# SPECIAL FIELD DAY ISSUE

# **DEVOTED ENTIRELY TO AMATEUR RADIO**

June 2012

The NEW Digital

Additional Content, Live Links,

FREE to ARRL Members!

Pages

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Official Journal of ARRL The national association for AMATEUR RADIO

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

FTM-350AR

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



# **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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> functions

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

For the latest Yaesu news, visit us on the Internet: http://www.yaesu com Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

\*APRS<sup>®</sup> is a registered trademark of Bob Bruninga WB4APR \*SmartBeaconing™ from HamHUD Nichetronix



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

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

- SmartBeaconing<sup>™</sup> Function · Memories to list 50 stations
- Memories to store 30 APRS<sup>®</sup> messages

8 DIGI-PATH routing settings

- DIGI-PATH routing indication function

5° is a registered trademark of Bob Bruninga WB4APR. SmartBeaconing \*\* from HamHUD Nichetronis

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

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

- GPS Compass Display "Heading Up" or "North Up" APRS® Symbol Icon pre-set function
   Clearly displayed APRS® Beacon Messages
- Selective Message Received indicated by Flashing LED



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

# 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 OSY instantly, without a tuner!

Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out. Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

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

The sunspot count is climbing and long-awaited band openings are finally becoming a reality. Now is the perfect time to discover why Cushcraft's R8 multi-band vertical is the premier choice of DX-wise hams everywhere! R-8GK, \$56.95. R-8 three-point guy kit for high winds.

## **R8 Matching Network**

The R-8

provides

. 360º (omni)

coverage or the horizon

and a low radiation

angle in the vertical plane for a better DX.



**R8's Rugged Design** 



# 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

## 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.

\$**699**<sup>95</sup>

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!

95



R-10

995

attention to detail means low SWR, wide



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 Famous *Ringos* 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!



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 http://www.cushcraftanteur.com/ biterent/end/sectorsectors/sectors/sectors/sectors/sectors/sectors/sectors/sectors

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Cushcraft... Keeping you in touch around the globe!

95

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.

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

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

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



# For Small Antennas & Limited Space

MODEL / ANT CONN / COAX CONN Maldol EM-5M SO-239 / PL-259 Footprint: 1.1"x .75 Max Antenna: 40'

# For Medium Size Antennas

MODEL / ANT CONN / COAX CONN COMET CP-5M SO-239 / PL-259 COMET CP-5NMO NMO / PL-259 Footprint: 3.4" x 1.25" Max Antenna: 60'

# For Tall or Multi-band HF Antennas

MODEL / ANT CONN / COAX CONN SO-239 / PL-259 MET HD-5M COMET HD- 5 3/8-24 3/8-24 / PL-259 3.75" x 1.1 80" Footprint: Max antenna

# 70cm 5/8 wave x 2 • VSWR: 1.5:1 or less • Length: 42" • Conn: PL-259 • Max Pwr: 150W CSB750A DUAL-BAND 2M/440MHZ W/FOLD-OVER EWI

Vavelength: 2M 1/2 wave.

# CSB770A DUAL-BAND 2M/440MHZ W/FOLD-OVER COMET NEW!

Mavelength: 2M 5/8 wave center load, 70cm 5/8 wave x 2 center load • VSWR: 1.5:1 or less • Length: 51 \* Conn: PL-259 Max Pwr: 150W

£

aldol Mobile

Mavelength: 2M 7/8 wave center load, 70cm 5/8 wave x 3 center load • VSWR: 1.5.1 or less • Length: 62" • Conn: PL-259 DUAL-BAND 2M/440MHZ W/FOLD-OVER CSB790A NEW Max Pwr: 150W 

# DUAL-BAND 2M/440MHz AX-50 Valdol

Vavelength: 2M 1/4 wave • 70cm 9/8 wave • Length: 21" • Conn: PL-259 • Max Power: 60M

# DUAL-BAND 2M/440MHz W/FOLD-OVER AX-75 Maldol

PL-259 • Max Power: 60V Navelength: 2M 1/2 wave center load • 70cm 5/8 wave x 2 • Length: 30" • Conn:

# DUAL-BAND 2M/440MHz W/FOLD-OVER AX-95 Maldol

60W Vavelength: 2M 1/2 wave • 70cm 5/8 wave x 2 • Length: 38" • Conn: PL-259 • Max Power:

# B-10 / B-10NMO DUAL-BAND 2M/440MHz **COMET**

**HOUSE** 

Navelength: 146MHz 1/4 wave • 446MHz 1/2 wave • Length: 12' B-10NMO - NMO style • Max Pwr: 50W Conn: B-10 PL-259

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

# SBB-2 / SBB-2NMO DUAL-BAND 2M/440MHz

Or contact NCG Company. 15036 Sierra Bonita Lane, Chino, CA 91710

909-393-6133 • 800-962-2611 • FAX 909-393-6136 • www.natcommgroup.com

ess • Length: or VSWR: 1.5:1 146MHz 1/4 wave • 446MHz 5/8 wave center load • 1 SBB-2 PL-259 • SBB-2NMO NMO style • Max Pwr: 60M Navelength: Conn:

8

or less • Length:29" 100W 1.5:1 Navelength: 146MHz 1/2 wave - 446MHz 5/8 wave x 2 - VSWR: 1.5.1 Conn: EX-107RB PL-259 - Ex-107RBNMO NMO style • Max Pwr: Maldol

# SBB-5 / SBB-5NMO DUAL-BAND 2M/440MHz W/FOLD-OVER COMET

SBB-7NMO DUAL-BAND 2M/440MHz W/FOLD-OVER Wavelength: 146MHz 6/8 wave • 446MHz 5/8 wave × 3 • Length: 58" • Conn: SBB-7 PL-259, SBB-7NMO - NMO style • Max Pwr: 70W SBB-7 / **U**WU

× **WW** 

# 2M/440MHz DUAL-BAND EX-107RB / EX-107RBNMO





COME BNC-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz • Wavelength: 2M 1/4 wave • 440MHz 1/2 wave • Length: 17" • Conn: BNC Super flexible featherweight whip

COMET SMA-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz Wavelength: 2M 1/4 wave • 440MHz 1/2 wave • Length: 17" • Conn: SMA Super flexible featherweight whip

COMET SMA-503 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz · Length: 8.75" · Conn: SMA

Maidol MH-209 (BNC Conn) MH-209SMA (SMA Conn) 2M/70CM DUAL-BAND HT ANTENNAS 3" length, soft rubber cover. Good performance in a small package!

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



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Beginning with the June issue of QST, the ARRL is unveiling two new membership benefits. League members can read a digital version of QST on electronic devices such as an iPad, iPhone, iTouch, Kindle Fire, Android smartphone, laptop or desktop — and even download it to certain devices. Members will also gain access to the complete QST Archive, spanning December 1915 through 2011. All this — at no extra cost — in addition to current League membership benefits! Join us at www.arrl.org/qst as we celebrate the digital revolution.

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# Interested in Writing for QST?

www.arrl.org/qst-author-guide e-mail: qst@arrl.org



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# QS7 – Devoted Entirely to Amateur Radio www.arrl.org June 2012



# Choice of the

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



# FT DX 9000MP

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

# FT DX 9000D

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





# FT DX 9000 Contest

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

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



# FF-2000 and FF-2000D

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

YAESU USA 6125 Phyllis Drive, Cypress, CA 90630 (714) 827-7600 http://www.yaesu.com

# **Top DXing Rig Picks**

# World's top DX'ers

# FT DX 5000 Series

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

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

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



# FIDX 5000MP

Station Monitor SM-5000 included; 0.05 ppm OCXO included; 300 Hz Roofing Fliter included

# FI DX 5000D

Station Monitor SM-5000 included; 0.5 ppm TCXO included; 300 Hz Roofing Fliter optional

# FT DX 5000

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

# FI-250



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



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

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

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

446000

TONI, LOW BAND NOM BOAN

50 W 2 m/70 cm\* DUAL BAND FM TRANSCEIVER

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

FT-7900R

.....

199

20

MONO BAND

2m/70 cm

DUAL BAND

2.ACH

# The King of Mobile

- Massive Heatsink guarantees 75 Watts of Solid RF Power with No Cooling Fan Needed
- Loud 3 Watts of Audio Output for noisy environments
- Large 6 Digit Backlit LCD for excellent visibility
- 200 Memory Channels for serious users

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

1

2



\*70 cm 45 W

HEAVY-DUTY 75 W 2 m FM TRANSCEIVER FT-2900R Size: 6.3" (W) x 2.0" (H) x 7.3" (D) / Weight: 4.0 lb

FM THANBCEP

# Best Selling, Reliable Mobile

- 55 Watts of Solid RF Power within a compact footprint
- Loud 3 Watts of Audio Output Power for noisy enviroments
- Large 6 Digit Backlit LCD for excellent visibility
- 200 Memory Channels for serious users

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

199

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ULTRA RUGGED 55 W 2 m FM TRANSCEIVER

T-1900R

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

# It Seems to Us



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

# Secondary: What Does It Mean?

Most of the radio spectrum access that we amateurs have between 420 MHz and 24 GHz is on a secondary basis. Up to now our secondary status has not imposed many constraints, but that is changing.

The history of the amateur UHF and microwave allocations is very interesting but cannot be told on one page. Briefly, before World War Two the frequency allocations to radio services in the United States did not go above 300 MHz. Radio technology took great leaps forward during the war, and at the 1947 Atlantic City Radio Conferences the international allocations were extended all the way up to 10.5 GHz. The band limits between 420 MHz and 10.5 GHz that were allocated to the amateur service at that time are quite similar to what we have today, the main differences being the addition of 902-928 MHz and the withdrawal of 1215-1240 MHz at the 1979 World Administrative Radio Conference (WARC) along with the reallocation of 2310-2390 MHz to other services on a domestic basis.

A lot has changed since 1947, not least the utilization of the radio spectrum in this frequency range. The first big change affecting radio amateurs occurred in 1958, when the Cold War and the advent of the Space Age propelled national defense to the top of the priority list. The amateur allocations were maintained (with a temporary shift of the 3300-3500 MHz band up by 200 MHz) but with the requirement that the government radiopositioning service (i.e. military radars) be protected from harmful interference. This was confirmed at the 1959 WARC where the amateur allocations in this range were made secondary, with radiolocation primary.

The Radio Regulations of the International Telecommunication Union (ITU) state that a secondary service "shall not cause harmful interference to stations of primary services" and "cannot claim protection from harmful interference from stations of a primary service." The same provisions are contained in the FCC Rules. Cohabiting with military radar can be uncomfortable at times and in some places, but in general we have been able to coexist for more than a half-century without a great deal of difficulty. After all, military radars must be able to function in an environment far more hostile than that created by the presence of a few amateur signals. Recently, however, we have begun to encounter new challenges.

About five years ago, upgrades to the Pave Paws radar at Beale Air Force Base near Sacramento resulted in new constraints on amateur operations in the vicinity. Apparently the cumulative effect of many signals from hilltop repeaters is enough to cause problems at the Beale installation, which among other things is used to track orbiting space debris. Similar issues have arisen at a Pave Paws installation on Cape Cod but have been somewhat easier to resolve.

A few months ago the Federal Aviation Administration (FAA) began installing a new generation of Common Air Route Surveillance Radars (CARSRs) that operate in the 1240-1350 MHz band. Aeronautical radionavigation is one of several primary services in the 1240-1300 MHz (23 cm) band that the amateur service must protect. We have been coexisting with aeronautical radionavigation for many years but it soon developed that amateur stations, particularly repeaters, operating on or near a CARSR frequency can cause harmful interference to the new system. The first case that has come to our attention involves an installation near Los Angeles, which happens to be a hotbed of 23 cm activity. Several dozen additional locations are or will be affected in the coming months. The ARRL is in touch with the FAA and will work with its engineers to limit the constraints on amateur operation as much as possible, consistent with aviation safety.

On this page in June 1993 QST we referred to 902-928 MHz (33 cm) as "The Kitchen-Sink Band." It earned the designation because of the FCC's inclination to shove "everything but the kitchen sink" into a band that in 1947 had been designated for Industrial, Scientific, and Medical (ISM) use in the Americas. We were able to gain access to the band on a secondary basis at the 1979 WARC because its ISM status made it unattractive to most other services. Unfortunately, spectrum access being a scarce commodity, others soon warmed up to the band and when it was finally opened up for amateur use in 1985 we were required to protect automatic vehicle monitoring (AVM) systems, among other services, from interference. In 1993 the FCC proposed expanding AVM into a new "location and monitoring service" (LMS) and ultimately did so, but with the interesting proviso that some LMS licenses are "conditioned upon the licensee's ability to demonstrate through actual field tests that their systems do not cause unacceptable levels of interference to 47 CFR part 15 devices." This is the reverse of the usual situation in which Part 15 devices are at the bottom of the pecking order. LMS has had its ups and downs, but recently a potential market has been identified for providing precise location information in places where GPS is either unreliable or not sufficiently precise. If this service becomes commercially viable it will pose some new challenges for amateurs in a band that is already impacted by other users.

Secondary status does have a couple of advantages. Our partnership with the military has helped fend off commercial pressures; we have retained access to wider bands than would be the case if we were all alone, and primary. If the amateur-satellite allocations in this frequency range were on a primary basis they would be subject to power flux density limits that probably would preclude the use of simple earth stations. However, the pressure on this part of the radio spectrum is increasingly intense as mobile broadband applications become regarded as essential to daily life.

We can't turn the clock back to 1958, but the ARRL will do everything it can to defend the amateur allocations. We always have. We always will.

I Same, KIZZ

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AV-12AVQ	\$139.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	\$119.95	10 - 80 M	1500 W PEP	18 feet	4 pounds	80 MPH	1.5-1.625"
DX-88	\$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
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Joel P. Kleinman, N1BKE – jkleinman@arrl.org

# **In Brief**

- The new Digital Edition of QST and an expanded QST Archives are to become available to ARRL members in late May. See Happenings, this issue, for details.
- The National Telecommunications and Information Administration (NTIA) has confirmed that it has no objection to the use of a broader range of data emissions by amateurs on the five 5 MHz frequencies.
- In response to the April 3 tornados in North Texas, area hams activated ARES<sup>®</sup> and RACES nets.
- Well-known ham radio personality Fred Maia, W5YI, became a Silent Key in late March.
- The Federal Aviation Administration is deploying a new generation of Common Air Route Surveillance Radar (CARSR) that has some implications for the use of the 1240-1300 MHz (23 cm) band by amateurs.
- The first quarter of 2012 (January-March) saw a 30% increase in Amateur Radio license exam sessions over 2011.
- The FCC is soliciting comments in response to the Congressional directive to prepare a study to assess Amateur Radio's role in emergency and disaster communications.
- The ARRL solicited comments on a draft band plan for 33 cm.
- World Amateur Radio Day, commemorating the 87<sup>th</sup> anniversary of the IARU, was April 18.
- The winner of the QST Cover Plaque Award for March is Eric P. Nichols, KL7AJ, for his article "Three Wrong Assumptions about the lonosphere." The April winner is Commander Richard Paton, USCG (Ret), for his article, "Radio's Role in the *Titanic* Disaster."

# **Media Hits**

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

- Just as I was about to write this column, the FCC published its CC&R inquiry. So, with more than a little interest, I recalled the March article in the Washington Post real estate section about Jim Talens, N3JT, and vice president of the local citizens association. He chose Chesterbrook Woods in McLean, VA partly because it had no rules that would preclude his erecting a 70 foot radio tower. There was no such consideration when ham radio got prominent publicity in a Maine Public Broadcasting Network radio interview for providing communication during the Can-Am Crown 250 international sled dog race. Unfortunately, many hams (or would-be hams) do not have that freedom.
- Having the ability to put up a decent antenna is critical if we are to continue providing community services. The March swarm of tornados proved that truth once again. Keith Taylor, KJ4IZN, did an interview with Clark County (IN) ARES<sup>®</sup> Director John Shean on WSFR-FM in Louisville, regarding their help before, during and after the tornados that hit Henryville. "Snow Hampers Henryville Recovery Efforts" was on WLKY-TV (KY) when a snowstorm added insult to injury and the city lost communications. The emergency management team called on Amateur Radio volunteers. Farther south, the *Shreveport Times* reported how an Amateur Radio operator gave warning from the Belmont area of a possible tornado 2 miles northeast of the Sabine Parish town of Zwolle. As far north to Michigan the hams were busy as the Lucy Ann Lance Show reported in "Saving Lives." Ham operators Mike Swartz, W8EFM; Jeff Cowall, KN8A, and Pat Clouse, KC8UAV, were credited with an early tornado warning in Dexter and 26 minutes later a horrific tornado went through the community.
- This ability to provide real time information and early warning has not been lost on the public or NWS. SKYWARN<sup>®</sup> classes are a major source of new hams and were advertised by WKSR (Pulaski, TN), *The Chattanoogan* and WTVC (Chattanooga, TN). The call for more SKYWARN ham volunteers echoed through the midwest on WTOL (Toledo) and WRCB (Cleveland). It went all the way out to Riverside, CA and the *Press-Enterprise*.
- But none of this would be possible without the wonderful people that make up Amateur Radio. People like George Bellairs, KB0ZZT, who was on WOWT in Nebraska and Ron Glass of the Yellowstone ARES in Montana who got a special award from the Governor. There was Tim Cruff, K0CRF, in North Dakota and Alexander Hilliard, W4GMM, in Memphis and Betsey Doane, K1EIC, in Connecticut. These folks and other hams got personal compliments in the news this month.
- Schools also got noticed in March with "HAM radio allows students to contact foreign countries" in the University Daily Kansan, "Olde Towne Middle School launches 'near space' balloon" in the Madison County Journal, "Parkside Elementary To International Space Station, Over" in Patch.com and "Students' balloon soars and transmits" in U-T San Diego.
- There was nothing sinister in "Mt. Carmel High Schoolers Up To Something" on KPBS in San Diego or "Liberty Junior Makes Space Station Contact" in the Southwest News-Herald (IL) or even "Sussex Tech becomes radio active" in the Cape Gazette.
- Meanwhile, the growth of Amateur Radio in the US continues to be noted by articles such as "What is Ham Radio/Amateur Radio and How Do I Start?" in *Newsday* and "Amateur radio is attracting a new generation of enthusiasts" in the *Fayetteville Observer* (NC). Even the Glenn Beck Show noted it and had Texas SM Walt Mayfield, KE5SOO, as a guest presenter for ham radio.

# **Greg Walden Meets a Vice President**

US Representative Greg Walden, W7EQI (R-OR-2), one of only two Amateur Radio operators in Congress, recently briefed the Radio Amateurs of The Gorge (RAGS) in Hood River, Oregon on the Jumpstarting Opportunity with Broadband Spectrum (JOBS) Act that he sponsored. In particular, he discussed the impact the Act might have on Amateur Radio, all the while creating new spectrum in the 700 MHz band for Public Safety communications. — *tnx Craig Nicholson, K7VEW* 

Representative Walden is pictured with Glynis Cochlin, W7GAC, who at age 12 is one of the youngest ARRL-affiliated club vice presidents. [Craig Nicholson, K7VEW]



# **Inside HQ**

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

# About the Digital Edition

# The June 2012 digital edition rolls out toward the end of May.

Welcome to the first monthly digital edition of *QST*. If you are reading the digital edition on your PC, iPad or Android device, we hope that you like it and enjoy the new features.

The process of converting *QST* to a monthly digital edition began almost two years ago. HQ staff did the preliminary research that generated a proposal to the ARRL Board in January 2011. The result of this effort was a Board motion for staff to "prepare a comprehensive marketing plan for electronic publishing of periodicals which will include timing, pricing, target audience,

risk assessment, etc." The Board asked us to report back at the July 2011 Board meeting, and at that meeting we received permission to move ahead with the project. Six months later, we picked Nxtbook, an electronic publisher that publishes over 600 digital magazines, to be our digital publishing partner.

Technically, QST has been available in

digital and other non-print formats for years. For more than 10 years, we have made available a digitized version of QST on CD-ROM at the end of each issue year. We also have an online QST Archive that has been available to members. Up to now, we held back the last couple of years, but starting this month, the QST Archive will be made current for all members. We made this change since the archive of digital editions will always be up to date.

Additionally, *QST* is available through the Library of Congress in an audio version and EBSCO Corporation makes *QST* articles available in their technical databases for academic libraries. However, none of these incarnations of *QST* have been available concurrent with the print edition or easily accessible to our members. The new digital version will be available monthly and be easily viewable by members on any digital device with a web browser.

The production of the digital edition of *QST* has required that changes be made across the organization. A team including Graphic Design Supervisor Sue Fagan, KB1OKW; Production Supervisor Michelle Bloom, WB1ENT; Assistant Production Supervisor Jodi Morin, KA1JPA, and Advertising Graphics Designer Diane Szlachetka, KB1OKV, began a redesign effort about six months ago to make *QST* easier to read in the digital format. You may have noticed the design changes during the last few months. This team created new logos and other graphic elements that will be used exclusively in the digital eletiton. They are currently working on more new graphics that will be used for the decicated iPhone and iPad apps that will be available later this year.

Under the direction of *QST* Editor Steve Ford, WB8IMY, and Managing Editor Joel Kleinman, N1BKE, the Editorial staff modified *QST*'s layout and pagination to accommodate the new content that will be featured in the digital edition. During this process, the entire publications staff has had to learn more about editing and producing multimedia content. Essentially, we now will be creating a second version of *QST* every month for the digital format.

Our membership and circulation departments, under the leadership of Marketing Manager Bob Inderbitzen, NQ1R; Circulation Manager Amy Hurtado, KB1NXO, and Membership Manager Diane Petrilli; KB1RNF, have modified policies and procedures to accommodate the digital edition. For example, a process

opt-out of the print edition and elect to receive only the digital edition. An e-mail system needed to be developed to let members know when the digital edition becomes available. Our IT Department has created a bulletproof Digital Rights Management system to prevent unauthorized sharing of content.

The ARRL, as an Association Publisher, has an obligation to produce quality content about Amateur Radio for its members. Our publishing surface used to be just ink and paper. However, today, there are new dynamics at play. The vast majority of our members have computers and many have Smartphones and tablets. They would like to experience our content on these surfaces as well.

Exactly how and where content is delivered continues to evolve. It's difficult for publishers to keep up! Nevertheless, we continue to expand our suite of digital publications. During the past few years, our Q & A Licensing Manuals have been published in Kindle and iTunes formats. We publish six digital newsletters, including the weekly ARRL Letter, The ARRL Contest Update and the ARES E-Letter. We've also begun publishing some of our manuals, such as The VEC Manual, both in print and digitally on our website. Our website, the largest depository of ARRL content, has become our primary vehicle for member communications and information. Member usage continues to climb each month with over 115,000 members registered as site users.

Our digital publications have become more than just content delivery systems. Social media, such as our Facebook page, and our recently introduced ARRL Forums have become platforms for member feedback and interactivity. Member input from these platforms will influence the kind of content that we produce and will continue to be a greater influence in the future. Publishing is no longer a one-way street or simply words printed onto paper.

Here at the ARRL, all of us will continue to do our best to provide the highest quality and most relevant Amateur Radio content to our members regardless of where or how it is actually published. In the meantime, enjoy this first digital edition of *QST* and let us know what you think.



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

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# **Up Front**

Joel P. Kleinman, N1BKE, upfront@arrl.org

# Head to Field Day June 23-24

It's that time again...time to get organized, time to make (or accept) assignments, time to bring everyone together with the goal of setting up and operating a Field Day station. This is old hat to DXpeditioners and those who enjoy mountaintopping, of course, but for many of us it's our only chance to enjoy ham radio alfresco.

Elsewhere in this issue you'll find tips for operating a VHF Field Day station and for snagging a satellite contact. Another article discusses those sometimes-elusive bonus points. Finally, ARRL Field Day Manager Dan Henderson, N1ND, provides an overview of what to do — and what to avoid doing — this Field Day.

Bring this issue of *QST* with you — it also has a Band Chart and a list of ARRL sections.



And it's good for you! For a successful Field Day, one needs the proper food. This may be one example. [David Koch, W8OV, photo]



**FD night-glo:** At AB0IM, South Park Basin, Colorado, the night of Field Day 2011 provided this dramatic view of the main operating venue. The daytime view, with snow covered mountains across the horizon, wasn't too shabby, either. — *tnx Walt Baranger* [Myron Schaffer, WV0H, photo]

## "Boy Scout Radio Field Day," December 15, 1923

An emergency scenario near the ARRL Headquarters building may just have been the first Field Day — with a somewhat different twist than our modern version. The joint ham-Boy Scout operation featured none other than ARRL President Hiram Percy Maxim, 1AW. A 14 point scenario set the scene: The Scouts were to locate a missing "crazy man," and the ham station was to relay information on his condition to 1AW (HPM's house a few miles away).

First Field Day? This group of Amateur Radio operators and scouts congregated in West Hartford, Connecticut in December 1923 to practice their search and rescue and communications skills. ARRL Traffic Manager Fred H. Schnell, 1MO, is at the key and President Maxim is at the right. [ARRL archive photo]





Unique Father's Day card: Daughter Kelly gave her dad, Jim Mayercak, WX8J, this card last Father's Day. [Lynne Mayercak photo]



EME for kids (with a little help from a friend): In February, former MDC SM Ken Cohen, NI3F, and his 11 year old son Ilan, KB3TDF, visited Nobel Laureate Joe Taylor, K1JT, where they got their first taste of EME, contacting PY2GN in Brazil. Ilan is writing a science report on K1JT for school. [Ken Cohen, NI3F, photo]

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# **Letters from Our Members**

# **Back to Basics with Beldar**

A friend of mine always says that if you don't learn something new every day, it is a wasted day. I believe this to be true. It has been many vears for me since I first studied for my Amateur Radio license that included units of measure. I am glad that Horace Beldar, L1AR ["Strays: On the Origin of Units of Measure," Apr 2012, page 92], a person displaying many credentials in this matter, wrote this article bringing readers up to date in this subject! This has been a timely article for me, since my grandson Steven, KD8JHP, and granddaughter Julie, KD8JHQ, are now working on upgrading to their General class license. have also noticed that the April issues of QST seem to be exceptional, particularly when it comes to educational articles.

# Karl Schwab, KO8S

ARRL Life Member Warren, Michigan

# **Experience the Difference**

In response to Alan Swinger, K9MBQ, concerning needed on-the-air experience ["Correspondence: Grooming Quality Hams," Feb 2012, page 24], I also feel this is a must, especially where equipment is concerned. One Field Day several years ago, I watched a ham — who in one year went from Technician to Amateur Extra — try and tune his HW-101 and he could not do it; his antenna tuner was damaged due to his inexperience.

I feel that hams still need to spend at least two years in each license class before upgrading. I have always thought that it was the Extra class licensees who we all looked up to because they had the experience that the lower license classes did not have. When a newly licensed ham hits the transmit button on his or her handheld transceiver without the antenna attached and wonders if it might have done damage, I have to wonder what happened to the electronics studying that should have been in the license text books, like the old days.

# Paul Eaton, KR4IN

Cleveland, North Carolina

■I am one of those "new" hams that Alan, K9MBQ, despairs of. Even thought I have been licensed for a comparatively short time, I now have an Amateur Extra class license as a result of hard work and study. I didn't get a chance to take a code test, since I got my ticket in 2008. I did like most of the new licensees do — I listened before keying the mic. Within six months, I was a net control station for the Alabama Traffic Net, a very large phone net.

My experience is quite different from Alan's. In my experience, the hams who have violated the rules — including those of good taste — were the long-term hams, not the "newbies." I have found that most hams are polite to both new and old (not age, but time with license) and that they follow the correct procedures; however, I have yet to hear a new ham be as impolite or operate improperly as those more experienced hams who want to limit the hobby for those who came later.

A limitation such that K9MBQ suggested is short sighted because new hams are the future of the Amateur Radio Service. If they are discouraged, ham radio will go away as the older hams die off. Rather than Alan's idea that radio amateurs must show operating proficiency before being allowed to upgrade their license, new hams should be mentored by experienced, friendly "old-timers" who can encourage them in correct usage and operating procedures. New hams want to do things right.

Be very careful about who you think is operating poorly. You may find it is a ham with 30 or 40 years of operating experience!

Dana Persells, WJ4Z Dadeville, Alabama

# **Code Lessons**

I read the letters by Scott Lichtsinn, KB0NLY, and John Rader, KD8PAF ["Correspondence: Proud to Be a 'No-Code-Extra," May 2012, page 24] in response to Ted Jefferies, ND4K ["Correspondence: Communicating to the Max," Apr 2012, page 24] and thought I might offer a counterpoint.

Morse code is what distinguishes hams from other hobbyist wireless communicators; it's really the only differentiator. As the oldest communication format we have as hams, it was used exclusively by our forefathers. It uses the most simplistic equipment that almost anyone can homebrew and it works when more sophisticated equipment is unavailable. I can build a CW station (TX/RX) out of junk box parts in about 20 minutes, but I can't do that with equipment for any other mode.

The excuse about being handicapped might have great merit for some, but not for me. I know and have worked with hams who are blind, deaf and paraplegic many times. Back when code was a requirement for licensing, they all not only got licensed, but went on to become active and productive hams. Deaf applicants could pass the code test by watching a blinking light or putting their fingers on a speaker, blind applicants could listen just fine, and paraplegics could blow through a straw to pass the sending test.

Code may no longer be a requirement, but it's as routine as tying a bowline for a blind or deaf sailor. It's what takes us all back to our roots and allows us to communicate when more sophisticated methods fail or aren't available. There is no handicap or impediment in the world that would restrict or inhibit learning the code, other than the one someone inflicts upon himself. We are a sad society when we believe a physical handicap restricts anyone's ability to reach for the stars and achieve great things.

# Steve Katz, WB2WIK

Winnetka, California

# Windows to the World

Do you have a pile of envelopes from QSL cards from around the world? I did, and I found a way to re-use them. I gave to a coworker who gave them to his grade school children. One kid got them and promptly got out an atlas to see where they came from. Another one took them to school for showand-tell. All the kids in his class got a kick out of looking at them. They wondered why this one boy had all these cards. He explained to his class that I had talked to all these people over the radio. This got the class wondering about Amateur Radio. My co-worker's son explained, as only kids can do, that it was like text messaging, but it all came before cell phones. He called it "the original social media." If you have a bunch QSL cards or envelopes from all over the world, find a friend of yours who has kids and let them explore the magic. Who knows? It just might get them interested in ham radio!

James Dale, W0PPA

Rosemount, Minnesota

# **Muddle in the Huddle**

Contesters have used add-on voice recorders to call CQ for a long time, but lately, something is wrong with some of the signals. In the last voice contest I entered, I found that there were horrible and unreadable signals on the bands, but when I pieced enough of a call to go back, the live operator was a perfect copy. I don't know if modern switching power supply hash is being picked up by the wiring, or you they are processing an already processed recorded signal, but if I can't understand your call, I can't call you back. If there is nobody nearby to give you a signal report off the dummy load the day before the contest, why not dial up one of the Internet-connected receivers and listen off the air?

Patrick Hamel, W5THT Long Beach, Mississippi

Send your letters to "Correspondence," ARRL, 225 Main St, Newington, CT 06111. You can also submit letters by fax at 860-594-0259, or via e-mail to qst@arrl.org. We read every letter received, but we can only publish a few each month. We reserve the right to edit your letter for clarity, and to fit the available page space. Letters published in "Correspondence" may also appear in other ARRL media. Of course, the publishers of QST assume no responsibility for statements made by correspondents.



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Of all the many different pieces of ham radio equipment I have owned and used over the last 47 years I can say the SteppIR Yagi is my all time favorite piece of gear.

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Cheers, Kim Bottles - K7IM



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# The 43 Foot Vertical Monopole – What's the Magic?

# All antennas are compromises, including this popular one.

# Joel R. Hallas, W1ZR

Everywhere you look in the Amateur Radio literature, as well as in the ads, it seems that the 43 foot monopole must be a magic antenna. Interestingly, this is an antenna that has a  $\frac{1}{4}$  wave resonance around 5.4 MHz. Sure, the 60 meter channels can be fun, but can that be the whole story?

Actually it's not even related --- this antenna



was popular long before 60 meters was even an idea for hams. To get the picture, let's look at the horizontal antenna that is its predecessor — the extended double-Zepp or EDZ. The EDZ is a center fed often wire antenna that is 1.25 wavelengths long — another length that isn't resonant. It has the property that it is the longest simple (no traps, or stubs) center fed antenna that has a its main response in broadside lobes in each direction. Any longer and the lobes split into multiple lobes that are largely off axis. The *EZNEC* azimuth pattern of such an antenna for 20 meters, 86 feet in length, is shown in Figure  $1.^1$ 

# And Half an EDZ on its Side is a 43 Foot Monopole

The 43 foot ground mounted monopole is just half of a 20 meter EDZ, or a  $\frac{5}{4}$  wave vertical on that band. As with the EDZ, it has its radiation focused broadside toward the horizon, or would if there were no ground losses. See Figure 2 (black). Still, it is the longest simple vertical monopole that keeps its radiation focused at low angles. The  $\frac{5}{4}$  wave ground mounted antenna is somewhat akin to a  $\frac{1}{4}$  wave monopole with elevated radials mounted  $\frac{3}{6}$  above ground, as discussed in a recent *QST* article, but avoids elevated radials and may be easier to install and feed.<sup>2</sup>

While this antenna is not resonant on 20 meters, and by itself has a high SWR, its impedanceas predicted by *EZNEC* is largely that of capacitive reactance. Adding a simple inductor (called a *loading coil* by many) in series (about 320  $\Omega$  of inductive reactance, or 3.6  $\mu$ H at 14.15 MHz) will get the 50  $\Omega$  SWR to below 2:1 as shown in Figure 3.

# How Does it Compare to Other Ground Mounted Verticals?

Anything from a 6 foot whip on the bumper of a car to our 43 foot vertical that we can get to accept power will radiate largely in a broadside direction on 20 meters — there's no magic here. The very short antennas, as in those on a vehicle, tend to be less efficient, but they still do work. There are two other popular lengths for home station use — the  $\frac{1}{4}$  and  $\frac{1}{2}$  wave monopoles. How do they stack up?

# The <sup>1</sup>⁄<sub>4</sub> Wave Monopole

The  $\frac{1}{4}$  wave monopole is the easiest of all to feed — it is resonant and has a low feed impedance, close to that of standard 50  $\Omega$ 

<sup>1</sup>Notes appear on page 31.

coax. It can be fed against a bunch of buried or on-ground radials, or elevated resonant radials. While the resonant resistance of a <sup>1</sup>/<sub>4</sub> wave antenna over perfect ground is 36  $\Omega$ , any losses add to that (and reduce efficiency) so the usual real antenna can be directly fed with 50  $\Omega$  coax with a reasonably low SWR. The pattern is shown in Figure 2 (red).

# The <sup>1</sup>/<sub>2</sub> Wave Monopole

A 34 foot monopole fed against ground makes a resonant  $\frac{1}{2}$  wave antenna on 20 meters. This has the advantage that it also can work as a  $\frac{1}{4}$  wave monopole on 40 meters, so is easy to feed on that band. On 20 meters it does have a pattern that is in



**Figure 1** — *EZNEC* azimuth pattern of 20 meter extended double-Zepp 1 wave-length above typical ground at 14° elevation. (Conductivity of 0.005 S/m, relative dielectric constant 13. These values are used in all results.) It has 3 dB more gain, and a narrower pattern than a ½ wave horizontal dipole at the same height.



**Figure 2** — *EZNEC* elevation pattern of % wave long ground mounted monopole on 20 meters above typical ground (black) compared to ¼ wave (red) and ½ wave (blue). The azimuth pattern for each is omnidirectional.

# Table 1 Gain and Angle of Peak Gain of 43' Monopole on HF Bands

Band (Meters)	Peak Elevation Angle (°)	G Max	ain (dBi) 5°	10°		
(	3.(7					
160	24	-2.4	-7.2	-4.1		
80	25	-0.33	-5.0	-2.9		
60	24	-0.28	-6.2	-2.5		
40	23	-0.26	-6.1	-2.4		
20	15	1.2	-2.9	0.5		
17	42	4.2	-6.1	-2.8		
15	35	4.0	-8.0	-4.2		
12	29	4.0	-7.0	-3.8		
10	54	5.9	-5.3	-4.8		

between the <sup>1</sup>/<sub>4</sub> and <sup>5</sup>/<sub>8</sub> wave patterns, perhaps not surprisingly (see the blue trace in Figure 2). Its only issue is that it has a very high feed-point impedance on 20 meters. The actual impedance depends on the conductor diameter. *EZNEC* predicts that it will range from around 2800  $\Omega$  if made from #14 AWG wire to about 880  $\Omega$  if made from 2 inch diameter tubing. Either will be a problem for an antenna tuner that is rated for a 10:1 SWR.

# How About the Lower Frequency Bands

A nice feature of the 43 foot vertical is that it works reasonably well on lower bands, at least in comparison to vertical monopoles that are any shorter. Of course, a full <sup>1</sup>/<sub>4</sub> wave on 160 meters will run rings around it, but not everyone has the resources for a 130 foot vertical.

The SWR of the 43 foot monopole on 40 meters is about 15:1, somewhat beyond the specs for most wide range tuners, but likely to work since they usually have more range on 40 than 80, where they often hit their limits. On 80 and 160 meters, the SWR of the antenna itself is very high — beyond the range of many tuners. As with the usual mobile whip, or our monopole on 20 meters, a series inductor can save the day. In this case, *EZNEC* indicates that about 15  $\mu$ H will get the 80 meter SWR to around 3:1 — workable for either a remote or coax connected tuner. A series of recent *QST* articles described specialized manual and remote

Table 2							
SWR and Coax Loss of 43' Monopole							
on Each Band in 100 of Coax							
(Meters)	SWR	LMR-400 RG-213 RG-8X					
80	81:1	5.8	6.7	8.8			
60	1.7:1	0.3	0.5	0.9			
40	15:1	2.0	2.7	4.1			
30	54:1	5.1	6.9	8.7			
20	9.9:1	1.8	2.8	4.0			
17	5.8:1	1.3	2.1	3.1			
15	33:1	4.9	6.7	8.4			
12	41:1	6.0	8.0	9.7			
10	1.5:1	0.7	1.3	2.0			

switched tuning boxes that use a tapped coil feed for an even better match on those bands.<sup>3</sup>

# So Far So Good — So What's the Bad News?

On bands at frequencies at which the antenna is longer than <sup>5</sup>/<sub>8</sub> wavelength, we are no longer in the realm of having most of our radiation at low angles broadside to the antenna. This should not be too much of a surprise, since we asserted earlier that <sup>5</sup>/<sub>8</sub> wavelength was the longest simple monopole

that would do that.

Yes, it still takes power, and still sends it forth on the higher bands, but if we are after low-angle radiation for long haul work, we may be disappointed. Still, even though the peak of the pattern is higher than we might like (see Figure 4), there is still useful radiation at the lower angles (see Table 1).

Table 1 compares the peak gain and angle of maximum radiation on each band, along with the gain at 5 and 10°, as in my November 2011 article, for all bands from 160 through 10 meters. Note that on the higher bands, the peak gain is much higher. This is because the radiation it is at high enough angles to avoid losses from propagating along the ground. This high angle radiation can be of benefit for medium range or space communication, but is not particularly helpful for long haul DX. In fact, it can bring in noise from medium ranges that is detrimental.

# What are the Feeding Options?

As noted, this antenna is not resonant on any band except 60 meters, nor is it close to a 1:1 SWR. There are basically two feeding options to deal with this mismatch:

• Install a manual or automatic antenna tuner at the antenna base, with switchable loading coils for some bands if needed, and use that arrangement to provide a match to 50  $\Omega$  coax. Then run the matched coax to the station with low losses.

> Accept the mismatch and feed mismatched coax to an antenna tuner at the station end. While this is simple, in a way, there are penalties. Table 2 indicates the expected loss as a result of the use of mismatched coax based on *EZNEC* predicted SWR at the monopole base.





**Figure 3** — *EZNEC* predicted 50  $\Omega$  SWR of 43 foot vertical with 3.6  $\mu$ H series inductor on 20 meters. This is the simplest way to set up for single band operation. Start with 9 turns of insulated wire on a piece of 2 inch PVC about 1.8 inches long.



**Figure 4** — *EZNEC* elevation pattern of 43 foot ground mounted monopole on 17 meters (black), 15 (red) and 10 meters (blue).

As shown, with the exception of 60 and 10 meters, the losses will be high unless much shorter coax is used. Some use a 4:1 balun at the feed. This may help on some bands, but will not eliminate the problem.

In either case, take the usual precautions, such as a common mode choke, to minimize current on the outside of the coax run.

# Notes

- <sup>1</sup>Several versions of *EZNEC* antenna modeling software are available from developer Roy Lewallen W7FL at www.eznec.com
- Lewallen, W7EL, at **www.eznec.com**. <sup>2</sup>J. Hallas, W1ZR, "How High Should Your HF Vertical Be?" *QST*, Nov 2011, p 51.
- <sup>3</sup>P. Salas, AD5X, "160 and 80 Meter Matching Network for Your 43 Foot Vertical," Part 1 — *QST*, Dec 2009, pp 30-32 and Part 2 — *QST*, Jan 2010, pp 35-36.

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

# Click to see a remote-tuned 43 foot vertical antenna

# **Build a Portable Mount for Your PV Panels**



Make your photovoltaic panel easy to set up and safe to transport with this easy to build support.

worked well for a several years, but the more I used it the more I realized that something better was needed. For one thing, the panel makes a pretty good sail and the whole apparatus could be blown over by strong winds unless it was guyed somehow. Guy lines are a problem that any ham who has ever put up a vertical antenna can well understand. Also, the power cord leaving the panel wasn't protected from flexing and strain. And transporting the unprotected panel can expose it to damage. A PV panel is expensive and fairly delicate. Carrying it in the back of a pickup truck with all sorts of camping gear, antennas, miscellaneous radio equipment and other toys is almost certain to damage it eventually. Consequently I decided to design a panel mount that would have the following features:

- Protect the panel and power cord during transport.
- Provide some protection for the panel during use.
- Provide strain relief for the power cord.
- Easy azimuth and elevation adjustment.

# **Richard L. Huttinger, AA4RH**

Photovoltaic (PV) solar panels are a great way to power ham radio gear for portable operation. They are clean and silent, and produce power at voltages and currents that are well suited to efficient, modern radios when used with a lead-acid storage battery. Solar panels do, however, have at least one problem that may not be obvious until you get one and try to put it to use — how do you mount the darn things? This is not a trivial problem. In this article I'll describe a mounting system that I built and have used over the last 5 years. This design could easily be scaled to fit larger or smaller panels.

# Solar panels do, however, have at least one problem...

I have owned my PV panel for about 15 years and it served me well on a sailboat for its first 5 years. The sailboat mount simply consisted of two strips of wood screwed to the back of the panel. This raised the panel off the cabin roof and provided a channel for air to circulate behind the panel for cooling. PV panels lose efficiency if they get hot, so keeping them reasonably cool is important. When I sold the boat the panel became available for use with ham radio gear.

My first attempt at a panel mount for ham radio use consisted of a simple crossed-arm construction that attached to a sturdy camera tripod. In general, the tripod PV panel mount



Figure 1 — Dimensioned drawing of my panel mount section. Adjust dimensions if your PV panel is a different model.


**Figure 2** — Panel mount ready for panel installation.

- Low tripping hazard.
- Wind resistant.
- Cooling channel for the panel.
- Cheap and easy to construct.

#### **Folding Mount Description**

The PV panel mount shown in the lead photo (a sort of version 3.0) is the result of my design efforts. I hope it is clear from the picture that the whole system opens up like a book to expose the panel to the sun. In use, the panel mount is swung through an angle of approximately 270° so that the front cover becomes the rear support and legs. The angle between the front legs and the back legs is adjusted to set the panel elevation angle. The whole unit is easily picked up and rotated as needed to follow the sun across the sky. Be careful when doing this, however, as there is a pinching hazard if you place your hands between the legs near the hinge points at the top of the panel mount. When the "book" is closed, both the front and the back of the PV panel are protected from damage.

Before you close up the mount for transport, the power cord should be wrapped around the wood support strips directly behind the PV panel. This protects the wire. The large diameter of the coil minimizes fatiguing the wire through repeated coiling. Also note that the wire exiting the panel is fastened to the plywood mount with a pair of nylon wire ties that serve as a strain relief.

This PV panel mount is not complicated; construction requires only minimal woodworking tools and skills. One thing that may be new to some amateurs is the use of a "cone nut." These clever nuts are a simple way to put steel threads in a piece of wood. They are readily available in a number of

sizes at any good hardware store. For items that will be subject to frequent assembly and disassembly, or need to mate with machine screw threads, this is a good way to provide that capability.

One decision you should make before you get started cutting wood is whether you want to protect the final assembly with exterior polyurethane. I decided to finish mine with varnish because I wanted the unit to be modestly weatherproof and I wanted it to look nice. Plywood is not very weather resistant and will quickly discolor and deteriorate unless protected. Carefully sanding and coating the plywood with polyurethane also helps to minimize edge splintering. The process of coating the parts with a minimum of two coats of exterior polyurethane will add a couple of days to the construction process and you may want to allow for this in your planning.

#### **Folding Mount Construction**

The PV panel in the accompanying photo is a 20 W panel made by Solarex that measures  $19\frac{1}{2} \times 17\frac{1}{2}$  inches. The panel came predrilled with holes in each corner on a 16 × 16 inch square pattern. The holes contain grommets to protect the panel from the mounting screws.

For a variety of reasons you may not want to build your panel mount exactly as described in the following instructions. Your panel may not be the same model, or the same size, or have the same mounting-hole locations as mine. You may be using wood you already have on hand, or you may have other considerations that require design changes. In any case don't start cutting wood until you have carefully thought things through, and as much as possible, "dry fit" all parts to double check dimensions and locations before drilling holes. Table 1 lists the parts I used for my panel mount.

The front and back of the mount are  $\frac{1}{4}$  inch exterior plywood and are nominally  $24 \times 24$  inch. Plywood panels this size are available pre-cut at most home centers. Mine are slightly smaller because that is the size of the plywood that I had in my scrap pile.

The plywood panel that forms the PV panel mount is drilled in six places for mounting the legs, four places

#### A PV panel is expensive and fairly delicate.

for mounting the cone nuts and four places for attaching the nylon wire ties (see Figures 1, 2 and

3). The PV panel is attached to the plywood panel with four 1½ inch long #10 round head machine screws.

The plywood panel that forms the cover of the assembled mount is simply drilled in six places for the screws that attach the plywood to the legs (see Figure 4). The holes are clearance holes and are countersunk so that the  $#8 \times 1$  inch flathead wood screws end up level with the plywood surface. The legs are drilled with small pilot holes that match up with the corresponding clearance holes in the plywood.

The legs are made from  $\frac{5}{8} \times 1\frac{1}{4}$  inch "white wood" (hemlock, pine or equivalent) furring strips available from any lumber yard or home center store. They come in a variety of lengths and are inexpensive. Try to pick out some nice straight furring strips with a minimum of knots and wild grain so that the legs don't warp as they age. Cut each of the furring strips to 341/2 inches long and drill in three places with pilot holes for the screws that attach them to the plywood panel. Each one is also drilled at one end with a 1/4 inch hole. This is one of the few places in this project where accuracy counts. All of the <sup>1</sup>/<sub>4</sub> inch holes in all four legs must line up after they are fastened to the plywood panels, since these holes form the hinge that permits the assembly to open and close.

Cone nuts are driven into the inside of each inside leg. Small, sharp prongs on the cone nuts act like nails to hold the nut in place. I chose to round off the top end of each leg for appearance. The bottom end of each leg is left square in order to reduce the chance of slipping on the ground when the PV panel mount assembly is in use.

The two panel spacer/supports were ripped from a larger piece of  $\frac{3}{4}$  inch white pine, but

Table 1
Materials List for Folding Panel Mount
Cone nuts, 4 each #10-24
Cone nuts, 2 each 1/4-20
Exterior plywood panels, 2 each $24 \times 24 \times \frac{1}{4}$ "
Flat head wood screws, 12 each #8 × 1"
Flat washers, 4 each #10
Flat washers, 2 each 1/4"
Hex head bolts, 2 each 1/4-20 × 11/2"
Nylon wire ties, 2 each
Pine spacer/supports, 2 each $\frac{3}{4} \times \frac{3}{4} \times \frac{17}{2}$ "
Round head machine screws, 4 each #10-24 × 11/4"
White wood furring strip legs, 4 each $34\frac{1}{2} \times 1\frac{1}{2} \times \frac{5}{8}$ "





Figure 3 — Rear view of PV panel mount section.

Figure 4 — Dimensioned drawing of the panel cover.

they could be made from the same material as the legs, if that's what you have. They are each drilled in two places with clearance holes for a #10 machine screw. The ends are rounded off on one side to provide a large radius for coiling the power cable.

After you have finished making all the parts, screw the legs to the plywood panels. Then join the front and back panels by assembling the hinges (see Figure 5). After the hinges are assembled the PV panel mount is selfsupporting and should easily open and close

without interference between the inside and outside legs. If you have any construction or assembly problems, make sure to

resolve them before attaching the PV panel. Once the assembly is functional and will stand securely on its own, you can attach the PV panel (see Figure 6).

Attaching the panel takes only 5 minutes and should be the very last thing you do in order to minimize the chance of damaging the panel with a stray drill bit or screwdriver. In sequence, the #10-24 machine screws pass through a flat washer, through the PV panel grommet, through the wood spacer/support,

and then finally into the #10-24 cone nut, which has been driven into the back of the <sup>1</sup>/<sub>4</sub> inch plywood panel. This "sandwich" arrangement is quite sound mechanically and easily assembled (see Figure 6).

#### **Operational Considerations**

While the folding PV mount may look unnecessarily large in relation to the panel, don't be tempted to shorten the legs. In my experience Field Day sites and other outdoor locations don't usually have the grass cut as short as the average suburban lawn and tall

> grass can partially block the sunshine if the PV panel isn't mounted well up in the air. Some of the other design aspects are just

based on what looked right to me and don't have any real functional necessity. If I were to make another folding mount I might shorten the legs that project from the top of the assembly to form the hinges. I would also consider moving the PV panel farther down the plywood support panel another inch or so to provide more protection for the power cord when it is coiled for storage and transportation. This, of course, would reduce the elevation of the panel in use and would require longer legs to compensate.

A feature of this tent-like design that I hadn't anticipated is the shaded environment that the assembly provides for charging batteries when the panel isn't in use for other purposes. Placing the battery underneath the assembly protects it from direct exposure to the sun, which can result in high battery temperatures and short battery life. I have standardized on the use of Anderson 30 A Powerpoles, so charging a battery is as simple as plugging the battery into the panel cable and setting it underneath the panelmount assembly. I included a Schottky diode in the end of the PV panel cable just ahead of the Powerpole plug so I can even leave a battery attached all night without danger of the battery discharging through the panel. Unless the battery is very small in terms of ampere-hours, or you leave it plugged into the panel for extended periods, no charge controller is needed. By the way, I have found gelled electrolyte lead-acid batteries to have a far longer service life than the standard liquid electrolyte deep-cycle batteries. They are more expensive, but worth every penny. They're safer, too.

When the panel is in use, the 10 foot power cord that comes with the Solarex PV panel is often too short for convenience. If you want to operate from the shade while still having the panel out in full sun, an exten-

When the "book" is closed, both

the front and the back of the PV

panel are protected from damage.





Figure 6 — Details of assembly sequence for installing PV panel to mount.

sion cord is a worthwhile and inexpensive accessory. I built a 30 foot extension cord from spare wire and two pairs of Anderson Powerpoles. This gives me a total of 40 feet between the panel and my operating position. The small voltage drop through the extension cord is inconsequential. My extension cord measures 0.3  $\Omega$  in each conductor for a total of 0.6  $\Omega$ . At 1.0 A maximum current, this amounts to a drop of only 0.6 V. Since most panels have an open circuit voltage of more than 20 V, there is more than enough overhead to provide current to a 12 to 14 V load.

The first time you operate your ham station

from free and silent solar power is exciting and actually seems a bit magical. So buy a PV panel, build a mount, unplug that 120 V ac power supply and get on the air.

