NOVEMBER 2011 QST Vol 95 No 11

QST

DEVOTED ENTIRELY TO AMATEUR RADIO

November 2011 WWW.ARRL.ORG

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For Your Listening Pleasure

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The radio YAESU ...

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

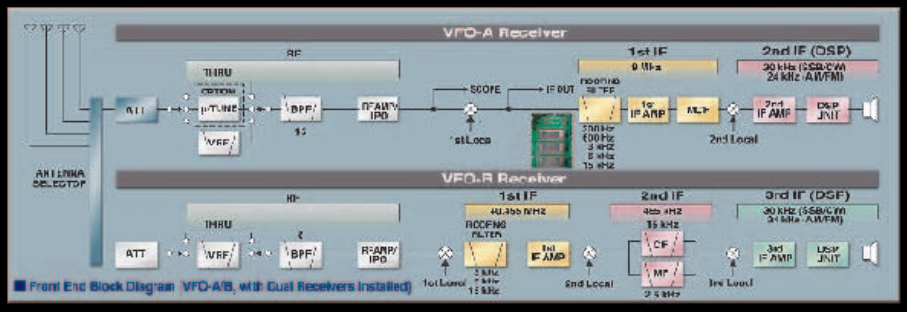
The New Premium HF/50 MHz Transceiver
FT DX 5000 Series

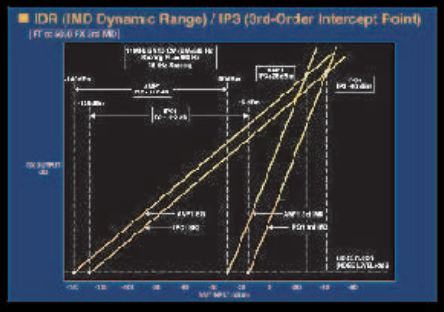
Two Totally Independent Receivers - The VFO-A/Main Receiver utilizes Super Sharp Roofing filters to give you the highest performance and best flexibility

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

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

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





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

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

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

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

HF/50 MHz 200 W Transceiver NEW
FT DX 5000

Station Monitor SM-5000 optional
± 0.5ppm TCXO included
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Introducing the Yaesu FT-950 transceiver for DX enthusiasts
Superb receiver performance
Direct lineage from the legendary FT DX 9000 and FT-2000

HF/50 MHz 100 W Transceiver

FT-950

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

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

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

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

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

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

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

DMU-2000 Data Management Unit (option)

"The Best of the Best Just Got Better"

Introducing the new FT-950 Series with PEP-950 (Performance Enhancement Program)

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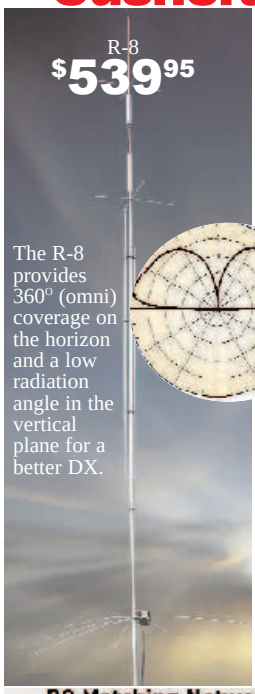
Cushcraft R8 *8-Band Vertical*



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.

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

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

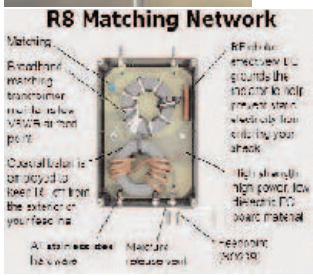
Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

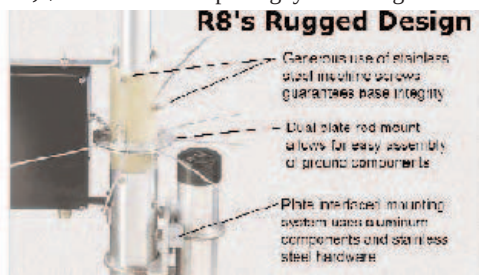
Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

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

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

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





MA-5B *5-Band* Beam

Small Footprint -- Big Signal

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

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

Cushcraft 10, 15 & 20 Meter Tribander Beams

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

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

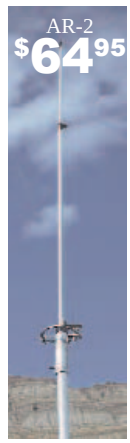
The 3-element A3S/A3WS and 4-element A4S are world-famous for powerhouse gain and super performance. **A-3WS**, **$499.95,** 12/17 M. **30/40 Meter** *add-on kits* available.

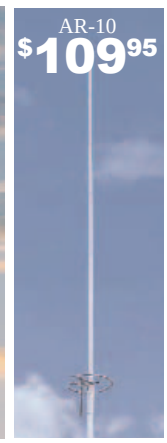
Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

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

Cushcraft Famous *Ringo* Compact FM Verticals





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

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and Nearest Dealer . . . 662-323-5803
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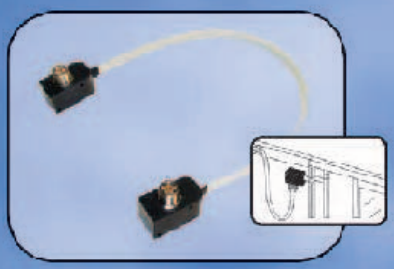
Life is a JOURNEY. Enjoy the ride!



NEW! COMET CTC-50M
Window Gap Adapter!

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

MALDOL HVU-8
Ultra-Compact 8 Band Antenna!

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

Max Power: HF 200W SSB/100W FM
6M - 70cm: 150W FM
TX: 80/40/20/15/10/6/2M/70cm
Impedance: 50 Ohm
Length: 8'6" approx
Weight: 5lbs 7oz
Conn: SO-239
Max Wind Speed: 92MPH

Each band tunes independently.
Approx 2:1 band-width:
80M 22kHz
40M 52kHz
20M 52kHz
15M 134kHz
10M 260kHz

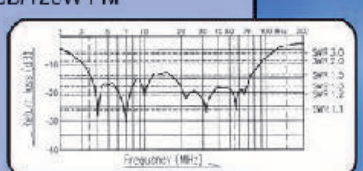
COMET CHA-250B
Broadband HF Vertical!

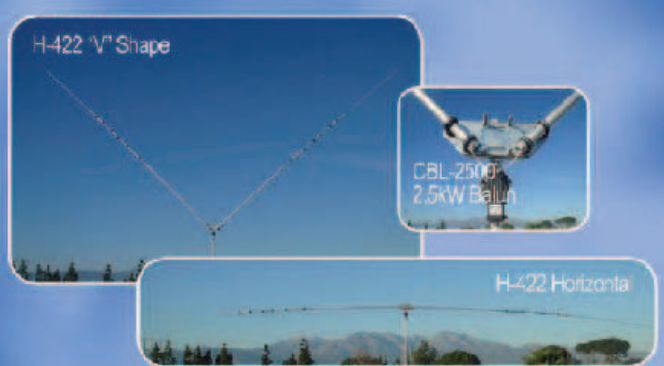
3.5 - 57MHz with SWR of 1.6:1 or less!

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

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

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





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

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

Max Power: 1000W SSB / 500W FM
SWR: Less than 1.5:1 at center frequency
Rotation Radius: "V" 12' 5" "H" 17' 5"
Length: "V" 24' 5" "H" 33' 10"
Weight: 11 lbs 14 ozs
Wind load: 3.01 sq feet
Max Wind Speed: 67 MPH

COMET and Maldol

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

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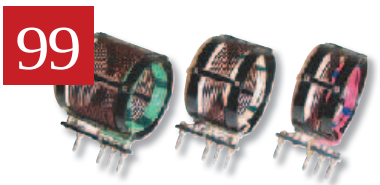

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Our Cover
Now that the colder months are upon us, our thoughts turn to tinkering in the shack. If your radio does not come with digital signal processing capability, why not build a DSP speaker while the winter winds blow? DSP cuts out the unwanted noise and gives you only the signal you want to hear, adapting to changes in the signal's conditions. Allen Baker, KG4JJH, offers a schematic for a DSP speaker you can build in a weekend. Turn to page 31 to get started.

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

FTM-350AR

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

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

FTM-350AR NEW

220 MHz 1 W (USA version only)

New Features of The FTM-350AR

1. New Vacuum Cup-Mounting Bracket with Angle Adjustment

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

2. Expanded APRS® functions

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

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

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Choose the Yaesu that meets your APRS® operating preferences in the field

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

Actual Size

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

Actual Size

VX-8DR NEW

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

Optional GPS and antenna unit for GPS/APRS® operation

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

Bluetooth®

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

VX-8GR NEW

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

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

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

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

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- 100 Watts When Using an External 13.8-Volt DC Power Source

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Fifty Years in Space

"In April the world celebrated the 50th anniversary of Yuri Gagarin's orbit of the Earth — the first human space flight."

In December the Amateur Radio community will mark its own 50th anniversary in space. It was on December 12, 1961 — coincidentally the 60th anniversary of Marconi's first spanning of the Atlantic by wireless — that Oscar 1 achieved orbit and began beeping its now-famous "HI" Morse code telemetry to thousands of eager amateurs poised at their "tracking stations" all over the world.

This was not our first brush with space. Amateurs had bounced signals off the Moon as early as 1953. When the first Sputnik was launched in 1957, amateurs were among the first to hear its signals on 20 and 40 MHz. Radio astronomy owes a great deal to the early work of amateurs.

Even so, there was nothing inevitable about there being such a thing as an Amateur Radio satellite. Oscar's launch was the culmination of more than two years of tireless effort by nearly 100 amateurs and friends organized under the banner of the Project Oscar Association. Based in the San Francisco Bay area, the Project Oscar team had to overcome countless obstacles to bring their shared vision to life. Not only was their creation the first amateur satellite, it was the first non-Government satellite *of any kind.*

Credit for planting the seed that became the amateur satellite program goes to Don Stoner, W6TNS. Reporting on a solar-powered repeater in his column in the April 1959 issue of *CQ* magazine, Don mused: "Can anyone come up with a spare rocket for orbiting purposes?" This tiny spark ignited the imagination of Fred Hicks, W6EJU, who knew something about rockets. He and Chuck Towns, K6LFH, who eventually became Chairman of Project Oscar, decided that not only was it worth a try, they were in the best position to work with Don to make it happen — so they did.

From our 21st century vantage point, building the satellite looks like the easy part. While solid-state transmitters were still relatively new and designing one for operation in space was a novel undertaking, Oscar's designers did not have to work too far outside their comfort zone. In contrast, there was no precedent for acquiring the necessary military and government approvals. Another *CQ* columnist, George Jacobs, W3ASK, volunteered to serve as Project Oscar's Washington, DC contact. The ARRL provided its endorsement and assistance. Somehow, all the necessary hurdles were cleared and a "piggyback" launch on an Air Force rocket was arranged.

The dramatic account by Bill Orr, W6SAI, in February 1962 *QST* conveys the excitement of the launch day and all that led up to it. Lacking an Internet, amateurs put together their own HF communications network to gather real-time reception reports from as far away as Antarctica. It was from a report by KC4USB in Marie Byrd Land that the anxious team in California first learned that Oscar had been heard, and from KL7EBM in Kodiak, Alaska that the world's first amateur satellite was well on its way to completing its first orbit. Oscar 1 logged 22 days in orbit and was followed by a somewhat improved package that became Oscar 2 upon its launch on June 2, 1962.

While the first two Oscar satellites contained simple beacon transmitters, from the beginning the Project Oscar team had a much more ambitious goal in mind: an orbiting linear transponder. The first attempt was Oscar 3, which utilized both uplink and downlink frequencies in the 2 meter band — an arrangement that proved to be problematic. Oscar 4 was meant to carry a crossband transponder into semisynchronous orbit, but a third-stage rocket failure kept it in a low orbit and shortened its useful life.

The first fully successful amateur satellite transponder was aboard Oscar 6 and used a 2 meter uplink and 10 meter downlink. It was launched in October 1972 and operated for nearly five years, giving thousands of amateurs in more than 100 countries the opportunity to experience two-way communication via satellite. By that time the Project Oscar pioneers had passed the torch to AMSAT and amateur satellites had become an international undertaking.

While the amateur satellite program has had its share of disappointments, today the amateur-satellite service (as it is formally known) is poised to begin its sixth decade with a healthy list of satellites in orbit and planned for launch. At universities in a number of countries, a new generation of space scientists is gaining valuable hands-on experience through amateur satellites. While we have not achieved the dream of amateur satellites in geostationary orbit, communicating through low-power transponders in constant relative motion continues to be an inviting challenge that helps us hone our operating skills and station capabilities.

Sadly, many of the leading lights behind Project Oscar are now Silent Keys. We salute their memory. To those who are still with us, we are grateful for your legacy. Amateur Radio's best days are still ahead — but thanks to you, December 12, 1961 will always be remembered as one of its finest hours.

David Sumner, K1ZZ
ARRL Chief Executive Officer

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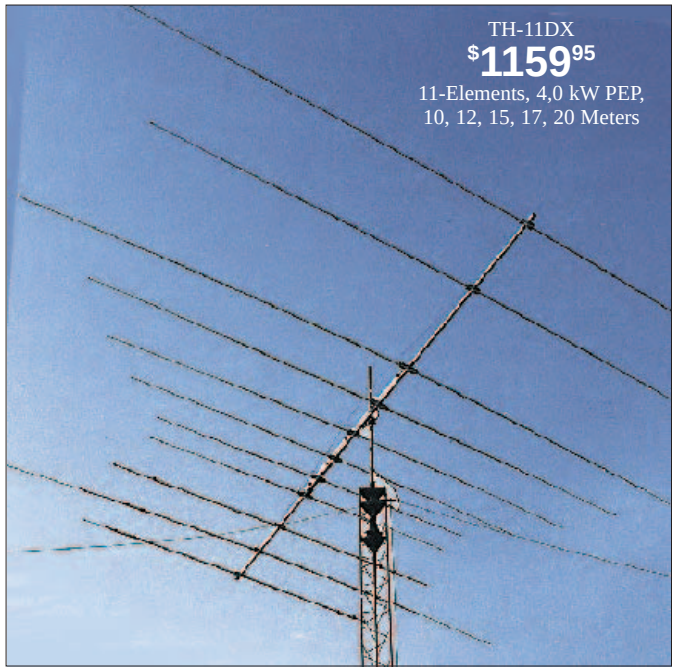

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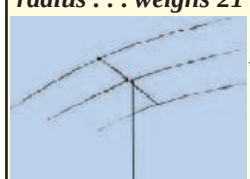

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TH-11DX	11	*For Gain and F/B ratio--See…* • www.hy-gain.com • Hy-Gain catalog • Call toll-free 800-973-6572		4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1159.95
TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$869.95**
TH-5MK2	5			1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$759.95
TH-3MK4	**3**			**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$469.95**
TH-3JRS	3			600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
TH-2MK3	**2**			**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$369.95**
EXP-14	4			1500	10,15,20 opt 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$599.95

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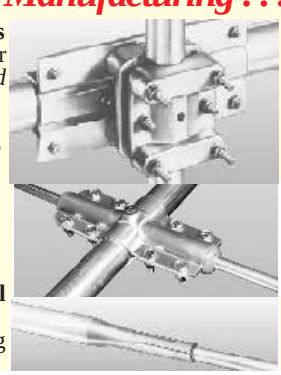

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

- Hams from Puerto Rico to North Carolina to Maine provided communications support before, during and after Hurricane Irene.
- Joe Taylor, K1JT, and Bruce Walker, W1BW, are the winners of the 2010 ARRL Doug DeMaw, W1FB, Technical Excellence Award for their article "WSPRing Around the World." The article appeared in the November 2010 issue of *QST*.
- The ARRL is seeking qualified candidates for Treasurer from among its membership. The Board of Directors will elect the Treasurer and other officers at its Annual Meeting in January.
- ARES® groups from two nearby counties assisted after a cable cut completely isolated the Johnson County 911 Center in Warrensburg, Missouri.
- Heathkit Educational Systems told the ARRL that it hopes to reenter the Amateur Radio market by the end of 2011.
- The ARRL Facebook page has more than 20,000 fans.
- Several Special Event stations operated in remembrance of those who died in the terrorist attacks that occurred 10 years earlier, on September 11, 2001.
- The Administrative Council (AC) of the International Amateur Radio Union held its annual meeting August 19-20 in Sun City, South Africa.
- In August, the ARRL filed comments with the FCC urging the Commission to dismiss or deny a *Waiver Request* submitted by the Anchorage VEC.

HAROLD KRAMER, WJ1B

Surprise!: **Former ARRL President Larry Price, W4RA, was named President Emeritus at the ARRL Board Meeting in January. Southeastern Division Director Greg Sarratt, W4OZK, and Vice Director Andrea Hartlage, KG4IUM, made the surprise presentation of Larry's engraved plaque at the ARRL Alabama State Convention in Huntsville in August.**

Media Hits

Allen Pitts, W1AGP
Media & Public Relations Manager

- First, a note for PIOs: There will be a special Webinar hosted by ARRL for PIOs and leaders involved in emergency work. National level media experts Mark Kraham, W8CMK, Chairman of the RTDNA, and Howard Price, KA2QPJ of ABC News, will share what media wants from hams in an emergency. Then we will look at how to efficiently provide that information. Write it down now for the evening of November 3.
- Normally things quiet down during the summer, but not this August. There are three major themes within Amateur Radio — hobby, technology and emergency uses. All three were in the media.
- "A Signal from the Past" in *The Aegis* (MD) highlighted the hobby side showing DX activities and QSL card displays. Two letters to the editor followed, protesting the "Between 1920 and 1980, the heydays of amateur radio..." line. *The News of Orange County* (NC) had a major page 3 story, "Amateur Radio a dedicated service, hobby." The North Carolina reporter, Erin Wiltgen, got the facts right. So did Carol Chroust writing "Amateur Radio a calling" in the *In Your Prime* (OH) newspaper. Finally, a very nice idea was spotted in the *Juneau Empire* (AK) when the Juneau Amateur Radio Club held a "thank you barbecue" for National Weather Service employees at their weather station. That's good PR!
- "Amateur (ham) Radio Station Connects Retirement Community to the World With Purpose" was a PR Newswire release that got hits in many places. It supplemented a feature story in the new edition of *Guide to Retirement Living Sourcebook* revealing how "residents of one retirement community have used Amateur Radio to maintain purpose, friendship and even their own health."
- The technological aspect of Amateur Radio was spotlighted by ARISSat-1, finally in orbit. This satellite, a prototype for a series of educational satellites yet to come, was designed and built by Amateur Radio operators. Its release had been repeatedly delayed. The goal is to get students worldwide interested in STEM education (Science, Technology, Engineering, Math). Hits about the new ham satellite were spotted in Examiner.com, SpaceFellowship.com, Space.com, *Aviation Week*, EETimes, EDN.com, SpaceDaily.com and Patch.com among others.
- And then came Hurricane Irene. ARRL HQ sent out two wire releases about hams and the hurricane. The first was "Hams Prepare for Irene." Later, a second wire release, "Ham operators still active from Irene," pointed out the continuing services of hams — especially in Vermont and New York flooding. The *Hartford Courant* highlighted the operations and support provided at ARRL HQ in "Ham Radio Headquarters Sets Up For Irene."
- While normal communication systems held up much better than the power grid during Irene (and this was reported in the *New York Times*), Amateur Radio operations got solid emergency related hits in NJ.com, DSLreports.com, SCNow.com, *Wall Street Journal*, Central Florida News TV-13 and even out west in Wisconsin at WJFW-TV.

Spreading the Word at the International Municipal Signal Association Conference

Amateur Radio had a formal presence at the 116th Annual Conference of the International Municipal Signal Association (IMSA) in Bellevue, Washington. The conference brings public safety technologists from across the US and Canada together for educational and specialty area certification programs covering a wide variety of public safety disciplines.

At the conference, ham volunteers:

- introduced Amateur Radio to the conference attendees who design, maintain and operate public safety systems,
- showed that Amateur Radio is an important communications component in public emergency situations, such as storms and floods,
- showed that Amateur Radio is an essential communications component of search and rescue operations and public service events, such as parades and races, and
- showed how Amateur Radio can also be a fun and engaging hobby for one's self and family, with the opportunity to make friends in your local community and across the world.

The outreach to this new community of potential hams was made possible because of the contributions of local hams. Thanks to them for their efforts. – *Dave Mitchell, WA7DTM*

COURTESY DAVE MITCHELL, WA7DTM

Tim Kane, K7ANE, left, and Jim Pace, K7CEX, at the ARRL booth at the IMSA conference in Washington state. Tim is with the Mike and Key Club of Renton, Washington, and Jim is the ARRL Western Washington Section Manager.

STEVE FORD, WB8IMY

Spotted in Jackson's Mill: **ARRL Roanoke Division Director Dennis Bodson, W4PWF, Vice Director Jim Boehner, N2ZZ, and Honorary Vice President John Kanode, N4MM, were among those enjoying the 53rd annual West Virginia State Convention in August.**

Inside HQ

The IT Department

Behind the Wizard of Oz's curtain here at HQ is the staff of our Information Technology (IT) Department. This department ensures that our membership interactions work seamlessly, our website operates properly, our data integrity is maintained and our transactions are secure.

Michael Keane, K1MK, is our IT Department head. Mike and his staff of six install, upgrade, service and maintain our IT systems including software and hardware. Inside HQ, they keep our network, Internet service, desktop computers, critical business processes and ARRL e-mail services functioning properly.

They are responsible for the arrl.net e-mail forwarding service that over 82,000 members now use. Each week this service forwards over a million legitimate e-mail messages to our members, while rejecting 3 million spam messages! Information about this member service can be found at **www.arrl.org/member-support**. E-mail support also includes setting up and maintaining user groups for our governance and advisory bodies and the millions of routine e-mails that we send to and receive from our members.

The IT Department supports and maintains the systems that process millions of membership transactions each year. These include membership applications, personal information changes and renewals. These systems compile the membership data that provides you with your monthly issue of *QST*. On the publications side, our IT systems process control our publications inventory, warehousing, shipping and order tracking systems. Properly functioning IT systems are also essential to our awards and contesting programs.

Another critical responsibility of our IT Department is maintaining and upgrading our website, **www.arrl.org**. This is no simple task, since our website has thousands of pages of content and contains many databases such as special events, hamfests, clubs, licensing classes, award standings and VE sessions. Because of the high traffic volume of our website, we use an outside hosting company. However, our IT Department has overall responsibility for keeping it live 24 hours a day seven days a week.

Managing and maintaining these complicated systems is not easy. According to Michael "The challenge for us is to maintain the diverse set of data systems here at HQ. These systems vary in type, age and complexity. It is a challenge to assure that they that all talk to each other and pass the correct information between the systems. Our next major project in 2012 will be an upgrade of the DXCC and Logbook of the World systems. Logbook of the World currently has over 43,000 users and a more than a third of a billion QSOs in its database and it requires substantial maintenance. In addition, during the next two years, we'll be doing a major update of our internal data services. This upgrade will give us the capability to deliver additional member services via our website."

The ultimate goal of all these IT systems is to provide the best possible programs and services to our members. Thanks to our IT Department for keeping everything up and running.

73,

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

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

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

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

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

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

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Radio Clubs (ARRL-affiliated clubs) – **www.arrl.org/clubs**
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Up/Down buttons let you manually move the antenna to any desired position. A 4-digit turns counter gives you precise antenna position -- you can see its *super bright LEDs* even in direct sunlight!

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B. Ameritron's exclusive *AutoPark*™ feature automatically bottoms your antenna for parking in your garage and *resets and calibrates* your counter each time to eliminate antenna slippage and turns count errors.

SDC-102
$129.95
Suggested Retail

C. The momentum of the moving antenna causes it to overshoot its stop point. Ameritron's exclusive *Dead-OnSTOP*™ feature automatically reverses the motor briefly just before it stops to eliminate overshoot and come to a precise stop.

Ameritron's exclusive *StallProtector*™ feature prevents your expensive motor from burning out. Automatically detects motor stall and completely shuts off power to motor.

Monitor motor current on LEDs for signs of trouble and to determine stall current.

If you wire the motor backwards, you can reverse its direction from the SDC-102 front panel so the UP button is always up and the DOWN button is always down.

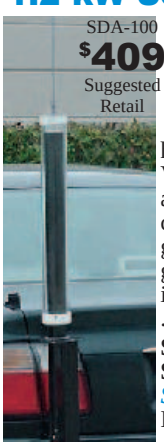
Compatible with single and dual magnetic turns sensors. Requires 12 VDC.

3½Wx3¼Hx1¼D inches.

SRS-100, $29.95. Magnetic sensor kit for High Sierra antennas to use SDC-102.

SRS-1001, $9.95. Magnetic sensor kit for Hi-Q Antennas to use SDC-102.

1.2 kW Screwdriver Antenna



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SDA-100 lets you operate 3.5 to 30 MHz continuous with six foot whip at full 1200 Watts PEP.

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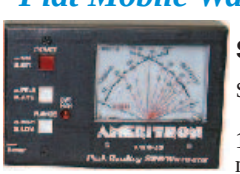

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Up Front in QST

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ARRL HQ and W1AW Revisited

David M. Coelho, WA1JGA

As so often happens, when you live in an area you don't take the time to visit nearby places. I live in Connecticut and the last time I visited the ARRL I was in college. I didn't return for 38 years!

When I arrived at HQ, the first thing I noticed was that the old museum area in the lobby was now a welcome center and store. The receptionist asked me if I was a Life Member. I said yes and she gave me a name tag with a Life Member ribbon. I then joined a small group for a guided tour around the HQ building.

The League museum, a collection of vintage radios and other artifacts, is now distributed around the hallways. Also on view are gifts to the ARRL from various countries, photos of Hiram Percy Maxim and friends, the Wouff-Hong and plaques from astronaut hams. The volunteer tour guide, Dan Arnold, W1CNI, showed us the various League offices, from awards to *QST* and the station for HQ staff to use at lunch or after work hours, W1HQ.

We then went across the parking lot to W1AW. That too had changed. The last time I was there, visitors operated from a semicircular console. Now there are three glass-walled radio rooms. *Wow!*

I showed my license to the chief operator, Scott Gee, WB9RRU. He asked, "Which room do you want to operate out of?" I chose the room with a Yaesu FT-2000, a straightforward transceiver and a beauty.

I operated CW and when I put my hand on the paddle and began my CQ DE W1AW, I thought of all the history behind that call, the most recognizable call in the world, and here I was operating W1AW on 20 meters. I operated for about a half an hour and I was so proud to do so. Scott asked me to fill in the electronic log and explained that every contact would receive a QSL card from W1AW. I said to myself, these guys are a class act.

I returned to the welcome center and in walked ARRL CEO David Sumner, K1ZZ. I introduced myself and we took some photos together.

So if you live in Connecticut or might be passing near the Hartford area during the week, be sure to stop at HQ. Bring your camera and a copy of your license so you can operate, too. You can find more information at **www.arrl.org/visit-us**.

We as members of the ARRL should all be so proud of it and all the fine staffers who work there to serve us, the ham community.

73 and TNX to all at HQ.

All photos by David M. Coelho, WA1JGA.

WA1JGA putting W1AW on the air.

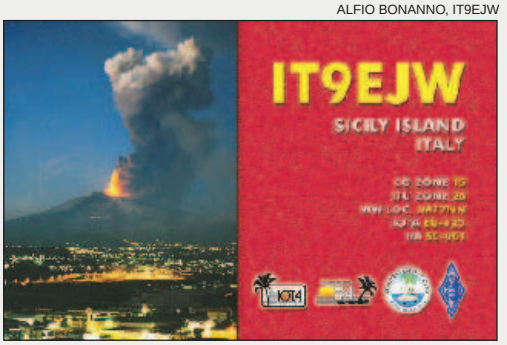
The author meets ARRL CEO David Sumner, K1ZZ, in the HQ welcome center.

The Diamond Terrace is a group of commemorative bricks placed by members as a remembrance of their own donation or to honor a family member or Elmer.

JEFF LILLARD, AD6RH

Learn code on horseback: **I took this picture on the way to work. It's actually a horse training facility in San Ramon, California. —** ***Jeff Lillard, AD6RH***

ALFIO BONANNO, IT9EJW



Alfio, IT9EJW, who lives in Valverde on Sicily, sent us his distinctive QSL card.

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CORRESPONDENCE

PONDERING THE HOBBY

♦ As I get ready to send in my renewal for ARRL membership, this past weekend reminds me why I got into ham radio. As I was getting ready for retirement, I looked around for some hobbies to get involved in to fill my time. I remembered building a small radio as a kid and decided to look into ham radio. Three years ago I got the first book, studied and passed the Technician test. I followed that up with studying for — and passing — the General written exam.

My only rig has been the venerable Kenwood TS-530S, with a 20 meter dipole thrown down on the second floor of my house. I am a "casual" user of the airwaves. I am listening about 99 percent of the time and talking (at the most) the other 1 percent. When I bought the radio, I got a keyer and a key. Unfortunately, I don't have the ear for CW, although I keep trying to learn.

Now back to my opening sentence. This past weekend, I made contacts with several hams from Washington State during the Salmon Run. To a person they were polite and patient as I tried to make contacts with my minimalist rig. I remarked to my wife how neat it is to have a radio that is half my age, connected to a wire thrown down on the floor and be able to hear (and sometimes talk to) people from Eastern Europe to Hawaii, from Canada to Latin America.

I will probably never have a big station, nor get seriously involved in all the aspects of ham radio, such as emergency communication or building equipment, but as a hobby, this has been a real winner. Thanks to all of you who have taken the time to be examiners, run contests and special events, and especially those who have taken the time to respond to my calls the last three years.

RICHARD WRIGHT, KDØEXQ
Albia, Iowa

A "SIMPLE" QUEST

♦ The editorial by David Sumner, K1ZZ ["It Seems to Us: Our Future in Emergency Communications," Sep 2011, page 9] made a point that should be more fully discussed and fostered by the ARRL: That there is an important role for simple, reliable, independent communications. This is an area in which radio amateurs can singularly shine. I am concerned that this lower complexity — but not necessarily "lower tech" — is edged out of headlines and out of mind by amateur systems more and more mimicking commercial infrastructure. Technical advancement is great, and Internet inter-operation is powerful, but there is an important place for "off-the-grid" capability. The National Traffic System, for example, has an opportunity here, as do the CW nets. I surely hope they are not clouded by the push to replicate commercial systems.

JAMES COLE, N3ZJ
Frederick, Maryland

INTEROPERABILITY AND AMATEUR REPEATERS

♦ On a recent 350 mile trip from home in Davenport, Iowa to my hometown south of St Louis, Missouri, I heard very little 2 meter activity on any repeater. I was not even able to make a contact on 146.520 simplex. Years ago, I always heard many 2 meter conversations on the same trip.

I don't think we are listening to the 2 meter repeaters any longer. I also think the repeater coordinator requirements for CTCSS tones on repeaters are discouraging operators from using 2 meters. With emphasis on "communications interoperability" and our current tone requirements, are we simply regulating our service out of existence? What about the person trying to use a repeater for emergency purposes?

It is a hassle trying to program a different tone for each of the repeaters while driving. Try to program some of today's rigs while driving. I don't recommend it! Traveling with 2 meters was much more fun when one was able to dial up a repeater and use it without having to look up and set the tone. I always found the conversations of people dropping in on our repeaters while passing through the area quite interesting and enjoyable. Look at the amount of good equipment on hamfest tables that operators are forced to replace because it cannot store a unique tone for each frequency

TERRY NIXON, WBØVQP
Davenport, Iowa

QR CONUNDRUM

♦ I am seeing more and more QR codes all over the place, and although I'm in the IT industry, I do not own a smartphone or any current device that reads those codes. Perhaps my reasoning is much like those hams who still use CW or 5-level RTTY. A phone, cell or landline, should be just that, not an electronic Swiss Army knife do-all gizmo.

My annoyance with these appearing in more and more publications is whether there is information that is not otherwise available to other users. What I expect to see in the future is the intentional exclusion of non-QR-code reading people when a "special offer" or contest is offered and the impending lawsuit that it brings. A QR code that points to a deal or contest web address is certainly an example.

As long as the ARRL information is in both machine-readable format and in human readable print, I do not object to them appearing in *QST*.

DOUGLAS TABOR, N6UA
Estes Park, Colorado

ARRL Chief Operating Officer Harold Kramer, WJ1B, responds: So far, all of the content available through QR codes is available to everyone on our website. We do not plan to have QR-exclusive content at this time. I believe that the world is going in this direction, so you may see advertisers start using it with more exclusive content in the future.

A NEW TWIST

♦ I just finished reading the article by Jerry Clement, VE6AB ["Gain Twist 75 Meter Mobile Monobander," Jul 2011, pages 39-42]. The antenna as shown and built by VE6AB is certainly a work of art and a joy to behold, but since in all probability a majority of ARRL members do not have the equipment or ability to build it, what is the relevance of such an article? I believe that before the editors even think of inserting an article like this, they should ask themselves if a majority of the membership can indeed duplicate it. A mobile antenna that could be constructed from easily obtainable parts would, in my opinion, better serve the membership.

ROBERT NAPOLI, K2LGO
Riverhead, New York

Jerry Clement, VE6AB, responds: "I have received a lot of e-mail from hams who are generally interested and have questions on how to build an antenna like mine. I know of an ARRL member who is building my antenna with hand tools, such as a hand drill, hacksaw and files, as well as a little ingenuity. I know I could build this antenna without my shop. I have seen some amazing projects built with hand tools that boggle your mind as to how they could be completed. If you want something badly enough, it is definitely doable."

Your opinions count! Send your letters via e-mail to **qst@arrl.org** or to "Correspondence," ARRL, 225 Main St, Newington, CT 06111. You can also submit letters by fax at 860-594-0259. 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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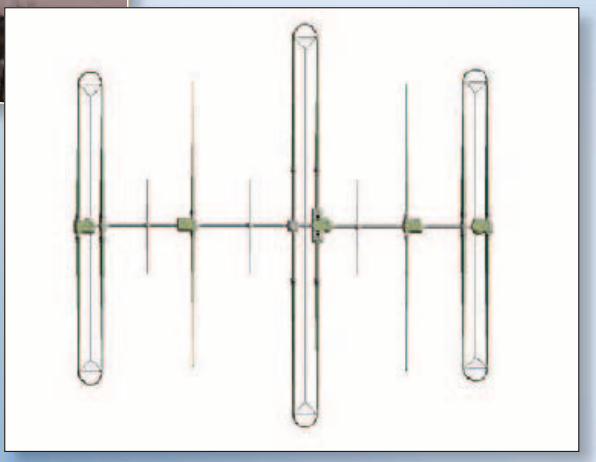

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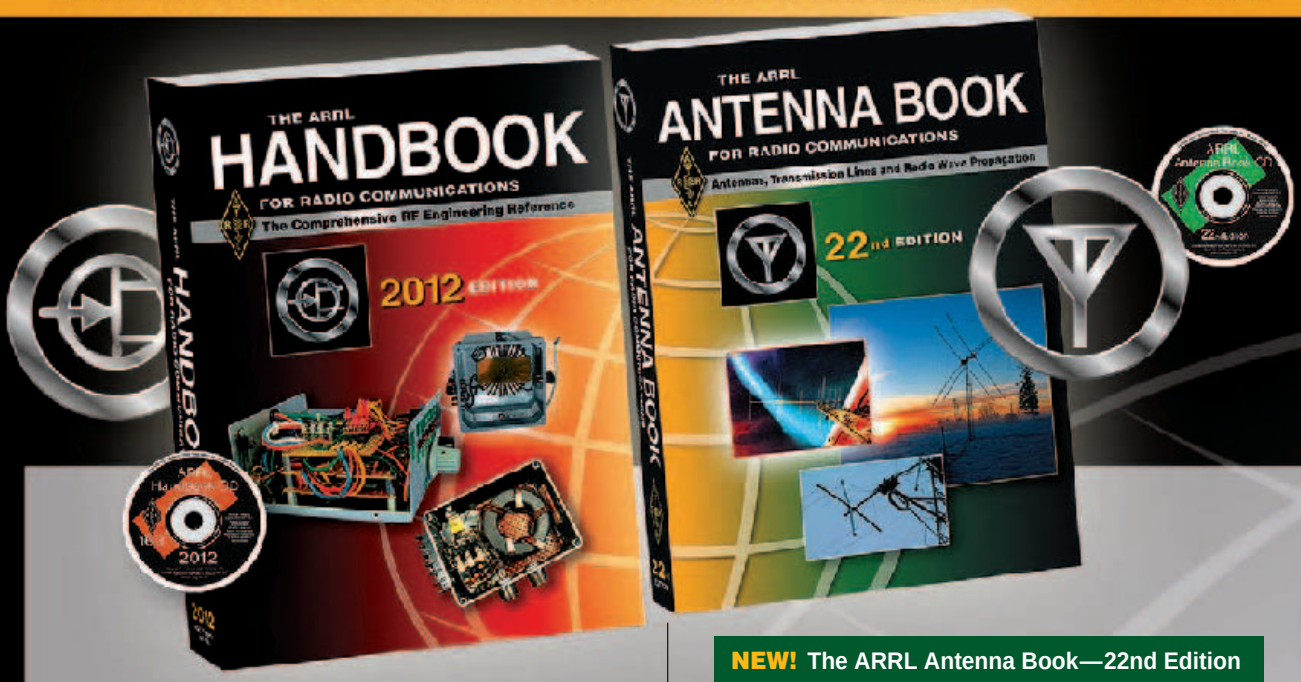

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Build Your Own DSP Speaker

Build this noise reducing system to help you pull in the weak ones.

Allen Baker, KG4JJH

Adaptive filters using digital signal processing (DSP) can be very effective in improving the receive quality of Amateur Radio communications. DSP analyzes the signal and differentiates between the noise and the desired signal. Unwanted noise and interference are then attenuated to leave only the signal of interest. The signal is constantly monitored and the DSP automatically adapts to any changes in the signal conditions.

BHI Ltd has a line of DSP products aimed at the Amateur Radio community.[1] A popular radio modification is to add the NEDSP1061-KBD module inside the radio.[2] It adds a microprocessor and LED to the basic module with a pushbutton that steps through four levels of noise reduction.

This project allows us to take advantage of noise reduction on multiple radios while using the basic NEDSP1061-PCB module. This implementation provides eight levels of noise reduction. Audio from the radio is fed to a level attenuator, clipping indicator, DSP module and a power amplifier that can drive a speaker or headphones.

Circuit Description

Figure 1 is the schematic of the unit, along with its parts list. Toggle switch S3 powers the unit and turns on the yellow PWR LED. Speaker and headphone levels are controlled by VOLUME potentiometer R17. The DSP LEVEL is selected by rotary switch S1. Toggle switches S2 and S4 switch the DSP in and out and turn the speaker on and off, respectively. The rear panel (see Figure 2) contains INPUT jack J1, PHONES jack J2, and 12 V dc POWER jack J3. Board mounted jumper JP1 allows the use of stereo headphones by connecting the output to both channels. Ferrite beads are used on all signals entering and exiting the circuit to reduce RFI.

M1, NEDSP1061-PCB

This tiny noise reduction module measures 1.45 × 1.06 inches and has 10 input/output pins. It has an internal voltage regulator, allowing it to operate over a 5-15 V dc range. The eight available DSP levels correspond to 9-35 dB of white noise or hiss reduction and 4-65 dB of tone or heterodyne reduction. Pins 1-3 have internal pull-up resistors to 3.3 V dc and determine the DSP level as indicated in Table 1.

Table 1
NEDSP1061-PCB DSP Level Setting

DSP Level	*Tone Reduction (dB)*	*White Noise Reduction (dB)*	*Pin 3-N2 (V dc)*	*Pin 2-N1 (V dc)*	*Pin 1-N0 (V dc)*	*BCD Value*
1	4	9	0	0	0	0
2	5	11	0	0	3.3	1
3	6	13	0	3.3	0	2
4	8	15	0	3.3	3.3	3
5	16	17	3.3	0	0	4
6	21	20	3.3	0	3.3	5
7	25	24	3.3	3.3	0	6
8	65	35	3.3	3.3	3.3	7

The N0, N1 and N2 voltage levels correspond to BCD numbers 0-7 and would preferably be set with an eight position BCD complement switch. Panel mounted BCD switches are not readily available, however, so the DSP level is set with an SP8T rotary switch and diodes D1-D12. Resistors R6 and R7 form a 10 dB attenuation pad to reduce speaker level to line level.

The noise cancellation can be turned off by grounding pin eight. However, this method results in a loss of high frequencies, so toggle switch S4 switches between the input and the module output.

U1, TL062 Dual Op Amp

The M1 module requires input levels greater than 50 mV_{RMS}, with a nominal level of 300 mV_{RMS}. The maximum input level is not specified but appears to be around 350 mV_{RMS}. The module includes a surface mounted LED to indicate clipping levels, but the LED is very small and not amenable to panel mounting. Therefore, a simple CLIP indictor has been added.

U1 forms a window comparator to detect

[1]Notes appear on page 34.

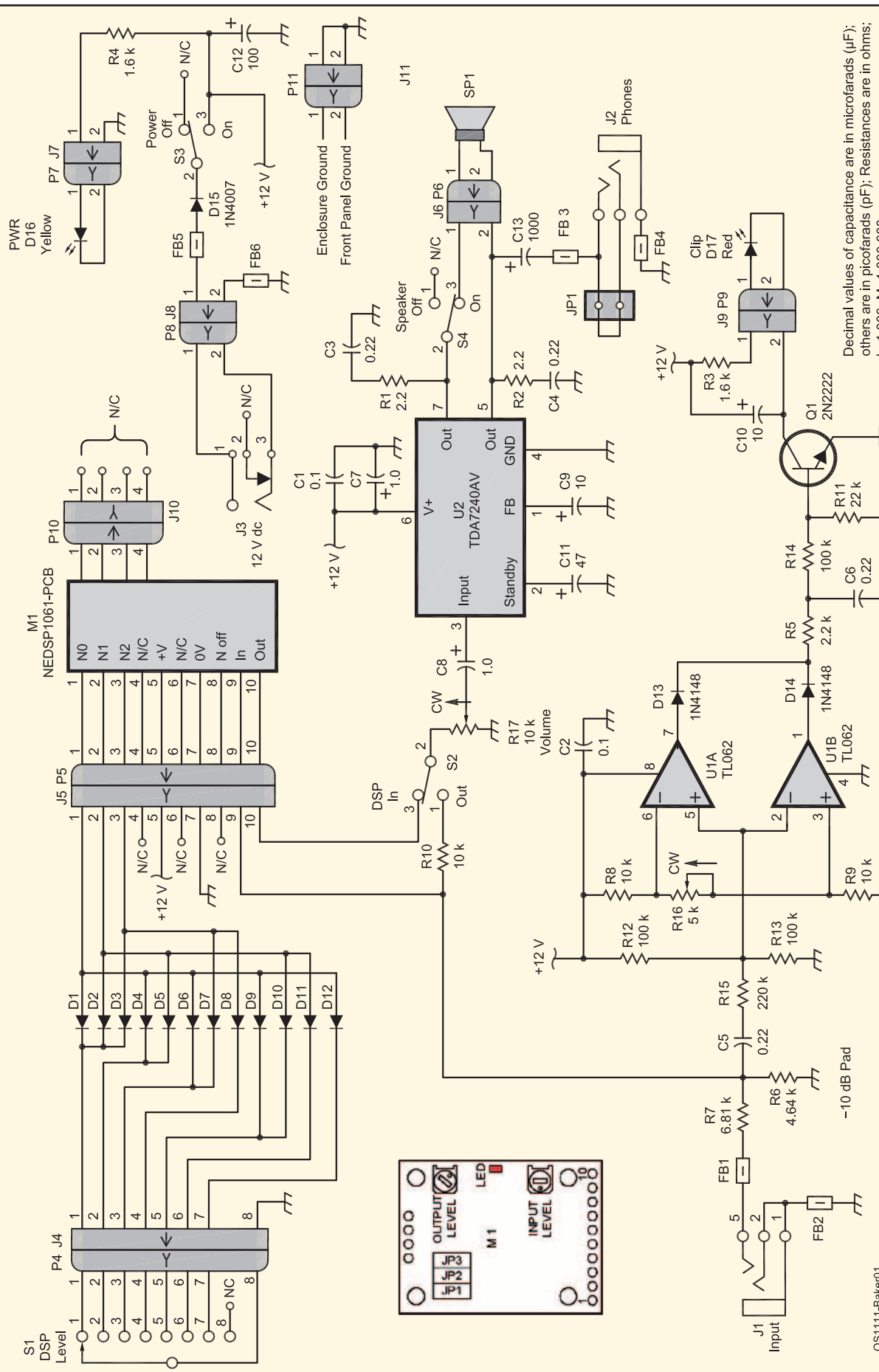

Figure 1 — Schematic diagram and parts list of the DSP speaker. Digi-Key parts are available from www.digikey.com, McMaster-Carr parts from www.mcmaster.com, Mouser parts from www.mouser.com, Parts Express parts from www.parts-express.com and Pololu parts from www.pololu.com. The inset shows the adjustments on the DSP module.

C1-C2 — Capacitor, ceramic, 0.1 µF, 50 V (Mouser 581-SR215C104KARTR2).
C3-C6 — Capacitor, ceramic, 0.22 µF, 50 V (Mouser 581-SR215E224MAR).
C7-C8 — Capacitor, electrolytic, 1 µF, 25 V (Mouser 140-XRL25V1.0-RC).
C9-C10 — Capacitor, electrolytic, 10 µF, 25 V (Mouser 140-XRL25V10-RC).
C11 — Capacitor, electrolytic, 47 µF, 25 V (Mouser 140-XRL25V47-RC).
C12 — Capacitor, electrolytic, 100 µF, 25 V (Mouser 140-XRL25V100-RC).
C13 — Capacitor, electrolytic, 1000 µF, 25 V (Mouser 140-XRL25V1000-RC).
D1-D14 — Diode, 1N4148 (Mouser 512-1N4148TA).
D15 — Diode, 1N4007 (Mouser 583-1N4007-B).
D16 —LED, Panel Mount, Yellow (Mouser 696-LXR3612SYD-150).
D17 —LED, Panel Mount, Red (Mouser 696-LXR3612SID-150).
FB1-FB6 — Ferrite bead, mix 43, 1.3 mm ID × 3.3 mm long (Mouser 623-2643000101).
HS1 — Heat sink, TO-220, 4.4°C/W (Digi-Key HS410-ND).
J1-J2 — Jack, 3.5 mm, stereo (Mouser 806-STX-3100-3C).
J3 — Jack, dc power, panel mount, 2.5 × 5.5 mm (Mouser 163-MJ22-EX).
J4 — Header, male, 1 × 8, 0.1 inch pitch (Included with P5).
J5 — Header, female, 1 × 10, 0.1 inch pitch (2 pack) (Pololu 1020).
J6-J9, J11 — Header, male, 1 × 2, 0.1 inch pitch (Pololu Included with P5).
J10 — Header, female, 1 × 5, 0.1 inch pitch (Pololu 1015).
JP1 — Shorting block, 1 × 2, 0.1 inch pitch (5 pack) (Pololu 970).
M1 — Module, noise reduction (BHI bhi-ltd NEDSP1061-PCB).
P4 — Crimp connector housing, 1 × 8, 0.1 inch pitch, 10 pack (Pololu 1907).
P5 — Header, male, 1 × 10, 0.1 inch pitch, 1 × 40 (Pololu 965).
P6-P9, P11 — Crimp connector housing, 1 × 2, 0.1 inch pitch, 25 pack (Pololu 1901).
P10 — Header, male, 1 × 4, 0.1 inch pitch (Pololu, included with P5).
Q1 — Transistor, NPN, 2N2222 (Mouser 863-P2N2222AG).
R1-R2 — Resistor, carbon film, ¼ W, 5%, 2.2 Ω (Mouser 291-2.2-RC).
R3-R4 — Resistor, carbon film, ¼ W, 5%, 1.6 kΩ (Mouser 291-1.6K-RC).
R5 — Resistor, metal film, ¼ W, 1%, 2.2 kΩ (Mouser 271-2.2K-RC).
R6 — Resistor, metal film, ¼ W, 1%, 4.64 kΩ (Mouser 271-4.64K-RC).
R7 — Resistor, metal film, ¼ W, 1%, 6.81 kΩ (Mouser 271-6.81K-RC).
R8-R10 — Resistor, metal film, ¼ W, 1%, 10 kΩ (Mouser 271-10K-RC).
R11 — Resistor, metal film, ¼ W, 1%, 22 kΩ (Mouser 271-22K-RC).
R12-R14 — Resistor, metal film, ¼ W, 1%, 100 kΩ (Mouser 271-100K-RC).
R15 — Resistor, metal film, ¼ W, 1%, 220 kΩ (Mouser 271-220K-RC).
R16 — Potentiometer, trimmer, 5 kΩ (Mouser 652-3362R-1-502LF).
R17 — Potentiometer, 7 mm, 10 kΩ, audio taper (Mouser 311-701AF-10K).
S1 — Switch, rotary, 1P8T (Mouser 611-A10815RNZQ).
S2-S4 — Switch, toggle, SPDT, threaded (Mouser 612-100A-T2B1M7Q).
SP1 — Speaker, 3 inch, HiVi B3N (Parts Express 297-428).
U1 — IC, dual opamp, TL062 (Mouser 511-TL062CN).
U2 — IC, power amplifier, TDA7240AV (Digi-Key 497-2168-5-ND).
Speaker grill, fan guard (McMaster-Carr 19155K95).
Enclosure, gasketed black textured aluminum, 6.73 × 4.76 × 3.98 inch (Digi-Key HM1217-ND).
Knob, ½ inch diameter, ¼ inch shaft (Mouser 450-2034-GRX).
IC socket, 8P DIP (Mouser 571-1-390261-2).
Acoustic foam, ½ inch thick (Parts Express 260-520).

Figure 2 — View of rear panel of DSP speaker. As shown, there are INPUT, OUTPUT and POWER jacks.

the positive and negative peaks of the audio input. The op amp outputs are mixed by diodes D13 and D14, smoothed by C6, R5 and R14, and feed the LED driver Q1 with a positive pulse. C10 adds a small output delay in order to allow detection of very short peaks.[3]

U2, Audio Amplifier, TDA7240AV

If supplied with 12 V dc, this amplifier will deliver approximately 8 W_{RMS} into an 8Ω load at 0.5% THD. This is more than enough power to cleanly drive most speakers. U2 has one input and a differential output, so neither side of the bridged speaker output is grounded. The headphone output utilizes one side of the amplifier output referenced to ground. Do not omit coupling capacitor C8 as the amplifier will not work without it.

SP1, Speaker, HiVi B3N

This full range shielded speaker has a frequency response of 80-8,000 Hz and a fairly smooth response curve. The speaker was selected to cover the voice frequency spectrum without adding too much bass. Although the speaker sensitivity level (SPL) is low at 81 dB, the U2 amplifier has enough reserve power to overcome this deficiency. A speaker grill is recommended for those who are concerned about the unprotected speaker cone getting damaged. Commercially available grills are either too large for the enclosure or have mounting holes that interfere with the speaker frame. A substitute speaker grill can be fashioned from a fan guard mounted on ¼ inch standoffs in front of the speaker.

Construction

The prototype was built using perf-board construction and point to point wiring. Figure 3 shows the top of the board indicating layout approach, while Figure 4 shows the wiring side. Detailed fabrication plans and layout drawings are on the QST-in-Depth website.[4]

Keep inputs away from outputs and be sure to ground the enclosure. For non-metallic enclosures, shielded cable is recommended on all audio lines. To prevent unwanted rattles, put a small dab of silicon sealant on the ferrite beads.

Headers of 5 and 10 pins are soldered to the M1 module, which is then plugged into board mounted sockets. The 5 pin header/socket helps to mechanically secure the module to the board and has no pin connections. For ease of assembly, components mounted off of the board are connected via male headers and female header plugs. The LED rear mounting nut can be threaded over the 2 pin header connector. First, knock the edges off of the connector with a small file and then cut threads by screwing the nut over the connector.

Sealed speaker enclosures should be air-tight to prevent unwanted leaks that could unload the speaker. For this reason, the front and rear panel controls and jacks are threaded and sealed with a nut. There is still some air leakage but it is not objectionable in this frequency limited application.

The enclosure features a front panel gasket that reduces air leakage and prevents rattles. The enclosure walls are lined with ½ inch adhesive backed acoustic foam to absorb internal standing waves and prevent reflections to the speaker cone. Keep the foam away from the heat sink to prevent it from melting. Before mounting the speaker, install the supplied adhesive-backed gasket material around the speaker cutout and install the speaker from the outside of the enclosure using 6-32 × ½ inch screws.

If the front and rear panel components are mounted on the perf-board according to the drawing, then the drilling template can

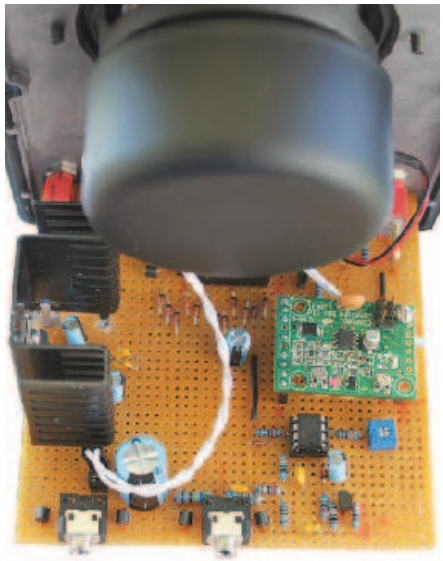

Figure 3 — The top of the perf board indicating component layout.

be used to mark the holes. Print the full-size drilling template on the QST-in-Depth website and then measure the panel and mark horizontal and vertical centerlines. Align the template with the panel centerlines and fasten it to the panel using a glue stick or rubber cement. Next, center-punch and drill all holes. The 2⅞ inch diameter speaker cutout was made with a metal hole saw. Alternatively, small holes can be drilled around the circumference of the hole to remove the bulk of the material and then the edge filed smooth.

Labeling can be added using dry transfer letters or a labeling machine. I used white dry transfer lettering (Woodland Scenics Railroad Gothic DT507) from the railroad section of my local hobby shop. A method of applying dry transfer letters is to print the lettering template full size on clear film. Secure the panel to a table top and then center and tape the clear film over the panel. Place the dry transfer sheet under the clear film, line up the appropriate letter, and then burnish. Follow up with a couple of coats of clear matte lacquer to protect the lettering. Be sure to try the lacquer on a test piece first to ensure compatibility.

Setup

Connect 12 V dc from the radio power supply to a 2.5 × 5.5 mm plug (center positive) to power the unit. The DSP speaker can draw over 1 A at high volumes, so make sure the power supply is adequate. Connect the speaker/headphone output from the radio to the INPUT jack using a shielded cable with a 3.5 mm mono phone plug on one end and a suitable plug on the radio end. The Yaesu FT-817/857 radios have a slide switch that switches the audio output to speaker or headphone levels but there is little difference observed between the two settings.

The M1 module has onboard input and output trimpots for setting sensitivity levels. Set these input and output trimpots to midpoint. The trimpots don't have stops so there will be a dead band area over which the sound disappears. Referring to the inset in Figure 1, the trimpot settings are indicated by a small circle in front of the screwdriver slot and are shown at midpoint. The DSP level is set by rotary switch S1, so remove the shorting blocks on headers JP1, JP2 and JP3.

The clip detector is adjusted with the DSP speaker connected to the radio. Tune in a strong station and adjust the radio VOLUME until you see the M1 OVERLOAD LED light on the peaks. Adjust trimpot R16 until the CLIP LED turns on, mimicking the M1 LED.

Operation

Operation couldn't be simpler. First, set your radio receiver for full bandwidth and disable any built-in noise reduction. Start with low DSP levels and increase the level as band conditions warrant. At the higher DSP levels the audio is somewhat watery sounding but still readable. The DSP is compatible with all modes of operation but is most remarkable on SSB. Heterodynes, static, hiss, buzzing and other noises can be attenuated to a remarkable degree. The audio files on the QST-in-Depth website were made with a DSP setting of 5.

As with all DSP processors, there is a time delay associated with the reduction of noise. The time required to analyze the signal and respond appears to be less than a second for the BHI DSP unit and is the same for all levels of DSP.

Yaesu FT-817/857 radios will begin to light the CLIP LED with the volume control at the 12 o'clock position. For other radios, increase the radio volume until the CLIP LED lights and then back off slightly. The DSP Speaker volume is set to the 9 or 10 o'clock position for normal listening. I find that the extra audio power comes in handy if I am some distance from the radio, for example manually turning a beam while listening for peak reception. I am looking forward to the next VHF contest to put the DSP speaker to good use. Six meter band noise at our contest location gets old after only a few hours of operation.

Conclusion

The DSP Speaker is a versatile tool that will clean up received audio and significantly improve intelligibility for radios not so equipped. The aluminum enclosure has a small footprint (6¾ × 4¾ × 4 inches HWD) and can be used with any radio with a speaker or headphone output. A highly effective noise reduction module teamed up with a hefty power amplifier and quality speaker form an impressive audio system for your radio. The result is less listener fatigue. So clean up the noise pollution and get more enjoyment out of your radio!

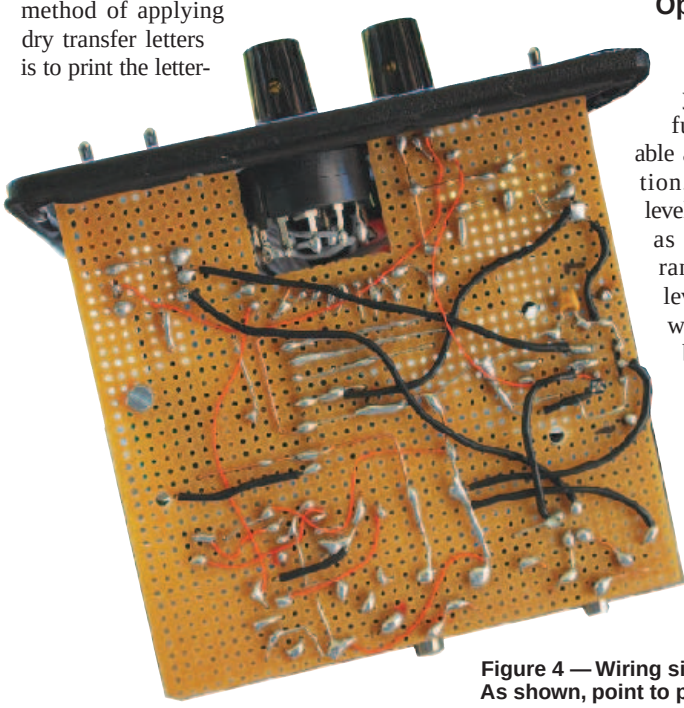

Figure 4 — Wiring side of perf board. As shown, point to point wiring is used.

Notes

[1]BHI Ltd, PO Box 318, Burgess Hill, West Sussex, RH15 9NR, UK, **www.bhi-ltd.com**.
[2]BHI DSP Noise Reduction Module for Yaesu FT-817, Chris Lorek, G4HCL, **www.wimo.de/download/bhi_rdcom_nedsp1061_review-dec03.pdf**.
[3]Audio clipping indicator, **www.redcircuits.com/Page132.htm**.
[4]**www.arrl.org/qst-in-depth**

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An Antenna Idea for Antenna Restricted Communities

Dress up your garden and neighborhood with antennas that look like lawn sculptures.

Cristian Paun, WV6N

For a number of years I used a various mobile antennas while operating from home on all bands between 3.5 and 30 MHz. My score of 264,922 in the 2010 CQ World Wide DX contest using low power (272 out of 14,765 entries) shows just how good such an antenna can be, if used in a permanent installation with appropriate ground radials.[1]

Still, I wanted something that would work even better on the lower HF bands and at the same time be unobtrusive to my neighbors. What antenna could possibly come close to the performance of a full size vertical and not be as visible?

The Small Loop Antenna versus the Competition

The small loop antenna, often called a magnetic loop, has been around for a long time. While some have had good luck with such an antenna, many others have been disappointed. I suspect they suffered from losses in loop conductors and in their interconnection method that can make such antennas much less efficient than expected. I recommend that the reader start with some useful references on this topic.[2-4]

The following will attempt to show that a properly constructed small loop antenna can perform almost as well as a properly installed elevated vertical. Since different readers will have different available space and other requirements, I have not attempted to provide detailed construction information. However, many of my design details are available on the QST-in-Depth website for those who are interested.[5]

An Elevated Vertical Monopole

Figure 1 is the elevation pattern of a 40 meter elevated vertical monopole antenna with the base 30 feet above average ground (conductivity 0.005 S/m, dielectric constant 13). At 15° elevation, a good yardstick for DX operation, the signal intensity from this vertical is about –0.41 dBi. While that doesn't sound too great, it is a lot higher than what a short mobile antenna can do. The azimuth pattern is omnidirectional, as one might expect.

Unless fed with a tuner, or traps or other schemes are employed, in its simplest form it is a single band affair.

The Horizontal Dipole at a Height of ½ Wavelength

A dipole at this height has a significant performance advantage over a monopole due to both the ground reflection and the restricted azimuth pattern that focus its radiation in the broadside direction. The azimuth pattern at 15° elevation is shown in Figure 2 and the elevation at the azimuth peak is shown in Figure 3. Note that while the main peak is at around 30°, the intensity at 15° elevation is a respectable 6.8 dBi, 7 dB greater in its preferred direction than from the monopole.

The dipole's disadvantages are that for the lower bands it is hard to rotate. To get worldwide coverage, it takes three of them, although two at right angles can come reasonably close. Each requires a half wave support pole on each end, although at least one could be shared. While traps can be used to operate on multiple bands, a coax fed dipole is basically a single band antenna. If fed with window line and a tuner, it will operate on all bands at frequencies higher than its half wavelength. The pattern at the higher frequencies is complex, however, and it is difficult to cover all directions with just two such antennas.

The Small Loop Antenna

An ideal small loop at a height of 10 feet has azimuth and elevation patterns as shown in Figures 4 and 5 respectively. The improvement in performance compared to the vertical monopole is notable — 5.47 dBi at 15° elevation versus –0.41 dBi at the same angle for the monopole. That is almost exactly 1 S-unit, similar to the gain of a small Yagi over a dipole. The comparison above assumes 100% efficiency, which is not quite attainable in practice. More about that later.

The same loop at a height of 5 feet above ground has slightly less gain, 4.08 dBi at 15° — still a lot better more than the vertical.

Building the Small Loop

I wanted my loop to be tunable from 3.5 to above 11 MHz, thus covering the 80, 40 and 30 meter bands, as well as our 60 meter

[1]Notes appear on page 37.

