liard in 2005 operating VE8JR) and give VE8RST a workout. Ft Liard consists of a couple of hotels, a general store/gas station, a nice campground and a few government office buildings. After fueling up I headed a few miles south for my favorite hilltop DX spot. From this location my 20 meter log was populated mostly by Canadians with some others thrown in.

On 40 meters I worked Bruce, VE4BDF, and a ton of stateside stations eager to make my Northwest Territories log. Seventeen meters also produced a few contacts, including Canada, Belgium, Germany, Japan and Wales. Ivan, VE7IVN, helped by spotting me, sending e-mails to my spouse and providing DX information.

By far 20 meters was the hot band here. On 20, Robert, KL7RB; Robert, AL7KK; Terry, AL7TC, and Edward, KL7HRN in Alaska were 59+ and on 40 meters Allen, KL7AM, was also 59+. I was mostly 59 to them off my 102 foot long G5RV (unmodified this time) at 30 feet in the air.

All HF bands loaded fine. Later on 20 meters I worked Tom, VE1TWB/VE1DC, who inspired me to pursue experimenting with the Wilson FGT series CB antennas many years ago. It was neat to finally work Tom after all the e-mails we exchanged over the years. Later in an e-mail, Gerry, VE8GER, in Inuvik, Northwest Territories had this to say: "Was on your **QRZ.com** page and read about the CB antenna. I had one lying around and connected it and tried to make contact with VE8RST. It worked! I pulled John out of the noise and gave him a 44 with fading and in return he gave me a 57. It made my day as John is the *first* contact that I made on 17 meters! Thanks for being there." Very cool Gerry. You were pounding in down here.

Some other DX worked included Asiatic Russia, Austria, Brazil, Croatia, France, Greenland, Germany, Italy, Japan, Netherlands, Poland, Portugal, Slovenia, Spain, Ukraine, Wales and a Finnish maritime mobile sailing north of Greenland. Also, I was pleased to work so many of my old radio friends, such as Guillermo, WC6DX; Dean, K3GGN/9; Gary, WL7LV; David, VE3LDT; Garry, VE3XN; Fred, N6AWD; John, VO1SA; Don, AA5AT, and Charles, KL7OH.

Amateur Radio never ceases to amaze me. Having turned 60 years old I am fortunate to have been a ham for half of my life. I don't see myself doing any more antenna work or contesting when it's 30 or 40 below, but I do see sand between my toes from a tropical beach somewhere soon. Listen for club activity by the North Country DX Association, WP2JR, and US Islands Last Frontier ARC, NH7DX. Further homebrew information on items in this story is available via **kl7jr@yahoo.com**. 73 de Yukon John, KL7JR.

Photos by John Reisenauer Jr, KL7JR.

John Reisenauer Jr, KL7JR (ex-VE8JR), an ARRL member, was first licensed in 1979 as KA7BKI. He grew up in North Dakota and was an SWL for many years. Now retired, John did electrical consulting work nationwide for industry giants such as Boeing, Westinghouse, General Electric, Shaw Stone and Webster and others in the power, oil and gas arenas.

Amateur Radio complements his other interests such as camping, fishing, travel, photography and writing. John has completed two books: Of Ice and Men *and* Brothers in the Yukon. *Antenna homebrewing, island activating and contesting from the north are his favorite ham activities.*

John is the founder and past program director for the US Islands (USI) Awards Program (KL7USI) and is currently activities manager for the North Country DX Association (WP2JR, KL7RST, VY1RST and VE8RST). His spouse Claire, WL7MY, also published in QST, *often accompanies him on trips. Listen for them in 2011 hamming from the Virgin Islands (US and British), Hawaii, Dominican Republic and American Samoa. John can be reached c/o T. Chrysler, 98105 East Reata Rd, Kennewick, WA 99338,* **kl7jr@arrl.net**.

After the 73s

Confirming your contacts is the final step on the path to awards and great memories.

Steve Sant Andrea, AG1YK

"Okay Alberto, thanks for the new one. I'll let you get back to the pileup. Can you just give me your QSL information?"

We've all heard this exchange on the air. Confirming that valuable contact, whether it is for an award, contest or a memorable ragchew is an important part of operating.

The name "QSL" comes from the CW Q signal that means "I acknowledge receipt of your message." In early ham radio, Morse code was the only means of communication and the "I acknowledge receipt" Q signal became stuck to the cards themselves. There are two basic methods for QSLing a contact — a physical QSL card and electronically.

Let's Get Physical

A QSL card is hardcopy verification of your contact useful in obtaining awards such as DXCC, but often exchanged just to say "thanks for a great contact." QSL cards come in many styles and many hams display them as "wallpaper."

The typical QSL card measures 3½ × 5½ inches and fits in a #10 envelope. Your QSL card should include the call sign of the station, the UTC time and date, the frequency and mode, and the RST or RSQ of the signal.

Mailing QSL Cards

"Alright," you say "I have the card filled out but where do I send it?"

The best source for ham addresses is **QRZ.com**. This ham website has become the go-to place for addresses and other pertinent QSLing information. A search for your contact's call sign will usually return an address. For DX stations, special event stations or DXpeditions, there will usually be information on the preferred QSL route, which is the best method to use to send a QSL card. *The Daily DX* website (**www.dailydx.com**) also contains a lot of useful information on QSLing DX contacts including links to various QSL databases.

For US stations, QSLing direct — just sending your QSL to your contact's home address — is usually the best method. If you are QSLing a special event or DXpedition, their **QRZ.com** listing or the operation's own website will list the address of the *QSL manager*, the ham who is handling QSL cards for the event.

The current IRC, called the "Nairobi" model, is valid until 2013.

Before You Lick the Envelope

If this is just a courtesy QSL to acknowledge an enjoyable contact you can just lick away. But, if you need the other QSL for an award, then you should make returning the QSL as easy as possible. For US contacts you can just put a self-addressed stamped envelope (SASE) in the envelope and send it off. For DX contacts things get a little trickier. DX stations can be QSLed direct or "via the buro."

To QSL DX stations direct use a self-addressed envelope (SAE) and some stamp substitute, since US postage is not honored in other countries.

Instead of Stamps

First, you can use International Reply Coupons (IRC), paper coupons issued by Universal Postal Union (**www.upu.int/en.html**) member countries. Go to **shop.usps.com** and enter *330800* in the search box to buy IRCs from the US Postal Service for $2.10 each. Check **QRZ.com** or The Daily DX for the correct number of IRCs for your DX's country and add them to the letter. The DX operator then converts the IRCs into the appropriate postage to return his QSL to you.

The other method is to use "green stamps." A green stamp is a dollar bill. Many DX operators will accept $2 for payment of return postage (a few countries require $3 for airmail; check with the op for what he needs). Then again, many are legally restricted from holding foreign currency. The best way to find out is to check the DXer's call in **QRZ.com**. Most will explain if they can accept green stamps and how many are needed for return postage.

It should be noted that in many countries pilfering of the mail is common. Sending either IRCs or "green stamps" does run the risk of your QSL being "diverted." For some methods of lowering your QSLs risk see the "QSLing, Tips & Advice" link on the **ac6v.com** website.

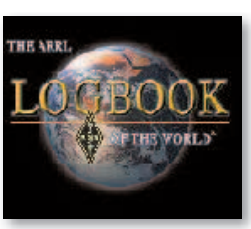
The "Buro"

Most countries have QSL bureaus. In the US, the ARRL operates the Outgoing QSL Bureau (**www.arrl.org/outgoing-qsl-service**). For about $2 the ARRL Outgoing Bureau will send up to 10 QSL cards to DX entities around the world.

Electronic QSLing

QSL cards fit all the requirements for awards and make a great display, but using cards takes time and money — for some DX stations, a lot of time and money. Recently, electronic QSLing methods have been developed that can be used to take the place of QSLs.

The ARRL's Logbook of The World (LoTW) is one such system. The LoTW is a database system that matches individual contacts. You upload your log, which is matched against the uploaded log from the DX station. If the logs have a matching contact, it is "confirmed." The ARRL has gone to great effort to make the LoTW a secure system and all contacts confirmed through LoTW can be used toward any ARRL award. For more information go to **arrl.org** and click on the LoTW link.



The LoTW is only a database system and doesn't provide any QSL-like confirmation. Another electronic QSLing system, eQSL (**www.eqsl.cc/qslcard/Index.cfm**), uses a different confirmation method that allows you to design and send an electronic QSL card to your contact.

Steve Sant Andrea, AG1YK, is an Assistant Editor for QST. He can be reached at **ag1yk@arrl.org**.

2010 Simulated Emergency Test Results

Compiled by Steve Ewald, WV1X

As Amateur Radio operators cognizant of the role that we have for emergency and public service communications, it is our hope that the 2010 ARRL Simulated Emergency Test (SET) enabled you, your community and/or your ARRL Section to prepare for the numerous communications emergencies that have needed (or will need) our assistance in time of need.

After the particularly harsh winter season of 2010-2011 that had snow and ice storms, and the spring season of 2011 that witnessed a severe outbreak of tornadoes, severe storms and flooding through many parts of the country, the reminders are everywhere to be ready and to be prepared.

The following written summaries shown in this article are representative of the many detailed reports that were submitted. These stories — and the statistical reports that follow in this article — 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. Thank you for your continued efforts!

JIM MILLSAP, WB4NWS

Assistant Emergency Coordinator Tom Olley, KG4VUB, operates from a shelter location in the Cherokee County (Georgia) SET.

San Francisco Section Conducts Earthquake Drill

Fred Polkinghorn, KQ6OB
EC, Sonoma County, California

On October 23, 2010, the San Francisco Section ARES conducted a joint drill with the Oakmont Emergency Preparedness Committee (OEPC). Oakmont is an active adult community with 5,000 residents located just east of Santa Rosa, California. The OEPC had activated three emergency triage centers. Each center was manned with 10-12 volunteers including doctors, nurses, counselors, transportation personnel and radio communicators.

In addition to the triage centers, Oakmont has 213 COPE (Citizens Organized to Prepare for Emergencies) teams. These neighborhood teams consist of 10-12 homes which are organized to give mutual aid in the event of an emergency. The COPE teams communicate via Zone Communicators to one of the three triage centers via Family Radio Service (FRS) radios.

Each triage center was linked to an emergency operations center (EOC) in Oakmont via a 2-meter simplex net. During the drill, the EOC was linked to an ARES net on the W6SON repeater. This net also included radio operators located at the American Red Cross in Windsor, California, and the Blood Bank of the Red Woods located in Santa Rosa.

The drill scenario was an 8.4 earthquake located on the San Andreas Fault. The simulated earthquake had caused extensive damage in the Santa Rosa area. In Oakmont, the earthquake had caused several fires, collapsed homes and a number of injuries.

The drill used a closed net with formal message handling procedures. Messages were sent form the COPE teams to the triage centers via the Zone Communicators. If the problem could not be resolved by the triage center, the message was forwarded via the ham operators to the Oakmont EOC. If the problem could not be resolved within Oakmont, the request for outside assistance was sent via the ARES net.

In all, there were approximately 52 people who took part in the exercise. Of these, 27 were communicators including 17 hams and 10 people operating FRS radios. Total messages passed were 87 including 36 messages passed between the Zone Communicators and the triage centers, 35 messages between the triage centers and Oakmont EOC and 15 messages passed between the Oakmont EOC, net control, the Red Cross and Blood Bank of the Red Woods.

In addition to the participants, we had a number of outside observers. These included four EMTs from the Santa Rosa Fire Department who offered suggestions for the triage centers. We also had a reporter from the Kenwood Press who wrote an article on the exercise. Dave New, AA6YX, was an ARES observer who worked with net control operators in the EOC. Considering this was our first full-scale exercise, it went very well. As with any exercise, there were a number of problems and improvements which were identified. Each participant was asked to complete an evaluation form, and the forms were reviewed and discussed at a critique meeting one week after the event.

Simulated Mid-Air Collision over the River

James Boyd, KCØQCO
PIO, SEMARC

By one o'clock Sunday afternoon, September 19, 2010, an estimated 90 volunteers had been involved in locating two aircraft downed on the Mississippi River in a simulated emergency drill in Minnesota (southeast of St Paul). Volunteers representing the SouthEast Amateur Radio Club (SEMARC), Cottage Grove and the Stillwater Amateur Radio Association (SARA) along with other radio amateurs participated in the drill.

Those responsible for overall coordination of the drill included John Regan, KAØHYR, Woodbury, EC of Washington County ARES; Tom Polzin, South St Paul, director of Dakota County Emergency Communications (DCEC), which is a RACES group.

The drill began with an 8 AM briefing at the Inver Grove Heights Twin Cities Marina by Bron Jones of the DCEC and Lieutenant Commander Barry Berg of the US Coast Guard Auxiliary. They detailed the search plan for two small/medium sized planes

that had earlier been reported in a simulated mid-air collision over the Mississippi River. The aircraft were believed down between Dakota County's Spring Lake Park Preserve and Washington County's Grey Cloud Island Camp Galilee.

Under gray overcast skies, volunteers moved into assigned locations while search and rescue units began their search patterns. According to Mr Regan, the Amateur Radio operators were dispatched with air, ground and water units to provide "interoperability, which is the ability to communicate on various frequencies with all agencies involved in the drill." Regan noted, "those Amateur Radio operators involved were able to provide communications with all agencies regardless of frequency or location. In addition, procedures that were in place worked well and were strengthened by the drill."

"The September 19 drill did highlight for us the importance of developing relationships with both other amateur groups and public agencies for whom we may have to provide communications in the event of an actual emergency," Regan concluded.

Overload at the Dispatch Center

Howard Fischer, KC9IVJ
EC, Juneau County ARES/RACES

Juneau County, Wisconsin, ARES demonstrated their capabilities throughout a scenario that tested the skills of a variety of emergency and public safety services. In a very short period of time, the dispatch center experienced an unusually high number of requests for fire and ambulance services at various locations in the county. At the same time, a couple of desperadoes attempted to rob the bank in Wonewoc.

With all the sirens and scanner activity, the telephones and cell phones were unable to handle the large volume by the general public calling friends, relatives, neighbors and the 9-1-1 center to see what the heck was going on. As with most "grapevine talk," events became bigger and more embellished than what was actually going on. This was the "perfect storm" (so to speak). Public service radio frequencies could not handle the exceptionally high traffic and Amateur Radio was called in for communications support.

At 9 AM, Larry Dudzinski, K9LRD, was notified to activate the 2010 SET from his residence. He immediately started up a resource net, took check-ins and directed Nancy Noga, KC9KCC, and John Noga, KC9ILO, to set up the communications trailer at Lions Park in the City of Mauston. Once the trailer was up and operational, net control was transferred to Nancy, KC9KCC, in the trailer. Bruce Lange, KC9LLI, became Incident Commander for the duration of the event and ran the exercise from the communications trailer, which also served as the command post.

Representatives of several local agencies and governments visited our command post during the exercise. The City of Mauston, Juneau County Sheriff Department, Mauston Ambulance, New Lisbon Police Department were among those visiting. Howard Fisher, KC9IVJ, and Larry, K9LRD, started to contact the law enforcement, fire, municipalities and emergency medical services to determine their needs.

Although we did not pre-plan what exactly the exercise would be, it became apparent these agencies were most concerned with communications and getting the necessary resources to where they were most needed. This year, we involved several agencies in the SET (including a few that we have never worked with before). It was pleasantly surprising how well it was received by these agencies and the positive remarks that followed. That, in itself, made the SET a big success.

2011 SET on the Schedule

October 1 and 2, 2011, is a main weekend to focus on for this year's SET although many sections and local Emergency Coordinators have the option of conducting their exercises on a different date that works better. 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!

2010 SET Top Ten

ARES Activity

Section	*Points*
Georgia	4965
Connecticut	4393
Wisconsin	4356
Indiana	3846
Alabama	3788
South Texas	1532
North Carolina	1518
Eastern Pennsylvania	1478
Michigan	1378
Illinois	1368

Section/Local Nets

Section	*Points*
Georgia	1972
Wisconsin	1939
Connecticut	1792
Western Pennsylvania	1429
Alabama	1006
North Texas	588
Ohio	561
North Carolina	520
New Hampshire	505
Western New York	369

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			
Delaware			**184**
New Castle Co	W3RSM	184	
Eastern Pennsylvania			**1478**
Montgomery Co	NE3I	1023	
South Central Task Force	KO1D	455	
Maryland-DC			**320**
Anne Arundel Co	N3SEO	215	
Kent Co	KB3ENU	105	
Southern New Jersey			**632**
Cape May Co	N2EWT	332	
Cumberland Co	N2MHO	166	
Ocean Co	WX2NJ	75	
Atlantic Co	N2VJM	59	
Western New York			**449**
Chenango Co	K2DAR	328	
Delaware Co	W2RRK	121	
Western Pennsylvania			**1183**
Erie Co	WX3E	228	
Indiana Co	KB3JOF	152	
Franklin Co	KB3MUN	147	
Cambria Co	KB3PSJ	144	
Beaver Co	N3TN	137	
Blair Co	KA3EJV	112	
Jefferson Co	KA3YCB	92	
Centre Co	K3CWP	72	
Clearfield Co	W3PRL	60	
McKean Co	KB3SVH	39	

Area	*Reporter*	*Points*	*Section Points*
Central Division			
Illinois			**1368**
Lake Co	K9DRW	484	
DeKalb Co	W9ICU	201	
LaSalle Co	KB9EZZ	175	
Lee Co	N9JWI	138	
Perry Co	N9VKO	116	
NW District	KA9FAJ	111	
Madison Co	KØRJL	87	
Sangamon Co	NA9GW	56	
Indiana			**3846**
Section-wide	W9AL	1102	
Monroe Co	KB9RVB	309	
Vanderburgh Co	WB9EFH	306	
Warrick Co	KT9B	256	
Tippecanoe Co	N9GKE	193	
Johnson Co	N9SIU	173	
Allen Co	K9RFZ	165	
Noble Co	KB9VTK	161	
Adams Co	AB9SO	143	
Starke Co	W9AL	142	
Harrison Co	W9WXN	107	
Gibson Co	N9LJA	105	
Hamilton Co	WAØJTL	92	
Orange Co	WB9FHP	92	
Ripley Co	WY9L	74	
Elkhart Co	KC9CDS	69	
Jackson Co	KC9MVK	69	
Clay Co	W9EEU	59	
Bartholomew	WW9A	44	
Fayette Co	N9TU	43	
Greene Co	K9PS	36	
District 5	N1HQH	36	

Area	*Reporter*	*Points*	*Section Points*
Shelby Co	KB9ZYC	19	
Posey Co	KC9CVL	17	
Jennings Co	KC9RLC	17	
Vermillion Co	W9COD	17	
Wisconsin			**4270**
La Crosse Co	NF9E	770	
Dunn Co	KB9ULF	482	
Juneau Co	KC9IVJ	351	
Milwaukee Co	WB9ODQ	283	
St Croix Co	N9XYX	267	
Rock Co	N9GQ	199	
Brown Co	K8KQS	184	
Marathon Co	KB9VBR	184	
Ozaukee Co	AB9ON	184	
Jefferson Co	KC9IKI	140	
Waupaca Co	N9TBM	131	
Richland Co	W9MZ	130	
Manitowoc Co	N9NCU	123	
Buffalo Co	N9UNW	101	
Trempealeau Co	N9UNW	101	
Winnebago Co	KC9SDK	95	
Polk Co	KC9NVV	92	
Price Co	AG9G	80	
Washington Co	WB9BVB	77	
Marquette Co	W1VOW	75	
Kewaunee Co	W9JFM	75	
Green Co	KC9YI	63	
Wood Co	WA9LFO	55	
Sawyer Co	N9VAO	54	
Lincoln Co	KC9NFJ	31	
Walworth	KC9KSN	29	

Area	*Reporter*	*Points*	*Section Points*
Dakota Division			
Minnesota			**155**
Washington Co	KAØHYR	155	
South Dakota			**143**
SE District	KØMCM	143	
Statewide	KØMCM	written	
Delta Division			
Arkansas			**302**
Eastern Arkansas	W5WPN	216	
Faulkner Co	N5GK	86	
Louisiana			**662**
Section wide	AI5B	482	
Rapides	KD5DFL	180	
Mississippi			**983**
Prentiss/ Tishomingo Co	WX5N	180	
Lauderdale Co	AE5FE	174	
Harrison Co	N9OKV	170	
Desoto Co	KD5VMV	168	
Panola Co	KE5WUN	164	
Pearl River Co	KE5WJN	125	
Jasper Co	WV1Q	98	
Itawamba Co	KB5NMB	84	
Tennessee			**707**
Bradley Co	KD5UBL	207	
Jefferson Co	W4DOD	172	
Sevier Co	N4JTQ	138	
DeKalb Co	KC4GUG	118	
Haywood Co	KI4WPH	72	
Great Lakes Division			
Kentucky			**267**
Hardin Co	W8WN	267	

Area	Reporter	Points	Section Points
Michigan			**1378**
Saginaw Co	KC8YVF	212	
Kalamazoo Co	NK8X	186	
Benzie Co	K8BTE	177	
Allegan Co	AB8SF	171	
McCulloch Co	N5KAO	132	
Monroe Co	N8KUF	191	
Osceola Co	N8NJA	109	
Livingston Co	N8WWX	104	
Gladwin Co	N8LYL	55	
Ontonagon Co	KC8OCK	41	
Ohio			**1365**
Erie Co	K8HLH	548	
Huron Co	KB8DNA	257	
Seneca Co	WB8REI	242	
Clark Co	N8NSD	149	
Guernsey Co	KC8SBB	109	
Van Wert Co	WB8YIH	60	
Hudson Division			
New York City/Long Island			**486**
Babylon	W2HCB	180	
Islip	KB2SCS	180	
Southold	N2QHV	126	
Northern New Jersey			**285**
Hunterdon Co	AC2BH	211	
Morris Co	N2OYU	74	
Midwest Division			
Iowa			**134**
Story Co	KCØJUO	134	
Kansas			**640**
Johnson Co	KCØBS	268	
Riley, Clay, Geary Co	WØPBV	148	
Leavenworth Co	KCØJCQ	146	
Zone 2B	WAØCCW	78	
Missouri			**520**
St Charles Co	NØPNP	234	
St Louis Co	KCØQMU	164	
Jackson Co	KØUAA	122	
Nebraska			**254**
Lancaster Co	KØGND	232	
Buffalo Co	KAØDBK	22	
New England Division			
Connecticut			**4393**
Region 5 North	K1DAV	390	
Region 4 South	W1GTT	321	
Region 4 North	KB1JDX	295	
Region 1	NN1H	294	
Danbury	WA2IZQ	229	
Region 2	WA1SFH	205	
Region 3	KB1PRP	204	
Red Cross	K1WMS	203	
Manchester	W1RGC	186	
Control/Command	N1CLV	179	
Region 1 Central	W1GIG	166	
Region 1 West	KB1IFX	165	
Region 1 West B	KB1QBZ	146	
Prospect	W7YY	114	
Sandy Hook	KB1ILY	109	
Brookfield	W1QK	95	
Region 1 East	KA1EOU	90	
Region 5 South	N1XLY	87	
Orange	K1QEX	79	
SKYWARN	KB1DGY	70	
Region 3 NW	W1FTE	65	
Canaan	K1DJW	59	
Harwinton	K1DAV	59	
Norfolk	K1DJW	59	
North Canaan	K1DJW	59	
Salisbury	K1DJW	59	
New Britain	KB1EWM	56	
Thomaston	K1DAV	53	
Bethlehem	K1TGW	51	
Morris	K1DAV	50	
Woodbury	AG1YK	46	
SKYWARN	K1PAI	41	
Winsted	KA1WPM	39	
New Hartford	K1PCK	38	
Bloomfield	AC1N	32	
Maine			**544**
Kennebec Co	KA1LPW	259	
Sectionwide	K1GAX	101	
Sagadahoc Co	N1TTT	96	
Androscoggin Co	N1OXA	88	
New Hampshire			**1069**
W Rockingham Co	KA1UVH	312	
Greater Manchester		258	
Sullivan Co	W1KRT	192	
Hillsborough Co	N4COY	172	
Mt Washington Vly	KB1IIR	135	
Rhode Island			**111**
South Kingstown	W1XX	111	
Northwestern Division			
Alaska			**176**
Matsu	KL7JFT	176	
Western Washington			**549**
Pacific Co	N7CVW	321	
District 5	N7ELF	228	
Pacific Division			
East Bay			**340**
Tri-Valley	WB6ETY	126	
Alameda Co	N3CKF	125	
Contra Costa Co	WA6NYP	89	
Nevada			**524**
Douglas Co	KA7AJQ	217	
Churchill Co	KE7CRZ	167	
South Nye Co	KC6ILH	140	
Pacific			**234**
Maui Co	KH6H	97	
S Kohala	NH7UA	73	
Hamakua	WH6N	64	
Sacramento Valley			**679**
Sacramento Co	W6SRA	170	
Sacramento Valley	WD6FXR	139	
Butte Co	W6AKF	130	
Yuba/Sutter Co	KI6CSO	125	
Amador Co	K6GTC	115	
San Francisco			**240**
Sonoma Co	KQ6OB	240	
Santa Clara Valley			**516**
Santa Cruz Co	KE6AFE	263	
South Coast	KI6PGD	169	
Santa Benito Co	W6TST	84	
San Joaquin Valley			**267**
Tulare Co	WA7HRG	267	
Roanoke Division			
North Carolina			**1518**
Cleveland Co	KM4C	517	
Thirteen Lincoln Co	WD4PIC	255	
Mecklenburg Co	WB2NHQ	222	
Ashe Co	N4RHC	176	
Moore Co	N4YYL	134	
Buncombe Co	K8SKX	106	
Rowan Co	K4GHL	60	
Stanly Co	KC4TDC	48	
South Carolina			**104**
Anderson, Abbeville	KL7FO	104	
Virginia			**232**
Goochland Co	N4HOK	134	
York Co	WB4UHC	98	
West Virginia			**234**
Kanawha Co	KB8YZT	234	
Rocky Mountain Division			
New Mexico			**308**
Bernalillo Co	W5WHN	308	
Southeastern Division			
Alabama			**3788**
Jefferson Co	N4HUB	1104	
Calhoun Co	KG4EUD	810	
Shelby Co	W4TCA	425	
Tuscaloosa Co	WS4I	334	
Madison Co	K4RGG	219	
Etowah Co	K4VMV	182	
Central AL	K4NWS	166	
Carroll Co	KI4LZG	130	
Talladega Co	W4LVT	126	
Dale Co	KJ4OJJ	104	
Cherokee Co	K4BMX	90	
Cleburne Co	W4AUB	48	
Mobile Co	KD4DLJ	41	
Pulaski Co	N4TUA	9	
Georgia			**4965**
Hall Co	AA4BA	1577	
Metro Atlanta	N4SEG	525	
Gwinnett Co	WB4QDX	407	
Chatham Co	K4GTM	334	
Cherokee Co	WB4NWS	314	
Clay, Henry Co	AJ4GT	234	
Thomas Co	N4KXL	234	
Gordon Co	AF4DN	216	
Butts Co	K3GWK	160	
Carroll Co	KI4LZG	130	
Newton Co	WA4UJC	128	
DeKalb Co	W4TGA	124	
Washington Co	K4GK	116	
Clark Co	KE4OGD	113	
Forsyth Co	KG4AOX	102	
Appling Co	W4WDT	97	
Putnam Co	KF4EOH	80	
Peach Co	KI4YNZ	50	
Lee Co	W5VRV	15	
Pulaski Co	N4TUA	9	
Northern Florida			**221**
West Panhandle Dist	N4CU	221	
Southern Florida			**1018**
Broward Co	KJ4AWB	631	
Palm Beach Co	K4DLF	617	
Indian River Co	WA4ASJ	70	
West Central Florida			**217**
Manatee Co	AC4MK	217	
Southwestern Division			
Arizona			**211**
Yavapai Co	WA6ZZJ	211	
Los Angeles			**110**
Westside	WA6P	110	
Orange			**218**
Mission Viejo	WA6RUZ	218	
West Gulf Division			
North Texas			**608**
Smith Co	W5MCT	341	
Irving	KA5OZC	162	
Grayson Co	WB5DCU	105	
South Texas			**1531**
Cameron Co	KFØMP	269	
Hays, Caldwell Co	K5GWC	192	
Brazoria Co	W5SRG	182	
McCulloch Co	N5KAO	132	
San Patricio Co	K5BV	121	
Williamson Co	KE5OIZ	118	
Waller Co	W5KAM	115	
Nueces Co	W2MY	111	
Live Oak Co	W5IM	86	
District 14	AE5JY	81	
Bexar Co	K5AUW	61	
Atascosa Co	N5TBS	49	
Bandera Co	KT4KL	12	
Goliad Co	W5DY	2	
District 8	K5RIK	written	
West Texas			**248**
Midland Co	W5ZOX	248	

Section/Local Nets

Area/Net Name	Net Mgr	Points	Section Points
Atlantic Division			
Delaware			**131**
Sussex Co	KB3KYH	131	
Maryland-DC			38
Kent ARS	KB3ENU	38	
Western New York			**369**
OCTEN	KA2ZNZ	139	
CARES	K2DAR	99	
W District Net	KB2DQ	97	
NYS/M	WA2IAX	34	
Western Pennsylvania			**1429**
Michaux Forest	KB3MUN	1061	
Indiana Co	KB3JOF	82	
Cambria Co	KB3PSJ	74	
Beaver Co	N3TN	72	
Bedford Co	KA3UPR	64	
Blair ARES	KA3EJV	57	
Franklin Co	KB3MUN	19	
Central Division			
Illinois			**279**
Lake Co	K9DRH	279	
Indiana			**166**
Orange Co	WB9FHP	92	
Harrison Co	W9WXN	46	
Fayette Co	N8MGR	28	
Wisconsin			**1939**
Dunn Co	KB9ULF	262	
Rock Co	N9GQ	214	
WI ARES/RACES	N9VAO	205	
Milwaukee Co	KC9GMW	180	
St Croix Co	N9XYX	127	
Pine Valley Repeater Assn	W9PVR	99	
La Crosse Co	NF9E	90	
OZARES	AB9ON	87	
Dane Co	KC9FKV	80	
Manitowoc Co	NZ9Z	73	
WCARES	WB9BVB	69	
Polk Co	KC9JIK	67	
JEFCARES	KC9IKI	65	
Brown Co	KC9OIS	64	
Waupaca Co	N9TBM	49	
Price Co 2 M	AG9G	44	
Kewaunee Co	W9JFM	42	
Wood Co	WA9LFO	40	
Green Co	KC9YI	38	
Walworth Co	KC9KSN	25	
Lincoln	KC9NFJ	19	
Delta Division			
Arkansas			**77**
Cross Co	W5WPN	77	
Tennessee			**248**
Sevier Co	N4JTQ	97	
DeKalb Co	KC4GUG	78	
JCARES	K2HYQ	73	
Great Lakes Division			
Michigan			**278**
Saginaw Valley	KC8YVF	92	
Monroe Co	K8MLH	91	
Benzie Co	K8BTE	77	
Gladwin Co	N8LYL	18	
Ohio			**561**
NW Ohio ARES	N8TNV	201	
FARA ARES	N8FMJ	183	
Huron Co	KB8DNA	177	
Midwest Division			
Kansas			**113**
KSN/KPN	NØKFS	113	
Missouri			**53**
Jackson Co	KØUAA	53	
Nebraska			**217**
E NE 2 M ARES	KBØDNP	217	
New England Division			
Connecticut			**1792**
CT Phone Special	N1DIO	367	
Western CT Special	KB1NMO	132	
Nutmeg Special	K1HEJ	114	
Region 4 Tactical	KB1DJX	104	
Darien, Stamford	KB1IFX	91	
CT Phone	N1DIO	89	
WESCONN Special	KB1NMO	88	
Western CT	KB1NMO	81	
Region 1 Central	KA1WYQ	76	
Region 4 South	W1GTT	72	
Command/Control	N1CLV	72	
Region 1 West B	W3EIC	70	
ETCN Special	KB1RPP	60	
WESCONN	KB1NMO	59	
BEARS	NM1K	54	
Region 3 Resource	KB1EWM	53	
Nutmeg	K1HEJ	53	
New Canaan Red Cross	KA1TZR	50	
East Granby EOC	W1FTE	46	
ETCN Regular	KB1RPP	43	
Enfield	NM1K	18	
Maine			**103**
Maine EmComm	K1HZU	103	
New Hampshire			**505**
W Rockingham Co	KA1UVH	129	
Greater Manchester		120	
Hillsborough Co	N4COY	92	
Mt Washington Vly	KB1IIR	89	
Sullivan Co	W1KRT	75	
Pacific Division			
San Joaquin Valley			**177**
TC ARES	WA7HRG	177	
Roanoke Division			
North Carolina			**520**
Shelby ARC/ Cleveland Co	N4HAW	177	
Metrolina 2 M	WB2NHQ	169	
Lincoln Co	WD4PIC	88	
Buncombe Co	K8SKX	86	
West Virginia			**296**
Kanawha	KB8YZT	296	
Southeastern Division			
Alabama			**1006**
Calhoun Co	KG4EUD	325	
Madison Co	K4RGG	236	
Randolf Co	KD4LXU	164	
N AL; S Mid TN	N4JDB	110	
Etowah Co	WB4NBP	102	
Talladega Co	KI4TEC	69	
Georgia			**1972**
Statewide ARES HF	K4GK	1016	
Metro Atlanta	WB4NWS	314	
North Fulton	AD4MC	278	
Clay, Henry Co	AJ4GT	173	
Carroll Co	KI4LZG	129	
Washington Co VHF	K4GK	62	
Southern Florida			**108**
SE FL Traffic	WB4PAM	108	
West Central Florida			**109**
Manatee Co	AC4MK	109	
Southwestern Division			
Los Angeles			**242**
LA Traffic (#2)	KO6V	129	
LA Traffic	KO6V	113	
West Gulf Division			
North Texas			**588**
East Texas Emcomm	W5MCT	286	
DFW Metroplex	KE5HYW	229	
Irving RACES/ ARES	KA5OZC	73	
South Texas			**136**
Hays, Caldwell Co	K5GWC	136	
West Texas			**173**
W5EOC	W5ZOX	173	

Hams Continue to Provide Support As Weather Clears in Southeast

Even though the storms that raged through the Southeast have long gone, the damage and heartache they left in their wake are still present. In Alabama, the state that felt the biggest brunt of the storms, hams made their way to fire stations, emergency operations centers and shelters — anywhere they were told that they were needed.

The ARRL — through its Ham Aid program — shipped five cases full of Amateur Radio gear to Alabama. Three cases held 2 meter, 440 MHz and HF radios, while the two cases other were packed with batteries and more handheld transceivers. According to ARRL Chief Development Officer Mary Hobart, K1MMH, hams in that state requested and received radios and antennas, since cell tower sites and repeaters have been damaged and are not yet back up. "We anticipate the demand for equipment may continue from Alabama and possibly from neighboring states," she said.

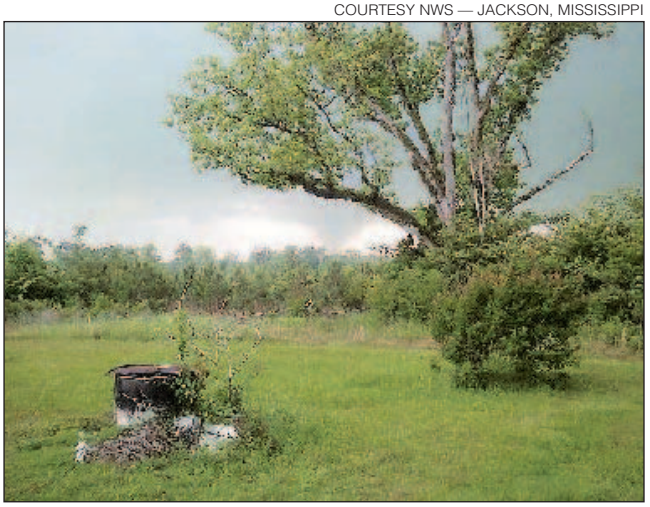
One of the ARRL Ham Aid kits was sent to Huntsville, in the northern part of the state. "It is nice to have a complete radio set in a durable watertight case ready to go for use in and around the disaster area," said ARRL Southeastern Division Director Greg Sarratt, W4OZK. "Even after 10 days, ARES® is still supporting the Huntsville Emergency Management Agency, the American Red Cross and VOAD. Amateurs went out with six teams on May 5 on May 6 to provide communications and support volunteer clean-up, chainsaw assistance and food deliveries in the EF5 tornado disaster area. Amateur Radio is expected to support 10 or more teams May 7 and through the weekend."

Sarratt said that members of the Huntsville ARES® group have been active since the first of the storms came through on April 27. "They staffed the Huntsville Emergency Management Agency, the American Red Cross and a medical clinic located adjacent to the disaster area, setting up in an elementary school's Amateur Radio station. ARES® continues to staff a large VOAD in-processing center that processes hundreds of volunteers each day. By April 30, they had processed 2200 volunteers. They are also active at a Southern Baptist Kitchen site and at two on-site volunteer coordination/processing centers. This is in addition to the multiple teams that are going out in the disaster area daily."

Calling it his first experience with an EF-5 tornado, Sarratt said that the devastation is "mind-boggling! ARES® successfully provided a massive amount of critical communications, got repeaters back on the air, with no utility power. It took five days before significant utility power was restored; my power was restored on the evening of Day Six. ARES® has gone above and beyond in supporting multiple government and non-government organizations and conducting many other tasks, all at once. ARES® works!"

ARRL Alabama Section Emergency Coordinator Greg Gross, K4GR, told the ARRL that he received antennas for 440 MHz on May 5, provided through the League's Ham Aid program. "I will be using them to maintain the 440 links between the field operations and the Emergency Management Agency in Tuscaloosa," he explained. "The radio equipment is being used to support different mobile and fixed operations on a daily basis in Jefferson and Walker Counties, located in the northwest part of the state. Thanks again to the ARRL and the Ham Aid program for your help and support."