#### Photos by the author.

ARRL member Richard L. Huttinger, AA4RH, lives in Staunton, Virginia. Richard has a BS in Chemical Engineering from the University of Virginia and worked for DuPont Company for the last 23 years of his career until retiring at the end of 2001. He specialized in computerized process control and the development and implementation of advanced process control strategies, for US and foreign manufacturing sites. He still does occasional consulting work in that specialty as well as general chemical engineering. He's been an Amateur Radio operator since 1965. He was first licensed as WN1EHW, then variously as WA1EHW, KF4QZG and finally AA4RH as an Amateur Extra class licensee. His Elmer was Bob Dixon (SK), K1SCC, of Glastonbury, Connecticut. Richard's primary ham radio interests are homebrew QRP, antenna experimentation and boatanchor radio repair and restoration. He has other hobbies that often complement his ham radio interests including woodworking, metalworking and photography. Richard can be reached at 107 Community Way, Apt 235, Staunton, VA 24401-4987 or via e-mail at **aa4rh@artI.net**.



#### **Feedback**

•In "The Doctor is In" [Apr 2012, pp 54-55] the correct call sign of Elwood who contributed the link about meteor pings is WB00EW.

•In "Level Converter to Allow Full Control of Peripherals by Computer or Radio" [Apr 2012, pp 38-40] the ground connection on J4 should go to pin 5, not pin 4. Also, the "Hamspeak" item was in error. It should have said:

**Null modem** — An adapter to interconnect two devices both wired as EIA RS-232-C DCEs or DTEs using DSUB25 or DSUB9 connectors. To allow communication, interconnect RECEIVE DATA (pin 3) on one connector to TRANSMIT DATA (pin 2) on the other for either connector type. The SYSTEM GROUND connection should also be interconnected end to end — pin 7 on DSUB25, pin 5 on DSUB9.

For most devices that require flow control, cross connecting CLEAR TO SEND and REQUEST TO SEND either at each connector or from end to end will allow data flow. Some implementations may also require DATA SET READY and CARRIER DETECT at one end connected to DATA TERMINAL READY at the other.

#### **New Products**

#### MFJ QRP 4:1 Current Balun

The MFJ-9211 current balun is designed for use with QRP transceivers and antennas with balanced feed lines. It measures  $2 \times 3 \times 1$  inches and is

mounted in a plastic box with five way binding posts for balanced line connections and a BNC connector for the QRP rig. Price, \$19.95. For more information, to order, or for your nearest dealer, call 800-647-1800 or see **www.mfjenterprises.com.** 

## A Cooler Battery Box with a Digital Meter

Keep those portable storage batteries cool whether on Field Day or an EmComm assignment.



#### Jerry Radcliffe, N8KLX

Spring is finally in the air and with the members of our club, the Utica Shelby Emergency Communication Association (USECA), thoughts turn to "Larks in the Park," our informal gatherings at local parks to "play radio," ARRL Field Day and other battery powered radio operations. This project is a simple way to house and monitor the batteries you use to power your radios.

I use a beverage cooler to house my batteries. I wanted to have some way to see how the batteries were doing while running the radio so I designed a simple metering system that allows viewing either battery voltage or current with just the flip of a switch.

#### **The Theory**

Measuring current flow requires a straightforward application of Ohm's law. Ohm's law

states that the voltage drop across a resistor is proportional to the current flowing through that resistor.

As shown in Figure 1, by using a resistor  $(R_s)$  with a resistance such that the voltage drop (V<sub>S</sub>) is numerically equal to the current flow  $(I_{\rm L})$  you can use a voltmeter to directly indicate the current. For example, 1 A of current flowing through 1  $\Omega$ of resistance creates 1 V, numerically equal to the current. It would also consume 1 W of power and result in significant voltage drop.

A more practical example is to use 0.001  $\Omega$  for  $R_S.$  In this case, 1 A of

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current flowing through  $R_S$  results in a drop of 1 mV (0.001 V) and consumes just 0.001 W of power. With 20 A through the same resistance we would read 20 mV (0.020 V) and only consume 0.020 W of power. So to be able to measure the current used by a radio (or anything else), we need to be able to measure very low voltages across very low resistances.

#### Design

So how do you come up with such a low resistance and measure such low voltage? The voltage measurement is pretty easy. Most modern digital multimeters can measure down into the millivolt range, which is what you need to do.

A quick check of resistor suppliers shows that getting resistors with those kind of values  $(0.001 \ \Omega)$  is difficult if not impossible. You could take a thousand 1  $\Omega$  resistors and wire

> them in parallel to get the right value, but that would be expensive and leave little room for the battery. So what can we do? It is easy to build your own adjustable very low value resistor used to measure current. This resistor is traditionally called a shunt. [Another possibility is to use a length of house wire. For example, #10 AWG copper has a resistance of about 0.001  $\Omega$ /foot. while #12 is about 0.0016 Ω/foot. -Ed.]

#### Construction

To build the shunt, you need to collect some hardware. For a shunt that will measure 0 to 50 A or more, you need the material in Table 1, all of which should be available at your local hardware store..

You start assembly by soldering (or crimping) suitable wire into the ring tab wire connectors. The heavy gauge (yellow) ones will get #12 AWG (or larger) wire to carry the main current load. Make sure the wires are long enough to facilitate the final connection to the power supply. The two smaller (red) ones get #16-18 AWG wire and are used to connect to the multimeter to measure the voltage drop across the shunt. Be sure to make them long enough to allow for easy connection.

The assembly of the shunt itself starts by threading one of the nuts onto the screw all the way to the head. Now add one of the yellow ring tab connectors followed by another nut. Tighten this assembly together. Add one red ring tab connector and follow it with a third nut. Tighten this while keeping the two ring tabs about 180° from each other (see Figure 2). That finishes the nonadjustable end of the shunt.

For the adjustable end, reverse the assembly order. Nut, red tab, nut, yellow tab, nut — leaving about <sup>13</sup>/<sub>16</sub> inch of space between the two inside nuts. Snug this set together but leave it loose enough to be able to adjust it up or down the length of the screw during calibration.

#### Calibration

Now that the shunt is assembled, you need to calibrate it. You will need a voltage source,

## Table 1Material Needed toMake a Shunt Resistor

- 1 Pan head steel (not stainless) screw,  $6-32 \times 2.5$ " or longer.
- 6 Hex nuts, steel, size 6-32.
- 2 Wire connectors. Ring tabs to fit a #6 screw and #12 AWG wire. Color code yellow.
- Wire connectors. Ring tabs to fit a #6 screw and #18 AWG wire. Color code red.



Figure 1 — Schematic of the measurement concept discussed in the text.



**Figure 2** — Details of the shunt construction. The bolt should be a steel (not stainless)  $6-32 \times 2.5$  inches



such as a power supply or battery, a digital multimeter with current reading capability and a load. The load can be a radio, power resistor or perhaps a low voltage lamp.

Connect the load to the voltage source with the multimeter in series, observing the polarity of the meter. Turn on the voltage

source and note the current on the meter. Turn off the voltage. Substitute the shunt for the

multimeter and then use the multimeter, now set to measure voltage instead of current, to measure the voltage across the shunt after you again turn on the voltage.

Adjust the distance between the sets of nuts to change the voltage drop across the shunt until it equals the numeric value of the

current you noted in the first step. Farther apart adds more resistance, hence more voltage drop; closer together, less resistance, less voltage drop. Once you have it adjusted, tighten the nuts well and then retest as the tightening may have changed the resistance a bit. Readjust as necessary.

> If you're using a load as I did, make your tests short so the resis-

tors don't overheat and change resistance.

Well, that's it! You now have a calibrated shunt that you can use to measure current.

#### **Putting it to Work**

Of course, it is a bit clumsy to have your multimeter out all the time, especially if you



are out in the field playing radio. There is an easier way - use a dedicated digital meter.

A quick check of the Internet or your local hamfest swap table, should turn up a number of low cost digital panel meters. I found mine at the Dayton Hamvention.<sup>®</sup> It's a model PM-128, but most of the major suppliers (Digi-key and Mouser, for example) have equivalent units. A Google search on "panel meter PM-128" will get you a bunch of sites to choose from.

The voltmeter at its default setting measures 199.9 mV and that just happens to be what we want to measure! How convenient. This type of meter usually requires an independent power source. A 9 V battery will do just fine and will last a long time.

There are a set of jumpers for setting the decimal place on the meter. Jumpering P3 will set the decimal place at 199.9. Leave P1 and P2 open.

Connect the wires coming from the red tabs on the shunt to the VIN (+) and GND (-)inputs of the meter (see Figure 3). As to the correct polarity, the panel meter reads plus or minus 199.9 mV so current flowing in one direction will produce a positive voltage across the shunt and current flowing the other way will produce a negative voltage. You can decide which direction you want as positive on the meter. An advantage to this is that the meter will show both load current and charge current depending on the sign on the meter.

Figure 3 shows the shunt connected to the negative side of the power supply. Connecting it this way has several advantages. It keeps the entire shunt assembly at or very near to ground potential, a good safety practice. It also provides an easy way to configure the meter to monitor either the supply voltage or the current with the flip of a switch.

Figure 4 shows a simple circuit that allows the monitoring of either the current or the voltage. R1, R2 and R3 form a voltage divider that produces a voltage that is 1/1000 of the supply voltage. This voltage is then connected via S1a to VIN (+) on the digital meter. R2 allows for calibration of the voltage measurement. S1b is wired to supply power from the battery to the digital meter. Switch S1 is a DPDT center off miniature switch.

Note that the cooler's insulation can be of benefit in a number of ways, keeping the battery cool in bright sunlight, and keeping it warm (for a while) in the winter. During charge, the box should be kept open to avoid overheating and to release any vented gas.





Figure 5 — Interior view of the wiring. The shunt is on the right side. The extra length of the shunt screw is used to mount it through the side of the case. The exposed nut on the outside is not a problem as it is at close to ground potential.



#### Options

In my experiments developing the mechanics of the shunt, I tried using different types of metal screws — I tried steel, stainless steel and brass. Each has different electrical resistance, and that affected the size and length of each shunt. Stainless steel has a lot more resistance than mild steel and when I attempted to calibrate that shunt, I wound up with the adjustable end right up tight against the fixed end and still had too much resistance.

#### Packaging

The options for packaging the meter are wide open. You could put it in a small plastic box, put Powerpole connectors on the power wires and use it to monitor any of your dc powered devices or you could build it into your bench power supply.

I put mine in my cooler battery case as seen in Figures 5 and 6. I used an Anderson

Figure 6 — A view looking into the box. The batteries in the bottom of the box are 7 Ah gel cells, a good fit for this six pack size container.

Powerpole connector block for my connections to the radio. You can connect the charger via the Powerpole connections. The charge current will show on the

current meter with the opposite polarity than the load current.

See you at the next lark in the Park!

#### Photos by the author's son-in-law, Jay Montgomery.

Jerry Radcliffe, N8KLX, is an ARRL member and Amateur Extra class licensee. He was first licensed in 1988 as a Technician class licensee. He studied computer engineering at the University of Detroit before joining the US Navy. After the Navy, he worked in business electronics and then personal computers becoming a senior software analyst. He is currently serving as a Master Radio Electronics Officer (MREO) in the US Merchant Marine assigned to Military Sealift Command ships. You can reach Jerry at 45061 Grant Park, Utica, MI 48317-5522 or at jerry.radcliffe@gmail.com.



#### **New Products**

#### **COMTEK W2FMI Series Baluns**

DX Engineering's Comtek W2FMI series baluns are engineered to provide an efficient match between unbalanced coax and balanced antennas. They're inspired by designs from antenna expert Jerry Sevick, W2FMI (SK), with improvements by DX Engineering. Comtek current baluns are designed to force equal current to flow through your antenna and prevent high values of common



mode feed line current and are intended to eliminate pattern distortion, unpredictable performance, RFI and noise pickup from nearby sources like TV sets and computers. Ratings: Typical insertion loss, <0.2 dB, with power handling ranging from 3 kW continuous to 5 kW+ intermittent from 1.8 to 54 MHz, with reduced power ratings at 54 MHz. Comtek baluns are sealed in a weatherproof box and constructed with stainless steel hardware and SO-239 connectors. The baluns are available in 1:1 and 4:1 versions, with several different configurations. Price: \$49.95 to \$69.95. For more information or to order, visit www.dxengineering.com.

## An Easy to Build Rear Mount 2 Meter Yagi

Here's an antenna that can get you on the air quickly in an emergency or for ARRL Field Day.

#### Zack Lau, W1VT

This inexpensive three element 2 meter Yagi is the perfect way to get more range with a handheld or portable transceiver. It is designed to work well with a metal mast. You can either mount it at the top of the mast for maximum range, or 20 inches lower for a better front to back ratio. The free space gain is about 7.5 dBi with a wide 114° azimuth beamwidth for easy aiming.

#### **An Easy No Tuning Feed**

I copied the simple J feed that first appeared in the 1963 edition of *Understanding Amateur Radio*, and reinvented decades later by Kent Britain, WA5VJB.<sup>1</sup> Instead of using a conventional dipole or folded dipole, the driven element has half of the driven element cut away. The center of the full dipole provides a low impedance point for attaching the shield of the coax — the open end of the half dipole connects to the coax center conductor. While the SWR is a little high — the best SWR is around 1.5, most of the band is under 2:1. This is plenty good enough for excellent performance with a handheld transceiver and a short transmission line. It may be a little high to use with some mobile rigs — you may see some power reduction from the SWR foldback circuitry that protects the final transistors.

#### **Designing the Simple Yagi**

The design was a three step process. The first step was modeling the antenna with *Yagi for Windows*, one of *The ARRL Antenna Book* companion programs, to optimize the free space performance of the three elements over the FM part of the band (see Figures 1 and 2).<sup>2</sup> Next, I modeled the antenna with *EZNEC Pro* to optimize the pattern over real ground with the antenna mounted on a metal mast (see Figures 3 and 4).<sup>3</sup> Finally, I used trial and error with an antenna analyzer to design the dimensions of the J. The last step was the most time consuming of the three.

I found that the front to back was optimized by placing the mast 7 inches behind the reflector, and placing the mast an inch higher than the reflector. This sacrifices 0.5 dB of gain, compared to mounting the antenna for maximum height. For maximum range, you want the antenna as high as possible. But, if you have an interference issue, you can hide the antenna behind a metal mast and null out the interference.

This antenna is small and light enough that the lack of balance isn't a big issue. The rear mounting avoids the boom interaction that often plagues vertically polarized beams mounted near the center of the boom. It is important that you select the proper polarization — using a horizontally polarized beam for FM work can cost you several S-units of

Table 1				
Lengths for Different Element Diameters (inches)				
Element	1⁄/8	<sup>3</sup> ⁄16	1⁄4	
Reflector	41.034 (411/32)	41.0	40.956 (40 <sup>31</sup> / <sub>32</sub> )	
Director	36.320 (365/16)	36.0	35.746 (35¾)	



Figure 1 — Free space gain, front/rear and SWR, according to Yagi for Windows, one of The ARRL Antenna Book companion programs.



**Figure 2** — *Yagi for Windows* program output. The azimuth pattern is green and the elevation pattern is red. Both patterns are in free space without the mast.

<sup>1</sup>Notes appear on page 40.



Mast saddle (can be made of wood)

U-bolt to clear 11/4" mast

Wing nuts for U-bolts Wire, 5' of #10 AWG ROMEX, #10 TW or #12 THHN (hardware or home supply store)

Wood furring strip,  $1" \times 2" \times 8'$ 



Figure 3 — EZNEC elevation pattern of the Yagi on the mast over real ground. The mast reflector costs about 1/2 dB of gain.



Figure 4 — EZNEC azimuth pattern of the Yagi mounted on the top of a 10 foot mast for maximum gain.

signal, more than wiping out the benefit of the beam.

#### **Building the Simple Yagi**

Merely cutting the provided antenna dimensions accurately should be enough for good performance with a handheld transceiver - the loss in range due to the SWR mismatch is negligible. But, if you wish to tweak the antenna for best SWR, I'd suggest cutting the driven element 1/4 inch long and clipping off 1/16 or 1/8 of an inch at a time. Because the width of the J is not very critical, you could narrow the driven element to compensate for cutting off too much.



Figure 5 — The completed Yagi showing key dimensions of the 2 meter Yagi mounted at top of metal mast.



Figure 6 — SWR plots of the Yagi using #6 AWG bare copper, #10 AWG TW and #12 AWG THHN wire for the driven element.

#### Alternate Element Dimensions

The dimensions are shown in Table 1 and again in Figure 5. If you want to make the driven element out of bare wire, you can use #6 AWG copper ground wire with an end-to-end length of 381/4 inches. A 5 foot length of wire will be required —  $\frac{1}{3}$  of it is used in forming the J. A comparison of the SWR with the different sizes is shown in Figure 6. A list of all required parts is shown in Table 2. Figure 7 shows the details of the driven element connections to an element made out of #10 AWG TW wire.

I used an old DOS program, scale.exe, to calculate new dimensions for 1/8 and 1/4 inch diameter parasitic elements. The change to the reflector is negligible - you can just use the 41 inch length of the original design, but you should change the lengths of the director element, if you wish to use a different ele-



Figure 7 — Closeup of the connections to a driven element made out of #10 AWG TW wire.

ment diameter. This program can be found on the Companion CD to The ARRL Antenna Book. But, as old software, it won't run on modern Windows 7 systems unless you run a DOS emulator.

#### Notes

1www.wa5vjb.com/yagi-pdf/cheapyagi.pdf <sup>2</sup>The ARRL Antenna Book, 22<sup>nd</sup> Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 6948. Telephone 860-594-0355, or toll-free in the US 888-277-5289;

www.arrl.org/shop; pubsales@arrl.org. <sup>3</sup>Several versions of *EZNEC* antenna modeling software are available from developer Roy Lewallen, W7EL, at www.eznec.com.

Photos by the author. Zack Lau, W1VT, is Senior Laboratory Engineer in the ARRL Lab. You may reach him at w1vt@arrl.org.

## A Spice Bottle Logic Probe

## Put some spice back in your troubleshooting with this handy probe.

# e tool of choice rk up into the GHz

#### Alan Bloom, N1AL

For a professional engineer working at a large, well-heeled company, the tool of choice for troubleshooting digital circuits is a logic analyzer. The best units work up into the GHz range and can read hundreds of signals at the same time. Such equipment costs tens of thousands of dollars. It also tends to be large and heavy, and requires extensive training in order to learn how to use its many sophisticated features.

#### **Enter the Digital Logic Probe**

Fortunately, most of the time all you really need to troubleshoot a simple digital circuit is some way to tell if signals are present at the various circuit nodes. That's the purpose of a *logic probe*. It has indicators that show whether the signal is high, low or toggling between the two states. It doesn't give as much information as an oscilloscope or logic analyzer but it is much smaller, cheaper and easier to use.

This logic probe includes an LED sevensegment display that indicates a capitalletter L if the signal is low and H if the signal is high (see Figure 1). If it is toggling between low and high with roughly a 50% duty factor, the letter B is displayed to indicate that *both* high and low are present. If the signal is mostly low with short-duration positive pulses, then a C is displayed, which can be thought of as standing for *cathode* since the signal is normally negative. If the signal is mostly positive with negative-going pulses, the LED indicates an A for *anode*.

#### **Circuit Description**

Traditionally, logic probes are powered from the circuit under test. You connect the ground lead to circuit common, attach the power lead to the circuit's power supply, and then touch the probe to the signal node to be tested. In many circuits, however, there is no convenient place to attach the power lead. This design includes a self-contained, battery-operated power supply so only one wire needs to be connected. It works with several different logic types, including TTL, 5 V CMOS and 3.3 V CMOS.

The circuit in Figure 1 uses a common anode seven-segment LED readout, so that each segment is illuminated when its pin is low. The 74ACT04 inverters are arranged so that a continuous low input signal lights up



Figure 1 — Schematic diagram and parts list of the logic probe. All parts can be obtained from Digi-Key at www.digikey.com except for the printed circuit board, available from FAR Circuits at www.farcircuits.net.

- $C1 10 \ \mu F$  electrolytic capacitor
- (Digi-Key P807-NĎ).
- $C2 0.1 \,\mu\text{F}$  ceramic capacitor
- (Digi-Key 490-3873-ND). J1 — Horizontal tip jack (Digi-Key J110-ND).
- R1-R7 1 k $\Omega$ , ¼ W, 5% resistor
- (Digi-Key 1.0KQBK-ND).
- $R8 100 \text{ k}\Omega$ , <sup>1</sup>/<sub>4</sub> W, 5% resistor
- (Digi-Key CF1/4100KJRCT-ND).
- $R9 10 k\Omega$ , <sup>1</sup>/<sub>4</sub> W resistor.
- S1 SPDT, right-angle slide switch

(Digi-Key CKN9559-ND).

- U1 LED display, 7-segment common-anode (Digi-Key 160-1525-5-ND).
- U2 Hex inverter integrated circuit, 74ACT04 (Digi-Key 296-4351-5-ND).
- U3 Monostable multivibrator integrated circuit, 74LS122 (Digi-Key 296-3639-5-ND). Battery clips (Digi-Key 82K-ND), quantity 6. L-bracket (Digi-Key 621K-ND), quantity 2.

L-bracket (Digi-Key 621K-ND), quantity 2. Printed circuit board (FAR Circuits).



the proper segments to form an L and a continuous high forms an H. The 74LS122 retriggerable multivibrator outputs a 33 ms pulse whenever there is a positive-going transition on its B2 input. Repetitive transitions with a period less than about 33 ms (30 Hz or greater) assert the 74LS122 output continuously, which causes the top segment to light. If the signal is mostly low, the L turns into a C and if the signal is mostly high, the H turns into an A.

Resistor R9 is a late change to prevent damage to U2 from exceeding the maximum voltage specification. The absolute maximum ratings of the 74ACT04 lists the maximum dc input voltage ( $V_I$ ) as  $V_{CC}$  + 0.5 V. If the battery supply were down to 4.5 V (from 4.95 V in new condition) and a circuit with a  $V_{CC}$  of 5.25 V were probed, the maximum input voltage of U2A would be exceeded.

The resistor will limit the current to a safe value in the unlikely event of this occurrence. This change was noted after the circuit artwork was defined, and thus one must cut the trace that runs along the left side of the top of the board and bridge it with the 10 k resistor.

#### Construction

You can build the logic probe into a plastic spice jar obtained at the local supermarket as I did for the example of Figure 2, but any clear plastic container big enough to accommodate the  $1.2 \times 3.5$  inch printed-circuit board (PCB) would also work. Batteries B1 and B2 and the test lead jack, J1, are mounted on the bottom side; all other components are on the top. Place a piece of tape under the top terminal of B3 to keep it from shorting to the ground plane.

The PC board from FAR Circuits does not have plated-through holes so at least the following must be soldered on both sides: R5, R6, R8, B1 and B3 (inner contacts), U2 pins 1 and 14 and U3 pins 1, 2, 3, 7 and 11. Also solder a wire to both sides of the via hole to the left of pin 1 of the display (U1). If you wish, you can use a socket for the LED display to raise it up higher, but don't use sockets for U2 and U3 since some of their leads must be soldered on both sides. Note that the L brackets that attach the board to the bottle cap have a long and a short side. The long side goes against the board.

The socket for the probe is a standard 0.08 inch (2 mm) diameter tip jack. The probe is just a nail soldered into the end of a



Figure 3 — Logic probe PCB, bottom view.

Figure 4 — Logic probe PCB, top view.

Figure 5 — PCB silkscreen.

mating tip plug. You can also use a standard test lead plugged into the jack. The component labeled J2 on the schematic is just a solder pad for the ground lead. Tie a knot in the wire where it exits the bottle for strain relief.

#### **Putting Your Probe to Use**

It's amazing how much useful information you can get from such a simple

such a simple device. One of the most common faults in a digital circuit is a node that is "stuck" low or high due to a short circuit or a faulty component. A logic probe is perfect for detecting that.

You can also get a rough idea of what per-

centage of time the signal is low or high by looking at the relative brightness of the segments. If the signal is low 100% of the time, an L is displayed. If there are narrow positive pulses, a C is shown. As the pulse width increases, the center and the two right segments start to glow dimly, finally forming a B when the duty factor is near 50%. As the

#### All you really need to troubleshoot a simple digital circuit is some way to tell if signals are present

, finally forming ear 50%. As the duty factor increases further, the bottom segment dims, eventually

turning the B into an A. And finally, if the signal is high 100% of the time, the top segment goes out, leaving an H.

So save yourself tens of thousands of dollars and build this logic probe instead of buying a logic analyzer. Alan Bloom, N1AL, was first licensed while in high school, in 1968. He received a Bachelor's degree in physics, then a Master's degree in electrical engineering, the latter while working as a W1AW operator.

While at the ARRL he co-authored *The ARRL License Manual* and *The ARRL Operating Manual*. He designed amateur and commercial equipment for the R. L. Drake Company and then worked for 26 years at Hewlett-Packard, designing RF and microwave test equipment. He recently returned to the Amateur Radio field as the designer of the Elecraft P3 panadapter. Alan has written several articles for *QST*, including two cover plaque award winners. Mainly a CW operator, AI has equipment for all of the amateur bands from 1.8 to 2450 MHz, including satellite operation. He is a life member of the ARRL and an ARRL Technical Advisor. You can contact the author at **n1al@arrl.net**.



#### Strays

#### Have a QST Delivery Issue?

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

#### Call for Papers — Central States VHF Society

The Central States VHF Society is soliciting papers, presentations and poster displays for the 46<sup>th</sup> annual conference in Cedar Rapids, Iowa July 26-28, 2012. All aspects of weak-signal work on Amateur Radio bands of 50 MHz and above are sought. The papers will be published in the Conference *Proceedings* and available at the conference. You do not have to attend the conference or present the paper to have it published in the *Proceedings*. Posters describing your project will be displayed during the two day conference.

Presentations and Posters at the conference may be technical or non-technical but will cover the full breadth of amateur weak signal VHF/UHF activities. The presentations generally vary from 15 to 45 minutes covering the highlights with details in the *Proceedings* paper. Topics of interest include:

• VHF/UHF antennas, propagation modes — such as meteor scatter, sporadic-E, aurora and tropo-scatter

• Equipment Design and Construction, such as pre-amps, transverters, power amplifiers and related accessories

■EME (moonbounce)

- Rover stations design, construction and operation
- Digital modes
- Digital signal processing and software defined radios
- •Operating including contesting, DXpeditions and awards

If you would like to contribute a paper, presentation, or poster, please contact Rod Blocksome, K0DAS, CSVHF Conference Program Chairman, *as soon as possible* with the title and a short description. You can reach Rod at **k0das@arrl.net** or 690 Eastview Dr, Robins, IA 52328. Author Guidelines and other details are available at **www.csvhfs.org**.

Deadlines for submissions are: Proceedings — June 15, Presentations — July 26 and Posters — July 26.

#### **Bert Wilson, Wireless Operator**

Project Gutenberg has placed this free e-book (radio adventure novel) on their website. See www.gutenberg.org/files/39262/39262h/39262-h.htm. — *tnx George Karshner, KC2UAV* 

#### QST congratulates...

■ARRL member Carey McCachern, N5RM, of Edmond, Oklahoma, one of 52 high school seniors — one from each state, the District of Columbia and Puerto Rico — selected as a winner of the AXA Achievement Scholarship. He is also a National Merit Finalist and an Eagle Scout. — *tnx Tim Duffy, K3LR* 

ARRL member Charles Weldon Fields Jr, W4AJT, age 98, and ARRL Life Member William C. Finch, W4EHF, age 100, who have been awarded North Carolina's prestigious Order of the Longleaf Pine for their part in the formation or and long term participation in the Tar Heel Emergency Net, which has operated daily for 65 years. — *tnx Raymond L. "Woody" Woodward, K3VSA* 

•ARRL member Steve Handler, N9ABC, whose book, JUST THE FAX! A Shortwave Radio Listener's Guide to Weather Facsimile Reception, is now available. For more information, contact Steve at **n9abc@arrl.net**.

ARRL member Garrison Kunst, KB3LEZ, who has achieved the rank of Eagle Scout. For his project, he interviewed 15 local veterans, and the video will go to the Library of Congress. — *tnx Don Kunst, W3LNE* 



## A 160 and 75/80 Meter Folded Monopole

## Let your tower do double duty by providing a support for effective lower band monopoles.

#### **Dennis Johnson, KF0QR**

Ahh, the war stories — pile-ups, weak signals, did I get 'em, the 2 meter chatter, the one ringers, the constant static, the tuner uppers and missing that once in a lifetime opening. Who could resist the lure of 160 meter DXing?

The line was cast, the bait was taken, and the hook was set deep — thus another fish was lured into the 160 meter maelstrom.

#### **Goals and Planning**

The goal of this project was to build a broad-

band antenna system to get me on 160 meters, and improve my existing 75/80 meter setup. After listening to fellow DX club members, and reading a few articles on 160 meter antennas, I decided to add a folded monopole configuration to my Trylon Titan 80 foot self supporting tower.

Unfortunately for this aspiring 160 meter DXer, the project had to start with some deconstruction of my old tower, which was damaged in an ice storm many years ago. So one of the items on my list of things to do was to take down the old tower, and replace it with another of the

same vintage (which my insurance company was kind enough to

provide). The following tasks were then needed to complete the project and get on the air:

- Remove and replace the existing old tower.
- Design and build a spreader system for the monopole drop wires.
- Design and build matching networks for 160 meters and 75/80 meters.
- Design and build a current balun to keep RF out of the shack.

Remove my

narrow-band

commercial verti-

cals for 75 and

Install ground

cable, rotor and

control cables.

Construction

followed in step

described above.

Spreader System

for the Monopole

The design for the

spreader system was based on using six drop wires

with the goals

**Drop Wires** 

and Installation The construction

rods, radials, coax

matching network

80 meters.

#### Table 1 Measured SWR on 160 and 80 Meters

	Frequer (MHz)	ncy SWR	Freque (MHz)	ncy SWR
	1.800 1.815 1.825 1.835 1.840 1.850 1.860 1.870 1.880 1.890 1.900 1.910 1.920 1.920 1.930 1.940 1.950 1.960 1.970 1.990	$\begin{array}{c} 1.50 \\ 1.40 \\ 1.30 \\ 1.22 \\ 1.30 \\ 1.23 \\ 1.21 \\ 1.29 \\ 1.29 \\ 1.29 \\ 1.29 \\ 1.37 \\ 1.46 \\ 1.46 \\ 1.66 \\ 1.95 \\ 1.95 \\ 2.15 \\ 2.37 \end{array}$	3.500 3.520 3.540 3.560 3.620 3.620 3.640 3.680 3.700 3.758 3.770 3.795 3.810 3.820 3.820 3.820 3.830 3.820 3.830 3.820 3.830 3.820	$\begin{array}{c} 1.30\\ 1.22\\ 1.22\\ 1.12\\ 1.14\\ 1.14\\ 1.14\\ 1.18\\ 1.22\\ 1.30\\ 1.35\\ 1.50\\ 1.57\\ 1.61\\ 1.66\\ 1.70\\ 1.72\\ 1.75\\ 1.89\\ 1.96\\ \end{array}$
1				

instead of the two or three wire set-ups that are typically used. This configuration was used with the idea that building a drop wire *cage* around the tower would increase the antenna's effective diameter and thus increase its bandwidth to the desired maximum. Figures 1 through 3 show the layout.

The use of insulated standoffs was mocked up on the tower's top section in my basement in early spring, with the final configuration being in the form of a T attached to each leg of the tower (see Figures 4 and 5). Thanks to Jim Junkert, KOJUH, for the T idea. This

#### Who could resist the lure of 160 meter DXing?

provided the required standoff distance of 1 to 2 feet (18 inches, in

my case) from the tower, and the spreading effect to space the six drop wires equidistant from each other and to form the cage.

The spreaders were made from 1½ inch PVC pipe, and painted with PVC compatible paint for UV protection. The spreaders were placed at the 75 and 40 foot levels of the tower using large hose clamps. As seen in the photos this maintains the cage shape from top to bottom of the tower, and keeps them from moving around in the wind.

#### **Current Balun**

The current balun design was found in an article on the Internet, and was built using a weather tight box and #31 mix toroids (see Figure 6).<sup>1</sup> The toroids were part of the bulk purchase made by the local ham clubs and the box was purchased from the local supply store. I used 16 toroids and wrapped the coax through as many times (6 or 7) as would fit through the centers.

#### **Matching Networks**

The matching networks were the heart of the whole project, in my opinion, and the most interesting and challenging to mock up and build. I am basically an appliance operator (with electronics and quality/reliability engineering background) and do not possess the expertise to design matching networks on my own. With the help of many articles

<sup>1</sup>webpages.charter.net/kotarak/bigir/choke.htm



Figure 1 — Side view of tower mounted monopole showing supports for two of the three pairs of elements.



Figure 2 — Top view of tower and monopole elements at the 40 foot level.



Figure 3 — Top view of tower and monopole elements from above the tower.

on monopoles (K9AY) and advice from local club members, I proceeded to lay out and build the matching network boxes for 160 and 75/80 meters.

The 160 meter box uses a surplus vacuum variable, and homebrew inductor made from ¼ inch soft copper tubing (see Figure 7), and various doorknob capacitors. All components were mounted in a weathertight box in a T-network configuration.

The 75/80 meter box uses a homebrew inductor of the same construction as in the 160 meter box and doorknob capacitors. Because I used the same drop wires for both bands, the 75/80 meter was electrically long, and required a different matching scheme. Thanks to Gary Hosler, W0AW, and a lot of head scratching, we were able to get a very good match using a voltage fed network that feeds the input to a tap on the inductor (see Figure 8).

If you looked closely at the two matching boxes, you probably noticed another bit of hardware lurking in the corner of each box. Because my setup uses a common feed point to the interconnecting



Figure 4 — Close-up of top of tower showing two of the three monopole support arms.





**Figure 5** — Detail of method used to attach the support arms to the tower.

Figure 6 — Inside view of the current balun.



loop at the base of the drop wires, a DPST relay was used to switch each matching box in and out of the circuit to prevent 160 meter signals from feeding the 80 meter circuit and sensing its impedance, and vice versa. The base of the tower with the matching networks and balun are shown in Figure 9.

#### **Remove and Replace** the Existing Old Tower

The "new" tower sections were laid out and bolted together on the ground in the backyard adjacent to the existing tower. The tower was assembled into two 40 foot sections to facilitate and speed up installation with a crane. All hardware was preassembled on the upper 40 foot section, including rotator, mast, coax, control cables and the drop wires. The coax and control cables were run down and attached inside the tower legs to minimize RF being fed into these lines.

I used the crane and bucket truck services of a local provider who was experienced in radio tower work. They took down the old damaged tower in two sections and erected the new tower in two 40 foot sections. They also installed my commercial 30 meter two element beam, dropped the coax and control cables, attached the PVC spreaders, and positioned the six drop wires at the top and 40 foot level.

#### **Miscellaneous Hardware Installation**

I installed six 8 foot ground rods around the tower base with the help of a rented electric jack hammer to drive them into my solid clay. It worked very well and only took 10 minutes to drive all six rods. For hard ground, I highly recommend it. It was worth the \$75.

Copper straps 3 and  $2\frac{1}{2}$  inches wide by 0.022 inches thick were used to interconnect the ground rods and radials, and connect to each tower leg.

The matching network boxes, current balun, and coax switch box were mounted to a piece of <sup>3</sup>/<sub>4</sub> inch plywood and installed on a 2 inch OD piece of galvanized water pipe. This was then inserted into a 4 foot piece of 2 inch ID pipe buried in the ground.

I installed 19 radials each 130 feet long and made from #16 AWG electrical wire. I will add to this count as space allows on my small lot.

The six drop wires (#12 AWG) were attached to a loop of #10 AWG copper wire around the base of the tower.

#### **Receiving Antenna**

This was not discussed earlier, but some type of receiving antenna is a must, in my opin-



Figure 8 — Schematic diagram and parts list for the loaded monopole matching networks.

- C1 Approximately 650 pF vacuum variable capacitor (see text).
- C2 Approximately 500 pF vacuum capacitor (see text).
- C3 Approximately 400 pF vacuum capacitor (see text). I used two 200 pF units in parallel.
- K1, K2 SPST relays. Coil voltage selected based on available power supply. Contact
- rating depending on transmit power.
- L1 160 meter inductor, about 5  $\mu$ H, 19 turns  $\frac{1}{4}$  inch soft copper tubing, 3 $\frac{1}{2}$  inch inside diameter.
- L2 80 meter inductor, about 8 µH, 15 turns ¼ inch soft copper tubing, 3½ inch inside diameter, tapped at approximately 7 turns. L1 and L2 will need adjustment for different height towers.



Figure 9 — The base of the tower with the matching networks and balun.

ion, for serious DX work on these bands.

I purchased and installed a K9AY receive antenna from Array Solutions. I was not about to attempt Topband without a receive antenna. There's nothing noisier for receive than a vertical antenna, unless it's two phased verticals, which in my opinion are even worse.

**Matching the System** 

After many hours of trial and error,

changing capacitor and inductance values, the 160 meter and 75/80 meter networks were matched. The 80 meter match turned out to be the most hair pulling of the two. It was finally accomplished with a voltage fed setup. So how does the SWR look? See Table 1. Nice bandwidth, eh? Much better than the typical 25 kHz that I've had with a skinny commercial monopole.

#### **Results**

Does it work? You bet, and better than I expected! It's very broadbanded on both 160 and 80 meters. The monopole has exceeded all of the goals I had at the outset. And, I've been told that I'm *loud*.

When I started this project I had worked and confirmed seven DXCC entities on 160 meters by firing up any mismatched piece of wire or aluminum that hung in the backyard. Since my first monopole contact on 160 meters, I have now worked an additional 139 entities, as of March 2012, and 49 of 50 states. Entities worked include 4X, ZD7, ZD8, ZD9, ZL8, VK, 9L, 9Q, 5R, R1F, KP5, VK9M, VP8O and HK0/M. I have mainly concentrated on 160 meters, but have also had some excellent results on 80.

This project was costlier than expected because of the additional tower work that had to be done. It has, however, been worth the effort and cost because the results are very satisfying.

ARRL member Dennis Johnson, KF0QR, was first licensed as a Novice in 1991 with the call sign KB0IGU. He later advanced to Amateur Extra and obtained his current call. An avid DXer from the very beginning, Dennis has achieved DXCC Honor Roll, #1 Honor Roll and 5 Band DXCC with his current entities count at 343. He is interested in most modes including SSB, CW, RTTY and PSK31, 63 and 125. He's now been able to achieve DXCC in all three modes and on 160 through 10 meters.

His professional background consists of two years of electronics training leading to an Electronics Technician Certificate. He spent 14 years as an electronics technician/inspector on avionics hardware, and 23 years as Support and Lead Quality Engineer working on various military and commercial avionics programs for Honeywell. He next spent 7 years as a Quality/ Reliability Engineer working on medical imaging devices for Eastman Kodak Company. He retired in 2007, and now devotes a majority of his time to golfing and DXing. You can reach Dennis at 25266 Itasca Ave, Forest Lake, MN 55025 or at kf0gr@frontiernet.net.



## Whip It? Here's a simple HF antenna you can "whip" together in less than 10 minutes

#### Steve Ford, WB8IMY

There are probably as many ideas for portable HF antennas as there are people holding ham licenses. My approach isn't new, but it meets several critical requirements for outdoor operating ...

- Low weight and volume (easy to pack and carry)
- Multiband capability
- Ease of setup (single support; no trees or other structures necessary)

Field Day looms large as the prime candidate for such an antenna, as does outdoor operating in general. I've also given thought to hams who need something they can set up quickly in their back yards - and pull down just as quickly before it attracts the Homeowner Association enforcers.

Browsing through the advertising pages of *QST* one day, I noticed that MFJ Enterprises offered a telescoping whip antenna with a 3/8-24 threaded stud at the base, the model MFJ-1977. The 1977 telescopes from a mere 26 inches all the way to 12 feet with a total of seven sections. Made of aluminum, it weighs just a few ounces. You'll find the 1977 at www. mfjenterprises.com, and at a number of ham dealers. It sells for about \$45.

A 12 foot telescoping antenna is slightly longer than a quarter wavelength at 15 meters and it can be easily reduced to quarter wavelengths at 12, 10 and 6 meters. But what sort of mount would I attach it to?

#### Meet "Jaws"

Keeping in mind that low weight and small size were important criteria, more research among QST advertisers turned up Jaws. This is a portable antenna mount designed to attach to almost anything. Jaws has a set of stainless steel choppers that viciously clamp down on pipes, porch railings, wood dowels or any other support up to about 2 inches in diameter. It sports an adjustable 3/8-24 female receptacle married to an SO-239 coaxial cable connector on the opposite side.

Jaws is about the size of your fist and it's lightweight despite the rugged design. You'll find Jaws for sale at High Sierra (www.hamcg.com) and OuickSilver Radio Products (http://qsradio.com/Mounts.htm) for about \$35.

#### **Bringing It All Together**

I noticed that Jaws had a convenient hole on the bracket, which happens to be at ground potential. I slipped in a machine screw and nut/lock washer combo, turning the hole into an attachment point for a set of radial wires. I cut a total of eight 12 foot long insulated wires (just some stuff I had on hand), stripped the insulation from just one end of each wire and soldered the stripped ends together on a single spade lug. I eased the lug under the washer, tightened the nut and Jaws suddenly had a nice set of radials.

I dashed out to the back yard, clamped Jaws onto a piece of thick-wall PVC tubing, attached a length of RG-58 coaxial cable and unceremoniously jammed the tube into the soil. After laying out the radial wires in a neat circle, I screwed the MFJ whip into the Jaws mount.

For the next step I used an antenna analyzer, but an SWR meter will do the job as well. With the whip retracted, I grabbed the ball at the top and began fully extending each section, working my way down, until I reached a length of about 41/2 feet, or one quarter wavelength at 50 MHz. While checking the analyzer, I adjusted the last partially extended section until I measured an SWR below 1.5:1. With a permanent marker I drew a line on the whip at the point where the partially extended section emerged from the one below it and labeled the line "6 Meters." I pulled out more sections and made more measurements, finding the low-SWR points for 10, 12 and 15 meters and marking them as well. My "Jaws Whip," as I chose to call it, was now "calibrated."

I've since taken the Jaws Whip on several outings. With the radials wrapped around the PVC tube, the whole package easily fits into a backpack with room to spare. Within less than 10 minutes I can be up and running with a <sup>1</sup>/<sub>4</sub> wavelength vertical antenna on 15 through 6 meters. I just extend the whip sections to the marked lines and I'm good to go. Even at low power levels the performance has been impressive.

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

The Jaws Whip extended to 1/4 wavelength at 15 meters



**Click to watch** a demonstration of the Jaws Whip antenna



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

## A Look at Gasoline Powered Inverter Generators

#### **Portable power for your ARRL Field Day station**

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

The fall of 2011 was a difficult time for New England residents who experienced the effects of Tropical Storm Irene and a surprisingly heavy late October snowfall spaced a month apart. Both storms caused widespread power outages and those with backup generators maintained some comforts of normal life.

My generator is an inexpensive 1000 W ac generator powered by a two stroke 63 cc engine. It's enough to start our oil burner for heat and hot water, plus some lights and the TV. It's not enough to run the refrigerator effectively.

Generators I grew up with all ran at one speed - 3600 rpm (to produce 60 Hz) - and were noisy. Today there is a lot of interest in a type of generator that is technically advanced, more fuel efficient, lighter weight and quieter - the inverter generator. Inverter generators produce high voltage, multiphase ac that is rectified to dc — similar to an automobile alternator. This dc power is then converted back to very clean and consistent ac power by a solid state power inverter. A microprocessor controls the process as well as the speed of the engine. Unlike older constant speed generators, inverter generators can run at idle, providing power to small devices. If demand for more power appears at the generator's outlet, engine speed increases. This feature is intended to improve fuel economy and can be switched on or off. (The various manufacturers have different names for this feature, but the concept is the same and I'll refer to it as ECONOMY mode throughout the review.)

For this review we chose four widely available inverter generators in the 2000 W class — the Champion 73536i, Generac iX2000, Honda EU2000i and Yamaha EF2000iS. All of the units were available locally from power equipment dealers, outdoor stores, industrial suppliers or box stores in the \$600 to \$1000 range. Prices shown in the tables are what we paid but will vary depending on dealer. Other inverter generator models are available with lower or higher power ratings. Generators in this class provide enough power for a light duty, backup power source at home or to run a power tool on the job. But how well do they work in a radio environment? All four appear to be attractive candidates for ARRL Field Day or emergency operation and so we conducted a variety of tests to determine how "radio friendly" each of these generators is.

#### **The Tests**

*Load Test:* Each generator was connected to a load consisting of two strings of incandescent light bulbs adjustable from 0 to 2500 W in 50 W steps. We measured the generator output voltage, frequency and sound level as the load increased up to the maximum rated output. In each case, the sound level was measured with a calibrated instrument at a distance of 9 meters from the muffler side of the generator. Sound levels will vary depending on location.

*Power per Gallon Test:* Each generator was run out of fuel, refueled with precisely one cup of gasoline, then restarted and placed on a 1000 W load until it again ran dry. Running time was noted and used to calculate kilowatt hours per gallon of gas (kWh/G).

*Waveform Test:* The Lab's Tektronix TDS-3052B storage oscilloscope captured the ac waveform during no-load and full-load conditions. Waveforms for each generator are available online.<sup>1</sup>

*No-Load to Full-Load Test:* Using the oscilloscope at a slow sweep speed, measurements were made at the point at which a full load was applied to the generator from a no load condition. This tough test shows how

<sup>1</sup>Additional ARRL Lab test results are available online at www.arrl.org/qst-in-depth.

#### **Bottom Line**

Inverter generators have advantages over normal ac generators, but have some disadvantages as well. With additional filtering, they can be made "radio friendly." quickly a generator responds to a drastic load change with ECONOMY mode on or off. Oscilloscope plots from this test are available online (see Note 1).

*Conducted Emission Test:* Conducted emission can have a major impact on Field Day or emergency operation as wideband RF noise is injected into the power wiring that then acts as an antenna. For our tests, we used a 100 foot extension cord. Each generator was swept for conducted emission using a Rohde & Schwarz LISN (Line Impedance Stabilization Network) and a Rohde & Schwarz EFH3 handheld spectrum analyzer.<sup>2</sup>

Radiated Emission Test: Each generator was placed on a cart and rolled around near a 40/20 meter dipole (15 feet high) to check for radiated emission from the electronics or ignition system. A nearby battery powered transceiver attached to the dipole (our simulated Field Day setup) listened for changes in noise level or ignition noise while I tuned up and down each band. The transceiver was also used for listening to conducted emissions with an extension cord plugged into a generator.

*Circular Saw Test:* Chances are you will need a generator to power a tool. I tried to run a 15 A maximum circular saw with each generator.

#### Safety

Before operating a power generator, carefully read the operator's manual and safety precautions. All four generator manuals recommend grounding the generator and determining local grounding codes. If you have any questions about wiring or grounding a power generator, ask a licensed electrician.

I recommend using an in-line ground fault circuit interrupter (GFCI) outlet with each generator. They are available online or in most hardware stores or home centers. If you plan to use a generator during power outages at home, have an electrician install a transfer switch to isolate the generator from the power lines.

<sup>2</sup>See April 2009 *QST*, page 48 for an explanation of conducted emission level limits.

#### Four Generators with a Lot in Common

All four generators weigh less than 50 pounds (dry) and have a durable, brightly colored plastic shell that holds up well when bumped or scraped. All are fairly close in size, about as big as a 1980s boom box, with comfortable handles to move them about. You shouldn't have much trouble loading any of them into your vehicle and transporting them to a portable operating location.

All have single cylinder, four stroke engines and require slightly less than  $\frac{1}{2}$  quart of oil in the crank case. Each has a low oil level shut-off feature, a good thing for those who forget to add oil before starting for the first time or who are lax on maintenance. Each has a slightly recessed exhaust pipe, reducing the risk of painful burn blisters.

Each generator produces a clean, stable 60 Hz ac waveform, suitable for running radio gear, computers or other sensitive electronics. Each has two 120 V, 20 A ac outlets. All have a 12 V dc battery charging outlet, though it is for the charging of a small automotive or lawn tractor sized battery only. The 12 V dc output waveform is full of transients and is unregulated - don't try running any 12 V device from this outlet!

All but the Generac have the ability to run two identical units in parallel with an optional cable to essentially double the power capability without sacrificing portability. There is no provision for using two generators to create 240 V ac.

To improve fuel economy and reduce noise when the generator is lightly loaded, each has an ECONOMY switch. With ECONOMY switched on, the generator runs at an idle speed with up to 300 W or so output. With ECONOMY off, the engine runs at a much

higher speed, ready for a sudden increase in demand for power.

Annoyingly for me, a lefty, all of the generators are designed to be started by a righthanded person. Fortunately, the recoil starter handle was very easy to pull on all but one of them.

Although the generators are similar in specifications, features and appearance, we found many differences in performance.

#### Champion 73536i

This bright yellow and black 1700 W (2000 W surge) inverter generator reminds me of a road hazard sign. In the box I was pleased to find the manual, a container of motor oil, funnel, spark plug wrench and battery charging cable.

For description sake, let's pretend this generator is an automobile, with the exhaust pipe at the back. The Champion has the controls clustered around the pull cord,

on two panels on the right side. Three LEDs — a yellow OIL WARNING light, red OVERLOAD light (lights at 1800 W threshold) and the green OUTPUT light — are at the top left. To the right of the LEDs are the ECONOMY and engine on/off switches. Below the LEDs are the choke knob and fuel shutoff valve. On the bottom panel, the top row has the ac outlets and a socket for the optional parallel operation cable. The bottom row features outlets used during parallel operation, the battery charging outlet, dc circuit breaker and a ground terminal.

On top are a vented gas cap and carrying handle. Large vents at

Conducted Emissions; Quasi-Peak Detection 100 Honda 90 Champion . Yamaha Generad 80 Magnitude [dBµV] 70 60 50 40 30 20 0 6 12 18 24 30 Frequency [MHz] QS1206-ProdRev01

Figure 1 — Conducted emissions from the inverter generators.

50

the front and back ends provide cooling. The left side engine access panel is secured with four screws without retaining clips so be careful if you remove them. The exhaust has a spark arrestor.

Unlike the other three generators, round pillars dominate each corner of the plastic shell. They are designed to fit a matching generator so the two units can be stacked vertically and run in parallel. This is a smart idea that takes up less surface area and presents less of a trip hazard from the cabling.

The manual is well written and has a wiring diagram, but what impressed me most was the exploded parts diagram complete with a parts list. The mechanically inclined can repair this generator at home. The Champion meets California clean air standards and gets 3 out of 10 on the green scale (0 is the cleanest).

#### Champion 73536i, s/n 11MAY1801016

Engine: four stroke, single cylinder, 80 cc. Fuel capacity: 1 gallon. AC output: 120 V at 60 Hz. Power output: 1700 W, 2000 W surge. DC output: 8 A at 12 V dc (battery charger). Weight: 49.2 pounds (dry). Size (HWD): 16.3 × 19.3 × 13.3 inches. Price: \$599

<i>Lab Tes</i> Load (W)	<i>ting: Load</i> Output (V ac)	<i>Test, Eco On</i> Frequency (Hz)	Sound Level* (dBa)	
0	124.5	59.9	61.0	
100	124.5	59.9	61.0	
250	124.2	59.9	62.0	
500	123.6	59.9	63.5	
1000	121.5	59.9	69.0	
1500	119.9	59.9	72.2	
1700	119.8	59.9	73.5	
Eco off	No load		66.2	
Fuel efficiency: 4.333 kWh/G				

\*See text.



#### Testing

After the usual oiling, fueling and choking, the Champion came to life on the first pull. The pull was smooth and easy. I let this generator and the others run about 15 minutes before testing.

Voltage varied a reasonable 4.7 V from no-load to full-load. Response from no-load to full-load was fast with the ECONOMY switch off and took 1.5 seconds to come up to full voltage with the ECONOMY switch on (more on this type of response later). With a 2000 W load, the generator provided power for one minute before the ac switched off. The motor still runs in this condition and has to be shut off to reset the circuit breaker.

As shown in Figure 1, conducted emission was quite high with RF radiated from the extension cord causing high noise levels across most of the HF bands. Ignition noise was eliminated by moving the generator 30 feet away from the antenna. The fuel economy test produced 4.333 kWh/G, the lowest of the four generators. Unfortunately, the Champion 73536i failed to run a circular saw, with the OVERLOAD light lighting and the ac shutting down in both ECONOMY modes.