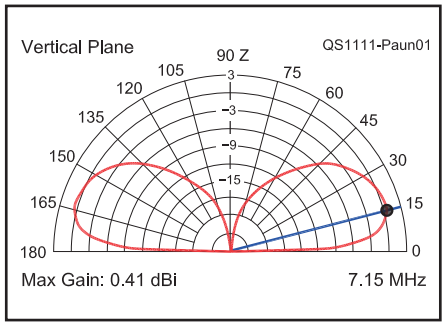


Figure 1 — The elevation pattern of the elevated ¼ wave vertical antenna 30 feet above average ground. Note the intensity of –0.41 dBi at 15° elevation. The data for all plots is from *4NEC2* simulation software.[6]

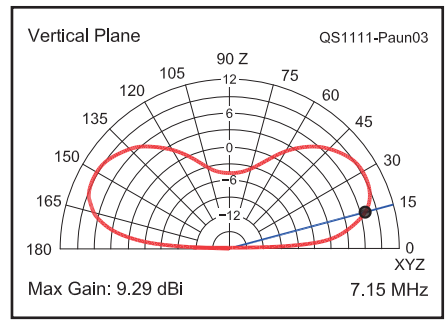


Figure 3 — The dipole elevation pattern at the peak azimuth. Note that while the main peak is at around 30°, the intensity at 15° elevation is a respectable 6.59 dBi, more than 7 dB greater than the monopole.

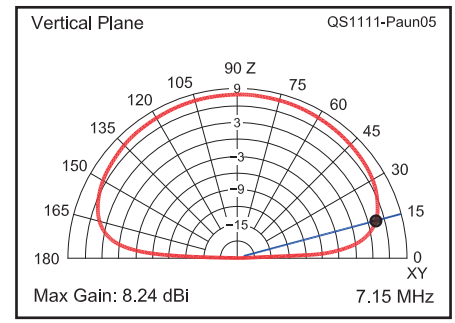


Figure 5 — The small-single-turn loop elevation pattern on 7.15 MHz at peak azimuth. Note that while the directivity is dipole-like, the loop's radiation is vertically polarized.

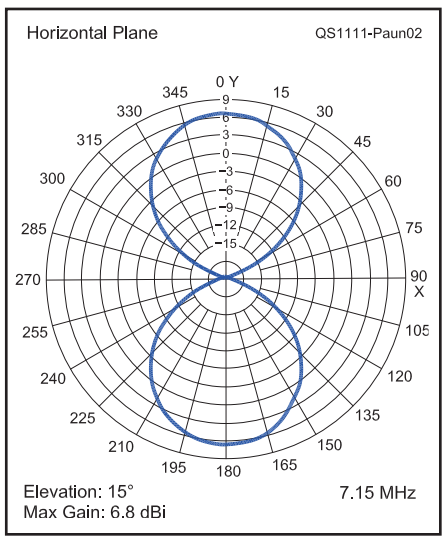


Figure 2 — The half-wave-high dipole azimuth pattern on 7.15 MHz at an elevation angle of 15°.

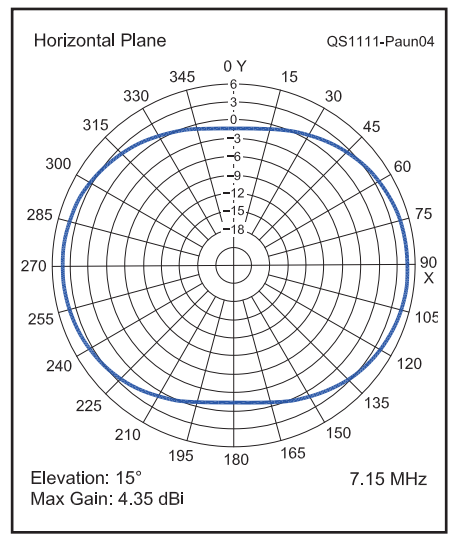


Figure 4 — The small single turn loop azimuth pattern on 7.15 MHz at an elevation angle of 15°. Note that the maximum radiation is in the plane of the loop perpendicular to the pattern of the more familiar large loop such as in the quad antenna.

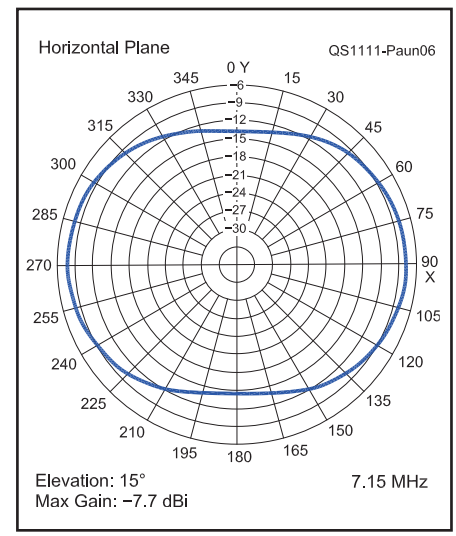


Figure 6 — The 3.3 foot diameter two turn loop azimuth pattern on 7.15 MHz at an elevation angle of 15°.

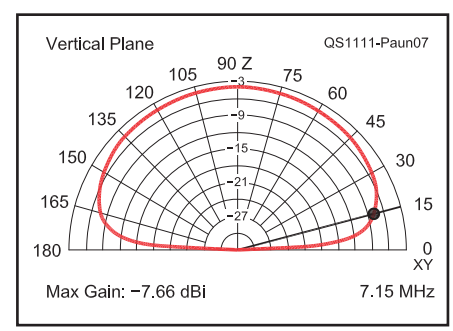


Figure 7 — The 3.3 foot diameter two turn loop elevation pattern at the peak azimuth.

channels. I started with the spreadsheet from Steve Yates's website.[7]

The distributed capacitance would make tuning at 14.2 MHz rather difficult if not impossible. A 6.6 foot diameter loop has a calculated efficiency of only 20% at 3.5 MHz but that is quite a bit better than most commercial mobile antennas. The predicted (*4NEC2*) efficiency is significantly higher on the 7 and 10 MHz bands. All said and done, that size loop is not going to be easily hidden, especially considering the directivity of this antenna and the need to make it rotatable.

Well, since the antenna is essentially a large one-turn coil resonated by a variable capacitor, I will get the same equivalent inductance by halving the diameter but using two turns instead of one. This will require approximately the same length of copper pipe that I used to minimize loss. This is particularly important because the radiation resistance will be reduced by a factor of four in the process.[8] I took this change into account in my assessment by inserting additional series resistance into AA5TB's spreadsheet calculator. Azimuth and elevation patterns are shown in Figures 6 and 7, respectively.

An additional price to pay for the convenience is the added distributed capacitance, which could make tuning difficult at the upper limit of the frequency range. Enough design margin can take care of that, though. With the above design data, I started to build a two turn loop, about 3.3 feet in diameter, made out of off-the-shelf, commercially available 1.5 inch copper pipe. I tuned it with a motor driven 12-500 pF, 15 kV vacuum variable capacitor. The rotator is a simple TV antenna unit.

The octagonal shape was an obvious choice because the 45° fitting pieces are also readily available. The vacuum variable capacitor is controlled remotely via an electric motor with planetary reduction gear. The supporting hardware is mostly homebrew with some wooden stands that were purchased for convenience. The two turns are 5 inches apart. This antenna has been in service at WV6N since April 11, 2010.

Over the air comparison between this antenna and the vertical, with help from my friends Jim, K6JRF and Randy, WB6MMJ, showed that it delivered 1 S-unit improve-

Figure 8 — The 3 foot diameter single turn loop for 14-30 MHz. Note the coupling loop used for excitation in both loop designs.

ment over my best mobile vertical on 75 meters. Once that orange tree grows taller, I may be able to raise this loop another 2 to 3 feet higher.

On to Higher Bands

After a couple of months of testing this loop, it was time to build one for the higher frequency bands. I again used the AA5TB spreadsheet calculator. I wanted this version to tune from below 14 MHz all the way to past 30 MHz.

For good design margin, a 5-100 pF, 25 kV variable capacitor was selected. I used the same type of motor with planetary reduction gear and the same antenna rotator as the lower frequency version. The vacuum variable capacitor tuning shaft is hot with RF, so the coupling between this shaft and the motor has to be able to withstand the very high voltages predicted by AA5TB's spreadsheet. The resulting antenna is shown in Figure 8. This second loop tunes as intended and it can take 1500 W with the use of the 25 kV capacitor.

All the wooden parts, the stand, the frame and the mast are home brew. I chose the octagonal shape again for convenience.

Hamspeak

Dipole antenna — A type of antenna consisting of a single element, often, but not always, approximately 1/2 wavelength long. This antenna is often used as a reference for gain comparisons and is frequently encountered in center-fed form on the high-frequency amateur bands. Multiple dipoles are often used in combination as directive antenna arrays.

Vacuum variable capacitor — Capacitor consisting of two electrodes, often concentric cylinders within an evacuated glass envelope. One is moved in and out with respect to the other by a lead screw running through a sealed bushing to change the capacitance.

Vertical monopole — Single vertical antenna element, typically a quarter or more wavelengths long. Often used as a transmit and receive antenna, singly or in combination with other similar antennas.

Conclusion

Small or magnetic loops turn out to be a viable choice for those hams living in restricted areas. Depending on the efficiency of the loop, they can come close to the performance of a full size dipole at a height of ½ wavelength. They don't quite look like antennas and will outperform an elevated vertical installed at the same height and with comparable efficiency. They radiate well at low angles for DX contacts as well as at high angles for short skip communications.

The thicker the copper pipe the more efficient they will be, and the higher voltage rating of the capacitor the more power they can take. These loops are narrow band and they exhibit directivity which could be a great advantage on receive. I used to get great reports from DX stations on 20 meters with the vertical while I was barely hearing them. It had to do with the local noise being captured by the antenna and with the take-off angles at each end. Not so with the loop. They hear me well and I hear them equally well.

The designs presented here are good compromises between performance and cost. They can handle significant power, at least 1 kW for the low bands (1.5 kW if 18 kV or higher rating capacitors are used) and 1.5 kW for the upper bands. Note that with high power levels and heights potentially near people, it is particularly important that an RF safety assessment be conducted in combination with methods of keeping people far enough away to be safe.

Notes

[1]**www.cqwpx.com/claimedcall.htm**

[2]For a good introduction to the basics of the magnetic loop, see **en.wikipedia.org/wiki/Magnetic_loop**.

[3]Practical information regarding the building of the magnetic loops is available at **www.standpipe.com/w2bri/**.

[4]This article makes extensive use of the *EXCEL* calculator that Stephen Yates, AA5TB, makes available on **www.aa5tb.com/loop.html**.

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

[6]*4NEC2* is available to amateurs by Arie Voors without cost at **home.ict.nl/~arivoors/Home.htm**.

[7]See Note 4.

[8]The radiation resistance of a small multiturn loop can be shown to be $R_R = 31{,}171 \times (n \times A/\lambda^2)^2$. See, for example, J. Kraus, *Antennas* (New York: McGraw Hill, 1950), p 167.

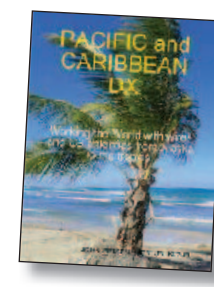
Photos by the author.

ARRL member and Amateur Extra class operator Cristian Paun, WV6N, has been interested in ham radio for many years, He started as a shortwave listener in 1983 and then became licensed as YO3FMY. He moved to Australia and there became VK3MS (still an active call sign). He now lives and works in California and operates as WV6N.

He holds an MS degree in Electrical Engineering. While living in Australia he was employed by Codan and Winradio. He now works as an RF engineer, designing radios and antennas for a large corporation. Cristian holds a number of US and European patents for antennas. You can reach Cristian at 904 Aster Ln, Lompoc, CA 93436-3241 or at **wv6n@arrl.net**.

New Book

PACIFIC AND CARIBBEAN DX BY KL7JR



◊*Pacific and Caribbean DX* by John Reisenauer Jr, KL7JR, includes stories of KL7JR's adventures working the world with wire and CB antennas from Alaska to the tropics. *QST* readers are familiar with some of John's radio exploits, and here are more stories for your enjoyment. 48 pages, 8.5 × 11 inches. Price: $12.99. Available from **www.lulu.com/product/paperback/pacific-and-caribbean-dx/16247513**.

A Four Tone SSB Test Generator

Really see what your transmitter is putting out with this handy piece of test gear.

Dave Lyndon, AK4AA

A customary method of testing single sideband (SSB) transmitters and linear amplifiers is the two-tone test. It requires two low distortion audio sine waves of equal amplitude to be input simultaneously. There is also a very convenient two-tone test for adjusting the carrier oscillator frequency to match the actual passband of an SSB filter. I suspect that most hams don't have two audio signal generators and a means of mixing them together linearly, so a self-contained multi-tone oscillator to do both of those jobs would be a handy addition to the ham shack or test bench.

A Simple Solution

The Wein bridge oscillators shown here produce low distortion audio at 300, 700, 1900 and 2700 Hz. Any of those frequencies can be selected individually, or they can be output in pairs of 300 or 700 and 1900 or 2700 Hz. The 700 and 1900 Hz pair is used for conventional two-tone transmitter testing. The two equal amplitude signals' frequencies are not harmonically related, and both fall well within the pass region of the typical SSB filter. If the transmitter is properly adjusted, their relative amplitudes remain equal with low distortion throughout the transmitter chain.

The 300 and 2700 Hz pair of signals with equal amplitudes provides a convenient method for setting the carrier oscillator frequency in a filter type SSB transmitter such that equal amplitude outputs on the slopes at the upper and lower cutoff frequencies of the filter passband are obtained. In both cases the output of the transmitter is observed on an oscilloscope, and the transmitter adjusted to produce the SSB modulation envelope shown in Figure 1. The desired pattern occurs when the two frequencies are of equal amplitude and low distortion at the point of measurement. Figure 2 shows one output of an incorrectly adjusted transmitter.

Although 300 to 2700 Hz is a typical bandwidth for SSB crystal filters, it could be different in some radios and if so, one or both frequencies might need to be adjusted accordingly. The frequency of oscillation is inversely proportional to the RC product in the bridge arms.

The Generator Circuit

The circuit consists of two oscillators, a linear adder and a low impedance output stage, all of which are configured with a single integrated circuit, an LM837N quad operational amplifier, and a single MPF102 JFET transistor. This high gain, low noise, wide bandwidth IC is overkill, but at $0.64 per unit (from Mouser) it's an offer you can't refuse.[1] The oscillators are Wein bridge circuits that can provide sine waves with as little as 0.1% harmonic content following proper adjustment.[2] A block diagram of the generator is shown in Figure 3.

[1]Notes appear on page 41.

Oscillator Circuit

The oscillators are stabilized by miniature lamps (B1, B2) with proportional resistance versus current characteristics. Once the feedback loop is adjusted to the proper level with its variable resistor (R1, R2), the lamp's resistance increases to lower the output if too much current flows through it, and decreases if too little, keeping the output level constant. With a ±4.5 V power supply, the stable output levels of the oscillators will be about 1 V_{RMS} after adjustment.

Op Amp Adder Circuit

The op amp adder gives the desired output by adding the two inputs without intermodulation, so only the input frequencies appear in the output. The adder has negative gain to reduce its output to about 100 mV and it is exceptionally linear due to the high degree of negative feedback. The final output level is adjusted with a voltage divider and potentiometer preceding the driver stage in order to lower the output to microphone level.

Source Follower Output Driver

It was tempting to use the fourth available op amp on the IC as a voltage follower output driver, but it would become unstable if the load had a significant reactance. So an MPF102 source follower is used to drive the load. It is capacitor coupled to the RCA output jack with a 10 µF tantalum capacitor to allow for differences in dc levels at the tester output

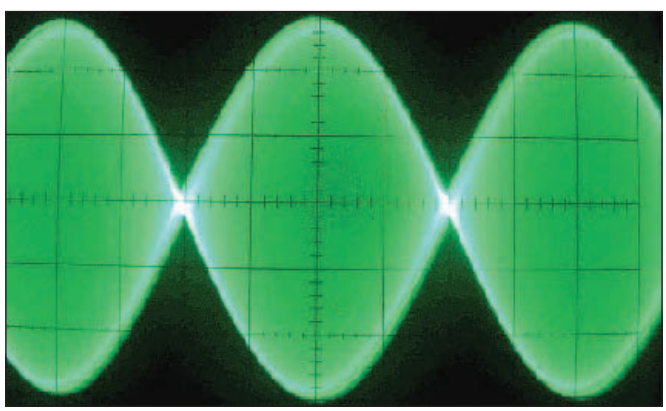


Figure 1 — SSB modulation envelope from the output of a properly adjusted transmitter with two-tone test input.

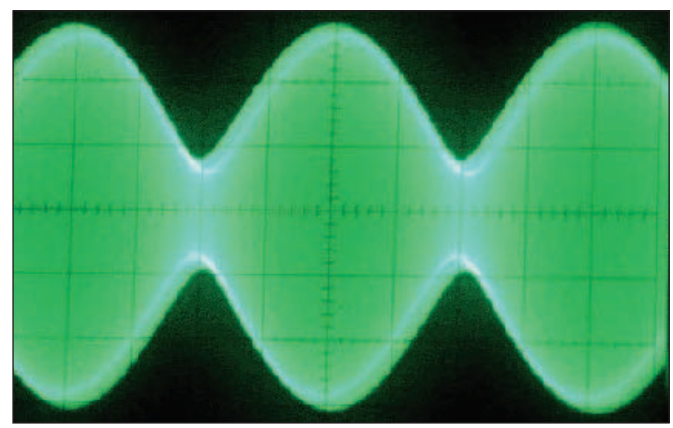


Figure 2 — One type of SSB modulation envelope from the output of an improperly adjusted transmitter.

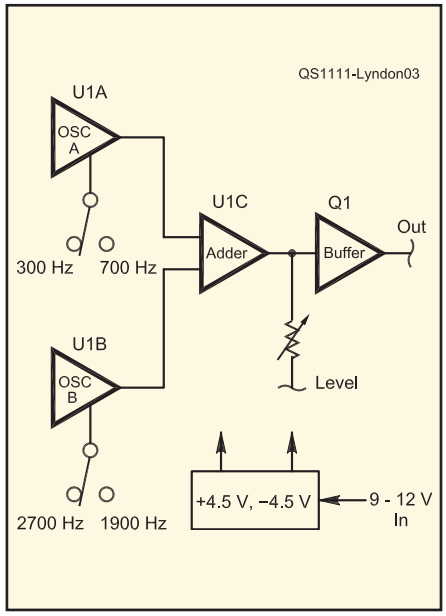


Figure 3 — Block diagram of the four-tone test generator.

and the transmitter input. This value of capacitance provides the low impedance, about 50 Ω, required at the lowest output frequency, 300 Hz, assuming a 600 Ω or higher load.

Most transmitters have high impedance microphone inputs requiring about 5 to 25 mV input levels, so the adder and level control reduce the output to that range. If a higher output level is required, the gain of the adder can be altered by changing the 1500 Ω feedback resistor to a higher value (less negative feedback); or the fixed resistor in the voltage divider at the input to the JFET source follower can be a smaller value, even zero.

Power Supply Options

If you happen to have a dc power supply that provides around +5 and –5 V, it can be used to power the tester. Alternatively a plug-in 6 V dc power block could be used, as long as its output is isolated from the ac line. Because of the light load, about 70 mA, it will deliver about 9 V. That voltage

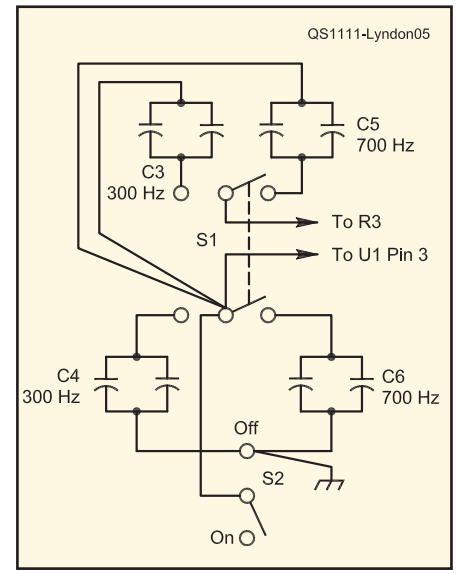


Figure 5 — Sketch showing wiring technique used to mount capacitors to S1 and S2 switch terminals. Only two wires are needed between switch and PC board.

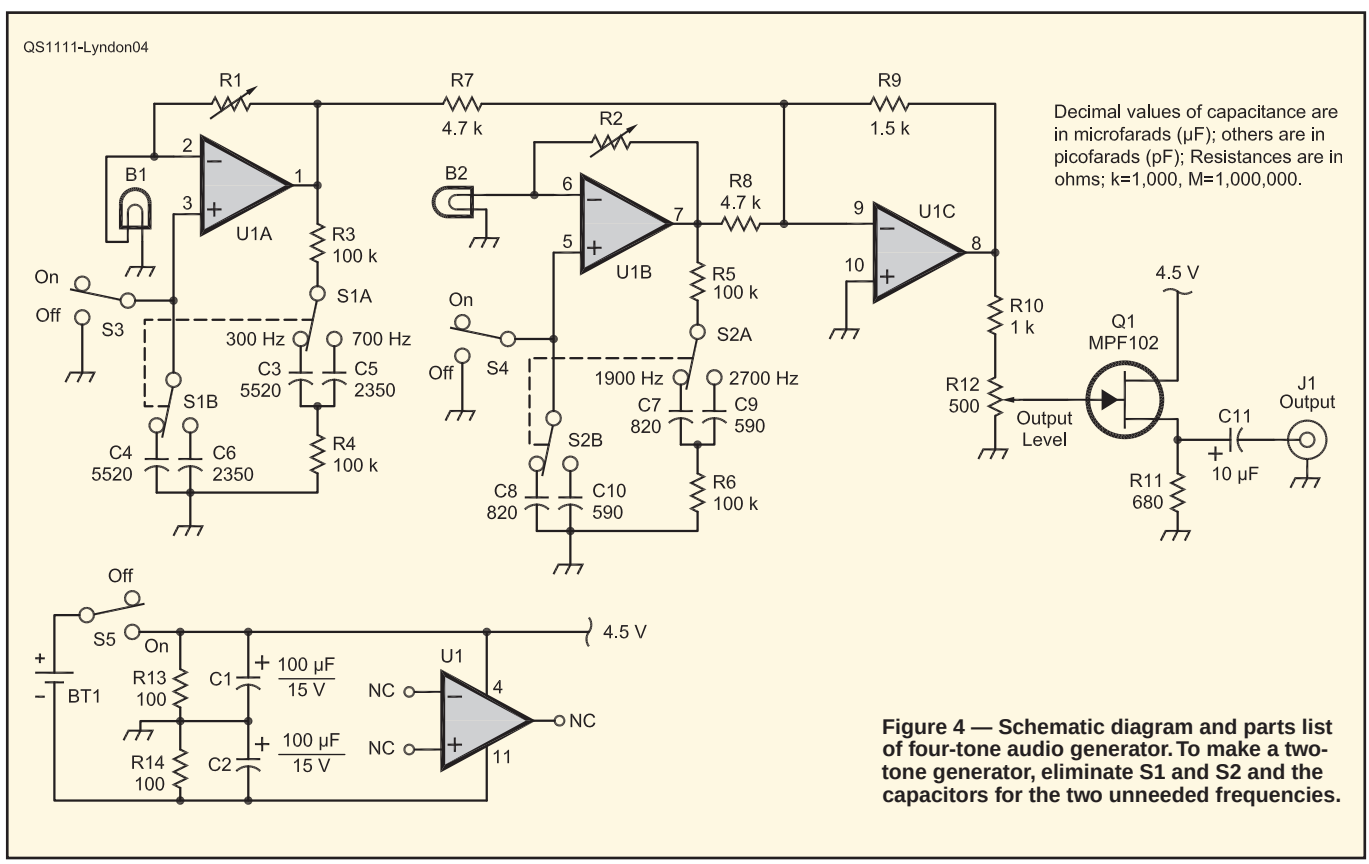


Figure 4 — Schematic diagram and parts list of four-tone audio generator. To make a two-tone generator, eliminate S1 and S2 and the capacitors for the two unneeded frequencies.

B1, B2 — 12 V, 25 mA bulb (RadioShack 272-1092).
BT1 — 9 V alkaline battery.
C1, C2 — 100 μF, 15 V electrolytic capacitor.
C3, C4 — 5520 pF, 4700 and 820 pF NP0 disc ceramic or polypropylene capacitors in parallel.
C5, C6 — 2350 pF, 2200 and 150 pF NP0 disc ceramic or polypropylene capacitors in parallel.
C7, C8 — 820 pF NP0 disc ceramic or polypropylene capacitor.
C9, C10 — 590 pF, 470 and 120 pF NP0 disc ceramic or polypropylene capacitors in parallel.
C11 — 10 μF, 35 V tantalum capacitor.
J1 — RCA feedthrough type jack.
Q1 — MPF102 field effect transistor.
R1, R2 — 500 Ω, 10 turn potentiometer.
R3-R6 — 100 kΩ, ¼ W, 1% resistor.
R7, R8 — 4.7 kΩ, ¼ W, 1% resistor.
R9 — 1.5 kΩ, ¼ W, 5% resistor.
R10 — 1 kΩ, ¼ W, 5% resistor.
R11 — 680 Ω, ¼ W, 5% resistor.
R12 — 500 Ω potentiometer.
R13, R14 — 100 Ω, ½ W, 5% resistor.
S1, S2 — DPDT toggle switch.
S3-S5 — SPDT toggle switch.
U1 — LM837N quad op amp integrated circuit.
Printed circuit project board (RadioShack 276-170).
Aluminum project box, 5 × 3 × 2 inch (RadioShack 270-238).

is split to ±4.5 V by the input voltage divider. After first building the tester with an external power supply, I found it inconvenient to deal with the long power cord, so I decided to use a 9 V battery instead. A typical 9 V alkaline battery has a capacity of about 800 mAh, which will provide 10 hours of continuous operation. As a practical matter, the tester would be used only occasionally for just a few minutes at a time, so the battery should last for years in a typical ham shack. An ON-OFF switch is included to conserve the energy of the battery when not in use.

The two 100 Ω, ½ W resistors in series across the 9 V input are grounded at their intersection to provide a voltage divider with equal plus and minus voltages to ground at half the battery voltage. The 100 µF electrolytic capacitors provide decoupling for stability. The plus and minus voltages are connected to pins 4 and 11 of U1 respectively. The MPF102 uses only the positive voltage, thus creating a slight imbalance across the voltage divider, but it is not significant.

Note that the unit will be "floating" with respect to your equipment ground, so it is necessary to provide a ground connection to the unit under test and the scope, and that is accomplished with the output RCA plug shield connection when connected to the transmitter. A separate ground connection from the generator case to your system ground might be needed to reduce noise, but I did not find it necessary.

Construction

The circuit is constructed on a printed circuit project board trimmed to fit in a 5 × 3 × 2 inch aluminum project box. The PC board is described as solderless, but it is important to solder all connections anyway, for reliability. It is attached with sheet metal screws to a pair of right angle rails at each end that are attached with sheet metal screws to the sides of the aluminum chassis. The rails are cut from flat aluminum stock and bent to shape in a vise.

Note that the PC board has continuous bus line traces along each long side in two sections each, and the four sections are connected with bus wire. These become the ground path for wiring on the board. The power supply voltage divider, filter capacitors, the LM837N IC, the MPF102 JFET, the power supply and voltage divider resistors, and the oscillator feedback potentiometers are mounted on the PC board. The feedback pots, R1 and R2, are 10 turn miniature PC mount components whose adjustment must be fairly precise, so single turn potentiometers would be touchy and possibly unstable.

For each oscillator frequency, closely matched resistor-capacitor pairs are used in the Wein bridge arms. The capacitors are not standard values with a single exception. They are made by soldering standard value capacitors in parallel as noted on the schematic diagram, Figure 4. They differ slightly from theoretical values and were determined experimentally. One of the oscillators on the PC board can be used as a test oscillator temporarily to verify capacitor values needed to produce the correct frequencies, but the values shown in the schematic should be close enough for this application if a frequency counter is not available. The measured frequencies were within 5% of the desired values using the standard capacitor values shown in the parts list on the schematic. NP0 disc ceramic or polypropylene capacitors are recommended for long term stability.

The capacitors for the Wein bridge oscillators are soldered directly to the terminals of the DPDT toggle switches on the front panel. For convenience and access they are wired to the switches before mounting on the panel along with connecting wires to the PC board. This reduces the number of connecting wires to just two for each oscillator switch, plus a ground wire from the PC board's ground bus to each of the oscillator ON-OFF switches, to which the grounded ends of oscillator capacitors are also connected. The six connecting wires to the

Making it Play

In order to use the test generator to look at transmitter distortion, use an oscilloscope and coupler as shown in Figure A. Make all connections with shielded audio cable or coax with appropriate connectors as required.

The output of the four tone generator is fed to the microphone input of the transmitter or transceiver under test. Adjust the MIC GAIN for desired power output. For a standard two tone test (as described in *The ARRL Handbook*) set for full rated power to observe distortion at maximum power. For carrier point adjustments only a small sample is required, and power may be set to 50% or less. Adjust the USB and LSB carrier frequencies in turn for the desired display.

A small sample of the power output waveform is taken from a coupler between the transmitter and the dummy load or antenna. A directional coupler, a power meter with sample output or a VSWR detector's reverse voltage. If none of those is available, a simple capacitive voltage divider as shown in Figure A may be used as shown by using a T coax connector. The capacitor values are not critical but must be able to withstand a peak voltage of about 100 V at 100 W. Note that the ground connection for the divider is made at a coax shield. The output of the coupler or divider is fed to the VERTICAL INPUT of the oscilloscope. Expect about 2 V_{P-P} with the values shown at 100 W.

Set the vertical gain as needed for a suitable display. The sweep frequency should be set to about 0.1 ms/cm, then locked in with the trigger set to vertical input and adjusted for a stable display. A bit of experimenting will be required since no two scopes are alike.

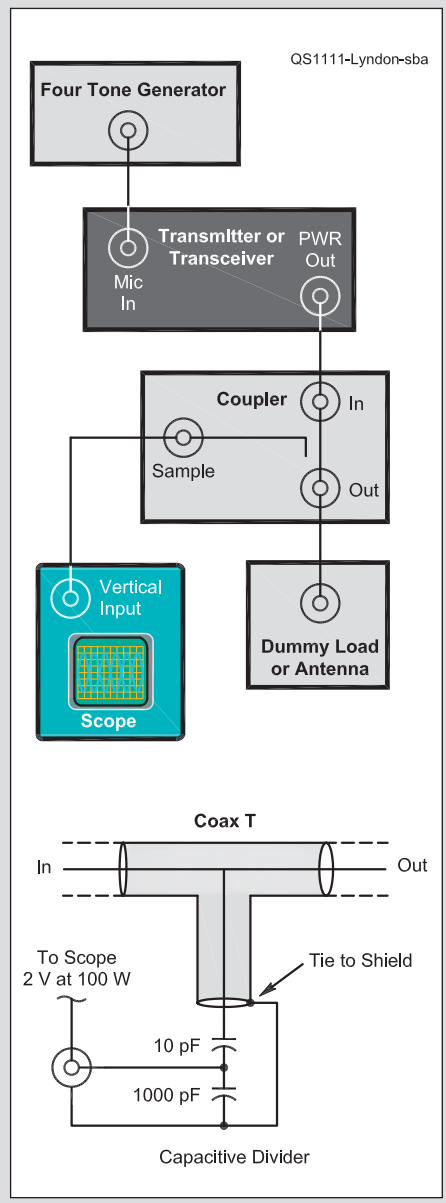


Figure A — SSB transmitter test setup. Use shielded wire or coax cable for connections.

board are long enough to allow its removal if servicing should be required. A sketch of the connections is provided in Figure 5 for the 300/700 Hz switch. The 1900/2700 switch is wired similarly with its capacitors.

The feedthrough type RCA jack is grounded to the box, and its ground lug is wired to the PC board ground bus. This single point connection to the box minimizes the possibility of ground loops. Figures 6 and 7 are external and internal views of the completed four-tone generator.

Alignment and Use

Initially the feedback resistors, VR1 and VR2, should be set at about midpoint. The oscillator outputs will be almost a square wave as the output swings between the plus and minus rail voltages. Negative feedback is increased by varying the feedback potentiometer until a good sine wave is seen on the scope and continued until oscillation stops due to too much negative feedback. From that point, decrease the feedback until oscillation resumes and go a full turn farther for reliable start-up and stable output.

Note that the oscillator amplitude will search up and down for about a second during startup or frequency change, but it stabilizes nicely after that. With ±4.5 V dc supply voltages, the levels at the oscillator outputs, pins 1 and 7 of U1, will be about 3 V_{P-P}. That is only 30% of the rail-to-rail supply voltage and yields very low harmonic distortion.

With the front panel output level control at maximum, the single frequency amplitude at the output jack is about 30 mV_{RMS}. To adjust the generator, enable the 300 Hz and 2700 Hz frequencies singly in turn, and adjust their feedback pots for equal amplitudes. They can easily be set to be within 0.5 dB (about 5% voltage difference) with an oscilloscope or RMS voltmeter. The levels remain essentially unchanged on other frequencies.

In actual use this generator allows convenient and precise SSB transmitter adjustment. It produces four low distortion sine waves singly or in pairs at microphone level, and it is sure to find frequent application by the radio amateur, experimenter or repair facility. It is a rewarding weekend project.

Hamspeak

JFET — Junction field effect transistor. Transistor type characterized by high input and output impedances. If configured as a source follower, the output impedance is low.

Linear amplifier — An amplifier that provides a constant multiple of the input signal resulting in a larger copy of all original input signals, and no additional signals, at the output. This is the ideal case for many types of amplifiers. All real amplifiers exhibit some distortion products, generally increasing with larger input signals.

Operational amplifier — An integrated circuit that contains a symmetrical circuit of transistors and resistors with highly improved characteristics over other forms of analog amplifiers. Often referred to as an op amp.

SSB — Single sideband. A standard amplitude modulated (AM) transmitter sends out a steady *carrier* signal surrounded by two *sidebands* containing the broadcast information. Both the upper (USB) and lower (LSB) sidebands contain the same information, so a more efficient transmission mechanism is provided by just sending one of the sidebands and applying the carrier in the receiver. This is the most common amateur voice transmission system used on our HF bands.

Figure 6 — Front panel of test generator. The OUTPUT jack (J1) and POWER switch (S5) are on the bottom. The knob adjusts R12, the OUTPUT LEVEL control.

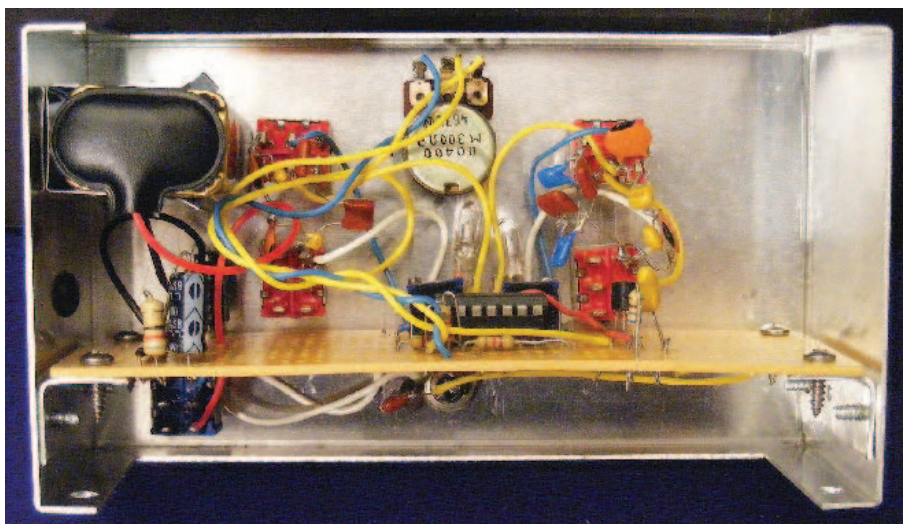


Figure 7 — Inside view of the generator. Note the PC board mounting technique.

Notes

[1]**www.mouser.com**

[2]Mancini and Palmer, *Sine Wave Oscillators*, TI Application Report SLOA60, Mar 2001, section 8.1 Wein Bridge Oscillators.

ARRL member and Amateur Extra class licensee Dave Lyndon was first licensed as K4IRQ in 1956. He subsequently held call signs WA2JGJ and OX5AB, and presently is AK4AA. Prior to retirement, Dave was occupied in both engineering and management positions in the aerospace industry specializing in naval radar systems. Educated as a physicist, he was licensed in California as a Professional Engineer in the electrical specialty.

Since retirement in 2000, he has been active as an instructor at community colleges in the Asheville, North Carolina area. Filling his current schedule is the repair and refurbishment of amateur equipment for other hams. Dave has written other articles for ARRL publications. You can reach Dave at 85 Woody Farm Rd, Hot Springs, NC 28743-7224 or at **ak4aa36@gmail.com**. *Dave also has a website at* **www.oldhamdave.com**.

Internal Full Break-in Keying Interface for the ALS-600 Amplifier

Add full CW break-in (QSK) to this popular amplifier without going outside the box.

Phil Salas, AD5X

I enjoy CW full break-in (QSK) operation with my QSK modified Ameritron ALS-600 as described in an earlier *QST* article.[1] I've learned, however, that there is a potential timing issue that can occur while operating QSK with some transceivers. The keying interface described here makes QSK more compatible with all transceivers.

QSK Unkey Timing

A QSK timing issue can occur with any transceiver that unkeys the amplifier *before* the transceiver's RF output decays to zero. Normally the transceiver's RF output should decay to zero and then the AMPLIFIER ENABLE line should go high. But if the AMPLIFIER ENABLE line goes high prematurely, hot switching of the transceiver or amplifier outputs can occur. Key clicks typically occur with a relay based QSK switch since the relays take about 5 ms to operate, giving the RF time to at least partially decay. PIN diode or high speed vacuum relay QSK switches are faster, so switching could occur at much higher power levels, which could cause switch, amplifier or transceiver damage.

I am not sure how many transceivers have the premature amplifier release issue. This does occur with the ICOM IC-706 and IC-7000, and with the Ten-Tec OmniVI, if using the TX-OUT/TX EN solid state interface for QSK amplifier keying.[2,3] Of course, transceivers with this premature amplifier disable issue can be operated semi break-in, but it would be nice if you could add a little delay to the QSK release time if necessary. This is the main purpose of the circuit described in this article.

Other Improvements

This interface is also designed for either closure to ground or +12 V dc keying. Kenwood radios provide a relay contact closure to ground for amplifier keying. They also provide a +12 V dc solid state output on transmit. Many folks would rather not use an internal relay for amplifier keying, especially while operating QSK.

It would also be nice if the amplifier keying interface could be a low current, low voltage interface. As an example, the normal keying requirement for the ALS-600 amplifier is about 100 mA (12 V dc open circuit voltage). Some transceivers can't

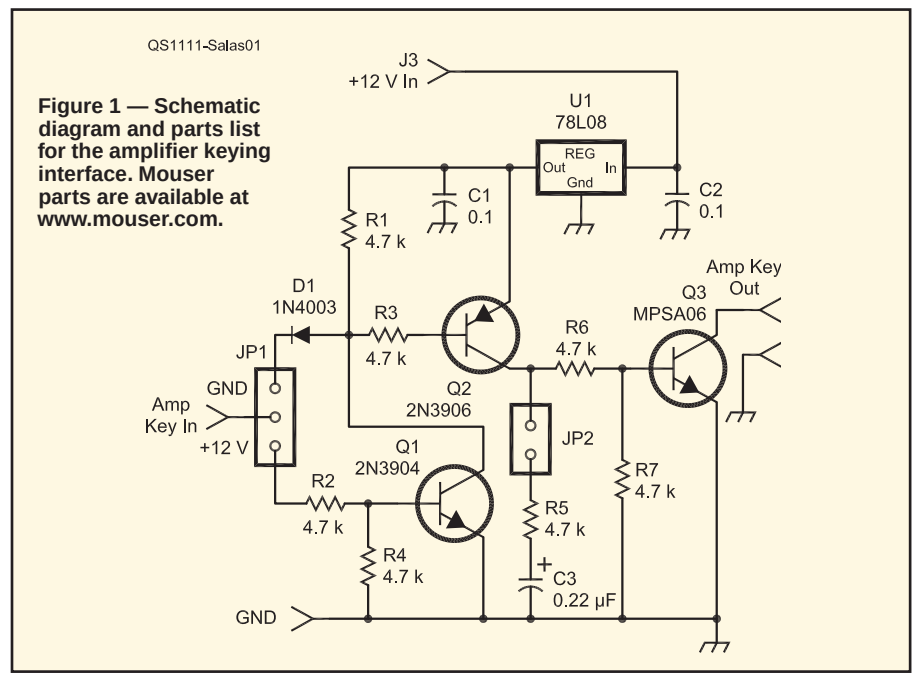


Figure 1 — Schematic diagram and parts list for the amplifier keying interface. Mouser parts are available at www.mouser.com.

C1, C2 — 0.1 µF, 100 V capacitor (Mouser 581 SR211C104KAR).
C3 — Electrolytic timing capacitor, 0.22 µF for 5 ms delay (Mouser 647 UFG1HR22MDM), 0.33 µF for 7.5 ms delay (Mouser 647 UVZ1HR33MDD) or 0.47 µF for 10 ms delay (Mouser 647 UKW1HR47MDD).
D1 — 1N4003 diode (Mouser 863 1N4003G).
JP1 — Three pin header (Mouser 538 90120 0123) and jumper (Mouser 538 15 29 1024).
JP2 — Two pin header (Mouser 538 90120 0122) and jumper (Mouser 538 15 29 1024).
Q1 — 2N3904 NPN transistor (Mouser 512 2N3904TA).
Q2 — 2N3906 PNP transistor (Mouser 512 2N3906TA).
Q3 — MPSA06 transistor (Mouser 512 MPSA06).
R1-R7 — 4.7 kΩ, ¼ W resistor (Mouser 660 MF1/4LCT52R472J).
U1 — 78L08 regulator IC (Mouser 863 MC78L08ACPG).
The following part is used for mounting the PC board in the author's ALS-600:
Threaded L bracket, #4 (Mouser 534 621).
The following parts are only needed for an externally housed universal keying interface:
Aluminum box, 1.5 × 2.25 × 1.375 inch (Mouser 537 M00 P).
J1, J2 — RCA jack (Mouser 161 0253 EX).
J3 — Coaxial dc power jack, 2.1 × 5.5 mm (Mouser 163 1060 EX).

[1]Notes appear on page 44.

directly key this amplifier, and so require an external keying interface. Further, the ICOM IC-706/7000 transceivers output a +8 V dc signal on the HSEND amplifier control output when in receive, and so could have problems with an open amplifier keying dc voltage much above this.

The Interface

Figure 1 is the schematic of the interface. The unkeyed input open circuit voltage is less than 8 V dc, and the current required to key the unit is less than 2 mA, well within any transceiver's amplifier drive capability. JMP1 provides a GROUND TO KEY or +12 V TO KEY strapping option. JMP2 provides additional turn off delay for transceivers with a premature amplifier release output. I use 5 ms (provided by the 0.22 µF delay capacitor) as my relay based QSK unit takes 3-5 ms for the relays to operate. So the total delay is 8-10 ms.

For a different amplifier that has a high speed vacuum relay, increase the delay to 7.5 ms by changing the delay capacitor to 0.33 µF. For PIN diode QSK switching, the delay capacitor should be changed to 0.47 µF to increase the delay to about 10 ms. Figures 2 and 3 show oscilloscope traces of the normal unstrapped (no delay) and 5 ms strapped delayed turn off time (the oscilloscope is triggered with the positive-going AMPLIFIER DISABLE line). Frankly, unless you are absolutely sure that your transceiver doesn't have a premature amplifier release output, you should leave this delay strapped in.

Adding 5 to 10 ms of between element delay to your Morse characters will be noticeable to only the highest CW speed operators. As an example, the length of the space between Morse elements within a letter in milliseconds is 1200/WPM. So at 40 WPM, this interelement gap is 30 ms. A 10 ms reduction (5 ms relay operate time plus 5 ms added turn off delay) in receive time between elements would be hardly noticeable at this speed.

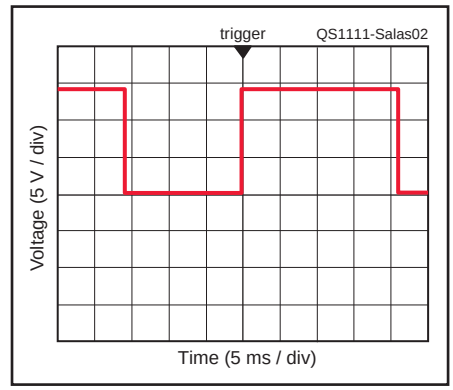


Figure 2 — Timing diagram with no added delay.

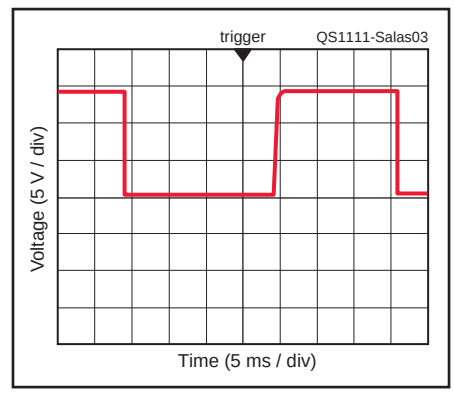


Figure 3 — Timing diagram with 5 ms added delay (0.22 µF capacitor at C3).

Construction

The complete parts list is shown in the caption of Figure 1. I implemented the circuit on a printed circuit board, though it is easily built on a small piece of perf board.[4] The connection points and component locations for my PC board are shown in Figure 4. The #4 threaded standoff provides the PC board mount as well as a dc ground. The strapping shown is GROUND TO KEY (JMP1), and DELAY (JMP2). For Kenwood +12 V solid state keying, slide the JMP1 strap down to the lower two pins.

You can build this interface as a standalone interface, making it usable with any amplifier that has an open circuit keying voltage of up to +80 V dc and a keying current of 0.5 A or less. Figure 5 shows the standalone unit built into a small aluminum project box.

Back in the Box

My final solution was to build the keying interface directly inside my ALS-600 amplifier. I added a threaded L bracket to the standoff (Figure 6) for ease in mounting.

In the ALS-600, a blue wire connects the back panel amplifier keying jack to J4 on the bottom amplifier PC board. Cut this blue wire close to J4 and solder the left wire to the AMP KEY IN point on the keying interface board. Solder the right (J4) blue wire end to the AMP KEY OUT on the keying interface board. The 12 V dc operating voltage is spliced into the white wire connected between J4 and the back panel 12 V accessory connector. The added mounting hole,

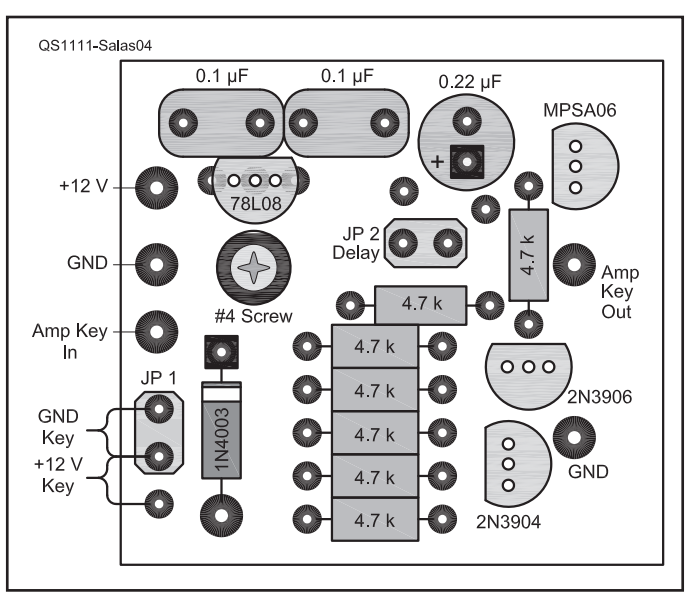


Figure 4 — PC board parts layout.

Hamspeak

CW — Continuous wave. Term for the on-off keyed signaling associated with radiotelegraph transmission.

Full break-in (QSK) — Radiotelegraph operation in which the sending operator can listen to the channel in between sent dots and dashes. This enables the other operator to "break-in" to ask for a repeat or a clarification. It also allows the sending operator to adjust speed or suspend operation in the presence of noise or interference.

Hot switching — Opening the contacts of a switch or relay while current is flowing. Necessary in some applications, as turning off a light, in others can result in unneeded burning of contacts or other transient effects.

Printed circuit board (PCB) — Wiring methodology in which a copper clad board is etched to remove undesired copper leaving connection paths for electrical connections between parts.

Transceiver — Radio transmitter and receiver combined in one unit. In many cases some circuitry is shared between the two functions.

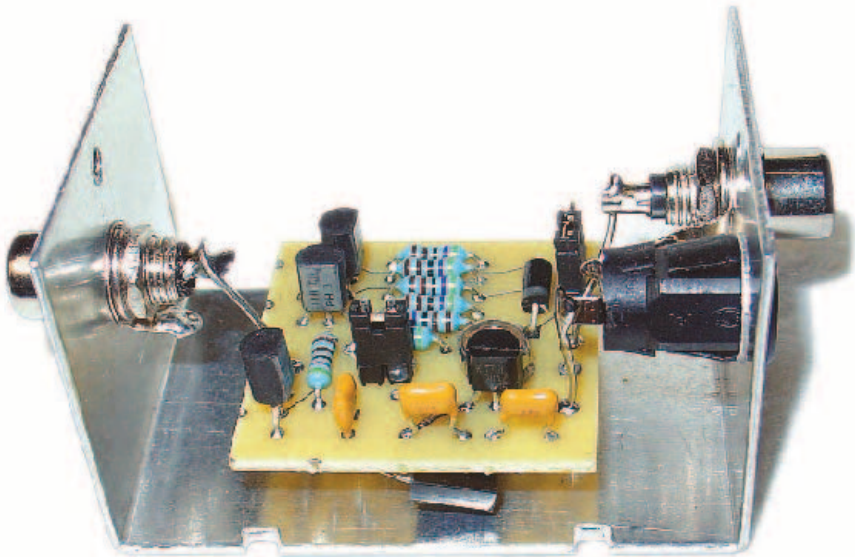


Figure 5 — Internal view of standalone version of the interface.

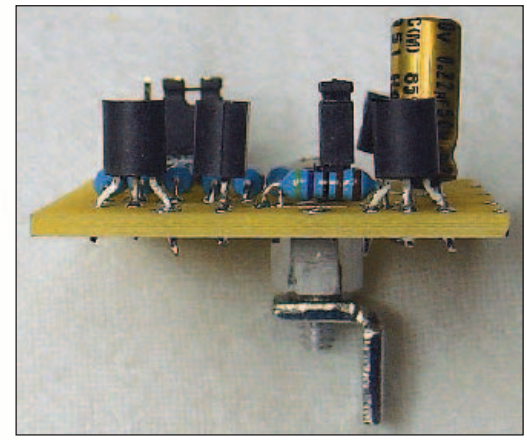


Figure 6 — Threaded L bracket added to standoff

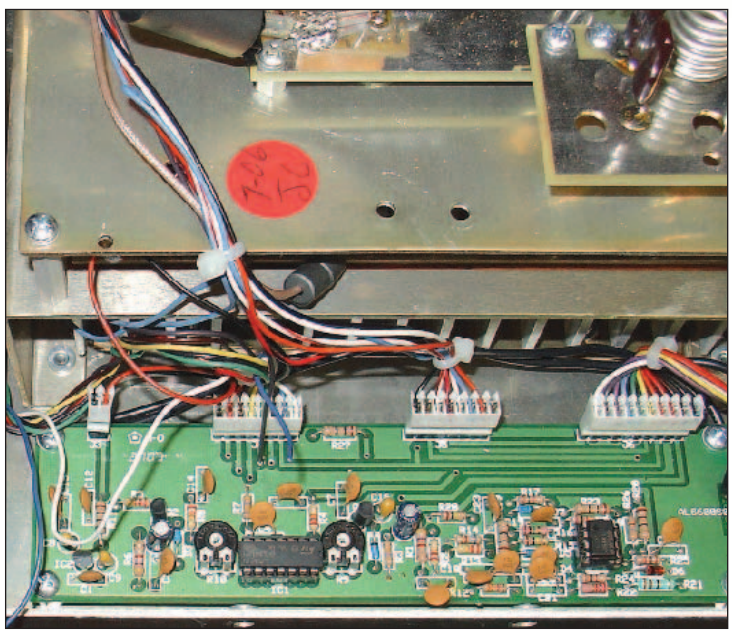


Figure 7 — Mounting hole (⅛ inch) added by upper left screw. Blue (amplifier key) and white (+12 V) wires are at lower left. The blue wire has already been cut.

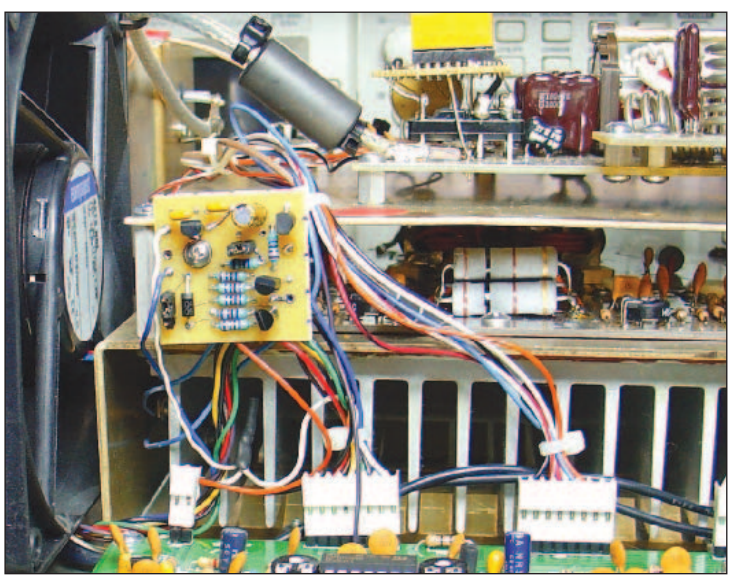


Figure 8 — Keying interface mounted in place in author's QSK modified ALS-600.

the cut blue wire and the soon to be cut white wire are seen in Figure 7. Figure 8 shows the keying interface PC board mounted in the ALS-600.

Conclusion

I've described a flexible keying interface that will work with most amplifiers. This unit provides a low current keying interface, the option for either ground or +12 V keying and turn off delay while using QSK amplifiers and a transceiver with a premature amplifier disable signal. Give this circuit a try if you have the need for any of these features.

Notes

[1]P. Salas, AD5X, "Low Cost QSK Conversion for the Ameritron ALS-600 Amplifier," *QST*, Jun 2009, pp 47-50.
[2]**www.bnk.com/w0qe/amplifier_timing.html**
[3]R. Monroe, K7NTW, Sidebar "Transceiver to Amplifier Relay Interface," *QEX*, Mar/Apr 2009, p 6.
[4]The printed circuit board is available from ExpressPCB (**www.expresspcb.com**). Use the artwork file on **www.arrl.org/qst-in-depth**.

Frequent QST *author and ARRL Life Member Phil Salas, AD5X, has been an active ham since he was first licensed in 1964. He obtained BSEE and MSEE degrees from Virginia Tech and Southern Methodist University respectively, and spent the next 33 years holding positions from design engineer to vice-president of engineering in microwave and lightwave development. Now fully retired, Phil enjoys spending all his time with his wife Debbie, N5UPT, along with continued tinkering with ham related projects.*

You can reach Phil at 1517 Creekside Dr, Richardson, TX 75081 or at **ad5x@arrl.net**.

A 160 or 80 Meter Downspout Vertical

It doesn't get much stealthier than this — make your downspout do double duty.

Dave Holdeman, N9XU

The Past

While cleaning out the basement, I ran across some old notes and logs from 1958 and 1959, my Novice days. What caught my attention was the antenna I used back then. I believe it came from an old article from *Popular Electronics* magazine. It consisted of a 12 foot piece of 2 × 2 inch lumber with holes drilled through it every 1.5 inches. Wire sized #14 AWG was then run in and out of the holes from one end of the 2 × 2 to the other. This made the electrical length of the antenna longer.

On one end I mounted a copper toilet bowl float for a capacitance hat and on the other end I attached an old military surplus inductor that I equipped with taps. I mounted the whole affair vertically on the side of the house with the capacitance hat up and proceeded to work 46 states, mostly on 40 meters.

The Present

The fine article by Greg Crossman, WEØD, in the August 2010 issue of *QST* stirred my thinking and caused me to consider an antenna for 160 meters, a band that I had never worked.[1] While I didn't need a stealth antenna as Greg did, I liked his idea of using an electrical junction box to terminate his antenna radials. Greg's article also made reference to the excellent article by Rudy Severns, N6LF, on ground radials for HF vertical antennas.[2] That was all it took to get me started.

Overview

I wanted to construct the antenna out of lightweight material that could be built and put into position by one person. I also liked the in and out feature of the old 2 × 2 antenna wire and the simplicity of the toilet bowl float as a capacitance hat. Coincidentally, my son and I had just finished a sun porch addition to the house, which we equipped with 2 × 3 inch plastic downspouts. I decided to build the antenna using two 10 foot sections of that material.

The top section would contain the capacitance hat and the bottom section would contain a base loading coil and electrical junction box to terminate the ground radials in a manner similar to that described in Greg Crossman's article. I was unsure how I was going to build and mount the base coil, but a trip to the hardware store solved that and other problems.

Figure 1 — View of the toilet bowl mounting flange and small joiner as purchased. Note that the PVC toilet bowl mounting flange has a stainless steel ring around the outside with six holes.

Figure 2 — Assembled PVC flange with attached capacitance hat.

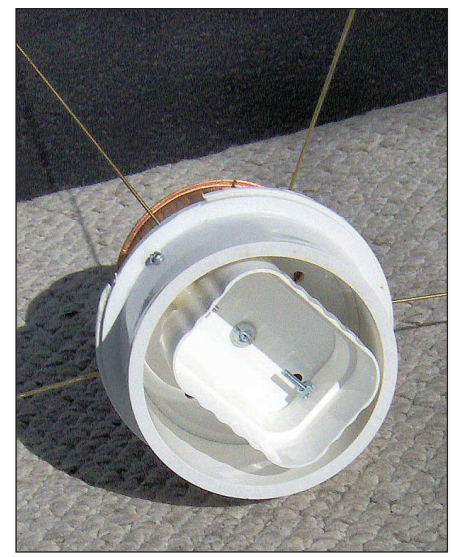


Figure 3 — Bottom view of the capacitance hat assembly.

The Hardware Store

I am always amazed at what one can find at a hardware store that is adaptable to ham radio. I first went to the electrical section and picked up a 500 foot roll of #14 AWG stranded wire, an electrical box, two 8 foot ground rods and four ground clamps. I then headed for the plumbing section and happened to spot a toilet bowl mounting flange made of heavy PVC. This could be used to mount the capacitance hat and six hat radials made out of 1/16 inch brass rod that I found at a hobby shop. I looked for a copper toilet bowl float, but only found plastic ones until I went to a store that had been around for a long time and had old stock.

I found the downspouts and two types of

[1]Notes appear on page 48.

joiners that are normally used to connect two downspout sections end to end. One type of joiner was socketed and that was the one I used to join the two sections. I put the two sections and the joiner together and picked up the whole assembly by the middle. While the ends drooped, it appeared that by strategic use of self-tapping screws, the joint would hold, especially if mounted vertically. I planned to use the other, shorter, joiner to mount the capacitance hat assembly.

I also needed something on which to wind my base coil. In the same area I noticed some round flexible downspout about 4¼ inches in diameter that could be stretched or compressed. This was ribbed and would hold coil turns firmly and neatly. I added two of those to my cart and headed for the checkout lane.

The capacitance hat consisted of the PVC toilet bowl mounting flange, the toilet bowl float, six brass rods for top radials and a short downspout joiner. See Figure 1 for a picture of the toilet bowl mounting flange and small joiner as purchased. You will note that the PVC toilet bowl mounting flange has a stainless steel ring around the outside with six holes. I covered the top of the PVC area with masking tape and drew lines from three of the six holes to their opposite number. Where the lines crossed is the exact center of the toilet bowl mounting flange. I drilled a hole at this point large enough to accommodate a ¼-20 machine screw. This will secure the copper toilet bowl float and top radials when assembled. I removed the masking tape. I then created six top radials 18 inches long from 1/16 inch brass rod by soldering a terminal lug with a ¼ inch hole to one end of each rod.

Adjacent to the holes in the stainless steel ring on the toilet bowl mounting flange, there is a circular ridge around the circumference of the PVC. I drilled six equally spaced 1/16 inch holes through the ridge right at the spot where the holes are in the stainless steel ring. These holes would be used to anchor the six brass rod radials. I then removed the stainless steel ring from the PVC as it was no longer needed. I temporarily bolted the toilet bowl float, radials and PVC flange together so it looked like the assembly shown in Figure 2. I still had to attach the capacitance hat to the top of the rigid downspout. I disassembled the capacitance hat so as not to damage the radials and turned over the toilet bowl flange. I drilled two holes in the side to attach the small downspout joiner. I used two long #6-32 machine screws, nuts, washers and plastic spacers. Refer to Figure 3 for a bottom view of the capacitance hat assembly. Reassemble the unit, carefully drill a couple of drain holes in the top, sit back and admire your work and lay the capacitance hat assembly aside.

I am sure that the antenna would work well without the toilet bowl float, but the top hat radials should remain. Since the toilet bowl float is a scarce item anyway, it could be eliminated. It could be replaced by an acorn nut and washer that would still hold the capacitance hat radials in place.

Figure 4 — The top section of the assembled antenna with the capacitance hat attached.

The Top Section

I moved my wife's car out of the garage and used that area to continue building the antenna. I took one 10 foot section of downspout and laid it across a pair of sawhorses with the wider side up. I ran a strip of masking tape down the length of the downspout and marked a spot every 1½ inches. I turned the downspout section over and did the same to the opposite side. I drilled holes in both sides large enough to accommodate the #14 AWG wire.

I removed the masking tape and threaded the wire in and out of the holes starting from one end and continued until I reached the other. I left about a foot of extra wire at each end. I determined which end of the downspout would be at the top and connected the wire to the top hat assembly using a ring terminal lug with a ¼ inch hole. I used PVC cement to secure the top hat assembly to the downspout, pushing the excess wire down into the downspout. The top section with the capacitance hat attached is shown in Figure 4.

The Base Coil Form and Bottom Section

The base coil is wound on a form made of two pieces of ribbed flexible downspout joined together. One piece of flexible downspout (as purchased) is shown in Figure 5. Each flexible piece has an end that was made to fit over the 2 × 3 inch rigid downspout. The other end of each flexible piece didn't match anything particularly well, so I cut those ends off both samples, using a sharp utility knife. I also cut off the 2 × 3 inch end of one of the flexible pieces.

I laid the remaining 10 foot section of rigid downspout on my sawhorses and slid the flexible piece of downspout that still had the 2 × 3 inch end on it over the rigid piece. This would become the top half of the base coil. I slid the remaining flexible downspout onto the rigid section and joined the round ends together to complete the base coil form. I found that one end slipped into the other snugly; I secured them with self tapping screws. I used white self-tapping gutter screws that matched nicely. You will find that the whole coil form assembly will slide up and down on the rigid downspout at this time. It will be affixed to the rigid downspout later.

The entire antenna assembly would be set in a 2 foot deep hole. I mounted an electrical junction box about 28 inches above the lower end of the bottom section. The junction box contains an SO-239 UHF coaxial jack on the bottom and a ceramic feed through insulator on the top. The junction box would also be used to terminate my radial field and ground rods later on.