COURTESY NWS — JACKSON, MISSISSIPPI



On April 27, an EF4 tornado, visible on the horizon in this image, swept through Smith, Jasper and Clarke Counties in Mississippi, as well as Choctaw County in Alabama.

ARRL SCORES PARTIAL VICTORY IN RECONROBOTICS PROCEEDING

The FCC has given radio amateurs a partial victory in response to the ARRL's challenge, in a *Petition for Reconsideration*, of a rules waiver that permits the certification and licensing of the Recon Scout — a remote-controlled, maneuverable surveillance robot operating in the 430-448 MHz band. The device is marketed to public safety agencies and certain security personnel by ReconRobotics Inc.

In an *Order on Reconsideration* released on April 15, the FCC granted the ARRL's request for changes in the labeling and instruction manual requirements to ensure that users of the device are aware of its limitations, with regard to interference. Noting that no applications for individual licenses to operate the Recon Scout had been granted, the FCC's Wireless Telecommunications Bureau, the Public Safety and Homeland Security Bureau, and the Office of Engineering and Technology deferred to the Commission's Enforcement Bureau with regard to complaints that ReconRobotics has been marketing uncertified devices and that the devices have been operating without authorization.

The FCC Order also acknowledged that the ARRL was correct in arguing that the

S. Khrystyne Keane, K1SFA ♦ ARRL News Editor ♦ k1sfa@arrl.org

FCC News

♦**FCC Seeks to Raise the Fee for Vanity Call Signs**: The FCC released a *Notice of Proposed Rulemaking* on May 3, seeking to raise the fee for Amateur Radio vanity call signs. Currently, a vanity call sign costs $13.30 and is good for 10 years; the new fee, if the FCC plan goes through, will go up to $14.20 for 10 years, an increase of 90 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 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.

waiver was insufficient in that it did not waive applicable provisions of Section 2.106 of the Commission's Rules, which contains the Table of Allocations of frequency bands to the various radio services. The Commission's solution was to "...retroactively waive the Table of Allocations to the extent necessary to permit use of the Recon Scout."

ReconRobotics did not object to the changes in labeling and instruction manual language sought by the ARRL. Recon Scout transmitters delivered after April 15, 2011 must carry the following label: "This device may not interfere with Federal or non-federal stations operating in the 420-450 MHz band and must accept any interference received." The instruction manual must also include the following: "Although this transmitter has been approved by the Federal Communications Commission, it must accept any interference received from Federal or non-federal stations, including interference that may cause undesired operation." The 430-448 MHz band is allocated to the amateur service on a secondary basis and to Federal users in the radiolocation service on a primary basis; non-federal radiolocation stations are secondary to both federal radiolocation stations and amateur stations.

The Recon Scout — manufactured and marketed by ReconRobotics — is a remote-controlled, maneuverable surveillance robot designed for use in areas that may be too hazardous for human entry. ReconRobotics was granted a waiver by the FCC for the device to operate between 430-448 MHz, a portion of spectrum available to the Amateur Radio Service on a secondary basis.

ARRL CHANGES PROVIDERS FOR EQUIPMENT PROTECTION, CLUB LIABILITY INSURANCE PLANS

Effective May 1, the ARRL began a new partnership to provide its ARRL-sponsored Equipment Insurance and Club Liability Insurance plans. The League signed an agreement with Hays Affinity Group to serve as the program administrator to provide equipment insurance to its members who choose to elect coverage. In addition, Hays will also provide club liability insurance to ARRL Affiliated Clubs for those clubs that wish to take advantage of that program. Hays will be replacing Marsh Affinity Group Services as the program's administrator and will be introducing new policies for both plans, underwritten by the Hanover Insurance Company.

Not only is equipment protection coverage through Hays Affinity Group slightly less expensive than with Marsh, it's easier to enroll in the plans. You can sign up online at **arrlinsurance.com** and even schedule your equipment online, too. With Hays Affinity Group, you can have all your radio equipment covered, even the computers, hard drives and printers in your shack. You can also elect to have coverage for your towers and antennas, up to $15,000 replacement cost.

Marsh has sent letters to those ARRL members who have policies with them. Be assured, if you currently have equipment or club liability insurance provided through Marsh Affinity Group, your coverage will continue through the end of your current policy. But keep in mind that when your policy expires, your coverage will not automatically be switched over to Hays. The ARRL will no longer be able to help you resolve any issues you may have with Marsh, the insurance company or their claims paying agent. Our contractual agreement with them has been terminated.

To have your equipment covered under the new policy, you will have to enroll with Hays to continue coverage under an ARRL-sponsored plan. If you wish to switch to either of the new insurance policies now, you can either cancel your policy with Marsh and sign up with Hays, or wait until your policy with Marsh is due for renewal and then sign up with Hays for coverage. If you choose to cancel with Marsh before renewal, you will receive a pro-rated refund of any unused premium fees you have paid.

SECTION MANAGER NOMINATION NOTICE

To all ARRL members in the Alabama, Alaska, Delaware, East Bay, Kansas, Michigan, New Mexico, Santa Barbara, Tennessee and Western Massachusetts sections: 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. Photocopied signatures are not acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms FSD-129 are available on request from ARRL Headquarters but are not required. A sample nomination form is available on the ARRL website at **www.arrl.org/section-terms-nomination-information**.

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 9, 2011. If more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before October 3, 2011, to full members of record as of September 9, 2011, which is the closing date for nominations. Returns will be counted November 22, 2011. Section Managers elected as a result of the above procedure will take office January 1, 2012.

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, 2012. If no petitions are received from a section by the specified closing date, such section will be resolicited in the January 2012 *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

Nominees Sought for ARRL Board of Directors

If you're a full ARRL member in one of the following five divisions and are interested in playing a part in the League's democratic organization, here's the opportunity. Nominations are open for the offices of director and vice director for the 2012-2014 term in the Atlantic, Dakota, Delta, Great Lakes and Midwest divisions.

ARRL Divisions

The policies of the League are established by 15 directors who are elected to the Board on a geographical basis to represent their divisions and constituents (see page 15 of any recent *QST* for a list of the divisions, directors and vice directors). These 15 directors serve for three-year terms, with five standing for election each year.

Just as in national or state politics, ARRL voters/members have the privilege and responsibility to decide that they like the actions of their incumbent representatives and support them actively for reelection or to decide that other representatives could do a better job, and to work for the election of those persons. Vice directors, who succeed to director in the event of a midterm vacancy and serve as director at any Board meeting the director is unable to attend, are elected at the same time.

How to Nominate

1. *Obtain official nominating petition forms*. This package consists of a cover letter; a reprint of this election announcement; blank Official Nominating Petition forms and Candidate's Questionnaires for the offices of director and vice director; a copy of the ARRL Articles of Association and Bylaws; and an informational pamphlet for candidates.

Any full member residing in a division where there is an election may request an official nominating petition package. You don't need to be a candidate to request the forms. Your request for forms must be received by the Secretary *no later than noon Eastern Time on Friday, August 12, 2011*. There are separate forms for director and vice director nominations.

2. *Submit petition with statement of eligibility and willingness to serve*. Official forms bearing the *signatures of 10 full members of the division* and naming a full member of the division as a candidate for director or vice director, must be submitted, with a statement *signed by the candidate* attesting to his or her eligibility, willingness to run and willingness to assume the office if elected. These documents must be filed with the secretary *no later than noon Eastern Time on Friday, August 19, 2011*. 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. On Monday, August 22, 2011, the secretary will notify each candidate of the names and call signs of each other candidate for the same office. Candidates will then have until Friday, September 2, 2011, to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

3. *Ethics and Elections Committee to certify eligibility*. In accordance with the Bylaws, an Ethics and Elections Committee, composed of three directors not subject to election this year, is responsible for the conduct of the election. This year, the Ethics and Elections Committee consists of Greg Sarratt, W4OZK; Bob Vallio, W6RGG and Tom Frenaye, K1KI.

Call for Nominations

Nominations are open for director and vice director in the five divisions mentioned above for the three-year term beginning at noon January 1, 2012.

The nominee must be at least 21 years of age and have been licensed and a full member of the League for a continuous term of at least four years immediately preceding nomination. A nominee must provide the Ethics and Elections Committee with 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 that would render him or her ineligible to be a Board Member (see Article 11 and Bylaw 46 of the ARRL Articles of Association and Bylaws).

Balloting Will Follow

If there is only one eligible candidate for an office, he or she will be declared elected by the Ethics and Elections Committee. Otherwise, ballots will be sent to all full members of the League in that division who are in good standing as of September 10, 2011. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1, 2011 and, to be valid, must be received at HQ by noon Eastern Time on Friday, November 18, 2011. A group of nominators can name a candidate for director or vice director, or both, but there are no "slates," as such. Each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Because 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, careful selection of candidates for vice director is just as important as for director.

Absentee Ballots

All ARRL members licensed by the FCC, but temporarily residing outside the US, are eligible for full membership. Members overseas who arrange to be listed as full members in an appropriate division prior to September 10, 2011, will be able to vote this year where elections are being held. 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. Even within the US, full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the Secretary prior to September 10, 2011, giving their current *QST* address and the reason that another division is considered home. If your home is in the Atlantic, Dakota, Delta, Great Lakes or Midwest division but your *QST* goes elsewhere, let the ARRL Secretary know as soon as possible, but no later than September 10, 2011, so you can receive a ballot from your home division.

The Incumbents

These people presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year:

Atlantic — Bill Edgar, N3LLR and Tom Abernethy, W3TOM

Dakota — Greg Widin, KØGW and Kent Olson, KAØLDG

Delta — Mickey Cox, K5MC and David Norris, K5UZ

Great Lakes — Jim Weaver, K8JE and Gary Johnston, KI4LA

Midwest — Cliff Ahrens, KØCA and Rod Blocksome, KØDAS

For the Board of Directors:

May 19, 2011

David Sumner, K1ZZ
Secretary

Medical Reserve Corps PODS Exercise Tests Radios

*Frank Knox, KS5F (***ks5f@arrl.net***)*
and S. Mark Fulmer, KE5PHU
(**smfulmer@tarrantcounty.com**)

What started as a relatively simple radio coverage exercise ended up to be a county wide, multiagency event that provided some excellent information on radio coverage throughout Tarrant County, Texas.

In the event of a large scale public health emergency caused by a terrorist attack, natural disaster or pandemic, the Strategic National Stockpile (SNS) stands ready to be deployed. The SNS is a large quantity of medicine and medical supplies maintained by the Centers for Disease Control and Prevention (CDC). These SNS assets are distributed through "Point of Dispensing Sites" or "PODS," which are strategically positioned throughout the nation. The mass dispensing PODS are able to be activated through the local health departments within 24 hours of an emergency event.

The Medical Reserve Corps (MRC), a volunteer organization that is a partner of Citizen Corps (**citizencorps.gov**), was formed to provide extra help as needed in the event of a national (or regional) health emergency. The MRC relies upon volunteer Amateur Radio operators to assist with PODS communications during public health emergencies. [The ARRL has been officially affiliated with Citizen Corps since 2003. — *Ed.*]

The Tarrant County Public Health (TCPH) MRC was formed several years ago to ensure that there are an adequate number of volunteers available to assist with PODS operations. There are well over two dozen sites in Tarrant County currently in the plan. Volunteers assist with directing the public as they arrive, form administration, provide information and assist in the dispensing of medications if properly licensed or trained (doctors, nurses, paramedics, etc).

One of the many aspects of the TCPH MRC group is communications and this is where the Amateur Radio community fits in. When the MRC was first formed, TCPH Preparedness Coordinator Mark Fulmer, KE5PHU, recognized that although TCPH personnel had access to 800 MHz radios and cell phones, proper preparation meant that backups (also known in preparedness planning as "redundancy") had to be in place. That's when he brought in Amateur Radio operators.

JOSE AGUILAR, KF5HJZ

MRC radio operators are checked in by Mark Fulmer, KE5PHU, foreground (with cap on) and Lee Sewell, KF5HJT.

Frank Knox, KS5F, was appointed as the first Tarrant County MRC Communications Lead in October 2007. Frank's first major task involved the project of designing and building mobile radio kits to be used for the PODS. The kits consisted of Yaesu FT-8800 dual-band radios, Diamond X-50 antennas with tripods, Astron SS-25 switching power supplies and the appropriate adapters for 12 V operation, if needed. The radio kits were packaged in Pelican electronic cases for portability. The first kit was deployed and tested in a single PODS exercise in April 2008.

Preparations for the Event

In July 2010, Mark initiated planning for a county-wide MRC radio coverage test. The test was needed to determine whether simplex operations could be used for all PODS communications back to the Alpha PODS (the control and deployment site for the PODS) or if designated RACES repeaters could be used.

John Sargent, W9JRS, the current MRC Communications Lead, assumed the coordination role for MRC volunteer radio activity.

LEE SEWELL, KF5HJT

Radio operators Darren Wallerstedt, W5DLW (foreground) and Stewart DeJournett, KE5UYM, staff radios at the Tarrant County Public Health Operations Center (DOC).

After the initial discussions, Frank (now John's MRC/COM lead backup) recommended that, since this would be a county-wide operation, it would be beneficial to get other agencies involved.

Frank has been involved in Tarrant County RACES and EOC operations for a while and offered to reach out to these groups to see if they wanted to participate. In addition, Frank contacted Roger Jones, KD5UJL, volunteer coordinator for radio operations for the Chisholm Trail Chapter of the Red Cross, since they also have an interest in simplex coverage at the county level. Finally,

MARK FULMER, KE5PHU

Kit radios are checked for mobile operation prior to departing for test locations by John Sargent, W9JRS (foreground), Frank Knox, KS5F (back to camera) and Lee Sewell, KF5HJT (red shirt).

he also contacted David Walker, W5DJO, ARRL EC for Tarrant County and one of the coordinators for Amateur Radio operations at the local hospitals.

The original plan was to test over a dozen simplex frequencies. The number was quickly reduced to three when seven repeaters were added. (The total number of UHF and VHF frequencies to be tested was limited to 10.) Once the frequencies were agreed on by all participating groups, Stewart DeJournett, KE5UYM, preprogrammed the first 10 channels of all of the MRC radio kits to simplify test operations.

In addition to the MRC radio volunteers, operators were recruited from local radio clubs, Red Cross and Tarrant County RACES. A test run in coordination with the county EOC and public health operations center was made 1 month prior to the exercise on September 15 from the Alpha PODS as part of a Tarrant County Public Health Hepatitis-A dispensing drill in order to validate the frequencies and procedures.

The Event

The full scale event ran on Saturday, October 16, 2010. MRC radio operators arrived at the Alpha PODS deployment site to pick up their radio kits. Prior to any operators being dispatched to their test sites, a short "just in time" training session was run to review the test plan and equipment. Since the operators would not have access to any ac power for this test, the plan was to have them use their vehicle 12 V receptacle outlets. To ensure that all vehicles were ready, a quick "power test" was done as each vehicle left the Alpha PODS deployment site.

Two dual-band radios were set up at the Alpha PODS; one was used for the actual frequency tests and the second was used to monitor the check-in channel. While the operators were en route to their first location, local EOC check-in was initiated. As operators arrived at their sites and set up their equipment, they would check-in. They would then proceed with the test or be put in the queue if a test was in progress. As each frequency was tested, signal readability and strength was recorded for the simplex channels. Repeater frequencies were recorded as "go" or "no go." After the exercise, the signal data was converted into decimal values and plotted into histogram bar charts per each PODS in a 24 page report and provided to the TCPH SNS coordinator for specific communications assessment.

The test coverage, in which 45 Amateur Radio operators participated, took approximately 5 hours and included the following emergency response sites:

- Alpha PODS Deployment Center
- Tarrant County Public Health Operations Center
- Texas Department of State Health Services
- 25 PODSs
- 12 local EOCs
- American Red Cross Chisholm Trail Chapter
- 2 local hospitals

Lessons Learned

- Inviting agencies outside of the MRC was a two edged sword. The test became far more complex to manage but allowed for testing interagency communications, a benefit worth the extra effort.
- Although the test was originally limited to the MRC operations, expanding it allowed other agencies (eg, the Red Cross) to gain valuable information relative to their radio coverage requirements.
- It's all about planning

a. Reviewing the frequency list and paring it down to a total of 10 frequencies made the operation more manageable.

b. Preprogramming radios substantially reduced the actual testing time; those agencies whose radios were not preprogrammed had difficulty keeping up with the testing process.

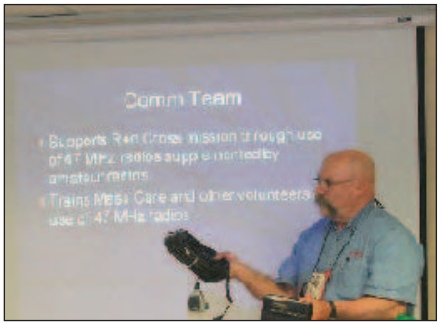
In the event of a public health emergency, whether a pandemic or bioterrorism attack, volunteer Amateur Radio operators stand ready to assist local health departments.

PUGET SOUND AREA HAS TRAINED COMMUNICATIONS TEAM

Lynn Burlingame, N7CFO

The King-Kitsap Chapter of the American Red Cross in Seattle has established an Amateur Radio Communications Team Reserve Corps to augment the chapter communications team. Reserve Corps

LYNN BURLINGAME, N7CFO



Comm Team Leader Rowland Brasch, K7RWB, explains Red Cross 47 MHz radio procedures at a recent class.

Comm Team members attend an intensive 1 day training class that includes orientation, communications training and a background check. Reserve Corps members are fully credentialed and require no further processing should their services be needed. This initiative has substantially enhanced Red Cross emergency response capabilities in the Puget Sound area.

Communications team members and Reserve Corps members support Red Cross disaster responses with 47 MHz business band and Amateur Radio equipment in Emergency Operations Centers, vehicles and at portable locations. They also install and maintain radio equipment and train Red Cross personnel in radio communications.

For more information contact Lynn Burlingame, N7CFO, at **n7cfo@arrl.net**.

AB1FM

EXAM INFO

Question Pools and Exams Update

New General Question Pool to Take Effect July 1

Effective **July 1, 2011** a new Element 3 General 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 December 6, 2010 (and updated March 1, 2011) by the Question Pool Committee (QPC) of the National Conference of Volunteer Examiner Coordinators (NCVECs) must be in use starting July 1. There are 456 questions in this pool, down from 485 in the previous pool. The new pool continues to be presented in an understandable and friendly fashion, while maintaining appropriate emphasis on safety, rules and operating procedures. There is one schematic diagram graphic file required for this pool.

With the General class exams changing **July 1**, new test designs must be used effective that day. Previous ARRL VEC supplied General class test booklet versions (2007 series) are valid until midnight June 30, 2011. At that time VE Team leaders may destroy the old versions of the General exams.

For ARRL VE teams using our exam generating *VE Exam Maker Software* package, the updated version is available for download from the ARRL website at **www.arrl.org/ve-exam-maker-software**. If you require any session forms or supplies to go with the new exams, please contact us directly or print from our VE resources page at **www.arrl.org/resources-for-ves**.

Next up for review is the Element 4 Extra class question pool. Public input is invited on future exam questions. The NCVEC QPC has already begun work on this pool. They welcome comments and suggestions for new questions or changes to the topic areas for any of the pools. Please send your input to the QPC using the following e-mail address: **qpcinput@ncvec.org**. You can help shape the next pool!

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: None.

- Extra class (Element 4) pool effective July 1, 2008 is valid until June 30, 2012.

The Extra class question pool contains 12 schematic diagrams.

Questions withdrawn from use: E1C04, E1C05, E1F13, E2E10, E8C04 and E9C16.

The question pools can be viewed on the ARRL website at **www.arrl.org/question-pools**.

VEC Web Pages

The VEC web pages offer information and resources for ARRL Volunteer Examiners. If there is some information you would like to see included on the website, please e-mail your suggestions to **vec@arrl.org**.

Register Your Exam Session and Order Supplies via the Web

ARRL VEs can register Amateur Radio exam sessions and order exam supplies via our interactive web forms. Register an Amateur Radio License Exam Session at **www.arrl.org/register-an-amateur-radio-license-exam-session**. ARRL VE Teams that have been formally Field-Stocked with exams by ARRL VEC may restock their exam supplies via the online VE team restock form at **www.arrl.org/field-stocked-ve-teams**.

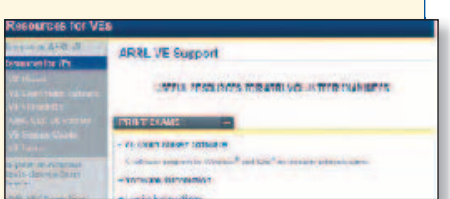
ARRL VEs simply complete the required form fields and click on the SUBMIT button. If the form is incomplete, "red" highlights will appear with a note that says THIS FIELD IS REQUIRED to show the user where the form requires additional information. Otherwise, a confirmation message appears on screen to verify the registration or restock order has been received by the ARRL VEC.

Completed online exam registration forms will automatically be sent to the VEC department for review and release to the exam search web page **www.arrl.org/find-an-amateur-radio-license-exam-session**. It normally takes a couple of business days for us to upload the approved listing. QST

Resources for ARRL VEs

The ARRL VEC VE support page **www.arrl.org/resources-for-ves** offers useful resources for ARRL VEs. The information you will need to help conduct exam session business has been compiled in this one location for your convenience.

- Link to the Amateur Radio Question Pools and keep up to date on the current pools and the questions formally withdrawn from use by the National Conference of VECs Question Pool Committee.
- View the List of Current ARRL VEC Exam Booklets. VE Teams officially Field-Stocked by the ARRL VEC with a bulk quantity of our exam materials should check our VEC Exam Booklets page periodically to ensure your VEC printed exam booklets are up-to-date.



- Generate and print exams using the ARRL VE Exam Maker Software program.
- Download and print all ARRL VEC exam session forms or print individual exam forms. All ARRL VEC forms, except for the CSCE (Certificate of Successful Completion of Examination) form, may be duplicated. Contact the ARRL VEC for a supply of CSCE forms.
- Access FCC Amateur Radio Service Rules and Regulations; particularly subpart F, which pertains to the rules governing the VEC program.
- Candidate information, which includes a detailed list describing the items candidates are required to bring to the exam session and prohibited from using during the test, FCC rules and VE instructions related to exam element credit, resources for the disabled and Amateur Radio practice exams.

We hope you find these pages and features straightforward and effortless to use.

Maria Somma, AB1FM ♦ ARRL VEC Manager ♦ msomma@arrl.org

CONTEST CORRAL

in association with the *National Contest Journal*

JULY 2011

Start and Finish	HF	VHF+	Contest Title	Phone	CW	Digital	Exchange	Sponsor's Web Site or Contact
Jul 1, 0000Z - Jul 1, 2359Z	1.8-28	50-144	Canada Day Contest	✘	✘		RS(T), Province/Territory or serial	**www.rac.ca/service/contesting**
Jul 2, 8 PM - Jul 3, 2 AM	7		070 Club Firecracker PSK31 Sprint			✘	RST and S/P/C	**www.podxs070.com**
Jul 2, 0000Z - Jul 3, 2400Z	1.8-28		Venezuelan Indep Day Contest	✘	✘		RS(T) and serial	**www.radioclubvenezolano.org/concurso.htm**
Jul 2, 1100Z - Jul 3, 1059Z	3.5-28		DL DX RTTY Contest			✘	RST and serial	**www.drcg.de**
Jul 3, 1100Z - Jul 3, 1700Z	28		DARC 10-Meter Digital Corona			✘	RST, serial	**www.darc.de/ukw-funksport**
Jul 4, 0000Z - Jul 10, 2400Z	28		Ten-Ten Spirit of 76 QSO Party	✘	✘	✘	Call, name, member number, S/P/C	**www.ten-ten.org**
Jul 4, 2300Z - Jul 5, 0300Z	1.8-28	50	MI QRP July 4th Sprint		✘		RST, S/P/C, and QRPMI number or power	**www.miqrp.org**
Jul 8, 0200Z - Jul 8, 0300Z	1.8-14		SNS and NS Weekly Sprints		✘		Serial, name, and S/P/C	**www.ncccsprint.com/rules.html**
Jul 8, 2000 EDT - Jul 8, 2400 EDT	3.5-28		FISTS Summer Sprint		✘		RST, S/P/C, name, FISTS number or pwr	**www.fists.org**
Jul 9, 1200Z - Jul 10, 1200Z	**1.8-28**		**IARU HF World Championships**	✘	✘		**RST and IARU zone**	**www.arrl.org/contests**
Jul 10, 0000Z - Jul 10, 2359Z	1.8-28	50	Straight Key Weekend Sprint		✘		RST, QTH, name, member number	**www.skccgroup.com/sprint/wes**
Jul 10, 2000Z - Jul 10, 2400Z	1.8-28		QRP ARCI Summer Homebrew		✘		RST, S/P/C, QRP number or power	**www.qrparci.org**
Jul 13, 1300Z - See website	3.5-14		CWops Monthly Mini-CWT Test		✘		Name and member number or S/P/C	**www.cwops.org/onair.html**
Jul 16, 1200Z - Jul 17, 1200Z	3.5-28		DMC RTTY Contest			✘	RST and serial	**www.digital-modes-club.org**
Jul 16, 1600Z - Jul 16, 1800Z	1.8-28		Feld-Hell Telephone Sprint			✘	RST, S/P/C, Feld-Hell member nr or age	**sites.google.com/site/feldhellclub**
Jul 16, 1800Z - Jul 17, 2100Z		50,144	CQ WW VHF Contest	✘	✘	✘	4-digit grid square	**www.cqww-vhf.com**
Jul 16, 1800Z - Jul 17, 0600Z	**3.5-28**		**North American QSO Party RTTY**			✘	**Name and S/P/C**	**www.ncjweb.com**
Jul 17, 0700Z - Jul 17, 1459Z	7-28		Russian Radio Team Championship	✘	✘		RS(T) and ITU zone or 3-letter code	**www.srr.ru/CONTEST/**
Jul 17, 2000Z - Jul 17, 2159Z	14		CQC Great Colorado Gold Rush		✘		RST, serial, category, CQC member nr	**www.cqc.org/contests**
Jul 18, 0100Z - Jul 18, 0300Z	1.8-28		Run For the Bacon - Monthly		✘		RST, S/P/C, Flying Pig nr or power	**www.fpqrp.com/fpqrprun.php**
Jul 21, 0030Z - Jul 21, 0230Z	3.5-14		NAQCC Monthly QRP Sprint		✘		RST, S/P/C, and NAQCC mbr nr or power	**naqcc.info**
Jul 24, 1700Z - Jul 24, 2100Z	7-28		Flight of the Bumblebees		✘		RST, S/P/C, Bumblebee nr or power	**adventure-radio.org/wiki**
Jul 30, 0000Z - Jul 31, 2400Z		144	144 MHz Digital EME Championship			✘	TMO or RST and R	**www.DUBUS.org**
Jul 30, 1200Z - See website	3.5-28	50-144	MARAC US Counties QSO Party	✘	✘		RS(T), state, county abbreviation	**www.marac.org**
Jul 30, 1200Z - Jul 31, 1200Z	3.5-28		IOTA Contest	✘	✘		RS(T), serial, IOTA number if island	**www.rsgbcc.org/hf/rules/2011/riota.shtml**

All dates refer to UTC and may be different from calendar date in North America. Times given as AM or PM are local times and dates.
Refer to the contest websites for full rules, scoring information, operating periods or time limits, and log submission information.
No contest activity occurs on 60, 30, 17, 12 meters. Serial = Sequential number of the contact. S/P/C = State, Province, DXCC Entity. XE = Mexican state.
Publication deadline for Contest Corral listings is the first day of the second month prior to publication.

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

Sean's Picks

All dates/times are in UTC.

- **State QSO Parties this Month**: None
- **QRP Contests this month:** MI QRP Club July 4th Sprint (July 4-5), QRP ARCI Summer Homebrew Contest (July 10), Flying Pigs Run for the Bacon (July 18), NAQCC Monthly QRP Sprint (July 21), ARS Flight of the Bumblebees (July 24).
- **Ten-Ten Spirit of 76 QSO Party (July 4):** For some reason, 10 meters explodes with sporadic-E activity on the 4th of July. This contest always has excellent activity. Exchange is your name, 10-10 number (if you have one) and your State or Country.
- **IARU HF World Championships (July 9-10):** A 24 hour major event in the middle of summer! Get your contest fill and still have time to do other things on the weekend. Exchange is RS(T) and your IARU Zone. See **iaru.org/ituzonesc.gif** for an IARU zone map.
- **North American QSO Party, RTTY (July 16-17):** 12 hours of RTTY fun throughout North America. Exchange is your name and your State, Province or Country. With a 100 W power limit and its short duration, NAQP is a fun way to try RTTY for the first time.
- **MARAC US Counties QSO Party (July 30-31):** A county hunter's dream! A great chance to be "The Hunted" by simply putting your rig in your car and going on a County DXpedition. Some rule changes for 2011, so be sure to check their website at **www.marac.org**.
- **IOTA Contest (July 30-31):** The HF contest where islands are the name of the game. Numerous islands all around the world will be active; how many can you work? Visit **www.rsgbiota.org/** for more info on this great DX program.

Results, 2011 ARRL RTTY Roundup

Don't measure yourself by what you have accomplished, but by what you should have accomplished with your ability. — *John Wooden*

Jay Townsend, WS7I
ws7i@arrl.net

RTTY Roundup is driven by the many guys and gals trying to improve on last year results, work a little DX or the next state they need — more than by operators chasing wallpaper, plaques and the head of the Top Ten box. This year we will take a regional focus and highlight participants. [See the online version at **www.arrl.org/contests** for the extended version of the article. — *Ed.*]

RTTY contesters often set a goal, make a plan, work on equipment, antennas, computers, programs, buffers and all the other necessary parts in the grand quest to enjoy the event. Here is a typical comment from Peter, HZ1PS: "I had two goals set for the contest. One was to work Wyoming — not achieved, unfortunately — not sure where the WYs were hiding but I still need WY to complete WAS RTTY. The other was to better my last year's effort, which I did."

For several years we've reported a yearly increase in contest logs received but this year was different. Perhaps the timing of the event, moving to a week later than normal, was significant and there were numerous conflicts with other contests. Nevertheless, participants from 132 different countries sent in nearly 1600 logs containing about half a million contacts from the 24 hours out of 30 that stations may operate.

Propagation

Ten meters was back but showed very low activity. Puerto Rico, the northern part of South America, Arizona, and Southern California were found to have the highest 10 meter totals. WP3C, NP4BM, K6LL, HI3TEJ and W6WRT were the leading 10 meter stations. Phil, GUØSUP, remarked that it was great to see 15 meters more open than last year but that it was a shame 10 meters did not open from his QTH. Mike, K4GMH, reported his QSO total on 15 meters was 10 times larger than last year.

Affiliated Club Competitions

Significant changes were afoot this year in the club ranks. The big news was the elevation of the Minnesota Wireless Association (MWA) to the Unlimited category in 2011 from the Medium category in 2010. The MWA has as its primary objective competing against other radiosporting clubs in North America. I would say that they have arrived. MWA won the Unlimited gavel and made a large impact on the RTTY and radiosporting club scene. [The winning club in each of the three club categories — Unlimited, Medium, and Local — receives a gavel. — *Ed.*] This was the second club *ever* to score over 2 million points in the RTTY Roundup. Do I hear a loud and deserved round of applause?

W/VE

Single Operator, High Power

K4GMH	286,125
N2WK	227,456
WØLSD	220,660
K6LL	204,710
VE7CC	203,610
ABØRX (@ WØMA)	196,650
AI9T	185,328
W5AP	178,866
K5DU	174,264
W7WW	173,937

Single Operator, Low Power

AA5AU	215,180
WW4LL	177,749
VA2UP	169,813
KØTI	162,864
N2QT	160,544
KB7Q	134,800
KE5OG	125,820
KTØDX	123,354
WØAW	112,672
KØAD	100,704

Multioperator, High Power

NØNI	212,653
WØSD	194,247
K1SFA	186,405
W4RM	164,944
N8NR	146,850
K7OX	140,816
K9MBB	140,026
K4QD	136,730
K7BTW	130,694
NR4M	130,626

Multioperator, Low Power

N5RN	116,737
KS1J	79,458
W1SLF	72,900
KU1YL	64,657
N8LRG	64,130
N6MA	63,756
K9NR	54,438
W2V	54,033
N7UVH	52,060
VA7RY	45,892

DX

Single Operator, High Power

P49X (WØYK, op)	385,113
LZ8E (LZ2BE, op)	170,688
SO4M (SP4MPG, op)	168,516
UW8I (UT2IZ, op)	148,680
YO9HP	132,240
KH6ZM	126,015
YT5W	97,308
OH1F (OH1NOA, op)	96,960
OH2HAN	90,404
JM1XCW	89,128

Single Operator, Low Power

HI3TEJ	159,600
WP3C	144,509
P4ØP	128,068
5C5W (CN8KD, op)	126,170
J39BS	96,416
EA3GLB	94,830
VP9/WW3S	91,368
ZC4LI	71,071
NP4BM	68,875
OQ6A (ON5MF, op)	67,620

Multioperator, High Power

XE2K	167,918
OL8M	154,580
IQ1RY	150,040
OK1DVM	146,816
ED1R	139,934
UW4I	139,411
OH8A	133,340
IT9BLB	128,344
UZ2I	120,310
PI4DX	98,197

Multioperator, Low Power

HI3A	111,647
KP2D	91,266
UT7E	68,150
OH8KTN	61,143
IW1QN	51,600
EA2DKF	49,808
OM3KWZ	33,540
UT8EL	32,116
YO5KUC	30,912
DF9ZP	30,108

West Coast Region

Our highlighted West Coast participant is Kirk, K7EKM who is the resident tower monkey for the Spokane DX Association and wanted to try his hand in a RTTY contest. He started on 15 meters and stayed there hour after hour, saving 20 meters for later. Luckily that strategy worked as K7EKM (with K7OX and WS7I) snared the Multi-Single, High Power (MSHP) victory for the Region, piloting the K7OX station. Kirk will get his first plaque!

The West Coast Region stretches over very long distances with many band opening differences. From Yuma, Dave, K6LL worked 98 contacts on 10 meters while Lee, VE7CC had not a single 10 meter QSO. It was a very tight race and after log checking there were just a few QSOs difference between the two stations and the southern end of the Region won this year. K6LL was fourth in the Top Ten and VE7CC was fifth.

Midwest Region

An interesting participant from Kansas is Jeff, ACØC. Jeff operated the Roundup using his stealth contesting antennas. It's quite a feat to get over 1,000 QSOs and 90-some thousand points with interior antennas!

Natasha, KU1YL and Alex, KU1CW navigated her station to fourth overall. They won the Midwest Division and the Midwest Region in Multi-Single, Low Power. Ron, KOØZ contested with his fiancée Debbie who had such a great time that she now wants to earn her ticket.

Central Region

Our featured participant from the Central

COURTESY SIMO SORVARI, OH2HAN

Simo, OH2HAN operates from his ham shack that is situated in a separate building so the disturbance between family and contester is minimal.

Region is Scott, K8SM who set out to win both the Great Lakes Division and Ohio Section Low Power awards. The last certificate that Scott won in an ARRL contest was Novice Roundup in 1979 when he took 1st place. His determination to beat his 2010 score led to 12 hours straight in the chair with his XYL (KD8EIJ) and girls (one is KD8EIP) bringing him food and drinks. Scott claimed, "I am NOT a big gun." Sorry Scott, when you win the Division plaque, place in the top five in the entire Central Region, and win Ohio you are indeed a "Gun."

Southeast Region

Living in the Southeast Region makes for great contesting and DXing, securing three overall category wins out of the four available in the US and Canada. A special contester from this region is Marty, W8AKS from West Virginia. Marty has given many of us that important West Virginia multiplier for many years. Marty's goals weren't unlike those of many other operators. He was shooting for 500 QSOs and came close but ran out of time with 490 in the log.

Bill, W4RM and his crew only do one RTTY contest as they are CW guys — and that is the RTTY Roundup — but they took fourth place. Jan, K4QD with the "Florida Boys" claimed the eighth place finish in the MSHP category. Finishing up tenth overall was Steve, NR4M and the "Goat Gang" (they contest from a farm).

Northeast Region

Single-Operator, Low Power in this Region was won by Fabi, VA2UP. Fabi set the new Canadian Low Power record while securing third place overall in the Top Ten box. Pamela, K6NDV — whose call is often confused with that of Will, K6ND — won the New England Division.

Our featured Northeast Region RTTY station this year is the W2V Multioperator, Low Power team. They won the Hudson Division while placing eighth in the Top Ten box. The call W2V was a special event of Ham Radio University. W2V reported that their rate was slowed by the call: "One station, a KH6, refused to work me unless I sent my whole call. I think his message was, 'No partial calls please!'"

New Records

Records indicate just how much the sport of RTTY contesting has grown as the years roll along. This year Mike, K4GMH set the Single-Operator, High Power record by averaging over 100 contacts per hour, a feat long waited for in America. Seventeen new Division records were obtained along with 41 new Section records. On the DX end of the QSOs there was one new Continental Record set along with 35 new Country records

DX Highlights

Ed, WØYK who operates in Aruba was the favorite going into the contest. Ed brought along another secret weapon into the event in 2011 going SO3R. His 2009 record still stands but Ed certainly wasn't challenged in 2011. A tip of the hat to Ed — now a six-time champion!

The featured DX participant this time is Simo, OH2HAN, who wrote a great account of the contest for us to get a feel for the DX end of the RTTY Roundup — it's available in the online version of this article!