*Manufacturer*: Champion Power Equipment, 10006 Santa Fe Springs Rd, Santa Fe Springs, CA 90670; tel 877-338-0999; www.championpowerequipment.com.

#### **Generac iX2000**

This orange 2000 W (2200 W surge) inverter generator has the largest displacement engine at 127 cc and can provide more power than the rest. It came with an orange funnel for adding oil, a bottle of motor oil, a two wrench set and a battery charging cable.

The right side of the generator has the pull cord, fuel valve and choke control. The front end contains the control panel. At the top are a yellow LOW OIL LEVEL light, a red OVERLOAD light and a green READY light. Below the LEDs is the dc battery charger socket with circuit breaker. To the right are two ac outlets and at the bottom, the engine on/off switch and ground lug. The engine access panel is released by loosening only one screw, which has a retaining clip. At the top is a vented fuel cap that also has a little priming pump. The front and back are well vented. There was no spark arrestor at the end of the exhaust pipe.

The manual didn't indicate that this model Generac meets California emission standards. I checked the website and found this model to be compliant in 49 states. The manual is adequate but does not provide

#### Generac iX2000i, s/n 6463450C

Engine: four stroke, single cylinder, 127 cc. Fuel capacity: 1 gallon. AC output: 120 V at 60 Hz. Power output: 2000 W, 2200 W surge. DC output: 5 A at 12 V dc (battery charger). Weight: 49.6 pounds (dry). Size (HWD): 18 × 22 × 12 inches. Price: \$589

<i>Lab Tes</i> Load (W)	ting: Load Output (V ac)	<i>Test, Eco On</i> Frequency (Hz)	Sound Level* (dBa)
0	121.5	60	72.4
100	121.3	60	72.1
250	121.1	60	69.0
500	121.3	60	71.6
1000	121.2	60	73.4
1500	120.8	60	74.1
2000	120.4	60	74.1
Eco off	No load	60	73.4
Fuel efficiency: 4.390 kWh/G			
*See tex	t.		



a wiring diagram as found in the other manuals.

#### Testing

Before I could start this unit, I had to clip off a needle-like projection on the choke control. It appeared to be an injection molding flaw with the plastic. Bandaged up and aggravated by my injury, I failed to carefully read the manual. After nearly pulling my arm off, I discovered that the engine must be primed by a pump built into the gas vent on the gas cap. Once primed, it started on the third pull. Each pull was not smooth and unlike the other generators, I could feel some compression from the piston moving in the cylinder.

The load test was interesting. In the ECONOMY

mode, the engine speed was slow to pick up as the load gradually increased. Each time a light bulb was turned on in the string, the motor speed hunted around a bit before settling down. This was by far the noisiest generator of the lot, with or without a load. During testing, it vibrated to the point where the engine access panel screw unscrewed itself. The Generac ran at its specified peak load of 2200 W for 10 seconds before shutting off both the ac and the engine. I tried but could not get the OVERLOAD LED to light before shutdown. The Generac had the lowest voltage variation between no-load and full-load conditions, only 1.1 V.

During the no-load to full-load test the Generac responded poorly with ECONOMY mode on or off. There was a noticeable delay before the generator got up to full voltage output. With ECONOMY mode switched on, there was a total dropout of power for a brief moment.

Some good news: the conducted emission (Figure 1) was lower than the Champion or Yamaha but was still quite noticeable in the receiver. Radiated emission was stronger and the generator had to be moved 50 feet away from the test antenna for the ignition noise to subside.

Even with its larger displacement engine, fuel economy was just a bit better than the smaller 80 cc Champion engine, providing 4.390 kWh/G. The Generac iX2000 passed the circular saw

test, but the saw was slow to come up to speed. You may get impatient with this generator if you have a lot of wood to cut.

*Manufacturer*: Generac Power Systems, S45 W29290 Hwy 59, Waukesha, WI 53187; tel 888-436-3722; **www.generac.com**.

#### Honda EU2000i

This red 1600 W (2000 W maximum) inverter generator carries the highest list price of the four, although we got ours from longtime *QST* advertiser Mayberry Enterprises for \$899 including shipping. The Honda arrived with only a manual and no other accessories.

The right side of the generator has the pull

cord, fuel valve and choke lever. Engine access is on this side as well, the cover secured by one screw with a clip. Indicators and outlets are at the front. Top row: ECONOMY mode switch, parallel operation outlets and ac outlets. Bottom row: a red OIL ALERT light, a red OVERLOAD light (lights at 2200 W threshold) and a green OUTPUT light. The OUTPUT LED also acts as a simplified run-time hour meter. It blinks once after 100 hours of operation, twice for 200 hours and so on. The front and back have large vents for cooling and there is a spark arrestor on the exhaust. This particular model does not meet California emission standards. though Honda offers a similar model available for sale in California. The manual is very good and includes everything needed to know to run and maintain the unit.

#### Honda EU2000i, s/n EAAJ-2263469

Engine: four stroke, single cylinder, 98.5 cc. Fuel capacity: 0.95 gallons. AC output: 120 V at 60 Hz. Power output: 1600 W, 2000 W maximum. DC output: 8 A at 12 V dc (battery charger). Weight: 45.6 pounds (dry). Size (HWD): 16.7  $\times$  20.2  $\times$  11.4 inches. Price: \$899

<i>Lab Test</i> Load (W)	t <i>ing: Load</i> Output (V ac)	<i>Test, Eco On</i> Frequency (Hz)	Sound Level* (dBa)	
0	127.2	59.9	61.6	
100	127.0	59.9	61.6	
250	126.4	59.9	62.0	
500	125.7	59.9	63.3	
1000	124.4	59.9	66.5	
1500	123.0	59.9	70.0	
1600	122.7	59.9	71.0	
Eco off	No load		67.4	
Fuel efficiency: 4.480 kWh/G				

\*See text.



#### Testing

The Honda EU2000i started on the first pull. I found the voltage to be a bit high, 127 V ac output with a 100 W load. The voltage varied 4.6 V from no-load to full-load. With the highest loads, the Honda was quiet with very little visual vibration. The no-load to full-load response was the best of the four. I ran the Honda with a 2000 W load for its rated 30 minutes with not one hint of overheating or straining.

While the Honda has levels of conducted emission as high as the other three on 160 meters, the levels drop off quickly, making this the least offending inverter generator in this department. See Figure 1. Though some noise can be heard, a receiver is usable with this generator attached to an extension cord. Ignition noise was fairly low as well.

> The 98.5 cc engine provided 4.480 kWh/G, number two in the fuel economy department. The Honda powered a circular saw flawlessly in both ECONOMY modes.

*Manufacturer*: American Honda Power Equipment Division, 4900 Marconi Dr, Alpharetta, GA 30005; tel 770-497-6400; **powerequipment.honda.com**.

#### Yamaha EF2000iS

This royal blue 1600 W (2000 W maximum) inverter generator included a manual, spark plug wrench and battery charging cable.

On the right side is the control panel, arcing around the pull cord handle. At the top of the panel are a red OIL WARNING light, a green AC pilot light and a red OVERLOAD indicator. While testing, I found the OVERLOAD indicator illuminated at the 1850 W threshold. Lower on the control panel are a black ECONOMY mode switch and a red engine on/off switch. About halfway down are the fuel shutoff valve and a choke control that must be pulled out when starting the engine. Below the choke are terminals for running two generators in parallel and two ac outlets. At the bottom of the control panel are the dc receptacle, dc circuit breaker and ground terminal.

At the top are a carrying handle and a vented fuel tank cap. The Yamaha is the only generator of the four with a fuel gauge, although I noticed the generator ran a long time while the gauge read E. The front and rear sides have large vents for cooling. The exhaust pipe has a spark arrestor. The left side of the unit has two screws (no retaining clips) that secure the engine access panel.

The manual is clearly written with ample illustrations and instructions for servicing the generator. A wiring diagram is included. This generator meets California air pollution standards and rates 3 out of 10 on the green scale.

#### Testing

After filling the EF2000iS with oil and fuel, I pulled out the choke rod and gave it one easy, slow pull. It started! After a few seconds, I pushed the choke rod in and the Yamaha settled down into a soft purr with ECONOMY switched on.

The Yamaha overall was the quietest at low rpm. No vibrations of the case were noticed, even at full load. The output varied 5 V ac from no-load to full-load — reasonable, but the most output change of the four generators. The no-load to full-load testing showed a very slow but steady response with ECONOMY mode on, but a very quick recovery with ECONOMY mode off. I placed the Yamaha on a 2000 W load. In 20 seconds, the overload circuitry kicked in and shut off the ac and the engine.

Figure 1 shows the conducted emission of the Yamaha is very high all the way up through the 20 meter band. We placed the generator 100 feet away from the operating table with the extension cord running perpendicular to the test dipole antenna, which was an additional 30 feet away. On the battery powered transceiver, an S9 level of noise peaks with slightly lower levels of hash were heard across 40 meters and S8 across 20 meters — all with the generator in the ECONOMY mode, at idle. Increasing the demand increased the noise level. Clearly, there is a need for filtering at the ac outlet (more on that later).

With the extension cord unplugged and the Yamaha running with the ECONOMY mode off, the radiated emission was found to be mostly from the ignition system. With the generator parked directly under the antenna (15 feet up), a few S units of ignition noise from the spark plug was observed. Turning on the receiver's noise blanker removed all of it; moving the generator 30 feet away (off the broad side) also reduced the ignition noise to nothing.

The Yamaha EF2000iS won the fuel economy test by a significant margin, creating 5.37 kWh/G. I suspect this is due to the generator's small 79 cc displacement. The engine ramps up quickly in the no-load to full-load test, so for power tools I would leave ECONOMY mode on.

#### Yamaha EF2000iS, s/n 7DK 1516423

Engine: four stroke, single cylinder, 79 cc. Fuel capacity: 1.11 gallons. AC output: 120 V at 60 Hz. Power output: 1600 W, 2000 W maximum. DC output: 8 A at 12 V dc (battery charger). Weight: 44 pounds (dry). Size (HWD): 17.9  $\times$  13.3  $\times$  11.0 inches. Price: \$990

Lab Testing: Load Test, Eco On			
Load (W)	Output (V ac)	Frequency (Hz)	Sound Level* (dBa)
0	124.6	60	59.9
100	124.3	60	60.0
250	122.7	60	60.0
500	123.0	60	62.4
1000	121.5	60	66.8
1500	120.1	60	71.0
1600	119.6	60	71.0
Eco off	No load		67.4
Fuel efficiency: 5.347 kWh/G			

\*See text.



*Manufacturer*: Yamaha Motor Corp, 6555 Katella Ave, Cypress, CA 90630; tel 800-962-7926; **www.yamaha-motor.com**.

#### **Conclusions and Observations**

A radio amateur's requirements for portable power are different from those of the average user. A homeowner's generator, acting as a backup power supply, usually works with fairly static loads. Power demand usually stays at one level for a while. On the other hand, a generator used for powering an SSB, AM or CW station is faced with a dynamic load, one that changes rapidly with modulation or on/off keying. How do these generators respond to dynamic loads?

I set up a 200 W transmitter and 300 W of incandescent lighting. With ECONOMY mode on, 300 W is just below the threshold of increased engine rpm. As I keyed the transmitter, each generator would try to respond to the increased load by momentarily trying to raise its rpm. Before the engine speed could



**Figure 2** — Conducted emissions from the Yamaha EF2000iS inverter generator with no filtering (blue line), a commercial Corcom filter (green line) and a filter built in the ARRL Lab (purple line).

respond, the increased load disappeared. Keying slowly, I could make all but the Generac make the sound of a grunt or laugh. Also, the line voltage would momentarily dip while keying; the Generac responded poorly to this test by speeding up and slowing down in an erratic manner. Though no chirp was detected in my test receiver, I did this test with only one transmitter. I suspect some transmitters may wobble in frequency or chirp with a momentary voltage dip. I would recommend leaving ECONOMY mode off so that the engine runs at a higher speed, ready for a momentary increase in load while transmitting.

An option is to use the generator to operate one or more battery chargers and run all transceivers from battery power. That way it is possible to take advantage of the ECONOMY mode, provided that the generator output is filtered, which leads me to the next topic.

#### **Conducted Emissions**

The biggest finding of this review is the high

conducted emission levels of these inverter generators. My little 1000 W conventional ac generator has very low conducted emission levels, but the output waveform has a harmonic in it and is not nearly as clean as the inverter output. As with inverters used to generate ac from batteries, inverter generators are power generating devices and don't plug into a wall outlet, so they are not held to FCC Part 15 conducted emission level limits.

There are two ways to attack this problem - buy a commercially made filter or build one. Figure 2 shows the Yamaha's conducted emission with no filter, with a commercially made filter made from Corcom (www.cor. com), and with a homemade filter whipped up by the ARRL Lab's RFI expert, Mike Gruber, W1MG. Most of the conducted emissions are common mode, though some is also differential mode. The amount of each mode may vary with different model inverter generator. Mike believes with some experimentation, patience and some 2.4 inch diameter type 31 toroids (www.fair-rite. com), the owner of an inverter generator can greatly reduce the conducted emission level. More information is available online at www. arrl.org/products-and-other-information (click on AC Line Filters).



Click to see an overview of four portable generators

## A Look at HF Triplexers and Bandpass Filters

Reviewed by Mark Wilson, K1RO Product Review Editor and Bob Allison, WB1GCM ARRL Test Engineer

In June 2010 *QST*, Gary Gordon, K6KV, described an HF triplexer he designed to allow his club to share a single triband Yagi among several stations at ARRL Field Day.<sup>3</sup> With the triplexer and suitable bandpass filters, the 20, 15 and 10 meter stations — all with typical 100 W transceivers — could use the tribander at the same time without risk of damage to the radios. Anyone who has helped set up a Field Day station knows how much time and effort it takes to erect a support and a Yagi. Why not put up one good antenna and use it on two or three bands?

Soon *QST* readers were building K6KV triplexers for use at Field Day, at the 2010 World Radiosport Team Championship in Russia and at low power multioperator and single operator, two radio contest stations. Using a triplexer does create one new wrinkle: Which station has priority over the rotator controller when the bands are open in different directions at the same time?

This month we'll take a look at two commercially available triplexers from Dunestar Systems and International Radio (Inrad), along with 20, 15 and 10 meter bandpass filters from Dunestar and W3NQN/Array Solutions. When considering any of these devices for your station, it's important to keep in mind several things:

• They're intended for low power operation only — up to 200 W per band. You'll need a different solution if you want to use an amplifier.

• The triplexer alone does not provide enough isolation between bands. You must use bandpass filters in conjunction with the triplexer to prevent receiver damage and minimize interstation interference.

• Your antenna must present a low SWR on 20, 15 and 10 meters simultaneously. A triband Yagi or trap vertical are good examples. A nonresonant antenna that requires an antenna tuner or one that changes element lengths or matching networks to switch bands is not compatible.

The triplexers and filters reviewed here are good for Field Day or contest stations with a

<sup>3</sup>G. Gordon, K6KV, "HF Yagi Triplexer Especially for ARRL Field Day," QST, Jun 2010, pp 37-40. separate transceiver dedicated to each band. If you plan to use your transceivers on multiple bands, some sort of switching will be needed to avoid swapping cables at each band change.

#### Testing

In the Lab, ARRL Test Engineer Bob Allison, WB1GCM, tested the triplexers and bandpass filters individually and in combination, using the Lab's HP8563E spectrum analyzer and tracking generator. Bob measured insertion loss of the triplexers and bandpass filters at the high and low end of each band. For the triplexers, this test was conducted with bandpass filters and 50  $\Omega$ terminations on the unused ports.

Isolation among the three bands was tested by placing a 50  $\Omega$  resistive load at the triplexer output jack, injecting a signal into two of the transceiver ports (one at a time) and measuring the rejection at the third port. Rejection was also checked with a 100  $\Omega$ resistive load at the triplexer output to simulate an antenna with a 2:1 SWR. One valuable discovery was the importance of terminating the unused triplexer transceiver port if you are using only two of the three bands. The amount of rejection sometimes is lower by several dB without termination. A low wattage 50  $\Omega$  resistor across an unused port would work.

Finally, Bob tested two combinations: the Dunestar triplexer with Dunestar filters, and the Inrad triplexer with W3NON filters. For this test, transceivers were connected to two of the bandpass filters and individually adjusted for 100 W at the triplexer output with a 50  $\Omega$  resistive load. An HP437B power meter measured power that would be seen by a receiver connected to the third filter. The test was performed with one transmitter, then the other transmitter, then both transmitting at the same time. With both transmitting, one transceiver was swept up and down the band while the other stayed on a fixed frequency. Then the role of each transceiver was reversed. No significant changes in power at the third port were observed.

How much power can the receiver in a

#### **Bottom Line**

An HF triplexer and suitable bandpass filters can make one multiband antenna do double or triple duty while protecting transceivers from damage. modern transceiver safely handle? That's one specification that you likely won't find in a transceiver manual. K6KV's original triplexer article indicated that rigs are generally safe with up to 1 W (+30 dBm) of RF at their antenna connectors. The Inrad triplexer instructions indicate that about +17 dBm (50 mW) is safe (reference: *Managing Interstation Interference* by George Cutsogeorge, W2VJN). ARRL Lab receiver test levels generally don't exceed +10 dBm (10 mW). The triplexers reviewed here, used in conjunction with bandpass filters, ensure that less than 1 mW (0 dBm) reaches the receiver input.

The other consideration is receiver overload from signals from the other transmitters using the triplexer. Let's take a look at Product Review testing on a typical mid-range Field Day radio. The 20 kHz blocking dynamic range is 134 dB at 14 MHz, with sensitivity (MDS) at -129 dBm. The blocking level is +5 dBm in this case; a +5 dBm (3 mW) signal 20 kHz away will cause interference in the receiver. Software defined radios (SDRs) typically have no blocking effects up to the threshold of clipping. That may be an issue with a triplexer/filter setup, depending on the input filtering of the SDR's A/D converter. Lab testing with SDRs indicates that the clipping threshold could be -16 to 0 dBm. If clipping occurs from an out of band signal, an attenuator must be used.

#### Dunestar Model 333 HF Triplexer and Model 300 Bandpass Filters

Dunestar's Model 333 triplexer (Figure 3) is housed in a sturdy aluminum box with SO-239 connectors for the antenna on one side and 20, 15 and 10 meter bandpass filters and transceivers on the other. No power supply or adjustments are required — just hook up the cables and go. We ordered the combination package that included the triplexer, three bandpass filters (Figure 4) and three double male barrel connectors.

Note that the Dunestar 333 works over the entire 15 and 20 meter bands but is rated for 28 to 28.7 MHz on 10 meters. The 300-28 10 meter bandpass filter carries the same rating. Both devices still work higher in the band, but insertion loss starts to rise quickly above 28.5 MHz. For some tests we had to use the transceiver autotuner to prevent SWR foldback at 28.5 MHz and higher as the SWR at the filter input approached 2:1. Dunestar notes that a typical unit would show 1.5:1 at 28.7 MHz.

Table 1

#### Dunestar Model 333 HF Triplexer

#### Manufacturer's Specifications

Insertion loss: 0.3 to 0.4 dB typical. Attenuation to adjacent band: ≥12 dB typical. Power handling: 200 W PEP intermittent. Size (HWD):  $3 \times 5 \times 7$  inches, weight 1.3 pounds. Price: \$195

#### **ARRL Lab Testing** Frequency **Insertion Loss** (MHz) (dB) 0.30 14.000 14.350 0.38 21.000 0.39 21.450 0.39 28.000 0.53 28.500 0.60 1.10 (rated to 28.7 MHz) 29.000

Input Signal (MHz)	1:1 SWR Rejection (dB)	2:1 SWR Rejection (dB)
<b>Rejection at</b> 1 21.000 21.450	14 MHz Port 18.6 18.9	20.1 21.1
28.000 29.000	31.1 25.8	25.5 28.4
Rejection at 2 14.000 14.350 28.000 29.000	20.5 20.0 17.4 21.0	23.5 23.5 21.0 24.5
<b>Rejection at 2</b> 14.000 14.350 21.000 21.450	28 MHz Port 27.1 26.8 18.9 18.6	29.3 29.5 21.7 21.8



Figure 3 -Dunestar Model 333 triplexer.

#### Table 2 **Dunestar 300 Series Bandpass Filters**

#### **Manufacturer's Specifications**

Insertion loss: 0.5 to 0.7 dB typical. Rejection: 40 dB band to band typical. Power handling: 200 W PEP. Size (HWD):  $2 \times 2 \times 6$  inches, weight 8 oz. Price: \$73 each; triplexer/filter package, \$399

<i>\\</i> 0000.	
ARRL Lab Tes	sting
Model 300-14	(20 meter)
Frequency	Insertion Loss
(MHz)	(dB)
14.000	0.80
14.350	0.76
21.000 21.450 28.000 29.000 29.700	<b>Rejection (dB)</b> 29.2 31.0 38.3 39.3 40.0

Model 300-	21 (15 meter)
Frequency	Insertion Loss
(MHz)	(dB)
21.000	0.57
21.450	0.67
14.000 14.350 28.000 29.000 29.700	<b>Rejection (dB)</b> 40.0 38.5 29.8 30.5 31.7
Model 300-	28 (10 meter)
Frequency	Insertion Loss
(MHz)	(dB)
28.000	0.41
29.000	0.80 (rated to 28.7 MHz)
14.000 14.350 21.000 21.450	<b>Rejection (dB)</b> 63.2 61.7 29.9 29.4

A label on the triplexer case warns: "Appropriate bandpass filters MUST be connected between the inputs and your transceiver or SERIOUS DAMAGE WILL RESULT." As shown in Table 1, the Dunestar 333 by itself offers about 17 to



Figure 4 — Dunestar 300 series bandpass filters.

#### Table 3 **Dunestar Triplexer and Dunestar Filters**

Measured power at the 20 meter	filter
100 W into 15 meter filter	0.37 mW
100 W into 10 meter filter	0.01 mW
Both of the above	0.38 mW
Measured power at the 15 meter	filter
100 W into 20 meter filter	0.02 mW
100 W into 10 meter filter	0.36 mW
Both of the above	0.39 mW
Measured power at the 10 meter	filter
100 W into 20 meter filter	0.03 mW
100 W into 15 meter filter	0.36 mW
Both of the above	0.39 mW

30 dB of rejection depending on the combination of bands used. With 100 W transceivers, a couple of watts of RF can be present on the ports for adjacent bands - enough to damage your receiver. Dunestar's 300 series bandpass filters provide an additional 30 to 63 dB of rejection (Table 2). As shown in Table 3, with the combination of triplexer and bandpass filters, a receiver typically will see about 0.4 mW (-6 dBm) with 100 W transceivers transmitting into the other ports. The worst case measured with any combination of frequencies was 0.64 mW (-2 dBm).

Manufacturer: Dunestar Systems, PO Box 37, St Helens, OR 97051; tel 800-457-1690; www.dunestar.com.

#### **Inrad HF Triplexer**

Inrad's HF Triplexer (Figure 5) is also housed in an aluminum box with SO-239 connectors for the antenna on one side and 20, 15 and 10 meter bandpass filters and transceivers on the other. The triplexer is adjusted at the factory and ready for operation throughout the 20, 15 and 10 meter bands. As shown in Table 4, insertion loss proved to be consistent across the entire 10 meter band.

The instructions include quite a bit of information about calculating safe receiver power levels and preventing receiver overload or blocking. Although the triplexer label says



#### Table 4 <u>Inrad HF Triplexer, s/n 011</u>

#### Manufacturer's Specifications

Insertion loss: 0.25 to 0.35 dB typical. Attenuation to adjacent band: 20 to >40 dB. Power handling: 200 W ICAS,  $\leq$ 1.5:1 SWR. Size (HWD): 3 × 5 × 7 inches, weight 1.6 pounds. Price: \$325

Frequency (MHz)	Insertion Los (dB)	S
14.000 14.350 21.000 21.450 28.000 29.000 29.700	0.23 0.41 0.33 0.33 0.34 0.36 0.31	
Input Signal (MHz)	1:1 SWR Rejection (dB)	2:1 SWR Rejection (dB)
Rejection at 1 21.000 21.450 28.000 29.000 29.700	<b>4 MHz Port</b> 32.4 33.8 45.9 46.2 47.1	32.9 33.8 45.2 46.4 46.9
<b>Rejection at 2</b> 14.000 14.350 28.000 29.000 29.700	26.9 26.1 23.8 26.6 28.4	29.5 29.0 24.2 30.0 28.5
<b>Rejection at 2</b> 14.000 14.350 21.000 21.450	28 MHz Port 33.5 33.1 21.0 20.2	36.2 36.1 23.6 22.4

that "additional outboard bandpass filters may be required," the manual goes on to say that filters must be used unless the transmitter power is very low (less than a watt).

The Inrad triplexer provides about 20 to 47 dB of rejection depending on the combination of bands used. With 100 W transceivers, up to 1 W of RF can be present at the ports for adjacent bands without additional filtering. To ensure safe receiver operation we ordered some W3NQN bandpass filters (see below).

*Manufacturer*: International Radio, PO Box 2110, Aptos, CA 95001; tel 831-462-5511; **www.inrad.net**.

#### W3NQN Single Band Bandpass Filters

In May and June 1998 *QST*, ARRL Technical Advisor Ed Wetherhold, W3NQN, described a series of bandpass filters with low insertion

<sup>4</sup>E. Wetherhold, W3NQN, "Clean Up Your Signals with Bandpass Filters." QST, May 1998, pp 44-48 and June 1998, pp 39-41.

#### Table 5 W3NQN Bandpass Filters

#### Manufacturer's Specifications

Insertion loss: <0.3 dB typical. Rejection: 2nd harmonic, 50 to >75 dB. Power handling: 200 W CW, RTTY, SSB. Size (HWD): 2 × 3 × 6.5 inches, weight 11 oz. Price: 10 meters, \$125; 15 and 20 meters, \$105.

ARRL Lab Te 20 Meter Bar Frequency (MHz)	esting ndpass Filter Insertion Loss (dB)	
14.000 14.350	0.17 0.19	
21.000 21.450 28.000 29.000 29.700	<b>Rejection (dB)</b> 29.7 32.6 >70 >70 >70	
15 Meter Bar Frequency (MHz)	ndpass Filter Insertion Loss (dB)	
21.000 21.450	0.53 0.57	
14.000 14.350 28.000 29.000 29.700	<b>Rejection (dB)</b> 34.8 34.4 66.3 >70 >70	
10 Meter Bar Frequency (MHz)	ndpass Filter Insertion Loss (dB)	
28.000 29.000 29.700	0.62 0.64 0.71	
14.000 14.350 21.450	Rejection (dB) 63.8 62 55.8	

loss and a deep notch at the second harmonic.<sup>4</sup> Ed now produces these filters commercially and they are available through Array Solutions. We purchased the 20, 15 and 10 meter versions for use with the Inrad triplexer. Of course they could be used with the Dunestar triplexer as well, or the Dunestar

#### Table 6 Inrad Triplexer and W3NQN Filters

Measured power at the 20 met 100 W into 15 meter filter 100 W into 10 meter filter Both of the above	er filter 0.02 mW <0.001 mW 0.02 mW
Measured power at the 15 met 100 W into 20 meter filter 100 W into 10 meter filter Both of the above	er filter 0.01 mW <0.001 mW 0.01 mW
Measured power at the 10 met 100 W into 20 meter filter 100 W into 15 meter filter Both of the above	er filter <0.001 mW <0.001 mW <0.001 mW

filters could be used with the Inrad triplexer.

Table 5 shows that the W3NQN filters provide rejection of 30 to more than 70 dB depending on the frequency combination. Used with the Inrad triplexer, with 100 W transceivers, a receiver typically will see 0.02 mW (-17 dBm) or less with 100 W transceivers transmitting into the other ports. The worst case measured with any combination of frequencies was 0.025 mW (see Table 6).

*Distributor:* Array Solutions, 2611 North Beltline Rd, Suite 109, Sunnyvale, TX 75182; tel 214-954-7140; **www.array solutions.com**.

#### Conclusion

On-air testing confirmed the results observed in the ARRL Lab and reported in K6KV's *QST* article: With either triplexer and suitable bandpass filters, it's possible to use a single triband antenna on two or three bands simultaneously with no worries about receiver damage.

Interstation interference won't be an issue either in most cases. The only exception we noticed occurred with the Dunestar triplexer and filters while listening on 10 meters with an SDR and transmitting at the high end of 15 meters. The -2 dBm signal at the 10 meter bandpass filter output was enough to raise the receiver noise level 10-15 dB. We didn't observe any interstation interference at these frequencies with several conventional receivers.



Figure 6 — W3NQN bandpass filters.

#### The Doctor is In

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



## It's Never Good to Push the Envelope Too Far!

Ken, KC8Y, asks: On 80 through 10 meters, I use a 300 W rated off-center-fed (OCF) dipole that has a 6:1 voltage type balun at the feed point. I always run 100 W or less and tune it with a high power (2 kW rated) antenna tuner and achieve a match with an SWR below 1.5:1 following tuning. I have never read or heard anything about using a tuner on an OCF and wonder whether my solid state transceiver will suffer because of this?

That should work fine with one caveat. The fact that you need a tuner indicates that you don't have a good match to  $50 \Omega$  on at least some bands. Even though the tuner can reduce the SWR at the radio, the SWR between the balun and the tuner may still be higher than desirable. Depending on how high it is, how long your feed line is and the type of coax, you could be leaving a fair amount of power in the cable.

Best to measure the SWR as close to the antenna as possible and then determine how much loss you have as a result of the SWR. Alternately, you can measure it at the radio end of the cable, without the tuner, and correct for the reduction in SWR due to transmission line loss as described in a *QST* article.<sup>1</sup> If the loss is more than a few decibels, you may want to consider some changes — perhaps going to lower loss cable, for example.

Jim, WA9PYH, asks: I have a Heathkit SB200 400 W linear amplifier that is causing problems when I try to drive it with a new solid state transceiver. On the 40 meter band only, I can drive the amplifier to full output without difficulty. On 80, 20, 15 and 10 meters, the transceiver cuts back the power dramatically or begins to squeal sometimes, locking up so that I have to cycle power to resume normal operation. This is the case even when driving a Heath Cantenna dummy load with the amplifier. I never had any problems driving the amplifier with my old transceiver with a vacuum tube final amplifier.

I put an SWR bridge between the transceiver and the amplifier and found that the SWR is over 3:1 on 20, 15 and 10 and 2.5:1 on 80 meters. 40 meters is a bit better with the highest SWR of 1.3:1, which explains why it works on that band. The input circuit of the SB200 is a simple series inductor with a capacitor to ground on the amplifier end on 80, 15 and 10. On 40 and 20 the input circuit is a pi-network. Any suggestions?

The most likely problem is the mismatch you have noticed. Your old transceiver had adjustable tuning and loading controls that could deal with the mismatch at the input — not so with a modern solid state rig. It is also possible, especially with the squeal, that you have some kind of RFI problem with the higher power getting into your transceiver.

I would suggest, as a diagnosis step, that you borrow a small 100 W antenna tuner to put between the radio and the amplifier. See what happens if it's all matched. If it works as expected, then it isn't an RFI issue or some other exotic problem and you can concentrate on the mismatch.

If that's the case, you have two choices, use a tuner there — the optional internal auto tuner should do fine, if you have one, and it can remember what to do on each band. You could also use a stand-alone tuner between the transceiver and amplifier. Of course, all tuners have a small amount of loss, so you won't get quite the full drive from your transceiver. If you need the full 100 W at the amplifier for full output, you may be disappointed. You will also have to remember to retune whenever you change bands, or switch the amplifier to bypass.

Alternately, you could see if you can adjust the input circuit for a proper match. You may be in for a lot of tweaking to get it right — (with power off) squeeze the turns, see if the SWR gets better or worse. Do more or different as indicated — could take a long time.

To know what to expect, you could also

go onto a Heath e-mail forum and see what other people experience. I had an SB-230 linear for many years and never had this kind of problem, so it seems likely that there has been a component change.

Yes, it is quite possible that the input circuitry needs tuning — it isn't a trivial process since the output network interacts with the input tuning — you won't have it fully tuned until the SWR is low when the amp is putting out full output power. Also, the input circuit acts as a buffer between the tube and your rig — there can be significant current spikes in a cable between a tuner and the input circuit of the amplifier — this is explained pretty well in Bill Orr's *Radio Handbook*. So yes, the problem is likely to just be in the input circuit.

John, KK4HRT, asks: I was reading a recent article in *QST* regarding type N connectors.<sup>2</sup> I wasn't sure whether they were compatible with UHF type. For example, can a type N plug connect to a UHF (SO-239) socket? If so, are there any down sides to performance?

No, they are a completely different series. If you have type N plugs on a cable, and an SO-239 UHF socket on the equipment, a "between series" adapter can be used (see Figure 1). The only exception to this rule may not occur to many, but a type N plug can actually connect to a BNC socket, but the lock ring doesn't work, so it is best reserved for test bench applications.

<sup>&</sup>lt;sup>2</sup>J. Hallas, W1ZR, "Type N Plugs for the Dedicated UHF Plug User," *QST*, Feb 2012, p 51.



**Figure 1** — A "between series" coax adapter can be used to connect a cable with a type N plug to a UHF socket.

<sup>&</sup>lt;sup>1</sup>J. Hallas, W1ZR, "I Know What's Happening at the Shack — What's Happening at the Other End of my Feed Line?" *QST*, Feb 2007, p 63.

Barry, 9V1FJ, asks: I plan to travel to the Caribbean for vacation and want to be able to operate DXpedition style while I'm there. I have my radio equipment ready and propose to take a 30 foot lightweight telescoping pole and 76 feet of wire to use as a loop on 20, 17, 15 and 10 meters. I know I can use the "A" configuration (see Figure 2), but if I have available trees, I could also do the inverted arrangement in "B." I will feed them using RG-8X or perhaps RG-174 coax. If I have the choice, is one better than the other?

Unfortunately, neither is great on all bands as the *EZNEC* modeled results summarized in Table 1 indicate, particularly with respect to SWR.<sup>3</sup> For example, a 50 foot length of RG-8X with a 10:1 SWR on 28 MHz will have a loss of about 3.3 dB, at 50:1 a loss of 8.1 dB. With RG-174 you will have a loss of 6.9 or 12.8 dB for the same conditions. Your antenna tuner may have trouble dealing with this level of mismatch as well.

Of the two choices, configuration B is preferred if the supports are available, both because of somewhat better gain and because the feed line can be 20 feet shorter, reducing the loss. This is a good example of why the design of multiband antennas can be a real challenge. The use of window line, or the even lighter and more compact 300  $\Omega$  TV twinlead, if available in your area, will reduce the losses — again if your tuner can handle the mismatch.

If you will be near the water's edge, a vertically polarized antenna may give you

<sup>3</sup>Several versions of *EZNEC* antenna modeling software are available from developer Roy Lewallen, W7EL, at www.eznec.com.

### Table 1EZNEC Modeling Results for Antennas in Figure

Configuration A Band (Meters)	Peak Gain (dBi)	Peak Elevation (°)	Gain at 10° (dBi)	SWR				
20 17 15 10	4.9 5.1 4.9 6.3	50 40 39 56	-3.4 -1.9 -1.9 -10.5	6:1 42:1 39:1 15:1				
Configuration B Band (Meters)	Peak Gain (dBi)	Peak Elevation (°)	Gain at 10° (dBi)	SWR				
20 17 15 10	6.2 7.0 7.3 2.9	36 28 24 15	-0.49 1.9 3.2 1.4	5:1 49:1 55:1 18:1				

improved low angle coverage. You could use a single end-fed wire going up your pole, along with some wire for radials. You could even have that on your pole while the loop is deployed and try switching back and forth.

A *QST* article by the late George Badger, W6TC, described a vertical monopole very much like the shape of Figure 2B.<sup>4</sup> You could try running your loop the way he did and easily switch between horizontal and vertical polarization.

I would try all your configurations from home before you leave to make sure that all interfaces interoperate as you expect. It may be harder to make adjustments thousands of miles from your workshop.

Dale, N2DM, asks: I am confused about the relationship of upper sideband (USB) and lower sideband (LSB) as I observe the signals I tune on my radios. I have found that if

<sup>4</sup>G. Badger, W6TC (SK), "The W6TC DX Loop," QST, Feb 2008, pp 37-39.



Figure 2 — The Caribbean antenna options proposed by 9V1FJ. At (A) a 76 foot loop supported by a single 30 foot telescoping pole. At (B) the loop is inverted and suspended from two trees.

tuning an LSB signal in on my receiver, I have to tune upward in frequency. While tuning a USB signal it is the reverse — I tune downward while listening to a station.

I have always thought that USB means the audio is added to the center (suppressed carrier) frequency making the frequency higher. I have noticed this on my newer rigs that are PLL controlled, as well as my old single conversion Hallicrafters (S-85/S-40) type receivers.

In Military Affiliate Radio Service (MARS), we take the center frequency and subtract half the audio bandwidth (1.5 kHz) to arrive at the channel frequency. This is always lower in frequency for a USB signal.

The dial reads the suppressed carrier frequency, which is what you should tune to in order to properly demodulate the audio. Thus, while the USB "signal" is above the suppressed carrier frequency, you actually need to tune down until you reach the suppressed carrier frequency, which will be lower than the sideband content. Of course, the opposite is true on LSB.

While amateur SSB channels are referred to by the suppressed carrier frequency, MARS as well as other government users, refer to the center of the occupied channel as the operating frequency. This can be a bit confusing, but is an equally valid methodology, just different. This is also the case on our 60 meter channels, because they are shared with government users and are defined by their channel center frequency designators. The government was there first, so they get to name them!

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.

#### Short Takes

Steve Ford, WB8IMY, wb8imy@arrl.org



## **Byonics Micro-Trak AIO**

A recent *QST* QuickStats survey showed that about 20% of ARRL members are active with APRS — the Automatic Packet Reporting System. That's a significant percentage for just one slice of Amateur Radio's highly diverse "pie."

APRS has been around for well over a decade. It began as a means of combining GPS receivers and ham transceivers to track moving objects. Today APRS has expanded to encompass weather monitoring, text messaging and much more.

Tracking objects on the move is still the most popular application of APRS. The basic approach is to assemble an APRS beacon package that includes a GPS receiver, an encoder to massage the GPS data into packet radio frames, and an FM transceiver to blast the position reports to the listening audience, typically at 144.39 MHz. You stuff the beacon box into the trunk of your car, attach an antenna and away you go.

Slapping together an APRS beacon can often be a bit cumbersome, though, when you need to do it on short notice for a specific application. If all you want to do is quickly add an APRS beacon to, say, a parade float or a search and rescue vehicle, it helps to keep everything as streamlined and simple as possible. That's where the Byonics Micro-Trak AIO comes in.

#### **A Self-Contained APRS Beacon**

The "AIO" in Micro-Trak AIO means "All In One." The Micro-Trak is a complete, self-contained APRS beacon package comprised of a GPS receiver, packet encoder and a 10 W 2-meter FM transmitter. Everything is housed in a small, canary yellow Pelican 1030 case. The case is quite rugged and equipped with an SMA antenna connector at one end. Note that while the case is highly water resistant, it is not waterproof.

Inside the case, you'll find the electronics on a single circuit board nestled beside a holder for eight AA batteries. With the batteries in place (rechargeable or single-use batteries as you prefer), you simply slide the power switch to the ON position to activate the beacon.

You can attach any antenna to the SMA jack. Byonics offers a flexible "rubber duck" whip or a magnetic-mount



An interior view of the Micro-Trak AIO.

mobile antenna; the cost is the same for either option. For this review we chose the whip.

#### On the Go

In its default configuration the Micro-Trak transmits a position report every two minutes. I found that even at 10 W output the batteries would power the beacon for almost a week continuously. By tweaking an internal potentiometer you can easily reduce the output power and extend the battery life.

With its tough-as-nails case you can treat the Micro-Trak in a

pretty cavalier fashion. I'd often just toss the Micro-Trak into the back of our SUV and drive off. Afterward, looking at the APRS display at my home station, I could see the journey the Micro-Trak took as we buzzed about town.

It is important to point out, however, that the Micro-Trak is what some call a "deaf beacon." It lacks a receiver, so it isn't aware of other transmissions taking place on the frequency. When the Micro-Trak wants to transmit, it transmits regardless of whether the frequency is clear or not. If you live in an area with a lot of APRS activity, chances are some Micro-Trak transmissions will be blocked by interference as a result.

#### Pre-Configured, But ...

When you order a Micro-Trak you're asked to specify the call sign and SSID you wish to use (WB8IMY-9 in my case). The Micro-Trak arrives pre-configured and ready for action. Pop the latch, add batteries, throw the switch and it's on the air.

For this review, however, we took the additional step of purchasing the programming cable. It's only \$15 and the *Windows* programming software is freely downloadable from the Byonics website (along with the Micro-Trak user manual). If you think there is a chance that you'll want to load a different call sign or otherwise change the Micro-Trak's behavior (such as making it transmit more or less often), the programming cable is a worthwhile investment. The only catch is that the cable is designed for a 9-pin serial port. Serial ports are becoming hard to find on modern computers, so you may need to add a USB-to-serial adapter.

Manufacturer: Byonics, LLC, 4960 S Gilbert Rd, Suite 1-155, Chandler, AZ 85249; tel 218-296-6427; www.byonics.com. \$260.

#### **Hands-On Radio**



H. Ward Silver, NOAX, nOax@arrl.org

## Experiment 113 Radiation Patterns

While most readers are quite familiar with antenna radiation patterns, there are several less familiar features and alternate styles. This month's article shows a few examples generated by the *EZNEC* free demo package (www.eznec.com).

#### **Angle Refresher**

If you plot two dimensional radiation patterns you are really plotting the data from a "slice" through the complete three dimensional (3D) pattern. For example, the 3D pattern for a wire dipole in free space looks a lot like a bagel with the axis of the antenna running through

the small hole at the center. What about at other angles or over ground? It's important to understand just where the slice is taking place.

Figure 1 shows the 3D elevation pattern for a 20 meter dipole, <sup>1</sup>/<sub>2</sub> wavelength above ground. The axis of the dipole is aligned as shown with its center at the origin under the Z axis label. Ground reflections have "squashed the bagel" into a beanbag shaped pattern with radiation in all horizontal directions and very little straight up.

The elevation pattern is shown in red on the 3D pattern. It shows the surface of the 3D pattern cut by the plane shown as the tilted rectangle. The rectangle is perpendicular to the ground and rotated around the center of the dipole. The azimuth angle specifies the orientation of the slicing plane with respect to the X axis - 20° in this case. (0° is usually, but not always, aligned with the antenna's direction of

maximum gain.) You might imagine the slicing plane spinning around and generating a series of elevation patterns that taken together form the 3D pattern surface.

Azimuth patterns are not quite so simply envisioned, and Figure 2 shows why. In the case of an azimuth pattern, the slice is no longer a plane — it's a cone! This is the very same 3D pattern as in Figure 1 with the dipole oriented in the same way. Staying with the bagel metaphor, now imagine sticking a very sharp knife into the bagel's center at the specified elevation angle above the cutting

> horizontal plane. Now twirl the knife around its point, keeping the angle constant so that you cut out a cone of bagel. The resulting edge on the surface of the bagel is the azimuth pattern shown by the red line on the surface of the 3D pattern in the figure.

board. er...

As the elevation angle is lowered, the cone gets wider and wider. As the elevation angle is increased, the cone gets narrower and narrower. It is customary to show an antenna's azimuth pattern for the elevation angle at which gain is maximum. From Figure 1 that would be an elevation angle of about 30°. Similarly, an elevation pattern is shown at the azimuth angle for which gain is maximum — 0° for the dipole.

You can see that for even this simple antenna a single pair of azimuth and elevation patterns doesn't begin to tell the whole story. If a 3D pattern is available, it gives you clues as to the antenna's general behavior. Then you can use the specific azimuth and elevation patterns to zero in on performance at specific bearings and elevations.

Some antenna modeling programs such as *4nec2* can generate color coded 3D patterns (see Figure 3) that are a bit easier to read than mesh surfaces.<sup>1</sup> It's pretty easy to overdo it with color but being able to visualize the 3D pattern clearly is important.

#### Map or Math?

If you looked at the usual azimuth pattern of Figure 4 you might assume that the antenna was pointing straight east and that rotating it

<sup>1</sup>4nec2 is published by Arie Voors (home.ict.nl/~arivoors).



Figure 2 — An azimuth pattern is taken at a constant elevation angle around an antenna. It can be thought of as the line where the cone and 3D pattern intersect.



**Figure 3** — Colorful 3D patterns, such as this one generated by the free modeling program *4nec2*, help the designer visualize antenna behavior.



**Figure 1** — An elevation pattern is taken in a plane containing the center of the antenna and at a specified azimuth angle from the X axis.



Figure 4 — Azimuth patterns can be drawn with 0° at the right and angle increasing counterclockwise (as shown here) or according to compass bearings with north at the top and angle increasing clockwise. In the second case, the main lobe of the antenna would be pointing east.

counterclockwise (CCW) to point north would also rotate the pattern CCW. You would be wrong. The default for nearly all azimuth patterns is the mathematical standard for drawing polar plots in which zero degrees (0°) is at the right and angle increases in the CCW direction — the opposite of a map. For compass bearing scales, north is at the top and angle increases in the clockwise (CW)





Figure 5 — The standard polar plot format at A compares the elevation patterns of two long wire antennas. The same information is presented in Linear dB format at B.

direction so that east (90°) is at the right and so forth.

This criss-cross of conventions is not an issue for most amateur antennas because they are symmetrical along the line of maximum forward gain. Theoretically, a symmetrical antenna such as a Yagi has a pattern that is the same to either side of the forward direction. More complex antennas, such as electrically steered or asymmetric arrays, have asymmetric patterns. For these antennas, it very much does matter which angle convention is used.

The way to change the angle convention in *EZNEC* is from the main window's OPTIONS | ANGLE CONVENTION menu selection. Pick either COMPASS BEARING or CCW FROM X AXIS as desired.

Elevation patterns can take the unusual angular assignment of 0° to both the left and right hand horizontal axes with straight up being 90°. *EZNEC* uses a convention of 0° being to the right and 180° to the left regardless of the selected azimuth convention.

#### **E and H Plane Patterns**

Another frequent area of confusion is in the relationship of E and H plane patterns to azimuth and elevation patterns and to vertical and horizontal directions. Let's start by defining what is meant by the terms E and H plane. The electromagnetic field radiated

by an antenna is a combination of an E field (or electric field) and an H field (or magnetic field). In the far field of the antenna, the E and H fields are perpendicular. So far, so good, right?

The orientation of the E and H fields is determined by the orientation of the currents in the antenna. An ac current flowing in a straight line generates both an E field parallel to the line and an H field that curls around the line according to the right-hand rule assuming we are talking about conventional current that flows from positive to negative.<sup>2</sup> Further assuming we are talking about antennas con-

structed of thin wire or tubing elements, the orientation of the elements also determines the orientation of the E and H fields because the current direction and element direction are the same. Again, so far, so good.

How are a dipole's E and H fields oriented? Since the current in the dipole flows in the same direction as the axis of the dipole, the E field is oriented parallel to the dipole and the H field forms

<sup>2</sup>en.wikipedia.org/wiki/ Right-hand\_rule circles around the dipole at right angles to the E field. If a radiation pattern is generated in a plane that contains the dipole, it will show the strength of the E field around the antenna. Similarly, a pattern that cuts through the dipole at right angles shows the H field. An E field (or H field) radiation pattern not only shows the strength of the E field (or H field) but is *also* oriented in the direction of maximum gain.

The orientation of E and H fields and patterns depends solely on the orientation of the antenna currents, which is almost always the same as for the elements of amateur antennas. Here's an example: If a Yagi has horizontal elements, the azimuth pattern with an elevation angle containing the peak of the main lobe is an E field pattern. An elevation pattern at right angles to the Yagi elements through the main lobe is an H field pattern. Whether the E or H field patterns are azimuth, elevation, horizontal or vertical patterns depends on the orientation of the antenna with respect to the surface of the Earth.

#### **Linear dB Pattern Plots**

The "linear dB" method of graphing an antenna's radiation pattern is not common in amateur use (yet) but is very common in professional and academic publications. In this type of graph, the vertical axis is gain in dB and the azimuth or elevation angle is the horizontal axis.

Figure 5 compares a regular polar radiation pattern to a linear dB plot to illustrate why the linear graph is particularly useful when comparing two antenna designs. Figure 5A shows the usual polar elevation pattern for a terminated long wire antenna on 20 meters. A pattern is shown for a 210 foot wire (black) and a 150 foot wire (blue). Figure 5B shows the same information plotted in linear dB format.

Which type of plot makes it easier to compare the performance of the two antennas? Around the main lobe, the polar plot does well. Away from the main lobe and particularly at low gains and nulls, the linear graph is much easier to read both in angle and amplitude. In addition, it's far easier to see the difference in gain on the linear graph at any angle. Linear dB patterns are used to compare antennas and to present a clearer picture of the antenna pattern away from the main lobe. In *EZNEC*, the Linear dB scale is available by using the OPTIONS | 2D, 3D PLOT SCALE menu selection.

#### **A Pattern of Options**

We have just scratched the surface of all the many pattern options available to antenna designers. Hopefully, though, this column has made you more aware of the importance of the more common options and parameters for the patterns you use to select and buy antennas.

#### **Eclectic Technology**

Steve Ford, WB8IMY, wb8imy@arrl.org



## Keeping Your Station Computer Clean

Last month the microprocessor cooling fan inside my station computer began wailing like a banshee. The sound was more than a minor annoyance — it was like a set of fingernails dragging across the chalkboard of my soul.

I immediately powered down, popped off the side cover and found myself staring into what looked like a haunted house from one of the old Hammer films. Gray dust was caked everywhere. It was on the motherboard, fan blades, heat sinks...you name it. Had it really been that long since I had cleaned the old digital workhorse? *Really*.

Dust not only looks grotesque, it can be bad news for your PC. At the very least it greatly compromises fan and heat sink efficiency. At worst, it can become conductive and damage sensitive electronics.



The stuff of dusty computer nightmares. (No, my station PC wasn't quite this bad!)

I wasn't blessed with owning one of those handy computer vacuums with the tiny nozzles, but I did have a can of compressed air. With the computer unplugged, a set of safety goggles in place, and a dust mask over my nose and mouth, I blasted the circuit boards and anything else I could reach including the fins of the heat sinks. I was careful not to get too carried away. Some of those miniature fans don't like being spun up to wild RPMs.

The trick is to aim the stream of pressurized air in such a way that it blows debris out of, and away from, crevices and recesses. I wouldn't suggest doing this inside your house unless you and your family are invulnerable to dust allergies. A table outdoors or in a garage is better.

Avoid touching the circuit boards if you possibly can. Your body may have accumulated a hefty static charge and a mere swipe of your finger can obliterate solid state components.

Removing the dust didn't banish the banshee, sorry to say. Full banishment required replacement of the fan entirely. Even so, the howling revealed a dusty problem in the making and I was grateful for the opportunity to render a clean machine. My local Amateur Radio computer guru says desktop PCs should be opened and cleaned every 6 months. I'll have to make a note of that.

#### It's All on the Surface

Scientists at Stanford University have found a way to harness the amazing properties of *topological insulators* — materials that conduct electricity only along their surfaces.

A paper published late last year in Nature Nanotechnology describes how they combined two previously known topological insulators to create a new one that carries only surface currents. They processed the material, made of bismuth, antimony and tellurium, into very thin plates. When they put everything together they found that current flow along the surface could be controlled by switching a separate electrical current on and off. Flipping the switch one way caused the compound to behave as an N-type material — one in which electricity is conducted by negatively charged electrons. Flipping the switch the other way turned the compound into a P-type material, in which positively charged "holes" carried the current. The result is a transistor that one can convert from NPN to PNP at will!

The scientists hope this new material will find applications in integrated circuits, but it can also be scaled up to much larger devices.

#### **The Ghosts of USBs Past**

Don Hill, AA5AU, pointed out yet another issue that tends to plague station computers. Every time you plug in a USB device — a printer, digital mode interface, mouse, etc — *Windows* looks for a small *driver* program that it uses to "talk" to the device. It often carries out the conversation by creating a so-called *virtual COM port*. If the driver isn't present, *Windows* will ask you to insert a CD or otherwise tell it where to find the precious program.