Once the junction box was mounted, I secured the base coil form to the rigid downspout just above the ceramic insulator on the top of the junction box. I used self-tapping gutter screws at the top and longer self-tapping screws and plastic spacers at the bottom. Once the base coil form was attached, I drilled more holes 1.5 inches apart in the remaining part of the rigid section above the base coil form to pass the additional wire needed to connect to the upper section.

Winding the Base Coil and Final Assembly

The ribs on the base coil form are not spirally wound, but are concentric. I cut a notch in each rib to allow the #14 AWG wire to pass from one groove to the next. I staggered the notches so the coil windings would not bunch up in one spot on the form.

Winding the wire on the coil form was not difficult since the ribs held the wire nicely as I wound. Initially, I didn't have a clue as to the antenna's resonant frequency, so I wound as

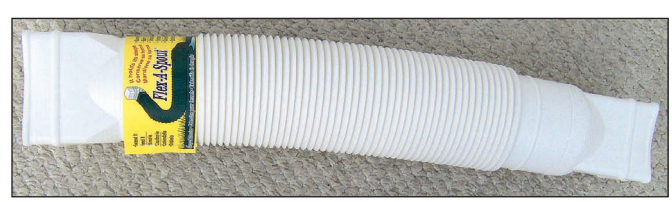


Figure 5 — The flexible downspout section used as a form for the loading coil.

many turns on the form as possible, figuring I could take excess turns off later as needed. The completed base coil is shown in Figure 6 and the junction box assembly is shown in Figure 7. Figure 7 also shows two of the 4 foot ground rods mentioned later on.

Erecting the Antenna

With safety in mind, I moved everything out of the garage into the backyard and supported the two sections on the sawhorses and a couple of lawn chairs, with the bottom end of the first section close to the hole in the ground that was to receive the base of the antenna. I connected the two sections together through the longer joiner and secured the joint with six self-tapping screws. I connected the wires together from the two sections with wire nuts. I put my extension ladder in place against the house rain gutter, with the base of the ladder close to the hole in the ground and made ready two large C clamps to temporarily hold the antenna upright.

I then horsed the antenna upright and the base slipped into the hole with a satisfying thunk. Using the C clamps, I temporarily clamped the antenna to the extension ladder and the upper section to the house rain gutter and stepped back to catch my breath. I loosened the C clamps alternately as needed and shifted the ladder in small increments to make the antenna as vertical as possible.

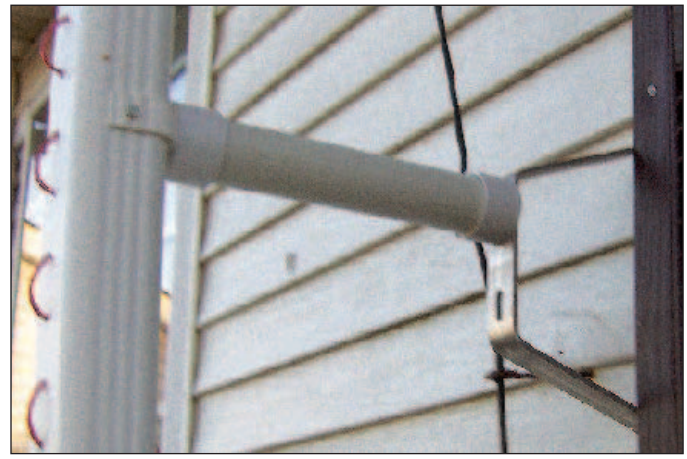


Figure 8 — A portion of the lower section and brace.

I bolted the antenna to the rain gutter using two long #6-32 screws, ¼ inch plastic spacers and airplane nuts. I filled the antenna hole in the ground with stones to make the bottom much more rigid and I breathed easier. I later added a brace made out of PVC pipe and an aluminum bracket between the house and the lower section. A portion of the lower section and brace is shown in Figure 8.

RF Safety and RFI

Any antenna that is built up against the house could radiate into an occupied area or subject people or animals outdoors to RF. It is thus particularly important to perform an RF safety assessment, as required by the FCC. I am running no more than 100 W of power output with low duty cycle CW and SSB operation, so RF exposure issues are not an issue at my station.

In addition, because of the proximity to the house and its systems, RF can couple into plumbing, power and communication wires or video cable lines. If the location of these can be ascertained, it is best to position the antenna as far from them as possible. When I had my house built, I had the contractor put the telephone and electrical wires into separate conduit. To date I have not experienced any RF problems.

Figure 6 — The completed base coil. Note the slits that allow the wire to transition between grooves.

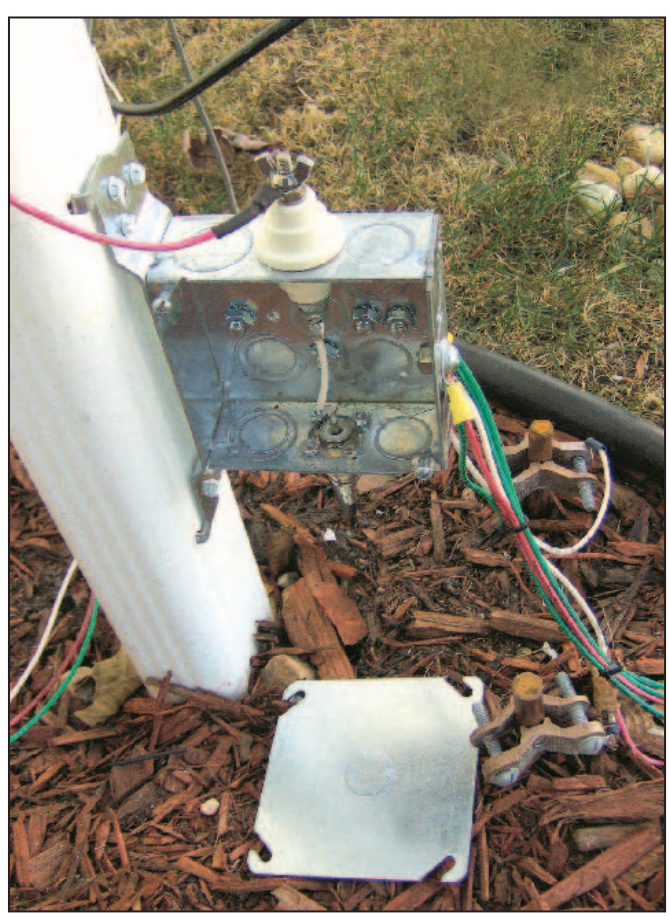


Figure 7 — The junction box assembly along with two of the 4 foot ground rods.

The Ground System

I buried five 160 meter radials with the first two running along the side of the house in opposite directions and around toward the front yard. The other three are more straight and conventional. Each 160 meter radial is 86 feet long and is buried about 6 inches in the soil. I made the radials of the same #14 AWG insulated stranded wire as is used in the antenna. This is shorter than the standard formula, but was the result of reading Rudy Severns' experiments on ground radials. I cut the two 8 foot ground rods in half and created four shorter ones out of the original two. (I have had sad experiences driving 8 foot ground rods down through Illinois clay.) I connected the radials and ground rods to the junction box and connected up my MFJ antenna analyzer, wondering where I would see a dip.

Resonance

I saw the start of a dip right at 1.6 MHz, the extreme end of the analyzer's range. I removed turns from the bottom end of the base coil until the indicator dipped at 1.845 MHz. Although I had a very pronounced dip, the analyzer showed only a 2.5:1 SWR with a 27 Ω impedance at that point. I took the analyzer into the shack and ran it through my MFJ

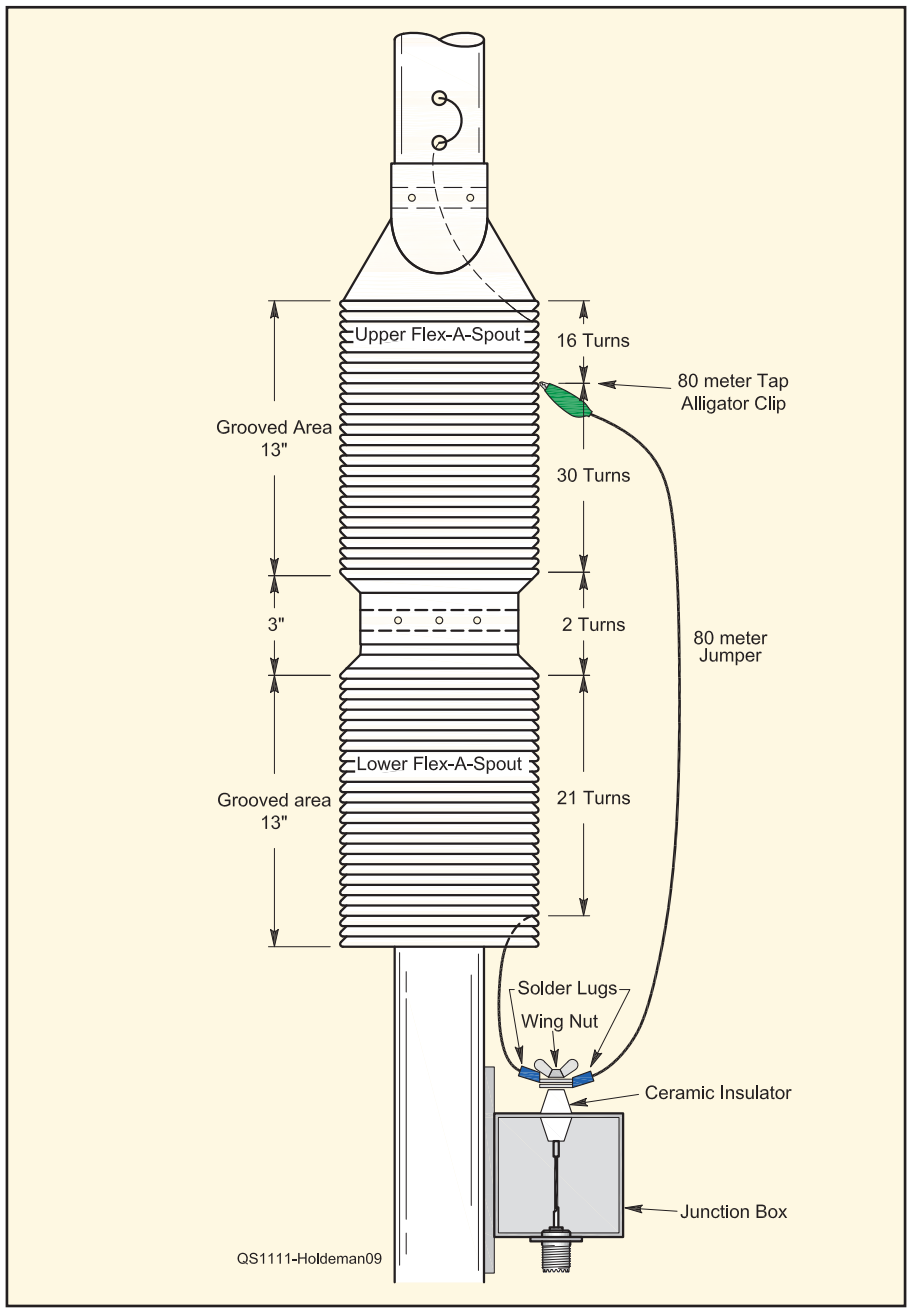


Figure 9 — The completed base coil showing the number of turns of wire required for both 160 and 80 meters.

949D antenna tuner. I was able to tune to a 1.1 SWR from 1.805 to 1.850 MHz.

The 80 Meter Option

I decided to see how my new addition would perform as an 80 meter antenna. I unwound turns from the bottom of the base coil until the analyzer showed resonance at the middle of the 80 meter band. The analyzer showed a very nice 1.1 SWR with an antenna impedance of 50 Ω at 3.825 MHz. With my antenna tuner, I was able to get a 1.1 SWR across the entire band. I marked that portion of the base coil with a wire nut and buried five more radials cut for 80 meters in between the 160 meter radials. These radials are 43 feet long and are also made of #14 AWG wire. I rewound the bottom portion of the base coil with new wire to get back to my 160 meter resonance point. I modified the top of my feed-through insulator on the electrical junction box with a wing nut so I could attach a jumper to connect to the 80 meter tap on the base coil as desired. Figure 9 depicts the completed base coil and the number of turns of wire required at my station for both 160 and 80 meters.

On the Air

I first tried out the antenna in the October Illinois QSO Party. I had worked several stations on 40 meters in the afternoon with my 40 meter G5RV, so after supper I dashed outside to set the 80 meter tap on the vertical. I worked eight stations on 80 meter CW in a short period of time. I was just getting warmed up, but the band suddenly started to go quiet and I realized that the contest was over. I didn't get a chance to work anyone on 160 meters that day, but I have worked several stations at random since the contest and I am happy with the results.

Possible Variations

If one were to construct the antenna with white wire, the wire would be barely noticeable. Elimination of the copper toilet bowl float, along with the wire change, would make it very nearly a stealth antenna.

If you are concerned about weather effects on the junction box, it is possible to obtain one made of ⅛ inch gray plastic with an airtight lid designed for marine applications. It also has four mounting tabs. One could mount an aluminum plate inside and terminate the radials through the side of the box with screws. One would also have to ground the shell of the SO-239 jack to this plate.

Notes

[1]G. Crossman, WEØD, "Earning 160 Meter WAS in 117 Days," *QST*, Aug 2010, pp 44-45.
[2]R. Severns, N6LF, "An Experimental Look at Ground Systems for HF Verticals," *QST*, Mar 2010, pp 30-33.

Dave Holdeman, N9XU, was born and raised in Muskegon, Michigan. After graduation from Muskegon High School, Dave joined the Army Signal Corps. He attended signal school in Ansbach, Germany and met his future wife, Christa, in Berlin while on temporary duty there. In the service he worked on BC610s, BC342s and other radio and cable carrier systems.

After his Army tour, Dave studied broadcast engineering received his FCC First Class Radiotelephone license and joined the staff of WONW-AM in Defiance, Ohio. After licensed engineers were no longer required at broadcast stations, Dave became a microwave communications craftsman at AT&T. He performed acceptance testing on new microwave radio installations and worked the microwave test bench.

In 1958 Dave passed his Novice exam and received the call KN8OIO. Later he passed his Technician and General class exams and became K8OIO. In 1963 he was promoted to AT&T Chicago Engineering and received the new ham call W9HJL. He now holds an Amateur Extra class license. You can reach Dave at 415 Barnaby Dr, Oswego, IL 60543 or at **holdex@att.net**.

A Skype Phone Patch — No Extra Hardware Required

Interconnect your radio over public networks with 21st century technology.

Peter Hoffman, W6DEI

Stop me if you've heard this one before. No, it's not an old joke that's gone around the Internet a million times, just an idea so simple that I can't believe it hasn't occurred to other hams as well as me. Anyway, here's the story.

The other day while on my usual morning dog walk, two very disparate things I'd been thinking about forged an interesting connection in my mind. I recently set up Skype on a friend's PC and my own. She just joined the Peace Corps and is going to Africa for 2 years so Skype might provide a good option for keeping us in touch. I'd been musing a lot about Skype lately. The second thing I was thinking about was how I was going to run the PSK station at our club's ARRL Field Day station this year.

Out of the Blue — an Inspiration

Here's the connection — did I have phone patch capabilities right under my nose, and without any additional hardware? What, you're probably asking, do Skype and PSK have to do with phone patches? Well, for years more and more of us have been pumping audio back and forth between our PCs and transceivers in the form of digitally encoded PSK and RTTY sounds. Why couldn't we do the same with a human voice via a Skype Internet connection? Again, the idea is so simple I have a hard time believing others haven't hit upon it too. Perhaps they have, but a quick search of the Internet didn't turn up anything.

The Nuts and Bolts

I couldn't wait to find out if it would really work the way I was envisioning it. I starting testing things as soon as I got home from my walk. For digital modes I use a simple, standard interface from Donner Digital that consists of AUDIO IN and AUDIO OUT lines between the PC and the transceiver, a USB to serial cable to key the PTT, and a simple isolation circuit.

I started by testing the receive side of things since that seemed easier. Enlisting the help of a friend with Skype, we made a Skype phone connection, computer-to-computer. I then tuned in a good strong SSB signal on 20 meters and connected the audio lines between the PC and transceiver. Like magic, my friend could hear the radio QSO coming through his Skype phone perfectly.

To test the transmit side I switched my rig from the antenna to a dummy load, turned on voice controlled transmit switching (VOX) and the transmit monitor and had my friend speak into his computer mic. Again like magic, his voice keyed the transmitter. It was loud and clear through the rig's monitor with the output power meter registering 90 W on

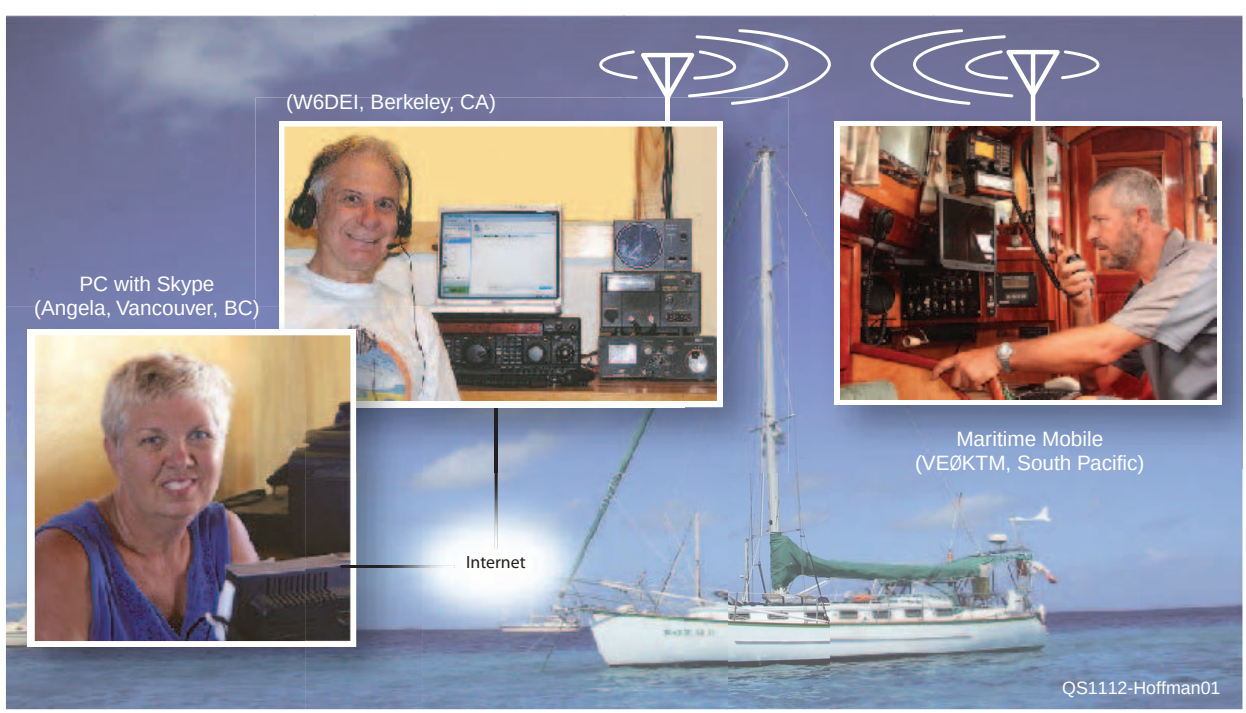


Figure 1 — Our first Skype phone patch contact.

Skype — Voice over IP for All

With the release of its software in 2003, Skype became one of the first companies to offer international telephone service from a personal computer using voice over Internet protocol (VoIP). Skype uses the PC's soundcard to digitize audio for transport across the Internet. Easy to download, install and use, the software is free and runs on *Windows*, *Mac* and *Linux* operating systems.

It requires only a minimally equipped personal computer that has at least a basic broadband connection to the Internet, such as DSL or cable. Skype offers unlimited free VoIP calls to any other Skype user regardless of their location. For a minimal charge, Skype also lets you make phone calls to regular landlines and mobile phones anywhere in the world. It's been my experience that audio quality is consistently better than either landlines or cellphones. That's important when using it as a phone patch under less than ideal propagation conditions.

Users register with Skype, download and install the software, and obtain a unique user ID and password. After booting up the software and logging on, you get a simple screen (Figure A) that shows the users in your address book on the left. The address book will indicate which are currently online. You simply select the person you wish to call and click the CALL (or VIDEO-CALL) button in the center of the screen and make your connection.

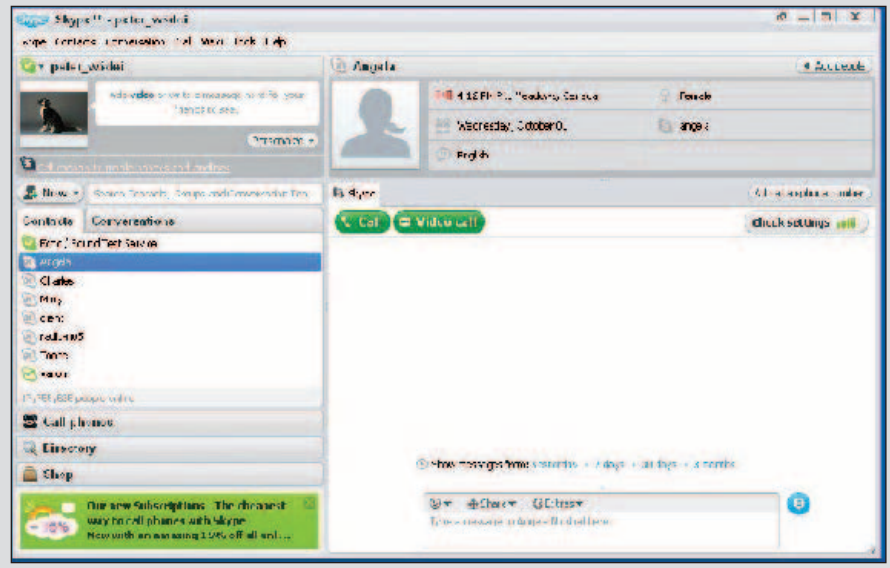


Figure A — *Skype* log on screen allows setting up and initializing a call to the distant party.

In May 2011, Skype was purchased by Microsoft. There are currently over 650 million registered users. More information, including software download and registration, can be found at **www.skype.com**.

peaks after a little tweak of the MIC GAIN.

Now we were ready to try a real phone patch. Enlisting the help of another ham friend we found a clear frequency on 20 meters and started a radio voice contact. Then I patched him through to my friend via Skype. It all worked beautifully.

Just a Couple of Notes

Since Skype was obviously not going to key my PTT (even with the cable interface), I needed to either do that manually or switch on VOX and automate things. Both work fine, although VOX needs to be adjusted carefully. I also added one piece of hardware — a simple Y adapter cable that plugs into the AUDIO OUT jack on the transceiver. This lets me connect both a headphone and the AUDIO OUT cable to the PC's MIC jack. This enables me to monitor both the radio and phone side of a phone patch contact so I can maintain proper control of things. It's also an obvious necessity if you're going to manually key the PTT.

Since I regularly provide scheduled contacts with sailors in the South Pacific who would love to call home occasionally, I had a perfect opportunity to put my new found capability into action. So at 0230Z, our usual schedule time, I got on 20 meters and called Martin, VEØKTM, on board his 36 foot sailboat *Katie M II*. Martin was about halfway through a passage between San Francisco and the Marquesas — one of the longer open ocean crossings in the Pacific. He'd been at sea for more than 2 weeks and I knew he'd jump at the chance to talk to his wife back home in Vancouver, British Columbia.

Angela is a Skype user, too, which made things even simpler. So after prearranging things with Martin and Angela, and praying Martin's signal would be as strong and clear as it usually is at my location in Berkeley, California we set things in motion. I don't know whose excitement was greater when everything worked — Martin and Angela's at hearing each other's voices, or mine exulting over a small technological achievement.

I'd been thinking about adding a phone patch for years. Now I've got one — with no extra expense and no extra gear to squeeze into the shack. Note that in addition to communicating between Skype users, Skype can also be used to communicate with people on regular phones, as with a hardware phone patch, although there are charges for connections through the regular phone system.

Amateur Extra class operator and ARRL member Peter Hoffman, W6DEI, is a computer programmer who has been a licensed ham since 1998. He is an avid DXer with 241 entities worked and confirmed (all with homebrew antennas and less than 100 W). He has also been providing radio support to sailors for the past 7 years. His other passion is bicycle touring. It was on a 6 month tour through countries where he didn't speak the local language that his childhood interest in shortwave listening was rekindled. That soon led to getting a ham license at the tender age of 48. Now he can travel by bike or vicariously via the radio. Both are a joy. You can reach Peter at 1123 Harrison St, Berkeley, CA 94706, or at **w6dei@arrl.net**.

How High Should Your HF Vertical Be?

Joel R. Hallas, W1ZR

Frequent advice given to those wanting to work distant stations is that if you can't get a horizontal antenna up at least a half wave high, you may be better off with a vertical.[1] A big advantage of HF verticals is they can work at ground level — but they may actually work a bit better at other heights.

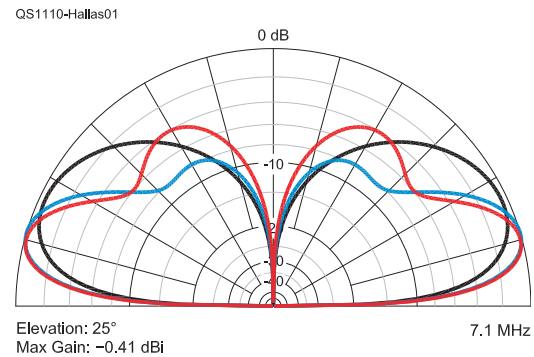


Figure 1 — *EZNEC* predicted elevation of ¼ wave monopole with four elevated radials at different heights above typical ground. The black trace is just above ground, the blue at 0.2 wavelengths and the red at 0.25. Note the increase in the higher lobe at the higher position. Any higher and it becomes the peak.

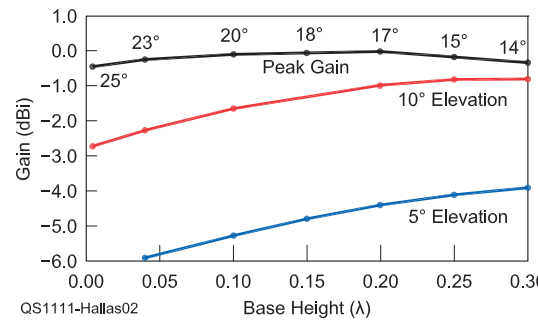


Figure 2 — Gain of a quarter wave monopole with elevated radials as a function of hight of base and radials above ground. The top curve is the peak gain with the peak elevation angle shown. The lower curves are the gain at 5 and 10° elevation, important for long haul work.

Aren't Verticals Low Angle Radiators?

They certainly are compared to low horizontal antennas. A ground mounted vertical monopole over perfect ground will radiate right down to 0° elevation. A monopole antenna mounted on the edge of a body of salt water will do almost as well — at least for paths over that patch of water.

A near ground mounted monopole with elevated radials (or one with many buried or on-ground radials) over typical ground will suffer losses along the low angle paths. The resulting elevation pattern is omnidirectional with an elevation peak in the mid 20s of degrees as shown in black in Figure 1. While this is at a relatively low angle, it does not have as much radiation in the 5 to 10° range as we might want.

What Happens if We Push it Up?

As we start increasing the height of the base, and the radials, the peak of the elevation response will be lowered — at least for a while. This is indicated in Figure 2. Note that the angle of peak gain steadily decreases until the base reaches about ⅓ wavelength. After that the higher lobes, seen in blue and red in Figure 1, start to predominate.

What's the Best Height?

We can all agree that there are few situations that work well with radials only a foot or two above ground. It does limit pedestrians, lawn mowers and even deer if they don't notice. At 6 feet high, you will clear most people and antlers, but if your supports let you go even higher, it can make a difference. If DX operation is what you're after, I'd stick below about ¼ wavelength. While the peak lobe does continue down for even higher positions, the secondary lobe increases rapidly and will bring in more noise and interfering stations from shorter distances.

Table 1

Gain and Elevation of ½ Wave Vertical Dipoles as a Function of Height of Bottom from Ground

Base Height (λ)	*Feet at 7.1 MHz*	*Peak Elevation Angle (°)*	*Gain (dBi)* *Max*	*5°*	*10°*
0.014	2.0	18	0.07	–4.8	–1.29
0.043	6.0	17	0.09	–4.4	–0.97
0.07	10	16	0.19	–4.1	–0.72

Table 2

Gain and Elevation of ½ Wave Horizontal Dipole and Inverted V at Height of ½ Wavelength

Antenna Type	*Peak Elevation Angle (°)*	*Gain (dBi)* *Max*	*5°*	*10°*
Dipole at ½ wavelength	27	7.75	–2.81	2.26
Inverted V with apex at ½ wavelength	31	6.5	–4.75	0.79

Once you're at the ¼ wave height, it's time to consider a ½ wave vertical dipole. It requires less wire and space. As shown in Table 1 it is very similar in performance to the monopole. But wait, if your antenna is made of wire, you now have at least one support up a half wavelength or more — perhaps it's time to consider that horizontal antenna again. Table 2 shows the gain and peak elevation for a horizontal dipole at a height of half a wavelength and a 90° horizontal inverted V for comparison. Note that at a height of ½ wavelength, the horizontal is the winner, at least in its preferred direction. To get the vertical's omnidirectional coverage, however, you will need at least two and better three horizontal antennas.

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

[1]J. Hallas, "The Antenna Elevation Pattern — What's the Big Deal?" *QST*, Mar 2010, pp 39-40.

TECHNICAL CORRESPONDENCE

A COMPACT 40 METER RECEIVER (FEB 2011)

◊ First of all, thanks to Lou Burke, W7JI, for doing the design work and writing the article that got me going on this project! It has been a fun and rewarding experience.

Since I had no intention of doing any portable operation, I modified the packaging to be more suitable for use in the shack and used a different form of construction. I've included some photos, which should give you an overview of the approach I've taken.

I used Manhattan type construction on an RF proto board with a solid ground backplane and pads on 0.1 inch centers. All controls and the speaker are mounted on the enclosure and connect to the circuit board by means of quick disconnect keyed cables using header stock for connectors. Figure 1 shows the inside of my receiver.

I opted for a larger enclosure mainly so that a large calibrated dial could be used to indicate the frequency. The dial is custom calibrated to accommodate the VFO non-linearity and is backlit with yellow LEDs to give the appropriate "old time glow" when using the receiver after dark. Dial accuracy is well within 500 Hz and the receiver has no noticeable drift in the indoor environment. See Figure 2.

The circuitry is 95% as published. I only made minor modifications to increase the filtering on the VFO reference and the input/output connections. The large type 31 cores visible in the interior photo are just common mode filtering for the dc and RF inputs. I also wired the unit to disconnect the speaker when headphones are plugged in rather than using a dedicated switch.

The tuning dial was surprisingly easy to construct. I drilled and tapped 4 holes on the back side of a standard black plastic knob to allow screwing the dial face to the rear of the knob. The dial face is just a printed paper sheet that has been run through a plastic laminator for protection of the legend and enhanced stiffness. I started out with a blank dial face and marked each 5 kHz interval on it with a Sharpie pen during the calibration process. I then used this template to generate the final version using *PowerPoint*. The transparent cursor was fabricated from acrylic and the red line scribed on the back and filled with red ink. Final tuning range was adjusted to be from 6.999 to 7.057 MHz.

The backlight consists of 4 series connected rectangular yellow LEDs glued together and fit into an appropriate rectangular opening in the front panel, behind the semitransparent paper and plastic dial. Figure 3 shows the rear panel of my receiver.

The performance of the unit has exceeded my expectations. I don't use it for day-to-day communications, but love to tune around with it in the evenings. It has excellent sensitivity — it is not uncommon to copy European stations even from here in Colorado. The four crystal filter is surprisingly good. Figure 4 is the filter response I

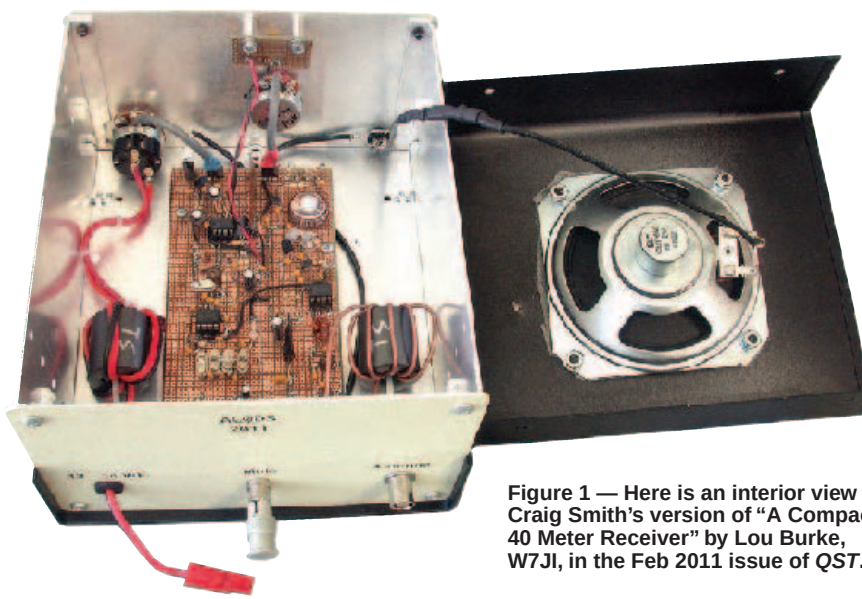


Figure 1 — Here is an interior view of Craig Smith's version of "A Compact 40 Meter Receiver" by Lou Burke, W7JI, in the Feb 2011 issue of *QST*.

Figure 2 — This front panel view of the 40 meter receiver shows the tuning dial and indicator made by ACØDS.

Figure 3 — The rear panel of Craig Smith's 40 meter receiver.

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

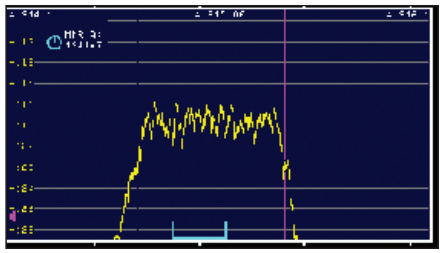


Figure 4 — This graph shows the receiver passband, as measured on an Elecraft P3 panadapter and a broadband noise source.

measured during construction. Notice the nice flat top and greater than 35 dB rejection outside the passband.

The total screen width on the Elecraft P3 panadapter is 6 kHz and the filter bandwidth is about 700 Hz. This was measured using a broadband noise source and peak detection mode on the P3.

Thanks again Lou, for a great project, and thanks to the ARRL staff for all the excellent coverage in *QST*. — *73, Craig D. Smith, ACØDS, 1009 Alder Way, Longmont, CO 80503*; **Craig@PowerSmith.net**

DANGEROUS CIRCUIT IN HAMSPEAK (MAY 2011)

♢ On page 43 of the May 2011 issue of *QST*, the circuit diagram found in "HamSpeak" describing a variable autotransformer presents a possibly dangerous situation. In wiring this type of circuit, you should make sure that the incoming power is wired under the guidelines of the National Electrical Code (NEC).

First, never use a common lamp cord. Use a cord with proper grounding and make sure that the "bottom" transformer connection in this diagram is tied to the white neutral terminal of the incoming power source, and the green equipment ground wire is tied to the chassis and transformer frame. Please be careful! — *73, Ewell "Bub" Pendergrass, W5BUB, 1106 Country Meadow Ln, Cedarville, AR 72932;* **w5bub@cs.com**

♢ Thanks for pointing out that possible problem. It could result in a very dangerous situation if the "hot" side of the ac supply were connected to the transformer frame. — *73, Joel Hallas, W1ZR, ARRL Technical Editor*; **jhallas@arrl.org**

THE TRUTH ABOUT ERROR DETECTION AND CORRECTION (JUL 2011 TC)

♢ I read with interest the letter from Garry Hooghkirk, KDØDHB, "The Truth About Error Detection and Correction" in the July 2011 Technical Correspondence column. While Garry's analysis of the data packets may be technically correct, it falls a bit short in the explanation. High reliability in data communication is achieved by the communication protocol used, not in the packet error detection and correction itself. The common TCP/IP ethernet protocols, X.25, including AX.25, the protocol used in amateur packet protocols, work far better than Garry's explanation would allow.

Garry is correct in that there is a checksum calculated by the transmitting station, and that is transmitted as part of each data packet. The checksum is recalculated by the receiving station, and compared to the one received. If the two checksums do not agree, the packet is rejected. The polynomial checksum is generated by a very sophisticated algorithm so that no reasonable combination of lost bits will generate the same checksum. Most data transmitting protocols do not attempt use error correction per se, by trying to correct the data in the defective packet by use of the checksum or other transmitted data. Error correction is achieved by signaling the transmitting station that the packet did not arrive correctly, so that the defective packet is retransmitted until it arrives correctly. Each packet must be acknowledged (one way or another) by the receiving station.

Most of this takes place in layer 4, the transport layer, of the OSI 7 layer network model. While it may be true that theoretically we can never achieve 100.000% reliability, the fact that various networks daily transmit billions of gigabits of data very reliably without problems is testimony that the protocols work extremely well. — *73, Ron Vincent, KF4D, 101 Tall Pines Dr, Hattiesburg, MS 39402*; **kf4d@comcast.net**

BONDING OF GROUNDING CONDUCTORS (JAN 2011 TC)

♢ The articles about grounding and precipitation static in the letter from my old friend Bruce Carpenter, W3YVV, were excellent and I would like to comment on both.

First, with regard to the grounding and bonding issue, Bruce's point is well taken about connecting the station and antenna grounds to the service-entrance ground bus. One very important fact was omitted, however. Referring to the NEC section 250-70 about ground conductors, under no circumstances should an operating (live) ground lug or wire be disturbed in order to insert another conductor into it (in other words, to "stack" the ground connections). If an existing ground is disturbed, you could induce a "swinging neutral" condition. Not only is this a potentially lethal condition, but the voltage on the two 120 V ac phases could undergo extreme fluctuation and put low voltage on one half of the structure and high voltage on the other half. I have witnessed "swinging neutral" faults and seen the damage done to connected equipment. No one was injured, thankfully.

NEC 250-70 states that ground conductors may be "stacked" on the same ground clamp *only* if the ground clamp is listed for that configuration. In other words, the clamp must be so designed such that any preexisting ground connections don't have to be loosened in order to add the subsequent ones.

As for Bruce's comments about precipitation static, the voltage accumulation on a longwire or HF beam can be sufficient to draw an arc across an unconnected UHF or Type N connector lying on the bench. At the Delaware Valley Radio Association's (W2ZQ) shack, we require all unused antennas to be shorted to ground at the connector end. If the antennas must remain connected to the radio, such as while operating, I recommend at least an MOV suppressor device (such as a Fisher Custom Communications or Polyphaser) in series with the coax. A spark gap style arrestor is not an active device and does not "see" the hot side of the antenna circuit at all times (something I brought up in my EMP article in the November 2009 issue of *QST*). Even so, a spark gap style device is better than no device at all.

In the FEMA EMP Protection and Maintenance course that I taught at the FEMA training center, we recommended installing a properly sized Zener diode across the receiver front end, assuming the design of the radio allows enough space to access the conductors. If you have a monitor, scanner, or just plain receiver, both Fisher and Polyphaser make receive-only suppressors that have plug-in connections (Type N, UHF, and RCA). Such a device would work well on Collins receivers since they had RCA connectors.

On VHF and UHF FM equipment, Bruce is right on with his comments about receiver degradation. If you can monitor the first limiter voltage on the radio (very easy to do on the older GE and Motorola gear), you will see the limiter voltage rise during wind, rain and snow, and particularly during thunderstorms. Another weather condition that can kill sensitivity is corona. Corona commonly occurs when there is wind and fog. As the body of air moves across the antenna, it induces a current into the antenna, tower and coax, which then goes to ground. Mountaintop repeaters and base stations are particularly easy targets because of their extreme height. I have seen this happen to many a repeater owner's equipment.

That was a very well done and useful Technical Correspondence column, Larry! Bruce and others may remember me as WA2JZF. We used to hang out on 52.525 MHz and the WCAU repeater. — *73, Robert Schroeder, 13 Tudor Ct, Ewing, NJ 08628*; **rschroeder@ieee.org**

YAGI INSTALLATION ERROR (UP FRONT FEB 2011)

◊ The February 2011 Up Front in *QST* page shows a sunset photo of a 7 element 2 meter Yagi taken by K3UAZ. When looking closely at this photo, you can easily observe the classic error made when installing vertically polarized VHF and UHF Yagi antennas.

The photo shows what looks like a metallic mast and coax line running parallel to the lower half of all of the Yagi elements. Having anything metallic in proximity to any of the elements in a Yagi will cause quite a bit of pattern distortion, and may create unwanted RF currents on the feed line, resulting in an undesirable SWR.

When first installed, my 10 element Cushcraft 2 meter Yagi had one major and two minor lobes. The minor lobes were only 3 to 5 dB down from the major lobe when installed this way. Changing to a non-metallic pipe at least 3 feet long for the upper section of the mast, and running the coax along the boom and out the rear of the Yagi in a big loop eliminated the two minor lobes, lowered the SWR and really improved the antenna performance. — *73, Jay Kolinsky, NE2Q, PO Box 300, Pound Ridge, NY 10576*; **ne2q@arrl.net**

GROUND FAULT CURRENT INTERRUPTER OUTLETS (GFCI)

◊ I've been a camper for decades starting with a cotton tent soaked wet during a hurricane. I've gone through tent campers, motorhomes, trailers and back to tents. My last trip to Dayton Hamventiont attracted a lot of attention on the road with my little car and on-site as I had everything a recreational vehicle could have with my tent except a bathroom. The July 2009 *QST* article "The Teardrop QTH" fascinated me for better trips in better times. I read this article and the page turned upside down, noticing the surge outlet strip and plugged in hot/neutral/ground sensor.

Water seeks its own level and electricity seeks a "return." What the GFCI outlet does is sense some electrical leakage to ground and disconnect the circuit before the human body completes the circuit. It is annoying in a hot and steaming bathroom to lose use of shaver or blow driver on a fault that opens up the circuit. GFCI devices do not ground out circuits — common sense of "Switch to Safety" applies. In a storm an RV/trailer might have hot chassis ground to be wary of as it sits on rubber tires.

You can purchase an inline GFCI device for extension cords from Home Depot, Lowes, Camping World and larger hardware dealers. It works with 115 V ac circuits like from home, campgrounds and generators. It is not a substitute for common sense. Electricity contact can result in lethal injury.

Almost every one of my engineering posts ends with "Switch to Safety." Never trust a "cold circuit" without checking with a meter and applying a *physical* ground jumper cable. — *73, Peter Murricane, WB2SGT, 200 East 63rd St, New York, NY 10065*; **peterann1@juno.com**

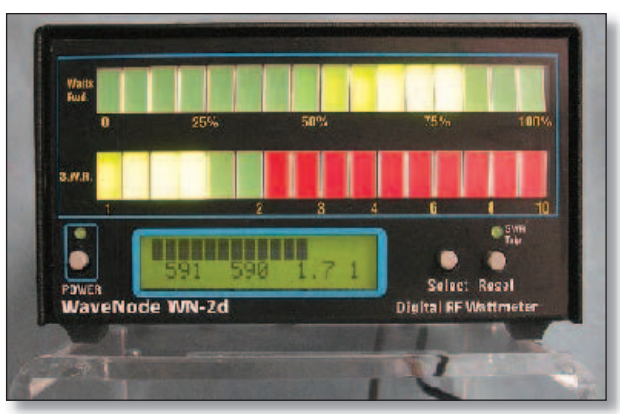
Technical Correspondence items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given idea will work for your situation, we make every effort to screen out harmful information.

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

New Products

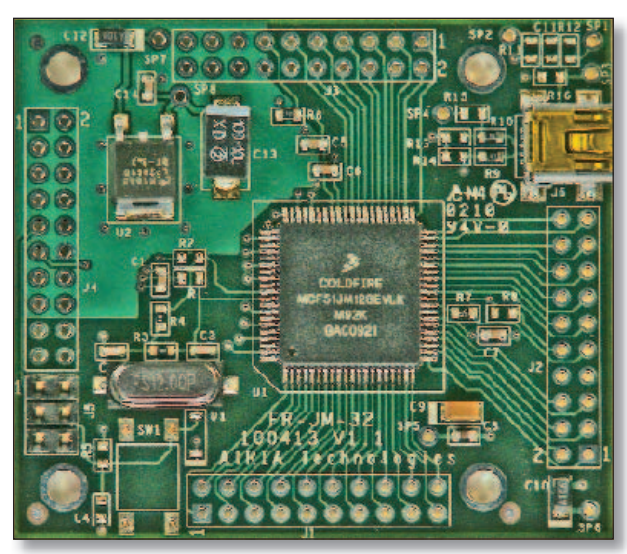
WAVENODE WN-2D DIGITAL WATTMETER/ MODULATION VIEWER

◊The WaveNode WN-2d digital wattmeter builds on features of the original WN-2 wattmeter and adds large LED bar graphs to display peak power and SWR at a glance. The WN-2d System includes a suite of software applications with a modulation scope, spectrum analyzer and mix-and-match monitoring of up to four sensors at a time. WaveNode's sensor selection extends from 30 kHz to 1.5 GHz, with power ranges from 100 W to 8 kW. The WN-2d connects directly to your *Windows* PC through the USB port. The WN-2d is provided with one sensor, wall transformer, software and USB cable. Price: $450; additional sensors range from $60 to $125. For more information, technical specifications or to order, visit **www.wavenode.com**.



BASIC ON BOARD FROM ATRIA TECHNOLOGIES

◊ATRIA Technologies introduces a solution for your microcontroller project — a FreRunner microcontroller module and Basic On Board. Add a terminal emulator such as *HyperTerminal* and you are ready to program. (Basic On Board is the first revision of *StickOS Basic* tailored specifically for the FreRunner modules.) For example, to write text to a display: **lcd 1, "Hello World"**. To read a 4×4 keypad: **on keychar do gosub KYPD**. Basic On Board is preprogrammed on many microcontroller modules from ATRIA Technologies. Peripheral modules for communications and control are available to support your latest project. Microcontroller modules with BASIC ON BOARD start at $24. For more information, or to order, visit **www.atriatechnologies.com**.



PRODUCT REVIEW

Yaesu FT-450D HF and 6 Meter Transceiver

Reviewed by Mike Corey, W5MPC
ARRL Emergency Preparedness Manager
w5mpc@arrl.org

Over the last decade or so many of Yaesu's popular HF transceivers have undergone improvements and been re-released as D models. The D model improvements have included additional popular accessories such as antenna tuners, DSP filters and the addition of 60 meters in some models. Following in the line of the FT-100D, FT-817ND, FT-857D and FT-897D is the latest version of the FT-450…you guessed it the FT-450D. Much of the information in the original FT-450 review in December 2007 *QST* still applies, and we won't repeat it here.[1]

So what is different on this new and improved FT-450D? There are six significant upgrades to the original FT-450:

- Internal automatic antenna tuner
- New knob design
- New standard hand microphone
- Button illumination
- Foot stand
- 500 Hz and 300 Hz CW filters

Let's see how the advertised improvements stand up.

New Accessories

The original FT-450 had as an option an internal automatic antenna tuner, the ATU-450. The new D model includes an automatic antenna tuner that covers the 6 to 160 meter bands and will, according to the manual, match impedances between 16.7 and 150 Ω. The manual also cautions that antennas such as non-resonant whips and wire antennas such as G5RVs may not be within the matching range of the tuner.

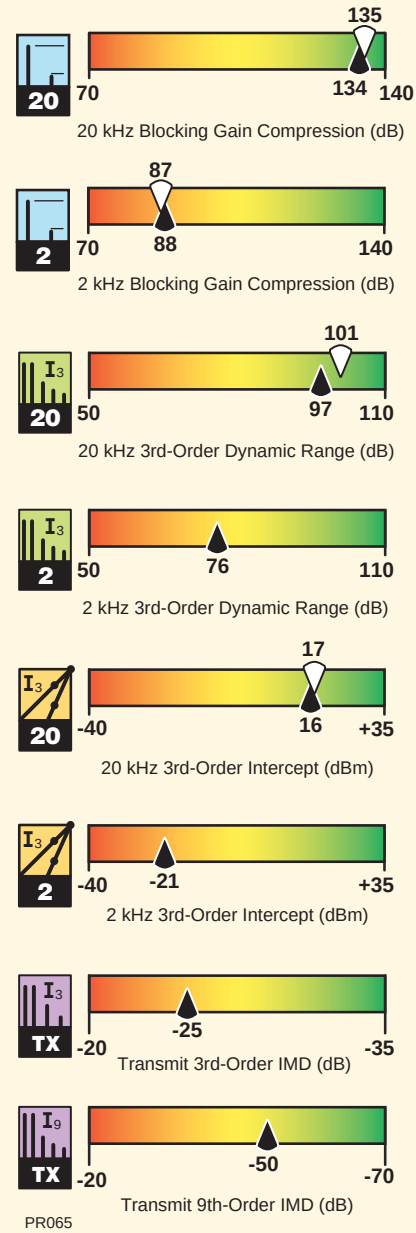
Tuner operation is very easy. Pushing the TUNE button momentarily brings the tuner inline and pushing and holding for about 1 second activates the tuning procedure. I tried matching an 80 meter dipole that was cut for the upper phone portion of the band and was able to get a match from about 3.6 MHz to 3.9 MHz. For a rig in this price class the '450D's tuner did a good job.

The D model DSP filter has width settings on CW for 300 Hz, 500 Hz and 2.4 kHz. Lab tests indicate that the 500 Hz filter setting on the D model measures close to 500 Hz. This is a significant improvement over the CW filter in the original FT-450 transceiver. The original review commented on operation of the DSP filter bandwidths on CW. The filter was not continually adjustable as commonly found on other radios and had fixed settings at different widths for SSB, CW, AM and FM. The filter widths for CW were 500 Hz, 1.8 kHz and 2.4 kHz. The narrowest setting, 500 Hz, tested in the lab at closer to 600 Hz; either way it proved to be too wide for very crowded band conditions.

While the addition of a 300 Hz setting is

[1]R. Lindquist, N1RL, "Yaesu FT-450 HF and 6 Meter Transceiver," Product Review, *QST*, Dec 2007, pp 53-57. This review is available to ARRL members online at **www.arrl.org/product-review**.

Key Measurements Summary



Bottom Line

The FT-450D adds a standard internal antenna tuner, new CW filter bandwidths and several ergonomic upgrades to the original FT-450. These refinements make a popular low cost transceiver even better.

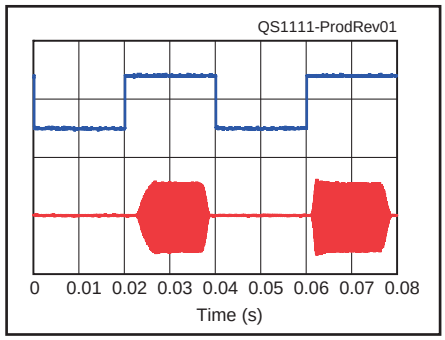


Figure 1 — CW keying waveform for the FT-450D showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. (Note that the first key closure starts at the left edge of the figure.) Horizontal divisions are 10 ms. The transceiver was being operated at 100 W output on the 14 MHz band.

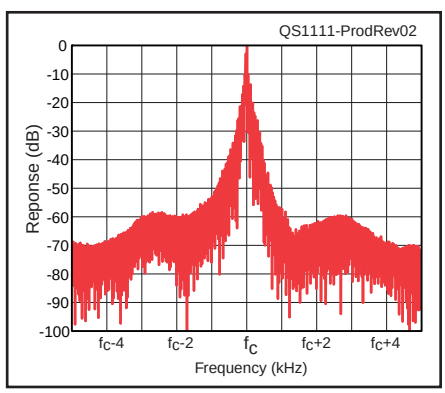


Figure 2 — Spectral display of the FT-450D transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 100 W PEP output on the 14 MHz band, and this plot shows the transmitter output ±5 kHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.

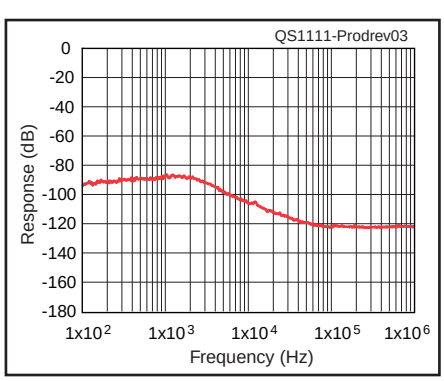


Figure 3 — Spectral display of the FT-450D transmitter output during composite noise testing. Power output is 100 W on the 14 MHz band. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 100 Hz to 1 MHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.

Table 1

Yaesu FT-450D, serial number 0N530112

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 0.03-56 MHz; transmit, 1.8-2.0, 3.5-4, 5.3305, 5.3465, 5.3665, 5.3715, 5.4035, 7-7.3, 10.1-10.15, 14-14.35, 18.068-18.168, 21-21.45, 24.89-24.99, 28-29.7, 50-54 MHz.	Receive and transmit, as specified.
Power requirement: 13.8 V dc ±10%; receive, 1.5 A (no signal); transmit, 22 A (100 W).	13.8 V dc; receive 1.0 A (max audio, max lights); 0.85 A (max audio, min lights); transmit, 16 A (100 W out). Operation confirmed at 12.4 V dc (85 W out).
Modes of operation: SSB, CW, AM, FM.	As specified.

Receiver

	Receiver Dynamic Testing
SSB sensitivity (2.4 kHz bandwidth, 10 dB S+N/N): SSB, 0.25 µV (1.8-2.0, 3.5-30, 50-54 MHz).	Noise floor (MDS), 500 Hz bandwidth: *Preamp off* / *Preamp on* 0.137 MHz –90 dBm / –93 dBm 0.505 MHz –103 dBm / –113 dBm 1.0 MHz –106 dBm / –115 dBm 3.5 MHz –129 dBm / –137 dBm 14 MHz –129 dBm / –136 dBm 50 MHz –125 dBm / –139 dBm
Noise figure: Not specified.	14 MHz, preamp off/on: 18/11 dB
AM sensitivity: 6 kHz bandwidth, 10 dB S/N: 2.0 µV (1.8-20, 3.5-30 MHz), 2 µV (50-54 MHz).	10 dB (S+N)/N, 1-kHz, 30% modulation, 6 kHz bandwidth: *Preamp off* / *Preamp on* 1.0 MHz 14.6 µV / 5.62 µV 3.8 MHz 1.60 µV / 0.65 µV 50.4 MHz 2.66 µV / 0.65 µV
FM sensitivity: 15 kHz bandwidth, 12 dB SINAD: 0.5 µV (28-30 MHz), 0.3 µV (50-54 MHz).	For 12 dB SINAD, 5 kHz bandwidth:* *Preamp off* / *Preamp on* 29 MHz 0.83 µV / 0.27 µV 52 MHz 0.93 µV / 0.24 µV
Blocking gain compression: Not specified.	Gain compression, 500 Hz bandwidth: *20 kHz offset* / *5/2 kHz offset* *Preamp off/on* / *Preamp off* 3.5 MHz 135/137 dB / 93/87 dB 14 MHz 134/136 dB / 93/88 dB 50 MHz 128/126 dB / 93/88 dB
Reciprocal mixing (500 Hz BW): Not specified.	20/5/2 kHz offset: –98/–83/–74 dBc.

ARRL Lab Two-Tone IMD Testing (500 Hz DSP bandwidth)**

Band/Preamp	*Spacing*	*Input Level*	*Measured IMD Level*	*Measured IMD DR*	*Calculated IP3*
3.5 MHz/Off	20 kHz	–28 dBm	–129 dBm	101 dB	+23 dBm
		–21 dBm	–97 dBm		+17 dBm
14 MHz/Off	20 kHz	–32 dBm	–129 dBm	97 dB	+17 dBm
		–22 dBm	–97 dBm		+16 dBm
		0 dBm	–38 dBm		+19 dBm
14 MHz/On	20 kHz	–37 dBm	–136 dBm	99 dB	+13 dBm
		–25 dBm	–97 dBm		+11 dBm
14 MHz/Off	5 kHz	–43 dBm	–129 dBm	86 dB	0 dBm
		–38 dBm	–97 dBm		–9 dBm
		0 dBm	–21 dBm		+11 dBm
14 MHz/Off	2 kHz	–53 dBm	–129 dBm	76 dB	–15 dBm
		–46 dBm	–97 dBm		–21 dBm
		0 dBm	–17 dBm		+9 dBm
50 MHz/Off	20 kHz	–25 dBm	–125 dBm	100 dB	+25 dBm
		–18 dBm	–97 dBm		+22 dBm

an improvement over the original, I agree with the reviewer of the original FT-450 that widths of 250, 500 and 800 Hz would be even better. I gave this new filter width a try during the Worked All Europe DX CW contest. I found the narrowest setting, 300 Hz, to be adequate. The 500 Hz setting, to me, seemed the best during crowded band conditions. A bandwidth wider than 500 Hz but narrower than 2.4 kHz would be useful for less crowded conditions.

Yaesu now includes an MH-31 hand mic with the FT-450D. This mic has frequency UP/DWN buttons that are useful in a mobile environment. Pressing and holding these buttons starts the scanning process.

Ergonomic Upgrades

Yaesu made several significant upgrades

Receiver	Receiver Dynamic Testing
Second-order intercept point: Not specified.	Preamp off/on, 14 MHz, +59/+31 dB; 50 MHz, +61/+61 dB.
DSP noise reduction: Not specified.	Variable, 12 dB maximum.
Notch filter depth: Not specified. Adjacent channel rejection: Not specified.	Manual notch: 50 dB. 20 kHz offset, 29 MHz, 82 dB,* 52 MHz, 83 dB.*
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset, preamp on: 29 MHz, 82 dB,† 52 MHz, 79 dB. 10 MHz channel spacing: 28 and 52 MHz, 98 dB.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: preamp off, 119 μV; preamp on, 38.9 μV.
Squelch sensitivity: SSB/ CW/AM, 2.5 μV (1.8-30 MHz), 1 μV (50-54 MHz); FM, 0.32 μV	At threshold, preamp on: SSB, 0.74 μV; FM, 29 MHz, 0.45 μV; 52 MHz, 0.11 μV. (28-30 MHz), 0.16 μV (50-54 MHz).
Receiver audio output: >2 W into 8 Ω at 10% THD.	2 W at 10% THD into 8 Ω. THD at 1 V RMS, 1.6%.
IF/audio response: Not specified.	Range at –6 dB points (bandwidth):‡ CW (500 Hz): 286-806 Hz (520 Hz); Equivalent Rectangular BW: 450 Hz. USB: (2.4 kHz): 300-1998 (1698) Hz; LSB: (2.4 kHz): 300-2010 (1710) Hz; AM: (6 kHz): 300-1673 (2746) Hz.
IF rejection: Not specified.	First IF rejection: 14 MHz, 100 dB; 50 MHz, 54 dB.
Image rejection, ≥ 80 dB (HF); ≥ 65 dB (6 m).	Image rejection: 14 MHz, 79 dB; 50 MHz, 74 dB.

Transmitter	Transmitter Dynamic Testing
Power output: HF & 50 MHz: SSB, CW, FM, 100 W; AM, 25 W.	HF: CW, SSB, FM, typically 6-105 W; AM, 1.8-25 W.
Spurious-signal and harmonic suppression: >60 dB on HF, >70 dB on 50 MHz.	HF, as specified; 50 MHz, 64 dB. Meets FCC requirements.
SSB carrier suppression: At least 60 dB.	68 dB.
Undesired sideband suppression: At least 60 dB.	>70 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	3rd/5th/7th/9th order (10 m, worst case): HF, 100 W PEP, –25/–27/–45/–50 dB; 50 MHz, 100 W PEP, –20/-30/–39/–45 dB.
CW keyer speed range: Not specified.	4 to 59 WPM.
CW keying characteristics: Not specified.	See Figures 1 and 2.
Iambic keying mode: Not specified.	Mode B.
Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.	S9 signal, AGC fast, 50 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	SSB, 26 ms; FM, 17 ms.
Composite transmitted noise: Not specified.	See Figure 3.

Size (height, width, depth): 3.3 × 9 × 8.5 inches; weight, 8.8 pounds.

Price: $900.

*Widest FM DSP filter setting is 5 kHz.
**ARRL Product Review testing now includes Two-Tone IMD results at several signal levels. Two-Tone, 3rd-Order Dynamic Range figures comparable to previous reviews are shown on the first line in each group. The "IP3" column is the calculated third-order intercept point. Second-order intercept points were determined using –97 dBm reference.
†Measurement was noise-limited at the value indicated.
‡Default values. Bandwidth and cutoff frequencies are adjustable via DSP. CW bandwidth varies with PBT and pitch control settings.

to the external design of the FT-450, so let's start with the one that was considered by many to be the biggest oversight in the original design…the feet.

The original FT-450 lacked one basic feature found not only on just about every transceiver on the market, but just about any type of personal electronics you may encounter — adjustable feet. The new D model features flip down feet so the face of the radio may be angled up for easier viewing. It's not an earth shattering upgrade but it sure beats propping up your radio with an old *ARRL Repeater Directory*. The new style feet are available separately to retrofit original FT-450 models.

Speaking of display there are some changes to the radio's front panel as well. The first thing one would notice in comparing the '450 to the '450D is the change in the tuning knob. The D model has done away with the finger dimple on the knob and instead simply uses a rubberized grip that makes it fairly easy to tune. Reviews of the original FT-450 pointed out that the finger dimple on the knob was generally useless due to its small size.

The D model also features four other knobs on the front panel, the same as the original '450. The redesigned knobs are attractive and for the most part they have a sturdier feel to them. The one exception is the DSP/SEL knob. Other users have noted that this knob seems a little loose. This may present a problem further down the road since this knob will likely see regular use.

A big improvement to the front panel is backlighting for the buttons. There are 24 buttons on the front panel that control a wide range of functions and features. The new backlighting is strong enough that buttons can be seen from several feet away in a dark room. The backlighting is linked to the display brightness setting in the menu and you cannot switch the backlighting off.

There are eight different display brightness levels, an improvement over four in the original '450. I found that settings 5 to 8 worked best in a well lit room. The lowest settings were really not usable.

Some literature shows 60 meter coverage as one of the improvements. The original '450 had 60 meter capability included. To access 60 meters, enter into the memory mode where the five 60 meter channels and the Alaska Emergency Channel (5167.5 kHz) are found. This is the same in the D model.

Anything New Under the Hood?

As the lab numbers indicate, the receiver performance on the FT-450D is about the same as the original '450. There are some slight differences in sensitivity on AM.

The new model has eliminated a strange problem noted with the original. The reviewer of the original FT-450 noted that when the early radio was first powered on there was a noticeable popping noise coming from the speaker. The cause was determined to be a DSP artifact present when the radio's attenuator and preamp were off and the bandwidth was at the narrowest setting.

Original Nits to Pick

The original review of the FT-450 found a few nits to pick that weren't addressed in the upgrade to a D model. As with the original FT-450, the D version lacks an automatic notch filter. It does include a manual notch that is, as in the original, quite effective.