The big change this year was in the Multi-operator, High Power category with what is usually an all-European-dominated group. Hector, XE2K with just packet assistance won top honors this year. OL8M operated by Pavel, OK1DRQ was in second place. Closely following Pavel was the IQ1RY group in third place. They related, "It was a first for us and we went through this learning the magic of the things."

Next Year

By now you might be thinking of building or buying that interface to get your computer hooked up and doing RTTY for the next Roundup (January 6-7, 2012). This digital sport is what makes the bands come alive and fills the bands with old-time RTTY signals. The solar cycle is in full swing so don't miss the RTTY Roundup…a radiosporting event that tests your skill and ability. Will the 4000-QSO barrier get challenged in 2012? Will 10 meters be a factor? Will SO3R be the next big breakthrough?

Affiliated Club Competition

Club Name	*Score*	*# of Logs*
Unlimited Club		
Minnesota Wireless Assn	2,183,630	64
Northern California Contest Club	1,824,779	52
Medium Club		
Potomac Valley Radio Club	1,833,820	37
Society of Midwest Contesters	1,087,536	31
Florida Contest Group	832,537	15
Arizona Outlaws Contest Club	599,011	12
Grand Mesa Contesters of Colorado	583,470	10
Contest Club Ontario	570,006	18
Yankee Clipper Contest Club	530,377	23
Willamette Valley DX Club	391,433	8
Frankford Radio Club	366,925	11
Western Washington DX Club	365,183	8
Louisiana Contest Club	336,861	3
Central Texas DX and Contest Club	329,862	3
Tennessee Contest Group	289,592	11
South East Contest Club	269,564	4
CTRI Contest Group	261,657	6
Alabama Contest Group	208,203	9
Contest Group Du Quebec	206,301	4
Kentucky Contest Group	126,966	3
Mad River Radio Club	122,954	5
Southern California Contest Club	98,867	8
Rochester (NY) DX Assn	94,687	5
Order of Boiled Owls of New York	87,410	4
Hudson Valley Contesters and DXers	60,110	3
Maritime Contest Club	49,944	3
Carolina DX Association	40,526	5
Local Club		
Dominion DX Group	639,851	10
Orleans County Amateur Radio Club	541,423	6
ORCA DX And Contest Club	432,781	9
Spokane DX Association	323,858	8
Boeing Employees ARS — St Louis	238,041	3
Low Country Contest Club	145,330	5
Bergen ARA	144,521	3
Kansas City DX Club	139,231	4
Skyview Radio Society	105,255	4
Metro DX Club	54,452	4
Bristol (TN) ARC	23,488	4
West Park Radiops	15,548	3

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	K4GMH
W/VE Single Operator Low Power — NM7M Memorial	Jim Reisert, AD1C	AA5AU
W/VE Multioperator High Power	John Lockhart, WØDC	NØNI
DX Multioperator High Power	Paolo Cortese, I2UIY Memorial by WØYK	XE2K
Atlantic Division Single Operator High Power	Orleans County Amateur Radio Club	N2WK
Delta Division Single Operator High Power	Roland Guidry, NA5Q	WB4YDL
Great Lakes Division Single Operator High Power	Southwest Ohio DX Association	W8JWN
Pacific Division Single Operator High Power	Northern California Contest Club	KF6T
Roanoke Division Single Operator High Power	Mark Sihlanick, N2QT	K4GMH
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	W1BYH
New England Division Multioperator High Power	Cuzco Contest Club	K1SFA
Roanoke Division Single Operator Low Power	Mike Sims, K4GMH	N2QT
Southeastern Division Single Operator Low Power	Alabama Contest Group	WW4LL
Roanoke Division Multioperator Low Power	Dominion DX Group, K4VAC	W4APP

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.

Shift to the Extended Results

Jay's online article at **www.arrl.org/contests** is nearly three times as large with more regional reporting, complete line scores and a searchable contest database, more photos and a sidebar by OH2HAN. Don't forget the personal stories on the ARRL's Soapbox page, too!

2010 ARRL 10 Meter Contest Results

New multipliers, more sunspots, *lots* of fun

Ken Harker, WM5R
wm5r@arrl.net

The 38th annual ARRL 10 Meter contest on December 11-12, 2010 was a new and exciting challenge for many enthusiasts of the 10 meter band. Propagation is picking up, albeit slowly, as solar cycle 24 builds momentum. Activity is also picking up, with the second-highest number of stations ever submitting logs from the US, Canada and Mexico.

XE-citement!

The 2010 contest rules included an exciting new twist. For the first time ever, Mexican stations would send their state in the contest exchange (instead of a serial number) and Mexican states now count as multipliers (in the same way that US states and Canadian provinces count as multipliers). The Mexican stations in the contest reported an enormous level of excitement and pride at representing their country in this new format of the ARRL 10 Meter Contest. In 2009, the ARRL received just 6 logs from XE stations; in 2010, the number of logs from XE jumped to 50. Over 100 unique XEs were active in the contest, and 26 out of the 32 states were on the air. Positive comments have been received from all over Mexico and the world. With new Mexican state records to chase and contest, even more activity from XE is expected in 2011.

Activity

A total of 2474 logs were entered in the contest this year, an increase of 413 logs, about 20% more than in 2009. One major source of the increase in submitted logs was Asia, which more than doubled the number of logs submitted (191 logs) from 2009 (just 89 logs). European stations submitted 43 more logs in 2010 and now account for 46% of all DX logs. In the United States, there were 150 more logs overall, an increase of about 11%.

The three Single-Operator, Low Power categories continue to account for more than half of all log submissions. For DX operators, the CW-only categories are now the most popular, while in W/VE/XE, the Mixed-Mode categories continue to be the most popular. In 2010, the CW-only categories had more log submissions than the phone-only categories, the first time that has ever happened since the single-mode categories were added to the contest in 1980!

Records

For the third year in a row, there were no world, continental, or overall W/VE/XE records set. There were, however, new records set at the DXCC entity level and the W/VE/XE section level. Thirty-four new DXCC entity records were set in 2010, with at least three new records set in each continental area. Seven section records were set in the US, all in single-operator QRP categories.

Starting in 2010, the W/VE record scores now include Mexican stations (becoming the W/VE/XE record scores). Mexican stations entered 7 of the 10 entry categories this year, setting 41 inaugural Mexican state records. With 32 states and 10 categories each, the vast majority of the 320 Mexican state records remain unclaimed, including every available QRP record.

COURTESY HECTOR GARCIA, XE2K

Thank these two for all the activity from XE-land. Hector, XE2K, Ramon, XE1KK, and Joaquin, XE1R were instrumental in drumming up activity from most of the 32 Mexican states in 2010. *Gracias amigos!*

Complete record scores can be viewed online at **www.arrl.org/contest-records**.

DX Single Operator, Mixed-Mode

First place in the Single Operator, Mixed Mode QRP category was Jose, PU5ATX from the coastal town of Imbituba in Santa Catarina state, Brazil. Jose's score of 60,888 was over 10 times the score of any other DX station in the category. Jose made about 6 CW contacts for every phone contact. Second place went to Ymanol, YV5YMA from Caracas, Venezuela with the contest call sign of 4M2L. Serge, UR2VA of Kirovograd, Ukraine came in third place with 4320 points and the top result from Europe.

In the Single Operator Mixed-Mode Low Power category, all three top scores were from South America. Moving up two spots from last year, Alex, PY2SEX took first place with 181,720 points from Campinas, Brazil. Despite his first place finish, Alex wishes the propagation had been better: "This was the worst ARRL 10 Meter Contest ever. There was no big opening to North America this time — only a one hour opening on Sunday." A close second-place result (180,804 points) went to Javi, LU5FF, operating from the Buenos Aires area. This is the second year in a row that LU5FF has finished in second place. By a very narrow margin, Eduardo, LW3DG took third-place (144,966 points) operating from the Buenos Aires area. The top non-South American score was made by Heijo, EA8OM (80,580 points) in the Canary Islands, off the west coast of Africa.

The top three scores in the Single Operator, Mixed-Mode High Power category also went to stations from South America this year. Moving up from second place last year, the category victory went to Jesus, AY5F (1,078,704 points) from Rosario, Argentina. With 1737 contacts and 198 multipliers, Jesus was the only DX single operator this year to score over a million points. Second place went to Jorge, HK1R (897,600 points) of Atlantico, Colombia. Pedro, CE3FZ of Santiago, Chile took third place (647,752). Unlike AY5F and

W/VE/XE

Mixed Mode, QRP

WA6FGV	119,210
N6WG	37,620
W6AQ	31,920
KS4X	31,780
W5GAI	29,070
K3TW	27,090
KØDI	22,230
VA3DF	21,600
WA1LAD	20,246
NT4TS	16,562

Mixed Mode, Low Power

N5DO	284,750
WQ5C	262,976
N9CM	244,758
K6AM	236,096
WQ5L	220,752
K4LY	217,884
WØPV	192,000
W5ZL	187,264
N4VA	175,104
NR7Q	156,600

Mixed Mode, High Power

N8OO	709,672
N4EEB	574,002
N6WM (@N6RO)	485,280
KF6T	467,262
N4PN	463,752
N8II	460,412
WB9Z	398,660
W3EP	395,592
NA4CW	391,012
K3ZO	375,552

Phone Only, QRP

KB5KYJ	35,604
W6QU (W8QZA, op)	23,652
KE2OI	15,582
N3AWS	7,722
N8MWK	6,552
N9FRY	6,144
WA5DSS	2,750
KR1ST	2,438
KBØOLA	1,802
WD5FGZ	1,776

Phone Only, Low Power

AC5O	133,292
WA8QYJ	75,884
AD5RQ	67,536
XE3N	50,048
WB5R	46,224
KC6AWX	36,226
K5KDX	26,208
AF6AV	25,500
N6KP	25,424
WB9PUB	25,000

Phone Only, High Power

W5PR	408,980
K5TR (WM5R, op)	341,904
NR5M	339,764
NA5TR	245,336
N8RA	118,736
K6HNZ	116,220
W5COW	109,062
N7UQ	104,310
K8CC (N8NX, op)	90,576
WA5ZUP	89,568

CW Only, QRP

WG5G	73,392
KØOK	35,340
KE5AKL	31,584
AE8M	30,100
W7JI	28,336
W4ZKE	26,880
K4CIA	26,724
NC7W	22,308
AA1CA	22,188
W5ESE	20,768

CW Only, Low Power

N4WW (N4KM, op)	335,328
WD4AHZ	248,304
WK2G	243,520
AE5GT	239,704
K9WZB	171,024
K7HP	139,444
K5FP	129,712
N4ZI	118,524
XE1AY	115,640
W2TX	108,420

CW Only, High Power

K1TO	717,060
K5NA	561,816
W5KFT (K5PI, op)	533,728
N4BP	513,616
KH6ZM	454,528
N7AT (K8IA, op)	374,016
NY3A	311,248
N5NA	259,624
WØSD (WØDB, op)	241,488
WJ9B	230,972

Multioperator

NX5M	1,161,864
K5KG	744,228
K6LL	678,960
W6YX	640,278
KØLUZ	555,680
AK7AZ	538,410
K1WHS	522,984
KØDU	518,856
N2MM	464,352
W5YAA	449,328

DX

Mixed Mode, QRP

PU5ATX	60,888
4M2L (YV5YMA, op)	8,120
UR2VA	4,320
VU2UR	3,542
PY2NY	3,400
UR5IFX	2,960
ON6AB	2,280
PY4ZO	1,794
LZ1MC	1,734
UA1AFT	1,568

Mixed Mode, Low Power

PY2SEX	181,720
LU5FF	180,804
LW3DG	144,966
HK3O	144,060
LO2F (LU1FAM, op)	133,760
EA8OM (DJ1OJ, op)	80,580
PY3OZ	72,000
LW1EUD	42,480
VK4TJF	33,528
DL5L (DGØOKW, op)	23,072

Mixed Mode, High Power

AY5F	1,078,704
HK1R	897,600
CE3FZ	647,752
PW2D (PY2ZXU, op)	452,452
VK4IU (VK4EMM, op)	424,780
V31RG (K4VU, op)	367,200
LV5V (LU5VV, op)	230,724
ZS1EL	216,106
OA4SS	191,820
VK3TDX	166,950

Phone Only, QRP

LU1VK	8,924
CT2IOV	7,140
VK4ATH	1,118
9M6/W8AY (R2AD, op)	588
JM2RUV	528
JA2MWV	384
YCØNSI	336
I5KAP	252
EA3FF	252
PY2BN	182

Phone Only, Low Power

HI3TEJ	194,940
LR4E (LW4EU, op)	105,120
LW7DUC	103,740
LU6FOV	82,320
LU5MT	65,412
LW3DN	64,372
LW6DAK	61,072
FY1FL	57,288
PY2CX	50,244
PP5JAK	44,238

Phone Only, High Power

LR2F	300,276
PQ5B (PP5JD, op)	231,768
P4ØK (K6KO, op)	154,528
LU7VCH	140,188
ZX2B (PY2MNL, op)	113,220
AY8A (LU8ADX, op)	112,662
CU2KG	92,820
V25R	58,926
PY5ZD	57,200
PY5AB	46,488

CW Only, QRP

AY9F	60,720
LP2D (LU6DO, op)	41,688
US5VX	3,680
UT2IV	3,648
RU7A	3,384
JR1NKN	2,444
JH8FAJ/1	1,400
JA7GAX	1,100
Z35F	792
UA9AFS	760

CW Only, Low Power

V31BD (WQ7R, op)	263,848
LU8QT	234,052
PY1NX	228,864
PP5KR	223,924
LW1E (LU1EWL, op)	194,884
Z21DXI (VK6DXI, op)	177,848
V51YJ	146,640
J39BS	129,888
PY2MTS	94,224
ZL3TE (W3SE, op)	85,044

CW Only, High Power

LU1HF	752,464
VP5CW (W5CW, op)	562,772
CX9AU	369,600
LU6UO	333,216
CE3DNP	315,084
CE1/K7CA	292,824
L33M (LU3MAM, op)	184,680
CR6K (CT1ILT, op)	109,272
9A5W	72,324
CA3KHZ	61,000

Multioperator

CW5W	1,161,960
ZX5J	1,148,940
LS1D	1,103,400
CE4CT	1,055,392
PJ2T	964,094
HD2A	827,696
CW5R	723,140
WP3C	658,762
PT3T	626,472
ZF1A	615,088

HK1R, Pedro made more contacts on phone than on CW. "It was a good idea to include Mexican states as multipliers. I worked several of them," says Pedro. The top score from outside South America was WRTC veteran John, VK4EMM of Queensland, Australia, operating from VK4IU.

DX Single Operator, Phone-Only

The top three DX results in the Single Operator, Phone-Only QRP category came from stations on three different continents in 2009 and the same pattern held true in 2010. The winner this year was Francisco, LU1VK (8924 points), operating from the foothills of the Andes Mountains in Rio Negro, Argentina. Francisco worked 46 multipliers, by far the most of any station in the category. Second place went to Arnaldo, CT2IOV of Loule, Portugal (7140 points). Third place went to Tom VK4ATH (1118 points) of Gailes, Queensland, Australia. The best Asian score was Paul, 9M6/W8AY (588 points) and the top European score was Franco, I5KAP (252 points).

Six of the top ten DX scores in the Single-Operator, Phone-Only Low Power category came from Argentina. Winning the category, however, was a North American: Ted, HI3TEJ (194,940 points) of Puerto Plata in the Dominican Republic. "Both nights, the band stayed open after midnight and was wide open to USA and South America." Second place in the category went to Jorge, LW4EU, operating as LR4E. Operating from the small town of Chacabuco, west of Buenos Aires, Jorge made 596 contacts with 90 multipliers for 105,120 points. A very close third place went to Claudio, LW7DUC (103,740 points) from Buenos Aires. Claudio worked 5 more multipliers than Jorge, but 39 fewer contacts. The point spread between the second and third place results in this category was just 1.3%!

In the Single Operator, Phone-Only High Power category, the victory went to last year's third-place finisher. Bob, LU2FA, operating with his contest call sign LR2F from Rosario, Argentina, won the category in 2008 and now again in 2010. Bob made 1330 contacts with 114 multipliers for a score of 300,276 points. Second place went to Jaime, PP5JD, using the contest call sign PQ5B. Operating from Florianopolis, Brazil, Jaime scored 231,768 points. Kay, P4ØK came in third place (154,528 points) operating from the island of Aruba.

DX Single Operator, CW-Only

Five of the top ten scores in the Single Operator, CW-Only QRP category went to European stations this year, but the top two scores were from South America. Overall DX victory in the category went to Edmundo, AY9F (60,720 points). Edmundo operated the contest from the small town of Santo Tome in the Santa Fe state of Argentina, 380 km northwest of Buenos Aires. Another station in Argentina, Mark, LU6DO, operating from the LP2D club station in Buenos Aires, took second place with 41,688 points. Last year's category winner, Eugene, US5VX (3680 points), operating from southeastern Ukraine, took third place and the top European score.

A North American station took the victory in the DX Single Operator CW-Only Low Power category. Raymond, WQ7R, operating at his station in San Ignacio, Belize with the call sign V31BD scored over 263,848 points to take first place. Second place went to Roque, LU8QT. Operating from the town of La Toma in San Luis state, Argentina, made 660 contacts to 91 multipliers for 234,052 points. Third place went to Soni Endlich Leite, PY1NX (228,864 points) from Rio de Janeiro, Brazil.

Operating from San Francisco, Argentina, Juan, LU1HF, made 1465 contacts with an impressive 131 multipliers to score 752,464 points and win the Single Operator CW-Only High Power category for DX for the second year in a row. David, W5CW, took

second place operating from the Turks and Caicos Islands with his VP5CW call sign (562,772 points). Third place went to Daniel Alejandro Neves Pardias, CX9AU (369,600 points), operating from the capital city of Uruguay, Montevideo: "This was my first time to work all 50 US states in the ARRL 10 Meter Contest."

DX Multioperator

In the DX Multioperator category, all of the top ten scores came from stations in South America or North America. Winning the contest for the third year in a row was the CW5W team in Cerro Largo, Uruguay. Operating from the station of Jorge, CX6VM and using his contest call sign, the team made 1,161,960 points, almost twice as many points as their winning effort from last year. For the second year in a row, second place went to the team at ZX5J (1,148,940 points) in Santa Catarina state, Brazil. Operators at ZX5J included Beatriz, PU5BIA (13 years old) and Eduardo PU5FJR (11 years old). Leo, PP1CZ notes, "It was a wonderful experience to take part in a contest with half of the team being kids." The four-operator team at LS1D in Buenos Aires, Argentina took third place in the category. The operators made 1590 contacts to 225 multipliers for 1,103,400 points, just 3.9% behind the second place score.

W/VE/XE Single Operator, Mixed-Mode

There were three new call signs in the top three spots of the W/VE/XE Single Operator, Mixed-Mode QRP category in 2010, and they all operated the contest from California. First place went to Dorian, WA6FGV (119,210 points) of Santa Barbara section. Dorian made 381 contacts to 91 multipliers, almost exactly twice as many contacts as the second place station. Second place (37,620 points) went to Robert, N6WG of East Bay section. "It's been a long time since 10 meters seemed so open and active. I really enjoyed it," says Robert. Third place (31,920 points) went to Dave, W6AQ of the Los Angeles section: "If Old Sol would only wake up, this would be a great contest."

In the Single Operator, Mixed Mode Low Power category, the top two scores went to stations in Texas. Victory in the category as claimed by Dave, N5DO (284,750 points) from the West Texas section. Dave made 732 contacts with 125 multipliers. "The decision to allow the Mexican states to count as multipliers was a great one," David said. "It added a lot of fun to chase down the various states. The participation from XE will hopefully continue to grow in the future." Second place went to Michael, WQ5C with 262,976 points, operating from the South Texas section. Michael made 721 contacts to 112 multipliers. Richard, N9CM took third place (244,758 points) this year, operating from West Central Florida.

Victor, N8OO (709,672 points) won the Single Operator, Mixed-Mode High Power category, operating from Louisiana. John, N4EEB, operating from North Florida, took second-place this year (574,002 points). Chris, N6WM (485,280 points) came in third place, operating from the N6RO contest station in the East Bay section: "I had some domestic openings that were profound, including a 300 plus QSO/hour rate on Saturday morning and one on Sunday as well, each with a slightly different focus providing many good multipliers."

W/VE/XE Single Operator, Phone-Only

Rick, KB5KYJ won the Single Operator, Phone-Only QRP category for the second year in a row. Operating from West Texas, Rick worked 393 contacts in 46 multipliers for 35,604 points. Second place went to Bill, W8QZA (23,652 points), using the club call sign of the San Diego Spark Gap Society, W6QU. Falling one spot from second place in 2009 to third place in 2010 was John, KE2OI (15,582 points) of Southern New Jersey. John made 148 contacts with 53 multipliers.

Jeff, AC5O (133,292 points), operating from his QTH southwest of New Orleans, Louisiana moved up two places from last year to finish in first place in the Single Operator, Phone-Only Low Power category in 2010. Jeff worked 717 contacts in 94 multipliers with a Hexbeam antenna at 15 meters above ground. Robert, WA8QYJ (75,884 points) of South Florida took second place. Third place went to Udo, AD5RQ (67,536 points) from the North Texas section. One of only two Mexican stations to make a Top Ten finish this year, Zalo, XE3N came in fourth place with 50,048 points from Playa del Carmen, Quintana Roo: "It was a great contest, with irregular propagation from my QTH similar to the six meter band."

In the Single Operator, Phone-Only High Power category, the top three stations all made over 200,000 points in 2010, and all four were located in the South Texas section. After two consecutive second-place finishes in 2008 and 2009, 10 meter specialist Chuck, W5PR took the top score this year with 1868 contacts to 110 multipliers for 408,980 points from his station in Manvel, south of Houston: "Working the new XE multipliers was a blast. I was astounded to work almost 50 XEs!" Three-hundred twenty kilometers to the west, last year's fifth place finisher, Ken, WM5R took second place (341,904 points) operating from the K5TR station near Johnson City in the Texas Hill Country. Third place went to George, NR5M (339,764 points), operating from his resurrected superstation near Hempstead, west of Houston.

W/VE/XE Single Operator, CW-Only

Three new faces were at the top of the Single Operator, CW-Only QRP category in 2010. Dan, WG5G of South Texas won the category with 278 contacts to 66 multipliers for a total of 73,392 points. "I tried to put in a big effort this year; the band was really amazing," says Dan. Robert, KØOK (35,340 points) came in second place, operating from his station in the Orange section of southern California. Third place went to Michael, KE5AKL (31,584 points), operating from New Mexico.

The top three scores in the Single Operator, CW-Only Low Power category all came from stations operating in Florida. Kevin, N4KM won the category with 335,328 points operating from the N4WW station in the North Florida section. Kevin was the only operator in the category to make more than 1000 contacts in the contest. Ron, WD4AHZ

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Florida Contest Group	9,015,272	78
Northern California Contest Club	3,993,006	57
Potomac Valley Radio Club	3,563,898	80
Medium Category		
Central Texas DX and Contest Club	5,437,738	21
Arizona Outlaws Contest Club	2,570,804	45
Yankee Clipper Contest Club	2,505,902	46
Southern California Contest Club	2,197,830	30
Society of Midwest Contesters	1,681,232	43
Grand Mesa Contesters of Colorado	1,449,878	18
Carolina DX Assn	1,188,626	18
Frankford Radio Club	1,154,288	19
Alabama Contest Group	1,149,768	19
South East Contest Club	984,418	16
Contest Club Ontario	898,786	35
Minnesota Wireless Assn	821,666	44
Tennessee Contest Group	793,056	29
Mad River Radio Club	683,866	17
Louisiana Contest Club	674,806	7
Western Washington DX Club	604,742	16
Texas DX Society	511,140	4
Maritime Contest Club	458,092	8
Willamette Valley DX Club	333,360	9
Hudson Valley Contesters and DXers	290,964	9
Utah DX Assn	237,272	8
CTRI Contest Group	218,720	7
Oklahoma DX Assn	172,944	3
Western New York DX Assn	148,596	6
Delara Contest Team	148,210	9
Order of Boiled Owls of New York	85,590	6
Rochester (NY) DX Assn	83,868	8
Contest Group Du Quebec	70,316	5
North Coast Contesters	58,580	3
North Texas Contest Club	20,558	4
Local Category		
Midland ARC	989,080	7
Central Virginia Contest Club	780,186	9
Mother Lode DX/Contest Club	573,330	8
Hampden County Radio Assn	197,830	9
ORCA DX and Contest Club	166,546	6
Kansas City DX Club	141,692	3
Bristol (TN) ARC	90,236	7
Southwest Ohio DX Assn	86,806	3
Lincoln ARC	79,848	5
Low Country Contest Club	76,076	5
West Allis RAC	73,282	6
Spokane DX Assn	62,612	3
Blue Ridge ARC	60,076	4
Livermore ARK	42,620	5
West Park Radiops	39,264	6
Bergen ARA	35,424	5
Northern Arizona DX Assn	33,148	3
Metro DX Club	31,040	3
Portage County Amateur Radio Service	26,134	7
Hilltop Transmitting Assn	28,134	5
Hays-Caldwell ARC	24,276	3
Badger Contesters	9,974	4

The Mexican Experience During the 2010 ARRL 10 Meter Contest

Hector Garcia, XE2K

First of all, let me say that all XE stations appreciate the initiative of the ARRL to include us in the fun of this contest. With the introduction of Mexican states as multipliers, the Grupo DXXE took the lead in Mexico to promote the event as a great chance to expand 10 meter band activity in Mexico.

The Grupo DXXE is the most active group of contesters and DXers in Mexico. Several weeks before the contest, the Grupo DXXE President Joaquin Solana, XE1R himself took on the job to promote XE participation in one of our weekly bulletins.

Reports from several XE operators on the weekend's propagation and the contest were very similar. A frequent comment was that many stations did not recognize the Mexican state multipliers. Some contesters did not read the new rules introduced in 2010 before the contest started and others did not update their contest logging software.

Ramon, XE1KK has summarized the results of the Mexican station activity in the contest. Ramon's report was made with the input of several of the Mexican contest logs and the logs from other participants from different parts of the US and the continent. The report can be found at **www.dxxe.org/arrl10m/xes-arrl-10-1.pdf**.

(248,304 points) came in second place, operating from West Central Florida. Also in the West Central Florida section, third place went to Merrill, WK2G (243,520 points). Last year's category winner, Clint, AE5GT of South Texas came in fourth place in 2010 (239,704 points), just 1.5% behind the third-place score.

Rebounding from his fifth place finish in 2009, Dan, K1TO won the Single Operator, CW-Only High Power category in 2010 (717,060 points) from West Central Florida. Dan had a three hour long power outage on Sunday, but still claimed the victory. Last year's category winner, Richard, K5NA, came in second place this year with 561,816 points from South Texas. "Dan, K1TO and I have gone head-to-head in this contest for a number of years. I realize that my best finishes are only with low sunspots, and as conditions improve my advantage will go away." Third place went to another South Texas operator, Robert, K5PI (533,728 points). Robert operated from the W5KFT station in the Texas Hill Country, about 100 km west of the K5NA station.

COURTESY MIKE RITZ, W7VO

W7VO opened his shack to contest first-timer Steve Gette, KF7GNI. Steve took full advantage of the station and turned his first contest into an Oregon section victory in the Single Operator, Phone only, High Power category.

W/VE/XE Multioperator

The four-operator team at NX5M earned its sixth consecutive victory in the W/VE/XE Multioperator category. This is the 14th year in a row that Bob, NX5M and team have entered the category, and their seventh victory overall. The team made 1,161,864 points from their station near Lake Somerville in the South Texas section. Earning the second place spot was George, K5KG (744,228 points), operating with packet assistance from West Central Florida. Dave, K6LL, also operating with packet and CW skimmer assistance (678,960 points) came in third place from Yuma, Arizona: "I rigged up a deal where one rig/amp was tuned up on CW, and one was tuned for SSB, and I could instantly flip between modes."

ARRL Affiliated Clubs Competition

Club competition continues to be very popular in the ARRL 10 Meter Contest. Fifty-five clubs qualified for the competition this year, 5 fewer than qualified in 2009, but 4 more than qualified in 2008. This year, there were 22 clubs in the Local Club category, 3 fewer than in 2009. The Midland Amateur Radio Club of Midland, Texas won the category for the third time in four years. Seven club members combined for a score of 989,080 points, over four times as many points as last year. The Central Virginia Contest Club came in second place again this year, with 9 club members combining a total score of 780,186 points. Third place went to the Mother Lode DX/Contest Club. Based in the gold country of California, 8 club members combined for a total of 573,330 points.

The most popular club competition category in 2010 was the Medium Club category. Twenty-nine clubs qualified for this category (the same number of clubs as last year), and nine clubs scored over 1,000,000 points. Up from a third place finish in 2009, the Central Texas DX and Contest Club won the category this year with 5,437,738 points from 21 logs. The CTDXCC averaged 259,000 points per log, by far the highest of any club in 2010. The Arizona Outlaws Contest Club came in second place with 2,570,804 points from 45 logs. Last year's second-place finisher, the Yankee Clipper Contest Club came in third place in 2010. The YCCC had one more log than the AOCC, but only amassed 2,505,902 points. The score difference between the two clubs was just 2.5%.

Three clubs entered the Unlimited Club category (two fewer than last year), which retains limits on the geographic locations of the club stations, but not on how many members can enter on behalf of the club. Moving up one spot in the rankings from last year, the Florida Contest Group scored 9,015,272 points to win the category. The FCG had the second-most logs submitted of any club (78). Second place in the category went to the Northern California Contest Club. The NCCC had 57 logs and a total of 3,993,006 points. Last year's winning club, the Potomac Valley Radio Club, came in third place this year. The PVRC had 3,563,898 points from 80 logs, the most submitted by any club this year.

Get Ready Now for Next Year!

The next ARRL 10 Meter Contest will be December 10-11, 2011. Propagation will undoubtedly be better this year, with expected higher sunspot counts and higher solar flux. While there are no guarantees, better east-west intercontinental paths are likely. Hopefully even more Mexican stations will participate, giving everyone a chance to work the XE state multipliers. Will you be ready?

Oh Wait, There's More!

The online results at **www.arrl.org/contests** include an expanded version of this article, full line scores and updated records.

2011 ARRL January VHF Sweepstakes Results

No propagation, no warmth, no problem!

Sean Kutzko, KX9X
kx9x@arrl.org

In 1924, famed English mountaineer George Mallory joined his third expedition to reach the summit of Sagarmāthā in the Himalayas, known by westerners as Mount Everest. At age 37, he believed it would be his final opportunity to stride upon the then-unreached top of the world's highest mountain. Legend has it he was the one who, when asked why he wanted to climb Everest, gave a simple but immensely profound reply: "Because it's there." The attempt cost him his life.

Today's VHF+ contesters generally don't have to contend with such perils. However, this past January, many competitors found themselves asking the same question: Why? The winter was one of the harshest on record for much of the country; record snowfalls in the Northeast, bitter cold in the Midwest, and the mere existence of substantial snow at all in parts of the southeast wreaked havoc on many contest efforts this January. As if that weren't enough, the propagation gods struck a deal with Mother Nature and sucked the ionosphere dry of any substantial enhancement. One thinks of Mallory at base camp, huddled in a lonely, cold tent, and can imagine similar thoughts running through the VHFer, calling CQ late on a cold Saturday evening, mentally turning over every virtual rock in hopes of working a new station. The answer for why VHF contesters do it in their world is the same as Mallory's in his: because it (the contest) is there.

DAN OLDFIELD, NØOLD

Stu Turner, WØSTU, made his first-ever foray into contesting a memorable one! Operating from the top of Mount Herman in Monument, CO (grid DM79), Stu managed 88 QSOs on 50, 144 and 432 MHz and earned a slot in the Top Ten in the Single Operator, Portable category. He'll be back on the mountain for more VHF+ fun!

Rick, K1DS, roved through five grid squares in the Northeast during this year's January VHF Sweepstakes. "Despite the challenges of potential problem weather, roving in the northeast is still a treasure of contacts," he explains. "The major highways are kept clear, the rover spots I like are not real mountain tops, but rather clear hills or parking areas with a reasonable horizon, allowing for good microwave activity." Some of the reason is purely practical. "I am restricted by CCRs from having an outdoor antenna. I do have some in the attic, but the contest is much more fruitful as a rover." When you can have more fun by hitting the road with better antennas than staying home, the choice is made for you.

Perennial Single-Operator, Portable op Zack, W9SZ, has similar reasons for trudgin' across the tundra, mile after mile: "I guess it's for several reasons. One is that I don't have any home antennas for VHF+ and a hilltop location works out really well. Another is that I like the challenge and adventure of it all! And I like doing something that very few, if any, are also doing. I don't think there are too many other people running Single-Operator Portable in the Midwest in January." He's right; there were only two other ops in the entire Central Region that braved the elements.

Why January?

So why *is* there a VHF contest in January? Kevin, W9GKA, has researched the history and trends of VHF+ contesting for years. In his work, he notes the ARRL announcement for the first January VHF Sweepstakes in the December 1947 *QST* saw the need "[T]o help stimulate activity on the VHF bands at a time when it is normally somewhat low." Indeed, then-ARRL Communications Manager F. E. Handy, W1BDI, made the comment as far back as November 1939 that regular communications on the VHF+ bands didn't require excellent conditions to be enjoyable: "Poor conditions were reported from some points, but that was the idea, to prove to the doubters that real communication can be accomplished on u.h.f. day in and day out, with average conditions — no exceptional lucky breaks required. It can."

The development and popularity of the "big three" contests occurred within a very short time frame in the late 1940s. With the creation of the January VHF Sweepstakes, the League wanted to continue the 1930s UHF Marathon tradition of promoting activity on the "ultra-highs" regardless of propagation. Read more of Kevin's analysis in the Expanded Results version of this article online at **www.arrl.org/contest-results-articles**.

Some operators enjoy the competitive challenges found in January. Long-time VHFer Emil Pocock, W3EP, noted, "The January VHF contest really tests station capabilities and operator skills because of the generally poor propagation conditions."

Division Leaders by Category

Single Operator, Low Power

Division	Call	Score
Atlantic	WA3NUF	151,276
Central	K2DRH	147,333
Dakota	KAØKYZ	2,112
Delta	N4QWZ	26,866
Great Lakes	WN8R	8,456
Hudson	WB2SIH	55,971
Midwest	NØLL	8,643
New England	N1DPM	106,812
Northwestern	KD7UO	4,147
Pacific	K1YQP	12,560
Roanoke	W3IP	37,157
Rocky Mountain	NØYE	5,902
Southeastern	W2BZY	9,503
Southwestern	KG6IYN	15,322
West Gulf	W6ZI	9,165
Canada	VA3ST	32,786

Single Operator, High Power

Atlantic	K3TUF	221,120
Central	WØUC	47,294
Dakota	WØGHZ	24,840
Delta	AA4DD	9,065
Great Lakes	K8TQK	49,147
Hudson	N2GHR	60,076
Midwest	NØGZ	8,192
New England	K1TEO	369,444
Northwestern	N7EPD	18,356
Pacific	KC6ZWT	18,179
Roanoke	K4QI	44,460
Rocky Mountain	W6OAL	11,468
Southeastern	W4ZRZ	52,668
Southwestern	KE7NR	8,415
West Gulf	K5LLL	23,175
Canada	VE2PIJ	6

Single Operator, QRP Portable

Division	Call	Score
Atlantic	N3YMS	31,150
Central	W9SZ	6,392
Dakota	KDØEBT	333
Delta	W4RXR	2,624
Great Lakes	N8XA	576
Hudson	WB2AMU	976
Midwest	NØJK	126
New England	WA1LEI	48
Northwestern	N6LB	340
Pacific	KB5WIA	2,134
Roanoke	KC8KSK	210
Rocky Mountain	KØNR	1,725
Southwestern	N6NB	170,262
Canada	VA3RKM	48

Limited Multioperator

Atlantic	K1JT	106,856
Central	W9RM	32,028
Dakota	KØSIX	20,060
Great Lakes	N8ZM	1,725
Hudson	KC2SOU	530
Hudson	W2NPT	341
Midwest	NØXP	200
New England	N1WK	58,887
Pacific	K6QG	1,323
Roanoke	K8GP	139,887
Southwestern	N6MDV	231
West Gulf	NR5M	8,844

Multioperator

Division	Call	Score
Atlantic	N3NGE	532,656
Central	N2BJ	21,608
Dakota	NØAT	18
Delta	N4JQQ	11,229
Great Lakes	W8RU	6,204
Hudson	N2GCZ	22,680
New England	W1XM	14,319
Pacific	WA6KLK	2,310
Roanoke	W4YCC	3,720
Southeastern	W4NH	21,528
Southwestern	KC6SEH	2,752
West Gulf	K5QE	178,563
Canada	VA7MM	36

Rover

Atlantic	K1DS/R	110,760
Central	K9TMS/R	9,075
Delta	AG4V/R	18,717
New England	W1RT/R	26,950
Northwestern	K7HPT/R	6,336
Pacific	K9JK/R	370,923
Rocky Mountain	KJ4EWA/R	2,278
Southwestern	N6TEB/R	245,244
West Gulf	K5GJ/R	15,129
Canada	VE3OIL/R	22,825

Limited Rover

Division	Call	Score
Atlantic	N2SLN/R	850
Central	KC9NJZ/R	3,440
Dakota	KFØQ/R	4,176
Delta	WA4JA/R	1,275
Northwestern	NL7HJ/R	1,045
Pacific	W6YLZ/R	60,390
Roanoke	K4GUN/R	15,052
Rocky Mountain	ABØYM/R	2,070
Southwestern	N6ZE/R	1,078
West Gulf	AF5Q/R	190

Unlimited Rover

Dakota	KCØP/R	4,959
Rocky Mountain	KRØVER/R	7,680
Southwestern	KE6HPZ/R	189,837
West Gulf	KD5IKG/R	2,376

Activity

Activity was lower in 2011 than in 2010; 710 submitted logs compared to 761 last year. This is in the lower portion of the average number of logs since 2006, which saw the highest number of submitted logs (793) in recent history. Despite the lackluster propagation often found on the Ultra-Highs in January, many HFers are taking a chance with their newer rigs that offer 6 meters and possibly 2 meters and connecting some feed line to the "other" antenna jack on the back. The VHF bands offer propagation and operating challenges that simply don't exist on HF, and it's nice to see some HFers dipping their toes in the VHF+ waters.