Over time you tend to gather an impressive collection of these drivers and virtual COM ports on your hard drive. That's all well and good until they come into conflict with each other and cause strange behavior the next time you plug in a USB device. Don offers a step-by-step solution for removing the pesky ghosts. You'll find it at http://rttycontesting.com/lagniappe/ removehiddencomports.html.

Bob Chudek, KORC, suggests an alternative procedure using *Drive Cleanup*. It is described here: www.techspot.com/vb/topic145884.html.

When using either approach proceed with care, lest you remove something you still need.

#### **Solar Backpack**

It's a solar cell. It's a backpack. Actually, it's both.

The \$339 "Fuse" by Voltaic is a backpack that sports a 10 W solar panel and a 16 Ah battery. The Fuse is intended to keep laptops and similar devices fully charged on the trail, but looking at the description at www. voltaicsystems.com/fuse10w. shtml it becomes obvious that this could power a QRP transceiver as well. Hams are particularly talented when it comes to "repurposing" stuff like this, so I wouldn't be surprised if some Fuses turned up on Field Day.



The Fuse solar panel attaches to a backpack containing a rechargeable battery.

#### **Hints & Kinks**

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



## Space Blankets, Golf Balls and Keeping the Bugs at Bay

#### **Space Blanket Antenna**

Ham radio operators often must set up and operate their equipment in remote areas with very limited resources. A necessity during such operations is a practical antenna. An operator can design a VHF or UHF vertical antenna on the spot but a counterpoise is needed.

This is where the space blanket antenna comes in. A space blanket is composed of a metal surface on a flexible Mylar base. It is easy to fold up and store and can fit into a shirt pocket or bug-out bag. It unfolds quickly and can be ready to provide an antenna counterpoise in only a couple of minutes. It can be used anywhere a vertical antenna is desired. Just lay the space blanket on a flat surface such as a table, the ground or sidewalk and it's operational in just minutes. Figure 1 shows a mobile antenna with a physical support so it will stand upright sitting on top of a space blanket laid out on top of a folding card table.

How well does the space blanket antenna work? Without the space blanket, the small vertical antenna in Figure 1 has an SWR value above 2.0 to 1. By simply adding the space blanket beneath the antenna, the SWR is reduced to 1.2 to 1. The space blanket provides the necessary counterpoise for the vertical antenna very effectively.



Figure 1 — A V/UHF antenna can be set up in a flash just about anywhere using a space blanket as a counterpoise. [Vernon Harris, W7GGM, photo]

The advantages of using the space blanket antenna in emergencies are obvious, but there may be other situations where it could be useful. One ham, while constructing a play house for his children was putting a wood cover on the structure, which had a roof height of about 12 feet. The roof was slanted a few inches. Tar paper was placed on the roof and then a space blanket was lightly tacked down on top of the  $12 \times 12$  foot roof. Next, rolled roofing was applied as the final roof material. A mobile antenna was anchored to the roof in the middle of the space blanket. It worked better than expected, providing an SWR of 1.25 to 1. A bit of adjusting the antenna whip length improved the SWR to 1.2 to 1.

One note: When the space blanket is laid out on top of a surface it would be wise to tack it down using thumb tacks or sticky tape of some kind to secure it. During testing of the antenna the SWR would vary as the breeze would move the edges of the space blanket and thus change the measured value. During the SWR testing small rocks placed on the edges of the table stabilized the blanket and kept the breeze from moving the edges.

The space blanket antenna concept is simple; the blanket is inexpensive and easy to store. It can be spread out and made operational in just minutes. The next time you have an urge to try a new antenna experiment, try out this simple concept. Happy antenna experimenting. — 73, Vernon Harris, W7GGM, 358 Meadow Brook Ln, Providence, UT 84332, bmsoffices@ comcast.net

#### **The Rigpod**

My Yaesu FT-817ND is a great radio to take along anywhere — even backpacking. It has all the bands I like including AM/FM radio. One problem plagues me each time I set up in a new location: Where do I put this thing so I can conveniently operate it? There is never a rock flat enough or at the right height. DXing with the FT-817 hanging from the shoulder or resting on the belly is no fun. Even sitting flat on a table, the operator must scrunch down to see the screen and controls. Yes, there are after-market accessories to prop the radio up at some pre-determined angle for better viewing but there is a better way. You can make this mount from items you probably already have and it will work on all surfaces, at all reasonable heights and angles.

I call my creation the rigpod. The items



**Figure 2** — The T-nut is mounted to the board to provide an attachment point for the table tripod. [Phillip Grant, N1YPS, photo]



**Figure 3** — The completed rigpod ready to keep your radio on the level no matter how crooked the terrain. [Phillip Grant, N1YPS, photo]

needed are a tabletop camera tripod (I tried a lighter duty tripod designed for digital cameras, but the radio's weight wouldn't allow the tripod to keep an angled position), a block of pine (end piece from a 1 inch board) and a  $\frac{1}{4}$  inch  $\times$  20 threaded fastener.

I cut the block to  $5 \times 7$  inches, about the size of the FT-817. The fastener is called a T-nut. It has four barbs designed to hold fast in wood (see Figure 2). First, you must drill a pilot hole in the center of the block deep enough to accommodate the length of the threaded portion. I used a <sup>1</sup>/<sub>4</sub> inch drill the size of the stud found on most camera tripods. I do not recommend hammering it into the wood. Put the assembly in a bench vise and squeeze it in. Even though I love the look of natural wood, I spray painted the wood black. It looks as though it belongs with the radio.

Sometimes, I like to operate outdoors while standing. My tripod extends enough to allow that and if using flexible antennas, they are that much higher above ground. If I operate the FT-817 at too steep an angle, I wrap the supplied shoulder strap around the radio and block to hold it there. An elastic band the size the post office uses will also work.

Enjoy your FT-817 and don't worry about it sliding off a rock and into the pricker bush. — 73, Phillip Grant, N1YPS, 119 Hoe Shop Rd, Bernardston, MA 01337-9638, phill112643@verizon.net

#### **Hole In One Antenna**

Here's something I "invented" to help raise wire antennas. I cannot imagine it hasn't been done by others, but since I've never seen it written anywhere let me describe it here.

The parts needed are a golf ball, a small screw eye, a small fishing snap swivel and a 6-8 inch length of 8 pound monofilament line.



Figure 4 — This simple arrangement can be used for the quick deployment of a simple wire antenna for portable or emergency work. When the operation is over, a hard pull on the antenna breaks the fishing line and all the parts fall to the ground. [Stan Levandowski, WB2LQF, photo]

Drill an undersized hole about <sup>1</sup>/<sub>4</sub> inch into the golf ball. Screw in the screw eye. Tie the monofilament to the screw eye with the standard fisherman's knot. Tie the other end of the monofilament line to the snap swivel. In the end of the antenna wire make a loop or solder a ring connector and then clip the snap swivel to the loop or ring (see Figure 4).

Now throw the golf ball up into the tree. Nine times out of 10 you can pull the wire out intact. If it manages to get hung up in a branch, the line will break before you exert enough force to break or damage the wire. The golf ball then falls to the ground. The antenna is easily retrieved and all you have to do is replace the short piece of line and you are back in business.

My antenna is 28 feet of #22 AWG stranded wire with a 33 foot counterpoise that I use with my Elecraft KX-1. It earned me my 1000 mileper-watt award (900 mW on eight AA batteries for a New York to the Canary Islands contact with EA8BVP). — 73, Stan Levandowski, WB2LQF, 6 Chatham Ct, Fishkill, NY 12524-1530, wb2lqf@arrl.net

#### Antenna Helper

The antenna helper idea started while attempting to make a 40 meter bobtail curtain antenna for Field Day. This is a large wire antenna and, working alone, I needed something to hold the wire and tape measuring tool. So with that in mind, it was off to my junk box to see what I could come up with. Large bulldog clips came to mind and after about half an hour I had the idea and the parts to put this holder together.

> All you need is a small piece of plywood to attach the clip to and hold the measuring tape (see Figure 5). The plywood measures  $5\frac{1}{2} \times 3\frac{1}{2} \times \frac{3}{4}$  inch. Drill a round hole on one side large enough to accommodate a screwdriver. At the other side cut a slot large enough for the metal tab on a tape measure. In the center tap a hole for a wood screw to hold the bulldog clip.

As you can see from Figures 6 and 7, there is not much to it, but it is a very useful tool for anyone making antennas. Push a screwdriver through the hole and into the ground to anchor it in place. Put the end of the tape measure in the slot and rotate the clip over the tape end to hold it in



**Figure 5** — To make the antenna helper you need a bulldog clip, wood screw and washer, and a wooden block. [Julian Blair, WA2WMJ, photo]



Figure 6 — The metal tab on the end of the tape measure is inserted into the slot on the board, then the clip is rotated over it to hold it in place. [Julian Blair, WA2WMJ, photo]



Figure 7 — Here is the antenna helper in use. The bulldog clip holds the end of the tape measure in place. The end of the antenna wire is held in the jaws of the clip. Pull them both back to the required length and cut. [Julian Blair, WA2WMJ, photo]

place. Next, put the wire in the clip, pull the wire and tape out to the required length and cut. — 73, Julian F. Blair, WA2WMJ, PO Box 602, Pine Bush, NY 12566-0602, wa2wmj@arrl.net

#### **CD Antenna Insulators**

Ever wonder what to do with all of the old CDs? I put some to use today as emergency center and end insulators for a quick dipole. While in the middle of a move, I still had my radios but not my antenna. I had a piece of coax and some wire but no insulators. What I did have was some CDs. It turns out they make dandy lightweight center insulators. Just drill a hole in either side and run the coax up though the hole in the middle. I also put a wire tie around the coax as a strain relief. I used two CDs as end insulators and ran 100 W with no problem with a SWR of 1.2:1. — 73. Randy Bardwell, WR7R. PO Box 13406, Burton, WA 98013-0406, rdb@randybardwell.com

#### **Let People Know**

Have fun at your next club meeting with this six message programmable LED badge. I found this at a local computer store for under \$15 and I have been having fun with it ever since. At Field Day or my radio club meeting, where there are strangers at times, I display my KO8S call sign (see Figure 8). When my wife Lois, N8KPW, chairs her quilt guild meetings, she wears it with her name indicating that she is the president. When my granddaughter Julie, KD8JHQ, danced at her school musical, I wore the badge with the words "Julie's Grandpa" proudly scrolling across it for all to see.

The badge is programmed by PC and comes with software and a USB cable. Included with the software is a printable seven page user manual. I have installed the software on our Windows 98SE, XP and 7 computers without any problem. The badge will store six messages, each up to 140 characters long, and will display them as steady, moving, flashing, flash then move and scroll up or down. In addition to this, the speed and brightness can be varied.

It has an internal lithium battery with an operating time of about 7-10 hours. It is



Figure 8 — This is one of many programmable LED badges that you can use to let people know who you are and why you're here. [Karl Schwab, KO8S, photo]

charged via the computer's USB port in about 3 hours and also is equipped with an auto shutdown feature. I have had mine on for about 8 hours and it was going great all that time. It can display in German, French, Spanish, Italian and others, although I have not tried any of the other languages. Another great thing is that it attaches magnetically to clothing so there are no pinholes to be concerned about. For more information go to www.ipsgproducts. com, select the PRODUCTS and then the GADGETS links. You can also do a search for "programmable LED badges," which will result in numerous other choices. -73, Karl Schwab, KO8S, 30752 Ridgefield Ave, Warren, MI 48088-3174, ko8s@arrl.net

#### **Bug Screen**

Bugs on Field Day? If you are bothered by various flying creatures buzzing your head and messing up your log, here's a way to save your temper for the electronic kinds. Just hang your light bulb about 3 feet above the operating position and suspend an old screen window (or door) horizontally about 6 inches below the lamp. The creatures will get around the edges of the screen and do their buzzing around the bulb. Then after they burn up on the hot bulb, they land on the screen, not on your papers. In the morning you just empty the screen, which is much better than wiping off the log every 10 minutes. — 73, Doyle Strandlund, W9NJD, 2849 N 035 W, Huntington, IN 46750-4012

#### **Coax Connector Covers**

I discovered this simple trick on a camping trip. It helps prevent dirt and debris from fouling my PL-259 and SO-239 connectors. On our trip, we encountered heavy rain and had to stow the ham gear. We didn't want to roll up all of the coax and needed something to cover the ends. While looking for some sort of cover, I saw a spent 12 gauge shell casing on the table and tried it. It fit and was a cheap and effective solution. Although this won't make a waterproof seal, it will keep a lot of moisture out.

The 12 gauge shell casings fit snugly over PL-259s. Although they will fit over SO-239s with a little help, 16 gauge shell casings would be a better fit. — 73, *Kevin Ballard*, *KB4RTR*, 121 Jasmine Dr, Alabaster, AL 35007-5214, **kb4rtr@arrl.net** 

#### **Airdux Coil Cutter**

A homebrew project I was working on



Figure 9 — This tool made from a box cutter blade and a soldering iron will cleanly cut the plastic forms on an Airdux coil. [Whitey Doherty, K1VV, photo]

required cutting a few turns from an Airdux coil form. The coil was 1½ inches in diameter with very close, fine-wire turns. I couldn't cut the coil form with any cutters or razor knives I had. I solved the problem by attaching a box cutter blade to the tip of my Weller soldering gun with a machine screw (see Figure 9). When heated, it easily cut through the four plastic form sections to remove the required number of coil turns. — 73, Whitey Doherty, KIVV, PO Box 1193, Lakeville, MA 02347-1193, klvv@comcast.net

#### **Printing Certificates**

Special event certificates are increasingly being delivered via electronic means, "allowing" the operator to print his or her own certificate. Some electronic QSL services also provide a file that can be printed on the home computer. I have found that printing on photo paper instead of regular paper produces a certificate that really "pops" and appears professionally printed on coated paper. You will need to temporarily adjust your printer settings as if you were printing an actual photograph. — 73, Roy Crosier, KV8KV, 800 E Arthur, Apt E3, Warsaw, IN 46580, **kv8kv@arrl.net** 

<sup>&</sup>quot;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.

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#### Steve Sant Andrea, AG1YK

"All right let's get this meeting going," barked President Steve. "We have a lot to do to get our Field Day scoring sheet filled in."

"I've got the basic information completed," says Tom, the club secretary, "We had five transmitters on the air, so as 5A Connec-ticut our final totals were 91 CW, 55 PSK31 and 436 phone. So Total QSO Points are 728. Our power multiplier is two giving us a Claimed QSO Score of 1456."

"Hey," said Andy, "what about the Get-On-The-Air (GOTA) and satellite stations? That would make seven transmitters."

"No," said Steve, "Rule 4 says that GOTA and satellite transmitters don't count toward the transmitter total or transmitter bonus points, but we get other bonus points for them."

"Yes," said Tom, "5A is correct. We had five regular stations set up in the side parking area by the green. The GOTA and satellite stations were set up on the lawn by the sidewalk next to the information table. This turned out to be an excellent arrangement. Passersby on the green could see and hear the activity and many stopped to check out the info table."

Phil jumps in: "Don't we get a  $\times$ 5 multiplier for my satellite station? My handheld is only 5 W."

"No," replies Tom, "The 5 W multiplier only applies when *all* the regular transmitters are running low power. Our regular stations were all 100 W, so it's only two.

"Okay," says Steve, "so that brings us to box 15, Bonus Points Claimed. Let's go through the list. First is emergency power. Mike, that's your area; what about the generator problem?"

"We did fine. There were some anxious moments when the generator wouldn't run, but Barry and I got it going by 2 Saturday afternoon and it was running through the entire Field Day period.

"Okay, great," said Steve, "so by rule 7.3.1 that's another 100 points per transmitter making 1956. Tom, what about media publicity?"

"Well, we didn't get any news people to actually show up, which was disappointing, but according to rule 7.3.2, all we needed to do was *attempt* to get publicity. I sent out a press release like the Field Day packet sample

## **That Extra Edge**

#### Bone up on some Field Day bonus points.

and that should get us the 100 points. Here's a copy for our entry."

"Good, so that gets us to 2056. Luckily, we were able to get permission to operate from the town green so we were very public. That location gets us another 100, which makes 2156. Sarah, how did things go at the information table?"

"It was pretty busy. I filled almost two pages of the visitors' log. Folks were curious about Phil waving his tape measure beam across the sky. I also talked to three inactive hams who were interested in getting back on the air. One of them still has a good license and I got him on the GOTA station."

"Hey, great," said Steve, "pass the visitor log sheets up here. I will need copies for our entry. So that brings us to 2256. Next are messa

to 2256. Next are message bonus points. Carol?"

"Well, we got two out of three on those. I sent a message to the section manager per rule 7.3.5, so that's a hundred points. I copied the W1AW bulletin on Sunday per rule 7.3.9 so that's another hundred. Unfortunately, we didn't handle any other messages so we lost out on the 10 points per message specified in rule 7.3.6."

"That's okay," replies Steve, "maybe we can

15. Bonus points claimed: Check each block as appropriate and include required proof of points with your submission. All bonus points will be verified at ARRL HQ and added to your score. 100% Emergency power (Max. 20 transmitters)

Media Publicity
Set-up in Public Place
Information Booth
NTS message to ARRL SM/SEC
W1AW Field Day Message
Formal NTS messages handled (# \_\_\_\_\_)
Satellite QSO completed
Natural power QSOs completed
Site Visit by invited elected official
Site Visit by invited served agency official
Educational Activity Bonus
Youth Element achieved
GOTA Bonus (total bonus points:
Submitted using the b4h.net applet

Total Bonus Points Claimed:

#### "My homebrew solar charge controller shorted out and all the magic smoke escaped."

figure a way to encourage messages next year. So all together that brings us to 2456. Phil, I take it we are covered for the satellite bonus?"

"Right; here are the logs."

"So by rule 7.3.7 that brings us to 2556. Next is natural power. Mike, what's the story?"

"Not good I'm sorry to say. My homebrew solar charge controller shorted out and all the magic smoke escaped. No bonus this year.

"Same on the elected official bonus," threw in Tom. "I sent out invites but nobody showed. We did get a visit from our town emergency manager so we can claim the rule 7.3.12

bonus. That puts us at 2656."

"Alright," said Steve, "next is the educational activity bonus. I think it was a big mistake to let

that one slide this year. We had a good day and a lot of traffic. We could have taught some of those kids to solder and gotten an easy hundred points. Next year let's put more effort into that." (A general murmur of agreement was heard.)

"Next on the list is the youth element. Mary and Bill both stopped by. They were on the GOTA station, right Barry?"

"Yes, they managed 20 contacts each so that's 40 rule 7.3.15 points. For the GOTA station we logged a total of 53 contacts. As you

mentioned, 40 of those were by Mary and Bill, the rest by various people who came by and were interested in trying. Mary and Bill were the only two to make the 20 contact minimum, though, so that gives us 40 GOTA points.

"So that's 40 youth points and 40 GOTA points," says Steve, "bringing us to 2736. I plan on submitting the log through the **b4h.net** applet, which is a final 50 points, giving us a grand total of 2786 for 2012. That's a pretty good showing; better than last year. Especially when you consider it only took a little time to read the rules and make some plans. Well, it's getting toward 10, any other business? No?"

"Okay," said Steve, "see you on the air."

Steve Sant Andrea, AG1YK, is an assistant editor at *QST*. He can be reached at

Don't miss out on the many Field Day bonus points.





## **Snag Proof Your Field Day**

## When Murphy, Mother Nature, Father Time and other unwelcome visitors arrive.

#### Dan Henderson, N1ND

Now that winter chills have given way to spring warmth, the thoughts of amateurs across North America are turning toward the "official" start of summer — ARRL Field Day. When the fourth full weekend in June comes around (June 23-24 this year) it finds tens of thousands of amateurs psyched and well prepared for whatever Murphy may throw at them. Toolboxes are stocked, replacement coax is at the ready, substitute antennas prepped for quick assembly and backup transceivers are operational.

Nevertheless, try as we do to plan for any eventuality, every year there seems to be a curve ball that comes out of nowhere to challenge our best-laid plans. Some of these creep in during the early planning while others may result from a fickle Mother Nature. A club member's sudden illness may make the generator unavailable. Father Time may pass too quickly to prepare "the way we always have." Whatever the reason, the unique nature of Field Day allows participants to manage and adjust — either during their preparations or on the fly during Field Day. In fact, that flexibility is one of its central components.

Over the years, we have all experienced unexpected snags. If you have done due diligence during your groundwork, then while you may not have planned for a specific challenge, you should have some reasonable ideas of how to address one that arrives. Let's talk about some common occurrences and how to approach them.

#### **Stormy Weather**

Probably the number one difficulty occurring at Field Day is a sudden change in the weather. What started out as a beautiful summer Saturday morning turns into a dangerous Saturday night storm. We cannot change the weather, but we can certainly prep for it. Every Field Day site should have some type of severe-weather-alert radio and you should pay attention to it. Also in today's wireless age, it is easy to monitor a weather radar site with your smartphone.

So you know the storm is coming — what do you do? When preparing the site for a storm make sure everything temporary — antennas,

support structures, tents or dining flies are properly erected, installed and adequately guyed. Have a plan for dropping the temporary tower or antenna to the ground quickly before the storm. Remember, once the danger has passed you can raise it again. The few extra contacts you might make instead of securing your site are not worth the potential danger and risk. Above all else — *safety* must be the watchword for Field Day.

Those of us who have participated in Field Day for years sometimes become complacent and simply "do what we have always done." There is something to be said for staying in your comfort zone, but don't let "we always do it that way" become the governing principle. Times change, circumstances change and participants change. Field Day gives us the chance to adapt and embrace change in ways that can maximize the *fun* of the event.





When you are on top of a tall mountain, you don't need tall towers, as Kenan Reilly, KR6J, reaffirmed at his site. [Kenan Reilly, KR6J, photo]

Pete, AA1PL, operated from the great outdoors at the George Washington Management Area Campground in Glocester, Rhode Island. [Peter Harrison, AA1PL, photo]

#### **Roll With the Punches**

Don't be afraid to change your operating category. Just because your club has always operated as Class A (Club or Nonclub Portable) doesn't mean you have to every year. For example, because your club was not able to secure its "usual" site this year doesn't mean you can't participate. Look for a new location. If that new location is your club's station or in a member's shack that's great. It simply means you operate as a Class D (Home) or E (Home with
Emergency Power) station instead of Class A.

Perhaps your club lacks the bodies to do all the usual setup in just a few hours Saturday morning. This doesn't mean you can't still do it "the old way." If you need to begin your setup before the start of Field Day to do what you want, the rules allow that. The only difference is that you would be a different operating class. It is okay to be Class E instead of Class A — there is nothing special about any of the operating classes. What is important is that you get on the air and have fun.



This scene from the Beaver Valley ARA, W3SGJ, station was duplicated all across the US and Canada. [Rich Soltesz, K3SOM, photo]

#### Whose Call Is It, Anyway?

There are always questions about using club call signs during Field Day. The most frequent thinking is: "The club call trustee is an Extra class licensee so we can operate on all bands and frequencies." Simply put, that is *not* true. A club call sign does not carry any

operating privileges and it does not have the operating privileges of the trustee. For any US Amateur Radio station, the

transmitter may be used only on frequencies allowed to the control operator present at the control point. If the operator at the mic has a General class license and is operating on 14.155 MHz, there must be an Extra class control operator "in control." If the station is operating on 14.257, there must be a General class control operator present.

Then there is the question of how unlicensed persons visiting the site may operate during Field Day. Again, simply put, an unlicensed person may not *operate* an amateur station. They may *participate* as a third party with a control operator who is licensed for the frequency and mode in use. It is *okay* to let visitors talk into the microphone as long as a control operator is running the station. There is a difference between "participate" and "operate." I hope your Field Day operation doesn't run afoul of that very distinct rule.

#### **Keep In Touch**

Common to almost all club Field Days is the attempt to build rapport with served agencies. It is common to see the head of the local Red Cross Chapter, president of the local hospital or local police chief drop by at your invitation. Those are important contacts to maintain — and you are encouraged to continue to develop them. At the same time, you shouldn't forget about the "next tier." The head of the local Red Cross disaster services committee, the hospital communications department manager, and the

#### Every Field Day site should have some type of severe-weatheralert radio...

rank-and-file patrol officers working the beat can be important contacts as well.

You will frequently find yourself working with these hard workers. Consider expanding your Field Day invitation to include these valuable resources. Besides, there is usually enough extra food at the Saturday night supper to include a few additional special guests.

#### **A Classy Operation**

We also need to remember that while Field Day primarily focuses on clubs and groups getting together to participate, there is a large segment of one or two person operations that make up approximately one-third of all entries. By definition, Class B (One or Two Person Portable)

stations have only one or two participants. The

#### vast majority of Class D and E stations have only one participant. While all share similar Field Day goals and preparation, these small entries face the additional challenge of accomplishing their established goals with far less help than larger operations.

Class B entries truly run the full spectrum. One may be an operator who sets up a solar-powered 5 W station in a campground

while the rest of the family hike and play in the river. Another might be two friends who rent a cabin on a lake then spend Saturday morning throwing up dipoles, placing the generator and laying down power cords. The same perils that line the path of the 20A entry are also along the road less traveled by the small station in the field. Planning and preparation are necessarv for either to be successful.

It is easy to downplay the importance of the "home-base" stations — Classes D and E. Remember, every station and person has a

role to play in Field Day. Some of us are not as young as we once were and our idea of roughing it is more along the lines of staying up late instead of dueling with the mosquitoes and gnats. A family reunion that weekend may only leave a few hours of sporadic operating. Whatever the reason, these home stations are important and necessary for Field Day success. After all, the most important goal of Field Day is to get on the air and have fun.

In an emergency, those home stations may by the best way to get the message relayed. During Field Day, they increase the number of stations available to work, enabling more people to learn how to communicate on the air. It is a win-win scenario!

To be sure, there is no single right way to "do" Field Day. Whether you participate from a local parking lot, the county emergency operations center, the picnic shelter at the city park or from your own shack, the end goal is the same — to get on the air and have some fun. If you treat it as a contest — great! If it is your club's main social event

... the most important goal of Field Day is to get on the air and have fun. — knock your socks off! If it is a key component in building your

working relationship with the community and its leadership — wonderful! Nevertheless, it all starts with flipping the power switch to "*on*" and having fun working other amateurs. Good luck June 23-24! Hope to see you in the log!

Dan Henderson, N1ND, is the ARRL Regulatory Information and Field Day Manager. He can be reached at **n1nd@arrl.org**.



# **Try Going High for Field Day**

## 50 MHz and beyond — Field Day gold mines

#### Sean Kutzko, KX9X

Field Day is just a few weeks away and many clubs are planning their efforts. Whether those plans are for several dozen operators or just a handful there are many potential points going un-claimed because those plans don't include the VHF+ bands (VHF, UHF and microwave). A rule change last year allows *any* class A or F station a "free" VHF station — one that does not change their transmitter count (www.arrl.org/field-day).

Getting on the VHF+ bands is much easier than it used to be, thanks to the many commercial transceivers that offer 6 and 2 meter capabilities (in some cases, 70 cm and 23 cm as well). This article will start you on the way to adding the VHF+ bands to your Field Day. I'll cover the basics and have you making points on 6, 2 and the satellites before you can say "QRZ?"

#### Why Use a VHF Station?

The simple answer is: it's free! By not adding a VHF+ station, you're missing some fun and leaving points on the table. Antennas for VHF+ are generally smaller than their HF counterparts, so set up is easier. You can also use the VHF+



Small antennas at a good location can yield big results on VHF. KX9X's 2 element, 6 meter Yagi and 5 element, 2 meter Yagi on a collapsible painter's pole serve him well when combined with an operating site on a high hill.

bands as a learning tool for your club's Technician class licensees. If they are only aware of FM repeaters, a VHF+ station at Field Day can expand their horizons. Finally, the VHF+ bands aren't "novelty" bands; high contact rates are possible. During Field Day 2011 at W1AW, I worked over 600 stations on 6 meters during a great opening that lasted all day Saturday and picked right up again early Sunday morning, all while running only 100 W.

#### **Propagation Enhancement on VHF+**

Without enhanced propagation on the VHF+ bands, your contacts will extend to your radio horizon — a couple of hundred miles or so. Numerous possibilities for enhancement exist, making contacts possible over longer distances. *Sporadic-E propagation*, well-known in the summertime on 10 meters, occurs regularly on 6 meters, too. During strong openings, it can even occur on 2 meters. During a 6 meter sporadic-E opening, a modest station (100 W and a dipole) will make contacts aplenty. Sporadic-E openings can last well into the night, so keep the VHF station manned or, at least, monitor near the 50.125 MHz calling frequency.

*Tropospheric enhancement* can occur on 2 meters and up, especially if there's a high pressure zone nearby. If you have a warm, cloudless day with little or no wind (doesn't sound like Field Day, right?), be on the lookout for tropospheric enhancement on 2 meters especially around sunset and just before dawn. Because

"tropo" openings are correlated to weather patterns, they can be predicted with some accuracy. Tropo enhancement can also occur along weather fronts (that does sound like Field Day!) so if rain is in the forecast, perhaps a little tropo activity is, as well. Meteorologist William Hepburn has a website devoted to troposphere forecasting; check it out at www.dxinfocentre.com/tropo.html.

Lastly, *auroral propagation* can occur when the Earth is in the path of a solar storm, which sprays us with charged particles. These charged particles can create a moving, passive reflector for radio signals. While aurora can severely disrupt HF communications, it actually creates a great propagation event for

## **VHF+ Basics**

• Field Day VHF+ SSB/CW activity will generally be on 6 meters and some on 2 meters. FM activity will be mostly 2 meters, with some on 6 meters and a touch on 70 cm.

• Generally speaking, the VHF+ bands are "lineof-sight" unless there is propagation enhancement, so raise your antennas as high as possible.

• Feed line losses are a lot higher than on HF so leave the RG-58 or 59 at home and use low-loss coaxial cable, such as LMR-400 or 9913. RG-8 or RG-213 will work for runs of 50 feet or less. Keep feed line runs as short as possible; coiled-up coax adds extra line loss very quickly.

Nearly all VHF+ SSB/CW operations use horizontally polarized antennas, such as Yagis, quads or dipoles. FM contacts should be made using vertically polarized antennas. A vertical, ground plane or small, vertically polarized Yagi are good options.

• It is very important to learn the band plans for the VHF+ bands (**www.arrl.org/band-plan-1**). This will help you avoid simple mistakes — calling CQ in the middle of the beacon band, for example.

Don't monopolize the VHF+ SSB/CW or FM simplex calling frequencies (50.125, 144.200 MHz and 52.525 MHz, respectively). Call CQ there but move off frequency once you receive a call.

If you know an experienced VHF+ operator, see if they'll act as an Elmer for the club. It will be a frustrating experience for all to place inexperienced operators at the VHF+ station without some guidance.

• VHF+ operators exchange "grid squares," which are rectangular areas 2° of longitude wide by 1° of latitude (www.arrl.org/grid-squares). While grid squares are not part of the standard Field Day exchange, you should know your grid square in case a contact asks for it.

Point your antennas toward high-population centers if there is no enhanced propagation.

# **The Basics**

#### **6 Meters**

• Six meters shares many characteristics of the 10 meter band. As noted earlier, sporadic-E is common on 6. If 10 meters is open, check for openings on 6 as well. A 100 W transmitter and a simple dipole up 20-30 feet will perform well during a decent 6 meter opening. A 2 element quad or 3 element Yagi for 6 are small and can provide gain. If the band is open, point your antenna toward the loudest signal and start working stations.

The 50.000-50.080 MHz subband is reserved for beacons; you won't make many contacts there. The 50.080-50.100 MHz subband is for CW. USB activity occurs between 50.125-50.200 MHz with 50.125 MHz being the calling frequency. If the band opens, move up the band and call CQ. If exceptional conditions exist, you will hear stations well above 50.200 MHz. For 6 meter FM, the calling frequency is 52.525 MHz.

The 50.100-50.125 MHz subband is the DX Window. This area is for DX contacts. **Do not make Field Day contacts in the DX Window**.

#### **2 Meters**

• USB/CW 2 meter activity is centered around the 144.200 MHz calling frequency. USB and CW activity is intermixed between 144.180-144.220 MHz. If you're near a densely populated area, you'll hear more stations farther from the calling frequency. If you're in a rural area, activity will be closer to the calling frequency.

• A small 3 or 4 element Yagi will do nicely (see photo). Remember, higher is better. If the band isn't showing signs of enhancement, try aiming at big cities. Call CQ and rotate your antennas in 30° intervals every few minutes.

• On FM, use vertically polarized antennas and operate near the 146.520 MHz calling frequency.

Remember you cannot use repeaters or the 2 meter FM calling frequency for Field Day contacts. Call on adjacent channels or move stations away from the calling frequency to complete contacts.

Open the squelch on your radio to hear weaker signals.



Most FM satellites can be worked with just a simple setup such as this dual-band handheld transceiver and a handheld dual-band Yagi.

the VHF+ operator. If the K index is above 4, try pointing your antenna toward the magnetic north pole. CW is the preferred mode during aurora as signals become distorted, rendering SSB signals virtually unreadable. Indeed, the pure "beep" of a CW tone becomes a raspy *pfft* during auroral openings.

#### **Bagging the Birds**

For the beginner, the FM satellites offer the easiest path to satellite operation. You can work most FM birds with a dual-band handheld transceiver and a handheld dual-band Yagi antenna (see photo). Satellites typically have an uplink (the frequency you transmit on) on one band and a downlink (the frequency you receive on) on another; for example, 432 MHz for transmit and 144 MHz for receive. You also have to know when the satellites will pass over your area; check the AMSAT website at **www.amsat.org/amsat-new/tools/predict**. The two most popular FM satellites are AO-27 (uplink: 145.85 MHz/downlink: 436.795 MHz) and SO-50 (uplink: 145.85 MHz, PL 67.0 Hz/downlink: 436.795 MHz).

# By not adding a VHF+ station, you're missing some fun and leaving points on the table.

As the satellites move overhead, the transmit and receive frequencies will shift, due to the Doppler effect. If you hear signals start to get scratchy even though the satellite is still visible, adjust your receive frequency lower by 5 kHz and your transmit frequency higher by 5 kHz.

Remember that Field Day rules allow you to make only *one* contact on the FM satellites. Like a busy repeater, there are going to be many stations calling. Passes are no more than 15 minutes long. There will only be a limited number of passes during Field Day and there will be *many* stations calling. When you make your single allowed contact and earn your 100 bonus points, give others a chance. (Check the AMSAT website for any special Field Day schedules or restrictions on satellite operation.)

#### **The Bottom Line**

The VHF+ bands offer a multitude of contact possibilities during Field Day, all without changing your club's entry class. With a bit of

planning and learning the common operating practices on VHF+, you will be able to capitalize on these "free" points. If the propagation gods smile, you could walk away with a much higher Field Day score for just a little investment. Give the VHF+ bands a try or you'll be missing out on free points and a lot of free fun!

#### **Further Reading**

ARRL Operating Manual (9th edition), Chapter 3, "VHF/UHF — Beyond Repeaters" by Michael Owen, W9IP.<sup>1</sup> "How To Get Started In VHF" from the Pacific Northwest VHF Society www.qsl.net/pnwvhfs/articles/ beyondfm/getting\_started.htm.

<sup>1</sup>Available from your ARRL dealer or from the ARRL Store, ARRL order no 1093. Telephone toll-free in the US 888-277-5289 or 860-594-0355, fax 860-594-0303; www.arrl.org/shop; pubsales@arrl.org.

Photos courtesy Sean Kutzko, KX9X. Sean Kutzko, KX9X, is the ARRL Contest Branch Manager. He can be reached at **kx9x@arrl.org**.



# STOR DXpedition to South Sudan

# Two DX groups join forces to activate the newest new one.

Figure 1 — Above is a group shot of the first half of the DXpedition team who were (front row, left to right): Jun, JH4RHF; Fabrizio, IN3ZNR; Dmitri, RA9USU; Paul, N6PSE, and Jose, EA7KW. In the second row, left to right are Antonio, EA5RM; Andreas, DH8RW; Manuel, EA7AJR; Valery, RG8K, and Hrane, YT1AD.

Figure 2 — The second half of the DXpedition team consisted of (front row, left to right): Fabrizio, IN3ZNR; Jun, JH4RHF; Dmitri, RA9USU; Dave, AH6HY, and Valery, RG8K. In the back row, left to right are: Andreas, DH8WR; Jose, EA7KW; David, K3LP; Antonio, EA5RM; Paul, N6PSE; Krassy, K1LZ, and Manuel, EA7AJR.

#### Paul S. Ewing, N6PSE

There are many aspects to Amateur Radio. One that I find exciting is to travel to foreign lands and operate as the station that everyone wants to work. What can make this even more exciting is if the country is a "new one." Such was the case with our July-August 2011 DXpedition to Juba, South Sudan as STOR.

Sudan has been involved in one form of war or another since its inception. During the 20<sup>th</sup> century it had its own civil wars in 1972 and again in 1983. In 2005, the United Nations brokered the Comprehensive Peace Agreement between the north and south, later followed by a referendum on independence for South Sudan. This referendum passed in January 2011 by 98% of the votes and gave South Sudan complete autonomy, paving the way for their declaration of independence on July 9, 2011.

The US based Intrepid-DX group (intrepiddx.com) and the European based DX Friends (www.dxfriends.com) watched these developments with keen interest. Having long admired and respected each other's previous DXpeditions, we decided to join forces for a DXpedition to South Sudan.

#### **Quick and Easy**

Since this was a new country its newly created government was just getting started.



Antonio Gonzalez, EA5RM, traveled to Juba, South Sudan's new capital, to obtain a license for the DXpedition. Tony spent several days in Juba completing the license process and paying the required fees. He also checked a number of locations, seeking the ideal venue for the DXpedition.

After Tony traveled to Juba and obtained the license, I traveled to Washington, DC to inquire about travel permits and visas. The staff in the consulate was very cooperative and excited that we wanted to come to Juba to help them celebrate the birth of their new country. The new government was focused on getting established and was happy to have us

share in their celebrations. There was very little red tape

# The many stations calling STOR covered 40-50 kHz on each of the bands!

and we were assured that there would be "no problems" getting our equipment into the country. I had to laugh, though, when they cautioned that we should not bring any weapons or explosives with us.

#### **A Quick Takeoff**

We were surprised when the UN voted on July 14 to admit Southern Sudan as their newest member. Later that day, the ARRL DXCC program announced that South Sudan was a new entity. We purchased our flights and planned to be in Juba only 7 days later! We never expected to be the first group on the air in Juba, nor the only group. Instead, our focus was to be the most effective. We would try to have a large and lasting presence. Toward that end we planned to be active for about 20 days with a large team.

We quickly assembled our equipment and packed our gear. We would need to pack light and carry as much gear as we could. Our luggage overweight fees were pretty significant as you can imagine.

Juba is like no other place. The heat and humidity are extreme. The airport is small and filled with a sea of people, chickens, pigs and goats passing through the terminal. There is a whimsical chaos in getting one's luggage.

We had hired two vans and our teams were taken to the Juba Grand Hotel. Tony, EA5RM, had visited this hotel and selected it as our venue. With its flat open grounds and large backup diesel generators, it would prove to be ideal. In addition, the food was good and the beer was ice cold.

We quickly surveyed the grounds and began to set up the equipment and antennas. Soon, we had the CW stations on the air followed

> by our SSB and RTTY stations. The many

stations calling STOR covered 40-50 kHz on each of the bands! Most of us had not experienced anything quite like this. While it was fun, it was arduous work to get the pileups down to a manageable size. Our Q rates were slow because of the many callers and interference. It was very rewarding to hear "thanks for the new one" repeatedly as we worked the many callers around the world.

We found that we could easily work European and Japanese stations around the clock. Propagation to most of North America ran from 2-8 AM, local time, but working the West Coast, Australia and New Zealand was difficult. Fortunately, most DXers were willing to stand by as we called these areas during their openings.

#### In the Groove

Soon, we fell into a daily rhythm. Schedules were in place and everyone had their shifts and rest periods established. Our goals were to work as many DXers as possible during our 3 weeks of activity and to cover all geographic regions as best we could. We also hoped to beat the long established RTTY DXpedition contact record. To this end, Andy, DH8WR; Jun, JH4RHF, and Tony, EA5RM, made a major RTTY effort. The amount of time these guys put into working RTTY and their focus and determination were amazing. Together, they set a new record for DXpedition RTTY contacts of 18,132!

Our SSB team consisted of myself; Tony, EA5RM; Dave, AH6HY; Fabrizio, IN3ZNR; Hrane, YT1AD; Krassy, K1LZ, and David, K3LP. Jose, EA7KW, was very busy with 6 meters and his CW/SSB roles.

Our CW crew consisted of Manolo, EA7AJR; Jose, EA7KW; Valery, RG8K; Dima, RA9USU; Hrane, YT1AD; Krassy, K1LZ; Jun, JH4RHF, and David, K3LP.

While our hotel situation was fairly comfortable, there were some operational challenges. There is no power grid in Juba, so our hotel runs several large diesel generators. We did lose power several times a day as the generators were refueled. Our Internet connection was satellite based and was very slow and unreliable. This made it difficult to upload logs.

The climate was also very harsh. The heat and humidity were very intense as we were setting

up our antennas. Our shack was often very hot and humid, particularly during the daytime. Perhaps that is why many of us enjoyed operating during the cooler evening hours.

Malaria is a danger is South Sudan, which is near the Nile River. Mosquitoes are prevalent and we all had to take malaria precautions. While the team members

remained healthy, our South Sudanese driver came down with Malaria and was very sick for an entire week.

#### **An Official Visit**

One of the high points of our DXpedition was when the Government of South Sudan's Undersecretary of Communications Stephen Lugga Juma and Director for Telecommunications Thomas Gatkuoth Nyak accepted our invitation to visit and have lunch with us. The Undersecretary and the Chief Engineer marveled at how well our equipment worked and at how easy it was for us to work the entire world. They listened intently as Fabrizio, IN3ZNR, made contacts around the globe. The Ministry of Telecommunications welcomed our assistance in helping them establish an Amateur Radio program. We consulted with them and assisted with their ITU application for their own prefix. The Undersecretary said that he would like to have the prefix of "SS" issued to South Sudan. The path has been paved for future

> Amateur Radio visits to South Sudan. This was indeed a very exciting day!

#### **Science Lesson**

The Intrepid DX Group and the DX Friends believe that part of the purpose of carrying out a DXpedition is to expose the local people to Amateur Radio. To that end, we visited the Juba Boy's Secondary Academy and invited them to visit our shack and learn about Amateur Radio. The school's headmaster was very excited and agreed to bring 24 boys ages 5-12 to our shack the following day. The next day the boys arrived. Like the



Figure 4 — Shown here are, from the left: Hrane, YT1AD; Jose, EA7KW; Fabrizio, IN3ZNR, and Jun, JH4RHF, busy racking up the DXpedition's 121,286 contacts.

Undersecretary and the Chief Engineer, they were impressed with the equipment and the ease with which we talked all over the world. They got a great thrill out of their STOR visit.

In closing, this was a great adventure to South Sudan. The people of Juba are very warm and friendly. They were genuinely grateful for our visit and our interest in their country.

I am very pleased and proud of the partnership with the DX Friends. This partnership proved to be very beneficial to both groups. We really enjoyed each other and we are already talking about future DXpeditions together. We are pleased that we were able to make 121,286 contacts with the Amateur Radio community throughout the world.

I would like to thank all of our sponsors and donors who helped us make this DXpedition possible. Lastly, I would like to dedicate this article in the memory of our friend, James McLaughlin, WA2EWE/T6AF, who was killed in Kabul, Afghanistan in April 2011.

#### Photos courtesy Paul Ewing, N6PSE.

Paul Ewing, N6PSE, is a retired Silicon Valley technology executive who has been an Amateur Radio operator since 1982. He loves to travel and has operated from Vietnam and many countries in Europe, the Middle East and the Caribbean.

Paul is a Life Member of the ARRL and an A-1 Operator. His proudest accomplishments are that his 13 year old son Ryan, N6RYN, and his 23 year old daughter Michelle, KJ6DOM, enjoy Amateur Radio almost as much as he does. He can be reached at 3052 Wetmore Dr, San Jose, CA 95148, **paul@n6pse.com**.





**Figure 3** — The Undersecretary Stephen Lugga Juma (left) and Chief Engineer Thomas Gatkuoth Nyak chat with Tony, EA5RM, as Dmitri, RA9USU, looks on.

#### Happenings

S. Khrystyne Keane, K1SFA, k1sfa@arrl.org



# ARRL Members Receive New Membership Benefits

ARRL members are in for a treat with the introduction of a digital version of QST and an expanded online archive.

The ARRL is excited to unveil two new membership benefits beginning in late May. In addition to the print copy of *QST*, all members will have access to an online digital edition of *QST* at no extra cost. You will be able to view *QST* from anywhere — on nearly any computer, laptop, mobile device, smartphone and tablet (including Apple iPad, iPhone, iTouch, Kindle Fire and devices using the Android operating system). Additional features such as video, audio, photo slideshows and additional digital-only content will also be available and will vary month-to-month depending on the editorial needs of the magazine.

Members will also gain access to archived issues of *QST* from December 1915 to the present; previously, only issues through 2007 were available to members. If you are familiar with the current periodicals archive, that platform will be expanded to include all of *QST*, from December 1915 through December 2011. A second, new archive will be introduced for issues beginning January 2012 that will feature enhanced functionality, including full-text search.

#### **Digital QST Features**

The digital edition of *QST* is a web-based edition of the journal that offers a way to

read and interact with the current issue of *QST* anytime and anywhere. It simulates the look and feel of the printed version, complete with page flipping, indexing and easy

ways to move around each issue. You can choose to read it online, or download the entire issue to an electronic device to read later. Members can also access the digital archive for access to

previous issues.

The digital edition is in an "epub" format, using proprietary software from our partner Nxtbook. Members can elect to receive an e-mail each month, notifying them that the new issue is available. This e-mail will include a link to the issue, with an option to download the file onto a desktop (which will utilize and load Adobe Air) to view offline. Although the digital *QST* is not yet downloadable onto a tablet or smartphone, it *can be viewed* on any tablet or smartphone with browser access.

Members must have a valid ARRL website login to access the current digital edition of *QST* and archived editions. You can access digital *QST* a few different ways: •E-mail notification: Sign up to get monthly e-mail notifications when the latest issue of digital *QST* is released. Just check off the "Notification of monthly digital



edition of *QST*' box in your ARRL website profile. Visit **www. arrl.org/myarrl** to add the notification to your preferences.

•*QST* website: You can visit www.arrl.org/ qst to get access to the latest issue of digital *QST*, as well as links to the digital archive beginning with the January 2012 issue. You can also access the print archives from 1915-2011.

ARRL members can choose to opt-out of the mailed, print edition of *QST* at any time by completing the online opt-out form at **www. arrl.org/QST-print-edition-opt-out-form.** Due to the lead time required to prepare *QST* for mailing, you may receive one last printed issue. Please keep in mind that choosing to opt-out of the print edition of *QST* is voluntary and will not result in a refund or reduction of ARRL membership dues; any savings will be used to extend the League's reach in the areas of public service, education, advocacy, technology and membership.

#### 2012 Continues to Show Growth in Amateur Radio Licensing

The first quarter of 2012 saw a high level of Amateur Radio license exam sessions, producing an elevated influx of applications for new licensees. According to ARRL VEC Manager Maria Somma, AB1FM, these numbers outpaced the 2011 first quarter results by 30 percent. This uptick does not only apply to new applications; there was a 6 percent increase in the number of upgrades, too. "Statistics over the last 13 years reveal that these are the highest numbers that we've seen for the total number of US amateurs and the most new amateurs since the early 1990s," Somma said.

Year	Ending Month	Extra	Advanced	General	Tech	Novice	Total
2012	Mar	127,674	57,393	161,220	343,597	14,352	704,236
2011	Dec	126,431	57,875	160,554	342,583	14,613	702,056
2010	Dec	122,951	59,387	155,781	342,191	15,731	696,041
2009	Dec	119,403	60,795	150,970	334,245	17,084	682,497
2008	Dec	115,625	62,104	144,832	322,660	18,343	663,564
2007	Dec	112,022	65,368	142,680	315,314	20,458	655,842
2006	Dec	108,223	69,915	131,224	323,073	23,633	656,068
2005	Dec	107,440	74,221	135,067	319,125	26,747	662,600
2004	Dec	106,090	77,948	138,292	319,742	29,765	671,837
2003	Dec	104,894	82,034	141,498	322,821	32,812	684,059
2002	Dec	103,257	84,326	139,848	321,805	36,072	685,308
2001	Dec	97,977	86,545	138,625	319,735	40,155	683,037
2000	Dec	93,807	88,783	134,144	319,874	45,632	682,240
1999	Dec	75,392	103,471	110,386	335,768	52,375	677,392

At the close of March 2012, there were more than 704,000 radio amateurs in the US. There was a 30 percent rise in the number of new applications in the first quarter of 2012, compared to the first quarter of 2011. Thanks to Joe Speroni, AH0A. for the information in this chart.



She added that there are currently 704,236 licensed Amateur Radio operators in the US. "We broke the 700,000 barrier in October 2011," she explained, "and the numbers continue to progress higher. Broken down by license class, at the end of March there were 14,352 Novices, 343,597 Technicians, 161,220 Generals, 57,393 Advanced and 127,674 Amateur Extra licensees. It's an all-time high for Technician, General and Extra class licensees, as well. Additionally, our total number of licensees across all three classes has grown each year."

For the first quarter of 2012, Somma said that the ARRL VEC test session statistics are the highest first quarter results since the FCC's restructuring of the license requirements in 2007: "Our exam session activity and exam elements administered are elevated. As the total number of licensees across all three license classes continues to grow each year, the demand for Amateur Radio exam sessions also grows. In turn, the number of amateurs who want to be Volunteer Examiners and who want to teach Amateur Radio classes is also rising. The ARRL VEC has seen a spike in the number of applications from General and Extra class radio amateurs who want to give back to their community by serving as examiners and instructors. This is a positive trend that we expect will continue over the coming months."

#### Special Event Stations Planned for London 2012 Olympic and Paralympic Games

Two special event call signs will be activated to celebrate the London 2012 Olympic and Paralympic Games: 2012L from London, England and 2012W from Barry, Wales. The London 2012 Inspire program has

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granted the Radio Society of Great Britain (RSGB) — Great Britain's IARU Member-Society — use of the "Inspire mark" for these stations. Both stations will be on the air for the duration of the Games, July 27-August 12.

•2012L: Operators will be active on 160-2 meters on all modes. The station is

located at the historic Eltham Palace in Southeast London, in the London borough of Greenwich, one of the six "host boroughs" for the Games.

•2012W: Operators will be active on 160 meters-23 cm on all modes, including SSTV and satellite. This station will be based on the seafront esplanade at Whitmore Beach, Barry

#### **Stephen Klinefelter Is New Army MARS Chief**

On April 2, US Army Colonel (retired) Stephen G. Klinefelter a senior staff officer who oversees Army MARS operations for the US Army Network Enterprise Technology Command announced that he was assuming the post of Chief of Army MARS, effective immediately.



Klinefelter, 61, took the leading role last December in untangling a Pentagon decision to "phase out" the Army MARS *Winlink 2000* 

messaging system, used by numerous state and municipal emergency management organizations. An investigation showed it lacked required certification for safety from hostile incursions. He successfully argued that the resources of Amateur Radio — not just MARS or *Winlink* — far outweighed any risk from enemy hackers. Lieutenant General Susan Lawrence, the Army's Chief Information Officer, ordered an exemption from this policy for Army MARS, which officials said would extend to the Air Force and Navy-Marine Corps MARS programs, too.

Klinefelter attended Virginia Military Institute on a full ROTC scholarship, becoming a Second Lieutenant in the Signal Corps upon graduation in 1974. He served as Chief of the Global Network Operations Center of the Defense Information Systems Agency (DISA) outside Washington, DC. After that, he was Deputy Commander — and then Commander — of the DISA's European operations based at Stuttgart, Germany. Earlier, Klinefelter served for varying periods with four mechanized infantry divisions and earned a master's degree in computer science at the Naval Postgraduate School in Monterey, California. His last uniformed post was Chief of Information Technology at the US Military Academy in West Point, New York. Klinefelter served 31 years active duty in the US Army Signal Corps. After retiring from the Army, he joined the NETCOM G3 section (operations and training) as deputy operations officer, a position he will retain.