The clarifier (Yaesu's term for *receiver incremental tuning*, RIT) is somewhat awkward to operate. There is no separate RIT knob. To use the clarifier, you press the CLAR

Figure 4 — The rear panel of the FT-450D.

button and adjust the receive frequency with the main tuning knob. I had some difficulty getting used to this. Although other HF transceivers have used this RIT scheme, current radios tend to have a prominent RIT knob.

I also agree with other users that a second antenna jack for 6 meters would be nice. I also found the fan to be quite noisy. It activates each time you transmit, so perhaps with enough operating you may get used to it. And finally, like the '450, the D version has an optional, not standard, carrying handle that would be useful for portable or emergency operation.

During the review I noticed that audio quality from the internal speaker left something to be desired. I would recommend using an external speaker or good quality headphones with this radio.

Conclusions

As was the earlier version, the FT-450D is a solid transceiver that is easy to use and offers many features for a radio in its price class. New operators, as well as seasoned operators, will find it enjoyable to use.

The upgrades on the D model add to an already good radio. While other radios in Yaesu's lineup are better choices for the serious contester or DXer, the FT-450D is definitely suitable for those new to HF, casual operators, emergency communications use, camping/RVing or as a backup radio.

Manufacturer: Vertex Standard, 6125 Phyllis Dr, Cypress, CA 90630; tel 714-827-7600; **www.yaesu.com**.

YAESU FT-450D

If you own a tablet or smartphone with the appropriate application, scan this QR Code to see a video overview of the FT-450D. You can also watch this video on your computer by going to:

youtube.com/watch?v=xenOt9jSK7I

Elecraft XG3 RF Signal Source

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

A signal generator is an important instrument to have on hand while testing receivers. Whether it's an old vacuum tube receiver or a brand new top-of-the-line model, a radio technician can use an RF signal generator to quickly determine a receiver's sensitivity.

Readers of *QST* Product Reviews know that sensitivity is a key measurement included with all receiver reviews. Noise floor, or equivalently *minimum discernible signal* (MDS), is measured in dBm (decibels referenced to a milliwatt). The value 0 dBm, or 1 mW, is the reference used for the measurement of signal levels. Noise floors of some current receivers have achieved sensitivities better than –140 dBm.

Sensitivity can also be measured in microvolts (µV) or, with stronger signals, millivolts (mV). A 0 dBm signal equals about 225 mV into a 50 Ω terminated system.

Another common signal reference level radio amateurs use is S9. Many receiver manufacturers align the S meter to read S9 with a 50 µV (–73 dBm) signal level at the antenna jack, though not all do this. A signal level of 1 µV is equivalent to –107 dBm, which is also the point at which a receiver's AGC is likely to kick in.

With this brief introduction out of the way, let's take a look at the subject of this review — Elecraft's XG3 Signal Source. *QST* previously reviewed the Elecraft XG1 Receiver Test Oscillator, a simple and inexpensive kit whose main use was S meter calibration.[2] The XG3 is significantly more sophisticated.

Features

The XG3 is a programmable, pocket sized RF signal generator that provides output from 1.5 to 1400 MHz. Four commonly used selectable output levels provide test signals at 0 dBm, –33 dBm (40 dB over S9), –73 dBm (S9) and –107 dBm (1 µV). Each output is calibrated from 1.5 to 200 MHz.

The XG3 has 12 output memory channels; each can be programmed to a particular frequency within a ham band. Elecraft has

Bottom Line

The Elecraft XG3 is a compact, accurate signal source with a variety of uses in the Amateur Radio station or on the workbench.

Table 2

Elecraft XG3 Signal Source

Manufacturer's Specifications	*Measured in the ARRL Lab*
Frequency range: 1-200 MHz fundamental; up to 1400 MHz via harmonics.	As specified.
Frequency resolution: 1.5-66 MHz, 1-10 Hz; 67-159 MHz, 1-12 Hz; 160-200 MHz, 1-24 Hz.	As specified.
Frequency stability: ±50 ppm, maximum.	As specified.
Frequency accuracy: not specified.	See Table 3.
Output level: 0 dBm (±3 dB), –33 dBm, –73 dBm, –107 dBm (±1 dB typ).	As specified.
Power requirements: 9 V battery or external 11-14 V supply; 60 mA max at 0 dBm output	At 13.8 V dc, 64 mA with 0 dBm output, 28 mA at other output levels.

Size (height, width, depth): 4.8 × 2.6 ×1 inches; weight, 4 oz with internal battery.

Price: $169.95.

Table 3

Elecraft XG3 Signal Source versus HP 5351 GPS Locked Frequency Counter

Elecraft XG3 Frequency (MHz)	*HP 5351 Frequency (MHz)*	*Frequency Difference (Hz)*
10.120000	10.120001	1
14.020000	14.019999	1
18.200000	18.199998	2
21.020000	21.020004	4
24.900000	24.900004	4
28.020000	28.020000	0
50.120000	50.120013	13
144.220000	144.220030	30

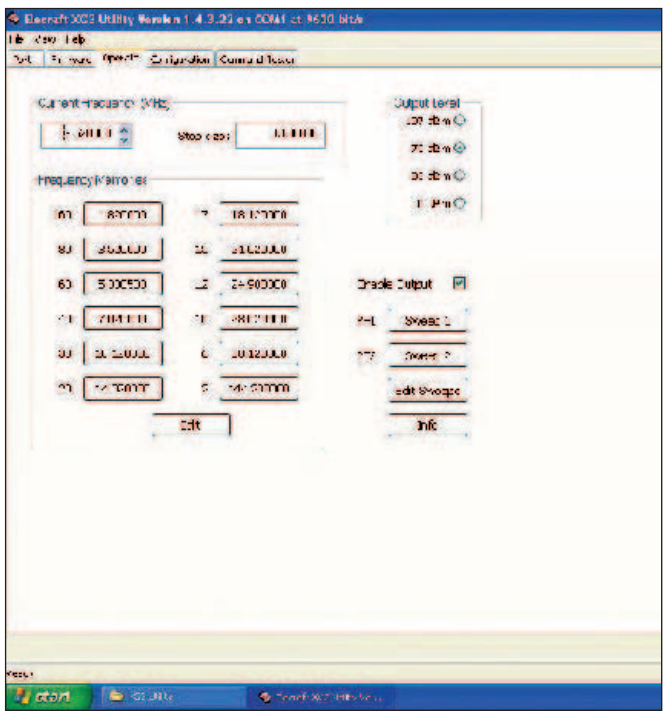


Figure 5 — The XG3 utility software may be used to set a variety of parameters as well as to update firmware. This screen allows the user to program specific test frequencies for each amateur band from 160 through 2 meters, set output level and perform swept frequency tests.

labeled each channel as a ham band, starting with 160 meters, all the way up to 2 meters. Using the XG3's utility program (Figure 5), the user can program any memory channel for an output frequency of 1.5 to 1400 MHz. Elecraft provides an RS-232 interface for connecting the XG3 to a PC.

The unit can be powered by an internal 9 V battery or with an external power supply of 11 to 14 V dc. The XG3 is quite small and light so you can use it in your home station or in the field. The plastic case is stronger than it looks. Though drop testing equipment is not (yet) in our ARRL Procedure Manual, the manufacturer performed this test repeatedly for us onto cement with no damage reported to the case or electronics.

The XG3 controls are minimal. There are four momentary contact push buttons: the BAND (+) and BAND (–) buttons, the ON/OFF power button and the output LEVEL button. The BAND (+) and BAND (–) buttons change the output to different fixed frequencies that have been preprogrammed at the factory or programmed by the user. When pressed and held for one second, each of these buttons selects a sweep frequency range that is chosen by the user, with selectable sweep step size and a sweep rate as little as 1 ms.

There is an LED indicator for each channel (ham band) that illuminates when selected. There is also an LED indicator for each output level, making a total of 16 indicators. The brightness of the LEDs is adjustable with the utility software.

The 0 dBm indicator will flash when the internal 9 V battery falls below a measured 7.6 V, or if an external supply falls below 11 V. A BNC type connector is used at the RF output.

Before using this or any other signal generator, be sure there is no possibility that RF from a transceiver under test is transmitted into the XG3's RF OUT jack — a real possibility if you have connected the XG3 to a transceiver's antenna jack. Transmitting into the XG3, even briefly, will damage the unit and will not be covered under Elecraft's warranty. A fusible link at the XG3's RF OUT jack provides a little protection from such incidents. It will open and will stop the frying process, but the degree of damage depends on the amount and duration of RF power applied to the RF output of the XG3. It's best to disable the test transceiver's transmit function if possible, or unplug any CW key or keyer, microphone or other keying lines before using any signal generator. At the ARRL Laboratory, I must always be mindful of these safety steps! I also turn the RF output and the microphone gain to minimum with any transceiver I test as an added precaution.

Applications

Elecraft's instruction manual for the XG3 is very thorough. If the reader is new to signal generators, they will soon discover the many uses of this test instrument. The "Applications" section starts off with a good explanation of how to measure receiver sensitivity with a step by step test procedure. Using the –107 dBm output, an ac voltmeter and some basic math, the user can determine the noise floor of a receiver. You can also determine the noise floor without the math if a step attenuator is used between the XG3 and receiver.

Another useful application that is explained in the manual is S-meter calibration, in which the user selects the –73 dBm output and manually adjusts the receiver's S-meter

[1]M. Tracy, KC1SX, "Elecraft XG1 Receiver Test Oscillator," Product Review, *QST*, Apr 2005, pp 78-79. This review is available to ARRL members online at **www.arrl.org/product-review**.

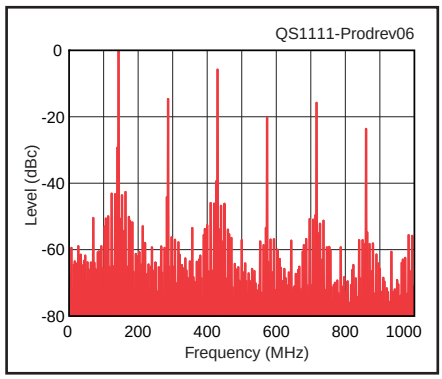


Figure 6 — The XG3 relies on harmonics to generate test signals above 200 MHz. Here, the XG3 is programmed for 440 MHz and shows 440 MHz on the display, but the synthesizer is actually programmed for 146.666667 MHz.

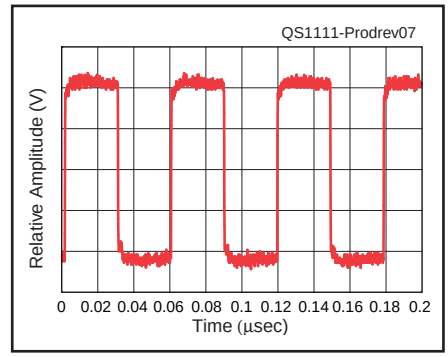


Figure 7 — The XG3's output is a classic square wave. Here the output level is –33 dBm.

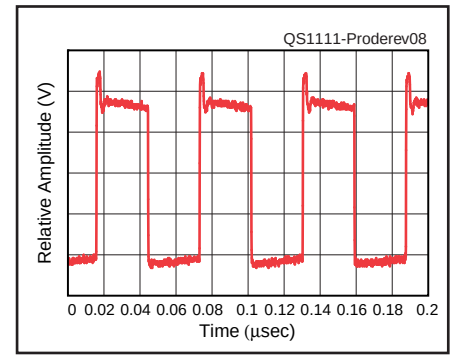


Figure 8 — At 0 dBm (maximum output), the XG3's waveform shows a little distortion.

sensitivity to read S9. Other applications of this test instrument are receiver alignment and using the XG3 as a VFO or local oscillator. The XG3 is a handy tool for tracing coax cables. On more than one occasion I've run bundles of coax cables and forgotten to mark each cable!

The XG3 can also be used as a signal tracer for testing each RF stage of a receiver. One word of caution, as the manual explains: Make certain there are no voltages present where the RF output jack connects to the test circuit. You must use a capacitor to block dc voltages found at various stages of a receiver.

Besides being a steady state signal generator, the XG3 can be used as a sweep generator, useful for checking filter or amplifier frequency response, and a programmable Morse and RTTY sender that can store up to 60 characters. I observed the sweep generator function using the swept frequency display of a software defined radio. Elecraft also provides a list of command control words for the technically savvy who wish to write their own custom control software. The sweep generator would be even more useful if a connection were provided to synchronize an oscilloscope sweep to the start of each generator sweep.

Utility Software

Elecraft allows for the firmware to be updated using the computer interface cable and the XG3 utility program. The latest firmware and software are available for free download on the Elecraft website, **www.elecraft.com**. Downloading and launching of the provided software went smoothly for me. Using the TEST COMMUNICATIONS SOFTWARE tab, I choose the only com port listed, COM 1, to get the program to run the XG3 with my computer. The software instructions in the manual are very good; they will not leave the user guessing.

Lab Testing

Tables 2 and 3 show the results of testing in the ARRL Lab. One software feature I appreciated was the ability to calibrate the RF output frequency so that it was close to the ARRL Lab's GPS locked HP 5351B frequency counter. I did this by using the EDIT OTHER SETTINGS tab and adjusting the calibration number while monitoring the frequency counter. Our counter's lower frequency limit is 10 MHz, so I selected the output frequency to be 10.120 MHz, the factory default. The XG3 uses a synthesizer and multiplier to create the desired output frequency from a stable, crystal controlled 10 MHz clock. Table 3 shows the actual output frequency error.

I discovered that when the low battery indicator is flashing, modulation is added to the signal, creating an audible tone in the test receiver's speaker. At this low voltage threshold, I found that the RF output dropped by only 1 dB or less. Frequency stability was rock steady within the normal operating voltages.

Using the XG3 during long periods at the 0 dBm output will definitely drain the battery quickly. A fresh generic alkaline battery I used lasted less than an hour during frequency measurement and calibration. There is an automatic power off feature in case the user forgets to shut off the unit. The default setting shuts off the XG3 after 10 minutes of inactivity; the time is adjustable with the utility program. A dc jack is provided for external power.

Output level accuracy was dead-on at all four output levels with the internal battery on all bands. With an external 13.8 V dc applied, accuracy was as good, except at the 0 dBm level, which increased to +2.5 dBm.

The RF output is a square wave and generates strong odd harmonics at the output. This is how the XG3 generates a signal higher than 200 MHz. While you can program any frequency up to 1400 MHz into the XG3's memories, for frequencies above 200 MHz, it will automatically program the XG3 synthesizer for the appropriate subharmonic. For example, if you program 440 MHz into the memory, it will show 440 MHz on the display, but the synthesizer will be automatically programmed for 146.666667 MHz (see Figure 6).

Above 200 MHz, accuracy of the RF output level is off, but a signal is generated nonetheless. If the user intends to operate this unit as a VFO, the RF output must be followed by a driver stage with shaped keying, a power amplifier and harmonic filters. Figure 7 shows the output waveform at –33 dBm and Figure 8 at 0 dBm.

Conclusion

Elecraft has built a very handy, reasonably priced signal generator with stability and accuracy normally seen only on more expensive units. This versatile test instrument is great for the bench technician, radio restorer and experimenter. The XG3 Signal Source's small size allows it to be an excellent addition to any modern emergency "'go kit."

A video about this product review is available via the QR code to the left, or at **www.youtube.com/watch?v=vhrW4UkJ2_U**.

Manufacturer: Elecraft, PO Box 69, Aptos, CA 95001-0069; tel 831-763-4211; fax 831-763-4218; **www.elecraft.com**. QST

Elecraft XG3 vs HP 5351

If you own a tablet or smartphone with the appropriate application, scan this QR Code to see a video overview of the XG3 vs HP 5351. You can also watch this video on your computer by going to

youtube.com/watch?v=vhrW4UkJ2_U

W1ZR

THE DOCTOR IS IN

Q Don, KC7YLH, asks: I have a 17 foot travel trailer that I am setting up for public service events. I want to mount three antennas on the back end of the trailer. All three are sleeved dual band, aluminum vertical antennas. I have one dual band-dual display radio for voice, one dual band-dual display radio for packet and APRS, and a dual band-single display radio for D-STAR. My question is how can I keep them from interfering with each other?

A It is hard for me to imagine that you could transmit on one radio and receive on another on the same band without some overload interference. In fact, I would be very concerned about damaging a receiver's front end. This question has come up a few times lately, so we decided to do some testing to see what really happens.

I enlisted the help of ARRL Lab Test Engineer Bob Allison, WB1GCM. We used my car and mobile rig operating on 2 meters. The test approach was to use two 2 meter magnetic mount ¼ wave antennas, transmit on one and measure the power into the other as a function of relative placement (see Figure 1). In each case we transmitted 40 W on 146 MHz into a matched antenna fed with 20 feet of RG-58. The 1.5 dB cable loss resulted in an effective radiated power (ERP) of 28 W (44.5 dBm). The loss in the receive antenna cable is taken into account in the received level. The data is presented in Table 1.

WR1B

Figure 1 — Joel Hallas, W1ZR, transmits on 2 meters to a ¼ wave whip on the rear fender while ARRL Lab Test Engineer Bob Allison, WB1GCM, measures the strong signal received on another ¼ wave whip.

Table 1

Signal Pickup on Second Coupled Antenna

Position	*Separation Distance*	*Received Signal (dBm)*	*Isolation (dB)*
Both on trunk lid	10"	35.5	9
Both on trunk lid	19.5"	32.5	12
Both on trunk lid	39"	32.5	12
Trunk lid corner to 16" higher roof center	5'	34.5	10
Trunk lid corner to opposite side hood cowl	11'	16.5	28
Center trunk to center cowl	11'	9.5	37
Car to car in line	12' 8"	15.0	30.5
Car to car adjacent lanes	7'	21.5	23
Car roof to car roof	16'	11.5	33

The next problem is that we don't know exactly what level is safe. This will likely be different for different radio models. Unfortunately manufacturers don't generally provide this information. We are fairly confident, based on lab testing, that a signal at 10 dBm is safe into a receiver. I would also be surprised if many solid state radios could handle the 30 dBm (1 W) we measured at close spacing.

Consider my HF and VHF mobile transceiver. If I were to click on the 10 dB attenuator, (see Figure 2 for a typical T attenuator), about half the power would be dissipated in R1. For our 1 W close spaced input signal, that would translate to 0.5 W. I'm not sure what the power rating of that attenuator is, but I haven't seen any ½ W resistors in my front end. I guess the good news is that if R1 opens up, that will protect the rest of the radio. I can only imagine that the sensitive first RF preamplifier stage is even more likely to fry. If it stays together the amplified signal will hit the mixer and crystal filter pretty hard.

As seen in Table 1, many configurations are in a zone in between the safe 10 dBm, and the unlikely to be safe 30 dBm. If we consider our power level and cable loss as typical, the 16 foot car to car spacing should provide about 10 dBm into the receiver. Any closer spacing should be viewed with caution. This is a particular problem while in the parking lot after a club meeting, or waiting in traffic to get into the Dayton Hamvention® parking lot. One obvious solution is to drastically reduce power. If you are working into nearby repeaters, the chances are you can do this. On the other hand, the driver of the car next to you may not be as considerate.

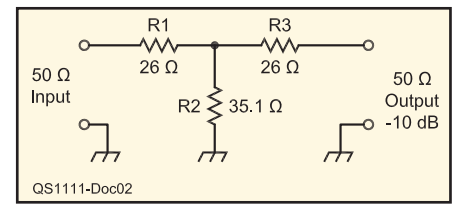


Figure 2 — A 10 dB T type attenuator for 50 Ω. Slightly more than half the input power is dissipated in R1.

If damage is not a problem, you should be able to operate at the same time except that you will likely have a big change in receive level while one of the other radios is transmitting. APRS should not transmit often enough in normal situations to require more than an occasional request for a voice repeat. D-STAR may be a different story if you are passing lots of data, however.

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

Q Randy, W7TJ, asks: I would appreciate your advice on purchasing a 12 V battery to run my 100 W HF transceiver for the duration of the next ARRL Field Day. Several of the locals I have spoken to mentioned that a marine battery might be a good choice. My radio is specified to draw a maximum of 20 A at 12 V while transmitting. If I assume a 50% duty cycle, would that be a 10 Ah average rate or a requirement for 240 Ah total battery capacity to last 24 hours?

A Good question. Your approach is in the right direction, but a bit more detailed analysis can save you some battery weight and cost. A 240 Ah capacity battery is expensive, heavy and probably more than you really need!

As to the current draw, I dug through old *QST*s, and in the May 2008 column I found some data I took on a transceiver in your class for a different purpose. I have reproduced it as Table 2.

There are a few observations to note in terms of duty cycle:

- The manufacturer's 20 A rating is the *maximum* current during transmit. The actual current will depend on the antenna load impedance, applied dc voltage and other parameters. For my ICOM IC-706Mk2 into a matched load, the measured current was 15.1 A. This is not trivial to measure, by the way — just putting your VOM in series with the dc line will result in enough voltage drop during transmit to cause the radio not to work. I used a magnetically coupled meter to take the data in Table 2. It should be safe to assume 20 A as the worst case for your calculations, but you may be able to reduce your current by adjusting your antenna load.
- You didn't say if you were operating SSB or CW. This relates to the required power because if you are operating CW, during the times you actually transmit (key down) you will draw 15-20 A. While the key is up you will either draw 3.7 A if the radio stays in transmit mode or about half that if break-in is used and the radio switches to receive while the key is up. The average current during transmit times will thus be between about 8.5 and 11.8 A. With SSB, during transmit time, the output power varies from 0 between syllables, 3.7 A draw, to H during speech peaks, 15-20 A draw, but probably averages about 10% of maximum PEP, or around 7 A.

Thus, during the time you are actually transmitting, the average current draw will likely be in the range of 7 to 10 A.

- In determining duty cycle effects, there are really three kinds of periods to consider:

1. Radio off — shift change, meals, bio breaks — 0 A draw, if you remember to power down.

2. Receive time, while PTT is open or key stays up — 1.5 to 2 A draw. Since it takes at least as long to copy a message as it does to send one, this represents at least half of the radio on time. Usually it is considerably more because it takes time to find the next station, or wait until they finish calling you. Some time studies while you are doing your typical contest operation should get you some good data that reflects your operating style.

3. Actual transmit time — 7 A SSB, 10 A CW draw, as described above.

In my experience, unless you "own" the frequency and people call immediately after you finish a transmission, you will spend a lot more time on receive than on transmit. If you are doing "hunt and pounce" you will need to find a station, enter the call into a log to see if you worked them before and then call. I would bet your transmit/receive duty cycle would be no more than 25%. Thus, using 10 A as transmit current, which will be close for CW and safe for SSB, and 2 A as receive current, the average current would be 0.75 × 2 + 0.25 × 10 or about 4 A. If you have 10% power-down time, that works out to about 86 Ah average capacity over the 24 hour period. You may want to adjust the calculation using the parameters that reflect your operating style and mode. In any case, it is considerably less than you anticipated — good news.

The bad news is the battery capacity reflects the total energy that is available from a fully charged new battery. Your battery will continue to provide current down to almost 0 V, possibly of interest if illuminating progressively smaller and smaller light bulbs. Your radio will, however, drop out of service at around 11.5 to 12 V at the radio terminals (don't forget to calculate your wire voltage drop at 20 A). Most batteries will provide about half their energy by the time they reach 10.5 V — a good working limit since they don't last as long if discharged below that point. Thus if you use a battery by itself as a power source, you will only be able to use something less than 25% of its advertised capacity before it fails to operate the radio.

All is not lost — a device called a *battery booster* or *boost regulator* is available that will put out a constant 13.8 V as the battery voltage drops to 10.5 V or lower.[1] This allows you to use about half the energy in a battery before you need to change to another or shut down. These devices cost less than most batteries in this class and can double the service time, so they are a good investment for this type of service. With the use of a boost regulator, and based on my duty cycle assumptions, it looks like you will want two 80-90 Ah deep cycle batteries — a convenient and popular size. If they are identical, you could put them in parallel, although I prefer a switching arrangement (see your Marine dealer for a suitable high current switch). This allows for one to be charged while the other is being used.

As to type of battery, a *deep cycle* battery is most appropriate for this kind of service. A regular *starting* battery is designed to provide a short burst of very high current to start a vehicle. It is not designed to be discharged deeply. While a deep cycle battery may be able to be charged up and heavily discharged hundreds of times, the usual starting battery may make 10 cycles of this sort before expiring. Note that marine dealers tend to sell both types, so *marine* battery is not a specific enough description of what you want. Many boats have one dedicated to each kind of service. RV, golf cart or electric wheelchair dealers may also offer deep cycle batteries.

Deep cycle "gel cell" or "AGM" batteries are a good choice. They may cost a bit more than traditional flooded cell deep cycle batteries, but they never need filling, don't spill, don't freeze and can be tipped over without problems. If you plan on using the battery inside a building, select a gel or AGM type to avoid the danger of explosive hydrogen gas that is released by flooded lead acid batteries during the charge cycle.

Speaking of AGM batteries, in the September 2011 column I noted that AGM and gel cell batteries were not suitable for use as starting batteries for large engines. A few readers wrote to say that Optima Batteries (see **www.optimabatteries.com**) now offers AGM batteries designed for starting, deep cycle or both.

Table 2

Measured IC-706Mk2 Key-Down Current at 13.8 V, Driving 50 Ω Load at 7.1 MHz

Setting	*Power (W)*	*Current (A)*
Receive	N/A	1.4-2.0
0	0	3.7
L	4	5.8
1	7	6.5
2	13	7.8
3	21	8.8
4	30	10.0
5	42	11.1
6	55	12.0
7	68	13.0
8	88	14.2
9	95	14.6
H	100	15.1

[1] P. Salas, AD5X, "Product Review — Battery Boost Regulators from TG Electronics and MFJ Enterprises," *QST*, Nov 2008, pp 46-49.

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

West Mountain Radio RIGblaster Advantage

If you plan to try your hand at PSK31, RTTY, JT65 or any of the other sound-card-based digital modes available today, chances are you're going to need some means to connect your computer (and its sound card) to your transceiver. Many amateurs rely on simple interfaces that merely provide transmit/receive switching and audio signal isolation. They are fine as far as they go, but the trend among more "deluxe" interfaces has been to incorporate the sound device within the interface itself. The advantage of this approach is that it frees the computer sound card for other applications (along with the need to readjust its settings between ham and family uses), and it eliminates the rat's nest of wires between the computer and the transceiver. Having an interface with an internal sound device makes life easier for the digitally active ham, especially if you want the convenience of being able to use the interface anywhere, and with just about any computer.

The Advantage rear panel.

West Mountain Radio has been making their famous RIGblaster interfaces almost since the day hams began using sound cards to create new digital modes. It was only recently, however, that they introduced an interface with a built-in sound device: the RIGblaster Advantage.

Unique Design

The RIGblaster Advantage is designed to be a flexible hub for your entire station, regardless of whether you intend to operate phone, CW or digital. For example, you may want to use the microphone jack of your transceiver for regular SSB, AM or FM operation *and* as the input for digitally modulated audio for PSK31. Normally this would be a bit of a hassle since you'd have to swap the microphone and interface plugs each time you wanted to switch from voice to digital. With the RIGblaster Advantage, you simply plug your microphone into the interface and connect the interface to the radio's microphone jack. The Advantage switches between the microphone and the internal sound device automatically.

Another perennial headache with sound-card interfaces has been configuring the transmit/receive switching connections and transmit audio lines to correspond to the wiring of the transceiver's microphone jack. This often involves the tedious use of tiny jumper blocks or wires that you must place in the correct positions according to which signals need to go on which lines. The odds of success are usually not in your favor.

West Mountain's solution is to streamline the process with what they call "Instant Setup Connectors." You just choose the connector that matches your particular transceiver brand and pop it into place. It takes all of 10 seconds and you're good to go.

The Advantage connects to your computer through a USB cable. It obtains its power through the same cable, so there is no need to hook up an external power supply. The USB connection creates a virtual COM port for your computer operating system and the Advantage user manual steps you through the process of figuring out the designation (COM 6, for instance) so that you can set up your software accordingly. The Advantage appears to your computer as a sound device, so you also need to "tell" your software to chose it as the default. As with the COM port setup, this is a one-time operation. I was able to easily configure the Advantage in *Windows 7* for use with *DigiPan* for PSK31 operation and *Ham Radio Deluxe* for multimode applications. I also was able to get it working with *Fldigi* under *Ubuntu Linux*. In each case it was a matter of a few mouse clicks within the appropriate menus.

Speaking of *Ham Radio Deluxe*, the RIGblaster Advantage also includes transceiver control interfacing. Through *Ham Radio Deluxe* the Advantage gave me full access to control of all the functions of my radio.

CW and FSK keying are achieved with relay switching through a dedicated jack on the Advantage rear panel. The Advantage has the ability to perform transmit/receive keying in response to sound alone, such as when your sound card sends AFSK RTTY or modulated CW (MCW) tones, but "hard" COM port keying is almost always the best choice. The Advantage gives you the option — VOX or COM keying — through a front-panel toggle switch.

Smooth Operation

The RIGblaster Advantage is one of the easiest interfaces I've ever used in terms of initial setup and overall operation. They've clearly put a lot of thought into making this product as simple to use as reasonably possible. The only glitch I encountered wasn't the fault of the Advantage. When I attempted to use *JT65-HF* software for *Windows*, the program had difficulty accessing the audio streams from the Advantage and generated errors as a result. Apparently this is a known issue with similar interface designs and will probably be resolved by the software author soon. With all other applications I tried, the Advantage was flawless.

Manufacturer: West Mountain Radio, 1020 Spring City Dr, Waukesha, WI 53186; tel 262-522-6503; **www.westmountainradio.com**. *$200.* QST

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

NØAX

HANDS-ON RADIO

Experiment 106
Effects of Gain-Bandwidth Product

Last month, we discussed gain-bandwidth product (GBW or GBP) and how it affects the ability of an op-amp to amplify signals of different frequencies. That's important, because op-amps are used as the active element in signal processing and filter circuits. What effect does GBW have in that kind of application? We'll use *LTspice* to illustrate the effects of GBW in a band-pass filter circuit as an example of the issues the circuit designer has to consider.

Gain and Q

In the experiment portion of the previous experiment, you built a simple amplifier circuit and substituted op-amps with different GBW to see the effect. Clearly, as GBW increased, so did the gain of the circuit at higher frequencies. What about circuit performance at much lower frequencies? Does GBW affect performance there, as well? Yes!

The effects are most easily seen in band-pass filters because requirements for steep filter "skirts" and narrow bandwidths require a lot of gain. Why do they require a lot of gain? Let's take a look at the multiple-feedback band-pass filter in Figure 1.[1] (This design was created by Jim Tonne, W4ENE, using the professional-level version of his *ELSIE* filter design software.[2]) It shows a two-pole band-pass filter with a center frequency, f_0, of 10 kHz and a bandwidth, BW, of 1 kHz. Thus, the filter's Q is

$$Q = f_0 / BW = 10\ kHz / 1\ kHz = 10$$

In this example, the software requires values for f_0 and BW, the capacitor values (using the equal C-method), and the order and type of filter response (second order Chebyshev in this case). Figure 1A is the filter design if an *ideal* op-amp is used. That means an op-amp with an infinite GBW and infinite dc gain. Each filter section has the same gain (A_V = 5.6 dB) and Q (18.24). The section's center frequencies are slightly different: $f_{0\text{-}1}$ = 9.56 kHz and $f_{0\text{-}2}$ = 10.46 kHz. Each section then acts as a narrow filter (Q = 18.24) tuned to a single f_0.

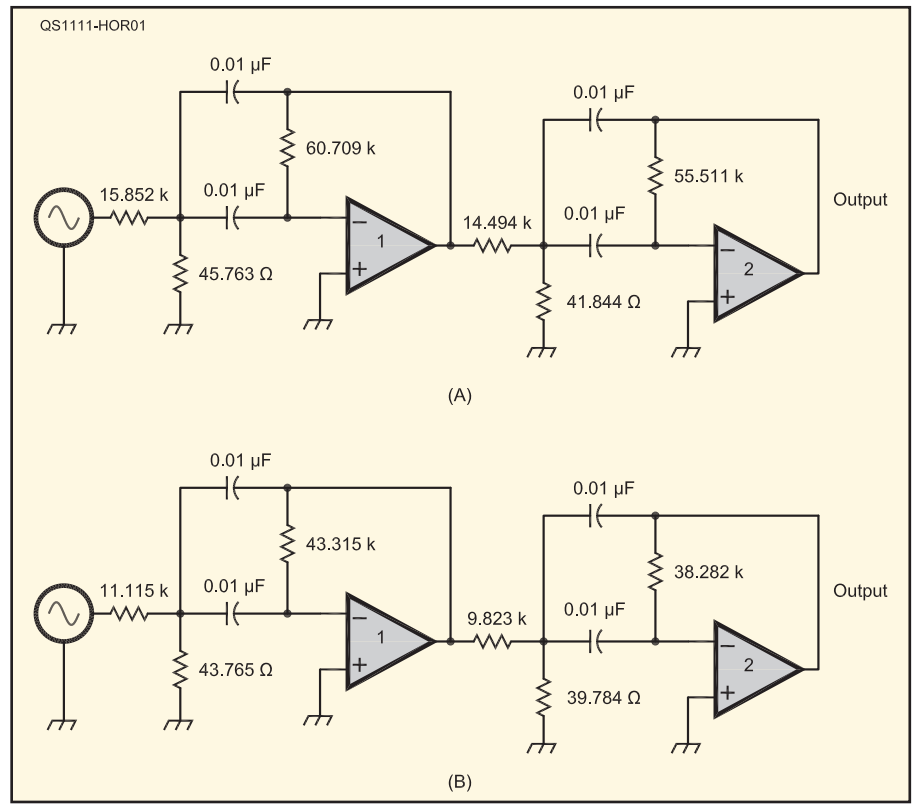


Figure 1 — Schematic of a two pole multiple feedback band-pass filter with a center frequency of 10 kHz and bandwidth of 1 kHz for a Q of 10. (A) shows the design for an ideal op-amp while (B) provides adjustments needed for practical op-amp performance (see text).

If the two filter sections are *cascaded* as shown, the result is the band-pass frequency response as shown in Figure 2. The *pole* for each section is shown by the small, red lines on the frequency axis to either side of 10 kHz. The extra gain is required because the individual filter sections work against each other away from their respective center frequencies. To create the passband of the filter the total response has to add up to 0 dB at the filter's overall center frequency of 10 kHz, which is between the two individual f_0 values. The result is that each filter has to have a gain of greater than 0 dB at its individual f_0.

All well and good, but it's kind of hard to buy an ideal op-amp. They are always out of them when I go to the store! Jim's software, though, allows you to specify the performance of the op-amp and compensates

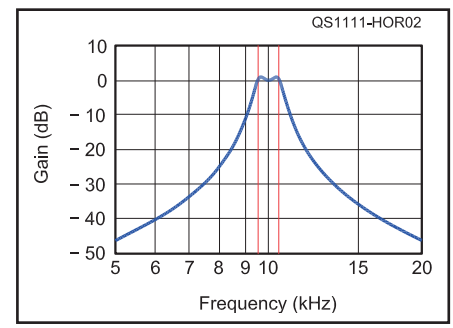


Figure 2 — Frequency response of the filter in Figure 1.

[1]Multiple-feedback band-pass filters are discussed in Hands-On Radio experiment #4. All previous experiments are available to ARRL members at **www.arrl.org/hands-on-radio**.

[2]Tonne Software, **www.tonnesoftware.com**.

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

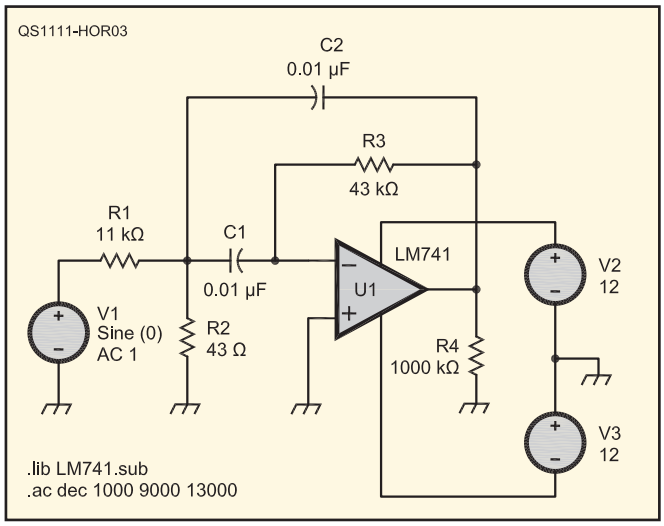


Figure 3 — *LTspice* schematic for Section 1 of the multiple-feedback band-pass filter.

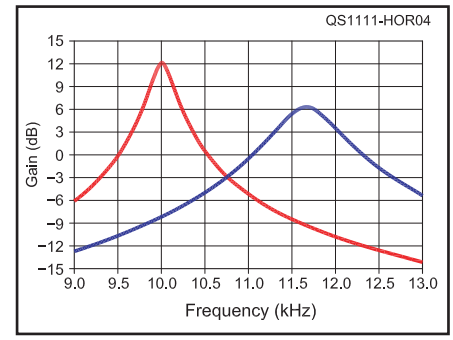


Figure 4 — Frequency response of the filter with an LM741 op-amp (red) and an LM318 op-amp (blue). The higher GBW of the LM318 results in performance that is closer to that of an ideal op-amp.

for its behavior. In this case, Jim used an op-amp with a dc gain of 100 dB (100,000 V/V), a GBW = 1 MHz and an input impedance of 1 MΩ. Figure 1B shows the result — the resistor values are a little smaller and the overall frequency response is the same.

Necessary Gain and Peaking

The non-ideal op-amp selected would seem to have plenty of gain at 10 kHz: 1 MHz / 10 kHz = 100. Each filter section has a gain of about 5.6 dB = 1.9 so we should be in good shape, right? Well, not really. From page 5.70 of the Analog Devices *Op-amp Applications* online book referenced last month: "A rule of thumb is that the open-loop gain of the op-amp should be at least 20 dB (×10) above the amplitude response at the resonant (or cutoff) frequency, including the peaking caused by the Q of the filter… A_0 = H Q, where H is the gain of the circuit."[3] (For a discussion of filter response peaking, see experiment #41.)

If each stage has a gain of 5.6 dB = 1.9 at f_0 and a Q of 18.24, then the op-amp must have a gain of $10 \times (1.9 \times 18.24) \approx 348$ at f_0. We're short of gain by a factor of about 3.5 to be able to ignore the effects of the op-amp's 1 MHz GBW. That's why the circuit values have to change a little bit.

Why does GBW make a difference at such a low frequency? What happens if the op-amp's GBW is too low? Quoting from page 5.106 of the *Op-amp Applications* book: "Without sufficient…gain, the op-amp virtual ground is no longer at ground. In other words, the op-amp is no longer behaving as an op-amp. Because of this, the [filter] no longer behaves like [a filter]." A virtual ground exists at the op-amp's inverting (–) input *only* if the op-amp's output signal causes all of the currents flowing into and out of those connections to balance. That allows the voltage at the inverting input to be the same as at the non-inverting (+) input, which is connected to ground. If the op-amp doesn't have enough "oomph" (gain and output drive capability) to keep those currents in balance, the inverting input is no longer at ground potential and that invalidates the assumptions on which the filter design equations are based. The circuit may provide some filtering function but it won't perform as designed.

Observing the Effects of GBW

You can simulate Section 1 of the circuit of Figure 1A to see the effects of GBW. Use the closest standard 5% series resistor values, such as 11 kΩ, 43 kΩ, 43 Ω, 10 kΩ, 39 kΩ and 39 Ω. This will shift the center frequency to nearly 12 kHz from the software's precision design. Retrieve the amplifier circuit you simulated for last month's experiment and add the necessary resistor and capacitors to make the multiple-feedback circuit as shown in Figure 3.

To change the values of the components, move the cursor over the symbol until it takes the shape of a hand, right click, then edit the value. (Use "u" for micro.) Start with the LM741 op-amp. You can change the op-amp library model by moving the cursor over the ".lib" library model identification line so that it becomes a text cursor, then right clicking and editing. Don't forget to change the op-amp part number as well, using the same process.

Because we want to see the frequency response of the circuit close to 10 kHz and not spread out from 1 kHz to 1 MHz, edit the simulation command line by right-clicking over the ".ac" line. I found that a span of 9 kHz to 13 kHz made it easy to see the effects of changing the op-amp. Figure 4 shows the result in red. (Click on the horizontal axis cursor to change the plot to linear and use 500 Hz tick marks. Click on the vertical axis cursor to turn off phase plotting.) Now change to the LM318 op-amp used for comparison last month and rerun the simulation. You'll get a response shown in blue in Figure 4 — quite a change!

First, the center frequency shifts from 10.1 kHz and a bandwidth of 300 Hz for the LM741 to 11.7 kHz and 800 Hz with the LM318. Gain also changes from 12 dB with the LM741 to 6 dB with the LM318. Because we're using standard values for the resistors, the design center frequency is now approximately 12 kHz, but the Q and gain values for the LM318 circuit are much closer to what is expected for an ideal op-amp.

You can see the effect even more clearly if you use one of the low cost high GBW op-amps available today, such as the LM7171 with a GBW of 200 MHz. (Download and use the model file as explained last month.) Another way to see big changes in performance is to increase the filter's center frequency. To change f_0 to 100 kHz, reduce the two capacitors by a factor of 100 kHz / 10 kHz = 10 for a value of 0.001µF. The higher-speed op-amp is required to get anything close to expected performance.

The moral of this story is that sensitive circuits such as moderate- to high-Q filters can be very dependent on the performance of the components used to implement them. Although our junk boxes are full of op-amps with 1, 4 or 10 MHz GBW, they will probably give confusing results in circuits for which they are not suited, or if the tools we use to design the circuits make too many assumptions about their capabilities!

[3] **www.analog.com/library/analogDialogue/archives/39-05/op_amp_applications_handbook.html**

AG1YK

HINTS & KINKS

TS-2000 TO SG-230 INTERFACE

◊ I have lived in antenna restricted communities all my adult life. My HF antennas were shortened dipoles crammed into the attic and had limited band coverage. When I moved into another antenna restricted community, I sought a way to cover more HF spectrum. After doing a fair amount of research, I decided to invest in an SGC SG-230 automatic antenna tuner that would cover all the HF bands and give me 200 W future capability. It feeds a delta loop located in an end gable of the attic. Fortunately the siding is not aluminum.

After installing the antenna and tuner in the attic, I wanted to interface the tuner and my Kenwood TS-2000 transceiver. The tuner requires 12-18 V dc at 0.9 A. This could have come from the station power supply, but the TS-2000 has an external antenna tuner connector that provides this power switched with the radio.

Aside from the power lines, the SG-230 has two control lines labeled RESET/LOCK (+12 V dc locks, momentary ground resets) and TUNED (goes low when coupler is tuned). Both these lines are optional, meaning the tuner will work without using these control lines. The TS-2000's external antenna tuner connector has two control lines marked TT and TS. Could these lines be utilized to control the SG-230? Some Internet searching turned up the service manual for the discontinued Kenwood AT-300 automatic antenna tuner. This answered how these control lines operate. These lines are bidirectional. TS stands for TUNING START and is activated when brought low. TT stands for TUNING TERMINATED and goes high when the tuner has completed tuning.

The TS-2000 disables its internal antenna tuner when it detects an external antenna tuner connected to the AT connector. But how does the radio do this? The AT-300 service manual did not reveal the answer, but again, some Internet searching did. (Thanks to Robert Lewis, AA4PB, for a nice technical description of the Kenwood tuner interface at **www.ham-kits.com/KWTuner/KWT%20technical%20description.pdf**). Upon power up, the TS-2000 sends signals over TS and TT and depending upon the tuner's response activates either the internal or external tuner mode. Connecting TS and TT through a 4.7 kΩ resistor fools the radio into selecting the external tuner.

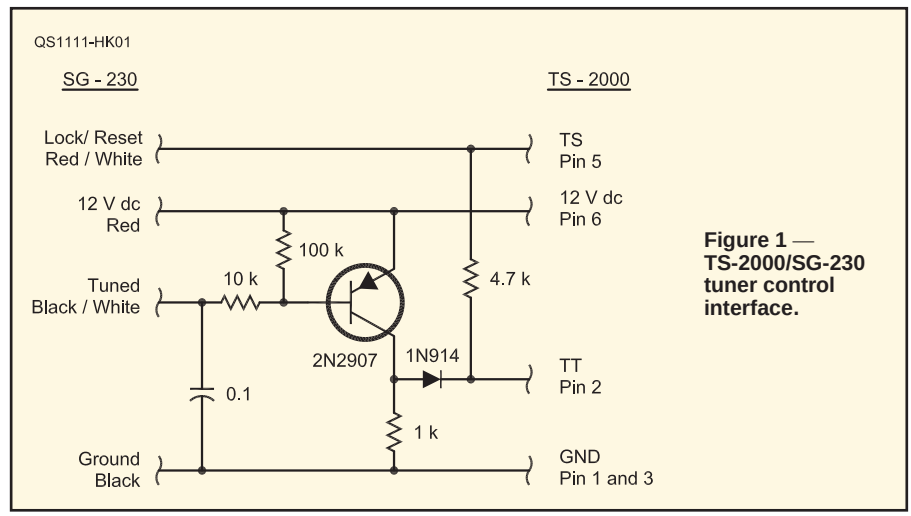


Figure 1 — TS-2000/SG-230 tuner control interface.

Examining the signal polarity of each control line I determined that the TS signal matched the requirements of the SG-230's RESET/LOCK line and could be directly connected. The TUNED signal from the SG-230 was inverted from what the TS-2000 TT line requires. I designed a simple transistor switch to invert the signal. I combined all my requirements and created the circuit shown in the schematic (see Figure 1). I built it on a small perfboard using point-to-point wiring, installed it inline and insulated it with shrink tubing.

Now when I press the AT button on the TS-2000 the rig transmits a 10 W carrier, my SG-230 tunes, signals it is done and the TS-2000 switches back to receive — just the result I wanted. This circuit does not implement all the functionality of the original Kenwood AT-300 interface, but it does provide the basic tuning start/stop function between the TS-2000 and the SG-230 tuner. — *73, Roland Kraatz, W9HPX, 35185 Carnation Ln, Indian Land, SC 29707,* **w9hpx.4@gmail.com**

SUPER SIMPLE GROUND PLANE

◊ The trick to making the Super Simple Ground Plane is to use the inner metallic tube and screws of a terminal strip. The only skill needed is the use of a screwdriver — no solder, no flux. Before I came up with this idea, I soldered the wires to the SO-239, but this approach makes the antenna difficult to store or disassemble.

The advantages of this technique are that you can assemble and disassemble it with just a screwdriver, in less than a minute. Several

PEDRO MOTILLA, EA5BFT

Figure 2 — Remove the screws from the connector tube to free it from the plastic housing.

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

PEDRO MOTILLA, EA5BFT

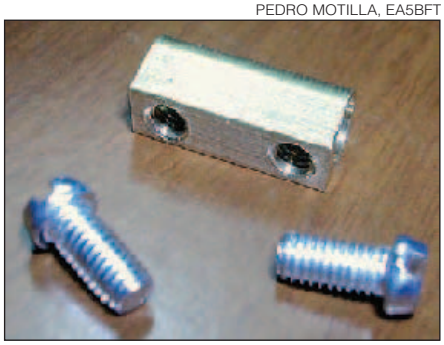


Figure 3 — The connecting tube and screws removed from the terminal strip.

PEDRO MOTILLA, EA5BFT

Figure 4 — Use the screws to attach the tubes to the base and center post of the SO-239.

PEDRO MOTILLA, EA5BFT

Figure 5 — Bend and trim the radials until you get a match and your antenna is ready to go.

sets of wires for your favorite bands can be prepared so you can get on the air quickly. Experimenting with the length and number of radials is simple. The whole antenna can be stored in a PVC pipe in the trunk of the car ready for use at a moment's notice. Even a hiker can put it in their backpack and have fun with a handheld transceiver by hanging the antenna from a branch. Finally, it's cheap!

Construction

1. Cut the radial and vertical element wires to the lengths for the band you want to use. Leave an extra 1 or 2 centimeters to trim for best SWR. In my experience for VHF the element lengths should be about 49 cm and for UHF about 16.3 cm.

2. Remove the metallic tubes from a five position terminal strip by taking out the two screws (see Figure 2) and sliding the tube free of the plastic housing (see Figure 3).

3. Using one screw, attach one tube to each mounting hole of the SO-239 (see Figure 4) and one to the center pin.

4. Insert the radials into the tubes at the base and tighten the other screw. Do the same for the vertical element. For the radials, bend them to an angle of approximately 120° with the vertical element (see Figure 5).

5. Finally, connect your transceiver and SWR meter, trim the radials for best match and you are ready to go.

I should note that this approach is good for portable or temporary use but long exposure to moisture and water will create corrosion problems degrading the antenna's performance. — *73, Pedro Motilla, EA5BFT, Urb Pedralvilla, Buzón 107, 46169 Olocau, Spain*, **pedrolo2@pedrolo.com**

BALANCED LINES GROUNDING

♢ I woke up at 6 AM in the middle of the December 27, 2010 Vermont blizzard and was in for a surprise. While in my shack I heard a zapping noise taking place 3-5 times per second. Outside the snow was flying sideways and the wind was howling from the north. A quick check revealed that the noise was coming from inside the MFJ-941D antenna tuner.

I have a number of coax antennas attached to this tuner as well as a 300 Ω balanced line twinlead feeding a 257 foot center-fed dipole for NVIS work on 160 and 80 meters.

Evidently, the WIRE/BALANCE position of the MFJ-941D tuner is not shorted to ground when another unused/unconnected position is chosen on the selector switch. The long dipole made a big capacitor with the earth and the snowflakes flying by charged it up. The noise was the dipole/capacitor discharging to ground inside the tuner.

The antenna twinlead is connected to the back of the tuner with a pair of banana plugs. Using insulated tools I disconnected the banana plugs and grounded them but not before discovering that the sparks could be as long as 2 inches and increased in frequency with wind speed.

If you have antennas connected to a tuner, you should check to see if the unused antennas are being grounded. If not, you need to create some kind of grounding system yourself since static can build to destructive levels very quickly. — *73, Jozef Hand-Boniakowski, WB2MIC, 465 Lamb Hill Rd, Wells, VT 05774-9707*, **wb2mic@arrl.net**

RIG WARMER

♢ Some time back I made the mistake of putting my HT-2400 handheld transceiver in the glove box for safe keeping. I forgot about it and left it there over an atypically cold Ohio winter weekend. As you might guess the liquid crystal display "rainbowed" and turned black from the below freezing weather, which was an expensive lesson learned. Now the question was how to keep the weather from getting into the radio?

I found a foam lined aluminum case that fits both my handheld transceiver and mobile rig quite nicely. For those times I can't take either with me, I break open one of those hand warmers that hunters use and put it in the case with the radios. You can pick them up at any sporting goods store. They are non-toxic and produce enough heat to keep the radio(s) happy and protected from the cold weather.

The case fits easily under the front seat or anywhere out of site from prying eyes until I get back in the car. Once the hand warmer runs out of heat merely dispose of it. The trick is to not forget you left them under the seat in the first place. — *73, Gregg Gary, WB8YYS, 3775 Kauffman Rd, Stow, OH 44224*, **wb8yys@arrl.net**

AUDIO OSCILLATOR POWER TESTING

♢ I needed to do some testing on the power supply of a tube-type audio amplifier (fuse checked good but it showed dead when plugged in). Not wanting to apply 120 V ac or fiddle with my Variac, I simply set my audio oscillator for a low level 60 Hz sine wave output, connected it to the power plug of the amplifier and went on my merry way chasing down the problem without worry of a shock. Actually, there could be some non-trivial voltage developed across the secondary of the high voltage winding of the power transformer, so as harmless as this configuration might seem, some caution is still warranted.

The outcome probably deserves mention. When I removed the fuse to check continuity, I left it in the "cap" of the fuse holder as I always have in the past. The problem was that the small spring inside the cap that pushes the fuse into the mating contact was missing. Inserting the fuse into the amplifier never actually put it inline. Snipping a small piece of an ink pen spring and placing it inside the fuse cap fixed the problem. — *73, Jeff Bauman, W8KZW, 6647 Stonebridge E, West Bloomfield, MI 48322-3255*, **w8kzw@arrl.net**

PUT A CORD ON THAT CORDLESS TOOL

♢If you are like me you have at least one cordless tool lying around your shack that has outlived its battery pack. Consider doing

JOE MORSE, AD4W

Figure 6 — The 12 V cord is attached to the connections removed from the dead battery pack.

what I did; put a cord on that old dead pack. If you don't have a suitable cord and cigarette lighter plug in your junk box, get one that can handle the current from an electronics house like All Electronics (**www.allelectronics.com**) or your local auto supply store. Just ask for a "cigarette lighter extension cord."

Clip off the socket end and save it for another project. Open up a dead battery pack but don't remove the dead cells. The contacts are attached to and supported by the cells in the center of the pack so they need to be left in place. You might have to remove one or more of the outer cells to make room for your cord where it enters the pack.

Use a cable tie to secure the cord to the pack case (see Figure 6). Usually one of the contacts is spot welded directly to a cell and the other is wired. Cut the wired connection and solder the cut tool wire to the cord (You should disconnect at least one of the tool's contacts from the cells so the old battery pack isn't in the power circuit). You do not have to disconnect the welded contact, just solder it to the other conductor of your cord (Of course, make sure you have maintained proper polarity). I have successfully done this modification on 12 and 14.4 V tools. The 14.4 V tool might turn a bit slower but will still be quite useable. — *73, Joe Morse, AD4W, 317 Westlawn Rd, Columbia, SC 29210-5622,* **ad4w@sc.rr.com**

GROUND CLAMP BATTERY EXTENDER

◊I had to connect a heavy ground cable to a 12 V auto battery with top posts. There wasn't enough room to get a wrench in, but there was room for a screwdriver. I solved my problem using a two-piece bronze ground clamp that I maneuvered around the post and then screwed on tightly. The ½-1 inch size easily accommodated both the 00 wire and the binding post. There has been no sign of any corrosion after 6 months. — *73, Howard Burkhart, KA6EMT, PO Box 91021, Los Angeles, CA 90009,* **hburkhart98@yahoo.com**

ANTENNA SUPPORT FOR MILITARY MASTS

◊Setting up for Field Day I ran into a small problem when I realized that all my mast rings for the guy ropes were at home — about 40 miles away. So after a quick run to the local Home Depot I was able to create a solution for guying the masts.

I used the following parts: a 1¼ inch PVC coupler (use a PVC coupler that has a ridge on the inside to hold the coupler on the male end of the pole), a three pack of spring links and an appropriate size metal hose clamp.

To prepare the guy ring, open the hose clamp fully and slip the three spring links onto it making sure they are facing in the same direction. Then hook the hose clamp back together again. Slip this over the PVC coupler and start to tighten down. Arrange the spring links at 120° intervals around the coupler and finish tightening the clamp (see Figure 7). Then slip the coupler over the male end of the pole seating the female end of the next section on top.

I have used this both as a replacement for guy rings and to attach a pulley at the top of some joined masts. I do have to stress two things though: First, some hose clamps can have *very* sharp edges, so wear gloves. Second, this is a *temporary* means to support these masts. Replace it with proper hardware as soon as you can. — *73, James French, W8ISS, 1811 Horger St, Lincoln Park, MI 48146-1424,* **w8iss@wideopenwest.com**

TEN CENT CONNECTOR COVER

◊I have my microphone input and PTT line connected to inputs on the back panel of my Yaesu FT-2000 transceiver. I wanted to cover the front panel connector to keep out dust and protect the close spaced pins.

I found the screw on sleeve from a microphone connector in my junk box. I thought about what to use for the end of the cap. I looked around and the best answer was a good old USA dime. I soldered the dime on the inside and it worked out perfectly. It looks good and adds a little piece of USA to a very fine Japanese radio (see Figure 8). — *73, Phillip Mikula, WU8P, 6901 Hammond Ave SE, B, Caledonia, MI 49316,* **wu8p@comcast.net**

JAMES FRENCH, W8ISS

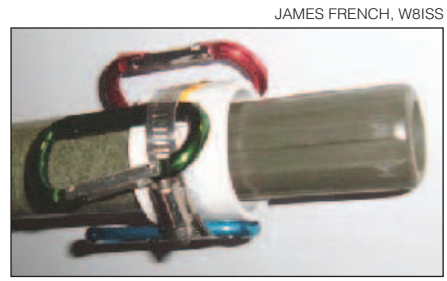


Figure 7 — Here is the temporary guy ring installed on the male end of a fiberglass mast section.

PHILLIP MIKULA, WU8P

Figure 8 — The 10 cent connector cover adding a touch of USA to a Yaesu FT-2000.

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

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

Feedback

◊ In "The Folded Skeleton Sleeve on Other Ham Bands" [Oct 2011, p 48] Table 1 has errors in the two entries for 15/10 meters. The half lengths, rather than the full lengths of both dimensions A and B were provided. For the 15/10 "folded" version, A = 20 and B = 15.4 feet. For the 15/10 "unfolded" version, A = 21.3 and B = 15.3 feet.

◊ In "Hints and Kinks"[Oct 2011, pp 61-63], the hint entitled "Piggyback RF Ammeter" is incorrect in that, for the shown configuration the meter in use should be an RF voltmeter, not an RF ammeter.

Android Apps for the Amateur

Charge up your Android smartphone with some handy ham apps.

William F. Vartorella, KJ4ORX

In the time it takes to read this article, you can download free ham radio apps to your smartphone for an array of gadgets that provide you the latest on location, repeaters, CW training, sunspots, satellite positions, bench equations, meteor showers, practice sessions for upgrading your license and much more.

We have come full circle from the sardine tin "homebrews" of the mystical early days of radio to the equally mysterious freeware appearing almost overnight for the most exotic of amateur communications.

Increasingly, hams have the opportunity to create freeware that drives the future of radio. Not surprisingly, the ham radio community has launched cutting-edge technologies into cyberspace, with a blinding, ever-changing array of apps for the Android platform.

Steve Ford, WB8IMY, addressed apps for the iPhone and iPod Touch last year.[1] This article presents the Android side of the equation.

Android Apps

Here, then, is a quick, dirty and probably controversial introduction to what is available on the Android platform. These apps are as close as your smartphone's app store — but, be careful what you install as Big Brother may be lurking around the edges ready to nibble away at your privacy.

For the sake of being user-friendly, let's look at the free apps by category. The app names used here are those found in Android Market (**market.android.com**). When you pull them up, review the user comments, as well as any linkages the app makes to your smartphone that you may find intrusive, aggravating or otherwise bothersome.

VoIP Based Apps

EchoLink — elegantly simple, with locations by regions, number of nodes broken down by country, node types (repeaters, users, etc), recent contacts.

EchoLink Finder — the world as a map at your fingertips, complete with search range and number of results.

IRLP Finder — similar to *EchoLink Finder*.

[1]S. Ford, WB8IMY, "Ham Apps Everywhere," *QST*, Apr 2010, p 95.

Location Apps

QTH Locator — calculates and displays your current Maidenhead Locator.

M3OYQ's Repeater Range — provides call sign, range, bearing and — particularly — operational status for repeaters.

NCDXF Beacon — shows which beacons are transmitting, in service, out of service, plus a useful TOOLS FOR LISTENERS that includes links to determine which beacon is transmitting on which frequency at a particular time.

Morse Code

Morse Trainer Light — 12 WPM speed (speed and letter spacing are not adjustable in the light version). Useful for getting your fist back in shape but not appropriate for novices.

Utilities

US Army Survival Guide — No ham in the field or lost at sea should be without this app, which, in "Chapter 19, Signaling Techniques," makes the point: "A radio is probably the surest and quickest way to let others know where you are and to let you receive their messages."

US Department of State —A go-to resource for the traveling ham, complete with travel advisories, health, immigration, country-specific information (for that exotic DXpedition) and daily press briefings, plus counterterrorism notices.

Scanner Radio — Has a browse by genre function that specifically lists AMATEUR RADIO as well as PUBLIC SAFETY and WEATHER. You can access scanners in the US, Italy, Canada, etc.

SZEBEL

The *QTH Locator* app maps your Maidenhead grid and the distance and bearing to other locations.

Propagation

Ham is one of my "go-to" apps, as it provides SOLAR CONDITIONS that includes both SOLAR TERRESTRIAL DATA, such as Solar Flux, A-Index, K-Index and Sunspots, as well as CALCULATED SOLAR CONDITIONS for bands (say, 30-20 meters) with Day and Night projections. It also gives a quick brief on VHF CONDITIONS, plus GEOMAG FIELD and SIGNAL NOISE.

Another app, *Clear Sky Droid*, details cloud cover, transparency, seeing, darkness, etc. This information is of interest for keeping track of the moon for EME and meteor scatter, but the data is also of interest to SKYWARN reporters. The SOLAR and MOON CALCULATOR functions keep track of Sunrise/Sunset values (local and UTC), plus Moon Rise/Set, Transit, Refraction, Azimuth, etc, specifically for your latitude and longitude.

Solaris gives you NOAA Auroral Activity, plus north and south-related movies (as well as **Spaceweather.com**). The estimated Planetary K index charts are especially interesting.

Satellites

MySatellites enables you to set locations (and use a night vision function as well) and monitor a host of satellites, including the ISS for those of you interested in ARISS.

More to the point is *HamSatDroid*, with an UPDATE KEPS function. Pick a satellite and get pass predictions for your home coordinates/grid square for up to a 24 hour time frame.

Satellite AR is especially helpful for

Amateur Radio iPhone Apps

Although this article is about Android apps, there are a multitude of apps for the numerous iPhones out there. I realized the value of my iPhone when I was an Amateur Radio volunteer working on the Boston Marathon. When I needed to find my assigned location on the course route, I used a GPS app. When I needed to reprogram my handheld transceiver I downloaded the manual to the iPhone. When I had to find a train station to transport a fatigued runner, the MAP app found it for me.

I wondered what other ham apps were available. To find out, I asked members on the ARRL Facebook page (**www.facebook.com/ARRL.org**) about their favorite apps. For those who responded, thanks for your help. Here are some of my favorite apps and those recommended by our Facebook friends. Most are free and some cost a few dollars. The majority work on the iPhone, iPod touch and iPad. Here's a brief look at what's available.

Digital Mode Apps

Of the digital mode apps, *EchoLink* is probably the most popular. I use it myself. It's free and it works great on the iPhone. *Multimode* is an HF, acoustically coupled, app for RTTY, BPSK31 and QPSK31 modes. It is easy to use and includes a nifty spectrum analyzer. *iPSK* is available from the same developer. Other digital mode apps include *PocketPacket*, an APRS client and *IRLP*Me* that works with the Internet Radio Linking Project, a system for linking Amateur Radio repeaters.

Satellite Apps

Satellite Tracker is a first-rate app and *GoSatWatch* provides real-time visual satellite tracking. For ARISS fans, *Space Station Lite* provides practical information about the International Space Station.

Information Apps

If you want to find out about the stations you are working, use *Callbook*. It seems quicker to me than using a browser based call sign lookup. *Callsigns* is another lookup friendly iPhone app. To find your grid square or latitude and longitude you can download the free *Maidenhead Converter* or *Ham Square* apps. To let other operators know where you are located use the APRS location finding and reporting apps *Ham Tracker*, *Ham Dashboard*, *iBCNU* and *OpenAPRS*. If you need to know the precise UTC time, try *HamClock* and *UTC Clock*. A ham radio "Swiss Army knife" app called *Ham Helper* provides time and other useful information.