Alabama Contest Group member Jim, KC4HW, made a handful of QSOs on 6 meters with an HF antenna from EM71. "I used the 40-2CD tuned with the FT2000D; was quite surprised that it worked." Jim's working on beams for 6 and 2 meters and should have them up soon. While sporadic-E generally stays dormant during the winter months, there have been some phenomenal tropo and auroral openings in January over the years. Like the new golfer that has a couple of great shots in an otherwise dull round, there were plenty of interesting occurrences in this year's January VHF Sweepstakes to get the HFers to come back for more.

Affiliated Club Competition

Club Name	Score	Logs
Unlimited Club		
Mt Airy VHF Radio Club	2,058,590	66
Medium Club		
Southern California Contest Club	2,404,964	17
North East Weak Signal Group	811,940	26
Potomac Valley Radio Club	481,749	21
Society of Midwest Contesters	201,724	15
Northern Lights Radio Society	111,522	11
Contest Club Ontario	78,518	9
Pacific Northwest VHF Society	66,578	19
Yankee Clipper Contest Club	57,629	8
Roadrunners Microwave Group	50,328	6
Florida Weak Signal Society	48,088	13
Badger Contesters	44,426	12
Tennessee Contest Group	27,209	5
Frankford Radio Club	22,263	4
Northern California Contest Club	17,326	14
Six Meter Club of Chicago	13,562	10
North Texas Microwave Society	7,873	3
Mad River Radio Club	7,527	5
Grand Mesa Contesters of Colorado	5,745	4
Rochester VHF Group	5,730	5
Alabama Contest Group	4,471	3
Rochester (MN) ARC	3,819	11
Alaska VHF-UP Group	1,315	3
Arizona Outlaws Contest Club	880	5
Local Club		
Murgas ARC	207,630	5
Eastern Connecticut ARA	69,410	5
Stoned Monkey VHF ARC	34,738	9
Bristol (TN) ARC	27,804	10
Chippewa Valley VHF Contesters	16,163	3
Granite State ARA	11,855	4
Bergen ARA	11,087	7
Raritan Bay Radio Amateurs	9,234	6
Burlington County Radio Club	6,131	5
Mobile Sixers Radio Club	3,531	4
Dauberville DX Assn	2,901	3
Portage County Amateur Radio Service	1,959	6
Delara Contest Team	1,535	3
Downey ARC	837	3

Single Operator Categories

Nearly 600 logs received were in a single-operator category, or 84% of all logs.

In the Single-Operator, High Power (SOHP) category, perennial winner Jeff, K1TEO in FN31 battled equipment failures and having to dig a tower base out of several feet of snow to effect repairs on a damp power divider. Even so, he cruised to his ninth SOHP victory in ten years. Making effective use of the higher bands was key to his success; out of 880 QSOs, 188 (18%) of Jeff's QSOs were on 902 and up. 100 QSOs came from Rovers.

Second place this year went to Phil, K3TUF in FN10, moving up a slot from 2010. Phil put in big efforts this past year to install a rotating tower and raise his microwave antennas above the trees. "I called this my test voyage and to that end the voyage was successful, the equipment held up and did not fail." Dave, K1RZ of the Grid Pirates fame earned third place from FM19. When conditions falter, the "Northeast Corridor" seems to dominate more than usual. This year was no exception; only Jimmy, W4ZRZ in EM63 and Glenn, K8TQK in EM89 made the Top Ten away from the East Coast, earning 9th and 10th place, respectively.

Single-Operator, Low Power (SOLP) continues to be the most popular category in the event; six out of ten entries were in this category. As with High Power, the Right Coast dominated the category's Top Ten, with one notable exception. The battle for first place was between Phil, WA3NUF in FN20 and Bob, K2DRH on the Illinois side of the Mississippi in EN40. Both gentlemen have a long history entering in the SOLP category, with Bob trumping Phil three out of the last four years. This year, Bob had almost double the multipliers of Phil; however, with the substandard conditions, the Northeast population advantage and QSOs on four extra microwave bands proved to be too much for Bob's high mult count, and WA3NUF bested K2DRH by less than one percent! Fred, N1DPM, a regular "Top of the Box" guy, fought off some equipment problems and earned third place from his Feeding Hills, MA QTH in FN32.

It takes a special breed of VHFer to venture out in sub-zero conditions to enter the QRP Portable category. This year, twenty-

Northeast Region
(New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)

WA3NUF	151,276	A
N1DPM	106,812	A
AF1T	70,012	A
K1KG	61,544	A
WB2SIH	55,971	A
K1TEO	369,444	B
K3TUF	221,120	B
K1RZ	180,737	B
WA2FGK (K2LNS, op)	177,232	B
WB2RVX	113,960	B
N3YMS	31,150	Q
WB2AMU	976	Q
N2SPI	876	Q
N2YTF	259	Q
KC2YUG	136	Q
K1JT	106,856	L
K2LIM	78,068	L
N1WK	58,887	L
W1QK	30,988	L
N8RA	22,098	L
N3NGE	532,656	M
K3EOD	70,713	M
WB3IGR	26,944	M
N2GCZ	22,680	M
W1XM	14,319	M
K1DS/R	110,760	R
NN3Q/R	75,509	R
W1RT/R	26,950	R
K3IUV/R	8,257	R
W3ICC/R	6,688	R
N2SLN/R	850	RL
N3XUD/R	640	RL
AB4XC/R	380	RL
AB2YI/R	312	RL
K4CHE/R	208	RL

Southeast Region
(Delta, Roanoke and Southeastern Divisions)

W3IP	37,157	A
N4QWZ	26,866	A
K4FJW	9,880	A
W2BZY	9,503	A
K5YPV	3,956	A
W4ZRZ	52,668	B
K4QI	44,460	B
KE2N	34,020	B
KN4SM	23,660	B
KØVXM	13,900	B
W4RXR	2,624	Q
KC8KSK	210	Q
N3AWS	18	Q
K9GY	1	Q
K8GP	139,887	L
WY3P	22,119	L
KU1T	1,656	L
N4ARR	315	L
W4NH	21,528	M
N4JQQ	11,229	M
W4YCC	3,720	M
WX5T	2,380	M
K5VIP	1,372	M
AG4V/R	18,717	R
K4GUN/R	15,052	RL
WA4JA/R	1,275	RL
KD4RSL/R	1,218	RL

Central Region
(Central and Great Lakes Divisions; Ontario Section)

K2DRH	147,333	A
VA3ST	32,786	A
N9LB	20,160	A
VE3SMA	13,475	A
K9MU	12,104	A
K8TQK	49,147	B
WØUC	47,294	B
K8MD	36,936	B
N8BI	20,306	B
W9GA	14,080	B
W9SZ	6,392	Q
N8XA	576	Q
VA3RKM	48	Q
W9RM	32,028	L
KC9JTL	1,976	L
N8ZM	1,725	L
N2BJ	21,608	M
W8RU	6,204	M
KO9A	3,658	M
K9IJ	1,896	M
VE3OIL/R	22,825	R
K9TMS/R	9,075	R
K9BTW/R	7,728	R
K9HA/R	6,384	R
KC9MMM/R	4,820	R
KC9NJZ/R	3,440	RL
KC9LFP/R	2,873	RL

Midwest Region
(Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)

W6ZI	9,165	A
NØLL	8,643	A
NØYE	5,902	A
WØETT	3,525	A
KAØKYZ	2,112	A
WØGHZ	24,840	B
K5LLL	23,175	B
WØZQ	12,169	B
W6OAL	11,468	B
NØGZ	8,192	B
KØNR	1,725	Q
WØSTU	1,309	Q
KDØEBT	333	Q
NØJK	126	Q
KØSIX	20,060	L
NR5M	8,844	L
WØVB	2,905	L
WD5IYF	2,475	L
KO5D	555	L
K5QE	178,563	M
KBØHH	67,146	M
KC5MVZ	348	M
NØAT	18	M
K5GJ/R	15,129	R
KØMHC/R	3,690	R
KJ4EWA/R	2,278	R
AE5P/R	1,350	R
KFØQ/R	4,176	RL
ABØYM/R	2,070	RL
AF5Q/R	190	RL
KRØVER/R	7,680	RU
KCØP/R	4,959	RU
KD5IKG/R	2,376	RU
NØHZO	1,425	RU

West Coast Region
(Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT Sections)

KG6IYN	15,322	A
K1YQP	12,560	A
K6TSK	10,395	A
W6OMF	6,846	A
K6XN	4,321	A
N7EPD	18,356	B
KC6ZWT	18,179	B
NU6S	9,040	B
K7CW	8,592	B
KE7NR	8,415	B
N6NB	170,262	Q
KB5WIA	2,134	Q
AF6RR	1,064	Q
N6LB	340	Q
K6QG	1,323	L
N6MDV	231	L
KE7DX	33	L
KC6SEH	2,752	M
WA6KLK	2,310	M
K6TWT	495	M
W6RKC	407	M
K9PY	288	M
K9JK/R	370,923	R
K6AH/R	363,664	R
WB6BFG/R	351,526	R
N6UWW/R	350,931	R
N6HD/R	344,029	R
W6YLZ/R	60,390	RL
N6ZE/R	1,078	RL
NL7HJ/R	1,045	RL
K6LMN/R	247	RL
KE6HPZ/R	189,837	RU

two hardy souls packed up their gear and headed for the hills. Not all of the country was beleaguered with bad weather, and the top QRP Portable op probably needed some sunscreen! Wayne, N6NB, set his sights on the QRP Portable category (as he did in September), and moved his operations to the top of Signal Peak, near Newport Beach, CA in DM13. With the assistance of the Southern California Contest Club's pack of rovers, Wayne decimated the previous record score for the QRP Portable category, amassing 170,000 points. With September and January's QRP record under his belt, one wonders if he'll go for June 2011 as well. Second place went to the 2009 and 2010 winner Nick, N3YMS from FM29. Third went to tried-and-true QRP Portable entrant Zack, W9SZ, set up outside near Champaign, IL in EN50. Zack reported he was able to complete QSOs with EM66 and EN44; not bad for no propagation and 10 W.

Single Operator, Low Power

WA3NUF	151,276
K2DRH	147,333
N1DPM	106,812
AF1T	70,012
K1KG	61,544
WB2SIH	55,971
W3PAW	54,720
W3IP	37,157
VA3ST	32,786
W3RJW	30,380

Single Operator, High Power

K1TEO	369,444
K3TUF	221,120
K1RZ	180,737
WA2FGK (K2LNS, op)	177,232
WB2RVX	113,960
W2SJ	84,588
WA3DRC	76,608
N2GHR	60,076
W4ZRZ	52,668
K8TQK	49,147

QRP Portable

N6NB	170,262
N3YMS	31,150
W9SZ	6,392
W4RXR	2,624
KB5WIA	2,134
KØNR	1,725
WØSTU	1,309
AF6RR	1,064
WB2AMU	976
N2SPI	876

Limited Multioperator

K8GP	139,887
K1JT	106,856
K2LIM	78,068
N1WK	58,887
W9RM	32,028
W1QK	30,988
WY3P	22,119
N8RA	22,098
KØSIX	20,060
W3HZU	18,700

Multioperator

N3NGE	532,656
K5QE	178,563
K3EOD	70,713
KBØHH	67,146
WB3IGR	26,944
N2GCZ	22,680
N2BJ	21,608
W4NH	21,528
W1XM	14,319
N4JQQ	11,229

Rover

K9JK/R	370,923
K6AH/R	363,664
WB6BFG/R	351,526
N6UWW/R	350,931
N6HD/R	344,029
N6TEB/R	245,244
K1DS/R	110,760
N6HC/R	101,367
NN3Q/R	75,509
W1RT/R	26,950

Limited Rover

W6YLZ/R	60,390
K4GUN/R	15,052
KF0Q/R	4,176
KC9NJZ/R	3,440
KC9LFP/R	2,873
ABØYM/R	2,070
WA4JA/R	1,275
KD4RSL/R	1,218
N6ZE/R	1,078
NL7HJ/R	1,045

Unlimited Rover

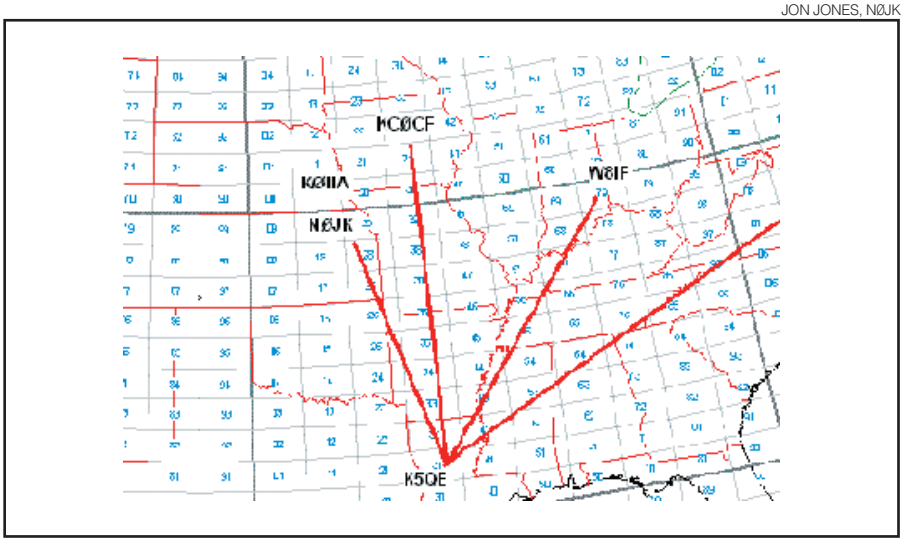
KE6HPZ/R	189,837
KRØVER/R	7,680
KCØP/R	4,959
KD5IKG/R	2,376
NØHZO/R	1,425

Multioperators

Multiop contesting can be the best of both worlds: when conditions are hot, you get to share the excitement with your friends. When conditions aren't so hot, you've got somebody to commiserate with. For the most part, this year seemed to fall into the latter category. Sixty multioperator logs were received for the event, or 8.5% of the total. This includes single-ops who decided they wanted to have spotting assistance or internet chat rooms at their disposal, too. The entries were split evenly between the Multioperator category (which allows QSOS on as many bands as you have antennas for) and the Limited Multioperator category (which allows QSOs only on 50-432 MHz).

The Multioperator category saw good representation from much of the country, and some very familiar calls, as well. Leonard, N3NGE, once again took his great station outside of Morgantown, PA in FN20, gathered a team of great ops, and maximized skeds on meteor scatter and with rovers to amass over 1,250 QSOs and 216 multipliers (including an impressive 39 grids on

JON JONES, NØJK



Conditions were very flat across most of the country. Jon, NØJK's map shows a select few of the meteor-scatter QSOs made on Saturday night. Note the relatively short distances for meteors.

432 MHz) for almost 536,000 points, earning their fifth straight Multioperator title. Second place was earned by the Texas team of Marshall, K5QE. "Murphy decided to make his home here this contest," he lamented, losing both 2 meters and 432 MHz capabilities for a time. Despite the troubles, EME and meteors catapulted the team to the highest grid totals on 6 and 2 meters of any other entrant in the contest. Al, K3EOD and his team came in third this year, earning a Top Three slot for the second year in a row.

Limited Multioperator entrants focus their efforts on the "bottom four." This allows the team to really work a band to the absolute bottom, which several did. As with all other categories, the East Coast advantage cannot be overlooked, although a couple of Midwest teams did make the big box. Top honors this year go to the Grid, K8GP, piloted by veteran team members Terry, W8ZN and Andy, K1RA. This marks K8GP's first January entry since 2008. Not far behind in second place was Joe, K1JT and his Princeton team. They took advantage of 12 hours of visible moon and made 58 2-meter EME QSOs. "Does not make for a high QSO rate, but sure helps the grid count!" Third went to Team LIMO, K2LIM. While the team lost an "A" somewhere along the line (formerly using KA2LIM), Ken Kent and his group did a great job earning yet another Top Ten slot. Honorable Mention to both Keith, W9RM and Vince, KØSIX for making the Top Ten from the Midwest tundra.

Rovers

If you're going to operate mobile during the January VHF contest, trying to stay warm is generally a good idea! The SoCal Rovers needn't worry about winter weather and were able once again to band together and take the top slots in each of the three Rover categories. The winner of the "classic" rover category this year was John, K9JK, who hopped a plane westward and joined forces with the SoCal group. With second op John, N6MU hitching a ride in 'JK's RoverMobile, the team activated nine grids and made an easy go of taking the top spot. Fellow SoCal rovers Andre, K6AH and Bill, WB6BFG rounded out the top three. Outside of California, Rick, K1DS braved bad weather in the Northeast and activated five grids on his way to seventh place.

Limited Rover was won by another SoCal'er, Mike, W6YLZ (with Roozy, KG6OKB as second op). Their 627 QSOs with 83 unique calls led the category. Second place went to Roanoke Rover Representative Steve, K4GUN (assisted, as always, by XYL Kristine, K4LIG), hitting eight grids along the East Coast. Third place goes to Matt, KFØQ, who managed just over 100 QSOs from the frozen kingdom of Minnesota.

The Unlimited Rover category — where anything goes — yielded only five entrants this January. Glenn, KE6GPZ led the category as part of the SoCal group. Eric, KRØVER, along with 8-year old assistant Alisha, activated four grids in Colorado on their way to second place. Mel, KCØP, earned third place from Minnesota. "Cold WX, but much better propagation than last January." Tim, KD5IKG and Carol, NØHZO rounded out the category with operations in Texas and Minnesota, respectively.

Club Competition

One of the big points historically of the January VHF Sweepstakes has been club competition. Clubs would get all their members active and promote learning and have a lot of fun, all while working towards a common goal. Does the same hold true today? Jeff, K1TEO is skeptical: "A huge thanks to the Packrats who provided over 20% of my QSOs. A few years ago there were multiple active clubs here in the Northeast but it seems like only the Packrats are still at it. Please continue!"

Indeed, the Packrats, aka the Mt Airy VHF Radio Club, ran away with the Unlimited Club title by submitting logs from 66 members, more than double the number of the second-most represented club, the New England Weak Signal Group. The Packrats have been tirelessly promoting VHF+ operating for more than fifty years, and their combination of technical prowess, Elmering and operating skill is mighty tough to beat. Well done to the Packrats for rallying their troops.

The Medium Club category saw entries from 23 different clubs. Top honors go to the Southern California Contest Club, who parlayed their 17 entries from their Rovers into a force to be reckoned with. The New England Weak Signal group managed second place this year, and the Potomac Valley Radio Club earned third place.

The Local Club category had fourteen entries from across the country. High atop the others was the Murgas ARC based in Wilkes-Barre, PA. Second place goes to the Eastern Connecticut ARA, while the Stoned Monkey VHF ARC represented the Midwest well and gets crowned third.

Conclusion

VHF+ contesting, like many other things, depends on what you put into it. It is not the place for guaranteed results, especially in January. Mallory never attained his goal of reaching the summit of Mt Everest, but he kept trying, in part, because the chase was important to him. Band conditions will run hot and cold from year to year, but it's the pursuit of the fun and accepting the conditions for what they are on contest weekend that keep competition levels strong during this event.

Be sure to plan for the next ARRL January VHF Sweepstakes on January 21-23, 2012. Why? Because it's there! QST

AT THE FOUNDATION

Foundation Awards Record Number of Scholarships!

In May the Board of Directors of the ARRL Foundation overwhelmingly approved a record-setting 79 scholarship awards to young radio amateurs to provide funding for their pursuit of higher education. After reviewing more than 240 applications, filed electronically for the first time, the Directors awarded scholarships to students from 24 states. The value of the 2011 scholarship awards totaled $ 83,450, not including the five active William R. Goldfarb Memorial Scholarships.

The six students currently attending college under the William R. Goldfarb Memorial Scholarship are Mellissa Meye, KBØWZA, studying Electrical Engineering at the Missouri University of Science and Technology; Andrea Hartlage, KG4IUM, studying Aeronautical Engineering at the Georgia Institute of Technology; Kyle Ebersold, KB1MNN, studying Pre-Med at Bryant University; Austin Wilmot, KD5QKS, studying Pre-Med at Washington University; Dean LaBarba, KI6CUX, studying Pre-Med at Westmont College and the 2011 scholarship winner, Peter Yao, AC8EF, who will study Biomedical Engineering at Johns Hopkins University's Whiting School of Engineering.

The application period for the 2012 ARRL Foundation scholarships opens October 1, 2011 and closes promptly on February 1, 2012. All the information about the available scholarships can be found on the web at **www.arrl.org/scholarship-program** including descriptions and selection criteria for each award, application instructions and forms. Note that applications, transcripts and FAFSA forms (required for the William R. Goldfarb Memorial Scholarship) will only be accepted electronically. Applicants should carefully review all the scholarship descriptions and apply only for those awards for which they qualify.

Mary M. Hobart, K1MMH ♦ Secretary, ARRL Foundation Inc ♦ mhobart@arrl.org

2011 ARRL August UHF Contest

1800 UTC Saturday, August 6 – 1800 Sunday, August 7

- 220 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 information on grid squares can be found at **www.arrl.org/grid-squares**.
- All logs must be received by 1800 UTC Tuesday, September 6, 2011. E-mail Cabrillo-formatted electronic logs to **augustuhf@arrl.org**. Paper logs to ARRL August UHF Contest, 225 Main St, Newington, CT 06111.

JAMES DUFFEY, KK6MC

Famous Rover James Duffey, KK6MC, lost his beloved Rovermobile immediately after the 2010 August UHF Contest. It is seen here from his stop last year in DM61. He'll be back again this year, with a new vehicle!

Complete rules are at www.arrl.org/august-uhf

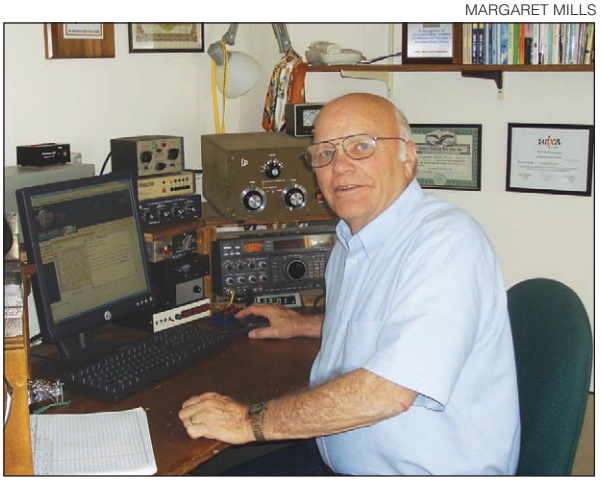
W3UR

HOW'S DX?

Listen Your Way to the Top of the Pile

From time to time, a little "how to" may be in order. Here's a bit of advice from former ARRL Membership Services Manager Wayne Mills, N7NG. Wayne has been DXing since the early 1950s and been on the other side of the pileup from 3D2AM, 9MØS, BS7H, BV9P, FOØXX, H40AA, KH5/AH3C, TXØDX, YU8/OH2R, ZA1A, ZL9AMO and ZS9Z/1 just to name a few. He is the current President of the YASME Foundation and the author of DXpeditioning Basics.

MARGARET MILLS



Wayne Mills, N7NG, enjoying the thrill of working DX from his Jackson, Wyoming shack. He had a very successful season on Topband this year.

That Station Is Transmitting, Why Are You Still Calling? Or, Do You Really Want To Work That DXpedition?

I am listening this morning to a split pileup calling 4A4A on Revillagigedo. (Yes, it's just one word and it's an island off the coast of Mexico, not the one off Alaska.) The operator is doing an excellent job. In the pileup, and on the 4A's frequency, things are pretty calm — almost. (If you're in Europe and think the operator could have been doing a better job, send him the link to *DXpeditioning Basics* (**www.dxpeditioningbasics.com**).

As I look through the pile, though, I hear a number of guys (like most of them) calling pretty much all of the time. When the 4A is trying to get a complete call sign from an EA8 they're calling and even when he's *transmitting* they're calling. In a few minutes, I find the guy he is actually working, I strategically pick a frequency, call him *once*, and he's in my log. Yes, it's easy from the western US, but not easier than for the WB5 who hours later is still calling on the DX frequency because he hasn't figured out that old A/B VFO switch.

That was easy; so what's next? I tune across the pile with the old '1000D subreceiver and hear all the same guys still calling — all the time! What's going on here? Analyzing the pileup is easy with the dual-receive Yaesu, but it's possible with most any two-VFO radio. Why are so many guys wasting so much energy calling?

Well, of course, that fine 4A operator can't work everyone immediately. That's an important principle. It takes a finite length of time to work everyone in the pileups. But many of the callers are figuring out how to increase their odds and accomplish the task more quickly. What many of the other guys are doing is just calling continuously, like every time the DX station stops transmitting — and more. Sometimes they're calling while the DX station is transmitting. Good grief! Isn't there a better way? Maybe there is, but what is it?

Let's assume for a moment that most of those DXers in the pileup — and on 4A4A's frequency — really want to make a contact. A few of them are interested in something else, but for now, let's assume that they really want to make a contact. Maybe it would be useful for them to make their next call on the exact frequency the DX operator is listening on. Ya think? Now there's an idea. How would they do that?

Listen — For What?

When I started DXing and ever since, one of the most often repeated admonitions for DXers has been to "listen." But to what? For what? Well, the first important thing to listen for is when the DX station himself is listening and when he is transmitting. Know the difference. Know when he is listening and when he is transmitting — always. Considering HF DXing is generally conducted simplex, rather than duplex — that is, only listening or transmitting at a given time. The DX operator can't be listening while he is transmitting. Neither can those continuous callers.

So, let's first get that one straight. I would listen to the DX station and then *consider* transmitting only when he is likely to be listening. Basic DXing, right? I think so, but listening to the pileup, I have to wonder. OMG! Some of the callers seem to think the DXpedition is listening to the pileup with a…Skimmer. (What is that? Not now…) First things first. In many cases, people are calling on frequencies that make no sense at all. Worse, if they're calling while the DX is transmitting, they're truly wasting their time. Further, if you're calling the DX station on a frequency where he's not listening, you're wasting your time. If you continue this process, you may eventually make a contact, but there's a much easier way.

Yes, the DX operator said "spread out,"

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or he said "Up 5." But you may need to be smarter than that. He may be having a problem finding calls because he is not really spreading the pile. He can do that by simply listening in places other than where he made his last contact. He can even tell you where to call next if necessary. Don't pay any attention to a DX operator who says "spread out," or "Up 5." *Pay attention to where he is actually listening and pick your calling frequency accordingly*. In other words *listen to what is going on*.

When and Where

The easiest way to work a DX station quickly is to call *when* he's listening and to call *where* he's listening. The idea makes sense, but can you actually do it? Yes, you can. Obviously, you can't do that each and every time, but the more often you succeed in finding the correct frequency — and the correct time — the more often you will quickly make a contact.

How can you find the station he's working? One way is *not* to be transmitting when the station being worked is transmitting. So, as soon as the DX station begins to listen to the caller, tune around the pile *looking* for a station sending something like "5NN TU," or the phone equivalent. You can make this easier by using a wider bandwidth to listen to the pileup. An ideal DXing receiver is capable of receiving both the DX frequency and the pileup frequency simultaneously — and with different bandwidths — narrow for the DX signal and wide for the pileup.

Once you have found the station being worked, you need to select the relative frequency and *time* your call correctly. Finding the station the DX is working isn't the end of the story, it's the beginning. Perhaps the worst place you can call is zero-beat with that station. Why? Because 50 other stations will have found that station and will all call precisely on that same frequency. Do you have any idea what that sounds like on the other end? Right! Finding that frequency is a starting point.

If you haven't found the station being worked, it seems obvious that this should be your first priority — not calling blind. Calling blind decreases the probability of a contact greatly. You might succeed, but it could take hours instead of minutes. The DX operator is usually following some sort of pattern, so it's worthwhile trying to determine that pattern. *The time during which the DX station is listening to the station he's working should be spent trying to find that station*. Obviously, you can't be looking for the station he's working if you're calling. If you are listening and trying to find the station he's working, you aren't continuously calling. Bingo! You have found the road to success.

Why do many DXers call continuously? That's a great question. They're really shooting themselves in the foot and they don't even know it. Whatever they're doing, they are increasing your odds to work the DX station quickly. Think about it. Perhaps they can't hear the pileup at all. That does happen at times on some bands. In such a case, you can look for other clues. You might look at a spotting database to determine where this operator has listened in the past. As a last resort, if he is saying "up," calling up 1 to 2 (on CW) would be an appropriate starting point — if those frequencies are not occupied by nonDXing stations.

How Can I Hear Him If I Don't Call First

Sometimes DXers seem to call continuously because they are having extreme difficulty copying the DX station. This is a difficult situation. They may feel that this is "their last chance," that they may never hear the DX station again. Hugh Cassidy, WA6AUD, wrote a great story in the *West Coast DX Bulletin* many years ago about a DXer (Deserving, of course…), who was calling Bouvet when he obviously couldn't hear the station. When asked about this, he said "how can I hear the station come back if I don't first call?" And on and on. The point is that if you can't hear the DX station well enough to make a decent contact, you won't and you might be embarrassed in the process. Wait patiently for the conditions to change in your favor. Things will go easier later.

Occasionally, the brute force, call continuously method works. That's probably why some people do it. Smart DXpeditioners know that DXers adapt to their procedures. If a DXpedition frequently accepts a call from a continuous caller, others will follow. This is extremely poor practice and leads to uncontrolled chaos. (Note: *controlled* chaos is a good thing.) The pileup reflects the quality of the DXpeditioner. If the DXpeditioner is experienced, the pileup will be orderly. If not, send him the link **www.dxpeditioningbasics.com**.

DX NEWS FROM AROUND THE GLOBE

6 METERS

By the time you read this hopefully all of us in the northern hemisphere will have had multiple 6 meter E-skip openings. During late June and early July all four of the new PJ DXCC entities are expected to be QRV on 50 MHz.

First up will be W7XU, NØQJM, WØSD and WØOE from Bonaire Island (PJ4) from June 15-July 5. As of press time no specific call was mentioned. Starting June 20 look for W6JKV and K6MYC to be on from Sint Maarten (PJ7). Again no call was available at press time. K5AND, K5TR and W5OZI will be on from Saba Island (PJ6) from a cottage on the northeast side of the island (grid locator FK87jp) 150 meters above sea level. Again they do not know their call as of press time. They plan to be on CW on 50.106 MHz and on SSB on 50.118 MHz from June 22-July 6. Keep an eye on their website — **dkhanson.com/pj6**. And finally June 26-July 6 German operators DJ8NK, DJ9ON and DK9KX will be on Curaçao. Again no calls were mentioned.

Some of these operations will also be QRV on HF. It should also be noted that island locals PJ2LS, PJ2BVU and PJ4NX are all QRV on 6 meters and may be on the air prior to the peak of the E-skip season, which is normally between June 24 and July 6.

DX GATHERING

The WØDXCC 2011 Convention will be held on July 23 at the Riverfront Community Center in Leavenworth, Kansas. The event will be hosted by the Kansas City DX Club and sponsored by the Missouri DX/Contest Club (MDXCC) and the Lebanon Amateur Radio Club. They have a great lineup of speakers including K4UEE, W8JI, K4SV, KØBJ, KØCA, K9LA, WØAIH, K5GO, N5DX, K5UR, NØJK. Complete details can be found at **www.w0dxcc.com**.

JX — JAN MAYEN

An international team led by Stan, SQ8A, is heading for Jan Mayen for activity as JX5O from July 6-14. They will not be operating on 160 or 80 meters due to the sun being up 24/7. Plans are for activity on 7-50 MHz on CW, SSB, RTTY and PSK, with an emphasis on CW and RTTY. Other team members include Vicky, SV2KBS (representing the ladies); Bernhard, HB9ASZ; Leszek, NI1L; Bjorn, SMØMDG; Tom, SQ9C; Pete, SQ9DIE, and Jon, TF3DA. They have a website at **janmayen2011.org**.

PYØF — FERNANDO DE NORONHA

Look for Marc, PY2FN, to be operating from here as PYØFO from July 2-9. Activity is planned for on 80 through 6 meters on CW with an emphasis on 50 MHz. QSL via PY2FN.

VK9/L — LORD HOWE ISLAND

The "Hellenic Amateur Radio Association of Australia" plans a major DXpedition to Lord Howe Island July 23-August 2 using the call sign VK9HR. The operation will be on "multiple bands simultaneously to give everyone the chance to contact Lord Howe Island." Their website can be found at **www.lordhowe2011.com**. QSL via EB7DX.

ZD8 — ASCENSION ISLAND

German operators DK1IP, DL7OR, DJ4KW, DL1CW and DJ9KH will be active from Ascension Island between July 24-August 9 using the ZD8D call sign. The five operators will have K3 rigs on 160-10, mostly digital, with CW and SSB coming later in the operation. They will be in the IOTA Contest July 30-31. More details can be seen at **www.zd8d.de**.

W3ZZ

THE WORLD ABOVE 50 MHz

Farewell

When I accepted the duties of the VHF Editor in 2002 I did so well knowing that my tenure would be circumscribed and likely not to exceed a decade in time. There are many reasons for this, most importantly that an individual begins to run out of new ideas after a given amount of time and that the position — and the readership — would benefit from fresh viewpoints. In my case I had decided that there should be a changing of the guard at the end of 2011. Some health issues have arisen since I made that decision and thus this will be my last column as conductor of "The World Above 50 MHz."

When I was a much younger man, I always thought it would be interesting to make a profession out of predicting the future. It's a tall order and requires assessing current trends and guessing which will continue to what degree and in what direction as well as the much less reliable but critical judgments as to what kinds of unexpected movement there may be. I'd like to take this opportunity to look back at the time since 2002 when I said that VHF might be entering a Golden Age and make some comments about VHF going forward.

Technology

During the last decade, the VHF+ world has been enhanced by a wide-ranging group of technical advances of all kinds. These have included hardware, software and entirely new ways to assemble them into working communications devices. Let's look at some of these trends:

New components have fortified the emergence of the digital age. Many digital innovations have substantially improved the equipment we use making it better, easier to use and often more economical to produce. Components have continued to evolve providing us such devices as +40 dBm mixers and clean and stable microwave oscillators.

Digital techniques have allowed the development of software-defined radios (SDRs). The concept of SDRs was introduced to many of us by Gerald Youngblood now K5SDR in a set of articles in *QEX*.[1] Most new modern radios now embody that concept. They come in two flavors, the pure SDR that does everything digitally and the hybrid that does most of its functions digitally but leaves some analog circuitry that works more effectively or is easier to implement than its digital counterparts.

The Flex Radio SDR-5000, -3000 and -1500 are good examples of the former. They derive their high performance from their powerful low frequency digital-to-analog converter (a device similar to a computer sound card). Most of the ultra-high performance radios like the Yaesu FT-9000/FT-5000, ICOM IC-7800, Elecraft K3, etc are hybrids that look and act like analog radios but internally are SDRs. Most, like the Flex SDRs, include 6 meters and some can be configured to include 2 meters.

Several features especially valuable in the VHF world fall out of an SDR design (see sidebar). Panadaptors, once only a visual toy, now can find weak signals virtually as effectively as one's ears. While several different architectures are used, IF filtering has improved significantly and rejection of nearby strong signals is much better than a decade ago. Noise, while still the bane of any VHF operator, can be reduced and eliminated as never before. You can produce almost any audio spectrum you want for both your transmitter and receiver.

A renewed emphasis on high performance, especially receivers. The last 10 years has seen one of the greatest advances in receiver performance. Almost all aspects of receiver design have moved forward significantly from the appearance of dynamic ranges exceeding 100 dB, higher mixer third-order intercept points, better Automatic Gain Control, improved ability to reject nearby signals and better quality IF filters.

The advent of new, high-end radios. Manufacturers have been providing new high-end radios with amazingly good performance. Many of them cover HF+6 meters in a single cabinet and some even include 2 meters as an option. All of these radios are transverter friendly and transverter manufacturers like Down East Microwave Inc, DB6NT and Elecraft have made their products work more easily with these new radios. The transverters themselves are now every bit the equivalent of the best transceivers and the 6 (and 2) meter sections of new transceivers have performance equal to the superb HF segments of these radios.

We have truly entered the age of integration. Advances in technology and availability of both amateur commercial gear and professional gear that can be readily modified for amateur use has now reached the point where we can buy what we need essentially off the shelf or make readily feasible changes that can produce functional equipment that can be integrated into func-

Useful Features of SDRs

- High dynamic range performance even against strong signals very close in frequency
- Continuously variable digital IF filters
- Finite Impulse Response (FIR) filters eliminate ringing even at very narrow bandwidths
- Superior noise limiting not compromised by nearby strong signals
- Sensitive and selective panadaptors with ranges from a few to many tens of kHz
- Exact settings of both TX and RX audio characteristics

This Month

*July 3	*Very good* EME conditions
July 16-17	CQWW VHF Contest
July 29-31	Central States VHF Society Conference, Irving, Texas

*Moon data from EA6VQ

[1]G. Youngblood, K5SDR, "A Software-Defined Radio for the Masses," *QEX*, Jul/Aug 2002, pp 13-21; Sep/Oct 2002, pp 10-18; Nov/Dec 2002, pp 27-36.

Gene Zimmerman, W3ZZ ♦ 33 Brighton Dr, Gaithersburg, MD 20877 ♦ w3zz@arrl.org; (301-948-2594)

tional stations. What was once the province of professional engineers is now possible for the experienced amateur. This has been particularly important for microwave operation, which up through 10 GHz is now readily possible without an engineering degree.