He succeeds Jim Griffin, who wound up 55 years in government service in the Army MARS Chief's job since 2009. Klinefelter will retain his post in NETCOM Headquarters while leading MARS, but a new position of MARS Program Officer was being created to assist him.

Island, Vale of Glamorgan, just a few miles southwest of Cardiff and the Millennium Stadium, home to the first football match that will open the Games in Wales.

"Amateur Radio operators everywhere will be able to share in the Olympic experience by making contact with the station and exchanging greetings messages with visitors and Games participants who visit the station," explained John Warburton, G4IRN. "The team aims to make contact with as many of the Games participating countries as possible. Special QSL cards will be available to stations contacted. The project aims to leave a lasting legacy by

encouraging visitors to learn more about radio communications and the social, career and recreational benefits that it brings."

#### Fred Maia, W5YI (SK)

The holder of one of the best-known US Amateur Radio call signs, Fred Maia, W5YI, of Arlington, Texas, died of cancer March 28. He was 76. Maia was a leading Amateur Radio journalist for nearly 35 years and a pioneer of the volunteer examining program adopted by the FCC in 1984.

An ARRL Life Member, Maia published *The W5YI Report*, dubbed "America's Oldest Ham Radio Newsletter," from 1978-2003, and was a *CQ* contributing editor since 1985. His regulatory affairs column — first titled "Ticket Talk" then "Washington Readout" — offered news and perspective on FCC regulations and ITU actions. His final column appeared in the May 2012 issue of *CQ*.

After the FCC adopted volunteer examining for all levels of Amateur Radio licensing in 1984, Maia became the first Volunteer Examiner Coordinator (VEC) appointed by the FCC. He subsequently founded The W5YI Group in 1986 to develop, publish and sell amateur and commercial radio license study materials. In the realm of FCC commercial radio licensing, he formed National Radio Examiners to provide examination services.

Maia served as President of the W5YI-VEC until his retirement in October of 2000 when

he sold The W5YI Group study material products to Master Publishing, Inc. The retail operations were purchased by General Manager Larry Pollock, NB5X, newly appointed president of the W5YI-VEC and National Radio Examiners organizations. Maia continued writing *The W5YI Report* newsletter until July 2003.

For several decades, Maia served on the National Conference of Volunteer Examiner Coordinators (NCVEC) as a member of the Question Pool Committee, the group that oversees the development and maintenance of the Amateur Radio license examination question pools.

"Amateur Radio is healthier today because of the tireless efforts of Fred Maia," said ARRL Chief Executive Officer David Sumner, K1ZZ. "While Fred did not always see things quite the same way as the ARRL, in my experience he always had the best interests of Amateur Radio at heart. He was a major figure who will be sorely missed."

#### NTIA: No Objection to Additional Data Modes on 60 Meters

In response to requests for clarification from the ARRL, the National Telecommunications and Information Administration (NTIA) has confirmed that it has no objection to the use of a



**In Brief** 

Malaysia to Host Eighth Global Amateur Radio Emergency Communications Conference: The Eighth Global Amateur Radio Emergency Communications Conference (GAREC) — called MyGAREC 2012 — will be held November 12-14 in the Malaysian state of Negeri Sembilan at the Thistle Port Dickson Resort. GAREC — which began in 2005 in Tampere, Finland — attracts radio amateurs who have an interest in providing emer-



gency communications in response to disasters or during training exercises. MyGAREC 2012 has been timed to immediately follow the IARU Region 3 Conference in Vietnam (scheduled for November 5-9) with its theme of disaster relief communications. For more information, please visit the MyGAREC website at **www.mygarec2012.com**.

- Amateurs Must Protect New Radars in 23 cm Band: The Federal Aviation Administration (FAA) is deploying a new generation of Common Air Route Surveillance Radar (CARSR) that has some implications for the use of the 1240-1300 MHz (23 cm) band by amateurs. The Amateur Service allocation in this band is on a secondary basis, with aeronautical radionavigation and several other services primary in the United States Table of Frequency Allocations. The FCC rules require that amateur stations operating in the 23 cm band may not cause harmful interference to stations in the radionavigationsatellite service, the aeronautical radionavigation service, the Earth exploration-satellite service (active) or the space research service (active). One case of harmful interference in Southern California has been reported. CARSRs are being installed in several dozen locations throughout the country and will use various frequencies in the 1240-1350 MHz range with an occupied bandwidth of about 3 MHz. In the vicinity of the radars, amateur operation may be precluded in a portion of the 23 cm band. The ARRL is in contact with FAA engineers. We anticipate that the constraints on amateur use of the band will be limited to those necessary to protect aviation safety, which of course cannot be compromised.
- W1AW Claims 5BDXCC: Nearly four decades after the introduction of the Five Band DXCC Award (5BDXCC), W1AW, the Hiram Percy Maxim Memorial Station has achieved this milestone, getting its last needed 80 meter QSO. W1AW Station Manager Joe Carcia, NJ1Q, said that at least 90 percent of the confirmations were made via Logbook of The World, but contacts #99 and #100 on 80 meters were confirmed via traditional QSL cards.
- Luxembourg Issues Stamp to Celebrate 75 Years of Amateur Radio: Founded in 1937, the Réseau Luxembourgeois des Amateurs d'Ondes Courtes (RL)
   — that country's IARU Member-Society — is celebrating its 75th anniversary in 2012. In honor of this milestone, Luxembourg's Entreprise des Postes et Télécommunications (P&TLuxembourg) has issued a .60 € postage stamp (about 80 cents in US dollars); P&TLuxembourg is Luxembourg's government-owned



corporation for mail and telecommunications. The Amateur Radio stamp is one of three commemorative stamps issued by Luxembourg in 2012.

quency of a transceiver operated in the Upper Sideband (USB) mode. This is typically the frequency shown on the frequency display.

Channel	USB Suppressed Carrier (kHz)	Center (kHz)
1	5330.5	5332.0
2	5346.5	5348.0
3	5357.0	5358.5
4	5371.5	5373.0
5	5403.5	5405.0

The ARRL advises amateurs to operate with care when using digital modes in consideration of the fact that hams are secondary users on these frequencies. See the revised 60 Meter FAQ page at **www.arrl.org/60meter-faq** on the ARRL website, as well as the revised ARRL 60-Meter Recommended Practices document at **www.arrl.org/files/ file/Regulatory/Recommended\_Practices\_ Version\_6\_5.pdf**.

broader range of data emissions by amateurs on the five 5 MHz frequencies on 60 meters. ARRL's original understanding was that the NTIA preferred that the use of 2K80J2D emission be limited to Pactor III. The NTIA now says that that is not the case.

In an e-mail response to ARRL Chief Executive Officer David Sumner, K1ZZ, Karl Nebbia, Associate Administrator of the NTIA Office of Spectrum Management, stated, "NTIA has no interest in limiting the types of emission used by the amateurs as long as the data emission does not exceed the 2.8 kHz bandwidth generated by the upper sideband transmitter." Nebbia referred all further inquiries to the FCC, which "... sets the conditions for use of the five 5 MHz frequencies by the amateurs."

The requirement of only one signal per channel remains, as well as the prohibition against automatic operation. The FCC continues to require that all digital transmissions be centered on the channel-center frequencies, which the *Report and Order* (released November 2011, see **www.arrl. org/news/new-rules-for-5-mhz-60-metersto-go-into-effect-march-5**) defines as being 1.5 kHz above the suppressed carrier fre-

#### Public Service

Rick Palm, K1CE, k1ce@arrl.org



# Hurricane Center Director Addresses ARES<sup>®</sup> Crowd at Conference

#### Amateur Radio was front and center at the NHC Conference in Orlando

National Hurricane Center Director Bill Read, KB5FYA, called radio amateurs "educated users of NHC products" and asked for their assistance in the development of future products consistent with Center visions for partnership.

The first director to hold an amateur ticket, he labeled ham radio as one of the best sources of information for Center processing of storm advisories. Read spoke for 30 minutes at the standing room only Amateur Radio Session on March 26 at the National Hurricane Conference, Orlando, Florida.

Read recited the fascinating history of hurricane forecasting, beginning in 1873 with the Army Signal Corps issuing the "first cautionary signal." In 1898,

President McKinley famously said, "I am more afraid of a West Indies hurricane than I am of the entire Spanish Navy." In 1935, the "hurricane service" was decentralized following a number of infamous forecast failures. In 1961, two day forecasts were introduced, followed by three day forecasts beginning in 1964. Four and five day forecasts began in 2003. The National Hurricane Center was adopted by the Miami weather office in 1955.

Read reviewed Center areas of responsibility of today and plans for the future. He is hoping to add graphical depictions of forecasted storm surge to NHC maps and advisories. He also reviewed how the Center gets its surface data from sources such as Amateur Radio and the WX4NHC station at the Center. Read closed his remarks by lauding radio amateurs and answering questions. It's the first time I can ever remember a director spending so much time with amateurs at the conference.



From the left, ARRL Emergency Preparedness Manager Mike Corey, KI1U, the Weather SEC at the National Hurricane Conference.

## famously said, "I am more afraid of a West Indies hurricane than I am of the entire Spanish Navy."

#### WX4NHC: Disseminating **Advisories Since 1980**

Veteran assistant coordinator of the Center's Amateur Radio station WX4NHC Julio Ripoll, WD4R, reviewed the role of the station in gathering reports from affected areas and disseminating advisories. The station is located in a room adjacent to the main forecasters' room. Ripoll also cited some history: the Amateur Radio function was added to the NHC in 1980 at the suggestion of director Dr Neil Frank. The operation faced its first major trial that same year, when Hurricane Allen, a category 5 storm, destroyed the Caribbean island of St Lucia. J69VJ had called SOS on 20 meters. Having recently won its independence from Britain, HMS Glasgow needed permission to land on the island, and the Prime Minister gave it via Amateur Radio.

Ripoll told of the role the station played

during Katrina, when all communications were lost with the Slidell, Louisiana NWS office as well as others. The 20 meter band was used to communicate with the office for six hours as the historic storm made landfall. Ripoll also reviewed the nuts and bolts of the station's mission and operation in receiving reports from the field and serving as a backup communications mechanism for the Center if it gets hit.

The station employs almost all bands and modes, digital and analog and the Internet, and coordinates closely with the VoIP Hurricane Net as well as the traditional Hurricane Watch Net on 14.325 MHz. WX4NHC operators worked closely with the VoIP Hurricane Net when the station had zero propagation to the stormaffected island of Granada. Ripoll reviewed information

gathering protocols in use by the station, emphasizing the importance of measured data. The conferees laughed when Ripoll reported one station that had called in an estimated barometric pressure.

Other reports received by the station included one from a hospital nurse who reported the ER doors had just been blown off, and another from a storm chaser who reported he thought this was the end when he tried to take refuge under a bridge. "He had possibly met his match." Ripoll doesn't recommend storm chasing.

The Amateur Radio coordinator for the National Hurricane Center, John McHugh, K4AG, another veteran there, reported on several initiatives: the APRS network of stations running down the Florida Keys, the Observer Network (ON-NHC) and CARMEN, the Caribbean Amateur Radio



NHC Director Bill Read, KB5FYA, addressing the Amateur Radio session at the National Hurricane Conference on March 26. [Rick Palm, K1CE, photo]





Three of the presenters at the Amateur Radio forum at the National Hurricane Conference 2012. From left to right: John McHugh, K4AG, coordinator for Amateur Radio at the National Hurricane Center station WX4NHC Bill Read, KB5FYA, director of the National Hurricane Center, and Julio Ripoll, WD4R, WX4NHC assistant coordinator. [Mike Corey, KI1U, photo]

Meteorological Emergency Network. The latter, sponsored by NOAA and Shell Oil, is composed of standardized weather stations placed throughout the region. Stations have been given to radio amateurs in phases, starting with the Northern Leeward islands, then to the Bahamas and elsewhere. The hardware and program has been enhanced and automated by the use of APRS.

Lastly, the Center and NWS have also developed the Citizen Weather Observer Program (CWOP), with some 8000 weather stations in the field now reporting data using free software available from the NWS.

Next up on the podium was Rob Macedo, KD1CY, a long-time participant in southern New England SKYWARN and hurricane events and manager of the VoIP Hurricane Net, a partner of the WX4NHC group for eight years. Macedo spoke briefly about the functioning of his net, and then launched into a review of New England's storm history. Hurricane Irene was the first major storm to hit the region since Hurricane Bob in 1991. The net's mission during Irene was twofold: to link via EchoLink/IRLP various EOCs, emergency management offices, and Red Cross facilities in the region; and gather reports of storm conditions and damage from the field and relay them to the appropriate agencies and officials, including the National Hurricane Center. All of New England was affected, but Vermont seemed to suffer the worst flooding and misery. The Vermont SEC called Macedo for help. Photos Macedo showed of Vermont flooding and damage were sobering, and silence filled the room as the scenes of devastation were displayed on the projection screen. The New England Regional SKYWARN Net was linked into the VoIP Hurricane Net for efficiency and effectiveness in communications management for this storm that spread out 320 miles from its center.

#### **Irene Retrospective**

Closing out the session was Mike Corey, KI1U, ARRL HQ Emergency Preparedness Manager, who spoke on the HQ response to Hurricane Irene. The HQ Emergency Response Team (HQERT) was activated,

≺Bill Read, KB5FYA, delivers a presentation to the Amateur Radio forum. [Mike Corey, KI1U, photo]



ARRL Southeastern Division Director Greg Sarratt, W4OZK, presents an ARRL ARES Challenge Coin to Dr Richard Knabb from The Weather Channel. Dr Knabb gave a presentation to local amateurs at the Orange County (FL) Emergency Operations Center. [Mike Corey, KI1U, photo]

and conducted numerous conference calls with Section Managers, Section Emergency Coordinators and Public Information Coordinators. The team conducted daily briefings, and communicated closely with national-level served agency contacts at the Red Cross, and also the National Voluntary Organizations Active in Disaster (NVOAD), of which the ARRL is a longtime member.

W1AW was opened on a rare weekend and operated by HQERT staffers. They monitored and checked into major nets including ECARS, the Hurricane Watch Net, SATERN, and the regional net of the Taunton NWS SKYWARN. W1AW operators also checked into section nets for the same purposes: information sharing, coordination and assistance. ARRL HQ sent Ham Aid kits with radios and accessories to Vermont, with Corey personally driving one package up to Brattleboro himself, with a consequent long ride home as the interstate highway southbound was flooded during his trip.

The conference was very well attended, and it was heartening to see so many ARRL Appointee badges in the audience. A special Amateur Radio session designed exclusively for emergency management professionals was scheduled for the following day.

# **Contest Corral – June 2012**

Check for updates and a downloadable PDF version online at www.arrl.org/contests Refer to the contest websites for full rules, scoring information, operating periods or time limits, and log submission information.

Dat	Start - e-Time	- Fini Dat	ish te-Time	Bands HF / VHF+	Contest Title	Mode	Exchange	Sponsor's Website
2	0000Z	3	2400Z	28/-	Ten-Ten Open Season	Dig	Call, name, S/P/C, member numbers	www.ten-ten.org
2	1100Z	2	1500Z	14/-	LZ Open 20 Meter Contest	CW	6-digit serial and serial from previous QSO	www.lzopen.com
2	1200Z	3	0300Z	1.8-28 / 50,144	Maritime QSO Party	Ph CW	Maritime county or S/P/C	www.maritimecontestclub.com
2	1200Z	3	1200Z	3.5-28/-	SEANET Contest	Ph CW Dig	RS(T), serial	2012sea.net
2	1300Z	3	1300Z	- / 50	UKSMG Sporadic E Contest	Ph CW Dig	RST, member nr, 6-digit grid locator	www.uksmg.org
2	1500Z	3	1459Z	1.8-28/-	IARU Region I Field Day	CW	RST, serial	IARU Society websites
2	1600Z	3	0400Z	1.8-28/-	Alabama QSO Party	Ph CW	RS(T) and AL county or S/P/C	www.alabamaqsoparty.org
2	1700Z	3	2100Z	- / 50	Six Club Contest	Ph CW Dig	Call sign, grid square, member number	www.6mt.com
3	1100Z	3	1700Z	28/-	DARC 10 Meter Digital Contest	Dig	RST, serial number	tinyurl.com/3o3kobs
4	1600Z	4	See web	3.5 / 50, 144	OK1WC Memorial Contest	Ph CW	RS(T) and serial	www.hamradio.cz/ok1wc
5	0200Z	5	0400Z	3.5-28 / -	ARS Spartan Sprint	CW	RST, S/P/C, and power	www.arsqrp.blogspot.com
8	0200Z	8	0300Z	1.8-14 / -	SNS and NS Weekly Sprints	CW	Serial number, name, S/P/C	www.ncccsprint.com/rules.html
9	0000Z	10	2359Z	1.8-28/-	WFF Green Days	Ph CW Dig	RS(T) and WFF number if available	www.wff44.org
9	0000Z	10	See web	3.5-28 / -	DRCG Long Distance Contest	Dig	RST, CQ Zone, and UTC time	www.drcg.de
9	0600Z	10	0600Z	3.5-28 / -	Australian Shires Contest	Ph CW	RS(T) and VK Shire or CQ Zone	groups.yahoo.com/group/vkshires
9	1100Z	9	1300Z	14-21 / -	Asia-Pacific Sprint	Ph	RST, serial	jsfc.org/apsprint/aprule.txt
9	1200Z	10	1200Z	3.5-28/-	Portugal Day	Ph CW	RS(T) and serial or district code	portugaldaycontest.rep.pt
9	1500Z	10	1500Z	3.5-28/-	GACW WWSA CW DX Contest	CW	RST, CQ zone	www.wwsatest.org
9	1600Z	10	1600Z	- / 50	REF DDFM Six Meter Contest	Ph CW	RST, serial number, grid square	concours.ref-union.org
9	1800Z	11	0300Z	- / 50+	ARRL June VHF QSO Party	Ph CW Dig	Grid square	www.arrl.org/contest-rules
13	0030Z	13	0230Z	3.5-14/-	NAQCC Monthly QRP Sprint	CW	RST, S/P/C, and NAQCC mbr nr or power	naqcc.info
13	1300Z	14	See web	1.8-28 / -	CWops Monthly Mini-CWT Test	CW	Name and member number or S/P/C	www.cwops.org/onair.html
16	0000Z	17	2400Z	1.8-28 / -	All-Asian DX Contest	CW	RST, operator age (YL may send 00)	www.jarl.or.jp/English
16	0000Z	16	2359Z	- / 50	SMIRK QSO Party	Ph CW	Grid square and member number	www.smirk.org
16	0800Z	16	1000Z	7/-	SARL Youth Day Sprint	Ph	RS and age	www.sarl.org.za
16	1500Z	17	1500Z	1.8/-	Stew Perry Warmup Contest	CW	4-char grid square	web.jzap.com/k7rat/stew.rules.txt
16	1500Z	17	2100Z	1.8-28/-	QRP ARCI QRP Shootout	Ph CW	Category, ARRL/RAC section or DX	www.qrparci.org/contests
16	1600Z	17	0200Z	3.5-28 / -	West Virginia QSO Party	Ph CW Dig	RS(T), WV county or S/P/C	www.qsl.net/wvsarc
16	1800Z	16	2400Z	3.5-28 / -	Kid's Day	Ph	Name, age, location, favorite color	www.arrl.org/kids-day
16	2000Z	16	2200Z	28/-	Feld-Hell Field Day Sprint	Dig	RST, S/P/C, Feld-Hell member nr	www.feldhellclub.org
17	0900Z	17	1500Z	- / 50	WAB 50 MHz Phone	Ph	RS, serial, WAB square or DXCC entity	www.worked-all-britain.co.uk
18	0200Z	18	0400Z	1.8-28/-	Run For the Bacon	CW	RST, S/P/C, Flying Pig nr or power	www.fpqrp.org
21	0000Z	25	0000Z	1.8/-	SARL Top Band QSO Party	Ph CW	RS(T) and province or country	www.sarl.org.za
21	0030Z	21	0230Z	3.5-14/-	NAQCC Milliwatt Sprint	CW	RST, S/P/C, and NAQCC mbr nr or power	naqcc.info
23	0000Z	24	2400Z	- / 5.7G	Worldwide EME Contest	Ph CW	TMO/RS(T) and "R"	www.dubus.org
23	1200Z	24	1200Z	1.8-28 / -	His Majesty King of Spain	Ph	RS, serial or EA province	www.ure.es
23	1400Z	24	1400Z	1.8-28/-	Marconi Memorial HF Contest	CW	RST and serial number	www.arifano.it/contest_marconi.htm
23	1800Z	24	2100Z	1.8-28 / 50+	ARRL Field Day	Ph CW Dig	Category, ARRL/RAC section or DX	www.arrl.org/field-day

All dates refer to UTC and may be different from calendar date in North America. Times given as AM or PM are local times and dates. No contest activity occurs on the 60, 30, 17 and 12 meter bands. Serial = Sequential number of the contact. S/P/C = State, Province, DXCC Entity. XE = Mexican state. Publication deadline for Contest Corral listings is the first day of the second month prior to publication date (May 1 for July QST) – send information to **contests@arrl.org**. Listings in blue indicate contests sponsored by ARRL or *NCJ*. The latest time for a valid contest QSO is the minute listed in the "Finish Time" column.

# 2011 ARRL November Phone Sweepstakes Results

#### "Next year finally came!"

Steve London, N2IC, n2ic@arrl.net



Finally! For years, we have been telling you that the start of solar cycle 24 was imminent, and sunspots would return - next year! Well, beginning just a few months before Sweepstakes our dreams came true. Ol' Sol was back in force! 10, 15 and 20 meters were again the premier daytime bands in Phone Sweepstakes. We could spread out in the wide-open spaces of 10 meters and when we needed some closer-in contacts there was some breathing room on 15 and 20 meters. Shortly after the Sun went down the MUF (Maximum Usable Frequency) dropped like a rock, leaving 40 and 80 meters to be the night-time workhorses.



The W5RU Team, #2 in the Multiop, High Power Category, (I-r) Ted, KN5O; Steve, KG5VK; Mark, K5ER; Scott, W5WZ, and Dallas, K1DW.

For those licensed within the last 10 years, you could now start to believe the tales of the old-timers. For those with new Technicianclass licenses, you could fully experience Sweepstakes for the very first time! This year, 1827 logs were submitted. Adding in those that did not submit a log but made a number of contacts, we had nearly 5000 participants. Over 635,000 QSOs were reported in the submitted logs with almost equal numbers on 15, 20 and 40 meters (approximately 145,000) and equal totals on 10 and 80 meters (approximately 100,000).

This year, several new categories were added to Sweepstakes. The existing Unlimited and Multioperator categories were split into Low

Power and High Power Categories. The existing Unlimited records became the Unlimited, High Power records and the existing Multioperator records became the Multioperator, High Power records. And, of course, all of the Section and Division winners in the Unlimited, Low Power and Multioperator, Low Power categories established new record benchmarks. As a result, this year there were 12 new Division records and 30 new Section records.

#### **The Not-So-Elusive Clean Sweep**

Thanks to the great conditions and favorable activity from all 80 sections, this year provided the best shot at a Clean Sweep (working at

> least one station in each of the 80 Sweepstakes sections) in many years. This year, 410 participants earned a Clean Sweep, an increase of 123 sweeps over 2010. 36 competitors mentioned in their comments that this was their first Clean Sweep ever. Congratulations!

Another 140 operators came really close to a sweep — missing only one section. What section was the most challenging this year? Just like last year, it was Puerto Rico (19 missed sweeps). In a real surprise, Rhode Island was the next toughest with 9 missed sweeps. Tied for the third most-difficult were Northwest Territories and Santa Barbara(!). For those of you still shaking your head, those four sections were well represented thanks to NP4Z, NP4A, KH2RU/KP4, WP4I, KP4DKE, W1WBB, W1XX,

AB1JV, K1VSJ, KA1GEU, VE8EV, VY1EI, VE8GER, VE8NSD, WA6FGV, KI6QDH, W6RFU, N6K, W1PR, AG6AY and W6RSP. Many thanks to those ops for making their rare sections available.

#### **Close Races**

Every year there are a number of very close Section races. Some of these are completely accidental - the two participants didn't even know they were competing in the same category, while others were clearly rivalries, extending back many years.

This year, the most exciting close race was in the Single-Op, Low Power category in Connecticut. David, AA1JM won over Alec, W2JU by just one QSO! Neither David nor

Alec operated for the full 24 hours so there was an opportunity for either of them to win. In the New Hampshire Single-Op, High Power category only 18 contacts separated AF1T and KK1KW out of a total of 1300 contacts.

Thanks to great club activity, Maryland-DC is always a competitive section. This year, in the Single-Op, Low Power category there was a

#### **Top Ten by Category**

Single Operat	or,	Single Operator			
N9BV	367 200	VOTI	111 COO		
VY2ZM	001,200	KK6MC	98 720		
(K1ZM, op)	358,240	KOAD	96,800		
KH7X	050.000	K0TG	96,000		
	352,000	N3TD	92,000		
KI 7BA	040,000	WU9B	90,168		
(N6TR, op)	337,440	KOMPH	85 920		
K7RL	327,040	W1WBB	81 600		
NR5M	313,280	AB1JV	78,560		
N2IC	200.000				
	296,000	Multioperato	r,		
K5WA	285,920	High Power	070 / 00		
		W6YI	3/2,160		
Single Operat	or,	K7IR	303 040		
Low Power		KODU	297.280		
VA7RR	256,160	WONO	289,920		
KH6LC	255 260	NP2B	288,960		
	233,300	K4OV	288,000		
W4AAA	200,700	WY/SS	264,480		
(KK9A, op)	223,200	VEGAO	242,720		
N4PN	222,880	(VE6TC, op)	235.736		
K9ZO	217,120	(,,,,,,	,		
W/YAQ	212,000	Multioperato	r,		
KEGT	198 880	Low Power			
W4LT	194,720	K2NNY	198,720		
		N5DO	180,000		
Single Operat	or,	N8HB	157,440		
QRP		VE3MGY	130,560		
NN7SS	100 100	N6KI	100,640		
	108,160	K0ORB	95,326		
NW2K	93 120	KC8IMB	95,040		
KOKE	92,320	W8VI	86 240		
N3UR	87,848	*****	00,240		
KORH	85,162	School Club			
ND0C	81,844	W6YX	256,480		
(WD0T op)	79 716	K0HC	254,560		
W4SVO	77.616	W4UAL	159,360		
K600	77,440	WOEEE	125,768		
0		W1YK	89.076		
Single Operat	or	W8SH	60,480		
High Power		K2CC	59,250		
WRICOR		KOVVY	56,736		
(W1SJ op)	310 560	W6RFU	~ 10 000		
K6LL	282,560	(KDSHPN, U	p) 49,000		
W7RN					
(WX5S, op)	276,320				
NOVE	274,080				
N477	269 120				
K1KD	264,480				
W6PZ	2 .,. 20				
(K6SRZ, op)	261,760				
(AA4NC, op)	250,560				
VVAJZUF	249.120				

three-way battle between KB3OK, WA3KYY and K8GU. Only two QSOs separated KB3OK from WA3KYY and 27 more QSOs from K8GU! In the Multioperator, High Power category, the battle was among N3OC, WA3EKL and WR3Z. These weren't the only close races. Details of all the Section close races are in the table "Close Races" in the online write-up.

#### Single-Op, High Power (B) Category

Every year, there is a pack of big dogs going after the Single-Op, High Power title. The names change slightly from year-to-year but not the level of intensity. This year, Pat, N9RV worked hard to get his Montana antenna farm in shape for the competition and was wellrewarded. Pat took the lead after 5 hours, and held it to the end, relying primarily on 10 meters in the daytime, and 40 meters at night. While Pat has a very capable SO2R (single-op, two radio) station, his SS operation was done entirely with one radio. Last year's winner, Jeff, K1ZM operating from his VY2ZM Prince Edward Island QTH placed 2<sup>nd</sup>, 56 contacts behind N9RV. Jeff tried to use 20 meters to his advantage during the daytime but much of the activity had moved to 10 and 15 meters where Jeff's 10 and 15 meter signal skipped over some of the high-population areas.

Moving to the other side of the ARRL domain, 3rd place was captured by Mike, KH6ND operating from KH7X. Mike got off to a great start but once 20 meters closed at 0330Z, he struggled on the low bands until 1700Z. Dan, W7WA took 4th place from Western Washington. It was tough sledding for Dan on the low bands Saturday night, falling more than 250 QSOs behind N9RV - a margin that stayed nearly constant throughout the day on Sunday. N6TR piloted KL7RA to 5th place despite power outages and antenna damage, Tree still set a new Alaska record.

#### Single-Op, Low Power (A) Category

Single-Op, Low Power continues to be the most popular category for SS participants with 887 submitted logs and a Top Ten distributed across all parts of North America. This year, the spread between the winner and second place was virtually nonexistent. Before taking into account scoring penalties, a mere two QSOs separated the winner and runner-up. Congratulations to both Gary Caldwell, VA7RR the victor, and Rob Van Geen, NH6V operating from KH6LC!

It was a see-saw battle between these two competitors. Gary got off to a great start, 21 QSOs ahead of Rob after the first hour but Rob made up that gap in the 2<sup>nd</sup> hour. The margin between them was no more than 21 QSOs until the 0200Z. At that point Gary lost 20 meter propagation while Rob continued to have 2 more great hours on 20 meters thanks to his Hawaii "Big Island" QTH. By 0400Z Rob had a 120 OSO lead over Gary.

This margin stayed essentially constant through the nighttime hours. Both competitors began their off-time around 0830Z, biding their time until sunrise brought the high bands back to life. With Gary's British Columbia sunrise being two hours before Hawaiian sunrise, Gary made up a 136 QSO deficit to take a 1 QSO lead at 1700Z. From there the lead shifted back and forth with no clear advantage for either competitor. When the dust settled and the logs were adjudicated VA7RR won by five QSOs (including scoring penalties).

#### Single-Op, QRP (Q) Category

This year 75 brave souls entered in the QRP category. Congratulations to the winner, Mark, K6UFO operating from NN7SS near Seattle. Despite running only 5 W, Mark sustained some nice runs on 10 meters with 676 QSOs and a Clean Sweep. Chris, W1MR (ex-



Figure 1 — This chart shows the number of QSOs made on the bands during each hour of the contest. Compare the terrific 10 meter totals with the band's barely visible presence last year!

KA1LMR) took 2nd place, moving up from 6<sup>th</sup> place in 2010 with 177 more QSOs and a Clean Sweep. In 3<sup>rd</sup> place is Dean, NW2K. This appears to have been Dean's first serious QRP SS effort and he set a new Section and Division record as well as turning in a Golden (perfect) Log! Dean had good success running on 40 meters during the daytime.

#### **Affiliated Club Competition**

Unlimited Category		
Potomac Valley Radio Club Northern California Contest Club Society of Midwest Contesters Minnesota Wireless Assn Yankee Clipper Contest Club Florida Contest Group	22,897,542 14,750,346 8,096,720 7,224,936 6,797,492 4,743,018	291 189 137 121 95 62
Southern California Contest Club Central Texas DX and Contest Club Frankford Radio Club Arizona Outlaws Contest Club Tennessee Contest Group Western Washington DX Club Grand Mesa Contesters of Colorado Mad River Radio Club North Texas Contest Club North Texas Contest Group Contest Club Ontario South East Contest Club Hudson Valley Contesters and DXers Willamette Valley DX Club Bochester	4,525,364 3,811,970 3,371,364 3,203,376 3,050,026 3,029,530 2,432,252 2,320,848 2,062,560 1,925,290 1,709,964 1,709,964 1,663,462 5 1,562,366 1,473,726	47 37 49 50 47 34 24 34 22 29 28 22 22 24
(NY) DX Assn CTRI Contest Group ORCA DX and Contest Club Saskatchewan Contest Club Saskatchewan Contest Club Northern Rockies DX Association Maritime Contest Club Kentucky Contest Group Allegheny Valley Radio Association North Coast Contesters Order of Boiled Owls of New York Contoccook Valley Radio Club Alberta Clippers Louisiana Contest Club Utah DX Assn Contest Group Du Quebec BC DX Club East Coast Canada Contest Club Motor City Radio Club Carolina DX Asson	$\begin{array}{c} 1,094,804\\ 810,768\\ 793,326\\ 786,144\\ 725,514\\ 689,632\\ 688,252\\ 663,686\\ 657,494\\ 635,456\\ 634,712\\ 572,560\\ 546,740\\ 490,462\\ 400,962\\ 400,962\\ 308,160\\ 257,224\\ 254,272\\ 230,524\\ \end{array}$	22 9 11 9 5 13 10 10 8 9 6 4 5 9 11 4 4 10 9 6
Local Category New Mexico Big River Contesters Iowa DX and Contest Club Kansas City DX Club Delara Contest Team Spokane DX Association Bristol (TN) ARC 599 DX Association Cakland County Amateur Radio Soci Hazel Park ARC Lincoln ARC Trojan ARC West Park Radiops Stoned Monkey VHF ARC Portage County Amateur Radio All Amateur Radio Club Sterling Park ARC CorTek Radio Association Badger Contesters Pueblo West Amateur Radio Club South Parsey Radio Assn Meriden ARC Arrow Communications Assn OH-KY-IN ARS Great South Bay ARC Saginaw Valley ARA West Allis RAC Boeing Employees ARS - St. Louis Bergen ARA Metro DX Club Central Michigan ARC Granite State ARA Alexandria Radio Club St Charles Amateur Radio Club South Texas DX and Contest Club Rowan ARS Nanaimo Amateur Radio Club South ARS Nanaimo Amateur Radio Club	862,386 671,378 644,412 444,098 439,658 434,646 359,698 ety 314,184 262,342 236,518 193,498 163,656 149,034 148,056 142,422 132,030 126,320 126,320 126,320 126,320 126,320 126,320 126,320 126,320 89,472 89,472 88,204 88,522 82,542 88,254 88,264 88,264 88,264 88,264 88,274 88,264 88,264 88,274 87,274 88,274 87	9588899344634446431054486644443377333334433334333333333333333

#### **Sponsored Plaque Winners**

We are pleased to announce that the Overall and Division leaders in each category receive a sponsored Sweepstakes plaque. ARRL is grateful to ICOM America and numerous clubs and individuals for sponsoring Sweepstakes awards. For more information on awards sponsorship or to order a duplicate plaque, contact ARRL Contest Branch Manager Sean Kutzko, KX9X at 860-594-0232 or by e-mail at **kx9x@arrl.org**. Plaques cost \$75 each, which includes all shipping charges.

Category	Winner	Plaque Sponsor
Single Operator High Power Phone Single Operator Low Power Phone	N9RV VA7RR	Don Lisle, K6IPV ARRL Contest Branch - Ken Adams, K5KA
Single Operator QRP Phone	NN7SS	QRP Amateur Radio Club
Single Operator Unlimited High Power Phone	(WB1GQR (W1SJ op)	ICOM America
Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	KOTI W6YI K2NNY W6YX	ICOM America ICOM America ICOM America David Brandenburg, K5RQ
Atlantic Division Single Operator High Power Phone Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone	W2ID W3PAW NW2K K3MM N3TD N3OC	North Coast Contesters Potomac Valley Radio Club ICOM America ICOM America ICOM America Mark Sickmeyer, KB3GJ Memorial
Multioperator Low Power Phone School Club Phone	K2NNY K2CC	ICOM America ICOM America
Central Division Single Operator High Power Phone	K9CT	Society Of Midwest
Single Operator Low Power Phone	K9ZO	Society Of Midwest
Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	K9ARF N2BJ K9IR N9SJ N9CK K9IU	Sean Kutzko, KX9X ICOM America ICOM America ICOM America ICOM America ICOM America
Dakota Division	WOSD	Minnesota Wireless
Single Operator Low Power Phone	(W0DB, op) N0KK	Association Minnesota Wireless
Single Operator QRP Phone Single Operator Unlimited High Power Phone	ND0C K1KD	Association Tod Olson, K0TO Minnesota Wireless
Single Operator Unlimited Low Power Phone Multioperator High Power Phone	KOTI NOGF	Association ICOM America In Memory of Jim Dokmo, K0FVF - Minnesota
Multioperator Low Power Phone School Club Phone	KK0SD K0VVY	Wireless Association ICOM America Tod Olson, K0TO
Delta Division Single Operator High Power Phone Single Operator Low Power Phone Single Operator ORP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	N8OO NA4K KS4X N4ZZ WBORUR W5RU KK5K W5YM	ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America
Great Lakes Division Single Operator High Power Phone Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator Low Power Phone Multioperator Low Power Phone School Club Phone	K8AO W5MX KT8K N8SNM WS6K NT8V N8HR W8SH	Mad River Radio Club Mad River Radio Club Mad River Radio Club ICOM America ICOM America ICOM America ICOM America
Hudson Division Single Operator High Power Phone Single Operator Low Power Phone Single Operator Unimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator Low Power Phone Multioperator Low Power Phone School Club Phone	KM2O K2UF AA2VK W2VQ KA2D NO2X WA2IID No Entrant	ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America
Midwest Division Single Operator High Power Phone Single Operator Low Power Phone	K0DEQ KU0G	ICOM America Society of Midwest
Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	KORH NOXR NUOQ WONO KOORB KOHC	ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America
New England Division Single Operator High Power Phone	NC1I	ICOM America
Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone	(K9PW, op) K1BX W1MR WB1GQR (W1SL op)	ICOM America QRP Club of New England ICOM America
Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	W1WBB K1KP N2GZ W1AF	ICOM America ICOM America ICOM America Michael McKaughan, K1DM

eive a sponsored Sweepstakes isoring Sweepstakes awards. For Contest Branch Manager Sean which includes all shipping charges.		PRINCIPAL AWARDS SPONSOR
Category	Winner	Plaque Sponsor
Northwestern Division Single Operator High Power Phone Single Operator Low Power Phone Single Operator QRP Phone	N9RV W7YAQ NN7SS (K6UEQ. op)	ICOM America ICOM America Barbara Yasson, AC7UH
Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	AL9A KK7X K7IR N6LO No Entrant	ICOM America ICOM America ICOM America ICOM America
Pacific Division Single Operator High Power Phone	KH7X (KH6ND op)	The Carroll Dean Jensen
Single Operator Low Power Phone	KH6LC (NH6V op)	ICOM America
Single Operator QRP Phone Single Operator Unlimited High Power Phone	(M160, 6p) K6OO W7RN (MX55, op)	ICOM America ICOM America
Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone	N6RK K6MMM No Entrant	ICOM America ICOM America
	W6YX	ICOM America
Single Operator High Power Phone Single Operator Low Power Phone	NN3W W4AAA	Potomac Valley Radio Club Raleigh Amateur Radio
Single Operator QRP Phone	(KK9A, op) K4WY	Society - W4DW Ronnie Reams WA4MJF &
Single Operator Unlimited High Power Phone	W4MR	Ronnie Reams WA4MJF &
Single Operator Unlimited Low Power Phone Multioperator High Power Phone	(AA4NC, op) N4RA K4OV	Sherry Reams KB4EXL ICOM America Ronnie Reams WA4MJF &
Multioperator Low Power Phone School Club Phone	KN4KL WD4EOG (KF4YPD, op)	ICOM America Ronnie Reams WA4MJF & Sherry Reams KB4EXL
Rocky Mountain Division	NOIC	Grand Masa Contesters of
Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone	(NOQO, op) N7MZW K0KE WA5ZUP	Colorado ICOM America Colorado QRP Club Grand Mesa Contesters of
Single Operator Unlimited Low Power Phone Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	KK6MC K0DU K7VU No Entrant	ICOM America ICOM America ICOM America
Southeastern Division		
Single Operator High Power Phone Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone	K4SSU (NA4BW, op) N4PN W4SVO K5KG N4KH NP2B	David Brandenburg, K5RQ David Brandenburg, K5RQ ICOM America Charlie Wooten, NF4A ICOM America David Higdon Jr KD4ICT - With thrace to WCOC
Multioperator Low Power Phone School Club Phone	No entrant W4UAL	ICOM America
Southwestern Division Single Operator High Power Phone Single Operator CAP Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Autilioperator High Power Phone School Club Phone	AA6PW K9WZB W6AQ K6LL WU9B W6YI N6KI W6RFU (KB3RPN, op)	ICOM America ICOM America N6HE and W6DLD ICOM America ICOM America ICOM America ICOM America ICOM America
West Gulf Division Single Operator High Power Phone Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone Multioperator High Power Phone School Club Phone	NR5M N1CC KJ5RM KJ5T KB0HH N5DO W5UH (KU5B, op)	ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America ICOM America David Brandenburg, K5RQ
Single Operator High Power Phone	(K1ZM op)	ICOM America
Single Operator Low Power Phone Single Operator QRP Phone Single Operator Unlimited High Power Phone Single Operator Unlimited Low Power Phone	VA7RR VA3DF VE3RZ VA2WA	ICOM America Frank Merceret, NA4CW ICOM America ICOM America
Multioperator High Power Phone Multioperator Low Power Phone School Club Phone	VE6AO VE3MGY No Entrant	ICOM America ICOM America

#### Accuracy Honor Roll

Stations with more than 500 QSOs and Error Rate below 1%

Call NW2K K3AN K5TA N2QT W7YAQ WQ5L NN7SS K6TU	# QSOs 582 669 803 627 1336 525 684 851	Category Q A UH A Q UH	Error Rate (% 0.0 0.3 0.3 0.3 0.4 0.4 0.4 0.5
Noted W1WBB ND0C WA3A WD0ECO K4B ND8L W8TM KC5R VE9AA K1BX K4EU K2KR K6GT KC8IMB KD4D N2UT N9SJ W2ID W3SO W6SR K4EDI	631 513 521 1578 538 1461 672 710 815 568 1478 725 801 1275 629 602 1456 602 1456 782 1158 1595 940 638 643	A UL Q B UH H U A A B A B H H H U A A B A B M H H B B H B B U B U B U	0.6 0.6 0.6 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8
K42DT KD5LNO VE2AWR W7ZRC	585 542 878	A A A	0.9 0.9 0.9

#### Unlimited, High Power (UH) Category

The Unlimited, High Power category was very popular this year with 278 entries. Congratulations to Mitch, W1SJ operating from WB1GQR in Vermont on his second consecutive victory in the Unlimited category and a new Division record. Mitch ran away from the pack of competitors with 212 more contacts this year, relying primarily on 80 meters at night and 10 and 20 meters during the day with only a few QSOs on 15 meters.

Second place went to Dave, K6LL operating from his postage-stamp sized QTH in Arizona. While racking up big numbers on 40 through 10 meters, Dave made but 1 QSO on 80 meters!

#### **Unlimited, Low Power (UL) Category**

118 participants tried this new category this year. Leading the pack was Dan, K0TI operating from Minnesota. Dan made 698 QSOs and a Clean Sweep in a part-time effort. In 2<sup>nd</sup> place from New Mexico was Duffey, KK6MC. Duffey did it all with inverted-Vs and lots of persistence.

#### Multioperator, High-Power (MH) Category

This year the Multioperator category was split into separate High Power and Low Power categories. 79 entries were received for the High-Power category. The W6YI team of Jim,W6YI, John K6AM, Dan N6MJ and Dennis, N6KI, claimed the #1 spot for the 5<sup>th</sup> consecutive year! The San Diego dynasty continued with 2327 QSOs! The W5RU Louisiana team moved up in the rankings from 6<sup>th</sup> place in 2010 to 2<sup>nd</sup> place in 2011. Another big jump in placement came from the K7IR team in Eastern Washington. The next 3 slots were incredibly close — with only 12 QSOs separating 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> places W0NO in Kansas, team NP2B in the Virgin Islands, and team K4OV in North Carolina, respectively.

#### Multioperator, Low-Power (ML) Category

In the first year of the Multioperator, Low-Power category, 64 entries were received. The top three slots went to teams operating from rarer sections — Northern New York, West Texas and Wyoming.

Moving from the High-Power to the Low-Power category was this year's winner, K2NNY. The team made 1242 QSOs with over half of their contacts on 80 meters. Second place went to the N5DO team of N5DO and KE5OG. They made good use of 40 meters at night and all three high bands during the daytime despite being handicapped by a low, non-rotating antenna.

#### School Club (S) Category

Nineteen schools competed in the School Club Category in 2011. Last year's battle between Stanford University, W6YX and Hesston College, K0HC continued unabated. Last year W6YX won by 7 QSOs. This year it by was 12 QSOs! Unlike last year Stanford got off to a slow start, down 43 QSOs in the first hour and 105 QSOs at 0300Z. The earlier sunrise in Kansas gave the Hesston crew an advantage in the early morning, ahead by as much as 172 QSOs. Team Hesston may have been pretty confident at this point but then things started to unravel. Team Stanford took advantage of great daytime conditions on 10 and 15 meters to crawl back into contention: 63 OSOs behind at 2000Z, 12 OSOs behind at 2300Z, finally pulling ahead at 0030Z for victory at the 0300Z bell!

#### **Club Competition**

Thanks to the many clubs who rallied their troops into getting on the air for Sweepstakes. For many club members Sweepstakes and Field Day are their major on-the-air efforts of the year. We can't thank the clubs enough, and of course, their members for their commitment, dedication and understanding families. This year, 1522 participants submitted their CW and Phone SS scores towards their club aggregate scores.

In the Unlimited Club category, the Potomac Valley Radio Club ran away from the other megaclubs with 291 entries for 22.9 million points. This is a 6% increase in entries and total score over 2010! In 2<sup>nd</sup> place was the Northern California Contest Club with 189 entries totaling 14.8 million points. The Society of Midwest Contesters again took 3<sup>rd</sup> place with 137 entries and 8.1 million points.



The School Club category's 7<sup>th</sup>-place entry, Michigan State University Team W8SH (front-to-rear) Hanna, KD8OKM; Scott, KB8VWM; Mike, KB8ZGL, and Andrew, KE7ESD. [Greg Mulder, WB8LZG, photo]

In the Medium Club category, the Southern California Contest Club emerged victorious with 47 entries and 4.5 million points. That's an impressive 96,000+ points per entry! The Central Texas DX and Contest Club moved up to 2<sup>nd</sup> place with their 37 entries for 3.8 million points. There was a close race between the 3<sup>rd</sup> place Frankford Radio Club, and 4<sup>th</sup> place Arizona Outlaws Contest Club. Just one more high scoring entry from the Outlaws would have propelled them ahead.

In the Local Club Category, the Albuquerquebased New Mexico Big River Contesters took 1<sup>st</sup> place with 9 entries, averaging 95,821 points per entry. Well done! The Iowa DX and Contest Club took 2<sup>nd</sup> place and the Kansas City DX Club took 3<sup>rd</sup> place.

#### Acknowledgments

Many thanks to "Tree" Tyree, N6TR for his hard work checking the logs and to George, K5TR for logistical and infrastructure support. In addition, K5OT, K9ZM, K9JK, KB9OWD, N6TV and K9DUR painstakingly typed in handwritten logs so that they could be properly adjudicated.

## As Always, There's More Online

For more reporting and graphics about this popular contest, including the story of how one operator used a Heathkit "Tener" on 10 meter AM, check out the extended write-up at www.arrl. org/contest-results-articles.

# Results, 2011 ARRL 160 Meter Contest

## **On 160, Mother Nature is always the winner.**

#### Gary Breed, K9AY

As Cycle 24 becomes more active, the past few years of very good conditions on the 160 meter band will become a memory. The first weekend of December 2011 saw a return to more typical conditions on this fascinating band — perhaps discouraging a few casual

Top Ten			
W/VE		DX	
Single Op QRP W0GJ K5RX	erator, 101,106 93.755	Single Opera QRP OK1CZ IV3AOL	ator, 50 2
W3TS VE3MGY N9NE N7IR N0UR N4AX K4CNW	55,284 47,628 46,872 44,132 41,211 37,960 37,314 27,022	MI6GTY Single Opera Low Power YN2CC VP5CW (W5CW, op)	2 ator, 23,868 ) 21,068
Single Op Low Powe N8OO KU1CW N0IM K8FH	erator, r 207,744 182,070 174,262 173,788	F6DDH SP5CJY IK0XBX UA2FL DL7UMK LZ2ZG JA1BJI DL8UKE	3,060 1,156 874 768 560 476 468 442
NE9U K4FT N2KW W2TZ WB8JUI K0TI	172,215 165,396 156,420 152,240 150,320 148,149	Single Opera High Power ZF2AH CE1/K7CA XE2S	ator, 104,976 65,208 42,210
Single Op High Power VY2ZM K8PO VE3EJ K1DG K3ZM AA1K WF2W	erator, 539,000 465,555 461,648 452,628 426,377 374,490 362 520	P40TA (K6TA, op) OK2W DF2PY OM2VL OK1FPS OL0A (OK1CZ, op JR5JAQ	41,942 18,800 8,892 8,480 7,752 9) 7,280 7,232
K9CT K5NA W5MX Multiopera Low Powe VE2OJ K1VW W.19B	326,300 314,895 309,838 ator, r 209,035 179,010 168 004	Multioperato Low Power SP5CJQ ON9CC OK2BFN JA7YCQ XU7ACY JA1YNE	or, 1,520 630 220 24 18 8
KOTV K3PA W2CCC N0HJZ K2DB K2RS W0ANT	167,130 99,549 65,238 63,516 57,680 53,244 46,152	Multioperato High Power PJ2T VP2MWG OL7M ON4WW DF2UU M2VEV	or, 143,364 141,960 33,700 8,256 6,536
Multiopera High Powe W8JI K1LZ W2GD N3UA N1LN K3WW N0NI NX5M W3UA KC4D	tor, 538,750 456,692 438,495 358,190 317,196 311,541 304,750 297,324 237,462 208 472	JA3YBK RL3A DL7CX F5IN F4DNW	6,420 4,080 4,030 3,894 3,600

operators and DX chasers but simply seen as another challenge by competitive contesters and regular denizens of 160 meters. As K7XC opined on the 3830 score-reporting reflector, "The winners of this event will have earned it."

Were conditions really that bad? No, they weren't horrible, just not as good as during the past few years of exceptionally low solar activity. Those great conditions attracted many newcomers to Top Band. There were 1120 logs submitted, a level of participation that would have been an all-time record just 5 years ago. In fact, many operators noted that the high activity made the contest fun in spite of the tougher conditions.

#### Western US/VE

Although there was one western station among the Top Ten — perennial QRP competitor Gary, N7IR who managed a sixth place finish from AZ — things were tough in the Old West. "No DX" was a common complaint but it was the propagation path between the eastern and western portions of North America that was the most notable difficulty, frustrating participants at both ends of the continent.

#### In the Midwest

The Top Ten list suggests that the middle of the continent was a good place to be! Glenn, WOGJ, repeated as the QRP winner, with three other Upper Midwest stations also among the top QRP finishers. The top six Low Power scorers were away from the East Coast, most of them Midwesterners. In High Power, Craig, K9CT, managed eighth place from Illinois. Toni, NONI, directed his Multioperator, High Power station to the seventh place spot in that category.

#### **South by Southeast**

Another good place to operate from was below the Mason-Dixon Line. Victor, N8OO, topped the Low Power list from Louisiana and the operators at Tom's, W8JI, station in Georgia won Multioperator, High Power wall decoration. Several other excellent performances came from Texas, Florida and Kentucky. Together with the Midwesterners, it seems that a central or south-central location could make a good



Like many portable operations, Jim's, K6EI, antenna wiring lash-up wasn't pretty but it worked. This is the base of his temporary 70 foot inverted L with 52 radials and an SGC-237 remote tuner. Jim worked 275 stations and 58 multipliers to lead the Pacific Division in the Single Operator, QRP category. [Courtesy Jim Peterson, K6EI]

score, especially for Low Power and QRP entries.

#### **Northeast Notes**

In the Single Operator, High Power and Multioperator categories it usually helps to be closer to the multipliers and contacts from Europe. A great example is Jeff, K1ZM, who operated from his Prince Edward Island station, VY2ZM, for another Single Operator win. The top seven Single Operators and the second through sixth place Multioperator scores were from W1, 2, 3 and eastern Canada. We can't give DX all the credit, though — these high scoring stations had very high US/VE contact totals with a few extra DX multipliers giving them the winning edge.

#### From the DX Side

In the Caribbean, the Multioperator crew at PJ2T edged out the gang at VP2MWG for the top DX score in any category. With a Single Operator, High Power entry, Joe, ZF2AH, gave out the ZF multiplier to 741 US/VE operators, reaching the top of his class. He was followed by Al, CE1/K7CA, who made 433 contacts from the Southern Hemisphere - with a remarkable multiplier total of 76 sections. Multioperator station OL7M was the most successful European operation, with Single Operator, JR5JAQ, achieving the best result from Asia.