DX Apps

DX cluster apps are handy for finding that rare one. *hamDXCluster* and *DX Hunter* are two feature rich DX cluster apps. Also for DXers, *Sunspot* provides the current SFI and A and K Index information. *HF Beacons* and *BeaconAid-HF* display real-time information for currently transmitting HF beacons.

Logging Apps

Once you work those rare ones, you can log them on the iPhone with *HamLog,* a multifunction logging application. There is also a slimmed down version of *HamLog* called *iRover* specifically for operating as a rover in V/U/SHF contests.

CW and Licensing Apps

CW aficionados will enjoy these learning, decoding and practice apps: *Ham Morse*, *Morse It*, *MorseMania* and *Morse Key*. Interested in obtaining or upgrading your license? The ARRL publishes *The ARRL Technician*, *ARRL General* and *ARRL Extra* apps based on our Q & A books.

These are just some of the many iPhone apps that are available specifically for Amateur Radio. If you have any other favorite Amateur Radio iPhone apps, let me know and I'll publish them on the ARRL Facebook page. — *Harold Kramer, WJ1B*

CubeSat satellites, ISS and the last 30 days' launches. The most interesting function here is that you can actually hold up your smartphone to the cosmos, get your bearings and follow the satellite path.

PrediSat describes satellite pass data, complete with alerts, countdowns and a useful night mode.

Homebrew

Ohms gives you quick calculations on watts, volts, amps, plus a separate resistor color code analyzer.

Resistor Ratio Calculator calculates the correct standard value resistors to obtain a specific ratio for dividers and opamps.

Licensing Study Guides

Ham Radio Study has the new Technician pool (Element 2), current General (Element 3) and Extra (Element 4) Q & A. Great for that early morning commute, pitting your mind against the machine.

PalmVE takes it a step further, with settings for WRONG ANSWER BEHAVIOR and FIND A VE SESSION. If you don't find a session listed nearby, NO RESULTS FOUND suggests you visit **www.arrl.org** for a search.

The Cost of Free

As hams, we're all interested in bandwidth issues. Yet the devil-in-the-details here is that your new handheld smartphone "radio" is typically updating itself every 1 or 2 minutes, creating network congestion. Simply put, the background signaling traffic for every smartphone is comparable to an estimated 1000 voice calls each day.

Enter Android and you can see where this trend is leading. Any solution begins with the network and, worse, potentially more regulation. We are already beset with demands for greater bandwidth allocation for "medical devices." Threats abound.

In short, smartphone and ham radio are hardly a panacea. To borrow from seemingly most scientific articles ever written, "more study is needed." These "free apps" come at a price and that hidden cost is network congestion and bandwidth. The airwaves "used to be free" or so the early thinking went. What today's "public interest, convenience, and necessity" are in ham terms is anyone's guess. We argue for the immediate implementation of this emerging technology, as it may prove the launching pad for the next great advance in ham radio. Marshall McLuhan called radio "the tribal drum." In our case, it's back to the sardine tin, tinkering and orchestrating that tribal beat.

William F. Vartorella, KJ4ORX, an ARRL member, is an Amateur Extra and newly minted VE. A former college professor, Bill earned a PhD in Mass Communications, with particular interest in emerging communications technologies in developing countries. He is the lead coauthor of Funding Exploration *and has penned more than 100 scholarly and professional articles and papers on a wide range of subjects. Bill is a Fellow of both The Explorers Club and The Royal Geographical Society. He can be reached at PO Box 1376, Camden, SC 29021,* **kj4orx@arrl.net**.

Homeowners Insurance and Your Radio Gear

When bad things happen to good gear the right insurance will make your loss disappear.

Ray Fallen, ND8L

Confession is good for the soul. I am no technical wizard. Every time I turn on the rig, fire up the amplifier, boot the computer, turn the antenna and say, NOVEMBER DELTA EIGHT LIMA with great gravitas and some DX or contest station comes back — it's a big mystery to my very small brain. So imagine my wonderment when in 1997 the greatest contest station and antenna guru I know, Tim Duffy, K3LR, asked me to speak at his Dayton Hamvention Antenna Forum. I thought, "Well, Fallen, you can spell dipole and when you solder a PL-259 it works for a while — but why would Tim ask you to speak to people who know more about antennas than you ever will?"

"Homeowners insurance," said Brother Duffy, noting my puzzlement, "nobody knows much about how their towers and equipment are covered and that's what you do, right?" Can't argue with that, I thought. Since then, I've spoken twice at K3LR's Antenna Forum. In 2010, I was even former ARRL President Joel Harrison's warm-up act — and it don't get much cooler than that. I've spoken to clubs in Northeastern Ohio and Western Pennsylvania, had an article published in *QST* and wrote a chapter for Don Daso's, K4ZA, book, *Antenna Towers for Radio Amateurs*, published by ARRL in 2010.[1,2]

My February 2009 *QST* article concentrated on insuring antennas and towers. But I also get a lot of questions on equipment and computers, both fixed and mobile. That is the focus of this article.

Caveats and Stuff

Like everything from bulldozers to your morning oatmeal, this article comes with some disclaimers, so let's review, shall we?

1. Most homeowners insurance policies written in the US (except in Texas) are based on standard language provided by the Insurance Services Office. Each company modifies that language to comply with individual state insurance laws.

Equipment damaged while being repaired isn't covered. If you're working on your Loudenboomer 9000 amplifier with the power on and you drop a screwdriver in the power supply cage and Flash! Bang! Smoke! Inappropriate Language! …there's no coverage.

2. Coverage varies from company to company, state to state and country to country.

3. Because of these variations, specifics are difficult, but I can give you some talking points for when you visit with *your* agent. *And you are going to do that real soon, aren't you?*

An insurance policy is a legal contract between you (The Insur*ed*) and the company (The Insur*er*). The contract is quite specific in its definitions, coverages and the duties and responsibilities of both parties. For example:

1. What's covered in the policy is in the contract.

2. What's *not* covered in the policy is in the contract.

3. Your duties following a loss are in the contract.

4. How the loss will be paid is, you guessed it, in the contract.

Here's the problem: While the policy is specific, it isn't always easily understood. Insurance policies are legal documents written in an obscure Old English dialect called Lawyer. You need to visit your agent, who can translate Lawyer into English. So unless you are reading this article and can say, "Yep, I knew that and yep, I knew that, too. Wow, this ND8L guy is pretty smart," you need to get in touch with your insurance agent — now!

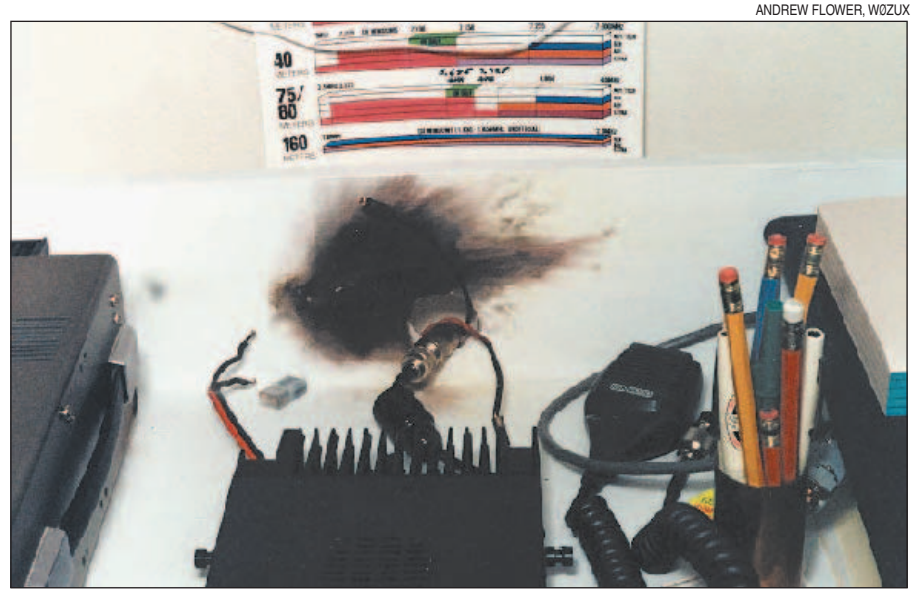
Remember, there is nothing more expensive than the insurance policy you did not buy. Chew on that a while — while we move on to…

Property Coverage

Personal property is your personally owned stuff that you *don't* use in a trade or business such as clothes, furniture, appliances and yes, ham radio equipment. Most homeowners insurance policies will provide "named peril" coverage for personal property. Named perils include, for example, fire or lightning, wind and hail, explosion, riot, impact by aircraft or motor vehicle, smoke, vandalism, theft, falling objects, weight of ice, snow or sleet, sudden water discharge from plumbing or appliances and power surge. Policy deductibles always apply to a property loss.

Some perils may be excluded from coverage such as damage resulting from flood, earthquake, intentional acts of the insured,

ANDREW FLOWER, WØZUX



This is only part of the damage Andrew Flower's, WØZUX, shack sustained when lightning struck his house.

[1]Notes appear on page 73.

wear and tear, birds, vermin and domestic animals. So if you intentionally drop your old broken handheld transceiver in your flooded basement during an earthquake and then Rover chews it up — you're out of luck. See your agent for details on named perils *and* exclusions in *your* policy.

Typically, your personal property is covered at home and/or anywhere in the world, unless there are specific exclusions in the policy. If you have any equipment on property you own or rent *away* from your primary residence, make sure your agent knows. Some policies have significant coverage limitations for off-premises personal property exposures.

Equipment *permanently mounted* in your vehicle is typically covered by your auto insurance policy under *comprehensive* coverage. Check with your car insurer to see if your company limits coverage on radio equipment or aftermarket audio gear. Some do, some don't. If a handheld transceiver is stolen off your front seat, homeowners insurance would probably apply. If a mounted HF transceiver is stolen, comprehensive coverage on your car policy will save the day. If your handheld transceiver is stolen from your car while attached with a charging cable, that's a gray area. Again, ask your agent.

Loss settlement provisions are extremely important. *What you want and need is Replacement Cost Coverage.* In the event of a loss, you will be paid the replacement cost of personal property with items of like kind and quality, when the items are replaced. *What you do not want is Depreciated or Actual Cash Value (ACV)* coverage, which pays you a depreciated amount on items that are damaged or stolen.

ARRL Equipment Insurance

An alternative to your homeowners policy is the ARRL-sponsored Ham Radio Equipment Insurance Plan, which was significantly improved on May 1, 2011. Visit **www.arrl.org/insurance** for more information.

This policy protects your *scheduled* home station *and* mobile equipment (scheduled equipment is the specific equipment you have listed on your policy) from loss or damage. Antennas, rotators and towers can be insured, too, up to $15,000. And, unlike most homeowners policies, your equipment is covered if damaged by an earthquake or flood.

If you have computer hardware scheduled on your policy you're even covered for the replacement cost of its computer software, including reimbursement of the expense of reprogramming for up to $1000 per claim. When adding a computer to your schedule of insured equipment, you don't have to list all the software individually, but you must keep a list of all the installed software and any technical support required to install and set the software up. Include the total cost of the software and any technical support in the total value of your computer when entering the computer on your schedule. Your scheduled equipment and accessories are covered in your vehicles as well as in your home.

The ARRL plan measures up well against homeowners insurance policies. Premiums are typically lower (currently $14 per thousand dollars of equipment covered) with much broader coverage. In fact, the ARRL "All-Risk" Ham Radio Equipment Insurance Plan underwritten through The Hayes Affinity Group is one of the most comprehensive policies you can buy.

How ARRL Insurance Stacks Up Against Your Homeowners Policy

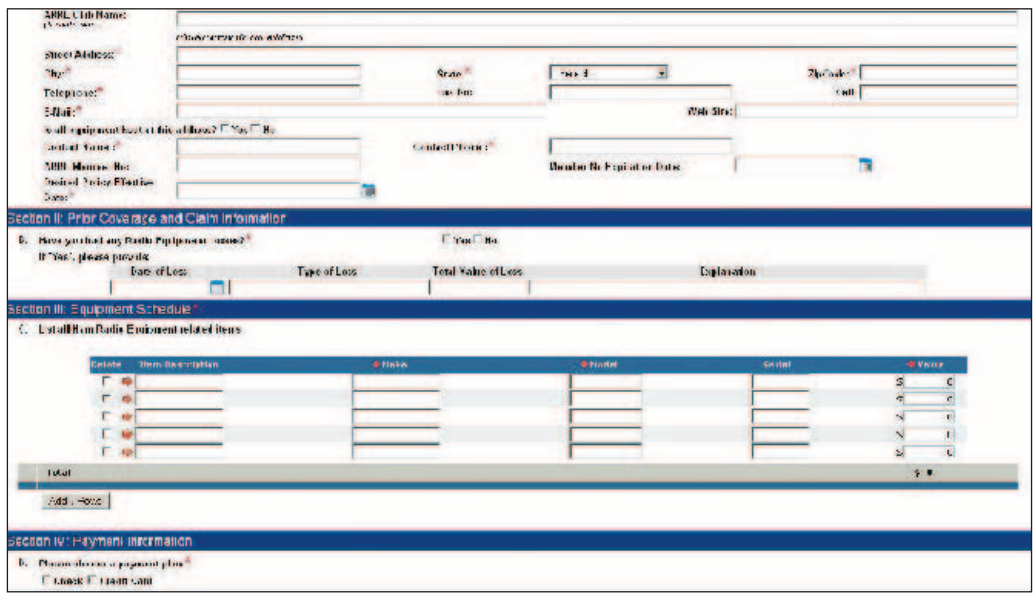
The ARRL's plan provides *accidental direct physical loss coverage* on all scheduled radio equipment, computers, towers and antennas. Unless the damage was caused by something specifically excluded in the policy, your claim gets paid. That's much better than the *named peril coverage* in your homeowners policy.

When you apply for the ARRL Policy (which you can do online at **www.arrlinsurance.com**), you will need to schedule or list the specific equipment you want covered by the policy. Equipment not listed on the policy *is not covered*, but newly acquired equipment is covered for 60 days after purchase up to $2000. If scheduled, it is covered until the next renewal with no additional premium.

Some exclusions do apply, though. Equipment damaged while being repaired isn't covered. If you're working on your Loudenboomer 9000 amplifier with the power on and you drop a screwdriver in the power supply cage and *Flash! Bang! Smoke! Inappropriate Language!*…there's no coverage. Normal wear and tear is also not covered. If your coax breaks down after being outside for 15 years — sorry.

Depending on your homeowners insurer, if you file a claim — even a small one — your policy may be surcharged for the loss. Worse yet, if you start having a higher than average number of claims (what people in the insurance business call a loss frequency problem) your policy may be non-renewed and you may find it difficult or impossible to purchase insurance *from any carrier, at any price.*

In Ohio, where I live, the average homeowner has a property claim that exceeds the policy deductible every 20-30 years, depending on their company and where they live. If you have a claim every couple of years, sooner or later (probably sooner) you *will* get a letter from your insurance company that won't make you or your mortgage company or, most impor-



Here is the application form for the ARRL insurance. "Section III Equipment Schedule" is where you list the equipment you want covered, creating your "equipment schedule."

tantly, your spouse, very happy.

Now why should you consider the ARRL's plan when you already have homeowners insurance? Gather 'round and let's review:

1. Broader coverage — accidental direct physical loss against named perils.

2. Lower deductibles ($50 for replacements and $25 for repairs).

3. Claims won't affect your homeowners policy.

4. Very competitively priced. The minimum annual premium is $20.

5. Happy spouse — happy house.

Everybody's situation is different, but here I am, an insurance agent, telling you the ARRL's plan might be a pretty good idea. If I were you, I'd pay attention.

Filing a Claim (or…Honey, What Happened to All That Junk in Your Radio Room?)

Notify your agent of the loss as soon as possible. Many agents and companies have 24/7/365 claims service, so if the loss happened on Sunday, make the call. It's appropriate to follow up with a short letter, fax or e-mail to your agent, just to make sure the claim was filed correctly. If theft or vandalism is involved, be sure to file a police report.

After that, your agent's involvement will be minimal, unless there's something you and the claim representative can't resolve. When your claim is settled, an "attaboy" e-mail to the agent *and* the claim representative would be an appreciated and unexpected surprise.

Organize Your Paperwork

Start a claim file that should include:

1. Notes on conversations with your agent and claim representative, including dates and times.

2. Cost estimates on items to be repaired or replaced.

3. Photographs and inventory of damaged or destroyed items. Do not throw *anything* away until the claim representative says to. Damaged property that the insurance company pays for is theirs and they may elect to sell it for salvage value.

4. Related claim data: claim number, claim representative's name, phone numbers, postal and e-mail addresses.

5. Get prices from several vendors. If the items destroyed are no longer available, most insurers provide for replacement with items of "like kind and quality." Document and discuss with your claim representative.

Remember that your claim representative is probably way out of his element. They are trained to pay what the company owes — not a penny more, not a penny less. The claim representative may have to justify your settlement to his boss. Make his job as easy as you can.

As my Grandmother used to say, "Pigs get fat, hogs get slaughtered." Some people think an insurance claim is like hitting the lottery. Not so, Bucko! If you can buy new gear at a great price, turn that price in — not the list price. Claims people get real cranky (and rightfully so) if they feel a claim is being "padded."

At best, padding slows the process and leaves you with egg on your face. At worst, you may find yourself facing felony insurance fraud charges and maybe jail. A word to the wise.

One more thing: Your damaged or stolen equipment is not as high a priority as someone's home with major damage, nor should it be. Be patient and be reasonable.

Repairs/Replacement

Most insurance companies write a check for the total damages (less your deductible) when the damaged/destroyed/stolen items are replaced or repaired. This is consistent with contract language in most homeowners policies and keeps everybody honest. Most policies provide for repair or replacement of damaged property, whichever is less expensive. Most companies will pay for a repair estimate even if the estimated repair costs exceed replacement cost.

Seek Professional Advice

What's the bottom line? Don't rely on your buddies, your neighbor or your brother-in-law for insurance advice. Call your agent right now, update him on your situation and ask hard questions. "If my equipment is damaged, will my policy cover the loss?" If there are coverage gaps, what will it cost for what you need? Get to know your agent — after all, on the worst day you will ever have, he'll be standing beside you.

Here's a little secret: Every time you pay your premium, your agent gets paid. (All right, I *said* it was a little secret.) If your agent can't or won't provide the service you deserve, he's not earning his keep and it's time to go shopping.

All agents have war stories. Some years back a local ham's beloved ICOM IC-765 transceiver was destroyed by a lightning strike. The claim representative didn't understand the quality of the radio and was proposing less expensive equipment of much lesser quality and fewer features. With the promise of a cold 807 (I don't work cheaply), I refereed. We listed the features of the ICOM and compared them with those of currently available equipment *of like kind and quality*. When the claim representative saw the original purchase price of the IC-765 and compared it with the lower price of currently available equipment, a check was written on the spot for a new IC-756 PRO II. My friend got a new rig, the claim representative covered his, uh, tracks and the beer was great.

Finally, and for the last time, *please* make it a priority to visit your agent and review your policies. Insurance agents are just like you. We don't like surprises and we don't like conflict. We feel good when we take care of a claim and put the client back to where he was before the loss. I saw a competitor's ad on TV a while back — the tag line said it all: "It doesn't matter who your insurance company is…until it does."

As my Grandmother used to say, "Pigs get fat, hogs get slaughtered." Some people think an insurance claim is like hitting the lottery. Not so, Bucko!

Get to know your agent — after all, on the worst day you will ever have, he'll be standing beside you.

Notes

[1]R. Fallen, ND8L, "Homeowners Insurance and Your Antenna System," *QST*, Feb 2009, pp 51-53.

[2]Available from your ARRL dealer, or from the ARRL Store, ARRL order no. 0946. Telephone toll-free in the US 888-277-5289, or 860-594-0355, fax 860-594-0303; **www.arrl.org/shop/**; **pubsales@arrl.org**.

Ray Fallen, ND8L, an ARRL member, has been a State Farm agent in Hubbard, Ohio since February 1988. The opinions expressed in this article are solely his and are not necessarily those of the State Farm Insurance Companies. Coverages described may not be available or apply in your state, province or country. You are strongly encouraged to review your homeowners policy and tower installation with your insurance agent to determine appropriate coverages and coverage amounts. The words "he/his/him/guy/attaboy" are used in a gender-neutral basis.

Ray's been licensed since 1964, an Extra Class licensee since 1983 and a member of the North Coast Contesters and the K8AZ Multiop team. A confirmed appliance operator, contester and DXer, Ray has earned 5BDXCC and DXCC Honor Roll (Mixed). He can be reached at 504 E Liberty St, Hubbard, OH 44425-2136, **ray@rayfallen.com**.

Clubs: Amateur Radio's Future

Whether specialized or general interest, large or small, Amateur Radio clubs provide the horsepower to move us forward.

Harold Kramer, WJ1B

Amateur Radio clubs are the machinery that drive the majority of Amateur Radio activities. In this article, I will discuss club trends and activities and, based on new research, I will review the ARRL benefits clubs use most and what benefits they find the most valuable.

For the last five years, the number of ARRL Affiliated Clubs has remained at about 2200, although there is always an annual "churn" as existing clubs disband and new clubs form. Five years ago, we estimated that there were about 35,000 members in these clubs and we believe that number is still accurate. ARRL Affiliated Amateur Radio clubs, including about 200 Special Service Clubs, are located in all 71 ARRL Sections. SSCs provide ongoing training and support to their communities, such as new ham development, public relations, school club support, technical advancement and other special areas.

General Interest and Specialty

Most clubs hold monthly meetings that encourage socializing and exchanging information with other hams; relevant and important functions of any club. In addition, Assistant Manager, ARRL Membership and Volunteer Programs Department Norm Fusaro, W3IZ, told me that many of today's most active and successful clubs focus on specific activities. For example, some clubs are expressly formed to administer Amateur Radio license examinations. These clubs sponsor and administer the majority of regularly scheduled ARRL VE sessions. The majority of Amateur Radio licensing classes are organized and run by clubs.

An important, but less apparent, function of clubs is organizing and managing hamfests and conventions. Here at HQ, we support about 500 of these events a year. Many take years of planning and employ the services of hundreds of volunteers. Many of the larger events, such as the Washington State Convention, are sponsored by groups of clubs. Along with hamfests and conventions, clubs organize and operate many of the special event stations that we list here in *QST*.

In recent years, we have seen more clubs dedicated to Emergency Communications and Public Service activities. These clubs are engaged in activities such as building sophisticated mobile emergency communications facilities, and conducting events, such as EmComm East, that are devoted solely to Amateur Radio Emergency Communications. They also work with served agencies in their communities and they provide the majority of field-based ARRL EmComm training. They also provide public service communications events such as the Boston Marathon.

DAVID SARTI, WC2V

W4YXA 4C TN: **ARRL Field Day is the most popular club activity. For 2011, the Short Mountain Repeater Club of Middle Tennessee operated from a houseboat.**

Field Day is Amateur Radio's largest emergency preparedness event. According to Field Day Manager Dan Henderson, N1ND, considerably more than half of all Field Day sites are run by clubs.

Affiliation Has Benefits

While we have not seen many new contest clubs, according to ARRL Contest Branch Manager Sean Kutzko, KX9X, we have seen greater geographic consolidation of contest clubs. Sean cites the Alabama Contest Group as an example of this trend. Members of some virtual contest clubs do not need to attend meetings in person. Their business is conducted online with e-mail, websites and forums. DX clubs encourage and mentor new and experienced DXers, and they also organize, fund and operate many DXpeditions to those rare entities that we all like to work.

The ARRL offers a suite of benefits to its affiliated clubs. The ARRL affiliated club benefits are listed at **www.arrl.org/affiliated-club-benefits**. Never satisfied with the status quo, we believe that we can always do better. To this end, the Programs and Services Committee (PSC) of the ARRL Board is reviewing the Affiliated Club Program to determine which club programs are beneficial; what types of programs and services are of interest to Amateur Radio Clubs and which club programs are most valuable.

Almost 1000 clubs were surveyed, including all club presidents, club contacts and club newsletter editors. The PSC was encouraged by the over 900 responses that they received to this survey. They are evaluating these replies now and we expect to have some recommendations for new affiliated club benefits later this year.

In the meantime, here are some of the preliminary results:

Most used benefits — ranked highest to lowest usage:

- Referrals of prospective radio amateurs
- ARRL e-mail forwarding service (arrl.net)
- Information/assistance for club licensing (club call signs)
- Club liability insurance program
- Club commission program (for new/renewing ARRL members)

Most valuable benefits — ranked most value to least value:

- Referrals of prospective radio amateurs
- Listings on newly licensed/upgrading amateurs
- Club liability insurance program
- ARRL e-mail forwarding service
- Equipment insurance program
- Club commission program

Let's Keep Clubs Growing

We owe our thanks to the thousands of club volunteers who give exams, teach classes, run hamfests, go on DXpeditions, operate in contests, mentor new operators and serve their communities and Amateur Radio in a variety of ways. With the breadth and depth of services that clubs perform for the ARRL and Amateur Radio, we need to keep them growing and successful. The future of Amateur Radio depends on their continuing success.

Harold Kramer, WJ1B, is ARRL Chief Operating Officer. He can be reached at **hkramer@arrl.org**

Splitting Up Isn't Hard To Do

Learning to operate split will help you put that rare one in the log.

Steve Sant Andrea, AG1YK

You're tuning around and happen upon a pileup. "Who's this?" you wonder. The din quiets down and you wait for the DX to respond. The dead air just continues and then the din returns. You press on your headphones and make out the DX's call. You check the Internet; it's the South Sandwich Islands DXpedition in the South Atlantic — a most-wanted DX entity. "I should definitely take a shot at him," you think.

"No wonder I didn't hear him. The beam's pointed toward Europe." You check your azimuthal map and swing your beam to 160°. "Now I should be on him."

The calling stops and — nothing. Then the pileup again.

"What's happening here? Why can't I hear him? Plenty of other East Coast stations do?"

What's happening is that the DX station is working his pileup *split*. When operating split, the DX station transmits on one frequency but listens on a different frequency. The DX might be transmitting on 14.195 MHz, but listening on 14.205 MHz. You need to "split" your rig.

Put That Hacksaw Down

You won't need it. Almost all modern rigs have a second VFO (VFO B) that is independent of the primary VFO (VFO A). Many rigs go a step further and have a SPLIT button that is used to set the rig up for split operation in one step.

So there you are — a rare DX station and all you can hear is the pileup. But, you have the first part of the puzzle. You know where the DX is *listening*. Now you need to know where he is *transmitting*.

You have two headphones and one mic — take the hint.

On phone the DX will be listening beginning at least 5 kHz above their transmit frequency. It's possible the DX could be listening as much as 20 kHz "up." In fact, it often happens that the DX station may actually be listening in a range of frequencies from 5 to 10 or even 20 kHz above their frequency. The DX station will establish a listening range (say from +5 to +10 kHz of their transmit frequency). So for our VP8 example, if he is using phone on 14.195 MHz, he could be listening for callers from 14.200 to 14.210.

When operating split, the DX station transmits on one frequency but listens on a different frequency.

Some DX stations also operate split between two subbands, transmitting in the Extra or Advanced subband and listening in the General subband. In such cases they could be listening 40-50 kHz above their transmit frequency. Usually the DX station will announce his listening range, but in the heat of battle sometimes he might forget and go for a while without letting listeners know where *he* is listening. In that case, if you can't find him in a 10 kHz range, try checking the Internet for a DX spot. These will frequently give the "split," that is, how far up the DX is listening.

Beyond Phone

This is how it is done when the DX is using phone. When other modes are used the range is different. Since CW is a very narrow mode, usually about 500 Hz wide, the typical split frequency is just 1 kHz, with a listening range of about 1-5 kHz. For most modes, the DX will begin listening on a frequency that is about twice his mode's bandwidth.

Splitting Up

Remember the old saying: "You have two headphones and one mic — take the hint." It's time to listen, but combine your listening with a little tuning. Most DX stations operating split usually — but not always — are listening above their transmit frequency. Since you already have the DX's listening frequency (the frequency of the pileup), write it down, wait for the din to die (that's when the DX is transmitting) and start tuning down slowly until you find the DX station's transmit frequency.

Now you have the DX's transmitting frequency. But that also means you're not transmitting on the DX's listening frequency. You have to split your operation to make the contact.

A and B

Say you are using VFO A to tune with. You happen upon a pileup and realize the DX station is operating split. With a dual VFO, you leave A set on the pileup frequency, press the A=B button to sync up the VFOs, then hit the A/B button to activate VFO B and tune in the DX station. Now you have B tuned to the DX's transmit frequency and A tuned to the DX's receive frequency.

"But wait," you say, "if I am listening to the DX on B and he clears with the station he is working, now I have to switch back to A to call him. I'll spend all my time pressing the A/B button."

Since CW is a very narrow mode, usually about 500 Hz wide, the typical split frequency is just 1 kHz…

That's right, punching the A/B button would be very awkward, which is why most dual VFO rigs have a SPLIT button. With VFO A set to the DX receive frequency (*your* transmit frequency) and B set to the DX transmit frequency (*your* receive frequency), push the SPLIT button once and your rig will automatically use VFO A to transmit and B to receive. (Check that manual!) All that's left is to key your transmitter and jump into the pile. Good luck!

Steve Sant Andrea, AG1YK, is an assistant editor at QST. *He can be reached at* **ag1yk@arrl.net**.

1950 on 40

A 1950s era BC-221 gets a new life as a low power 40 meter transceiver.

Mark Zelesky, KA9OOI

This is the inside of the BC-221 showing the SW40+ board mounted to the vintage chassis.

Here is the completed unit ready for 40 meter CW.

Even before I got into ham radio 30 years ago, I had a deep fascination with military radios. I guess it came from watching all those episodes of *Combat* and the *Rat Patrol* on TV when I was a kid. I could never pass up an opportunity to buy an old Command receiver or other piece of military communications gear at a hamfest. I have always wanted to own a working piece of military gear that I could put on the air.

While working WWII radios are still available at hamfests, they are quite expensive, very hard to find parts for and not very reliable for daily operation. Then I thought, why not retrofit some old piece of military gear with a modern solid state radio. A quick call to my friend Bruce, WD9GHK, who collects military radios, got me an old BC-221 from the early 1950s. The BC-221 is a piece of test gear that was used to check the frequency calibration of receivers and transmitters. It was a very well made unit and had a number of tubes, a power supply and a precision calibrated tuning capacitor. It looks like a small field radio and even has an antenna jack on the topside. Thousands of these units were made and many are available cheap at hamfests.

Choosing a radio to mount in the BC-221 was easy. I have built a few of the low power transceivers from Small Wonder Labs (**www.smallwonderlabs.com**) over the years. Dave Benson, K1SWL, provides kits that are simple and elegant in design and lend themselves well to modifications. I decided to build an SW40+ CW transceiver board for the BC-221. The SW40+ is a moderately easy kit to build for 40 meter CW and comes with just about everything you need to get it going, except the enclosure.

Out With the Old

While waiting for the kit to arrive, I started stripping the BC-221 down and removed almost all of the original circuit from the chassis along with the tube sockets. About the only part of the original circuit I left intact was the precision variable capacitor and calibrated dial. I might note that the capacitor is silver plated and fitted with ball bearings and precision cut gears. It was in excellent shape even after 50 years. After filling all the dents and heavy scratches with some auto body putty, I gave the outside a good sanding and a coat of olive drab paint to make it look more realistic.

By the time I refinished the cabinet, the SW40+ kit arrived and I had it completed in about 3 hours. I left out the varactor tuning diode and ran a wire from the original capacitor in the BC-221 to the point where the hot side of the varactor diode would go on the board. Using the original capacitor in the unit gave me about 30 kHz of tuning range, which is close to what the kit was designed to have.

Get In Line

After aligning the superheterodyne receiver on the SW40+, I mounted the board to the backside of the capacitor enclosure inside the unit. I added a small chassis mount BNC connector to the front panel to allow a regular coax connection, if desired. The original banana plug quick connects inside the cabinet were used for the power and top antenna connections for easy removal from the cabinet. The original power switch and earphone jacks were also used, saving on cost and preserving the unit's original appearance.

For power I use two 6 V gel cells in the lower backside compartment, which provide around 24 hours of operation before recharging. To finish the unit, I logged all the dial markings by calibrating the transmitter output with a frequency counter. I then printed out a frequency chart with the dial markings to put in the original cover for reference. For an antenna, I can use a 32 foot long piece of wire attached to the original binding post on top or use a regular 50 Ω coax and antenna hooked to the front BNC connection.

The retrofitted BC-221 gives me about 3 W output of full break-in CW between 7.030 and 7.060 MHz, which covers the low power watering hole and most of the CW subband on 40 meters. The original mechanical capacitor in the unit makes it very stable — there is almost no drift at all during operation. I have had many hours of fun building and operating the set. I really enjoy the nostalgic feel of the radio combined with the reliability of modern technology.

Photos by Mark Zelesky, KA9OOI.

Mark Zelesky, KA9OOI, an ARRL member, has been interested in radio since he saw his first episode of Flash Gordon *at the age of 5.*

Currently, Mark has ICOM IC-751, IC-735 and IC-706 transceivers and operates a homemade ATV transmitter running about 30 W PEP of color video with on-carrier audio on 434 MHz. He also runs a Johnson Valiant and a National NC-303. Mark enjoys CW and can be heard many evenings around 7.040 MHz. Finally, Mark wishes to thank Art Collatz, K9JZM, for Elmering him into this great hobby. Rest in peace Art. Mark can be reached at 18266 White Oak, Lowell, IN 46356, **morseman88@yahoo.com**.

Frequency Measuring Test — November 2011

H. Ward Silver, NØAX

On November 9 you'll be able to compete for the coveted title of "most accurate ham."

K5CM

Connie, K5CM, leads the team of stations that will be making the FMT transmissions on 40 and 80 meters during the North American evening of November 9.

The FMT (**www.arrl.org/frequency-measuring-test**) returns to the airwaves on the traditional second Wednesday of November (the 9th). As in April, the format will simulate a roundtable QSO in which all of the stations are *close* to the same frequency but not *exactly* on the same frequency. This time, there will be more time — about five minutes — between the transmissions from each station. There will be three test-signal stations, K5CM (OK), W8KSE (OH) and W6OQI (CA), with WA6ZTY (CA) sitting out this edition of the FMT.

If you have not participated in an FMT before, it doesn't take a room full of test equipment to have fun and make surprisingly accurate measurements. You can read all of the *QST* articles about the exercises — they are available from the ARRL FMT web page. More information on frequency measuring techniques and exercises can be found on K5CM's website at **www.k5cm.com**.

Here's how the roundtable format works: K5CM will lead off with a call-up that lasts for three minutes. The call-up is then followed by a two-minute key-down period and an end announcement. The frequency is then turned over to W8KSE who repeats the process before handing it off to W6OQI. Your job is to measure and report the frequencies of all the stations.

The test will begin on 40 meters near 7055 kHz at 10:15 PM (all times are given Eastern Standard Time or EST). That is on Tuesday evening in North America and all times are listed in EST in Table 1. (For our friends in Europe, that is 0215 UTC on the morning of November 10.)

Once the roundtable is completed on 40 meters, the test will then move to 80 meters near 3579 kHz beginning at 10:45 PM. The 80 meter stations will be K5CM, W8KSE and W6OQI, in that order. All stations will be within ±200 Hz of the initial frequency for K5CM. The April results (**www.b4h.net/fmt/fmtresults201104.php**) showed the schedule to be a good one for all locations.

For more information and any updates in procedure, check the ARRL's FMT web page. Results will be reported using the data entry website provided by WA7BNM at **www.b4h.net/fmt/fmtentry.php**. QST

Table 1

November 2011 FMT Schedule in Eastern Standard Time

40 Meter Time Line (near 7055 kHz)			*80 Meter Time Line (near 3579 kHz)*		
K5CM	10:15	call up (3 mins)	K5CM	10:45	call up (3 mins)
K5CM	10:18	key down (2 mins)	K5CM	10:48	key down (2 mins)
K5CM	10:20	end announcement	K5CM	10:50	end announcement
W8KSE	10:25	call up (3 mins)	W8KSE	10:55	call up (3 mins)
W8KSE	10:28	key down (2 mins)	W8KSE	10:58	key down (2 mins)
W8KSE	10:30	end announcement	W8KSE	11:00	end announcement
W6OQI	10:35	call up (3 mins)	W6OQI	11:05	call up (3 mins)
W6OQI	10:38	key down (2 mins)	W6OQI	11:08	key down (2 mins)
W6OQI	10:40	end announcement	W6OQI	11:10	FMT end announcement

The Never Ending Field Day

Too many restrictions at home? Try taking your rig on the road.

Yigal Rechtman, K2EFG

EDWARD KRITSKY, NT2X

Yigal's portable station set up in Brooklyn, ready for a day of DXing.

EDWARD KRITSKY, NT2X

Yigal and his friend Mike setting up the YP-3 in Brooklyn.

In 2008 I obtained my General license and purchased a Yaesu FT-857D HF transceiver. I tried to mount antennas on my four-story brownstone in Brooklyn, New York. No matter what I tried, because of the many metal urban obstacles the SWR meter never went below 3:1. Determined to go on the air, I made the decision to be all portable, all the time.

Forever Field Day

To accommodate this strategy, I purchased a Buddipole antenna and a 15 foot photographer's tripod, which I adapted to hold the Buddipole.

With this very basic rig I tried my luck. My first attempt was at a park by the Brooklyn Bridge, overlooking the Manhattan skyline. I parked my car and set up my portable shack. After some adjustments I was able to make my first ever contact. The police were quick to come and inquire about my rig, and although all the paperwork was fine I was asked to leave because of being illegally parked.

Since then, I have gone to plenty of outings with my rig. In effect, I am on Field Day every time I work the radio.

Planning, Planning

Here are some lessons I have learned for portable operating:

- Have copies of your license available. Police, park rangers, hotel security, reporters and citizens in the area always wonder about the rig.
- Yellow "caution" ribbon is a good way to let others know that guy wires are in place and for controlling visitors who want to stand directly under the antenna while you transmit.
- A cap with your call sign is a good way to help explain what you're doing. I point to the hat and say "K2EFG, that's my call sign. I am working a station in …"
- Extra screws, wires, electrical tape and duct tape are a must. In the field, one cannot just head to the hardware store to get something. If I don't bring it, I have to make do without it. I try to double up on every critical piece of equipment such as antenna whips, coax and grounding cable.
- If I know where I'm heading I try to figure out my grid location. Occasionally, I will hear a contest or QSO party and knowing your grid helps.

Airborne Radio

Traveling by car is one way to get going, but flying with the equipment and operating from a rented car has additional requirements:

- Pack everything in one well-marked suitcase. Often airport security officers will ask that radios be shipped as luggage and not as carry-on. Having a dedicated hard-shell suitcase makes it easier to part with your rig for the duration of the flight.
- Have manuals and a copy of your license packed with your equipment in the suitcase. Airport security inspectors will be much "happier" to know that what looks like a rocket is really, *really* a portable antenna.
- Insure your equipment. I use the ARRL's insurance program for peace of mind when I travel.
- Lock the suitcase with a TSA-approved lock.
- When operating in other countries always check what the reciprocity rules are. [Information on operating in other countries can be found at **www.arrl.org/us-amateurs-operating-overseas**. — *Ed.*]

The Rewards

Taking some extra steps to plan ahead gives me the opportunity to try out my rig in various weather and elevation conditions.

The rewards for being in permanent Field Day mode are numerous: My abilities to adjust the rig are constantly challenged and I get to be active and enjoy the outdoors. I also get to work stations from countries and places that my 100 W output would not have reached otherwise, and I get to enjoy the surprise of operators who hear a K2 station right in their backyard.

While on the road, I have worked countries as varied as Japan, Jamaica, Ukraine, England and Arab Emirates.

Finally, I find that my experience as a forever Field Day ham adds to the effectiveness of the work I do with ARES®. Having made all my contacts under unpredictable conditions is exactly what ARES preparedness calls for. The additional handheld transceiver and a YP-3 portable Yagi (**newsuperantenna.com**) that I added to my collection make my shack well prepared for ARES-related events. Best of all, I know that for me the saying "When All Else Fails" is forever true; in an "always Field Day" operation, one needs to be prepared for any contingency.

In short, the "curse" of my urban setting became quite a blessing. From spring through fall I enjoy ham radio time, all in the outdoors and all over the country and the world. The rig is light (one suitcase), flexible and fun, and satisfaction abounds. For me, life's a never-ending Field Day.

Yigal Rechtman, K2EFG, an ARRL member, was also a member of the 4Z4YJ radio club from 1982-1986. Yigal received his General class license in 2008. When not at his radio Yigal is a CPA and a certified fraud examiner. He can be reached at 86 4th Pl, Brooklyn, NY 11231-4008, **k2efg@arrl.net**.

The Bill Leonard, W2SKE Professional Media Award

Allen G. Pitts, W1AGP

Did you spot a good ham radio Media Hit in the newspaper? Maybe it was on TV or on the radio. Perhaps it was even on one of the commercial Internet websites. Amateur Radio has been promoted in all of these ways in 2011 thanks to clubs, individuals and national press releases. Now it is time to say "Thank You!" to the professional media people and reporters who made it happen. The way to do that is to nominate them for the *Bill Leonard, W2SKE, Professional Media Award*.

This is a national level, annual award that honors *three* professional journalists whose outstanding work in audio, video and print formats best reflect the enjoyment, importance and public service value of the Amateur Radio Service.

The Award is divided into three categories, each with its own award:

- Audio formats
- Visual formats
- Print and Text formats

The award is sponsored by the ARRL — the national association for Amateur Radio. Nominations are judged by members of the ARRL national PR Committee, and the final decision is made by the ARRL Board of Directors at their meeting in January 2012. The winners each receive an engraved plaque and a donation of $250 will be made in each of their names to the charity of their choice. The deadline for receiving nominations is 5 PM on December 9, 2011.

The award was created as a tribute to the late CBS News President Bill Leonard, W2SKE, an avid Amateur Radio operator. Full information, rules and entry forms are at **www.arrl.org/bill-leonard-award**. Recipients must be professional journalists

in print, electronic media or multimedia. The term "professional" refers to full time, part time, stringers, freelancers and contract journalists. In the case of a group project, the recipient may be the group, but only one prize will be awarded. We're looking for media pieces that are truthful, clear and accurate, and reflect high journalistic standards.

If your group got a good news hit or article, what better way to respond than to nominate the person who publicized it? Media professionals can submit their own work, but it is best when hams themselves show their thanks, action and consideration. Amateur Radio emergency services, educational stories, space stories and ham technology — all of these topics could be winners. If a reporter covered your activity well, nominate them!

- *Audio format:*

Submit CD with audio file(s) in mp3 format with name of candidate written on each disk.

- *Visual format:*

Submit CD with mp4 file or DVD of the work with name of candidate written on each disk.

- *Print article:*

Submit clear, easily readable copy of printed text, any related web addresses, and 8.5 × 11 sheets displaying the writing in situ as it appeared to the public (photocopies are fine).

All entry forms and supporting disks and documentation must be received by 5 PM on December 9, 2011. Mail the packets to Manager of Media Relations, American Radio Relay League, 225 Main St, Newington, CT 06111.

Each of the award winners will receive a plaque and a donation in their name of $250 will go to a recognized non-profit organization of the recipient's choosing.

For more information about the award, full rules and to obtain a nomination form, go to **www.arrl.org/bill-leonard-award** or contact ARRL's Media & Public Relations Department, **apitts@arrl.org**, 860-594-0328. QST

Last Year's Winners

Print/Text — to Phillip Lucas, then a staff writer for the *Washington Post*, for his coverage of 2010 Field Day with the Loudon, Virginia Amateur Radio Club.

Video — to Ms Jennifer Crompton, producer for *New Hampshire Chronicle* on WMUR-TV of Manchester, New Hampshire. The weekday half hour news magazine featured a seven minute segment that followed Field Day for the Contoocook Valley Radio Club.

Audio — to Bill Colley, host of an afternoon drive time talk show on WGMD-FM in Rehoboth Beach, Delaware. His special guest was Bill Duveneck, KB3KYH, of the Sussex Amateur Radio Association (SARA).

Strays

EMILY PUCKETT RODGERS

Match this! **When Dan Puckett, K5FXB, recently retired from IT Services at the University of Arkansas there was a clandestine effort, aided by his wife, Becky, to surprise him with something special at his reception. Secret photos were taken in the K5FXB shack and one piece of gear was chosen by a co-worker (who happens to be an expert cake maker) for reproduction.**

New Products

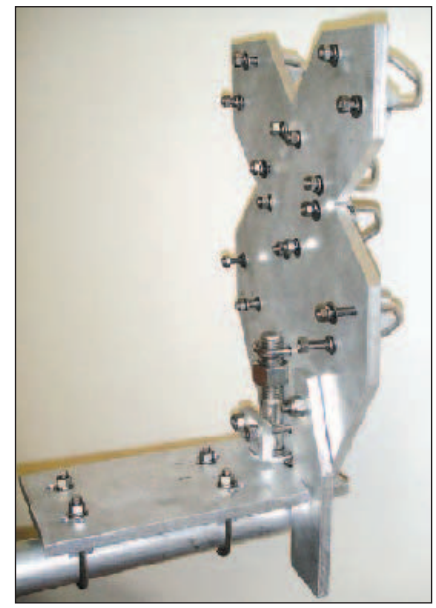
REMOTESHACK REMOTE BASE CONTROLLER

♢The RemoteShack RBC-212 from OnTheGoDevices is a standalone "black box" hardware solution specifically designed for remote base operation. Operators use a cell phone to communicate with a RemoteShack installed at their station. The RemoteShack installation is preconfigured to control specific transceivers (check website for supported models). The RemoteShack connects to the radio's serial port, mic jack and the desired link (a VOIP service such as Vonage, MagicJack or Skype, or a regular telephone line). The station is controlled via DTMF commands with voice response confirmations. The RemoteShack has the ability to control the transmitter and tuner, scan the bands, set and recall memories, fine tune stations, apply filters, rotate a beam, set power level, control relays and much more. Price: $480; plug-and-play transceiver cable kits, $50-$64; rotator and relay control cable kits, $36. For more information, or to order, visit **www.remoteshack.com**.

ATOM AUDIBLE TRANSMITTER OUTPUT MONITOR

♢Sight impaired amateurs often wonder if their transmitters are working correctly and putting out full power. Mike Keithley, KJ6CBW, himself blind, well understood this problem when he helped conceive the ATOM monitor. This rugged device connects in series with the feed line, and senses RF voltage to produce an audible tone whose pitch is proportional to power. When switched on, one can "hear" the auto tuner at work, and by listening to the pitch, be reassured that the transmitter, tuner and antenna are working correctly. The ATOM is rated to work with power levels from 1 to 150 W and on the 160 to 6 meter bands. Price: $90. For more information, or to order, visit **www.blindham-products.com**.

NN4ZZ QUADLOCK

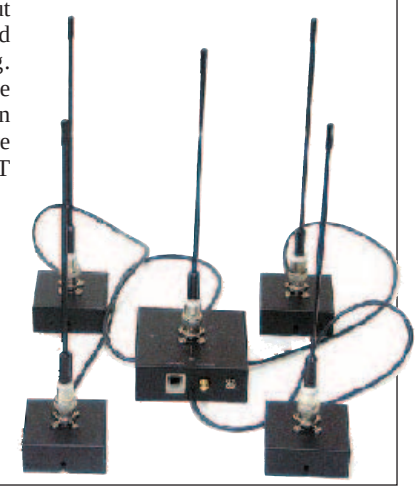


♢ The QuadLock is a safety and convenience product for hams who use a cubical quad antenna. The three dimensional shape of the quad antenna prevents lowering the antenna to ground level for installation or maintenance even if mounted on a tiltover tower. This usually means working from a tall ladder or renting a lift or bucket truck. The QuadLock allows you to tilt your tower all the way to the ground to work on the antenna, rotator or tower. It works by letting the quad loops swivel out of the way. When the tower is in the operational position the elements are locked into position. The locking mechanism is powered by gravity. No cables, bolts or climbing required to lock or unlock the elements. Hardware is stainless steel. Price: $425. For more information, or to order, visit **www.nn4zz.com**.

STEALTH DDF2020T RADIO DIRECTION FINDER

♢The Stealth DDF2020T Direction Finder kit from Global TSCM Group is a Doppler direction finder (DF) with a GPS input and RS-232 output to provide the ability to indicate its location and draw bearing automatically or manually on a Google Earth map to find the RF transmitter more conveniently. The user must provide a 12-28 V power supply, narrowband VHF/UHF FM receiver, five whip antennas to fit the provided antenna mounts and a *Windows* PC for DF bearing. The DDF2020 display program further requires a GPS receiver with NMEA 4800 baud output. The DDF2020T is compatible with APRS software and uses the optional *Navi2020* map plotting display program for bearing (requires the optional GPS receiver). It uses the Google Earth viewer for a display window and accepts standard NMEA GPS data. Frequency range: 100 to 1000 MHz and beyond; useful from 88 to 100 MHz with reduced sensitivity. Price: DDF2020T, $299; GPS receiver, $99.

The *Navi2020* map plotting program accepts DDF2020 DF + GPS messages and plots them on a Google Earth display window. Manual latitude/longitude and DF bearing inputs allow operation without a DDF2020 direction finder. Up to 100 plot points are allowed, and hunt results are saved in archive files. Google Earth normally works with an open Internet link, but areas previously viewed are archived and available for offline viewing. This makes Navi2020 suitable for use in real time mobile hunts, when an internet link is not available. For more information or to order the DDF2020T and *Navi2020*, visit **www.kn2c.us**.



Hams Provide Communications Support During Hurricane Irene

Hurricane Irene — the first major hurricane of the 2011 hurricane season — left extensive flood and wind damage along its path through the Caribbean, the East Coast of the United States and as far north as Atlantic Canada. On August 20, as then-Tropical Storm Irene headed toward Puerto Rico, radio amateurs were already on alert.

Irene first made landfall in the US as a Category 1 storm on the morning of Saturday, August 27 on North Carolina's Outer Banks. In preparation, ARRL Emergency Preparedness Manager Mike Corey, W5MPC, activated the ARRL HQ Emergency Response Team (HQERT). On Tuesday, August 23, this team of ARRL HQ staffers began monitoring various nets and providing support to the affected Field Organizations from W1AW, the Hiram Percy Maxim Memorial Station. Two days later, the HQERT went into active mode.

Radio amateurs at W1AW provided reports to the Hurricane Watch Net (HWN) and the Voice over Internet Protocol Weather Net (VOIPWX), who in turn relayed these reports to WX4NHC, the Amateur Radio station at the National Hurricane Center in Miami. W1AW also checked into nets run by the Salvation Army Team Emergency Radio Network (SATERN) and the East Coast Amateur Radio Service (ECARS). Hams at W1AW were also active reporting into the National Weather Service office in Taunton, Massachusetts.

"We began monitoring Irene and communicating with Section leadership several days before the storm made landfall," Corey said. "The level of preparedness from the amateur community was quite high. Hams were ready to go when called on to assist their communities."

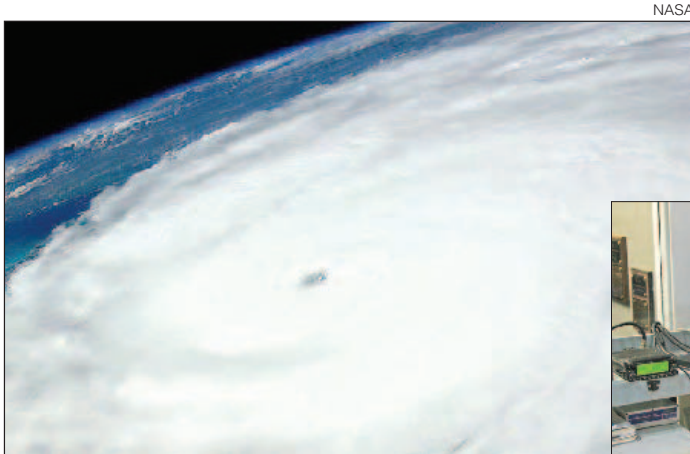
W1AW Station Manager Joe Carcia, NJ1Q, said that activity at W1AW was centered on the voice nets that were active on 80, 40 and 20 meters: "In addition, W1AW was connected to the 'WX_TALK' EchoLink weather net. We also monitored the 2 meter Connecticut ARES® net, and W1AW's EchoLink conference server — normally used by hams to monitor the station's daily broadcasts — was made available to those in the ARRL Field Organization who were in Irene's path." Carcia said that D-STAR and *Winlink*, as well as W1AW's IRLP node, were also monitored during the storm, but saw no traffic. W1AW was on the air for 31 hours, from 7 AM on August 27 through 2 PM August 28, utilizing all three studios.

North Carolina ARRL Section Manager Bill Morine, N2COP, told the ARRL that his home was a mere 60 miles west of the eye of the storm: "The storm passed us by about 4 AM on Saturday. We lost power at that point for about five minutes, but by morning, 54 percent of homes in Wilmington had lost power. Irene made landfall as a Category 1 storm near Morehead City, North Carolina, which is about 90 miles northeast of me. There is considerable flooding and damage 100-200 miles northeast of me. North Carolina ARES was used minimally, as most County Emergency Operations Centers kept power and commercial communications. Irene is my eighth hurricane in the 20 years I've lived by Wrightsville Beach, where many a Weather Channel reporter does their reports."

In Massachusetts, the City of Boston's Emergency Operations Center requested assistance from radio amateurs. According to ARRL Eastern Massachusetts Official Emergency Station Mike Neilsen, W1MPN, this is the first time ever that this has happened in a storm situation. Neilson told the ARRL that WX1BOX, the Amateur Radio station at the NWS office in Taunton, was active during the storm. "The SKYWARN operations at the Taunton NWS office was secured on August 28, as were three ARES® operations: in Bridgewater in Southeastern Massachusetts, one on Cape Cod and another in Brookline, just outside of Boston," he said. Neilson told the ARRL that hams in the ARRL's Eastern Massachusetts Section provided support to shelters operated by the American Red Cross in Salem, Dedham, Attleboro, Weymouth, Bridgewater, Falmouth and on Nantucket Island, as well as seven shelters on Cape Cod and another shelter at Otis Air Force Base.

"I would like to thank all of those involved in the response to Irene. The ARES® members, Field Organization leaders, net control stations and the amateurs assisting our served agencies all did an amazing job," Corey said. "I also have to say thanks to those who helped staff W1AW over the weekend. They made it possible to stay in touch with those in the field and assist locally as Irene impacted Connecticut. Thank you all for a job well done."

NASA



The eye of Hurricane Irene, as seen from the International Space Station on August 24.

MIKE COREY, W5MPC

ARRL Contest Branch Manager Sean Kutzko, KX9X — part of the HQ Emergency Response Team — helped staff W1AW during Hurricane Irene. Kutzko was instrumental in passing area weather reports to the National Weather Service office in Taunton, Massachusetts.

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

ARRL FILES COMMENTS WITH FCC IN RESPONSE TO ANCHORAGE VEC'S WAIVER REQUEST

In April 2011, the Anchorage VEC — one of 14 Volunteer Examiner Coordinators — filed a *Petition for Rule Making* (RM-11629) that asked the FCC to give permanent credit to radio amateurs for examination elements they have successfully passed. This would, in effect, create a license exam credit that would be valid throughout an amateurs' lifetime, never expiring. On July 6, the Anchorage VEC submitted a *Waiver Request* with the FCC while RM-11629 is pending. This request asks that the FCC grant a blanket waiver of Section 97.505 of the Commission's Rules to those radio amateurs whose licenses have expired — and are beyond the two-year grace period for renewal — to be afforded credit for examination elements previously passed. On August 11, the ARRL filed comments with the FCC, urging the Commission to dismiss or deny the *Waiver Request*.

At this time, the ARRL is not taking a position with respect to the merits of RM-11629; however, the ARRL opposes the *Waiver Request* "because the Anchorage VEC has failed to justify the need for the interim relief sought therein. That opposition, however, does *not* extend to the underlying petition, RM-11629," and that "[r]eview of the issue now may be timely, but it should be done in the context of a normal notice-and-comment rulemaking, not by waiver. Even if the justifications cited by the Anchorage VEC in support of the waiver were all accurate (which is not the case), they are not sufficient justification for grant of a temporary waiver of the Commission's rules, relative to examination element credit," the ARRL noted in its comments. "They might serve as partial justifications for the underlying *Petition*, but not for the temporary *Waiver Request*."

According to the ARRL, if the FCC grants Anchorage VEC's *Waiver Request*, it "would quite obviously prejudge the outcome of RM-11629. If for any reason RM-11629 is denied or dismissed, those who re-obtained licenses pursuant to the temporary waiver would either have been given a privilege not afforded others similarly situated, or else they would have their reinstated/renewed licenses revoked at a later date. Should the Commission grant the temporary waiver, it is tantamount to grant of the underlying petition. Indeed, it appears that the *Waiver Request* is principally an effort by the Anchorage VEC to bolster (or amend) the underlying *Petition for Rule Making*." The ARRL asked the FCC to process RM-11629 "in the normal course, and either proceed with a rulemaking proceeding based on the *Petition* or dismiss it, as the record indicates. However, the Commission should not grant the requested temporary waiver" and the *Waiver Request* should instead be "dismissed or denied." For more on the ARRL's filing, including background information, please see **www.arrl.org/news/arrl-files-comments-in-response-to-anchorage-vec-s-waiver-request**.

ARRL FACEBOOK PAGE: 20,000 FANS STRONG

With more than 20,000 fans on Facebook, the ARRL Facebook page (**www.facebook.com/ARRL.org**) is the number one spot for hams on the Internet's most popular social networking site. Not only is the ARRL page the most popular Amateur Radio page on Facebook, it is attracting many young — and not-so-young — hams to share their opinions and ham radio-related news with other hams.

According to Facebook demographics, more than 460 people between the ages of 13-17 are fans of the ARRL's page, with 74 percent of users below the age of 55 (Facebook breaks down its statistics in age groups of 13-17, 18-24, 25-34, 35-44, 45-54 and 55+). Since September 2010, hundreds of users each week are posting their own comments on the page, making comments on posts made by others or "liking" a comment. The ARRL has been active on Facebook since July 2010. Since that time, almost 14.5 million people — fans and non-fans alike — have viewed the ARRL Facebook page. The ARRL also has a Logbook of the World Facebook page (**www.facebook.com/LogbookOfTheWorld**). Premiering in June 2011, this popular page already has almost 1000 ham fans.

"We are excited to have such a strong presence on Facebook," said ARRL News Editor S. Khrystyne Keane, K1SFA, who serves as the Chief Administrator of the ARRL's Facebook pages. "Through our page, we try to showcase Amateur Radio fun by using interactive status updates, articles from the ARRL website and photos from events that are happening all around the world. Personally, I really enjoy seeing what other hams have to say about their love and enjoyment of Amateur Radio."

While US hams make up the vast majority of users on the League's Facebook pages, hams from all over the world — including Indonesia, Italy, Canada, the United Kingdom, Malaysia, Spain, the Philippines, Germany, France, Greece, Turkey, Australia, Argentina, India, Norway, Belgium, Portugal and Brazil — are active, too. "Facebook only gives us the top 20 countries represented that visit our page, but I know from personal interaction with hams that we have more than just those 20 countries visiting us every day," Keane explained. "We invite hams to 'like' the ARRL and the LoTW Facebook pages and leave comments. Joining Facebook is free, and you just might be surprised at who you'll find on the site."

ARRL SEEKS TREASURER

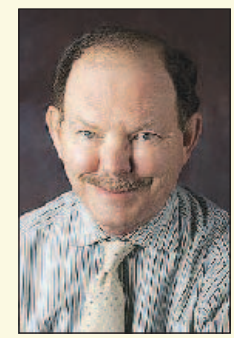
After more than 31 years of distinguished service to the ARRL as its volunteer Treasurer, Jim McCobb, K1LU, has decided to step down when his current term expires in January 2012. The ARRL is seeking qualified candidates from among its membership. The Board of Directors elects the Treasurer and other officers at its Annual Meeting in even-numbered years.

The Treasurer is a non-voting member of the Board of Directors and must be a licensed radio amateur and a Full member of the ARRL for four continuous years prior to nomination. The ARRL By-laws define the role of the Treasurer as follows:

- In consultation with and subject to the general supervision of the Administration and Finance Committee, provides for the investment and reinvestment of the surplus funds of the League in any bonds or stocks or other securities as would be selected by a trustee with the care of a prudent investor.
- Reports to and attends all regular meetings of the Board of Directors.
- Serves as a member of the Administration and Finance Committee.

The position is unpaid; however, necessary expenses including travel to meetings are reimbursable.

A Search Committee has been established to recommend one or more candidates for Treasurer to the Board. Interested and qualified members are invited to submit a Statement of Interest and qualifications by November 14, 2011 to the Secretary, preferably by e-mail to **dsumner@arrl.org**.



Jim McCobb, K1LU, is stepping down after 31 years as ARRL Treasurer.

ARRL ANNOUNCES WINNERS OF TECHNICAL EXCELLENCE AWARD

Joe Taylor, K1JT, and Bruce Walker, W1BW, are winners of the 2010 ARRL Doug DeMaw, W1FB, Technical Excellence Award for their article "WSPRing Around the World" that appeared in the November 2010 issue of *QST*.

Joe Taylor, K1JT

Joe Taylor was first licensed as KN2ITP in 1954, and has since held call signs K2ITP, WA1LXQ, W1HFV, VK2BJX and K1JT. He was Professor of Astronomy at the University of Massachusetts from 1969-1981 and since then Professor of Physics at Princeton University, serving also as Princeton's Dean of the Faculty from 1997-2004, retiring in 2007. He was awarded the Nobel Prize in Physics in 1993 for discovery of the first orbiting pulsar.

Active on all amateur bands from 160 meters through 2.3 GHz, Taylor's favorites have always been the VHF bands. Starting in 2001, he applied techniques learned and developed during his half-century of astrophysical research to the problems of communicating with very weak radio signals. This work led to development of the open-source computer programs *WSJT*, *MAP65* and *WSPR*, which are freely available to the Amateur Radio community. Among Taylor's proudest achievements are his recent completion of both WAS and DXCC on 2 meters. His confirmed DXCC total on 2 meters now stands at 106, with all QSOs made by EME ("moonbounce") using the JT65 signaling protocol of *WSJT*.

Bruce Walker, W1BW

Bruce Walker has a Bachelor of Science degree in Physics from the Massachusetts Institute of Technology and is the Director of Genome Assembly and Analysis at the Broad Institute in Cambridge, Massachusetts. He was an avid shortwave listener in his youth and became a ham in 1991. Walker's involvement in Amateur Radio has gone through several phases: homebuilt QRP, amateur satellites, early computer-based digital modes (such as PSK31, MSFK) and occasional contesting. His current interests are software-defined radios, weak-signal HF work and DSP modes. Bruce lives in Concord, Massachusetts with his wife and two daughters.

Established in 1975 as the ARRL Technical Excellence Award, the name was changed in 1997 to honor the late Doug DeMaw, W1FB, a former ARRL Headquarters technical editor and well-known Amateur Radio author. The award consists of an engraved 9 inch pewter cup.