VHF+ Activity

So where do we stand with the activity on our VHF+ bands? Here there is both good and bad news.

Day to day operating. For many years the day-to-day activity on the VHF+ bands has been slowly dropping, Activity nets have been garnering fewer and fewer participants. Activity nights on 222, 432 and above have tended to disappear. Part of this is sociological. In today's society there is a great demand for instant gratification. The VHF+ bands are not enhanced all the time and it is not easy to convince non-VHFers about the thrills that you feel when something unusual happens. Likewise it has gotten easier to get a license that allows you to get on the HF bands where something is going on all the time.

But all is not lost. Remember all those high end radios already mentioned that have 6 meter capability? We have had HF/V/UHF radios for upwards of 20 years now [think ICOM IC-706 and Yaesu FT-100 transceivers]. These compact radios while excellent for portable or mobile use have left something to be desired in the receiver especially for HF. The new high performance radios are slowly gaining favor and many of their users are beginning to try 6 meters. In my local contest club, the Potomac Valley Radio Club, where there were once only a handful of weak signal VHF users, the numbers are now well over two dozen and those are owners of radios such as the FT-2000, K3, various ICOMs and the like. The inclusion of 6 meters in the DX challenge has also helped fuel the interest in VHF operating.

VHF contests. Over the years VHF contest activity has been quite cyclic for a variety of reasons including licensing structure, variations in numbers of new hams, competition from other aspects of ham radio, equipment availability, contest rules and other factors — even band conditions in a particular contest. Most recently since a peak in the mid-1990s activity appears to have been slowly declining. Throughout the past decade this trend has continued with one notable and exciting exception. We have perhaps been looking in the wrong place for new blood here.

Although a few FMers became stalwart weak signal VHF operators, it was never in the ranks of FM operators that the solution lay. In the past few years activity in the ARRL June VHF QSO Party has increased substantially, driven by the entry of all those HFers with HF+6 meter radios looking for E-skip (E_s) contacts. Given that there is a reasonable chance of E_s in that contest and the resultant large amount of activity on 6 meters, participation in the June contest has grown by leaps and bounds.

The CQWW VHF Contest in July, which also emphasizes 6 meters, has also been growing rapidly and now gets more logs than the ARRL September VHF QSO Party, which has no such 6 meter activity. We will have to see whether this trend continues but it is a very positive feature so far. Although I have not crunched the numbers for the past few years, activity on 2 meters and above continues to appear to stagnate or decrease.

Where Are We Going?

During the late spring and summer months when 6 meter E_s is the dominant propagation I think we can expect day-to-day activity on 6 meters to continue to increase at those times. On the other bands, unfortunately I cannot see significant increases in daily activity. Likewise I think the increase in contests dominated by enhanced 6 meter summertime conditions look likely to continue to grow while the others continue to stagnate.

What was once the province of professional engineers is now possible for the experienced amateur.

There are options here too, among others single band competitions, a limited single-operator category, distance scoring in one or more of the contests or converting one or more of the contests into something more than a microwave contest. Unfortunately, the VHF+ community has repeatedly said no to all these options so there is no reason to believe that VHF contest activity is going to rise in any but the June ARRL and July CQ contests, which are being aided by an influx of new operators.

One possible external factor is the size of the current solar cycle. Predictions for Cycle 24 have varied all over the lot. The latest NASA prediction I have seen estimates the peak at only a smoothed sunspot number of 62 occurring in mid-2013. Yet, in the last 2 months the daily sunspot numbers have risen substantially from almost nothing. Anyone who follows sunspot numbers knows that the smoothed number estimated over a 12 month period is what counts and that it is much too early to argue that the number will exceed 62. But recent events give us some hope. We will have to see if the numbers continue to increase.

Thanks

During the last decade this column has been enlivened by the expertise of many people: Bob Cooper, ZL4AAA (2 meter transatlantic tropo and 6 meter long-path F2); Ned Sterns, AA7A (early detection of 144/222 MHz E_s); Lance Collister, W7GJ (6 meter EME); Chip Angle, N6CA (VHF QRP); Clarke Greene, K1JX (angle of arrival); Dave Craig, N3DB (TEP); Jim Kennedy, KH6/K6MIO (Cycle 24 predictions and mechanisms of long distance E_s); Bruce Clark, KØYW (microwave EME); Terry Price, W8ZN (station integration); Dave Olean, K1WHS, and Brian Justin, WA1ZMS (2 meter transatlantic tropo communication); Jan Bruinier, DL9KR (the first 70 cm DXCC); Bill VanAlstyne, W5WVO (Fred Fish Memorial Award); Joe Craft, CT1HZE (nE_s long distance E_s) and Chris Patterson, W3CMP (terrestrial 2 meter DXCC).

I would be remiss also not to mention some others whose thinking has influenced this column. These include Bob Magnani, K6QXY, for his knowledge of the transpacific duct and 6 meter DX, Dave Bernhardt, N7DB, for his reports of Pacific Northwest activity, Kevin Kaufhold, W9GKA, for his data on VHF contesting and Han Higasa, JE1BMJ, for his postulation of long distance ionospheric ducting.

Much of the VHF+ world is very local in nature so visiting other parts of the country is an important part of this column. Here I have been fortunate to visit many of the major groups such as the Northeast Weak Signal Group, Packrats, Southeastern VHF Society, Pacific Northwest VHFS and others like the Midwest VHF Society, Northern Lights, Rocky Mountain, NTMS, and Roadrunners via Central States VHF Society, Microwave Update (MUD) and Dayton Hamvention. To those who I have not visited like the Rochester VHF Group and San Bernardino Microwave Society whose MUD convention I was unable to attend because of illness, my apologies. This column is also a monthly chronicle of band conditions, which is critically dependent on the e-mail input of my readers.

Finally what you read in *QST* would be impossible without the professional staff at the ARRL, which gets so little notice from the readership. My handling editors Bob Schetgen, KU7G (SK); Larry Wolfgang, WR1B, and currently Steve Sant Andrea, AG1YK; Managing Editor Joel Kleinman, N1BKE, and *QST* Editor Steve Ford, WB8IMY. To the extent that *QST* is the

polished, professional magazine that we read every month it is people like this who make it so.

ON THE BANDS

This April has been marked by violent temperature swings, copious thunderstorms and tornadoes. Warm weather and electrical storms are often associated with sporadic E and so it is little surprise that the summer E_s season is off to an early start.

6 meters. Transequatorial propagation (TEP) continued throughout the month. Once again John, W5UWB (EL17) had an excellent month with openings to LU and occasionally CE on April 2, 3, 12, 13, 20 and 23. On the 4th, stations in Brazil worked into the Middle East (A9) and the Pacific (KH6). On April 12 Fred, KH7Y (BK29) worked DU7/PAØHIP via TEP/meteor bursts. José, XE1JPP (EK09) reports contacts into CE on April 12 and 23. Florida was into CE on the 29th.

Ionization continued high in the central Pacific leading to possible F2 openings. Bob, K6QXY (CM88) heard ZL video April 1-4 and worked FK8CP on the 5th after hearing him on the 3rd. On April 5 Fred, KH7Y, worked into HP, FO and VK and worked BA4SI on April 6 for perhaps the first KH6/BY contact. April 14 brought an FK8 to TI (tnx ZL4AAA) and K6QXY heard ZL video. Bob, K6QXY, and Mike, K6MYC (DM07) worked FK8CP on April 30. ZL3NW heard Bob at this time but there was no contact.

The summer E_s season got started early. Dave, N9HF (EL99) worked OA4TT on April 4. NØJK reports a big E_s opening on the 11th from the Iberian Peninsula to central Europe. NØJK reports FL into ME and VE2 on the 16th. Al, K7ICW (DM62) worked into central CA on April 18. April 20 produced a widespread opening into Mexico. Those so favored included Tim, K7XC (DM09); Paul, KA5TJI (EM20); John, AA5JG (EM04); Chip, K7JA (DM04); Al, K7ICW, and several stations in the Pacific Northwest (tnx N7DB). Chip also worked stations in MT, TX and CO. Meanwhile John, W5UWB, and stations in FL worked Jack, OA4TT. Jon, NØJK (EM17) reports the band open from sunrise onward to the East Coast April 27. Dave, N7DB, reports an opening from the Pacific Northwest to WY and CO on April 28. K7JA worked KH7Y and heard OA4TT/B on the 29th.

Tropospheric ducting. April had relatively poor tropo conditions. April 9 Kent, KA2KQM (EM74) worked 2 meter stations throughout TX and the Gulf Coast and heard but did not work XE2OR/m DL98. April 23 Bobby, N3LL (EM86tx) worked ZF1EJ (EK99ig) with weak but steady signals. Conditions during the 2 meter Sprint were relatively flat but activity was normal.

70 MHz. Joe, CT1HZE, reports that on March 28 at 1756Z, Leo, SV2DCD (KN00) and Willem, ZS6WAB (KG46) worked the very first transequatorial propagation (TEP) contact on 70 MHz. The distance, 7208 km, is a new world record for two-way contact on this band.

Brian, WA1ZMS/4, says that as of 1230Z May 2, a 4 meter band radio science E-skip transatlantic (TA) propagation beacon is operational on CW from FM07fm on 70.005 MHz. ERP is 3 kW aimed at 60° toward Europe. The beacon has a new call sign, WE9XUP, for 2011. The beacon is scheduled to run 24 hours a day until September 1, 2011 but must shut down sooner if there are technical or "any" interference issues.

This is a nonamateur beacon (just like 2010 operations) and two-way contacts are not permitted. Any and all QSL/SWL reports are welcome via e-mail to **wa1zms@arrl.net**. This beacon has been licensed solely with the gracious cooperation of the Society of Broadcast Engineers SBE (representing the TV industry, which holds the primary 4 meter band spectrum allocation here in the US) and the FCC's Office of Engineering Technology.

Although there is no possibility of an amateur allocation on the 4 meter band in the US in the foreseeable future (because the TV broadcast service is the sole allocated radio service), Brian is very grateful to the SBE and the FCC for permission to do propagation research in 2011 on transatlantic E_s with the hope that a TA contact may someday take place on 2 meters.

Microwaves. Henry, KT1J, reports that as a result of a 4 year effort Philipp, DL2AM, and his team, Alexander, DL2GWZ, and Gerhard, DJ5AP, have made a two-way 228 km 76 GHz contact, exceeding the previous record of 177 km made in California. The contact was made with 35 mW at each end, GPS locked, at 0945Z March 3, 2011 between Philipp, DL2AM/P (JN57ik) on Zugspitze (2951 meters elevation) and DJ5AP/P (JN74au) at Feldberg/Black Forest (1450 meters elevation). Congratulations to Philipp and his team!

HERE AND THERE

2010 CQ World Wide VHF Contest. This 6 and 2 meter contest begins 1800Z July 16 and ends 2100Z July 17. Exchange four-digit grid squares; 6 meter contacts count 1 point and 2 meter contacts count 2 points. *Note these rules changes:* Passive contact alerting assistance (DX cluster, packet, etc) is now *permitted in all categories*. Self-spotting is not permitted except by digital EME/MS stations posting call sign, frequency and sequence *only*. Two-way *interactive* "chats" are not permitted. Full details and rules can be found in the June issue of *CQ* or at **www.cq-amateur-radio.com**. When there is good E_s, this is perhaps the most active of all the major VHF contests.

Central States VHF Society 2011 Conference. The 45th CSVHFS conference will be held at the Westin DFW in Irving, Texas, July 29-31. Once again there will be a "Getting Started in VHF/UHF" program, a poster session as well as a "Rover Row," and preamp and antenna measuring sessions. Complete details are at **www.csvhfs.org/2011conference/index.html**.

FRANCISCO R. F. ARAGÃO, PT2TD

KB6NAN SK. I am sad to report that one of the leading West Coast 6 meter DXers, Dianna Killeen, KB6NAN, passed away on April 6. Dianna had a magnificent location in CM87 where she often was almost the only one to hear some of the rare DX. Dianna, we will miss you! QST

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Jun 19, 0000Z-2359Z, GØBON, Naseby, Leicestershire, England. Welland Valley Amateur Radio Society. 366th Anniversary of the Battle of Naseby. All bands. QSL. eQSL or direct to Peter Rivers, G4XEX, 34 Coales Gardens, Market Harborough, Leicestershire LE16 7NY, England. *100% eQSL; For QSL sent direct, card will be sent via bureau or direct with $2 for postage and SAE.* **www.wvars.com** *or* **www.qrz.com/db/gb0bon**

Jun 25-Jun 26, 0600Z-0600Z, WA6BGS, San Diego, CA. Amateur Radio Club of El Cajon, Inc. ARRL Field Day 2011. 146.475/147.420 (Offset .945) (PL 107.2). Certificate & QSL. Amateur Radio Club of El Cajon, PO Box 50, El Cajon, CA 92022. **arcec.wa6bgs.us**

Jun 25-Jun 26, 1800Z-1800Z, W6O, Huntington Beach, CA. Huntington Beach RACES. ARRL Field Day. 146.445. QSL. Jim Hansen, 1912 Park St, Huntington Beach, CA 92648. **www.hbraces.net**

Jul 1-Jul 5, 0000Z-2359Z, WM3PEN, Philadelphia, PA. Holmesburg Amateur Radio Club. Original 13 Colonies Independence Week Special Event from Philadelphia. 14.253 All HF bands, 6 and 2 m. QSL. Holmesburg Amateur Radio Club, 3341 Sheffield Ave, Philadelphia, PA 19136. *Each state offers a great QSL card; full color certificate for all 13 Colonies.* **www.qrz.com/db/wm3pe**

Jul 1-Jul 5, 0001Z-1259Z, K2A-K2M, Eastern USA. Original 13 Colonies Operators. Original 13 Colonies Independence Week Special Event. All HF bands except WARC and 60 m, 2 and 6 m simplex encouraged, all modes. Certificate & QSL. Ken Villone, KU2US, Award Manager, PO Box 185, Conesus, NY 14435. *Special certificate for contacting all 13 original colonies; see complete details at* **www.13colonies.info**

Jul 1-Jul 5, 0401Z-0359Z, KU2US, Conesus, NY. The 13 Colonies Special Event Group. Original 13 Colonies. 14.213. Certificate & QSL. Ken Villone, Awards Mgr for NY QSL/Cert, PO Box 185, Conesus, NY 14435. *All 13 original colony states will be on the air for 5 days. Each state will offer a great QSL card; full color certificate will also be offered. Hope to work you all!* **www.qrz.comdb/ku2us**

Jul 1-Jul 6, 0401Z-0359Z, K2L, Ladson, SC. The US Original 13 Colonies Group. Original 13 Colonies Independence Week Special Event from South Carolina. 21.313 14.313 7.213 3.813. Certificate & QSL. Dennis Zabawa, KG4RUL, 307 Pine Cone Ct, Ladson, SC 29456. *Request Event Certificate from KU2US (see URLfor details); QSL for South Carolina contacts* only *from KG4RUL.* **www.13colonies.info**

Jul 2, 1330Z-1930Z, K4S, Ashland, KY. River Cities Amateur Radio Association. Summermotion Special Event. 28.410 14.240 7.240. Certificate. RCARA, PO Box 612, Ashland, KY 41101. **www.rcara.site90.com**

Jul 2, 1400Z-2200Z, K4F, Smithville, TN. DeKalb County Amateur Radio Club. 40th Annual Smithville Fiddlers' Jamboree & Crafts Festival. 28.425 21.325 14.280 7.275. QSL. Wm Freddy Curtis, KC4GUG, 288 Dogwood Cir, Smithville, TN 37166. **www.dcarc.drivehq.com**

Jul 2-Jul 17, 0000Z-2359Z, K7LBY, Libby, MT. Lincoln County Amateur Radio Group. 100th Anniversary Libby MT Volunteer Fire Company. 18.150 14.240 7.200 3.875. QSL. QSL to station worked as listed in QRZ. *Individual club members will use their own call signs. QSL direct to each individual station.*

Jul 4, 1215Z-1800Z, K1R, Northfield, MA. 72 Rag Chew Net. Celebrating 4th of July. 7.271 (1215Z-1300Z) 7.272 (1300Z-1800Z). Certificate. Robert W. Lobenstein, WA2AXZ, 1958 East 36 St, Brooklyn, NY 11234. **www.ragchewers.net**

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 4-Jul 8, 0900Z-2359Z, GB5GHT, Nr Exeter Devon, England. RSGB. Great Haldon Shutter Telegraph over 200 yrs. 14.190. QSL. John Wakefield, 'Oakhurst', Lower Common Road, West Wellow, Romsey SO51 6BT, England. **www.qrz.com**

Jul 6-Jul 10, 2300Z-2000Z, NU5DE, Mc Dade, 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 9, 1400Z-2000Z, KB2WXV, Geneseo, NY. Keuka Lake Amateur Radio Association. Warbird Airshow. 28.400 14.250 7.200. Certificate. John S Babbitt, WB2SQX, 1990 Square Woods Dr, Canisteo, NY 14823. **www.klara.us**

Jul 9, 1700Z-2359Z, NI6IW, San Diego, CA. USS *Midway* (CV-41) Museum Radio Operations Room. Independence Day. 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 9-Jul 10, 1400Z-1900Z, W3S, Pottsville, PA. Schuylkill Amateur Repeater Association. Schuykill County 200th Anniversary. 14.244 7.197. Certificate. Carl H. Zimmerman, 45 Frankford Ave, Tamaqua, PA 18252. *Online certificate available*. **w3sc.org**

Jul 9-Jul 10, 1400Z-2100Z, TM9ØLH, Le Havre, France. F6KOH Club SHTSF. 90th Anniversary of the Radio Club Le Havre. 14.290 7.090 3.690 14.070 PSK. QSL. SHTSF, 25 rue des Iris, Le Havre 76610, FRANCE. *Operating mobile. Event running several weekends.* **www.shtsf.com**

Jul 9-Jul 10, 1400Z-2100Z daily, W8MRM, Trenton, MI. Motor City Radio Club. Trenton Mid-Summer Festival. 14.240 14.040 7.240 7.040. Certificate. Dale Poblenz, W8FRD, 2095 22nd St, Wyandotte, MI 48192-3837. **www.w8mrm.org**

Jul 9-Jul 10, 1500Z-2100Z, N2B, Winona, MN. Winona Amateur Radio Club. 8th Annual Great River Shakespeare Festival. 14.260 7.260. Certificate. Leslie Hittner, KØBAD, 1340 Conrad Dr, Winona, MN 55987. *On the banks of the Mighty Mississippi*. **www.w0ne.org**

Jul 12-Jul 13, 1400Z-0200Z, N9GTC, Sturtevant, WI. Gateway Technical College's Student Amateur Radio Club . 100th Anniversary of Gateway Technical College. 14.240 14.040 7.240 7.040. Certificate & QSL. Patrick Hoppe, WW9R, Gateway Technical College, 2320 Renaissance Blvd, Sturtevant, WI 53177. *Gateway Technical College is the oldest two year Technical College in Wisconsin*. **engtech.gtc.edu/n9gtc**

Jul 16, 1400Z-1800Z, NC4MC, Candor, NC. Montgomery Amateur Radio Society. Candor NC Peach Festival 2011. 14.250. Certificate. Don Grady, 120 Woodline Dr, Troy, NC 27371.

Jul 16-Jul 17, 1300Z-0300Z, K3B, Irwin, PA. American Cancer Society/Nicole Palm. Relay For Life/Breast Cancer Awareness. 28.400 14.270 7.280. QSL. Nicole Palm, 2225 Trolist Dr, Irwin, PA 15642.

Jul 16-Jul 17, 1600Z-2200Z, WØNOZ, DeSmet, SD. Huron Amateur Radio Association, Inc. 40th Laura Ingalls Wilder Pageant 14.265 7.265. Certificate & QSL. Huron ARA, Inc, PO Box 205, Huron, SD 57350. *Send $2 with QSO info; we'll supply envelope and postage*. **huronarc.info**

Jul 17, 1500Z-2100Z, W9BSP, Olathe, KS. Santa Fe Trail Amateur Radio Club. Marshal Ensor Park and Museum Event. SSB 14.260 7.240 CW 14.050 21.050 7.050. QSL. Del Sawyer , 1259 Frontier Ln, Olathe, KS 66062.

Jul 21-Jul 22, 1700Z-0200Z, W8C, Manchester, MI. Chelsea Amateur Radio Club. Manchester Chicken Broil. 14.050. Certificate. Chelsea ARC, PO Box 43, Chelsea, MI 48118. **wd8iel.net/chibro.htm**

Jul 21-Jul 24, 1300Z-0100Z, W4C/W3U, Manassas National Battlefield, VA. AMRAD and Ole Virginia Hams. Anniversary of the Battle of First Manassas (First Battle of Bull Run). QRP CW PSK-31 SSB. QSL. W3U/W4C, PO Box 6148, McLean, VA 22106. **www.amrad.org**

Jul 22-Jul 24, 0800Z-1200Z, W6A, Pittsburg, CA. Upstairs Pittsburg Radio Club. LDS Field Day. 447.800 144.250 146.415 3.785. Certificate & QSL. Upstairs Pittsburg Radio Club, 4312 Rainier Pl, Pittsburg, CA 94565. *If you work us on three bands we will include a personalized certificate with your QSL card*. **www.w6pit.org**

Jul 23, 1000Z-1700Z, K9G, Mitchell, IN. Hoosier Hills Ham Club. Gus Grissom Day — 50th Anniversary of Mercury 7 Sub Orbital Flight. 21.270 14.200 7.170 146.730 50.200. Certificate. Hoosier Hills Ham Club, PO Box 891, Bedford, IN 47421. **www.w9qyq.org**

Jul 23-Jul 31, 1500Z-2200Z, W9IMS, Indianapolis, IN. Indianapolis Motor Speedway Amateur Radio Club. Brickyard 400. 21.340 14.240 7.240 3.840. Certificate & QSL. W9IMS, PO Box 18495, Indianapolis, IN

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

46218. SASE for QSL. *$4 for certificate. Must work all three races in one year for certificate*. **www.qrz.com/db/W9IMS**

Jul 27-Jul 31, 1500Z-0000Z, W9ZL, Oshkosh, WI. Fox Cities Amateur Radio Club Inc. EAA Airventure 2011. 14.270 7.250 52.550 FM 146.520. Certificate. FCARC Airventure 2011, PO Box 2346, Appleton, WI 54912. **fcarc.us/eaa/eaa.htm**

Jul 29-Jul 30, 1300Z-2000Z, W9A, Berne, IN. Adams County Amateur Radio Club. Swiss Days. 14.270 14.034 7.270 7.034. QSL. Adams County Amateur Radio Club, c/o 817 W Main, Berne, IN 46711. **wb9kqo.com**

Jul 30, 1200Z-2200Z, KJ4TJD, Tavares, FL. Central Florida D-Star Group. D-Starters Academy. 444.500 D-Star "B". Certificate. Paul Branch, 1246 Belmont Cir, Tavares, FL 32778. **www.cfldsg.org**

Jul 30-Jul 31, 1400Z-2200Z, K4CG, Alexandria, VA. Mount Vernon Amateur Radio Club. 221st Birthday of the US Coast Guard. 14.250 10.110 7.270. QSL. US Coast Guard TISCOM, 7323 Telegraph Rd, Alexandria, VA 22315. **k4us@mcarc.com** *or* **www.mvarc.org**

Jul 30-Jul 31, 1705Z-0912Z, W2GSB, Southold, NY. The Great South Bay Amateur Radio Club. Custer Institute. 14.255 14.070 7.175 3.850. Certificate. W2GSB/Custer, PO Box 1356, West Babylon, NY 11704. **www.gsbarc.org**

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 Web site.

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 also available at that site. You can also request a copy by e-mail or send a self-addressed, stamped envelope (SASE) (Special Requests, ARRL, 225 Main St, Newington, CT 06111; write "Special Events Form" in the lower left-hand corner.) 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 **Aug** *QST* would have to be received by **Jun 1**. In addition to being listed in *QST*, your event will be listed on the ARRL Web Special Events 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**. QST

Strays

NEW AWA ONLINE PUBLICATION

♢The Antique Wireless Association has a new online newsletter, *The AWA Gateway*. aimed at a broader audience than the printed membership publication, *The AWA Journal*. *The AWA Gateway* is a free quarterly electronic newsletter that will be published between issues of *The AWA Journal*. By providing basic information on history, collecting and restoration, we hope to encourage participation in these fields. *The AWA Gateway* can be viewed for free (membership not required) at the AWA website, **www.antiquewireless.org**. — *Duncan Brown, K2OEQ*

QST congratulates…

♢Rod Newkirk, VA3ZBB/W9BRD, whose book, *The Rod Newkirk Collection: From the Pages of the K9YA Telegraph 2004-2009*, is available at cost from the *K9YA Telegraph* (**www.k9ya.org/books.htm**). Newkirk wrote the How's DX? column in *QST* from 1948 to 1978 and is a member of the CQ Amateur Radio Hall of Fame. He is credited with coining the term Elmer for a ham who helps others.

July 2011 W1AW Qualifying Runs

W1AW Qualifying Runs are 10 PM EDT Wednesday, July 6 (0200Z July 7) and 9 AM EDT (1300Z) Friday, July 22 (35-10 WPM). The West Coast Qualifying Run will be transmitted by station W6SX on 3590 kHz at 9 PM PDT Wednesday, July 13 (0400Z July 14). Unless indicated otherwise, speeds are from 10-35 WPM.

In the July/August "Contesting 101"

"Following the sun — The Art of the Possible." Kirk, K4RO, hears from guys who say "what's the point? It's all super stations and megawatt amps nowadays." He'll try to give some perspective on the whole game, and examine some realities about the field of competition. Contesting 101 can be found in the *National Contest Journal*, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

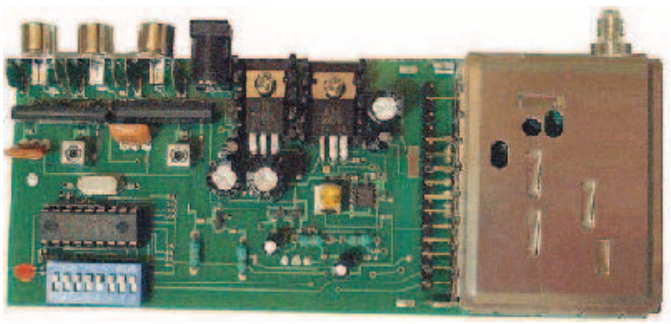
Old xmit tubes never die…: **Some time ago, Joe, WB8DNO, gave me a transmitter tube that had reached the end of its useful life. After he showed me a sample of what could be done with it, I invented this device, housed in a shoebox.**
— Bud Siebel, KG4SME,
budinjax@aol.com

WB8IMY

ECLECTIC TECHNOLOGY

FM Amateur TV on the Cheap

Mel Whitten, KØPFX, is doing some cool things with FM amateur television these days. He has a Mobicomm "ATV LCD Kit" controlling a Mobicomm DFM900 FM TV transmitter on 900 MHz. You can find Mobicomm modules for sale on their eBay store at **www.mobicomm.net**. Prices range from $89 to about $200.



A MobiComm 900 MHz FM TV receiver.

In addition to the 900 MHz system, Mel is also using a 1.2 GHz FM ATV transmitter along with a surplus Bensat DR903mx satellite receiver, creating an effective FM ATV transceiver.

"Whichever band you choose, once you try FM ATV, you'll never go back to AM, at least not for local contacts," Mel says. According to Mel, FM provides a much improved picture over AM. He has enhanced his FM ATV station with a very low cost "pan" unit with wireless remote control from **Geeks.com**. "I mounted a Panasonic color camera on it and use it to pan so my ATV viewers can watch me roam around in the shack. It works quite well although some say it scans a bit too fast."

With miniature video cameras being so inexpensive these days, it is almost trivial to create an FM ATV station of your own. Chat with your friends around town, use it for public service work, or whatever!

KØPFX's 900 MHz FM ATV transmitter.

Printing Antennas

At the University of Illinois at Urbana-Champaign, they're *printing* antennas using silver nanoparticle inks. This isn't new technology by itself, but what is interesting is the fact that they are able to do it on just about any surface, even a sphere.

The compact UHF and microwave antennas are less than ¼ wavelength at the design frequency. As most hams know, antennas suffer limitations in gain, efficiency and bandwidth when their size is reduced below a quarter-wavelength. The University of Illinois printing technique doesn't work miracles in this regard, but it apparently results in antennas that offer reasonable performance for the application. It achieves this by printing in a zigzag pattern over the surface. That's how they are able to create antennas in unusual places.

According to Professor Jennifer Lewis, "Printing with metallic nanoparticle inks offers an attractive alternative for meeting the demanding form factors of electrically small antennas (ESAs). To our knowledge, this is the first demonstration of printed antennas on curved surfaces." Their research findings and fabrication methods were featured in the cover article of the March 18 issue of *Advanced Materials* ("Conformal Printing of Electrically Small Antennas on Three-Dimensional Surfaces").

To fabricate an antenna that can withstand mechanical handling, for example, the silver nanoparticle ink can be printed on the interior surface of Lexan hemispheres. Other non-spherical antennas can be designed and printed using a similar approach to enable integration of antennas on, for instance, the inside of a cell phone case or the wing of an unmanned aerial vehicle. (A multiband HF dipole printed on my roof would be nice!)

Smartphones in Space

You may have heard about the father and son who attached a smartphone to a weather balloon last year and sent it to an altitude of nearly 100,000 feet, capturing fascinating video along the way.

Well, at Surrey Satellite Technology Limited (SSTL) at the University of Surrey in the United Kingdom, they plan to take this idea to the next level, so to speak, by sending a smartphone into orbit!

The mission is called STRaND-1 (for Surrey Training Research and Nanosatellite Demonstration number 1). The SSTL team plans to stuff an ordinary off-the-shelf smartphone into a satellite to see how it performs in space. They haven't selected the smartphone model yet, but they've already specified that it must run the Google Android operating system.

The SSTL team wants to find out first if a smartphone will work in orbit, and if it does, they want to determine if it can be used to control a satellite. The phone will be afforded some protection from the radiation and the large temperature variations by being mounted within the satellite casing, with a hole cut in the side for the camera lens. All pictures and messages from the phone will be transmitted back to Earth via the satellite's radio.

In the initial stages of the mission, the satellite's microcomputer will be in charge of operations, with the smartphone acting as a backup, but at some point these roles will be reversed. Operations overseen by the computer and smartphone include the navigation systems, miniature reaction wheels and the pulse plasma thrusters.

Google's Android operating system was chosen because it is open-source, which means the engineers could modify the software as required for the mission. In the future, if the phone works in orbit, relevant apps could be developed for the phone's use in space.

If the STRaND-1 mission goes off without a hitch, using a smartphone in space could make operations in orbit far less expensive than using custom-designed equipment. In fact, the cost of the entire STRaND-1 satellite is less than a family car. This would be a large benefit for small Amateur Radio satellites as well. QST

Steve Ford, WB8IMY ♦ *QST* Editor ♦ sford@arrl.org

K2TQN

VINTAGE RADIO

Amateur Telegraph Stations

Many early hams professed to have started their radio careers by stringing up a telegraph wire between their home and a friend's nearby. Sometimes other friends hooked in on the line, making it a party line. The lines were strung from home to home, from rooftop to tree to barn, across streets, and on and on. That would be almost impossible today but back then electric and telephone poles were not as prevalent and it was not unusual for adults to see young people doing "odd" things like this. It was the Internet of the day.

I came across several letters written by radio pioneer Lloyd Espenschied reminiscing about his youth. It's a real first-person look at the early 1900s in and around Brooklyn, New York detailing the effect he and his friends had on early radio and the effect early radio had on them. Lloyd went on to receive 133 Bell System patents. One of them we use every day and is very important to us in many ways. He was coinventor of coaxial cable. Imagine the world today without coaxial cable.

Arriving in Brooklyn

(from a letter dated 21 November 1968)

It was in December 1901 that I first came to New York, as a boy of 12, with my mother, — to visit the grandparents I thought, a visit that became a permanent 'stay.'

I well remember our arrival at the Jersey City Terminal of the Pennsylvania Railroad, — we had come from the inland city of St Louis, Mo. There at the station to meet us was dear Uncle Nick. The train was late and it was dark as we took the 'Annex' ferry across the Bay to Brooklyn, foot of Fulton St. The lights on the shimmering water, the toots of the tug boats, the trill of the capstans as the ferry boat tied up, — and finally the journey on the Fulton St 'L' behind a baby steam engine, — all a prelude to being welcomed at Grandpa's home at 1369 Dean St, is still a vivid memory.

K2TQN COLLECTION

Lloyd Espenschied (left) and Herman A. Affel, of the Bell Laboratories, examine sections of the coaxial cable they invented.

Radio Amateur Days in Brooklyn

Lloyd Espenschied
New York City, July 9, 1943, Part 1

Just a few minutes ago outside my door, of Room 1058 here in the Bell Laboratories Building at 463 West St, I was spoken to by an apparent stranger, this wise:

'Do you remember the old days at Boys High School in Brooklyn around 1903, the Electrical Club and the out-of-hour experiments in the Physical labs, with spark coils, radio coherers and the like; do you remember some of the fellows such as Walter Franklin and me — I'm H. H. Young — and then there was a particular amateur pal of yours

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

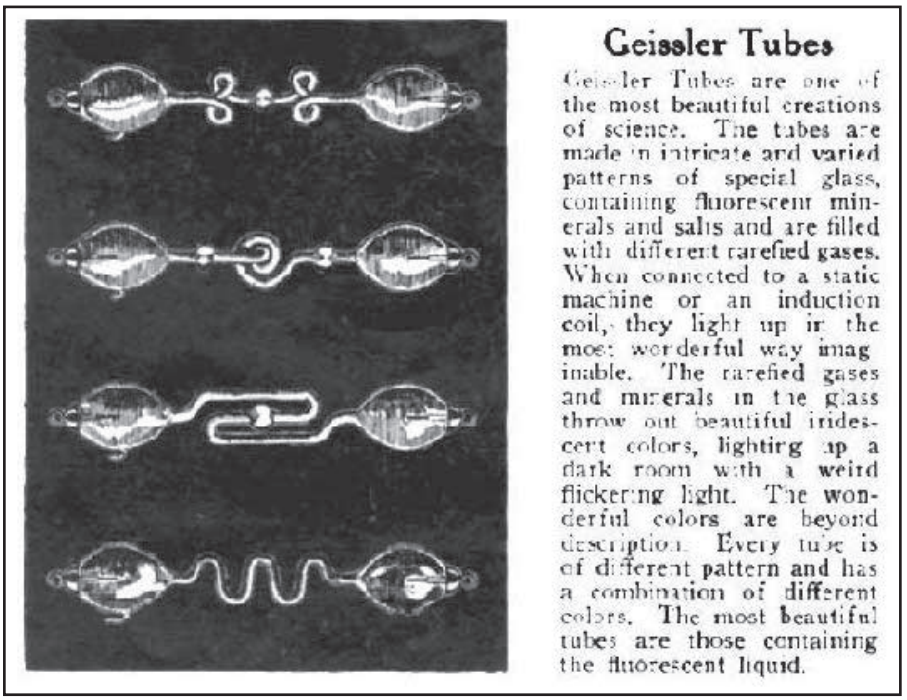
— Curtis was the name?'

Naturally I was amazed at this sudden recalling of a past now forty years back, a past that seems like a dream. And I'm delighted too in recalling something of those boyhood amateur days, so much so that I am making these notes while the spirit moves!

Often have I looked back at the very high school scene to which he refers, realizing that it was the sight of these enticing devices in the cases of old Dr Hale's physics laboratory that aroused my first interest in things electrical. There was the big Ruhmkorff spark coil, an imposing black cylindrical coil mounted on a contrasting mahogany base with a massive interrupter at the end of its core. And when the device was permitted to be taken out and operated, to produce a spark a foot long and to light up the beautiful colored Geissler tubes in their zigzag and winding forms, — it touched off my boyish delight in seeing things happen and in wondering how they worked. And then the older boys at BHS, led by Franklin, as a part of the electrical club activities, brought in some of their own apparatus and experimented with radio across the room, hero worship and the make instinct, combined with natural curiosity, fired an interest in things electrical and in the physical world in general that has never subsided. As I now recall it, after an early flair for nature and a bit of art, this was really the first of the constructive impulse and yearning that ran through a buoyant youthhood.

I then and there became so interested in things and in what one might accomplish by means of tools and apparatus, that I soon started my own little experimental shop, an activity that ran quickly into wireless and the field of electrical communications. Thus started what has proved to be my life work.

Soon this interest became so absorbing that I was quite unable to do justice to the language parts of my high school study. It became impossible to keep up with those subjects for which I had no interest as evening after evening I sacrificed the study of them in my intense pursuit of things mechanical and electrical. Then also my youthful energy ran to a certain amount of out-of-door play and natural devilment, which latter further 'put me in bad' with some of the teachers. One day several of us cut a class or a study hour and went outside and played ball. Upon running up to one of the side entrances to recover the ball, much to my surprise I found myself nabbed by no less than the Principal of Boys High School, Dr Mickleborough. This was after I had previously been before him on some escapade. The next thing I knew I was discharged from school. How my mother pleaded with me to conform and study what I should. It seemed impossible, so strong was the lead of my natural interest.



Geissler Tubes

Geissler Tubes are one of the most beautiful creations of science. The tubes are made in intricate and varied patterns of special glass, containing fluorescent minerals and salts and are filled with different rarefied gases. When connected to a static machine or an induction coil, they light up in the most wonderful way imaginable. The rarefied gases and minerals in the glass throw out beautiful iridescent colors, lighting up a dark room with a weird flickering light. The wonderful colors are beyond description. Every tube is of different pattern and has a combination of different colors. The most beautiful tubes are those containing the fluorescent liquid.

I often wonder how many of our boys in every generation are victims of the rigidity and artificiality of our school and college systems.

