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JULY 2010 QST Vol 94 No 7

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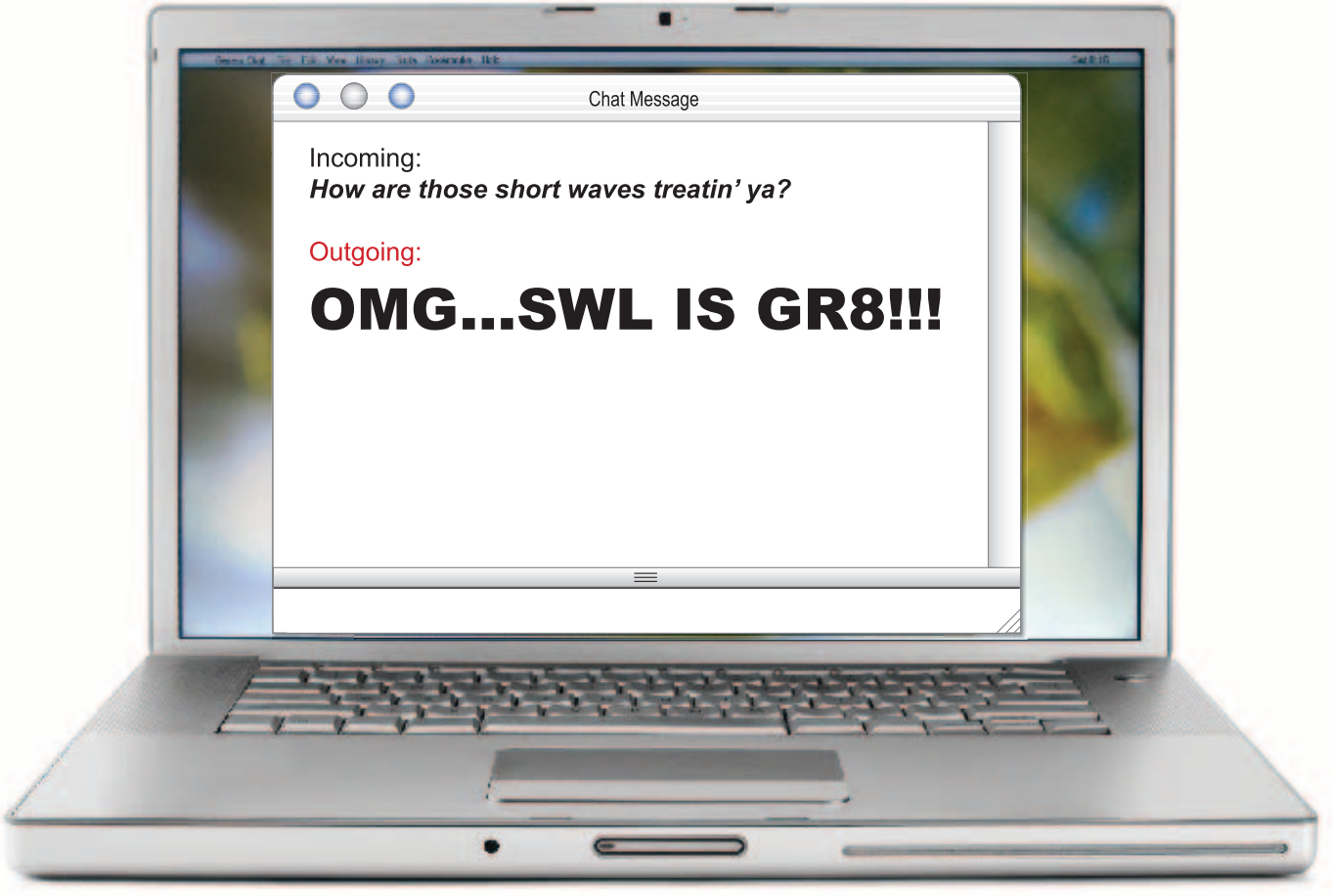

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HAM-IV

HAM-IV
$649.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of $2^{1}/_{16}$ inches.

HAM IV and HAM V Rotator Specifications	
Wind Load capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power	800 in.-lbs.
Brake Power	**5000 in.-lbs.**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	26 lbs.
Effective Moment (in tower)	**2800 ft.-lbs.**

HAM-V

HAM-V
$1099.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

ROTATOR OPTIONS

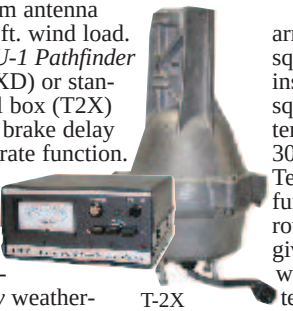
MSHD, $109.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $49.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller

DCU-1
$749.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

TAILTWISTER SERIES II



For large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, $2^{1}/_{16}$ inch max. mast.

T-2X
$799.95

T-2XD
$1229.95
with DCU-1

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power	1000 in.-lbs.
Brake Power	**9000** in.-lbs.
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	31 lbs.
Effective Moment (in tower)	**3400 ft.-lbs.**

AR-40

AR-40
$349.95

For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. $2^{1}/_{16}$ inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power	350 in.-lbs.
Brake Power	**450 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight	14 lbs.
Effective Moment (in tower)	**300 ft.-lbs.**

AR-35 Rotator/Controller

AR-35
$89.95

For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

CD-45II

CD-45II
$449.95

For antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to $2^{1}/_{16}$ inches. MSLD light duty lower mast support included.

CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power	600 in.-lbs.
Brake Power	**800 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	22 lbs.
Effective Moment (in tower)	**1200 ft.-lbs.**

HDR-300A

HDR-300A
$1499.95

King-sized antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power	5000 in.-lbs.
Brake Power	**7500 in.-lbs.**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight	61 lbs.
Effective Moment (in tower)	**5000 ft.-lbs.**

NEW! Automatic Rotator Brake Delay

RBD-5
$29.95

Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.

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

For Medium Size Antennas

MODEL / ANT CONN / COAX CONN

COMET **CP-5M** SO-239 / PL-259
COMET **CP-5NMO** NMO / PL-259
Footprint: 3.4" x 1.25"
Max Antenna: 60"

For Tall or Multi-band HF Antennas

MODEL / ANT CONN / COAX CONN

COMET **HD-5M** SO-239 / PL-259
COMET **HD- 5 3/8-24** 3/8-24 / PL-259
Footprint: 3.75" x 1.1 "
Max antenna: 80"

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

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

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

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

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

COMET **NEW! CSB770A** **DUAL-BAND 2M/440MHZ W/FOLD-OVER**
Wavelength: 2M 5/8 wave center load, 70cm 5/8 wave x 2 center load • VSWR: 1.5:1 or less • Length: 51" • Conn: PL-259 • Max Pwr: 150W

COMET **NEW! CSB790A** **DUAL-BAND 2M/440MHZ W/FOLD-OVER**
Wavelength: 2M 7/8 wave center load, 70cm 5/8 wave x 3 center load • VSWR: 1.5:1 or less • Length: 62" • Conn: PL-259 • Max Pwr: 150W

Maldol **AX-50** **DUAL-BAND 2M/440MHz**
Wavelength: 2M 1/4 wave • 70cm 9/8 wave • Length: 21" • Conn: PL-259 • Max Power: 60W

Maldol **AX-75** **DUAL-BAND 2M/440MHz W/FOLD-OVER**
Wavelength: 2M 1/2 wave center load • 70cm 5/8 wave x 2 • Length: 30" • Conn: PL-259 • Max Power: 60W

Maldol **AX-95** **DUAL-BAND 2M/440MHz W/FOLD-OVER**
Wavelength: 2M 1/2 wave • 70cm 5/8 wave x 2 • Length: 38" • Conn: PL-259 • Max Power: 60W

COMET **B-10 / B-10NMO** **DUAL-BAND 2M/440MHz**
Wavelength: 146MHz 1/4 wave • 446MHz 1/2 wave • Length: 12"
• Conn: B-10 PL-259 ,B-10NMO - NMO style • Max Pwr: 50W

COMET **SBB-2 / SBB-2NMO** **DUAL-BAND 2M/440MHz**
Wavelength: 146MHz 1/4 wave • 446MHz 5/8 wave center load • VSWR: 1.5:1 or less • Length: 18"
• Conn: SBB-2 PL-259 • SBB-2NMO NMO style • Max Pwr: 60W

Maldol **EX-107RB / EX-107RBNMO** **DUAL-BAND 2M/440MHz**
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • VSWR: 1.5:1 or less • Length:29"
• Conn: EX-107RB PL-259 • Ex-107RBNMO NMO style • Max Pwr: 100W

COMET **SBB-5 / SBB-5NMO** **DUAL-BAND 2M/440MHz W/FOLD-OVER**
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • Length: 39"
• Conn: SBB-5 PL-259, SBB-5NMO - NMO style • Max Pwr: 120W

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

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Radiosport

Our Cover
In 1907, Lord Robert Baden-Powell began the scouting movement when he took 22 boys to Brownsea Island; two years later, W. D. Boyce founded the Boy Scouts of America. One hundred years later, more than 40,000 Scouts and Scouters will gather in August at Fort AP Hill in Virginia to live the values and skills exemplified by Baden-Powell and his scouting legacy. In 2005, the National Jamboree hosted K2BSA with its 12 operating positions manned by 46 operators. It is used to demonstrate ham radio for the Scouts who are working for their Radio Merit Badge. The top inset photo shows groups of Scouts waiting their turn to go into the station and view contacts in progress. All photos courtesy of K2BSA Staff.

Departments

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55 WATTS

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FC-40
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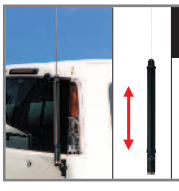

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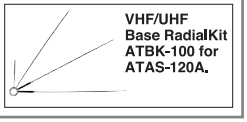

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5.2" x 1.6" Large dot matrix (264 x 64 dots) LCD display
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NEW

144/(220)* /430 MHz 50 W
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FTM-350R

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Screen Example

Dual Band (Spectrum Scope function)

Navigation (with GPS antenna unit attached)

Mono Band (Spectrum Scope function)

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"It Seems to Us"

60 Meters, Version 2.0

"It was 20 years ago this month that the International Amateur Radio Union first set its sights on an amateur allocation near 5 MHz, and seven years ago this month that the FCC first authorized General, Advanced and Amateur Extra class licensees to operate there. Now, in response to an ARRL petition, the FCC has proposed a frequency change and a slight expansion of privileges."

The vision for what is generally called the 60 meter band (although it is not a "band" in the traditional sense, since we are restricted to five specific channels) arose from the fact that regional communications can be maintained much more reliably if stations have access to frequencies spaced throughout the lower part of the high frequency (HF) spectrum. Depending on the time of day and season of the year, paths of a few hundred miles can be difficult to bridge on either 80/75 or 40 meters when using low power and simple antennas of the kind that are likely to be deployed in an emergency. By using antennas that are optimized for near-vertical incidence skywave (NVIS) propagation and by switching between frequencies in the 80/75, 60, and 40 meter bands as conditions warrant, it is possible to maintain a reliable circuit over distances and terrain that cannot be traversed on VHF or UHF.

There is no international allocation to the amateur service between 4 and 7 MHz. Efforts to secure 5260-5410 kHz as an international amateur allocation at the 2007 World Radiocommunication Conference failed when the Conference declined to approve related proposals to expand some of the HF broadcasting allocations. However, under the international Radio Regulations an administration may assign frequencies to stations in derogation of the Table of Frequency Allocations as long as such stations do not cause harmful interference to, or claim protection from, stations operating in accordance with the Table. This "no harm, no foul" provision sometimes works against us (and is one of the reasons why the work of the IARU Monitoring System is so important in reporting non-amateur stations operating within the amateur bands), but it has permitted the United States and several other countries to authorize limited amateur operation on frequencies in this range. In doing so the administrations (and, of course, we amateur operators) are obliged to avoid interference to stations in the fixed and mobile services that are the primary occupants.

Domestically, the federal government is the principal user of this frequency range. In 1996 we were able to gain the support of the National Telecommunications and Information Administration (NTIA), the agency responsible for federal spectrum management, for shared use of 50 kHz near 5 MHz. Additional work resulted in an ARRL petition, in July 2001, for a domestic allocation of 150 kHz on a secondary basis, the rationale for the wider band being that it would offer greater flexibility in frequency selection to avoid interference. Unfortunately, in the aftermath of 9/11 there was renewed interest in federal HF use and NTIA found itself unable to support anything more than 50 watts effective radiated power on five spot frequencies, limited to upper sideband voice. Such has been the situation since July 2003.

Based on the record of responsible use of the five channels by amateurs, in 2006 the ARRL filed a petition, RM-11353, with the FCC seeking (1) the replacement of one of the five frequencies with another, less heavily used channel, (2) an increase in power to 100 watts effective radiated power, and (3) authorization for three additional emission designators to permit CW, PSK31 and PACTOR-III operation. The request was coordinated in advance with NTIA and we hoped for prompt and favorable FCC action, but this did not occur until a new administration took over and began clearing a large backlog of pending rulemaking items.

In a Notice of Proposed Rulemaking (NPRM) in ET Docket No. 10-98 the FCC generally proposes the rules changes sought by the ARRL: substitution of 5358.5 kHz for 5368 kHz, the power increase, and the three additional modes. ARRL had suggested that the rules stipulate Voice-Operated Transmit (VOX) operation as an additional protection against interference to the primary users, but the FCC notes that this might create operational difficulties in noisy environments such as an emergency operations center. The Commission seeks comment on this as well as on other means of avoiding harmful interference to Federal stations, such as limiting transmission lengths to three minutes (or some other length of time) and encouraging amateurs to incorporate Automatic Link Establishment (ALE) capability in their stations. Comments are also solicited with respect to possible additional emission types and how the benefits of their use can be balanced against the need to protect primary stations. Perhaps the most problematic aspect of the NPRM is that it would limit CW and PSK31 operation to a single frequency in each channel; in each case the carrier frequency would have to be the center frequency of the channel. This would greatly reduce the utility of these narrowband modes, since a bandwidth of 2.8 kHz otherwise could accommodate multiple CW and PSK31 stations.

At this writing on May 21 the NPRM has not yet appeared in the *Federal Register*, so the comment deadline is unknown but will be no earlier than late June (30 days after publication in the *Federal Register*, with an additional 15 days for reply comments). Watch the ARRL Web site, the weekly *ARRL Letter*, and W1AW bulletins for further word.

David Sumner, K1ZZ
ARRL Chief Executive Officer

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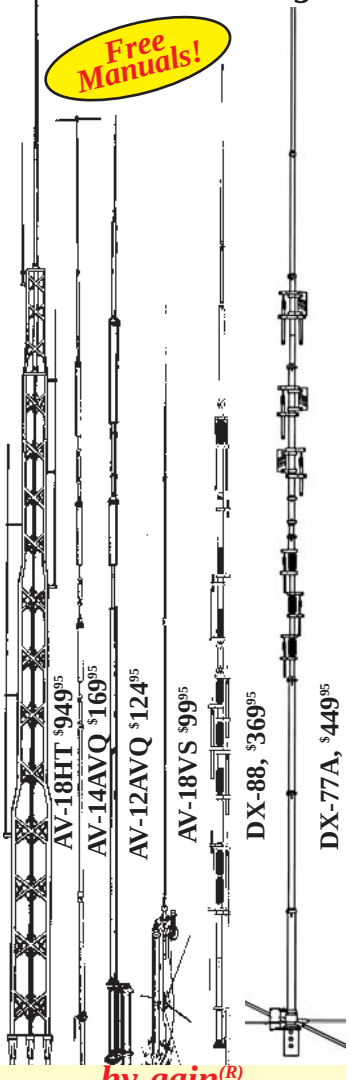

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AV-12AVQ	$124.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$99.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

■ New gear. New friends. Old gear. Old friends. An enthusiastic throng of hams enjoyed the 2010 Dayton Hamvention® May 14-16. Read all about it beginning on page 61.

■ On May 14, a summary of the FCC *Notice of Proposed Rulemaking (NPRM)* regarding spread spectrum communications and an *Order* implementing several non-substantive changes to Part 97 were published in the *Federal Register*. Comments are due June 14 and Reply Comments are due June 28. The rules changes will be effective July 13.

■ Acting on a 2006 *Petition for Rulemaking* filed by the ARRL, the FCC has issued an *NPRM*, ET Docket No 10-98, to modify the rules that govern amateurs' secondary use of five channels in the 60 meter band.

■ Two more Congressional Representatives — Greg Walden, W7EQI (R-OR-2) and Jeff Fortenberry (R-NE-1) — pledged their support for HR 2160, *The Amateur Radio Emergency Communications Enhancement Act of 2009*.

■ When a shortwave station began transmitting on two frequencies in the Amateur Radio 40 meter band, IARU Region 1 Intruder Watch volunteers identified the source and brought about a quick remediation.

■ Once again, there was a strong Amateur Radio presence at Maker Faire, the world's largest DIY festival. It was held in San Mateo, California May 22-23.

■ The ARRL Atlantic Division hosted a Field Day webinar on May 19.

■ The first two-way contact on the new Canadian 2200 meter band (135.7-137.8 kHz) was reported in late April.

■ The ARRL Foundation Board of Directors announced the recipients of 65 annual scholarships for 2010.

■ The winner of the *QST* Cover Plaque Award for April is George Badger, W6TC (SK), for his article "Easy to Make 4:1 Coreless Baluns."

■ Registration remains open through June 20 for these online course sessions beginning July 2: Amateur Radio Emergency Communications Level 1, Antenna Modeling, Radio Frequency Interference, Antenna Design and Construction, Propagation, Analog Electronics, and Digital Electronics.

Media Hits

Allen Pitts, W1AGP
Media & Public Relations Manager

■ Late April to early May was a rough time for Amateur Radio public relations. From the Carolinas to way out west, some media outlets seemed quite happy to give hams a black eye when they could. It did not seem to matter that the Asheville, North Carolina airport incident had nothing to do with the person arrested being a ham. The national media hyped how a "ham radio operator" was arrested at the airport anyway. This was a hard turn of events when just a month before, WLOS TV-13 of Asheville had done such a nice job of reporting how hams were helping the Blue Ridge Regional Hospital in Spruce Vine, and showing Dave Houser, WA9OTP, providing volunteer emergency communications using both voice and digital modes.

■ Then in California, reliable reports told us that it was not a ham radio that was involved in the on-air threats to San Jacinto police, but a modified business band rig. No matter, the accused was a ham and so headlines read "HAM radio operator jailed for broadcast threats" and we got painted as bad guys again.

■ Meanwhile, other hams were working hard on getting positive publicity. Back in 2008 I reported on the groundbreaking work of John Kanzius, K3TUP (SK), whose work with radios and nanoparticles looked very impressive in killing cancerous tumors. After John died things got quiet for a while, so I was very happy to read "Social media helps boost Kanzius to No. 1" in GoErie.com . The Kanzius Cancer Research Foundation won a $250,000 grant from the Pepsi Refresh Project through popular support including teenage fans, the Honor Society, Jamie Tolbert , WW3S, and other ham radio operators, and even a Washington bartender.

■ Diana Eng, KC2UHB, struck again with a unique article about "Collapsible fabric Yagi antenna" on the popular blog BoingBoing.net. Yes, the boom on this VHF/UHF satellite catcher is made of cloth and also serves as a handy carry bag for everything. Diana says, "One of my favorite ham radio activities is making contacts on satellites. It's really fun."

■ Here's one activity most any club can do! "Experience the adventure of shortwave radio at the Norwalk Public Library" was published by *NorwalkPlus* (Norwalk, CT). The Norwalk Public Library, in partnership with the Greater Norwalk Amateur Radio Club (GNARC) put a shortwave receiver in the library for people to hear. Matched with appropriate brochures and protected by a simple glass limiting any "dummkopf mittengrabben," the display worked very well.

■ The aftershocks of the National Public Radio story on the "unexpected" growth of Amateur Radio in the past years have continued. Several spin-off articles appeared including "Old Two-Way Radio Thrives in Internet Age" on Voice of America and "Ham Radio Still Popular In The iPad Era" on PSFK.com. As Naresh Kumar wrote, "In today's age of Twitter, Facebook and the likes, ham radio, which was speculated to gradually diminish, is not only alive and well, it is actually growing**..."**

■ With thunderstorm and tornado season starting up, there were several weather-spotter related hits such as the Cincinnati, Ohio WARN group that was featured on WKRC TV-12. Public Information Officer Mike Nie, W8VMX, was interviewed by Michelle Boutillette on WKRC Channel 12 News at the WARN console in WLW studios.

■ Finally, PR is not only about getting media hits; it is also about making friends. The Yazoo City, Mississippi tornado in April unfortunately came when no PIO was available to speak for the hams. But while their services did not make the media, they were more than noticed by the local hospital, ambulance and emergency staff as they provided communications in the disaster area. The hams made good friends, good neighbors and a good team. I have seen some of the compliments they received. "Y'all dun gud!"

■ Did you know that you can see almost all of the posted media hits at **www.arrl.org/media-hits**?

MARYANN MACDONALD

Enjoying the 2010 Hamvention® are the Olenders of Bloomfield Hills, Michigan. From the left: Max, KD8BVE, who's an Eagle Scout; Amy; Teddie and Allen, WA8IWK. They've been to numerous Hamventions together since Max and Teddie were small. There's more about the 2010 Dayton Hamvention beginning on page 61.

Good Turnout for the Second Annual Idaho State Convention

Nearly 500 people attended the second annual Idaho State Convention April 23-25 in Boise. They enjoyed a seminar with E. E. Van Valkenberg, who shared his experiences as Chief Communicator on Air Force One. The Saturday night banquet featured an informative presentation about ham radio onboard the space shuttle and the international space station by Teacher-in-Space program candidate Dave Marquart.

CLIFF AHRENS, KØCA

200 years of ham radio: **Three old-timers and a medium-timer got together at the Ararat Hambash in Kansas City, Missouri in April. From the left: Midwest Division Vice Director Rod Blocksome, KØDAS (first licensed in 1960 and an ARRL member since 1962), Wilbur Goll, WØDEL (long time ARRL member first licensed in 1941), Andy Anderson, WØAFQ (also a long time ARRL member first licensed in 1936) and ARRL Midwest Division Director Cliff Ahrens, KØCA (licensed and an ARRL member since 1979).**

Inside HQ

Our Volunteers

When I was a teenager here in Connecticut, I belonged to the Connecticut Mobileers, a 1960s Amateur Radio emergency communications volunteer organization that was run by "Uncle" Leon, K1HJV, whose creed mirrored his call — Help, Join, Volunteer. I still have the certificate and I've never forgotten those words. Helping, joining and volunteering have always been part of Amateur Radio. The ARRL itself is a membership organization that organizes and manages tens of thousands of volunteers to fulfill its mission of advancing the art of Amateur Radio.

What volunteer positions are available for ARRL members? Starting at the top of the organization, ARRL's Board of Directors is a volunteer Board, composed of regional Directors, Vice Directors and non-staff Officers, who serve without compensation. Directors are elected by ARRL members in their 15 geographic Divisions and serve a three year term. To learn more about this process, you can review the election notice for Director elections on page 75 of this issue.

There are many ARRL Volunteer opportunities such as Instructors, Volunteer Examiners and Volunteer Counsels. In this issue, however, I will primarily discuss the ARRL Field Organization with its more than 10,000 volunteers. Section Managers (SMs) lead the Field Organization in each of the 71 ARRL geographic Sections. Members in each Section elect their own SMs who serve a two year term. SMs appoint and supervise a team of volunteers who are responsible for coordinating emergency communications and other Amateur Radio activities, such as training and traffic handling, in their section.

SMs appoint other volunteers including a Section Emergency Coordinator (SEC) who assists with emergency preparedness and emergency communications. Other Section leadership appointments include Emergency Coordinators (EC) who prepare for and manage the emergency communications needs in a given area. There are more than 2200 Emergency Coordinators. In some areas there are also District Emergency Coordinators (DEC) who manage a larger region than an EC and may supervise a groups of ECs.

Getting the word out in a timely, accurate manner about the good things that we do is critically important to the ARRL and Amateur Radio. If you are skilled in public relations, journalism or other media, this could be a volunteer opportunity for you. While many clubs have their own public relations appointments, there are two types of official ARRL appointments: Public Information Coordinators (PIC) and Public Information Officers (PIO). PICs are section-level appointees with a successful background in public relations. They are responsible for recruiting, training and coordinating the activities of the PIOs within their section. The ARRL has almost 500 volunteer PICs. You can find the specific duties of a PIC at **www.arrl.org/public-information-officer**.

I'll be discussing more volunteer opportunities next month. In the meantime, if you are interested in volunteering, contact your Section Manager and click that "Get Involved" button on the top of every page in our Web site, **www.arrl.org**, and Help, Join and Volunteer!

73,

Harold Kramer, WJ1B
ARRL Chief Operating Officer
wj1b@arrl.org

Guide to ARRL Member Services

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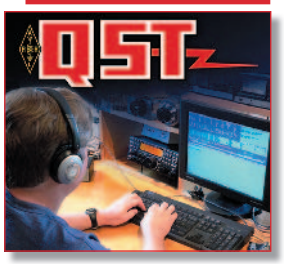

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The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communication in the event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

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

"Of, by, and for the radio amateur," the ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

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

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

Officers, Division Directors and Staff

As an ARRL member, you elect the director and vice director who represent your division on ARRL policy matters. If you have a question or comment about ARRL policies, contact your representatives at the addresses shown.

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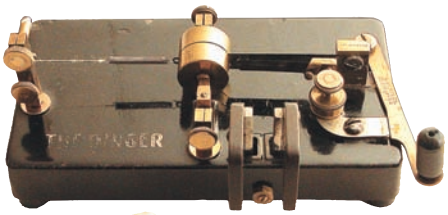


Rare bug: **This Dinger semi-automatic key was manufactured in 1908.**

Even rarer vertical bug: **This key, called a Magnavert, was custom manufactured in Indianapolis.**

A Key Donation

Two rare telegraph keys have been donated to the ARRL from the collection of Dave Ingram, K4TWJ, who passed away in January of this year. Dave was a long time columnist for *CQ Magazine* and author of many books on telegraph keys including *Keys, Keys, Keys*; *KEYS II: The Emporium*, and *The World of Keys*. Dave's widow, Sandy Ingram, WB4OEE, formally presented them to the ARRL. She said that "Dave's wish was for these keys to be given to the ARRL Museum to be displayed with his call."

The first donated key is a Dinger Key from 1908, serial #8343. It originally sold for $5. The Dinger is a bug, or semi-automatic key, that was manufactured by The D & K Mfg Co of Cleveland, Ohio. The name comes from one of the owners of the company, Paul Dinger. It is a unique mechanism that releases a tension spring to create the dits.

The second key is a unique chrome and brass vertical bug called a Magnavert. These keys were custom manufactured by the late Stan Hails Jr, W9WBL, of Indianapolis, Indiana, who only made a few of them. It still functions perfectly. Notably, it has many fine adjustments to accommodate the operator's sending preferences.

The ARRL plans to prominently display both of these keys in the lobby of the Headquarters building in Newington. We are grateful to Dave and Sandy for their generosity.

Find That Fox — Safely

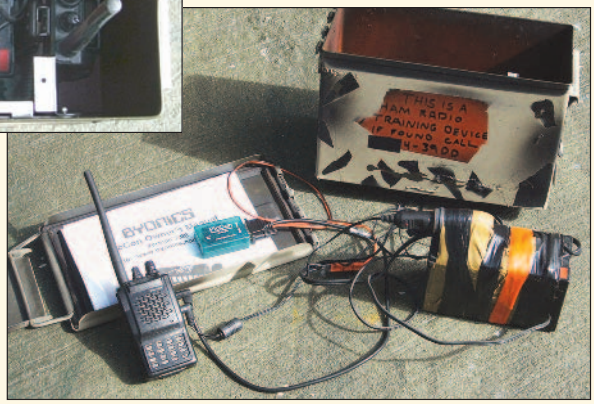
What better way to rev up your ham radio engine than to attend the Dayton Hamvention® for the first time? I took my son along and he was as impressed as I was. We both got interested in fox hunting and built the "Stiff Wire Quad" using plans in *Transmitter Hunting: Radio Direction Finding Simplified* by Joe Moell, KØOV. During the search for parts and information, my son found a disturbing story. Seems that a local bomb squad had blown apart a PVC ham antenna balun. Joe passed along some good advice:

- Mark your fox box on the outside.
- Have a control operator within sight of the fox box.
- Carry your Amateur Radio license with you.
- Don't wear camouflage clothing or clothes with political statements.
- Make eye contact with other park users, identify yourself and explain what you are doing.
- Carry a business card with your contact information and your club's fox hunt Web page. A dispatcher can confirm this for a police officer.
- Be aware of your surroundings. If you see the police pull up, put down the antenna, keep your hands out of your pockets, look at the officer and follow his directions. Explain what is going on once he is in listening mode. He will not be ready to listen until he feels that the situation is safe.

I built two containers to hold the fox. One is a military surplus ammo can and the other is PVC pipe. They are painted in subdued colors, but they are both marked on the outside with what they are and my cell number. Both containers have room for the Yaesu VX-150 handheld transceiver, the Byonics PicCon Fox Controller and a sealed gelled electrolyte battery. The fox hunters will have to find the fox, not the control operator. — *Will Holcomb, K4NIO (Photos by K4NIO)*

The inside of the ammo can fox box. The transceiver is clipped on the added interior support to the left. The 12 V battery and wiring harness is in the center, while the PicCon controller is in the upper left hand corner.

The ammo can, with lid removed, and PVC fox box containers. They are both painted to blend in to the environment, but are both marked with identification and contact number. The electronics fit in either container with room for air flow.



The ammo can fox box components. Note the exterior markings and owner's cell phone number on the outside of the ammo can.

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THOMAS W. DONOHOE, W2NJS
Washington, DC

DSET

♦ While I enjoyed the Digital Simulated Emergency Test article [Jun 2010, pp 76-78], I only wish it was more complete. It seems too much like an infomercial for digital methods instead of an honest assessment of what they are useful for and what they aren't suited for.

I suspect many operators reading this article will also note the lack of anything negative whatsoever in the article and not give the methods seriously consideration. That would be disappointing, as they can be very useful in many cases. However, the authors not only didn't mention those shortcomings, but actually promote using digital methods in those areas where the methods were demonstrated to be a hindrance to quick effective communication, such as the dispatch of information bulletins. As Amateur Radio operators we are charged with experimenting, but in emergency situations we have to remember to "KISS." Lives may depend on it.

I also wish they had provided better examples. The concept of the example given in the article is valid, even if a detail might not be. It's just a detail that annoys me 40-plus hours a week, as I see thousands of drug prescriptions daily through my employer (a pharmaceutical benefits management company). While a doctor might use a drug name and dosage on a prescription, the hospitals and pharmacies all use NDC (national drug code) numbers. They are 10 digit numbers that identify the drug, dosage, packaging, formulation, size, form, etc. Telling a hospital pharmacy that dept X needs "10" hydrochlorothiazide would be useless. What dosage? Tablet, oral liquid or IV? The stuff that's pure, or the stuff cut down to 50%? The NDC system also provides a cross reference system for substitutions, generics, etc.

GARY DEZERN, K3WOW
Tarentum, Pennsylvania

EASE OF USE COUNTS

♦ The review written by Richard K. Palm [Product Review, Jun 2010, pages 46-48] struck a chord with me. To quote: "The amount of functionality built in to modern VHF transceivers can get in the way of easy use of the basic radio functions. If I were an emergency coordinator on a disaster scene, I would want a radio that can be operated out of the box by anybody within seconds, not after reading the fine print of a manual. There may be a niche for a 2 meter FM handheld with only the most basic of functions: frequency selection via keypad or knob, CTCSS and 10 memory channels on a larger, rugged chassis with big knobs and key buttons and a BNC connector antenna."

I'm part of an emergency response communications team in my retirement community. I passed my license exam and went looking for a 2 meter radio. After reading a review on your Web site I bought a radio that the marketing types would call a "feature rich radio" but it suffers from "technology bloat" and very poor usability.

Most of the 2 meter radios for sale today suffer from this disease. How about a very simple 2 meter radio for the guys like me who use their radios only for emergency use?

JULES E. THOMPSON JR, KI6PBA
Santa Rosa, California

1935 CQ IN ORLANDO

♦ I recently returned from Disney World with my family. While waiting on line at EPCOT with my 4 and 7 year old daughters to get a photo with Mickey Mouse, there were several TV monitors playing old Mickey Mouse cartoons. In one from 1935 called "Mickey's Garden," a determined insect rallied his forces to attack the garden by actually calling CQ in Morse code with his antennae. The CQ call ended with the prosign $\overline{AR}$. There must have been someone in the Disney studios who was a ham operator involved with the production of the cartoon. I was able to find the cartoon on You Tube for anyone who may be interested.

ANTHONY J. SALVATE, N1TKS
Greenwich, Connecticut

INDOOR QRP

♦ I wanted to share a recent experience concerning QRP operation. I have been licensed since 1965 and, for the most part, operated pretty much CW, running anywhere from 50 to 100 W. I was bitten by the QRP bug around 1998 and have been operating with 5 W with a long wire antenna, up around 13 feet, ever since.

Recently, I had some remodeling done on my house. Not wanting to drill holes through the siding or windows for an antenna, I constructed an attic dipole, fed with coax, into an antenna tuner. My first night on the air with it I worked into Florida and North Carolina on 40 CW with 559 and 599 reports, respectively. This past Friday evening I worked into Italy, Hungary and Slovenia with 569 and 579 reports on 20 CW.

I read a few of the ARRL books about QRP operating with indoor antennas and was very skeptical. But I was pleasantly surprised with the performance of the attic dipole I built. It goes to show you that one does not always need to be a "big gun" to get out.

FRITZ HUTTELMAYER, WB2QWH
Cheektowaga, New York

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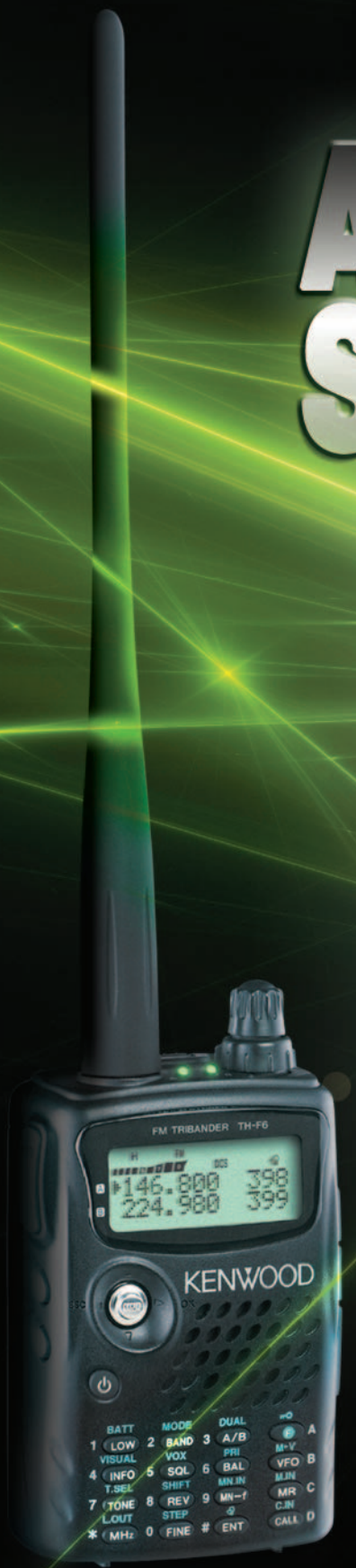
[1]Note that certain frequencies are unavailable. [2]5W output



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The Portable Omni Box

You'll likely find this compact multi-function test gear a valuable part of your outdoor activities.

Mike Bryce, WB8VGE

When my wife and I go off roading in our Jeep, we usually include a night or two of camping. At night while everyone is sitting around the campfire telling lies about the day's adventure, I throw some wire up a tree and decompress with ham radio.

With all the camping gear, food, extra axles, U-joints and other necessary items there's very little room left for radio gear. Now add in all the little boxes of stuff that are required to keep the radio equipment running and we're crammed full.

While I can replace a broken front axle on the trail, I don't take the parts or equipment with me to repair a HF transceiver in the field. That being said, many times I've set up the portable station and heard nothing on the bands. Is my receiver working? Do I have a shorted coax cable? Is my transmitter really transmitting? Well, the list goes on and on. I needed something that I could take in the field with me. Something that would help answer all the above questions and more. Something that would hold up to the rigors of riding in my Jeep while rock climbing. Something that could do it all and more, but in one small rugged portable box.

I came up with a list of the features this magic box had to do for me:

- A field strength meter to let me know the antenna and transmitter are working.
- A signal generator to test if the receiver is working.
- Continuity tester to check for shorted coax.
- A dummy load to help test the transmitter.
- An expanded voltmeter to keep tabs on the battery supply.
- A 4A charge controller to manage solar power in the field.
- The whole shebang would need to fit into a small waterproof Pelican case.

The Beginnings of the Portable Omni Box

Allow me to digress a bit. I am a firm believer in not reinventing the wheel. There are lots of smarter people out there than I. Why not use their talents? So, as a member of the ARRL, I took advantage of an ARRL member service. The entire library of *QST* from 1915 to 2005 is now available for free to members from the ARRL Web site.[1] Even if you do not use any other ARRL member service, this ability to access the *QST* library is worth the price of admission.

The Portable Omni box is a collection of circuits and designs pilfered from the *QST* library. In fact, even the title is stolen.[2]

The Circuits

As with all complex systems, including this one, it can be broken down into much smaller bite size circuits. I use five separate circuits on a single PCB. The charge controller has its own PCB. I won't break down every single part and its function in this project. If you want a more detailed explanation, I have referenced the original articles. The overall schematic is shown in Figure 1.

The Field Strength Meter

This is the simplest circuit to build and test.[3] It's an untuned design that will work from just above dc to just below daylight. RF is coupled into the set of diodes and the resultant dc is applied to the meter via the CAL control. Since the input is untuned, the response is quite broad. It will sniff out 80 meter RF or provide proof that your 2 meter handheld transceiver really is transmitting.

The Signal Generator

This is a really simple crystal oscillator followed by a small buffer amplifier.[4] I use a 7.015 MHz crystal. This way I have harmonics on 14.30, 21.045 and 28.06 MHz. Frequency accuracy is not the issue, so no means of calibrating the crystal frequency is provided. The output on the end of R7 is applied to the front panel CAL control to provide adjustable attenuation.

The Expanded Voltmeter

Since I use batteries while camping, I thought having an expanded voltmeter would be a good idea.[5] Instead of using an LM336Z5.0 reference diode, this time around I used an off the shelf LM7805 5 V regulator IC. The value of the trimmers and the associated resistors might have to be changed to accommodate the meter you're planning on using. Later on, I explain the reason why.

The Dummy Load

It really is nice to know if the transmitter is in fact transmitting. My Yaesu FT-897 will show TX function when the batteries are low, but there's nothing coming out of the antenna connection. This dummy load will prove very useful in the field.

Normally, most small dummy loads use a combination of parallel and series connected

[1]Notes appear on page 36.

resistors to achieve the required 50 Ω. In this example, one 30 W, 50 Ω, Caddock resistor in a TO-220 case is used. Why only 30 W? Well, most of my portable HF gear operates at low power (QRP) levels and both my ICOM IC-703 and FT-897 produce 20 W or less while on battery power. If you desire a higher wattage dummy load, Caddock makes a 100 W, 50 Ω resistor. Of course, provision to dissipate the resulting heat must be provided, if you make that change.

Some of the RF from the dummy load is rectified and applied to the front panel meter. If set fully clockwise, the CAL control will provide an indication of relative power output. Resistors R17, R16 and trimmer R21 are used to calibrate the meter at 20 W using an external wattmeter.

The Continuity Meter

It's impossible to tell just by looking at the end of a coax cable if there is a short in the PL-259 plug or if the cable has an open connection. This really simple continuity checker will tell you. A single 1.5 V battery is used to power the checker. Trimmer R10 and resistor R18 set the maximum deflection of the meter. That way you won't wrap the needle around the upper stop if you have the CAL control turned up all the way.

A Charge Controller for the Portable Omni Box

Using a solar panel while camping provides the necessary power to keep my radios humming. I take a 10 W panel with me, although that's a bit undersized for all my needs. Should I decide to go with a larger panel, the charge controller will handle up to 4 A.

I personally know the designer of this controller and he assures me that you can squeeze more current out if necessary.[6] The charge controller does not produce any RFI so all you will hear in the field will be signals and not the charge controller.

If you don't use — or plan to use — solar power, you can leave this out or replace it with some other function.

Controls for the Portable Omni Box

The really hard part of this project began when I had to figure out how to select the various circuits with the least amount of fuss. Four of the five circuits use the meter to display the results. The CAL control is used on three of the circuits. What I came up with is a two-switch system. One switch provides the MODE while the other provides the FUNCTION. Both switches are rotary type. They are both the same except the MODE switch has its mechanical stop moved to provide only three positions. The switching circuits are shown in Figure 2.

The MODE switch alternates between

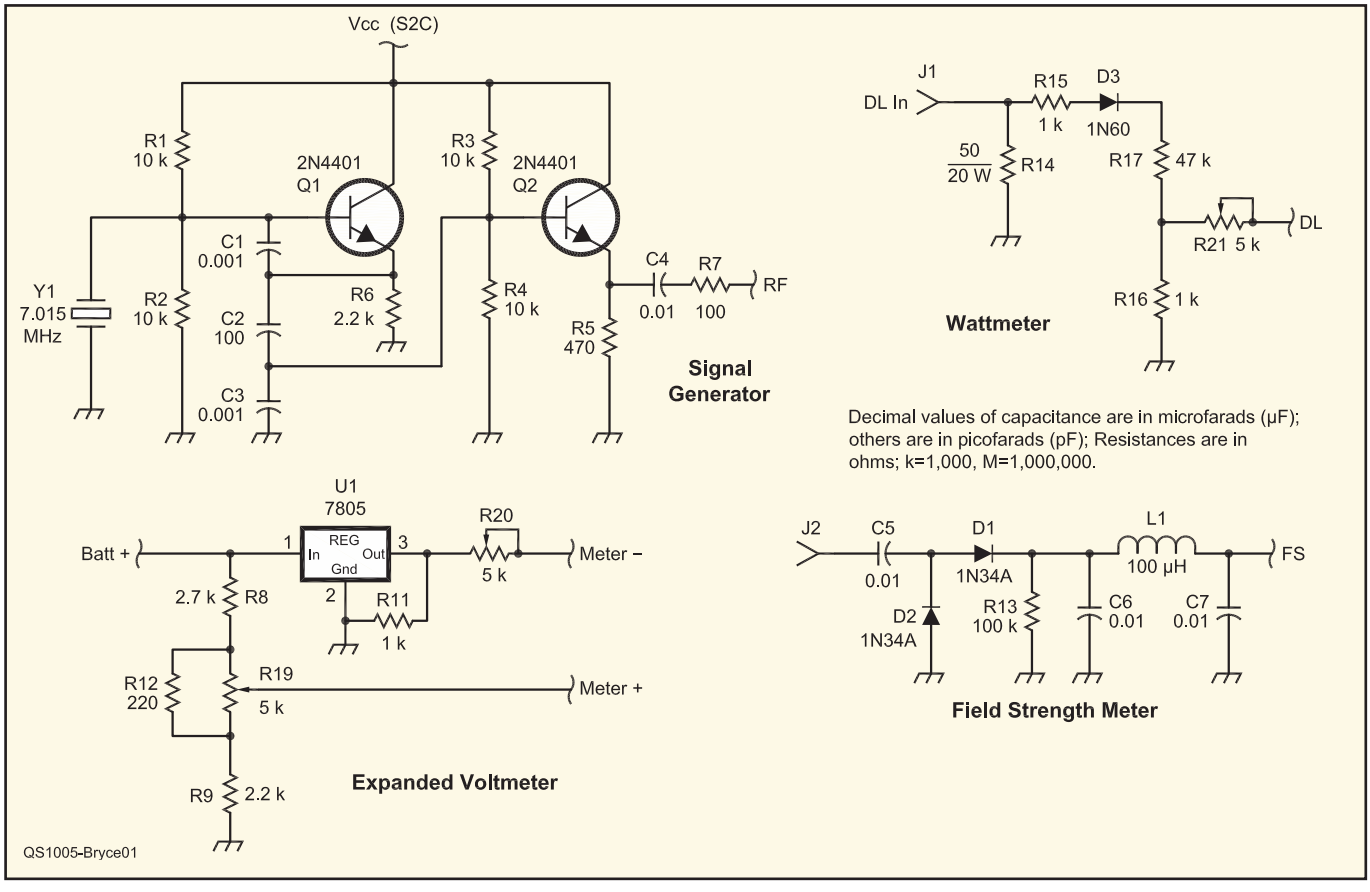


Figure 1 — Schematic diagram and parts list of the Portable Omni Box. All parts are commonly available with just a few exceptions; see text. Build only the functions you will need for your applications.

C1, C3 — 0.001 µF, 100 V ceramic capacitor.
C2 — 100 pF, 100 V ceramic capacitor.
C4-C7 — 0.01 µF, 100 V ceramic capacitor.
D1, D2 — Germanium diode, 1N34A or equivalent (see text).
D3 — Silicon diode, 1N60 or equivalent.
J1 — UHF jack, SO-239.
J2 — BNC panel mounting jack.
L1 —100 µH miniature inductor.
Q1, Q2 — PNP bipolar transistor, 2N4401 or equivalent.
R1-R4 — 10 kΩ, ¼ W resistor.
R5 — 470 Ω, ¼ W resistor.
R6, R9 — 2.2 kΩ, ¼ W resistor.
R7 — 100 Ω, ¼ W resistor.
R8 — 2.7 kΩ, ¼ W resistor.
R11, R15, R16 — 1 kΩ, ¼ W resistor.
R12 — 220 Ω, ¼ W resistor.
R13 — 100 kΩ, ¼ W resistor.
R14 — 50 Ω, 20 W resistor (see text).
R17 — 47 kΩ, ¼ W resistor.
R19-R21 — 5 kΩ, linear potentiometer.
U1 — 7805, 5 V voltage regulator IC.
Y1 — 7.015 MHz crystal.

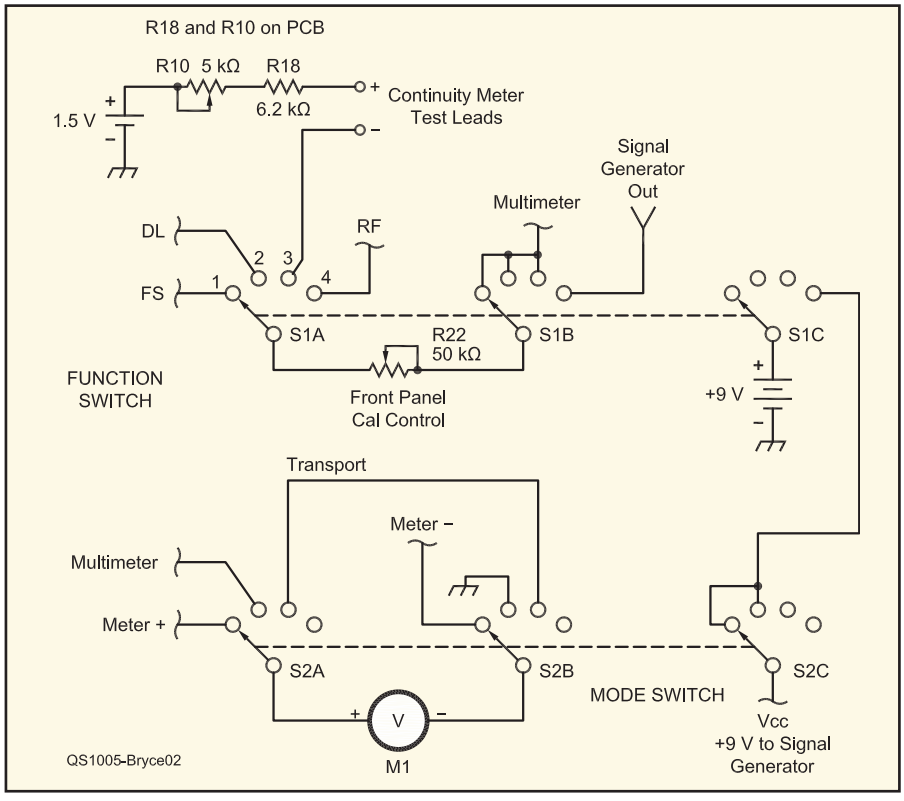


Figure 2 — Schematic diagram and parts list of the function and control switching subsystem.

R10 — 5 kΩ, linear potentiometer.
R18 — 6.2 kΩ, ¼ W resistor.
R22 — 50 kΩ, linear potentiometer.
S1, S2 — Miniature rotary switch, 3 pole, 4 position.

selecting the expanded voltmeter, the multimeter or putting the device in transport mode. The FUNCTION switch selects among the field strength, dummy load, continuity and the signal generator.

The signal generator operates from a set of four 1.5 V penlight batteries. While I tried to come up with various solutions to turn the power off when the case is closed, it became clear that I was fighting an uphill battle. I did not want to ruin the waterproof nature of the Pelican case by drilling holes and adding external switches to turn off the power.

I decided to electrically interlock the two switches. If the signal generator is selected, power must flow through both switches. If the MODE switch is in any mode other than TRANSPORT, power can be routed to the FUNCTION switch if in the GENERATE position.

The TRANSPORT mode shorts out the meter so its movement is dampened when the meter is jostled while bouncing around. While in TRANSPORT position, power is broken to the signal generator even if you leave the FUNCTION switch in the SIGNAL GENERATOR position.

There was a problem, however. I could not come up with a switching solution that allowed me to sleep at night when it came to routing RF to the dummy load or from the signal generator to the radio. To that end, the dummy load connects directly to an SO-239 connector, while the signal generator terminates to a BNC connector.

The size of the meter I used and the small Pelican case proved a real headache. Because I was determined to use the meter I had, and the front panel had finite space, some give and take was needed. Therefore the field strength meter has its own connector, a BNC type, as well.

There is a plus side to all these different connectors. It is very hard to squirt RF from the transmitter into the signal generator or the field strength meter. I know had I used a switch to select the actual RF path I would toast something. I know, I've seen me do it.

The power in and out for the charge controller uses Anderson Powerpoles. I used yellow and black for the solar panel input and the customary red and black for the battery. The expanded voltmeter uses these connections to monitor the battery, even though there may not be a solar panel used. I made up a set of wires with test clips on one end and Powerpoles on the other end. This way I can have a voltage tester that is not limited to a battery connected to the solar panel.

Building Your Own Version of the Portable Omni Box

This is an open-ended project when it comes to building your own. I included the features that I needed; you may want something else. You may decide to remove one or more features from your version.

I wanted the rugged Pelican case so the meter would hold up to the stresses of off road use and camping.[7] I ended up using the Pelican model 1120 in flaming yellow to match my Jeep. If you don't plan for such extreme use, a smaller metal utility box would be just fine. In fact, a plastic project box could work great, too. Although some purists might argue that only a metal box be used to house test gear.