REPORT CALLS ON NASA TO HIRE MORE ASTRONAUTS

Even as the space shuttle era has come to a close, a NASA-commissioned report says the space agency needs to hire more astronauts to maintain its presence on the International Space Station and prepare for the next generation of spaceflight. The report warns that "the Astronaut Corps appears to be sized below the minimum required" and that the current corps size "poses a risk to the US investment in human spaceflight capabilities." NASA commissioned the report — released September 2011 — from the National Research Council, part of the National Academy of Sciences, to examine the agency's astronaut and astronaut training needs in the post-shuttle era. Beginning in November 1983 with Owen Garriott, W5LFL, on board STS-9, Amateur Radio has been an integral part of NASA missions in space. More than 100 NASA astronauts have earned their Amateur Radio license.

NASA

The Expedition 29 crew. Front row, left to right: Mike Fossum, KF5AQG, and Dan Burbank, KC5ZSX. Back row, left to right: Satoshi Furukawa, KE5DAW, Sergei Volkov, RU3DIS, Anatoly Ivanishin and Anton Shkaplerov. Volkov was one of two Russian cosmonauts who deployed the ARISSat-1 satellite from the ISS in August. Burbank, Ivanishin and Shkaplerov were scheduled to go to the ISS in mid-November

Today, NASA has 59 astronauts, down from 150 a decade ago. According to *The Washington Post*, observers expect the agency to lose another half-dozen before the end of the year. While the report does not recommend a specific number of astronauts, it does point out that the extensive training required, non-spaceflight tasks and the medical demands of long tours of duty on the ISS could lead to astronaut shortages within five years.

In 2009, NASA hired nine astronaut candidates and hopes to add nine more in 2012 and six in 2014, according to Peggy Whitson, ex-KC5ZTD. Whitson is chief of NASA's astronaut office at Johnson Space Center in Houston. Wayne Hale, a former space shuttle launch director, reviewed the report. "New astronauts are needed in the pipeline," he told *The Washington Post*. "It takes quite a while to train people for human spaceflight." According to the report, basic space station training takes 2.5 years, with 31 weeks of that spent in Russia training on the Soyuz and learning Russian. NASA has said that it expects to send four to six astronauts to the ISS each year for six-month rotations.

Medical issues can keep otherwise qualified astronauts grounded. In January 2011, according to the report, the astronaut office needed to choose two crew members for future space station missions. Of the 63 on the roster, only six were medically qualified and available. The reports notes that astronauts who go to the ISS often cannot return to space for three years or more as they recover from lost bone mass.

As of press time, there are three men

on board the ISS: Mike Fossum, KF5AQG (NASA), Sergei Volkov, RU3DIS (RKA), and Satoshi Furukawa, KE5DAW (JAXA). Expedition 29 is scheduled to launch for the ISS on November 14, carrying three crew members — Dan Burbank, KC5ZSX, Anton Shkaplerov and Anatoly Ivanishin. They will join Fossom, Volkov and Furukawa.

HAWAIIAN VEs AND ARRL VEC ADMINISTER EXAMS VIA INTERNET VIDEO FEED

From the sunny shores of Hawaii's Kalaupapa Peninsula, ARRL Volunteer Examiners gave a remote ARRL VE session on July 25. What made this VE session so special that it was only the second VE session to be administered via Internet video feed. The first video VE session — and the first-ever VE session in Antarctica — took place in October 2010. Now there are three new radio amateurs in Hawaii's Kalawao County.

Not only was this VE session special due to its location, only one VE was at Kalaupapa for the exam. "This is where the Internet video feed came into play," explained ARRL VEC Manager Maria Somma, AB1FM. "Joe Speroni, AHØA — who lives in Honolulu but went to the site at his own expense — was at Kalaupapa, but Bev Yuen, AH6NF, and Ray Moody, AH6LT, were in Honolulu and watching on video. We also had three VEs here at ARRL Headquarters watching via video feed: Penny Harts, N1NAG, Steve Ewald, WV1X, and Rose Anne Lawrence, KB1DMW. These three administer many VE sessions each year here at ARRL HQ."

Kalaupapa is an isolated peninsula located on the island of Molokai in the Hawaiian Islands. From 1866-1969, those Hawaiians who were afflicted with leprosy (today called Hansen's disease) were removed from their families and sent to live at Kalaupapa for the rest of their lives, separated from society. Chosen by the Hawaiian Monarchy for its natural barriers to escape — including some of the highest sea cliffs in the world and a coastline with high surf and hazardous ocean currents — the site became a National Historical Park in 1980. Currently, about 90 people, including former patients, Department of Health staff and National Park Service staff, live in the settlement of Kalaupapa. "To get to Kalaupapa, you must either take a mule train or be an expert hiker; entry by sea is restricted," Yuen explained. "The trail down to the peninsula goes down a very steep 1600 foot cliff and the trail is 3.5 miles. If you take a plane from Honolulu to Kalaupapa — a distance of about 60 miles — you can expect to pay at least $500 for a round-trip ticket."

The Kalaupapa Peninsula (as seen by the red dot) — located on the island of Molokai in Hawaii — was the site of the second and third remote VE testing sessions administered by the ARRL.

While there are modern communication systems on the peninsula, such as telephone or high speed Internet, Yuen said that Kalaupapa residents are concerned that there is no backup communications during the frequent power failures: "Having hams at Kalaupapa would give residents a form of backup communications. This became evident during the recent tsunami following the March 2011 earthquake in Japan. While little damage was done, residents had to be evacuated in the middle of the night to higher ground on the peninsula, and had limited connection with the outside world."

Those Kalaupapa residents interested in getting their ticket contacted the Civil Defense Amateur Radio Club (CDARC), which provides VE testing on Oahu, and asked the group for assistance. "The CDARC VE group had read about the ARRL VEC remote testing used for candidates in Antarctica," Yuen said. "While not as remote as Antarctica, the Kalaupapa peninsula is still a logistically and financially challenging trip. It would be difficult for even one VE to travel to the peninsula, but doing so for three VEs is a major burden. They requested and received FCC approval for a remote testing session. With enthusiastic support from ARRL VEC Manager, Maria Somma, AB1FM, a testing session was set up for the several residents who had been studying on their own for the Technician exam. Joe traveled to Kalaupapa to be the one needed VE on-site."

Two residents took the Technician exam and both passed. "We gathered in the ARRL VEC office to start the video conference exam session," Somma explained. "Testing was in the Superintendent's office, with the candidate's computer logged onto the ARRL VEC examination website. Six ARRL Volunteer Examiners observed the session. Three different interactive online Tech exams were available, so tests could be randomly assigned." The candidates received their test results within a few minutes after they were electronically submitted to the ARRL VEC and the VE team. In August, the ARRL VEC sponsored another Internet licensing session. One of the new Technicians upgraded to General (and can now administer VE sessions on site) and another resident earned his Technician license.

SECTION MANAGER NOMINATION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, Louisiana, North Carolina, Pacific, San Diego, South Dakota and Virginia sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

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

We suggest the following format:

(Place and Date)

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

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

(Signature___ Call Sign___ City__ ZIP___)

Any candidate for the office of Section Manager must be a resident of the Section, an Amateur Radio licensee of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a nominating petition. Petitions must be received at Headquarters by 4 PM Eastern Time on December 9, 2011. If more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before January 3, 2012, to full members of record as of December 9, 2011, which is the closing date for nominations. Returns will be counted February 22, 2012. Section Managers elected as a result of the above procedure will take office April 1, 2012.

If only one valid petition is received from a Section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 2012. If no petitions are received from a section by the specified closing date, such Section will be resolicited in the April 2012 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Membership and Volunteer Programs Manager. — *David Patton, NN1N, Membership and Volunteer Programs Manager*

So You're the New EC — Now What?

Mark Conklin, N7XYO
ARRL Oklahoma Section Emergency Coordinator
n7xyo@arrl.net

Oklahoma Section Emergency Coordinator Mark Conklin, N7XYO, has developed the following primer for new Emergency Coordinators in his section to help them navigate their new responsibilities and role.

Now that you are the Emergency Coordinator (EC), what do you do or what should you be doing? No doubt you have seen the long list of duties and responsibilities an EC is supposed to be doing (**www.arrl.org/emergency-coordinator**). How in the world does one person do all of that and how do you start building or maintaining an active ARES® team? And I do mean active, not just names on a roster but volunteers ready, trained, and able to respond to your county's communications emergency.

How does *one* person do all that? Answer: *One* person cannot! It takes a team effort. However, you, as the EC are the team's coach, quarterback and cheerleader all in one nice bundle.

The first thing a new EC must do is locate and/or recruit your replacement. What? Leaving already? *No!* But any good plan has at least one backup. You need to find someone who would be willing to step into the role as EC if needed. Let's say you're out of town on vacation, you're ill, your boss will not let you leave work, or you and your family are victims of the disaster and you need to take care of your family first. Any of those situations can and do happen. Your backup does not have to be someone who is being groomed to someday take over as EC when the time is right for you to step aside, but they can be.

Next, read, learn and understand the section's and your county's ARES Emergency Communication plan. Take special note that any good plan is always evolving and being revised. Don't make any changes to your county's plan right off. Build your team, get their input and *then* make any needed changes to the county plan. More importantly, your overall understanding of the plan(s) is important. ARES volunteers in your county will be looking to *you* to know what's going on and what they should be doing. Being able to put a written plan(s) in their hands and being confident in the plan will make any event go much smoother.

Now let's do a "by the numbers" review each of the duties of the EC. Look for the author's comments and suggestions in italics below each of the listed duties and responsibilities.

EC's Position Description

The ARRL Emergency Coordinator is a key team player in ARES on the local emergency scene. Working with the Section Emergency Coordinator (SEC), the District Emergency Coordinator (DEC) and Official Emergency Stations (OES), the EC prepares for and engages in management of communications needs in disasters. EC duties include:

The word "local" is the most important word in the above paragraph. All emergencies or disasters are LOCAL. The EC is the primary manager of ARES volunteers in a communication emergency.

Promote and enhance the activities of the Amateur Radio Emergency Service (ARES)

Nominations Open for George Hart Distinguished Service Award

The George Hart Distinguished Service Award may be presented by the Board of Directors to the ARRL member whose service to the ARRL's Field Organization is of the most exemplary nature. The Distinguished Service Award is named in honor of George Hart, W1NJM, long-time Communications Manager at ARRL Headquarters and chief developer of the National Traffic System.

Selection criteria include:

- Operating record with the National Traffic System; or participation within the Amateur Radio Emergency Service; or
- Station appointments and/or leadership positions held within the Field Organization.

Procedure:

- Nominations shall be accepted from anyone.
- Nominations shall be submitted to the Membership and Volunteer Programs Manager at ARRL HQ by November 1.
- Nominations should document as thoroughly as possible the nominee's lifetime activities and achievements within the Field Organization. It is expected that nominated candidates will have 15 or more years of distinguished service.
- The Programs and Services Committee will serve as the Review Committee.
- The Board of Directors shall make the final determination at its Annual Meeting in January.
- The award shall consist of: An engraved plaque, a cover letter, and coverage in *QST*.

Nominations for the **2012 George Hart Distinguished Service Award** and any related supporting material and letters of recommendation may be sent to ARRL Headquarters to the attention of Dave Patton, NN1N, ARRL Membership and Volunteer Programs Manager (**nn1n@arrl.org**) or to Steve Ewald, WV1X (**wv1x@arrl.org**). The nomination period continues until November 1, 2011.

Steve Ewald, WV1X ♦ Public Service Specialist ♦ sewald@arrl.org

for the benefit of the public as a voluntary, non-commercial communications service.

Notice that this is number one on the list. It's your biggest duty. Promote, enhance/grow/build, then recruit and recruit, then recruit some more. Never miss an opportunity to meet, greet and recruit volunteers and leaders to your team.

Manage and coordinate the training, organization and emergency participation of interested amateurs working in support of the communities, agencies or functions designated by the Section Emergency Coordinator/Section Manager.

This is a bit of a catch-all paragraph, and it also should remind you flexibility is a big part of any successful ARES team. You should also keep "Manageable Span of Control" (remember your ICS/NIMS [Incident Command Structure/National Incident Management System] training) in mind as your team grows — you will need to assign a leader, or in most cases several leaders (AECs, Assistant Emergency Coordinators), to oversee many operational functions such as training, exercises and logistics to name a few. This may also include the training of new Amateur Radio licensees to help your ARES team grow.

Establish viable working relationships with federal, state, county, city governmental and private agencies in the ARES jurisdictional area which need the services of ARES in emergencies. Determine what agencies are active in your area, evaluate each of their needs, and which ones you are capable of meeting, and then prioritize these agencies and needs. Discuss your planning with your SEC and then with your counterparts in each of the agencies. Ensure they are all aware of your ARES group's capabilities, and perhaps more importantly, your limitations.

The EC is a key part of the overall plan and partnership with the each served agency. However, your best leaders (AECs) can help you with this matter. Here in Oklahoma, under the management of the county EC, an AEC leads a small team (Rapid Response Team — RRT) focusing on the day-to-day interaction and communication with a specific served agency. One RRT per each served agency. The size of each RRT is one AEC and three to seven ARES emergency communications volunteers. The size of the RRT follows NIMS best practice "Manageable Span of Control." You, the EC, cannot do it all, or in a communications emergency, be everywhere.

Develop detailed local operational plans with "served" agency officials in your jurisdiction that set forth precisely what each of your expectations are during a disaster operation. Work jointly to establish protocols for mutual trust and respect. All matters involving recruitment and utilization of ARES volunteers are directed by you, in response to the needs assessed by the agency officials. Technical issues involving message format, security of message transmission, Disaster Welfare Inquiry policies, and others, should be reviewed and expounded upon in your detailed local operations plans.

This should all be covered in a Memorandum of Understanding (MOU) and in your county's ARES communication plan. A key point to remember is that ARES volunteers work under the management and direction of ARES leadership. When ARES is there to assist with communications, that is what we do. ARES volunteers do not become part of a served agency's volunteer pool. ARES is a self-standing Non-Governmental Organization (NGO) with national partnerships and MOUs in place with many national disaster response providers. See this link for more information on MOUs with current national served agency partners: **www.arrl.org/served-agencies-and-partners**.

Establish local communications networks run on a regular basis and periodically test those networks by conducting realistic drills.

A weekly local ARES net is a good place to start. This can be simplex, or via local repeater — you and your leadership team decide. I suggest that you make this net a part of your county's ARES communication plan. This net can be an "on air" meeting place any time your ARES team is either on standby or is active during a communications emergency.

Establish an emergency traffic plan, with Welfare traffic inclusive, utilizing the National Traffic System as one active component for traffic handling. Establish an operational liaison with local and section nets, particularly for handling Welfare traffic in an emergency situation.

As EC, it is important to have your county's ARES communication plan (your roadmap) all worked out before any emergency. If your county's ARES leaders are knowledgeable about the ARES communication plan, then you will find that communications and message traffic will flow smoothly. This also applies to your core ARES emergency communicators — make sure they have working knowledge of your county's ARES communication plan.

In times of disaster, evaluate the communications needs of the jurisdiction and respond quickly to those needs. The EC will assume authority and responsibility for emergency response and performance by ARES personnel under his jurisdiction.

Okay, as EC you're in charge, but remember you do not have to and really cannot do it all. My suggestion is that during a communication emergency, each of your RRT leaders should check in with each served agency and evaluate communication needs. Then your leaders report their findings to you, the EC. More often than not, once you have all the information (from the leaders of each RRT), you will find that not all of your county's served agencies have urgent communications needs. This first evaluation of the communications needs will allow you and your leaders to make decisions and shift resources where needed.

Work with other non-ARES amateur provider-groups to establish mutual respect and understanding, and a coordination mechanism for the good of the public and Amateur Radio. The goal is to foster an efficient and effective Amateur Radio response overall.

The first time I read that one I had to pause and think. Then it hit me — Play well with others. If your leaders and core volunteers are trained and ready to go, you will notice that other non-ARES Amateur Radio groups will be looking for you to lead the way. Any planning and MOUs you can have in place before any communication emergency will make working with any group a smoother process.

Work for growth in your ARES program, making it a stronger, more valuable resource and hence able to meet more of the agencies' local needs. There are thousands of new Technicians coming into the amateur service that would make ideal additions to your ARES roster. A stronger ARES means a better ability to serve your communities in times of need and a greater sense of pride for Amateur Radio by both amateurs and the public.

It bears mentioning again…Never miss an opportunity to meet, greet and recruit volunteers and leaders to your team. Growing your team is VERY important and recruiting really never stops.

Report regularly to the SEC, as required.

EVERY month on the first day of the month, ECs send your report to your DEC. DECs send your report to the SEC. Here in Oklahoma to make it easy to report, we can do it online via the **www.ARESOK.org** *website.*

Emergency Coordinators are encouraged to earn certification in Level 1 of the ARRL "Intro to EmComm, EC-001" Course (see **www.arrl.org/online-course-registration**).

**I feel for a leader this is a MUST, and I would go so far as to change the word "encouraged" to "required." I understand ARES leaders are volunteers. The way I see it, leaders should not ask their teams to participate in training they themselves have not passed. ARES leaders should also take the "EmComm for Managers" (EC-016) course online from the ARRL. See the online course registration web page (noted above) for details.*

In Oklahoma, all ARES officers are also expected to complete ***ICS-700.A****,* ***ICS-100.B****,* ***ICS-200.B*** *and* ***ICS-800.B*** *FEMA training. All ARES members must complete this training within one year from the time of application.*

Just like recruiting, training and being ready…it all never stops. About the time you think you and your team is all trained up, there's another course to take or more training to do. If you know that going in, it will never be a surprise to you.

Recruitment of new hams and ARRL members is an integral part of the job of every League appointee. Appointees should take advantage of every opportunity to recruit a new ham or member to foster growth of Field Organization programs, and our abilities to serve the public.

Yep, recruiting is here, too. Not only for ARES but for the ARRL. It only makes sense because ARES ***is*** *an ARRL-supported program. So, in case you passed over a section or two earlier in this article, I'll mention it again: Never miss an opportunity to meet, greet and recruit volunteers and leaders to your team. Always invite all new volunteers to become a member of the ARRL — The national association for Amateur Radio.*

Requirements: Full ARRL membership; FCC Technician class Amateur Radio license or higher.

These are the minimum requirements to become your county's EC. Having an EmComm or leadership background is very helpful, but not required.

Conclusion

Okay, I know that's a lot to take in, and I hope that my added comments and thoughts on the listed duties and responsibilities were helpful in your new role as ARES Emergency Coordinator for your county. My goal here is to be helpful and to stop that loud scream of "what did I get myself in for" (which is usually accompanied with that hard slap to your own forehead) right after you tell your SEC that you would be happy to serve as your county's EC. And replace that reaction with, "I get it! Teamwork, recruiting, planning, clear communication and training will make our ARES team function smoothly and grow."

Do not be afraid to ask questions of your DEC, SEC, the ARRL Section Manager or a neighboring EC. The more you learn and the more you grow your team, the more successful ARES will be in your part of the world. 73 and Good Luck!

MONTANA ARES TEAM DEPLOYS FOR TRAINING

Rod Jackson, AE7JJ
ARES Assistant EC for Training

Members of the North Central Montana Amateur Radio Emergency Services (ARES) Team deployed for training May 20-22. At what is now becoming an annual event, the ARES Team provided communications support to the Wild Land Fire Academy at the Bull Run Ranch, located approximately 45 miles south of Great Falls. The primary purpose of this academy is to provide certification training for volunteer and contract wild land firefighters. Using the Incident Command System (ICS) command control model, firefighters were divided into two different task force divisions and were sent to separate areas on the ranch to conduct simulated firefighting activities.

ARES members provided support by assisting in the setup of fire fighter radios, deconfliction of mutual aid radio frequencies, and serving as a radio relay center between the incident commander and deployed fire engines in the field. On Sunday, May 22, the Academy Director had the ARES team move from our relay point and become part of the Incident Command Post. This allowed ARES members to experience a great number of ICS functions. At the Command Post, ARES members became the primary dispatchers for the Incident Commander sending fire equipment to various points in the exercise zone and monitoring their status for the Operations section and the Incident Commander.

ARES Emergency Coordinator George Forsyth, AA7GS, commented that this was an excellent training opportunity for the ARES Team: "We had several new ARES members get to experience the dynamic communications environment that a simulated exercise brings. This event also brought with it a tough logistical challenge for the ARES team to deal with. That challenge was mud and lots of it. Positioned on the banks of the Missouri River, the ARES team needed 4 wheel drive vehicles to reach the optimum location to support radio relay activities between the two fire training groups. In the end, this was a great training event for ARES. It closely followed what a small to medium size wild land fire could look like and the associated incident response actions. Training like this you can't get from a book. It will significantly help prepare this ARES team to assist if needed when our real fire season hits later this Fall."

Over the three day period, 9 ARES members participated, contributing 110 volunteer man-hours and 1120 personal vehicle miles to support the Wild Land Fire Academy.

ROD JACKSON, AE7JJ

George Forsyth, AA7GS, operated the North Central Montana ARES communications van that is shown in position along the banks of the Missouri River during the Wild Land Fire Academy exercise.

IARU Administrative Council Holds Annual Meeting in South Africa, Plans for WRC-12

The Administrative Council (AC) of the International Amateur Radio Union (IARU) held its annual meeting on August 19-20 in Sun City, South Africa, in conjunction with the IARU Region 1 Conference. The AC is responsible for the policy and management of the IARU and consists of the three IARU international officers and two representatives from each of the three IARU regional organizations.

IARU President Tim Ellam, VE6SH/G4HUA, along with IARU Vice President Ole Garpestad, LA2RR, and IARU Secretary Rod Stafford, W6ROD, were in attendance. IARU Region 1 President Hans Blondeel Timmerman, PB2T, Vice President Tafa Diop, 6W1KI, and Executive Committee Member Colin Thomas, G3PSM, represented IARU Region 1. IARU Region 2 President Reinaldo Leandro, YV5AM, and Secretary Ramon Santoyo, XE1KK, represented IARU Region 2. IARU Region 3 Chairman of Directors Michael Owen, VK3KI, and Secretary Ken Yamamoto, JA1CJP, represented IARU Region 3. David Sumner, K1ZZ, attended as recording secretary.

The Administrative Council acted on the following items:

- IARU positions on relevant agenda items for the 2012 World Radiocommunication Conference (WRC-12) were reviewed and updated in light of developments since the 2010 AC meeting. Desired agenda items for future WRCs were considered. Progress on the action plan for developing support for Amateur Radio frequency allocations was reviewed and the plan was updated for the period through the end of 2012. For more on WRC-12, please visit **www.itu.int/ITU-R/index.asp?category=conferences&rlink=wrc-12&lang=en**.
- The International Telecommunication Union meetings at which IARU representation will be required for the coming year were identified. Plans for representation at these meetings, as well as at WRC-12 and Telecom World 2011 were reviewed.
- The working document that sets out the spectrum requirements of the Amateur and Amateur Satellite Services was reviewed and updated.
- A Spectrum Futures Committee was named to develop strategies for retaining access to bands above 148 MHz for the Amateur and Amateur Satellite Services globally. The committee is to review current IARU policies, seek input from stakeholders and formulate recommendations to the AC by March 1, 2012.
- The AC requested that the IARU 2025 Committee develop an alternative financial model for its proposed new organizational structure for the IARU, based on feedback from Member-Societies.
- The AC continued its review of the role of the IARU in emergency communications, noting the performance of radio amateurs in responding to recent disasters in several parts of the world.
- An encouraging report was received from Region 1 with respect to recent progress in developing Amateur Radio in Ethiopia.
- Terms of reference were adopted for a new volunteer position of IARU Electromagnetic Compatibility (EMC) Coordinator. Regional representatives were requested to identify qualified candidates for the position.

Discussions continued with respect to improvements in the IARU Monitoring System. It was agreed that consultation with regional coordinators would continue with the objective of concluding action on this item by November 1, 2011.

- The Administrative Council endorsed the 2014 World Radiosport Team Championship (WRTC 2014), to be held in New England in conjunction with the IARU HF World Championship. For more information on WRTC-2014, please visit **www.wrtc2014.org**.
- The budget for 2012-2014 as presented by the International Secretariat was reviewed and adopted; the ARRL serves as the IARU International Secretariat. The budget is based upon anticipated financial contributions from the three regional organizations to defray a portion of the expenses, in accordance with previously adopted policy. Support for the maintenance and continued development of the International Beacon Project are included in the budget.
- The theme *Amateur Radio Satellites: Celebrating 50 Years in Space* was adopted for the next World Amateur Radio Day, April 18, 2012.
- Reports of the IARU international coordinators and advisers were received. They are International Beacon Project Coordinator Peter Jennings, AB6WM/VE3SUN; Satellite Adviser Hans van de Groenendaal, ZS6AKV; EMC Adviser Christian Verholt, OZ8CY; International Coordinator for Emergency Communications Hans Zimmermann, F5VKP/HB9AQS, and Interim Monitoring System International Coordinator Chuck Skolaut, KØBOG. Van de Groenendaal presented his report in person.
- Tafa Diop, 6W1KI, was named an IARU Technical Representative. He is retiring as Region 1 Vice President and was thanked for his many years of service and willingness to continue serving IARU. Two volunteer Expert Consultants were also named: Bryan Rawlings, VE3QN, and Bram van den Berg, PBØAOK.

GAREC

The 2011 Global Amateur Radio Communications Conference (GAREC), also held in Sun City, was organized and chaired by Francois Botha, ZS6BUU. Ken Yamamoto, JA1CJP, gave an in-depth description of Amateur Radio activity in Japan in response to the March earthquake and tsunami. Johnny Tan, 9M8DB, explained how Amateur Radio emergency communications is organized in Malaysia and extended an invitation for GAREC 2012 to be held in Malaysia in conjunction with the SEANET Convention. Eddie Leighton, ZS6BNE, described how radio amateurs are prepared to use digital communications for emergencies in South Africa. IARU Region 1 Emergency Communications Coordinator Greg Mossup, GØDUB, moderated a session on IARU band planning and a tabletop exercise to test Amateur Radio's ability to respond to a prolonged and widespread power blackout. Wim Visch, PG9W, described the Dutch Amateur Radio Emergency Service. Finally, Craig Lambinon of the National Sea Rescue Institute explained the mission of this South African volunteer organization and discussed its communications needs. QST

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

CONTEST CORRAL

in association with the *National Contest Journal*

NOVEMBER 2011

Start and Finish	HF	VHF+	Contest Title	Phone	CW	Digital	Exchange	Sponsor's Website or Contact
Nov 1, 0200Z - Nov 1, 0400Z	3.5-28		ARS Spartan Sprint		✘		RST, S/P/C, and power	www.arsqrp.blogspot.com
Nov 4, 0200Z - Nov 4, 0300Z	1.8-14		SNS and NS Weekly Sprints		✘		Serial, name, and S/P/C	www.ncccsprint.com/rules.html
Nov 5, 1200Z - Nov 6, 1200Z	1.8-28		Ukrainian DX Contest	✘	✘		RST and serial or Ukraine oblast	www.ucc.zp.ua
Nov 5, 1700Z - Nov 6, 0500Z	3.5-21		Radio Club of America QSO Party	✘			RST, QTH, name, equipment	www.radioclubofamerica.org
Nov 5, 2100Z - Nov 7, 0300Z	**1.8-28**		**ARRL November Sweepstakes**		✘		**Serial, category, call, check, ARRL sec**	www.arrl.org/contests
Nov 5, 2100Z - Nov 7, 0300Z	1.8-28		Collegiate ARC Championship		✘		See ARRL Sweepstakes	www.collegiatechampionship.org
Nov 6, 1100Z - Nov 6, 1700Z	28		DARC 10-Meter Digital "Corona"			✘	RST and serial	www.darc.de/referate/ukw-funksport
Nov 9, 1300Z - See website	3.5-14		CWops Monthly Mini-CWT Test		✘		Name and member number or S/P/C	www.cwops.org/onair.html
Nov 12, 0000Z - Nov 13, 2400Z	3.5-28		Worked All Europe DX Contest			✘	RST and serial (see web for QTC rules)	www.waedc.de
Nov 12, 0001Z - Nov 13, 2359Z	28		10-10 Fall Digital QSO Party			✘	Call, name, 10-10 number, S/P/C	www.ten-ten.org
Nov 12, 0700Z - Nov 13, 1300Z	3.5-28		Japan International DX Contest	✘			RST and JA prefecture or CQ Zone	jidx.org
Nov 12, 1200Z - Nov 13, 1200Z	1.8-28		OK-OM DX Contest		✘		RST and serial or OK/OM district	okomdx.crk.cz
Nov 12, 1400Z - Nov 13, 0200Z	1.8-28	50	Kentucky QSO Party	✘	✘	✘	RST and KY county or S/P/C	www.wkdxa.com
Nov 12, 1900Z - Nov 14, 0500Z	1.8-28	50-440	CQ WE (Western Electric)	✘	✘	✘	Call, name, Bell QTH, yrs of svc (see web)	cqwe.cboh.org
Nov 13, 0000Z - Nov 13, 2359Z	3.5-28		SKCC Weekend Sprintathon		✘		RST, S/P/C, name, SKCC nr or "none"	www.skccgroup.com
Nov 16, 1600Z - Nov 18, 1800Z	3.5-28		Feld-Hell Turkey Shoot Sprint			✘	RST, S/P/C, Feld-Hell member nr	www.feldhellclub.org
Nov 17, 0130Z - Nov 17, 0330Z	3.5-14		NAQCC Monthly QRP Sprint		✘		RST, S/P/C, and NAQCC mbr nr or power	naqcc.info
Nov 19, 0000Z - Nov 20, 2359Z		**50-1296**	**ARRL EME Contest**	✘	✘	✘	**Call signs, sig rpt, acknowledgement**	www.arrl.org/contests
Nov 19, 0000Z - Nov 20, 2359Z	1.8-28		Mongolia DX Contest	✘	✘		RS(T) and CQ Zone	www.qsl.net/jt1kaa/radiosport.html
Nov 19, 1200Z - Nov 20, 1200Z	3.5-28		LZ DX Contest	✘	✘		RST and ITU Zone or LZ district	lzdx.bfra.org
Nov 19, 1600Z - Nov 20, 0700Z	1.8		All Austria 160 Meter Contest		✘		RST, serial, OE district	www.oevsv.at
Nov 19, 2100Z - Nov 21, 0300Z	**1.8-28**		**ARRL November Sweepstakes**	✘			**Serial, category, call, check, ARRL sec**	www.arrl.org/contests
Nov 19, 2100Z - Nov 21, 0300Z	1.8-28		Collegiate ARC Championship	✘			See ARRL Sweepstakes	www.collegiatechampionship.org
Nov 19, 2100Z - Nov 20, 0100Z	1.8		RSGB Second 1.8 MHz Contest		✘		RST, serial, UK district	www.rsgbcc.org/hf
Nov 20, 1300Z - Nov 20, 1700Z	3.5-7		Homebrew and Oldtime Contest		✘		RST, serial, and category	www.qrpcc.de/contestrules/hotr.html
Nov 21, 0200Z - Nov 21, 0400Z	1.8-28		Run For the Bacon		✘		RST, S/P/C, Flying Pig nr or power	www.fpqrp.org
Nov 23, 0000Z - Nov 23, 0200Z	1.8-28	50	SKCC Straight Key Sprint		✘		RST, S/P/C, name, SKCC nr or power	www.skccgroup.com
Nov 26, 0000Z - Nov 27, 2400Z	1.8-28		CQ World Wide CW Contest		✘		RST and CQ zone	cq-amateur-radio.com
Nov 27, 1300Z - Nov 27, 1600Z	3.5-14		SARL Digital Contest			✘	RST and serial	www.sarl.org.za

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

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

Sean's Picks

Contest Manager Sean Kutzko, KX9X

All dates/times are in UTC.

- **State QSO Parties this month:** Kentucky.
- **QRP Contests this month:** ARS Spartan Sprint (Nov 1), NAQCC Monthly QRP Sprint (Nov 17), Flying Pigs Run for the Bacon (Nov 21).
- **ARRL November Sweepstakes, CW (Nov 5-7):** The Great Tradition of Amateur Radio contesting in North America returns for the 78th time. New for 2011: The Single Operator Unlimited and the Multioperator categories have both been split into High Power and Low Power. Complete details can be found online at **www.arrl.org/sweepstakes**.
- **Worked All Europe DX Contest, Digital (Nov 12-13):** point your beams toward Europe and work 'em all! This contest features the sending of QTC, or a segment of your log, to give Europeans extra points. This event is arguably the most challenging contest of them all!
- **Japan International DX Contest, Phone (Nov 12-13):** Emphasis here is working as many Japanese prefectures (roughly the equivalent of a state) as you can. Non-JA stations send a signal report and your CQ zone. Plenty of JAs will be on to work, so give this one a try.
- **ARRL EME Contest, 50 MHz-1296 MHz, Round 2 (Nov 19-20):** EME (Earth-Moon-Earth, or moonbounce) operating is easier than you may think…100 W and a decent horizontally polarized 2 m Yagi is all it takes for digital EME QSOs. Check out Gabriel, EA6VQ's site at **www.vhfdx.info/jt65bintro.html** for info on getting started.
- **ARRL November Sweepstakes, Phone (Nov 19-21):** Stations from all 80 ARRL/RAC sections will be on for the second round of SS. Can you work all 80 and earn a Clean Sweep? Find out!
- **CQ World Wide DX Contest, CW (Nov 26-27):** A smorgasbord of DX on CW. If you love CW and enjoy working DX, you will never have a better opportunity to get your fill than this weekend. It's the biggest CW contest on the planet!

2011 ARRL 10 Meter Contest

0000 UTC Saturday, December 10 – 2359 UTC Sunday, December 11

COURTESY SCOTT MCDONALD, ZF2SC

Scott McDonald, ZF2SC, got on the air from the beach in the 2010 ARRL 10 Meter Contest with a simple rig and antenna. When the band cooperates, you don't need much to make contacts!

2 New Multioperator Categories for 2011!

- As Solar Cycle 24 slowly works its way upward, 10 meters has been coming to life in 2011. We can finally be hopeful of good conditions! Don't forget, Technician-class licensees have 10 meter privileges, so don't miss out on this great event!
- W/VE/XE stations (including Alaska and Hawaii) send a signal report and their ARRL/RAC section or Mexican state. DX stations send a signal report and sequential serial number beginning with 001.
- 2011 sees the Multioperator, Single Transmitter category now subdivided into High Power and Low Power. Couple this with the Mexican states as multipliers (just like last year) and you have some exciting times to look forward to the second weekend in December!
- All entries must be e-mailed or postmarked by 0000 UTC Wednesday, January 11, 2012. E-mail logs to **10meter@arrl.org**; paper logs to ARRL 10 Meter Contest, 225 Main St, Newington, CT 06111.

Complete rules for both contests may be found at www.arrl.org/contests

2011 ARRL 160 Meter Contest

2200 UTC Friday, December 3 – 1600 UTC Sunday, December 5

New Categories for 2011!

CRAIG THOMPSON, K9CT

Bill, W2RQ, Dan, W2NO, and Gerry, W1GD, made up part of the W2GD team during the 2010 ARRL 160 Meter Contest. They operated from radio station WYRS-FM in West Creek, New Jersey.

- As the Northern Hemisphere prepares for winter, the low bands pick up steam. What better reason to have a contest on Top Band? This CW-only event always has great participation and is lots of fun.
- You don't need 250 feet of wire to get on 160 meters. An inverted L antenna with a couple of radials works quite well, or load up whatever you have available. Many QSOs can be made using a 40 meter dipole through an antenna tuner.
- New for 2011: The Multioperator, Single Transmitter category has been split into High Power and Low Power! If you don't own an amp, bring your friends over and join in the fun as a team in this new category!
- All logs must be postmarked no later than 1600 UTC Tuesday, January 4, 2012. Cabrillo-formatted electronic logs may be e-mailed to **160meter@arrl.org**. Paper logs go to ARRL 160 Meter Contest, 225 Main St, Newington, CT 06111.
- Hope to see you on Top Band!

W3UR

HOW'S DX?

Expand Your Entity Totals in the CQ World Wide Contests

Late October through November is a great time of the year for working DX. During the last weekend of October and the last weekend of November are the best two DX contests, as these two events give the opportunity to work many DXCC entities. The CQ World Wide SSB will take place over the October 29-30 weekend, followed four weeks later by the CW edition.

These two contests produce the most Contest DXpeditions, typically with somewhere between 100 and 200 announced operations for each event. The week leading up to both contests is the perfect time for new DXers and little pistols to work all time new countries, band countries and mode countries. So starting around October 24 to 28 and again from about November 21 to 25 many contest DXpeditions will be arriving at their contest locations, setting up their stations and testing signals before the big weekend. With this in mind, this is the perfect time for new DXers and small gun DXers to get on the air and work these operations quickly on many bands and modes before the big guns who will be on for the contests.

HA SOUTH PACIFIC TOUR RESCHEDULED

Laci Szabo, HAØHW

Due to difficulties in organizing and making arrangement for the transportation to Banaba Island, we decided to reschedule the HA South Pacific Tour DXpedition to January/February 2012.

We will leave Budapest on January 8. The operation will start from Tuvalu on January 12 as T2HA. We will be back to Fiji on January 26 and 3 days of operation can be expected as 3D2HA. We will leave for Tarawa on January 31. Operation from Kiribati will take place till February 23. We will attempt to go over to Banaba for 7-10 days within this period. We will do our best to get over to Banaba, but the exact time of T33HA Banaba operation can be announced from Tarawa only. Two stations will be on the air from 160-10 meters on CW, SSB, RTTY and some PSK modes.

The landing permit to Banaba, licenses and flight tickets to Fiji, Tuvalu and Tarawa are in hand. The radios, antennas, PAs and other technical stuff have already been put together and packed. The weight of these packages exceeds 100 kg (220 pounds). We will bring everything with us, as excess baggage. This DXpedition is not an expedition with dozens of operators, nor a family holiday. It will be a "simple two man show."

However, our 8 week long operating plan, working from 3 different rare countries, makes it very expensive. We will cover the flight tickets, accommodations and other personal expenses. The excess baggage fees and the transfer to Banaba are extremely expensive. Thus we are seeking support from DX foundations and organizations to help us to cover the extremely high transfer expenses to Banaba and the excess baggage fees. Personal contributions are also welcomed. More information on **ha5ao.novolab.hu**.

DX NEWS FROM AROUND THE WORLD

3X — GUINEA

DL7DF, Sigi, and his crew of DK7LX, DL4WK, DL7UFR, SP3CYY and SP3DOI are teaming up to put 3XY1D on the air from Guinea starting October 18 through November 1. Plans are to be on 1.8 through 50 MHz on CW, SSB, RTTY, PSK31 and SSTV. They have a web page with complete details at **www.dl7df.com/3xy1d/index.html**. QSL via DL7DF.

6W — SENEGAL

6V7Q in Le Calao, Senegal, will be F8IJV's operation October 22- November 11. Seb will operate mostly SSB from the resort, with perhaps some digital and CW, 160-6M. He will have an Acom 1011 amplifier along, 700 W output and will be in the CQWW SSB Contest.

QSL to his home call, F8IJV, direct, bureau or LoTW.

8Q — MALDIVES

8Q7CC in the Maldives will be by IØWDX November 2-12. This will be IOTA AS-013. He plans to be on 20-6 with an IC-7000 to Cushcraft R6000 vertical. For 40 he'll try to put up an inverted V if there's room at his bungalow. He doesn't know yet if he will try CW and RTTY. QSL to his home call.

9N — NEPAL

A multi-national team from the Mediterraneo DX Club (MDXC) is heading to Nepal for activity as 9NØMD from November 13 to 25. Operating so far will be 4Z4DX, 4Z4OQ, CE6TBN, F1HRE, F9IE, I2VGW, I8YGZ, IV3BSY, IZ2ESV, IZ2GNQ, IZ2KXC, IZ3NXC, IZ8CCW, ON7RN, XE1L, XQ3SA and YB3MM. As pilot station, it's IZ8BGY. Look for them on all HF bands and modes. There is a survey running now asking where you need them most: **www.mdxc.org/nepal/topic1/index.html**. There will also be awards for working them, with various criteria. Check that out at this address: **www.mdxc.org/nepal/topic1/index.html**. Their main website is **www.mdxc.org/nepal2011/**.

C2 — NAURU

Members of the Pacific DXers have announced plans of seven Amateur Radio operators going to the island of Nauru. But first team members VK4AN and VK4FW will be operating from the Fiji Islands between October 25 and November 8 as 3D2A and 3D2T, respectively, including entries in the CQ WW SSB DX Contest. Once on Nauru, which ranks number 44 on the most wanted list, they will be operating with three complete stations for activity on 160 through 6 meters (including a 6 meter break-in beacon) on SSB, CW, RTTY and PSK31 as C21A from November 10 to December 6. Team members include K4ZLE, NJ7N, NL8F, VK4AN,

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VK4NEF, VK4FW and W5SL. The team is grateful for all donations, which can still be given via PayPal to **dxpedition@westnet.com.au**. Plans are to have an online QSL service at **www.vk4fw.com/oqrs-php**. Bill, VK4FW, says, "however, it is important that people do not use it before we get back so as not to overload the system causing mailbox failure." The team has a web page at **c21.pacific-dxers.com/C21A.html**.

C3 — ANDORRA

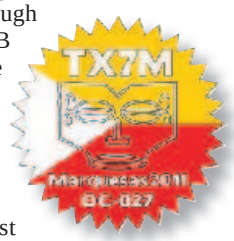
Members of the Tifariti Gang have announced their plans to operate in the CQ World Wide SSB DX Contest as C37N from Naturlandia, Andorra. The multi-two team includes C31CT, C31JM, C31KC, C31US, C31VM, EA1CJ, EA1SA, EA2RY, EA5RM, EA7AJR, F5CWU, IN3ZNR, JH4RHF, RG8K and UY7CW/EA4CWW. They have a website at **www.dxfriends.com/c37n/**. QSL C37N via EA4URE, Spanish Amateur Radio Union, PO Box 220, E-28080 Madrid, Spain.

C5 — THE GAMBIA

C5A in The Gambia will be multi-multi in the CQWW DX SSB Contest October 29-30. Operating will be OK8WW/OM2TW, OK1RI, OM6NM, OM5AW, OK1DIG, OK1NY, OK1FFU and OK1DO. During the CQWW DX CW Contest, November 26-27, OK8WW/OM2TW, OK1RI, OM6NM, OM5AW, OK1DIG, OK1NY, OK1FFU, OK1DO and OM2IB will also put C5A in the MM category. They have a website at **www.om0c.com**. QSL via OM2FY.

FO — FRENCH POLYNESIA AND MARQUESAS ISLANDS

The FO (Fox Oscar) prefix represents four DXCC Entities and an international team is planning to operate from two of the four countries during the second half of October and the beginning of November. The team includes: Oleg Zhukov (Team Leader), R3FA; Alexey Yakovlev (Co Team Leader), UT5UY; Michel Huin, FO5QB; Max Oskoma, UZ1HZ; Andrey Kotovsky, UU4JMG; Andrey Zhukov, RK7A; Andrey Fedorishchev, RA6LBS; Sergey Oskoma, UXØHX; Aleksandr Betsan, USØKW; Alexandr Pavlenko, UXØLL; and Leonid Kashigin, UA7A. Their first stop and last stop will be from Papeete, Tahiti, French Polynesia as TX3T. The first time will be October 16-19 and finishing up November 1-4. The bulk of their activity will be from Hatiheu, Nuku Hiva, Marquesas Islands as TX7M from October 19-November 1. During the CQ World Wide DX SSB Contest they will activate TX5A from this same location. Plans are to have four K3s and amplifiers for activity on 1.8 through 50 MHz on CW, SSB and RTTY. They have received all three of their licenses. The team has a website that includes a band and mode survey, propagation forecast and will include a log search. That site is **www.tx7m.com**.



GU — GUERNSEY ISLAND

Members of the Dutch Amateur Radio DX and Contest group (PA6Z) are planning a DXpedition from October 23-30 to Guernsey Island, using the call sign MU/PA6Z. They will be active on 1.8 through 50 MHz on both CW and SSB. Complete details can be found on their website at **www.pa6z.nl**. QSL via PA9M.

N7OU HEADING BACK TO PACIFIC

E51NOU will be on October 17-November 7 from Rarotonga Island (OC-013), South Cooks, with Bill, N7OU, operating. He will be CW only on 80-10 meters in his spare time as work on the island allows. Next stop will be from Manihiki Atoll (OC-014), in the North Cook Islands, November 8-22. His call sign for this stop is not known at this time. Here he will again be on CW only but will add 160 meters to the mix. QSL both of his operations via N7OU.

PJ5/PJ6 — ST EUSTATIUS & SABA

Janusz, SP6IXF, and Wlodek, SP6EQZ, are heading back to St Eustatius, which counts as the PJ5/PJ6 — St Eustatius and Saba DXCC Entity. Look for them to be QRV as PJ5/SP6IXF and PJ5/SP6EQZ, respectively, from October 20 to November 3. Activity will be on CW, SSB and RTTY on 1.8 through 28 MHz. QSL via their home calls.

PJ5/PJ6 — ST EUSTATIUS & SABA

Gerd, DL7VOG, will go on DXpedition from November 13 until December 4, 2011 to Sint Eustatius Island (PJ5). His call sign will be PJ5/DL7VOG. (He will be applying for a shorter call sign for the CQ WW CW.) Gerd will be QRV mostly on CW and RTTY on all bands. He'll be using an IC-706MKIIG, a 400 W FET-PA, HF9VX Butternut vertical and a homebrew inverted L (15 m "fishing rod") for 160 meters. Plans are to focus on the low bands and JA stations during his sunset and sunrise. He says to QSL in the following preferred order: Bureau, e-mail request for bureau cards (via **qsl@dl7vog.de**), PayPal request for direct QSLs (2 USD to **ebay@dl7vog.de**) or direct cards with SAE (2 USD).

PJ7 — SINT MAARTEN

Charlie, K4UWH, is heading back to Sint Maarten (PJ7) during late October and early November. He's planning to be QRV on 1.8 through 28 MHz and possibly 50 MHz, this time with a more focused operation on ham radio. Dates are October 29 to November 12. QSL via his home call.

S9 — SAO TOME AND PRINCIPE ISLANDS

Father and son team Matt, KØKKO, and Ed, KØGUV, are heading to Ilheu das Rolas (AF-023), one of the islands that count for Sao Tome and Principe for DXCC, in March 2012. Concentration will be made on 6 meters EME, with the first few days having the best opportunities. They will also be on HF. Equipment includes an IC-756PRO, Acom 1000 and M² 6M8GJ. Listen for them on SSB on 50105 kHz and on CW on 50105.7 kHz. They have a web page at **www.k0kko.net/pb/wp_5bd6e10c/wp_5bd6e10c.html**. Their web page lists the calls S92DX, S9CW and S9SX. QSL via KØKKO.

TU — IVORY COAST

The TU2T expedition to the Ivory Coast by an Italian team will be in October-November, with the precise date not set [This one might happen October 21 to November 7 — *Ed.*]. The operator list is I1HJT, I2YSB, IK1AOD, IK2CIO, IK2CKR, IK2DIA and IK2HKT. There will be a real-time online log being handled by IH9GPI, and IK7JWY will be the pilot station. **www.i2ysb.com**. One rig will be an Elecraft K3 and a second will be a Yaesu FT-857D. Antennas: Spiderbeams, verticals and beverages, plus a quad for 6. Amp: An Acom 1000 and Elecraft KPA 500. There is a band and mode survey to register your "needs" at **www.i2ysb.com/joomla5/index.php?option=com_pollxt&Itemid=164**.

VK9C — COCOS (KEELING) ISLANDS

Look for husband and wife DXpeditioners Lot, DJ7ZG, and Babs, DL7AFS, who are planning to be QRV as VK9CX from the Cocos (Keeling) Islands from October 19 to November 9. Activity will be on 80 through 50 MHz mostly on RTTY, PSK and SSB. See their website at **www.qsl.net/dl7afs/Index_VK9_C.html**. QSL via DL7AFS.

ZK2 — NIUE ISLAND

Chris, GM3WOJ (GM2V/ZL1CT), had to push back his DXpedition to Niue Island (OC-040). Originally he was going to be QRV as ZK2V starting October 15. The new dates are October 21 until the end of the year. Joining him for two weeks will be Keith, GM4YXI (GM5X), probably signing ZK2X. Chris has a website at **www.zk2v.com**.

Strays

QST congratulates...

◊ Matthew Morrison, KB3PSN, of Landisburg, Pennsylvania, recipient of a complete station, courtesy of the Frankford Radio Club. As part of its promotion of contest operating, the FRC looked to donate a station to one licensed Amateur Radio operator who wished to get started in the contest experience but was unable to put one together.

NØJK

THE WORLD ABOVE 50 MHz

Hurricane Irene Sets Stage for Impressive Tropo Opening

Hurricane Irene left extensive flood damage and widespread destruction along its path during the latter part of August. Damage estimates in the US were over $7 billion and there were more than 55 fatalities. Upstate New York and Vermont suffered the worst flooding in a century.

Hurricane Irene also helped in creating a strong tropospheric ducting opening over the midsection of the US from August 25 through 28. This opening was similar to a huge one Hurricane Diana caused during the September VHF QSO Party in 1984. During that contest strong tropo was worked from the Canadian Maritimes south to Georgia and the Carolinas.

With both hurricanes, the tropo started with the formation of a high pressure system that developed in southern Canada. It then drifted south and east. By August 24, 2011 tropo developed across the Midwest, mostly up to 500-700 km. Some noteworthy DX was NØLL EM09 to W9RM EN52 on 2 meters and WØGHZ EN34 to W9ZIH EN51 on 3456 MHz. This system drifted east and was overridden by another on August 25-26. With Hurricane Irene now approaching the Outer Banks of North Carolina, the tropo began building over the next couple of days. Irene's contribution to this was slowing the progression of the high pressure systems. As Irene churned up the eastern seaboard, the high pressure system stalled. Subsidence occurred from the sinking air in the high and created a strong inversion of warm dry air over cooler moist air below at 850-900 mb of atmospheric pressure, equivalent to an altitude of about 1500 meters above sea level (see Figure 1). The subsidence built in strength each day as the high pressure system remained essentially stationary. Sam, K5SW, observed, "when a Hurricane comes ashore it can help make tropo." Many VHF operators were watching the bands closely in anticipation of a repeat of the Hurricane Diana tropospheric ducting opening. They were hopeful of a mega opening from the Midwest to New England and the East Coast. The tropo did appear every evening like clockwork from August 24 to 28.

The tropo started August 23 with a strong regional evening opening from KS, NE north to SD, MN, IA and IL. NØLL worked WØGHZ EN34 on 222 MHz and the next morning W9RM EN52 on 2 meters. At work in Salina, EMS units in Nebraska and South Dakota were very loud on the "Med-9" channel (about 462 MHz).

The tropo grew in intensity and coverage on August 25 and 26. The evening of the 25th (26 UTC) W5LUA EM13 worked WØGHZ EN34 on 144, 222 and 432 MHz over a 1355 km path. From Lawrence, KS KØSIX EN35 was loud on 2 meters for me at 0115 UTC August 26. Many other contacts were made from Texas, Oklahoma, Kansas and Missouri north to Minnesota, Illinois, Wisconsin and Michigan. NØIRS EM29 spotted W5LUA EM13 with the comment "hello tropo!" on 2 meters at 0335 UTC. JD also worked KI5KC in rare EM24 on 2 meters at 0336 UTC

The following morning conditions were even better. WØGHZ logged W5LUA on 902 MHz at 1428 UTC and WØRT EM27 on 1296 MHz. The tropo even extended down to 6 meters — K5SW EM25 logged WØGHZ EN34 at 1230 UTC. The duct width has to be over 1000 feet to refract 50 MHz signals. It is about 165 feet minimum to bend 902 MHz. W9RM in EN52 found good conditions east on 2 meters and worked 2s in FNØ3 and FN14. He spotted the 2 meter VE2FUT/b FN35 "S9+" at 1419 UTC. Just 25 minutes earlier K5SW EM25 worked W9RM…had the duct been aligned just a little differently, could Sam have heard the VE2 beacon? FN35

NOAA NEX LAB, COLLEGE OF DUPAGE

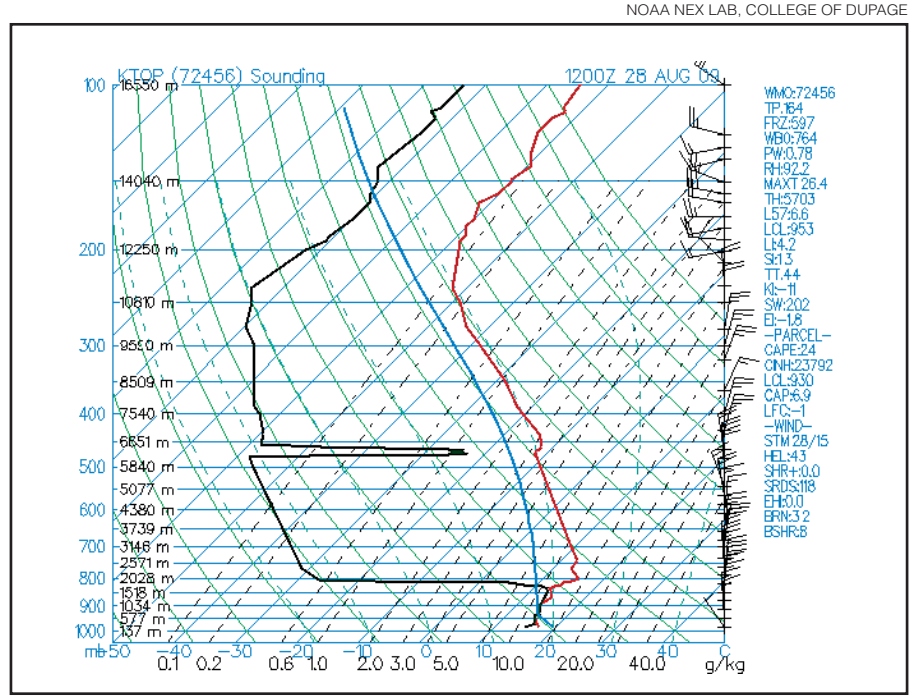


Figure 1 — Stuve Diagram showing inversion at 1500 meters ASL over Topeka, Kansas the morning of August 28.

This Month

November 5-6 Moderate EME conditions*

November 19-20 ARRL EME Contest

*Moon data from W5LUU

The best EME conditions occur when the Earth-Moon distance is at the absolute minimum and the Moon is in the coldest sky region along the Moon path.

Jon Jones, NØJK ♦ 5212 Eisenhower Pl, Lawrence, KS 66049 ♦ n0jk@arrl.net (316-655-4331)

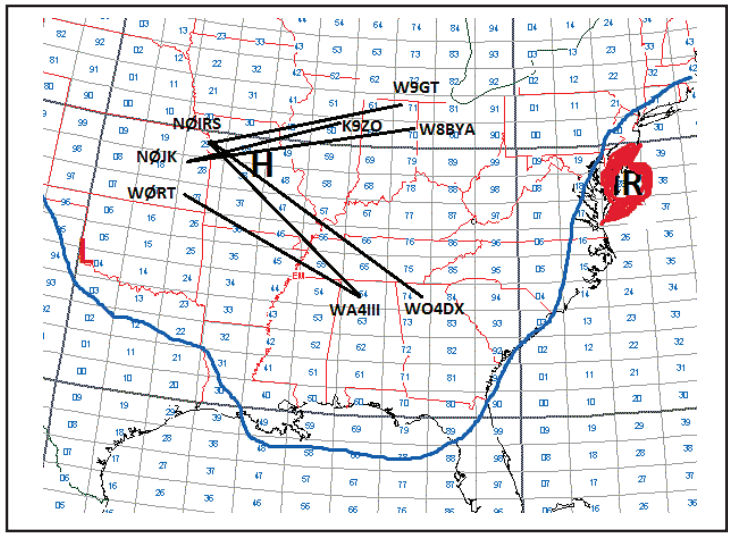


Figure 2 — Tropo paths in the Midwest August 28 with Hurricane Irene blocking the movement of the high pressure system.

Figure 3 — The 144 and 432 MHz arrays of W8BYA EN70. Gedas made many tropo contacts in August with these.

to EM25 would have been an outstanding 2 meter tropo logging.

The tropo was back August 27, though not as strong. KAØPQW was active from EN33 working south to KS, MO and OK on 144 and 432 MHz. NØIRS found a duct to the northeast with W8MIL EN74 and K8MD EN82 Michigan with strong signals. He also picked up KE5JXC in rare EL39.

Sunday morning August 28 was the finale. Strong tropo again developed after sunrise from KS, MO, OK north to Minnesota, northeast to Michigan, southeast to Alabama and Georgia and south to the Texas Gulf Coast (see Figure 2). The tropo was intense at times as the morning fog burned off and low power, simple antenna stations could work it. W8BYA EN70 was a real 59+ 20 on my 7 element M^2 Yagi (see Figure 3). With 25 W and an 8 element Quagi antenna on 432 MHz from our apartment balcony in EM28, I worked Ralph, K9ZO EN50 who was running just 10 W at 1354 UTC (see Figure 4). From EM27, Rick WØRT worked southeast to EM55 and EM64 on 2 meters with 59+ signals. NØIRS EM29 reported loud signals from stations east and southeast. Highlights

NØJK

Figure 4 — The Yagi on the balcony at NØJK.

were logging WO4DX EM74 on both 144 and 222 MHz (JD barely missed working him on 432 MHz as conditions dropped while his amplifier was warming up), KU4IU EM55 on 144 and 222 MHz, and WA4III EM62 144 and 432 MHz. JD runs the K3 and 500 W THP amp to stacked Yagis on 2 meters. K4LY EM84 in South Carolina was active and heard by several in the Midwest on 2 meters but no QSOs confirmed. The tropo went west about as far as EM19 with WØKKK working W8BYA EN70 on 2 meters. NØLL EM09 and KBØHH EM06 were on but out of the tropo on the 28th.

The tropo openings associated with Hurricane Irene were good…but never grew into the anticipated "monster" opening like the Hurricane Diana opening in 1984. It was nice to see considerable 222 MHz activity.

Other Tropo

There was strong tropo across the Midwest to Virginia August 1 and 2. The morning of August 2 was probably the best. Jerry, KN4SM FM16 worked Bob, K2DRH EN41 on 144 MHz with S-9 signals and 222 MHz at S-5 over a 1300 km path around 1450 UTC. Jerry runs 1.5 kW on 2 meters to an M^2 5 WL at 65 feet and 325 W to a 20 element K1FO Yagi on 222 MHz. I set up that morning portable in EM28 and K2DRH had a huge signal on 2 meters. Bob suggested trying 432 MHz… but I did not have a 432 antenna along. I used the 2 meter Yagi and was able to work Bob with S-5 signals on SSB. I worked Bob, K8TQK EM89 on 2 meters around 1600 UTC; he was my best DX.

The evening before was good as well. Scott, KA9FOX was active from EN43 and made over 50 contacts on 2 meter SSB between 0049-0455 UTC (see Figures 5 and 6). Scott was loud to EM28 on SSB at 0245 UTC. It was interesting to hear Scott run 4, 5 and Ø call area stations. Scott's most memorable contact of the evening was with KI4TZ in South Carolina! He uses an IC-746 and an M^2 2M 5WL at 115 feet. Small stations did well, too. Jim, KO9A logged NØPB EM39 on 144, 222 and 432 MHz, and N4QWZ EM66 on 144 and 222 MHz. He uses a CLP 5130-1 log periodic Yagi up 30 feet with a TS-200x and FT-736 on 222 MHz. This tropo opening was somewhat unusual as the temperatures were very high in the Midwest. Normally the tropo seems to stop when it is over 90°F. But it started the evening of August 1 before sundown with the local temperature at 101°!

AURORA

A major aurora opening occurred August 5. This was due to three coronal mass ejections combining into one, striking the Earth's magnetic field. The CME impact was around 1800 UTC August 5, and aurora began in the States a few hours later. Many reported aurora signals appeared around 2200 UTC, and faded out by 2330 UTC. There was a strong aurora, good on 6 meters but not so on 2 meters and above. Jerry, KO9A notes the aurora was pretty good and he worked a bunch of new grids on 6 meters. NWØW EM47 had the loudest signal, and he ended up with about 30 QSOs split between SSB and CW. He observed aurora is a great way to pick up close-in grids on 6 meters.

Fred, K3ZO, had great conditions on 6 meters and gave 2 meters a try when K2ZD got to "20 over 9" on 6. He worked WØVB MN on 2 meters, and several others including W9JN and N9LR. NWØW EM47 was the farthest west on 6, and north to VE9. An aurora warning tip: Fred uses is to listen for "auroral screech" on W1AW's 10 meter signal.

The next day the aurora had subsided, but the geomagnetic activity seemed to "jump start" E_s on 6 meters. On August 6, HI8LAM,

W8BYA

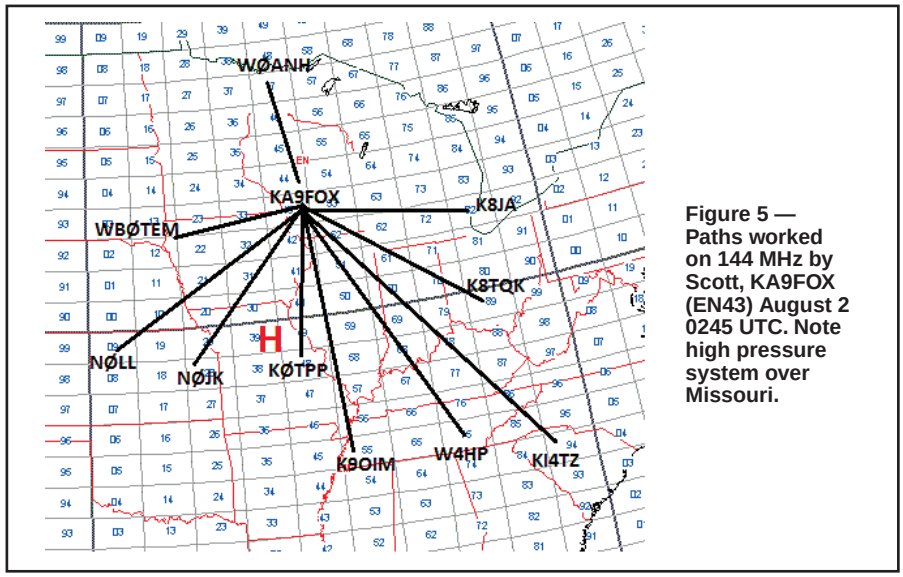


Figure 5 — Paths worked on 144 MHz by Scott, KA9FOX (EN43) August 2 0245 UTC. Note high pressure system over Missouri.

P43JB and PV8ADI worked stations across the lower 48 states. Joop, P43JB was in to Kansas at 1636 UTC, banging in on 50.100 CW. KØHA reported good signals from PV8ADI — 3 E_s hops away in Brazil.

Sunday, August 7 had even better conditions. E_s were present most of the day on 6 meters. Sunday evening 6 meters opened to both Hawaii and Alaska for the western USA and even the Midwest. KØGU DN70 logged ZF1EJ, KH6SX, KH7Y, NL7Z and WL7X. N5JEH NM worked KH6SX followed by KL7NO and KL7RA. Farther east, W9FF EN40 worked Hawaii and Alaska Sunday evening to complete his WAS on 6 meters. His story:

It started as just another day in the shack of W9FF. Using modest equipment, the station consists of a Yaesu FT-736R, ARR GaAsfet preamp, Harris SSPA running about 750-800w and a 5el CC with (WVO mod) at 55 ft.