We get a different view from each of these geographical areas. That's the joy of a worldwide hobby! Plus, it's why the results at the regional, division or section level may be more fun for most participants. Did you beat your buddy over in the next state? How did your station and operating skills compare with the other competitors in your part of North America? Did you beat (or at least come close) to a personal best or even a section record?

#### The New Multioperator, Low Power Category

Most ARRL contests have added Low Power as an entry option for Multioperator stations. This category allows a Low Power entry using spotting or CW Skimmer software or true multiham teams to operate at low power. The inaugural winner in this new category is VE2OJ for the first #1 certificate. Not far behind were K1VW, WJ9B and K0TV with scores that were separated by just a few percent. With 77 entries, Multioperator, Low Power represented 7% of the total entries.

#### **Club Competition**

Two heavyweights submitted a nearly equal number of logs but The Potomac Valley Radio Club outscored the Minnesota Wireless Association in the Unlimited category. The race was very close in the Medium category as the Frankford Radio Club prevailed by just a couple of mediumsized scores over the Yankee Clipper Contest Club. Farther south, the Central Virginia

#### **Affiliated Club Competition**

	Score	Entries
Unlimited Category		
Potomac Valley Radio Club Minnesota Wireless Assn	4,621,675 2,791,817	71 69
Medium Category		
Frankford Radio Club Yankee Clipper Contest Club Society of Midwest Contesters Contest Club Ontario Tennessee Contest Group South East Contest Club Central Texas DX and Contest Club Mad River Radio Club Alabama Contest Group Maritime Contest Club Grand Mesa Contesters of Colorac Northern California Contest Club Florida Contest Group Western New York DX Assn Arizona Outilaws Contest Club Contest Group Du Quebec Rochester (NY) DX Assn North Texas Contest Club Contest Group Du Quebec Rochester (NY) DX Assn North Texas Contest Club CTRI Contest Group Southern California Contest Club Hudson Valley Contesters and DXc Western Washington DX Club Northern Rockies DX Association Saskatchewan Contest Club Willamette Valley DX Club Carolina DX Association	3,196,142 3,115,975 2,218,827 1,632,298 1,072,037 941,474 0,878,830 738,740 691,370 677,427 10,654,572 565,357 561,947 499,362 410,646 410,042 360,008 355,988 317,988 317,988 279,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,654 268,758 207,249 179,656 207,249	40 49 45 27 24 7 8 14 14 11 9 9 24 15 3 8 7 7 8 5 13 9 8 4 3 7 3
Local Category		
Central Virginia Contest Club Kansas City DX Club Delara Contest Team New Mexico Big River Contesters Bristol (TN) ARC Mother Lode DX/Contest Club Sterling Park ARC West Park Radiops Spokane DX Association Low Country Contest Club Midland ARC	697,053 591,311 495,947 220,613 166,273 161,059 156,515 69,075 61,580 38,453 26219	7485 8435 4335 433

#### For a collection of comments directly from the contest operators, check out the online version of the article at arrl. org/contest-results-articles

Contest Club took the honors in the Local category. It looks like the East Coast made for some great club activity!

#### **Closing Time**

Among the entrants who posted to the ARRL Soapbox website (www.arrl.org/soapbox) and the various reflectors were many hams who had given 160 meters their first try. This has been a continuing trend over the past 15 years or so as other countries around the world introduced or expanded 160 meter operating privileges.

Do you want to know more about 160 meter contests? The Club Competition listing is the place to start. As with any special interest part of our great hobby, contests are encouraged and supported by local and regional clubs. Their experienced operators are great Elmers. Up-and-coming operators like you can benefit from their experience to help build better stations and hone their skills. So join in the conversation with these groups and be better prepared next December when long,

#### **Division Winners by Category**

Single Operator, Q	RP	
Atlantic Central Dakota Delta Great Lakes Hudson Midwest New England Northwestern Pacific Roanoke Rocky Mountain Southwestern Southwestern West Gulf Canada	W3TS N9NE W0GJ N4IR N8BB W2DPT N0SM AA1CA W7DRA K6EI K4CNW W5GZ N4AX N7IR K5RX VE3MGY	55,284 46,872 101,106 20,884 28,428 16,512 29,810 37,083 3,750 30,894 37,314 4,983 37,960 44,132 93,755 47,628
Single Operator, Lo	ow Power	
Atlantic Central Dakota Delta Great Lakes Hudson Midwest New England Northwestern Pacific Roanoke Rocky Mountain Southeastern Southwestern West Gulf Canada	W2TZ NE9U N0IM N8OO K8FH K2UF KU1CW N2KW W7YAQ N6RK K2AV W0DLE K4CWW W7RH W5RYA VE3OSZ	152,240 172,215 174,262 207,744 173,788 90,650 182,070 156,420 67,040 75,306 115,559 109,263 96,876 75,573 84,931 76,858
Single Operator, H	igh Power	
Atlantic Central Dakota Delta Great Lakes Hudson Midwest New England Northwestern Pacific Roanoke Rocky Mountain Southeastern Southwestern West Gulf Canada	AA1K K9CT K9DU WD5R (N5ECT, op) W5MX N2ED N0TT K8PO N9RV KF6T K3ZM K0RF (W0UA, op) N4PN N6MA K5NA VY2ZM	374,490 326,300 99,176 265,776 309,838 122,655 281,214 465,555 121,512 109,188 426,377 264,384 206,112 96,564 314,895 539,000
Multioperator, High	n Power	
Atlantic Central Dakota Delta Great Lakes Hudson Midwest New England Northwestern Pacific Roanoke Rocky Mountain Southwestern West Gulf Canada	W2GD W9IU KoKX N4DW N8TR N1EU N0NI K1LZ KG7H KH6LC N3UA KODU W8JI N6SS NX5M VE3RZ	438,495 177,039 131,192 81,744 116,109 131,677 304,750 456,692 133,280 70,882 358,190 197,560 538,750 111,542 297,324 176,626
Multioperator, Low	Power	
Atlantic Central Dakota Great Lakes Hudson Midwest New England Northwestern Pacific Roanoke Rocky Mountain Southeastern Southwestern West Gulf Canada	W2CCC WE9R N0HJZ N9KY K12P K3PA K1VW WO7V K9YC N4ZR W0ANT WJ9B N7MAL KN8KAZ VE2OJ	65,238 38,208 63,516 440 5,280 99,549 179,010 3,072 4,080 20,691 46,152 168,004 16,168 9,810 209,035

cold nights lure you into the shack for some Top Band fun!

Don't miss the starting gun! The ARRL 160 Meter Contest starts at 2200 UTC Friday; in 2012, that means the contest begins begins on November 30.



# 2012 June Kids Day Announcement

The third Saturday in June is the time to get youngsters on the air and share the joys and fun that Amateur Radio can provide! Kids Day returns on June 16, from 1800 to 2400 UTC.

Sponsored by the Boring (Oregon) Amateur Radio Club, this event helps bring the excitement of Amateur Radio to a younger audience. The exchange is simple: First name, age, location and favorite color. After that, the contact can be as long or as short as each participant likes.

Above — Adam Nathanson, N4EKV, of Lafayette, California turns the shack over to his daughters Amber (front) and Audrey (rear). [photo courtesy N4EKV] Complete info is at www.arrl.org/ kids-day.

Kids Day opens doors and opens minds. Open your shack doors and invite the youngsters over to learn and enjoy themselves. Let's all work to get some fresh, young voices on the air on Saturday, June 16!

# -kidsday@arrl.org

# ARRL VEC Volunteer Examiner Honor Roll

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The ARRL VEC Honor Roll recognizes the top 25 Volunteer Examiners according to the total number of exam sessions they have participated in since their accreditations. Since each session requires an average time commitment of 2-4 hours or more, the thousands of hours these VEs have invested is extraordinary! Whether you are one of our VE Teams that test once a week, once a month or once a year, we want to express our warmest appreciation to all volunteers for their generous contribution to the ARRL VEC program.

If you are an ARRL VE, you can see your session stats online at **www.arrl.org/ve-session-counts**. If you're not a VE, become one! See **www.arrl.org/become-an-arrl-ve**.

Examiner	Sessions	Accreditation Date	Examiner	Sessions	Accreditation Date
Sammy Neal, N5AF	513	20-Nov-84	Gerald Grant, WB5R	319	4-Jan-85
Harry Nordman, AB0SX	506	9-Jan-02	Richard Morgan, KD7GIE	319	11-Aug-00
David Bartholomew, AB0TO	408	22-Mar-02	John Hauner, K0IH	311	11-Jan-85
Franz Laugermann, K3FL	391	1-Dec-91	David Fanelli, KB5PGY	309	1-Oct-91
Kevin Naumann, N0WDG	388	17-Nov-02	Daniel Calabrese, AA2HX	297	1-Nov-91
Karen Schultz, KA0CDN	374	6-Sep-84	Adolph Koehler, K5VCR	290	29-Sep-95
John Moore, III, KK5NU	370	21-May-95	E. Drew Moore, W2OU	287	1-Aug-90
Royal Metzger, K6VIP	368	29-Apr-85	Michael Faucheaux, N5KBW	286	15-Jul-96
William Martin, AI0D	351	1-Nov-84	Robert Hamilton, NORN	286	19-May-87
John Mackey, Jr, KS0F	345	1-Oct-90	Gary Mangels, AD6CD	285	30-Jul-97
Paul Maytan, AC2T	334	6-Sep-84	Loren Hole, KK7M	284	6-Sep-84
Victor Madera, KP4PQ	326	1-Mar-92	Frankie Mangels, AD6DC	281	14-Oct-97
Jeanette Nordman, AB0YX	321	21-Aug-03			



# The 2012 IARU HF Championships

## 1200 UTC Saturday, July 14 – 1200 UTC Sunday, July 15

The summer months get even hotter as the IARU HF Championships take to the bands! With sunspots now appearing regularly, the high-frequency HF bands should provide great DX opportunities.

Single-ops can enter High, Low or QRP Power, using SSB, CW or a mix of both. Or you can enter as a Multioperator and work everything you hear! Use of spotting networks requires entry in the Multioperator category.

Many IARU Headquarters stations will be on the air from around the world promoting their IARU member society. How many different "HQ" stations can you work?

Be sure to post your story, high-resolution photos and commentary in the IARU soapbox after the contest! Tell us how you did at www.arrl.org/soapbox.

E-mail electronic Cabrillo logs to **iaruhf@iaru.org**. Paper logs to IARU HF World Championships, ARRL, 225 Main St, Newington, CT 06111. All logs must be postmarked by 1200 UTC Tuesday, August 14, 2012.

Complete rules, forms and other info are online at www.arrl.org/iaru-hf-championship.

■We'll see you in IARU!

# Sean's Picks

Sean Kutzko, KX9X ARRL Contest Manager

All dates/times are in UTC.

• State QSO Parties this month: Alabama, Maritimes (Canada), West Virginia.

• QRP Contests this month: ARS Spartan Sprint (June 5), NAQCC Monthly Sprint (June 13), QRP-ARCI QRP Shootout (June 16-17), Flying Pigs' Run For The Bacon (June 18), NAQCC Milliwatt Sprint (June 21)

•IARU Region 1 Field Day (Jun 2-3): ARRL Field Day isn't the *only* Field Day. Listen for our friends in Region 1 doing the same thing us folks in Region 2 will be doing just three weekends later.

•ARRL June VHF QSO Party (June 9-11): With several consecutive years of incredible openings on 6 and 2 meters, the "June Contest" has established itself as the premier VHF+ operating event on the calendar. VHF+ SSB/CW offers tremendous amounts of fun in the summertime; if you haven't tried this one, you are simply missing out on an excellent experience.

• Stew Perry Warmup Contest (June 16-17): 160 meters is supposed to be a "winter" band, right? It *is…* in the Southern Hemisphere. There are plenty of stations to work during this "Summer Stew" Top Band event around the Summer/Winter solstice.

• ARRL Field Day (June 23-24): Yes, we know Field Day isn't a contest, but it sure is a heck of a lot of fun! Hope to hear you on the air.



Craig Thompson, K9CT, and crew will be in IARU 2012 from his big-gun station in Illinois. Maybe you'll work one of his ops (though not all four at once). L-r: N7MB, K3WA, K9ZO, KB9UWU. [Craig Thompson, K9CT, photo]

## June 2012 W1AW Qualifying Runs

W1AW Qualifying Runs are 10 PM PDT Friday, June 8 (0200Z June 9) and 7 PM EDT (2300Z) Tuesday, June 19. The West Coast Qualifying Run will be transmitted by station K6YR on 3590 kHz at 9 PM PDT Wednesday, June 13 (0400Z June 14) (40-10 wpm). Unless indicated otherwise, speeds are from 10-35 wpm.

## **New Products**

#### DXtreme Station Log – Multimedia Edition Version 8.0

DXtreme *Station Log* Version 8.0 offers multimedia and advanced functions. If the computer is connected to the DX spotting network, the DX Spot Checker queries the *Station Log* database and alerts the operator to spots needed for DXCC or VUCC awards. The software indicates whether spotted stations are users of ARRL's Logbook of the World (LoTW), displays beam heading information and tunes a supported radio to the spot frequency.

The *Station Log* window includes the expected logging functions and also retrieves the frequency and mode from supported rigs through integration with Afreet Omni-Rig; displays DXCC and grid/VUCC status information for logged stations; indicates whether logged stations are LoTW users; retrieves and stores current and historic solar flux, A Index, and K Index values; allows tracking of the propagation mode used; and tracks QSLs sent and received.

Multimedia functions let users listen to previous contacts and view QSLs whenever they browse their logs. The software can also be used to create QSL and address labels for physical QSLs, create signed TQ8 files automatically for uploading to the LoTW server; and produce a variety of reports. DXtreme *Station Log* runs in 32- and 64-bit versions of Microsoft Windows 7, Vista and XP. Price: \$89.95 (North America) for new users; special upgrade pricing is available for current users. For more information or to order, visit **www.dxtreme.com**.

#### How's DX?

Bernie McClenny, W3UR, w3ur@arrl.org



# 6 Meter Summer E-skip Season

## Fun for all on 50 MHz

The spring/summer sporadic E, or "E-skip" season on 6 meters typically takes place every year in the northern hemisphere between May and July. Single hop sporadic E typically ranges from about 400 to 1500 miles (643-2414 kilometers). During the E-skip season we can even get multi-hop which really makes 6 meters an exciting DX band. Whether you are new to 6 meters or are an old hand, Emil Pocock's, W3EP, article "Sporadic-E Propagation at VHF: A Review of Progress and Prospects" (*QST*, Apr 1988, pp 33-39) is a great first read or review for the old timers.

Having only been on 6 meters since June 2003 I have only experienced a handful of F2 propagation QSOs, and several thousand on E-skip, on 50 MHz. I

continue to listen daily for those openings as in 2001 and 2002, the ones my friends told me all about. Most HF rigs sold today

have 6 meters and that's a good thing as DXpeditioners can now just take one rig on their trips around the globe.

Here in the US there are two calling frequencies. One is the DX calling frequency 50.110 MHz and the other is for general purpose, on 50.125 MHz. The ARRL band plan has the DX Window from 50.100 to 50.125 MHz. It is highly frowned upon for US stations to work other US stations, and some might even say Canadians, in the DX Window. In reality DX stations could be anywhere on 6 meters but typically show up in the DX Window, usually on 50.110 MHz, to make it easier for those listening for them. When the band is open DX stations are highly encouraged to move off the DX calling frequency to allow another DX station the opportunity to see what he can work. It's not good practice for anyone to monopolize either calling frequency. Once you have made a contact move up the band. Don't worry - someone will soon spot you and your new frequency on the DX Cluster Network to alert everyone of your new frequency.

Six meters can be a lot of fun, especially if everyone follows a few basic rules. The peak

of the E-skip season is typically from about June 24 to July 7. So if you are going by a 6 meter E-skip season this is nominally the best time to do it! See you on the Magic Band and have fun!

#### Six Meter DXpedition Suggestions

The other day I was talking DX, a usual subject, with my next door neighbor, Frank Donovan, W3LPL. We were on the subject of 6 meters and countries from the Caribbean, Central and South America. Frank got on 6 meters about two years after I did. He also is chasing countries in the ARRL DXCC Challenge. "By far the rarest and easily accessible entity is Fernando de Noronha (PY0F)," says Frank. Two other rare ones from South America include CP — Bolivia

Six meters can be a lot of fun, especially if everyone follows a few basic rules. a few basic rules.

> from HC8 and some activity is the last 12 months from CP6UA. No doubt Bolivia is the rarest mainland country from South America. The HC8N contest station use to be very active, including some occasional QRV on 50 MHz before or after the contests. Over that past 9 or so years there has been some activity from HH-Haiti, HK0 — San Andres and Providencia, KG4 — Guantanamo Bay and YS — El Salvador. Frank says "8R, 9Y,

FJ, FP, FS, FY, J3, J6, J7, J8, PJ5, PJ7, PZ, VP2E, VP2M and VP2V are not common,

Most HF rigs sold today have 6 meters and that's a good thing as DXpeditioners can now just take one rig on their trips around the globe.

but are activated regularly." Obviously we've left out the rarest ones from North America and South America like HK0/M, KP1, KP5, TI9, XF4 and YV0 as well as all five of the VP8s. Some were fortunate to work HK0NA this past January, but it still remains high on the most wanted list for 6 meters. This list of suggestions might be a little late for this year, but might be worth thinking about for the 2013 E-skip season.

#### **Upcoming 6 Meter DXpeditions**

Since we are on the subject of 6 meters let's give some details of some upcoming 6 meter E-skip DXpeditions that have been

announced. John, KB4CRT, has announced his plans to return to the Caribbean Island of Montserrat where he will be QRV as VP2MRT from June 6 to 13, including participation in the ARRL June QSO Party, on June 9 and 10<sup>th</sup>. He will be uploading his logs to LoTW or QSL direct with SASE or SAE and two green stamps to KB4CRT.

Drew, N2RFA/C6ABB; Gene, K2KJI/ C6ALC; Ivars, KC4PX/C6APX; and Jay, K2TTT/C6ATT, plan to be on Cable Beach, New Providence Island in the Bahamas for the June VHF QSO Party. QSL via their home calls.

Starting June 19 through the 29 W3CMP will be back at the Northwest Haiti Christian Mission in St Louis du Nord, Haiti and QRV using an FT-897 and small amp. Listen for HH4/W3CMP on 50.106 or 50.117 MHz and on 2 meters on 144.200 MHz.

Six meter veteran Jimmy Treybig, W6JKV, is heading back to St Barthelemy where he will be focused on the Magic Band between June 20 and July 2. He'll be using his trusty 8 element Yagi, most likely on 50.103 MHz, and signing FJ/W6JKV. QSL via W6JKV.

Dave, W9DR, had so much fun last year as V26DR on Antigua he's heading back to the Caribbean as VP2V/W9DR from the British Virgin Islands. The 6 meter only activity will

take place on 50.1156 MHz on CW and 50.115 MHz on SSB between June 21 and July 2. QSL to W9DR's home address.

Eric, KV1J, is heading back to Miquelon Island, although not specifically for 6 meters, from July 10 to 17. On July 9 he could be on for a few hours from St Pierre Island, the other island for this DXCC entity. Once on Miquelon and set up he'll be on 1.8 through 50 MHz on CW, SSB, RTTY, PSK31 and Feld Hell as FP/KV1J. Eric knows FP is kind of rare on the Magic Band and is no rookie on this band. He'll also be in the IARU HF World Championship. He has a web page with all the details at **www.kv1j.com/fp/ July12.html**. QSL via KV1J and LoTW.

And last but not least an international team is heading to St Paul Island from July 26 to August 1. It's a little late in the season, but you never know what can happen. The CY9M "main 6 m operator" will be Kevin, VE3EN. Their website is **www.cy9m.com**.

So there you have it the announced 6 meter DXpeditions as of press time. Hopefully the European 6 meter DXpeditions will activate a few of the rarer locations such as 1A, 3A, 4U1ITU, ER, ES, EU, HV, JX, LY, OH0, OJ0, R1F, SV/A, TK, UA, UA2, YL or ZA.

A good source for 6 meter news and to arrange skeds when the band is open are the ON4KST Chat pages (**www.on4kst.com/ chat/start.php**). There are separate 6 meter chat pages for IARU Region 2, Region 3 and then a main page, which has mostly European stations. The chat pages are great for asking a station for a sked, but should not be used to fabricate a QSO! Make the sked then get on the air to make the QSO. There is no need to ask "did you get my report" on the chat page. If you do it wasn't a QSO! Don't exchange QSO information on the chat page. On the air is where that should be taking place.

#### **ZL1AMO** Tribute

On March 6 I was saddened to learn of the passing of the legendary DXpeditioner Ron Wright, ZL1AMO. I first worked Ron from the Chatham Islands as ZL3HI/C in the old 10 meter CW Novice Band in 1978. AMO put on more than 100 Pacific Island DXpeditions between the late 1970s and 2002 including 3D2RW, 3D2RW/R, 5W1CW, A35EA, C21/ZL1AMO, FW0BX, H44RW, T28RW, T28RW, T30BH, VR6HI,



Members of the Auckland Contest Club (ZM1A) hosted Frank Donovan, W3LPL, and his wife Phyllis in December 2009. Shown are (front row I-r) Ron Wright, ZL1AMO; Frank Donovan, W3LPL; John Powell, ZL1BHQ (back row I-r) Jacky Calvo, ZL3CW; Armin Ficza, ZL1KMN; Dusko Dumanovic, ZL3WW, and Aki Seko, ZL1GO. [photo courtesy Jacky Calvo, ZL3CW] YJORW, ZK1CQ (South), ZK1CQ, (North), ZK1MB (North), ZK2RW, ZK3RW, ZL7AMO, ZL8AMO and ZL9AMO just to name a few of his calls! He was a longtime BOD member of INDEXA, the A1 Club, the CQ DX Hall of Fame and the "2nd inductee to the NZ DX Hall of Fame." ZL1AMO enjoyed CW and had worked all the current DXCC Entities, except 3C0, which ironically was on during his last days. During the early '80s I was fortunate enough to meet Mr Wright for an eyeball QSO. He had a great sense of humor and will be missed by all and as corny as it may seem he was one of my DX heroes! RIP ZL1AMO.

#### DX News from Around the Globe 5H — Tanzania

Chas, NK8O (VE3ISD), is taking his QRP Elecraft KX3 with him this year to Nyakato, Tanzania where he will be QRV as 5H9CP from June 11 to  $22^{nd}$ . QSL via NK8O.

#### CY0 — Sable Island

Alan, VE1AWW, will be wrapping up his three month stay on Sable Island at the end of June. He'll be QRV as CY0/VE1AWW is his spare time. QSL via his home call.

#### **D6 — Comoros Islands**

Sometime during the month of August an

international team will be operating with the special call D64K from the Comoros Islands. The license has been issued and they can operate on 1.8 through 50 MHz. Due to security concerns they

have not given the exact dates or location where they will be operating from. That information will be distributed through the DX publications about 30 days before the operation begins. Operators will be IW3SQY, IV3DSH, IT9YVO, IZ8GCE, IZ4AKS, SP3DOI and C31CT/EA3QS. They have reportedly already sent the needed paperwork to Newington for DXCC approval. They have a website at **www.d64k.com**. QSL via IV3DSH.

#### JX — Jan Mayen

By the time you read this Svein, LA9JKA, should be well adjusted to his new QTH on Jan Mayen, where he will be staying until March 29 of next year. He'll be signing JX9JKA from this semi-rare European DXCC Entity. QSL direct only to his home address: Svein Rabbevag, Brendlia 12, 6013 Alesund, Norway.

#### **Pacific Northwest DX Convention**

This year's Pacific Northwest DX Convention will be hosted by the Willamette Valley DX

Club on August 3, 4 and 5 at the Monarch Hotel in Milwaukie, Oregon. Complete details can be found at **www.wvdxc.org**.

#### Queen's Diamond Jubilee and the Olympics

To mark the 60<sup>th</sup> anniversary of Queen Elizabeth II's coronation Amateur Radio operators from the United Kingdom will be adding the letter Q to their call signs between May 5 and June 10. For example G3, M3, GM3, 2E0, 2M0 or GX3 stations will change the prefixes to GQ3, MQ3, GQ3, 2Q0, 2Q0 and GQ3, respectively. When you work these stations it might be a good idea to ask them, which DXCC Country they are located in, as it could be a little confusing. Stations from Gibraltar (ZB) will be using the ZQ prefix in celebration of the Diamond Jubilee during the same time period. Then from July 21 to September 9 UK stations will be adding the letter O to their call signs in celebration of the 2012 Summer Olympics, being held in London.

#### **United Nations Global Service Center**

Members of the United Nations Global Service Center (UNGSC) Amateur Radio Club in Brindisi, Italy (I7) have been issued the call sign 4U1GSC by the United Nations Headquarters in New York City. Ivo Pezer, I7/9A3A, is the club's first appointed ARC Trustee. "In accordance with ARRL current criteria only 4U1UN and 4U1ITU count as separate entities," says Ivo. It apparently also does not meet criteria for the DARC Worked All Europe program, so it will count for Italy for all awards and contests. Ivo says, "I am sure the call sign will attract pileups, so we should have some fun and try to promote the new role of the Global Service Center." QSL via 9A2AA.

#### VK9L - Lord Howe Island

Pat, VK2PN, and Miro, OK1NG, will be on Lord Howe Island and QRV as VK9PN from May 23 to 30, including the CQ WPX CW Contest. Joining them later will be Chris, VK3FY, who will be on a work assignment from May 27 to June 2. He'll be operating as VK9LHI in his spare time. Chris will have a rig and amplifier using a long wire antenna and tuner on all modes. Pat and Miro might extend their stay to leave with Chris.

#### Wrap Up

That's it for this month. Thanks to KE3Q, W3LPL and *The Daily DX* for making this month's column possible. Until next month, see you in the pileups! — *Bernie, W3UR* 



#### **The World Above 50 MHz**

Jon Jones, N0JK, n0jk@arrl.org



# Has the Internet "Killed" the VHF Radio Star?

#### March was big on tropo but low on activity. What's going on?

The song *Video Killed the Radio Star* by the Buggles was the first video played on MTV on August 1, 1981. The following lines from the song *Internet Killed the Video Star* by The Limousines has something to say about current activity levels on the VHF, UHF and microwave bands (VHF+).

Internet killed the Video Star The kids are disco dancing They're tired of rock and roll... Some ghost strumming his guitar on the radio Tune in the signal but it's fading

With the unseasonably warm weather this spring there have been a number of good tropospheric openings on the VHF+ bands. Unfortunately, activity even during the strong openings was low. Are signals fading away on 2 meters and up? Only "some

ghosts left on the radio"? Comments such as these about the sparse activity appeared on the "prop Loggers" and chat pages:

"VHF APRS Prop map shows 2 meter DX from SW Texas to Southern Iowa. It should be good on all modes."

"My APRS in Southwest Texas is hearing much from Central and Eastern KS, but 144.200 is dead."

"WD9BGA/b now 589 loud no one on the band...what a shame!"

"APRS shows promise toward Texas & XE land. No live ops..."

Has the Internet "killed" the casual VHF operator? Activity on 50 MHz is robust and the Internet may be helping. Chat rooms such as ON4KST, loggers and DX clusters alert operators promptly of DX openings on 6 meters. DX Sherlock's maps allow real time plotting of openings. With 4G smartphones one can see what is happening on the band from nearly anywhere. Many new well-designed HF radios now include 6 meters and USB ports that can utilize web DX clusters. The Internet is a great resource to learn about 50 MHz propagation, antennas and amplifiers, and chat with other operators to learn operating techniques.

So why is the SSB/CW daily activity on the VHF+ bands dropping? A number of possible reasons come to mind. Digital modes such as WSJT and JT-65A have made meteor scatter and EME feasible for smaller stations on 144 MHz and up. There is considerable activity on these modes. If one can work distant states on 144 MHz via WSJT meteor scatter and foreign countries on 432 MHz EME using JT-65A, perhaps contacts a few hundred miles away on 2 meter tropo scatter may not be that interesting.

#### She Who Waits

**"Video Killed the Radio** 

Star" ... "the Net's Killed

the Casual VHF Operator."

- JD, NOIRS

Tropo openings are rare. It takes patience to wait for one. A self-fulfilling prophecy may

> be ensuing. A new operator turns on her FT-857 to 144.200 and hears hiss. A few SSB CQs — no answers. It does not take much of that to discourage

someone. Eventually you don't even bother to check. Then one day the band opens, the light is on for contacts over a thousand miles away, but no one is "home" on the radio.

How did we know the band is "open" if no one was on? One way is with APRS. The APRS (www.aprs.org) "automatic packet reporting system" has a beacon system on

2 meters. These beacons can transmit to and receive other APRS beacons. The results are plotted on a map for easy reference at

**aprs.mountainlake.k12.mn.us**. On a number of days in March, 2 meter APRS stations in Texas were receiving and trans-

#### **This Month**

June 23-24 Good EME conditions. Degradation 1.6 dB.\* \*Moon data from EA6VQ. mitting packets to stations up to 1000 miles away on tropo. Most were low power, omnidirectional stations, so conditions were good.

"OK, I see red on the APRS map this morning; 2 meters is open. Where is everyone?"

#### **Stir Things Up**

A solution may be in building daily SSB/ CW activity on 144 MHz and up. Then people are around and stations primed when the band opens.

One way is through activity nets. Sam, K5SW (EM25) holds a weekly SSB "W5VHF 144.190 MHz net" every Tuesday at 8 PM local time. Stations from up to 400 miles away often check in. Other regional nets are held by KC9BQA (EN63) and WB9LYH (EN54) on 144.240 MHz 8 PM local Wednesdays, K8TQK in Ohio on 144.252 MHz Wednesday evenings, N9BJW (EN61) 144.220 MHz Thursday 7 PM local time. AB8XG (EM89) calls a net on 144.250 MHz 8 PM Thursdays. An FM net is held by W9VNE (EN43) La Crosse, Wisconsin Thursdays at 8:30 PM on 146.460 MHz. There are regional activity nets in other areas.

JD, NOIRS, has an outstanding website (www.kcvhfgridbandits.com) with the mission "To Promote VHF/UHF Weak Signal Activities in North America." Posted are recordings of DX contacts made during openings, propagation analysis and fore-

#### "WD9BGA/b now 589 loud no one on the band...what a shame!"

casts, and other useful items. The ON4KST chat pages (**www.on4kst. com**) assist in "lining up" stations on the higher UHF and microwave

bands. This "21st Century Internet style of operating" can help encourage activity.

Stan, KA1ZE, has come up with a great way to build SSB/CW VHF activity via a daily e-mail newsletter known as the 205MorningReport. The name comes from using 144.205 MHz as a coordination frequency for stations to line up their antennas and make calls via timed sequences. His newsletter features daily activity and DX reports, pictures of VHF/UHF operators and their stations, a listing of stations active in various grids, APRS map screenshots, regional activity nets, tropo reports and analysis. Stan has a "leader board" for the "144 MHz tropo CW/SSB DX Hog," "144 MHz Digital DX Hog" and higher bands. The "all band QSO Kings" are listed. A leader board is a great way to encourage activity. On HF, the "Club Log DXpedition leader boards" are very competitive. Stan's e-mail newsletter has nearly 600 subscribers and is free — check www.ka1ze.com. KA1ZE says "make some noise!"

#### **On the Bands**

50 MHz. On March 2 F2 with Peru had Jack, OA4TT, making many contacts to North America. K4PI (EM73) logged Jack at 2255 UTC. OA4TT was spotted by K1TOL, K2MUB, N3DB, KA9CFD, NW0W, K0HA, VE3FGU, VA3DX and others that afternoon. Bill, K0HA (EN10) noted: "It acted like a meteor scatter linked to F2 with Jack from here. I heard him 579 giving a report to somebody then he disappeared for a few minutes. Then I heard the end of his CQ, I called, he gave me a 599 report, I sent 559, and I heard his confirmation." Later in the evening Arne, N7KA (DM65) reported contacts with ZP5SNA, LU5FF and LU6QI. He had sporadic  $E(E_s)$ at the same time (suggesting an Es link to TEP) to "XE1FAA in EK08, XE1FZE in DL80, XE1GZU in DL80 and XE2YWH in DL92, all on SSB."

#### Al, K7ICW, found LU6QI, CE4WJK, OA4TT and LU5FF via TEP around 0200 UTC March 5.

On March 6 around 0130 UTC Fred, KH7Y, reported a strong opening to Brazil.

On March 7 at 1945 UTC, N7KA experienced another opening to South America. "CA3SOC was a solid S9 SSB both directions DM65 Strain Surprisingly both Raul, CA3SOC, and I were running 100 and 5 el Yagis." Steve, NN4X, in EL98 worked LU9AEA (FE79) at 1903 UTC. He notes LU9AEA was mobile with a 5×5 report! The geomagnetic field was active that day.

There were multiple Coronal Mass Ejections from sunspot 1429 that week and aurora reported on the 8<sup>th</sup> and 9<sup>th</sup>. Dave, N7DB, worked KE7V (CN88). Larry, NOLL (EM09) reported making a few 6 meter aurora contacts around 0700 UTC, mostly over a few hundred miles. Larry didn't hear any 2 meter aurora. "I was at a conference in Maui and set up a 1/4 wave whip with counterpoise taped to the deck railing at our hotel. At 0808 UTC March 9 FK8CP answered

my CO. Remi was 599 +40 dB with TEP flutter."

March 16 found stations in New England working Argentina, possibly via E<sub>s</sub> links. K1TOL and W1IPL found LU2DPW, LU8YSF, LU8DCF, LU5FF and CX8DS around 2230 UTC. Later in the evening (March 17 UTC) Joey, W5TFW, logged E51CG at 0207 UTC. The band was slow until...

March 28 started with widespread E<sub>s</sub> across the continental states (see Figure 1).  $E_s$  is rare in March and a big extended opening more so. From my location in Kansas (EM28), the K3TYE/b (DM42) in Arizona on 50.065 MHz was in for over an hour around 1730 UTC. N7DB in Oregon worked W5WM (DM64) at 1728 UTC. K0GU (DN70) reported E<sub>s</sub> to California and Mexico.

The E<sub>s</sub> continued through the afternoon and a solid "Es link to TEP" opening set up from the Rocky Mountain states. Oklahoma, Texas and western Kansas to South America. Gary, KB0HH (EM06) worked LU8EEM (FF95) at 2050 UTC. NW0W (EM47) had XE2X via Es at 2222 UTC, 3 minutes earlier NOLL (EM09) logged CE4WJK (FF45) with Larry's link likely off the



Figure 1 — A rare March TEP event conducted signals from the southern tier of the US down as far as South America. [DXSherlock]

same  $E_s$  cloud (see Figure 2). No  $E_s$  link was observed from EM28 during this time frame. It was landing 150 miles west. K0GU (DN70) was in the hot spot and worked the DX "for hours." Jay says this was his best opening ever to South America and "definitely had at least one hop of  $E_s$  and since I heard TI7/N5BEK 599 off the side of his antenna for a while sometimes two hops of E<sub>s</sub>." Jay's log for March 28:

19:31	LW3EX	GF05	529	539	CW
20:38	CE4WJK	FF45	59	59	SSB
20:42	LW6DG	FF95	59	59	SSB
20:47	LU8EEM	FF95	59	59	CW
20:54	CE3SX	FF46	57	57	SSB
20:57	LU1DMA	GF05	59	59	SSB
21:07	ZP5SNA	GG14	579	579	CW
21:22	CA3SOC	FF46	55	59	SSB
21:42	TI7/N5BEK	EK70	599	599	CW
22:05	LU6ARR	GF05	59	59	SSB
22:06	CX9AU	GF15	59	59	SSB

The opening extended quite far north and Jim, W7OUU (DN22) Idaho "camped out on 50.130 looking for LW6DG and sure enough at 2146 UTC LW6DG FF95FE popped out of the noise calling CO DX and I bagged him for a new one. It lasted about 7-8 minutes and then he was gone." I suspect double or possibly triple hop E<sub>c</sub> link to TEP!

ZL1RS/VK9N was on a 6 meter DXpedition to the Norfolk Islands and appeared in the Pacific



Figure 2 — This map shows the approximate center of the Es cloud over the south-central US that provided the link to TEP for Larry, N0LL, to contact CE4WJK. The cloud is at the intersection of the NW0W-XE2X path and the N0LL-CE4WJK path. [DXSherlock]

Northwest around 2240 UTC along with FK8CP. Both were in for almost 5 hours! N7DB noted: "I got back home about 0145Z (March 29) and got a call from K7RWT about 0230Z saying VK9N/ZL1RS was still in. I was finally able to work Bob 5/5 at 0241Z. FK8CP was a good S9 at times and the locals that were on then worked him. As I write this, VK9N/ZL1RS is still in there (0317Z)."

#### K7RWT closely observed this opening:

There had been some Sporadic E to California, Arizona, and New Mexico earlier in the day and I had one of my two six meter beams pointed toward South America and one to the South Pacific in hopes that there might be an E-skip to TEP link. I was listening on the South America antenna when around 2315 I saw spots from VE7DAY in CO70

and K7CW in CN87 reporting contacts with VK9N/ZL1RS! I switched to the 11 element M2 pointed toward the

Pacific and tuned down to 50.105 and, lo and behold, there was VK9N/ZL1RS being

worked on cw by Hank, WORLI, about 15 miles from my QTH. As soon as Hank signed with Bob, I called and worked him at 2334. He was only 519 at that time, but I got him in the log. He wasn't a new country for me as I had worked VK9NS on April 2nd, 1989, but I was thrilled to have some Cycle 24 DX!

The real prize for me was short time later. I was busy calling some of the other 6 meter ops in the Portland area on the phone to let them know the band was open when I heard Mike, KB7ME in Vancouver, Washington report over our local 2 meter FM "intercom" frequency of 144.320 that he had just worked FK8CP on 50.110! I tuned up to 50.110 and there was Remi, 5x5 on SSB. He was calling CQ but saying he was turning his antenna toward Asia! I called him twice, asking him to please not turn his antenna, and he answered my second call for my first new country of Cycle 24. After I worked Remi. I briefly heard E51WL on cw on 50.115. He faded before I could work him, but I saw Paul, K7CW, post him at 519 in CN87. Remi left his antenna pointed stateside and continued working many western U.S. stations.

This was a very interesting opening. Signals got progressively stronger over the next hour or so and I worked VK9N/ ZL1RS again at 0121, this time on SSB with S9 signals both ways. FK8CP was in for at least two hours and was also up to S9 at times. The band was open to VK9N/ZL1RS for about four hours until Bob finally faded out at about 0330. All

in all, it was a highly unexpected and sur-prisingly strong and long-duration opening. The four hours that the band was open and long periods of S5 plus signals allowed many Pacific North-west six meter operators to get home from work and get on the air in time to work VK9N/ZL1RS and/or FK8CP, and at least KE7V and K7CW were spotted having worked FO4BM and E51WL, respectively.

Mike, KB7ME (CN85) logged FK8CP at 0100 UTC, then ZL1RS/VK9N at 0109 UTC. Lance, W7GJ, in Montana also got Norfolk and New Caledonia in his log. Mike, N6MZ (CN87) worked ZL1RS/ VK9N and FK8CP 59 running 100 W to a 5 element M<sup>2</sup> Yagi. Steve, K7AWB, had fallen asleep "watching reruns of NCIS

when W7MEM in Idaho" called him "This was a very interesting opening. on the telephone to Signals got progressively stronger over alert him to the the next hour or so and I worked VK9N/ ZL1RS again at 0121, this time on SSB opening. (thanks Daily DX) Pete, N6ZE, worked

> FK8CP at 0342 UTC from Southern California.

with S9 signals both ways."

Bob, ZL1RS/VK9N, made over 70 North American contacts on this opening. He used two stacked 5 element Yagis from Duncombe Bay, Norfolk Island.

That evening an E<sub>s</sub>-TEP opening to the Cook Islands occurred from the Midwest states. K5SW (EM25), NW0W (EM47), KA9CFD (EN40) and W0RT (EM27) worked E51CG around 0105 UTC March 29. Rick, WORT, had Victor, E51CG, in for over 30 minutes with signals peaking  $5 \times 7$ . I heard E51CG weakly from EM28 on an indoor antenna but could not go out portable due to a thunderstorm. K0GU worked LU5FF at 0213 UTC.

The widespread E<sub>s</sub> March 28-29 was a major driving force of this opening. This created E<sub>s</sub> links to F2 and TEP from the western states to South America and the mid-section to the Cook Islands. The opening from the Pacific Northwest to the South Pacific is more uncertain, but I suspect E<sub>s</sub> may have been involved as well. The first Es hop would land in the Pacific Ocean. A rare March E<sub>s</sub> opening created 6 meter magic for many.

On March 31 ZL1RS/VK9N had a big TEP opening to Japan and Korea from 0530-0830 UTC. Many callers were "60 dB over S9"! Earlier, Bob worked WI7N and K7AWB at 0110 UTC. Fred, KH7Y, on the Big Island (Hawaii), worked JR6QWW Okinawa and JH7XRZ, JG1RVN, JE2XBY, JA5XAE and others in Japan around 0430-0530 UTC. Fred was spotted by rare

BV2DQ at 0437 UTC. FK8CP was heard in California for K6QXY at 0402 UTC 599 and HL1LTC spotted Remi at the same time. N7DB, WA7GCS and KI7JA spotted FK8CP around 0425 UTC.

144 MHz. March 9, WOVB (EN34) worked K9MRI (EN70) with 58A signals via aurora.

Tropo reported by Sam, K5SW (EM25); JD, NOIRS (EM29) and NOJK (EM28) March 13 to the Houston, Texas area. WB5OBS and K5DDD (EM20) were strong around 1400 UTC.

On March 14, NOIRS and I both worked W9PM (EN45) on 144.200 MHz tropo around 1500 UTC. Earlier NOIRS worked K8TQK (EM89) at 1143 UTC.

March 18 N0YK (DM98) found a strong tropo opening to KA0KYZ (EN33), WB0YWW (EN22) and KA0JGH (EN10) at 1400 UTC. At 1506 N0YK worked K2DRH (EN41) at 618 miles! This was a narrow duct, KC0HFL (EM17) was not in it.

VE1SKY (FN74) reported working KB8RQ with his "little pistol" 144 MHz EME station March 20 on JT-65A. He awarded Gary the "Sky Trophy" for being his first EME contact.

432 MHz. NOIRS (EM29) worked N9IYV and N4PZ (EN52) on March 13 at 0207 UTC.

1296 MHz. Al, W5LUA (EM13) worked K5SW, W5VTM and W7QJQ in Oklahoma on March 13. On March 24 K5SW (EM25) worked WORT (EM27) at 1402 UTC.

#### **Here and There**

British Virgin Islands, VP2V. Dave, W9DR, will be operating from the British Virgin Islands on 6 meters from June 21-July 2, 2012. The call will be VP2V/W9DR and he will be on 50.115.6 MHz CW and 50.115 MHz SSB. Please submit OSL requests to W9DR's home address.

#### Strays

#### **New Amateur Radio Club**

We're pleased to announce the birth of a new Amateur Radio Club open to all employees and retirees of CenturyLink, the Century Link Employees' Amateur Radio Club. The new club is open to membership to all employees of CenturyLink, and to anyone retired from the company. You don't need an Amateur Radio license to join, only an interest in Amateur Radio. For more information, see www.centurylink.com/arc. — Randy Schulze, KD0HKD

#### Maty Weinberg, KB1EIB, events@arrl.org

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

#### May 11-May 13, 1300Z-1400Z,

PD6MILL, Gieterveen, Netherlands. Stichting de Eendracht. Windmill Weekend. 28.475 14.245 7.075. QSL. Bernard Zuidema, PD7BZ, Zetveld 45, 7848CX, Schoonoord, Netherlands. Frequencies depend on QRM; 10, 20 and 40 m SSB and digimodes. QSL is going automatic via the bureau, also eQSL (AG) and LoTW. Manager is PD7BZ (Bernard). www.pd6mill.com

#### May 12, 0800Z-1700Z, K9UXZ,

Effingham, IL. National Trail Amateur Radio Club. AINAD Shriner's 100th Anniversary. 14.300. Certificate & QSL. Jesse Warner, 13067 E 300th Ave, Mason, IL 62443. kb9sso@hotmail.com

#### May 12, 1400Z-1800Z, W4NCG, High Point, NC. Gold Wing Road Riders Association North Carolina Chapter NC-G. Celebrating

Motorcycle Awareness Month. 147.555 7.215 7.210 7.205. Certificate. W4NCG, 2587 Wayne White Rd #52, Pleasant Garden, NC 27313. Talk in on W4GG repeater 145.250 - 88.5. www.qrz.com/db/W4NCG

#### May 12-May 13, 1500Z-0000Z, W4F,

Gallatin, TN. Sumner County ARES. 2nd Anniversary Nashville Flood. 28.350 14.315 7.220 3.950. QSL. Lyle Townsend, 1037 Chris Dr. Portland, TN 37148. www.sumnerares.org

May 18, 1500Z-2300Z, W7O, Centralia, WA. Oakview Elementary School Students. Mt St Helens Eruption Anniversary. 28.415 21.300 14.270. QSL. Donn Gallon (W7O), 20833 Grade St SE, Centralia, WA 98531. www.qrz.com/db/W7O

May 18-May 19, 2000Z-1100Z, N1R, Brunswick, ME. Merrymeeting Amateur Radio Association. American Cancer Society's Relay For Life. 10.120 7.020 3.525 3.094. QSL Stephen W. Kercel, 2 Brian Dr, Brunswick, ME 04011. All QSOs uploaded to LoTW. www.ks1r.org

#### May 19, 1400Z-2000Z, W9DUP, Clarendon Hills, IL. DuPage Amateur Radio Club. Armed Forces Day. 145.430 28.400 14.290 7.250. Certificate. Brian Eder. WB9UGX. 206 N Wilmette St, Westmont, IL 60559. www.w9dup.org

May 19, 1200Z-2359Z, N1MHC, East Boothbay, ME. Troop 238, Central Eastern Section Pine Tree Council. Boy Scout Camporee. 14.262 14.062 7.262 7.062. Certificate & QSL. Sara Sherman, Scoutmaster, c/o N1MHC, PO Box 2, East Boothbay, ME 04544.

#### May 20-May 21, 1900Z-0200Z, K6E,

Mount Shasta, CA. Mt. Shasta Amateur Radio Club. Annular Solar Eclipse May 20, 2012. 146.552 28.348 21.348 14.348. Certificate. Mt Shasta Amateur Radio Club. 329 N Washington Dr, Mount Shasta, CA 96067. msarc-mail@yahoogroups.com

May 28-May 29, 1300Z-0100Z, W5LEX, Corpus Christi, TX. South Texas Amateur Radio Club. 20<sup>th</sup> Anniversary of the USS Lexington Museum Ship. 14.325. QSL. Larry Boudreau, 910 Stromen, Corpus Christi, TX 78411. www.n5crp.org

#### Jun 1-Jun 2, 2300Z-1800Z, WOS,

Bloomfield, MO, Bootheel & SEMo Amateur Radio Clubs. Stars & Stripes Museum 28.460 14.260 7.260 3.960. Certificate. Stars & Stripes, PO Box 98, Jackson, MO 63755. stripes@newwavecomm.net

Jun 2, 0200Z-1800Z, W7C, Cheyenne, WY. Whip 7 Cancer. American Cancer Society's Relay For Life. 18.155 7.260 7.125 3.950. QSL. Fred Culek, KD7LLF, 3008 Terry Rd Sp#25, Cheyenne, WY 82007.

Jun 2, 1300Z-2359Z, WOM, South Saint Paul, MN. South East Metro Amateur Radio Club. Remembering the Battle of Midway and Richard E. Fleming, USMC, CMH. 28.460 21.360 14.260 7.260. Certificate. SEMARC W0M, 1655 68th St West, Inver Grove Heights, MN 55077. www.semarc.org

Jun 2, 1400Z-1800Z, NC4MC, Badin, NC. Montgomery Amateur Radio Society. Badin Bomber Crash 1944. 14.250. Certificate. Donald L. Grady, KG4ZRH, 120 Woodline Dr, Troy, NC 27371.

Jun 2, 1400Z-2000Z, W5WQ, Tylertown, MS. Southwest Mississippi Amateur Radio Club. Walthall County Dairy Festival. 7.282 14.282 21.282 28.482. QSL. Homer Richardson, 1545 Friendship Ln NW, Brookhaven, MS 39601. w5wg.net

Jun 2, 1500Z-2350Z, WOVFW, Topeka, KS. VFW Post 3115. VFW Department of Kansas, 92<sup>nd</sup> State Convention. 21.240 18.140 14.240. QSL. Dwight Holtzen, 795 N McComas St, Wichita, KS 67203.

Jun 2-Jun 3, 0000Z-1400Z, W1W, Russell, MA, BSA Venture Crew 510/Hampden County Radio Association. Western Mass Council BSA Webelos Woods. 28.390 21.360 14.290 7.190. Certificate & QSL. BSA Venture Crew 510, C/O HCRA, PO Box 562, Agawam, MA 01001. LoTW and direct mail QSLs only.