My Portable Omni Box centers around a really impressive meter I purchased at the Dayton Hamvention several years ago. It was brand new in a sealed package. The meter is waterproof, dust proof and ruggedized for military use. The face of the meter indicates it came out of some sort of test gear, more than likely a VOM.[8]

Besides being a brute of a meter, its full-scale range is 50 µA. This makes the meter very sensitive and is great for the field strength meter function. It did, however, require some changes in two of the circuits — the expanded voltmeter and the dummy load.

Since the meter I used is so sensitive, R8 and R19 were changed to 10 kΩ. R12 is not used and R20 required a 500 kΩ trimmer. R8, R19 and R20 values should be fine with a 1 mA meter. A 1 mA meter can be used but won't produce as much deflection in the field strength position as will the one I used.

If you don't have a suitable meter, keep your eyes out for a meter from an old CB set, or the S-meter from a kaput FM receiver. These normally are around 200 µA and would be a good substitute.

All five circuits are assembled on a single PCB about the size of a business card (see Figure 3).[9] Although all five circuits share the same PCB, you only need to put in the parts for the circuits you want, or you can stuff parts for all five. If you're up to it, all five circuits can be built on perforated board. Nothing is critical in layout or design.

In a stroke of luck, the Micro M+ charge controller's mounting holes line up exactly with the PCB used in the Portable Omni box. This way, you can piggyback the two PCB assemblies into one package. Amazing!

But Wait, There's More!

This is really a junk box project and there are only two parts that I would not suggest changing. The diodes I specified and the Caddock resistor are needed to provide proper function in their modes. The 50 kΩ CAL pot can be just about any value from at least 10 kΩ to 500 kΩ. It should have a linear taper to makes adjustment smoother. A short run of RG-174 is used to route RF to the dummy load.

I don't care for a zillion wires coming out

of a PCB assembly, so with the exception of the dummy load, all connections are made via AMP MTA100 assemblies. You don't need to use these connectors. And if you don't, feel free to just solder wires to the PCB. I would highly recommend you use different color wires as it gets busy inside the box once you begin wiring the switches.

Other than that, everything else is fair game. As such, most of the adjustments are noncritical as well. The only two that come close to being critical are the low and high set trimmers for the expanded voltmeter.

If you use the PCB, then I would build only one circuit at a time. Test it and then build another one. I began with the continuity meter, signal generator, then the field strength meter and the expanded voltmeter. The dummy load was the last one built and tested. Test each circuit before you wire up the rotary switches. This way, you can rule out a wiring error if there's a problem. That's the hardest part of this project — wiring the switches. I suggest wiring in only one circuit at a time and testing it before you move on to the next one.

The Caddock power resistor must be heat sinked. Failure to do so will almost guarantee its destruction. A clip-on heat sink is not enough. I used the aluminum front panel to dissipate the heat. Don't forget to use a glob of heat sink goo between the power resistor and the metal.

The charging LED for the Micro M+ is removed from its PCB assembly and mounted on the front panel. I decided to go with a high brightness blue LED so I can see it in the sunlight. The FET for the charge controller uses a clip-on heat sink. There's no need to mount the FET to a larger hunk of metal.

The test leads for the continuity meter are designed for banana style connectors. The batteries for the continuity meter and the signal generator are in plastic battery holders. A strip of hook-and-loop fastener holds them both to the bottom of the Pelican case. A hunk of foam rubber between the batteries and the front panel keeps everything tight.

Adjustment and Test

The expanded voltmeter is calibrated first. Set the MODE switch to the EXPANDED VOLTMETER position. Apply 10 V to the circuit and adjust the LOW trimmer for zero on the meter. This sets the left edge of the meter at 10 V. Adjust your power supply to 15 V and adjust the HIGH trimmer for full scale. Because these two set points interact, repeat the process a few times.

For the dummy load, connect your transceiver and an external wattmeter to the Portable Omni box. Set the switches to their proper positions. Set the output of the transceiver to 20 W as shown on the external wattmeter. Now set the front CAL control fully clockwise and adjust R21 for full-scale deflection. Keep the transmission short, as the dummy load can handle 20 W for no more than 15 seconds at a time. Allow for cooling between tests.

Set the mode and function switches to continuity. Set the CAL control to about 70% of its range. Plug in your test leads and short them together. Adjust R10 so the meter is off the scale, but not slammed into the endpin. With the CAL control you should be able to set the meter from past full scale to slightly under full scale. If not, readjust R10.

Reset the switches to the FIELD STRENGTH setting. Connect your field strength antenna to the BNC and use your handheld as a signal source. If you use a spare 2 meter antenna on the Portable Omni box, you should see full deflection from a foot or two away from your handheld. The CAL control sets the amount of deflection.

A Few Afterthoughts

Although the front panel real estate of my version is very limited, I almost convinced myself to add an antenna tuner. I don't know if I really like that idea. As of right now I have a portable unit. If I installed a tuner, it would be connected to the transceiver and antenna all the time.

I have a larger Pelican case and that would have made installing other features more feasible. In particular, and perhaps I'll add this one later, a circuit to add dc filtering and noise reduction would be helpful in many locations.

Since I was really bound and determined to use the Pelican 1120 case, I had to be creative on getting everything inside. The Portable Omni Box PCB was designed to mate with the PCB of the Micro M+ charge controller, but in my application I had to offset the Micro M+ PCB to right angles to allow everything to fit.[10] I accomplished this by using L brackets on both PCB assemblies.

Because I did not want to break the weatherpoof seal on the meter, I did not change the meter's face. There's software on the market that will allow you to make custom meter faces if you so desire.[11]

Whether you are negotiating Hells Revenge in Moab, Utah in a Jeep, or you're setting up the communication tent as a first responder, this portable test device might well be the most important piece of gear you'll haul around.

Notes

[1]Members of the ARRL Diamond Club have access to all articles before the current year.
[2]D. DeMaw, W1FB (SK), "The QRP Omni Box," *QST*, Nov 1987, pp 18-22.
[3]J. Noakes, VE7NI, "The 'No Fibbin' RF Field Strength Meter," *QST,* Aug 2002, pp 28-29.
[4]See the Test Equipment chapter of any recent *ARRL Handbook*.
[5]J. Grebenkemper, KI6WX, "Expanded Range DC and AC Voltmeters" (Technical Correspondence), *QST*, May 1993, p 77.
[6]M. Bryce, WB8VGE, "The Micro M+ Charge Controller," *QST*, Oct 2001, pp 28-31.
[7]**www.pelican.com/**.
[8]The back of my meter says NSN 6625-00-952-3556.
[9]A PCB is available from the author if desired.
[10]The Micro M+ charge controller is available from the author.
[11]Tonnes meter face software Web site, **tonnesoftware.com/meter.html**.

ARRL member Mike Bryce, WB8VGE, has written many QST *articles and is the author of the ARRL book* Emergency Power for Radio Communications. *You can reach him at 955 Manchester Ave SW, N Lawrence, OH 44666 or at* **prosolar@sssnet.com**.

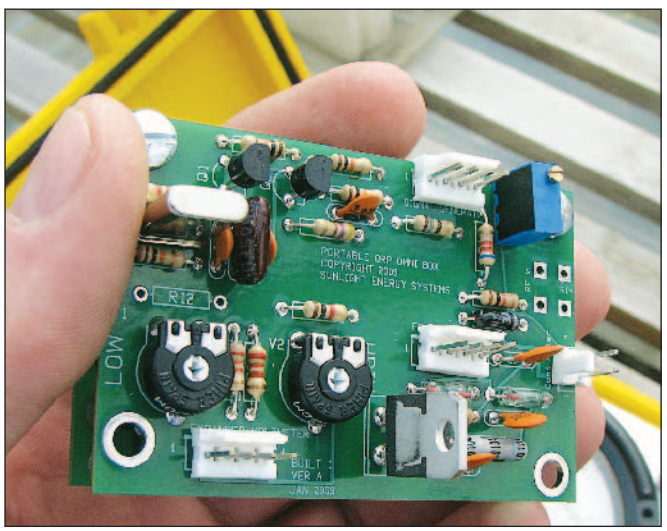


Figure 3 — The PC board version of the Omni Box. Perforated project board could also be used.

The Classic Universal Sound Card Interface

Explore digital communications with an interface that will work with modern transceivers.

Howard "Skip" Teller, KH6TY

After reading the article by Steve Ford, WB8IMY, in the January 2010 *QST* ("PSK31 This Weekend," page 30), I decided that what was needed was a low cost sound card interface that could be built in a single evening. This would make it possible to actually get on the air and enjoy PSK31 QSOs in that weekend Steve described. It would have everything needed to interface with the most popular transceivers; it would be as simple and trouble free as possible, and be convenient to operate.

In the June 2009 *QST*, I described a VOX type sound card interface for FM transceivers ("A Sound Card Interface for FM Transceivers," page 30) that operates through the microphone jack. This would enable hams with FM rigs to try sound-card-based digital modes such as *DominoEX* on VHF or UHF.

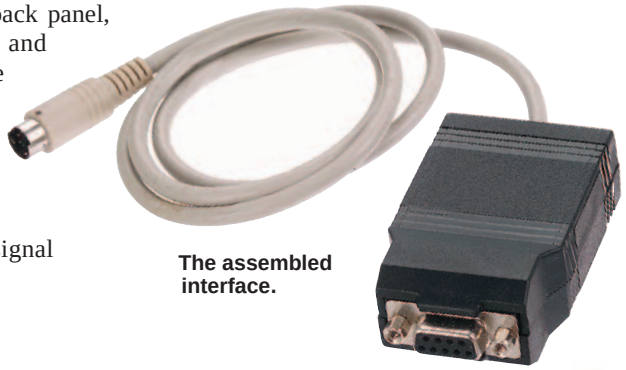
The interface described here employs the more well-known and widespread technique of using the computer serial port for transmit-receive switching. Although ground loop problems are usually avoided by isolating just the transmit audio line from the computer, this interface also isolates *both* the receive and transmit audio lines. The benefit can be substantial. For instance, I have a laptop computer that I like to use for digital operating, but its switching power supply spews interference that's visible in the software "waterfall display" (the display you use to detect and tune signals). By isolating both audio lines from my transceiver, the interference is eliminated completely.

How it Works

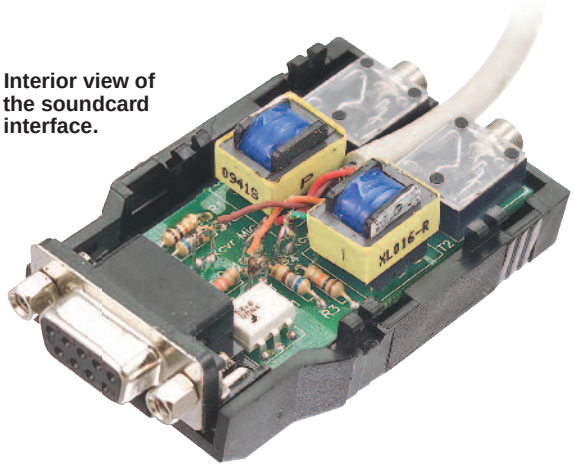
This interface will also work through the microphone jack, as did my sound card interface for FM transceivers. Even so, it is more convenient not to have to unplug the microphone every time you operate PSK31, RTTY, or other digital modes, so this interface is intended to be used most of the time on HF through an accessory port on the back of the transceiver, with the microphone left plugged in for voice communication. Some transceivers mute the microphone when operating digital modes, and some older ones do not. For those that do not, just turning down the microphone gain will mute the microphone without having to unplug it. For transceivers such as the ICOM IC-7000, which have the microphone jack on the back panel, the absence of plugging and unplugging the microphone is more than welcome!

For transmitting, the digital software you're using (see the sidebar "Sound Card Software") generates a WAV audio signal that modulates the transceiver with the data, such as the warbling sound when PSK31 is being transmitted. On its path to the transceiver microphone, this WAV audio enters the interface from the computer sound output via J1, passes through T1 (which isolates the computer from the transceiver), and into an attenuating L-pad comprised of R1 in series and R2 to ground. The junction of these two resistors is connected to the transceiver microphone or accessory input. The L-pad is used to prevent strong audio sounds from overdriving the transceiver microphone input, and the value of R1 can be changed if necessary for optimum audio drive.

For receiving, the audio output of the transceiver is connected to another L-pad, comprised of R3 and R4, and then on to T2 and J2, which feeds the microphone input of the computer for display by the software on a waterfall, and on the screen as printed



The assembled interface.



Interior view of the soundcard interface.

Sound Card Software

Once you've built the interface, download one of these free software packages and get on the air!

Windows

- *DigiPan:* **www.digipan.net**
- *Fldigi:* **www.w1hkj.com/Fldigi.html**
- *Ham Radio Deluxe:* **www.ham-radio-deluxe.com**
- *MultiPSK:* **f6cte.free.fr/index_anglais.htm**

MacOS

- *Cocoamodem:* **http://homepage.mac.com/chen/w7ay/Site/Downloads/index.html**

Linux

- *Fldigi:* **www.w1hkj.com/Fldigi.html**

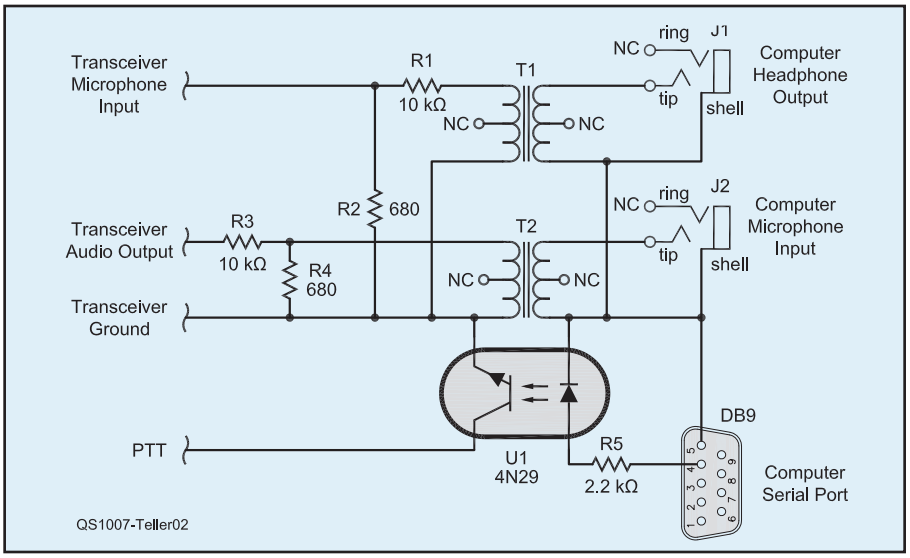


Figure 1 – Schematic diagram of the Classic Universal Interface. Vendor part numbers are shown in parenthesis. Components can be obtained from Mouser Electronics, tel 800-346-6873; www.mouser.com. Complete kits are available on a limited basis at http://home.comcast.net/~hteller/interface.htm.

DB9 — DB9 female connector (Mouser 152-3409).
J1, J2 — ⅛ inch stereo jack (Mouser 161-3507-E).
R1, R3 — 10 kΩ ¼ W resistor (Mouser 241-1-0K-RC).
R2, R4 — 680 Ω resistor (Mouser 291-680-RC).
R5 — 2.2 kΩ ¼ W resistor (Mouser 291-2.2K-RC)
T1, T2 — 600CT: 600CT isolation transformer (Mouser 42XL016-RC).
U1 — 4N29 or 4N30 Darlington optocoupler (Mouser 512-4N29M)
Enclosure — (Mouser 616-74609-510-000).

characters. T2 isolates the transceiver and computer receive audio line.

For push-to-talk, which your software conveniently handles for you, a signal from a serial port DTR line (pin 4) is fed to the DB9 connector, and then to optocoupler U1's internal LED through current-limiting resistor R5, which lights the LED if the signal from the serial port is positive. If the signal is negative, which is the default idle case for the serial port, the LED is back-biased, does not conduct, and therefore does not shine. Whenever the LED is shining, the internal transistor (in this case a Darlington-connected pair for good sensitivity) conducts, the collector is pulled to ground, and grounds the transmit-receive line to the transceiver, causing it to go into transmit. The LED is connected to the computer side of the interface, and the Darlington transistor pair is connected to the transceiver side, so the computer and transceiver are still isolated from each other. Since the LED and Darlington transistor pair are only connected by the light from the LED, there is no path for hum or noisy ground loops to travel between the computer and transceiver.

Although it is possible with some transceivers to successfully use VOX for push-to-talk switching and eliminate the need for using a serial port, to do this it is necessary to connect the interface through the microphone connector (the VOX operates via the microphone preamp and therefore will not work if the preamp is bypassed). This means you have to unplug the microphone to operate digital modes and then plug it back in again when using phone. Some transceivers, such as the FT-857 and FT-897, have "digital VOX" through the data port, which also eliminates using the serial port, but generally require isolation of both transmit and receive audio lines for stability, so this design provides that isolation.

If you examine your computer in search of a serial port, don't be surprised if you can't find one. Most computers these days do not have serial ports, but USB ports instead. If that's true for your computer, you'll need to purchase a USB to serial adapter cable to connect the interface to the computer USB port. You'll find many examples of these at **www.usbgear.com/USB-Serial.html** and other vendors.

The software included with the USB-serial adapter generates an internal "virtual" serial port that the software can then use for push-to-talk switching and the microphone can be left plugged in. (See the sidebar, "Finding Your Virtual Port."") Some newer transceivers even mute the microphone when push-to-talk is activated using the data port, eliminating the need to turn down the microphone gain when using digital modes.

Assembling the Interface

I am making circuit boards and complete kits available for this interface on a limited basis. You'll find details at **http://home.comcast.net/~hteller/interface.htm**.

If you're using the circuit board that I provide, just solder all parts as indicated by the legend on the board, using good soldering techniques and checking that there are no bridges between solder junctions. Pay particular attention to placing optocoupler U1 with the dot adjacent to the label PTT printed on the circuit board. If building from my kit, the transformers may have been mounted in place for protection during shipping, so finish soldering the six leads of each of the transformers and trimming the leads within 1/16 of an inch of the circuit board.

As you install the resistors, save the cutoff leads to use for wire tie points. Then, install the tie points. To create a tie point,

Finding Your Virtual Port in *Windows*

If your computer lacks a serial port, don't despair. You can purchase a USB to serial adapter cable and still use this interface. The only trick is determining your *virtual serial port*.

The adapter you purchase will likely come with a setup program on a CD. Run this program before attaching the adapter. The program installs a *driver* that makes it possible for *Windows* to communicate with the adapter. In a sense, the driver mimics the behavior of a serial port. That's why we call it a virtual serial port.

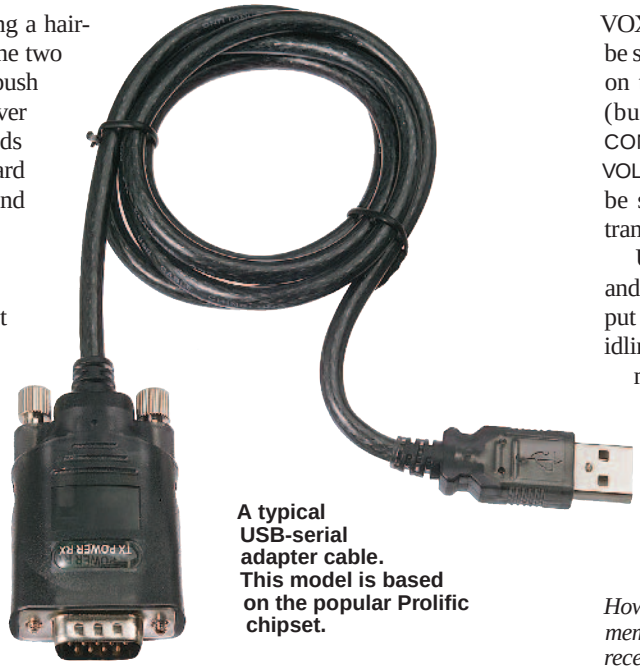
With the driver installed, go ahead and plug in the USB serial adapter. Now open the *Windows* Control Panel, SYSTEM, HARDWARE tab, DEVICE MANAGER and click on the "+" sign to expand the "Ports" section. If the USB-serial adapter is working properly, *Windows* will identify the new COM port as a virtual serial port. This is the port your software will use to key the interface. Depending on how *Windows* assigns your USB virtual port, it could be COM 6, COM 10 or whatever. Your digital software (*MultiPSK*, *Fldigi*, *Ham Radio Deluxe*, etc) will require that you enter this port number, so write it down and set up your software accordingly.

bend a cutoff lead in half, making a hair-pin shape, place both ends into the two holes on the circuit board, and push down until it is about 3/16 inch over the circuit board. Bend the leads on the bottom of the circuit board slightly apart to hold in place, and solder.

Modifying the Enclosure

After assembling the circuit board, place it into one half of the enclosure with the DB-9 connector as far forward as possible. The rear of the circuit board will not drop into place until holes are drilled in the enclosure, so use a pencil to mark the back of the case where J1 and J2 touch the enclosure and make another mark halfway between those two marks. Remove the circuit board from the enclosure and snap on the other half of the enclosure. Where the pencil marks and the parting line between the two enclosure halves meet, drill a small pilot hole and then enlarge it to ¼ inch diameter with a larger drill.

If you are using an interface-to-transceiver cable that is thinner than ¼ inch in diameter, drill the center hole to fit the cable instead. This completes the modification of the enclosure. A cable from a discarded computer mouse can be used for transceivers with mini-DIN data jacks, or half of a CAT-5 jumper cable can be used for those that use an RJ45 jack for the microphone.



A typical USB-serial adapter cable. This model is based on the popular Prolific chipset.

Wiring and Testing the Interface

With a connector to match your transceiver accessory jack or microphone jack attached to one end of the transceiver cable, cut the cable to the desired length, strip about ¾ inch and then strip ¼ inch and tin each wire of the cable. Identify which wire colors connect to the microphone input, audio output, ground, and push-to-talk line of the connector. This can be easily done by touching each of the wires to the transceiver ground (caution — do not wire any dc voltage pin to the cable!). The wire that causes the transceiver to go into transmit when grounded is the PTT line. Make a note of that wire's color. Next, touch each of the remaining wires to that PTT wire. The one that causes the transceiver to transmit is the ground wire. Make a note of the color of that wire also.

Solder the ground and PTT wires to the tie points as indicated on the circuit board legend. Unscrew the "jack screws" on the interface serial connector and plug directly into your computer serial port, or use a serial cable or USB-serial adapter cable instead. Now run the software, select the serial port you are using in the software, select DTR for push to talk, and put it into the transmit mode. The transceiver should go into transmit if the software has been configured for the correct serial port.

Plug an audio cable into J2 and the other end into the computer microphone jack. Now put the transceiver back in the receive mode and look at the waterfall display. Make sure your *Windows* audio mixer has proper "Recording" input selected — microphone, line or whatever you are using. Set that input slider to maximum.

If you are using the kit circuit board, touch each of the remaining two wires to the tie point marked XCVR EP and solder the one that causes signals or noise to be displayed on the waterfall to that tiepoint. Solder the other wire to the tiepoint marked XCVR MIC. When testing is complete, dress the cable between the two audio jacks.

Before placing the wired circuit board back into one half of the enclosure and snapping the other half on to complete assembly, test the complete assembly by plugging in one end of a receive cable into the transceiver while running the software, and plugging the other end into whichever jack produces transceiver noise on the waterfall. The other audio cable is connected to the remaining jack for transmit audio. Plug the DB-9 plug into a serial port or into a USB-serial cable if that is used.

If that is working okay, check that audio is being sent to the transceiver microphone or accessory connector for transmit. If using VOX instead of a serial port for push-to-talk, be sure to mute both LINE and MICROPHONE on the *Windows* VOLUME CONTROL panel (but *not* on the *Windows* RECORDING CONTROL panel) and initially slide both VOLUME and WAV sliders all the way up to be sure enough audio is being sent to the transceiver.

Under actual use, reduce the VOLUME and WAV sliders together until the power output decreases to half of the maximum when idling (not typing) in PSK31. Further adjustment can be made to obtain the desired power output, which, for the cleanest signal, is usually between ¼ and ⅓ of the maximum rated power of the transceiver. Set the microphone gain of the transceiver to the usual setting for using a microphone.

Howard ("Skip") Teller, KH6TY, is an ARRL member and was first licensed in 1954. He received his commercial First Class Radiotelephone license in 1959 and worked his way through college as chief engineer of several radio stations. He hold a BS degree in electrical engineering from the University of South Carolina and is retired from running a factory in Taiwan, where he manufactured the weather-alert radio he designed in 1974 and which is still sold by RadioShack and many other companies today. Skip enjoys developing digital software, such as DigiPan *and* NBEMS, *and designing VHF/UHF antennas. He is currently studying the potential of working 2 meter DX on FM using the DominoEx 4 digital mode. You can contact Skip at 335 Plantation View Lane, Mt Pleasant, SC 29464;* **kh6ty@comcast.net**.

New Products

PK-232 25TH ANNIVERSARY SOFTWARE FROM CSS

The PK-232 25th Anniversary Collectable CD from Creative Services Software includes *PakRatt* and *PkFax* for DOS, *PakRatt Lite*, *PakRatt 2.3* for *Windows*, *Pkterm '99*, *Wefax '99*, *Pacterm* and *Wefax* for *Windows*, *Radio Operations Center* for AEA/Timewave and *Wefax Ops* for AEA/Timewave. PDF manuals for all the programs are included as well. CSS has worked with Timewave to include pictures of older advertisements from AEA as well as PDFs of the AEA catalogs. The collection will only be available during 2010. Each copy will be numbered and have a certificate of authentication included. Price: $149.95. For more information or to order, visit **www.cssincorp.com**.

A Simple and Effective Approach to Station Grounding

Every station needs a grounding plan — here's one approach.

Jim Talens, N3JT

JIM TALENS, N3JT

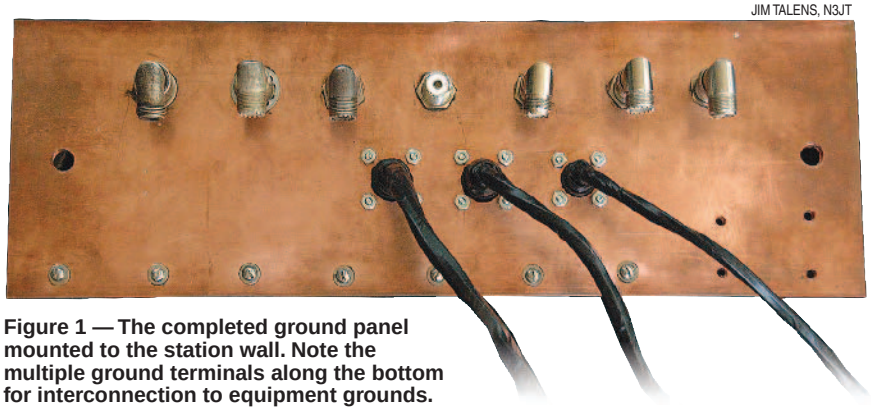


Figure 1 — The completed ground panel mounted to the station wall. Note the multiple ground terminals along the bottom for interconnection to equipment grounds.

One morning in early summer I entered the shack to check 20 meters and my e-mail but neither the radio nor the PC would turn on. A check in the garage revealed a tripped circuit breaker for the shack. I reset it and returned to the shack only to find the 35 A power supply for the HF rig had no output, the PC would not turn on, the external hard-drive did not work, the laser printer showed gibberish, the telephone company equipment for Internet and television service, including the router, was nonfunctional and an assortment of low voltage equipment produced no output. Nothing else in the house was damaged. I later found the HF transceiver's liquid crystal display was scrambled, and it had other problems. The list had grown to include everything in the shack except the HF amplifier, rotator controller and desk lamp. What had happened?

In anticipation of a predicted thunderstorm the night before, I had disconnected coaxial cables, rotator cable and other lines leading from outside into the shack. Except for the amplifier, everything remained plugged into the ac mains. During the night there had been plenty of atmospheric activity but nothing sounded particularly close.

Unplugging Antennas Isn't Enough

Inspection of the equipment revealed a sizeable weld mark on the side of the 35 A power supply where its case touched the 2 meter transceiver, which was similarly scorched. The Ethernet cable from router to PC displayed a clear connector at one end and a blackened mess at the other. It appears that a voltage surge entered the shack on a coaxial cable and had found a low resistance route to ground through my equipment and the branch ac circuit.

Recovery and Inspiration

Many computers use a logic stage on the motherboard to activate the power up procedure. A voltage spike there can easily lead to a new computer purchase, which I fortunately had been considering before events forced an early decision. The 35 A power supply was repaired by replacing all its transistors and the voltage regulator; the telephone company replaced the router and its optical network terminal, the HF radio needed factory attention and was repaired by replacing a minor printed circuit board. The overall damage tally could have easily been worse. It was clear, though, that the shack needed a single point ground system to eliminate different ground potentials for the radio gear and the remainder of the house.

Setting the Stage

A single point ground system basically assures the ground potential everywhere in the station is the same. That means linking the grounds from the radio devices, electrical system, tower and cable grounds with low impedance interconnections. First, I ran a length of #8 AWG copper wire from the basement cold water pipe to the base of the tower. Then I planted a new 8 foot ground rod outside the shack window and ran a 2 inch wide #24 AWG copper strap into the shack. A cable to the tower also connects to that ground rod.

The house electrical ground is connected at the ac entry location by connection to a house copper cold water pipe, the typical practice at the time my house was constructed. That pipe is bonded to the tower and the tower is bonded to the shack ground rods. Those rods in turn are bonded to my new copper panel, with additional connections to the grounds in the shack wall sockets (as described below). So the whole system is interconnected using the shortest possible paths.

Following professional engineering standards, I could have run a heavy copper cable around the house with multiple ground rods or even installed a screen of wires and ground rods, but there is no way to do this without laying cable under a paved driveway. The key to achieving my more practical approach involves constructing a grounding plate in the shack that provides a single-point radio ground connection along with means to quickly disconnect the radio gear from outside cables.

Panel Construction

I chose a solid piece of copper plate measuring ¼ × 6 × 18 inches as the foundation for the single point ground panel.[1] This provides sufficient surface area to accommodate a number of coaxial and other cables as well as ground connection points for

[1]Notes appear on page 41.

shack equipment and the copper strap to the ground rod outside.

I drilled holes for double female coaxial cable bulkhead connectors and holes for other connectors (rotator cable, tower antenna relays, and others). I then drilled a series of equally spaced holes along the bottom for bolts to tie equipment ground wires to the panel, as well as holes for fastening the copper strap. Even with a new carbide bit, it was a challenge to drill those large holes! [A step drill bit might work better. — *Ed.*] For the rotator and other connectors, I used the same drill bit but then used a file bit to enlarge the holes as necessary. At all connection points I used an antioxidant to prevent contact deterioration.

You can see from Figure 1 what this plate looks like. It is mounted to the wall behind the PC monitor but toward one side of the operating desk so that it is not obvious, yet remains readily accessible. It takes only a few seconds to disconnect all the gear from the antenna and other outside cables.

Preventing Bumps on Your Head

To connect the main electrical circuit in the shack to this system I ran an extension cord from the 120 V ac outlet to a metal enclosed receptacle box screwed to the top rear edge of the operating desk adjacent to the copper plate. A #12 AWG wire connects the box and plate. At the other end of the desk, near the amplifier, I did the same for the 240 V ac outlet, though there I connected the metal box with #12 AWG wire to the copper strap because the strap was close by. Another reason for mounting the outlets on the desk surface is to prevent thumping your head when crawling under the operating desk to disconnect ac plugs. Now all disconnects are done above the desk and, importantly, there is less reluctance to disconnect because there is no need to climb under the desk.

Some Parts Suggestions

Make sure you're sitting down when you shop for connectors. They are quite costly but I have identified a company that produces sturdy, round connectors that are perfect for this kind of project. They're only a few dollars each, even with the gold plated pins. See the parts list and supplier list on the QST-In-Depth Web site.[2] As noted earlier, it's not easy to drill through ¼ inch copper plate, let alone fashion square holes, so stick to round connectors. Even if you use thinner copper, use round connectors. Also, when installing pins in a connector body make sure you don't do it backwards as I did on one occasion. They are not easy to remove.

Worthwhile Finishing Touches

I now use a wireless computer-to-router and computer-to-printer systems and thus have eliminated some of the cable exposure in the shack, but there are still power cords, Ethernet and telephone cables across the house to the telephone equipment. These cables now route through high quality surge protectors.

Few hams would install the extensive and costly grounding networks needed to prevent damage from a direct lightning hit, but the probability of such a strike is very low in most parts of the country, according to IEEE reports.[3] The more common risk of induced voltage surges like the one that destroyed much of my equipment can be reduced significantly by creating a single point ground system and disconnecting cables when dangerous weather approaches. In the shack I also use high quality surge protectors for devices that remain connected to ac at all times, such as printer and router. I also use a UPS for the PC, which contains a similar surge protector. Lightning arrestors should also be installed at the coax cable entrance panel.

The Future

So will all this protect me from a future lightning strike? Your guess is as good as mine, but I am confident that the kind of arc and resulting damage I experienced recently will not happen again!

Notes

[1]I chose ¼ inch thickness because I had planned on more holes and was concerned about rigidity over time, but ⅛ or 3⁄16 inches would be more than adequate and less costly. Also, many panel mounting connectors specify a thickness limit, though for the connectors I used that was unimportant because I mounted the connectors atop the panel rather than recessed.

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

[3]R. Cohen, et al, "How to Protect Your House and Its Contents from Lightning, IEEE Guide for Surge Protection of Equipment Connected to ac Power and Communication Circuits," Standards Information Network, IEEE Press, ISBN 0-7381-4634-X (2005).

ARRL Life Member and Amateur Extra class licensee Jim Talens, N3JT, was first licensed in 1960 as KN3MNJ (and soon K3MNJ) in Philadelphia, Pennsylvania. That ham radio interest kindled a career in communications that began with a BSEE from the University of Pennsylvania and several years as an engineer with Western Union and General Electric. Jim then got his MBA and law degrees from Temple University with the intention of going into patent law. But when the FCC recruited at law school and offered him a chance to combine his ham radio, technical and legal skills in a position of considerable responsibility he figured it would be good experience for a couple of years. Twenty-two years later, after a succession of senior staff and management positions in telephone, wireless, satellite and international regulation, he became Of Counsel for five years with the law firm of Steptoe & Johnson, specializing in satellite and wireless matters.

When he is not watching out for thunderstorms, Jim keeps busy as a telecom consultant and counsel for broadcast, wireless and satellite clients. He is also a Realtor. Jim has operated from a number of locations during international contests, winning the ARRL DX Contest CW single operator category as HKØ/N3JT in 1991. He lives in McLean, Virginia and operates 97% CW. Jim has a Web site at **www.n3jt.com** *and can be reached at 6017 Woodley Rd, McLean, VA 22101 or via e-mail at* **n3jt@arrl.net**. QST

Feedback

◊ In "Easy to Make 4:1 Coreless Balun" [Apr 2010, pp 33-36], the correct year for footnote 1 is 2008.

◊ In "Having Fun with Your Tech License" [May 2010, pp 60-61], in Table 1 the column headed *DSP* should have been headed *IF DSP*, as described on the following page.

◊ In "Build an Ampere-Hour Meter for Portable Operation" [May 2010, pp 44-45], in Figure 2 the connection to pin 4 of U2 should go to the power ground, not signal ground as shown.

◊ In "Hands on Radio" [Jun 2010, pp 55-56], the original designer of the circuit in Figure 2 notes that it will not function properly with generators that do not ground the neutral winding. Most modern generators do not have a connection between any winding and ground — this must be added by the user as directed by the manufacturer to meet safety codes. For this circuit to function properly with any generator, the connection between the 12 kΩ, 2 W resistor must be to NEUTRAL on the line side of the GFCI. This allows the circuit to work regardless of grounding. Remember that applying this circuit involves connections to hazardous voltages and appropriate care should be taken to mitigate those hazards.

Capacitors — Which One to Use?

The many types of capacitors share the same symbol. How do you know which to select?

Joel R. Hallas, W1ZR

Conceptually, a capacitor is a pretty straightforward device. It consists of two conductive surfaces, or electrodes, separated by an insulator or *dielectric* medium. In operation, if a voltage is applied between the two surfaces, an electric field is formed between the electrodes within the dielectric. If the voltage is removed, the field remains until a circuit path is provided between the elements, or dielectric losses allow the charge to leak away.

As usual, the devil, or in this case the differences, are in the details. The larger and closer the electrodes, for a given dielectric, the higher the capacitance of the device and the more charge it will hold. The differences between capacitor types can be summarized by category:

Inductance — All capacitors, with the possible exception of the smallest surface mount chip capacitors, have their electrodes connected by leads. The leads act like series inductance on the way to the capacitor. This inductance with the capacitance results in a series resonant circuit. Above the resonant frequency, the capacitor no longer acts like a capacitor, but instead acts as an inductor.

Dielectric loss — Dielectrics, with the exception of a perfect vacuum, are not perfect and have some leakage. This results in losses that are generally higher at higher frequencies.

Dielectric stability — The properties of dielectrics change with temperature and age. This makes some types of capacitors less suitable for applications in which the capacitance value needs to stay stable for proper operation. In some cases, a predictable change of capacitance with temperature is part of a capacitor's properties and is used to compensate for changes in other components.

Dielectric breakdown — At some applied voltage, the two electrodes of a capacitor simulate those of a spark plug and the capacitor arcs or breaks down. This is a function of the spacing of the electrodes and the dielectric material and is reflected in the capacitor's *voltage rating*.

Capacitor Types and Applications

Air and Vacuum Dielectric Capacitors

Air dielectric capacitors are very straightforward and very useful for RF applications. They usually consist of parallel plates, often with one rotatable, to provide a variable value of capacitance. They are also seen as concentric metal or metalized glass tubes with an air space between. These can have low inductance and low loss dielectrics and are generally used in circuitry for RF frequencies. Capacitance values are in the range of a few picofarads (pF) to hundreds of pF while voltage ratings range from perhaps 100 to tens of thousands of volts. Similar structures are sometimes encountered in evactuated glass enclosures.

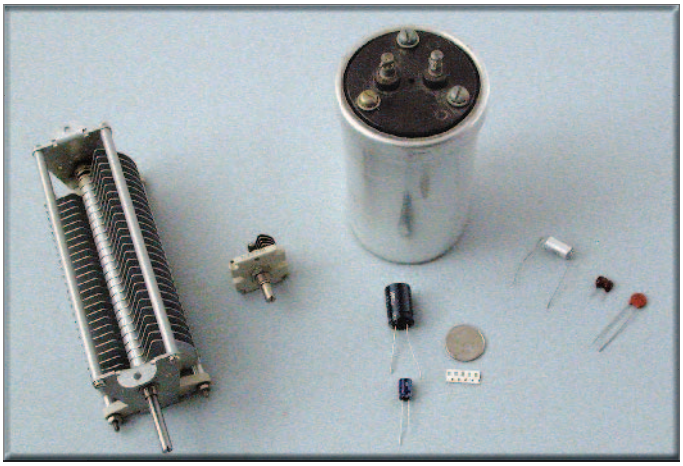


Figure 1 — Representative sampler of capacitors. On the left are two variable air dielectric units. In the center are three sizes of electrolytic capacitor. Below the US quarter is a strip of five flea size chip capacitors used for surface mounting. The three on the right are polystyrene, silvered mica and disc ceramic, from left to right.

Electrolytic Capacitors

Electrolytic capacitors are at the opposite end of the spectrum from air capacitors. These high capacitance units, typically 1 to hundreds of microfarads (µF), have considerable inductance and thus are useful at lower frequencies. They are often found as power supply filter capacitors, or as bypass capacitors in audio circuits with voltage ratings from ten to hundreds of volts. Tantalum capacitors have replaced traditional electrolytics in many applications, particularly low voltage power supply filters.

Mica Capacitors

These are made from either sandwiches of metal and thin mica, or in the case of *silvered* mica capacitors, the mica surfaces have metal deposited on them to act as the electrodes. These tend to be low loss and useful into the RF region, providing capacitance in the range of a few pF to hundreds of pF, mica and other compact units.

Ceramic Capacitors

Ceramic capacitors have been in the middle ground. They are somewhat lossy, less stable than mica, but inexpensive and able to cover a wide range of values, into the µF range at low cost and in a small package. NP0 types have good thermal stability. Ceramic capacitors make good bypass capacitors because of low inductance.

Polyester Capacitors

These units use polyester or mylar film as a dielectric with metal film or deposited metal as electrodes. They span the functionality from mica to ceramic, offering lower cost than mica and less loss, more stability and higher Q than ceramic. These have replaced both in many applications.

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

PRODUCT REVIEW

Yaesu FTDX9000MP HF and 6 Meter Transceiver

Reviewed by Norm Fusaro, W3IZ

Assistant Manager, Membership and Volunteer Programs Department

Any automobile on the market today can get you from point A to point B safely and comfortably. Similarly, any HF transceiver currently on the market can get you on the air and reliably making contacts with other radio amateurs on a variety of bands and modes.

For those looking for better performance beyond entry level radios there are competition class transceivers that boast sharp filters and high performance processors. For the discriminating radio amateur who is looking for a luxury ride with everything included, there is the premium class of transceivers. These ultra high end boxes are packed with features and exclusive circuitry designed to take your on air experiences to a new level.

Today we will test drive Yaesu's FTDX9000MP, their top of the line full size HF and 6 meter transceiver.

Some History

There are three versions of the FTDX9000. The FTDX9000D, reviewed in August 2005 *QST*, features a 200 W transmitter, internal power supply, dual receivers and a color TFT display on the front panel.[1] The FTDX9000 Contest shares features and performance with the '9000D but comes with a lower starting price.[2] You can add those options you need — the second receiver, a tunable preselector (variable RF filter, VRF) for the second receiver and a data management unit (DMU) which can drive an optional front panel TFT display or external monitor. The FTDX9000MP reviewed here puts out 400 W (or 100 W in Class A for lower distortion) and includes an external 50 V, 24 A ac power supply with speaker and audio filters. It includes the DMU, but the front-panel TFT display is optional. As with the '9000 Contest, the non-TFT version of the '9000MP has a small LCD panel, two additional meters and four additional knobs in the upper right corner of the front panel.

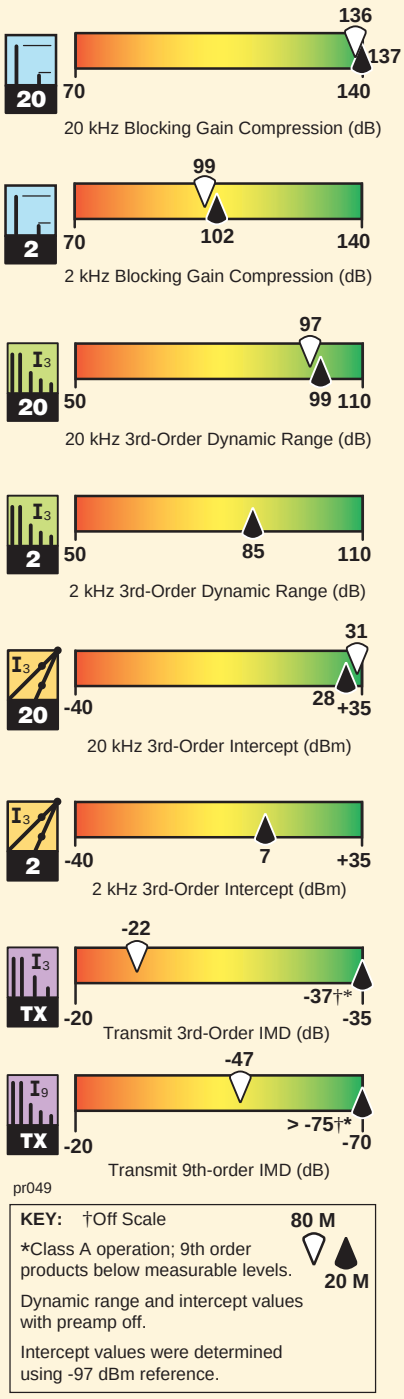
In late 2008, Yaesu announced sweeping upgrades to the original '9000 series radios. Called the Performance Enhancement Program (PEP9000), the upgrades involved changes to the radio's firmware as well as a number of factory installed hardware upgrades to as many as seven modules. (The specific modules replaced depended on when a particular transceiver was manufactured.) Current production radios received the PEP9000 upgrades, and during 2009 Yaesu arranged for existing customers to return their older transceivers for modifications at no charge.

The Yaesu FT-950 and FT-2000 series transceivers received PEP firmware up-

[1]J. Hallas, W1ZR, "Yaesu FTDX9000D HF and 6 Meter Transceiver," Product Review, *QST*, Aug 2005, pp 53-59. Past *QST* reviews are available to ARRL members at **www.arrl.org**.

[2]R. Lindquist, N1RL, "Yaesu FTDX9000 Contest HF and 6 Meter Transceiver," Product Review, *QST*, Mar 2006, pp 61-66.

Key Measurements Summary



pr049

KEY: †Off Scale

*Class A operation; 9th order products below measurable levels.

Dynamic range and intercept values with preamp off.

Intercept values were determined using -97 dBm reference.

80 M

20 M

Bottom Line

The full size FTDX9000MP is Yaesu's flagship transceiver, offering a 400 W transmitter and a full suite of features and functions. Hardware and firmware upgrades under the PEP9000 program have made the radio even better.

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

grades as well. Only the FTDX9000 series of radios received factory installed hardware upgrades, however.

The FTDX9000D and FTDX9000 Contest reviews referenced above describe in detail the '9000 series basic operating features and functions, and we won't cover that ground again. Check out those reviews, available to members on the ARRL Web site, for a full description of the radio's controls and characteristics. This review will focus on some of the changes since Yaesu made the PEP9000 improvements to their transceivers, as well as some of the features unique to the '9000MP.

Using the FTDX9000MP

About five years ago I had an opportunity to take the FTDX9000D (200 W version) home and use it during a contest for a weekend. In my comments I said that a weekend was not nearly enough time to get to know such a complex piece of equipment.

Since that time I have been able to play with and experiment with all of the HF transceivers currently in the Yaesu lineup. Each radio in the line is designed to meet the performance expectations at a given price point. Generally the controls and menus are similar among all of the current Yaesu HF transceivers, and my experience with the other radios made using the FTDX9000MP less daunting than it would have been had I just been exposed to the radio for the first time. Certainly a new user should become familiar with the layout of the controls and the operation of each feature before using the radio in a contest or other activity. I found the user manual to be a good source of information even for an experienced user. (A PDF version of the manual is available for download from Yaesu's Web site and is worth a look.)

To truly enjoy a radio of this caliber, it deserves a sufficient quantity of steel, aluminum and copper outdoors, at the other end of the coax. My antenna farm does not have acres of land with multiple towers and miles of receiving antennas, but I do have an adequate assortment of monoband Yagis, vertical arrays and dipoles to let the '9000MP stretch its legs.

The FTDX9000MP is a large and heavy radio. Before unpacking it, I used a hand truck to carry it from my vehicle downstairs to the shack. Out of the box, the transceiver weighs close to 70 pounds. It uses a separate power supply built into a cabinet that also holds two speakers. Altogether the shipping weight of both pieces is around 90 pounds. It takes up a lot of table space, too. Before uncrating the '9000MP and power supply I had to clear the desk of my existing transceiver, external speaker, rotator control, antenna switches and the furniture that housed all of this equipment on the desktop.

Once set up and powered on, the FTDX9000MP goes through an initialization process. The whirring of the stepper motors centering the mechanical preselectors along with the four illuminated meters, amber display and LEDs are very impressive indeed. It is like watching the radio come to life. I had connected an external LCD monitor to view the video output of the data management unit (DMU), which added more dazzle

Table 1
Yaesu FTDX9000MP, serial number 9I440013

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 0.03-60 MHz; transmit, 1.8-2, 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: 90-246 V ac; power consumption at 117 V input, 100 W (no signal), 120 W (signal present), 1000 W (transmit at 400 W output).	At 120 V ac input, receive 88 W (max audio); transmit, 847 W (400 W out).
Modes of operation: SSB, CW, AM, FM, RTTY, PKT.	As specified.

Receiver	Receiver Dynamic Testing†
SSB/CW sensitivity: 2.4 kHz bandwidth, 10 dB S+N/N: 160-10 meters, 0.2 µV; 6 meters, 0.125 µV; 0.1-54 MHz, 2 µV.	Noise floor (MDS), 500 Hz bandwidth: 3 kHz roofing filter: *Preamp off / Preamp on* 0.137 MHz: n/a / –121 dBm 0.505 MHz: –107 dBm / –115 dBm 1.0 MHz: –108 dBm / –120 dBm 3.5 MHz: –121 dBm / –130 dBm 14 MHz: –119 dBm / –131 dBm 50 MHz: –113 dBm / –136 dBm
Noise figure: Not specified.	14 MHz, 16 dB.
AM sensitivity: 6 kHz bandwidth, 10 dB S+N/N: 0.1-1.8 MHz, 3.2 µV; 1.8-30 MHz, 2 µV; 6 meters, 1 µV.	10 dB (S+N)/N, 1 kHz, 30% modulation, 9 kHz filter, 15 kHz roofing filter: 1.0 MHz: 3.39 µV 3.8 MHz: 1.51 µV 50 MHz: 0.85 µV
FM sensitivity: 15 kHz bandwidth, 12 dB SINAD: 10 meters,0.5 µV; 6 meters, 0.35 µV.	For 12 dB SINAD: 29 and 52 MHz, 0.44 µV.
Blocking gain compression: Not specified.	Gain compression, 500 Hz bandwidth, 3 kHz roofing filter: *20 kHz offset Preamp off/on / 5/2 kHz offset Preamp off* 3.5 MHz: 127/136 dB / 124/99 dB 14 MHz: 125/137 dB / 122/102 dB 50 MHz: 119/127 dB / 124/103 dB
Reciprocal mixing (500 Hz BW): Not specified.	Preamp on, 20/5/2 kHz offset: –114/–105/–92 dBc.

ARRL Lab Two-Tone IMD Testing

Band/Preamp	*Spacing*	*Input Level*	*Measured IMD Level*	*Measured IMD DR*	*Calculated IP3*
3.5 MHz/Off	20 kHz	–24 dBm	–121 dBm	97 dB	+25 dBm
		–12 dBm	–97 dBm		+31 dBm
14 MHz/Off	20 kHz	–22 dBm	–121 dBm	99 dB	+18 dBm
		–14 dBm	–97 dBm		+28 dBm
14 MHz/On	20 kHz	–35 dBm	–131 dBm	96 dB	+13 dBm
		–20 dBm	–97 dBm		+13 dBm
14 MHz/Off	5 kHz	–22 dBm	–121 dBm	99 dB	+18 dBm
		–15 dBm	–97 dBm		+26 dBm
		0 dBm	–67 dBm		+34 dBm
14 MHz/Off	2 kHz	–36 dBm	–121 dBm	85 dB	+7 dBm
		–28 dBm	–97 dBm		+7 dBm
		0 dBm	–45 dBm		+23 dBm
50 MHz/Off	20 kHz	–17 dBm	–113 dBm	96 dB	+31 dBm
		–13 dBm	–97 dBm		+29 dBm

Second-order intercept point: Not specified.	14 MHz, preamp off/on, +85/+83 dBm. 52 MHz, preamp off/on, +67/+67 dBm.