It had been a strange day from an E_s standpoint. There seemed to be signals coming from everywhere. As evening arrived the E_s seemed to settle in on the west coast and Pacific North West.

I use the VE7CC DX cluster and try to watch it as much as possible. On the evening of 8/8/11 at 0145Z I noticed a spot from KH6SX and he had spotted the WZ8D beacon. there was also another spot very close to it, so I started watching his spotted frequency. Not much was heard from KH6SX at first, but he started staying in longer and longer. At 0251Z He was worked for my first HI on 6M.

I thought I would just see how much was going on to the west of me and noticed on ON4KST that Fred, KH7Y, had just announced his intention to call CQ. I immediately tuned to his frequency and there he was, in nicely, gave my call and logged Fred at 0328Z.

I then started watching for AK as they had been spotted and working the PNW. It never hurts to listen even though the spots are not trending your direction. I was interested as I had heard KL7NO calling CQ on 50.125 two days earlier, but had the antenna east. A 4 was calling him on SSB with no results. By the time I had the antenna around I put out calls twice on CW and no results were had.

I sat here listening for KL7NO and heard very little that I could be sure of, then KL7RA was spotted. I decided to watch for him as I had heard him faintly on a previous opening, but not well enough to work. I needed a drink of water, went to the kitchen for that, and when I got back to the rig and put on the headphones there was a loud CW station there. KL7RA was calling CQ and I got him immediately, 599s', grids and logged at 0404Z. Now, I have a problem using the key due to shaking and excitement just makes it worse. I responded to Rich's report with a string of Rs and butchered one and thought to myself, oh no, not now. The rest of the exchange went smoothly. He then vanished and was heard again three more times briefly, never worse than a 559. No Au or doppler was noted on this qso.

DX SHERLOCK

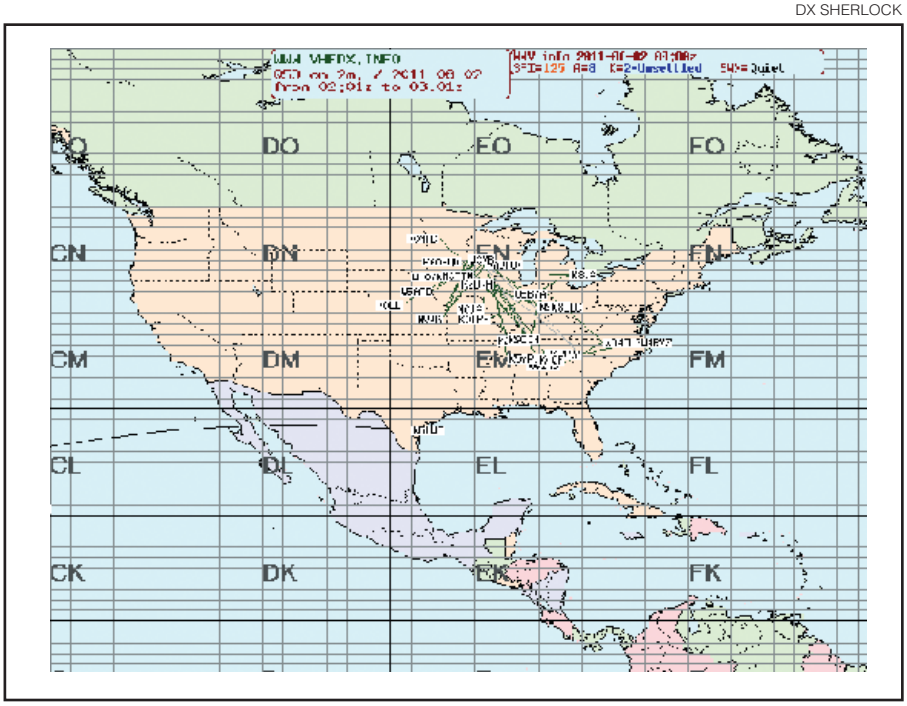


Figure 6 — DX Sherlock map for the 2 meter tropo opening on August 2.

The following morning Dave, N7DB worked V31UB on 6 meters from the Pacific Northwest, unusual for August.

PERSEIDS METEOR SHOWER

Al, K7ICW, reports 6 meter random SSB contacts with N6EQ and WA7KYM August 13.

KØGU worked EA7KW and CT1HZE August 13 via multi-hop E_s, possibly with some help from the Perseids. He notes this is a full week later than he had ever worked Europe via E_s.

On 222 MHz, W5UWB worked NQ7R via FSK441 at 1830 UTC August 14 at 885 miles.

EME

Good conditions reported on EME the last week of August. On August 27, K7ULS Utah made 13 contacts on 144 MHz EME using 2×2M12s and 350 W.

HERE AND THERE

Fred, KH7Y informed me that he worked Liu, BA7SI on June 4, 2011 for the first "USA to China" 50 MHz contact. This was about 3 weeks before Bob, K6QXY's contact with Liu. Bob was the first in the "mainland 48 states" to work China. Fred also worked A35CT via TEP on August 30 at 0900 UTC. A35CT is running 15 W and a halo antenna. QST

AT THE FOUNDATION

Apply Now for 2012 ARRL Foundation Scholarship Awards!

The application period for the ARRL Foundation Scholarship awards opened October 1.

More than 80 scholarships for the 2012-2013 academic year will be awarded in the spring of 2012. If you are a young radio amateur pursuing higher education, this is your opportunity to apply for a scholarship to help pay for your education. Information about all of the awards including selection criteria, application instructions and application forms can be found on the web at **www.arrl.org/scholarship-program**. Applicants are urged to review the scholarship descriptions and apply *only* for those awards for which they qualify. The application period closes promptly on February 1, 2012.

2012 will be the second year of the electronic application process. Paper applications are not accepted. In addition, applicants must submit a complete and current electronic transcript, which can be attached to the application.

For high school seniors applying for the William R. Goldfarb Memorial Scholarship, a FAFSA (Free Application for Federal Student Aid) is required, based on the most recent available federal tax information. This family financial statement must also be attached to the student's application.

There are two new scholarships to be awarded in 2012 — **The Jackson County Amateur Radio Association Scholarship** for an applicant from Mississippi or the ARRL Delta Division (Arkansas, Louisiana, Mississippi or Tennessee) and **The David Knaus Memorial Scholarship** sponsored by the West Allis Radio Amateur Club for an applicant from Wisconsin or the ARRL Central Division (Illinois, Indiana or Wisconsin).

A special note for Amateur Radio clubs: You can help young hams in your area by including this scholarship information in your next club newsletter or on your club website, and by sharing it with members, especially students and their parents, at your next club meeting.

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

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Oct 14-Oct 16, 0900Z-1200Z, K7P, Homer, AK. Alaska Maritime NWR, Friends of Alaska Refuges and Moosehorn Amateur Radio Club. Alaska Maritime NWR celebrates Refuge Week & Refuges on the Air. 14.250 15 20 m SSB. Certificate & QSL. Jeff Williams, PO Box 1268, Homer, AK 99603. **www.qrz.com/db/k7p**

Oct 14-Oct 16, 1400Z-1500Z, K8B, Delaware, OH. BSA. Jamboree On The Air. 14.250. QSL. Thomas Richards, 17510 Devall Rd, Spencerville, IN 46788.

Oct 15, 1200Z-2100Z, W2S, Wayne, NJ. Boy Scout Troop 104. 70th Anniversary. 146.43 14.290 7.190. QSL. Jim Sadur, N2RBJ, 4 Hillcrest Dr, Wayne, NJ 07470. *In parallel with the Jamboree-on-the-Air, we celebrate 70 years as a Boy Scout unit.* **t104.org/jota**

Oct 15, 1300Z-2000Z, K4NPT, Port Charlotte, FL. North Port Amateur Radio Club. 54th JOTA. World Scout Frequencies. QSL. NPARC, PO Box 7714, North Port, FL 34290. **www.w4npt.org**

Oct 15-Oct 16, 0700Z-0700Z, W6H, El Cerrito, CA. Boy Scout of America Mount Diablo Silverado Council. Jamboree On The Air. 28.390 21.360 14.290. Certificate. Boy Scout of America Mount Diablo Silverado Council, 800 Ellinwood Way, Pleasant Hill, CA 94523.

Oct 22, 1200Z-2200Z, N4A, Smyrna, GA. USCG Aux Flotilla 22 Seventh District. Commemorating 72nd Anniversary of USCG Auxiliary. 28.449 21.339 14.259 7.239. QSL. KG4FXV/N4A, PO Box 641, Smyrna, GA 30081. *Marietta, GA US Coast Guard Auxiliary Flotilla 22 Seventh District (Allatoona Lake).* **kg4fxv@arrl.net**

Oct 22, 1200Z-2300Z, N3G, Augustine Beach, DE. US Coast Guard Auxiliary. US Coast Guard Auxiliary 72nd Anniversary. 144.223 14.070 7.032 1.810. QSL. William G. Begley, 3 Pancoast Ave, Aston, PA 19014. *We will activate Old Reedy Island Light USA-568; also Air Mobile station flying over the Delaware Bay.* **nd3e@comcast.net**

Oct 23-Oct 24, 1300Z-0100Z, W9W, Prairie du Chien, WI. Vernon/Richland Amateur Radio Operators. 1st Time Activation of St Feriole Island WI-048 for the US Islands QSO Party. 14.255 14.070 14.050 7.255. Certificate & QSL. Ralph Hendrickson, S6509 County Rd J, Viroqua, WI 54665.

Oct 23-Oct 30, 1600Z-2000Z, K2A, Sandy Hook, NJ. Roseland Amateur Radio Club. Fort Hancock Establishment Day. 14.270 7.270. QSL. Roseland ARC, 300 Eagle Rock Ave, Roseland, NJ 07068. **www.qsl.net/k2gq**

Oct 28-Oct 30, 0000Z-1600Z, VI6CHOGM, Perth, Australia. Scout Member Amateur Radio Team. Commonwealth Heads of Government Meeting. World Scout Calling Frequencies SSB SSTV PSK31 EchoLink. QSL. Check website for QSL info. **vi6chogm.com**

Oct 29, 1400Z-1800Z, NC4AR, Randleman, NC. Tri-County Amateur Radio Club. 23rd NASCAR Days Festival. 14.275 7.210 145.290 & 53.010 Linked. Certificate. NC4AR, PO Box 747, Trinity, NC 27370. **www.nc4ar.net**

Nov 3-Nov 6, 1700Z-1700Z, N8F/K8F, Whitefish Point (N8F) and Paradise (K8F), MI. Stu Rockafellow Amateur Radio Society. Remembering the *Edmund Fitzgerald*. 21.360 14.260 7.260 3.860. Certificate. Richard A. Barker, W8VS, 264 N East St, Brighton, MI 48116. **www.qsl.net/w8njh/index.html**

Nov 4-Nov 6, 2000Z-2300Z, WØJH, Two Harbors, MN. Stillwater Amateur Radio Association. Remembering the *Edmund Fitzgerald*. Freqs TBD. Certificate. Stillwater ARA, 1618 West Pine St, Stillwater, MN 55082. **www.radioham.org**

Nov 4-Nov 6, 2200Z-1400Z, W8F, Livonia, MI. Livonia Amateur Radio Club. Sinking of the *Edmund Fitzgerald*. 21.050 21.340 14.340 14.050. Certificate. Bruno Walczak, 16601 Golfview, Livonia, MI 48154.

Nov 4-Nov 13, 0917Z-0917Z, N4V, Fayetteville, NC. Cape Fear Amateur Radio Society. Heroes Homecoming. 14.260 14.040 7.260 7.040. QSL. CFARS - N4V, PO Box 36106, Fayetteville, NC 28303. *Honoring Vietnam Veterans*. **cfarsnc.org**

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

Nov 5, 1300Z-2300Z, KØAGF, Saint Paul, MN. St Paul Radio Club. Minnesota Transportation Museum/Jackson Street Roundhouse. 28.350 21.350 14.250 7.240. Certificate. St Paul Radio Club, PO Box 9375, Saint Paul, MN 55109. **www.stpaulradioclub.org**

Nov 5-Nov 6, 1500Z-2345Z, WØJH, Split Rock Lighthouse, Split Rock, MN. Stillwater Amateur Radio Association. Remembering the *Edmund Fitzgerald*. 21.360 14.260 7.260 3.860. Certificate. Shel Mann, **w0jh@arrl.net**. Requested WØJH QSL certificates will *only* be sent via e-mail in PDF. *WØJH operating from Split Rock Lighthouse (ARLHS: USA 783; Grid Square: EN47). Other participating clubs at different locations; please observe QSL route for each participating club.* **www.radioham.org**

Nov 6, 0000Z-2359Z, VA3AAR, Almonte, ON. Almonte Amateur Radio Club, Inc. 150th Birth Date of Dr James Naismith, Inventor of the Game of Basketball. 14.150 7.250 3.750. QSL. Robin Webb, 160 Duncan Dr, Almonte, ON K0A 1A0, Canada. **www.almontearclub.ca**

Nov 8-Nov 11, 1300Z-2359Z, W5M, Spiro, OK. Don Greenwood, K5DLO. US Marine Corps Birthday. 14.317 7.260. QSL. Don Greenwood, 19299 Greenwood Rd, Spiro, OK 74959.

Nov 10-Nov 13, 1600Z-2200Z, KA9NLX, Arlington Heights, IL. The Armored Force Amateur Radio Net. Veterans Day. 21.375 14.325 7.283 7.065. Certificate. John Paskevicz, 1423 North Ridge Ave, Arlington Heights, IL 60004. *AFAR members will operate HF from home stations and simplex 146.520 in their local communities.* **ka9nlx@arrl.net**

Nov 10-Nov 13, 1700Z-2300Z, K7PIR, Avondale, AZ. Team PIR. NASCAR Kobalt Tools 500. 14.255 7.255. QSL. Team PIR, 1211 W Wood Dr, Phoenix, AZ 85029. *No LoTW or EQSL!* **www.kg9jp.com/k7pir**

Nov 11, 1000Z-1400Z, W3UDX, Butler, PA. Butler County Amateur Radio Association. Veterans Day Special Event. 14.250 7.200 3.900. QSL. Obie King, 336 Westbrook Dr, Butler, PA 16001. **www.w3udx.org**

Nov 11, 1300Z-2020Z, KC2LSD, Holmdel, NJ. Area amateurs. NJ Vietnam Veterans' Memorial Veterans Day Ceremony. 21.300 18.135 14.250 7.225. Certificate & QSL. Cody J Codianni, 41 William St, Clifton, NJ 07014. **www.njvvmf.org**

Nov 11, 1500Z-2000Z, KØGRL, Bellevue, NE. Strategic Air Command Memorial Amateur Radio Club. Salute to Veterans. 14.247 7.247. QSL. SACMARC, Inc, PO Box 1292, Bellevue, NE 68005. *From the Eastern Nebraska Veterans' Home; 40 m SSB prime, other bands on request. Ragchews welcome.* **www.sacmarc.org**

Nov 11, 1500Z-2245Z, W5KID, Baton Rouge, LA. Baton Rouge and USS *Kidd* Amateur Radio Cubs. Veterans Day. Gen bands CW in QRP freqs 20 m 40 m, CW preferred, other bands possible. QSL. W5KID, 305 S River Dr, Baton Rouge, LA 70802. **www.lus.edu/brarc/uss_kidd.htm**

Nov 11-Nov 13, 1400Z-2300Z, K4NYC, Pompano Beach, FL. Veterans Day. 28.800 21.325 18.125 14.250 7.225 PSK 28.120 21.070 18.100 14.070 7.080. QSL. Edgardo "Ed" Ramos, 11200-B NW 39th St, Pompano Beach, FL 33065. **www.k4nyc.com** *or* **www.qrz.com/db/k4nyc**

Nov 11-Nov 13, 1300Z-2100Z, K8V, Iron Mountain, MI. Mic-A-Con Amateur Radio Club. Veterans Day. 14.280 14.090 14.060 7.230. Certificate & QSL. Thomas Martin, 812 W B St, Iron Mountain, MI 49801. *From the UP Veterans Memorial.* **w8jwn@arrl.net**

Nov 11-Nov 13, 1700Z-1700Z, K4R, Fleming Island, FL. Clay County ARES & Hibernia Baptist Church. 3rd Annual Fleming Island & Hibernia Baptist Church Bike & Car Show. 21.290 14.240 7.190 3.940. QSL. Joe Bassett, 1503 Greenway Pl, Fleming Island, FL 32003. **www.k4r.org**

Nov 12, 1400Z-2200Z, K5EOK, Guthrie, OK. Edmond Amateur Radio Society. Oklahoma Statehood Celebration. 21.268 14.268 7.268. Certificate. Edmond Amateur Radio Society, PO Box 48, Edmond, OK 73083. *Using emergency power from the historic Santa Fe Depot in Guthrie, OK, the original capital of Oklahoma Territory and the first state capital.* **www.k5eok**

Nov 12, 1600Z-2359Z, NI6IW, San Diego, CA. USS *Midway* (CV-41) Museum Radio Operations Room. US Veterans Day; US Marine Corp Birthday Established 1775. SSB 14.320 7.250 PSK31 14.070 D-STAR 012C 2 m 70 cm SOCAL rptrs. QSL. USS *Midway* Museum Radio Room, 910 N Harbor Dr, San Diego, CA. **kk6fz@arrl.net**

Nov 12-Nov 13, 1300Z-2000Z, K4ZK, Stuart, FL. Martin County Amateur Radio Association. Stuart Air Show– A Salute to Veterans. 14.280 14.028 7.026 EchoLink 315546. QSL. Wayne Devrous Jr, W2BLS, PO Box 1901, Special Event Chairman, Stuart, FL 34995. **www.roadtovictorymilitarymuseum.org** *or* **www.mcaraweb.com**

Nov 12-Nov 13, 1400Z-2100Z, K2JJI, Johnstown, NY. Tryon Amateur Radio Club. Elizabeth Cady Stanton Woman's Suffrage Event. See URL for freqs. Certificate. Tryon Amateur Radio Club, 230 Old State Rd, Johnstown, NY 12095. **www.k2jji.org**

Nov 12-Nov 13, 1500Z-2200Z, WØFSB, Waterloo, IA. Five Sullivan Brothers Amateur Radio Club. Veterans Day Special Triple Event Honoring Veterans Day, US Marine Corps Birthday, Loss of The Five Sullivan Brothers. 21.240 14.240 7.240. Certificate & QSL.* Five Sullivan Brothers ARC, 4015 Independence Ave, Waterloo, IA 50703. **t-mc-nulty@msn.com**

Nov 17, 1500Z-2400Z, K7NRA, Paulden, AZ. Yavapai Amateur Radio Club. NRA's 140th Birthday. 21.335 14.250 14.050 7.250. Certificate. YARC, PO Box 11994, Prescott, AZ 86304. **www.w7yrc.org/special_events.htm**

Nov 19, 1300Z-2200Z, W2RCA, Fort Worth, TX. Radio Club of America. Radio Club of America Awards & Banquet 2011. 14.270 7.270. QSL. Ronald Jakubowski, 8500 Ridgewood Ave, Apt 103, Cape Canaveral, FL 32920. **www.radioclubofamerica.org**

Nov 26-Nov 27, 1300Z-1900Z, K4VRC, Lady Lake, FL. The Villages Amateur Radio Club. Radio On The Square. SSB 14.266 7.255 CW 14.066 7.033 PSK31 14.072 7.036. Certificate. Dennis Hardoin, 601 Lacy Pl, Lady Lake, FL 32162. **K4VRC.org**

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information. *Note: Some clubs may ask for a nominal fee to cover the cost of the certificate or QSL. Request will be made on air during the event or on the club's 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 **Jan** *QST* would have to be received by **Nov 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 Sep 10. You can view all received Special Events at **www.arrl.org/special-event-stations**. QST

November 2011 W1AW Qualifying Runs

W1AW Qualifying Runs are 9 AM EDT (1300Z) Wednesday, November 2 and 7 PM EST Thursday, November 17 (0000Z November 18)(35-10 WPM). The West Coast Qualifying Run will be transmitted by station K6YR on 3590 kHz at 9 PM PST Wednesday, November 9 (0500 November 10). Unless indicated otherwise, speeds are from 10-35 WPM.

In the November/December "Contesting 101"

"The Importance of Finding and Curing RFI in the Contest Station." Kirk, K4RO, discusses RFI in the shack, how it can ruin a good contest operation, and what to do to eliminate it. Contesting 101 can be found in the *National Contest Journal*, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

WB8IMY

ECLECTIC TECHNOLOGY

Is the PC Dead?

The personal computer has been with us always, or so it seems. Hams began using them in late '70s as crude logging systems and as terminals for radioteletype. The early '80s saw amateurs using PCs for SSTV, CW keying and more. By the turn of the century, PCs had become integral parts of most Amateur Radio stations.

But times are changing quickly. This year two of the world's largest manufacturers of personal computers, HP and Dell, reported major losses in sales. PC sales to businesses have fared better, but a turning point has clearly passed.

Even laptops, which have become very popular among hams, are evolving. Apple's Mac Air has the instant-on capability of a tablet computer, and isn't much bigger. Intel recently announced their Ultrabook, a thin, light tablet-like laptop with a touch screen. And if you watch much television you've no doubt seen the advertisements for Motorola's Atrix 4G, a smartphone that docks to a laptop-like device that's really just a screen, keyboard and giant battery. The smartphone is the brains of the operation.

Nowhere is the PC demise starker than among the consumers of tomorrow — college students. Stroll through a typical college dormitory and count the number of desktop PCs. Chances are you won't need more than the fingers of your hands — maybe just one hand — to keep the tally. At Penn State University, Director of Education Technology Services Allan Gyorke estimated that 95% of students now bring a laptop or tablet device to campus instead of using traditional PCs in their dorm rooms.

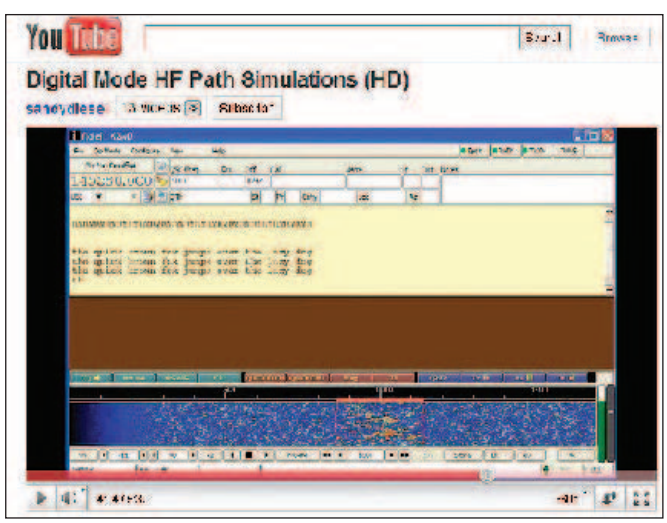
So where is this trend taking us? Look for tablet computers such as the Apple iPad to become the dominant machines for all but the most processor intensive applications. Already hams are designing Amateur Radio "apps" for the iPad; you've seen a few of them discussed in the pages of *QST*. Search the iTunes App Store and you'll find logging apps, PSK31 and RTTY software, CW decoders, APRS apps and more. (I'm personally awaiting a full-featured contest logging app for the iPad.)

It's probably premature to think in terms of replacing your station PC with a tablet, although I've heard from a few amateurs who've done so. But as Amateur Radio software for tablet computers becomes more commonplace and sophisticated, look for this trend to accelerate.

Remember when an IBM-PC with a 4 MHz processor was "state of the art"? Now the days of the PC itself may be numbered.

HF DIGITAL TESTS ON YOUTUBE

Tony Bombardiere, K2MO, has been running some HF digital throughput tests using an HF Path Simulator. He tried various modes such as PSK31 and others to see which one provides the best copy under marginal conditions. Tony has recorded his tests on video and has posted several to YouTube. Try this one at **www.youtube.com/watch?v=PzN0g8v86TA**. The results may surprise you.

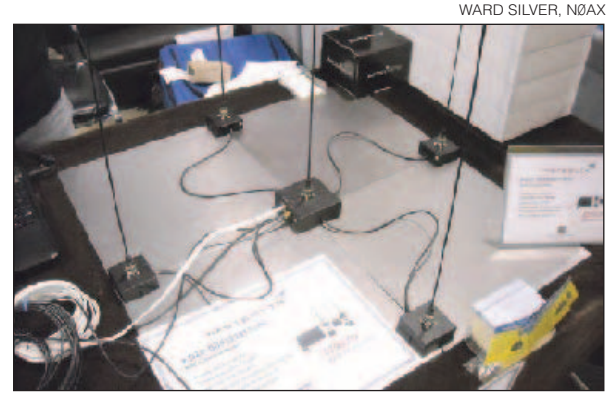


One of K2MO's HF path simulation tests on YouTube.

DOPPLER DIRECTION FINDING

Going through the collection of photographs that Ward Silver, NØAX, and I took at the Dayton Hamvention® this year, I came upon an interesting piece of new Doppler Direction Finding technology from KN2C at the Global TSCM Group. Doppler Direction Finding isn't new, but the DDF2020T marries the hardware to a GPS receiver and Google Earth mapping software. The result is precise position plots in real time using just about any VHF receiver you happen to have available (including VHF-FM handhelds). The full package cost is about $400 and you can learn more at **www.kn2c.us**.

WARD SILVER, NØAX



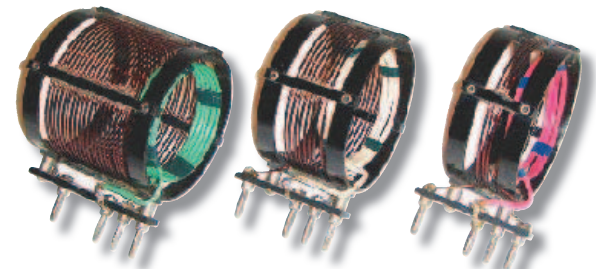
A glimpse of the DDF2020T Doppler Direction Finding system at the 2011 Dayton Hamvention. QST

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

K2TQN

VINTAGE RADIO

Early Coils and Kits



LWT-10 Aero Coil set. Note that the antenna coils have been rewound in different colors for easy band selection and more signal efficiency.

For our early rural hams, gathering parts to build the radios found in *QST* and other publications wasn't always easy. First getting a complete parts list from the magazine and then finding the parts usually required ordering from several companies by mail. It was a long process for some.

During my Novice days I wound some pretty ugly coils on toilet paper rolls and then glued them to a tube base. Keeping the turns neat and organized required careful plugging and unplugging when I changed bands. Over the years a number of companies sold coil forms, but toilet paper rolls were cheap and did the job. I'm sure the early hams used similar methods, including some coils wound from large copper tubing. These supported themselves.

One company found a need and provided it. AERO Products specialized in prebuilt coils. Advertising in 1920 era *QST*s, they showed several sizes and configurations of coils at reasonable prices. Builders could order a set and then build a receiver around them.

The coils were well made and if you find them today they should be intact and fully usable if you too want to build a radio around them. I see coil sets at hamfests and on eBay from time to time.

A Happy Customer

The following letter, lightly edited, was taken from the AERO catalog:

Dear Sirs,

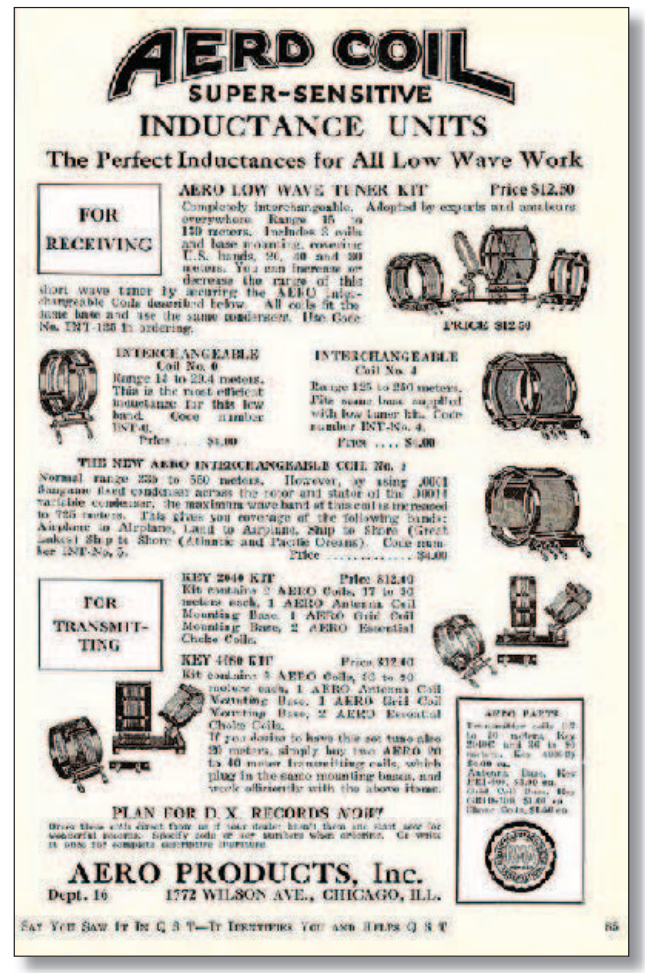
A week ago I bought a pair of your coils and tune from 16 to 130 meters. It took me two days to get it to work, but the results are certainly surpassing anything that I could have expected. The set is made up of two Hammarlund SLF condensers, but outside of that the rest of the works is just junk that was laying around.

Last night I got up about 2 a. m. and before the sun rose I logged 22 sixes, 6 BZ's, 2 F's, 3 A's, 2 Z's and several others whose call I mixed up or lost. All of these signals were on the 40 band and all were at least R 4-6.

I really think your coils are the berries and all the boys that have seen the set are crazy about it, not the workmanship, but the results.

I can honestly say that your coils are the best, both in construction and results, the only ones that will give satisfactory results without the crackling that is found in most sets.

vy 73s es Cu agn,
2 AYJ (Bob Poncel, Op.)
Oyster Bay, N. Y.


AERO COIL
SUPER-SENSITIVE
INDUCTANCE UNITS
The Perfect Inductances for All Low Wave Work
FOR RECEIVING
AERO LOW WAVE TUNER KIT Price $12.50
Completely interchangeable. Adopted by experts and amateurs everywhere. Ranges 15 to 130 meters. Includes 3 coils and base mounting, covering U.S. bands, 20, 40 and 80 meters. You can increase or decrease the range of this short wave tuner by securing the AERO interchangeable Coils described below. All coils fit the same base and use the same condensers. Use Coil No. INT-135 in ordering.
PRICE $12.50
INTERCHANGEABLE Coil No. 0
Range 12 to 23.4 meters. This is the most efficient inductance for this low band. Coil number INT-0.
Price ... $3.00
INTERCHANGEABLE Coil No. 4
Range 125 to 230 meters. The same base supplied with low tuner kit. Coil number INT-No. 4.
Price $3.00
THE NEW AERO INTERCHANGEABLE COIL No. 1
Normal range 230 to 550 meters. However, by using .0001 Sangamo fixed condenser across the rotor and stator of the .0001 variable condenser, the maximum wave band of this coil is increased to 725 meters. This gives you coverage of the following bands: Airplane to Airplane, Land to Airplane, Ship to Shore (Great Lakes) Ship to Shore (Atlantic and Pacific Oceans). Coil number INT-No. 1.
Price $3.00
FOR TRANSMITTING
KEY 2040 KIT Price $12.40
Kit contains 2 AERO Coils, 17 to 30 meters each, 1 AERO Antenna Coil Mounting Base, 1 AERO Grid Coil Mounting Base, 2 AERO Essential Choke Coils.
KEY 4080 KIT Price $12.40
Kit contains 2 AERO Coils, 35 to 80 meters each, 1 AERO Antenna Coil Mounting Base, 1 AERO Grid Coil Mounting Base, 2 AERO Essential Choke Coils.
If you desire to have this set tune also 20 meters, simply buy two AERO 20 to 40 meter transmitting coils, which plug in the same mounting bases, and work alternately with the above items.
PLAN FOR D. X. RECORDS NOW!
AERO PRODUCTS, Inc.
Dept. 16 1772 WILSON AVE., CHICAGO, ILL.
SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T

The above statements are from an unsolicited letter received on May 27th by the Aero Products, Inc., from a satisfied user of a short wave set built around Aero Coils. This receiver is located on [Long Island, New York]. The original letter can be seen at the offices of Aero Products, Inc., 4611 East Ravenswood Avenue, Chicago, Illinois.

While such results as this are by no means to be expected from every receiver, there is no question but that with a given amount of power, a broadcasting station can be heard at far greater distances when transmitting on short waves than in the usual broadcast band, and this fact has been responsible for the tremendously increasing interest in short wave reception by radio fans during the past Season. Furthermore, static is much less objectionable on the short waves and their use has made possible, for the first time, summer reception in many parts of the country where the seasonable decrease in signal strength and increase in atmospheric disturbances has heretofore rendered the summer use of a radio receiver very unsatisfactory.

Most of the short wave receivers which have been made available to the public up to the present time have been designed Primarily for the reception of continuous wave code signals, and have been more or less unsatisfactory for the reception of musical programs, and we believe that the receiver presented in the following paragraphs is the first ever placed before the general public which has been designed primarily for the reception of broadcast programs on short waves.

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

The AERO International Four Receiver, rear view.

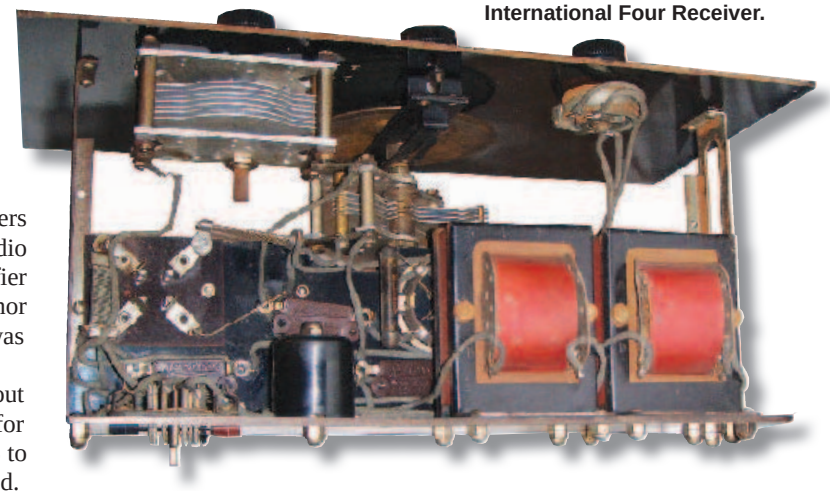
After selling thousands of coil sets, AERO started to provide complete kits. The kits covered from 1 tube radios and converters to 3, 4, 5 and higher tube count radio kits. Most interested radio listeners or hams could find one that suited their needs.

The AERO International Receiver

I found this excellent example being sold by my friend Larry Rosine, WØOG, on eBay. Larry was thinning his collection and told me the radio was in working condition, which it is. I have several other AERO radios and converters and wanted to add it to my collection. This four tube radio utilizes the then new 222 Shield-Grid tube as an RF amplifier ahead of the detector tube for, the catalog says, "saving minor manipulation of the regeneration condenser." This radio was excellent on voice and CW.

AERO also sold a three tube "Standard" receiver (without the 222), which looks similar but is a little cheaper. And for the ham, AERO also sold several transmitter kits from $95 to $185 depending on model and power. These are hard to find.

A bottom view of the International Four Receiver.



AERO Catalog

The 1929 catalog has all the information in it for all the models offered, but they printed the schematics in a light green ink that has faded, making the circuit difficult to see. AERO sold the kits with blueprints but I have been unable to find copies for my radios.

The following parts list is from the 1929 AERO catalog:

The Kit for this receiver includes everything necessary to build a set, including the complete base unit described below and schematic and pictorial wiring diagrams and all parts.
Aero Complete Kit No. 8.
Price ... $55.30

The front panel of the AERO International Four Receiver.

The following parts are used in the Aero "International" Four:

1-No.8 Base Unit.*
1-Aero Special Short Wave Condenser.
1-Aero Variable Condenser, .00025.
1-Aerovox Moulded Mica Condenser, 00015.
1-Aerovox Moulded Mica Condenser, .001.
2-Aerovox Moulded Mica Condensers, .003.
1-No. 520 Yaxley Rheostat, 20 Ohms.
1-No. 500 Yaxley Switch for Rheostat.
1-No. 669 Yaxley Cable Connector and Plug.
1-No. 810 Yaxley Resistance, 10 Ohms.
1-No. 815 Yaxley-Resistance, 15 Ohms.
1-Aero Coil Kit, Type LWT-10.
2-Aero Noskip Choke Coils, Type No, C-60.
l-Aero "International" Antenna Adapter, Type No. C-65.
1-No. 2 Ballast.
1-Type "E" National Dial Illuminated.
3-Black Kurz-Kasch Knobs.
1-No. 342 Shield Grid Connector.
2-No. AE-770 Aero Audio Transformer.
1-Eby Junior Binding, Post.
1-Allen Bradley Grid Leak, 10 Megohms.
1-Aero Bushing for Dial Shaft.

*The Base Unit includes a 7x14" front panel; a subpanel containing the detector and audio frequency amplifier sockets and clips for mounting the ballasts on a Bakelite back panel, as well as a handsome silver escutcheon plate and a special suspension socket for the shield grid tube. Solder connectors; hookup wire, solder and all the necessary machine screws, nuts and bushings are included.

All photos by John Dilks, K2TQN

OP-ED

No Nonsense Radio

Frank Columbus, WA2KWR

At one time manufacturers of Amateur Radios produced handhelds and mobiles that operated well in their intended bands and were generally easy to operate. You could read the manual and then program and operate most of the functions without referring back to the manual or suffering through a great deal of trial and error.

I purchased an ICOM IC-02AT handheld transceiver over 25 years ago. Today without referring to the manual, I can still program a repeater into the IC-02AT in about 1 minute and, no, I don't use this radio every day. Personally, I am very technically skilled inasmuch as I design computer networks professionally and have both Cisco and Juniper certifications. Yet, I find the current lot of handheld and mobile Amateur Radios to be overly complex.

FRANK COLUMBUS, WA2KWR

The ICOM IC-02AT handheld transceiver was produced from 1983-1990. Total functions are what appear on the keyboard. It has six directly keyed functions and one shift level for a total of 11 functions. There are two buttons: BACKLIGHT ON/OFF and TRANSMIT POWER HIGH/LOW. This radio can be called "What you see is what you get." There are no multilevel menus and no complex, exotic functions.

Why Would I Say That?

I have been active in RACES and have seen a member make a radio programming error. Several of the members spotted the error quickly, but in trying to fix the problem I have watched people struggle with their hot new radio, passing it to a few others before everyone simply gives up. I have walked into radio stores and have asked for a demonstration of various radios. In most cases, it took more than one sales person due to its complexity, often sending them scrambling to find the manual.

How Did We Get Here?

When handheld and mobile radios evolved from the first crystal-controlled rigs to the microprocessor-controlled synthesized radios of today, there was a feature war between the manufacturers. While much effort was taken to cram features into the radios, no one ever considered how useful these features were to the average ham.

In engineering, we are constantly being faced with trade-offs. When you try to build a radio that is extremely small, the battery will need to be small. Battery life may be compromised and an alternate pack using standard batteries may not be possible.

The display will also be fairly small and readability may be compromised. Keyboards may have multiple shift operations that may require finger gymnastics to key in the desired functions. More features also translate into many complex menus and submenus to access the features.

I had a good chuckle when I looked at a mobile with an extended range receiver that could only receive part of the 900 MHz band. Why? The manufacturer blocked the majority of the band because it may be possible to receive a stray image from the cellular phone band at 800 MHz. An Amateur Radio with an extended range receiver that has an amateur band blocked — is that a testament to product quality?

What do we really want? That is the challenge for the manufacturers and for the ARRL test engineers.

Radio Manufacturers

Build radios that work well in the intended band with a strong focus on user friendliness. See which product line is more successful, the user friendly radio or the complex, do everything one. These should be the design goals:

- Eliminate extraneous features, for example, weather receive, extended receive, GPS integration, multiple modes beyond FM, tone scan. For scanning, just have a simple channel scan.
- Eliminate multilevel menu trees and complex keying sequences. Restrict your design to no more than a single shift for all operations.
- Eliminate the proprietary programming cables in favor of a mini USB port for programming purposes. To enter alphanumeric labels, it is easier to use a computer. Once again, streamline the radio's interface to the bare essentials like receive frequency, transmit offset and tone plus memory store.
- Allow an option for a battery pack that uses disposable batteries. This is essential for emergency communication scenarios and for travel convenience.
- Manufacturers should consider creating an intervendor standard for the user interface. It should allow any Amateur Radio operator to feel comfortable with the equipment of any radio manufacturer regardless of the specific model.

ARRL Test Engineers

Lastly, it would be wise for the ARRL test engineers to add a "user friendliness" test to the Key Measurements Summary of their product reviews. If user friendliness becomes a key criterion, the likelihood is that more people who get licensed will continue to use their radios and ultimately will buy more. Yes, everyone wins.

Frank Columbus, WA2KWR, an ARRL member, obtained his Novice license in 1977 and has since upgraded to Extra class. Frank lives in southern California with his wife and children, the youngest of whom, Thomas, holds a Technician class license, KI6KSB.

Frank has a BSEE degree and works for a major US telephone company as a sales engineer. It is no surprise that Frank is also very interested in digital modes, 900 MHz, 2.4 GHz and 5 GHz, and the reuse of wi-fi and other networking equipment within the context of Amateur Radio. He can be reached at 30362 Le Port, Laguna Niguel, CA 92677-5536, **fcolumbu@cox.net**.

Op-Ed Policy

The purpose of Op-Ed is to air member viewpoints that may or may not be consistent with current ARRL policy.

1) Contributions may be up to 900 words in length.

2) No payment will be made to contributors.

3) Any factual assertions must be supported by references, which do not necessarily have to be included in the body of the article to be published.

4) Articles containing statements that could be construed as libel or slander will not be accepted.

5) The subject matter chosen must be of general interest to radio amateurs, and must be discussed in a way that will be understandable to a significant portion of the membership.

6) With the exception that the article need not be consistent with League policy, the article will be subject to the usual editorial review prior to acceptance.

7) No guarantee can be made that an accepted article will be published by a certain date, or indeed, that it will be published at all; however, only articles that we intend to publish will be accepted, and any article we have decided against publishing will be returned promptly.

8) Send your contributions to ARRL Op-Ed, 225 Main St, Newington, CT 06111 or via e-mail to **qst@arrl.org** (subject line Op-Ed).

CONVENTION AND HAMFEST CALENDAR

Abbreviations
Spr = Sponsor
TI = Talk-in frequency
Adm = Admission

Alabama (Montgomery) — Nov 12
D F H R S T V
9 AM-3 PM. *Spr:* Montgomery ARC. South Alabama State Fairgrounds, Garrett Coliseum, 1555 Federal Dr. RC airplane demonstrations, RV parking (334-242-5597). *TI:* 146.84, D-Star 146.92. *Adm:* $7. Tables: $15; tailgating $15. Jason Smith, W4EGR, 151 James Dr, Millbrook, AL 36054; 334-414-7296; **w4egr@arrl.net**; or Phil Salley, K4PO, 334-396-8369; **hamfest@w4ap.org**; **www.w4ap.org**.

Arizona (Mesa) — Dec 3 D F H R T V
6:30 AM-12:30 PM. *Spr:* Superstition ARC. Mesa Community College, 1833 W Southern Ave. *TI:* 147.12 (162.2 Hz). *Adm:* $1. Tables: $5 (per marked parking spot; minimum 2 spots). Jerry Davis, K7AZJ, 609 W Latona Ln, Phoenix, AZ 85041; **jdawgaz@gmail.com**; **wb7tjd.org/wiki/Field_Day_June_25_and_26**.

Colorado (Morrison) — Nov 5 R S
9 AM-3 PM. *Spr:* 285 TechConnect RC. Intercanyon Fire Station #1, 7939 S Turkey Creek Canyon Rd. VHF contesting. *TI:* 147.225 (107.2 Hz). *Adm:* $10 (includes 2012 club membership). Nancy Stitt, KØNNC, 246 Tapadero Rd, Bailey, CO 80421; 303-838-6427; **k0nnc@arrl.net**; **www.na0tc.org**.

Florida (Coral Gables) — Nov 19. Bill Moore, WA4TEJ, 305-264-4465 (days); **wa4tej@juno.com**; **www.FlamingoNet.8m.net**.

Florida (Oakland Park) — Nov 12
F H Q R T V
Sellers 6 AM, buyers 7 AM. *Spr:* Broward ARC. Collins Community Center, 3900 NE 3rd Ave. "Cy Harris W4MAQ Memorial Free Flea." *TI:* 146.91 (110.9 Hz). *Adm:* Free to sell. Tables: Bring your own table and chairs or sell out of your car. Robin Terrill, N4HHP, 4240 SW 20th St, Ft Lauderdale, FL 33317; 954-249-5343; **n4hhp@comcast.net**; **browardarc.org**.

Florida (Okeechobee) — Nov 26 D H R T V
6 AM-4 PM. *Spr:* Okeechobee ARC. Freedom Ranch, 11655 Hwy 441 SE. "Hamfest in the Woods." *TI:* 147.195 (100 Hz). *Adm:* $5. Tables: Bring your own. Charles Whipple, W4PHD, 32801 Hwy 441 N, Lot #48, Okeechobee, FL 34972; 863-467-2487; **charles.whipple4@gmail.com**; **k4oke.com**.

WEST CENTRAL FLORIDA SECTION CONVENTION
December 3-4, Palmetto
D F H Q R S T V
The West Central Florida Section Convention (36th Annual Tampa Bay Hamfest), sponsored by the Florida Gulf Coast AR Council, will be held at the Manatee Civic Center, US-301 and Haben Blvd. Doors are open Saturday 8 AM-5 PM, Sunday 9 AM-2 PM. Features include large electronics flea market, paved tailgating ($20 per space plus admission for the entire weekend; opens Saturday for setup at 6 AM, public 7 AM, Sunday at 8 AM; **tailgate@fgcarc.org**), commercial exhibit booths ($175 each; **commercial_booths@fgcarc.org**), vendors, forums and programs, VE sessions (Saturday, 10 AM-2 PM, Sunday 9 AM only, $15 fee; walk-ins accepted on Saturday but reserved basis only on Sunday; **testing@fgcarc.org**), ARECC Testing (Saturday 2-3 PM; $14 fee), card checking (DXCC, WAS, VUCC, IARU; both days), handicapped accessible. Talk-in on 145.43 (100 Hz). Admission is $9 in advance, $10 at the door (good all weekend; **tickets@fgcarc.org**). Tables are $25 each for the weekend, plus admission (electricity available for $32 per outlet for the weekend; **tables@fgcarc.org**). Contact Bill Williams, AG4QX, c/o FGCARC, Box 22042, Tampa, FL 33622-2042; 813-837-3833; **ag4qx@arrl.net**; **www.fgcarc.org/**.

Florida (Pinellas Park) — Nov 12 F R T V
8 AM-noon. *Spr:* St. Petersburg ARC. Freedom Lake Park, 9990 46th St. *TI:* 147.06. *Adm:* Free. Tom Schaefer, NY4I, 232 Old Oak Cir, Palm Harbor, FL 34683; 727-437-2771; **ny4i@arrl.net**; **www.sparc-club.org**.

Florida (Starke) — Nov 19-20
D F H R S T V
8 AM-8 PM (both days). *Sprs:* ARC-Bradford Area, North FL Regional Chamber of Commerce, City of Starke, FL. New River District ARES Meeting, foxhunt, Ham Jamboree (musicians bring your instruments and join the fun). *TI:* 145.15. *Adm:* $5 adults, $2 children 12 and under. Tables: $50 (10x10), $100 (10x20); small added fee for electricity. Joelle Clark, KI4VSV, 2805 NE 71st Ave, Gainesville, FL 32609; 352-505-1242; **ki4vsv@arrl.net**; **www.facebook.com/home.php?sk=group_129827083753201**.

GEORGIA SECTION CONVENTION
November 5-6, Lawrenceville
D F H R S T V
The Georgia Section Convention (Stone Mountain Hamfest and Computer Expo), sponsored by the Alford Memorial RC, will be held at the Gwinnett County Fairgrounds, 2405 Sugarloaf Parkway. Doors are open Saturday 8 AM-4 PM, Sunday 8 AM-2 PM. Features include indoor flea market, huge boneyard ($8 per space for both days, plus admission; no pre-registration-first-come, first-served), commercial tailgating ($25 per space, electric connections available; can now reserve in advance), major manufacturers and commercial vendors, forums, youth lounge, contests, VE sessions (both days; registration 8-8:30 AM, testing at 9 AM sharp; $15 cash test fee), on-site camping ($15 per night with any hookup; $5 per night without hookups), refreshments. Talk-in on 146.76 (107.2 Hz), 145.45. Admission is $6 in advance, $8 at the door (good both days); 16 and under are free. Tables are $20 ($25 with electrical hookup; includes admission). Contact Randy Bassett, KR4NQ, Box 1282, Stone Mountain, GA 30086; 770-978-9181; **hamfest@stonemountainhamfest.com**; **www.stonemountainhamfest.com**.

Illinois (Litchfield) — Nov 13. Scott Millick, K9SM, 217-324-2412; **smillick@wamusa.com**. (Banquet/Swap)

Indiana (Evansville) — Nov 26 D F H R T V
8 AM-1 PM. *Sprs:* Electronic Applications Radio Service (EARS) and The Ham Station. Vanderburgh County 4-H Fairgrounds Auditorium, 202 E Boonville-New Harmony Rd. 19th Annual Hamfest. *TI:* 145.15 (136.5 Hz). *Adm:* $8. Tables: $15. Neil Rapp, WB9VPG, 2744 Pinehurst Dr, Bloomington, IN 47403; 812-333-4116; **wb9vpg@w9ear.org**; **w9ear.org/hamfest.htm**.

INDIANA STATE CONVENTION
November 19-20, Fort Wayne
D F H Q R S V
The Indiana State Convention (39th Annual Fort Wayne Hamfest and Computer Expo), sponsored by the Allen County AR Technical Society, will be held at the Allen County War Memorial Coliseum, 4000 Parnell Ave (corner of Indiana 930/Coliseum Blvd). Doors are open for setup on Friday evening and Saturday morning; public Saturday 9 AM-4 PM, Sunday 9 AM-3 PM. Features include over 750 commercial and flea market tables; new and used radio, computer, and general electronics items; vendors; several international ham equipment manufacturers; many forums and meetings; VE sessions (Saturday); parking ($4). Talk-in on 146.88. Admission is $6 for both days or $4 for just Sunday (at the door only); children 11 and under are free when accompanied by an adult. Flea market tables are $25, premium tables are $50; $30 for electricity (advance reservations required; no table sales at the door). Send inquiries to AC-ARTS/Fort Wayne Hamfest, Box 10342, Fort Wayne, IN 46851-0342; or contact James Boyer, KB9IH, 260-579-2196; **chairman@fortwaynehamfest.com**; **www.fortwaynehamfest.com**.

Coming ARRL Conventions

October 13-16
Microwave Update, Enfield, CT*

October 14-16
Pacific Division, Santa Clara, CA*

October 21-22
West Gulf Division, Ardmore, OK*

October 22
Iowa State, Sergeant Bluff*

November 5-6
Georgia Section, Lawrenceville

November 6
Iowa Section, Davenport*

November 19-20
Indiana State, Fort Wayne

December 3-4
West Central Florida Section, Palmetto

January 8
New York/Long Island Section, Bethpage, NY

*See October *QST* for details.

D = DEALERS / VENDORS
F = FLEA MARKET
H = HANDICAP ACCESS
Q = FIELD CHECKING OF QSL CARDS
R = REFRESHMENTS
S = SEMINARS / PRESENTATIONS
T = TAILGATING
V = VE SESSIONS

Gail Iannone ♦ Convention and Hamfest Program Manager ♦ giannone@arrl.org

Massachusetts (Bourne) — Nov 12
D F H R V
Set up 7 AM; public 9 AM-noon. *Spr:* Falmouth ARA. Upper Cape Cod Regional Vocational School, 220 Sandwich Rd. *TI:* 146.655 (88.5 Hz). *Adm:* $5. Tables: advance $9 (by Nov 1), door $10. Ralph Swenson, N1YHS, Box 815, W Falmouth, MA 02574; 508-548-0422; **depsher911@comcast.net**; **www.falara.org**.

Mississippi (Ocean Springs) — Nov 18-19
D H Q R S V
Friday 5-8 PM, Saturday 8 AM-3 PM. *Spr:* Jackson County ARA. St Martin Community Center, 15008 Lemoyne Blvd. *TI:* 145.11 (123 Hz). *Adm:* $4. Tables: $10. Dan Miller, AE5JG, 18724 Reese Dr, Saucier, MS 39574; 228-539-4930; **dwarden233@aol.com**; **www.jcmsara.org**.

Mississippi (Poplarville) — Dec 10
D F H R S T V
8 AM-2 PM. *Spr:* Pearl River County ARC. Pearl River County Emergency Operation Center, MS Hwy 26 and US 11. *TI:* 145.21 (136.5 Hz). *Adm:* $5. Tables: $10. Roger Aubert, KE5ELS, 176 Country Heritage Rd, Poplarville, MS 39470; 601-795-4425; **audra@datasync.com**; **www.prcarc.com**.

New Hampshire (Londonderry) — Nov 5
D F H R T V
8 AM-noon. *Spr:* Interstate Repeater Society. Londonderry Lions Hall, 259 Mammoth Rd. *TI:* 146.85 (88.5 Hz). *Adm:* $3. Tables: $15. Chris Martin, KB1QVM, 19 Windham Rd, Derry, NH 03038; 603-434-6137; **kb1qvm@yahoo.com**; **www.irs.nhradio.org**.

New Jersey (Bergenfield) — Dec 10
D F H R V
8 AM-4 PM. *Spr:* Boy Scout Troup 139/Venture Crew 7373. Conlon Hall, 19 N William St. *TI:* 146.955 (141.3 Hz), 146.52. *Adm:* $2 (suggested donation per person over 13). Tables: $20 (1 table), $35 (2 tables), $10 for each additional table (includes vendor breakfast). Gordon Beattie, W2TTT, 29 N Washington Ave, Bergenfield, NJ 07621; 201-314-6964; fax 201-387-8896; **w2ttt@arrl.net**; **sites.google.com/site/boyscouttroop139bergenfield/**.

New Jersey (Succasunna) — Oct 21 R
Doors open 5 PM; Auction 6:30 PM. *Spr:* Splitrock ARA. Roxbury Senior Center, 72 Eyland Ave. Auction. *TI:* 146.985 (131.8 Hz). *Adm:* $3. Greg Mohr, W2GCM, Box 610, Rockaway, NJ 07866; 866-457-6687; **auction@splitrockara.org**; **www.splitrockara.org**.

North Carolina (Benson) — Nov 20
D F H R T V
8 AM-4 PM. *Spr:* Johnston ARS. American Legion Complex, Hwy 301 N. 24th Annual "JARSFEST." *TI:* 147.27. *Adm:* advance $6, door $7. Tables: $12. Bill Lambert, AK4H, Box 302, Benson, NC 27504; 919-894-3352; **blambert1@mindspring.com**; **www.jars.net**.

Ohio (Georgetown) — Nov 5 D F H R V
8 AM-2 PM. *Spr:* Grant ARC. ABCAP Building, 406 W Plum St. *TI:* 146.73. *Adm:* $2. Tables: Free. Rodney Crawford, WD8CTX, 2585 SR 138, Sardinia, OH 45171; 937-446-2338; **wd8ctx@juno.com**; **garcohio.net**.

Texas (Azle) — Nov 12 D F H R S T V
8 AM-1 PM. *Sprs:* Tri-County ARC and DiRECT ARC. Azle Community Center, 404 W Main St. *TI:* 147.16 (110.9 Hz). *Adm:* $5. Tables: $10. Vic Bell, KC5WEN, 138 Edgehill Dr, Azle, TX 76020; 817-444-5872; **kc5wen@peoplepc.com**; **www.wc5c.org/WC5CClub/NCTECH/tabid/152/Default.aspx**.

Texas (Corpus Christi) — Oct 22
D F H Q R S T V
8 AM-4 PM. *Spr:* South Texas ARC. First Presbyterian Church, 430 S Carancahua St. 13th Annual Coastal Bend Hamfest. *TI:* 146.82 (107.2 Hz). *Adm:* $5. Tables: $5. John Herzer, KF5GLB, 2456 Oak Park Dr, Ingleside, TX 78362; 361-776-2175; **cchamfest2011@gmail.com**; **www.n5crp.org**.

To All Event Sponsors

Before making a final decision on a date for your event, you are encouraged to check the Hamfest and Convention Database (**www.arrl.org/hamfests-and-conventions-calendar**) for events that may already be scheduled in your area on that date. You are also encouraged to register your event with HQ as far in advance as your planning permits. See **www.arrl.org/hamfest-convention-application** for an online registration form. Dates may be recorded up to two years in advance.

Events that are sanctioned by the ARRL receive special benefits, including an announcement in these listings and online. Sanctioned conventions are also listed in the *ARRL Letter*. In addition, events receive donated ARRL prize certificates and handouts.

For hamfests: Once the form has been submitted, your ARRL director will decide whether to approve the date and provide ARRL sanction. *For conventions:* Approval must come from your director and the ARRL executive committee.

The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **October 1** to be listed in the **December** 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

SPECIAL ARRL WEBINAR NOVEMBER 3: HAMS, EMERGENCIES AND THE NEWS

◊ARES® and emergency groups have had their hands full in the past months. Time and again Amateur Radio was called upon to provide emergency communications. In some places the hams made the news and were highly praised. In other places the community never knew they were there because no one worked with the news media.

On the evening of November 3, 2011 there will be a special webinar hosted by the ARRL national Public Relations Committee (PRC) for public information officers, group leaders and hams who want to learn how to appropriately work with media in an emergency.

Key presenters will be Howard Price, KA2QPJ, of ABC News in New York and Mark Kraham, W8CMK, chairman of the national Radio Television Digital News Association. RTDNA represents local and network news executives in broadcasting, cable and other electronic media in more than 30 countries. Together, they will discuss the needs of news media in events and what hams can provide to reporters. A panel of veteran hams, ARES leaders and PIOs will look into how we can effectively meet those needs.

We all say we want Amateur Radio to grow and be recognized for its service to the community, but without good local media relations our actions are unknown. "If it did not get in the media, it never happened," said ARRL Media Relations Manager Allen Pitts, W1AGP. "The national Public Relations Committee recognizes this and is determined to help resolve the problem."

More information, exact times and how to monitor the webinar will be posted on the ARRL website, **www.arrl.org**. The webinar will be recorded and copies made available.

QST congratulates:

◊ARRL Life Member Maurice H. Davidson, K8SJD, of W Bloomfield, Michigan, who has been awarded a 25 Year Service award as a Cooperative Observer for the National Weather Service in White Lake, Michigan.

◊Danny Baer, KAØDBK, of Kearney, Nebraska, who was awarded a Resolution of Appreciation by the city for his 45 years of voluntary service to his community. Danny has been Buffalo County ARES EC for 15 years. — *Art Zygielbaum, KØAIZ*

STEVE BENSON, N9OT

Bloomington (IN) VEs honor their VEC: **The Volunteer Examiners of the Bloomington Amateur Radio Club (BARC) and the Hoosier Hills Ham Club (Bedford, IN) surprised John P. Maassen, K9FK (our VEC) when we presented him with a Certificate of Achievement for participating in over 100 VE sessions. — *Charlie Sears, N9MEW***

75, 50 AND 25 YEARS AGO

November 1936

- The cover announces, "In This Issue — New Data on Antenna Performance."
- The editorial discusses the role of the League's Directors in representing their constituents, rather than pressing for their own personal goals.
- "'Phone-C.W. De Luxe" reports on W1CCZ, Cape Cod, Massachusetts — "a veritable amateur's paradise." W1CCZ is remembered as the first amateur station to work all call districts in one night — in 1922, on 200 meters!
- James Lamb, W1CEI, presents the idea of "Heterotone C.W. Telegraph Reception," which Jim says gives M.C.W. an advantage over pure D.C. signals.
- George Grammer, W1DF, discusses "The All-Around Radiation Characteristics of Horizontal Antennas."
- Ross Hull, VK3JU, and C. C. Rodimon, W1SZ, give us some "Plain Talk about Rhombic Antennas," and tell us how to build rhombics for our own use.
- "Automatic 'Phone Break-In" tells us how Phil Stout, W3FVF, constructed a unit that automatically switches the 'phone transmitter on when the operator starts speaking.
- By Goodman, W1JPE, describes "A Simple Two-Band 6L6 Tri-Tet Transmitter."
- Clinton B. DeSoto, W1CBD, tells us about "A General Utility Mixer and Speech Amplifier" that has three inputs and automatic level control.

November 1961

- The cover photo montage shows the many areas covered in any issue of *QST*. Perhaps the photo that applies to all of us is in the lower right-hand corner — K3LVA's hand key with the motto on the knob, "LISTEN FIRST."
- The editorial reminds us that OSCAR will soon get a piggyback ride on a USAF rocket as it launches other satellites, and will be transmitting on 145.0 Mc when in orbit.
- Joel Hurwitz, W3YZI, tells how he installed a tri-band beam and a 40 meter beam on the roof of his home, to have "Four Bands on a Split Level."
- "Sweepstakes Comes First," by John Troster, W6ISQ, tells how an unidentified ham named John backed out of a free vacation in Alcapulco to stay home and work the Sweepstakes contest…only to find that he had inadvertently missed the *first* half of the two-weekend contest.
- D. W. Bray, K2LMG, presents "A Method for Determining V.H.F. Station Capabilities," based on readily obtainable data.
- Ed Tilton, W1HDQ, takes aim at a sacred cow in his article, "The S Meter — False Idol."
- Raphael Soifer, K2QBW, discusses noise sources and the all-important signal-to-noise ratio, as they apply to "Space Communication and the Amateur."
- Lew McCoy, W1ICP, presents "A Wide-Range Transmatch" that operates on all H.F. bands.
- Larry Kleber, K9LKA, describes his "Single-Band Grounded-Grid Linears" that each use a pair of 813 tubes to run a kilowatt.
- In the report, "A Night of Tragedy," Bill Gary, K8CSG, tells how amateurs helped in the aftermath of West Virginia's July flash floods.

November 1986

- The cover photo shows G8VR's grids-worked map of Europe, with the teaser, "Meteor Scatter, European Style."
- The editorial urges us, "Let's Put out the Welcome Mat" for Novices, who will have new enhanced operating privileges early next year.
- "On the Air — At Last!" by Paula McKnight, N1DNB, is a compilation of a number of hams' reports of their first contacts — fun reading, each and every one!
- Jack Priedigkeit, W6ZGN, explains how we can calculate propagation paths, in "Ray Tracing and VHF/UHF Radio Propagation."
- Doug DeMaw, W1FB, in Part 13 of his "Under Construction" series, tells us "How to Build a 160-Meter 'Shortie'" — a half-size wire vertical.
- In Part 4 of "Electromagnetic Pulse and the Radio Amateur," Dennis Bodson, W4PWF, presents ideas that can protect the ham station from both lightning and EMP transients.
- Ken Willis, G8VR, points out that meteor-scatter operation in Europe and the US are different, and presents a discussion of "Meteor Scatter — European Style."