Although Manual Training High School didn't have a football team, it rather looked good to me since it should afford more access to physical things. So to the Brooklyn Manual Training High School, over on Park Slope, I went, frequently walking there from my home in the Bedford section along what was then empty Eastern Parkway. At Manual there developed another group of young wireless enthusiasts including Perce Collison, Frank Kenny, Clarence Foote. I continued there for almost the necessary three more years, but without graduating — leaving to go to sea as a wireless operator at 18, in 1907. (But by the fall of 1907 I had learned better and entered Pratt Institute to get more technical training.)

I had become head over heels interested in making and experimenting with electrical devices, particularly radio, in company with some of the other boys of the Bedford section of Brooklyn, especially Austen M. Curtis who was something of a naturalist and was quite a genius in making his own apparatus in his mother's kitchen. He was in fact quite original and analytical and discovered as a detector the Zincite crystal* that later formed part of the famous Perikon detector. (* Patented broadly by Wm. E Ashton, who attended to the business side, and Austen M. Curtis. US Patent No.1,145,658, filed 1907 April 27, issued 1915 July 6 after prevailing in an interference with G. W. Pickard.) I myself was fortunate enough to have the greater part of an attic to my use and went in for the making of things, had a lathe, etc. Located immediately above the bedroom of an aunt, my pounding must have bothered her but she protested not too much at the noise over her head. But when finally sulphuric acid from my home made storage batteries leaked down onto her ceiling, she did protest.

Then again there was my rigorous old German-born grandfather, Nicholas Espenschied the hatter, in whose home it was that I lived and who gave me my education. He was rather amused at the industry of us boys but thought it a kind of tomfoolery, this hearing things in earphones, especially when it came to spending $5.00 for a queer little lamp bulb (an early McCandless Audion!) that wasn't even a good electric light! Upon coming home one night he was surprised to find a 40-foot spiced spruce pole sticking skyward, making his dignified bay-windowed white-limestone-front look like a ship, a mark on the block. But he let it remain, much to my relief. A year or so later one evening during a heavy storm, there was a terrific crash on the roof coincident with thunder. Fortunately, Grandfather didn't distinguish the crash of the pole from that of nature and I was able to reconstruct my transmitting antenna.

Stay tuned — the story will be continued next month.

Vintage events and hamfests I'm attending: Michigan Antique Radio Club, July 7, 8, 9, at Lansing, Michigan, **michiganantiqueradio.org**; Glacier-Waterton Hamfest, July 15, 16, 17, at Glacier National Park, Montana, **www.gwhamfest.org**. See more about Glacier-Waterton in the March 2009 *QST* "Vintage Radio" column. QST

CONVENTION AND HAMFEST CALENDAR

Abbreviations
Spr = Sponsor
TI = Talk-in frequency
Adm = Admission

Alabama (Cullman) — Jul 30
D F H R S T V

9 AM-3 PM. *Spr:* Cullman ARC. McGukin Civic Center, 510 5th St SW. 5th Annual Hamfest. *TI:* 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**.

Colorado (Monument) — Jul 16
D F H Q R S V

8 AM-1 PM. *Spr:* Pikes Peak RAA. Lewis Palmer High School, 1300 Higby Rd. *TI:* 146.97. *Adm:* $5. Tables: $12. Dan Scott, WØRO, 1644 Gold Camp Rd, Colorado Springs, CO 80906; 719-635-0871; **w0ro.dan@gmail.com**; **ppraa.org**.

Connecticut (North Haven) — Jul 23
D F H R T

8 AM. *Spr:* Meriden ARC. Holiday Inn, 201 Washington Ave. Yankee Peddler Hamfest. *TI:* 147.36. *Adm:* $7. Tables: $15. John Bee, N1GNV, 30 Tremont St, Meriden, CT 06450; 203-440-4973; **n1gnv@arrl.net**; **www.yankeehamfest.com**.

Florida (Milton) — Jul 22-23 D F H R S T V

Friday noon-9 PM; Saturday 8 AM-2 PM. *Spr:* Milton ARC. Santa Rosa County Auditorium, 4530 Spikes Way. 16th Annual Hamfest. *TI:* 145.49 (100 Hz). *Adm:* $5. Tables: $9. Robert Perry, KAØAGC, 6646 Elm St, Milton, FL 32570; 850-390-1665; **ka0agc@bellsouth.net**; **miltonarc.org**.

Georgia (Covington) — Jul 30 F T V

8 AM-3 PM. *Spr:* Newton County RC. Newton County Fairgrounds, 3162 Mill St. *TI:* 146.925 (88.5 Hz). *Adm:* Free. Tables: Free (limited number or bring your own). Charles Davis, WA4UJC, 10175 Starr St, Covington, GA 30014; 770-786-6546; **wa4ujc@arrl.net**; **www.ncrcga.org**.

Illinois (Carlinville) — Aug 6 D F H R S T V

7 AM-noon. *Sprs:* Montgomery and Macoupin County ARCs. Macoupin County Fairgrounds, IL Rte 4. *TI:* 146.82, 442.25 (103.5 Hz). *Adm:* $5. Tables: $5. Mark Osborn, WA9SXK, 1515 Seymour Ave, Hillsboro, IL 62049; 217-259-2558; **wa9sxk@consolidated.net**; **k9mce.org**.

Illinois (Peotone) — Jul 17
D F H Q R S T V

8 AM-2 PM. *Spr:* Kankakee Area Radio Society. Will County Fairgrounds, Wilmington-Peotone Rd. 28th Annual Hamfest. *TI:* 146.94 (107.2 Hz). *Adm:* advance $6, door $8. Tables: $10 (first table); additional tables $8 each. Carl Schroeder, K9CS, 1505 N 2000 East Rd, Watseka, IL 60970; 815-473-4263; **karsfest@gmail.com**; **www.w9az.com**.

Illinois (Quincy) — Aug 6 D F H Q R T V

8 AM-2 PM. *Spr:* Western Illinois ARC. Eagles Alps, 3737 N 5th St. *TI:* 147.03 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $10. Danny Pease, NG9R, Box 231, Camp Point, IL 62320; 217-430-2046; **dpease@adams.net**; **www.w9awe.org**.

Indiana (Angola) — Aug 6 F T

8 AM-2 PM. *Spr:* Land of Lakes ARC. Steuben County 4-H Fairgrounds, 100 Lane 101 Crooked Lake. *TI:* 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**.

Coming ARRL Conventions

July 2
Eastern Pennsylvania Section, Marysville*

July 15-17
Montana State, Essex

July 23
WØDXCC, Leavenworth, KS

July 29-30
Oklahoma State, Oklahoma City
Central States VHF, Irving, TX

August 5-6
Texas State, Austin

August 5-7
Midwest Division, Cedar Rapids, IA
Rocky Mountain Division, Taos, NM

August 12-14
Pacific Northwest DX, Everett, WA

August 20
West Virginia State, Weston

August 20-21
Alabama State, Huntsville

August 21
Kansas State, Salina

August 28
Western Pennsylvania Section, New Kensington

September 9-11
Southwestern Division, Torrance, CA

*See June *QST* for details.

MIDWEST DIVISION CONVENTION

August 5-7, Cedar Rapids, IA
D F H Q R S T V

The Midwest Division Convention, co-sponsored by the Collins and Cedar Valley ARCs, will be held at the Clarion Hotel and Convention Center (for Friday and Saturday convention), 525 33rd Ave and the Teamsters Hall (for Sunday hamfest), 5000 J St SW. Doors are open Friday 3-6 PM for BeagleBoard Tutorial ($20, pre-registration only; **beagleboard.org**), Saturday 8:30 AM-9 PM, Sunday 8 AM-2 PM. Features include indoor tables and outdoor fleaspots; forums (operating, ARRL, DX, Youth, technical); Special Event Station WØCXX; VE sessions (both days); banquet with special guest speaker ARRL President Kay Craigie, N3KN ($35, only available in advance); Wouff Hong ceremony. Talk-in on 146.745. Admission is $5 (hamfest; under 13 free); $10 (convention). Tables are $10. Contact Rick Olney, NØXZL, 1574 W Mt Vernon Rd, Mt Vernon, IA 52314; 319-396-8979; **rolney@qwest.net**; **convention2011.cvarc.rf.org**.

WØDXCC CONVENTION

July 23, Leavenworth, KS
D H Q R S

The WØDXCC Convention, co-sponsored by the Kansas City DX Club, the Missouri DX/Contest Club, and the Lebanon ARC, will be held at the Riverfront Convention and Community Center, 123 S Esplanade. Doors are open 8 AM-8 PM. Features include Hospitality Suite (Friday, July 22, 7-10 PM; Country Inns and Suites Meeting Room, 111th St); a full day of forums covering the latest in DXing, contesting, antennas and more; outstanding array of speakers; DXCC card checking (including 160m); many local and national vendors with the latest in equipment and accessories; ARRL booth; world famous Kansas City DX Club Pileup Contest; special KC barbeque buffet banquet featuring guest speakers ($25). Talk-in on 147.0 (151.4 Hz). Registration fee is $30 (Mike Crabtree, ABØX, 913-334-0139). Contact Don Devins, WDØBWM, 7323 Reeds Rd, Overland Park, KS 66204; 913-677-5265; **wd0bwm1@swbell.net**; **www.w0dxcc.com/**.

Louisiana (Slidell) — Jul 16 D F H Q R S V

8 AM-2:30 PM. *Spr:* Ozone ARC. John Slidell Park Gymnasium, 105 Robert Blvd. *TI:* 147.27 (114.8 Hz). *Adm:* $5. Tables: 8-ft $7. Ron Riviere, WB5CXJ, Box 3087, Slidell, LA 70459; 985-640-5858; **wb5cxj@live.com**; **w5sla.net**.

Maryland (West Friendship) — Jul 17
F H Q R T V

6 AM-3 PM. *Spr:* Baltimore RA Television Society. Howard County Fairgrounds, Rte 144 at Rte 32. *TI:* 147.03, 448.325. *Adm:* $6. Tables: $35. Les McClure, W3GXT, 516 Gwynnwest Rd, Reisterstown, MD 21136; 410-833-8667; **lesmcclure@comcast.net**; **www.bratsatv.org**.

Massachusetts (Cambridge) — Jul 17. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); **w1gsl@mit.edu**; **www.swapfest.us**.

Michigan (Escanaba) — Aug 6 D F H R S

9 AM-2 PM. *Spr:* Delta County ARS. Bay de Noc Community College, 2001 N Lincoln Rd. *TI:* 147.15 (100 Hz). *Adm:* $5. Tables: First table free, $5 for each additional. John Anderson, WD8RTH, Box 295, Wells, MI 49894; 906-399-4490; **wd8rth@dcars.org**; **www.dcars.org/**.

Minnesota (St Paul) — Jul 23 F R

8-11 AM. *Spr:* Magic Repeater Group. Art's (KAØJLB) Yard, 37 Hatch Ave. Yard Sale. *TI:* 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 16
D F H R S V

8 AM-1 PM. *Spr:* Warrensburg Area ARC. Johnson County Fairgrounds, W Hwy 50. Military and Communications Vehicles, Red Cross Emergency Vehicles, MARS Station, equipment testing table. *TI:* 146.88 (107.2 Hz). *Adm:* $5 (3 for $10). Tables: 8-ft $10. Keith Raihala, NØVJ, 457 NW 501st Rd, Warrensburg, MO 64093; 660-864-1911; **n0vj@arrl.net**; **www.waarci.org/**.

Missouri (Washington) — Jul 17
D F H R T V

6 AM-1 PM. *Spr:* Zero-Beaters ARC. Bernie E. Hillerman Park, Grand Ave. 49th Annual Ham-

D = DEALERS / VENDORS
F = FLEA MARKET
H = HANDICAP ACCESS
Q = FIELD CHECKING OF QSL CARDS
R = REFRESHMENTS
S = SEMINARS / PRESENTATIONS
T = TAILGATING
V = VE SESSIONS

Gail Iannone ♦ Convention and Hamfest Program Manager ♦ giannone@arrl.org

fest. *TI:* 147.24. *Adm:* Free. Tables: $25. Bruce Serbus, KDØKCF, Box 277, Gray Summit, MO 63039; 636-221-1101 (Craig, NØMFD); **washingtonhamfest@sbcglobal.net**; **www.WA0FYA.org**.

MONTANA STATE CONVENTION

July 15-17, Essex

D F H Q R S T V

The Montana State Convention (77th 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 (QRP, APRS, ATV, Repeater Linking, DXCC); meetings (QCWA, annual hamfest, ARES, ARRL, RAC); high speed CW contest; old equipment and Beer Bottle auctions; DXCC, VUCC, and WAS field card checking; VE sessions ($15 cash or check only); camping (406-226-4479; **stay@glacier-meadowrvpark.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; **aa7gs@arrl.net**; **www.gwhamfest.org**.

Nebraska (North Bend) — Jul 30 D F H R V

9 AM-12:30 PM. *Spr:* Pioneer ARC. St Charles Parish Center, 8th and Locust Sts. 14th Annual Flea Market. *TI:* 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**.

Newfoundland/Labrador (St John's) — Jul 30-31. Joe Earles, VO1BQ, 709-738-2437; **vo1bq@arrl.net**; **www.rac.ca**.

New Jersey (Egg Harbor Township) — Jul 23 D H R S V

9 AM-4 PM. *Spr:* Southern Counties ARA. Shore Mall, 6725 Black Horse Pike. Indoor tailgating. *TI:* 146.745 (146.2 Hz). *Adm:* Free. Tables: $20. Howard Minnichbach, KC2TYZ, 6515 Delilah Rd, Lot 2000, Egg Harbor Township, NJ 08234 609-272-9984; **kc2tyz@comcast.net**; **mysite.verizon.net/kb2mn/**.

ROCKY MOUNTAIN DIVISION CONVENTION

August 5-7, Taos, NM

D F H Q R S T V

The Rocky Mountain Division Convention (*Discovering the Thrill of Ham Radio*), sponsored by the ARRL Rocky Mountain Division, will be held at the Sagebrush Inn and Convention Center, 1508 Paseo del Pueblo Sur. Doors are open Friday noon to Sunday noon. Features include Friday eve Meet and Greet, technical and non-technical forums on a wide variety of ham radio topics, buy/sell/trade new and used ham radio equipment, tailgating ($5 per space), major manufacturers and exhibitors, fun competitions (club newsletter and website; individual QSL card; homebrew challenges; antenna shootouts; high speed CW copying, QLF, and CW pileup contests, transmitter hunts, and more), W1AW/5 Special Event Station, Satellite QSO demonstrations, Boy Scout radio merit badge class, Saturday luncheon ($20; special guest speaker Chip Margelli, K7JA), Wouff Hong ceremony, VE sessions, Saturday eve banquet ($25; special guest speaker Riley Hollingsworth, K4ZDH), Sunday breakfast buffet ($10; special guest speaker ARRL Vice President Rick Roderick, K5UR). Talk-in on 147.12 (67 Hz). Admission is $17, under 17 free. Tables are $20 each (electricity $5). Contact Brian Mileshosky, N5ZGT, Box 20186, Albuquerque, NM 87154; 505-463-9468; **bpmiles@gmail.com** or **info@2011convention.org**; **www.2011convention.org**.

New York (Alexander) — Jul 30

D F H Q R S T V

7 AM-3 PM. *Spr:* Genesee Radio Amateurs. Alexander Firemen's Field, 10708 Rte 98. 31st Batavia Hamfest. *TI:* 147.285. *Adm:* $5. Tables: $5 each (inside only). Harold Hay, W2ABQ, 5066 Clinton St Rd #10, Batavia, NY 14020; 585-343-2844; **abqhay@rochester.rr.com**; **www.gramradio.com**.

New York (Frankfort) — Jul 16 D F H R T V

8 AM. *Spr:* Utica ARC. Herkimer County Fairgrounds, Cemetery St. RadioComm 2011. *TI:* 146.76. *Adm:* $5. Tables: $2. Marty Benedict, W2MVB, 315 Marion St, Herkimer, NY 13350; 315-866-5924; **w2mvb@arrl.net**; **www.uticaarc.org**.

New York (Trumansburg) — Aug 6

D F H R T V

6 AM-noon. *Spr:* Tompkins County ARC. Trumansburg Fairgrounds, 2150 Trumansburg Rd. *TI:* 146.97 (103.7 Hz). *Adm:* $5, under 12 free with paid adult. Tables: vendor tables free with reservations. Bill Klinko, KC2OYN, 118 Brickhouse Rd, Horseheads, NY 14845; 607-738-4694; **whk2@cornell.edu**; **tcarc-ny.org/hamfest.htm**.

North Carolina (Cary) — Jul 16 F H T V

8 AM-2 PM. *Spr:* Cary ARC. Ritter Park, 301 W Lochmere Dr. 39th Annual Swapfest. *TI:* 146.88. *Adm:* $4. Tables: $10; car spaces $5 each. Herb Lacey, W3HL, 1022 Medlin Dr, Cary, NC 27511; 919-467-9608; **w3hl@arrl.net**; **www.qsl.net/n4nc**.

North Carolina (Fayetteville) — Aug 6

D F H R T V

8 AM-noon. *Spr:* Cape Fear ARS. Methodist University (Reeves Auditorium), 5400 Ramsey St. 13th Annual Swapfest. *TI:* 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**.

North Carolina (Waynesville) — Jul 30

D F H Q R S T V

8 AM-4 PM. *Spr:* Western Carolina ARS. Haywood County Fairgrounds, 758 Crabtree Rd. 36th Annual Hamfest. *TI:* 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 8-10

F H R S T V

Friday-Sunday all day. *Sprs:* North Dakota and Manitoba ARCs. CCC Lodge and Campgrounds, West Loop Rd (ND side). 48th International Hamfest, camping, dancing, contests. *TI:* 146.52. *Adm:* $13 (for the weekend). Lynn Nelson, WØND, 6940 4th St SW, Minot, ND 58701; 701-833-1000; **w0nd@arrl.org**; **www.mts.net/~holderr/ihf.htm**.

Ohio (Columbus) — Aug 6 D F H R S T V

8 AM-2 PM. *Spr:* Voice of Aladdin ARC. Aladdin Shrine Center, 3850 Stelzer Rd. *TI:* 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 16 D F H R S T

8 AM-1 PM. *Spr:* Northern Ohio ARS. Lorain County Community College, Spitzer Conference Center, 1005 N Abbe Rd. 47th Annual Hamfest. *TI:* 146.7. *Adm:* $6. Tables: $10. Darlene Ohman, KA8VTS, 4122 Bush Ave, Cleveland, OH 44109; 216-398-8858; **dohman@roadrunner.com**; **noars.net**.

Ohio (Randolph) — Jul 31 D F H R S T V

8 AM-2:30 PM. *Spr:* Portage ARC. Portage County Fairgrounds, 4215 Fairgrounds Rd. *TI:* 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**; **hamfair.com**.

Ohio (Stow) — Aug 7 D F H R T

Set up 7 AM; public 8 AM. *Spr:* Cuyahoga Falls ARC. Robert Pinn Armory (Stow Armory), 4630 Allen Rd. *TI:* 147.27 (110.9 Hz). *Adm:* $5 (per vehicle, buying or selling). Tables: Outdoor spaces only. Frank Tompkins, W8EZT, Box 614, Cuyahoga Falls, OH 44222; **tailfest2011@cfarc.org**; **www.cfarc.org/tailgate2011.html**.

Ohio (Van Wert) — Jul 17 D F H R T

8 AM. *Spr:* Van Wert ARC. Van Wert County Fairgrounds, 1055 S Washington St. *TI:* 146.85. *Adm:* $5. Tables: $10. Louie Thomas, WD8LLO, 208 N Chestnut St, Van Wert, OH 45891; **techserv@embarqmail.com**; **www.w8fy.org**.

OKLAHOMA STATE CONVENTION

July 29-30, Oklahoma City

D F H Q R S V

The Oklahoma State Convention ("Ham Holiday 2011"), sponsored by the Central Oklahoma Radio Amateurs, will be held at the Biltmore Hotel and Conference Center, 401 S Meridian Ave. Doors are open Friday 4-8 PM, Saturday 8 AM-3 PM. Features include 36th Annual Ham Holiday, flea market, vendors (contact **kc5qcv1@att.net** for details), technical and non-technical programs, DXCC/WAS card-checking, VE sessions. Talk-in on 147.03 (167.9 Hz). Admission is $8 in advance, $10 at the door; under 16 free with paying adult. Tables are $15 in advance, $20 at the door (if available). Contact Bill Wilburn, N5NUK, 6417 N Warren Ave, Apt #243, Oklahoma City, OK 73116; 405-843-4705 (eves); fax 405-841-2624; **n5nuk@sbcglobal.net**; **www.HamHoliday.org**.

Oregon (North Bend) — Jul 16 D F H R S V

10 AM-2 PM. *Spr:* Coos County RC. North Bend Middle School, 16th and E Sts. *TI:* 146.61 (110.9 Hz), 147.28 (146.2 Hz). *Adm:* $3 (non-ham spouses and under 12 free). Tables: $15 (includes 1 admission). Elise Ciraolo, N7CIR, 63353 Juniper Dr, Coos Bay, OR 97420; 541-267-4243; **e.ciraolo@frontier.com**; **www.coosradioclub.net**.

Pennsylvania (Greensburg) — Jul 31

D F H R

8 AM-2 PM. *Spr:* Foothills ARC. Hose Co #1, 6 McLaughlin Dr. *TI:* 147.18 (131.8 Hz). *Adm:* Free. Tables: $10. Frank Rossi Jr, N3FLR, 707 9th St, Irwin, PA 15642; 724-989-0462; **n3flr@arrl.net**; **w3lww.org**.

Pennsylvania (Kimberton) — Jul 17

D F H R T

7 AM-noon. *Spr:* Mid-Atlantic ARC. Kimberton Fire Company Fairgrounds, Rte 113 and Firehouse Ln. Valley Forge Hamfest and Computer Fair. *TI:* 145.13, 147.06 (131.8 Hz). *Adm:* $6. Tables: $10. Mike Pilotti, KF3CD, 983 Crownpointe Ln, West Chester, PA 19380; 610-696-5040; **kf3cd@arrl.net**; **www.marc-radio.org**.

Pennsylvania (Somerset) — Jul 17

D F H R S T V

8 AM-1 PM. *Spr:* Somerset County ARC. Somerset County Technology Center, 281 Technology Dr. *TI:* 147.195 (123 Hz). *Adm:* advance $4, door $5. Tables: $10 (first tailgate space free). Stew Saylor, AK3J, 156 Sequoia Ln, Apt 1, Friedens, PA 15541; 814-444-0637; **ssaylor@earthlink.net**; **k3smt.org**.

TEXAS STATE CONVENTION

August 5-6, Austin

D F H Q R S T V

The Texas State Convention (Austin Summerfest 2011), 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 Brennan Price, N4QX, ARRL Chief Technology Officer; 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**.

CENTRAL STATES VHF CONFERENCE

July 29-30, Irving, TX

D F S

The Central States VHF Society Conference (45th Annual Conference), sponsored by the Central States VHF Society, will be held at the Westin Hotel, 4545 W John Carpenter Frwy. Doors are open both days 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), Saturday eve banquet, hospitality suite. Registration fee is $50. Contact Charles Clark, AF8Z, 469-667-3877; **af8z@earthlink.net**; **www.csvhfs.org**.

Virginia (Berryville) — Aug 7

D F H Q R T V

6 AM-4 PM. *Spr:* Shenandoah Valley ARC. Clarke County Ruritan Fairgrounds, Business Rte 7. 61st Annual Berryville Hamfest. *TI:* 146.82. *Adm:* $6. Tables: $10-$20. Teresa Orndorff, KJ4DOR, 117 Buchanan Dr, Stephens City, VA 22655; 540-533-0961; **hamfest2011@comcast.net**; **www.svarc.us/hamfest**.

Virginia (Vinton) — Aug 6 D F H R S T V

8 AM-1 PM. *Spr:* Roanoke Valley ARC. William Byrd High School, 2902 E Washington Ave. *TI:* 146.985 (107.2 Hz). *Adm:* advance $5, door $6. Tables: $10. Timothy Farrell, KJ4NPB, 865 Scenic River Dr, Rocky Mount, VA 24151; 540-598-0719; **williamff92@yahoo.com**; **www.w4ca.us**.

Washington (Chehalis) — Jul 30

D F H R T V

9 AM-1 PM. *Spr:* Chehalis Valley ARS. Southwest Washington Fairgrounds, 2555 N National Ave. *TI:* 147.06 (110.9 Hz), 146.52. *Adm:* $3. Tables: $10 (for selling spot and one admission). John Ellingson, K7OSK, 18140 Mi Lane, Rochester, WA 98579; 360-273-5929; **k7osk@boatanchor.com**; **www.cvars.org**.

Wisconsin (Chippewa Falls) — Jul 16 R T

8 AM-noon. *Spr:* Chippewa Valley ARC. Eagle's Club Parking Lot, 2855 Hwy 53. *TI:* 147.375 (110.9 Hz). *Adm:* $5. Joe Peloquin, KC9JFP, 3158 Kilbourne Ave, Eau Claire, WI 54703; 715-271-4176; **kc9jfp@yahoo.com**; **w9cva.org**.

To All Event Sponsors

Before making a final decision on a date for your event, you are encouraged to check the Hamfest and Convention Database (**www.arrl.org/hamfests-and-conventions-calendar**) for events that may already be scheduled in your area on that date. You are also encouraged to register your event with HQ as far in advance as your planning permits. See **www.arrl.org/hamfest-convention-application** for an online registration form. Dates may be recorded up to two years in advance.

Events that are sanctioned by the ARRL receive special benefits, including an announcement in these listings and online. Sanctioned conventions are also listed in the *ARRL Letter*. In addition, events receive donated ARRL prize certificates and handouts.

For hamfests: Once the form has been submitted, your ARRL director will decide whether to approve the date and provide ARRL sanction. *For conventions:* Approval must come from your director and the ARRL executive committee.

The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **July 1** to be listed in the **September** issue. Information in this column is accurate as of our deadline; contact the sponsor or check the sponsor's Web site for possible late changes, for driving directions and for other event details. Please note that postal regulations prohibit mention in *QST* of games of chance such as raffles or bingo.

Promoting your event is guaranteed to increase attendance. As an approved event sponsor, you are entitled to special discounted rates on *QST* display advertising and ARRL Web banner advertising. Call the ARRL Advertising Desk at 860-594-0207, or e-mail **ads@arrl.org**.

QST

Strays

ELECTRONICS CLASS AT UC BOULDER YIELDS ELECTIVE CREDITS — AND HAM RADIO LICENSES

◊"Electronics for Wireless," a sophomore elective class for students in Electrical, Computer and Energy Engineering was offered at the University of Colorado, Boulder, in Spring 2011. The class was taught for the first time by Dr Zoya Popovic, a professor specializing in applied electromagnetic and microwaves. More students than expected signed up for the class, so Professor Popovic sought help from the Boulder radio amateur community. Larry Benko, WØQE, and Tom Thompson, WØIVJ, volunteered.

During the laboratory sessions the students built NorCal 40A QRP CW transceivers, all of which successfully passed the transmitter and receiver tests. During the semester, the various stages of the transceivers were studied and tested, and basic analog circuit theory taught through the electronics of the NorCal 40A. By the end of the semester, students had earned 29 Technician and 12 General class amateur licenses. Professor Popovic now holds the General class call KDØOLD. — *Tom Thompson, WØIVJ*

KEN LONG, NØQO

A University of Colorado class, "Electronics for Wireless," resulted in 41 Amateur Radio licenses — plus one for the instructor, who's now KDØLD. The class is holding some of the NorCal 40A circuit boards after NØQO gave an HF radio demonstration.

75, 50 AND 25 YEARS AGO

July 1936

■ The cover photo shows the raw material and the end result of some home-wound tank coils.

■ The editorial introduces new League officers — President Eugene Woodruff, W8CMP, and George Bailey, W1KH, Vice-President. (W8CMP is the League's second President, elected following the death of the League's founder and first President, Hiram Percy Maxim, W1AW.)

■ "Five Meters Again Shoots the Works" reports night-time thousand-mile contacts on this U.H.F. band.

■ Stanley Brown, W3EHE, tells about "Simplifying the Push-Pull-Push Crystal Oscillator."

■ Clark Rodimon, W1SZ, describes his latest piece of handiwork, "A 500-Watt Transmitter with Band-Switching Exciter."

■ A method of "Inductive Neutralization of R.F. Amplifiers" is presented by L. M. Craft and Art Collins, WØCXX, of the Collins Radio Company.

■ "Hamdom" introduces us to three active YL hams — W9PCU, W1FRO, and W9ILH.

■ "High Fidelity Audio at Low Cost," by A. G. Hull, describes how to build an inexpensive but high-performance audio amplifier that uses a pair of the new metal 6L6 tubes in its push-pull output stage.

■ Structural engineer Frank Cartwright tells us how he built "A New Type of Unguyed "Sky-Hook" for Amateur Antennas" at W3ZD's station.

■ Frank Edmonds, W2DIY, reports on building a kilowatt amplifier, in "A High-Power Three-Stage C.W. Transmitter with Beam-Power Crystal Control."

July 1961

■ The cover photo shows the several units of "A Complete Two-Band Station for the V.H.F. Beginner," described in this issue.

■ The editorial discusses the new band-sharing plan for 20 meters.

■ Ed Tilton, W1HDQ, presents "A Complete Two-Band Station for the V.H.F. Beginner" that uses home-built modular units to get the new V.H.F. ham on 50 and 144 Mc.

■ In "Sporadic-E Warning Service for the Six-Meter Man," Davis Helton, WØPME, describes how to use frequencies below 50 Mc. as indicators of band openings.

■ Lew McCoy, W1ICP, tells us how he used salvaged TV-set parts and military surplus units to build a unit to provide "Plate Modulation for the TV-set/Surplus Transmitter."

■ Lew, W1ICP, also gives us "The 50-Ohmer Transmatch," which will match your antenna to your rig.

■ John Troster, W6ISQ, once again uses humor to make pithy points to ponder, in "Old DX Clobber."

■ David Geiser, WA2ANU, discusses the use of "Semiconductor Rectifiers."

■ William Deane, W6RET, built a slick-looking 10-meter mobile transmitter, which he describes in "Twenty-Five Watts — Mobile."

■ In "The Nikey," Nicholas Lefor, W2BIQ, describes his homebrew keying paddle.

■ It has been announced that General Curtis LeMay, K3JUY (ex-KØGRL), has been named the new Air Force Chief of Staff.

July 1986

■ The cover photo shows Japan Amateur Satellite JAS-1, and notes that the countdown to its launch has begun.

■ The editorial notes that "Novice Enhancement Moves a Step Forward."

■ Jon Bloom, KE3Z, describes his state-of-the-art project, "The ARRL Microcontroller."

■ In "Aerials — A Lost Art," George Murphy, VE3ERP, tells us "how to get on the air with an impossible antenna." VE3ERP seems an appropriate call sign for the discussion.

■ Dick Jansson, WD4FAB, and Mark Wilson, AA2Z, present "Adventures in Satellite DXing," Part 4.

■ Bob Heil, K9EID, tells us how to use off-the-shelf commercial equipment to assemble "A VHF/HF Remote-Base Station."

■ In Part 9 of his "Under Construction" series, Doug DeMaw, W1FB, unveils "The SWR Twins — QRP and QRO."

■ "ALC for Class AB_1 Amplifiers," by Mark Mandelkern, KN5S, describes his self-adjusting ALC circuit for amplifiers.

■ David Peterson, WDØEOI, reports on "Ham Radio in China," following its re-authorization in 1982.

Al Brogdon, W1AB ♦ Contributing Editor

Field Organization Reports

APRIL 2011

Public Service Honor Roll

This listing recognizes radio amateurs whose public service performance during the month indicated 70 or more points in six categories. Details on the program are at this Web page: **www.arrl.org/public-service-honor-roll**.

525 KK5NU
467 KT5SR
425 KØIBS
410 W5KAV
399 NC4VA
374 WA9LFO
366 W4CAC
355 KT2D
306 WB8RCR
270 N9VC
265 K9LGU
255 K2HJ WB9JSR
250 NX9K WB9YBI
246 KD8EBY
245 K8RDN
240 WD9FLJ
237 N8OSL
230 K7BFL
225 K6HTN
224 WB9FHP
220 WD8BCS
215 KD1LE
211 W9WXN
210 KB5SDU
204 KØLQB
196 KC5MMH
190 KB2RTZ
188 KB1RGQ
185 NX8A
180 N1QLN K2HAT
177 KK1X
175 WS6P
173 WA2BSS
171 KO6V
170 KA3OCS KE5HYW N5NVP K7EAJ
168 K7OAH
166 WD8USA
165 KK3F
160 W5DY KGØGG
156 KD8KWG
155 KØVTT W7ARC KA8ZGY
150 AG9G KF5IOU N8CJS WA4UJC W4DNA
147 KB5PGY
145 KW1U
140 K4GK K2TV
139 W8CPG
138 AD5CQ
137 KK7DEB
133 W5XX W3CB
131 W2SFD
130 K6JT N4ELI WB2FTX KB2BAA K4IWW WE2G WØLAW
128 KC5ZGG
126 W7ELI
125 WK4P
122 N9WLW
120 KCØM KA4FZI NN7H KI4AAN KT4YA N8IO WB8HHZ W8UL K4BEH W1GMF W4KLB N2JBA WB8WKQ
116 KF7GC
115 KC5OZT W8DJG K2GW KB1NMO
114 KØMEL
110 W7QM W7GB KE4CB KE5YTA N9MN WA3EZN N3RB K4BG N1IQI N1LKJ K1YCQ W7JSW WA5LOU N7XG N7YSS W2EAG KB3LNM K7BDU W7FQQ KB8RCR
107 WM2C
105 K1REV N5EEO KK7TN KC2PSN W2LIE
101 AD4BL
100 N7EIE W6WW K4SCL
KJ6HJW N5OUJ NR2F KA1G NU8K WD8Q WG8Z N1JX W4WNE N3SW W3TWV WB6OTS W4TTO WB4FDT AA3SB NM1K WØCLS NIØI NØMEA WAØVKC KC2UVQ K8VFZ
99 N7IE
97 WB4GHU
96 NA7G N2VC
95 W5CU WA2NDA W3YVQ N3ZOC
94 K5MC
93 N2DW
92 KØBXF
91 KF5CRX NA9L KB8UIH
90 N9VT K1JPG AI4RI KZ8Q N8DD WB8SIQ K2WRC WB4BIK W9MBT WA2CUW AA2SV KI4YV N4MEH K3IN K8AE KD8LZB KD8CYK
89 KB9KEG K4MSG
88 KJ7NO
87 WØSJS W3GQJ K4JUU
86 W8IM KD7OED KD8NWE
85 AL7N
84 KC8WH K1STM
83 W2CC
80 K7MQF KA3NZR KA1HGH K8KV KB8HJJ N8DBY N2GS K5GLS WS4P KCØZDA KBØDTI N5ASU
79 N8SY WDØGUF
78 NS7K
77 N9DVL
75 AC6C KA8IAF N8OD W1PLK
73 W2KFV
72 KB3LFG N2RDB
71 KB4CAU N2VQA
70 KØDEU KØDLK NØDUW NØDUX NUØF WØFUI KBØJKO N3NTV KØPTK KØOR KØRXC NØUKO KD7ZUP WY2U

The following stations qualified for PSHR in previous months, but were not properly recognized in this column: (Mar) KB2RTZ 190, KB2BAA 180, KC2UVQ 135, N2RDB 125, W2KFV 118, WA2NDA 110, W2LIE 103, W5CU 95, K2GW 90, WA2CUW 90, AA2SV 90.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AR, AZ, CO, CT, EB, EMA, ENY, EPA, EWA, GA, IL, IN, KS, LA, LAX, MDC, ME, MI, MN, MO, NC, NFL, NLI, NNJ, NNY, NTX, OH, OK, OR, ORG, SC, SD, SFL, SJV, SNJ, STX, TN, UT, VA, WCF, WI, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: AZ, DE, EWA, IN, KS, MDC, MI, MN, MO, MT, NLI, NM, OH, OK, SFL, SJV, STX, 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.

W1GMF 1781, WB5NKD 1648, KW1U 1202, N1IQI 1033, WB9FHP 952, W8UL 916, N8IXF 857, WB2FTX 800, WB9JSR 792, KØMEL 694, W4WNE 692, WB5NKC 674, WB8WKQ 630, K6JT 615, WD8Q 596, KK3F 595, K8RDN 583, N1LKJ 553, KZ8Q 549, KCØM 544, K7IFG 542, W4KLB 542, NX9K 525, K1JPG 507, K4IWW 501.

Stations earning BPL by Originations plus Deliveries: KA8ZGY 129, K8LJG 113, NM1K 111.