Receiver	Receiver Dynamic Testing†
DSP noise reduction: Not specified.	Variable, 18 dB maximum.
Notch filter depth: Not specified.	Manual notch: 61 dB; auto notch: >70 dB, attack time: 40 ms.‡
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: preamp on, 29 MHz, 86 dB*, 50 MHz, 86 dB*. 10 MHz channel spacing: 52 MHz, 98 dB.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: preamp off, 58.2 µV; 50 MHz, 29.5 µV.
Squelch sensitivity: Not specified.	At threshold: SSB, 24.5 µV; FM, 29 MHz, 1.64 µV; 52 MHz, 0.56 µV.
Receiver audio output: >2.5 W into 4 Ω at 10% THD.	2.52 W at 10% THD into 4 Ω. THD at 1 V RMS, 0.9%.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth):** CW (500 Hz): 543-1050 Hz (507 Hz); Equivalent Rectangular BW: 506 Hz (sharp); USB: (2.4 kHz): 274-2686 Hz (2412 Hz); LSB: (2.4 kHz): 281-2694 Hz (2413 Hz); AM: (9 kHz filter): 85-3160 Hz (6150 Hz).
Spurious and image rejection: 160-10 meters, >70 dB.	First IF rejection, 14 MHz, 116 dB; 50 MHz, 109 dB; image rejection, 14 MHz, 110 dB; 50 MHz, 77 dB.

Transmitter	Transmitter Dynamic Testing
Power output: 10-400 W, (10-100 W AM); 10-100 W (Class A mode, SSB).	HF: CW, SSB, RTTY, PKT, FM, typically 10-405 W; AM, typically 12-128 W; Class A (SSB), typically 115 W PEP.
Spurious-signal and harmonic suppression: >60 dB on HF, >70 dB on 50 MHz.	As specified.
SSB carrier suppression:>70 dB.	As specified.
Undesired sideband suppression: >80 dB.	As specified.
Third-order intermodulation distortion (IMD) products: –31 dB below peak output at 400 W PEP; Class A, –50 dB below peak output at 100 W PEP.	3rd/5th/7th/9th order (worst case): At 400 W PEP: HF, –22/–37/–44/–47 dB 50 MHz, –32/–45/–55/–60 dB Class A, 100 W PEP: HF, –37/–53/–66/*** dB 50 MHz, –51/–54/–60/–62 dB
CW keyer speed range: Not specified.	4 to 53 WPM.
CW keying characteristics: Not specified.	See Figures 1 and 2.
Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.	S9 signal, 38 ms.
Receive-transmit turnaround time (tx delay): Not specified.	SSB, 32 ms; FM, 42 ms.
Composite transmitted noise: Not specified.	See Figure 3.

Size (height, width, depth): transceiver, 6.5 × 20.4 × 17.3 inches; weight, 64 pounds. FPS-9000H power supply/speaker: 6.5 × 9.7 × 17.2 inches; weight, 23.1 pounds.
Price: $10,999.

†Receiver A test results shown. Receiver B had virtually identical test results. Two-tone testing was performed with the bandwidth set to 500 Hz and the 3 kHz roofing filter. ARRL Lab Two-Tone IMD results are shown 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.
‡The automatic notch filter was capable of notching two tones but took 30 seconds to do so.
*Measurement was noise-limited at the value indicated.
**Default values; bandwidth and cutoff frequencies are adjustable via DSP. CW filter varies with PBT and Pitch control settings.
***9th order products in Class A were below measurable levels.

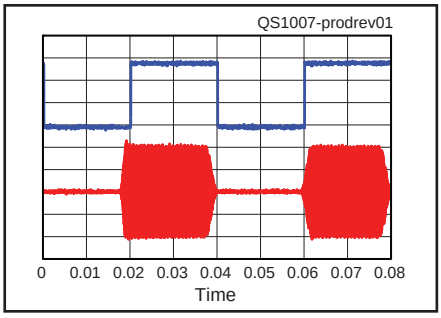


Figure 1 — CW keying waveform for the FTDX9000MP showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. (Note that the first key closure starts at the left edge of the figure.) Horizontal divisions are 10 ms. The transceiver was being operated at 400 W output on the 14 MHz band.

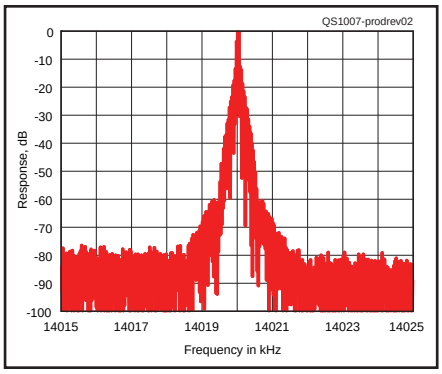


Figure 2 — Spectral display of the FTDX9000MP transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 400 W PEP output on the 14 MHz band, 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.

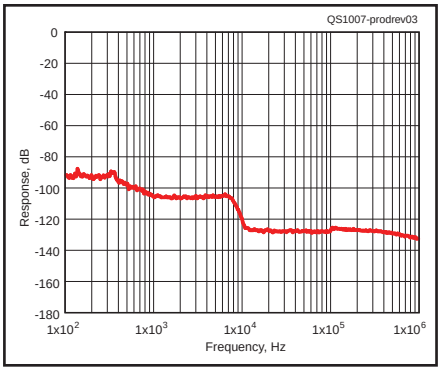


Figure 3 — Spectral display of the FTDX9000MP transmitter output during composite-noise testing. Power output is 400 W on the 14 MHz band. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 100 Hz to 1 MHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.

to the visual kaleidoscope. (More on the DMU later.)

The front of the radio is well populated with knobs and buttons. The commonly used knobs are full sized and very easy to reach — one of the benefits of the big cabinet. My operating position is very well illuminated, but at times I found myself using auxiliary lighting to enable me to read some of the labels on the smaller controls. This was especially true while using the DMU. It might have been easier to see the buttons had

the radio included the optional TFT display screen, which helps illuminate the buttons grouped around the display.

Making a Good Thing Better

A feature shared among the FT-950, FT-2000 and FTDX9000 series of Yaesu transceivers is the ability to upgrade the radio's software when a new version is released by the company. The upgrade files are downloadable from Yaesu's Web page and easily installed by the user using the CAT (computer aided transceiver) connection from transceiver to computer. The most current software version includes all previous changes, so only one download is required to have the most up-to-the minute functionality.

Prior to the PEP9000 enhancements, most of the software changes had been minor and addressed some nits that users were experiencing. PEP9000 included major improvements in the operating system and DSP section of the transceivers. The new firmware included improvements to the noise reduction, notch filter, AGC, DSP bandwidth filter characteristics, SSB speech processor, CW sidetone, band scope and CAT operation.

It is almost like getting a new radio after the PEP upgrade. The first thing I noticed when I powered up the FTDX9000MP was how quiet the receiver was. Operating CW was a real treat. One nice feature is the contour control, a circuit designed to enhance the desired signal. This worked very well, in my opinion, even before the PEP upgrade. After the PEP upgrade the contour control now has a CW only feature that can be engaged by holding the contour button for about a second or two. When activated the contour acts like a super duper ninja CW filter that makes the desired signal sound as if it the only signal on the band.

The digital noise reduction (DNR) is a DSP feature that allows the user to select 15 different levels of processing that best suit the band and noise conditions at the moment. The DSP circuitry uses different algorithms to process the signal. Prior to the upgrade it was hit or miss as to which level you were selecting while turning the DNR control. After the PEP upgrade the DNR levels are momentarily displayed on the large display and the processing has been improved quite a bit. The DNR can make the average white noise on a band almost disappear, improving the signal-to-noise ratio for clearer reception.

Figure 4 — Close-up of the main tuning knob and controls. The small display to the right shows the frequency of the selected VFO, as well as antenna, roofing filter and bandwidth settings for both VFOs and graphical representations of current roofing filter, bandwidth and shift settings.

Two Receivers

The FTDX9000MP boasts two identical receivers capable of independent operation on two separate bands, making it possible to operate a contest SO2R (single operator two radio) with a single transceiver. This style of operating is useful to contesters for gathering multipliers on one band while CQing and running stations on another. The manual strongly urges some station testing and the use of high quality bandpass filters or coax stubs before attempting to operate the transceiver in this configuration.

Neither my station nor my brain is set up for SO2R operation, but I was able to use two antennas and a bandpass filter to experiment with receiving on one band while transmitting on another. This feature worked as stated. A great deal of station planning is required for anyone who is serious about operating SO2R, and the FTDX9000MP could be the foundation for such an operation.

There are separate controls for each receiver, which helps explain the abundance of knobs on the front panel. Each receiver has its own AF GAIN, RF GAIN, IF SHIFT and so on. All of these controls make the receivers completely independent of each other, almost like having two radios in one box.

ARRL Lab testing (Table 1) showed that the performance of both receivers was essentially identical, within 1 dB of each other for virtually every test. Overall, receiver performance is very similar to our Lab test results for the FTDX9000D and FTDX9000 Contest and is still quite good, considering that the '9000 series was introduced to US amateurs at the 2004 Dayton Hamvention.

In the intervening six years, other transceivers — including Yaesu's new FTDX5000 — have raised the performance bar, particularly in the IMD dynamic range and blocking tests performed at 5 kHz and 2 kHz spacing. The latest radios make use of narrow roofing filters or software defined radio (SDR) technology to deliver strong dynamic performance at very narrow signal spacings. With blocking gain compression above 120 dB and third order IMD nearly 100 dB at 20 and 5 kHz spacings, the FTDX9000MP is no slouch, and many users will not be able to tell the difference between its receiver and a newer model.

That 400 W Transmitter

While the other versions of the FTDX9000 offer 200 W output, the 'MP doubles that to 400 W and requires an external 50 V power supply. If you're using a linear amplifier, the extra power may not be important to you. Most current amplifiers require 50 to 100 W drive to reach legal limit. A lot of operators like to run barefoot, though, and the extra 6 dB of signal strength compared to the typical 100 W transceiver makes a noticeable difference in pileups or tough conditions.

In common with the other FTDX9000 versions and the FT-2000D I reviewed in October 2007 *QST*, the '9000MP can be operated in Class A at lower output.[3] The 'MP can deliver up to 100 W in Class A, compared to 75 W for the other radios. Although operating Class A runs the final transistors a bit warmer than normal, amplification is more linear with lower distortion products on the output signal. That means a cleaner signal to drive an external amplifier or to use directly on the air.

Table 1 shows transmitter IMD products on the worst case band (10 meters for the 400 W tests and 160 meters for the 100 W Class A tests). The 10 meter IMD products are much worse than the other bands, and not typical of the radio's performance. Elsewhere, performance is much better, and is excellent compared to many radios we've reviewed in the past few years. Excluding the worst case bands, at full 400 W output the 3rd order IMD products averaged –36 dB, and for Class A at 100 W they averaged –46 dB. Yaesu engineers provided 10 meter IMD tests for another FTDX9000MP that were nearly 10 dB better. They indicated that on 10 meters the transceiver is more sensitive to ALC threshold and mic settings, but that our test results indicate the review unit was likely was out of alignment or had a defective component.

[3]N. Fusaro, W3IZ, "Yaesu FT-2000D HF and 6 Meter Transceiver," Product Review, *QST*, Oct 2007, pp 65-71.

Power Supply and Speaker

The included FPS-9000H houses the 50 V, 24 A power supply, two 4 inch speakers, headphone jacks and two audio filters. The left speaker is for audio from the main receiver (VFO A), and the right speaker is for the sub receiver (VFO B).

With the MUTE A and MUTE B switches, you can shut off audio from either receiver. Pressing the OUTPUT switch combines the two speakers. This produces better sounding audio if you're listening to one receiver at a time. Headphone jacks provide a similar function. The A/A+B jack supplies audio from the main receiver, or a mix of both receivers if OUTPUT switch is pressed. The B/A+B jack works similarly with audio from the sub receiver.

Separate audio filters work with the main and sub receiver output. Each filter has two LOW CUT settings to attenuate audio below 300 Hz or 500 Hz, and three HIGH CUT settings to attenuate audio above 700, 1000 or 2400 Hz. The filters can be switched in or out and adjusted independently.

Eye Candy

The FTDX9000MP includes the data management unit (DMU) standard on the '9000D and optional on the '9000 Contest. You can view the DMU output on a display built into the front panel as on the '9000D (for the 'MP this is an $1100 option if ordered when the radio is purchased). Or you can do what I did and hook up an external LCD computer monitor.

I will restate a point made in one of my previous reviews: the data management unit (DMU) appears to be a flashy toy designed to amuse the operator. The unit cannot be controlled via keyboard/mouse and relies on using multifunction buttons on the front of the transceiver.

The DMU is limited as an operating tool. It includes a provision for logging contacts, but the logger is limited to 500 QSO entries. That number is easily reached in a few hours during any serious operation, and I much prefer computer software designed for operating, logging and station management. A personal computer and appropriate software is required to send or receive RTTY signals or other digital modes with the FTDX9000MP. The world clock feature keeps accurate time.

The band scope on the DMU has a substantial delay. I could hear a CW note in the headphones for what seemed like a full second before seeing the spike on my LCD monitor. In addition to viewing received signals processed through the IF stage, you can also see a waveform for the transmitted signal of the FTDX9000MP. Realizing that the DMU is not a calibrated test monitor, I did however notice that the pattern for the transmitted SSB signal on 10 meters had more noticeable peaks on either side of the main signal. This was confirmed during ARRL Lab transmitter IMD testing.

Summary

Overall the FTDX9000MP is a good looking, big, self contained, SO2R capable radio that sounds great on the air and hears incredibly well. It's an elite class amateur transceiver loaded with outstanding receiver tools, and can be easily upgraded anytime new firmware is released by the manufacturer. The two capable receivers backed up by a 400 W transmitter, four antenna outputs, receive antenna inputs and the ability to control a Yaesu antenna rotor in one package makes a sweet desktop station that would satisfy the discerning operator.

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

Elecraft W2 HF/VHF/UHF Wattmeter

Reviewed by Larry Wolfgang, WR1B
Senior Assistant Technical Editor

"The Elecraft W2 is a versatile autoranging RF power and SWR meter that utilizes remote sensing. Up to two remote sensors can be attached, with various power and frequency ranges available." So begins the *W2 Owner's Manual* (12 sheets of 8½ × 11 inch paper, printed on both sides and stapled in one corner). This sounds like a handy accessory to any Amateur Radio station.

The W2 is available either as a kit or a fully assembled and tested unit. There are three remote sensors available for the W2: 1.8 to 54 MHz sensors are available for powers from 0.1 to 200 W and 1.0 W to 2 kW and a 144 to 450 MHz sensor for 0.1 to 200 W. The basic W2 comes with your choice of one sensor. You can order additional sensors with your W2 or add them at a later date. We purchased the 2 kW HF sensor and the 200 W VHF/UHF sensor. Each sensor comes with a 5½ foot, 8 conductor Ethernet (CAT5) cable with RJ45 connectors on each end to connect the remote sensors to the W2. There is no assembly or calibration procedure required for the sensors.

The W2 comes with a serial cable to connect the wattmeter to a 9 pin serial port on your computer. (If your computer only has USB ports, the KUSB adapter is available for $39.95. You can also find USB to serial port adapters and even components to build your own from a variety of computer sales sources.) The W2 also comes with about 2 feet of red and black zip cord power wire with a coaxial power plug on one end. You will add the appropriate connectors for your power source on the other end.

Bottom Line

Elecraft's easy-to-build W2 wattmeter kit results in an accurate instrument that can be used over a wide range of frequencies and power levels.

Some Assembly Required

It's no secret that I really enjoy building things, so you should not be surprised that I requested the kit version of the W2 for this Product Review. The W2 kit came in a small box containing two fully assembled and tested circuit boards and an assortment of aluminum cabinet pieces. See Figure 5. This kit

Figure 5 — Here the W2 pieces are laid out on a workbench for inventory.

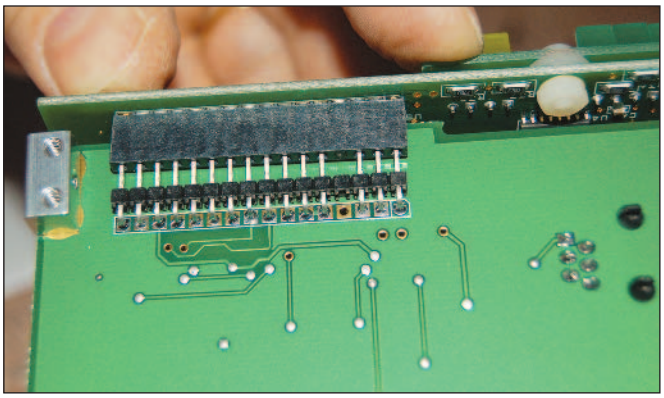


Figure 6 — The display board plugs into the main circuit board using 16 pin in-line connectors. You can see one of the 2-D fasteners attached to the main circuit board in the top left corner.

will not tax the electronics project assembly skills of even the least experienced builder! The assembly process is all mechanical, and only basic mechanical skills are required.

The *Owner's Manual* lists the required tools as no. 0 and no. 1 size Phillips screwdrivers and a pair of needle nose pliers. I would add a nut driver or small wrench instead of the pliers, and a piece of sandpaper or other means of removing paint from the chassis pieces where connectors will be installed. The *Manual* also suggests an electrostatic discharge wrist strap and static dissipating work pad.

The assembly process took me about 3 hours, including the time to read the entire *Manual*, inventory the pieces and do the mechanical work. Elecraft's instructions are clear and well illustrated. There is a box to check as each step is completed. Small *2-D fastener* blocks attach to the main circuit board and some chassis pieces to hold the circuit boards and cabinet together.

The assembly instructions tell you to remove the paint in an area around the inside of the chassis pieces where these fasteners will attach. This is to ensure a good electrical connection for proper RF shielding. A small piece of fine sandpaper or steel wool should do the job nicely. I happened to have my Dremel tool out for another project, so I chucked a small wire brush into that and gently cleaned the paint away from the mounting holes. Caution: All of the mounting locations are on the inside of the chassis. Do not remove paint from the outside of any chassis pieces!

The extent of the "electronics assembly" for this kit is plugging the display circuit board into the main circuit board, via 16 pin mating in-line connectors. See Figure 6. The cabinet pieces attach to the 2-D fasteners, and the project is complete.

The W2 has front panel push buttons for power ON/OFF, SENSOR selection and power RANGE. LEDs indicate the selected power range as 2 W, 20 W, 200 W or 2 kW. The AUTO LED will also be illuminated if you have selected the automatic power range setting. Forward power is displayed using a row of 17 LEDs, indicating 1 through 15, 17 and 20. You will have to interpret the decimal point for the reading, depending upon the selected power range. A pair of LEDs indicate whether you have selected sensor 1 or sensor 2. The SWR is indicated by a row of 13 LEDs. The first seven LEDs indicate SWR values from 1:1 to 1.7:1. The next two LEDs (yellow) indicate SWR values of 2 and 2.5. The last four LEDs (red) indicate SWR values of 3, 3.5, 4 and 5:1.

You can turn the peak power hold function on or off by tapping the SENSOR and RANGE switches simultaneously. With peak hold turned on, the highest power LED will remain on for 1 second while the lower value LEDs will continue to indicate the average power.

The rear panel includes two RJ-45 connectors for the sensor connections, a coaxial power connector, and a ⅛ inch stereo remote signaling connector, which provides a +5 V signal that drops to ground if the SWR alarm goes off. A pair of phono jacks provide a remote PTT control. This relay switched loop

Table 2
Elecraft W2 Wattmeter

Frequency range	1.8-54 MHz, 144-450 MHz (HF, VHF/UHF sensors).
Power range	20/200/2000 W (high power sensor), 2/20/200 W (low power sensor).
Power requirement	9-16 V dc.
Current consumption:	46-72 mA (minimum brightness), 102-360 mA maximum brightness) at 13.8 V dc.
PEP measurement	Active

Indicated Forward Power	**Actual Power Applied to Sensor***					
Frequency (MHz)	*2*	*14*	*28*	*50*	*144*	*432*
1 W CW	–	–	–	–	0.94	0.90
1 W 50%	–	–	–	–	0.95	0.95
10 W CW	10.5	10.5	10.5	10.7	9.0	9.0
10 W 50%	10.5	10.6	10.5	10.7	9.0	9.0
100 W CW	99	100	99	102	92	92
100 W 50%	103	104	102	108	92	92
100 W Two-Tone	–	117	–	–		
1 kW CW	940	940	960	1000		
1 kW 50%	1010	1010	1000	1038		
1 kW Two-Tone	–	1040	–	–		
SWR Accuracy**						
1:1 SWR	1.0:1	1.0:1	1.0:1	1.0:1	1.0:1	1.2:1
2:1 SWR	1.7:1***	1.7:1***	2.0:1	2.0:1	2.0:1	2.0:1
Insertion Loss (dB)	<0.1	<0.1	<0.1	<0.1	0.16	0.46

– Not measured.

* Power levels needed for the indicated forward power.
**SWR indicated by meter LEDs.
***Front panel 1.7:1 LED is illuminated. The W2 Interface Program indicates 1.86:1 SWR at 2 MHz and 1.92:1 SWR at 14 MHz.

through can be used to disable a transmitter or amplifier for high SWR protection, if the SWR alarm is set.

First Impressions

I connected the HF remote sensor between the RF output of my K2 transceiver and my antenna, connected the remote sensor and power cables to the W2 and was ready to make some measurements. The *Owner's Manual* did not mention any calibration procedures, so I took a few readings with several output power levels from my K2 transceiver. Since that Elecraft radio has a fairly accurate output power adjustment, with a display of the selected output power as the control is turned, I was quickly able to compare the radio and W2 settings from 1 W to 100 W.

One of the first things you will notice as you try to read the output power on the W2 is that the display is "digital," in that an LED is either on or off. So with the radio set for an output power of 50 W, the W2 was reading 40 W on the 200 W range. With a slight tweak of the K2 power control, I was able to toggle the 50 W LED on. For that example, the K2 was telling me it was producing 52 W. I also quickly took a series of SWR readings across the 15 and 10 meter bands with my Yagi and a few more across the 75/80 meter bands on my dipole. I didn't plot graphs, but the results were about what I expected.

Lab Testing

I brought the W2 into the ARRL Lab for Bob Allison, WB1GCM, our Lab Test Engineer, to perform the official testing. Bob developed a revised test procedure for the W2 as compared to previous wattmeter tests.[4,5] The normal procedure would be to transmit with a specified power and record the meter reading. Because of the "digital" readout on the W2, Bob adjusted the transmitter power until the W2 appropriate LED just toggled on. Table 2 shows the final test results. The W2 power readings are in the left column, with the actual applied power recorded in the body of the table. This seemed to be the best way to present the W2 measured data.

When Bob first measured our W2, he noticed that with the VHF/UHF sensor, the unit would not properly display low power levels. On the 2 W range, readings toggled from 0 to 1.7 W while slowly increasing the transmitter power.

To test the SWR measurement, Bob used a 50 Ω resistive load for the 1:1 impedance match and a pair of loads in parallel to create a 25 Ω resistive load for the 2:1 test. Bob noticed that our W2 was reading 1.7:1 SWR for all of his 2:1 measurements.

Firmware Updates

It was about this time that I checked the Elecraft Web site and discovered there had been three new firmware versions since our W2 was shipped. I downloaded the updates (the latest was version 0.96 in early February) as well as the W2 utility program used to install the firmware updates to the W2. With the serial cable connected between the W2 and my computer, it only took a few seconds to copy the new firmware and update the meter.

When I read the release notes, I discovered that those updates covered the problems we were having with the VHF sensor low power readings. Several new features had also been added, including a power calibration factor that can be changed to "tweak" the wattmeter readings when compared with a known wattmeter or a carefully calibrated power source.

The utility program does much more than simply install updated firmware, however. There are numerous commands, with appropriate responses from the W2. I don't have space here to describe them all, but a few will be of particular interest. Aside from pressing the POWER button, you can control all of the W2 settings from the program. Typing an F on the command line returns the current forward power reading! Now instead of those somewhat coarse steps between lighted LEDs, you can read the power to one or two decimal places, depending on the power range. Typing an R returns the reflected power reading. (There is no way to read reflected power from the LED display on the W2.) Typing S returns the SWR reading. These commands return the values being measured by the W2 when the command is sent, so you will have to type the commands while the transmitter is keyed.

Next I experimented with the calibration factor. Elecraft sets the value to 500 for each sensor. By typing a + or – you can adjust that factor up or down in unit steps. The < and > keys will increase or decrease the calibration factor by 5. So how close could I make the W2 compared to my K2? With a factor of 545 on our HF 2 kW sensor, I recorded the following forward power values for the obvious K2 power output values: 9.79, 19.4, 50.3 and 99.6 W.

Note that the data in Table 2 represents the readings as taken from the meter LEDs, not the software, which offers higher resolution. The data was taken with the factory calibration factors, and not with my adjusted factors.

There still seemed to be a problem with our 2:1 SWR measurements, so we sent a copy of the data table to Elecraft for comments. They discovered an error in the way SWR was being calculated, and sent us new firmware. Sure enough, problem solved. The meter now reads 2:1 SWR or very close with the 25 Ω load connected.

During one last check of the Elecraft Web site as I wrapped up this review, I discovered the *W2 Interface Program*. This program actively scans the W2 and displays the information on your computer screen. There is no need to type commands to read forward and reflected power and SWR. Onscreen buttons allow you to set all of the W2 operating parameters, as well.

Whether you are looking for a quick indication of your output power and SWR or need to make accurate forward and reflected power and SWR measurements, the Elecraft W2 can fill the bill. The remote sensing wattmeter is the perfect match to your Elecraft K2, K3 or any HF/VHF/UHF radio. Expect new features to be added to the firmware and the *W2 Interface Program*, making this meter an even more versatile station accessory.

Manufacturer: Elecraft, PO Box 96, Aptos, CA 95001; tel 831-763-4211; **www.elecraft.com**. W2 kit: $229.95, factory assembled and tested: $289.95; additional directional couplers: $99.95 each. QST

[4]B. Allison, WB1GCM, "*QST* Compares Analog HF/VHF Wattmeters," Product Review, *QST*, Mar 2009, pp 46-49.

[5]The ARRL Lab can now test power meters at high power levels on 6 meters, thanks to Lou Parascondola, W1QJ. Lou converted the Lab's Heathkit SB-220 amplifier for 6 meter operation only. This amplifier can now be used for lab testing as well as providing our HQ staff station, W1HQ, with a legal limit output signal on 6 meters. Lou repainted the cabinet, relabeled the knobs and added several nice modifications to the amplifier. The ARRL Lab thanks Lou for the donation of his time and expertise.

Strays

QST congratulates...

◊ARRL HQ receptionist Penny Harts, N1NAG, who has been awarded a Doctor of Divinity degree from Dussault University, Columbia, South Carolina.

◊Bob Locher, W9KNI, author of the recently published book *A Year of DX* (**www.idiompress.com/yearofdx.php**). His previous book is *The Complete DX'er*.

◊LTC Thomas J. Schwab, W4TJS, who was recently promoted to Lieutenant Colonel. An ARRL member, Tom serves as the Senior Signal Trainer/Mentor at the US Army Joint Readiness Training Center at Fort Polk, Louisiana. — *Dennis Griffin, W4DG*

I would like to get in touch with...

◊other CLOVER operators for some experimentation. — *Rabbi Cy Stanway,* **rabbi@bethmiriam.org**

◊others with hearing problems who have overcome the difficulties of hearing on the air. — *Marco Thorne, KF6SXZ, 4325 W Overlook Dr, San Diego, CA 92115*

TECHNICAL CORRESPONDENCE

KEEPING CURRENT WITH ANTENNA PERFORMANCE (FEB 2009)

For some time I have considered building a clamp-on RF current monitor for things like measuring balun effectiveness and general testing around the shack. I enjoyed the article on antenna current measurement by Eric Nichols, KL7AJ, in the Feb 2009 issue of *QST*. I also saw the follow up by Allen Wolff, KC7O, in the Aug 2009 Technical Correspondence column and the article by Paul Danzer, K1II, in the Sep 2009 issue of *QST*. Something in each of these articles, however, didn't seem quite right to me.

Though an EE with considerable RF experience, I haven't worked with RF current transformers. Therefore, I consulted with Paul Weber, WD9P, did some research and even talked to one of the commercial current monitor manufacturers, all to validate my gut feel on this.

A home-brew clamp-on type transformer may not behave precisely like an ideal transformer, but the ideal should be a good starting point for discussion and analysis.

For current measurement, we don't want any more resistance than necessary to be inserted into the circuit under test. Starting with general characteristics of an ideal transformer, we know that the power in the secondary is equal to the power in the primary. We also know that the voltage is proportional to the turns ratio and, therefore, the current is proportional to the inverse of the turns ratio. Working through all the numbers, we can show that the impedance or resistance is transformed proportional to the square of the turns ratio. The resistance inserted into the feed line is equal to the load connected to the secondary divided by the turns ratio squared.

When a transmission line passes through the center of a toroid core, that forms a single turn. Every time the wire passes through the center, that is one turn on the core. The wire does not have to form a "loop" around the edge of the core to make one turn.

With, for example, 12 turns on the secondary of a clamp-on bead, the turns ratio is 1:12 and the impedance reflected back to the primary will be $\frac{1}{144}$ of the load. With a 50 Ω load (also called "burden") as Allen used, this reflects $\frac{50}{144}$, or 0.35 Ω into the transmission line. This is certainly low compared to a 450 Ω ladder line and also is acceptable for a 50 Ω coax. This value of series resistance would have little effect on the normal operation of the line.

What caught my eye was in Eric's last section ("The Toroid Way" page 36) regarding using only an oscilloscope, which is typically a high impedance. Though the transformation will certainly not follow the ideal in this case, starting with the ideal, we see that a 1 MΩ scope input will be transformed to 6944 Ω. This is an extremely high value, so most likely it will look like some high impedance, not at all different from the bead alone. This is not good to insert into a transmission line. A current transformer needs a low impedance load; low, of course, being relative to the transmission line impedance after it is transformed through the clamp-on transformer.

As a suggestion for Allen's version, I would recommend replacing the three-resistor 50 Ω pad at the SWR meter end of the coax with only a 50 Ω resistor to match the coax. Then, use a single resistor on the clamp-on transformer secondary, in parallel with the secondary and coax. Since this end does not require a matched source for the coax, it can be whatever value gets the voltage down to the same level at the SWR bridge. This then, lowers the impedance on the secondary and, therefore that which is inserted into the transmission line. I see that Allen's attenuator is about 20 dB (19.08 dB and has a 41 Ω input/output impedance). I used the calculator at: **chemandy.com/calculators/matching-pi-attenuator-calculator.htm** to verify these values.

To achieve that reduction by decreasing the 50 Ω load in Allen's circuit, a resistor of 5.0 Ω will be close. Since this is $\frac{1}{10}$ of 50, the voltage developed across it is $\frac{1}{10}$, giving the same 20 dB as his attenuator: $-20 \times \log (Va / Vb)$.

So, remove one shunt 51 Ω resistor and the series 250 Ω resistor (Aug 09 *QST*, Fig 3 p 53) and put a 5 Ω resistor across the 12 turn secondary, along with the coax. This gives a much lower impedance inserted into the transmission line of $\frac{5}{144}$ or 0.035 Ω. Yes these are all "ideal" numbers, but if the core performs well, these numbers should be close to the truth.

Ideal characteristics of a transformer are a good place to start, but comments on some non-ideal, real-life characteristics are in order. Several other factors affect the real-life behavior of a current transformer. Although it can get very complex, here are some of the basics.

Coupling Between Primary and Secondary

When there is less than ideal coupling, less energy is transferred to the secondary. This means that the primary (the coax) has less energy extracted and it is, therefore, affected less. The result is that the series resistance transferred to the coax won't be as high as the ideal. Remember, reducing an added series resistor affects a circuit less. A longer core will tend to couple more to the secondary, therefore, a shorter core will tend to couple less.

Unfortunately, even if the magnetic coupling to the secondary is poor the clamp-on core is still around the conductor. A core around a conductor will introduce a combination of inductance and resistance into the transmission line. Therefore, the series impedance introduced can be higher than the transformer calculations predict. This effect can dominate and increase the inserted resistance above the calculated value.

One of the factors affecting coupling is the core permeability. A higher permeability concentrates the magnetic lines more and improves coupling, so a higher permeability is better. The size or inner diameter of the core may or may not affect coupling, depending on several factors.

Loss

One obvious result of loss will be that the output from the secondary won't be the ideal, so that you will not have an accurate representation (a known fraction) of the true current. This can also heat the core and if taken to excess can change the core characteristics.

Both the lower than ideal coupling and the loss mean that while the output does not follow the ideal, it still provides a relative current indication. Looking for maximum or minimum is still valid. So comments that the core type is of little importance are, for the most part, correct.

Saturation

There is a limit to how much magnetic field you can cram into any core. It reaches a limit called "saturation." When the core saturates, it can't couple any more to the secondary so no further increase can be measured.

SWR

One final factor that should be understood is the effect of SWR. As explained in Eric's article, tuning for maximum current anywhere along the line is adequate because it increases and decreases proportionally everywhere, including at the antenna. With something other than a 1:1 SWR, however, the current is not the same at every point along the line, but varies and repeats every half wavelength. This is the "Standing Wave" that forms due to the forward and reflected waves either adding in phase (constructive interference), or subtracting out of phase (destructive interference) at places along the line. Because of

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Figure 1 — This photo shows my MFJ 269 SWR analyzer measuring a 47 Ω resistor at 1.8 MHz. The readout shows a resistance value of 46 Ω and a reactance value of 2 Ω. A standard 50 Ω test load, along with two current transformer secondaries and a T-line section are shown on the side.

Figure 2 — Here is a close-up view of the 47 Ω resistor in the test fixture.

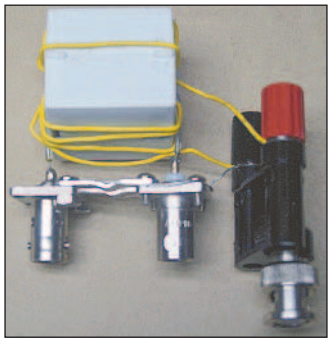


Figure 3 — This photo shows my secondary output test fixture.

this, the location of the current transformer determines the absolute level of current being measured. This might cause some confusion for an antenna system that is used on several bands. The location of the standing wave current maximums and minimums on one band will not necessarily be the same on another band. As a result, the reading obtained, when everything is tuned, can be considerably different from band to band even though the same amount of power makes it to the antenna. Again, while the absolute value may be different, the maximum occurs everywhere on the line at the same tuning.

Looking for some numbers, I found that Ian White, GM3SEK, appears to have made some measurements that show the inserted resistance to be in the range of 2 Ω (14 MHz) to 4 Ω (29 MHz).

I made some measurements with an MFJ 269 analyzer using a 1 inch square by 1.25 inch long clamp-on core of unknown material between 1.8 and 29 MHz. This core alone measured 46 Ω real, 9 Ω reactive at 1.8 MHz and 111 Ω real, 123 Ω reactive at 30 MHz.

To keep the MFJ analyzer in the region of best accuracy, I measured the change in impedance of a 47 Ω resistor that was caused by adding the transformer. This was with an 8 turn secondary (the piece of wire I picked up would only do 8 turns) and a 50 Ω secondary load (burden). It showed about 1 to 2 Ω increase, for a calculated value of 0.8 Ω. The value at 53 MHz was similar as well.

It is better to have the secondary grounded on one end directly to the coax ground. This makes the secondary act like a partial shield, thus better retaining the coax-like structure as it passes through the core. Out of curiosity, I shorted the secondary and was unable to see any difference from the 50 Ω load.

To verify that the power delivered by the secondary was correct, I used my TS-2000 at 50 W for 1 A of current. The secondary output was within 2 dB of the calculated value of 29 dBm at 1.8, 14.3 and 29 MHz. Since it also looked good with the MFJ analyzer on 6 meters, I checked the output there. It was about 3.5 dB higher on 6 meters, but that may have been because I hadn't planned to go that high and didn't take more care in construction. Figures 1 through 3 show my measurement setup.

As a side note, I happen to be one of the lucky ones with a real thermocouple-type RF ammeter. It looks okay except for the missing glass (suggestions for obtaining a replacement are welcome). The dc resistance of this General Electric, IS-178 3 A RF ammeter is in the vicinity of 0.07 Ω. Realizing that any ampere is as good as any other ampere, I hooked it up to a dc power supply and dialed in 1 A. Sure enough, 1 A is what it read; as well as the lower values lining up very well.

Here are some references to information on the Internet.

Douglas McNutt's paper on Current Measurement, Sections 38.7 and 38.8: **www.autex.spb.ru/download/wavelet/books/sensor/CH38.PDF**

Page 5 of: **ftp://ftp.macnauchtan.com/Theory/Current.pdf**

Measuring RF Power, Electronics World 1999 **techdoc.kvindesland.no/radio/measurements_simple/20051021152350051.pdf**

Article by Ian White, GM3SEK, with information on the inserted resistance: **http://www.ifwtech.co.uk/g3sek/clip-on/clip-on.htm**

A construction and information article by Tom Rauch, W8JI:**http://www.w8ji.com/building_a_current_meter.htm**

A construction and information article by John Andrews, W1TAG: **http://www.w1tag.com/RFA.htm**

Measuring Tower current by Rudy Severns, N6LF: **rudys.typepad.com/files/current-transformer-2.pdf**

A detailed account from David Knight, G3YNH: **www.g3ynh.info/zdocs/bridges/appendix/a6-1.html**

A clamp-on current sampler by Lyle Koehler, KØLR: **www.nutstreet.net/k0lr/currprob/currprob.htm**

I calculate that Koehler's version inserts about 7 Ω into the primary, which is rather high for monitoring 50 Ω coax current, but may be fine for general RF current sniffing.

There are several manufacturers of very accurate RF current transformers, and the cost can easily get into the thousands of dollars. If you do further research, please note that some commercial units include an internal secondary load and others do not. Fischer: **www.fischercc.com/**. Look in Products. ETS-Lindgren: **www.ets-lindgren.com/**. Look in: Products > Probes > EMC. Pearson: **pearsonelectronics.com/**. Look in Products. Bergoz: **www.bergoz.com/**. — *73, Steve Noskowicz, K9DCI, 4019 W Lake Shore Dr, Wonder Lake, IL 60097*; **k9dci@arrl.net**

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

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

W1ZR

THE DOCTOR IS IN

Q Dan, KB4ZVM, asks: What is the difference between the *average* and *peak* setting on a wattmeter, and when is it appropriate to use each?

A With a steady state signal, such as key down in CW mode, the two readings should be the same. With a complex signal such as SSB or on-off keyed CW, the power output changes with time. The typical meter cannot respond to such changes quickly enough to show how high the power gets, but lags behind the peaks showing something close to the average reading. A peak reading meter, on the other hand, holds the reading of the maximum value, either for a specified time or until reset — depending on the design.

Our FCC power limit is based on peak envelope power (PEP), which is what a peak reading meter should indicate while you are speaking in SSB (or any other mode). Thus a PEP meter is useful to make sure you are operating within the legal limit — but make sure you know how accurate it is — not all are laboratory grade instruments.

Average power is useful in order to determine heating effects on components, which tend to respond in an average kind of way. Peak power is related to such things as the voltage needed for arc over and similar stresses. Both are useful, and many amplifiers have ratings for both.

Q Ken, K6SI, asks: I would like to try the half rhombic vertical antenna described in a recent *QST* article.[1] It specifies 9:1 unbalanced transformers at each end. I can find commercial high power rated devices in *QST* ads, but I only need to run 100 W — any ideas?

A The short answer is I am not aware of any 100 W rated 9:1 transformers that are commercially available, although it is possible to wind your own. The good news is that I can think of some other solutions to make the antenna work at the 100 W level without the need for such transformers. See Figure 1 for a diagram of a half rhombic antenna with no transformers.

The termination needs to be in the range of 450 to 600 Ω. While special termination loads designed for rhombic use are available, they are usually quite expensive. Instead, the earlier article made use of a 9:1 transformer and a more readily available 50 Ω dummy load for the termination. This is great for a high power station with an extra "Cantenna" kW dummy load lying around, but for a lower power radio it can be even easier.

The load needs to handle 50% of the transmitted power, so a 50 W, 450 to 600 Ω resistive load will work fine. Caddock resistors are non-inductive power resistors (they must be non-inductive to work properly) and Mouser (**www.mouser.com**) lists a 75 Ω, 15 W Caddock resistor at $3. Six such resistors in series will make a 450 Ω, 90 W dummy load. You will probably want a box, some perforated board and a coax connector or terminals, but it sounds like around $20 to me.

The other end may be even easier. All you need is to be able to couple a 450 to 600 Ω mostly resistive load to your radio. If you have a tuner designed to work with a single wire or unbalanced antenna with a 10:1 SWR, you're done. If you want the tuner to be some distance from the antenna, a garden variety 4:1 balun and a run of coax to your tuner and radio should work just fine, even with an internal tuner rated for a 3:1 SWR.

[1] J. Hallas, W1ZR, "Antennas Away from Home," *QST*, Mar 2010, pp 44-46.

Q Jeff, KAØKAF, has a mobile installation in his truck including an HF/VHF/UHF transceiver connected directly to his battery, automatic antenna tuner and appropriate antennas for each range. He asks whether or not adding accessories such as a battery boost regulator or voltage conditioner in series with his power source would be a good idea.

A Regarding the battery booster, I only recommend those for mobile installations that have a dedicated battery separate from the vehicle starting battery. They work great at keeping the voltage to your radio

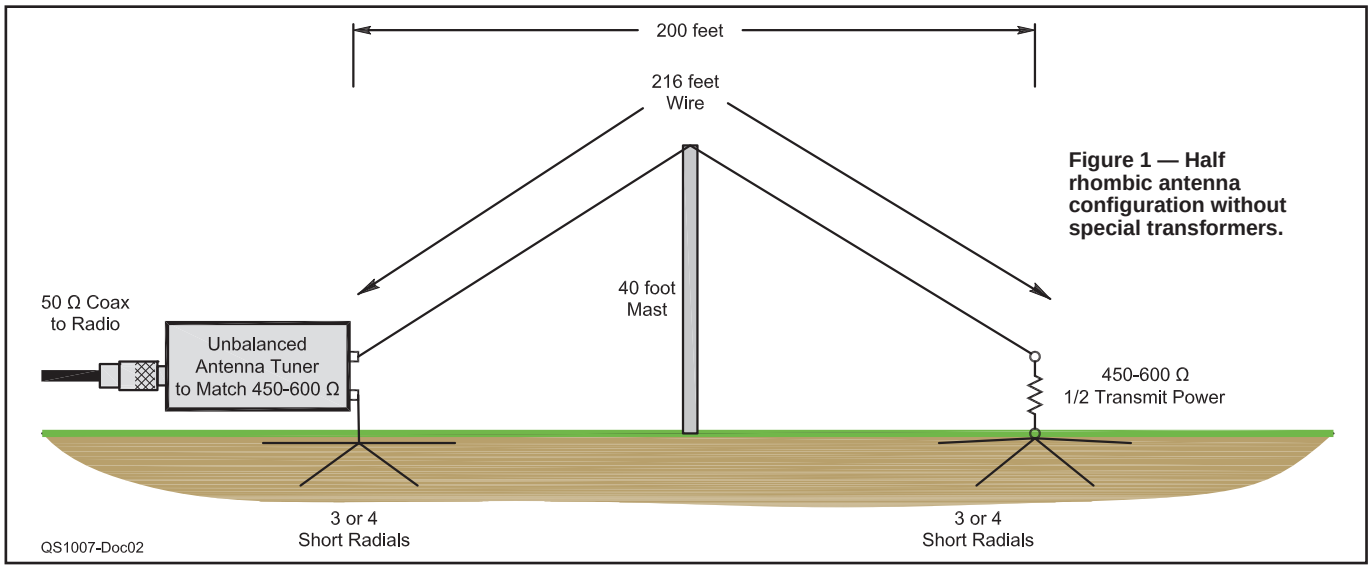


Figure 1 — Half rhombic antenna configuration without special transformers.

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

up at 13.8 V dc — right where it is with your engine running — as your discharging battery drops down to 10 V or less. The problem is, if it's your starting battery, then your truck likely won't start!

I use a battery boost regulator on my sailboat, where I have a second battery reserved for starting the diesel, and at home on my UPS system when the power fails. It gives me almost twice the operating time. But I wouldn't recommend it for a single battery truck system. If you only operate with your engine running, you should have the 13.8 V you need and avoid the dead battery problem.

It also is best to use a boost regulator with a deep discharge battery, rather than a starting battery. The regular auto starting battery isn't designed to be discharged down to where the booster really helps. It will only do that perhaps a dozen times before it fails. A deep discharge battery will do it hundreds of times. Unfortunately, most deep discharge types are not as good at providing the cranking amps that your starter motor needs. So my suggestion is to hold off on the battery booster until you decide to go to a two battery system.

A general voltage conditioner can be helpful, although it is designed to solve a number of problems — many of which you probably won't have. Most of its circuitry is designed to let your 20 A peak current radio operate from a 10 A cigarette lighter socket. Since you are connected directly to your battery, you don't need that.

The one handy thing a conditioner offers is the high voltage protection. This can protect your radio if your truck's voltage regulator fails and you get much too high a voltage through the system. That is a good idea, and I've heard from readers who have lost transceivers for that reason. We had a recent *QST* article on a simple circuit that just provides high voltage protection for about $5 of parts in a tiny box.[2] You might consider that instead; in fact, I recommend having one of those with every transceiver.

Q Carroll, WX4Y, notes that he needs to give a presentation on antennas at a club meeting and wonders how he can generate the professional looking drawings of coax and connectors such as in Figure 1 of the February 2010 column (partially reproduced as Figure 2 here).

A I wish I had the skills or tools to make such drawings, but we are fortunate to have an outstanding graphics department at ARRL. All the schematics, mechanical drawings and illustrations you see in *QST*, or other ARRL publications are currently drawn by Technical Illustrator David Pingree, N1NAS, a member of the graphics team. I just have to rough out a sketch on a paper napkin and, if David can read my writing, it appears in the form we all enjoy. David provided the following details.

The drawings you see in ARRL publications are drawn using either AutoCad *or Adobe* Illustrator. *Both programs are generally too expensive to justify their purchase for occasional use. A couple of programs I could suggest are* TurboCad *and Microsoft* Visio.

TurboCad *is based on the* AutoCad *"engine" but is more icon driven with some easy to use features that* AutoCad *does not offer. It is a good general drafting program, and is file-compatible with* AutoCad. *It costs about $100 and can be found at office supply stores. You can download a trial at* **www.turbocad.com**.

Microsoft Visio *is also good, although it is not quite a general computer aided design (CAD) program.* Visio *features many functions that automate the process of drawing. It provides tools needed to generate block diagrams, flowcharts, mechanical, electrical and electronic engineering drawings. The type of thinking is supposed to be at an object level and not the "line between two points" paradigm. It works very well with* Word *and* PowerPoint.

Both programs offer a minimal set of schematic symbols. They can make drawing easy for the types of drawing they're designed for. Both programs allow you to create macros. ARRL drawings are made for print publication, which has different priorities than the engineering world or on line presentations. These programs do not completely meet our needs for this purpose, which is why we don't use them.

The coax cables you see in ARRL publications are one of those graphic elements that has evolved over the years and are now drawn using a custom AutoCad *function to automate the steps: Draw a path, draw an ellipse on each end, offset the path twice, fill with color (or not) then adjust the line weight. Sometimes the program just doesn't work. Then it's back to basics.*

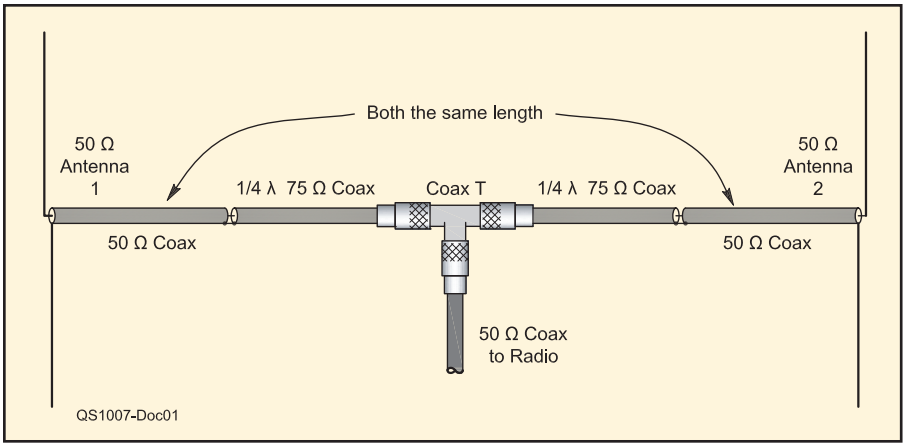


Figure 2 — A portion of Figure 1 from the February 2010 column illustrating the drawing of coax cables and connectors.

Q Jim, NØJSN, asks: I just purchased a used HF linear amplifier that doesn't work. I do observe that the plate choke has a burnt spot with wire ends showing in middle of the choke. Do you have any ideas on what would cause this?

A It is difficult to make a single choke that doesn't have any resonances across the entire HF range. Manufacturers thus design their chokes so that any resonances are between the bands so they won't cause problems during normal operation. It is fairly likely that your amplifier had a choke with a series resonance between 12 and 10 meters. Now if some previous owner (illegally) tried to use the amplifier on the 11 meter citizens band, much of the RF output would end up burning up the choke rather than going to the antenna. Chances are that's what happened.

◊*I understand that there was some confusion about my discussion of elevated radial configurations in last month's column. In my response to Chris, AG4AX, I noted that the elevated radials should be "resonant and insulated, as with other antenna structures." I did not mean that insulated wire needed to be used. Either bare or insulated wire is fine. Rather, I intended to say that they should be insulated from ground and supported using insulators, just like a dipole. The common center point goes to the coax shield and can be grounded for lightning protection, if desired. — Ed.*

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

[2]P. Salas, AD5X, "Compact Voltage Protector and Fuse Assembly for 100 W Transceivers," *QST*, Apr 2010, pp 30-32.

Jetstream VHF/UHF Wattmeter

A reliable SWR/Power meter is one of the most important station accessories you'll ever own. At a glance it will tell you how much RF power your transceiver is generating, how much of that power is being reflected back to the rig through the antenna system (due to impedance mismatches) and the resulting Standing Wave Ratio, or SWR.

Knowing the SWR doesn't necessarily tell you how well your antenna is performing. A terrible antenna system can still present a flat 1:1 SWR at the transceiver. A nonradiating 50 Ω "dummy antenna" will give you an excellent 1:1 SWR!