Jun 2-Jun 3, 0000Z-2359Z, W1T, Shelburne, VT. Radio Amateurs of Northern Vermont. Museum Ships Weekend. 28.500 21.300 14.250 7.200. Certificate. Bob Brown, 5 Repa Dr, Essex Junction, VT 05452. From the Steamboat Ticonderoga, Shelburne Museum. w4vfi@comcast.net

#### Jun 2-Jun 3, 0001Z-2359Z, NJ2BB,

Camden, NJ. Battleship New Jersey Amateur Radio Station. Museum Ships Weekend Event 2012. 21.326 14.262 7.262 7.042. Certificate & QSL. Margaret Burgess, 150 Schooner Ave, Barnegat, NJ 08005. www.nj2bb.org

#### Jun 2-Jun 3, 1400Z-2000Z, VE3MIS,

Mississauga, ON. Mississauga Amateur Radio Club. Streetsville Bread and Honey Festival. 14.240 7.230. Certificate & QSL. Michael Brickell, VE3TKI, 2801 Bucklepost Cres, Mississauga, ON L5L 1M6, Canada. Please include \$2 US for postage; US postage cannot be used in Canada. www.marc.on.ca

## Jun 2-Jun 3, 1400Z-2100Z, NB9QV.

Manitowoc, WI. USS Cobia Amateur Radio Club. WWII Submarine USS Cobia AGSS-245. 14.250 7.240. Certificate & QSL. Certificate\* Vernon McNulty, K0EFV, 4015 Independence Ave, Waterloo, IA 50703; QSL. Fred Neuenfeldt, 4932 S 10th St, Manitowoc, WI 54220. www.qrz.com/db/nb9qv

#### Jun 2-Jun 3, 1500Z-2130Z, N4WIS,

Virginia Beach, VA. USS Wisconsin Radio

Club. Museum Ships on the Air. 14.264 7.264. QSL. USS Wisconsin Radio Club, PO Box 6682, Virginia Beach, VA 23456. www.n4wis.org/n4wis/index.php

Jun 2-Jun 6, 1200Z-2200Z daily, W2W, Baltimore, MD. Amateur Radio Club of the National Electronics Museum. D-Day Commemoration. 21.270 14.270 7.240. Certificate & QSL. W2W Special Event Station, PO Box 1693, MS 4015, Baltimore, MD 21203. QSL & certificate details and web cam at ww-2.us

Jun 4, 1200Z-2200Z, W2W, Baltimore, MD. Amateur Radio Club of the National Electronics Museum. Battle of Midway Commemoration. 21.270 14.270 7.240. Certificate & QSL. W2W Special Event Station, PO Box 1693, Baltimore, MD 21203. www.k3nem.org

#### Jun 6-Jun 13, 0000Z-2359Z, K2PC,

Carmel, NY. Putnam Emergency and Amateur Repeater League. Putnam County, NY Bicentennial 14.203. Certificate. PEARL Bicentennial, PO Box 501, Carmel, NY 10512. Stations confirming via LoTW may request a certificate (PDF) by e-mail, qsl@pearl-k2put.org. Operation will be on an as available basis. Mode and frequency will be chosen by individual operator. pearl-k2put.org

Jun 8-Jun 9, 1600Z-2359Z, K5P, Plano, TX. Plano Amateur Radio Club. HamCom. 2012 28.420 14.320 7.220. QSL. Greg Evans, 815 Wind Elm Dr, Allen, TX 75002. hamcom.org

Jun 9, 1600Z-2359Z, NI6IW, San Diego, CA. USS Midway (CV-41) Museum Radio Operations Room. International Museum Ships Radio Event, D-Day Normandy 1944, Navy Hospital Corps Established 1898. SSB 14.320 7.250 PSK31 14.070 D-STAR 012C and 2 m/70 cm SOCAL rptrs. QSL. USS Midway Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101. kk6fz@arrl.net

#### Jun 9-Jun 10, 1430Z-2300Z, NWOAA,

Angle Inlet, MN. Northwest Angle Radio Club. Annual Activation of the Northern Most Radio Club in the Contiguous 48 States. 14.245 7.200 3.940 3.550. Certificate & QSL. Dan Whipple, 11726 Norway St NW, Minneapolis, MN 55448. www.grz.com/db/NW0AA

#### Jun 9-Jun 10, 1800Z-1800Z, W7M

Great Falls, MT. Girl Scouts of Montana and Wyoming. 100th Anniversary of Girl Scouting 28.405 21.325 14.228 7.190. QSL. Ken Wolfslau, W7WOF, 529 Skyline Dr NE, Great Falls, MT 59404. w7wof@arrl.net

#### Jun 9 and Jun 16, 1600Z-0000Z,

WY7U, Green River, WY. Sweetwater Amateur Radio Club. To Commemorate Fort Bridger and the Pony Express Re-Ride. 28.325 21.355 14.272 3.920. Certificate & QSL. Sweetwater ARC, 1000 South Dakota, Green River, WY 82935. wy7u.angelfire.com

# Jun 12-Jun 26, 0000Z-2359Z, CK3/ CJ3, Kitchener, ON. Municipality. City of

Kitchener's 100th Anniversary. 50.140 28.400 14.070 7.077. QSL. Richard Goetze, 105 Fairfield Ave, Kitchener, ON N2H 6C2, Canada. CJ3 is for operator's with VA3 call signs, and CK3 is for operators with VE3 call signs. Prefixes may be used by any amateur in the Region of Waterloo, ON. All HF bands operating, all modes. The main planned frequencies for Trustee station CK3ZUP: 40 m Feld Hell; 20 m PSK; 10 m USB; 6 m USB. QSL via. SASE (and \$2 dollars if outside Canada). Note: US stamps not usable in Canada. ck3zup@gmail.com

#### Jun 15-Jul 15, 0000Z-2359Z,

**CG7CWPC**, Burnaby, BC. Burnaby Amateur Radio Club. 100<sup>th</sup> Anniversary of the C. W. Parker Carousel at the Burnaby Village Museum. 21.250 14.175 7.225 3.775. QSL. Via bureau or direct to Eric Stapleton, VE7EES, 128 - 4111 Hastings St, Burnaby, BC V5C 6T7, Canada. www.ve7bar.org

Jun 16, 0500Z-1300Z, W6SVS, Simi Valley, CA. Simi Settlers Amateur Radio Club. Simi Valley History Day. 14.255 14.045 7.260 . QSL. Simi Settlers ARC, PO Box 2125, Simi Valley, CA 93065. www.simihistory.com. simisettlers.org

Jun 16, 1200Z-1800Z, NA1RL, Newington, CT. Newington Amateur Radio League. NARLFEST. 28.450 24.950 14.250 7.250. QSL. Richard Lawrence, KB1DMX, 335 Lloyd St, Newington, CT 06111. www.narl.net

#### Jun 16-Jun 17, 1400Z-0000Z, K3C,

Salisbury, MD. Peninsula Radio Operators Society. Delmarva Chicken Festival. 14.240 7.182. QSL. Delmarva Chicken Festival, PO Box 1077, Salisbury, MD 21802. www.delmarvapros.i8.com

#### Jun 18-Jul 2, 1201Z-2359Z, VC390IC,

Kitchener Waterloo, ON. Kitchener Waterloo Amateur Radio Club. KWARC 90<sup>th</sup> Anniversary. 3.760. QSL. Gord Gibson, 102 Grand River Blvd, Kitchener, ON N2A 2T1, Canada. We will be communicating on a vintage Viking Pacemaker transmitter/Gonset G63 receiver, SSB 40 and 80 m. Other equipment on higher frequencies. QSL via. SASE (and \$2 dollars if outside Canada). Note: US stamps not usable in Canada. www.kwarc.org

Jun 21, 1400Z-2100Z, WOKY, Kearney, NE. Midway Amateur Radio Club. Pony Express Reride. 14.280 7.280. Certificate. Midway ARC, PO Box 1231, Kearney, NE 68848. w0ky.kearney.net

#### Jun 22-Jun 24, 1600Z-1800Z, WOG,

West Bend, IA. 100th Anniversary of the Grotto of the Redemption. 21.320 14.250. QSL. Bernie Lewiston, PO Box 432, West Bend, IA 50597. June 22: 1600- 2000Z, June 23: 1600-1800Z, June 24: 1800-2200Z. www.qrz.com/db/KB0L

#### Jun 22-Jun 25, 0000Z-2359Z, K6Q,

Cupertino, CA. Field Day. 14.050; All HF bands 50-440 MHz. QSL. Bill Phillipson, K6KQV, 18954 Pendergast Ave, Cupertino, CA 95014.

#### Jun 23-Jun 24, 0200Z-0200Z, W4J,

Jupiter, FL. Jupiter Tequesta Repeater Group. 30 Anniversary Jupiter Tequesta Repeater Group. 14.265. QSL. Andrea Kola, PO Box 7751, Jupiter, FL 33468. www.jtrg.org

#### Jun 23-Jun 24, 1800Z-1900Z, N6R,

Simi Valley, CA. Ventura County Amateur Radio Society and Simi Settlers Amateur Radio Club. Field Day and Commemorating the Lives of President and Mrs Ronald Reagan. 28.400 21.320 14.255 7.260. QSL. Ventura County Amateur Radio Society, N6R c/o Peter Heins, N6ZE, 1559 Norwich Ave, Thousand Oaks, CA 91360. www.qrz.com/db/n6r

Jun 25, 1600Z-2359Z, NI6IW, San Diego, CA. USS *Midway* (CV-41) Museum Radio Operations Room. ARRL Radio Field Day. SSB 14.320 7.250 PSK31 14.07. 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

#### Jun 29-Jun 30, 1300Z-2200Z, N4T,

Cross Plains, TN. Robertson County Amateur Radio Club. Cross Plains Trash and Treasures. 28.405 28.355 14.305 14.247. QSL. Rick Robinson, W4AKT, 4759 Henry Rd, Cross Plains, TN 37049. www.robertson countyarc.org

#### Jun 30-Jul 1, 1200Z-2200Z, W1SYE,

Newport, RI. Newport County Radio Club. America's Cup World Series Races. 28.400 21.270 14.260 7.250. QSL. NCRC, PO Box 3103, Newport, RI 02840. www.w1sye.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 9x12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information. \*Note: Some clubs may ask for a nominal fee to cover the cost of the certificate or QSL. Request will be made on air during the event or on the club's website.

**Special Events Announcements:** For items to be listed in this column, use the ARRL Special Events Listing Form at **www.arrl.org/special-events-application**. A plain text version of the form is available at that site. You may also request a copy by mail or e-mail. Off-line completed forms can be mailed, faxed (Attn: Special Events) or e-mailed.

Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; a special event listing for **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 Event page. Note: All received events are acknowledged. If you do not receive an acknowledgment within a few days, please contact us.

Special Events listed in this issue include current events received through Apr 10. You can view all received Special Events at **www.arrl.org/special-event-stations**.

#### **US/Canada Section Abbreviation List**

Those new to the ins and outs of Field Day will find this list of Section abbreviations useful — for those in the US and Canada, they're an important part of the FD exchange, along with station call sign and class. Be sure to bring a copy of this Section Abbreviation List with you to FD 2012.

1 Connecticut Rhode Island Eastern Massachusetts Vermont Maine Western Massachusetts New Hampshire 2 Eastern New York Northern New York NyC / Long Island	CT RI EMA VT ME WMA NH ENY NNY	Georgia Tennessee Kentucky Virginia North Carolina West Central Florida Northern Florida Puerto Rico South Carolina Virgin Islands <b>5</b> Arkansas	GA TN KY VA NC WCF NFL PR SC VI AR	Orange San Joaquin Valley Santa Barbara Santa Clara Valley Sacramento Valley Pacific <b>7</b> Alaska Nevada Arizona Oregon Eastern Washington	ORG SJV SB SCV SV PAC AK NV AZ OR EWA	Wisconsin Indiana O Colorado Missouri Iowa Nebraska Kansas North Dakota Minnesota South Dakota <b>Canada</b>	WI IN CO MO IA NE KS ND MN SD
Western New York <b>3</b> Delaware Maryland – DC Eastern Pennsylvania Western Pennsylvania <b>4</b> Alabama Southern Florida	WNY DE MDC EPA WPA AL SFL	Oklahoma Mississippi South Texas New Mexico West Texas <b>6</b> East Bay San Diego Los Angeles	OK MS STX NM WTX EB SDG LAX	Western Washington Montana Wyoming 8 Michigan West Virginia Ohio 9 9 Illinois	WWA MT WY MI WV OH	Alberta Quebec British Columbia Ontario Northern Territories Manitoba	NL AB QC BC ON NT MB

Mary M. Hobart, K1MMH, k1mmh@arrl.org

# Two Amateur Radio Grants Approved!

The ARRL Foundation Board of Directors has approved the first two grants of 2012.

The first award goes to the **Polaris Career Center**, a public school in Middleburg Heights, Ohio for a Boy Scout Merit Badge Course. The course is to be conducted in conjunction with Northern Ohio DX and the Quarryland District of the BSA Northeastern Ohio. The grant will assist with training for 20 young scouts in radio technology and experience in STEM standards. The course includes each scout's building a modulated radio receiver with a speaker, an IC and an antenna coil with high grade ferrite core so no external antenna is necessary. The second award goes to the **South Hopkins Middle School Radio Club** for Project Goodwill to establish a base station at the school to give club members and other students a hands-on radio operating experience

around the country and around the world. The school club will be assisted by the Hopkins County Amateur Radio Club and the Western Kentucky Repeater Group. The grant will enable the school to purchase an HF transceiver with a power supply and microphone plus a 160-80 dipole antenna. An additional benefit of establishing the HF station is that



the rural community around the school will provide emergency communications capability for weather spotters.

Grants for Amateur Radio activities are available to groups that seek to promote

Amateur Radio and bring young people into the service. All the information about the grant program is available on the web at **www.arrl.org**, including application forms and instructions. Grants are reviewed by the ARRL Foundation Proposals Committee on a rolling basis during the year and average from \$500 to \$1500 each.

#### Life Members

#### Elected March 24, 2012

Richard C. Adamy, KA4GFY George R. Anderson, W4GRA Robert S. Anderson, KR4YO Timothy B. Anderson, AG4XM Daniel N. Arbogast, NODA Tony M. Armendariz, AD6ID Leonard J. Ash, N3MMQ Tommy R. Averett, AE6WL George B. Beeler, N8AHT Daniel J. Beer, N9NSN Fred A. Bellegante, K5DJK Mark P. Benson, KM3P Mark Blasing, W8MRK Roger R. Block, KD7UT Gerry Boudreaux, W5IC Robert M. Bownes, KI2L James R. Brolaski, AE50G Charles A. Budnick, KI4YLS Thomas C. Burnett, KH7N Geoffrey D. Burns, NE3K Craig R. Cahan, N9FD Philip Cardamone, VK3HPC Rusty Caufield, KD5RXY James G. Chester, AI4JK Delwyn W. Ching, KH6DC Edwin E. Chung-Hoon, NH7QR Karen S. Claing, W1KSC Francis E. Clark, AK4LN Keith W. Collins-Allen. K2WCA Gregory E. Cowling, KJ4WRZ John E. Cresson, W2JGH Colin J. Crim. KE5CC Shawn R. Crossland, N6REP Warren E. Davis, AB4GE

Leland M. Deane. AA2LD Ronald G. Dement, AA2QQ Michael P. DeVivo, N1CHP Scott H. Dickson, W5WZ Analissa W. Drummond, KC5PAC Robert A. Edry, W1RE Alaaeldeen Elsayed, AG6IL Andrew D. Engle, KOADE Robert Faerber, W9AQ Charles Fischer, K2CAF Glen Fisher. KD5PPB Dale A. Fitzgibbons, WOWW Donald Fletcher, W4DSF Vince Foley, WN8VEF Lynn Foust, KC5NDG Rex D. Foust, N5XMY Gregory M. Fowler, K6NK Hisashi Fujinaka, K7EMI Christophe J. Gerard, K1TOF William J. Gervais, KE1BZ Rod Godfrey, W8RKG Willard S. Grant. WS3G Neil H. Gray, N8SSW Keith D. Hagen, KK4PJ Jeremy J. Hall, KB7QOA John D. Hawkinson, KB0AVM Michael Hendershot, KJ4FEQ William K. Hensley, WG8S William J. Honeyman, KG6CNL Christopher Howard, W0EP Marcus B. Howell, N3PGS David J. Huff. WOIM Bill E. Hunstein, KL7TC

Wayne L. Hupman, KF4UCF Kevin W. Inman, KF6ICD Nancy S. Jarrin, N2ANG Stephen Jeffries, W1SBJ Mark O. Jensen, KAOWTX James W. Jones, AB4D John F. Jones, N6IRZ Stephen R. Jones, N8SRJ William R. Jones, W4MAJ Donald W. Keenan, KF5FPH Sean P. Kelly. W5SPK John S. Kerr, KC9QFP Robert K. Kingery, AE7AP W. D. Kunz, WY6I Jeremy D. Kurck, WA5JK Tighe W. Kuykendall, NK4I Michael D. Landau, KG6FRL Andrew M. Leeds, WO3L George D. Lillenstein, AB1GL Andrew D. Littlejohn, W5ROX Marv Jo Littlewood. K4MJL Kenneth H. Lockard, K2KKC Philip J. Lonzello, WA6LDI Scott A. Mackenzie, KA6SUY Robert E. Maguire, KH6LDO Sarah A. Manuel-Barksdale, W9BAM James W. Marchant, N6QDO Billy D. Mason, KD5KNR David B. Matthews, KI4PSR Kem E. McBride, W5TR Bill McLean, K7WWM Dave McLaughlin, WOZY John Mercer, W7XK

Michael A. Miller. KI4RDP Paul J. Moore, N1VUI Steve Mosconi. K6KS Daniel J. Musall, KDOORS Ken R. Noffsinger, AE8I Dennis R. O'Dell, N4QM Lee F. Oliver, KC2WH Emilio Ortiz, WP4KEY Earl S. Pack, AE5PA Stevan J. Pavitt Thomas A. Powers. W4FDF William D. Powers, KOCSA Adam J. Quigg, NZ3S William Rahiser, KB9JBA Charles Reeves Douglas A. Rose, N9DR David A. Rosenblum, WX4U Mark R. Rothenberg, KD6EMF Ray A. Rothrock, WB5NVN Charles Rowe, KI4OUO Michael C. Royse, KC6RSH Jarret Rush. NMOV Kevin A. Ruth. KG6QCH Robert Salsgiver, NR30 Michael J. Sandor, N2NMB Scott Scheirman, AD7XV Donald C. Schmitt, K3DCS Elmer F. Schumacher, KI4JLM Fredric Serota, K3BHX Don R. Shelton, NOKGU John C. Shepherd, AK9DR Mark Shukla, VE7GPZ Joe Shupienis, W3BC

Franklin E. Skinner, KOJQZ John S. Slater, KL1AZ Nathan A. Smith. KI4YHI Steve J. Solton, KD0FKO Yoshiaki Sone, W3JH Alfred E. Springer, WM5V Bartholomew Stavisky, KF5EKG Richard A. Stiles, AB4ZT Jun Tanimoto, JN3MUC Barclay M. Thomas, WU1B Jerry J. Thomason, WB5SYT Leo J. Thrush, WOPK Robert H. Tinney, K8LR Jose L. Toca, XE1JTR Vladimir Ulogov, KC2QMB Ronald E. Vastine, KC4RV Jose C. Vicens Rodriguez, NP4G Wilbur R. Vincent, W6PUX Michael A. Waldron, AEOMW Jesse D. Warner, KB9SSO Dean A. Webb, N4NLT Jerry Weisskohl, AC4BT Sheldon M. Werner, AG4TG Ricky West, W4KQB Newton R. White, N4EWT James K. Wieland, KB3MUV Mark C. Wilke, K8VL Sean R. Wilkerson, NB7A James W. Winney, KD6MXE Paul W. Winroth, ND8N Henry Wixon, WXON Raymond T. Wynn, WA6JPP Michael W. Zappe, KOZAP

#### **Vintage Radio**

John Dilks, K2TQN, k2tgn@arrl.org



# The Society of Wireless Pioneers

## Sparks Journals saved from the recycling bin

For some time I have been hearing that the Society of Wireless Pioneers was coming to an evolutionary end. At one time membership of these early (ship) wireless operators numbered over 4000. Then over the last few decades many of them became Silent Keys. Membership dwindled, as no "new blood" Radio Officers were joining. This is because the position of a ship radio officer had been eliminated by most shipping lines and there were few new radio officers to join. The remaining SOWP officers lacked the energy they had when they were younger to keep the organization running. Most were now were in their 80s and beyond, and things slowed to an eventual halt. Their web page announced that the once robust organization was going to terminate operation.

Over the years I have been lucky enough to acquire a few of their publications. They were filled with stories about radio officer life at sea: disasters, rescues and history dating back to the time the first ships were equipped with wireless sets. For the most part these are all first person stories, written by those who lived them.

I visited the North Jersey DX Association meeting a few months ago and saw an SOWP member there — I could tell by his jacket patch. He told me he was headed to assisted living and had to throw away all his old SOWP *Sparks Journals*. I realized that this was a continuing cycle and was afraid no one would save these wonderful stories.

With the encouragement of several SOWP members I gathered a complete set of *Sparks Journals*, clean enough to scan into Adobe files. I bounced the idea off of the secretary of the organization and he was elated that someone cared enough to do this. I planned to send CDs of the files to various radio museums for preservation.

I purchased a large 11 by 17 inch flatbed scanner and a dedicated (refurbished) computer, and set up a work station in the guest bedroom. I had 30 tabloid sized



Page one of the *Sparks Journal* from Volume 1, Number 4, 1978. [K2TQN, SOWP photo]

*Journals* to scan with an average of 32 to 40 pages each. I dedicated most of my spare time for over two months, scanning each page. Then I had to digitally enhance each photo and page, and remove the dirty spots as they were printed on newsprint.

The next step was to make them into Adobe files, one per issue. I OCRed the pages and set links from the Table of Contents to the articles, and links back to the TOC. The last step was to shrink the Adobe files to a manageable size for downloading. During this time I met Michael Carroll, N4MC, who offered to host the files at his Silent Key website. I sent the files to him and now everyone can read these stories. You can find them at **www. silentkeyhq.com**/. Click on the SOWP banner.

Then in early April I received an e-mail from my friend Bart Lee. K6VK, of the California Historical Radio Society. "John, we have saved the Society of Wireless Pioneers. (Maybe resurrected is a better word!) I am looking forward to working with the Society of Wireless Pioneers as a program of the California Historical Radio Society. Our focus will be historical, of course, but we want to keep the social aspect going as long as members want it."

This is great news! The California Historical Radio Society

(CHRS) website is **www.californiahistorical** radio.com/.

#### **National Silent Key Archive**

One of the greatest pleasures I have is sharing stories about ordinary hams who have done some extraordinary things. Most

#### It's a great way to honor a good friend.

of these hams have been Silent Keys (SK). Though I try to feature them when I can, there are only 12 columns in a year and

I like to write about historic radios too.

Until now most SKs have been honored by someone writing a story for a ham club



This is the National Silent Key Archive page for AWA Founder Bruce Kelley, W2ICE, SK. [John Dilks, K2TQN]

newsletter or making a presentation to the local club. That covers your local club but many hams talk around the world and have friends every-

where. Their distant friends may never hear

history. Now, I'm happy to tell you there is a

place where the whole world can find them.

website that is easy to use. If your friend is

in the database, you can find them by enter-

ing their call sign. If not, then you can add them to the database. You can enter biographical information, an obituary or story, and upload photos about your friend. Later,

you or others can add to what's already

there. It's a great way to honor a good

I asked Michael to explain how the website

with a project of incorporating monthly

Silent Key data provided by the ARRL into my Unique Call Lookup at Vanity HQ. I wrote some software that enabled me to easily organize and upload the data.

Allocating a small piece of the Internet to honor silent keys was the least I could do for those who came before me. As time progressed, and I continued to post silent

I began posting silent key data to my other web page, Vanity HQ's Unique Call Lookup, in 2008 after Dick Norton, N6AA, director, ARRL Southwestern Division, asked me if I'd like to help him

**How Did This Get Started?** 

friend.

began:

that they became an SK or any of their

Michael Carroll, N4MC, has created a

#### ... or a personalized tribute telling how your friend or family member was your mentor, rag chew buddy or Field Day partner.

key data, I became disappointed to find there were so many silent keys that were

"documented" but who had no photo, no obituary, no biography and not a single fact or statement that would transform their data into their story. I was tired of seeing "just the facts.

I decided that I needed to harness the collective efforts of many if there was going to be any progress documenting the hundreds of thousands of silent keys.

The National Silent Key Archive

represents about two years of software development and testing. The code is written using PHP, and uses simple text files for data storage, although you'd never know this from using The Archive. Lookups respond quickly, and the pages are not cluttered with links to everything under the sun.

#### **Be Creative**

First, read some of the existing SK pages. See what looks good to you and try to make yours as good or better. Write the information you want to display about your friend ahead of time. Read and reread it until you're sure it's how you want it to be displayed. Have your photos scanned and ready to copy to the Archive.

Visit www.silentkeyhq.com and remember a friend.

#### **Maine: Wireless North Pole Presentation**

I will be making my WNP, Don Mix at the North Pole presentation Tuesday, July 10 at 7:30 PM in Castine, Maine, at the Castine Historical Society's (www.castinehistorical society.org) Mitchell Room, located on the lower level of the Abbott School on the town common in Castine, Maine. The presentation will be free of charge and open to the public. I hope to see some of my readers there.

The Maine Maritime Academy is in Castine, Maine and is the home of the Schooner *Bowdoin*. The *Bowdoin* may be there on that date. You can check the sailing schedule on the college website at www.mainemaritime.edu.



Thirty issues of the Society of Wireless Pioneers Sparks Journals are also available on the Archive web page. [John Dilks, K2TQN]

#### **Convention and Hamfest Calendar**

#### Gail lannone, giannone@arrl.org

#### Abbreviations

Spr = Sponsor *TI* = Talk-in frequency Adm = Admission

# California (Orcutt) — Jun 16 D F H R S T 7:30 AM-3 PM. *Spr:* Satellite ARC. Newlove

Picnic Grounds, Órcutt Hill Rd. Santa Mariastyle BBQ, T-hunts. Tl: 145.14 (131.8 Hz). Adm: Free. Tables: \$15. Eric Lemmon, WB6FLY, 4416 Titan Ave, Lompoc, CA 93436; 805-733-4416; wb6fly@verizon.net; www.satellitearc.com.

Colorado (Delta) — Jun 2 H T 9 AM-noon. *Spr:* Montrose ARC. Lions Club Pavilion at Confluence Park, 530 Gunnison River Dr. 11<sup>th</sup> Annual Tailgate Party. *TI:* 147.195. *Adm:* Free. Tables: \$5. Steve Schroder, KIOKY, 29848 Stingley Gulch Rd, Hotchkiss, CO 81419; 970-201-5997; ki0ky@arrl.net.

#### Connecticut (Newington) — Jun 16 FHRSTV

Set up 6 AM; public 8 AM-2 PM. Spr: Newington AR League. St Mary School, 625 Willard Ave. NARL Fest 2012, Transmitter Hunt. *TI*: 145.45 (127.3 Hz). Adm: \$5, under 12 free. Tables: \$15 (outside spaces \$12). Vinnie Alianiello, W1VJA, Box 310133, Newington, CT 06131-0133; 203-987-2108; w1vja@arrl.net; www.narl.net.

# Illinois (Wheaton) — Jun 17 D F H R T V 7 AM-1 PM. Sprs: Six Meter Club of Chicago,

Antique RC of Illinois, and Midwest Classic Radio Net. DuPage County Fairgrounds, 2015 Manchester Rd. 55<sup>th</sup> Annual Hamfest. *TI*: 146.97 (107.2 Hz), 146.52. *Adm:* advance \$6, door \$8. Tables: \$12. Mike Huedepohl, WD9GJK, 3532 Raymond Ave, Brookfield, IL 60513; 708-485-5481; wd9gjk@arrl.net; k9ona.com.

#### Kentucky (Princeton) — June 2 D H R T V

7 AM-noon. Spr: Princeton Ham Radio Club. Princeton Fire and Rescue Training Center, 2001 Hwy 62 W. Princeton/Pennington Tailgate Fest, Kentucky Phone Net Group Meeting. TI: 145.23 (179.9 Hz). Adm: Free. Tables: Free. Mike Taylor, N4MHT, 402 S Seminary St, Princeton, KY 42445; 270-365-7777; n4mht@mchsi.com; w4kbl.org.

Massachusetts (Cambridge) — May 20. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); w1gsl@mit.edu; www.swapfest.us.

Massachusetts (Cambridge) — Jun 17. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); w1gsl@mit.edu; www.swapfest.us.

#### Michigan (Midland) — Jun 16 **DFHRSTV**

8-11 AM. *Spr:* Midland ARC. Salvation Army Building, 330 Waldo Ave. *Tl*: 147.0 *Adm*: \$5. Tables: \$5. Keith Johnson, KB8SOE, 1300 E Olson Rd, Midland, MI 48640; 989-832-4123; kb8soe@arrl.net; www.w8kea.org/hamfest.

## Michigan (Monroe) — Jun 17 D F H R T

7:30 AM-1 PM. Spr: Monroe County Radio Communications Assn. Monroe County Fairgrounds, 3775 S Custer Rd. *TI:* 146.72 (100 Hz). *Adm:* \$6. Tables: \$15. Fred VanDaele, KA8EBI, 4 Carl Dr, Monroe, MI 48162; 734-652-3843; ka8ebi@yahoo.com; www.mcrca.org.

New Jersey (Piscataway) — Jun 16 D H Q R S T V 8 AM-noon. Spr: Raritan Valley RC. Piscataway High School (Lots 11/12), 110 Behmer Rd. Technical Demonstrations. Tl: 146.625, 442.25 (141.3 Hz). Adm: \$7. Drew Moore, W2OU, 30 Ethel Rd, Piscataway, NJ 08854; 732-801-4654; drumor@optonline.net; www.w2qw.org.

#### **Coming ARRL Conventions**

**May 18-20** Dayton Hamvention®, Dayton (Trotwood), OH\* June 1-3 Northwestern Division, Seaside, OR\* June 2 Georgia Section, Marietta\* June 8-9 West Gulf Division, Plano, TX\* June 9 Arkansas State, Rogers\* Tennessee State, Knoxville\* June 30 Eastern Pennsylvania Section, Harrisburg July 4-7 Mobile AR Awards Club, Vancouver, WA

July 20-22 Montana State, East Glacier

July 26-28 Central States VHF, Cedar Rapids, IA

July 27-28 Oklahoma Section, Oklahoma City

July 27-29 Rocky Mountain Division, Bryce Canyon, UT

> August 3-4 Texas State, Austin

August 3-5 Pacific Northwest DX, Portland, OR

> Angust 4 Ohio State, Columbus

\*See May QST for details.

# New Jersey (Township of Washington) — May 26 D F H Q R T V

8 AM-3 PM. *Spr:* Bergen ARA. Westwood Regional High School, 701 Ridgewood Rd. *TI:* 146.79 (141.3 Hz). *Adm:* \$5. Tables: \$15 (two parking lot spaces). Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Township of Washington, NJ 07676; 201-664-6725; k2zo@arrl.net; bara.org

New York (Bethpage) — Jun 3 D F H Q R Set up 7 AM; public 9 AM-2 PM. Spr: Long Island Mobile ARC. Briarcliffe College, 1055 Stewart Ave. Outdoor Hamfair. TI: 146.85 (136.5 Hz). *Adm:* \$6. Tables: \$10 per space. Dave Akins, AK1NS, 55 Admiral Ln, Hicksville, NY 11801; 516-312-8745; hamfest@limarc. org; www.limarc.org.

#### New York (Queens) — Jun 10 FHQRTV

Set up 7:30 AM; public 9 AM-2 PM. *Spr:* Hall of Science ARC. New York Hall of Science Parking Lot, 47-01 111<sup>th</sup> St (Flushing Meadow Corona Park). Drop and Shop. *Tl:* 444.2, 145.27 (both 136.5 Hz). *Adm:* buyers \$5, sellers \$10 per space plus admission. Stephen Greenbaum, WB2KDG, 85-10 34<sup>th</sup> Ave, Apt 323, Jackson Heights, NY 11372; 718-898-5599; wb2kdg@arrl.net; www.hosarc.org.

#### New York (Rochester) - Jun 30 FHQRTV

9 AM-4 PM. Spr: Rochester ARA. Rochester Institute of Technology - Gordon Field House, 1 Lomb Memorial Dr. Rochester Hamfest and Technology Exposition. TI: 146.61 (110.9 Hz) *Adm:* advance \$5, door \$8. Tables: \$10. Frank Schramm, WB2PYD, Box 93333, Rochester, NY 14692; 585-210-8910; HFProducer@ RochesterHam.org; www.rochesterhamfest. com/.

#### North Carolina (Kinston) — Jun 30 FHQRST

8 AM-3 PM. Spr: Down East Hamfest Assn. Lenoir Community College, 231 Hwy 58 S. 22<sup>nd</sup> Annual Hamfest. *TI:* 146.685, 145.31 (both 82.5 Hz). Adm: advance \$5 each or 3 for \$12; door \$6 each or 3 for \$15. Tables: \$12 (\$5 additional for electricity); tailgate spaces \$12 each. Byron Highland, K4BMH, 3753 Thorne Dr, Farmville, NC 27828; 252-347-1498; bhighland@nc.rr.com; www.downeasthamfest.org.

#### North Carolina (Salisbury) - Jul 7 FHRTV

8 AM-3 PM. Spr: Rowan ARS. Salisbury Civic Center, 315 S Martin Luther King Ave (behind Office Depot). Homebrew Contest. TI: 145.41 (136.5 Hz). *Ádm:* advance \$4, door \$5. Tables: \$5. Tommie Wood, N4YZ, 310 Cruse Rd, Salisbury, NC 28146; 704-637-0024; n4yz@arrl.net; www.rowanars.org.

Ohio (Milford) — Jun 16 D F H R S T V Set up 6 AM; public 8 AM-2 PM. Spr: Milford ARC. Eastside Christian Church, 5874 Montclair Blvd. 22<sup>nd</sup> Annual Hamfest. *TI:* 147.345. Adm: \$5. Tables: inside \$5, plus

admission; tailgating \$1 regardless of spaces needed. Jim Linn, WB8RRR, 5110 Romohr Rd, Cincinnati, OH 45244; 513-831-6255; fax 513-528-7270; wb8rrr@arrl.net; www.w8mrc.com.

#### **OKLAHOMA SECTION CONVENTION**

#### July 27-28, Oklahoma City DFHQRSV

The Oklahoma Section Convention ("Ham Holiday 2012"), 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 36<sup>th</sup> Annual Ham Holiday; flea market; vendors (contact vicepresident@hamholiday.org for details); technical and non-technical programs; DXCC/WAS card-checking; VE sessions; special guest speaker ARRL President Kay Craigie, N3KN, Talk-in on 146,925 (141.3 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; 405-841-2626 (days); fax 405-841-2624; n5nuk@sbcglobal.net; www.hamholiday.com.

#### Pennsylvania (Allison Park) — Jul 7 HRSTV

8 AM-1 PM. Spr: North Hills ARC. Parkwood United Presbyterian Church, 4289 Mt Royal Blvd. 27<sup>th</sup> Annual Hamfest. *TI:* 147.09 (88.5 Hz). Adm: \$5. Tables: \$10. Cathy Heiles, KB3OYS, 134 Easley Rd, Pittsburgh, PA 15237; 412-486-2785; kb3iys@hotmail.com; nharc.org.

- 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

#### EASTERN PENNSYLVANIA SECTION CONVENTION June 30, Harrisburg

#### DFHQRSTV

The Eastern Pennsylvania Section Convention ("Firecracker Hamfest and Electronics Expo"), sponsored by the Harrisburg Radio Amateur Club, will be held at the Harrisburg Area Com-munity College Public Safety and Fire Training Grounds, 3599 Industrial Rd. Doors are open for setup Friday 6-9 PM, Saturday 6 AM; public 8 AM. Features include 40th Annual Event, largest tailgate (\$5 per space) and electronics flea market in central PA, covered indoor commercial tables, new and refurbished equipment dealers, seminars, DXCC and WAS card checking until 10 AM, special event station W3W in operation, on-site VE sessions (11 AM, walk-ins welcomed), great breakfast and lunch, handicapped accessible. Talk-in on 146.76 (100 Hz). Admission is \$5 (nonham spouses and kids free). Tables are \$12 each (before Jun 1), \$15 (on or after Jun 1). Contact Terry Snyder, WB3BKN, Box 355, Halifax, PA 17032-0355; 717-896-0256;

#### wb3bkn@gmail.com; www.w3uu.org. Pennsylvania (Kimberton) — Jul 8

8 AM-noon. *Spr:* Mid-Atlantic ARC. Kimberton Fire Company Fairgrounds, Rte 113 and Firehouse Ln. Valley Forge Hamfest. *Tl:* 145.13, 147.06 (131.8 Hz). *Adm:* \$6. Tables: \$8. Mike Pilotti, KF3CD, 983 Crownpointe Ln, West Chester, PA 19380; 610-696-5040; kf3cd@arrl.net; www.marc-radio.org.

#### Pennsylvania (Lehman) — Jul 1 D H R T V

8 AM. *Spr:* Murgas ARC. Luzerne County Fairgrounds, Rte 118. Hamfest and Computerfest. *TI:* 146.61 (82.5 Hz). *Adm:* \$7. Tables: advance \$15 (inside), door \$20. Herb Krumich, K2LNS, 311 Meadow Run Rd, Wilkes-Barre, PA 18702; 570-829-2695; wa2fgk@yahoo.com; www.qsl.net/k3ytl.

# Pennsylvania (Somerset) — Jul 8

8 AM-1 PM. *Spr:* Somerset County ARC. Somerset County Technology Center, 281 Technology Dr. *TI*: 147.195 (123 Hz). *Adm:* \$5. Tables: Free. Stew Saylor, AK3J, 156 Sequoia Ln, Apt 1, Friedens, PA 15541; 814-444-0637; ssaylor@earthlink.net; www.k3smt.org.

#### South Dakota (Spearfish) — Jun 9 F H R S T V

8 AM-2 PM. *Spr*: Hams in the Hills ARS. United Methodist Church, 845 N 5<sup>th</sup> St. Homebrew and QSL Contests. *Tl*: 146.16 (146.2 Hz). *Adm*: \$5. Tables: \$5. Joanna Jones, KD7GLY, 10559 W Highway 14, Spearfish, SD 57783; 605-450-0121; Joanna\_Jones@yahoo.com; www.hamsinthehills.org.

#### Tennessee (Mountain City) — May 26 D H V

8 AM-noon. *Spr:* Johnson County ARC. National Guard Armory, 1923 S Shady St. *TI:* 146.61 (103.5 Hz). *Adm:* \$3. Tables: \$5. Erik Iddings, KF4KRK, 162 Buckshot Ln, Mountain City, TN 37683; 423-727-7793; erikwi@yahoo.com.

#### Virginia (Manassas) — Jun 10 D F H Q R S T V

6 AM. *Spr*: Ole Virginia Hams ARC. Prince William County Fairgrounds, 10624 Dumfries Rd. 38<sup>th</sup> Annual Hamfest. *Tl*: 146.97, 442.2, 442.5125. *Adm:* advance \$7, door \$8. Tables: \$30. Donald Blasdell, W4HJL, 9727 Loudoun Ave, Manassas, VA 20109; 703-369-2877; w4hjl@aol.com; www.w4ovh.org.

#### MOBILE AMATEUR RADIO AWARDS CLUB CONVENTION

#### July 4-7, Vancouver, WA

R S

The Mobile Amateur Radio Awards Club Convention (44<sup>th</sup> Annual MARAC National Convention), sponsored by the Mobile Radio Operators, will be held at the Red Lion Hotel at the Quay, 100 Columbia St. Features include County Hunting forums, several tours, Thursday BBQ, Saturday Banquet. Registration fee is \$35. Contact Philip Yasson, AB7RW, 13208 NE 5<sup>th</sup> Ave, Vancouver, WA 98685; 360-574-1152; **ab7rw@arrl.net; www.marac.org**.

### Wisconsin (Oak Creek) — Jul 7 D F R

6:30 AM-2 PM. Spr: South Milwaukee ARC. American Legion Post #434, 9327 S Shepard Ave. 45<sup>th</sup> Annual Swapfest. *TI*: 146.58. Adm: \$5. Robert Kastelic, WB9TIK, 7410 S Clement Ave, Oak Creek, WI 53154; 414-764-3871; wb9tik@sbcglobal.net; www.qsl.net/wa9txe.

#### 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-conventionscalendar) 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/hamfestconvention-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.

Issuings and ominine. Cancellong contention are are 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 **June 1** to be listed in the **August** 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**.

## **Strays**

#### Jennifer Melfi, KC2TMA, Receives Special Service Citation

On August 27 and 28, 2011, for 28 hours during Tropical Storm Irene, 13 year old Jennifer Melfi, KC2TMA, assisted the Town of Babylon (New York) Emergency Operations Center calling for volunteers on the radio several hours before the storm struck. She tirelessly provided emergency communications, relaying information about shelters and highways to Town of Babylon officials, Red Cross shelters and other nets throughout Long Island.

In January, Senator Owen H. Johnson (D-4), presented her with a much deserved Citation at the Ham Radio University event at Briarcliff College in Bethpage, New York. The citation states, in part, "Age does not play a factor in one's ability to volunteer their time to serve one's community. This citation recognizes your outstanding community service to the residents of the Town of Babylon, may you be an inspiration to others who follow in your footsteps." — Peter Portanova, WB2OQO



Recognized at Ham Radio U: ARRL member Jennifer Melfi, KC2TMA, of Babylon, New York receives a Special Service Citation from state senator Owen H. Johnson (in the red tie) for her volunteer efforts to prepare for and then deal with the Tropical Storm Irene emergency. From the left: Tom Carrubba, KA2D, HRU chairman; John Melfi, W2HCB, Great South Bay ARC president; KC2TMA; Senator Johnson; Mike Lisenco, N2YBB, NYC/ LI Section Manager, and Norm Fusaro, W3IZ, from ARRL Headquarters. [Diane Ortiz, K2DO, photo]

## 75, 50 and 25 Years Ago

#### Al Brogdon, W1AB

#### June 1937

- The cover photo shows two hams operating their portable station from the open trunk of a car.
- The editorial speaks of the need for accurate signal reporting and log keeping.
- E. S. Van Deusen, W3ECP, describes his new baby, "A Complete Dry-Battery Portable Station with Crystal-Controlled Transmitter."
- William Jacobs, W4CVQ, tells about his version of "A Battery-Operated Rig of Proved Performance" (the proved performance was during the recent severe flooding of the Ohio River).
- In "And Now We Have Full-Range Superhet Selectivity," James Lamb describes his simple electromechanical I.F. filter that provides continuously variable bandwidth from 10 cycles to 10 Kc.
- Earl Anderson, W8UD, brings us "A Three-Stage Transmitter Unit for 1.75- to 30-Mc. Output." The breadboard rig with plug-in coils uses a 6L6G oscillator, a T20 multplier, and a T55 final.
- Mel Williams, W9DNP, provides details on "The 100-Foot Lattice Tower at W9DNP." The 400-pound tower was designed by W8KAZ, an engineer who designs highway bridges, and built using  $1 \times 2$ -inch pine lath.
- E. C. Hughes, W3EHJ, gives us some "Frank Talk about This Business of Transmitting" Tube Ratings.
- James Millen, W1HRX, presents "A 500-Watt 14- and 28-Mc. Amplifier" that uses a single RK37 to drive a pair of RK38s in push-pull.

#### **June 1962**

- The cover cartoon by Gil, W1CJD, shows the Podunk Hollow gang happily and energetically reaching their Field Day site... it makes us wonder what next month's cover will show.
- The editorial assures us that home brewing has not become a lost art, contrary to many comments you hear among hams nowadays.
- E. C. Kunze, WOWVM, writes about "Space-Age Antenna Ideas," giving us practical hints about antennas for Oscar, Echo or Moonbounce arrays.
- In "Recent Trends in Receiver Front-End Design," E. A. Andrade, W0DAN, discusses noise figure and cross-modulation characteristics of tube and transistor front ends.
- Lew McCoy, W1ICP, tells about "A Novice 'Gallon' or General 150-watter" that covers 80 through 10 meters with a two parallel 6GJ5s in the final.
- Halford Greenlee, W3AXF, presents "A Transistor Transceiver for 6 Meters," a small hand-carried package that delivers 1/4 watt of n.b.f.m.
- Ed Tilton, W1HDQ, shows and tells us how to make "No-Holes V.H.F. Mobile Installations."
- An item in "Strays" reports that WA2QAO has two licensed sons WA2SLY and WA2RAT.

# **June 1987**

- The cover photo of the Atlanta skyline reminds us of the upcoming National Convention to be held there next month. Earphones on a peach were added by N2EST/4.
- The editorial again addresses the question of what we can do to thwart the FCC's proposal to take part of the 220 MHz band away from amateurs.
- Steven Powell, W2CXM tells us how to turn an \$18 weather radio into a 2-meter scanning receiver, in "The W2CXM 2-Meter Cube Receiver and Scanner." (W2CXM is the call sign of the Cornell University ARC.)
- Warren Dion, N1BBH, tells us how we can use "A New Chip for Charging Gelled-Electrolyte Batteries."
- In "Build Your Own MCM ICs," Doug DeMaw, W1FB, explains how we can lay out and build mini circuit modules.
- David Newkirk, AK7M, gives the Novices some "Plain Talk about Voice Operation."
- Steve Mendelsohn, WA2DHF, and Richard Moseson, N2BFG, report on the good work of the "Silent Angels: Amateur Radio in the New York City Marathon."
- "Up Front in QST" notes that the television hit show Jeopardy posed the answer, "If someone refers to you by your call sign, such as K8IGW, your hobby is this." K8IGW's son N6DIW is a writer for the show. Happily, a contestant scored with the correct question!



#### **Field Organization Reports**

#### **MARCH 2012**

077

#### Public Service Honor Roll

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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.

101

125

K7BDU	W9WXN	AG9G	KØLQB	85
520	K2ABX	N2GJ N2WKT	KD8EBY	W4VAM
406	N8IO	K2TV	KA1G	84 KROKEC
AE5VY	W7JSW	124	NU8K	RD9REG
403 W7FQQ	178 WA2BSS	121 4F9W/	N5OUJ WB9WKO	N9WLW WB3FTQ
375 KT5SR	175 KB2BAA	120	W9BGJ N1JX	81 K6RAU
362 WB8BCB	173 VE7DXD	KA4FZI	WB8SIQ WG8Z	W8CPG
352	170	K9LGU N2JBA	WD8Q	K7MQF
KI4KWR	WB9JSR	KB2RTZ	K3IN	K8KV WB4R.IW
345 KOIRS	165 W4DNA	W8UL	WØCLS	K5AXW
KT2D	161	WA3EZN	WAØVKC	KB5KKT
330	KC8QWH	KD8KWG KB3LNM	WB6UZX	KØDEU
N9VC		WI2G	W35W W3TWV	
325 KA27NZ	KGØGG	WB8WKQ	K8VFZ	KFØXO
310	159	WB8YYS	98 K2GW	KCØZDA
KA4IZN	KB8RCR	116	97	KC8BW
300 NX9K	K6HTN	W2DWR	N2RDB	KD8CYK
285	150	N8CJS	KJ/NO 05	79 WDØGUF
WA9LFO	KØVTT KK3E	KB1NMO	K4JUU	N5ASU
280 KB2ETO	WK4P	110	94	78 Wai W
275	N8OSL	N1IQI	KK/DEB WB8R	W9MBT
W5DY	K5CRX	N1LKJ N7EIE	93	NS8Y N2RTF
271 KC57CC	W3CB	W7QM	WM2C	W8QZ
270	146 K4BEH	N9MN KE4CB	91 NC3E	77
K2DYB	145	KC50ZT	N8FVM	KAUDBK K4VWK
265	K1PJS	WA5LOU	90	76
WA2PUU	142	AA2SV	KI4AAN	KB3LFG
260	K7OAH	N5NVP	W3GQJ	75 W5XX
K8RDN KC8RTW	141	WB8HHZ	KZ8Q	WB8TQZ
248	WS6P	K4BG	N5RL	73 KC2EMM
WB9FHP	W8IM	K4GK	W2CC	72
225 WD9FL.L	NM1K K7BEI	N7XG	W5CU KB8H.I.I	N2VQA
224	136	N7YSS KB1BGQ	N8DD	71 KD844D
W4CAC	KJ4JPE	W2EAG	KD8CES	70
210 K2HAT	135 W3YVQ	W4TTO W7GB	N3ZOC	K2UL
202	K7EAJ	NX8A	KD8QPF	N2YJZ
WD8USA	120	108 WA4UUC	WD8BCS	KC2UMX
200 KB5SDU	WØLAW	106	88 W5GKH	KDØAYN
KB2KOJ	K6JT WE2G	KC2SYM	87	KØDLK
195 KC28EU	WB2FTX	105 NAELI	KE5YTA	NØDUX
10/	W8DJG	K6FRG	NN 11N 86	WØFUI N3NTV
KB5PGY	K4IWW	KF7GC	WØRJA	KØPTK
190	KW1U	102	N2DW NA9I	KØRXC KD7ZUP
KK5NU		NA7G	1010L	ND/20F

The following stations gualified for PSHR in previous months. but were not recognized in this column: (Feb) W5KAV 540, W7FQQ 318, VE7DXD 170, K7BFL 140, K7BDU 110, W7GB 110, KC4PZA 74.

#### **Section Traffic Manager Reports**

The following Section Traffic Managers reported: AK, AL, AZ, CO, CT, EB, EPA, EMA, ENY, EWA, GA, IL, LA, LAX, MDC, ME, MI, MN, MS, NFL, NE, NLI, NNJ, NTX, OH, OK, OR, ORG, SD, SFL, SJV, SNJ, STX, TN, UT, VA, WCF, WI, WNY, WV, WY.

#### Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: ENY, EWA, KS, MDC, MI, MN, MO, MT, ND, NLI, NM, NNJ, NTX, OK. SD. SFL. STX. SV. 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 ABRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

W5KAV 3784, KK3F 1997, N1IQI 1672, WB9FHP 1561, WB5NKD 1493, K6HTN 1048, K7BDU 877, WB2FTF 1501, WB3ND 1463, K6HTN 1048, K7BDU 877, WB2FTX 874, KW1U 836, K6FRG 800, NX9K 780, N9VC 766, W8UL 759, WB9JSR 581, W0RJA 558, W9WXN 521.

The following station qualified for BPL with Originations plus Deliveries: K8LJG 107, NM1K 103. The following stations qualified for BPL in February but were not

listed previously in this column: W5KAV 4315; K7BDU 1102.

#### Silent Keys Administrator, sk@arrl.org

#### It is with deep regret that we record the passing of these amateurs:

N1AXQ Beers, William A., Bedford, NH W1BIH Thompson, John H., Plymouth, MA Lindsay, Ronald P., Bethel, CT W1CUB W1GHK Mason, Carl L. Jr, Augusta, ME K1HDO Cote, Maurice R., Nashua, NH Curwen, William L., Westwood, MA Tonucci, Robert M., Shelton, CT K1N7 K10DY Magee, Donna, Waterford, CT Hall, Nathan E., South China, ME KB1RPP K1VFG Johansmeier, James E., Benton, ME Vigars, Brian J., Salem, NH N1VSS K1VVM N1WWS Martin, Michael N., Belmont, NH Guptill, Frank E., Hartland, CT Prochilo, Patrick T., Amesbury, MA WO1Z N2BOX Addison, Mark, Shrewsbury, MA Davison, Charles H., N2CTJ K2DOV Monroe Township, NJ WA2DSZ Woerner, Ruth, Oradell, NJ Krey, Arthur W., Trenton, NJ W2EFH W2ERS Carlson, Roger W., Fort Pierce, FL WA2FDK Goetz, John "Jack" A., Reno, NV WA2FGA Marder, Milt, Mount Laurel, NJ W2FGD Fricklas, Marvin T., Freeport, NY WB2FWR Schlick, Erma F., Horseheads, NY Schlick, Erma F., Horseheads, NY La Paugh, Arthur E., Interlachen, FL Hotaling, Richard E., West Coxsackie, NY Hatfield, George W., Oneida, NY Carpenter, William E., Dothan, AL Madaffore, Frank V., North Brunswick, NJ Brennan, Martin G., Wichita, KS Adams, Michael F., Ramsey, NJ Lawlor, James J. Jr, North Port, FL Alamond, Daniel E. Sr, Whitesboro, NY Brown F. M. Biverton, N.I. K2GEE WB2GRY W2GXE WA2KFH K2KVT WA2MVT WA2MWT KB2NZ KA2OQB W2PAU Brown, E. M., Riverton, NJ **Phillips**, Americo V., Montville, NJ **Wood**, Allen J., Schenectady, NY W2PCZ KB2OL Benjamin, Sophia A., WA2QMT North Syracuse, NY K2RBR Seifridsberger, Gerald J., Hoosick Falls, NY N2RLA Weyrauch, John J., Norwich, NY AA2UU Coulehan, Robert E., Dobbs Ferry, NY NI2Y Longo, Gerald, Saratoga Springs, NY Enge, Francis J., Harrogate, TN Rudinoff, Ron, Wilmington, DE Myers, Robert A., Altoona, PA Maurits, William "Bill," Bel Air, MD Ertl, Timothy P., Dalton, MA K3AV N3EQK **KB3EVO** КАЗНИЗ KE3HT 🔶 K3IVI Urban, Charles T., Paoli, PA Driscoll, Lee G., York, PA N3LD Vandegrift, John F., Ivyland, PA King, Douglas W., Hellertown, PA K3OOB N3TME W3WBF Franklin, William B. III, Crisfield, MD Willis, William, Stanton, DE Harris, David E., State College, PA Johnson, Alan B., Jackson, MI KC3YT W3ZX KC4AAQ KC4CAK Henley, George S., Richmond, VA DiRenzo, Patrick, Palm Coast, FL Dovenbarger, Ralph H., Canton, OH KK4CHN AD4CO K4CRN Michaels, Willis A. Jr, Montgomery, AL K4CS Scruggs, Clyde, Sebring, FL AF4DC Apperson, Ronald, Hardinsburg, KY Nixon, James "Dan," Loganville, GA W4EA Lynch, Frank A., Raleigh, NC W4FAL Fill, Paul E., Pensacola, FL Fugle, Frank L., Fort Myers, FL Bregman, Allyn, Catawba, SC Baker, William E., Glen St Mary, FL KQ4FE W4FF W4GHQ K4GNS Mc Kinney, Gordon R., Heflin, AL Southard, George G. D., W4GRM AC4GS Coral Springs, FL Potts, William H. Sr, Jacksonville, FL Coulter, Roger L., Radford, VA Van Winkle, Michael A., WA4HPS KT4HV W4HV Mount Carmel, TN WD4HZQ Bennett, John W., Collierville, TN Chappell, John H., Charlottesville, VA Kennedy, William C., Mt Dora, FL WA4IUN WO4K K4KFP Miner, Boyd S., Gray Court, SC

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Regular	\$39	\$76	\$111	Monthly QST via standard mail for US members	QS1. Dues subject to change without notice and are
Canada	\$49	\$93	\$132	Monthly QST via standard mail for Canadian members	nonrefundable.
International QST	\$62	\$118	\$167	Monthly QST via air mail for international members	Blind and youth rates are available. Contact ABBL for
International – no printed QST	\$39	\$76	\$111	Digital QST only	more details.
Family	\$8	\$16	\$24	Reside at the same address as the primary member, no additional <i>QST</i> . Membership dates must correspond with primary member.	Additional membership options available online at www.arrl.org/join.