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

WA1BDO **Classy**, George E., Saint Augustine, FL
KA1BTR **Leite**, Stephen J., Fall River, MA
KC2BVI **Peters**, Robert D., Rocky Mount, VA
W2DGE **Naughright**, John D., Long Valley, NJ
WB2FRG **Mitchell**, George W., Spencerport, NY
♦W2GC **Cronn**, James W., Sun City Center, FL
WA2HYK **Pristas**, Richard M., Orchard Park, NY
WA2IKS **Schaumleffel**, Robert W., Olean, NY
WA2PYH **Hellems**, John D., Pittsford, NY
W2QKY **Blumel**, William A., Palm Coast, FL
KD2WV **Schwab**, C. Sidney, Rochester, NY
KP2YL **Keegan**, Ann Z., Christiansted, VI
WJ3I **Telford**, James T., Hartly, DE
WA3UKE **Masonis**, Bernard A., DuBois, PA
K4AJK **Waddell**, Avery R. C., Gadsden, AL
KE4BDA **Nichols**, Roger S., Jupiter, FL
AF4IF **Corteguera**, Jose R., Miami, FL
K4JSP **Swearengin**, Milton G., Palm Harbor, FL
KF4KNL **Barbera**, John C., Monroe, NC
AB4MM **Seaman**, Harry V., Saint Augustine, FL
WD4SFG **Hall**, John D., Miami, FL
W4TTH **Lowman**, Bryson L., Columbia, SC
K4UMK **Anderson**, Robert E. Sr, Roanoke, VA
♦W4UQ **Bay**, Kenneth K., Cincinnati, OH
KF4URC **Gammon**, James D., Princeton, KY
KC4YYD **Erisman**, Charles M. Jr, Rockwood, TN
N4ZFC **Click**, Daryl R., Johnson City, TN
AC5IO **Davis**, Palmer D., Copperas Cove, TX
NC5K **Price**, Edwin F., Jonesboro, AR
AB5KP **Keedy**, Jerry K., Pine Bluff, AR
KD5OGY **Langston**, Arnold J., La Mesa, NM
KD5QQV **Burton**, Violet, Farmersville, TX
W5SMC **Townsdin**, L. Keith, Lafayette, LA
W5TXP **John**, George L., Austin, TX
WA5ZAY **Babbitt**, Jack F. Sr, Walla Walla, WA
KG6B **Hume**, Robert W., Manhattan Beach, CA
N6BXZ **Verhaagen**, Peter C., Alvord, TX
KH6CD **Lee**, Wah H., Honolulu, HI
KI6DFZ **Helton**, Robert W., Russellville, AR
W6KTW **Johnson**, Earl L., Fresno, CA
WA6LVN **Lawson**, Gerald A., Santa Clara, CA
WA6PRS **Hobbs**, Fred D. Jr, Brentwood, CA
WA6QDS **Powell**, Murray A. Jr, Tehachapi, CA
KB6VHJ **Hymer**, Glenn H., Fremont, MI
W6WJM **McDole**, Arthur E., Salinas, CA
WA6YKW **Knowlton**, David F., Columbus, NM
W6YWH **Johnston**, George W., Mariposa, CA
♦K6ZHA **Henderson**, William M., Encinitas, CA
W7EVI **Taft**, Delbert H., Arlington, WA
KL7FLO **Whitmore**, Brent L., Seward, AK
N7IEZ **Stutzman**, Glenn W., North Fork, ID
W7ITZ **Booth**, Ruth E., Grants Pass, OR
WA7LDM **Cloud**, James M., Port Angeles, WA
W7MLK **Lyons**, James W., Livermore, CA
W7MSO **Soehrman**, Martin, Molalla, OR
KK7QL **Cambier**, James S., Payson, AZ
WB7RUM **Stone**, Gerald M., Lambertville, MI
WA7TGA **Runge**, Roger W., Grants Pass, OR
WA7VEF **Dyer**, Jay M., Nampa, ID
ex-W7RKO **Nelson**, Glenn L., Ferndale, WA
W7YSF **Jones**, Mark J., Farmington, NM
W8DFG **Gaboury**, Dennis, Mount Clemens, MI
KC8FS **Soper**, Frederick G., Mosherville, MI
WN8I **Ridenour**, Dale G., Monroe, OH
W8KRK **Skinner**, Kenneth R., Lakeland, FL
KG8VT **Berner**, Victor G., Manning, SC
W8ZZM **Helppi**, Reino R., Calumet, MI
♦K9GEL **Lieber**, Richard, Carmel, IN
W9IYZ **Tonnell**, Roland J., Appleton, WI
KC9JEB **Borden**, Paul M., Seymour, IN
KC9KTG **Thomas**, Renee K., Leo, IN
AA9TX **Jones**, William A., Eldorado, WI
W9UVV **Zaun**, Roger C. Sr, Mequon, WI
WØABF **Schneider**, Edmund C. Jr, Excelsior, MN
WAØDFT **Kopischke**, Arnie L., Mankato, MN
NØDJD **Vaughan**, Sidney K., Cedar Rapids, IA
NØEVR **Kidd**, James E., Kirkwood, MO
KØEZB **Curtis**, James M., Mexico, MO
NØFHP **Hajdu**, Julius P., Kremmling, CO
♦WØGFQ **Meyerson**, Leo I., Omaha, NE
KAØHPX **Ritz**, Jack, Muscatine, IA
WØLK **Seymour**, Robert G., Mountain View, AR
KBØLLZ **Watson**, H. B., Albion, NE
WØLTN **Erickson**, Raymond H., Florence, OR
KØTVP **Prokes**, Stanley, David City, NE
NØYBX **McCormick**, Keith J., Independence, MO
♦VE3FC **Cooper**, R. Fraser, Cambridge, ON, Canada
♦VE4AE **Chapman**, Jack, Winnipeg, MB, Canada
DL3TD **Wilke**, Dr. Lothar, Erfurt, Germany
FR5ER **Ledrean**, Gerard, Grayan-et-l'Hôpital, France
G4KHF **Wilkinson**, David, London, Great Britain
YV5BNR **Centeno**, Napoleon, Santa Paula, Caracas, Venezuela

♦ 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. QST

Silent Keys Administrator ♦ sk@arrl.org

Strays

I would like to get in touch with...

◊anyone who could donate some very old issues of *QST* to the National Electronics Museum, Baltimore, Maryland. The NEM collection is complete from January 1923 to the present, but we are missing nearly all of the issues prior to that date. We would, of course, appreciate donations, but would purchase if the price is reasonable. — *Roland Anders, K3RA, Trustee, National Electronics Museum, PO Box 1693, MS 4015, Baltimore, MD 21203*

◊anyone with memories (or home movies) of the1964-65 New York World's Fair for a documentary film that will focus on the legacy and memories of the fair (**www.worldsfairmovie.com**). While the movie isn't Amateur Radio specific, I want to make sure this part of the story is told. — *Ryan Ritchey, KA3ZZC*, **ryanrit@mac.com**

◊hams engaged in the sport of racing homing pigeons. — *Edward A. Borow Jr, K2OQA*, **edwardborow@verizon.net**

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.

♦ **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 on 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 2011, Headquarters and W1AW are closed on New Year's Day (observed December 31, 2010), Presidents' Day (February 21), Good Friday (April 22), Memorial Day (May 30), Independence Day (July 4), Labor Day (September 5), Thanksgiving and the following day (November 24 and 25) and Christmas (observed December 26). For more information, visit us at **www.arrl.org/w1aw**.

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	DIGITAL BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	DIGITAL BULLETIN				
6:45 PM	7:45 PM	8:45 PM	9:45 PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

12 STORE BUYING POWER

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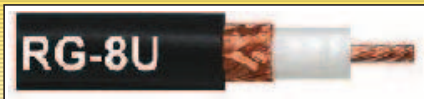


- 95% Bare Copper Braid Shield
- 78% Velocity Factor
- Foam Polyethylene Dielectric .285" O.D.
- Black Vinyl Jacket .405" O.D.
- Center Conductor 13 AWG
  7 Strands of 21 AWG Bare Copper

SPECIAL BUY! Vertical Antennas Affordable Pricing

DXE-80VA-3
Full Size Performance 80M, Only 43 ft. Tall
Now Only **$349.95**

HYG-AV-640
8 Bands 40-6M, 25 ft. No Radials
Now Only **$379.95**


AV-640


80VA-3

#1 Rated 43 ft. Multi-Band Verticals

Why Pay More For Less?
Priced Right!
Highest Quality!

New!

From **$194.95**

Stainless steel tilt and mount, strongest Extren® base insulator—standard equipment

DX Engineering Original

Multi-Band

DXE-8040VA-1	THUNDERBOLT™ Design 80/40 Meter Dual Band 55 ft.	$694.95
DXE-MBVA-1UP	43 ft. THUNDERBOLT™ Design 160-10 Meter w/UNUN	$299.95
DXE-MBVE-1	43 ft. 160 to 10 Meter Multi-Band	$194.95
DXE-MBVE-1-4P	43 ft. Multi-Band Vertical/Radial Plate Package *SPECIAL*	$269.95
DXE-MBVE-1-4UP	43 ft. Multi-Band Vertical/ UNUN Package *SPECIAL*	$289.95
DXE-MBVE-1-4UPR	43 ft. Multi-Band Vertical/Radial Plate/UNUN Package	$349.95
DXE-MBVE-1-3ATP	43 ft. Multi-Band Vertical/ Remote Tuner Package	$579.00
DXE-MBVE-2-4UP	33 ft. 80 to 10 Meter Multi-Band UNUN Package	$279.95
DXE-4030VA-1	THUNDERBOLT™ 40/30 Meter Dual Band	$199.95

Monoband

DXE-7580VA-1	THUNDERBOLT™ Design 75/80 Meter Monoband 55 ft.	$549.95
DXE-80VA-3	THUNDERBOLT™ Design 75/80 Meter Vertical	$349.95
DXE-60VA-1P	THUNDERBOLT™ Design 60 Meter 43 ft. Vertical	$259.50
DXE-30VE-1	Fast Taper High Performance 30 Meter	$229.50
DXE-40VA-1	40 or 30 Meter High Performance 1/4 Wave	$249.50
DXE-40VA-1TB	Foldover 24 ft. High Performance Freestanding, Low Profile	$179.95
DXE-40VE-1	Fast Taper, High Performance 40 Meter	$179.95
DXE-40VE-1TB	Foldover 40 Meter 1/4 Wave Freestanding, Heavy Duty *SPECIAL*	$179.95
DXE-60VE-1P	Fast Taper High Performance 60 Meter	$229.50

Accessories

DXE-VRW-1	Manual Winch Add-on Raising Kit for 7580 and 8040	$169.99
DXE-8040-30AOK	30 Meter Add-on Kit for 8040VA-1	$129.95
DXE-7580-THK	CW Optimizer Capacity Hat Kit for 75/80 and 80/40 Antennas	$59.95
DXE-MBV-ATU-1	Multi-Band 43 ft. Vertical Automatic Tuner Add-on Kit	$399.00
DXE-UN-43-R	UNUN Complete Add-on Kit for 43 ft. Vertical Antennas	$129.95

We Have First Rate Products, Reliable Performance, & Great Prices—

NEW - UNSLIT TUBING— OR SLIT ONE END EXACT TELESCOPING SIZES!

6063-T832 Aluminum Tubing

- Smoothly telescoping sections
- Drawn - not extruded tubing
- Better than the other guys - guaranteed lowest price
- Custom made just for DX Engineering
- Use DXE Stainless Steel Element Clamps to assemble slit lengths

New!

.058" wall x 36" long

	DXE-AT#	Unslit	DXE-AT#	Slit one end
0.375" O.D.	1240	$1.45		NA
0.500" O.D.	1494	$2.05	1241	$3.75
0.625" O.D.	1495	$2.35	1242	$4.05
0.750" O.D.	1496	$2.65	1243	$4.35
0.875" O.D.	1497	$2.75	1244	$4.45
1.000" O.D.	1498	$2.95	1245	$4.65
1.125" O.D.	1499	$3.25	1246	$4.95
1.250" O.D.	1500	$4.15	1247	$5.85
1.375" O.D.	1501	$4.45	1248	$6.15
1.500" O.D.	1502	$5.25	1249	$6.95
1.625" O.D.	1503	$6.05	1250	$7.75
1.750" O.D.	1504	$6.85	1251	$8.55
1.875" O.D.	1505	$7.65	1252	$9.35
2.000" O.D.	1506	$8.45	1253	$10.15
2.125" O.D.	1507	$9.25	1254	$10.95

.058" wall x 72" long

0.375" O.D.	1189	$2.95		NA
0.500" O.D.	1480	$4.15	1205	$6.05
0.625" O.D.	1481	$4.75	1206	$6.65
0.750" O.D.	1482	$5.35	1207	$7.25
0.875" O.D.	1483	$5.65	1208	$7.55
1.000" O.D.	1484	$5.95	1209	$7.85
1.125" O.D.	1485	$6.55	1210	$8.45
1.250" O.D.	1486	$7.75	1211	$9.65
1.375" O.D.	1487	$8.45	1212	$10.35
1.500" O.D.	1488	$8.95	1213	$10.85
1.625" O.D.	1489	$9.75	1214	$11.65
1.750" O.D.	1490	$10.65	1215	$12.55
1.875" O.D.	1491	$11.55	1216	$13.45
2.000" O.D.	1492	$12.45	1217	$14.35
2.125" O.D.	1493	$13.35	1218	$15.25

Also available 6061-T8 .120 wall - 1.5" to 3" O.D.
Unslit for booms and HD element designs!

DXE-AT1311	6' x 1.5" O.D.	$23.85
DXE-AT1312	6' x 1.75" O.D.	$28.20
DXE-AT1313	6' x 2.0" O.D.	$33.00
DXE-AT1314	6' x 2.25"O.D.	$37.45
DXE-AT1315	6' x 2.5" O.D.,	$42.50
DXE-AT1316	6' x 2.75" O.D.	$46.95
DXE-AT1317	6' x 3.0" O.D.	$51.40
DXE-AT1325	12' x 3.0"O.D.	$103.95

See DXEngineering.com for specs and additional tubing. DX Engineering Has All-Stainless Steel Element Clamps That Fit Exact Tubing Sizes!

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

High Quality Performance Grade Cables

- Heat shrink weatherproofing/strain relief
- All assemblies Hi-Pot high voltage tested
- Silver/Teflon® crimped and soldered connectors

RG-213/U JSC-3780 Cable Assemblies with PL-259 Connectors

DXE-CBC-213JU003	3 ft.	$12.88
DXE-CBC-213JU006	6 ft.	$15.88
DXE-CBC-213JU012	12 ft.	$20.88
DXE-CBC-213JU025	25 ft.	$29.88
DXE-CBC-213JU050	50 ft.	$52.88
DXE-CBC-213JU075	75 ft.	$71.88
DXE-CBC-213JU100	100 ft.	$91.88
DXE-CBC-213JU125	125 ft.	$112.88
DXE-CBC-213JU150	150 ft.	$133.88

RG-8/U JSC-3030 Cable Assemblies with PL-259 Connectors

DXE-CBC-008JU002	2 ft.	$12.88
DXE-CBC-008JU003	3 ft.	$13.88
DXE-CBC-008JU006	6 ft.	$16.88
DXE-CBC-008JU012	12 ft.	$24.88
DXE-CBC-008JU025	25 ft.	$39.88
DXE-CBC-008JU050	50 ft.	$61.88
DXE-CBC-008JU075	75 ft.	$85.88
DXE-CBC-008JU100	100 ft.	$108.88
DXE-CBC-008JU125	125 ft.	$139.88

RG-8X JSC-3060 Cable Assemblies with PL-259 Connectors

DXE-CBC-8XJU002	2 ft.	$10.88
DXE-CBC-8XJU003	3 ft.	$11.88
DXE-CBC-8XJU006	6 ft.	$13.88
DXE-CBC-8XJU012	12 ft.	$16.88
DXE-CBC-8XJU025	25 ft.	$23.88
DXE-CBC-8XJU050	50 ft.	$32.88
DXE-CBC-8XJU075	75 ft.	$40.88
DXE-CBC-8XJU100	100 ft.	$47.88

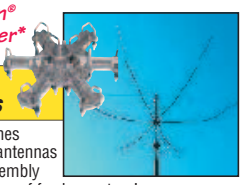
DXE-400MAX Cable Assemblies with PL-259 Connectors

DXE-400MAXDU003	3 ft.	$13.88
DXE-400MAXDU006	6 ft	$16.88
DXE-400MAXDU009	9 ft	$20.88
DXE-400MAXDU012	12 ft	$24.88
DXE-400MAXDU018	18 ft	$31.88
DXE-400MAXDU025	25 ft	$39.88
DXE-400MAXDU050	50 ft	$61.88
DXE-400MAXDU075	75 ft	$85.88
DXE-400MAXDU100	100 ft	$104.88
DXE-400MAXDU150	150 ft	$159.88
DXE-400MAXDU175	175 ft	$179.88
DXE-400MAXDU200	200 ft	$199.88

FREE SHIPPING on $50.00 or more Coax order!

Custom Lengths Available—Contact Us
See DXEngineering.com for complete information!

*Complete 5-Band Kit with NEW Stainless/Teflon® Balanced RIGID Feeder**



MARK II Hexx 5-Band HF Beam Antenna Kits

- Low noise results—approaches performance of closed loop antennas
- Pre-slit fiberglass—easy assembly
- Patented, balanced weather-proof feeder system!
- Small 11 ft. turning radius, weighs less than 25 pounds
- Full gain on 20, 17, 15, 12, 10 meter bands
- Can be turned with a light duty rotor—save money
- Has full length elements—no lossy coils or traps

New!

- Requires no matching network—direct single 50 Ω coax feed
- Good results at 20 to 30 feet above ground

DXE-HEXX-1HBP	Hub and Hardware Package	$99.95
DXE-HEXX-1SCP-2	Spreader & Center Post Package	$199.95
DXE-HEXX-1WRP-2	1-Band Element & Wire Guide Package	$75.95
DXE-HEXX-5WRP-2	5-Band Element & Wire Guide Package	$149.95
DXE-HEXX-5FFP	5-Band Rigid Feeder* Package	$194.95
DXE-HEXX-1TAP-2	1-Band Total Antenna Package	$359.95
DXE-HEXX-5TAP-2	5-Band Total Antenna Package	$599.95

We Will Beat Any Competitor's Prices—Call Us For Details!

$50.00 or more COAX ORDER!

RG-213/U

- 97% Bare Copper Braid Shield
- 66% Velocity Factor
- Polyethylene Dielectric .285" O.D.
- .405" O.D. Non-Contaminating Black Vinyl Jacket
- Center Conductor 13 AWG
  7 Strands of 21 AWG Bare Copper

DXE-400MAX

New!

- Bonded Aluminum Tape plus Tinned Copper Braid Shield, 95% coverage
- 84% Velocity Factor
- Gas Injected Foam Polyethylene Dielectric,.285" O.D.
- .405" O.D. Black Low Density Polyethylene Jacket
- Center Conductor 10 AWG
  19/.0210" Strands Bare Copper

Plus Great Customer Service and Fast and Inexpensive Shipping!

8 Circle Super Receiving Array!

New!

160-80-40 Meters
8 Switchable Directions

The latest version of DX Engineering's sophisticated receiving systems with time delay phasing. Use with your own eight identical antennas for monoband operation. Use DX Engineering's Active Receive verticals for easier installation.

- Directivity equal to phased Beverage antennas
- Switchable in eight 45 degree spaced directions
- Excellent directivity for better signal-to-noise ratio
- Includes 8 AVA Active Voltage Amplifiers with relay
- Much less area than an equivalent Beverage system
- Rugged stainless steel enclosure
- Described as "best performing" in ON4UN's Low Band Dxing
- See website for various package configurations

DXE-RCA8-SYS-2P	Controller and Switch Only	**$449.95**
DXE-RCA8-SYS-3P	Full Electronics Package	**$1,375.00**
ARR-8560	ARRL ON4UN's Low Band DXing, 5th Ed.	**$44.95**

Four Square Receiving Array!

100 kHZ - 30 MHz
4 Switchable Directions

A sophisticated receiving system with time delay phasing for broadband performance. Optimized to produce wider and deeper rear nulls and a narrower main lobe. Noise and undesirable signals are greatly reduced by a superior front-to-rear ratio (F/R). Better control of phase and currents provides a cleaner pattern than found on available TX four square arrays.

- Less susceptible to high angle signals compared to EWE, Flag, Pennant, and K9AY antennas
- Excellent directivity with better signal-to-noise ratio
- Switchable in four 90 degree-spaced directions
- Usable over a very wide frequency range with DXE-ARAV3 active elements
- Much less area than an equivalent Beverage system
- Active elements require minimal ground system
- Enhanced relay contact reliability
- Incudes 4 AVA Voltage Amplifiers with relay
- See website for various package configurations

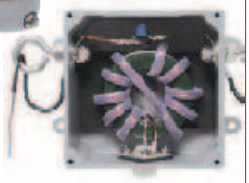
DXE-RFS-SYS-2P	Controller and Switch only	**$389.95**
DXE-RFS-SYS-3P	160/80/40m Electronics	**$799.00**

Limited Time Offer—
FREE Shipping on Comtek Baluns!

COM-BAL-11130T

New!

COM-BAL-11130E



Better Performance,
Lower Prices—from just $49.95

COMTEK W2FMI Series Baluns

Design inspired by Jerry Sevick W2FMI and perfected by DX Engineering's balun R&D department.

- High voltage compensating capacitors for unequalled low SWR—a DX Engineering innovation!
- Large fender washers distribute fastener loading to prevent case deformation
- Special coated toroid core handles close coupling without extra stress
- High, consistent common mode impedance across specified bandwidth—provides isolation where most needed
- Special wire sizing and Teflon-insulated wire sleeves for exact impedance matching and better isolation than Thermaleze wire
- Typical insertion loss: less than 0.2 dB
- Power handling: 3 kW continuous to 5 kW+ intermittent depending on model
- Silver-plated gasketed SO-239 connectors, stainless hardware, weatherproof NEMA box

1:1 Dual Wire/Single Core, 1.8 to 54 MHz		
COM-BAL-11130E	3 kW, side eyebolts	**$49.95**
COM-BAL-11130ET	3 kW, side and top eyebolts	**$49.95**
COM-BAL-11130S	3 kW, side studs/wingnuts	**$49.95**
COM-BAL-11130T	3 kW, top studs/wingnuts	**$49.95**
1:1 Coax/Single Core		
COM-BAL-11150E	5 kW, side eyebolts	**$49.95**
COM-BAL-11150ET	5 kW, side and top eyebolts	**$49.95**
COM-BAL-11150S	5 kW, side studs/wingnuts	**$49.95**
COM-BAL-11150T	5 kW, top studs/wingnuts	**$49.95**
1:1 Dual Wire/Dual Core		
COM-BAL-11140T	5 kW, top studs/wingnuts	**$69.95**
COM-BAL-11140S	5 kW, side studs/wingnuts	**$69.95**
1:1 Coax/Dual Core		
COM-BAL-11150DS	5 kW, side studs/wingnuts	**$69.95**
COM-BAL-11150DT	5 kW, top studs/wingnuts	**$69.95**
4:1 Dual Wire/Single Core		
COM-BAL-41130E	3 kW, side eyebolts	**$59.95**
COM-BAL-41130ET	3 kW, side and top eyebolts	**$59.95**
COM-BAL-41130T	3 kW, top studs/wingnuts	**$59.95**
COM-BAL-41130S	3 kW, side studs/wingnuts	**$59.95**
4:1 Dual Wire/Dual Core		
COM-BAL-41150T	5 kW, top studs/wingnuts	**$89.95**
COM-BAL-41150S	5 kW, side studs/wingnuts	**$89.95**
COM-BAL-41150E	5 kW, side eyebolts	**$89.95**

Contact DX Engineering Customer Support for recommendations for your application.

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ROHN™ Products LLC

Rohn Commercial Towers

DX Engineering is now an Authorized Distributor of Rohn Commercial Tower products and accessories. We have the Rohn products you need to solve your tower structural needs.

Contact us for technical information and availability!

Enjoy the Fun of
Digital Communications!

A Complete Digital Solution for Less

PSK-31
SSTV
WSJT

RTTY
& More

SignaLink™ From Tigertronics

TIG-SL-USB **$86.95**

Then choose a cable for each radio!

Any Radio Interface Cable*, only **$12.95** when purchased with SignaLink™ unit

.....YOUR TOTAL $99.90

For your complete digital solution!

**except the special Elecraft K3 cable*

- Easiest installation and setup—Macintosh or PC
- Software CD ROM included
- Built-in low noise sound card
- USB port powered
- Works with ALL radios
- Supports all sound card digital and voice modes
- Requires radio interface cable

Green Heron Digital Rotor Controller

Replaces your existing rotor control system. Preprogrammed for Hy-Gain HAM series and T2X rotors. Solderless setup for other rotor types (with jumpers) and field programmable. Fully user-programmable including reversal and brake delay, maximum/minimum speed, limits, ramps, etc.

- RS-232 and USB interface for computer control
- Master/slave for stacked arrays—turn together or separately
- PWM variable speed control
- FREE Software for easy setup
- Precision heading accuracy up to 720° of travel
- Fully supports side-mounted antennas
- Offset control for multiple directions on one mast
- High visibility display with adjustable backlight

GHE-RT-21	Green Heron Rotor Controller	**$559.00**
HYG-HAM-IVRLC	HAM-IV rotor only	**$499.95**
HYG-T-2XRLC	T2X rotor only	**$599.95**

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8:30 am to 4:30 pm ET
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LDG ELECTRONICS

We're #1

Our customers have always known we're #1. But did you know that LDG was the first company with a "no questions asked" two-year transferable warranty on ALL our products? LDG autotuners also have the highest resale value of any autotuner on the market. Our customers feel good about owning LDG products and so will you!

Call us or log-on today!

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

NEW! AT-200ProII

The AT-200ProII features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and now includes LEDs for the antenna position and if the tuner is in bypass. A function key on the front panel allows you to access data such as mode and status. Includes six foot DC power cable. ***Suggested Price $259.99***

Z-11ProII

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

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required.
Suggested Price $129.99.

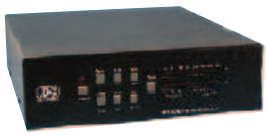
We have a tuner that will work for you!

We make tuners that will work with any transceiver. Don't know which one is right for you? Give us a call or see the Tuner Comparison Chart on our web site for more selection help!

radio not included

AT-897Plus for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment and takes power directly from the CAT port of the FT-897 and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier. ***Suggested Price$199.99***



AT-600Pro

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

Z-100Plus

Small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six foot DC power cable.***Suggested Price $159.99***

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 ***Phone 410-586-2177 • Fax 410-586-8475***

The #1 Line of Autotuners!

YT-100

An autotuner for several popular Yaesu Radios. An included cable interfaces with your FT-857, FT-897 and FT-100 (and all D models) making it an integrated tuner, powered by the interface. Just press the tune button on the tuner, and everything else happens automatically: mode and power are set, a tune cycle runs, and the radio is returned to its original settings. It's the perfect complement to your Yaesu radio.
Suggested Price $199.99

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

AT-100ProII

This desktop tuner covers all frequencies from 1.8 – 54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch with LEDs, allowing you to switch instantly between two antennas. The AT-100ProII requires just 1 watt for operation, but will handle up to 125 watts. Includes six foot DC power cable.
Suggested Price $229.99

AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes six foot DC power cable.
Suggested Price $599

IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible.
Suggested Price $179.99

YT-450

LDG's newest tuner is specially designed for Yaesu's newest 100 watt radios. The YT-450 interfaces directly with the Yaesu FT-450 and FT-950 radios, making integration easier than ever. Simply connect the tuner to the radio with the customer supplied cables and you are ready to operate. DC power and all control is done through the interface cable. Just press the tune button on the tuner and the rest happens automatically: mode and power are set, a tune cycle runs and the radio is returned to its original settings. It will quickly match nearly any kind of coax fed antenna with an SWR of up to 10:1. 2000 memories recall settings in an instant! An extra CAT port on the back allows seamless connection to a PC. You have the newest radio, now get the newest tuner to go with it!
Suggested Price $249.99

KT-100

LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. The LEDs on the front panel indicate tuning status, and will show a match in seconds, or even less of you've tuned on or near that frequency before. Has 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers.
Suggested Price $199.99

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! The mode is set to carrier and the RF power is reduced, a tune cycle runs and the radio is returned to the original settings.
Suggested Price $249.99

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. The Z-817H interfaces to the CAT port (ACC) on the back of the radio with the provided cable. Tuning could not be simpler; one button push on the tuner and the Z-817H takes care of the rest. Switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! The CAT thru port on the back allows connection to the THP HL-45B for automatic band selection on the amp. The Z-817H 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), so there are no additional cables required. 2000 memories cover 160 through 6 meters. Latching relays, so power consumption is Zero when not tuning. ***Suggested Price $159.99***

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LDG

hy-gain ROTATORS

. . . the first choice of hams around the world!

HAM-IV

HAM-IV
$649.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of $2^{1}/_{16}$ inches.

HAM IV and HAM V Rotator Specifications	
Wind Load capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power	800 in.-lbs.
Brake Power	**5000 in.-lbs.**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	26 lbs.
Effective Moment (in tower)	**2800 ft.-lbs.**

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!*

ROTATOR OPTIONS

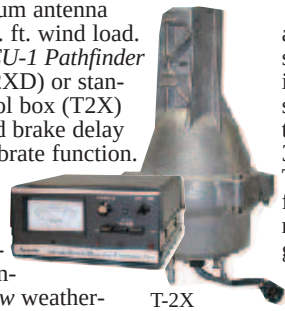
MSHD, $109.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $49.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller

DCU-1
$749.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

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.**

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.**

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.

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.**

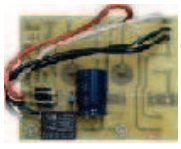
HDR-300A

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.**

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.

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Antennas, Rotators & Towers
308 Industrial Park Road,Starkville, MS 39759, USA

FT-250R VX-6R VX-8GR

FT-250R 2M FM HT

• TX: 144-148 MHz • RX: 136-174 MHz
• Power: 5/2/0.5W • Memories: 209

VX-6R 2M/440 FM Dual Band HT

• TX: 144-148, 222-225, 430-450 MHz • RX: 0.5-999 MHz (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 w/Built-in GPS

• TX: 144-148, 430-450 MHz • RX: 108-999 MHz (cell blocked) • Memories: 1200+ • Power: 5/2.5/1/0.05W
• GPS unit and antenna is built-in for APRS® data

FT-1900R 2M FM Mobile

• TX: 144-148 MHz • RX: 136-174 MHz
• Power: 55/25/10/5W • Memories: 221

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-817ND

HF/VHF/UHF All Mode Backpack QRP

• TX: HF/VHF/UHF • RX: 0.1-56, 76-154, 420-470 MHz
• Power: 0.7-5W (AM 1.5W) • Memories: 200
• Field operation with AA batteries or Ni-MH pack
• Works great with the Yaesu ATAS-25 portable antenna

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 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 DMU-2000 Data Management Unit displays various operational conditions
• 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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Intl CD	$39	$76	$111	Annual CD-ROM (*QST*, *NCJ* and *QEX*) for international members
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Family	$8	$16	$24	Reside at the same address as the primary member, no additional *QST*. Membership dates must correspond with primary member.

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Source Code: QST 7/2011

D-STAR HANDHELDS

IC-V82 2M FM HT
- TX: 144-148 MHz • RX: 136-174 MHz
- Power: 7W • Memories: 200
- D-Star upgradable with optional UT-118

IC-80AD 2M/440 D-Star & FM HT
- TX: 144-148, 420-450 MHz
- RX: 0.495-999.990 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 • Duel RX
- Optional HM-175GPS Speaker Mic adds GPS capabilities

D-STAR MOBILES

ID-880H 2M/440 FM Analog & D-Star Digital Dual Bander Mobile
- TX: 144-148, 430-450 MHz • RX: 118-173.995, 230-549.995, 810-999.99 MHz (cell blkd) • Power: 50/15/5W
- Memories: 1052

IC-2820H 2M/440 FM Mobile
- TX: 144-148, 430-450 MHz • RX: 118-549.95, 810-999.990 MHz (cell blkd) • Power: 50/15/5W
- Packet ready (9600 BPS – 6-pin DIN) • Upgradable D-Star DV (digital voice) & GPS capabilities w/optional UT-123

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-7000 Multimode HF/VHF/UHF Mobile
- TX: HF/6M/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 • RMK-7000 included!

IC-7200 HF/6M Portable Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 201 • Rugged design for outdoor use
- 32-bit IF-DSPs + 24-bit AD/DA Converters
- USB Port for CI-V Format PC Control and Audio In/Out

IC-7410 HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- 15kHz 1st IF Filter and optional 3kHz & 6kHz filters to protect against strong unwanted adjacent signals
- Much faster DSP unit compared to the IC-746PRO
- Automatic antenna tuner • USB connector for PC control

IC-7600 HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 101 • 5.8 inch color screen
- High-resolution real time spectrum scope using a dedicated DSP unit • Automatic antenna tuner

IC-7700 Multimode HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 5-200W
- Memories: 101 • 7 inch color screen
- Two 32-bit floating DSPs • Power supply built-in
- Three roofing filters • External VGA connector
- Automatic antenna tuner • USB memory drive socket
- Real time spectrum scope

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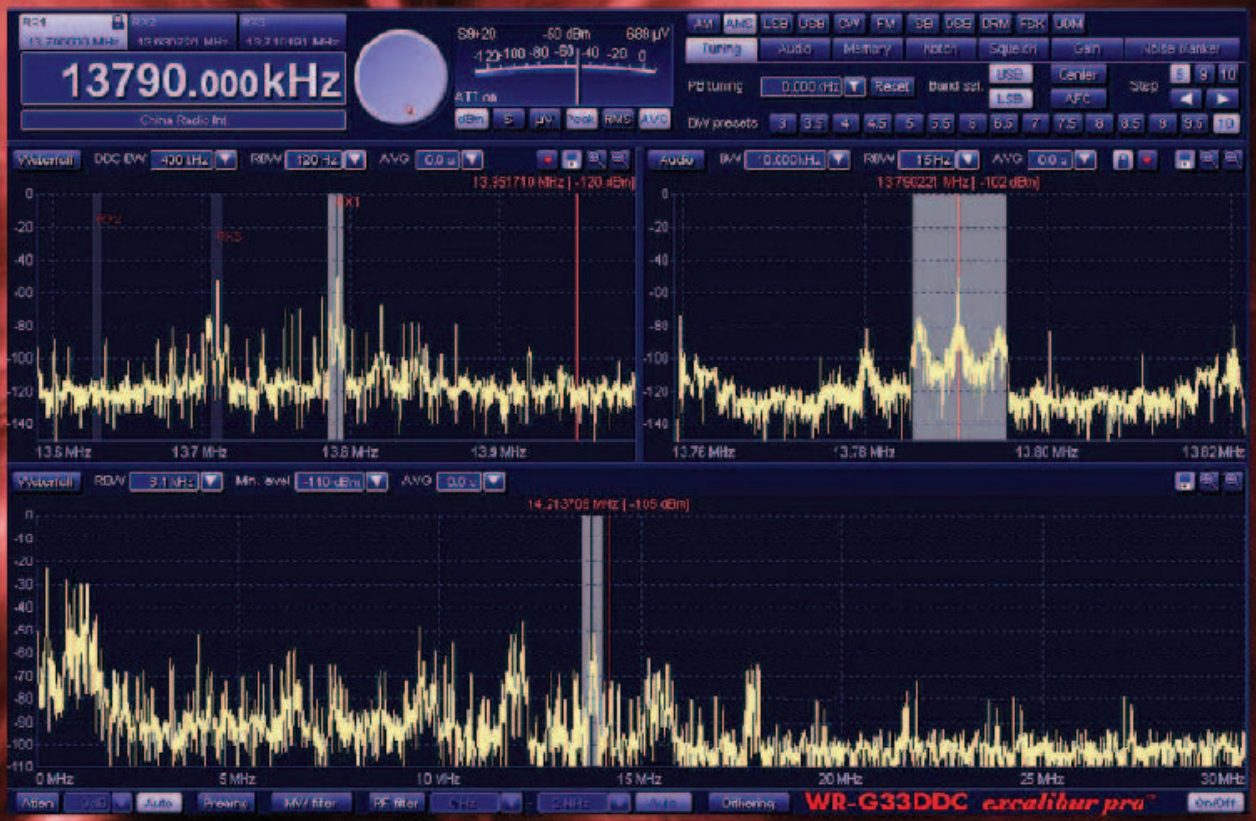

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- Affordable, easy to install and use

Just when you thought the bar was raised high enough with our award-winning Excalibur receiver, here comes a serious competitor - the Excalibur Pro. With its unparalleled 4 MHz processing and recording bandwidth, laboratory-grade measurement facilities and many other new features, this is a receiver that will surely be making waves - not just receiving them! For more details, see:

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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, $15.95. 4Wx6$^{3}/_{4}$Hx2D inches.

Here's What You Can Do

Find true antenna resonant frequency
Tune *antenna quickly for minimum SWR*
Match complex loads to your feedline
Adjust *mobile whips without stressing finals*
Determine safe 2:1-SWR operating windows
Adjust *tuners without generating QRM*
Find exact location of shorts and opens
Cut *stubs and phasing lines accurately*
Check cable for loss and contamination
Find *value of unknown coils and caps*
Test RF transformers and baluns
Troubleshoot *filters and networks*
Find self-resonance and relative Q
Check *patterns and compare gain*
MFJ-259B does all this and more!

MFJ Analyzer Accessories

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Special foam-filled fabric cushions blows, deflects scrapes and protects knobs and meters from harm. **MFJ-39C, $24.95.** Like MFJ-29C, but for MFJ-269.

MFJ-66, $24.95. Plug-in coils turns any MFJ Antenna Analyzer into a sensitive and accurate *band switched* dip meter. 2 coils.

MFJ-92AA10, $29.95. Ten MFJ *SuperCell*™ Ni-MH AA rechargeable batteries.

MFJ-99B, $88.90. ***Save $7!*** MFJ-259B Deluxe Accessory Pack: MFJ-29C Pouch, 10 Ni-MH batteries, dip coils, AC adapter. **MFJ-98B, $88.90.** Like MFJ-99B but for MFJ-269.

MFJ-99, $60.85. ***Save $5!*** Like MFJ-99B, less batteries, for MFJ-259B. **MFJ-98, $60.85.** Like MFJ-99 but for MFJ-269.

MFJ-99C, $40.90. ***Save $5!*** AC Adapter and 10 Ni-MH batteries for MFJ-259B/269.

MFJ-917, $29.95. Current balun lets you make balanced line antenna measurements on HF with your MFJ Analyzer. **MFJ-7702, $3.95.** MFJ-917 to MFJ Analyzer adapter.