Even so, an elevated SWR is a sure sign of trouble somewhere along the line. If the SWR exceeds 2:1, most transceivers are designed to immediately reduce their output power. (Some rigs will start cutting back when the SWR edges above 1.5:1.) In addition, a high SWR translates into higher signal loss – both transmitted and received – between the radio and the antenna.

High SWR is more easily tolerated at HF frequencies where feed line losses aren't as great, but at VHF and UHF frequencies an elevated SWR can be deadly. For instance, even with 100 feet of low-loss coaxial cable such as LMR-400, a 2:1 SWR at 440 MHz can result in a total loss of 4.5 dB. That's substantially more than *half* of your signal.

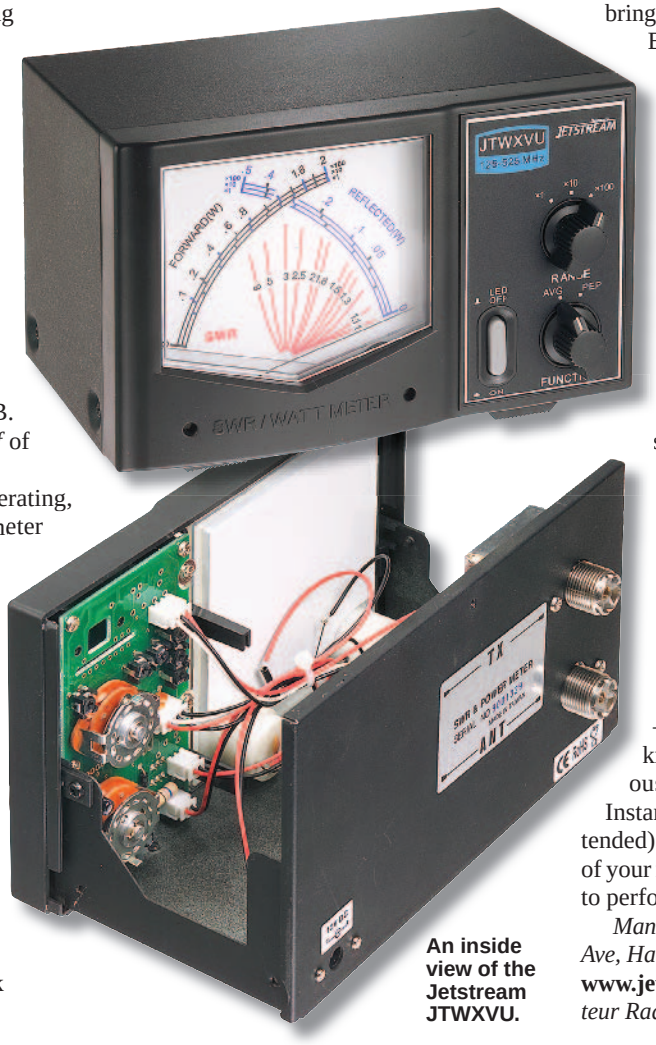
So if you enjoy VHF/UHF operating, it pays to have an SWR/Power meter that's designed specifically for that application. The Jetstream model JTWXVU is one such device.

Specifications and Design

The Jetstream JTWXVU covers 125 to 525 MHz, which includes the 2 meter, 1.25 meter and 70 cm bands, and it is rated for a maximum of 200 W, although it will provide readings with as little as 1 W. Forward power scales (×1, ×10, ×100) are selected via a front-panel rotary switch. Another switch gives you the option to measure either peak or average power.

Speaking of the meter, it's a big one, measuring 4.5 inches diagonally. Inside the meter you'll spy two needles: one for indicating forward power and the other to indicate reflected power. Where the needles meet above the intermediate scale indicates your SWR. The great advantage of this *nomograph* approach to power and SWR measurement is that you see everything at once. As you make changes to the antenna system, for example, you'll see the results at a single glance. The meter scales are printed in color and arranged in a staggered fashion for easy reading.

The JTWXVU is housed in a rugged 4.75 × 7.5 × 4 inch metal enclosure and the switches have a very solid feel. The back panel is fitted with two SO-239 coaxial cable connectors. If you have a source of 12 V dc nearby, you can connect a line to the JTWXVU and enjoy the well-diffused LED lighting.



An inside view of the Jetstream JTWXVU.

Accuracy

Measurement accuracy is always a challenge, especially with VHF/UHF equipment, and the greater the accuracy, the higher the cost. The JTWXVU is an economically priced meter and its specifications call for ±10% full-scale accuracy. In the ARRL Laboratory we measured ±20% worst case. This is still acceptable for average Amateur Radio use, but Bob Allison, WB1GCM, one of our Lab engineers, decided to pop open the JTWXVU case to see if it could be improved. He was able to quickly adjust the internal trim pots to bring the JTWXVU in line with the Lab's Bird Model 43 meter (less than ±10%). According to Bob, there are pots for each power scale and recalibration was accomplished easily.

I took the opportunity to test another JTWXVU owned by a friend and it met the ±10% specification without adjustment. On that basis there is a good chance that the out-of-the-box accuracy of our meter was atypical.

Good Value

The accuracy issue notwithstanding, I found the Jetstream JTWXVU to be a good value overall. Not only did I enjoy having it at my home station (especially as I was installing and adjusting a new satellite antenna), the meter came in handy while I was troubleshooting a 2 meter mobile setup. This is a dependable instrument that you'll install and probably take for granted — until its bobbing needles let you know that "Murphy" has taken a serious interest in your antenna system. Instant knowledge is power (no pun intended) and it certainly beats sitting in front of your radio wondering why it doesn't seem to perform as well as it used to!

Manufacturer: Jetstream Inc, 100 Hancock Ave, Hamilton, OH 45011; tel 800-524-4889; **www.jetstream-usa.com**. *Available at Amateur Radio dealers worldwide. $109.95.* QST

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W1ZR

GETTING ON THE AIR

Antenna Polarization — What Does it Mean and When is it Important?

The many antennas we encounter seem to be oriented in different ways. It can be a bit baffling for unfamiliar amateurs to make sense out of this and know what's best for a particular application.

The Basics

Antennas of a particular linear polarization respond best to signals of the same polarization. That is, a horizontally polarized signal — one with the electric field parallel to the earth — can be best received by an antenna that is horizontally polarized. The same horizontal antenna, if used for transmission, will launch a horizontally polarized wavefront. The previous sentences also work if horizontal is replaced by vertical in all appearances.

What About Horizontal Waves to Vertical Antennas?

If everything is aligned perfectly, a horizontal antenna will pick up nothing from a vertically polarized wavefront, and vice versa. Of course amateurs rarely achieve perfection. In contrast, it is common for commercial satellite operators to save spectrum through *frequency reuse* — simultaneously using both horizontal and vertical polarization on the same frequency to the same satellite. This requires careful antenna alignment, but it gives an idea of the isolation that can be achieved. In amateur communication a reduction in signal strength of 30 dB is typical as an antenna is changed from the same to the opposite polarization of the incoming signal.

Are There Other Choices?

There is nothing magical about having horizontal or vertical antennas, except that they are frequently used. Any angle in between can also be used. This is called *skew* polarization. If the antenna is at, say, 45° it will respond equally well (or equally poorly) to horizontally or vertically polarized signals, each down by half from their response to an antenna of the matched polarization. Of course it will respond fully to signals at the same skew angle.

Circularly polarized signals are those that change polarization as they move across space as shown in Figure 1. They can be received at full level by a circularly polarized antenna of the appropriate rotational sense. As with skew polarized antennas, a circularly polarized antenna can receive a horizontally polarized, vertically polarized or skew polarized signal at any angle at a 3 dB loss compared to matched polarization.

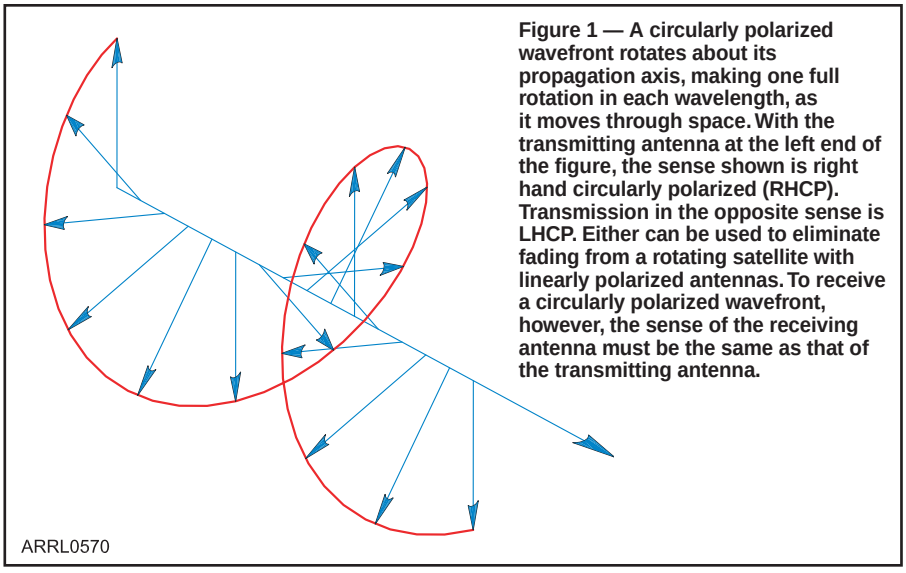

Figure 1 — A circularly polarized wavefront rotates about its propagation axis, making one full rotation in each wavelength, as it moves through space. With the transmitting antenna at the left end of the figure, the sense shown is right hand circularly polarized (RHCP). Transmission in the opposite sense is LHCP. Either can be used to eliminate fading from a rotating satellite with linearly polarized antennas. To receive a circularly polarized wavefront, however, the sense of the receiving antenna must be the same as that of the transmitting antenna.

So What Does it All Mean?

The question then comes down to one of what polarization you should expect to receive and what you need to transmit. We will look at a few distinct cases, each with somewhat different answers, and try to develop some general conclusions.

Line of Sight Communication

Short range HF communication, particularly on 10 meters, and most VHF and UHF communication tend to be along line of sight or extended LOS paths. There are some exotic propagation modes that operate differently, but for a terrestrial LOS path, the signal polarization tends to stay relatively constant. Thus for this case, it is fairly important to be able to respond to the appropriate polarization.

You might think that this would mean that everyone has standardized on a particular polarization for VHF and UHF. While that was almost the case for a while — at least on a regional basis — as local communication moved to FM with surplus commercial (public service, utility and taxi) radios, the amateur FM community adopted their vertical standard — perfect for omnidirectional mobile operation. Almost all other V/UHF gear, that for long-range terrestrial CW and SSB (frequently referred to as *weak signal* communication modes) use horizontal antennas. Space communications tends to use circular polarization to avoid certain kinds of fading. This set of divergent views has resulted in the current conundrum.

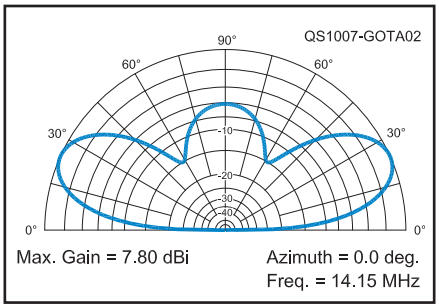

Figure 2 — Elevation pattern of a 20 meter horizontal dipole 40 feet above typical ground.

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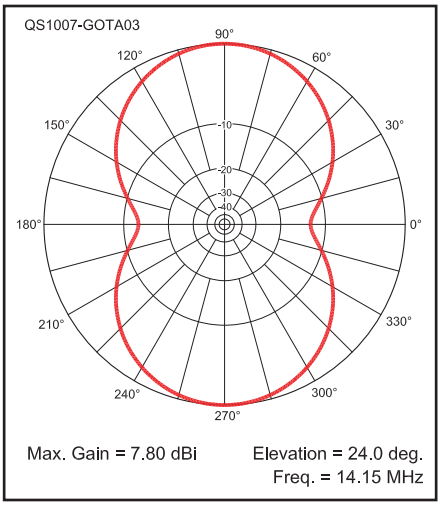

Figure 3 — Azimuth pattern of the dipole of Figure 2 at the elevation peak of 24°.

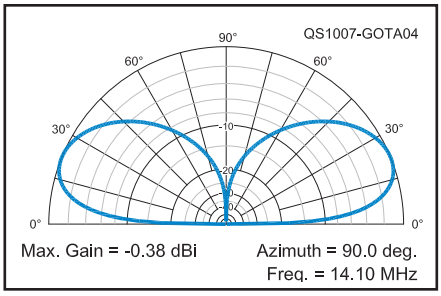

Figure 4 — Elevation pattern of a 20 meter ¼ wave vertical monopole fed against 4 elevated radials. The circular azimuth pattern is not shown.

Some solve the problem by using circular polarization for all modes. Most operators who enjoy weak signal modes have horizontally polarized rotatable directive arrays with a separate omnidirectional vertical antenna for local FM. Shifting a horizontal array by up to 20° will reduce the horizontal signal by only about 0.5 dB, however, and will result in a vertical component down less than 10 dB from the horizontal. This will provide more signal than the usual omnidirectional antenna in its preferred direction. This is rarely seen, however, perhaps since 0.5 dB counts to the serious VHF fan.

Long Range MF and HF Communication

All the same rules should apply to long range MF and HF communications, although the path through the ionosphere distorts the polarization of the signals that are received so the polarization is harder to predict. It used to be thought that the polarization of signals arriving via the ionosphere was random. Recent research (to be reported in a forthcoming *QST* article) indicates that signals arriving from the ionosphere are actually more like circular rather than linear polarization. Still, there is little reason to choose either horizontally or vertically polarized antennas based on the polarization itself.

Instead, the polarization that results in the radiation leaving your transmitting antenna at the angles you want, and at the strength you want, are much more important than the polarization itself. Each polarization has certain benefits that may make it most attractive for particular HF applications.

Horizontally Polarized HF Antennas

Horizontally polarized antennas have the advantage that the signals that they transmit are reinforced by ground reflections at elevation angles depending on their height above ground. For long distance communication, low elevation angle antenna patterns are desirable and can be achieved with heights greater than ½ wavelength above ground. Depending on the height of available supports, this usually translates to the upper HF region, often 20 meters and above, unless tall buildings or towers are available.

Simple horizontal antennas, such as dipoles, have directional patterns that put more energy in some directions than others, providing apparent gain or increased signal in the favored directions. Figure 2 shows the elevation pattern of a 20 meter dipole 40 feet above typical ground. Note that at this height the ground reflection adds to the direct signal with a maximum at 24° elevation. This is a useful angle for medium length propagation, but there is still a reasonable signal at the lower elevations. The azimuth pattern is shown in Figure 3. Note that the 3 dB beamwidth is a bit more than 83° on either side of the antenna.

Vertically Polarized HF Antennas

Vertically polarized antennas also have a ground reflection, but it reinforces the signal at the horizon. Unless the ground surface is sea water, this means that the losses in the real ground will attenuate signals at very low angles. Figure 4 shows the elevation pattern of a ¼ wave vertical monopole with 4 elevated radials 6 feet above the same kind of ground. The azimuth pattern is a circle with equal radiation in all directions. This is a mixed blessing since, while it allows communication in all directions, it does so at a reduced signal level compared to a more directional antenna.

While many would make a comparison between this monopole and a horizontal dipole as representatives of simple vertical and horizontal antennas, I don't think it is quite a fair comparison for a few reasons. First, the dipole requires two supports at 40 feet above ground, while the vertical only needs one at 23 feet. If we eliminate the radials and make a vertical dipole the same size as the horizontal dipole, but hang it from a single 40 foot support, we get the elevation pattern shown in Figure 5. While the gain is not as high as the dipole, its peak is at a lower elevation angle.

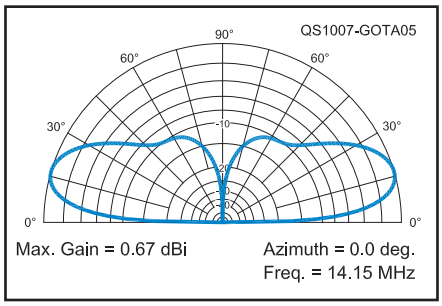

Figure 5 — Elevation pattern of a 20 meter vertical ½ wave dipole with one end 40 feet above typical ground.

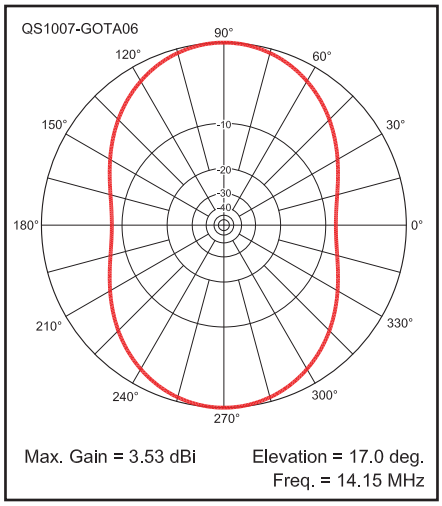

Figure 6 — Azimuth pattern of two vertical dipoles of Figure 4 fed in phase and spaced 27 feet apart. Note the same beamwidth as the horizontal dipole. A wider spacing would provide a narrower pattern with somewhat additional gain, but this makes a better comparison to a horizontal dipole. Note also that there is no reason the same supports couldn't be used to support both horizontal and vertical antennas — now you're talking!

Suppose we also use the second 40 foot support that we would need for a dipole. If we suspend two vertical dipoles and feed them in phase, at a spacing of 27 feet we get the azimuth pattern shown in Figure 6. Note that this has a beamwidth similar to that of the horizontal dipole. Now we are closer to comparing apples to apples.

Yes, the gain of the vertical is somewhat lower, but it is getting into the same ball park, and it is at a lower elevation angle. In fact, if we compare the two at 10° elevation, we find they are within about a decibel of each other. My point is that many antenna comparisons aren't quite fair, and it may pay to dig a bit deeper to get a better feel for how they will work in your environment. Personally, I tend to use horizontal antennas on 40 meters and above because I have tall trees that can get them above a half wavelength. On 80 and 160 meters, however, my vertical with a few elevated radials has the upper hand for long haul work. QST

NØAX

HANDS-ON RADIO

Experiment 90 — Construction Techniques

Back to the Bench

This month we're reacquainting ourselves with our toolboxes and soldering irons, having neglected them in favor of computer screens lately. Building the circuit tests your model and allows you to complete the four step cycle — *design, simulate, build, compare*. Clean off your workspace and let's dig in!

Dead Bug

It's hard to beat *dead bug* or *ugly style* construction for speed and convenience if you're building an initial prototype. No special tools or parts are required — just grab a handy piece of unetched printed circuit board (PCB) material and start soldering. The surface of the PCB acts as a common connection for all parts — often ground potential. If a component lead is to be connected to circuit common, it's soldered directly to the PCB surface. This mounts the component to the PCB, which then also acts as the mechanical base. Components are held in place by soldering their leads together directly or by using wire jumpers if they don't reach.

Figure 1 shows a typical candidate for dead-bug construction — a three-terminal voltage regulator circuit based on a 7800 series IC. You can find out more about using three terminal regulators in Hands-On Radio experiments #8 and #70 and in Section 3.8 of the *2010 ARRL Handbook*.[1,2] The copper surface of the PCB does double duty in this circuit, providing both a ground plane and a small amount of heat sinking. (If your voltage regulator dissipates more than a few hundred milliwatts, you should use a real heat sink.)

Start by carefully bending the pins of the regulator IC. Pins 1 and 3 can be bent *up* (away from the PCB surface) to act as tie points for the input, output and bypass capacitors. Pin 2 takes a bit more technique, since it will need to lie flush along the surface of the PCB. First, bend the thin part of the lead *down* (toward the PCB surface) at about a 45° angle. At the point at which the lead would intersect the PCB surface, bend it back up so that the outer part of the lead is parallel to the surface. This may take a couple of tries if you haven't done it before. DIP ICs mount upside-down against the PCB, held in place by grounded pins soldered to the PCB.

It's important that the pin lay flat against the board so that the IC's metal tab can also make good contact with the copper. Thermal contact between the IC's tab and the PCB surface is insured by holding the IC to the board with a machine screw with a small amount of thermal compound or a thermal pad between the IC and PCB surfaces.

Once the IC is mounted, solder the bypass capacitors between pins 1 and 3 to the PCB surface as ground. In Figure 1, you can see that I've drilled a hole through the board and used a knot to hold the input and output wiring in place — cheap but effective.

Done carefully, dead-bug construction is RF-friendly up into the low UHF range. The PCB's surface also acts as a *ground plane*, proving low inductance ground connections and helping reduce coupling between different parts of the circuit. To get good RF performance, leads must be kept short and direct. Remember to keep inputs and outputs

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

[2]*The ARRL Handbook for Radio Communications*, 2010 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 1448 (Hardcover 1462). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop**; **pubsales@arrl.org**.

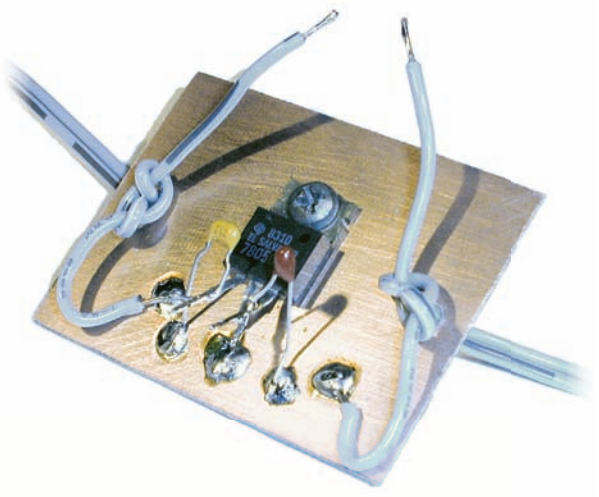

Figure 1 — Dead bug or ugly-style construction uses the surface of unetched PCB material as the base for circuit assembly. Component leads are soldered directly to the PCB surface or to other leads. (Photos and graphics reprinted with permission from *Circuitbuilding Do-It-Yourself for Dummies*, Wiley Publishing.)

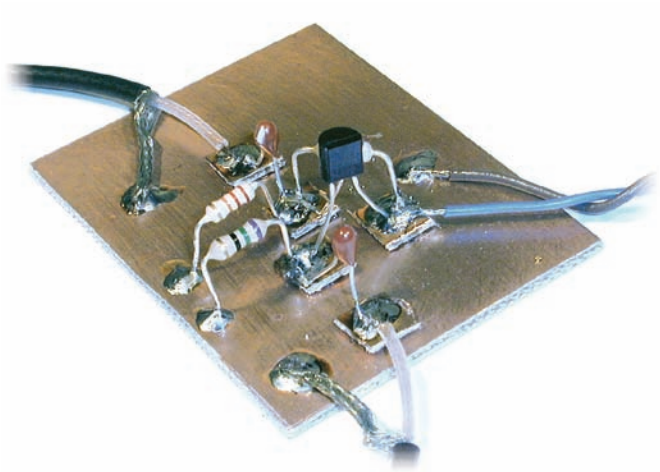

Figure 2 — Small pads made from PCB material are used as isolated connecting points in Manhattan style construction. Pads are either soldered or glued to the PCB surface.

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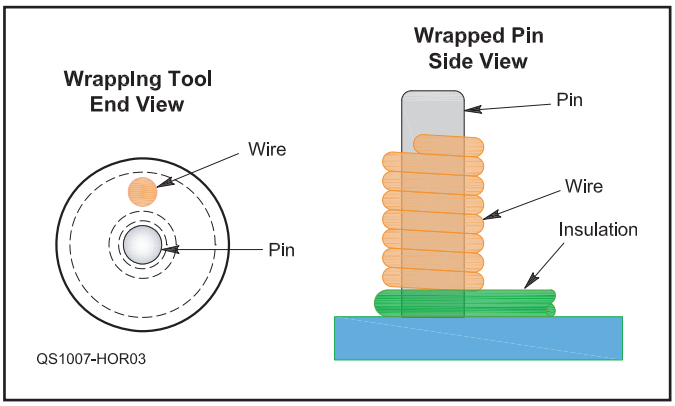


Figure 3 — A wire wrap connection is made by using a wire wrap tool to coil the solid wire around the sharp corners of the wire wrap pin. A wrap of insulation at the bottom of the pin provides stress relief for the wire and prevents breakage.

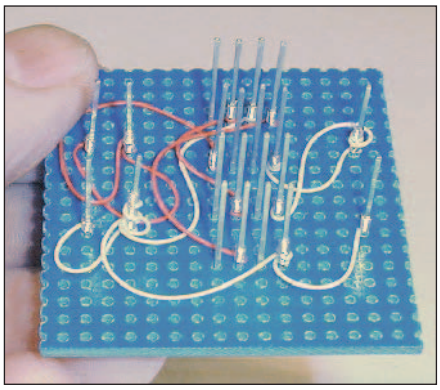


Figure 4 — The wire wrapped circuit's components are soldered to pins or inserted into sockets that extend through the insulating board. Individual wires make the connections.

away from each other, to the extent feasible.

The dead bug procedure begins with cleaning the PCB surface with steel wool or a scrubbing pad. Then solder components with common connections to the PCB. When those components are all mounted, solder the other components between the remaining leads. Because it can be difficult to make large changes in the circuit layout, dead-bug construction is best for simple circuits or designs in which you are confident. If using a multi pin IC, be careful to note that you will be working with the pins in a reversed layout from the normal view. It helps to use a pencil or label to indicate pin numbers. Don't ask me how I learned this.

Manhattan Style

A technique that is closely related to dead bug style is *Manhattan style*. This technique uses pads of PCB material to provide isolated mounting points for circuit connections. The individual pads are hot glued or soldered to the PCB surface. Components are then soldered to the pads. Because the pads are often square, the resulting resemblance of the completed circuit to a city street grid gives the technique its name. Grounded component leads are still soldered directly to the PCB surface as in dead bug construction.

To make pads of PCB material, remove a strip of PCB about ¼ inch wide. Use a saw or score the material with a sharp utility knife and straightedge, then bend the piece over the edge of a work surface to break it loose. Use heavy wire cutters (and eye protection) to cut the strip into small squares.

Figure 2 shows a circuit assembled using Manhattan style construction. Connection pads were attached to the PCB surface with hot glue. Gluing works for pads made from both single and double sided PCB material. If you use glue, you'll have to work fast to keep your soldering from melting the glue, allowing the pad to shift position. Some glues, including acrylonitrile based products, may not hold well while heated. If you use double sided PCB pads, you can solder the pads to the board by tinning the pad and PCB, then placing the pad on the PCB and reheating the PCB until the solder melts on both surfaces. You'll have to hold the pad against the PCB surface with a small screwdriver or sturdy toothpick during this procedure.

Manhattan style construction creates a larger (and easier) connection point for ungrounded connections. The combination of using the PCB surface and the pads allows for easier circuit layout, but the resulting circuit is usually somewhat larger than if constructed purely using the dead bug technique. Nevertheless, it's also easier to make changes to the circuit if isolated pads are used. Because leads are generally a bit longer than in dead-bug technique, Manhattan style construction is generally used at HF and below.

Wire Wrap

Our final technique is an old standby, particularly in digital electronics — *wire wrapping*. In this technique, individual pins or sockets with pins are press-fit into holes in an insulating material called *perforated board*. Connections are made by tightly wrapping solid, tinned wire around square pins so that the pin's corners bite into the wire for a secure connection.

Figure 3 shows the end view of a wire wrapping tool and a side view of a properly wrapped connection. You can either use a manual tool, about the size of a small screwdriver, or a motorized tool that resembles a soldering gun. For small projects, a manual tool is fine. One end is used for wrapping, the other end is an unwrapping tool. A wire stripper is usually in the middle.

A special type of wire is used for wire wrapping. The most common is #30 AWG with Kynar insulation that is easy to strip. Be sure to get the right gauge wire for your stripping tool or the stripping process may leave nicks, causing the wire to break easily. Using three or four colors of insulation will also help you keep the connections straight in the resulting nest of wires. Wire wrapping tools, wire and pins are sold by electronics parts and tool vendors. You may also be able to buy prestripped wires, although this is relatively expensive for the casual builder.

Figure 4 shows a finished circuit that was assembled using the wire wrap technique. Components and input/output wiring are soldered to pins pressed into the board. (I used a miniature screwdriver.)

The bottom side of the circuit shows how wires are wrapped onto the pins that extend through the perforated board. Two colors of wire insulation are used here — the darker is used for power connections and the lighter for signal connections. Where more than one connection is made to a pin, the wires are wrapped onto the pin one above the other, not wrapped directly over the previous wrap.

Wire wrapping was originally invented for digital circuitry with clock frequencies of few MHz or lower. It can be used for audio and dc circuits. Because the wires loop and cross frequently, wire wrapping is not good for circuits that are sensitive to coupling between signal paths. The thin wires and wrapped connections are not well suited to carry currents of more than 100 mA. It's very easy to create and modify circuits, however, so wire wrapping remains a common technique.

[3]Ward Silver, *Circuitbuilding Do-It-Yourself for Dummies*, Wiley Publishing, 2007. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 0015. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop**; **pubsales@arrl.org**.

AG1YK

HINTS & KINKS

EASIER PERFBOARD LAYOUTS

◊There are a number of ways to build small semiconductor circuits, ranging from dead-bug construction, Vectorbord, wired perfboards and Manhattan-style construction [small pads are glued to the board to use as attachment points for leads — *Ed.*] to printed circuit (PC) boards designed for those circuits. Some methods are easier to change, others are neater and more finished in appearance (though as *Experimental Methods in RF Design* points out, a circuit's appearance doesn't necessarily indicate its effectiveness).[1]

Wired perfboards are a useful compromise between the extremes. They can be laid out neatly, built quickly and changed easily. Plus they can look good and be fairly easy to follow. In putting one together, it is often difficult to keep track of where the connections are supposed to go on the unmarked board.

Printed circuit design and construction have been simplified in recent years by programs that help arrange components and route traces, and by ironing laser-printed patterns onto the raw boards. The following method takes advantage of these technologies to simplify wiring circuits on perfboards.

1. Design a printed-circuit layout for your project using one of the several PC design programs that are available online.

2. Print the resulting pattern of traces with a laser printer in black and white on a transparency.

3. Iron the pattern onto a piece of blank perfboard.

4. Use the image of the traces to guide the process of populating and wiring the board, using wire in place of the traces.

For example, Figure 1 shows a pattern of traces for the discrete component audio amplifier on page 1-12 of *EMRFD*, designed in this case with the freeware version of *DipTrace1* and ironed onto a piece of perfboard.[2] This pattern guided the wiring of the circuit.

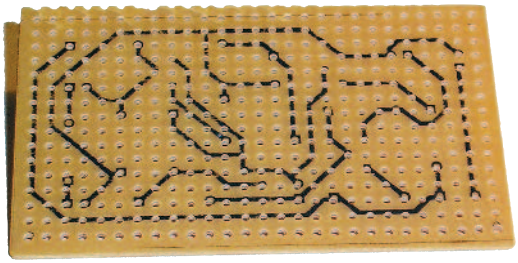


Figure 1 — A pattern of traces ironed onto a blank piece of perfboard.

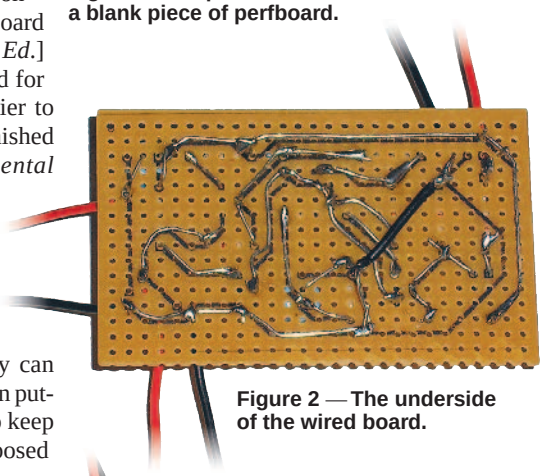


Figure 2 — The underside of the wired board.

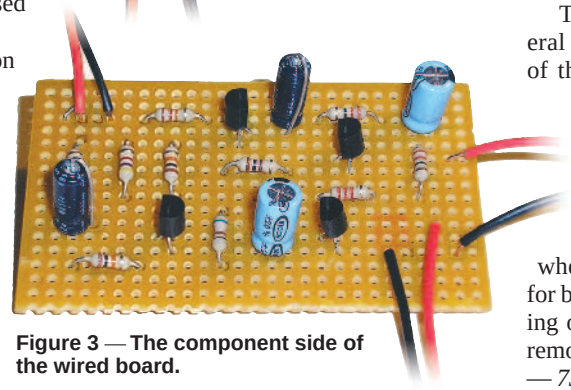


Figure 3 — The component side of the wired board.

Figure 2 shows the wired underside of the completed board and Figure 3 shows the board from the top.

Since the traces on a board like this are laid out by hand, you needn't (and probably shouldn't) try for the greatest possible component density. Set the program to generate wide spaces and leave yourself room to work. Similarly, draw wide traces so they will be easily readable when transferred to the board. Note that even an imperfect transfer of the pattern to the board provides lots of help.

A few more hints:

■ Set the PC program to 0.1 inch spacing, so that component leads will line up with the holes in the predrilled board and use component patterns with the same pin spacing.

■ When ironing the pattern onto the board, use a piece of paper between the iron and the transparency, use pressure rather than movement and be careful not to melt the transparency with the iron.

■ Trim the perfboard after you've ironed the pattern onto it; the board is easier to handle when it's larger.

■ When wiring the board, you can fasten long wires to the board at intermediate points with short wire loops through two holes.

■ You are not obligated to follow the traces exactly. The program may place some long and winding roads; your wires can jump more directly, as can be seen by the black wire in Figure 2, which follows a much more direct route than the trace it replaces.

■ Don't be too concerned about traces that the program cannot place. You can use jumpers on either side of the board.

This technique can be extended in several ways. You can print a mirror image of the board's top side and iron it to the component side, in registration with the traces. Now you have a guide for placing the components. You can use this technique on undrilled blank boards. In addition to indicating the connections, the pattern will indicate where to drill holes. Also, it might work for boards with single-hole pads and for laying out Manhattan-style boards. Be sure to remove toner where leads will be soldered. — *73, Bryant Julstrom, KCØZNG, 1945 30th St S, St Cloud, MN 56301,* **kc0zng@arrl.net**. *Photos 1, 2 and 3 by KCØZNG*

ADD 70 CM WITH A COAT HANGER

◊On a recent road trip through California I was faced with having just a 2 meter quarter-wave mag-mount antenna for the car, yet many of the interesting repeaters were in the 70 cm band. Fortunately, my handheld transceiver covered both of those bands. Not willing to sacrifice a perfectly good 2 meter whip, I opted for an ad hoc conversion of the antenna to a dual-band 2 meter /70 cm antenna. With only scissors and side-cutters for tools, and a wire coat hanger, painter's blue masking tape and steel wool for materials, I came up with the following workable solution.

I bent a straight piece of the wire coat

[1]Available from your local ARRL dealer, or from the ARRL Bookstore, ARRL order no. 9239. Telephone toll-free in the US 888-277-5289, or 860-594-0355, fax 860-594-0303; **www.arrl.org/shop**; **pubsales@arrl.org**.

[2]**www.diptrace.com**

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

KAI SIWIAK, KE4PT

Figure 4 — The modified 2 meter whip with the hairpin taped in place on the antenna element.

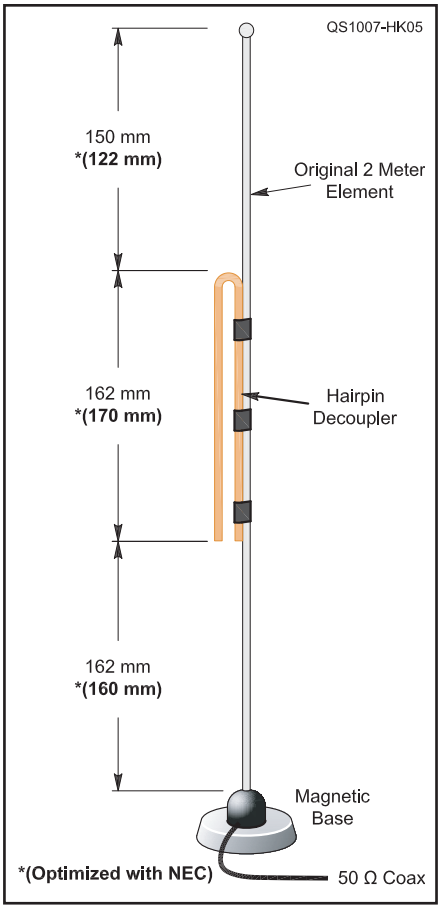


Figure 5 — A diagram of the modified antenna showing the component spacing used by the author and also the optimized values generated by *NEC* computer simulation.

hanger into a "hairpin" so that it resembles a section of parallel transmission line that is shorted at one end. The total length of coat hanger wire was estimated to be 95% of a quarter wavelength at 440 MHz or 162 mm (see Figures 4 and 5).

This hairpin decoupler was positioned open end down 162 mm up from the base of the 2 meter whip. With no soldering equipment available, I polished the whip as well as one leg of the bent wire coat hanger hairpin with some steel wool. Then I laid the two elements, with the polished sections in contact along their entire length, on the sticky side of some painter's blue masking tape. The tape was then folded over along the length of the joint, sticky side to sticky side, and firmly pressed together to form a temporary watertight connection. The excess blue tape was then trimmed with scissors.

A quick test using the relative SWR feature on a friend's ICOM IC-817 transceiver indicated that the antenna was quite serviceable on both bands. I was able to communicate with 2 meter and 70 cm repeaters in the San Francisco area using my multiband handheld radio.

A subsequent check, later in the road trip when some test equipment became available, revealed that the antenna VSWR was indeed less than 2:1 on both bands. In fact, resonance was actually about 5 or 6% low indicating that the antenna could be trimmed for a better match. Nevertheless, the antenna functioned beautifully during the trip.

In theory, on the 2 meter band the antenna continues to function like a quarter-wave whip but the addition of the hairpin stub adds some inductance, lowering the resonant frequency, as was observed. In the 70 cm band, the lower section of the whip functions like a quarter-wave section at 440 MHz. The open circuited end of the hairpin element functions like a quarter-wave decoupler at 440 MHz and together with the remaining top element of the whip forms a half-wave radiator, which is in phase with the lower quarter-wave section. Thus, the dual-band conversion yields a ¾ wave antenna in the 70 cm band and a ¼ wavelength antenna in the 2 meter band. — *73, Kai Siwiak, KE4PT, 10988 NW 14th St, Coral Springs, FL 33071-8222,* **ke4pt@amsat.org**

FLOATING RV

♢I have camped with cotton tents soaked in a hurricane, tent trailers, motor homes and back to tents. Hams seeing me on my last trip to the Dayton Hamvention® were stunned with the load in my little car, which contained a big tent that had everything a recreational vehicle could except a bathroom.

The *QST* article "The Teardrop QTH" fascinated me for brighter day adventures.[3] I turned the page upside-down to see the details of the 120 V ac power strip. It had surge suppression and a plugged-in ac polarity sensor (hot/return/ground). What was missing from the addition of the RV 115 V ac 15 A inlet was a ground fault circuit interrupter (GFCI) outlet. An RV, when plugged into ac lines, sits insulated above ground on rubber tires. Rain often creates a current path that can cause lethal injury by physical contact to the RV body or chassis, even by reaching for the door. Few directly bond their RVs to ground in campgrounds.

The GFCI outlet is an annoyance. In a hot steamy bathroom it trips when you use a shaver or blow dryer because a relay senses a current flow to ground, which trips a contactor disconnecting the circuit, but this does not *safe ground* the circuit — a danger still exists.

When applying power to the RV, whether by fixed power or a generator, an inline GFCI adapter should be added. Such adapters are available from RV stores and hardware suppliers in an outlet configuration that does not require hard wiring. It just plugs into the extension cord. What does not come in the package is common sense about electricity. Water seeks its own level and electricity seeks its return through you. Almost every technical post I write concludes with, "Switch to Safety." [*Warning*: RV electrical system designs vary. You should study your RV's electrical schematic or contact its manufacturer to determine the safest method for providing earth ground and GFI protection. — *Ed.*] — *73, Peter Murricane, WB2SGT, 200 East 63rd St, New York, NY 10065,* **wb2sgt@arrl.net**

[3]R. Parks, WB5DYG, "The Teardrop QTH," *QST*, Jul 2009, pp 63-65.

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

The ARRL EXPO at the Dayton Hamvention®: Everything Under the Sun (or Rain, or Snow, or…)

This year's Hamvention had everything from soup (tasty clam chowder) to (hot roasted cinnamon) nuts — and everything in between!

S. Khrystyne Keane, K1SFA

It just wouldn't be a "real" Hamvention if the weather didn't cooperate, and on Friday, May 14 — the first day of the 2010 Dayton Hamvention — the humidity was brutal. Be it too much rain, too much sun (or not enough!) or maybe even a snowstorm, thousands of radio amateurs still flock to Hara Arena. But late on Friday afternoon, the sweltering atmosphere gave way to clear skies and frisky breezes, a harbinger for the rest of the weekend.

Inside Hara, aisles were packed with hams from all over the world seeking the latest in Amateur Radio technology, products, gadgets, gizmos and more. It's said that if you can't find it at Dayton, it just doesn't exist. If you want the latest in top-of-the-line transceivers, there are more than a few to choose from. If you need a 45 tube for your 1920s-era TNT oscillator, take your pick from the more than 200 exhibitors and vendors — not to mention the acres of flea market booths — attending Hamvention.

Hamvention is the time when many Amateur Radio vendors launch new products, and 2010 was no exception. The chatter on various e-mail reflectors about anticipated rigs and peripherals spilled over into the aisles at Hara as visitors gawked and gazed at the new treats laid before their eyes. *QST* Technical Editor Joel Hallas, W1ZR, followed the buzz and sniffed out new HF transceivers from FlexRadio, Kenwood and Yaesu, as well as other equipment that was introduced. See page 64 for a summary of some of these new products.

Bargain hunters galore perused the Hamvention world famous flea market looking for anything that caught their fancy or their budget. From an F-16 flight simulator to a cadaver storage box — and oh yes, radio equipment, too! — hams could find anything they ever needed (or thought they needed). From minivans filled to the brim with boxes of "junque," to friends ragchewing behind tables filled with tubes under their canopies, to tents so large you needed a map to find your way around, the flea market was a great place to browse.

And then there's the food. Many local non-profit organizations from the Dayton area come to Hamvention to work as concessionaires at Hara Arena, receiving in turn a portion of their sales for use in their programs. This year, high school bands, rodeo clubs, parent-teacher organizations, roller derby teams, scout groups and more were on hand serving Hamventioners some of Hara Arena's finest. BBQ sandwiches and chowder in bread bowls were quite popular, as were the usual popcorn, hot dogs and sodas. But the one staple, the one vendor everyone headed toward, the most popular item at Hara had to be the hot-roasted-cinnamon almonds. The nut vendor, a fixture in the food court by the Ballarena at Hara for at least 10 years, scooped and bagged

Just a small representation of the almost 150 ARRL officers, Board members, HQ staff members and volunteers who presented the ARRL EXPO at the 2010 Dayton Hamvention.

ARRL Membership Manager Diane Petrilli, KB1RNF; ARRL Product Marketing Specialist Jackie Cornell, KB1PWB; ARRL Accountant Kim Leary, KB1TLM, and ARRL Customer Service Representative Kim Piatek helped staff the always busy ARRL Bookstore.

The Dayton Amateur Radio Association (DARA) sponsors the yearly Hamvention. As part of their outreach, they in turn help sponsor the ARRL Teachers Institute on Wireless Technology. DARA presented a $25,000 check to ARRL President Kay Craigie, N3KN (third from left) to be used for the TI program.

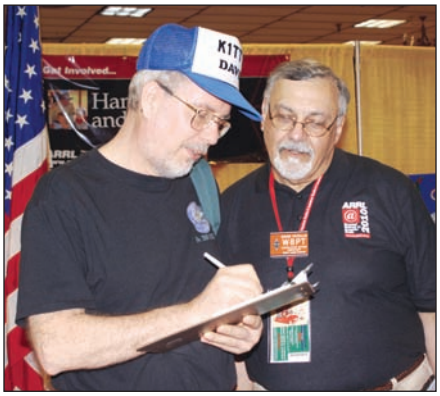
nuts all through Hamvention, shelling out more than 1000 bags a day.

ARRL EXPO Activities

The largest exhibit at the 2010 Dayton Hamvention was the ARRL EXPO. Almost 150 ARRL staff members, officers, Board members and volunteers made their way to Dayton, bringing with them the best that Amateur Radio has to offer. With 25 exhibits and activities located in the EXPO area — ranging from youth activities, kit building, QSL card checking and an expanded ARRL Bookstore — throngs of amateurs wound their way through to check everything out.

Making her first Hamvention as ARRL President, Kay Craigie, N3KN, greeted EXPO visitors. Many hams said they made sure to stop by and congratulate Craigie on her new office; she was elected at the 2010 ARRL Annual Meeting after Joel Harrison, W5ZN, decided not to stand for re-election after serving two terms as the top-elected League official. ARRL First Vice President Rick Roderick, K5UR, together with Chief Executive Officer David Sumner, K1ZZ, and Chief Operating Officer Harold Kramer, WJ1B, along with numerous ARRL Officers, Directors and Vice Directors joined Craigie in welcoming visitors to the ARRL exhibit.

One of the most-visited areas in the EXPO was the QSL card checking area. As doors opened at 9 AM Friday morning, a dozen ARRL card checkers were at the ready for the multitude of DXers that were sure to come. And they did not disappoint: By 9:10, more than 100 hams were in line. Some elected to wait and watch the card checkers validate each presented QSO; some decided they wanted to start exploring the exhibits and decided to drop off their cards and come back for them later in the day. At the end of the Hamvention, the card checkers had checked almost 12,000 QSL cards and accepted more than 200 award applications for DXCC, VUCC and Worked All States.



Dave Robbins, K1TTT, of Peru, Massachusetts, discusses with ARRL Great Lakes Division Legislative Action Assistant Chuck Patellis, W8PT, the League's legislative goals and how ARRL members can help support them.

In 2009, the ARRL offered amateurs the opportunity to drop off their outgoing QSL cards at Hamvention. These cards, destined for the ARRL Outgoing QSL Bureau, were hand-delivered by ARRL staff to the Bureau at ARRL Headquarters. While hams who took advantage of this service still had to pay the nominal charges associated with the Bureau, they did not have to pay the postage to send the cards to Newington. This proved such a success in 2009, the Outgoing Bureau service returned to Hamvention in 2010. By Sunday afternoon, hams had dropped off more than 60 pounds — approximately 9300 — of QSL cards.

The ARRL Education Services area was quite popular. ARRL Education Services Manager Debra Johnson, K1DMJ, teamed up with ARRL Media and Public Relations Manager Allen Pitts, W1AGP, to showcase how the League provides outreach to schools through the Education and Technology grant program and the ARRL Teachers Institute on Wireless Technology. "It's so exciting to see everyone come visit and see all what we can do to promote Amateur Radio to young people," Johnson said. "We've seen many educators who are interested in our Teachers Institute, as well as representatives from local ham clubs who want to reach out and bring the fun of Amateur Radio to schools in their area."

Hordes of hams clustered around the ARRL Bookstore — sometimes five or six deep — to pick up the latest in League publications. "We saw many popular titles sell out early," said ARRL Marketing Manager Bob Inderbitzen, NQ1R. "Many hams were incentivized to renew their ARRL membership for three years, as they received a free *2010 ARRL Handbook* by doing so. ARRL Field Day merchandise — shirts, mugs, hats and our new Field Day book — have been literally flying off the shelves. In fact, quite a few people couldn't wait to have that Field Day experience, as we saw many wearing their new Field Day shirts on Saturday here at Hamvention!"

ARRL Volunteers and Staff Participate in Hamvention Forums

One of the many highlights of the Dayton Hamvention is the host of educational and fun forums that take place the entire weekend at Hara Arena. The Forums Committee pulled together 43 unique programs encompassing nearly 80 hours of programs and activities for the thousands of attendees. While at Dayton, several ARRL staff members presented forums on a number of exciting topics.

ARRL Media and Public Relations Manager Allen Pitts, W1AGP, along with members of the ARRL Public Relations Committee, presented the ARRL Public Relations Forum. In this interactive session, participants learned about what works — and

ARRL's Annual Donor Reception Welcomes Record Crowd

The annual reception for ARRL donors in Dayton welcomed the largest attendance since its inception in 2002. Nearly 150 donors who contributed $1000 or more during the previous year enjoyed the reception on May 13 at the Meadowbrook Country Club in Clayton, Ohio. Guests at the reception included international visitors IARU President Tim Ellam, VE6SH; IARU Region 2 Secretary Ramon Santoyo, XE1KK; IARU Secretary Rod Stafford, W6ROD; IARU Region 1 President Hans Blondeel Timmerman, PB2T, and his wife Margreet, K2XYL; Seike Hidefumi, JA5CKZ; Keko Diez, TI5KD, and Deutscher Amateur Radio Club (DARC) Board Member Mitch Wolfson, DJØQN.

The Guest of Honor was new ARRL President Kay Craigie, N3KN, who mingled with the crowd and shared her thoughts on what it takes to be successful in the Amateur Radio world. Her comments began with the story of how she launched her involvement with the ARRL as an Assistant Section manager in Eastern Pennsylvania when she said "yes" to a request for her to prepare the Section's newsletter. Her steps to the Presidency of ARRL continued with her role as Section Manger, Vice Director, Director, Vice President, culminating with her election as ARRL President in January 2010. Her message to the audience was simple but straightforward — those who continue to say "yes" make a commitment to service, as well as a willingness to contribute generously to support the League make significant contributions to both Amateur Radio and to the ARRL.

At the conclusion of President Craigie's remarks, the ARRL announced new members of the Maxim Society. Current Maxim Society Donors gathered to recognize William Fugate, W8IYD; Kenneth Goodwin Jr, K5RG; Charles Heath, K6ZIZ; Henry Pownall, W4FWR; Walter Wooten, W1LW; Kurt Pauer, W6PH, Ted Goldthorpe, W4VHF, and his wife Itice Goldthorpe, K4LVV. The ARRL Maxim Society recognizes donors whose lifetime giving to various ARRL funds reaches $10,000 or more. As of May 2010, the Maxim Society numbers 67 members. For more information — including all the benefits of membership in the Maxim Society — visit the Maxim Society Web page on the ARRL Web site (**www.arrl.org/maxim-society**) or call the ARRL Development Office at 860-594-0397.

Almost 150 people showed up to honor the newest inductees to the ARRL's Maxim Society. Members of the Maxim Society have donated more than $10,000 to the ARRL in support of its many programs.

COURTESY MIKE COREY, W5MPC

ARRL President Kay Craigie, N3KN — along with ARRL Emergency Preparedness and Response Manager Mike Corey, W5MPC (right) — met with Gary Mentro, N3OS (left), and Jean-Robert Gaillard, HH2JR, at the ARRL EXPO. Mentro and Gaillard presented a forum at Hamvention describing the Amateur Radio relief efforts that followed the earthquake in Haiti earlier this year.

what doesn't work — in trying to get the word out about Amateur Radio. Pitts also presented the ARRL's PR-101 course, showing how it teaches hams the basics of making — and keeping — a good relationship with their towns and the media.