Name			Call Sign	
Street			City	State ZIP
E-mail			Phone	
Family Member Name			Call Sign	(if any)
☑ Payment Opt	tions			□ Total enclosed payable to ARRL \$
□ Visa □ MasterCard	□ Amex	Discover	□ Check Enclosed	I do not want my name and address made available for non-ARRL related mailings.
Card Number		Exp	piration Date	- Join Now

ONLINE: www.arrl.org/join PHONE: 1-888-277-5289 (US) ARRL•225 Main Street•Newington, CT 06111-1494 Phone: 860-594-0338 • FAX: 860-594-0303 Source Code: OST 5/2012

Cardholder's Signature

Expiration Date

## Strong, High Quality, **Corrosion-Resistant, Unique, Purpose-Designed Clamps**

V-Bolt Style

**Our Clamps are Specified by Scientific, Military & Government Designers! Used by Antenna Builders: Commercial & Amateur!** 

#### Saddle Clamps with Cast Saddles

ENGINEERING

- · Stainless steel flat washers, lock washers, nuts and bolts
- Corrosion-resistant aluminum saddles with as cast rough finish for secure grip

#### **U-Bolt Style**, designed and sized to fit tubing

• Full 360° grip for specified tubing size

• •	Nominal	Thread	
Part Number	Size	Bolt Size	Price
DXE-SAD-050A	0.50	1/4-20	\$4.95
DXE-SAD-075A	0.75	1/4-20	\$5.35
DXE-SAD-100A	1.00	1/4-20	\$5.70
DXE-SAD-125A	1.25	1/4-20	\$6.55
DXE-SAD-150A	1.50	1/4-20	\$7.40
DXE-SAD-175A	1.75	1/4-20	\$8.55
DXE-SAD-200A	2.00	5/16-18	\$9.75
DXE-SAD-200B	2.00	3/8-16	\$10.95
DXE-SAD-250A	2.50	5/16-18	\$11.75
DXE-SAD-250B	2.50	3/8-16	\$13.25
DXE-SAD-300A	3.00	5/16-18	\$13.30
DXE-SAD-300B	3.00	3/8-16	\$14.90
DXE-SAD-400A	4.00	3/8-18	\$34.40
DXE-SAD-450A	4.50	3/8-16	\$39.90

Dimensions in Inches.

#### V-Bolt Style, sized to accommodate ranges of tubing sizes



Part Number	Nominal Size	Thread Bolt Size	Price
DXE-CAVS-1P	0.50 to 1.75	1/4-20	\$9.95
DXE-CAVS-11P	0.50 to 1.75	5/16-18	\$10.45
DXE-CAVS-2P	1.00 to 2.00	5/16-18	\$11.95
DXE-CAVS-3P	2.00 to 3.00	3/8-16	\$14.95
Dimensions in In	ches.		$\overline{\mathcal{A}}$

Clamps with black powder coated saddles are also available in U-Bolt and V-Bolt styles, designed and sized to fit 1/2" to 2" tubing.

#### Super Duty Saddle Clamps

Super Duty Saddle Clamps are designed for maximum clamping strength to control large or unbalanced loads.

 A356-T6 cast aluminum saddle, with rough, as-cast finish for high torque grip on masts, etc

· Cast stainless reinforcement plate included

t sets sold separately	
Tube O.D.	Price
2.00	\$32.00
2.50	\$39.00
3.00	
	Tube 0.D.           2.00           2.50           3.00

Dimensions in Inches

#### **Resin Support Blocks**

Securely mount tubing to any flat surface. An insulated mount between tubing and plates, ideal for antenna construction and electrical applications.

· Optional stainless steel voilable ant plat

Part Number	Tube O.D.	Price		
DXE-RSB-I02500	0.250	\$2.65		
DXE-RSB-I03125	0.3125	\$2.65		
DXE-RSB-103750	0.375	\$2.65		
DXE-RSB-I05000	0.500	\$2.90		
DXE-RSB-106250	0.625	\$2.90		
DXE-RSB-I03400	0.750	\$3.05		
DXE-RSB-I10000	1.000	\$3.05		
DXE-RSB-I11250	1.125	\$4.70		
DXE-RSB-I12500	1.250	\$4.70		
DXE-RSB-I11500	1.500	\$4.70		
DXE-RSB-I13400	1.750	\$7.15		
DXE-RSB-I20000	2.000	\$7.15		
DXE-RSB-122500	2.250	\$7.95		

Dimensions in Inches.

#### **Cushioned P-Clamps**

· Provides strain relief of coaxial cable connections

Grips the cable jacket without nicking or cutting

DXE-CPC-250

DXE-CPC-375

For RG-8X, RG-6, RG-59 ...pack of 10 \$14.95 cable For RG-213, RG-8, RG-11 cable ......pack of 10 \$14.95



round or irregularly shaped structures.

Part Number	Nominal Size	Price/Pack of 2
DXE-ECLS-050	0.500	\$9.99
DXE-ECLS-062	0.625	\$9.99
DXE-ECLS-075	0.750	\$9.99
DXE-ECLS-087	0.875	\$10.99
DXE-ECLS-100	1.000	\$10.99
DXE-ECLS-125	1.250	\$11.49
DXE-ECLS-150	1.500	\$11.49
DXE-ECLS-175	1.750	\$11.49
DXE-ECLS-200	2.000	\$11.49
DXE-ECLS-225	2.250	\$11.49
DXE-ECLS-250	2.500	\$11.99
DXE-ECLS-275	2.750	\$11.99
DXE-ECLS-300	3.000	\$11.99
DXE-ECLS-325	3.250	\$11.99

Dimensions in Inches.

#### Tell us how you used DX Engineering clamps. The best design will win **200 DX Bucks!** One winner every month. Details at DXEngineering.com!

World Class Products Shipped Worldwide, Every Day!

First Winner: 20 meter dipole antenna made by James, K8JHR. James says DX Engineering saddle clamps made it easy to build "A high precision, easy to tune and adjust, aluminum dipole." See it on DX Engineering's Customer Showcase at DXEngineering.com.



8:30 am to 4:30 pm ET 1230 to 2030 UTC (March-October) 1330 to 2130 UTC (November-February) Tech/International: 330.572.3200 Country Code: +1 Sale Code: 1206QS

#### Order by 4 PM ET (US) for Same-Day Shipping

We'll See You at Booths 0-7 in the Main Arena at Dayton Hamvention!









- 5 to 1,000 Watts PEP
- RF Sensing
- Auto and Semi Tuning Modes
- Two-Position Antenna Switch
- 2,000 Memories per Antenna
- 1.8 to 54 MHz range
- 6 to 800 ohm range (15 to 150 on 6M)

#### **NEW!** AT-1000Proll

Artoo Meter Solutions Artoo Artoo Meter Solutions Artoo Arto

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

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



#### Z-11Proll

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



**Z-817** 

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple: one button push on the tuner is all that is needed, the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2,000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the Tune button on the tuner. Powered by four AA internal alkaline batteries (not included), so there are no additional cables required.

Suggested Price \$129.99

#### We have a tuner that will work for you!

We make tuners that will work with any transceiver. Don't know which one is right for you? Give us a call or see the **Tuner Comparison Chart** on our web site for more selection help! AT-897Plus

for the Yaesu FT-897 If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment, takes power directly from the CAT port of the FT-897, and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier. **Suggested Price \$199.99** 



#### AT-600Pro

of Autotuners!

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



#### Z-100Plus

Small and simple to use, the Z-100Plus sports 2,000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six-foot DC power cable. **Suggested Price \$159.99** 

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 **Phone 410-586-2177 • Fax 410-586-8475** 

Designed to handle the higher power of the Tokyo Hi Power HL-45B.



#### **NEW! Z-817H**

The ultimate autotuner for QRP radios including the Yaesu FT-817(D) with addition of the Tokyo High Power HL-45B. Interfaces to the CAT port (ACC) on the back of the radio with the provided cable. One button push on the tuner and the Z-817H takes care of the rest. Will also function as a general purpose antenna tuner with other QRP radios or QRP radios with up to 75 watt HF amps. Powered by four AA internal alkaline batteries (not included). 2,000 memories cover 160 through 6 meters.

#### Suggested Price \$159.99



- RF Sensing
- Tunes Automatically
- No Interface Cables Needed

#### AT-100Proll

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-100Proll requires just 1 watt for operation, but will handle up to 125 watts. Includes six-foot DC power cable. **Suggested Price \$229.99** 

# -----

- RF Sensina 📕
- Tunes Automatically
- No Interface Cables Needed

#### AT-200Proll

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

Suggested Price \$259.99



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



For Yaesu FT-857, FT-897 and FT-100 (and all D models) an integrated tuner, powered by the interface. Press the Tune button on the tuner, and everything else happens automatically. **Suggested Price \$199.99** 

**YT-100** 



For AT-300 compatible Kenwood transceivers (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. **Suggested Price \$199.99** 



Designed for Yaesu's newest 100 watt radios. Interfaces directly with the Yaesu FT-450 and FT-950 radios. Press the Tune button on the tuner and the rest happens automatically. It will quickly match nearly any kind of coax fed antenna with an SWR of up to 10:1. 2,000 memories recall settings in an instant! Seamless connection to a PC.

Suggested Price \$249.99

#### **YT-8**47



YT-847 Autotuner is an integrated tuner for the Yaesu FT-847. An included CAT/Power cable interfaces with your FT-847. Just press the Tune button on the tuner and everything else happens automatically! **Suggested Price \$249.99**  When You Buy A S9V 43<sup>1</sup>, 31<sup>1</sup> or 18' Multiband Antenna

RBA=1:1 Balun

or RU=4:1 Unun

Purchase an S9V 43', 31' or 18' antenna and fill out the included form. Mail it to LDG Electronics, and we will send you either a 200 watt balun or unun, your choice!



**S9V 43' \$199.99** 80-6 meters Fixed Operation

The S9V 43' is a high-performance, lightweight, telescoping fiberglass vertical. The best value in high-performance "tall" verticals!

#### S9V 31' \$99.99

5

40-6 meters Fixed or Portable Operation

#### S9V 18' <mark>\$49.99</mark>

20-6 meters Fixed or Portable Operation

The S9V 31' and 18' are tapered, ultralightweight, fiberglass, vertical antennas. Friction-locking sections and high-tech polymer tube rings allow the antenna to be quickly and safely deployed in practically any environment without tools!

#### **S9RP \$39.99** Aluminum Radial Plate

Includes 20 sets of stainless steel nuts & bolts.

Your Favorite Dealer has these tuners in stock NOW! Don't Miss Out - Call or visit them TODAY!

Visit our website for a complete dealer list www.ldgelectronics.com



# hy-gain, ROTATORS ... the first choice of hams around the world!

HAM-IV The most popular \$649<sup>95</sup> 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 inlbs.			
Brake Power	5000 inlbs.			
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 ftlbs.			

#### HAM-V

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



HAM-V

999

with DCU-1

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1º accuracy, 8-sec. brake delay,

**\$749**<sup>5</sup> choice for center of rotation, crisp plasma display. Computer controlled with many logging/contest programs.



RBD-5 **NEW!** Automatic Rotator Brake Delay \$**29**<sup>95</sup> Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents

**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, fer-

rite 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 lock-

with DCU-1 ing steel wedge brake, North or South center of rotation scale on meter, low voltage control, 2<sup>1</sup>/<sub>16</sub> inch max. mast.

T-2X

T-2XD

229<sup>95</sup>

95

TAILTWISTER Rotator Specifications				
Wind load capacity (inside tower)	20 square feet			
Wind Load (w/ mast adapter)	10 square feet			
Turning Power	1000 inlbs.			
Brake Power	9000 inlbs.			
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 ftlbs.			
	AR-40			

**49**<sup>95</sup>

#### AR-40

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 inlbs.		
Brake Power	450 inlbs.		
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 ftlbs.		

#### **AR-35 Rotator/Controller**



For UHF, VHF, 6-**\$89**<sup>95</sup> Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAČ. One Year Warranty.

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 pro-

For antenna

arrays up to 8.5

**CD-45II** 



tection, 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 inlbs.			
Brake Power	800 inlbs.			
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 ftlbs.			

#### HDR-300A

HDR-300A *King-sized* anten- \$1499<sup>95</sup> na 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

IIDR 50011 Rounder Specifications						
Wind load capacity (inside tower)	25 square feet					
Wind Load (w/ mast adapter)	not applicable					
Turning Power	5000 inlbs.					
Brake Power	7500 inlbs.					
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 ftlbs.					





Antennas, Rotators & Towers 308 Industrial Park Road, Starkville, MS 39759, USA Prices/specs subject to change without notice/obligation @2010 Hy-Gain





#### IC-V80 2M FM Handheld

- TX: 144-148 MHz RX: 136-174 MHz
- Power: 5.5/2.5/0.5W
  Memories: 207
  Comes with NiMH Battery and Wall Charger

#### ID-31A 440 FM & D-STAR HT W/GPS

- TX: 420-450 MHz RX: 400-479 MHz
- Power: 5/2.5/0.5/0.1W Memories: 1252
- D-Star Digital Voice and GPS receiver is built-in

• Large Dot Matrix Display and Directional Keypad makes the radio easy to navigate through the menus



#### IC-718 HF Transceiver

- TX: HF (except 60M) RX: 0.03-30 MHz
- Power: 5-100W Memories: 101 DSP built-in
- SSB, CW, RTTY and AM (2-40W)



#### IC-7200 HF/6M Portable

- TX: HF/6M RX: 0.03-60 MHz Power: 2-100W
- Memories: 201 Rugged design for outdoor use
- 32-bit IF-DSPs + 24-bit AD/DA Converters
- USB Port for CI-V Format PC Control & Audio In/Out



#### IC-2200H 2M FM Mobile

- TX: 144-148 MHz RX: 118-174 MHz • Power: 65/25/10/5W • Memories: 207
- D-Star upgradable with optional UT-118





#### IC-208H 2M/440 FM Mobile

- TX: 144-148, 430-450 MHz Memories: 512
- RX: 118-173, 230-549, 810-999 MHz (cell blkd)
- Power: 55/15/5W (2M), 50/15/5W (440 MHz)



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) • Upgradable D-Star DV (digital voice) & GPS capabilities w/optional UT-123



#### IC-7410 HF/6M Transceiver

- TX: HF/6M RX: 0.03-60 MHz Power: 2-100W • 15kHz 1st IF filter and optional 3kHz & 6kHz filters to
- protect against strong unwanted adjacent signals
- Much faster DSP unit compared to the IC-746PRO
- Automatic antenna tuner 
   USB connector for PC control



#### IC-9100 HF/6/2M/440 MHz All Mode

- TX: HF/6/2M/440 MHz RX: 0.03-60, 136-174, 420-480 MHz Optional 1.2 GHz, 1-10W Operation
- Power: 2-100W HF/6/2M & 2-75W 440 MHz
- Memories: 297 Optional D-Star Board Auto Tuner
- USB Port for CI-V Format PC Control & Audio In/Out



#### IC-7700 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



AMATEUR ELECTRONIC SUPPLY

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#### a e s h a m . c o m





TRADE UP TO ICOM Call AES NOW FOR A QUOTE!







#### FT-250R 2M FM HT

• TX: 144-148 MHz • RX: 136-174 MHz • Power: 5/2/0.5W • Memories: 209

#### FT-60R 2M/440 FM HT

• TX: 144-148, 430-450 MHz • RX: 108-520, 700-999 MHz (cell blkd) • Power: 5/2/0.5W • Memories: 1000

#### VX-8DR Quad-band FM HT

- TX: 50-54, 144-148, 222-225, 430-450 MHz
- RX: 0.5-999 MHz (cell blocked) Memories: 1200+
- Power: 5/2.5/1/0.05W (1.5W on 220 MHz)
- Optional GPS Unit FGPS-2 with either CT-136 adapter or MH-74A7A hand mic provides you with APRS<sup>®</sup> data



#### FT-2900R 2M FM Mobile

- TX: 144-148 MHz RX: 136-174 MHz
- Power: 75/30/10/5W Memories: 221



#### FT-7900R 2M/440 FM Mobile

- TX: 144-148, 430-450 MHz
- RX: 108-520, 700-999 MHz (cell blocked)
- Power: 50/20/10/5W (2M), 45/20/10/5W (440 MHz)
- Memories: 1055 YSK-7800 included!



#### FT-8800R 2M/440 FM Mobile

• TX: 144-148, 430-450 MHz • RX: 108-520, 700-999 MHz (cell blkd) • Power: 50/20/10/5W (2M), 35/20/10/5W (440 MHz) • Memories: 1000 • Crossband repeat • YSK-8900 included!

#### FT-8900R Quad-Band FM Mobile

Same as FT-8800R but TX: 28-29.7, 50-54, 144-148, 430-450 MHz and RX: 28-29.7, 50-54, 108-180, 320-480, 700-985 MHz (cell blkd) 

 Power: 50/20/10/5W (10/6/2M), 35/20/10/5W (440 MHz)
 YSK-8900 included!

Gamele Kitt

#### FT-857D 100W HF/VHF/UHF Mobile

• TX: HF/VHF/UHF • RX: 0.1-56, 76-108, 118-164, 420-470 MHz • Power: 5-100W (HF/6M), 5-50W (2M), 5-20W (440 MHz) • Memories: 200 • YSK-857 included!



FT-897D 100W HF/VHF/UHF Portable • Similar to the FT-857D but can also operate 20W using optional FNB-78 13.2V @ 4.5 Ah NiMH battery packs



#### FT-950 HF/6M Transceiver

- TX: HF/6M RX: 0.03-56 MHz Power: 10-100W
- Memories: 100 Auto Antenna Tuner
- 32-bit Floating Point DSP Built-in high stability TCXO



#### FT-2000 HF/6M Transceiver

• TX: HF/6M • RX: 0.03-60 MHz • Power: 10-100W • Memories: 99 • Auto Antenna Tuner • 32-bit Floating Point DSP • Dual In-Band Receive • Internal Power Supply • Optional MTU tune units for 160M, 80/40M and 30/20M bands allowing you to pull through weak signals

FT-2000D RF output is 200W, PS is external



**FTDX-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 TCX0 FTDX-5000D - With Station Monitor & ±0.5ppm TCX0 FTDX-5000MP - With Station Monitor, ±0.05ppm 0CX0 & 300 Hz Roofing Filter



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Access all open repeaters from *The ARRL Repeater Directory* or *TravelPlus for Repeaters* database. Easy to use and all just a touch away! For more information and to place an order visit **www.arrl.org/shop**. At checkout, you will receive an email confirmation with instructions for downloading and installing to your GPS.

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#### ТН-К2ОА 2М FM HT

- TX: 144-148 RX: 136-174
- Power: 5.5/2/1W Memories: 200

#### TH-F6A Triband FM HT

- TX: 144-148, 222-225, 430-450 MHz
- RX: 0.1-1300 MHz (cell blkd) Dual band RX
- FM Wide/Narrow, AM, SSB and CW receive modes
- Power: 5/0.5/0.05W Memories: 435

#### TH-D72A 2M/440 FM HT Built-in GPS

- TX: 144-148, 430-450 RX: 118-174, 320-524 MHz
- Power: 5/0.5/0.05W Memories: 1000 USB Port
- 1200/9600 bps packet TNC SkyCommand and APRS
- Stand-alone Digipeater Built-in High Performance GPS
- GPS logging stores up to 5,000 points of track data
- Echolink® ready KISS mode protocol



#### TM-281A 2M FM Mobile • TX: 144-148 MHz • RX: 136-174 MHz

- Power: 65W Memories: 200



#### TM-D710A

#### Dualband FM Mobile w/TNC • TX: 144-148, 430-450 MHz

- RX: 118-524, 800-1300 MHz (cell blkd) • Power: 50/10/5W • Dual receive (V+V) (U+U)
- Built-in TNC for APRS (needs GPS) • Cross-band repeat • AvMap G6 & EchoLink® ready

#### Green Light Labs GPS-710

- Plug-and-play adds GPS for TM-D710A & RC-D710
- Acquires GPS lock from cold start in under 60 seconds
- Quick and easy install typically in less then 5 minutes
- Longer cable sold separately to mount on vehicle's glass



TM-V71A Dualband FM Mobile

- TX: 144-148, 430-450 MHz
- RX: 118-524, 800-1300 MHz (cell blkd)
- Power: 50/10/5W Dual receive (V+V) (U+U)
- Cross-band repeat 
   EchoLink® ready
- The optional RC-D710 can replace the TM-V71A control panel to enable all the features of the TM-D710A.



TS-480HX 200W HF/6M Mobile • TX: HF/6M • RX: 0.5-60 MHz • Power: 10-200W (with two optional 22A PS's) • Memories: 99 • IF/stage DSP on main band, AF/stage DSP on sub-band TS-480SAT 100W version with built-in automatic antenna tuner.



TS-2000 100W HF/VHF/UHF Transceiver

• TX: HF/6M/2M/440 MHz • RX: 0.03-60, 142-152, 420-450 MHz • Power: 10-100W (10-50W on 440 MHz) Memories: 99 • HF/6M Auto Antenna Tuner

• IF/stage DSP on main band, AF/stage DSP on sub-band

TS-B2000 Same as the TS-2000 with no front panel controls. Includes PC control software.

TS-2000X The TS-2000 with 1.2 GHz @ 10W.



#### TS-590S 100W HF/6M Transceiver

- TX: HF/6M RX: 0.03-60 MHz
- Power: 5-100W (5-25W on AM)
- Memories: 110 + 10 Quick Channels
- HF/6M Auto Antenna Tuner
- Full/semi break-in CW 10 Hz Dual VFO Display
- USB connectivity for PC and remote control



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J-259B World's most popular Antenna Analyzer is super easy-to-use! MFJ-259B



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

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#### 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<sup>3</sup>/<sub>4</sub>Hx2D inches.

#### Here's What You Can Do

Find true antenna resonant frequency Tune antenna quickly for minimum ŠWR 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 O *Check* patterns and compare gain MF.J-259B does all this and more!

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including 50, 51, 52, 53, 73, 75, 93, 95, 300,

**Logarithmic Bar Graph** 

bargraph and SWR meter for quick tuning.

to ensure minimum mismatch on all fre-

quencies. Includes N to SO-239 adapter.

Like MFJ-269, MFJ-269PRO

but has extended \$41995

commercial fre-

quency coverage

Has easy-to-read LCD logarithmic SWR

Uses instrumentation grade N-connector

MFJ-269*PRO* ™ Analvzer

450 Ohms -- an MFJ-269 exclusive!

#### MFJ-269 ... 1.8-170 MHz and 415-470 MHz plus 12-bit A/D! The MF.J-269 does everything the 170 MHz) from 10 to over 600 Ohms. MFJ-269

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equivalent resist-

(Rp+jXp) - an

ance and reactance

Lets you calcu-

versa for any fre-

quency and any

The compact

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



#### **Use any Characteristic Impedance**

You can measure SWR and coax loss with any characteristic impedance (1.8 to

5-185 MHz and 300-490 MHz!

in UHF range (430 to 520

that protects LCD display,

**MHz**) and *ruggedized* cabinet

knobs, meters and connectors

from damage in the field/lab.

Includes N-to-SO-239 adapter.



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MFJ-266...Wide range

MHz) and UHF (300-490 MHz).

In Antenna Analyzer mode, vou 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.

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Use eight AA alkaline batteries or 110 VAC with MFJ-1312D, \$15.95.



# ЛF\_I UNE

#### New, Improved MFJ-989D 1500 Watt legal limit Antenna Tuner

World's most popular 1500 Watt Legal Limit Tuner just got better -- much better -- gives vou more for your money!

New, improved MFJ-989D legal limit antenna tuner gives you better efficiency, lower losses and a new true peak reading meter. It easily handles full 1500 Watts SSB/CW, 1.8 to 30 MHz, including MARS/WARC bands.

New dual 500 pF air variable capacitors give you twice the capacitance for more efficient operation on 160 and 80 Meters.

New, improved AirCore<sup>™</sup> Roller Inductor gives you lower losses, higher Q and handles more power more efficiently.

New TrueActive<sup>™</sup> peak reading Cross-Needle SWR/Watt*meter* lets you read *true* peak



power on all modes. New high voltage current balun lets you tune balanced lines at high power with no worries.

New crank knob lets you reset your roller inductor quickly.

95 smoothly and accurately. 89 New larger 2-inch diameter capacitor knobs with easy-to-see dials

make tuning much easier. New cabinet maintains components' high-Q. Generous air

vents keep components cool. 12<sup>7</sup>/8Wx6Ĥx11<sup>5</sup>/8D inches.

**Includes** six position ceramic antenna switch, 50 Ohm dummy load, indestructible multi-color Lexan front panel with detailed logging scales and legends.

The MFJ-989D uses the superb time-tested T-Network. It has the widest matching range and is the easiest to use of all matching networks. Now with MFJ's new 500 pF air variable capacitors and new low loss roller inductor, it easily handles higher power much more efficiently.

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Every MFJ tuner is protected by MFJ's famous one year No Matter What<sup>™</sup> 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-986 Two knob *Differential-T*<sup>m</sup> MFJ-949E *deluxe* 300 Watt Tuner





Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 103/4Wx41/2Hx15 in. MFJ-962D compact kW Tuner



A few more dollars steps you \$299<sup>95</sup> 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*<sup>™</sup> roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10<sup>3</sup>/<sub>4</sub>x4<sup>1</sup>/<sub>2</sub>x10<sup>7</sup>/<sub>8</sub> in. MFJ-969 300W Roller Inductor Tuner



MFJ-969 Superb AirCore™ Roller \$219<sup>95</sup> 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. 31/2Hx101/2Wx91/2D inches.

More hams use MFJ-949s than any other

antenna tuner in the world!



Handles 300 Watts. Full 1.8 to 30 \$179<sup>95</sup> MHz coverage, custom inductor switch, 1000 Volt tuning capacitors, full size peak/average lighted Cross-Needle SWR/ Wattmeter, 8 position antenna switch, dummy load, ORM-Free PreTune<sup>™</sup>, scratch proof Lexan front panel. 31/2Hx105/8Wx7D inches. MFJ-948, \$139.95. Economy version of MFJ-949E, less dummy load, Lexan front panel.

**MFJ-941E** super value Tuner

The most for your money! Handles 300 Watts



PEP, covers 1.8-30 PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/ **\$139**<sup>95</sup> 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

#### Extends your mobile

antenna bandwidth so you don't have to stop, go outside and adjust your antenna. s2995 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.

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Tunes coax, balanced lines, random wire 1.8-30 990 MHz. Cross-Needle Meter. MFJ-971 SWR, 30/300 or 6 Watt QRP \$119<sup>95</sup> ranges. Matches popular MFJ transceivers. Tiny  $6x6^{1/2}x2^{1/2}$  in.

#### MFJ-901B *smallest* Versa Tuner

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MFJ-901B MHz. Great for matching \$**99**95 solid state rigs to linear amps.

#### **MFJ-902** Tiny Travel Tuner

*Tiny*  $4^{1}/_{2}x^{2}/_{4}x^{3}$ MFJ-902 inches, full 150 Watts, \$**99**<sup>95</sup> 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.  $7^{1}/_{4}x2^{1}/_{4}x2^{3}/_{4}$  inches.

#### MFJ-16010 random wire Tuner

**Operate** all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. **MFJ-16010** 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 6 Meter Tuners MFJ-906 has light-

ed Cross-Needle SWR/ Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. MFJ-903, \$69.95, Like MFJ-906,



less SWR/Wattmeter, bypass switch. MFJ-921/924 VHF/UHF Tuners

#### MFJ-921 covers

2 Meters/220 MHz. MFJ-924 covers 440 MHz. SWR/Wattmeter.  $8x2^{1/2}x3$  in.



MFJ-931 artificial RF Ground

Eliminates RF hot spots RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Creates artifi-



cial RF ground or electrically places MFJ-931 far away RF ground directly at rig **\$109**<sup>95</sup> 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<sup>TM</sup> 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<sup>™</sup> and AutomaticRecall<sup>™</sup> 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 ...

## **J-998 1500 Watt** Legal Limit IntelliTuner<sup>TM</sup>



Only the MFJ-998 gives you fully automatic antenna 0 tuning for your legal limit full 1500 Watts SŠB/CW linear amplifier!

Ultra-fast Automatic Tuning **Instantly** match impedances from 12-1600 ohms using MFJ's exclusive *IntelliTune*<sup>TM</sup>, *Adaptive Search*<sup>TM</sup> and *InstantRecall*<sup>TM</sup> algorithms with over 20,000 VirtualAntenna<sup>™</sup> Memories. Safe auto tuning protects amp MFJ's exclusive Amplifier

**MFJ-998** Bypass Control<sup>TM</sup> **95**<sup>makes</sup> tuning safe and 'stupid-proof"! Digital/Analog Meters A *backlit* LCD meter displays

SWR, forward/reflected power, frequency, antenna selected, an auto-ranging bargraph power indication, and much more.

Has quick-glance auto-ranging Cross-Needle SWR/Wattmeter. MFJ VirtualAntenna<sup>™</sup> Memory

MFJ new VirtualAntenna<sup>™</sup> Memory system gives you 4 antenna memory banks for each

of 2 switchable antenna coax connectors. Select up to 4 antennas on each antenna connector. Each antenna has 2500 memories, 20,000 total. Has binding post for end-fed long wire antennas.

#### Download & Upgrade Remotely

Download from internet and upgrade your MFJ-998 firmware as new features are introduced.

#### **Plus Much More!** Built-in radio interface con-

trols most transceivers. Automatically bypasses with

excessive tuning power. Use balanced line antennas

with external MFJ-912, \$59.95, 1.5 kW 4:1 balun.

Small 13Wx4Hx15D inches easily fits into your ham station. 8 pounds. Requires 12-15VDC at 1.4 amps maximum or 110 VAC with MFJ-1316, \$21.95.



\$359<sup>95</sup> amps like Ameritron AL-811/ALS-600/ALS-500M. Matches 12-800 Ohms. 10,000 Virtual Antenna<sup>™</sup> memories. Cross-Needle SWR/Wattmeter. 10Wx23/4Hx9D inches.

No Matter What<sup>™</sup> 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.

#### 300 Watt...Best Seller

Digital Meter, Ant Switch, Balun



The world's best selling **MFJ-993B** automatic antenna tuner is \$**259**95 highly acclaimed the world over for its ultra high-speed, wide matching range, reliability, ease-of-use! Matches virtually any antenna.

#### 200 Watt ... Econo

Small, Ant Switch, 20K VA Memories



**MFJ-928** \$**199**<sup>95</sup>

MFJ-926B

\$**279**<sup>95</sup>

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.

#### 200W...Weather-sealed



**Fully** weather-sealed for remote Outdoor/ ✓ Marine use! Tough, durable, built-to-last the elements for years. MFS 

300 Watter 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.





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 vou need for a completely automated station using any antenna! Just tune and talk!



nas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.



200 Watt ... Compact

Digital Meter, Ant Switch, Wide Range

World's fastest compact auto tuner uses MFJ Adaptive Search<sup>TM</sup> and



InstantRecall<sup>TM</sup> algorithms. 132,072 tuning solutions instantly match virtually any antenna with near perfect SWR.



**G5RV** Antenna MFJ-1778 Covers all bands,

**\$4495** 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. Halfsize, 52 ft. 40-10M with tuner, 1500 Watts.



• 1 Year No Matter What<sup>TM</sup> warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ



FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. Add shipping. Prices and specifications subject to change. (c) 2010 MFJ Enterprises, Inc.

http://www.mfjenterprises.com for instruction manuals, catalog, info

# ARRL Field Day is June 23-24, 2012 Get Active, Get Outdoors and Get on the Air!

#### Show off your support for ARRL Field Day!

Official Field Day pocket t-shirts, hats, participation pins, and more —are a great way to recognize your involvement in this annual operating event. **Clubs, order early!** Collect orders from members, and place a single order—pay only \$12.50 shipping for orders over \$50, while supplies last.

#### **Now Shipping!**

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• Field Day Hat

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Texas orange cap embroidered with "Field Day". One size fits most. ARRL Order No. 2301.....**Only \$9.95** 

• Field Day Pin Official 2012 Field Day Pin. Size 1-1/8" x 7/8". ARRL Order No. 3357.....Only \$5.00

• GOTA Pin Don't forget GOTA pins for your Field Day newcomers. Size 1" x 1". ARRL Order No. 8911.....Only \$5.00

• Field Day Poster (pack of 25) Encourage participation in ARRL Field Day. A great recruitment tool! ARRL Order No. 4840......Only \$5.95

• Field Day Logbook Log sheets, dupe sheets, VHO Operating Tips, WAS map and more. ARRL Order No. 4500......Only \$7.95

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HAM RADIO

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GOTA

FIELD DAY

FIELD DAY

Bands -- 1 Anten 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 . . .

Meters. On 6 Meters, the 17 Meter radiator

The active radiator works as a stub to

decouple everything beyond it. In phase

tors. This forms a very large equivalent

widths. Radiator stubs provide automatic

bandswitching -- absolutely no loss due to

the most efficient form of loading -- gives

you highly efficient performance, excellent

MFJ's unique Frequency Adaptive L-

Network<sup>™</sup> 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

You don't need a ground or radials

because an effective counterpoise that's 12

feet across gives you excellent ground iso-

lation. You can mount it from ground level

to roof top and get awesome performance.

from the antenna with MFJ's exclusive

no matter how high your power.

most versatile rotatable dipole!

are full-length halfwave dipoles.

AirCore<sup>™</sup> high power current balun. It's wound with Teflon<sup>R</sup> coax and can't saturate,

Incredibly strong solid fiberglass rod

entire length always radiating. With 6 and

Each HF band uses a separate, efficient

end-loading coil wound on fiberglass forms

with Teflon<sup>™</sup> wire, and capacitance hats at each end (no lossy traps). 6 and 2 meters

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

MFJ-1775W, \$249.95. WARC band ver-

band has little effect on other bands.

sion for 12, 17, 30, 60 Meters only.

2 Meters thrown-in, you have ham radio's

The feedline is decoupled and isolated

bandwidth, low angle radiation and auto-

On 30, 40, 75/80 Meters, end loading --

radiator and gives you incredible band-

antenna current flows in all parallel radia-

are used on 20, 17, 15, 12, 10 and 2

becomes a 3/4 wave radiator.

loading coils or traps.

matic bandswitching.

bottom of the antenna.



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<sup>™</sup> 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

#### 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** 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

#### MFJ's Super High-O Loop<sup>™</sup> Antennas

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.

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.

#### FJ 6-Band Halfwave Vertical Antenna 6 bands: 40, 20, 15, 10, 6, 2 Meters .

No radials or ground needed

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-1785



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.

#### MFJ 80/40/20 Meter Rotatable Dipole

Now you can operate the low bands on 80, 40, and 20 Meters with a true **\*369**<sup>95</sup> 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 lowlosses. 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 G5RV Antenna



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. Halfsize, 52 ft. 40-10M with tuner, 1500 Watts.

#### Dealer/Catalog/Manuals Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

Year No Matter What™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

> MFJ ENTERPRISES, INC. 300 Industrial Pk Rd, Starkville, MS 39759 PH: (662) 323-5869 Tech Help: (662) 323-0549

FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. Add shipping. Prices and specifications subject to change. (c) 2009 MFJ Enterprises. Inc.

MFJ's tiny 36 inch diameter loop antenna lets you operate 10 through 30 MHz con-Ideal for limited

1000 MFJ-1786 attics, or mobile homes. Enjoy **\$419**<sup>95</sup> 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.

......

tinuously -- including the WARC bands! space -- apartments, small lots, motor homes,

MFJ... the world leader in ham radio accessories!



# 

**Tips, Tricks & Projects** 

for the Radio Amateur 18th Edition

#### Ideas for Any Shack!

QST's monthly **Hints & Kinks** column is one of the most popular sections of the magazine—and it's easy to see why. If you're in the mood for an evening or weekend project, you'll find it in **Hints & Kinks** 

This brand new edition gathers the best projects and problem-solving techniques spanning 8 years, from 2004 through 2011. It's more than 170 pages of practical information you can use every day!

#### Includes: -

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- Batteries and Other Power Sources
- Mobile and Portable Stations
- Software and Computers
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- Restoration
- Construction/Maintenance
- Antenna Systems
- Operating
- Around the Shack
- Interference (RFI/EMI)

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Only \$19.95\* (regular \$22.95) \*plus shipping and handling

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# MFJ glant 6.5 inch SWR/Watter World's largest HF SWR/Watter 6.5 inch SWR/Watter MEJ-868 ORP or OPO operation

meter has giant 61/2 inch meter! This one you can SEE! Extra-long

scales gives you highly accurate SWR and power measurements. Huge numbers makes reading easy across your shack.

Like your analog watch, one glance at the meter needle gives you fast and accurate readings without actually reading the scale.

MFJ's exclusive *TrueActive*<sup>™</sup> peak read-ing circuit captures *true* peak or average forward and reflected power readings.

Has 20/200/2000 Watt ranges for accurate

#### MFJ peak-reading giant 4.5 inch Cross-Needle SWR/Wattmeter



See it all at once on giant Cross-Needle SWR/Wattmeter! MFJ-891 simultaneously displays forward/reflected power and SWR on easyto-read three-color scale. 20, 200, 2000 Watt ranges have individual scales. True<sup>™</sup>Active peak-reading circuit reads forward and reverse

**\$109**<sup>95</sup> *true peak* power in all modes. New directional coupler gives increased coupler gives increased accuracy over entire 1.6 to 60 MHz frequency range. Low bias Schottky diode detectors increase linearity at low power -- great for QRP. Super-bright LED backlight with on/off switch provides smooth even illumination. DC grounded antenna connections prevent electrostatic build up. Quality SO-239 connectors. Designer-styled molded front panel and rugged metal housing looks great. 7<sup>1</sup>/<sub>4</sub>Wx4<sup>1</sup>/<sub>2</sub>Hx4<sup>1</sup>/<sub>2</sub>D in.



ORP or ORO operation. \$**1\_10**95 Exclusive MFJ Wattmeter Power Saver<sup>TM</sup> circuit turns on meter only when RF power is being measured. **Covers** 1.8-30 MHz. Use 9 volt battery or 12 VDC or 110 VAC with MFJ-1312D, \$15.95. 7Wx51/2Hx5D in. SO-239 connectors.



**Giant** 144/220/440 MHz SWR/Wattmeter MFJ-867, \$159.95. Like MFJ-868 giant SWR/Wattmeter, but covers 144/220/440 MHz.

#### MFJ high-accuracy Digital SWR/Wattmeter

MFJ-826B has a large high-contrast, high-accuracy backlit LCD display. Autoranging selects optimum full-scale range from 25W, 250W and 1500W ranges



with full 10-bit resolution on each range. Covers \$17 **Q**95 entire amateur power spectrum. Built-in frequency counter selects frequency compensated data set to insure highest accuracy for each band. Displays frequency, provides digital readout for older rigs and QRP rigs. True peak/average and forward/reflected power, SWR and frequency are simultaneously displayed. Select bargraphs to display forward/reflected power or forward/SWR or SWR only. MFJ's PeakHold<sup>™</sup> freezes highest forward power displayed 1, 2 or 3 seconds. When SWR is greater than 1.5 to 3 (selectable) an alarm LED lights and buzzer sounds. Use 12 VDC or 110 VAC with MFJ-1312D, \$15.95. 61/2Wx25/8Hx6D inches.

#### www.mfjenterprises.com . . . World's largest selection of HF/VHF/UHF SWR Wattmeters!



Needle Meter, SWR/Watts, Meter, SWR/Watts, 144/ 1.8-200 MHz, Fwd/Ref pwr, 30/300W. Compact.

Lighted 3" Cross-|Lighted Cross-Needle 220/440 MHz, 30/300 Watts Fwd, 60/6 W Ref.

Lighted Cross-Needle.SWR/ Watts, 1.8-60/144/440 MHz, C/N Meter, SWR/Watts, 1.8 220 MHz, built-in field

30/300W Fwd, 6/60W Ref. -30 MHz, 300/3000W Fwd, strength meter, Fwd/Ref, Hook up HF&VHF/UHF rigs. 60/600W Ref. True Peak. Pwr in 2 30/300W ranges.

#### MFJ-4416B Super Battery Booster

Boost battery voltage as low as 9 Volts back up to 13.8 VDC! Keeps your transceiver at full power output, compensates for run down battery, wiring voltage drop, car off ...



**MFJ-4416B Boost battery voltage as 14995** low as 9 Volts back up to 13.8 VDC! Keeps your transceiver at full power output, provides full performance/ efficiency, prevents output signal distortion and transceiver shutdown. Compensates for run-down battery, wiring voltage drop or when car is off. Provides up to 25 Amps peak with 90% efficiency. Selectable 9/10/11 s11995 et. Protects against reverse/over voltage prevents hat Volts minimum input voltage prevents bat-

tery damage from over-discharging. RF sense turns MFJ-4416B off during receive to save power and increase efficiency. Adjustable 12 to 13.8 VDC output pass-through voltage improves efficiency and lets transceiver run cooler. Has output over-voltage crowbar protection. Anderson PowerPoles(R) and highcurrent 5-way binding posts for DC input, regulated output. 7<sup>3</sup>/<sub>4</sub>Wx4Hx2<sup>1</sup>/<sub>8</sub>D inches.

#### 100 Watts SSB from cigarette lighter socket!



4-Farad capacitors supply 25 Amps needed for 100 Watts SSB peaks and replenished by 10 Amps average from cigarette lighter sock-

circuits. Provides super noise/ripple filtering.

#### MFJ all-in-one Transmit Audio Console

MFJ all-in-one Transmit Audio Console gives you an 8-Band Equalizer for full quality ragchewing audio or powerful, pileup penetrating speech . . . Adjustable Noise Gate gives you transparent, back-ground noise reduction . . . Clean low-distortion Compressor

\***219**<sup>95</sup> gives you more powerful, richer, fuller sounding speech and higher average power SSB . . . Smooth *Limiter* keeps audio peaks from over-driving your transmitter, prevents SSB distortion and splatter. Universal Mic-Interface lets you use any microphone with any transceiver. Has low-noise preamp, mic voltages, PTT jack, impedance matching, level controls, RF/audio isolation, VU meter, headphone monitor, auxiliary input.



MFJ AC Line RFI Filter

Filters and reduces AC power MFJ-1164B line RFI, hash, noise, transients, **\$79**<sup>95</sup> surges generated by computers, motors, RF transmitters, static/lightning by 30 db and up to 60-80 dB with a good earth ground. Super fast, nano-second overvoltage protection. Four 3-wire 15A, 120VAC outlets.

#### Transceiver Surge Protector

MFJ-1163, \$69.95. Protects your expensive transceiver from damaging



power surges. Capacitive decoupling and ultra-fast MOVs protection. 4 AC outlets.

#### *Free* MFJ Catalog Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year No Matter What<sup>TM</sup> warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ



MFJ... The World Leader in Amateur Radio!

#### **MFJ** Speech Intelligibility Enhancer ... makes barely understandable speech highly understandable!



"What did you say?" Can you hear but . . . just can't always understand everything people are saying?

As we get older, high frequency hearing loss reduces our ability to under-

stand speech. Here's why . . . **Research** shows that nearly *half* the speech intelligibility is contained in 1000 to 4000 Hz range, but contains a miniscule 4% of total speech energy. On the other hand, the low frequen-

cies, 125 to 500 Hz have most of the speech energy (55%) but contribute very little to intelligibility -- only 4%.

To dramatically improve your ability

to understand speech, you must:

First, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

Second, drasti-

cally reduce speech energy below 500 Hz where only 4% of speech intelligibility lies.

The MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

A balance control and separate  $2^{1/2}$  Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

By boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

Even if you *don't* have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more. Here's what *QST* for April, 2001 said

... "I expected a subtle effect at best, but I was astonished ... The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . .

Immuned to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch. 10Wx2<sup>1/2</sup>Hx6D". Needs 12 VDC.

MFJ-1316, \$21.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

MFJ-72, \$69.80. All-in-one MFJ-616 Accessory Pack. Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. Save \$7! Try it for 30 Days Order from MFJ and try it -- No obli-

gation. If not delighted, return it within 30 days for refund less shipping.

60 dB Null wipes out

noise and interference

#### **MFJ Contest Voice Keyer**

Transformer-coupled -- No RFI, hum or feedback ... 75 seconds total, 5-messages ... Records received audio ...



Let this new microprocessor controlled MFJ Contest Voice Kever<sup>™</sup> call CQ, send your call and do contest exchanges for you in your own natural voice!

Store frequently used phrases like "CQ Contest this is AA5MT" "You're 59" . . . "Qth is Mississippi"... Contest by pressing a few buttons and save your voice.

Record and playback 5 natural sounding messages in a total of 75 seconds. Uses eeprom -- no battery backup needed. Use your mic or its built-in mic for recording.

You can repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes a great voice beacon and calling CQ is so easy

You can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be

MFI-434B halted by the \$199<sup>95</sup> Stop Button, your microphone's PTT/VOX, remote control or computer.

Has jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

Your mic's audio characteristics do not change when your MFJ-434B is installed.

All audio lines are RF filtered to eliminate RFI. audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

*New!* It's easy to use -- just plug in your 8 pin round or modular mic plug, set the internal jumpers for your transceiver and plug in the appropriate (included) cable for your rig.

Built-in speaker-amplifier. Speaker/phone jack. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312D, \$15.95. 6<sup>1</sup>/<sub>2</sub>Wx2<sup>1</sup>/<sub>2</sub>Hx6<sup>1</sup>/<sub>2</sub>D in

MFJ-73, \$34.95. MFJ-434B Remote Control with cable.

#### MFJ-1026 **99**<sup>95</sup> 6.0 H

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes.

It's more effective than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on all modes -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF

You can null out strong QRM on top of weak rare DX and then work him! You can null

tilter

out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an adjustable phasing network. You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive Constant Amplitude Phase Control<sup>™</sup> makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, \$15.95.  $6^{1}/2x1^{1}/2x6^{1}/4$  in. MFJ-1025, \$179.95. Like

MFJ-1026 less built-in active antenna use

8-8-8 external noise antenna.

#### MFJ *tunable* Super DSP Only MFJ gives you tun-MFJ-784B **9**95 able and programmable "brick wall" DSP filters. You can continuously tune low pass,

high pass, notch and bandpass filters and continuously vary bandwidth to pinpoint and eliminate interference.

Only MFJ gives you 5 factory pre-set and 10 programmable pre-set filters you



can customize. Automatic notch filter searches for and eliminates multiple heterodynes. Advanced adaptive noise reduction silences background noise and QRM.

http://www.mfjenterprises.com for instruction manuals, catalog, info



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FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. Add shipping. Prices and specifications subject to change. (c) 2010 MFJ Enterprises, Inc.

# **MFJ** *Pocket size* **Morse Code Reader**

Hold near your receiver – it instantly displays CW in English! Automatic Speed Tracking ... Instant Replay... 32 Character LCD... High-Performance Modem... Computer Interface... Battery Saver... More!

Is vour CW rustv? Relax and place this tiny pocket size MFJ Morse Code Reader near your receiver's speaker...

Then watch CW turn into solid text messages as they scroll across an easy-to-read LCD display.

No cables to hook-up, no computer, no interface, nothing else needed!

Use it as a backup in case you mis-copy a few characters - - it makes working high speed CW a breeze - - even if you're rusty.

Practice by copying along with the MFJ-461. It'll help you learn the code and increase your speed as you instantly see if you're right or wrong.

Eavesdrop on interesting Morse code QSOs from hams all over the world. It's a universal language that's understood the world over.

MFJ AutoTrak<sup>TM</sup> automatically locks on, tracks and displays CW speed up to 99 Words-Per-Minute.

Simply place your MFJ-461 close to

CO DE KY71 20 WPM

your receiver speaker until the MFJ-461 lock LED flashes in time with **89**<sup>95</sup> the CW. Digs out weak signals. Phase-Lock-Loop even tracks slightly drifting signals.

Of course, nothing can clean up and copy a sloppy fist, especially weak signals with lots of QRM/QRN.

The MFJ-461's serial port lets you display CW text full screen on a bright computer monitor -- just use your computer serial port and terminal program.

When it's too noisy for its microphone pickup, you can connect the

MFJ-461 to your receiver with a cable. A battery saving feature puts the MFJ-461 to sleep during periods of inactivity. It wakes up and decodes when it hears CW.

Uses 9 Volt battery. Fits in your shirt pocket with room to spare smaller than a pack of cigarettes. Tiny  $2^{1/4}x3^{1/4}x1$  inches.  $5^{1/2}$  ounces. Super easy-to-use! Just turn it on -- it starts copying instantly!

MFJ-26B, \$9.95.

Soft leather protective pouch. Clear plastic overlay for display, push but-

ton opening, strong, pocket/belt clip secures MFJ-461.

MFJ-5161, \$16.95. MFJ-461 to computer serial port cable (DB-9).

MFJ-5162, \$7.95. Receiver cable connects MFJ-461 to your radio's external speaker 3.5 mm jack.

MFJ-5163, \$10.95. Cable lets you use external speaker when MFJ-461 is plugged into radio speaker jack. 3.5 mm.

MFJ Morse Code **Reader and Keyer** Combination

Plug MFJ's CW Reader with Keyer into your transceiver's phone jack and key jack.

Now you're ready to compete with the world's best hi-speed CW operators -- and they won't even know you're still learning the code! Sends and reads 5-99 WPM.

Automatic speed tracking. Large 2-line LCD shows send/receive messages. Use

#### MFJ lambic Paddles

MFJ-564 Chrome MFJ-564B Black \$**69**<sup>95</sup>

MFJ Deluxe Iambic Paddles<sup>™</sup> feature a full range of adjustments in tension and contact spacing. Self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and nonskid feet on heavy chrome base. Works with all MFJ and other electronic keyers.

Miniature Travel Iambic Paddle MFJ-561, \$24.95. 1<sup>3</sup>/<sub>4</sub>Wx1<sup>3</sup>/<sub>4</sub>D x<sup>3</sup>/<sub>4</sub>H inches. Formed phosphorous bronze spring paddle, stainless steel base. 4 ft. cord, 3.5 mm plug.

#### MFJ Deluxe CW Keyer



Deluxe MFJ Keyer has all controls on front panel for easy access -- speed, weight,

MFJ-407D tone, volume knobs, and tune, semi/ **\*79**<sup>95</sup> auto, on/off push-buttons. You get all keyer modes, dot-dash memories, self completing dots/dashes, jam- proof spacing, sidetone, built-in speaker, type A /B keying. RF proof. Solid state keying. 7x2x6 inches. MFJ-401D, \$69.95. Econo

Keyer II has front-panel volume/ speed controls (8-50 wpm), tune switch. Internal adjust weight, tone. Solid state keying. Tiny  $4x2x3^{1/2}$  inches.

paddle or computer keyboard. Easy menu operation. Front

panel speed, volume controls. 4 message memories, type ahead buffer, read again buffer, adjust-

able weight/sidetone, speaker. RFI proof. MFJ-551, \$39.95. RFI suppressed keyboard, a must to avoid RFI problems.

#### MFJ Code Oscillator



Morse key and oscillator unit mounted together on a heavy steel base -- stays put on your table! Portable. 9-Volt battery or 110 VAC with MFJ-1312D, \$15.95. Earphone jack, tone and volume controls, speaker. Adjustable key. Sturdy.  $8^{1/2}x2^{1/4}x3^{3/4}$  inches.

MIFJ-550, \$14.95. Telegraph Key Only with adjustable contacts. Handsome black.

#### Kever/Paddle Combo



Best of all CW MFJ-422D **189**<sup>95</sup> worlds -- a *deluxe* MFJ Curtis<sup>™</sup> keyer that fits right on Bencher paddle! Adjustable weight

and tone, front panel volume and speed controls (8-50 WPM), built-in dot-dash memories, speaker, modes. Use 9V battery or 110 VAC with MFJ-1312D, \$15.95. 4<sup>1</sup>/8x2<sup>5</sup>/8x5<sup>1</sup>/4 in. MFJ-422DX, \$99.95.

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B-2518-G	5	7	40	60	80	100	125	160		
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Watts In	.25	.5	3	5	8	10	15	25	35	50

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