MFJ-731, $99.95. Tunable RF filter allows accurate Antenna Analyzer measurements in presence of strong RF fields. 1.8-30 MHz.

MFJ-5510, $9.95. Cigarette lighter cord.

MFJ-269 ...1.8-170 MHz and 415-470 MHz plus 12-bit A/D!

The MFJ-269 does everything the MFJ-259B does - and much more!

Expanded Frequency Coverage

MFJ-269 adds UHF coverage from 415 to 470 MHz -- right up into the commercial band. With it, you can adjust UHF dipoles, verticals, Yagis, quads and repeater collinear arrays with ease -- plus construct accurate phasing harnesses and timed cables. Also use it as a signal source to check UHF duplexers, diplexers, IMD filters and antenna patterns.

Much Better Accuracy

New *12-bit* A/D converter gives much better accuracy and resolution than common 8-bit A/D converters -- *an MFJ-269 exclusive!*

Complex Impedance Analyzer

Read Complex Impedance (1.8 to 170 MHz)as series equivalent resistance and reactance (Rs+jXs) or as magnitude (Z) and phase (degrees). Also reads *parallel* equivalent resistance and reactance (Rp+jXp) -- *an MFJ-269 exclusive!*

MFJ-269
$389.95

CoaxCalculator™

Lets you calculate coax line length in feet given electrical degrees and vice versa for any frequency and any velocity factor -- *an MFJ-269 exclusive!*

Use any Characteristic Impedance

You can measure SWR and coax loss with *any* characteristic impedance (1.8 to 170 MHz) from 10 to over 600 Ohms, including 50, 51, 52, 53, 73, 75, 93, 95, 300, 450 Ohms -- *an MFJ-269 exclusive!*

Logarithmic Bar Graph

Has easy-to-read LCD *logarithmic* SWR bargraph and SWR meter for quick tuning.

Uses instrumentation grade N-connector to ensure minimum mismatch on all frequencies. Includes N to SO-239 adapter.

MFJ-269*PRO*™ *Analyzer*

Like MFJ-269, but has extended commercial frequency coverage in UHF range ***(430 to 520 MHz)*** and *ruggedized* cabinet that protects LCD display, knobs, meters and connectors from damage in the field/lab.

MFJ-269PRO
$419.95

MFJ-266 ...Wide range 1.5-185 MHz and 300-490 MHz!

New!

MFJ-266
$349.95

The compact MFJ-266 covers HF (1.5-65 MHz) in 6 bands, plus VHF (85-185 MHz) and UHF (300-490 MHz).

In *Antenna Analyzer* mode, you get Frequency, SWR, Complex Impedance (R+jX), and Impedance Magnitude (Z) *all displayed simultaneously* on a high-contrast backlighted LCD (SWR only on UHF).

In *Frequency-Counter* mode, the MFJ-266 functions as a 500-MHz counter with up to 100 Hz resolution and measures relative field strength of a signal and its frequency and can be used for tracking measurement interference.

MFJ-266 also functions as a 10 dBm signal source with digital-frequency readout. It can also measure inductance and capacitance at RF frequencies.

Features include solid-state band switching and electronic varicap tuning with a smooth 10:1 lockable vernier tuning drive.

Use eight AA *alkaline* batteries or 110 VAC with MFJ-1312D, $15.95. Includes N-to-SO-239 adapter. 3$^{3}/_{4}$Wx6$^{1}/_{2}$Hx2$^{3}/_{4}$D inches. 1.3 lbs.

Free MFJ Catalog

Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
300 Industrial Pk Rd, Starkville, MS 39759 **PH:** (662) 323-5869
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MFJ . . . The World Leader in Amateur Radio!

MFJ TUNERS

Ham Radio's *Most Popular* 300 Watt Antenna Tuner

More hams use MFJ-949s than any other antenna tuner in the world!

Why? Because the world's leading tuner has earned a world-wide reputation for being able to match just about anything.

Full 1.8-30 MHz Operation

Tune your antenna for minimum SWR! Works 1.8-30 MHz on dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas . . . Use coax, random wire, balanced lines. Has heavy duty 4:1 balun for balanced lines.

Custom inductor switch

Custom designed inductor switch, 1000 volt tuning capacitors, *Teflon*(R) insulating washers and proper L/C ratio gives you *arc-free* no worries operation

MFJ-949E $179.95

up to 300 Watts PEP transceiver input power.

The MFJ-949E inductor switch was *custom* designed to withstand the extremely high RF voltages and currents that are developed in your tuner.

8-Position Antenna switch

Antenna switch lets you select two coax fed antennas, random wire/balanced line or dummy load through your MFJ-949E or direct to your transceiver.

Lighted Cross-Needle Meter

Full *size* 3-inch lighted Cross-Needle Meter. Lets you easily read SWR, *peak* or average forward and reflected power simultaneously. Has 300 Watt or 30 Watt ranges.

QRM-Free PreTune™

MFJ's *QRM-Free PreTune™* lets you pre-tune your MFJ-949E *off-the-air* into its built-in dummy load! Makes tuning your actual antenna faster and easier.

Plus Much More!

Full *size* built-in non-inductive 50 Ohm dummy load, scratch-proof Lexan multi-colored front panel, $10^{5}/_{8}$x$3^{1}/_{2}$x7 inches. Superior cabinet construction and more!

MFJ-948, $159.95. Econo version MFJ-949E. Has all features except for dummy load.

***No Matter What™* Warranty**

Every MFJ tuner is protected by MFJ's famous one year *No Matter What™* limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-989D ***Legal Limit*** Tuner

MFJ-989D $389.95

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. Easily handles *full* 1500 Watts SSB/CW, 1.8-30 MHz, including MARS/WARC bands. Six position antenna switch, dummy load. *New* 500 pF air variable capacitors. *New* improved *AirCore™* Roller Inductor. *New* high voltage current balun. *New* crank knob. $12^{7}/_{8}$Wx6Hx$11^{5}/_{8}$D".

MFJ-986 Two knob ***Differential-T™***

MFJ-986 $349.95

Two knob tuning (differential capacitor and *AirCore™* roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. $10^{3}/_{4}$Wx$4^{1}/_{2}$Hx15 in.

MFJ-962D ***compact*** kW Tuner

MFJ-962D $299.95

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore™* roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. $10^{3}/_{4}$x$4^{1}/_{2}$x$10^{7}/_{8}$ in.

MFJ-969 300W ***Roller Inductor*** Tuner

MFJ-969 $219.95

Superb *AirCore™* Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune™*, antenna switch, dummy load, 4:1 balun, Lexan front panel. $10^{1}/_{2}$Wx$3^{1}/_{2}$Hx$9^{1}/_{2}$D inches.

MFJ-941E ***super value*** Tuner

MFJ-941E $139.95

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek $10^{1}/_{2}$Wx$2^{1}/_{2}$Hx7D in.

MFJ-945E HF/6M ***mobile*** Tuner

MFJ-945E $129.95

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

MFJ-971 ***portable/QRP*** Tuner

MFJ-971 $119.95

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

MFJ-901B ***smallest*** Versa Tuner

MFJ-901B $99.95

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-902 ***Tiny Travel*** Tuner

MFJ-902 $99.95

Tiny $4^{1}/_{2}$x$2^{1}/_{4}$x3 inches, full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire.

MFJ-904H, $149.95. Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. $7^{1}/_{4}$x$2^{1}/_{4}$x$2^{3}/_{4}$ inches.

MFJ-16010 ***random wire*** Tuner

MFJ-16010 $69.95

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 ***6 Meter*** Tuners

MFJ-906 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-921/924 $89.95

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in.

MFJ-931 ***artificial*** RF Ground

MFJ-931 $109.95

Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Creates artificial RF ground or electrically places far away RF ground directly at rig.

MFJ-934, $209.95, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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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

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.

MFJ-1778 $44.95

200W...Weather-sealed

for Remote/Outdoor/Marine

Fully *weather-sealed for remote Outdoor/Marine use*! Tough, durable, built-to-last the elements for years.

MFJ-926 $399.95

200 Watt...Remote

Coax/Wire Ant, No pwr cable needed

Weather protected fully automatic *remote* auto tuner for wire ***and*** *coax* antennas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.

MFJ-927 $259.95

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10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground system or radials. Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna . . . Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

MFJ-1798
$299.95

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. In *phase* antenna current flows in all parallel radiators. This forms a very large equivalent radiator and gives you incredible bandwidths. Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands. Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation. You can mount it from ground level to roof top and get awesome performance.

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ *6-Band* Halfwave Vertical Antenna

6 bands: 40, 20, 15, 10, 6, 2 Meters . . .
No radials or ground needed

MFJ-1796
$229.95

MFJ-1796 is only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments, small lots, trailers. Perfect for field day, DXpeditions, camping.

Efficient end-loading, no lossy traps. Entire length always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

MFJ-1796W, $229.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ-1792, $189.95. Full size 1/4 wave radiator for 40 Meters. 33 ft., handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $209.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

6-Band, 40-2 Meters ***Rotatable*** Mini-Dipole

Low profile 14 feet . . .7 ft. turning radius . . . 40, 20, 15, 10, 6, 2 Meters . . . 1500 Watts . . .

MFJ-1775
$249.95

MFJ-1775 is inconspicuous and low profile -- not much bigger than a TV antenna and is easily turned by a lightweight rotator like Hy-Gain's *AR-35*.

It's no Wimp! Its *directivity* reduces QRM/noise and lets you *focus* your signal in the direction you want -- work some *real* DX.

You can operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters -- and run *full 1500 Watts* SSB/CW on all HF bands!

Features automatic band switching and uses highly efficient end-loading with its *entire length* always radiating. With 6 and 2 Meters thrown-in, you have ham radio's most versatile *rotatable* dipole!

Each HF band uses a separate, efficient end-loading coil wound on fiberglass forms with *Teflon*™ wire, and capacitance hats at each end (no lossy traps). 6 and 2 meters are *full-length* halfwave dipoles.

Built-to-last -- incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing radiator. Assembles in an afternoon. Adjusting one band has little effect on other bands.

MFJ-1775W, $249.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ *80/40/20* Meter ***Rotatable*** Dipole

MFJ-1785
$369.95

Now you can operate the *low bands* on 80, 40, and 20 Meters with a true rotatable dipole that'll blend in with the sky! Take advantage of excellent low band propagation during this low sunspot cycle. Handles 1500 Watts SSB/CW. 80/40 meter end-loading coils are wound on fiberglass forms with *Teflon*™ wire, and resonated with capacitance hats to ensure extremely low-losses. Full-size on 20 Meters gives incredible DX. Balun included! 33 foot low-profile, inconspicuous. Easily rotatable with a medium duty rotator like Hy-gain's AR-40.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$419.95

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes. Enjoy DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you highest possible efficiency*.

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning. Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

Cover 40-15 Meters. MFJ-1788, $469.95. Like MFJ-1786 but covers 40 - 15 Meters continuous. Includes remote control.

MFJ's G5RV Antenna

MFJ-1778
$44.95

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 M as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

Dealer/Catalog/Manuals

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- HRO
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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!

- Single USB connection to computer
- USB Sound Card built-in
- Rig Control built-in - Yaesu CAT, ICOM CI-V & Kenwood logic level
- Computer isolated from Radio

As Always-
Upgrade any PK-232 ever made to the PK-232SC!

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 rig control for your Icom CI-V, Yaesu CAT and older Kenwood radios is optically isolated. There is a new audio monitor jack so you can hear the PK-232 ouput. You never have enough downstream USB ports so we even added a pair for that new radio with USB rig control and other accessories.

New! - HamHub II - Connect and Control your TNC, Radio & PC

HamHub II works with any TNC and Radio!

- Single USB connection to computer
- USB Sound Card built-in
- Rig Control built-in - Yaesu CAT, ICOM CI-V & Kenwood logic level, USB and RS-232
- Isolates Computer from Radio
- 2 RS-232 port and two USB ports

The HamHub II connects your computer, your TNC and your radio. It switches seamlessy between data controller modes and sound card modes under software control. A single USB cable connects to your computer - 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 logic level rig control works with your Icom CI-V, Yaesu CAT and older Kenwood radios. Dual USB and dual RS-232 ports take care of rig control on your newer radios, TNC control and accomodate addtional accessories.

Why do I need a HamHub II?

The problem with a typical sound card interface is that it is designed to work with your radio only. Many stations still use hardware data controllers for modes and features the sound card interfaces and computers don't have. The HamHub II connects any radio, any TNC and your computer in a flexible system to use all the resources of your hardware and software.

- **TZ-900 Antenna Impedance Analyzer**
  Quickly check Antennas & transmission lines- color graphics - no computer required!
- **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
- **DSP-599zx Audio Signal Processor***
  Noise Reduction & filtering for Audio, CW & data
- **ANC-4 Antenna Noise Canceller**
  Kill noise before it gets to your receiver!

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 new computers!
- **HamLinkBT-BTH+™ Headset**
  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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MFJ 160-6 Meter Antenna

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

MFJ-2990
$359.95

New!

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

Exceptional Performance

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

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

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

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

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

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

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

Assembles in an hour

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

Great for Stealth Operation in antenna restricted areas

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

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

MFJ *Automatic* Tuners

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. ¾" thick *pressure-treated* weather-proof wood.

Free MFJ Catalog

Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

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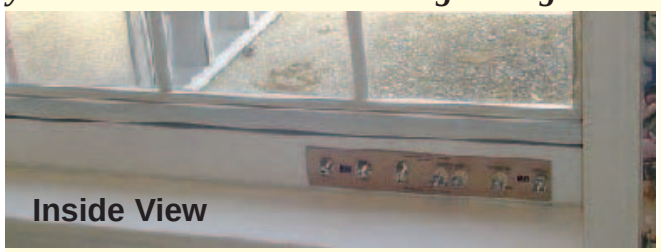
MFJ Weather-Proof *Window Feedthrough Panels*

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, 3½ inch high, ¾ inch thick *pressure-treated* wood panel. Has excellent insulating properties. Weather-sealed with a heavy coat of long-lasting white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Includes window locking rod.

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

MFJ-4603 Universal Window Feedthru Panel

MFJ-4603 $89.95

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

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

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

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

Has random/longwire antenna *ceramic feedthru insulator*.

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

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

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

3 Coax, Balanced Line, Random Wire

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

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 1¼x1⅝ inches and 3 cables with UHF/N size coax connectors. Seals out weather.

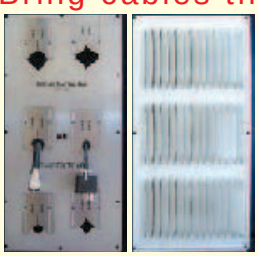
MFJ-4604 $99.95

All-Purpose FeedThru/CableThru™

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

MFJ-4605 $159.95 New!

Bring cables thru eave of your house



MFJ-4616 shown with standard full-size vent (not included) it replaces. For *6 Cables* $26.95

MFJ-4613 shown with standard half-size vent (not included) it replaces. For *3 Cables* $14.95

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

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

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

AdaptiveCable™ *Wall Plates*

MFJ-4614 *For 4 Cables* $34.95

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

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

MFJ-4612 *For 2 Cables* $24.95

MFJ-4611 *For 1 Cable* $14.95

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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!

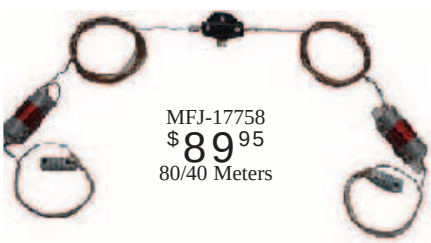
MFJ-1778M, $39.95. *Half-size*, 52 foot *G5RV JUNIOR* covers 40-10 Meters with tuner. Handles full 1500 Watts.

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*(R) coax and *Teflon*(R) 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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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	160	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 $119.95

35 Watts, $99.95, FM only

B-34, $99.95. 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 $179.95

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.

B-310-G $229.95

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- ***High Current Roller Inductor***
- ***SSB*Analyzer Bargraph™***
- ***Cross-Needle Meter***
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- ***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!

Arc-Free Operation

Two 4.5 kV transmitting variable capacitors and a massive roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

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.

Tune any Antenna

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.

Accurate SWR/Power Meter

A shielded directional coupler and backlit Cross-Needle meter displays accurate SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

6 Pos. Ceramic Antenna Switch

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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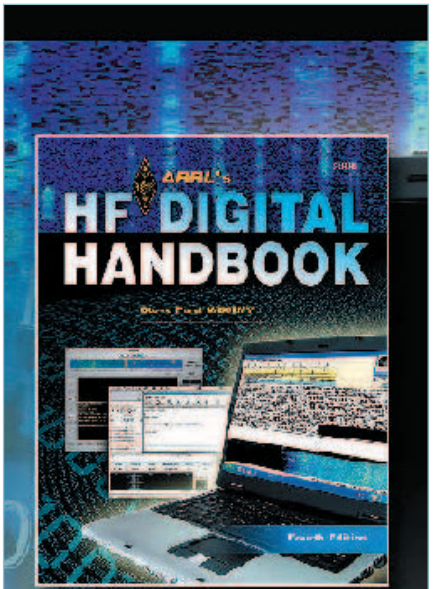

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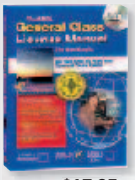

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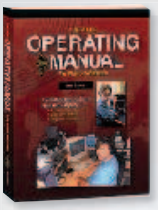

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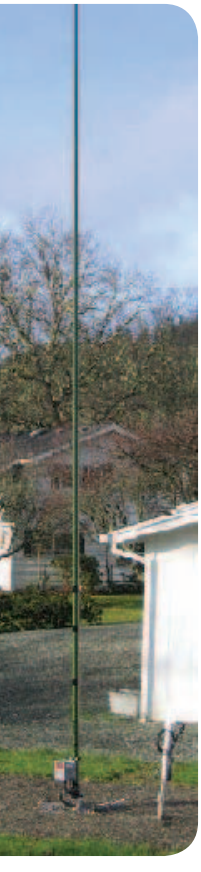

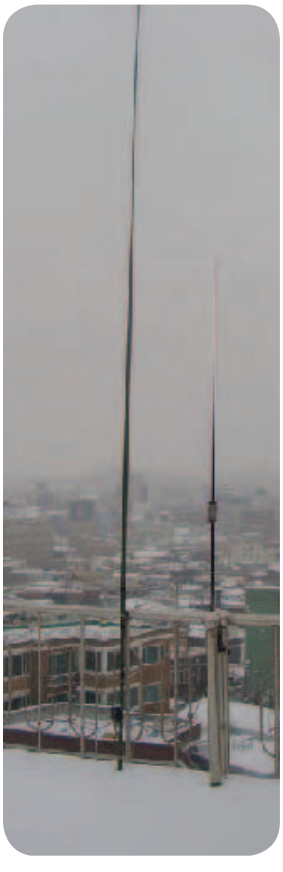

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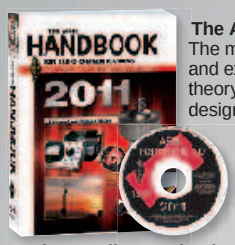

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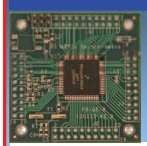

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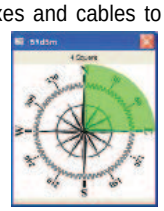

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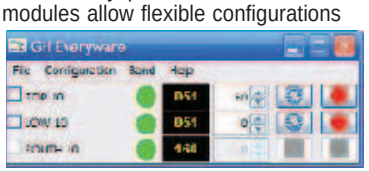

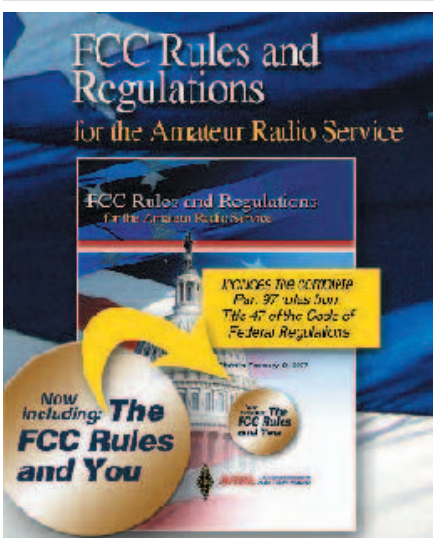

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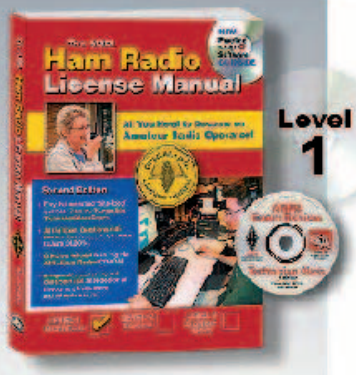

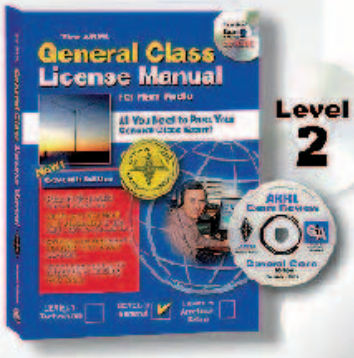

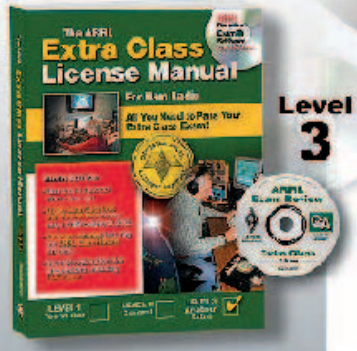

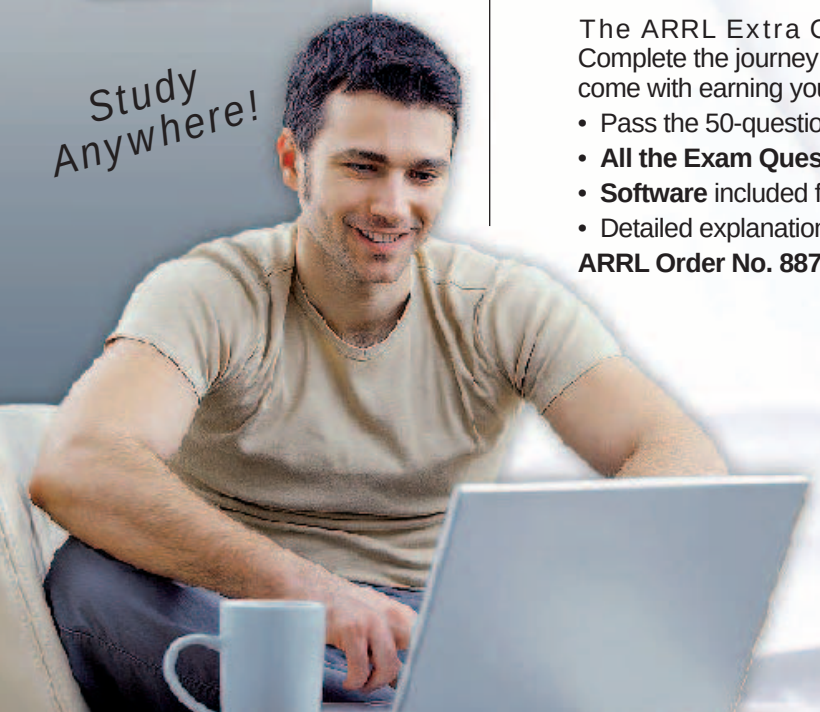

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sta·tis·tics (st-tstks) n.
1. (used with a sing. verb) The mathematics of the collection, organization, and interpretation of numerical data, especially the analysis of population characteristics by inference from sampling.
2. (used with a pl. verb) Numerical data.

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Online QuickStats Poll Results for April 10 through May 10.

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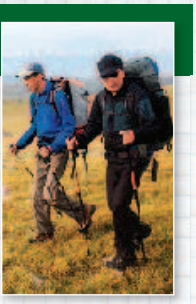
Do you operate HF portable while camping or hiking?



Yes, often – **12%**
Yes, occasionally – **28%**
No, I don't bring along an HF radio – **20%**
No, I don't camp or hike – **40%**

Have you earned an ARRL Worked All States award?

Yes – **34%**
No, but I'm working on it – **23%**
No, I haven't really tried – **43%**

How old is your oldest transceiver?

Less than a year – **4%**
1 to 5 years – **15%**
6 to 10 years – **14%**
11 to 20 years – **19%**
21 to 30 years – **20%**
31 years or more – **28%**

Do you monitor W1AW transmissions?

Yes, regularly – **6%**
Yes, occasionally – **48%**
No – **44%**
What is W1AW? – **2%**

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VHF/UHF DUAL BAND TRANSCEIVER

IC-880H

- D-STAR DV mode
- Analog FM
- Easy to use DR mode
- Free Software CS-80/880
- Wideband receiver

Feature-rich mobile with optional GPS receiver

VHF/UHF DUAL BAND TRANSCEIVER

IC-2820H

- D-STAR DV mode*
- Analog FM
- GPS receiver*
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*Optional UT-123 required.

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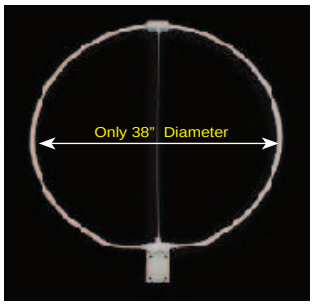

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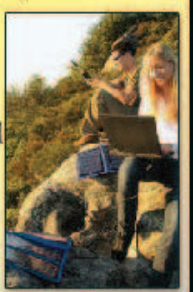

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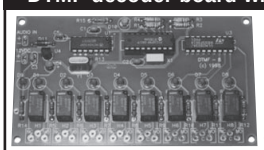

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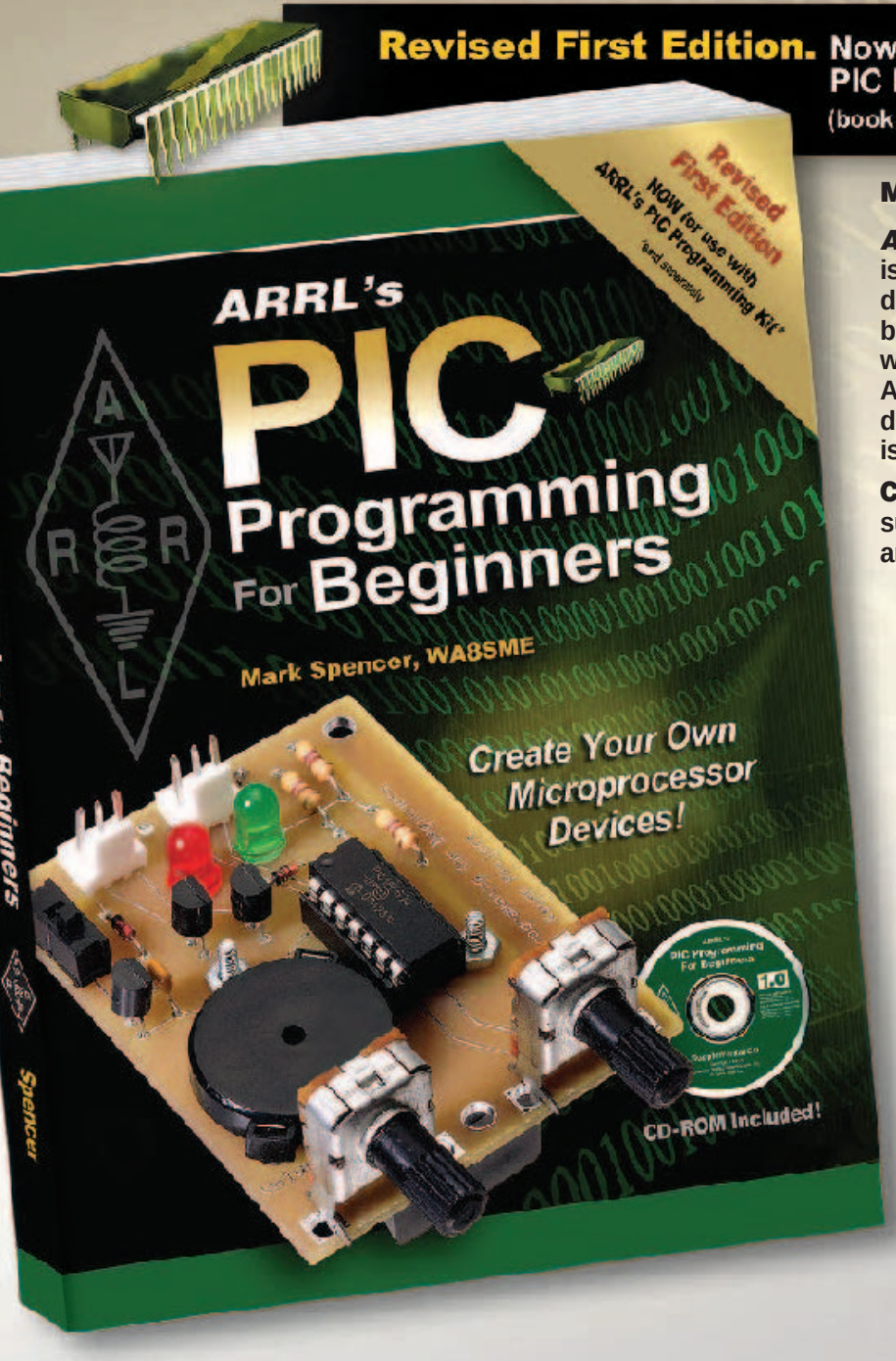

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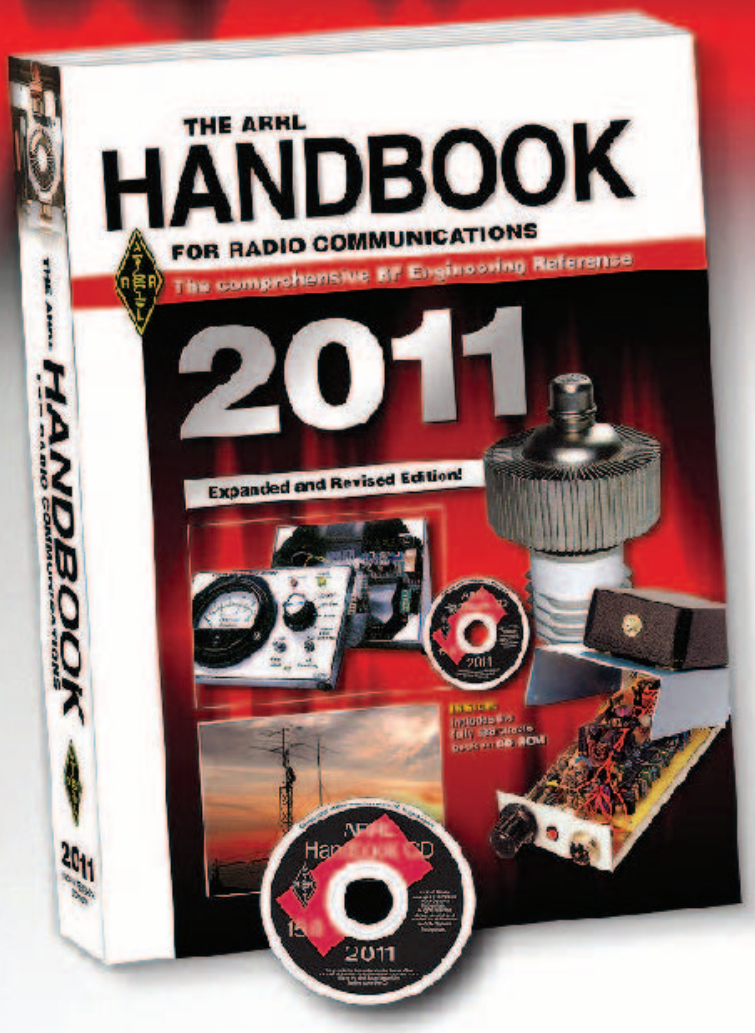

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6. New firms or individuals offering products or services for sale must check with us to determine if a production sample (which will be returned) should be submitted for examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must stand by and support all claims and specifications mentioned in your advertising.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The American Radio Relay League does not discriminate in its advertising on the basis of race, color, religion, age, sex, sexual orientation, marital status or national origin. The League reserves the right to decline or discontinue advertising for any other reason.

7. AN IMPORTANT NOTICE TO ALL HAM AD POSTERS AND RESPONDERS, FROM THE ARRL ADVERTISING DEPARTMENT Greetings from ARRL HQ! Please note that we have received reports from many ARRL members who have placed classified ads in these listings, and have received responses from individuals proposing "creative" payment schemes. These particular instances involved offers of overpayments for goods by bank check, followed by instructions to deduct the cost of your item from the overpayment, and to transfer the overage back or to another individual. This is a well-known scam. Unfortunately, we have no control over this and other scams of this type. Once your email address is posted, you are vulnerable to those individuals seeking to provide you with questionable information. See **http://www.arrl.org/news/features/2005/07/15/1/?nc=1** for further details. REMEMBER: TRANSACT CAREFULLY AND PROTECT YOURSELF.

QST Ham Ads on the Web – Updated Monthly!
www.arrl.org/ads/ham-ads.html

Club/Hamfests/Nets

ARMS-Amateur Radio Missionary Service Net Christian Fellowship Net - Everyone Welcome 14.307.5 Daily xcpt Sunay 1500-1700Z Website: www.qsl.net/arms

EMCOMM EAST 2011 SUNDAY (Sept. 25, 2011) Amateur Radio Emergency Communications Conference at St. John Fisher College, Rochester, NY. ARRL Sanctioned event. www.EmCommEast.org

FRIEND OF BILL W – Join HAAM net daily on 14.316 at 12:30 East (09:30 Pac) time w/290 or 340 as alt freq's http:www.qst.net/haam

MARCO The Medical Amateur Radio Council Ltd is a charitable non-profit group of health care professionals who meet weekly at 10:00am Eastern time Sundays for the "Grand Rounds of the Air" net on 14.307 MHz. All interested are welcome. Request info & free newsletter to Danny@w4dan.com or write MARCO, 2712 Bryant Dr, Cleveland, TN 37311. Ph 423-479-6160. Web site www.marco-ltd.org

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QST Advertising Deadlines:

Issue	Reservation Date	Materials Due Date
August 2011	Friday, June 17, 2011	Monday, June 20, 2011
September 2011	Friday, July 15, 2011	Monday, July 18, 2011

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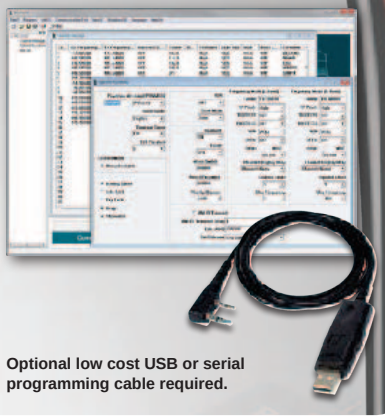

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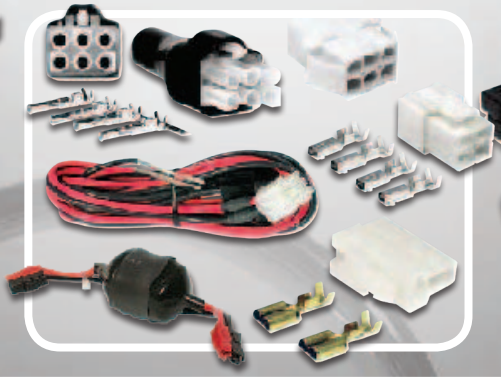

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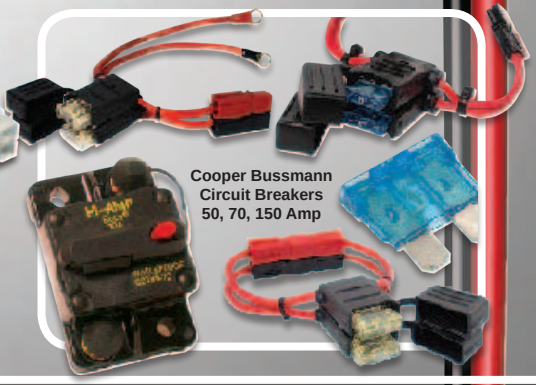

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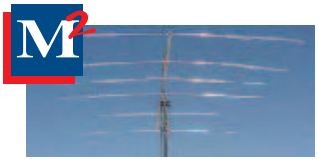

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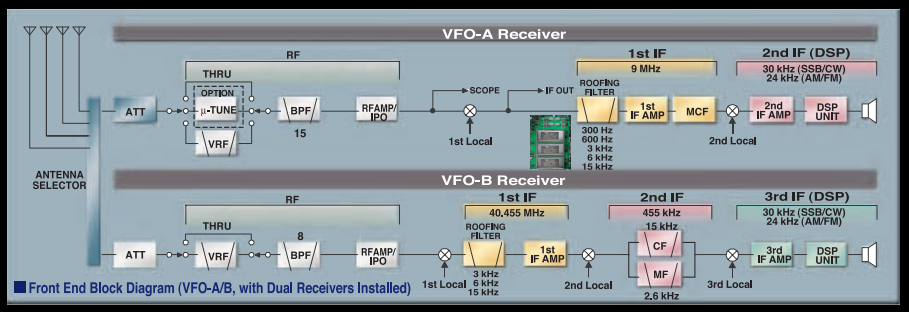
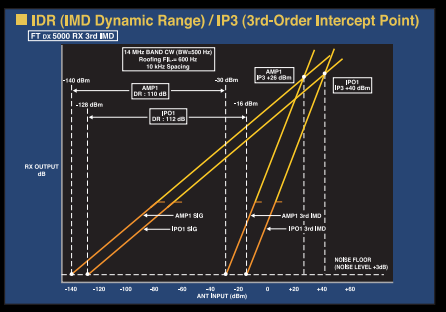


Front End Block Diagram (VFO-A/B, with Dual Receivers Installed)



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