Together with Pitts, ARRL Ohio Section Emergency Coordinator Jack Sovik, KB8WPZ, presented the ARRL ARES® Forum where participants learned about the branding of ARES® and how to best present Amateur Radio and emergency communications to the public. They also led a discussion on the recently signed *Memorandum of Understanding* between the ARRL and the American Red Cross.

ARRL Volunteer Counsel (VC) Jim O'Connell, W9WU, along with *Antenna Zoning for the Radio Amateur* author Fred Hopengarten, K1VR, and ARRL VC Paula Uscian, K9IR, presented "Ham Radio and the Law — Getting It Up and Keeping It Up." This forum, presented by Amateur Radio attorneys, discussed legal issues of interest to hams on topics that included how to avoid restrictive covenants, how to present your case for a tower permit and how to defend against nuisance claims. Attendees learned about the latest court rulings on RFI, PRB-1 and towers, and got updates on the ARRL's Legal Defense and Assistance Committee.

ARRL Laboratory Manager and RFI guru Ed Hare, W1RFI, presented two forums at Dayton: one on power line noise and another on antenna modeling and propagation prediction software. In the power line noise forum, Hare explained just what power line noise is, how to differentiate power line noise from their noise sources and how to work with power companies, the ARRL and the FCC to get it fixed. He showed how the ARRL is working with the FCC and the power industry on possible long-term solutions to prevent power line noise before it happens. In the antenna modeling and propagation prediction software forum, Hare provided an introduction to the software and answered antenna questions to help participants plan and build the best antenna for their situations.

ARRL Membership and Volunteer Programs Assistant Manager Norm Fusaro, W3IZ, and ARRL VEC Manager Maria Somma, AB1FM, discussed resources for Amateur Radio clubs, showing attendees the myriad of resources that the ARRL makes available for clubs, as well as ways to recruit — and retain — members.

At 1 PM Sunday afternoon, the vendors and exhibitors began taking down their booths and boxing up their things for the trek back home. As the last ham left the building and the doors to Hara Arena closed with another Hamvention in the books, members of the Dayton Amateur Radio Association (DARA) are already thinking about 2011. The 2011 Dayton Hamvention is scheduled for May 20-22, 2011. But remember: If you're *not* here, you definitely won't be able to find just what you're looking for.

Photos by S. Khrystyne Keane, K1SFA, unless otherwise noted.

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

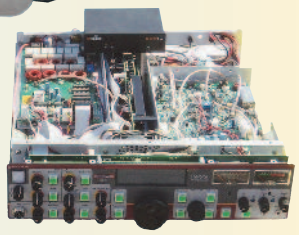
What's New at Dayton 2010?

HF Transceivers

Alinco introduced their new HF transceiver, the DX-SR8. This compact transceiver is designed with the portable or mobile operator in mind, featuring a removable face plate to increase mounting options. Coverage is from 160 through 10 meters, including the US 60 meter channels with operation on AM, FM, CW and SSB modes.

Alinco DX-SR8

DZKit showed off their Sienna HF transceiver kit, now available in full production. The Sienna is a real do it yourself kit, with instructions in the Heathkit™ style. The kit can be purchased in modular form starting with a basic receiver with optional modules added as time and budget permit to result in a fully featured 100 W transceiver with a built in PC.



DZKit Sienna

FlexRadio showed off a number of new products this year. The FLEX-1500 is an all mode 5 W software defined radio (SDR) designed to provide an opportunity for amateurs to experience the capabilities of SDR at an entry level price. The FLEX-1500 uses the same *PowerSDR* software that runs its larger brethren and provides more than 80 dB of dynamic range on 160 through 6 meters. It can be used as a stand-alone (using a PC) low power HF transceiver, or can serve as an IF strip for V/UHF transceivers.

FLEX-1500

FlexRadio demonstrated a new version of *PowerSDR*, the software that runs their SDRs. Version 2.0 is said to include a new user interface, automated wide band image rejection, enhanced noise reduction and notch filter capability, completely revamped CW timing and faster transmit-receive turnaround time as well as other features.

FlexRadio also introduced the FLEX-VU5K, a 60 W, 2 meter and 70 cm transverter module that fits into and operates with their FLEX-5000 software defined transceiver. There is also a low power version with 50 mW output, designed to drive microwave transverters.

ICOM IC-9100

ICOM introduced their new IC-9100 HF, VHF and UHF transceiver. This radio essentially merges the capabilities of the previous generation's IC-746PRO HF and 6 meter transceiver and the IC-91 V/UHF transceiver in a single box. In this case, the result is greater than the sum of the parts because near-in HF dynamic range is likely improved by the addition of selectable roofing filters at the first IF.

Kenwood TS-590

Kenwood introduced an engineering model of their new HF and 6 meter transceiver, the TS-590. This compact transceiver features a down converting design with multiple HF roofing filters included to provide good near in dynamic range. The '590 features 32 bit IF DSP filtering for operating selectivity and other filtering. It is expected that the '590 will be available in the fall at a price below $2000.

Yaesu FTDX-5000

Yaesu showed off their new FTDX-5000 series of HF and 6 meter transceivers. These 200 W transceivers all feature dual receivers and many features and options of the other FTDX series radios at a lower price point. The primary receiver features a 9 MHz first IF and selectable roofing filters as narrow as 300 Hz (optional in some models) that result in top notch close spaced dynamic range.

HF Power Amplifiers

Elecraft introduced a 500 W HF and 6 meter solid state power amplifier, the KPA500, designed to complement their K3 HF and 6 meter transceiver. The amplifier is in a package matching the dimensions of the K3, including a built-in ac power supply. As with other Elecraft radio products, this amplifier supports full break-in operation.

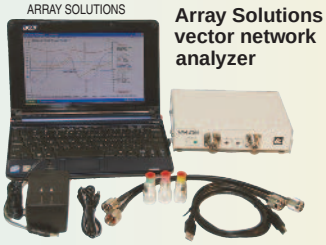
Elecraft KPA500 (shown with K3)

Yaesu showed their new full legal limit HF and 6 meter linear amplifier, the VL-2000. This will be available later this year, augmenting the Quadra amplifier line. See **www.yaesu.com** for more information.

Yaesu VL-2000

Accessories

Array Solutions introduced their new vector network analyzer, the VNA 2180. This device measures the magnitude and phase of impedance or filter and device transmission parameters over the range of 5 kHz to 180 MHz. Outputs are displayed graphically on a PC as shown in the photo.



Array Solutions vector network analyzer

Elecraft introduced a stand-alone panoramic receiver (panadapter) to display the signals received on their K3 HF and 6 meter transceiver. The P3 is the same height as the K3 and is designed to sit next to it.

Heil introduced the Pro Set Elite, a headset with boom microphone designed for commercial sportscasters, podcasters, and Amateur Radio operators. This boom-set features the new wide response Heil HC-6 microphone element.

MFJ introduced the MFJ-828 digital auto-ranging wattmeter and frequency counter. This unit measures over the range from 1.8 to 54 MHz at powers from very low to 1500 W.

The MFJ-828 measures true peak or average forward and reflected power, SWR and frequency, which can all be displayed simultaneously.

Telepost introduced a digital station monitor using a high resolution 24 bit color TFT display. It combines a power/SWR meter with auto selection of up to four couplers (any mix of HF, VHF, UHF), with simultaneous displays of other data.

Ten-Tec Regal 707 microphone

Ten-Tec introduced the Regal 707. This high quality dynamic microphone is provided in a classic retro style case including a slide PTT switch. The mic, connected via an XLR connector, is always live, permitting VOX operation in any switch position.

For descriptions of many more new items, see "What's New at Dayton" on the ARRL Web.

— Joel R. Hallas, W1ZR

Heil Pro Set Elite

Amateur Radio and the National Scout Jamboree

K2BSA brings ham radio to life for Scouts at the National Jamboree

Bill Morine, N2COP

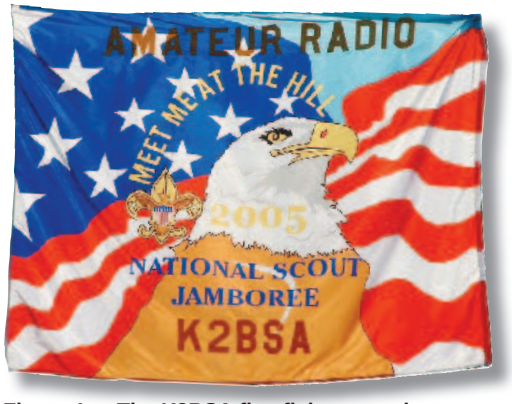


Figure 1 — The K2BSA flag flying over the station tent at the 2005 Jamboree.

Ketchup and fries. Burns and Allen. Ginger and Fred. Amateur Radio and Boy Scouts. Some things just go together and this year marks 100 years of collaboration between one of the world's largest youth organizations and one of the world's greatest hobbies. The culmination of recognition for this marriage will be the 10 day extravaganza known as the Boy Scout National Jamboree, taking place July 26 to August 4 at Fort A.P. Hill outside Fredericksburg, Virginia.

The Jamboree will pull in 35,000 youths and 10,000 leaders, and overnight become Virginia's 14th largest city. At the heart of the Jamboree will be K2BSA, the official Amateur Radio station. Next to the annual Jamboree On-The-Air (JOTA), an international Scouting event held every October with up to 500,000 participants, the quadrennial Boy Scout National Jamboree showcases Amateur Radio to more youth than any other single event in the world.

The roots of Amateur Radio and the Boy Scouts intertwine back to their origins. William Boyce began the Boy Scouts of America (**www.Scouting.org**) in 1910. The nascent American Scouting movement encouraged youth to become familiar with state-of-the-art technologies, including Amateur Radio. The first *Boy Scout Handbook* published in 1911 contains diagrams for building a "wireless receiver and spark-gap transmitter," and the first Radio Merit Badge was offered in 1923. A working replica of the original 1911 wireless set will be on display at K2BSA in 2010.

K2BSA Brings Ham Radio to the Jamboree

Although Boy Scout National Jamborees have been convening every 4 years since 1937, Amateur Radio first appeared as K2BSA (see Figure 1) beginning in the 1970s (The 2010 National Jamboree was delayed one year from its normal four year rotation to coincide with BSA's centennial). This year the staff of K2BSA will consist of 46 ham radio operators from all over the United States. Applications for one of the coveted slots begins 2 years before each Jamboree, with an applicant listing his or her (yes, there have been young ladies on the K2BSA staff) qualifications. The K2BSA chairman and director look for applicants having extensive experience interacting with youth, especially those who have been active with Scouting's annual Jamboree On-The-Air (JOTA) and in teaching the Radio Merit Badge. Although not a requirement, the majority of staff members are Extra class operators.

A half dozen positions are reserved for "Youth" staff, who are either Boy Scouts under age 18 or Venture Scouts between 18 and 21 and are licensed ham radio operators. These young men and women are active operators who have run nets or helped other Scouts to become licensed. Former Hiram Percy Maxim Award winner and current Rocky Mountain Division Director Brian Mileshosky, N5ZGT, served as a K2BSA Youth Staff Member at the 2001 Jamboree. He'll return this year as K2BSA Station Manager. *QEX* magazine Editor Larry Wolfgang, WR1B, a frequent past K2BSA staffer himself, will be ARRL liaison.

Starting 3 days before the Jamboree opens, the K2BSA team members will arrive to begin setting up antennas and equipment. Local utilities bring cherry pickers to help lift Yagis onto telephone poles surrounding the station. Numerous wire antennas crisscross the site with bundles of coax coming into the very recognizable 40 × 20 foot red-and-white striped circus-like rental tent. Under the "Big Top," the 12 operating positions begin to take shape.

Figure 2 — Groups of Scouts wait their turns to tour the K2BSA tent. Many are curious about ham radio while others are already working toward their Radio Merit Badge.

Figure 3 — Some of the 161 new Technicians taking their license exam at the 2005 Jamboree.

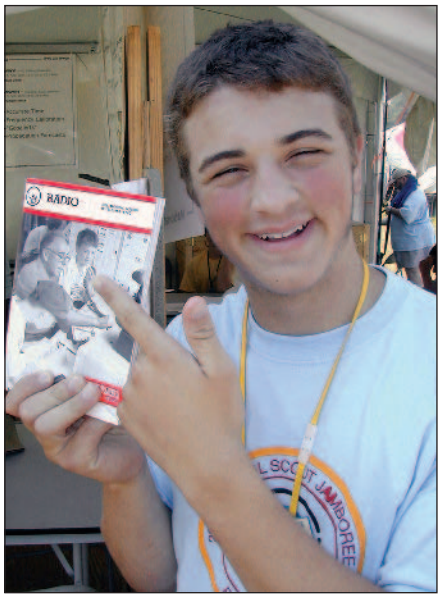


Figure 4 — Clarke Monroe, KG4OQL, points to the photo of his 12 year old self with Shelly Weil, K2BS, on the cover of the 2003 *Radio Merit Badge* booklet.

This is where thousands of Scouts will witness Amateur Radio in action (see Figure 2). Because of the intense heat and humidity the side flaps of the tent are lifted during the day. Numerous floor fans drone in the background as staffers, glowing with perspiration, point out the operating positions. One requirement of the Radio Merit Badge is to carry on a 10 minute contact, so tent staffers take turns escorting groups of 8-20 Scouts around the tent before stopping in front of one of the positions so the boys can fill in their Merit Badge sheets as they participate in an actual contact.

During hectic moments, up to 60 staffers and Scouts can be compressed inside the K2BSA tent. Somehow during the pandemonium of thousands of Scouts transiting through the tent over 10 days in 2005, K2BSA worked all 50 states and 109 countries, and staffers expect to contact the same or more in this centennial year.

It's Not Just About the Radios

Next to the Big Top are two other structures that house the other functions of K2BSA. While the stations and operating positions are the focal point, the Radio Merit Badge and licensing classes are also important parts of the ham radio experience at the Jamboree.

To the right of the main tent is a smaller tent that houses the licensing classes and VE testing. "For the first time, we are glad to be adjacent to the K2BSA main tent," says Dave Gaddis, KE4KPC, head of K2BSA's licensing and VE program. "At past Jamborees we held licensing and testing sessions sometimes miles from the main tent, so we're grateful for the new space."

Behind the main tent is a trailer with a large awning. Under its shade is an outdoor classroom. Here is held a short class that explains operating procedures for those working toward the Radio Merit Badge. Scouts taking the badge stop here before proceeding to the Big Top to learn about Q signals, prosigns and RST signal reports.

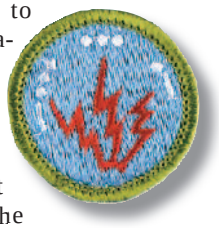
Inside the trailer are K2BSA's two repeaters. The repeaters operate on 145.17/144.57 MHz and 442.90/447.90 MHz and we hope we don't have to use a CTCSS tone. Often tinkering inside the trailer is K2BSA General Chairman Ed Dudley, WA4ISI. The repeaters are his and they perform several duties during the Jamboree. Many ham Scouts and leaders come to the Jamboree with their handheld transceivers to sample K2BSA as part of the overall Jamboree experience. During the 2005 Jamboree, a total of 366 licensed hams registered with K2BSA.

Both repeaters are busy during the Jamboree — so busy that a K2BSA staffer monitors the repeaters up to 18 hours a day. In addition to the traffic from hams at the Jamboree asking for directions and general questions, many hams call K2BSA as they drive by on adjacent I-95. Every evening at 7 PM, a 2 meter net is held. Some nights there are up to 70 check-ins. There are no IRLP repeaters near Fort A.P. Hill, but K2BSA hopes to use EchoLink repeaters in the area.

Merit Badge Midway

Fort A.P. Hill has 76,000 acres, but it is an active military facility, so the Jamboree is confined to a still spacious 3000 acre plot. Jamboree functional areas are grouped together. Classes for seven of the nine requirements for the Radio Merit Badge are conducted 2 miles from K2BSA at "Merit Badge Midway," a tent city where almost all 123 Boy Scout Merit Badges are offered.

Classes are taught continually from 9 AM to 5 PM on most of the 10 days of the Jamboree. (The hours are shortened on Sunday and evening show days.) K2BSA staff members have been working with APRS developer Bob Bruninga, WB4APR, to look for APRS applications at Jamboree, possibly including bus route information. Although there are established bus routes with frequent service throughout the Jamboree, most Scouts and leaders find the fastest way between two points is the tried and true "shoe leather express."



Over 800 Scouts begin the Radio Merit Badge and squeeze in the required elements offered at Merit Badge Midway with other badges they're seeking before circling over to the K2BSA tent for the remaining two requirements. With so much going on at Jamboree, you can forgive the almost 200 Scouts who don't complete the Radio Merit Badge. "Still, we're very happy with the completion rate, despite the obstacles of not having all the requirements in one location," says Bill Burns, WA6QYR, head of K2BSA's Radio Merit Badge training. About half of K2BSA's 2010 staff members will be assigned to the Radio Merit Badge program.

For those who catch the bug to get licensed, K2BSA offers classes to earn a Technician license, including some 1 day short courses. For eight of the 10 nights of

Figure 5 — Clarke Monroe, KG4OQL, acting as net control for the nightly 2 meter net held on the K2BSA repeater. Some nights as many as 70 check-ins join the net.

Figure 6 — Two Scouts participate in a contact as part of their Radio Merit Badge requirement.

the Jamboree, VEs administer FCC license exams (see Figure 3). In 2005, 161 new Technician licenses were issued.

What type of Boy Scout gets hooked on ham radio? A great example is Clarke Monroe, KG4OQL. At the 2001 Jamboree as a 12 year old Scout he became a K2BSA groupie, hanging out at the tent during his free time. His enthusiasm was so contagious that his picture was captured operating K2BSA with Shelly Weil, K2BS, and became the cover for the 2003 revision of the *Radio Merit Badge Series* booklet (see Figure 4). In 2005, Clarke returned to K2BSA as a youth staff member (see Figure 5).

For those looking to contact K2BSA, (see Figure 6) search near the standard JOTA frequencies (a list can be found at **www.arrl.org/jota-resources**). K2BSA is typically on the air 16-24 hours per day and operates voice, CW and PSK on 80, 40, 20, 15, 10, 6 and 2 meters and also 70 cm. K2BSA will also attempt satellite contacts. If you make contact and want a QSL card, send a stamped self-addressed envelope to K2BSA.[1]

Amateur Radio and Boy Scouts of America — a century of dedication and cooperation. "Sharing the attributes of Amateur Radio and Scouting is a privilege," says K2BSA Director Bob Wiemers, W5FIG. "We look forward to spreading the fun of Jamboree to the rest of the world from K2BSA." To paraphrase what the Jamboree staff at Fort A.P. Hill are fond of saying, "Hear you at Hill!"

For more information about K2BSA, look for it on Facebook or go to **www.nsj2010ham.com** or **www.bpmlegal.com/k2bsa.html**.

All photos courtesy of Bill Morine, N2COP.

Bill Morine, N2COP, an ARRL Life Member, was a K2BSA staff member at the 2001 and 2005 Boy Scout National Jamborees, which his Eagle Scout sons Reid, W4RSM, and Grant, W4GHM, attended. He is the North Carolina Section Manager and Chairman of the ARRL Public Relations Committee. He can be reached at 101 Windlass Dr, Wilmington, NC 28409-2030, **n2cop@arrl.org**.

[1]K2BSA Amateur Radio Association, 303 Westover Dr, Euless, TX 76039, Attn: Raymond Moyer, WD8JKV.

New Products

TWO RADIO CONTROLLER FROM MICROHAM

♢The micro2R radio controller is designed for single operator, two radio (SO2R) operation with two transceivers and any control interface. It provides automatic or manual control of headphone audio and transmitter selection, and is compatible with the automatic modes of the most popular contest logging programs. The front panel has push button controls for headphone audio and transmitter selection, a speed control for the built-in CW keyer, and separate sound card drive controls for each transmitter. LEDs indicate manual or automatic operation, headphone audio source and selected transmitter. The micro2R uses either USB or LPT control, includes a WinKey 2 CW keyer, support for either electret or dynamic microphones, a UART compatible FSK port for each radio and built-in support for the voice keyer capabilities of the most popular contesting software. Price: $379. For more information or to order, visit **www.microham-usa.com**.

When Should I Operate?

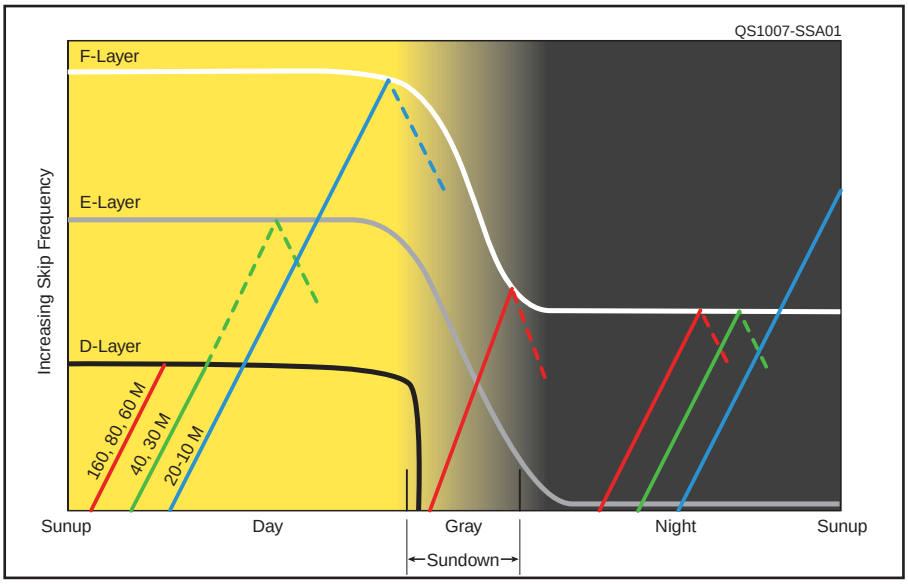
Propagation is not just the sunspot cycle.

Steve Sant Andrea, AG1YK

Time and tide wait for no man or, in amateur terms, local time and the gray line wait for no ham.

The propagation of radio signals, the process that carries your signal from your antenna to the DX's, is affected not just by sunspots but by the motions of the Earth. Unquestionably, the sunspot cycle is the single most significant piece of the propagation puzzle. Yet, the sun doesn't shine everywhere all the time. If it's daytime here at W1AW in Connecticut then it's going to be night in Australia. How does that affect my signal? Light here — dark there, yet it is still possible to contact a VK.

To determine the best time to contact a particular place you must consider not only what Ole Sol is up to, but where Mother Earth is as she spins around the sun and where you are as she spins you around her axis.



Our bands fall into three different groups, each being affected differently by the three layers of the ionosphere and the three times of day. This diagram shows how different signals are reflected or absorbed by the ionospheric layers at different times of the day.

Summer Sparks

In the summer, there is more energy in the atmosphere and consequently more lightning than in winter. "Lightning?" you say, "I've got a lightning arrestor so I'm all set there." Not exactly — the National Lightning Detection System records 25 *million* lightning bolts every year.[1] The typical bolt generates about 100 *million* V. All those bolts with all those volts make lots of static.

Lightning generates radio energy across a wide range of frequencies (as opposed to your transmitter, which generates RF at or near a particular frequency) with the lower frequencies tending to be stronger. Because of this, the lower-frequency ham bands, 160, 80 and 60 meters, are affected more, with the noise level decreasing as frequency increases. Above 40 meters atmospheric noise is greatly diminished. So, to work DX on 160 or 80, your best bet is a chilly winter evening.

ABCs of D, E and F

"Okay, so I should hold off on Topband DXCC till the winter but what's this about evening? I like to pick up a contact during lunch."

Well, making contacts and making *long distance* contacts are two different things. Any band will support some communication at any time of the day or night. How far you can go on a particular band is determined by the ionosphere. The ionosphere, in turn, is affected by the sunspot cycle but also by the time of day.

[1]**www.lightningsafety.noaa.gov/science.htm**

The ionosphere is composed of three layers, D, E and F. As your signal travels skyward, it meets one of these three layers. If everything goes well your signal will skip off the layer it meets and return to Earth to be received or to skip again. If things don't go well, your signal is absorbed by the layer it hits.

The D-layer is the lowest and is wholly the product of solar radiation. When the sun comes up, the D-layer appears, and when the sun goes down the D-layer disappears. The D-layer absorbs signals below 5 MHz (160-60 meters) and limits the range of signals between 5 and 10 MHz (40 and 30 meters). So trying to work Topband DX during lunch, even in winter, is not going to be productive. Most of your 1.8 MHz signal will end up warming the D-layer and not another station's antenna. This is also true of 80 and 60 meters.

Forty and 30 meters will be better, but they are affected by the D-layer double whammy. The D-layer absorbs low angle 40 and 30 meter RF permitting only high angle signals, at reduced strength (the green dashed line above), to pass through to the E-layer. This results in shorter range and weaker signals. So you can get some long-range contacts on 40 and 30 during the day through E-layer skip, but you are not going to work any really long haul DX. Signals above 30 meters pass through the D and E-layers and are reflected by the F-layer, which will support worldwide contacts most of the day.

When the sun goes down, the E-layer becomes very thin and is unimportant in nighttime propagation. The F-layer remains in place as night falls, but the loss of solar radiation causes it to weaken, and propagation above 20 meters drops off significantly. As Solar Cycle 24 increases so will propagation — long-range contacts above 20 meters will become more common during both the day and night.

The bottom line: At night, the D-layer disappears, the E-layer dissipates and the F-layer declines. In general, your frequency should rise and fall with the sun.

The Twilight Zone

The gray line is an area of twilight running around the globe. In the hour surrounding dawn and dusk, the D and E-layers have not yet formed but the F-layer is still present, though only able to support lower frequency communications. During twilight it is possible to experience some long range communications using this north/south corridor. On 160, 80 and 60 meters, long-range communications can be achieved by timing your CQ to catch this gray-line propagation corridor.

So you see UTC isn't the only time you need to consider when you sit down at your rig. Local time and the season have a significant impact on which bands will get you across town, across the country or around the globe.

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2009 Simulated Emergency Test Results

One of the key factors for any Simulated Emergency Test is the scenario. What happens will often dictate — or at least help determine — the kind of response that should follow.

When it comes to the 2009 ARRL Simulated Emergency Test, the scenarios were creative and inventive. They were meant to test the emergency preparedness skills and response activities of the Amateur Radio public service and emergency community as well as the served agencies.

If you were a part of the 2009 Simulated Emergency Test, then you will have had a first-hand experience in at least one of these exercise scenarios. Many exercises incorporated scenarios that set the scene and established a framework for the rest of the event. The written summaries shown here are representative of the many reports that arrived. These reports, and the statistical reports that follow in this article, show the care and commitment to emergency communications by Amateur Radio operators as well as members and leaders of the ARRL Field Organization.

COMMEX/SET 2009

Excerpts from the report created by John Acton, K7ACT (DEC), and compiled and edited by Doyle Bennink, KC7GX.

The COMMEX/SET 2009 exercise took place on October 10, 2009. It combined two actual exercises. The first is the annual Simulated Emergency Test (SET) sponsored by the ARRL. The second was a communications exercise conducted for the purpose of cross border communication preparations and to demonstrate to our customers that those communication plans and their execution are a viable resource in a time of emergency.

COMMEX/SET 2009 planning and execution were done by the Amateur Radio operators of both sides of the border [United States and Canada]. This area includes Langley Emergency Program, Surrey Emergency Program, Delta Emergency Program from the British Columbia area and the Victoria and Duncan programs on Vancouver Island. Groups from Region one includes Whatcom, Skagit, Snohomish, Island and San Juan Counties [in Washington State]. This exercise was a direct result of the forming of the Cross Border Communications Group (CBCG) which has been meeting regularly for two years. The group is made up of Amateur Radio operators from both sides of the border who saw a need to plan on helping each other during the 2010 Olympics and beyond.

On October 9, 2009, at 7:55 PM, the affected area received a simulated 7.2 earthquake that was located one and a half miles underground. In the scenario, the earthquake was located between Waldron, Stuart and San Juan Islands. The simulated quake generated a tsunami which caused damage to most shorelines throughout the San Juans, Vancouver Island and the mainland (including the Olympic Peninsula).

This drill dealt only with the first day after the quake. It was up to all areas to figure out how they would deal with the problems that come up in their areas. ICS (Incident Command Structure) protocol would be used for this event.

On October 10, the COMMEX Exercise began, and it was designed to accomplish several things: 1) To show that Amateur Radio can pass radio traffic back and forth across the border smoothly and accurately. 2) To show that Amateur Radio can choose from many different routes to get this message traffic where it needs to go. 3) To show that, even with extensive damage to local high level repeater systems, the traffic can still be delivered to its correct destination. 4) To show that, on either side of the border, hams can work together to get things done.

All of the "high level" repeaters in the region were shut down to simulate their destruction by the earthquake. Members were asked to actually go out to different parts of the counties to send their messages just as they would in a real emergency. This presented a challenge as some could not establish contact with their Net Controls. This required relay stations positioned in other areas where they could hear both the remote stations and the net control stations.

Most traffic and messages coming from the field were passed using either VHF or UHF voice on simplex or low level repeaters. Most message traffic from net controls to other net controls was passed using digital modes including packet, AirMail and PACTOR III. Direct contact between EOCs, Net Controls, OPS-1 and the State EOC (emergency operations center) was also maintained on UHF voice. In all cases, the primary concern was accuracy of the traffic.

We were all very pleased with the way the COMMEX exercise played out. Our counterparts in British Columbia seem to be very happy with the way we worked together. Our goals were all accomplished. We found only some minor issues that we will take care of in the near term with some extra training and experience. We were surprised at the amount of digital traffic that was passed. It was much greater than anticipated. While this is gratifying and resulted in some greater efficiencies in traffic handling, we will soon need to address this development to better accommodate the increase in traffic.

2009 SET Top Ten

Section	Points	Section/Local Nets	
ARES Activity			
Wisconsin	4803	Wisconsin	2451
Connecticut	3718	Connecticut	1525
Georgia	3654	Western Pennsylvania	1409
Alabama	2715	Georgia	875
Indiana	2470	Ohio	602
Michigan	2468	North Carolina	576
Illinois	1845	Western New York	489
Western Pennsylvania	1819	Virginia	465
Western New York	1572	Michigan	445
Arkansas	1526	Indiana	332

WB4NWS

(Left to right) Jay Kenyon, Manager-Communications with Cobb Emergency Management Center, Juan Quirog, KI4RXE (AEC), and Steve Bramham,W4SKB (ARES and CERT member), helped establish communications for the Cobb EMC during the Georgia SET that simulated a complete power grid outage.

Operation Highball

Hubbard Harvey, N4HUB (EC), and Jay Isbell, KA4KUN (Alabama Section Manager)

The 2009 Simulated Emergency Test in Alabama, "Operation Highball" focused on rail car accidents. Emergency Coordinators and EMCOMM Group leaders were asked to stretch themselves and their organizations to prepare for a major event in their area, which did not primarily resolve around weather. Historically, rail accidents account for the third most emergency responses in Alabama after severe weather and hurricanes.

Alabama ARES® has strongly encouraged FEMA and emergency communications training for all members. I am excited to report that 52% have completed the NIMS Phase I (FEMA) training. 35% have shown a dedication to being prepared in case of emergencies by completing at least Level I of the ARRL Amateur Radio Emergency Communications Course. Also 63% were equipped with emergency power.

Our goal for SET in 2009 was to make extensive use of digital modes. Traffic was passed to the State EOC, KF4LQK, by a number of digital means including APRS, PSK31, MT63 and D-STAR. Most of the 13 D-STAR repeaters in the state were linked together on reflector 2B. This proved to be an excellent mode to reliably pass voice traffic across great distances. In fact, ARES groups from northern Florida and Washington State used this mode to join our SET. However, slow speed digital data did not meet our expectations. We are using this as a learning and training tool for the future.

Storm Scenario in New Jersey

Michael Adams, WA2MWT (DEC)

The 2009 SET was held on October 3 and in Bergen County, originated from Ramsey Emergency Management's Emergency Operations Center, the Interim Emergency Management Headquarters.

"In past years, the New Jersey Office of Emergency Management's RACES division has prepared the scenario and participated in the exercise," explained Michael Adams, WA2MWT, Ramsey OEM Coordinator and Interim EmComm Coordinator. "This year we were on our own and began planning the week before."

Guided by seven drill messages issued by the ARRL starting on Tuesday, September 22, the scenario evolved from a rainfall of 9 inches to 15 inches over central Georgia to an early season ice storm with the potential for serious consequences.

"An ice storm not only has the potential to affect power and telephone lines, it also has concerns for all radio based communications systems (cellular, public safety and even Amateur Radio) as extensive ice buildup on any or all of these systems can cause extensive damage as both antennas and feed lines are at risk.

With Joyce Birmingham, KA2ANF, Hudson Division Vice Director and George Sabbi, KC2GLC, Northern New Jersey Section Emergency Coordinator operating the Ridgewood Weather Center, Amateur Radio operators from around the county began mobilizing at the Ramsey EOC radio room. The first message to greet them was, "High winds following the storm have knocked down trees on many power lines and telephone lines causing widespread outages. Since the event has occurred on a Saturday, high call volumes between concerned relatives have further overloaded long distance trunk lines and cellular circuits."

Adams was chosen as Incident Commander and Lou Janicek, N2CYY, Ramsey Radio Officer, was picked as Operations Commander. Gordon Beattie, W2TTT, became Net Control Station, and Richard Busch, KC2PYB, was assigned the task of maintaining the communications log. KC2FTL, Ramsey's ARES license, was assigned as the EOC's call sign.

"The EOC has lost power. Continue operations there on emergency power. Your primary repeater has failed. Switch operations to simplex or to a back up repeater located at another site." These are two serious situations which not only can but probably will occur.

Fortunately, the radio room has two backup alternatives: generator power and an extensive 12 V battery system engineered and installed by Metroplex Amateur Radio Club President John Acovino, KB2VVO. Ramsey OEM had received permission from Peter Van Den Houten, K1VDH, and President of the 10-70 Repeater Association, to use that club's repeater. Both Acovina and Van Den Houten are life members of Ramsey OEM.

"We were going to switch to the Metroplex machine as our backup," Adams commented. "But, we decided to try simplex and we were very pleased at how well it worked. As always, a couple of stations in the field had to reposition themselves for better transmission and reception, but communications were maintained at all times. A record number of 26 Amateur Radio operators and non-licensed first responders participated in the drill.

2010 SET on the Schedule

October 2 and 3, 2010, is a main weekend to focus on for this year's SET although many sections and local Emergency Coordinators have the option of conducting their exercises on a different date that works better. Please contact your local ARRL Field Organization leaders to find out specific dates, times, and potential plans for the Simulated Emergency Test in your area. Thank you!

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

ARES Activity

Area	Reporter	Points	Section Points
Atlantic Division			
Delaware			
New Castle	AD3M	written	
Sussex Co	KF3BT	written	
Maryland-DC			**1105**
Montgomery Co	WM3L	409	
Baltimore Co	AJ3X	352	
Anne Arundel Co	N3SEO	175	
Carroll Co	KB3LNM	85	
Kent Co	KB3ENU	84	
Southern New Jersey			**675**
Burlington Co	KB2BAA	188	
Cumberland Co	N2MHO	175	
Ocean Co	WX2NJ	163	
Mercer Co	KB2EGI	83	
Atlantic Co	N2JVM	61	
Western New York			**1572**
Ontario Co	N2UMH	469	
Onondaga Co	WA2PUU	293	
Chenango Co	K2DAR	243	
Oneida & Madison Co	AB2QZ	182	
Broome Co	K2DLB	177	
Herkimer Co	N2ZWO	130	
Section-wide	KC2DKP	78	
Western Pennsylvania			**1819**
Erie Co	WX3E	293	
Allegheny Co	W3YJ	202	
Centre Co	K3CWP	155	
Cambria Co	K3WS	151	
Blair Co	KA3EJV	148	
Butler Co	WB3G	143	
Franklin Co	KB3MUN	128	
Beaver Co	N3TN	115	
Jefferson Co	KA3YCB	102	
Washington Co	N3TIR	102	
McKean Co	KB9PJF	77	
Indiana Co	KB3JOF	74	
Lawrence Co	N3OLA	71	
Elk Co	KB3PJF	34	
District N2	KB9PJF	24	
Central Division			
Illinois			**1845**
Wabash Co	AI9H	364	
Franklin Co	W9GAR	281	
Lake Co	K9DRW	246	
Kane Co	N9CV	242	
Vermilion Co	KB9AZA	150	
Will Co	N9JH	126	
Sangamon Co	K9CNP	125	
Hancock Co	KA9FAJ	118	
Williamson Co	WA9APQ	97	
Perry Co	N9VKO	96	
Indiana			**2470**
Allen Co	K9RFZ	316	
Tippecanoe Co	N9GKE	238	
Whitley Co	K9EJS	184	
Vanderburgh Co	WB9EFH	183	
Hamilton Co	WAØJTL	154	
Sheboygan Co	N9ZMO	149	
Orange Co	WB9FHP	141	
Adams Co	AB9SO	126	
Harrison Co	W9WXN	115	
Rock Co	N9GQ	114	
Jackson Co	KC9MVK	113	
Shelby Co	KB9ZYC	113	
Bartholomew Co	N9CJT	104	
Starke Co	KB9OLZ	86	
Gibson	N9LJA	70	
Steuben Co	KC9GUY	65	
Fayette Co	N9TU	45	
Spencer Co	W9DRB	43	
Clay Co	W9EEU	41	
Putnam Co	N9NDS	36	
Wabash Co	N9WVM	21	
Green Co	K9PS	7	
Elkhart Co	KC9CDS	6	
Adams Co	AB9SO	written	
Wisconsin			**4830**
Racine/Kenosha Co	KB9MMA	456	
Sauk Co	N9ROY	335	
West Central	KB9ULF	333	
Milwaukee Co	WB9ODQ	214	
Juneau Co	KC9IVJ	211	
Dane Co	KB9UAJ	194	
Waupaca Co	AB9TV	183	
Eau Clair Co	W9RLL	181	
Marquette Co	W1VOW	168	
Columbia Co	KC9FNM	176	
Brown Co	N8KQS	170	
Green Co	KC9YI	170	
Jefferson Co	KC9IKI	157	
Ozaukee Co	AB9ON	148	
St Croix Co	N9XYX	147	
Sheboygan Co	N9ZMO	147	
Richland Co	W9MZ	136	
Manitowoc Co	N9NCU	132	
Marathon Co	KB9VBR	120	
Burnett Co	NØJOF	118	
Rock Co	N9GQ	114	
Ashland Co	KC9GSK	113	
La Crosse Co	N9UNW	99	
Marinette Co	KC9PLW	86	
Wood Co	KC9OKM	81	
Douglas Co	WØNWO	75	
Fond du Lac Co	W9GPI	71	
Trempealeau Co	N9UNW	65	
Buffalo Co	N9UNW	59	
Sawyer Co	N9VAO	59	
Kewaunee Co	N9JKX	55	
Winnebago Co	K9NL	30	
Dakota Division			
Minnesota			**183**
Steele Co	NØUW	94	
Washington Co	KAØHYR	89	
Delta Division			
Arkansas			**1526**
State-wide RACES	KE5VRO	593	
Eastern AR	W5WPN	329	
Craighead Co	KE5HKW	308	
Baxter Co	K5ABH	114	
Pope Co	W5RZ	94	
Johnson Co	W5FRG	88	
Louisiana			**1010**
Section-wide	AI5B	915	
Grant Parish	AC5PW	95	
Mississippi			**1091**
Hinds Co	KE5KTU	159	
Lamar Co	NE5P	150	

Area	Reporter	Points	Section Points
Rankin	K5FV	146	
Lauderdale Co	AE5FE	140	
Prentiss/Tishomingo	WX5N	140	
Itawamba Co	KB5NMB	94	
Forrest Co	N5SP	82	
Grenada	AD5IT	62	
Yalobusha	KE5MIS	62	
Greene Co	KG6LJN	56	
Tennessee			**686**
Monroe Co #2	K4SEY	117	
Bradley Co	KD5UBL	140	
DeKalb Co	KC4GUG	103	
Monroe Co #1	K4SEY	93	
Rutherford Co	N9DGK	89	
Gibson Co	WØSPZ	76	
Greene Co	KI4PDH	68	
Great Lakes Division			
Kentucky			**919**
Hardin Co	W8WN	151	
District 9	KB9ORD	145	
Caldwell Co	KI4YIB	136	
Hopkins Co	KC4FRA	123	
Tuscola Co	WB8WJV	116	
Boone Co	WD8JAW	77	
Lawrence Co	KJ4GRJ	71	
McCracken Co	KO4XJ	53	
Webster Co	AG4BT	45	
Graves Co	WA4RKM	2	
Michigan			**2468**
Calhoun Co	KC8COT	663	
Alcona Co	W8SZ	639	
Saginaw Co	KC8YVF	212	
Kalamazoo Co	NK8X	203	
Allegan Co	AB8SF	162	
Hillsdale Co	KC8RYF	141	
Benzie Co	K8BTE	121	
Tuscola Co	WB8WJV	116	
Grand Traverse Co	K8RCT	114	
Monroe Co	WB7RUM	83	
Guernsey Co	KC8SBB	79	
Osceola Co	N8NJA	50	
St Clair Co	W8RIT	26	
Ohio			**1409**
Erie Co	K8HLH	357	
Van Wert Co	WB8YIH	212	
Huron Co	KB8DNA	179	
Hancock Co	N8PTJ	159	
Clinton Co	WF8B	158	
Clark Co	N8NSD	152	
Stark Co	WD8AYE	104	
Montgomery Co	KD8AIZ	88	
Guernsey Co	KC8SBB	79	
Hudson Division			
Eastern New York			**167**
Albany Co	K2QY	167	
New York City/Long Island			**261**
Town of Southold	N2QHV	157	
Huntington	WB2LUA	104	
Northern New Jersey			**1013**
Middlesex Co	KC2PBJ	373	
Monmouth	N2SMV	242	
Hunterdon Co	AC2BH	192	
Bergen Co	WA2MWT	141	

Area	Reporter	Points	Section Points
Englewood	W2CC	65	
Midwest Division			
Iowa			**36**
Story Co	KCØJUO	36	
Kansas			**526**
Clay Co	WØPBV	168	
Zone 6A, 6E, 6C	KØEQH	132	
Riley Co	WØPBV	116	
Zone 2B	WAØCCW	110	
Missouri			**86**
Jackson Co	KØUAA	86	
Nebraska			**220**
Lancaster Co	KØGND	190	
Buffalo Co	KAØDBK	30	
New England Division			
Connecticut			**3718**
Region 3 East	KB1KIX	404	
Region 5 North/Litchfield	K1DAV	312	
SKYWARN	K1SJW	273	
Farmington Red Cross	K1WMS	271	
Region 4	W1GTT	251	
Manchester CERT	W1RGC	222	
Danbury	W1QH	208	
Region 1 Central	W1GIG	185	
Region 4 North	KB1JDX	183	
Section-wide Command	N1CLV	180	
Ridgefield/Redding	AB1DO	166	
Region 1 West #2	KB1FIX	142	
Ellington CERT	W1HEN	117	
Region 1 West	KB1FIX	106	
Brookfield	W1QK	90	
Region 1	NN1H	85	
Suffield	AB1RB	84	
Region 3 Enfield	NM1K	82	
New Britain	KB1EWM	72	
Region 5 Bethlehem	KB1QXN	69	
Region 5 Wolcott	N1UIL	69	
East Granby	W1FTE	50	
Region 3 Southeast	K1CMM	44	
Region 3 Ellington	K2KKH	34	
Newington	KB1PRP	19	
Maine			**169**
Androscoggin	N1OXA	169	
New Hampshire			**229**
W Rockingham Co	KA1UVH	229	
Rhode Island			**112**
Charlestown	W1XX	112	
Northwestern Division			
Eastern Washington			**885**
Yakima Co	KA7LJQ	267	
Whitman Co	K7LL	227	
Spokane Co	W7UWC	244	
Lincoln Co	WB7QMD	88	
Asotin Co	K7LWC	59	
Oregon			**439**
Lane Co	N7MQ	196	
Coos Co	W7WVF	127	
Jackson Co	WB7Q	116	

Area	Reporter	Points	Section Points
Western Washington			**1326**
Pacific Co	N7CVW	419	
Island Co	WB7WOW	270	
Grays Harbor Co	N7UJK	182	
Clallam Co	N7DWA	175	
Sammamish	N9VW	106	
Issaquah	N7TCW	92	
Centralia	KD7OWN	82	
Pacific Division			
East Bay			**193**
Oakland, Piedmont	KS6M	193	
Nevada			**87**
South Nye Co	KC6ILH	87	
Pacific			**694**
Hawaii State Civil Defense	AH6RH	322	
S Kohala Co	NH7UA	144	
Maui Co	KH6H	141	
Hamakua	WH6N	87	
Sacramento Valley			**380**
Sacramento Co	WD6FXR	380	
San Francisco			**174**
Sonoma, Marin Co	KF6SZA	174	
Santa Clara Valley			**457**
Santa Cruz Co	KE6AFE	304	
La Honda, Loma Mar	WA6YJR	153	
San Joaquin Valley			**6**
Tulare Co	KC5LUB	6	
Roanoke Division			
North Carolina			**1451**
Cleveland Co	KM4C	544	
Pitt Co	KG4CZV	164	
Moore Co	N4YYL	152	
Buncombe Co	K8SKX	123	
Henderson Co	WI1L	120	
Eastern Branch	W9EF	101	
Rowan Co	K4GHL	98	
Pamlico Co	KI4NSQ	87	
Catawba Co	W1FAI	62	
South Carolina			**156**
Anderson Co	N4SZ	156	
Virginia			**861**
Virginia Beach	WA4TCJ	362	
York Co	WB4UHC	131	
Norfolk	W4NMH	128	
Hampton	KC4F	126	
James City Co	KC4CMR	114	
West Virginia			**500**
Wood Co	KC8TUE	229	
Kanawha Co	KB8YZT	179	
Jefferson Co	K8WDX	91	
Southeastern Division			
Alabama			**2715**
Jefferson Co	N4HUB	555	
Calhoun	KG4EUD	504	
Shelby Co	W4TCA	285	
Mobile	KD4DLJ	210	
Tuscaloosa	WS4I	209	

Area	Reporter	Points	Section Points
Talladega	W4LVT	156	
Emerg Response Team	WD4NYL	150	
Limestone	W4JSI	144	
Etowah	K4VMV	139	
Cleburn Co	W4AUB	123	
Madison Co	K4RGG	119	
Cherokee Co	K4BMX	57	
Bartow Co	N4QET	54	
Georgia			**3654**
Hall Co	AA4BA	861	
Thomas Co	N4KXL	416	
Gwinnett Co	WB4QDX	395	
Chatham Co	K4GTM	375	
Putnam Co	KF4EOH	275	
Central District	KI4QFF	203	
Gordon Co	AF4DN	178	
Towns Co	W4VFZ	165	
Butts Co	KG4LTL	136	
Fayette/Coweta Co	AG4ZR	135	
Newton Co	WA4UJC	135	
Towns Co	W4FVZ	165	
Haralson, Carroll, Heard	N4IF	110	
Washington Co	K4GK	87	
Lee Co	W5VRV	18	
Northern Florida			**667**
Clay Co	W4NEK	193	
Putnam Co	KI4NAI	154	
St Johns Co	KC1SS	114	
Lake Co	W4ALR	109	
Nassau Co	KI4GTS	97	
Southern Florida			**1021**
Palm Beach Co	K4DLF	478	
Broward Co	KJ4AWB	414	
Indian River Co	WA4ASJ	129	
West Central Florida			**465**
5 County Area	AC4MK	261	
Charlotte Co	N9JZG	204	
Southwestern Division			
Arizona			**513**
Maricopa Co	KE7EJF	318	
Yavapai Co	WA6ZZJ	195	
Los Angeles			**214**
South East	W6UPN	214	
Orange			**208**
Mission Viejo	WA6RUZ	208	
West Gulf Division			
North Texas			**410**
Ellis Co	KD5NFW	209	
Irving	KA5OZC	147	
Grayson Co	WB5DCU	54	
South Texas			**844**
District 14	KE5FGA	386	
Travis Co	AC5YK	197	
Burnet, Llano Co	K5RIK	192	
Live Oak Co	W5IM	69	
West Texas			**285**
Midland Co	W5EOC	285	

Section/Local Nets

Area/Net Name	Net Mgr	Points	Section Points
Atlantic Division			
Maryland-DC			**29**
Kent Co	KB3ENU	29	
Southern New Jersey			**43**
Salem Co	NJ2SC	43	
Western New York			**489**
OCTEN	KA2ZNZ	189	
CNYTN	WA2PUU	186	
New York Phone Net	AK2Z	57	
Chenango Co	K2DAR	57	
Western Pennsylvania			**1409**
Franklin Co	N3QBI	1061	
Blair ARES	KA3EJV	88	
Cambria Co	KB3PSJ	74	
Beaver Co	N3TN	58	
Clarion Co	KB3DIV	54	
District 2	N3UDN	37	
Washington Co	N3TIR	37	
Central Division			
Illinois			**178**
R.A.D.I.O.	AI9H	89	
Lake Co	K9DRW	89	
Indiana			**332**
Whitley Co	K9EJS	105	
Warrick Co	KT9B	97	
Orange Co	WB9FHP	69	
Harrison Co		61	
Wisconsin			**2451**
Racine/Kenosha	KB9MMA	613	
Badger Emergency Net	WD9FLJ	306	
Dunn Co	KB9ULF	188	
Milwaukee Co	WB9ODQ	158	
WI ARES/RACES	N9VAO	139	

Area/Net Name	Net Mgr	Points	Section Points
Dane Co	KC9FKV	128	
Sauk Co	N9ROY	105	
OZARES	AB9ON	97	
Eau Claire Co	W9RLL	91	
Polk Co	AB9LV	87	
Waupaca Co	AB9TV	78	
Manitowoc Co	NZ9Z	77	
Brown Co	KC9OIS	72	
Jefferson Co	KC9IKI	62	
Sheboygan Co	N9ZMO	62	
Rock Co	KB9UNX	57	
Douglas Co	WØNWO	50	
Green Co	KC9YI	45	
Kewaunee Co	N9JKX	37	
Delta Division			
Arkansas			**103**
Cross Co	W5WPN	103	
Mississippi			**81**
State-wide ARES	W5XX	81	
Tennessee			**304**
Heart of TN ARES	AG4WK	85	
Greene Co	KJ5KLX	63	
DeKalb Co	KC4GUG	58	
Monroe Co #2	K4SEY	52	
Monroe Co #1	K4SEY	46	
Great Lakes Division			
Kentucky			**52**
E KY ARES	KB9ORD	52	
Michigan			**445**
Alcona Co	W8SZ	259	
Saginaw Valley RA	KC8YVF	83	
Benzie Co	K8BTE	53	
ARPSC	KC8RQI	50	
Ohio			**602**
Central Ohio Traffic	N8XCT	287	
Erie Co	N8FMJ	138	
Huron Co	KB8DNA	100	

Area/Net Name	Net Mgr	Points	Section Points
Northwest OH ARES	N8TNV	77	
Hudson Division			
Northern New Jersey			**48**
New Jersey Phone	W2CC	48	
Southern New Jersey			**144**
Mercer Co	KB2EGI	83	
Atlantic Co	N2JVM	61	
Midwest Division			
Kansas			**152**
Kansas Sideband/Phone	NØKFS	152	
Missouri			**61**
Jackson Co	KØUAA	61	
Nebraska			**139**
Eastern Nebraska	KBØDNP	139	
New England Division			
Connecticut			**1525**
Connecticut Phone Net	N1DIO	223	
New London Wx	W1JOP	134	
ECTN	NX1Q	128	
Nutmeg VHF	K1HEJ	127	
Region 4 North	KB1JDX	104	
New Canaan Red Cross	KA1TZR	101	
SEC/ARES Net	N1CLV	97	
Stamford EOC	KB1FIX	96	
WESCONN	KA1GWE	95	
Norwalk EOC	N1NB	84	
Bridgeport EOC	KC1EOC	66	
Region 1 Central	W1GIG	65	
Westport EOC	W1ZR	49	
Region 5 North	WA1EOC	46	
Bears of Manchester	NM1K	41	
Eastern EOC	W1RTI	36	
Enfield EMCOMM	NM1K	33	

Area/Net Name	Net Mgr	Points	Section Points
Maine			**190**
Maine Emergency Comm	K1HZU	190	
New Hampshire			**91**
W Rock ARES	KA1UVH	91	
Northwestern Division			
Western Washington			**288**
Evergreen State Traffic	WB7WOW	266	
Grays Harbor Co	W7EOC	22	
Roanoke Division			
North Carolina			**576**
Tar Heel Emergency	KD4IMA	308	
Cleveland Co	N4HAW	239	
Catawba Co	W1FAI	29	
Virginia			**548**
Virginia Beach	WA4TCJ	465	
Southeastern Division			
Georgia			**875**
Statewide ARES	K4GK	723	
Gordon Co	K4WOC	92	
Old Capitol ARES	K4GK	60	
Southern Florida			**221**
SEFTN	AF4RJ	163	
BEARS	W4NLX	58	
West Central Florida			**109**
Manatee ARES	AC4MK	109	
West Gulf Division			
North Texas			**87**
Irving	KA5OZC	87	
West Texas			**195**
Midland Co	N5ATO	195	

European IARU Member-Societies Exhibit in European Parliament

During the last week in April, representatives from various European Amateur Radio societies have come to the Espace Léopold — the European Parliament building located in Brussels, Belgium — to provide information about the Amateur Radio Service to members of the European Parliament. Using the motto *European Amateur Radio Benefiting Society*, the event was sponsored by the IARU Region 1 EUROCOM Working Group and European Parliament Member (MEP) Birgit Sippel, who supports the goals and the socio-political importance of Amateur Radio. Before the event, she said it was her hope that the exhibition would offer the possibility for her colleagues to become informed about the Service: "I am very much looking forward to sharing information on this Amateur Radio Service with my colleagues, their assistants and anyone else who may be interested." The European Parliament is the legislative body of the European Union (EU).