Al Brogdon, W1AB ♦ Contributing Editor

Field Organization Reports

AUGUST 2011

Public Service Honor Roll

This listing recognizes radio amateurs whose public service performance during the month indicated 70 or more points in six categories. Details on the program are at this web page: **www.arrl.org/public-service-honor-roll**.

662 KI4KWR
650 KØIBS
460 W4CAC
414 W5KAV
375 KT2D
345 KI4GWC
335 KA2ZNZ
K2TV
318 N8OSL
302 N2RDB
K8OLY
295 WB9YBI
286 W2MTA
285 N9VC
270 KB2ETO
267 KB3LFG
265 AC6C
NX9K
255 N7CM
245 K7EAJ
230 WB9JSR
224 K2HAT
220 WX4CB
218 W2LIE
215 WD9FLJ
210 WE2G
196 KD8KWG
K2DYB
195 K2BRG
194 KC2SYM
192 WM2C
190 W7FQQ
KC2RJX
183 WD8USA
180 W5DY
KK3F
KD1LE
179 KC2YDT
178 WA2BSS
177 K2ABX
KC2PSN
176 KC2SFU
175 W4DNA
170 WA9LFO
K4JUU
160 KE5HYW
N8IO
KB2KOJ
NX8A
158 N2EB
157 WS6P
156 W9WXN
155 K4JGA
W3YVQ
KA4IZN
154 W4OTN
152 WB2HPI
WB8RCR
150 KØVTT
N2DW
K9LGU
WØLAW
N1IQI
148 W3CB
KD8EBY
147 W2DWR
143 KC8VYF
140 K7BFL
W4TTO
138 WB9FHP
137 KA8ZGY
132 KC2PPR
130 K6JT
KF5IOU
WB2FTX
N2GJ
W8CPG
KW1U
WK4P
K4IWW
K2YYD
125 NN7H
N1TF
122 WA3EZN
121 KC2YFO
120 K6HTN
KA4FZI
KA3OCS
N3RB
WB8HHZ
W8UL
K4GK
WA5LOU
WI2G
N2JBA
KC2ILP
WA2AQQ
W8EAB
WB8WKQ
KB8RCR
KB5SDU
119 KK5NU
NA9L
116 W2OSR
115 AG9G
K7OAH
N2WKT
113 KO6V
110 W7QM
KE4CB
KB1NMO
KB1RGQ
KC5OZT
W7GB
W2GS
K7BDU
K4BG
K4BEH
N9MN
N7XG
N7YSS
KD4SM
W2EAG
K8VFZ
N5NVP
108 KF7GC
107 KT5SR
106 N9WLW
K2KNB
105 AD7BL
KF5CRX
K1YCQ
N5ASU
104 KG4GPJ
101 WØSJS
100 W6WW
K4SCL
NM1K
AE5VY
N5OUJ
N3SW
W3TWV
N1JX
KA8IAF
N8CJS
WD8Q
WG8Z
WB8SIQ
W8DJG
W8MAL
N5EEO
KI4AAN
NR2F
NU8K
KT4YA
N7IE
WB6OTS
WB4FDT
AA3SB
N1LKJ
WB6UZX
99 K2KYQ
98 W2MIT
96 N7EIE
K1EIC
NA7G
95 KCØM
W5GKH
93 WB4GHU
90 K1JPG
K4MSG
AD8BC
N8DD
WB4BIK
N4ELI
W3GQJ
KA1G
KJ4HGH
W8IM
KZ8Q
W9MBT
KD7THV
KBØDTI
KB7RVF
KB3LNM
N3ZOC
K3IN
N3KB
N2GQR
KD8LZB
NW8E
KD8CYK
89 W7JSW
87 KB9KEG
86 KK1X
W1RHH
84 WA4UJC
82 W2CC
81 WDØGUF
80 KI6QME
KA3NZR
KE5YTA
KB8HJJ
WD8DIP
K8KV
WB8KPE
KC7ZZ
WA2LKJ
W8QZ
79 K6FRG
AL7N
77 KK7TN
75 KJ7NO
K7FLI
K2JAN
73 KC5MMH
NC8V
N8SY
74 N2VQA
72 WB8YYS
71 W5XX
70 KC2YFN
KM2CMJ

The following stations qualified for PSHR in previous months, but were not recognized in this column: (Aug) W5CU 94. (July) N3ZOC 90, W5CU 89. (June) WA5LOU 125. (May) N2RDB 159.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AR, AZ, CO, CT, EB, EMA, ENY, EPA, EWA, GA, IA, IL, IN, KS, LA, LAX, MDC, MI, MN, MS, NC, NLI, NNJ, NNY, NTX, OH, OK, OR, ORG, SD, SFL, SJV, STX, TN, UT, VA, WCF, WI, WNY, WPA, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: EWA, IA, IN, KS, MDC, MI, MT, NLI, NNJ, NTX, OK, SD, SFL, STX, SV, TN, WV, WWA.

Brass Pounders League

he BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

KK3F 3631, W5KAV 3018, WB5NKD 1673, WB9FHP 1407, N1IQI 1216, WB2FTX 1119, W6WW 1275, KZ8Q 936, W8UL 914, WX4CB 752, KW1U 714, WB9JSR 700, N4ELI 688, WB5NKC 678, KCØM 626, K4JGA 616, NX9K 584, WD4DNC 571, N9VC 563, WB8WKQ 556.

Stations earning BPL by Originations plus Deliveries: NM1K 135, K8LJG 108.

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

KM1A **Hill**, John B., Killingworth, CT
W1CCN **Yates**, E. P., Ogdensburg, NY
W1DLP **Turner**, Paul A., Portland, OR
KE1GM **Noiseux**, Leo, Coventry, RI
KB1GVR **Austin**, Mark A., Franklin, ME
W1LLV **Mitchell**, Carl A., Fairfield, CT
KA1SYP **Allen**, George V., Old Saybrook, CT
W1TLV **Warmolts**, James L., East Hartford, CT
N2BFH **Moberg**, Per, Easton, NY
N2ESV **Martin**, William B., Lebanon, NH
WA2FCF **Floro**, Peter F., Stanhope, NJ
♦W2LES **Stay**, Lester A., Clifton Park, NY
WA2RRS **Avery**, Raymond W., Vestal, NY
K2SPX **Meegan**, Keith F., Lee's Summit, MO
WA2ZWB **Porada**, Zigmund J., Westborough, MA
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Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation or to ARRL. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, QST

Silent Keys Administrator ♦ sk@arrl.org

Strays

COMMEMORATING PAUL GODLEY'S SCOTTISH 90TH ANNIVERSARY

♢Paul Godley's visit to Ardrossan, Scotland in December 1921 resulted in the first shortwave transatlantic Amateur Radio signals being received in Scotland. Afterward, Godley, 2ZE, of Upper Montclair, New Jersey, stated that the experiment was wholly successful and beyond anticipation. During the ARRL-sponsored Transatlantic Tests he received a pre-planned scheduled message from 1BCG in Greenwich, Connecticut and the further reception of 43 different North American stations. The *New York Times* quoted ARRL President Hiram Percy Maxim, W1AW, as saying, "Our success is revolutionary in radio communication."

The Crocodile Rock Amateur Group (CRAG) has resurrected the special call sign GB2PG to commemorate the 90th anniversary of this seminal event in Amateur Radio history. The group will be operating next to the original 1921 site from November 18 until December 15. Organizer Bob, GMØDEQ, stated that they will naturally be focusing on North America to recreate and demonstrate Amateur Radio to visitors. For further details, visit our blog at **www.gb2pg.blogspot.com**. For more on the Transatlantic Tests of 1921, see S. Ford, "Across Oceans of Time," *QST*, Dec 2001, pp 45-47. — *Bob Alexander, GMØDEQ*

In November 1921, the ARRL sent Paul Godley, 2ZE, to Ardrossan, Scotland to listen for amateur signals from the Unites States.

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- Echolink compatible, Mil-Spec STD810

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2M/220/440

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- FM, AM, SSB
- 5w 2M/220/440 TX, FM
- 435 Memories
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2m 5w • VOX • CTCSS/DCS/1750 Burst Built In • Weather Alert •

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TM-D710A 2M/440 Dualband

- 50w 2M & UHF
- Optional Voice synthesizer
- 1000 memories • Dual receive
- Advanced APRS Features
- Echolink ® Ready w/ 10 memories
- Built-in TNC • Sky Command II+
- GPS I/O Port
- Choice of Green/Amber LCD backlight

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TS-2000 $200. Kenwood Coupon

TS-2000X $225 Kenwood Coupon

- 100W HF, 6M, 2M • 50W 70CM
- 10W 1.2 GHz w/opt UT-20 module
- Built-in TNC, DX packet cluster
- IF Stage DSP • Backlit Front Key Panel

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- EchoLink® Sysop mode for node terminal ops
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- 1,000 multifunction memory

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NEW!

- 65 Watt, 200 Mems, CTCSS/DCS
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- 480SAT 100w HF & 6M w/AT
- 480HX 200w HF & 100w 6M (no Tuner)
- DSP built in
- Remotable w/front panel/speaker

TS-480SAT $250. Kenwood Coupon

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- 100W HF + 6M
- 500Hz & 2.7Khz roofing filter
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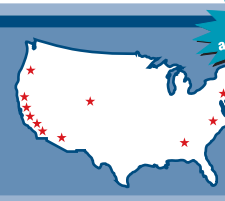

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RRC-1258 MkII-S-Set

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Works with all Computer-controllable radios from:
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For radios with detachable front panels *no PC is required* for:
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Just simply insert your control box in place of your front panel interconnect cable, place the body of the radio on the remote end and you are on the air as if you are there!

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Now includes 12v power supply, $12.95 value!

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40' Tubular Tower

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Handles 10 sq.ft. at 50mph
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- UV Resistant — Direct Burial

DXE-8U

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- 0.9 dB loss/100 ft. @50 MHz
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From $194.95

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Stainless steel tilt and mount, strongest Extren® base insulator—standard equipment

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- High strength Delrin Compression Insulator or Extren Channel—your choice for the same low price!
- NEW patent pending SAF-T-TILT™ base allows easy, safe tilt action without unsafe removal of mounting hardware!
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SAF-T-TILT™ #5 43 ft. Multi-Band Antennas

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DXE-MBVE-1-4P	Vertical/Radial Plate Package, 43 ft.	SPECIAL $234.95
DXE-MBVE-1-4UP	Vertical/UNUN Package, 43 ft.	SPECIAL $259.95
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Monoband

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Full Size 75/80 Meter Quarter-Wave Vertical Antennas!

New!

DX Engineering's FULL SIZE quarter-wave vertical antennas provide the highest possible performance. Now you can achieve the strongest possible presence at your power level and be competitive!

The 68-foot tall antennas have rugged base sections starting from 2, 3 and 4-inch diameter aircraft-grade aluminum tubing. The VA-1 requires simple guying, while the VA-2 and VA-3 models are very stout antennas that can stay up with no guying necessary and no worry on your part. The VA-2 and VA-3 antennas can easily be lowered with the supplied Heavy Duty Plus Stainless Pivot Base and the optional hand winch.

- Ultra-WIDE SWR bandwidth
- Highest Wind Ratings—high strength 6063/6061 tubing manufactured to DX Engineering specifications
- High Power Handling Capacity—BIG high strength, UV-protected Extren® insulator
- Reliability Second to None—specially manufactured stainless steel and aluminum saddle clamps, stainless steel bolts, and precision machining
- Easy Tilt Up and Down—specially manufactured heavy duty stainless steel Pivot Base supplied with VA-2 and VA-3 antennas

DXE-7580FS-VA-1	Vertical Antenna, standard HD	$379.50
DXE-7580FS-VA-2	Vertical Antenna, Heavy Duty	$675.50
DXE-7580FS-VA-3	Vertical Antenna, Ultra Duty	$1,675.50

DXE-VRW-1 Manual Winch

This optional winch for the VA-2 and VA-3 Vertical Antennas allows easy one-man raising and lowering. You can use the DXE-VRW-1 winch on similar DX Engineering antennas in a multi-antenna installation.

DXE-VRW-1 Manual Winch Add-on Raising Kit ..$169.99

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6063-T832 Aluminum Tubing

- Smoothly telescoping sections
- Drawn - not extruded tubing
- Better than the other guys - guaranteed lowest price
- Custom made just for DX Engineering
- Use DXE Stainless Steel Element Clamps to assemble slit lengths

See DXEngineering.com for details.

65 Ft. Telescoping Antenna Kit

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

DXE-ATK65	Telescoping Antenna Kit	$194.50
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High Quality Performance Grade Cables

- Heat shrink weatherproofing/strain relief
- All assemblies Hi-Pot high voltage tested
- Silver/Teflon® crimped and soldered connectors

RG-213/U DXE-213U Cable Assemblies with PL-259 Connectors

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DXE-213DU006	6 ft.	$14.88
DXE-213DU012	12 ft.	$21.88
DXE-213DU018	18 ft.	$24.88
DXE-213DU025	25 ft.	$34.88
DXE-213DU050	50 ft.	$58.88
DXE-213DU075	75 ft.	$82.88
DXE-213DU100	100 ft.	$104.88
DXE-213DU125	125 ft.	$131.88
DXE-213DU150	150 ft.	$157.88
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DXE-8UDU150	150 ft.	$159.88
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DXE-8XDU025	25 ft.	$23.88
DXE-8XDU050	50 ft.	$32.88
DXE-8XDU075	75 ft.	$40.88
DXE-8XDU100	100 ft.	$47.88
DXE-8XDU150	150 ft.	$69.88

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DXE-400MAXDU018	18 ft.	$31.88
DXE-400MAXDU025	25 ft.	$39.88
DXE-400MAXDU050	50 ft.	$61.88
DXE-400MAXDU075	75 ft.	$85.88
DXE-400MAXDU100	100 ft.	$104.88
DXE-400MAXDU150	150 ft.	$159.88
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- Precision, two-step operation
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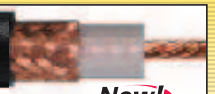

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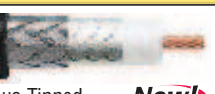
- 96% Bare Copper Braid Shield
- 1.3 dB loss/100 ft. @50 MHz
- Polyethylene Dielectric .285" O.D.
- .405" O.D. Non-Contaminating Black Vinyl Jacket
- Center Conductor 12.5 AWG
- UV Resistant — Direct Burial

DXE-400MAX



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DXE-CW8-HD 2 #16, 6 #18 AWG ..per ft. **$0.89**
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Genuine Synthetic Textiles Brand Antenna Rope

- Black Double Braid Dacron/Polyester

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- Flat tinned copper with ring terminals and heat shrink tubing

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DXE-TCB05-RT03	3 ft.	$5.95
DXE-TCB05-RT05	5 ft.	$6.95
DXE-TCB05-RT10	10 ft.	$9.95

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High power tuner performance at low power pricing!

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LDG-AT-200PROII 250 Watt Autotuner

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- Up to 250 watts—handles any transceiver
- 1.8 to 30 MHz, 100 watts on 6 meters
- Matches virtually all coax-fed antennas
- Optional LDG remote balun for long wires, etc.

LDG-AT-200PROII.....just **$234.00**

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Limited Time Offer— FREE Shipping on Comtek Baluns!

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COMTEK W2FMI Series Baluns

Design inspired by Jerry Sevick W2FMI and perfected by DX Engineering's balun R&D department.

- High voltage compensating capacitors for unequalled low SWR—a DX Engineering innovation!
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COM-BAL-11130E	3 kW, side eyebolts	$49.95
COM-BAL-11130ET	3 kW, side and top eyebolts	$49.95
COM-BAL-11130S	3 kW, side studs/wingnuts	$49.95
COM-BAL-11130T	3 kW, top studs/wingnuts	$49.95
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COM-BAL-11150E	5 kW, side eyebolts	$49.95
COM-BAL-11150ET	5 kW, side and top eyebolts	$49.95
COM-BAL-11150S	5 kW, side studs/wingnuts	$49.95
COM-BAL-11150T	5 kW, top studs/wingnuts	$49.95
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COM-BAL-11140T	5 kW, top studs/wingnuts	$69.95
COM-BAL-11140S	5 kW, side studs/wingnuts	$69.95
1:1 Coax/Dual Core		
COM-BAL-11150DS	5 kW, side studs/wingnuts	$69.95
COM-BAL-11150DT	5 kW, top studs/wingnuts	$69.95
4:1 Dual Wire/Single Core		
COM-BAL-41130E	3 kW, side eyebolts	$59.95
COM-BAL-41130ET	3 kW, side and top eyebolts	$59.95
COM-BAL-41130T	3 kW, top studs/wingnuts	$59.95
COM-BAL-41130S	3 kW, side studs/wingnuts	$59.95
4:1 Dual Wire/Dual Core		
COM-BAL-41150T	5 kW, top studs/wingnuts	$89.95
COM-BAL-41150S	5 kW, side studs/wingnuts	$89.95
COM-BAL-41150E	5 kW, side eyebolts	$89.95

Contact DX Engineering Customer Support for recommendations for your application.

FIBERGLASS TUBING TELESCOPING SIZES HIGH STRENGTH

Great for wire antenna spreaders or insulated stacking frames! Build your favorite antenna design!

50 Ft. Telescoping Fiberglass Tubing Mast Kit

- Tubing custom made just for DX Engineering
- Smoothly telescoping sections
- Neutral light gray color
- Uses DX Engineering Stainless Steel Element Clamps to assemble slit lengths

DXE-FTK50 Telescoping Tubing Kit.....**$138.00**

Telescoping Fiberglass Tubing

- 1/8" nominal wall x 8 feet long

Unslit Tubing

DXE-FT0500-8	0.500" O.D.	$6.45
DXE-FT0750-8	0.750" O.D.	$8.95
DXE-FT1000-8	1.000" O.D.	$9.95
DXE-FT1250-8	1.250" O.D.	$11.95
DXE-FT1500-8	1.500" O.D.	$18.95
DXE-FT1750-8	1.750" O.D.	$20.95
DXE-FT2000-8	2.000" O.D.	$25.95
Tubing with One End Slit		
DXE-FT0750-8S	0.750" O.D.	$13.95
DXE-FT1000-8S	1.000" O.D.	$14.95
DXE-FT1250-8S	1.250" O.D.	$16.95
DXE-FT1500-8S	1.500" O.D.	$23.95
DXE-FT1750-8S	1.750" O.D.	$25.95
DXE-FT2000-8S	2.000" O.D.	$30.95

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SSTV
WSJT

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with any new LDG tuner or S9V antenna!

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

NEW! AT-200ProII

The AT-200ProII features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and now includes LEDs for the antenna position and if the tuner is in bypass. A function key on the front panel allows you to access data such as mode and status. Includes six foot DC power cable. ***Suggested Price $259.99***

Z-11ProII

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

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required.
Suggested Price $129.99.

We have a tuner that will work for you!

We make tuners that will work with any transceiver. Don't know which one is right for you? Give us a call or see the Tuner Comparison Chart on our web site for more selection help!

radio not included

AT-897Plus
for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment and takes power directly from the CAT port of the FT-897 and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier. ***Suggested Price$199.99***

AT-600Pro

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

Z-100Plus

Small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six foot DC power cable.***Suggested Price $159.99***

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 ***Phone 410-586-2177 • Fax 410-586-8475***

The #1 Line of Autotuners!

Designed to handle the higher power of the Tokyo Hi Power HL-45B.

NEW! Z-817H

The ultimate autotuner for QRP radios including the Yaesu FT-817(D) with addition of the Tokyo High Power HL-45B. Interfaces to the CAT port (ACC) on the back of the radio with the provided cable. One button push on the tuner and the Z-817H takes care of the rest. Will also function as a general purpose antenna tuner with other QRP radios or QRP radios with up to 75 watt HF amps. Powered by four AA internal Alkaline batteries (not included). 2000 memories cover 160 through 6 meters.

Suggested Price $159.99

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

AT-100ProII

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

Suggested Price $229.99

AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes six foot DC power cable.

Suggested Price $599

IT-100

Matched in size to the IC-7000 and IC-706, for either manual or automatic tunes, and status LEDs. Control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. For your Icom radio that is AH3 or AH-4 compatible. ***Suggested Price $179.99***

YT-100

For Yaesu FT-857, FT-897 and FT-100 (and all D models) an integrated tuner, powered by the interface. Press the tune button on the tuner, and everything else happens automatically. ***Suggested Price $199.99***

KT-100

For AT-300 compatible Kenwood transceivers (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. ***Suggested Price $199.99***

YT-450

Designed for Yaesu's newest 100 watt radios. Interfaces directly with the Yaesu FT-450 and FT-950 radios. Press the tune button on the tuner and the rest happens automatically. It will quickly match nearly any kind of coax fed antenna with an SWR of up to 10:1. 2000 memories recall settings in an instant! Seamless connection to a PC.

Suggested Price $249.99

YT-847

YT-847 Autotuner is an integrated tuner for the Yaesu FT-847. An included CAT/Power cable interfaces with your FT-847. Just press the tune button on the tuner and everything else happens automatically!

Suggested Price $249.99

FREE!

RBA-1:1 Balun or RU-4:1 Unun

When You Buy A S9V 43', 31' or 18' Multiband Antenna

Purchase an S9V 43', 31' or 18' antenna and fill out the included form. Mail it to LDG Electronics, and we will send you either a 200 watt balun or unun, your choice!

Antennas!

S9V 43' $199.99

80-6 meters *Fixed Operation*

The S9V 43' is a high-performance lightweight telescoping fiberglass vertical. The best value in high-performance 'tall' verticals!

S9V 31' $99.99

40-6 meters *Fixed or Portable Operation*

S9V 18' $49.99

20-6 meters *Fixed or Portable Operation*

The S9V 31' and 18' are tapered, ultra-lightweight fiberglass vertical antennas. Friction-locking sections and high-tech polymer tube rings allow the antenna to be quickly and safely deployed in practically any environment without tools!

S9RP $39.99

Aluminum Radial Plate

Includes 20 sets of stainless steel nuts & bolts

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LDG

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. . . the first choice of hams around the world!

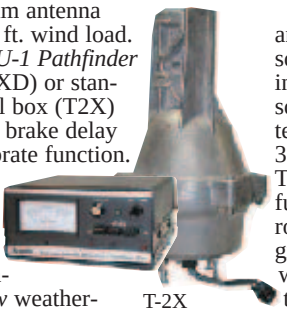
HAM-IV

HAM-IV
$649.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of $2^{1}/_{16}$ inches.

HAM IV and HAM V Rotator Specifications	
Wind Load capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power	800 in.-lbs.
Brake Power	**5000 in.-lbs.**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	26 lbs.
Effective Moment (in tower)	**2800 ft.-lbs.**

TAILTWISTER SERIES II



For large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, $2^{1}/_{16}$ inch max. mast.

T-2X
$799.95

T-2XD
$1229.95
with DCU-1

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power	1000 in.-lbs.
Brake Power	**9000** in.-lbs.
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	31 lbs.
Effective Moment (in tower)	**3400 ft.-lbs.**

CD-45II

CD-45II
$449.95

For antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to $2^{1}/_{16}$ inches. MSLD light duty lower mast support included.

CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power	600 in.-lbs.
Brake Power	**800 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	22 lbs.
Effective Moment (in tower)	**1200 ft.-lbs.**

HAM-V

HAM-V
$1099.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

AR-40

AR-40
$349.95

For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. $2^{1}/_{16}$ inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power	350 in.-lbs.
Brake Power	**450 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight	14 lbs.
Effective Moment (in tower)	**300 ft.-lbs.**

HDR-300A

HDR-300A
$1499.95

King-sized antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power	5000 in.-lbs.
Brake Power	**7500 in.-lbs.**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight	61 lbs.
Effective Moment (in tower)	**5000 ft.-lbs.**

ROTATOR OPTIONS

MSHD, $109.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $49.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller

DCU-1
$749.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

AR-35 Rotator/Controller

AR-35
$89.95

For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

NEW! Automatic Rotator Brake Delay

RBD-5
$29.95

Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.

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308 Industrial Park Road,Starkville, MS 39759, USA

FT-270R 2M FM HT

• TX: 144-148 • RX: 136-174 • Power: 5/2/0.5W
• Memories: 200 • Extra large LCD display & speaker

VX-6R 2M/440 FM Dual Band HT

• TX: 144-148, 222-225, 430-450 • RX: 0.5-999 (cell blkd)
• Power: 5/2.5/1/0.3W (1.5W on 220) • Memories: 900
• Submersible 3 feet for 30 minutes

VX-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® data

FT-1900R 2M FM Mobile

• TX: 144-148 MHz • RX: 136-174 MHz
• Power: 55/25/10/5W • Memories: 221

FT-7900R 2M/440 FM Mobile

• TX: 144-148, 430-450 MHz
• RX: 108-520, 700-999 MHz (cell blocked)
• Power: 50/20/10/5W (2M), 45/20/10/5W (440 MHz)
• Memories: 1055 • YSK-7800 included!

FT-8800R 2M/440 FM Mobile

• TX: 144-148, 430-450 MHz • RX: 108-520, 700-999 MHz (cell blkd) • Power: 50/20/10/5W (2M), 35/20/10/5W (440 MHz) • Memories: 1000
• Crossband repeat • YSK-8900 included!

FT-8900R Quad-Band FM Mobile

• Same as FT-8800R but TX: 28-29.7, 50-54, 144-148, 430-450 MHz and RX: 28-29.7, 50-54, 108-180, 320-480, 700-985 MHz (cell blkd) • Power: 50/20/10/5W (10/6/2M), 35/20/10/5W (440 MHz) • YSK-8900 included!

FT-857D 100W HF/VHF/UHF Mobile

• TX: HF/VHF/UHF • RX: 0.1-56, 76-108, 118-164, 420-470 MHz • Power: 5-100W (HF/6M), 5-50W (2M), 5-20W (440 MHz) • Memories: 200 • YSK-857 included!

FT-897D 100W HF/VHF/UHF Portable

• Similar to the FT-857D but can also operate 20W using optional FNB-78 13.2V @ 4.5 Ah NiMH battery packs

FT-950 HF/6M Transceiver

• TX: HF/6M • RX: 0.03-56 MHz • Power: 10-100W
• Memories: 100 • Auto Antenna Tuner
• 32-bit Floating Point DSP • Built-in high stability TCXO

FT-2000 HF/6M Transceiver

• TX: HF/6M • RX: 0.03-60 MHz • Power: 10-100W
• Memories: 99 • Auto Antenna Tuner • 32-bit Floating Point DSP • Dual In-Band Receive • Internal Power Supply
• Optional MTU tune units for 160M, 80/40M and 30/20M bands allowing you to pull through weak signals

FT-2000D RF output is 200W, PS is external

FTDX-5000MP

FTDX-5000 Series – Covers HF and 6M;

Three different configurations all running 10-200W on CW, SSB, FM, RTTY & PKT and 5-50W on AM • RX: 0.03-60 MHz • Memories: 99 • The "D" and "MP" model comes with SM-5000 Station Monitor that features an excellent bandscope • The "MP" also comes with high stability ±0.05ppm OCXO & 300 Hz roofing filter

FTDX-5000 Basic Model & ±0.5ppm TCXO
FTDX-5000D With Station Monitor & ±0.5ppm TCXO
FTDX-5000MP With Station Monitor, ±0.05ppm OCXO & 300 Hz Roofing Filter

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Source Code: QST 7/2011

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

IC-V80 SPORT 2M FM Handheld
- No NiMH Battery or Charger • Has AA Battery Case

IC-91A 2M/440 FM Dual Band HT
- TX: 144-148, 420-450 MHz
- RX: 0.495-999 MHz (cell blkd) • Power: 5/0.5W
- Memories: 1304 • D-Star w/optional UT-121 board

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 blk)
- Power: 55/15/5W (2M), 50/15/5W (440 MHz)

IC-7000 Multimode HF/VHF/UHF Mobile
- TX: HF/6M/2M/440 MHz • RX: 0.03-199, 400-470 MHz
- Power: 2-100W (HF/6M), 2-50W (2M), 2-35W (440)
- Memories: 503 • 41 band-widths with sharp or soft filter shape • RMK-7000 included!

IC-7200 HF/6M Portable Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 201 • Rugged design for outdoor use
- 32-bit IF-DSPs + 24-bit AD/DA Converters
- USB Port for CI-V Format PC Control & Audio In/Out

IC-7410 HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- 15kHz 1st IF Filter and optional 3kHz & 6kHz filters to protect against strong unwanted adjacent signals
- Much faster DSP unit compared to the IC-746PRO
- Automatic antenna tuner • USB connector for PC control

IC-7600 HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 101 • 5.8 inch color screen
- High-resolution real time spectrum scope using a dedicated DSP unit • Automatic antenna tuner

IC-7700 Multimode HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 5-200W
- Memories: 101 • 7 inch color screen
- Two 32-bit floating DSPs • Power supply built-in
- Three roofing filters • External VGA connector
- Automatic antenna tuner • USB memory drive socket
- Real time spectrum scope

IC-9100 HF/6/2M/440 MHz All Mode
- TX: HF/6/2M/440 MHz • RX: 0.03-60, 136-174, 420-480 MHz • Optional 1.2 GHz, 1-10W Operation
- Power: 2-100W HF/6/2M & 2-75W 440 MHz
- Memories: 297 • Optional D-Star Board • Auto Tuner
- Optional 3 kHz & 6 kHz Roofing Filters (first IF)
- USB Port for CI-V Format PC Control & Audio In/Out

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Radios by ICOM

MFJ-259B *World's* most popular Antenna Analyzer is super easy-to-use!

MFJ-259B
$289.95

The MFJ-259B is the world's most popular Antenna Analyzer and the easiest to use! Just select a band and mode. Set frequency. Your measurements are instantly displayed!

Handheld Antenna Lab

Owning the MFJ-259B is like having an entire antenna lab in the palm of your hand!

Measure SWR quickly or make sophisticated measurements such as Return Loss, Reflection Coefficient, Resonance, Complex Impedance (R+jX), Impedance Magnitude (Z) plus Phase in degrees. Covers 1.8 to 170 MHz -- no gaps.

Coax Analyzer

Determine coax cable velocity factor (Vf), loss in dB, coax length, distance to open or short plus detect wrong coax impedance.

Frequency Counter

Measure frequency of external signals using the separate BNC counter input.

Signal Generator

Use as a signal source 1.8-170 MHz with digital dial accuracy for testing and alignment.

Inductance and Capacitance

Measure Inductance (uH) and Capacitance (pF) at RF frequencies not at audio frequencies used by most L/C meters.

Digital and *Analog* Meters

A high-contrast backlit LCD gives precision readings and *two* side-by-side *analog meters* make antenna adjustments intuitive.

Smooth, Stable Tuning

Velvet-smooth reduction drive tuning and precision *air-variable capacitor* makes setting frequency easy and stable.

Battery Saver & More

Battery-saver, low-battery warning, battery voltage meter and charger are all built in. Use ten Alkaline, NiCad or NiMH AA batteries (not included) or 110 VAC with MFJ-1312D, $15.95. 4Wx6¾Hx2D inches.

Here's What You Can Do

Find true antenna resonant frequency
Tune *antenna quickly for minimum SWR*
Match complex loads to your feedline
Adjust *mobile whips without stressing finals*
Determine safe 2:1-SWR operating windows
Adjust *tuners without generating QRM*
Find exact location of shorts and opens
Cut *stubs and phasing lines accurately*
Check cable for loss and contamination
Find *value of unknown coils and caps*
Test RF transformers and baluns
Troubleshoot *filters and networks*
Find self-resonance and relative Q
Check *patterns and compare gain*
MFJ-259B does all this and more!

MFJ Analyzer Accessories

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Special foam-filled fabric cushions blows, deflects scrapes and protects knobs and meters from harm. **MFJ-39C, $24.95.** Like MFJ-29C, but for MFJ-269.

MFJ-66, $24.95. Plug-in coils turns any MFJ Antenna Analyzer into a sensitive and accurate *band switched* dip meter. 2 coils.

MFJ-92AA10, $29.95. Ten MFJ *SuperCell*™ Ni-MH AA rechargeable batteries.

MFJ-99B, $88.90. ***Save $7!*** MFJ-259B Deluxe Accessory Pack: MFJ-29C Pouch, 10 Ni-MH batteries, dip coils, AC adapter. **MFJ-98B, $88.90.** Like MFJ-99B but for MFJ-269.

MFJ-99, $60.85. ***Save $5!*** Like MFJ-99B, less batteries, for MFJ-259B. **MFJ-98, $60.85.** Like MFJ-99 but for MFJ-269.

MFJ-99C, $40.90. ***Save $5!*** AC Adapter and 10 Ni-MH batteries for MFJ-259B/269.

MFJ-917, $29.95. Current balun lets you make balanced line antenna measurements on HF with your MFJ Analyzer. **MFJ-7702, $3.95.** MFJ-917 to MFJ Analyzer adapter.

MFJ-731, $99.95. Tunable RF filter allows accurate Antenna Analyzer measurements in presence of strong RF fields. 1.8-30 MHz.

MFJ-5510, $9.95. Cigarette lighter cord.

MFJ-269 ...1.8-170 MHz and 415-470 MHz plus 12-bit A/D!

The MFJ-269 does everything the MFJ-259B does - and much more!

Expanded Frequency Coverage

MFJ-269 adds UHF coverage from 415 to 470 MHz -- right up into the commercial band. With it, you can adjust UHF dipoles, verticals, Yagis, quads and repeater collinear arrays with ease -- plus construct accurate phasing harnesses and timed cables. Also use it as a signal source to check UHF duplexers, diplexers, IMD filters and antenna patterns.

Much Better Accuracy

New *12-bit* A/D converter gives much better accuracy and resolution than common 8-bit A/D converters -- *an MFJ-269 exclusive!*

Complex Impedance Analyzer

Read Complex Impedance (1.8 to 170 MHz)as series equivalent resistance and reactance (Rs+jXs) or as magnitude (Z) and phase (degrees). Also reads *parallel* equivalent resistance and reactance (Rp+jXp) -- *an MFJ-269 exclusive!*

MFJ-269
$389.95

CoaxCalculator™

Lets you calculate coax line length in feet given electrical degrees and vice versa for any frequency and any velocity factor -- *an MFJ-269 exclusive!*

Use any Characteristic Impedance

You can measure SWR and coax loss with *any* characteristic impedance (1.8 to 170 MHz) from 10 to over 600 Ohms, including 50, 51, 52, 53, 73, 75, 93, 95, 300, 450 Ohms -- *an MFJ-269 exclusive!*

Logarithmic Bar Graph

Has easy-to-read LCD *logarithmic* SWR bargraph and SWR meter for quick tuning.

Uses instrumentation grade N-connector to ensure minimum mismatch on all frequencies. Includes N to SO-239 adapter.

MFJ-269*PRO*™ *Analyzer*

Like MFJ-269, but has extended commercial frequency coverage in UHF range ***(430 to 520 MHz)*** and *ruggedized* cabinet that protects LCD display, knobs, meters and connectors from damage in the field/lab.

MFJ-269PRO
$419.95

MFJ-266 ...Wide range 1.5-185 MHz and 300-490 MHz!

New!

MFJ-266
$349.95

The compact MFJ-266 covers HF (1.5-65 MHz) in 6 bands, plus VHF (85-185 MHz) and UHF (300-490 MHz).

In *Antenna Analyzer* mode, you get Frequency, SWR, Complex Impedance (R+jX), and Impedance Magnitude (Z) *all displayed simultaneously* on a high-contrast backlighted LCD (SWR only on UHF).

In *Frequency-Counter* mode, the MFJ-266 functions as a 500-MHz counter with up to 100 Hz resolution and measures relative field strength of a signal and its frequency and can be used for tracking measurement interference.

MFJ-266 also functions as a 10 dBm signal source with digital-frequency readout. It can also measure inductance and capacitance at RF frequencies.

Features include solid-state band switching and electronic varicap tuning with a smooth 10:1 lockable vernier tuning drive.

Use eight AA *alkaline* batteries or 110 VAC with MFJ-1312D, $15.95. Includes N-to-SO-239 adapter. 3¾Wx6½Hx2¾D inches. 1.3 lbs.

Free MFJ Catalog

Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

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MFJ . . . The World Leader in Amateur Radio!

MFJ TUNERS

Ham Radio's *Most Popular* 300 Watt Antenna Tuner

More hams use MFJ-949s than any other antenna tuner in the world!

Why? Because the world's leading tuner has earned a world-wide reputation for being able to match just about anything.

***Full* 1.8-30 MHz Operation**

Tune your antenna for minimum SWR! Works 1.8-30 MHz on dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas . . . Use coax, random wire, balanced lines. Has heavy duty 4:1 balun for balanced lines.

***Custom* inductor switch**

Custom designed inductor switch, 1000 volt tuning capacitors, *Teflon*® insulating washers and proper L/C ratio gives you *arc-free* no worries operation up to 300 Watts PEP transceiver input power.

MFJ-949E $179.95

The MFJ-949E inductor switch was *custom* designed to withstand the extremely high RF voltages and currents that are developed in your tuner.

***8-Position* Antenna switch**

Antenna switch lets you select two coax fed antennas, random wire/balanced line or dummy load through your MFJ-949E or direct to your transceiver.

***Lighted* Cross-Needle Meter**

***Full* size** 3-inch lighted Cross-Needle Meter. Lets you easily read SWR, *peak* or average forward and reflected power simultaneously. Has 300 Watt or 30 Watt ranges.

***QRM-Free PreTune*™**

MFJ's *QRM-Free PreTune*™ lets you pre-tune your MFJ-949E *off-the-air* into its built-in dummy load! Makes tuning your actual antenna faster and easier.

Plus Much More!

***Full* size** built-in non-inductive 50 Ohm dummy load, scratch-proof Lexan multi-colored front panel, $10^{5}/_{8}$x$3^{1}/_{2}$x7 inches. Superior cabinet construction and more!

MFJ-948, $159.95. Econo version MFJ-949E. Has all features except for dummy load.

***No Matter What*™ Warranty**

Every MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-989D ***Legal Limit*** Tuner

MFJ-989D $389.95

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. Easily handles *full* 1500 Watts SSB/CW, 1.8-30 MHz, including MARS/WARC bands. Six position antenna switch, dummy load. *New* 500 pF air variable capacitors. *New* improved *AirCore*™ Roller Inductor. *New* high voltage current balun. *New* crank knob. $12^{7}/_{8}$Wx6Hx$11^{5}/_{8}$D".

MFJ-986 Two knob ***Differential-T*™**

MFJ-986 $349.95

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. $10^{3}/_{4}$Wx$4^{1}/_{2}$Hx15 in.

MFJ-962D ***compact*** kW Tuner

MFJ-962D $299.95

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. $10^{3}/_{4}$x$4^{1}/_{2}$x$10^{7}/_{8}$ in.

MFJ-969 300W ***Roller Inductor*** Tuner

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. $10^{1}/_{2}$Wx$3^{1}/_{2}$Hx$9^{1}/_{2}$D inches.

MFJ-969 $219.95

MFJ-941E ***super value*** Tuner

***The** most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek $10^{1}/_{2}$Wx$2^{1}/_{2}$Hx7D in.

MFJ-941E $139.95

MFJ-945E HF/6M ***mobile*** Tuner

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

MFJ-945E $129.95

MFJ-971 ***portable/QRP*** Tuner

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

MFJ-971 $119.95

MFJ-901B ***smallest*** Versa Tuner

MFJ-901B $99.95

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-902 ***Tiny Travel*** Tuner

Tiny $4^{1}/_{2}$x$2^{1}/_{4}$x3 inches, full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire.

MFJ-902 $99.95

MFJ-904H, $149.95. Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. $7^{1}/_{4}$x$2^{1}/_{4}$x$2^{3}/_{4}$ inches.

MFJ-16010 ***random wire*** Tuner

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-16010 $69.95

MFJ-906/903 ***6 Meter*** Tuners

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $69.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-906 $99.95

MFJ-921/924 ***VHF/UHF*** Tuners

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in.

MFJ-921/924 $89.95

MFJ-931 ***artificial*** RF Ground

Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Creates artificial RF ground or electrically places far away RF ground directly at rig. **MFJ-934, $209.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

MFJ-931 $109.95

***Free* MFJ Catalog**

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MFJ *IntelliTuner*™ Automatic Tuners

More hams use MFJ tuners than all other tuners in the world!

World's most advanced Automatic Antenna Tuners feature world renowned MFJ AdaptiveSearch™ and AutomaticRecall™ algorithms -- world's fastest ultra-wide range tuning. Nine World Class models! Choose your features: Digital/Analog/Audio SWR-Wattmeter, Antenna Switch, Balun, Radio Interface, Digital frequency readout, Remoteable, Coax/Balanced Lines/Wire Tuning, Field Upgradeable . . .

MFJ-993B 300 Watt *IntelliTuner*™

The World's Best Selling Automatic Antenna Tuner!

The MFJ-993B *IntelliTuner*™ lets you tune any antenna -- balanced or unbalanced -- *automatically* and *ultra fast*.

It's a comprehensive automatic *antenna tuning center* complete with SWR/Wattmeter, antenna switch for two antennas and 4:1 current balun for balanced lines.

MFJ's exclusive *IntelliTuner*™, *Adaptive Search*™ and *Instant Recall*™ algorithms give you *ultra fast* automatic tuning with over 20,000 *VirtualAntenna*™ Memories.

Select 300 Watt SSB/CW power level and match 6-1600 Ohm antennas ***Or . . .*** select **150 Watt** SSB/CW power level and match *extra wide-range* 6-3200 Ohms!

You get a highly efficient L-network, 1.8-30 MHz coverage, Cross-Needle *and* digital meters, audio SWR meter, *backlit* LCD, remote control port, radio interface, heavy-duty 16 amp/1000V relays.

MFJ-993B **$259.95**

The MFJ-993B automatically tunes for minimum SWR and remembers your frequency and tuner settings. The next time you operate on that frequency and antenna, these tuner settings are instantly restored and *you're ready to operate in milliseconds!* 10W x2¾ Hx9D". Use 12-15 VDC/1 amp or 110 VAC with **MFJ-1316, $21.95**. Radio interface cables, remote control available. See ***www.mfjenterprises.com***

for 600 Watt amps

AL-811/ALS-600/ALS-500

For 600 Watt amps like Ameritron AL-811/ALS-600/ALS-500M. Matches 12-800 Ohms. 10,000 *Virtual Antenna*™ memories. Cross-Needle SWR/Wattmeter. 10Wx2¾Hx9D inches.

MFJ-994B **$359.95**

No Matter What™ Warranty

Every MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

1500 Watt *Legal Limit*

for Ameritron AL-1500/1200/82 amps

Roam the entire HF spectrum 1.8-30 MHz *hands-free* with full *1500 Watt* legal limit on SSB/CW and near-perfect SWR! Lighted LCD/Cross-Needle Meter.

MFJ-998 **$699.95**

300 Watt...*Extra* Wide Range

SWR/Wattmeter, 10000 VA Memories

Extra *wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

MFJ-991B **$219.95**

200 Watt ...Compact

Digital Meter, Ant Switch, Wide Range

World's fastest compact auto tuner uses MFJ *Adaptive Search*™ and *InstantRecall*™ algorithms. 132,072 tuning solutions instantly match virtually any antenna with near perfect SWR.

MFJ-929 **$219.95**

200 Watt ...Econo

Small, Ant Switch, 20K VA Memories

High-speed, wide matching range and compactness at low cost! Leave in-line and forget it -- your antenna is *always* automatically tuned! 2-position antenna switch.

MFJ-928 **$199.95**

200 Watt *MightyMite*™

Matches IC-706, FT-857D, TS-50S

No *extra space needed!* Just set your IC-706/7000, FT-857D, TS-50S on top of this matching low-profile automatic tuner -- it's all you need for a completely automated station using *any* antenna! Just tune and talk!

MFJ-925 **$179.95**

G5RV Antenna

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 Meters as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778 **$44.95**

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

200W...Weather-sealed

for Remote/Outdoor/Marine

Fully *weather-sealed for remote Outdoor/Marine use*! Tough, durable, built-to-last the elements for years.

MFJ-926B **$279.95**

200 Watt...Remote

Coax/Wire Ant, No pwr cable needed

Weather protected fully automatic *remote* auto tuner for wire ***and*** *coax* antennas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.

MFJ-927 **$259.95**

Free MFJ Catalog

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http://www.mfjenterprises.com for instruction manuals, catalog, info

10 Bands – 1 MFJ Antenna!

Full size performance . . . No ground system or radials. Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna . . . Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

MFJ-1798
$349.95

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

Self-supporting and just 23 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. In *phase* antenna current flows in all parallel radiators. This forms a very large equivalent radiator and gives you incredible bandwidths. Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive Network*™ provides automatic impedance matching for lowest SWR on these low bands. Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation. You can mount it from ground level to roof top and get awesome performance.

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *Air Core*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ 6-Band Halfwave Vertical Antenna

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed

MFJ-1796
$229.95

MFJ-1796 is only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments, small lots, trailers. Perfect for field day, DXpeditions, camping.

Efficient end-loading, no lossy traps. Entire length always radiating. Full size halfwave on 2/6 Meters. High power *air wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

MFJ-1796W, $229.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ-1792, $189.95. Full size 1/4 wave radiator for 40 Meters, 33 ft., handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $209.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

6-Band, 40-2 Meters *Rotatable* Mini-Dipole

Low profile 14 feet . . . 7 ft. turning radius . . . 40, 20, 15, 10, 6, 2 Meters . . . 1500 Watts . . . entire length always radiating

MFJ-1775
$249.95

MFJ-1775 is inconspicuous and low profile -- not much bigger than a TV antenna and is easily turned by a lightweight rotator like Hy-Gain's *AR-35*.

It's no Wimp! Its *directivity* rejects QRM, so you hear your signal in the direction you want -- works some *real* DX.

You can operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters -- and run *full 1500 Watts* SSB/CW on all HF bands!

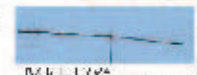
Features automatic band switching and uses highly efficient end loading with its *entire length* always radiating. With 6 and 2 Meters thrown in, you have ham radio's most versatile *rotatable* dipole!

Each HF band uses a separate, efficient end-loading coil wound on Fiberglass forms with *Teflon*® wire, and capacitance hats at each end (no lossy traps). 6 and 2 Meters are *full-length* halfwave dipoles.

Built-to-last -- incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing radiators. Assembles in an afternoon. Adjusting one band has little effect on other bands.

MFJ-1775W, $249.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ 80/40/20 Meter *Rotatable* Dipole



MFJ-1782
$369.95

Now you can operate the *low bands* on 80, 40, and 20 Meters with a true rotatable dipole that'll blend in with the sky! Take advantage of excellent low band propagation during this low sunspot cycle. Handles 1500 Watts SSB/CW. 80/40 meter end-loading coils are wound on fiberglass forms with *Teflon*™ wire, and resonated with capacitance hats to ensure extremely low losses. Full-size on 20 Meters gives incredible DX. Balun included! 33 foot low profile, inconspicuous. Easily rotatable with a medium duty rotator like Hy-gain's *AR-40*.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$419.95

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes. Enjoy DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in, two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has ny or 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.

Covers 40-15 Meters. MFJ-1788, $469.95. Like MFJ-1786 but covers 40 - 15 Meters continuously. Includes remote control.

MFJ's G5RV Antenna

MFJ-1778
$44.95

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 M as Marconi. 1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

Dealer/Catalog/Manuals
Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less shipping on orders direct from MFJ)

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Create Your Own Microprocessor Devices!

ARRL's PIC Programming For Beginners

Revised First Edition. Now for use with ARRL's PIC Programming Kit.
(book and kit sold separately)

Mark Spencer, WA8SME

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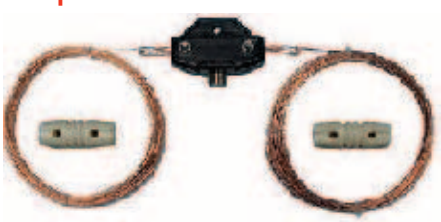

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. . . makes barely understandable speech highly understandable!

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As we get older, high frequency hearing loss reduces our ability to understand speech. Here's why . . .

Research shows that nearly *half* the speech intelligibility is contained in 1000 to 4000 Hz range, but contains a miniscule 4% of total speech energy.

On the other hand, the low frequencies, 125 to 500 Hz have most of the speech energy (55%) but contribute very little to intelligibility -- only 4%.

To dramatically improve your ability to understand speech, you must:

First, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

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The MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

A balance control and separate 2½ Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

By boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

Even if you *don't* have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more.

Here's what *QST* for April, 2001 said . . . *"I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . ."*

Immuned to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch. 10Wx2½Hx6D". Needs 12 VDC.

MFJ-1316, $21.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

MFJ-72, $69.80. *All-in-one MFJ-616 Accessory Pack*. Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. ***Save $7!***

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Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Records received audio . . .

MFJ-434B
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Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own natural voice!

Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" . . . Contest by pressing a few buttons and save your voice.

Record and playback 5 natural sounding messages in a total of 75 seconds. Uses *eeprom* -- no battery backup needed. Use your mic or its built-in mic for recording.

You can repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes a great voice beacon and calling CQ is *so* easy.

You can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by the *Stop Button*, your microphone's PTT/VOX, remote control or computer.

Has jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

Your mic's audio characteristics do not change when your MFJ-434B is installed.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

New! **It's** easy to use -- just plug in your 8 pin round or modular mic plug, set the internal jumpers for your transceiver and plug in the appropriate (included) cable for your rig.

Built-in speaker-amplifier. Speaker/phone jack. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312D, $15.95. 6½Wx2½Hx6½D in.

MFJ-73, $34.95. MFJ-434B Remote Control with cable.

60 dB Null ***wipes out*** noise and interference

MFJ-1026
$199.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, $15.95. 6½x1½x6¼ in.

MFJ-1025, $179.95. Like MFJ-1026 less built-in active antenna, use external noise antenna.

MFJ ***tunable*** Super DSP filter

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Only MFJ gives you *tunable* and *programmable* "brick wall" DSP filters.

You can continuously *tune* low pass, high pass, notch and bandpass filters and continuously *vary* bandwidth to pinpoint and eliminate interference.

Only MFJ gives you 5 factory pre-set and 10 programmable pre-set filters you can customize. **Automatic** notch filter searches for and eliminates multiple heterodynes. Advanced adaptive noise reduction silences background noise and QRM.

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MFJ *giant* 6.5 inch SWR/Wattmeter

World's *largest HF SWR/Wattmeter has giant 6½ 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*™ peak reading circuit captures *true* peak or average forward and reflected power readings.

Has 20/200/2000 Watt ranges for accurate QRP or QRO operation.

MFJ-868
$149.95

Exclusive MFJ Wattmeter *Power Saver*™ 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 peak-reading *giant* 4.5 inch *Cross-Needle* SWR/Wattmeter

New!

See it all at once on giant Cross-Needle SWR/Wattmeter! MFJ-891 simultaneously displays forward/reflected power and SWR on easy-to-read three-color scale. 20, 200, 2000 Watt ranges have individual scales. *True*™*Active peak-reading circuit* reads forward and reverse *true peak* power in all modes. New directional 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. 7¼Wx4½Hx4½D in.

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MFJ *high-accuracy* Digital SWR/Wattmeter

MFJ-826B has a large high-contrast, high-accuracy *backlit* LCD display. Auto-ranging selects optimum full-scale range from 25W, 250W and 1500W ranges with full 10-bit resolution on each range. Covers entire amateur power spectrum. Built-in frequency counter selects frequency compensated data set to insure highest accuracy for each band. Displays frequency, provides digital read-out 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*™ 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. 6½Wx2⅝Hx6D inches.

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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 . . .

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100 Watts SSB from cigarette lighter socket!

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4-Farad capacitors supply 25 Amps needed for 100 Watts SSB peaks and replenished by 10 Amps average from cigarette lighter socket. Protects against reverse/over voltage, voltage transients, short circuits. Provides super noise/ripple filtering.

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Eliminate obnoxious power line and computer hash and noise by 6 S-units!

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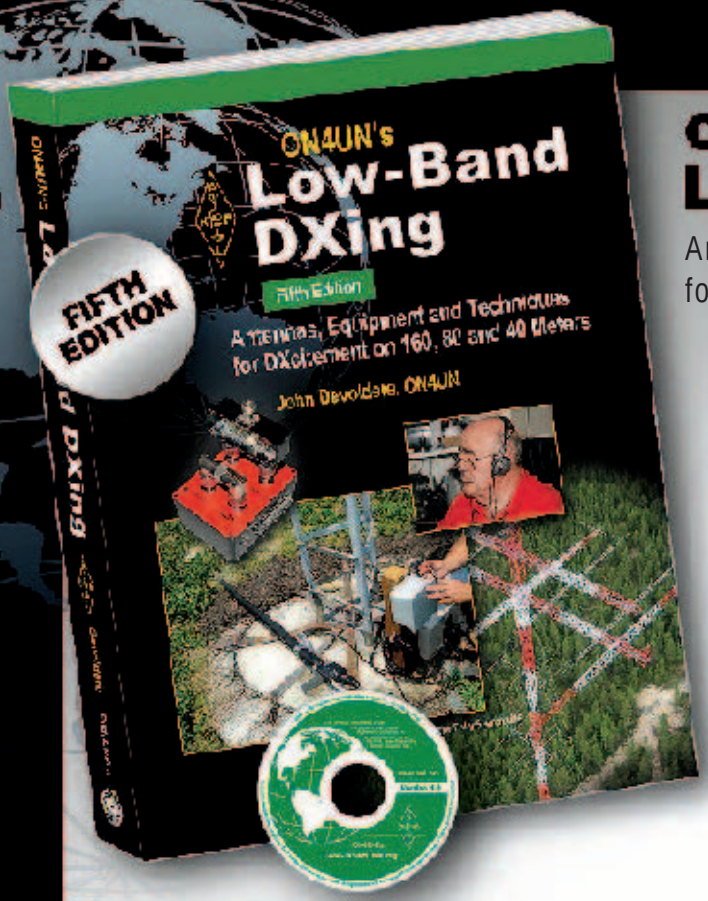

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Watts In	.25	.5	3	5	8	10	15	25	35	50

35 Watts for 2 Meter HT

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100 Watts for 2M HT

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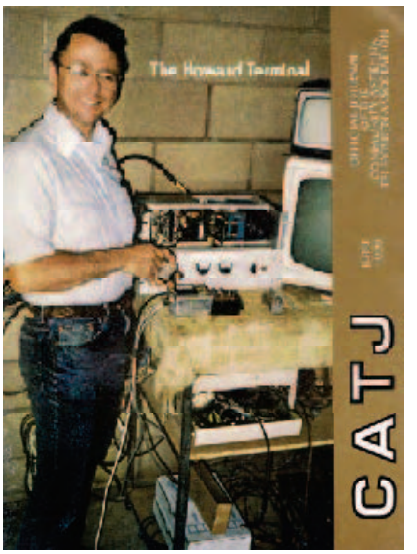

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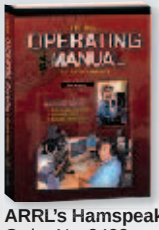

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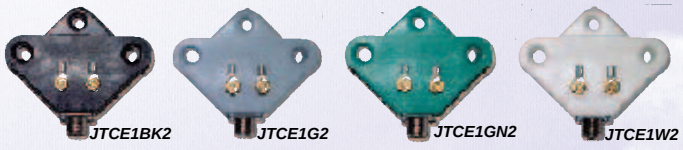

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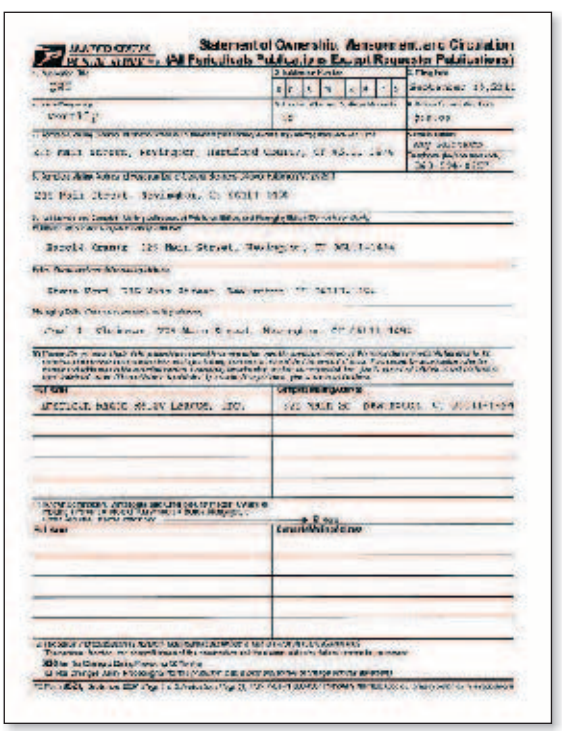

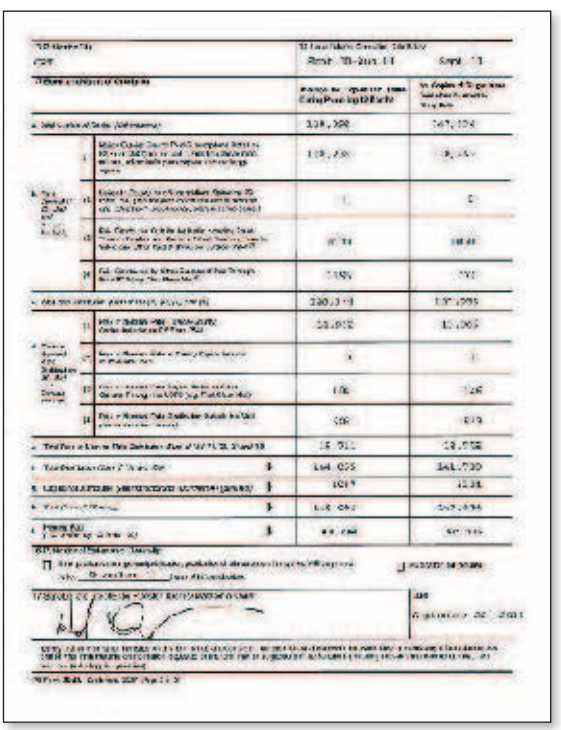

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- Large Monochrome LCD Display
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AD/DA Converter
ADC Signal (Noise+Distortion): 100dB
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Large Heat Sink
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DSP Unit
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QST QuickStats

sta·tis·tics (st-tstks) n.
1. (used with a sing. verb) The mathematics of the collection, organization, and interpretation of numerical data, especially the analysis of population characteristics by inference from sampling.
2. (used with a pl. verb) Numerical data.

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Online QuickStats Poll Results for August 5 through September 10.

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Yes: **11%**
No, but I plan to: **19%**
No: **46%**
I've never heard of JT65: **24%**

Did you work the STØR South Sudan DXpedition?

Yes: **20%**
No: **80%**

Do you operate SSTV?

Yes, analog: **7%**
Yes, digital: **2%**
Yes, both analog and digital: **4%**
No: **87%**

Do you ever watch Amateur Radio-related videos on the Internet?

Yes, regularly: **20%**
Yes, occasionally: **46%**
Rarely: **24%**
Never: **10%**

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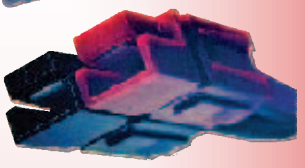

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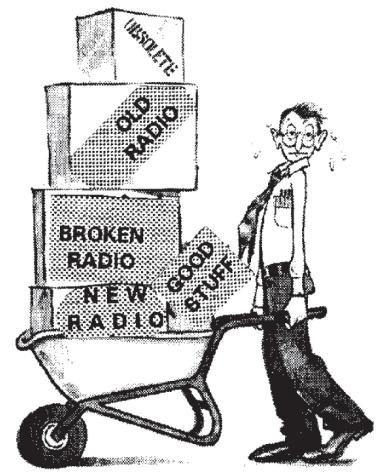

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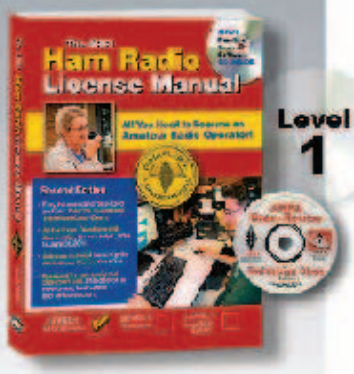

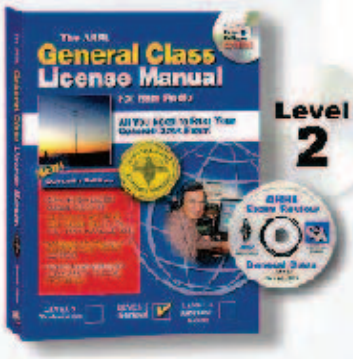

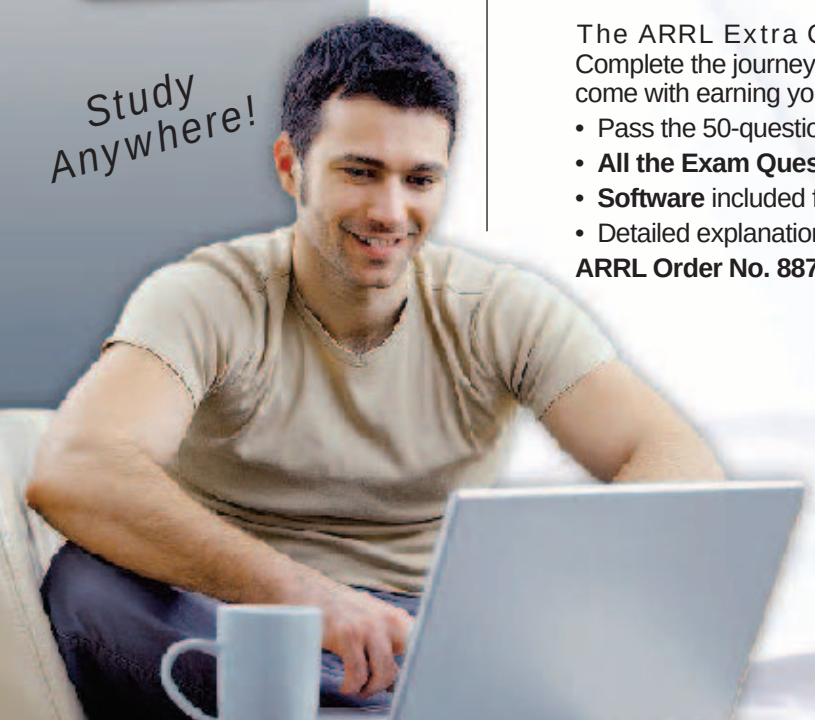

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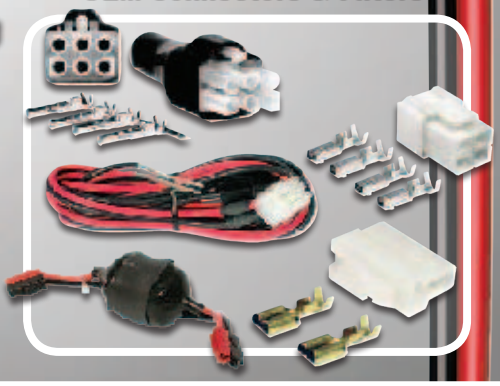

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