"Even though the Amateur Radio Service has been around since 1908, and many countries even have special laws to regulate it, the Service is often unknown in public," said EUROCOM Working Group Chairman Thilo Kootz, DL9KCE. "Many politicians have never heard about the Amateur Radio Service, making this a very good starting point for the exhibition. In the European Union alone, about 350,000 people of all ages are fascinated by this hobby. They operate their radios and socialize with others throughout the world, all while generating a large amount of international goodwill in the process. This combination of communication, technology and sports bonds them together and makes Amateur Radio unique."

Through personal contacts and demonstrating practical examples, the exhibitors illustrated the Amateur Radio Service and its structures and benefits for society. Young people who are interested in space exploration are drawn to Amateur Radio, as it allows them to actually communicate via satellites and even speak to the International Space Station (ISS). But according to Kootz, a contact to the other side of the globe with self-built equipment and limited antennas fascinates youngsters, as well: "These technology-loving youngsters are likely to become engineers or high tech specialists, benefiting the wealth and growth of the EU."

Kootz said that the representatives demonstrated to the MEPs how Amateur Radio helps in emergencies, using the recent earthquakes in Haiti and the tsunamis in the Indian Ocean as examples. "Amateur Radio operators were always the first to communicate to the outside world, as the telecom infrastructure was destroyed," he said.

European Commissioner for International Cooperation, Humanitarian Aid and Crisis Response Kristalina Georgieva called Amateur Radio operators "heroes." Speaking of the February earthquake that rocked Chile, she wrote in her blog that "It is in critical situations like this when the voluntary work of Amateur Radio operators becomes priceless. Yesterday I had the opportunity of meeting some European 'hams' in an exhibition they organised in the hall of the European Parliament. Their passion for the air waves is admirable. 'Hams' often build their own equipment and spend endless hours talking to fellow radio operators from every corner of the world (actually also from outer space, since they can even connect with the International Space Station, as I could see in the exhibition).

"Some think of them as an unusual bunch of people with no real impact on our daily lives but, when it comes to crisis, they often become heroes. The Amateur Radio Service provides flexible networks that are

COURTESY IARU REGION 1

The IARU Region 1 EUROCOM Working Group organized this exhibition in the European Parliament, focusing on emergency communications, education and space, with the aim to raise awareness of the Amateur Radio Service among European politicians. Pictured are (left to right) Panayot Danev, LZ1US; Claude Van Pottelsberghe de la Potterie, ON7TK; MEP Birgit Sippel; Thilo Kootz, DL9KCE; European Commissioner for International Cooperation, Humanitarian Aid and Crisis Response Kristalina Georgieva, and IARU Region 1 President Hans Blondeel Timmerman, PB2T. ON7TK is the President of the Union Royale Belge des Amateurs-Emetteurs/ Koninklijke Unie van de Belgische Zendamateurs/ Königliche Union der Belgischen Funkamateure (UBA), Belgium's IARU Member-Society.

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

independent of vulnerable infrastructures like telephone cables or GSM antennae, and transmit in frequencies that are not easily overloaded. Radio operators are aware of their potential in case of crisis and have established well-coordinated structures for emergency response that provided vital services during the Tsunami in 2006, the hurricanes Rita and Katrina in 2005, or more recently, during the earthquakes of L'Aquila, Haiti and Chile." Her blog is available online at **http://blogs.ec.europa.eu/georgieva/the-wave-heroes/**.

During the exhibition, 10 students from a school in Brussels contacted the ISS, one of the many highlights of the exhibition; models of the ISS and an Amateur Radio satellite were also on display. Visitors to the exhibit could test their Morse code skills, one of the most effective modes of shortwave operation in low signal conditions. The European directives that affect the Amateur Radio service were also presented to the MEPs and discussed. "Future European legislation may affect the Service, making it necessary to inform visitors about the special needs that this fine hobby has," Kootz said.

IARU REGION 1 HAMS CONVINCE KUWAITI BROADCASTER TO CEASE OPERATIONS ON 40 METERS

The IARU Region 1 Monitoring System — led by Wolf Hadel, DK2OM, and Uli Bihlmayer, DJ9KR — is ever vigilant in monitoring the amateur bands for intruders. On April 12, Bihlmayer first observed a shortwave station on 7.150 and 7.190 MHz and alerted the monitoring group to listen and send reports to their appropriate authorities. Through their combined efforts, he identified the station as Radio Kuwait. Once the station was identified, Bihlmayer immediately informed the German Federal Net Agency (Bundesnetzagentur) to monitor the exact frequencies and to send an official complaint to Kuwait. He also sent a fax and an e-mail to the Kuwaiti Embassy in Berlin, as well as e-mails to Radio Kuwait and Kuwait's Ministry of Telecoms.

Bihlmayer invited all participating IARU Intruder Watchers to inform their telecom authorities, asking them to send their observations to Kuwait. Faisal Al-Ajmi, 9K2RR, coordinates the IARU Region 1 Monitoring System in Kuwait. He contacted Radio Kuwait to inform them of the many amateurs asking them to cease transmissions inside the amateur bands. On April 19, Al-Ajmi informed Hadel and Bihlmayer that the General Manager of Engineering for Kuwait Radio had told him that transmissions on both 7.150 and 7.190 MHz had been suspended. Al-Ajmi said that this is another battle won against intruders to the 40 meter amateur band. As usual, the Region 1 Monitoring System will keep monitoring the band for any other complaints.

MIKE COREY, W5MPC, JOINS ARRL STAFF AS EMERGENCY PREPAREDNESS AND RESPONSE MANAGER

The ARRL is pleased to welcome Emergency Preparedness and Response Manager Mike Corey, W5MPC, to the Headquarters staff in Newington. Corey's major responsibilities include addressing the development and implementation of an organizational disaster response plan as well as an operational continuity plan, complete with supporting procedures and training. Corey also will play an integral part in the management of ARES®, and in future negotiations with served agencies with whom ARRL shares or creates *Memoranda of Understanding*.

An Extra class licensee and an ARRL Life Member, Corey comes to the ARRL with almost 20 years of experience with emergency communications. Licensed since 1988, he has been involved with SKYWARN since 1991 and has attended basic and advanced SKYWARN training. He is the author of the *ARRL Storm Spotter's Handbook*, released in May.

Corey comes from a ham family: His grandparents, parents and uncle are all hams. "I first went to the Dayton Hamvention® when I was eight months old," he said. "It was the family vacation every year. We would drive out in the RV, camp out at the campground and fish a little if we had time after exploring Hara Arena each day." Corey is married to Elizabeth: "She's not licensed — yet! We're working on that."

After graduating from Indiana University, Corey embarked on a career in law enforcement, working as the Communications Officer for the Howard County Sherriff's Department, where he was responsible for dispatching law enforcement, emergency medical services, fire services and county resources to calls for service, as well as operating and maintaining the logs for the National Crime Information Center. Corey also served a Project Manager for contingency planning for public safety communications. While employed at the Sherriff's Department, he also volunteered at the Kokomo-Howard County Emergency Management Agency, serving as a Special Deputy Sherriff, and assisted with emergency management response planning and local disaster response as part of the Emergency Operations Center staff.

Corey left Indiana to pursue a Master's

FCC News

♦ **FCC Clarifies Portions of Part 97**: In March, the FCC released an *Order* that made certain nonsubstantive revisions to Part 97, and in May, it was published in the *Federal Register*. According to the FCC, the revisions are necessary to amend the Amateur Service rules or conform them to prior Commission decisions. The revisions will enhance the usefulness of the Amateur Service rules by making the rules conform to other Commission rules, thereby eliminating licensee confusion when applying the rules to Amateur Service operations. These new rules — available at **http://edocket.access.gpo.gov/2010/pdf/2010-11385.pdf** — will take effect July 13, 2010.

♦ **FCC Again Denies Amateur's *Petition* Regarding Station Identification**: On May 18, the FCC denied a *Petition for Reconsideration* filed by Glen Zook, K9STH, asking for changes in Part 97 regarding how often amateurs must identify themselves on the air. This action follows the Commission's denial of Zook's April 2009 *Petition for Rulemaking* requesting that the Commission amend Section 97.119(a) to change how often amateur stations must identify themselves, specifically "to require that an amateur station transmit its call sign during the first transmission of any communication or series of transmissions, and to allow an amateur station to not transmit its call sign at the end of a communication when the communication or series of transmissions lasts less than three minutes." The FCC Denied Zook's *Petition for Reconsideration*, concluding that it, "like your previous petitions, does not demonstrate that the current station identification rule is inadequate or that revising the station identification requirement as requested would address the concern that many amateur radio operators do not identify their station timely or at all. We also note that, in response to your 2006 petition, commenters believed that the current station identification rule properly balances the burden of requiring the station to transmit its call sign with the convenience of those receiving the transmissions to determine the identity of the station making the transmissions."

S. KHRYSTYNE KEANE, K1SFA

ARRL Emergency Preparedness and Response Manager Mike Corey, W5MPC

degree in Criminal Justice at the University of Mississippi. While attending to his studies, he joined the University of Mississippi Police Department as the Communications Officer. Corey served as the primary contact for the department, provided support training to new employees, coordinated public safety communications during campus events and advised the University administration on severe weather response. While part of the University Police Department, Corey became a Mississippi Certified Public Safety Communications Instructor.

During August and September 2008, Corey volunteered at the Saint Helena Parish (Louisiana) Office of Homeland Security, providing support during Hurricane Gustav. He helped to manage the Emergency Operations Center and served as its liaison to local, state and federal agencies, as well as to local private entities and the local evacuation shelters.

Corey said he would like to take his love for Amateur Radio and public service "and bring in the education part of ham radio, training and teaching and learning" to his position at HQ. "I'd like to work with the existing relationships that the ARRL has with outside agencies. For instance, I noticed that the ARRL's contact at the National Weather Service is the same person who reviewed my book for the National Weather Service. So I already have a good working relationship with him. Building on the strength and stability that we enjoy will be a main focus of mine."

Corey enjoys contesting — "I live for CW Sweepstakes" — DXing and even a bit of QRP. "I hold DXCC (mixed) and am also working on DXCC for RTTY. I'd eventually like to get DXCC using QRP, but I'm a long ways off from that yet," he said. He enjoys the public service aspect of Amateur Radio, and has volunteered by providing communications support at many events, such as the Run 4 Life, Double Decker Festival and the Mississippi Diabetes Foundation.

"When I read the job description [of the Emergency Preparedness and Response Manager], it fit me to a T," Corey said. "This is what I do professionally, it's what I do as a hobby — it's a perfect marriage. I am very excited to be able to be here in Newington and be a resource for all the hams out there in the field."

In Brief

• **W1AW Offers Code Practice, Bulletins via EchoLink**: Audio from W1AW's CW code practices and CW/digital bulletins is now available using EchoLink via the W1AW Conference Server W1AWBDCT. The 9:45 PM ET phone bulletin is currently unavailable via W1AWBDCT. The audio is sent in real-time and runs concurrently with W1AW's regular transmission schedule (**www.arrl.org/w1aw-operating-schedule**). According to W1AW Station Manager Joe Carcia, NJ1Q, this server is currently at an experimental stage: "Since the server is located at ARRL — and uses the ARRL's Internet connection — there may be an issue as to how many users can connect to W1AWBDCT via EchoLink. The current number of connections is set to 350. If the current system can properly handle these connections without adversely affecting the performance of the conference server, this number will be bumped up higher." All users who connect to the conference server are muted. Please note that any questions or comments should not be sent via the "Text" window in EchoLink. Please send any questions or comments via e-mail to **w1aw@arrl.org**.

• **Former Hudson Division Director Linda Ferdinand, N2YL (SK)**: Linda Ferdinand, N2YL, of North Chatham, New York, passed away May 4 due to complications from chronic heart failure. She was 63. Ferdinand served as Hudson Division Vice Director from 1980-1982, and as Division Director from 1985-1987. She was an extremely proficient Morse code operator and was active in the ARRL National Traffic System at the local, section, region and area levels, as well as serving in the Transcontinental Corps. An ARRL Life Member, Ferdinand received an advanced degree in computer science and worked for IBM, transitioning their mainframe computers to large computers based on small microprocessors running in parallel. She was also a member of the ARRL A-1 Operator Club, FISTS and the Six Meter International Radio Club (SMIRK). Ferdinand was an avid quilter and lover of cats. She is survived by her husband Gary, W2CS, and son Brian, N2EKS, daughter Lauren and two grandchildren. The family requests that contributions in Ferdinand's memory be made to AnimalLovers (The Animal Welfare League of Albany, New York).

SECTION MANAGER NOMINATION NOTICE

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

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms FSD-129 are available on request from ARRL Headquarters but are not required. A sample nomination form is available on the ARRL Web site at **www.arrl.org/section-terms-nomination-information**.

We suggest the following format:

(Place and Date)

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

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

(Signature___ Call Sign___ City___ ZIP __)

Any candidate for the office of Section Manager must be a resident of the Section, an Amateur Radio licensee of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a nominating petition. Petitions must be received at Headquarters by 4 PM Eastern Time on September 10, 2010. If more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before October 1, 2010, to full members of record as of September 10, 2010, which is the closing date for nominations. Returns will be counted November 23, 2010. Section Managers elected as a result of the above procedure will take office January 1, 2011.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 2011. If no petitions are received from a section by the specified closing date, such section will be resolicited in the January 2011 *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*

Section Manager Nomination Resolicitation

Since no nomination petitions were received for the Santa Clara Valley Section Manager election by the nomination deadline of March 5, nominations are hereby resolicited. See above for details on how to nominate.

Nominees Sought for ARRL Board of Directors

If you're a full ARRL member in one of the following five divisions and are interested in playing a part in the League's democratic organization, here's the opportunity. Nominations are open for the offices of director and vice director for the 2011-2013 term in the Pacific, Rocky Mountain, Southeastern, Southwestern and West Gulf divisions.

ARRL Divisions

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

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

How to Nominate

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

Any full member residing in a division where there is an election may request an official nominating petition package. You don't need to be a candidate to request the forms. Your request for forms must be received by the Secretary *no later than noon Eastern Time on Friday, August 13, 2010*. There are separate forms for director and vice director nominations.

2. *Submit petition with statement of eligibility and willingness to serve*. Official forms bearing the *signatures of 10 full members of the division* and naming a full member of the division as a candidate for director or vice director, must be submitted, with a statement *signed by the candidate* attesting to his or her eligibility, willingness to run and willingness to assume the office if elected. These documents must be filed with the secretary *no later than noon Eastern Time on Friday, August 20, 2010*. Only original documents can be accepted; *no facsimiles of any kind are acceptable*. On Monday, August 23, 2010, the secretary will notify each candidate of the names and call signs of each other candidate for the same office. Candidates will then have until Friday, September 3, 2010, to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

3. *Ethics and Elections Committee to certify eligibility*. In accordance with the Bylaws, an Ethics and Elections Committee, composed of three directors not subject to election this year, is responsible for the conduct of the election. This year, the Ethics and Elections Committee consists of Tom Frenaye, K1KI; Cliff Ahrens, KØCA, and Greg Widin, KØGW.

Call for Nominations

Nominations are open for director and vice director in the five divisions mentioned above for the three-year term beginning at noon January 1, 2011.

The nominee must be at least 21 years of age and have been licensed and a full member of the League for a continuous term of at least four years immediately preceding nomination. No person is eligible whose business connections are of such nature that his or her influence in the affairs of the League could be used for his or her private benefit or would materially conflict with the activities or affairs of the League. The primary test of eligibility under this portion of the Article shall be full compliance with the Articles, Bylaws and Rules and Regulations of the League relating to ethics, elections and conflicts of interest.

Balloting Will Follow

If there is only one eligible candidate for an office, he or she will be declared elected by the Ethics and Elections Committee. Otherwise, ballots will be sent to all full members of the League in that division who are in good standing as of September 10, 2010. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1, 2010 and, to be valid, must be received at HQ by noon Eastern Time on Friday, November 19, 2010. A group of nominators can name a candidate for director or vice director, or both, but there are no "slates," as such. Each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Because all the powers of the director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Absentee Ballots

All ARRL members licensed by the FCC, but temporarily residing outside the US, are eligible for full membership. Members overseas who arrange to be listed as full members in an appropriate division prior to September 10, 2010, will be able to vote this year where elections are being held. Members with overseas military addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal addresses. Even within the US, full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the Secretary prior to September 10, 2010, giving their current *QST* address and the reason that another division is considered home. If your home is in the Pacific, Rocky Mountain, Southeastern, Southwestern or West Gulf division but your *QST* goes elsewhere, let the ARRL Secretary know as soon as possible, but no later than September 10, 2010, so you can receive a ballot from your home division.

The Incumbents

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

Pacific — Bob Vallio, W6RGG, and Jim Tiemstra, K6JAT

Rocky Mountain — Brian Mileshosky, N5ZGT, and Dwayne Allen, WY7FD

Southeastern — Greg Sarratt, W4OZK, and Jeff Beals, WA4AW

Southwestern — Richard Norton, N6AA, and Marty Woll, N6VI

West Gulf — Dr David Woolweaver, K5RAV, and John Thomason, WB5SYT

For the Board of Directors:

May 19, 2010

David Sumner, K1ZZ

Smoky Mountain Rescue

David Bower, K4PZT, ETDXA Public Information Officer and Assistant Section Manager, Tennessee, **k4pzt@arrl.net**

Amateur Radio operators in eastern Tennessee provided assistance to the rescue of an injured hiker in the Great Smoky Mountains National Park in late March. On that day, the weather started out with beautiful, clear skies and pleasant temperatures for hikers going to the top of Mt LeConte at an elevation of approximately 6600 feet above sea level.

During the night, the weather conditions deteriorated as the wind increased with a mix of rain, sleet, snow and temperatures hovering just above freezing. During the decent down the mountain and following the bad weather conditions, John Oakberg, NK4N, and a friend encountered a hiker who had fallen and broken her ankle. Although hikers a few minutes earlier had tried to call for help with their cell phones, they could not get through. John, NK4N, quickly assessed the situation and used his 2 meter handheld to communicate through a repeater for rescue assistance.

"The rescue initiative consisted of communications, wilderness survival and first aid."
— John, NK4N

His initial call was answered by Scott Wyrick, KD4CWB, who immediately contacted the Great Smoky Mountain National Park dispatcher to relay and coordinate the rescue communications. Others participating with Scott to relay messages included Dean Webb, N4NLT, and Cleve Hayes, KB4UAL.

The rescue initiative, according to John, NK4N, consisted of "communications, wilderness survival and first aid." The injured hiker was given hot liquids, monitored for shock and hypothermia, and kept comfortable until rescuers arrived. The rescue team transported her by stretcher to safety down the long mountain trail.

John estimates that without ham radio communications, the rescue team would not have had complete information on the injured hiker's condition and they would have likely been delayed at least 2 hours in the rescue. John acknowledges the importance of the Amateur Radio operators who were involved and the professional rescue of the injured hiker by the National Park Service.

The East Tennessee DX Association (ETDXA) recognized the four Amateur Radio operators at their April meeting and presented certificates in recognition of their efforts. Two of the four radio amateurs were able to attend and speak to the ETDXA attendees about their experience. Local Knoxville, Tennessee, television station WATE-TV (Channel 6) interviewed John Oakberg, NK4N, and Dean Webb, N4NLT, at the conclusion of the club meeting. Their interview aired later on WATE-TV.

DAVID BOWER, K4PZT

John Oakberg (left), NK4N, and Dean Webb, N4NLT, are interviewed by WATE-TV in Knoxville, Tennessee, following the ETDXA meeting.

DAVID BOWER, K4PZT

(From the left) ETDXA President Dave Garner, K4YRK; Willard Sitton, W4HZD; Dean Webb, N4NLT, and John Oakberg, NK4N, gather at the conclusion of the April 19 ETDXA meeting.

REFLECTIONS ON 2009 SET

While the results of the 2009 Simulated Emergency Test are published elsewhere in this issue of *QST*, here are some additional reflections and recognitions on this annual test of preparedness.

North Carolina Statewide Emergency Drill

Bill Morine, N2COP, ARRL North Carolina Section Manager, **n2cop@arrl.org**

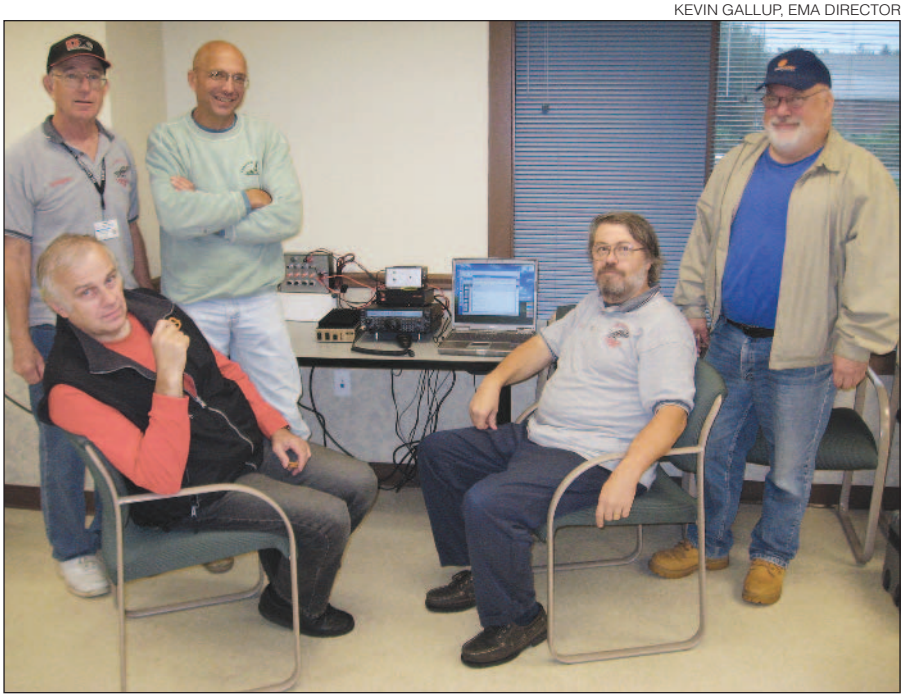
"This is only a drill." This became the on-air mantra on October 3, 2009, as hundreds of Amateur Radio operators took to the air for its annual statewide [North Carolina] simulated emergency test exercise, or SET. For 75 years, Amateur Radio has had formal emergency response organizations that work with state and municipal governments and agencies to supply supplemental emergency communications. The SET was held the first weekend in October and many of North Carolina's 1800 members of ARES® (Amateur Radio Emergency Services) were on the air checking out their equipment and honing their operating skills.

Bernie Nobles, WA4MOK, the North Carolina Section Emergency Coordinator, said, "The purpose of the SET is to keep our skills sharp and our response capability high." The 2009 statewide exercise pretended that a Category 1 hurricane enveloped the coast and compromised electrical transmission throughout the state, plunging all of North Carolina into darkness.

"The most effective way to respond is to

Steve Ewald, WV1X ♦ Public Service Specialist ♦ sewald@arrl.org

KEVIN GALLUP, EMA DIRECTOR



The Charlestown, Rhode Island, ARES teamed up with the group from South Kingstown in the 2009 Simulated Emergency Test October 3. The objective was for everyone to gain hands-on familiarity with the Emergency Operation Center's VHF, HF and packet radios. Shown here at the EOC packet station are standing (from left) Emergency Coordinator John Lindholm, W1XX; Donald Watson, KW2G, and Christopher Seeber, KA1GEU. Seated are (from left) Kazimierz Bogusz, AA1EM, and John Zabriskie Sr, W1JPZ.

COURTESY WILLIAM MORINE, N2COP

ARRL North Carolina SEC Bernie Nobles, WA4MOK, operating from the eastern branch of the North Carolina Emergency Management building in Kinston during the 2009 SET.

practice frequently through training," said Ron Knapp, W9EF, of Kinston, who oversees ARES in the eastern third of North Carolina as an Assistant SEC. The 2009 North Carolina statewide exercise permitted teams to experiment with new digital technologies. The 2010 ARRL Simulated Emergency Test is scheduled for October 2-3 and will further integrate analog and digital technologies.

2010 HURRICANE FORECAST

Each year the Tropical Meteorology Project at Colorado State University issues a forecast for the upcoming hurricane season. The initial forecast is made in December of the previous year (December 2009 for the 2010 season) and an updated forecast is made in April just 2 months before the start of the Atlantic hurricane season. The Atlantic hurricane season runs from June through November and according to the forecast it may be a busy season.

The forecast calls for 15 named storms this season; of those, eight are predicted to be hurricanes, four of which are forecasted to be major hurricanes. The forecast also indicates a 45% chance (average is 31%) of a major hurricane making landfall along the East Coast of the United States and a 44% chance (average is 30%) of a major hurricane making landfall along the Gulf Coast of the United States. The forecast also calls for a 69% chance (average is 52%) of a major hurricane making landfall on a US coastline.

Hurricanes are one of nature's greatest threats and each season those in hurricane prone areas must take preparedness very seriously. If you are in a hurricane prone area make sure your emergency plans are in order, home is prepared and go-kit stocked and ready to go. Also don't forget that in 2010 the National Hurricane Center (NHC) has made changes to lead times for hurricane watches and warnings. For more information on the forecast see **hurricane.atmos.colostate.edu/Forecasts/2010/april2010/apr2010.pdf** and for more information on hurricanes refer to the NHC Web site, **www.nhc.noaa.gov**.

FEMA LAUNCHES NEW WEB SITE FOR SMARTPHONES

On April 28, FEMA announced a new Web site for users of smartphones. The Web site **m.fema.gov** allows users to access information about emergency preparedness and what to do before and after a disaster. FEMA is planning to add enhancements to the site in the future. The site uses a question and answer format on topics such as "What should I do in a disaster?" "Where can I find assistance?" and "How can I help others?" There is also an instructional video about the site posted on You Tube (**www.youtube.com/fema**).

AB1FM

EXAM INFO

Question Pools and Exams Update

New Technician Question Pool to Take Effect July 1

Effective July 1, 2010 a new Element 2 Technician class question pool takes effect for examinations. VECs and VEs will have new test designs available for use at exam sessions effective that date.

The newly revised pool released January 4, 2010 and updated February 1, 2010 by the Question Pool Committee (QPC) of the National Conference of Volunteer Examiner Coordinators (NCVECs) must be in use starting July 1. The new pool continues to be presented in an understandable and friendly fashion for beginners, while maintaining appropriate emphasis on safety, rules and operating procedures. There are 396 questions in this pool, up from 392 in the previous pool. There are seven graphics files required for this pool.

With the Technician class exams changing July 1, new test designs must be used effective that day. Previous ARRL VEC supplied Technician class test booklet versions (2006 series) are valid until midnight June 30, 2010. At that time VE Team leaders may destroy the old versions of the Technician exams.

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

NCVEC Question Pool Committee Withdraws Four Questions

The QPC of the National Conference of Volunteer Examiner Coordinators has announced the withdrawal of two questions from the Technician class pool and two questions from the Extra class pool. VECs and VEs must take action to remove these questions from use by July 1, 2010.

Due to a rules change and pending action by the FCC, questions T2C02 and T2C03 from the July 2010 Technician Pool, and questions E1C04 and E1C05 from the July 2008 Extra Pool are not to be used in examinations after June 30.

Resources for ARRL VEs

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

- Link to the Amateur Radio Question Pools and keep up to date on the current pools and the questions formally withdrawn from use by the National Conference of VECs question pool committee.
- View FCC Amateur Radio Service Rules and Regulations; particularly subpart F, which pertains to the rules governing the VEC program.
- Generate and print exams using the *ARRL VE Exam Maker* software.
- Download and print all ARRL VEC exam session forms or print individual exam forms. All ARRL VEC forms, except for the CSCE (Certificate of Successful Completion of Examination) form, may be duplicated. Contact the ARRL VEC for a supply of CSCE forms.
- Candidate information that includes a detailed list describing the items candidates are required to bring to the exam session and prohibited from using during the test, FCC rules and VE instructions related to exam element credit, resources for the disabled and Amateur Radio practice exams.

We hope you find these new pages and features straightforward and effortless to use. Happy surfing!

ARRL VEC Exams Update — Booklets Removed from Use

Extra class exam booklet design version **4–3–2008** contains withdrawn question **E1C04** (exam question 22). As a result, this booklet should be removed from exam session use on July 1, 2010.

General class exam booklet design version **3–2–2007** contains withdrawn question **G0B14** (exam question 26). This booklet should have already been removed from use at exam sessions by November 30, 2009.

Please make sure your *ARRL VE Exam Maker* software has been updated and previously randomly generated exams do not contain any withdrawn questions. If any printed exams contain any withdrawn questions, they must be discarded.

VEC Web Page Changes

Explore and Discover!

The VEC invites you to take a tour of the redesigned ARRL VEC Web pages at **www.arrl.org/volunteer-examiners**. The new and improved pages, now easier to understand and navigate through, offer information and resources for ARRL Volunteer Examiners. As we update and refine the Web site, if there is some information missing or something you would like to see included, please e-mail your suggestions to **vec@arrl.org**.

Register Your Exam Session and Order Supplies via the Web

ARRL VEC has simplified the process for Amateur Radio exam session registrations and exam supply orders. VEs may use our new interactive web forms to perform these tasks.

From the Register an Amateur Radio License Exam Session page, **www.arrl.org/register-an-amateur-radio-license-exam-session**, ARRL VE Teams that have been formally Field Stocked with exams by ARRL VEC may restock their exam supplies via the online VE team restock form at **www.arrl.org/field-stocked-ve-teams**.

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

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

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

This Month in Contesting

Sean Kutzko, KX9X
ARRL Contest Branch Manager, kx9x@arrl.org

DIFFERENT CONTESTS, DIFFERENT RULES

When I was cutting my teeth in contesting in the late 1980s, it occurred to me that each contest had a different exchange. Some called for serial numbers, some needed a zone, others needed my state.

Why was it that each event had a different exchange? It was all the same, right? Couldn't things be simplified and have each contest send the same information? How was I supposed to keep track of all that stuff?

The simple answer is that each event is different because each event is different. While that seems like Lewis Carroll doublespeak, it is in fact the truth. All of the major contests evolved differently, and as a result, you have events with different exchanges. Food differs from region to region, as does music, sports, dance, language, beer and myriad other things. If all of these things were as homogenized as many fast food restaurants, contesting (as well as that trip overseas) would be pretty boring affairs.

The first international DX contest was sponsored by the ARRL, and was a byproduct of the attempts in the early days of Amateur Radio to make the first Transatlantic QSOs, which were still quite rare in those days. The contest "exchange," as it were, was the form of an official message. As F. E. Handy wrote in the March 1927 *QST*, the challenge of being able to make lots of long-haul DX QSOs was still novel:

Here you are, OM! Here's a contest in which every amateur in the whole world can have a part — the only requirement, an amateur radio station. The contest will show which stations in each country are the star stations for two-way international work. There are test messages to relay which will insure that actual solid two-way QSOs are made. These messages are going to be entirely of an experimental nature so that all countries can take part whatever their regulations regarding the handling of radiograms. Both operating and station performance will play a part and a great deal depends on the judgment of the individual operators. The tests will show which countries make the best record. The tests will show which stations in the United States can work most countries in the two weeks of the tests — also what stations can do the best work with any particular country.

This is why the ARRL DX Contest is an event where stations and Canada only work DX stations, and vice versa.

The ARRL Sweepstakes originated as an on-air party to send 60th birthday greetings to Hiram Percy Maxim in 1929. The volume of traffic handled was so great and from so many different stations that a call for a national message-handling contest came from all corners of North America, which was referenced in the January 1930 *QST*:

There will be two weeks to cram full of operating enjoyment, two weeks of unparalleled opportunities. How many stations can be worked and messages exchanged in the given time? How many Sections of our ARRL field organization is it possible to contact in this fashion in fourteen days? And what scores!!

The rules were that you had to both send and receive a properly formatted piece of traffic, and you received one point for messages sent and one point for messages received. That's why QSOs in SS are worth two points, and why the sent exchange is much longer than other events. Amateur radio is certainly driven by tradition, and the tradition of Sweepstakes being an homage to the early days of traffic handling has not been lost over time.

Many other events sponsored by other clubs around the world offer different formats. Some of these are very interesting indeed! The Worked All Europe Contest allows Europeans to request a list of other stations you have worked in the contest — known as QTC (or "traffic"). The All-Asia DX Contest has an exchange of a signal report and the operator's age. However, chivalry isn't dead; YL operators can send **00** for their age. Then there are the numerous national events that offer their countries' states or regional governmental bodies as multipliers, such as the Japan International DX Contest, the Russian DX Contest, Hungarian DX Contest and many others. These events offer an excellent opportunity to learn regional geography. There are often nice certificates available from the national organization for confirming all of a country's states or regions, and these contests offer a great way to earn those certificates. Domestically, state QSO parties offer ways to work on your county total and even operate mobile from a county or two yourself!

Lastly, there are smaller events that focus on a specific mode or operating style. QRP events keep your transmitter power low, and often involve operating from the field. Lots of CW clubs offer events that require you to send with a straight key. One of the most interesting events I've come across is the Strange Antenna Challenge, where the object is to use a non-conventional antenna. Stations have made QSOs with such oddball antennas as ladders, folding chairs, box springs, metal signs and other interesting items. You can learn more about the Strange Antenna Challenge at **www.n0ew.org/k0s/**.

"Variety is the spice of life," as the old saying goes. More diverse rules, exchanges and operating formats help keep contesting interesting to all comers. We will all have our favorite events, of course, but don't forget to try something a little different. Who knows — you might discover something new in Amateur Radio that you enjoy.

Operating Tip of the Month

Look it up! *Not sure what a NIL is? Unfamiliar with S/P/Cs or LCRs? Use the ARRL Contest Glossary to look up those contesting terms you're not familiar with. You can find it at* **www.arrl.org/contest-glossary**.

CONTEST CORRAL

in association with the *National Contest Journal*

JULY 2010

Start and Finish	HF	VHF+	Contest Title	Phone	CW	Digital	Exchange	Sponsor's Web Site
Jul 1, 0000Z - Jul 1, 2359Z	1.8-28	50-144	Canada Day Contest	✘	✘		RS(T), Province/Territory or serial	www.rac.ca/service/contesting
Jul 2, 0230Z - Jul 25, 0300Z	1.8-14		NS Weekly Sprint		✘		Serial, name, and S/P/C	www.ncccsprint.com/rules.html
Jul 3, 8 PM - Jul 4, 2 AM	7		070 Club Firecracker PSK31 Sprint			✘	RST and S/P/C	www.podxs070.com
Jul 3, 0000Z - Jul 4, 2400Z	1.8-28		Venezuelan Indep Day Contest	✘	✘		RS(T) and serial	www.radioclubvenezolano.org/concurso.htm
Jul 3, 1100Z - Jul 4, 1059Z	3.5-28		DL DX RTTY Contest			✘	RST and serial	www.drcg.de
Jul 4, 1100Z - Jul 4, 1700Z	28		DARC 10-Meter Digital Corona			✘	RST, serial	www.darc.de/ukw-funksport
Jul 4, 2300Z - Jul 5, 0300Z	1.8-28	50	MI QRP July 4th Sprint		✘		RST, S/P/C, and QRPMI number or power	www.miqrp.org
Jul 9, 2000 -2400 EDT	3.5-28		FISTS Summer Sprint		✘		RST, S/P/C, name, FISTS number or pwr	www.fists.org
Jul 10, 1200Z - Jul 11, 1200Z	**1.8-28**		**IARU HF World Championship**	✘	✘		**RST and IARU zone**	www.arrl.org/contests
Jul 10, 1200Z - Jul 11, 1200Z	3.5-28		World Radiosport Team Championship	✘	✘		RS(T) and ITU zone or 3-letter code	www.wrtc2010.ru
Jul 10, 1600Z - Jul 10, 1800Z	1.8-28		Feld-Hell Monthly Sprint			✘	RST, S/P/C, Feld-Hell member nr or age	sites.google.com/site/feldhellclub
Jul 11, 0000Z - Jul 11, 2359Z	1.8-28	50	Straight Key Weekend Sprint		✘		RST, QTH, name, member number	www.skccgroup.com/sprint/wes
Jul 11, 2000Z - Jul 11, 2400Z	1.8-28		QRP ARCI Summer Hombrew		✘		RST, S/P/C, QRP number or power	www.qrparci.org
Jul 14, 1100Z - Jul 15, 0400Z	3.5-14		CWops Mini-CWT Test		✘		Name and member number or S/P/C	www.cwops.org/onair.html
Jul 17, 1200Z - Jul 18, 1200Z	3.5-28		DMC RTTY Contest			✘	RST and serial	www.digital-modes-club.org
Jul 17, 1800Z - Jul 18, 0600Z	**3.5-28**		**NA RTTY QSO Party**			✘	**Name and S/P/C**	www.ncjweb.com
Jul 17, 1800Z - Jul 18, 2100Z		50,144	CQ WW VHF Contest	✘	✘	✘	4-digit grid square	www.cqww-vhf.com
Jul 18, 2000Z - Jul 18, 2159Z	14		CQC Great Colorado Gold Rush		✘		RST, serial, category, CQC member nr	www.cqc.org/contests/gold2008.htm
Jul 19, 0100Z - Jul 19, 0300Z	1.8-28		Run For the Bacon - Monthly		✘		RST, S/P/C, Flying Pig nr or power	www.fpqrp.com/fpqrprun.php
Jul 24, 1200Z - Jul 25, 1200Z	3.5-28		IOTA Contest	✘	✘		RS(T), serial, IOTA number if island	www.rsgbcc.org/hf/rules/2010/riota.shtml
Jul 25, 1700Z - Jul 25, 2100Z	7-28		Flight of the Bumblebees		✘		RST, S/P/C, Bumblebee nr or power	adventure-radio.org/wiki

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 Web sites 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.
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

- **State QSO parties this month:** *none*
- **Canada Day Contest (July 1):** Help our friends to the north celebrate their birthday in style! Stations outside Canada send a signal report and a sequential serial number while trying to work as many Provinces as possible.
- **PSK Firecracker Sprint (July 4-5 local time):** 6 hours of PSK31 fun on 40 meters! PSK has never been easier to check out; this mini-contest makes it fun to try something new!
- **IARU HF World Championship (July 10-11):** The great summer HF contest. Everybody works everybody in this 24 hour affair. IARU Member Societies will be QRV handing out special "HQ" multipliers. How many can you work?
- **North American QSO Party, RTTY (July 17-18):** 12 hours of RTTY contest goodness. Exchange is your name and state, province or country.
- **CQ WW VHF Contest (July 17-18):** a VHF event that focuses on 6 and 2 meters, with lots of activity around the globe. Exchange is your grid square. Go hilltopping and enjoy VHF!
- **IOTA Contest (July 24-25):** Islands On The Air is one of the great awards programs. Sponsored by the RSGB, this contest will activate a lot of different islands all around the world. Break out your maps and see who you can talk to… or better yet, go activate an island yourself!

On-Air Skills — Technical Knowledge
— Understanding Propagation —
Worldwide Friendship —
Amateur Radio Contesting!

Get Involved!
www.arrl.org/contests

2010 ARRL January VHF Sweepstakes Results

Cold winter weather throughout most of North America coupled with the usual winter TV sporting event distractions. Yet activity improved from recent years — *a good sign.*

Jan Carman, K5MA
jcarman@capecod.net

There is good news to report for the 2010 January VHF Sweepstakes competition, held January 23-25 — the second highest log submission total in six years (761), which followed the lowest reported total (650) for the 2009 January VHF SS. The highest number of log submissions during this period was 793 in 2006. The second highest number of logs submitted in the past six years indicates improving interest in the January VHF SS competition.

As is usually the case, winter weather conditions play a significant part in the January VHF SS competition, particularly in the colder regions of the USA and Canada. Rover enthusiasts are often subjected to difficult weather situations and I find it very encouraging that rover activity continues at a significant pace in spite of the winter obstacles. In cold winter weather, Gerald, K9PY, Midlothian, IL hiked to the top of Wasson Peak at 4687 feet ASL near Tucson, Arizona carrying an FT-817ND with a portable 4 element Yagi for the 2 meter band and a 3 element Yagi on 446 MHz. That takes dedication as well as a serious commitment to Amateur Radio!

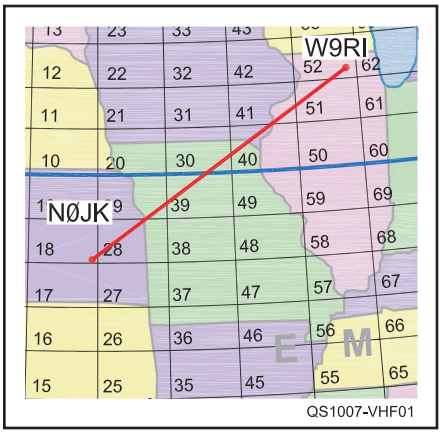
Propagation

Jon, NØJK, of Wichita, KS mentioned that there was no tropo at all on the 144 MHz band and no sporadic E skip on 50 MHz. He set up his portable station early Sunday morning at the "Cattle Pens" in the heart of the Flint Hills. Jon noted that his best DX with 10 W transmitter output on 144 MHz was about 250 miles. Ken, WB2AMU, of Patchogue, NY noted that this was the first time in years in FN30 on Long Island that there was no snowfall or cold weather for his QRP portable operations. Bob, K2DRH, Albany, IL noted that "conditions were flat, flat, flat with no enhanced propagation to speak of" and "nothing like the unusual tropo inversion to the east that we'd had just a weekend before."

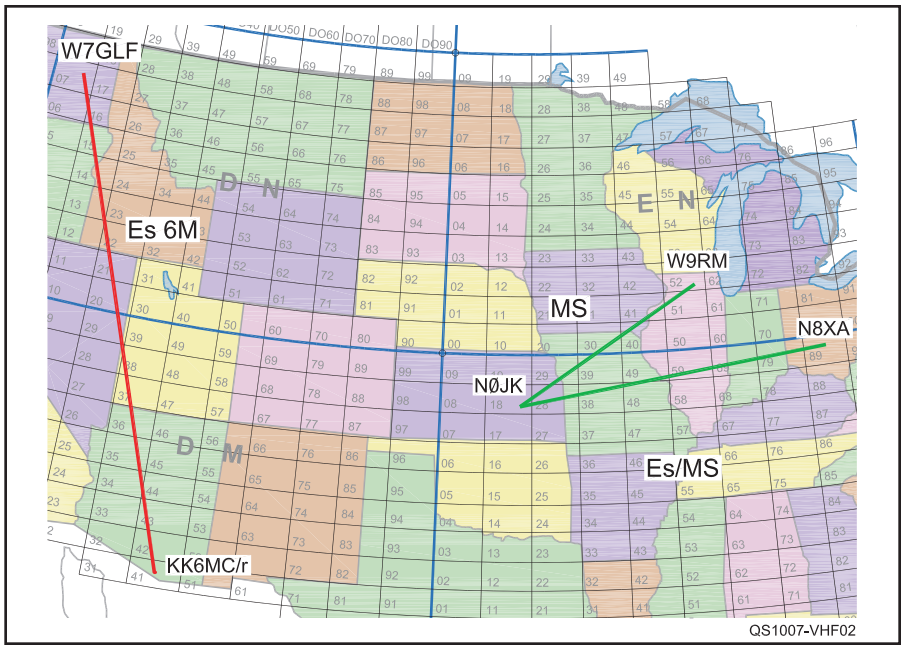
The few reported sporadic E and enhanced tropo contacts reported were few and far between. This was a typical winter event with tropo scatter as the primary propagation mechanism, generally reaching maximum QSO distances out to about the 300- to 400-mile range.

The National Scene

Another interesting observation is the number of HF contesters who have submitted entries in the January VHF SS competition for 2010. As I look through the 'Logs Received Report' of 761 logs, I have found



This map shows the path of the meteor scatter SSB QSO between W9RM in EN52 and NØJK in EM18.



With the exception of a short sporadic-E opening from Arizona to Washington state on Saturday and some meteor scatter between Illinois and Ohio and Kansas Sunday morning, conditions this year were pretty flat.

Division Winners by Category

Single Operator, Low Power

Division	Call	Score
Atlantic	W3SZ	144,979
Central	K2DRH	139,671
Dakota	KØSIX	8,507
Delta	N4QWZ	40,748
Great Lakes	K8MR	17,000
Hudson	WB2SIH	64,800
Midwest	NØLL	8,631
New England	N1DPM	93,102
Northwestern	KD7UO	5,070
Pacific	K1YQP	9,415
Roanoke	K4FJW	9,114
Rocky Mountain	NØYE	6,144
Southeastern	W2BZY	16,591
Southwestern	N6RMJ	19,404
West Gulf	W6ZI	3,612
Canada	VE3SMA	18,104

Single Operator, High Power

Atlantic	K1RZ	222,772
Central	K9EA	32,571
Dakota	WØGHZ	26,962
Delta	K5WBX	1,537
Great Lakes	K8MD	46,816
Hudson	W2KV	9,477
Midwest	WQØP	2,774
New England	K1TEO	415,492
Northwestern	W7CE	36,182
Pacific	K4QI	58,590
Rocky Mountain	WA7KYM	440
Southeastern	KØVXM	171,000
Southwestern	KC6SEH	5,828
West Gulf	K5LLL	26,208
Canada	VE3ZV	27,534

Single Operator Portable (QRP)

Division	Call	Score
Atlantic	N3YMS	32,184
Central	W9SZ	2,268
Dakota	WØUC	380
Delta	No Entrant	
Great Lakes	N8XA	6,864
Hudson	WB2AMU	1,518
Midwest	NØJK	80
New England	K1EXE	60
Northwestern	No Entrant	
Pacific	K9TMS	1,420
Roanoke	KC8KSK	138
Rocky Mountain	KØNR	741
Southeastern	K2ULR	1
Southwestern	K9PY	50
West Gulf	No Entrant	
Canada	VA3RKM	56

Limited Multioperator

Atlantic	W3SO	174,564
Central	W9RM	60,759
Dakota	WØVB	5,842
Delta	W4OAR	2,158
Great Lakes	N8ZM	19,783
Hudson	K2OAK	10,197
Midwest	NØLD	1,508
New England	KB1DFB	66,960
Northwestern	KF7EEL	3
Pacific	KB5WIA	360
Roanoke	N4ARR	1,224
Rocky Mountan	No Entrant	
Southeastern	W4NH	22,542
Southwestern	W7PBJ	261
West Gulf	NR5M	2,400
Canada	No Entrant	

Multioperator

Division	Call	Score
Atlantic	N3NGE	717,676
Central	KO9A	9,761
Dakota	No Entrant	
Delta	N4JQQ	5,217
Great Lakes	W8RU	12,648
Hudson	N2GCZ	22,984
Midwest	KØKU	48
New England	N1JEZ	20,016
Northwestern	No Entrant	
Pacific	W6TV	30,366
Roanoke	WY3P	13,920
Rocky Mountain	WØEEA	51,113
Southeastern	No Entrant	
Southwestern	No Entrant	
West Gulf	K5QE	156,060
Canada	VE6AO	476

Rover

Atlantic	K1DS/R	152,334
Central	W9FZ/R (+KC9RDC)	19,890
Dakota	WØZQ/R	2,595
Delta	AG4V/R	6,201
Great Lakes	NE8I/R	4,482
Hudson	KJ1K/R	21,318
Midwest	No Entrant	
New England	No Entrant	
Northwestern	K7HPT/R	6,552
Pacific	WB2WIK/R	164,619
Roanoke	K4GUN/R	26,634
Rocky Mountain	NØLP/R	15,463
Southeastern	N2CEI/R	101,244
Southwestern	N6NB/R	591,300
West Gulf	AE5BN/R	57,672
Canada	VE3OIL/R	37,962

Limited Rover

Division	Call	Score
Atlantic	KC2QZF/R	28,842
Central	WB8BZK/R	12,410
Dakota	No Entrant	
Delta	WA4JA/R	1,500
Great Lakes	No Entrant	
Hudson	KB2BSL/R	1,725
Midwest	WRØI/R	1,911
New England	N1FJ/R	646
Northwestern	NL7HJ/R	1,764
Pacific	No Entrant	
Roanoke	W5JMC/R	5,688
Rocky Mountain	No Entrant	
Southeastern	K2STO/R	1,794
Southwestern	N6ZE/R	1,332
West Gulf	KD5IKG/R	481
Canada	VA7AJK/R	1,577

Unlimited Rover

Division	Call	Score
Pacific	W6TE/R	212,812
Rocky Mountain	KRØVER/R	24,327

many entries from primarily HF-oriented clubs, such as the Yankee Clipper Contest Club (YCCC), Potomac Valley Radio Club (PVRC), Northern California Contest Club (NCCC), Western New York DX Association, etc. I hope that this growing trend produces more HF enthusiasts who also choose to compete in VHF+ competitive events.

Single Operator Categories

Roger, W3SZ, of Reading, PA took the top position in the Single Operator, Low Power (SOLP) category with a score of 144,979 points, more than two and a half times the fourth place score he produced in 2009. This score was down slightly from last year's SOLP leader, Bob, K2DRH, of Albany, IL who finished in second place with a 139,671-point score. The number three spot was captured by Phil, WA3NUF, of Warminster, PA with 138,810 points, followed by Fred, N1DPM, and Dale, AF1T, in the number four and five spots. The top six through 10 spots in SOLP were filled in order by W3RJW, W3PAW, WB2SIH, K2SMN and K1KG. Like most of last year's scores, this year's totals are down primarily because of low levels of sporadic E propagation.

The Single Operator, High Power (SOHP) category leader was last year's winner, Jeff, K1TEO, of Trumbull, CT with a total of 415,492 points, slightly less than his 432k point 2009 effort. Jeff has been a consistent winner in the VHF+ arena, the result of an outstanding location coupled with well-organized and implemented electronics and tower/antenna/transmission line systems. The second place position goes to Dave, K1RZ, of Damascus, MD, up one notch from the third spot last year with a 222,772 point score. Phil, K3TUF, Ephrata, PA takes the number three position, down one place from last year at 194k points. Charles, KØVXM of Merritt Island, FL claims the fourth spot with 171k points, followed by WJ9B, K3DNE, WA2FGK, K1JT and W2SJ rounding out the top 10, all with very close scores.

QRP Portable (QRP)

Nick, N3YMS, of Felton, DE took the top position in the QRP Portable category again this year with 32,184 points. Nick improved his score by more than 12,000 points compared with his results last year. Second place in QRP goes to Phil, N8XA, Dayton, OH with 6864 points, followed by Zach, W9SZ, with 2268, Ken, WB2AMU, at 1518, and Tom, K9TMS, at 1420 points rounding out the top 5. The final top 10 QRP entries include KØNR, WØUC, NØHJZ, KC8KSK and NØJK in order.

Limited Multioperator (LM)

The Limited Multioperator category permits entrants to operate on a maximum of four bands of their choice. There were a total of 33 LM entries covering the four bottom VHF+ bands (50, 144, 222 and 432 MHz), representing three fewer entries than last year and nine fewer than in 2008. This trend appears to be in the wrong direction!

The leader in the LM category by a wide margin is W3SO, the Wopsononock Mountaintop Operators of Altoona, PA with a score

Single Operator, Low Power

W3SZ	144,979
K2DRH	139,671
WA3NUF	138,810
N1DPM	93,102
AF1T	84,084
W3RJW	83,722
W3PAW	66,992
WB2SIH	64,800
K2SMN	60,750
K1KG	50,165

Single Operator, High Power

K1TEO	415,492
K1RZ	222,772
K3TUF	194,183
KØVXM	171,000
WB2RVX	149,578
WJ9B	141,120
K3DNE	138,567
WA2FGK	138,475
K1JT	128,136
W2SJ	122,490

Single Operator QRP Portable

N3YMS	32,184
N8XA	6,864
W9SZ	2,268
WB2AMU	1,518
K9TMS	1,420
KØNR	741
WØUC	380
NØHJZ	192
KC8KSK	138
NØJK	80

Limited Multioperator

W3SO	174,564
KA2LIM	90,297
KB1DFB	66,960
W9RM	60,759
W3HZU	44,560
W1QK	33,733
WO9S	25,258
W4NH	22,542
N8ZM	19,783
K2QO	12,768

Multioperator

N3NGE	717,676
K5QE	156,060
K3EOD	104,339
WØEEA	51,113
W6TV	30,366
KBØHH	29,808
WB3IGR	24,640
N2GCZ	22,984
N1JEZ	20,016
KE1LI	16,641

Rover

N6NB/R	591,300
N6TEB/R	557,925
W6XD/R	556,660
W6TAI/R	553,926
K9JK/R	539,160
AF6O/R	532,854
KK6KK/R	477,829
N6VI/R	472,125
KJ6CNO/R	467,728
WB2WIK/R	164,619

Limited Rover

KC2QZF/R	28,842
WB8BZK/R	12,410
W5JMC/R	5,688
WRØI/R	1,911
K2STO/R	1,794
NL7HJ/R	1,764
KB2BSL/R	1,725
VA7AJK/R	1,577
KC9MKL/R	1,545
WA4JA/R	1,500

Unlimited Rover

W6TE/R	212,812
KRØVER/R	24,327

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

W3SZ	144,979	A
WA3NUF	138,810	A
N1DPM	93,102	A
AF1T	84,084	A
W3RJW	83,722	A
K1TEO	415,492	B
K1RZ	222,772	B
K3TUF	194,183	B
WB2RVX	149,578	B
K3DNE	138,567	B
N3YMS	32,184	Q
WB2AMU	1,518	Q
K1EXE	60	Q
KB2AYU	45	Q
WA1LEI	39	Q
W3SO	174,564	L
KA2LIM	90,297	L
KB1DFB	66,960	L
W3HZU	44,560	L
W1QK	33,733	L
N3NGE	717,676	M
K3EOD	104,339	M
WB3IGR	24,640	M
N2GCZ	22,984	M
N1JEZ	20,016	M
K1DS/R	152,334	R
NN3Q/R	44,982	R
KJ1K/R	21,318	R
K3IUV/R	9,637	R
KB3GJT/R	6,006	R
KC2QZF/R	28,842	RL
KB2BSL/R	1,725	RL
N1XKT/R	1,050	RL
N1FJ/R	646	RL

Southeast Region
(Delta, Roanoke and Southeastern Divisions)

N4QWZ	40,748	A
W2BZY	16,591	A
K4FJW	9,114	A
K4ZOO	8,326	A
WA4QYK	7,315	A
KØVXM	171,000	B
WJ9B	141,120	B
W4ZRZ	58,630	B
K4QI	58,590	B
KE2N	57,072	B
KC8KSK	138	Q
K7RLL	15	Q
K2ULR	1	Q
W4NH	22,542	L
K1KC	2,639	L
W4OAR	2,158	L
N4ARR	1,224	L
WB8COX	720	L
WY3P	13,920	M
N4JQQ	5,217	M
N2CEI/R	101,244	R
K4SME/R	45,840	R
K4GUN/R	26,634	R
WA2IID/R	15,155	R
AG4V/R	6,201	R
W5JMC/R	5,688	RL
K2STO/R	1,794	RL
WA4JA/R	1,500	RL
N4TZH/R	350	RL
WA2VNV/R	120	RL

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

K2DRH	139,671	A
K9MU	29,280	A
KC9BQA	26,640	A
WA9FIH	19,965	A
VE3SMA	18,104	A
K8MD	46,816	B
K9EA	32,571	B
VE3ZV	27,534	B
K8CC	17,009	B
K2YAZ	16,133	B
N8XA	6,864	Q
W9SZ	2,268	Q
VA3RKM	56	Q
W9RM	60,759	L
WO9S	25,258	L
N8ZM	19,783	L
N9TF	10,122	L
W9RVG	7,434	L
W8RU	12,648	M
KO9A	9,761	M
N2BJ	2,050	M
VE3OIL/R	37,962	R
W9FZ/R	19,890	R
NE8I/R	4,482	R
K9TMS/R	2,664	R
N9YH/R	1,708	R
WB8BZK/R	12,410	RL
KC9MK/R	1,545	RL
VE3RKS/R	1,139	RL
N9IFG/R	1,014	RL
KC9NJZ/R	1,014	RL

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

NØLL	8,631	A
KØSIX	8,507	A
NØYE	6,144	A
W6ZI	3,612	A
WØETT	2,596	A
WØGHZ	26,962	B
K5LLL	26,208	B
W5LUA	17,875	B
WØZQ	9,512	B
KØAWU	5,720	B
KØNR	741	Q
WØUC	380	Q
NØHJZ	192	Q
NØJK	80	Q
KD7WPJ	48	Q
WØVB	5,842	L
NR5M	2,400	L
WD5IYF	2,065	L
NØLD	1,508	L
K5QE	156,060	M
WØEEA	51,113	M
KBØHH	29,808	M
KC5MVZ	98	M
KØKU	48	M
AE5BN/R	57,672	R
AE5P/R	52,712	R
K5GJ/R	22,981	R
NØLP/R	15,463	R
WK5F/R	13,908	R
WRØI	1,911	RL
KD5IKG/R	481	RL
K6LMN/R	91	RL
KRØVER/R	24,327	RU

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

N6RMJ	19,404	A
K1YQP	9,415	A
KD7UO	5,070	A
K6XN	4,920	A
W6OMF	3,906	A
W7CE	36,182	B
N7EPD	17,848	B
K7CW	9,476	B
W7GLF	7,392	B
KE7SW	6,534	B
K9TMS	1,420	Q
K9PY	50	Q
W6MDH	12	Q
W6CT	4	Q
KB5WIA	360	L
W7PBJ	261	L
AI6O	154	L
W6RKC	20	L
K7MKL	14	L
W6TV	30,366	M
W6YX	10,857	M
VE6AO	476	M
N6NB/R	591,300	R
N6TEB/R	557,925	R
W6XD/R	556,660	R
W6TAI/R	553,926	R
K9JK/R	539,160	R
NL7HJ/R	1,764	RL
VA7AJK/R	1,577	RL
N6ZE/R	1,332	RL
W6TE/R	212,812	RU

of 174,564 points produced by 36 club members. This was a substantial effort, surpassing the excellent 2009 top score of 102,582 by K1JT. Second place goes to Ken, KA2LIM, of Dayville, CT with 90,297 points, followed in third position by Kim, KB1DFB, also of Dayville. Keith, W9RM, of Hampshire, IL took the number four position followed by the Keystone VHF Club, W3HZU in fifth place. The remaining top 6 through 10 LM finalists are W1QK, WO9S, W4NH, N8ZM and K2QO in order.

Multioperator (MO)

The Multioperator category is a truly unlimited event — no holds barred! A participant in this category may operate on any number of bands simultaneously for the full 48 hour contest period. There are a total of 37 entries in this category for the 2010 event, down from 53 entries in last year's competition but significantly higher than the 27 entries in 2008. The top-scoring MO entry is N3NGE of Morgantown, PA with a score total of 717,676 points, up significantly from their 568k score in 2009. The second position is awarded to the team at the station of Marshall, K5QE, in Hemphill, TX with 156,060 points, down significantly from their 2009 showing. Position three goes to Allen, K3EOD, of Vineland, NJ scoring 104,339 points, followed by Jim, WØEAA, of Ramah, CO and the Trowel Radio Club, W6TV, in Fresno, CA. The final 6 through 10 top MO finalists include KBØHH, WB3IGR, N2GCZ, N1JEZ and KE1LI in order.

Rover Categories

There are three distinct categories for rover stations, each of which had participation: Rover (R), Limited Rover (RL) and Unlimited Rover (RU). In the Rover (R) category operation on all bands is permitted but there can be no more than two operators. This category can produce some very large scores using a technique known as "grid circling." Perennial VHF SS competitor Wayne, N6NB, from Tustin, CA was very pleased with his results, saying "We're happy that West Coast clubs can now be competitive in VHF contests for the first time." I hope that Wayne's observation proves to be correct and that West Coast VHF/UHF (VHF+) activity levels continue to expand. There must be a limit as to how high these scores can reach, although it is likely that creative West Coast rover enthusiasts will find a way to reach even higher achievement levels! All but one of the top 10 Rovers were located in California.

The leading score for the 2010 competition was produced by Wayne, N6NB/R, of Tustin, CA with a score of 591,300 points, which exceeded his winning score in 2009 by more than 195,000 points! Second place was taken by Dave, N6TEB/R, of Downey, CA with 557,925 points. Third place goes to Art, W6XD/R, of Costa Mesa, CA with 556,660 points, followed closely by Carrie, W6TAI/R, of Yucca Valley, CA with 553,926 points and John, K9JK/R, of Palatine, IL at 539,160 points. K9JK/R is the only non-California entry in the top 10 Rover listing. The bottom five of the top 10 competitors in the Rover category include AF6O/R, KK6KK/R, N6VI/R, KJ6CNO/R and WB2WIK/R in order.

The Limited Rover (RL) category requires that participants use their choice of only four bands. Most RL activity will be found on the bottom four VHF+ bands (50, 144, 222 and 432 MHz). The top position goes to Steve, KC2QZF/R, of Clarence Center, NY with 28,842 points, which is a significant improvement over his 2009 fifth place, 7805 point score. Second place was taken by Mike, WB8BZK/R, of Algonquin, IL with 12,410 points, followed in third place by W5JMC/R of Alexandria, VA with 5688 points. The fourth place slot goes to Mel, WRØI/R, of Sedgwick, KS, with the fifth place listing awarded to John, K2STO/R, from Floral City, FL. The sixth through 10th RL places are awarded to NL7HJ/R, KB2BSL/R, VA7AJK/R, KC9MKL/R and

WA4JA/R in order.

The final category is Unlimited Rover (RU), which allows more than two operators in a single vehicle. There were only two competitors this year compared with five in the 2009 event, although there was only one competitor in the 2008 competition. The top position is awarded to David, W6TE/R, of Fresno, CA with 212,812 points, followed by Eric, KRØVER/R, of Littleton, CO with 24,327 points.

Club Competition

VHF clubs are a great source of knowledge, inspiration and camaraderie in and out of contests. If you're a VHF+ weak-signal operator and not a member of a club, join one today — you won't be disappointed! 2010 saw activity from 41 clubs that submitted the minimum-required three logs to be eligible for the Club competition.

In the Unlimited Club category, the Mt Airy VHF Radio Club (aka the Packrats) submitted a whopping 70 logs worth a combined 2.6 million points to be the only club that qualified for the Unlimited Category. This year's effort was dedicated to long-time club member W2KKN who became a Silent Key in 2009. The Packrats continue to set a very high mark of both technical ability and in "rallying the troops."

In the Medium Club category 26 clubs met the criteria. The winner was the Southern California Contest Club with 12 logs and 5.06 million points. SCCC's pack rovers accounted for all but 261 points of their score.

JERRY CELMER, K9PY

Jerry, K9PY, operated from Wasson Peak (4687 feet) near Tucson, AZ in DM42 to take the Southwestern Division in the Single Operator, QRP Portable category.

The North East Weak Signal Group took second place with 35 logs and 993,000 points and only one Rover in the bunch. Third place went to the Potomac Valley Radio Club with 22 logs and just under 840,000 points.

The Local Club category saw 14 clubs submit scores. This year, the gavel goes to Eastern Connecticut ARA, pulling off a repeat of their 2009 Local Club victory, submitting 5 logs for 87,423 points. Second place is awarded to the Chippewa Valley VHF Contesters, up from third place in 2009. From the Midwest, the Fort Wayne Radio Club took third. Congratulations to all clubs for submitting scores and enjoying the event.

Next Year

Will 2011 bring more activity? Could we get some aurora, winter tropo or other enhancement? Let's find out together! The 2011 ARRL January VHF Sweepstakes will be held January 22-24, so mark your calendar now!

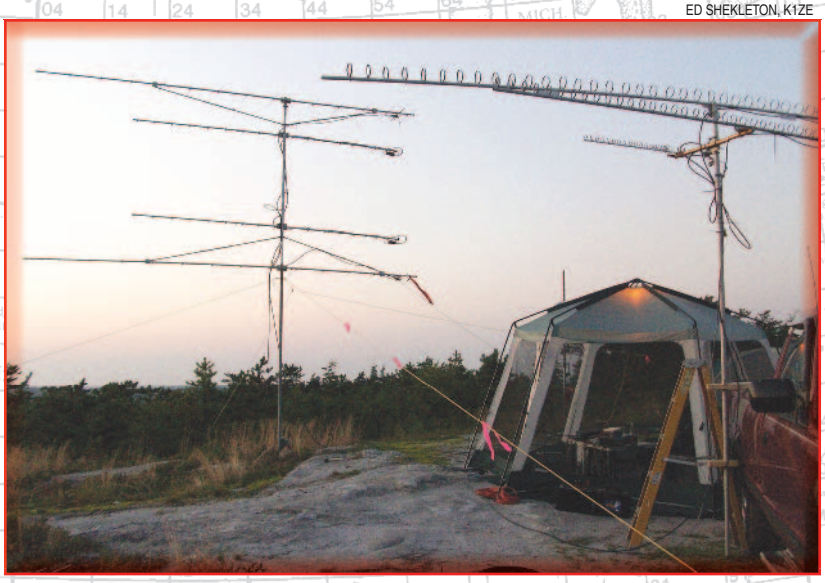
Much More Online

For more on the January VHF Sweepstakes, see **www.arrl.org/contests**.

2010 ARRL August UHF Contest

1800 UTC Saturday, August 7 – 1759 UTC Sunday, August 8

ED SHEKLETON, K1ZE



- 220 MHz and up is the place to be! UHF operating offers some great propagation possibilities, making QSOs over hundreds of miles possible. Operate from home, find a great hilltop in a rare grid square or hit the road and go "roving" through multiple grids. Get several of your ARRL-affiliated club members active and go for a club competition gavel!
- E-mail Cabrillo-formatted logs to **augustuhf@arrl.org**. All logs must be received by 1800 UTC Tuesday, September 7, 2010.
- Complete rules can be found at **www.arrl.org/contests**

2009 ARRL 10 Meter Contest Results

The high band shows signs of life.

Ken Harker, WM5R
wm5r@arrl.net

On December 12-13, 2009, thousands of Amateur Radio contesters tuned to the highest frequency amateur HF band, perhaps uncertain about what they'd find. Operating between 28 and 29.7 MHz can be a capricious endeavor at this low point in the solar cycle. Without reliable F layer propagation, would there be anyone to work? This year, wide-spread sporadic E was observed in most of North America east of the Rocky Mountains on Sunday afternoon.

The ARRL 10 Meter Contest is also the perfect time of year to try meteor scatter communications. The Geminids meteor shower typically peaks from December 12-14. Stations all over the world noted meteor scatter at work. Henry, KC2TA describes what a meteor burst sounds like: "Openings that did happen were at times EXTREMELY brief. A station would be S9+40 for all of two letters of the call — then gone!" If you've never made a meteor scatter QSO before, give it a try in 2010.

Activity

Activity in the ARRL 10 Meter Contest improved in 2009. A total of 2,061 logs were entered, an increase of about 9% from 2008. Two-thirds of the increase came from DX stations, particularly from Europe which now accounts for 53% of all DX logs. Logs from Canada were down 13%. In the United States, although there were 72 more logs overall, activity was slightly down in about half of the divisions. We can now say with certainty that this was the first solar cycle minimum in which the overall number of logs stayed above 1,000 every year.

Records

For the second year in a row, no world, continental, or overall W/VE records were set. (For a complete listing of ARRL 10 Meter Contest records see **www.arrl.org/contests**.) Fifteen new DXCC entity records were set and, just like last year, four new W/VE section records were set; three in QRP categories and one in a Low Power category.

W/VE Categories

Three Canadians — VA3DF, VE3MMQ, and VE3KZ — one in each of the Single Operator, Mixed Mode categories, made the listings, the best results for Canada since 2006.

Single Operator, Mixed Mode (SOMM)

After second place finishes in 2007 and 2008, Manuel, W2MF won the W/VE SOMM QRP category with 51,520 points and a new record. Second (33,852 points) went to Doug, VA3DF. Third (21,894 points) went to Dan, WG5G of South Texas.

In the SOMM Low Power category, the top score went to Toni, NØNI (219,200 points) in Iowa from 686 QSOs to 100 different multipliers. Second went to Bill, VE3MMQ with 118,320 points. Richard, K9OM took third (113,730 points) from North Florida.

With 1165 QSOs in the log, Scott, NE9U, operating from WØAIH (408,250 points) in Wisconsin, won the SOMM High Power for the second time in three years. Last year's victor, John, WE3C, operating from Eastern Pennsylvania, took second (275,988 points). Jerry, WB9Z (275,000 points) in Illinois was third.

Single Operator, Phone-Only (SOPH)

W/VE Activity in the SOPH QRP category grew by over 50%, with 31 entries. Winning the category was Rick, KB5KYJ from West Texas with 218 contacts and 33 multipliers for 14,058 points. John, KE2OI (6402 points) of Southern New Jersey took second with exactly 100 QSOs. Third place finisher Jory, KJ5RM was close behind with 6048 points.

Three new faces took the top spots in SOPH Low Power. Bud, W3LL (33,024 points) won from Maryland with 346 contacts to 48 multipliers. Mike, N5MT (31,648 points) from South Texas, took second with 342 QSOs and 46 multipliers. Third went to Jeff, AC5O (24,768 points), just edging out Charles, WB9PUB's 24,140 points.

In the SOPH High Power category, the top five stations all made over 1000 contacts and 100,000 points, and all were from two sections, South Dakota and South Texas. Ed, WØSD moved up from a third place result in 2008 to win with 1235 QSOs to 64 multipliers for 156,928 points. Finishing in second for the second year in a row, 10 meter specialist Chuck, W5PR shook off the flu to make 149,034 points from South

CX6VM

The CW5W Team led all DX Multioperator, Single Transmitter entries with 574,560 points. Left to right are Alan, CX5TR; Claudio, CX4DX; Leo, CX3AL, and Jorge, CX6VM.

W/VE

Mixed Mode, QRP

W2MF	51,520
VA3DF	33,852
WG5G	21,894
K3TW	18,532
NDØC	18,450
KL7OO	14,094
WA6FGV	12,416
N2TM	10,260
WØRU	6,480
WA1LAD	4,416

Mixed Mode, Low Power

NØNI	219,200
VE3MMQ	118,320
K9OM	113,730
KTØK	111,148
KB9OWD	107,856
W5ZL	100,100
WD5K	96,460
WA8ZBT	90,272
N4VA	72,450
K6AM	69,520

Mixed Mode, High Power

WØAIH (NE9U, op)	408,250
WE3C	287,988
WB9Z	275,000
K1KI	226,920
W3EP	205,744
WØBH	159,402
VE3KZ	153,408
K1WHS	144,320
N4EEB	143,152
W5AJ	140,320

Phone Only, QRP

KB5KYJ	14,058
KE2OI	6,402
KJ5RM	6,048
KKØQ	4,186
W6QU (W8QZA, op)	3,838
W7YA	3,026
KS4X	2,700
KØKRH	2,242
W6GMT	952
KR1ST	588

Phone Only, Low Power

W3LL	33,024
N5MT	31,648
AC5O	24,768
WB9PUB	24,140
WB5R	16,698
AGØM	16,048
WA5IYX	12,180
WA8QYJ	11,904
WW5TT	10,676
K9IAC	10,440

Phone Only, High Power

WØSD	156,928
W5PR	149,034
W7XU	143,232
NR5M	130,804
K5TR (WM5R, op)	112,600
NØQO)	90,970
N8RA	76,856
N2BJ	64,356
K8CC (N8NX, op)	63,600
WO4DX	62,150

CW Only, QRP

NØUR	22,968
K4ZJ (@ WW4LL)	22,464
WØMHS	15,840
KR2Q	12,064
AA1CA	11,988
N8AP	10,556
W5ESE	10,300
W7JI	8,700
WO2N	7,992
NØJK	6,500

CW Only, Low Power

AE5GT	80,808
K5UZ	72,928
W5MX	71,280
K9CS	59,520
K5FP	53,048
K3CB	46,592
W3BGN	45,696
K1DC	44,204
K5PI	42,420
W9PN	41,888

CW Only, High Power

K5NA	220,248
N2KW	163,432
N4BP	145,728
KØRF	145,440
K1TO	144,648
NY3A	142,128
W5ZZ	139,776
AB7E	124,372
N4DA	108,612
WJ9B	106,800

Multioperator

NX5M	437,552
K1LZ	323,782
KDØS	280,052
W4MYA	265,888
K4FJ	254,272
AA1JD	241,768
K8GP	230,658
K3OO	207,774
W4UH	203,070
K3WW	200,070

DX

Mixed Mode, QRP

E77DX	5,084
CT7/LZ3ND	3,450
YO8DDP	3,408
PY2NY	2,850
7K1CPT	1,680
DL2TM	910
9A2EY	768
PU5ATX	720
EA5GVZ	624
JK1TCV	574

Mixed Mode, Low Power

LU5WW	220,320
LQØF (LU5FF, op)	214,008
PY2SEX	144,072
LU2EE (LW5EE, op)	127,872
AY8A (LU8ADX, op)	105,000
L33M (LU3MAM, op)	32,010
EA8OM	29,998
LU3JVO	28,200
F8AKC	25,864
AO7T (EA7KJ, op)	24,816

Mixed Mode, High Power

CX5BW	560,880
AY5F	366,758
LU7HN	291,100
HC8GR (K6AW, op)	255,498
PY1NB	124,548
DL6FBL	120,848
4O3A (YU1YV, op)	115,928
RU6CQ	89,856
S57S	79,212
OA4SS	71,400

Phone Only, QRP

AYØDX (LU3DR, op)	5,280
IU9A	4,284
TG9ANF	4,096
EA1TI	3,520
I5KAP	1,152
VK4ATH	536
CT1ELF	272
JA2DLM	230
IK3XTY	96
HP1RIS	54

Phone Only, Low Power

HI3CCP	34,488
ZV2C (PY2CX, op)	33,984
LU1UM (LU2UF, op)	33,604
LQ5H (LU3HS, op)	27,816
CT1IUA	23,698
PU2LEP	20,928
LW3DN	20,882
LU6FAH	16,300
PY2ZY	15,980
LU6EDC	11,868

Phone Only, High Power

PY2LSM	140,760
AY4D	92,310
LR2F	32,230
IZ4DPV	30,528
EA5DFV	28,618
DL5L (DGØOKW, op)	23,306
PY5RB	22,736
IZ4AMS	21,436
GØAEV	20,244
OE3DWC	16,800

CW Only, QRP

US5VX	4,224
S59D	3,312
RW1AM	3,040
UT5IA	2,432
PY4ZO	2,240
UX2KA	1,836
LZ1MG	1,568
UA3TW	1,232
PY2WLY	920
PD5CW	880

CW Only, Low Power

LW1E (LU1EWL,op)	96,000
LU3DAT	55,680
EA5GS	47,808
PY2XC	40,768
EA3NT	40,188
LU3FID	39,220
PJ2T (WØCG, op)	26,208
H2E	24,024
CO8ZZ	23,392
EA5YU	21,904

CW Only, High Power

LU1HF	388,620
9A5W	91,200
DK6XZ (E77XZ, op)	45,144
EA2IF	36,816
EA4KA	30,400
SP3RNZ	29,580
ZM1K (ZL1AIH, op)	27,384
ZL2BR	24,016
YU1ZZ	22,464
SP2JMB	21,600

Multioperator

CW5W	574,560
ZX5J	531,840
LT1A	417,960
PQ5B	376,640
CE4CT	268,176
EA8AH	161,112
PT3T	158,886
ZM4G	134,976
CV5K	126,260
S51DX	102,660

Texas. Third went to another South Dakotan, Arliss, W7XU (143,232 points).

Single Operator, CW-Only (SOCW)

Three new calls were at the top of SOCW QRP. James, NØUR of Minnesota won with 177 contacts to 35 multipliers for 22,968 points. Dennis, K4ZJ (22,464 points) came in a close second from WW4LL in Georgia. Third went to Dave, W7FB operating as WØMHS to make 15,840 points from Missouri.

Winning the SOCW Low Power category, Clint, AE5GT of South Texas made 482 contacts to 82 multipliers for 80,808 points. Second went to David, K5UZ (72,928) of Arkansas, who made over 350 contacts. Bryan, W5MX of Kentucky took third (71,280).

Rebounding from his fifth place finish in 2008, Richard, K5NA won the SOCW High Power category with 220,248 points from South Texas. In second was Allen, N2KW (163,432 points) of Western Massachusetts, one of the best results for a New England station. Down one position from last year, third went to Bob, N4BP (145,728 points) of South Florida.

Multioperator, Single Transmitter (MOST)

The four-operator team at NX5M earned its fifth consecutive victory in W/VE MOST. The team made 1345 contacts and 116 multipliers for 437,552 points from South Texas. Earning second place was a four-person team at K1LZ (323,782) in Eastern Massachusetts. The three-op team at KDØS (280,052 points) in South Dakota came in third.

DX Categories

Single Operator, Mixed Mode (SOMM)

Braco, E77DX took the overall DX victory in the SOMM QRP category with 5084 points. Second place went to Nikolay, LZ3ND, operating as CT7/LZ3ND from Portugal. Arsene, YO8DDP took third with 41 contacts from Romania. Vitor, PY2NY, the first place winner last year, came in fourth and the top entry from Asia was Kiyoharu, 7K1CPT of Tokyo, who finished fifth.

In the SOMM Low Power category, seven of the Top Ten scores were from South America. Alejandro, LU5WW enjoyed a repeat victory from his Patagonia station with 535 contacts and 136 multipliers (220,320 points). A close second went to Javi, LU5FF, operating from the Buenos Aires area as LQØF (214,008 points). Alex, PY2SEX took third with 144,072 points from Campinas. The top non-South American score was made by Heijo, EA8OM (29,998 points) in the Canary Islands.

The top three scores in the SOMM High Power category also went to stations from South America. Pedro, CX5BW, who has hosted Multioperator efforts in recent years, won as a Single Operator with 560,880 points from 934 QSOs and 180 multipliers. Second went to Jesus, AY5F (366,758 points) from Rosario. Rene, LU7HN came in third (291,100 points) from Cordoba. The top European score was sixth place finisher Ben, DL6FBL (120,848 points), operating from DR1A in western Germany.

Single Operator, Phone-Only (SOPH)

The top three DX results in the SOPH QRP category came from stations on three different continents. The winner was Dario, LU3DR (5280 points), operating with his AYØDX call sign from Tanbril. Second place went to Dario, IT9SSI (4284 points), using IU9A from the coast of northeastern Sicily. Francisco, TG9ANF of Guatemala City, last year's winner, took third with 4096 points. The best result from Oceania or Asia was sixth place by Tom, VK4ATH (536 points) in Queensland.

Just like last year, eight of the top ten DX scores in the SOPH Low Power cat-

egory came from South America. Winning, however, was the same North American — Tino, HI3CCP — who finished with 389 QSOs in 36 multipliers for 34,488 points. A very close second went to Mauricio, PY2CX (33,984 points), operating as ZV2C from Sao Paulo. Operating at LU1UM in La Pampa, Alex, LU2UF took third with 33,604 points.

In the SOPH High Power category, one station had a score far above the others. Alan, PY2LSM (140,760 points) won from Sao Paulo, working 697 QSOs and 102 multipliers. Juan, LU4DX (92,310 points), operating as AY4D from Buenos Aires, took second. Third place went to last year's winner, Bob, LU2FA (32,230 points) operating as LR2F from Rosario. The top European score was from Cortesi, IZ4DPV (30,528 points), who finished in fourth from IK4JQO.

Single Operator, CW-Only

Eight of the top scores in the SOCW QRP category went to European stations in 2009, with five from Eastern Europe. Overall DX victory went to Kulenko, US5VX (4224 points) from southeastern Ukraine. Janko, S59D (3312 points) took second for the second year in a row. To the north and east near St Petersburg, third place went to Peter, RW1AM (3040 points).

Only two DX stations in the SOCW Low Power category scored over 50,000 points. First place went to Hugo, LU1EWL, operating as LW1E from Buenos Aires. Second place went to another Buenos Aires operator, Gabriel, LU3DAT (55,680 points). Third place went to the top European, Jose, EA5GS (47,808 points) in Valencia.

Operating from San Francisco, Juan, LU1HF made 779 QSOs to an amazing 127 multipliers for a total score of 388,620 points to win the SOCW High Power category for DX. Second place went to a Croatian operator, Nikola, 9A5W (91,200 points), near the capital city of Zagreb. Suad, E77XZ came in third (45,144 points) from DK6XZ in Pforzheim. The top Oceania score in the category came from Robert, ZL1AIH (27,384 points), operating as ZM1K northwest of Auckland.

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Potomac Valley Radio Club	2,048,194	61
Florida Contest Group	2,004,124	64
Minnesota Wireless Assn	1,342,150	53
Society of Midwest Contesters	1,112,315	51
Northern California Contest Club	761,374	59
Medium Category		
Frankford Radio Club	1,160,678	17
Yankee Clipper Contest Club	1,079,780	39
Central Texas DX and Contest Club	1,055,884	10
Arizona Outlaws Contest Club	646,514	33
Grand Mesa Contesters of Colorado	597,892	14
Tennessee Contest Group	427,662	26
Contest Club Ontario	422,070	25
Alabama Contest Group	362,190	11
South East Contest Club	307,096	15
Mad River Radio Club	287,610	17
Western Washington DX Club	256,668	12
Texas DX Society	232,342	3
Southern California Contest Club	185,616	18
Louisiana Contest Club	158,662	5
Western New York DX Assn	158,128	5
BC DX Club	152,384	3
North Texas Contest Club	148,492	3
CTRI Contest Group	129,940	7
Rochester (NY) DX Assn	100,852	6
Hudson Valley Contesters and DXers	100,674	11
Willamette Valley DX Club	63,232	8
Utah DX Assn	57,640	7
Order of Boiled Owls of New York	45,174	6
Contest Group Du Quebec	41,080	5
Kentucky Contest Group	31,460	6
Central Arizona DX Assn	25,036	3
Carolina DX Assn	14,050	5
Portage County Amateur Radio Service	19,522	11
Local Category		
Midland ARC	230,008	5
Central Virginia Contest Club	129,012	8
Lincoln ARC	120,384	4
West Allis RAC	105,314	8
Hampden County Radio Assn	72,258	8
Spokane DX Association	71,186	4
Kansas City DX Club	66,010	3
Maritime Contest Club	58,668	6
Sussex County ARC	43,980	3
West Park Radiops	42,838	9
South Texas DX and Contest Club	25,758	3
Metro DX Club	23,622	3
Six Meter Club of Chicago	22,410	4
Mother Lode DX/Contest Club	21,400	4
Fort Wayne Radio Club	13,032	3
Granite State ARA	10,638	5
Meriden ARC	9,190	3
Panhandle ARC	8,556	3
Sterling Park ARC	5,916	6
Great South Bay ARC	5,704	3
Livermore ARK	4,106	4
Athens County ARA	3,360	3
Hazel Park ARC	3,204	3
Bergen ARA	3,154	3
Badger Contesters	2,092	3

Multioperator, Single Transmitter (MOST)

In the DX MOST category, eight of the top ten scores came from stations in South America. Winning the contest for the second year in a row was the CW5W team in Cerro Largo, making 574,560 points. Second went to the team at ZX5J (531,840 points) in the state of Santa Catarina. Daniel, LU3CT and Silvio, LW9EOC teamed up together using the LT1A call sign to take third (417,960 points).

ARRL Affiliated Clubs Competition

More clubs than ever are getting into the 10 meter action as 60 clubs qualified. There were 25 clubs in the Local Club category, 6 more than in 2008. Last year's third place club, the Midland Amateur Radio Club moved into the top spot from Texas for the second time in three years. The Central Virginia Contest Club came in second with 8 logs and a total of 129,012 points. The Lincoln Amateur Radio Club came in a close third with 120,384 points from four logs from Nebraska.

The most popular category was Medium Club. Twenty-nine clubs qualified and three scored over 1,000,000 points. The Frankford Radio Club won for the second year in a row with 1,160,678 points from 17 logs. The Yankee Clipper Contest Club moved up two spots from last year to come in second with 39 logs, the most of any Medium club, and 1,079,780 points. The Central Texas DX and Contest Club came in third and was the only club to average over 100,000 points per log.

Six clubs entered the Unlimited Club category (three more than last year). The Potomac Valley Radio Club just edged out the competition to claim victory. Sixty-one club members combined to score 2,048,194 points. Moving down one spot, the Florida Contest Group fell short of victory by just 2.2%. The Minnesota Wireless Association had enough entrants to qualify as an Unlimited Club and finished third.

Are You Ready for Next Year?

A major change is in store for the 2010 ARRL 10 Meter Contest (December 11-12) as the 32 states of Mexico will count as multipliers, using three-letter state abbreviations. Check out the Web site of the Grupo DXXE (**www.dxxe.org**) for information on Mexican stations and their contest activity. While there have been many changes to the contest rules over the past 37 years, this one is sure to change its flavor. Will it heat things up for you? QST

Expanded 10 Meter Results are online at www.arrl.org/contests!

In the August/September "Contesting 101"

Kirk, K4RO discusses call sign and exchange databases — what they are, how they work and why to use (or not use) them.

Contesting 101 can be found in the *National Contest Journal*, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

JULY 2010 W1AW QUALIFYING RUNS

W1AW Qualifying Runs are 10 PM EDT Wednesday, July 7 (0200Z July 8)(35-10 WPM) and 9 AM Friday, July 23 (1300Z). The West Coast Qualifying Run will be transmitted by station W6SX on 3590 kHz at 9 PM PDT Wednesday, July 14 (0400Z July 15). Unless indicated otherwise, speeds are from 10-35 WPM.

2010 ARRL RTTY Roundup Results

"Good, better, best. Never let it rest. Until your good is better and your better is best." — *Tim Duncan*

Jay Townsend, WS7I
ws7i@arrl.net

New Decade Arrives

January for digital radiosporting means just one thing: RTTY Roundup! After the 2009 "Triple Play" introduced many to RTTY contesting, it was nice to see another modest gain in participation again this year with 1623 submitting logs. We had 564,443 total QSOs during the January 2-3 contest with nearly 7000 different calls. That's an average of over 18,000 QSOs per hour over the 30 hour contest period!

Special Performances

New World and US/VE records were established for Multioperator, Low Power by the team at NØNI. They eclipsed the previous World record by 38,046 by nearly 59,000 points for the new US/VE record. Joining the ranks of RTTY operators notching a Roundup victory is Mike, K4GHM, this year's Rush Drake Memorial Trophy winner for Single Operator, High Power. Rookie of the year is Gary, AL9A, who along with his packet connection entered his first Roundup and managed to secure the final spot in the Top 10 DX Multioperator, High Power standings with his new ICOM IC-7600 and his packet connection. Pretty impressive — placing from Alaska!

Single Operator, High Power

We saw some impressive scores by the High Power group. This year Mike, K4GMH took home the trophy. West Coast guys Chris, N6WM in second and Jeff, WK6I in fourth bracketed John, K1FWE. Ralph, KØIR was just off the pace a little bit and finished out the top five. Wayne, N2WK represented the East Coast. Dave, K6LL who seemed to have no problems from Arizona, was seventh. The sunspots didn't favor Texas but probably will next year. Texas was well represented with Jim, W5AP and Susan, K5DU. George, ABØRX went Single Operator from the Black Hole at 10th place.

Single Operator, Low Power

New CW contest hall-of-famer Don, AA5AU was back to his usual place at number one and said, "The Roundup without 10 meters and a fully open 15 meters is really starting to be a drag, It seems we've been playing this same strategy too many years in a row." Frank, N2FF related that his log had more QSOs on both 80 and 40 meters than he did on 20 meters. This indicated to him that this Roundup had tough times for the Low Power guys.

Single Operator

W/VE — Low Power

AA5AU	198,592
N9CK	173,635
N2QT	157,599
KA4RRU	146,853
W3LL	134,931
VA2UP	132,354
KC4HW	130,758
KB7Q	123,986
KE5OG	103,323
KØAD	101,952

W/VE — High Power

K4GMH	245,754
N6WM	228,573
K1FWE	225,036
WK6I	223,008
KØIR	196,000
N2WK	191,643
K6LL	183,168
K5DU	181,048
W5AP	179,064
AB0RX	170,610

DX — Low Power

HI3TEJ	170,235
P4ØYL	161,998
CN8KD	124,526
J39BS	93,840
EU8RZ	69,579
ED7AJR (EA7AJR, op)	68,701
ON4BHQ	64,365
SP8NR	63,552
GØMTN	61,570
UT1IA	53,792

DX — High Power

P49X (WØYK, op)	358,360
RD3AF	209,616
G6PZ (UT5UDX, op)	198,924
WP2B	167,580
IQ2CJ (IK2NCJ, op)	149,193
KH6ZM	137,740
PI4DX (PD1DX, op)	134,463
IQ1RY (IK1HXN, op)	134,351
XE2K	131,412
US5I (US5IQ, op)	123,264

Multioperator

W/VE — Low Power

NØNI	210,500
N5ZM	147,120
K9NR	116,584
WD4LBR	92,597
N3XLS	78,652
N9LAH	69,978
N8LRG	68,860
KFØUR	63,750
VA7RY	51,294
W1SLF	49,495

W/VE — High Power

NR5M	243,144
WØSD	204,740
K1SFA	195,822
WW4LL	180,999
ND2T	160,339
W4RM	158,848
WB9Z	156,366
KN5O	147,340
K4QD	143,298
W6YX	141,934

DX — Low Power

ZX2B	119,886
KP2D	82,863
RK3MWI	77,126
LZ9R	56,846
IW1QN	51,308
YO5CBX	41,440
YT4RA	38,376
UT8EL	36,432
IKØCHU	33,360
EA2RY	31,898

DX — High Power

OL6X (OK1DIG, op)	188,328
S53M (S51FB, op)	155,776
YL5T (YL3DQ, op)	118,236
UZ2I	114,852
MW2I	104,868
LZ8E (LZ2BE, op)	97,114
OK3C	64,872
ON4ATW	59,584
OH2MZB	54,810
AL9A	53,452

Multioperator

It took a new Multioperator, High Power, W/VE World record for the NR5M crew to edge out WØSD who had their all-time best score and set a new record for the Roundup. Running the K1TTT station was the K1SFA team who piloted it to a third place finish this year. Those are some high power stations at the top of the High Power standings.

The NØNI team of NØNI, NØAC and NØXR eclipsed the old records in Multioperator, Low Power. The team at N5ZM was not able to complete with the antenna farm that exists in the Midwest. Earl did set some new personal goals but dropped back one place from first this year.

DX Overview

On the DX side of Roundup in the Single Operator, High Power category it was Ed, P49X again leading the pack into the clubhouse with his fifth victory in a row. Maybe Val, RD3AF will unseat Ed from his Canary Island site. Val won for Europe while setting a new all-time European record and still finished second.

Serge, UT5UDX traveled to Paul, G6PZ's QTH, finding the new four-square antenna gangbusters on 80 meters. Brad, WP2B won the Caribbean and set the new all-time North American record for DX. Back to Europe where the IQ2CJ station with Luca, IK2NCJ operating completed the first five places. From Hawaii in the Pacific it was Massimo, KH6ZM in sixth. Another European entry, PI4DX with Eric, PD1DX operating, was next. Mario, IK1HXN piloted IQ1RY for eighth. Hector, XE2K put Mexico on the map again this year and found the new locals with plasma TVs. It seems that those new TVs are causing us some pain, but Hector still set a brand new Mexican record. Finishing out the

SUE COOK, AI6YL

Sue, P4ØYL finished second in Single Operator, Low Power this year from her station on the island of Aruba.

top 10 was Ukrainian station US5I put on the air by Vlad, US5IQ. DP1POL with DL5XL operating set the new Antarctica record.

Single Operator, Low Power DX was led again this year by Ted, HI3TEJ and closely followed up by our 2008 Special Salute winner Sue, AI6YL running her P4ØYL station. Mohamed dropped a spot this year as CN8KD was third. Fourth was secured by Derek, J39PS. Then came the Europeans with Anatoly, EU8RZ moving way up from 2009. ED7AJR operated by Manuel, EA7AJR was next. Wim, ON4BHQ couldn't hold a run frequency so he did a lot of search and pounce. Andrzej, SP8NR broke into this year's winners' circle. Lee, GØMTN with his Force 12 was in ninth place with Bob, UT1IA rounding out the pack.

DX Multioperator, High Power is where the Europeans dominate year after year. Daniel, OK1DIG beat out last year's winner, S53M piloted by Miha, S51FB. Daniel set a new all-time European Record while securing the top all-time multiplier record as well. YL5T with Norm, YL3DQ using his contest call was in third place. Team UZ2I secured the fourth spot in the top 10. The Wales team of the Denzil Contest Group, MW2I finished up the top five.

The second tier of this category was led by LZ8E with Boyan, LZ2BE operating in sixth place. OK3C using his contest call was Ludek, OK3ZC seventh. Theo, ON4ATW secured the eighth spot. Pasi, OH2MZB was the last of the Europeans. Our rookie Gary, AL9A from the tough spot of Alaska was in 10th place.

DX Multioperator, Low Power was won by ZX2B operated by Wanderly, PY2MNL moving up from his 2009 third place finish. Ron and his guys at KP2D were second. RK3MWI was third. Nasko, LZ9R and packet completed the top four. The IW1QN team was fifth. Mircea, YO5CBX followed by YT4RA, UT8EL, IKØCHU and EA2RY completed the top 10.

DX Records

There were five new continental records set this year in the DX division. Most of these scores were quite nice considering the lack of propagation from Europe to US/VE on 15 meters that we had hoped for. 2010 brought 39 new entity or country records to the RTTY Roundup. These were from nearly all continents of the world and show the growing popularity on the DX side of the contest.

Even with the weak conditions, due to the hard work of the SO2R guys there were five new members in the Top DX QSO Totals records. Most came from South America. QSO numbers were down 6% or more this year for the SO2R guys. Two of the same stations that had QSO records joined in having new all-time multiplier records this year.

Affiliated Club Competition

One of the significant changes in Roundup over time has been the impact of the club action on strategy in parts of the country. There were a total of 45 clubs entered in the Club Competition this year. Drawing on their vast resources, the Northern California Contest Club (NCCC) was the only club able to get enough logs to enter the Unlimited Club category. The Potomac Valley Radio Club (PVRC) took top honors in the Medium Club category, narrowly beating the Minnesota Wireless Association (MWA). The Society of Midwest Contesters (SMC) made it to third place this year. The Local club competition was won by the Orleans County Amateur Radio Club.

Affiliated Club Competition

Club Name	*# of Logs*	*Score*
Unlimited Club		
Northern California Contest Club	60	2,502,251
Medium Club		
Potomac Valley Radio Club	40	1,813,567
Minnesota Wireless Assn	41	1,726,312
Society of Midwest Contesters	31	1,463,612
Yankee Clipper Contest Club	27	1,365,170
Tennessee Contest Group	29	1,067,347
Florida Contest Group	20	809,574
Contest Club Ontario	20	767,150
Frankford Radio Club	15	619,152
Arizona Outlaws Contest Club	17	844,099
Alabama Contest Group	13	620,322
Grand Mesa Contesters of Colorado	12	571,577
Willamette Valley DX Club	11	494,490
CTRI Contest Group	11	477,592
Central Texas DX and Contest Club	4	463,987
Western Washington DX Club	8	407,030
Louisiana Contest Club	3	376,050
Contest Group Du Quebec	7	322,190
Mad River Radio Club	10	281,218
Order of Boiled Owls of New York	10	272,449
BC DX Club	4	187,235
Kentucky Contest Group	8	180,874
Oklahoma DX Assn	6	161,231
Southern California Contest Club	7	153,951
Hudson Valley Contesters and DXers	6	130,563
Rochester (NY) DX Assn	7	126,818
Texas DX Society	4	106,258
North Coast Contesters	3	90,393
Saskatchewan Contest Club	3	86,497
Western New York DX Assn	3	86,335
South East Contest Club	4	72,264
Carolina DX Assn	6	68,610
Local Club		
Orleans County Amateur Radio Club	6	449,103
Dominion DX Group	6	365,692
Metro DX Club	7	217,915
Southwest Ohio DX Assn	3	183,450
Spokane DX Association	5	149,910
Bergen ARA	3	147,759
Midland ARC	3	141,778
Maritime Contest Club	5	140,237
Kansas City DX Club	3	114,193
Sterling Park ARC	3	52,476
Delaware-Lehigh ARC	4	50,174
Nanaimo Amateur Radio Association	3	34,714
Great South Bay ARC	4	29,653

Looking Ahead and Acknowledgments

The 3500-QSO barrier is still there but with 15 back and perhaps some action on 10 it might go in 2011. January 8-9, 2011 will be the next running of the RTTY Roundup. Many thanks to Ken, K1EA for his labor in checking the logs. A tip of the hat to Ken, WM5R who always does the records on short notice. I appreciate the entire ARRL support staff, as well.

Sponsored Plaque Winners

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

Plaque Category	*Winner*	*Plaque Sponsor*
Overall Winners		
W/VE Single Operator High Power - W7RM Award	K4GMH	Spokane DX Association
W/VE Single Operator Low Power - NM7M Memorial	AA5AU	Jim Reisert, AD1C
W/VE Multioperator High Power	NR5M	John Lockhart, W0DC
DX Single Operator High Power	P49X (WØYK, op)	Gary Belcher, KH6GMP
W/VE Division Winners		
Atlantic Division Single Operator High Power	N2WK	Orleans County Amateur Radio Club
Dakota Division Single Operator Low Power	KØAD	W2JGR Memorial by Don Hill, AA5AU
Delta Division Single Operator High Power	AB4GG	Roland Guidry, NA5Q
Great Lakes Division Single Operator High Power	W8JWN	Southwest Ohio DX Association
Hudson Division Single Operator Low Power	K2DSL	Troy Amateur Radio Association N2TY
Midwest Division Single Operator Low Power	NTØF	In Memoriam of Larry Lindblom, WØETC by Bob Ruvolo, KI6DY
New England Division Single Operator Low Power	W1BYH	CTRI Contest Group
New England Division Multioperator High Power	K1SFA	Cuzco Contest Club, WK1Q
Pacific Division Single Operator High Power	N6WM	Northern California Contest Club
Pacific Division Single Operator Low Power	N6OJ	Doug Faunt, N6TQS
Roanoke Division Single Operator High Power	K4GMH	Mark Sihlanick, N2QT
Roanoke Division Single Operator Low Power	N2QT	Mike Sims, K4GMH
Roanoke Division Multioperator Low Power	WD4LBR	Dominion DX Group, K4VAC
Southeastern Division Single Operator Low Power	KC4HW	Alabama Contest Group

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

Head Online for More

For much, much more on this growing contest, shift over to the extra LTRS and FIGS on the ARRL Web site at **www.arrl.org/contests**.

W3UR

HOW'S DX?

EZ — Turkmenistan

Turkmenistan (EZ) gained its independence upon the disbanding of the Union of Soviet Socialist Republics (USSR). The former Soviet Republic claimed its independence on October 27, 1991, which was later recognized on December 25 of that same year. The Central Asian nation borders Kazakhstan (UN), Uzbekistan (UK), Afghanistan (YA), Iran (EP) and the Caspian Sea. Turkmenistan is a member of the CIS (Commonwealth of Independent States). The country's first President was Saparmurat Atayevich Niyazov, who was later declared President for Life by the Turkmen Parliament on December 28, 1999.

Emblem of the Turkmenistan MOC

Amateur Radio Within Turkmenistan

In mid 2006 the Turkmenistan Radio Amateur League (TRAL) received official word from the Ministry of Communication of Turkmenistan that Amateur Radio was suspended. At the time, no reason was given as to why the sudden change of no longer issuing Amateur Radio licenses or renewing those expiring. In late August legal Amateur Radio activity from EZ had been stopped.

For some unknown reason in 2004 Turkmenistan's Ministry of Communications (MOC) rearranged the terms of permission for Turkmen Amateur Radio operators, stating they incorrectly registered their organization with the Ministry of Justice. On December 21, 2006 Niyazov unexpectedly passed away. In April 2007 The TRAL asked Amateur Radio operators from around the globe to contact the MOC stressing the importance of Amateur Radio in their country. Submitted regulations and other documents lay in the Ministry, without any movement until 2008. After the inauguration of the new President the matter of registration still did not move forward. In early 2009 Members of the TRAL met with the highest level of officials within Turkmenistan's MOC.

This year Turkmenistan radio amateurs found the only advocate who wasn't afraid to represent them, paying him money and giving him documents, which the Ministry of Justice had already been given, multiple times. As soon as the TARL is registered they will be given the right to apply for an extension of receipt of radio amateur call signs for the local amateurs and possibly temporary calls for foreign Amateur Radio operators. The earliest this can be expected would be the end of this year.

Table 1

Table of Soviet Turkmenistan Oblasts

Prefix	*Oblast #*	*Oblast Name*
UH8A	191	Ashkhabad City
UH8B	180	Nebit Dag
UH8E	044	Maryiskaya
UH8H	043	Turkoman
UH8W	045	Tashauzskaya
UH8Y	046	Chardjouskaya

Amateur Radio History in Turkmenistan

Until the mid 1990s the Amateur Radio prefix for Turkmenistan was UH8 and UK8B, UK8E, UK8H and UK8W. In the old days of the Soviet Union there were six oblasts within Turkmenistan (see Table 1).

By early 1995 the prefix for Turkmenistan was changed from UH to EZ. Turkmenistan continued with six different call districts (see Table 2).

Turkmenistan also issued the EZØ prefix to foreign visitors. Since the ban on Amateur Radio in Turkmenistan it has moved up on the most wanted list and ranked number 74 on The DX Magazine's 2009 Most Wanted Countries list. Currently there are about 25 Amateur Radio operators in Turkmenistan waiting for the go ahead to get back on the air. Numerous EZ spots have been made on the packet clusters since late August of 2006, but the majority of them have been either busted E7 (Bosnia and Herzegovina) spots or pirates.

Turkmenistan (EZ) has been an independent state since 1991.

Table 2

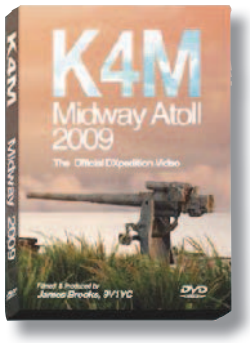
Table of Independent Turkmenistan Oblasts

Prefix	*Division*	*Capital City*
EZ3	Ahal Province	Anau (Annau)
EZ4	Balkan Province	Balkanabat (formerly Nebit Dag)
EZ5	Mary Province	Mary
EZ6	Dasoguz Province	Dasoguz (Dashkhovuz)
EZ7	Lebap Province	Turkmenabat (Chardzhev)
EZ8	Ashgabat City	Ashgabat

K4M — MIDWAY ATOLL 2009 — THE OFFICIAL DXPEDITION VIDEO

In early April I received and viewed the recently released "K4M — Midway Atoll 2009 — The Official DXpedition Video," which was filmed and produced by the renowned James Brooks, 9V1YC. Midway was the key turning point for WWII in the Pacific and

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org



is now under the US Department of the Interior's Fish and Wildlife Service's management. Once again James has shown us the beauty of yet another exotic DX location, which many DXers would love to have the opportunity to visit. You'll see and understand why KH4 is so rare and how the team was able to pull off their DXpedition, despite the transportation delay to one of the top 10 most wanted entities.

Get your copy today as it is a great view and a worthy addition to your DXpedition video library. The video runs for 44 minutes and would make a great program for an Amateur Radio Club meeting, even for non DXers. To order your copy go to **www.dxvideos.com**.

DX NEWS FROM AROUND THE GLOBE

CHILTERN DX CLUB: THE UK DX FOUNDATION

One of the goals of The Chiltern DX Club (CDXC): The UK DX Foundation is to sponsor DXpeditions. The CDXC has a new Web site and has posted a new funding application with criteria for sponsorships at **www.cdxc.org.uk/funding**.

D4 — CAPE VERDE ISLANDS

D44TOI, Cape Verde Islands, will be Michel, HB9BOI. He plans to be on the north coast of Sal Island July 1-13, active on all the HF bands. QSL direct or bureau to HB9BOI.

DX GATHERING

The BCDXC will be hosting this year's Pacific Northwest DX Convention, which will be held in Vancouver July 30 through August 1. Details are posted at **www.bcdxc.org/dx2010convention.htm**.

FP — ST PIERRE AND MIQUELON ISLANDS

An upcoming DXpedition to FP, St Pierre and Miquelon, is set for July 5-14. Call signs will be FP/K9OT and FP/KB9LIE. Paul and Peg plan to be in the IARU HF Championship Contest as two single-operator entries. They will be on 80-10 meters CW and SSB, possibly 160 and 6 if conditions are good, they say. Also, they hope to have Internet access from the "Motel de Miquelon." QSL to their home calls, direct with return postage, bureau or LoTW. **www.hamradio.pnpfarms.com**

FW — WALLIS AND FUTUNA

Three Japanese operators have announced their plans for a DXpedition to Wallis and Futuna followed by a short relaxed operation from Fiji afterward. Mine, JA2NQG/JE1CTM; Yuji, JH2BNL, and Shige, JI2UAY, will be QRV from Wallis Island (OC-054) starting the afternoon of July 14 and leaving on the afternoon of July 21. The team members have requested FW5M, TO2BNL and FW5FM, respectively. They will also make a side trip to Hoorn "Futuna" Island (OC-118). They will be staying at the Hotel L'Albatros in Mata-Utu (same location as FW5X). Plans are to have three stations as follows:

- IC-7000 transceiver plus Thamway DXV500L amplifier (500 W on 160-40; 300 W on 30-20), 14 meter high vertical with top-load wires on 160 and 80, wire vertical on 40, SPI-RO D-314; 30, 17 and 12 meter dipole in sloping dipole or vertical configuration.
- FT-897 transceiver plus IC-2KL amplifier, 10 meter high vertical with a top-load wire on 75-40, 3 element beam on 20-15-10.
- IC-736 transceiver and 2 element beam on 10.

In order to avoid mutual interference (due to minimum antenna separation) one station will be active at all times. They may have to limit their power output to 250 W due to local regulations. Activity is expected on 1.8 through 28 MHz on CW, SSB, RTTY and they are hoping to try FM.

After their serious effort on Wallis and Futuna they will then travel to Nadi, Fiji Islands arriving late in the afternoon of July 21 and staying until late evening on July 24. As of press time they do not know their call signs. QSL cards are expected to go via their home calls.

JT — MONGOLIA

IW5ELA has announced that he will be QRV from Mongolia as JT1/IW5ELA from July 7-22. Activity will be on 7 through 21 MHz, using verticals and wires in a "holiday style operation." QSL via IW5ELA either via the bureau or direct.

S7 — SEYCHELLES

Marq, CT1BWW, says his upcoming DXpedition to the Seychelles now has a Web page at **www.ct1bww.com/s79bww**. The dates will be July 17-31.

V3 — BELIZE

Bob, W5UQ; San, K5YY, and Bill, W5SJ, will appear from Belize July 12-19. Calls will be V31UQ, V31YY and V31SJ, respectively. Look for Bill to "get with it" in the CQ WW VHF contest July 17-18 on 6 meters. San will deal out 60 meter contacts and Bob will keep the other bands hopping. All of them plan lots of operating, 80-6, CW and SSB plus some fun on the beach and in the rainforests. V31YY QSLs to K5YY; QSLs for V31UQ and V31SJ go to W5JAY.

VK — AUSTRALIA

In celebration of the 100th anniversary of the Wireless Institute of Australia, special event station VK1ØØWIA will be QRV from May 1 to October 31. A special award will be available during this period. Complete details can be found at **www.wia.org.au/newsevents/centenary/about/index.php**.

ZS8 — PRINCE EDWARD AND MARION ISLANDS

By the time you read this hopefully ZS8M will be QRV by Pierre, ZS1HF, who is on a 1 year work assignment as the radio technician as part of the 67th Marion Island Expedition team. He arrived in April and expects to begin activity in May and will remain on the island until May of next year. He'll be on SSB only on 1.8 through 144 MHz. For equipment he is supposed to have an ICOM IC-706 Mk2G, IC-7000 and IC-7200 transceivers, plus a TransWorld 600 W amplifier and dipole antennas. He says the high winds will preclude his taking a beam along, plus concern about the possibility of killing birds with a beam. Those were the rules laid down by authorities of the island. Pierre has a Web site at **www.zs8m.com**.

WRAP UP

That is all for this month. A special thanks to JA2NQG, K1QS, K9OT, KE3Q, NT2X, UT3UV, W5SJ, ZS8M/ZS1HF and *The Daily DX* for helping to make this month's column possible. Over the next few months I'll be in Friedrichshafen, Germany (June 25-27) and W9DXCC in Chicago (September 10-11). Until next month, see you in the pileups! — *Bernie, W3UR*

W3ZZ

THE WORLD ABOVE 50 MHz

Springtime Fireworks

April has been a month with two memorable events: one of the best coastal tropo events in the last decade and the activation of KP4AO for 432 MHz EME using the 305 meter dish at Arecibo in Puerto Rico. This month we will look in detail at both.

Genesis of a Tropo Event

March 31 a huge high pressure set up in the Gulf of Mexico and began to drift slowly eastward and then northeastward. Beginning on the 31st a strong transgulf episode began as noted last month. By April 2 the high had moved just east of North Carolina and Florida stations on the back side were working into KP4. After 0000Z April 3 and particularly after 1200Z the entire Florida peninsula was working into southern New England and points in between.

By April 4 the high had split into pieces off the coast of Georgia and in western Pennsylvania. It took on a more narrowly coastal profile and stations in the Yucatan were worked in Florida. By April 5 the high had moved off the South Carolina coast and only the transgulf paths remained. On April 6 Texas stations were working as far north as EM29 and a path opened between central Tennessee and XE just south of Texas. April 7 a few stations in Rhode Island (FN41) made it back into Florida. At that point a cold front approached from the west and the tropo was over. Throughout this period on the Hepburn maps (**www.dxinfocentre.com/tropo.html**) bright yellows, oranges and reds were displayed across the gulf and lit up the East Coast.

The openings can be summarized in two maps: Figure 1 shows transgulf and Atlantic coast ducting. Figure 2 displays openings from Florida to the Caribbean. My thanks go to my many correspondents and the propagation reflectors at **dxworld.com** and DX Sherlock (**www.vhfdx.net**).

Caribbean DX

Openings occurred the first 4 days of April (see Figure 2). Details from Puerto Rico from Julio, NP3CW, indicate that on April 2-3, KP4EIT (FK68) worked into EL86, 87, 95, 96, 98, 99 and C6ANX (FL15) and Julio worked into EL95 and 96. Active Florida stations included Bob, N3LL (EL86); Dan, K3ZXL (EL87) and Dave, N9HF (EL99). A good duct existed between Florida and the mid-South and the Yucatan (XE3 — EL61) on the first with contacts to EL87, EM26, 42 and 50. Many stations in Florida worked into the Bahamas (FL15) from EL86, 87, 96, 98, 99. The highlight of all this activity was a new 222 MHz Atlantic tropo record at 1220Z on April 3 between John, KQ4PI (EL99hk) and KP4EIT (FK68si) 1950 km/1211 mi. Unexpectedly, Ivars, KC4PX (EL98) worked KP4EIT on April 24. Caribbean tropo is reasonably rare and here are two openings in the same month.

This Month

July 4	Moderate EME conditions*
July 17-18	CQ WW VHF Contest
July 18	Moderate EME conditions*
July 22-24	Central States VHF Society, Bridgeton, MO

*Moon data from W5LUU

Transgulf Tropo and More

The long distance king on April 1 was Ron, NN5DX (DM80) who worked throughout Florida EL87, 88, 95, 97, 98, 99 EM80, 90 and inland to EM25, 31, 50, 54, 74 from west Texas. John, W5UWB (EL17) was into Florida, Mississippi and Alabama on 2 meters and Mississippi on 1296. Greg,

GENE ZIMMERMAN, W3ZZ

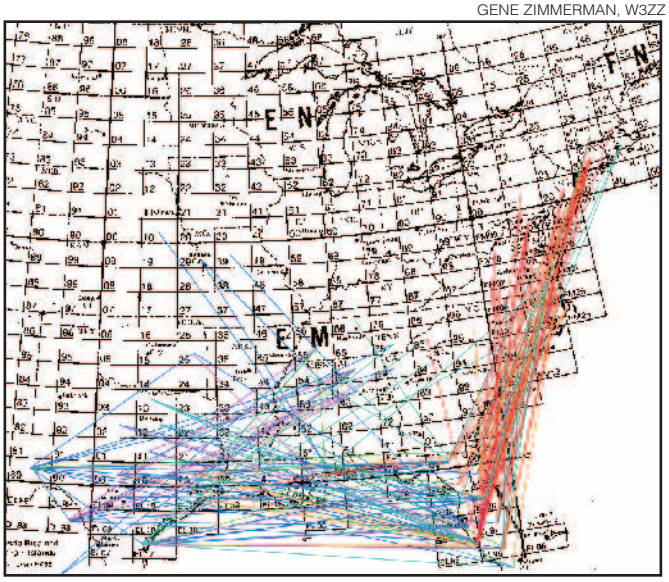


Figure 1 — Tropo paths during April 1-7 coastal openings. Color Legend: Blue = April 1, Green = April 2, Red = April 3, Cyan = April 4, Magenta = April 5, Orange = April 6, Lt Blue = April 7.

ANDREW R ZWIRKO, K1RA/AZ_PROJ

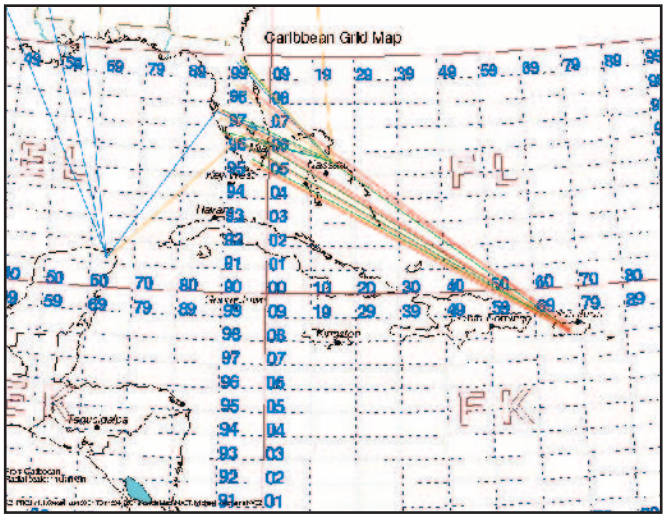


Figure 2 — Tropo paths April 1-4 in the Caribbean. Map created by Andrew Zwirko, K1RA, from the azimuthally equidistant map generator at www.wm7d.net/azproj.shtml with permission. Color Legend: Blue = April 1, Green = April 2, Red = April 3, Cyan = April 4.

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K5GJ/R (EM10) enjoyed Florida Qs from the car. From the other end Steve, N2CEI, and Sandra, K4SME, worked into Texas EL17, 29, 49 EM00, 10 DL98. Other Florida stations active into Texas included K3ZXL (EM87) and N9HF (EL99).

April 5 N2CEI worked EM13 on 222. Les, N1LF (EM63) worked into Texas and Mexico (DL98) with indoor antennas. On the 6th W5UWB worked throughout Florida and the mid-South up to EM66. Todd, N4QWZ (EM66) worked into northern Mexico (DL95). By April 7 the opening had expanded somewhat. W5UWB worked as far as EM85 on 432. K1MAP worked Florida from Virginia and N2CEI worked W1LP (FN41) on 2 and 432. N4QWZ worked all over Florida on 2-432. But local propagation remained good as WD4ELG (FM06) raised eastern Virginia with 35 W and a small Elk Yagi.

Atlantic Coast Tropo

Saturday morning April 3 was the peak day for an intense coastal tropo event. The opening was relatively narrow but did include the mid-Atlantic as your conductor and Dave K1RZ (both FM19) worked throughout the Florida peninsula, though neither of us worked Steve and Sandra in EM80. We found conditions above 2 meters very spotty.

From Florida K3ZXL (EM87) worked three stations in Connecticut (FN31). Tom, K4MM (EL97) worked two dozen stations up the coast, half a dozen being W1/W2 contacts. Jack, W3TMZ (EL88) worked EM63, 95 FM16, FN31 all on 432. N2CEI and K4SME were at the edge of the opening but worked a few new grids on 2-432. Jeff, K1TEO (FN31jh) was probably in the ideal spot with seven Florida grids on 2; two Florida grids on 222; six Florida grids on 432; and N4TUT (EL98) on 1296.

Conversely, neither W1ZC (FN42dr), W1ZI (FN32rk) or K1WHS (FN43mj) heard anything. But Mark, K1MAP (FN32sb) worked EL98 and FM04. WZ1V (FN31) worked EL88, 98 on 432 and EL96, 87 on 2. Don, W1FKF (FN42jk) worked into Florida Saturday evening as did WZ1V who completed with N4TUT on 1296. The path returned on April 7 but was limited to eastern New England. Clint, W1LP (FN41) worked EL95, 96, 98, 86, 87, 89 and EM80, 81 on 2 meters and EM80 on 432.

Bottom Line

This monster tropo opening from March 31 to April 7 was marked by several notable events: The transgulf episode lasted for over a week and extended unusually far westward with New Mexico (DM82) and far west Texas (DM80) working all over Florida. This was the best Caribbean opening in many years with Florida working KP4 (FK68), C6 (FL15) and the Yucatan XE3 (EL61) on more than 1 day and KP4 tropo returned on April 24. More entities would have been worked had there been more active 2 meter stations in the Caribbean. A new Caribbean 222 MHz distance record was set.

The Atlantic tropo was strongly limited to coastal locations and the second opening on April 7 apparently only reached far eastern New England from Florida. In spite of the strong inversion, conditions were spotty — locations not far from one another did not work stations at the same time. In addition, unlike some tropo openings these ducts did not appear to support microwave contacts very well; very few microwave contacts were reported although many correspondents report trying.

Many stations reported outstanding totals: for instance N3LL worked 16 states XE, C6 and KP4 from DM80 1270 mi to the west, XE3ISS to the south, KP4 to the southeast and W1LP (FN41) to the north. Springtime tropo events like this have become quite uncommon. We can only hope they recur next year.

Echoes of Apollo

In honor of the Apollo astronauts, for the first serious Amateur Radio operation since 1965 the world's largest radio astronomy antenna, the 305 meter dish at Arecibo, Puerto Rico, was activated on 432 MHz EME on April 16-18. Although the Arecibo moon window was limited to ~2 hr 40 minutes a day, with a gain approaching 60 dBi many stations running 100 W or less into a typical amateur satellite antenna had the capabilities to work KP4AO. Joe Taylor, K1JT, has kindly provided information on the actual operation for this column. Look for Joe's feature article in *QST* with much more detail and pictures at a later date.

April 16. The 3CX800 amplifier arced over shortly before their moon window, so they ran the TS-2000 barefoot at ~35 W measured in the lab, or ~25 W at the feed. They had 15 quick SSB Qs in the first 20 minutes and then switched to CW for 74 more Qs before they lost the moon. The overall Q rate on day 1 was 33 per hour.

Overnight they fixed (or thought they had fixed) the 3CX800 amplifier by replacing a vaporized 10 Ω, 20 W protective resistor in the high voltage line. Angel, WP4G, located two 24 V, 25 A dc supplies to use in series for their 50 V backup amplifier (SSPA).

April 17. The 3CX800 amplifier ran fine at 350 W output generating 15 SSB Qs in the first 15 minutes. Then *BANG!*, another arc-over. After running low power for 10 minutes and making several more SSB Qs, they switched to the SSPA, which ran flawlessly at nearly 500 W for the rest of the moon window. The day's totals were 75 SSB QSOs in 112 minutes (40 Qs per hour) then 31 CW Qs in 51 minutes (36 per hour). Obviously they decided to run the SSPA again on Sunday; but they repaired the tube amplifier again, to be sure of a spare.

April 18. Five minutes before their moon window they tested the SSPA and sadly discovered that one of the 24 V power supplies had died. So they returned to the 3CX800, which this time ran without problems. They started with 16 SSB Qs in 25 minutes (38 per hour), then 17 CW Qs in 32 minutes (32 per hour) and finally 14 JT65B Qs in 61 minutes (14 per hour).

In general, operations went smoothly despite the huge number of stations calling. Operators were mostly well behaved and spread out over 10 kHz or more, as requested. A very rough estimate suggests that they may have worked something like 20% of the potentially workable callers on SSB, 10% of those workable on CW and only a few percent of those workable on JT65.

Overall they made 106 SSB Qs, 122 CW Qs and 14 JT65B Qs or 242 Qs total in 36 DXCC entities. Their net rate was ~30 Qs per hour. In detail there were 79 Qs in the US, 6 VEs and the rest were mostly Europeans. The operators were: Angel, WP3R; Pedro, NP4A; Angel, WP4G; Jim, WA3FET; Joe, K1JT, and additional guest operator Pat, AA6EG.

Joe says they will have to try to do it again and work the rest of the callers.

ON THE BANDS

6 meters. April has produced an unusually strong start to the summer E_S season with plenty of DX to the south. Until the 21st things moved more slowly. In the good deeds category John, W9RPM (WI) gave WØYZZ (MO) his 50th 6 meter state after 55 years. On April 7 Jon, NØJK (EM17) worked FM16. Ed, W4RVZ (FM16) worked into the Midwest and Southwest single hop. On April 9 Bob, K6QXY (CM88) worked ZL3NW on F2 after hearing weak ZL video. He also heard ZL video on April 22 and 25. On the 16th Al, K7ICW (DM62) worked into northern CA and NV. April 19 N7DB reports the Pacific Northwest into CA/AZ and TI.

Starting on April 22 6 meters began to heat up. John, W5UWB (EL17) worked westward into southern CA. On April 23 double hop was seen by W5UWB to KP4 and Chip, K7JA (DM03) worked KH7Y. Joey, W5TFW (EM41) worked into KP4, ZF and C6. Ivars, KC4PX (EL98) ran double hop into CM98 on April 24. Bob, K6QXY, worked two stations in KH6. W5UWB worked FL and throughout the Northeast as far as VE3. W3CMP reports that Ed, VP9GE (FM72) worked 23 FL Qs early and then 56 Qs into the Midwest later that day. Tim, K7XC (DM09) worked KP4 double hop and single hop to CA and the Midwest on the 24th. Tim repeated to the upper Midwest on the

144 MHz Standings

Published 144 MHz standings include call area leaders as of May 1, 2010. For a complete listing, check the Standings Boxes on the "World Above 50 MHz" Web pages at **www.arrl.org/vhf-uhf-microwave-eme-standings**. There are two requirements for inclusion in this list: US operators located east of the Mississippi River must have worked at least eight states. All operators must have submitted information within the previous 2 years. (You need not work additional stations to remain in the standings, but please confirm your continued interest.) Submit data by e-mail to **standings@arrl.org** or mail paper submissions to Steve Ford, WB8IMY, ARRL, 225 Main St, Newington, CT 06111. Listed by states worked.

Call Sign	State	States Worked	DXCC Entities Worked	Grids Worked	DX (km)
1					
K1MS*	MA	50	32	—	2,166
W1AIM*	VT	50	18	231	2,340
K1SIX*	NH	43	14	201	2,501
W3TWX*	VT	38	42	161	1,984
W3EP/1	CT	36	3	191	2,450
WA1FVJ	CT	26	2	54	2,200
2					
K1JT*	NJ	47	73	466	2,369
W2UAD	NY	39	3	143	2,323
K1NY	NY	38	4	151	2,576
WB2CUT	NJ	37	2	158	—
K2OVS*	NY	36	6	165	2,812
3					
W3CMP*	PA	50	64	407	2,455
WA2FGK*	PA	48	49	313	—
AE3T*	PA	44	30	—	—
W3ZZ	MD	38	8	241	2,526
4					
W4WA	GA	42	7	167	—
K4ETC	TN	40	8	295	1,289
K4RF	GA	40	4	212	2,147
N4QWZ	TN	40	3	207	2,295
K2BLA*	FL	39	77	373	—
K4RWP	TN	39	3	174	2,323
K4ZOO	VA	38	4	198	2,162
AA4H	TN	38	3	169	2,007
K4RTS	VA	37	3	172	2,023
N9HF*	FL	36	24	—	—
N4MM	VA	35	5	153	—
K4MM	FL	34	8	163	2,347
N4HN	NC	34	2	161	—
K4MSG	VA	31	2	107	1,656
KØVXM	FL	26	6	139	1,974
K4YMQ	AL	26	2	77	1,320
KE4WBO	FL	22	5	64	2,264
5					
W5UWB*	TX	50	63	400	2,332
WD5AGO*	OK	50	32	220	2,050
K5YY*	AR	50	31	498	2,510
WA5VJB*	TX	50	19	—	—
W5LUA*	TX	50	—	—	—
K5UR	AR	48	5	517	—
N5LJL	OK	48	3	219	2,472
K5SW	OK	47	5	298	2,378
K5QE*	TX	47	5	—	—
K5LLL	TX	39	3	208	2,089
AA5JG	OK	39	3	151	2,171
W5HNK	TX	37	3	—	2,442
AA5AM	TX	31	3	125	2,271
6					
K6AAW*	CA	50	58	411	3,831
KC6ZWT*	CA	35	38	280	3,934
KR7O*	CA	26	29	219	2,134
K6QXY*	CA	24	8	—	3,794
N6ZE*	CA	22	16	115	2,600
7					
W7GJ*	MT	50	110	—	—
W7MEM*	ID	50	78	478	—
W7EME	MT	50	78	—	—
WA7GSK	ID	30	2	215	3,635
K7CW	WA	17	3	121	2,518
8					
K8BHZ*	MI	50	45	362	2,278
WA8RJF*	OH	44	27	227	2,131
K8ROX	OH	40	2	151	1,915
K2YAZ	MI	38	2	165	2,167
N8PUM	MI	23	2	108	2,188
WA8WV	WV	19	2	35	1,026
KB8O	OH	17	2	39	1,097
9					
N9LR*	IL	50	50	511	2,274
AA9MY*	IL	49	69	417	2,045
W9RPM*	WI	43	21	196	2,670
KA9UVY	IL	43	2	164	2,373
W9RM*	IL	35	8	109	2,121
WA9PWP	WI	32	2	144	1,940
Ø					
KØFF*	MO	50	35	267	2,185
WØLD*	CO	50	26	167	2,373
WØRT*	KS	50	17	206	2,357
WØSD*	SD	50	13	297	—
KØAWU*	MN	50	53	408	—
NØPB	MO	48	5	315	2,474
WAØKBZ*	MO	45	16	209	—
KWØA	MO	45	2	245	2,501
KØGU*	CO	42	40	350	2,400
KBØPE	MO	29	1	111	1,702
KØRZ*	CO	26	2	107	2,173
KØCS	CO	26	2	83	2,177
Canada					
VE3KH*	ON	50	63	400	1,985
VE2PIJ*	PQ	14	2	52	1,781
International					
DL8EBW*		39	99	826	—
XE2AT*		43	63	300	2,191
PA3CEE*		29	109	723	—

*Includes EME contacts
— Not given

25th. Julio, NP3CW, had excellent conditions to the southeastern and mid-Atlantic US on April 23-24 reaching NM on the 24th. John, W5HX (EM20) worked several stations from northern to central Mexico on April 27.

Tom, LA4LN, reports that 70 MHz meteor scatter conditions in a contest the day after the eruption of the Eyjafjallajökull volcano in Iceland appeared to be quite poor and that GPS inaccuracies beneath the ash clouds were apparent. On the other hand John, W5UWB, notes poor meteor scatter conditions here in the US in the week preceding the Lyrids (April 23) meteor shower so any effect of the volcanic eruption on scatter propagation is still an open question. John had five 6 meter Qs and a 959 mi completion with N3LL (EL86tx) on 222 via MS.

Joe, CT1HZE, and Ken, VE3FIT, report that two important European TV beacons are gone or compromised. EA TV 48.250 shut down April 3 and CT TV 28.242 is apparently left running 1.5 kW. So better call those CQs.

TEP. Dan, K3ZXL (EL87) worked CX4CR on April 7 via 6 meter transequatorial propagation (TEP). Bill, K2EK (EL88) worked to CX and LU and says the opening included stations in EL89, 99 as well. Paul, ZS6NK (KG46rc) reports several TEP openings, the first from ZS in cycle 24 on March 4. Short openings to 5B4 on April 8 and SV9 and EA6 on April 10 were recorded.

Tropospheric ducting. Jim, K5YC (DM82) in NM reports working DL98, 99 on April 19, an opening that did not appear to exist farther east. Dave, N7BHC, sends details of an exciting 2881 km/1791 mi tropoducting event between Phil, FR5DN (LG78ps) and Glenn, ZS2GK (KF47kt) on April 13-14. They worked initially on JT65b and then on SSB. Though no contact was made there was some evidence of a continued path via a tropo to meteor scatter link after the pure tropo path disappeared.

Bill, KØAWU (EN37ed) has completed 2 meter WAS after 35 years by working W7OJT in NV on digital EME. Bill had 30 states on tropo, 14 states on meteors and 6 states on WSJT EME. Congratulations.

Aurora. Aurora has returned if only poorly. Associated with a k=7 and an unusually high solar wind of 756 km/s on April 5 the *Daily DX* (**www.dailydx.com**) reports that Joe, W1JR, worked into VE2 via 6 meters AU. Dave, N7DB (CN85) worked CN87 on 6 meters but heard nothing on 2 meters. Likewise on April 12 Jon, NØJK, heard NØUD/B (DM87) on 6 meters but nil on 2 meters.

Spring Sprints. The 144, 222 and 432 MHz Spring Sprints are history with decent activity and, especially for the latter two, poor conditions. This year featured the first use of distance scoring and 6 digit exchanges. And I am here to report that this experiment went extremely well. I originally thought that distance scoring might help those who live in the hinterlands but it wouldn't really change the overall approach to contesting. I now think that its effects could be much more important and provide a stimulus for increased activity. Since almost none of the current contest software outputs distance scoring metrics we will have to wait to see if and how this new approach will affect the results. So far I like what I see. A 500 point Q is always just around the corner.

HERE AND THERE

2010 CQ World Wide VHF Contest. Beginning at 1800Z July 17 and ending at 2100Z July 18 this contest encompasses just 6 and 2 meters. The exchange is four-digit grid squares; 6 meter contacts count 1 point and 2 meter Qs count 2 points. Details and rules can be found in the June issue of *CQ* or at **www.cq-amateur-radio.com**. This contest is built for big E_s openings and when they happen it can be as exciting as any event you ever entered.

Central States VHF Society 2010 Conference. The CSVHFS conference is perhaps the biggest VHF+ meeting of the year. The 44th annual version will be held in Bridgeton, Missouri near St Louis, July 22-24. This year there will be a "Getting Started in VHF & UHF Weak Signal Operations" program as well as a "Rover Row" and the usual preamp and antenna measuring. Dr Sandra Mangus is the Banquet speaker and Bob Heil, K9EID, is the Friday luncheon speaker. Complete details are at **www.csvhfs.org/conference/index.html**.

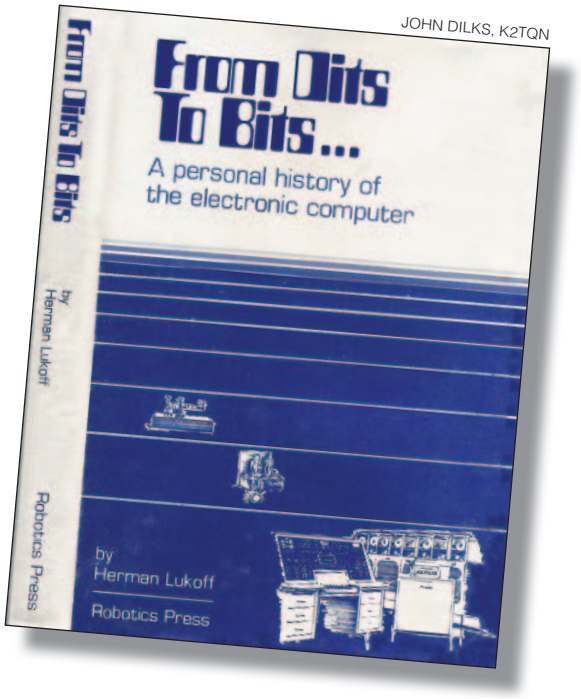
French St Martin DXpedition. Jimmy Treybig, W6JKV, heads to French St Martin (FS) between June 24 and July 4. He has an excellent location and will have his portable 8 element M^2 6M8GJ Yagi with him. QSLs go to his home address. QST

K2TQN

VINTAGE RADIO

From Dits to Bits

JOHN DILKS, K2TQN



In 1975 I was a charter subscriber to *Byte Magazine* and the newsletter that preceded it. Both were edited by Carl Helmers, a young genius from New Hampshire who at one time in his life was a ham. Carl offered a chatty, informative style of writing that made one feel they too could build a computer with minimal directions and some integrated circuits.

During the summer and early fall of 1975 I contacted Carl and asked if he knew where I could go and see any of the few kits that were advertised in *Byte*. (This was way before computer stores.) He mentioned that he knew of one computer store starting in California but nothing else.

I sneaked into the Spring Joint Computer conference in Atlantic City once to see computers, so I asked if any computer shows had computer kits. He responded that none of the new companies could afford to attend the commercial shows of the day. They were just too small. So then I said something that unknowingly would come to consume a huge part of my future, "Someone should put together a small computer show for these new companies and we'd all come to it." Carl offered if he could find someone or a company in Atlantic City to run a computer show, he'd back it in the magazine and help promote it to *Byte's* advertisers.

After calling several "convention" companies listed in the Yellow Pages who showed no interest, I finally contacted a ham friend who owned a hotel on the Boardwalk. Gary Malamut (I've forgotten his call) (SK) set up a meeting with me and offered to host a convention if I held it the weekend before Labor Day, a historically slow weekend for the resort. He only wanted to rent rooms and keep his people busy. We struck a deal. He would help and guide me. I would do all the work. This sounded good to me. (Remember, I figured I would go to the convention, find a computer kit and buy it.) We set the date for August 28-29, 1976.

I quickly realized I needed some help.

In the meantime I joined the Amateur Computer Group of New Jersey (ACGNJ), a computer user group (club) based in Scotch Plains. (Founded in May of 1975, they are the oldest computer club still in operation: **www.acgnj.org**.) Several of my close ham friends joined too: Jim Main, K2PU; Chuck Naylor, K2VRK (SK) and Dave Jones, WA2AML (SK).

So once a month we traveled over 2 hours each way to attend the meetings, which were great. At my first meeting I saw two different computers on display, owned by a couple of club members. I quickly learned of the two, the IMSAI seemed to be the better quality kit. Three of us signed up with another member, Art Fowler, a salesman from an electronics wholesaler who said he was an authorized dealer for IMSAI. To be a dealer back then, one had to commit to purchase three computer kits. So we helped him I'm sure. A couple of months later the kits arrived and we built them. Dave decided to order a South West Technical Products (SWTP-6800) computer kit by mail.

UNIVERSITY OF PENNSYLVANIA ARCHIVES

Herman Lukoff, W3HTF

Since I now had my kit, I no longer needed to have a local convention to see them. But the wheels were already in motion and I continued with the show. Carl Helmers had started to get promises from some of the advertisers in *Byte* that would attend in August. It looked like it was going to fly.

I invented the term "Personal Computing" after a telephone conversation with Carl Helmers. He had mentioned the word "personal" while discussing the pluses of owning our own computer and using them at home for all kinds of uses that we envisioned. The name made sense. I later registered the trademark.

Then in 1976, along with my close friends, our wives and a quite a few other friends, we put together the first national "Personal Computing" show ever held. We called it "PC76" for short. The show was a huge success and I was encouraged to have another, then another, then another....

The second year, 1977, we were fortunate to have Dr John W. Machly as our keynote speaker. Dr Machly was coinventor of ENIAC, the first electronic computer, built at the University of Pennsylvania Moore School of Electrical

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

UNIVERSITY OF PENNSYLVANIA ARCHIVES

Early UNIVAC computer that Herman Lukoff helped develop.

Engineering during World War II. His wife, Kay, one of ENIAC's first programmers, attended with him. Dr Machly continued to attend our shows for several years. Having the honor to introduce him at the banquet was one of the things I'm most proud of.

From Dits to Bits

In 1978 the show was moved to the Philadelphia Civic Center and in October 1979 we hosted a book fair at the show. There I met Shirley Lukoff, W3VNN (SK) and some members of her family. Her husband, Herman Lukoff, W3HTF/W3HT, had recently passed away. She was there to promote his book, *From Dits to Bits*, which was completed just weeks before his passing. Merl Miller, the "Robotics Press" publisher, rushed the printing to get it to our show in time.

From Dits to Bits is the story of Herman Lukoff, a son, husband, father, computer engineer and ham whose work has contributed greatly to the development of electronic computers, and personally to my writing (using my PC) for all my columns, the printing of each *QST* and the myriad of technical devices we own today. Herman was a student at University of Pennsylvania when he started working on ENIAC with Dr Machly and Dr J. Presper Eckert at the Moore School in 1943.

Herman's story starts by telling how he was first interested in electricity, then radio and then after hearing some hams talking on the radio he built, he became a ham. Throughout the book he relates how his ham radio hobby contributed to his career and in the development of electronic computers.

He takes us through the EINAC, UNIVAC, LARC and the Sperry-Rand years of early commercial computer development, its trials and tribulations, in a plain-speaking easy to understand manner. Remember, there were no text books or college courses back then to teach you how to design a computer. Building them was done one circuit, one function, one device at a time, and then tying everything together and making it work. Those were exciting times and his book makes you feel proud as you read it.

It has always been my opinion that this is a "must own" book to be reread every few years. (I just reread mine for the third time and found it just as interesting as the first time I read it in 1979, maybe even more so.)

I'll have more on Herman Lukoff in the future, but in the meantime you might want to locate a copy of his book. Since it appears to be out of print, finding a copy is still possible with a little work. I saw several listed on **www.Amazon.com** and **www.Abebooks.com**. Some were at reasonable prices and some way too expensive. Also some libraries still have copies to lend. It is my hope that with this column, someone will have it reprinted or Google Books will make it available. It is an important book that each student of computers today should read to really appreciate what happened before PCs. For more information, please check my Web page, **www.k2tqn.com**.

— 0111 0011 K2TQN QST

THE INTELLIGENT MACHINES JOURNAL

PC '79 TO FEATURE AN 'ANTIQUE' COMPUTER SHOW

The Personal Computing and Small Business Computer Show, to be held at the Philadelphia Civic Center, October 5-7, will host an 'antique computer' exhibit. Items to be shown will include early analog and digital computers, unusual computing devices, printed circuit boards from the 1940's through the 1970's, antique core memory devices, and many other computer-related items.

On display will be the control console and various other modules of a gigantic IBM 360 computer, which cost over six million dollars when new. Several early minicomputers will also be shown.

Early microcomputers which are no longer being manufactured will be on display, including the "Baby!" computer (the first ready-to-run personal computer, dating from 1976), the Altair 8800 (1975), the Sphere 6800 (1975), and the Mark 8 (1974).

Exhibitors are invited to bring some of their 'antique' personal computing devices to put on display. The show management hopes that this exhibit will be fun for participants, and will contrast nicely with the modern personal and small business systems also on display.

PC '79 will also host the next meeting of the Microcomputer Industry Trade Association. All companies associated with the microcomputer industry are urged to attend. More information can be obtained about MITA by contacting the acting president, Jim Warren, at 345 Swett Rd., Woodside, CA 94062; (415) 851-7075.

In addition to the MITA meeting, there will also be a meeting of people in the software industry. Its purpose is to bring together those who write and market software for the microcomputer industry. Among the topics to be discussed will be copyrighting and protecting software. For more information on the software industry meeting, contact

John Dilks, Personal Computing '79.

News story taken from the *Intelligent Machines Journal* of October 3, 1979 about the PC'79 show. Note that back then I thought about collecting old computers. I have a couple of early PCs still, but I found the rest too large to store at my home. The IBM 360 was loaned by Milt and Jerry Silver of the Selectronics Company in Philadelphia. Selectronics was an early computer/electronics recycler and the IBM 360 came to them from the Philadelphia Navy Yard. It was a popular exhibit.

WB8IMY

ECLECTIC TECHNOLOGY

Sundown for Hard Drives

These Toshiba solid-state storage devices (SSDs) can hold 128 Gbytes of data with no moving parts. The latest breakthrough will bump that capacity to one Terabyte in half the size.

If you ever visit ARRL Headquarters here in Newington, Connecticut, wander by our Information Technology department on the second floor. In the hallway you'll see what appears to be a framed piece of abstract art. It is a large metallic disk etched in concentric circles. But it isn't art — it's a warning.

That disk was once part of an ARRL mainframe computer that failed many years ago. It is a graphic example of what can happen when things go horribly wrong in a hard drive. Framing the wreckage and hanging it on the wall is analogous to the slave who allegedly rode in the chariot with the Roman general during his triumphal procession whispering, "Remember, thou art mortal."

No, this isn't a harangue about the need to back up the data in your station computer. Instead, it is an introduction to an important milepost we're about to pass on the road to revolutionizing computer technology. And like all such computer revolutions, it will eventually impact ham radio.

Recently I attended a public service event where the Amateur Radio team was using the Automatic Packet Reporting System (APRS) to track parade vehicles. The fellow next to me was staring into the screen of a tiny netbook computer that was running his APRS software. I marveled at the fact that it was doing all its data storage in flash memory — no hard drive, no moving parts. This was a glimpse of the future.

Just a couple of months ago I saw an announcement that a team of Japanese researchers from Toshiba and the Keio University in Tokyo have developed a technique that will reduce the size of these solid-state storage devices (SSDs) by 90%, making it possible to hold a *terabyte* of information in a space the size of a half dollar! Not only that, the technology also increases the energy efficiency of the SSDs by 70% and makes them cheaper to manufacture. A prototype of the new SSD consists of one controller chip and 128 NAND flash memory chips. The data transfer speed is said to be 2 GB per second.

According to the announcement, these SSDs are expected to be available within two years. When they arrive, they'll turn little netbooks into true powerhouses of computing ability. So long, electro-mechanical hard drives! (And good riddance.) For hams who take computers into the field for public service or portable operation in general, this day couldn't arrive fast enough. Now your computer will be able to take just as much physical abuse as your transceiver, if not more.

Super quiet S-Flex fans from Scythe.

A Reason to Upgrade to *Windows 7*?

As long as we're talking about computer hard drives, it appears that there may be another compelling reason for *Windows XP* users like me to upgrade to *Windows 7*.

Throughout this year and into 2011, hard drive makers will expand drive sector sizes from 512 bytes to a new industry standard of 4 kilobytes. Because *XP* was coded in a time before this standard switch was under consideration, the *Windows* OS could see compatibility problems at worst, and speed drops at a minimum. Some advanced drives will be able to emulate the older sector sizes for compatibility, but still, those building their own computers or trading up on hard drives may see notable performance problems.

Quieting PC Fans

I was chatting with a fellow on 20 meter SSB recently and I commented that I could hear his amplifier fans in the background. The only problem was that he didn't own an amp!

"That's my noisy station computer," he replied. "I have a cramped station setup and the computer is on the desktop near the microphone."

Now *that's* one noisy PC! My station computer isn't that bad, but I often find the fan noise annoying nonetheless. Inside an average PC there are four to six 80 mm fans buzzing away as they disperse the heat generated by all the internal components. Mine not only buzz, they occasionally do it in a strange, sing-song harmony.

I'm envious of those who own whisper-quiet station PCs. For the rest of us, the fix is to replace those small, noisy blowers with larger, quieter ones. I tried an experiment by swapping out my worst offending fans with a few 120-mm S-Flex fans from Scythe (**www.scythe-usa.com**). Not only are these fans larger and slower, but they are built with fluid-dynamic bearings for a smoother spin, which brings the decibel rating of each down significantly. Thirty minutes of work went a long way toward muzzling my station "beast."

By the way, if possible, it's always a good idea to power your fans off the motherboard "system fan" plugs, rather than directly off the power supply. By supplying juice from the motherboard, the computer can control the speed of the fans based on its own temperature measurements, instead of simply running them at maximum RPM constantly. QST

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

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Jun 19-Jun 20, 1500Z-2200Z daily, WØH. Beatrice, NE. Lincoln Amateur Radio Club/National Park Service. Homestead Days. 14.045 7.045. QSL. Lincoln Amateur Radio Club, PO Box 5006, Lincoln, NE 68505. *Operating from two locations: the Homestead National Monument and Chautauqua*. **lonnierech@windstream.net**

Jun 20-Jun 26, 2000Z-2400Z, W1W. South Wellfleet, MA. W1ATV and KE1AV. Six Meter FN51 Activator Special Event Station. 50.170. QSL. Walter Yatzook, 77 Baker Ave, South Meriden, CT 06451. **www.qrz.com/db/w1w**

June 25-27, 0800Z-1800Z, K7C. Hardin, MT. Yellowstone Radio Club. Custer's Last Stand. 20 40 80 160 m. Certificate and QSL. Yellowstone Radio Club, Robert Port, KE7KPB, 576 Declaration Ave, Billings, MT 59105. **www.k7efa.net**

Jun 26, 1400Z-1800Z, AC5DI. Grapeland, TX. Grapeland Ham Group. Grapeland Watermelon Festival. 144.200 28.400 50.125 7.250. Certificate. Jack Coleman, AC5DI, 219 E Plum St, Grapeland, TX 75844. **watermelonqso@gmail.com**

Jun 26-Jun 27, 1030Z-1800Z, WP4CRG. Lares, PR. Caribbean Amateur Radio Group, Field Day 2010. 14.070 PSK31 28.400 SSB 7.080 SSB 144.300 SSB. QSL. Serafin Martinez, Coordinator, HC 4 Box 43014, Hatillo, PR 00659.

Jun 26-Jun 27, 1800Z-2100Z, K8BLP. East Liverpool, OH. Triangle Amateur Radio Club. Field Day 2010. 80 40 20 15 m. QSL. K8BLP, 626 15th St, Wellsville, OH 43968.

Jul 1-Jul 4, 2359Z-2359Z, TC2Ø1ØDHO. Istanbul, Republic of Turkey. TCSWAT. Cabotage. All Bands. Certificate. TCSWAT/Op A. K. Tevfik, TA1HZ, PO Box 73 Karakoy, Istanbul 34421, Republic of Turkey. *Contacts can be used for Istanbul 2010 European Capital of Culture Award*. **www.ta0u.com/2010/eng/pdf/TC2010DHO.PDF**

Jul 1-Jul 5, 0900Z-0000Z, KU2US. Conesus, NY. The US 13 Original Colonies Group. Second Annual 4th of July Week, The Original 13 Colonies, 2010. 14.213 *All bands except WARC and 60 m*. Certificate. Ken Villone, KU2US Awards Manager, PO Box 185, Conesus, NY 14435. **www.qrz.com/db/ku2us**

Jul 2-Jul 11, 0000Z-2359Z, W5E. Oklahoma City, OK. OKC DX Club. Sporadic E Special Event. 50.150 28.425 6 and 10 m SSB only. QSL. OKC DX Club, 3217 NW 69th St, Oklahoma City, OK 73116.

Jul 3, 0800Z-1900Z, N8R. Zanesville, OH. Muskingum Valley Council. Adventures in Reading.14.290 7.270. QSL. Matt Murphy c/o Muskingum Valley Council, BSA, 734 Moorehead Ave, Zanesville, OH 43701. **kc8bew@gmail.com**

Jul 3, 1230Z-1900Z, K4S. Ashland, KY. River Cities Amateur Radio Association. Summer Motion Arts and Crafts Festival in Central Park. 28.400 14.240 7.250. Certificate. RCARA, Attn: Vernon KA4OIL, PO Box 612, Ashland, KY 41105. **www.qsl.net/kg4dve** *or* **www.summermotion.com**

Jul 3, 1400Z-2200Z, K4F. Smithville, TN. DeKalb County Amateur Radio Club. 39th Annual Smithville Fiddlers' Jamboree & Crafts Festival. 28.425 21.335 14.280 7.275. QSL. Wm Freddy Curtis, KC4GUG, 288 Dogwood Cir, Smithville, TN 37166-2712. **www.dcarc.drivehq.com**

Jul 3-Jul 5, 1500Z-0100Z, W9AWE. Camp Point, IL. Western Illinois Amateur Radio Club. Town celebrates 155 years and radio club's 70th year. 28.350 21.350 14.250 7.250. QSL. WIARC — QSL, PO Box 3132, Quincy, IL 62305. **www.w9awe.org**

Jul 4, 1600Z-2300Z, W7PX. Missoula, MT. Hellgate Amateur Radio Club. Independence Day at Fort Missoula. 21.310 14.260 14.071 14.030. QSL. HARC, PO Box 3811, Missoula, MT 59806. **www.w7px.org**

Jul 4-Jul 5, 2000Z-0400Z, K6ORI. Orinda, CA. Orinda Radio Interest Group. 25th Anniversary of the Incorporation of the City of Orinda. 147.540 28.410 7.270 3.960. QSL. Orinda Radio Interest Group, PO Box 617, Orinda, CA 94563-0572. **www.k6ori.com**

Jul 5-Jul 10, 1500Z-1500Z, W3P. Philipsburg, PA. Philipsburg Amateur Radio Association. Philipsburg 2010 Heritage Days Special Event. 146.520 14.248 10.117 7.027. QSL. David Runk, 887 Decatur St, Philipsburg, PA 16866-8335. **aa3ej@live.com** *or* **www.philipsburg-ara.org**

Jul 6-Jul 11, 1800Z-2000Z, NU5DE. Austin, TX. Naturist Amateur Radio Club. Nude Awareness Celebration/Nude Recreation Week. 28.465 21.365 14.265 7.265. Certificate. Naturist Amateur Radio Club, PO Box 200812, Austin, TX 78720. **www.nu5de.org**

Jul 8-Jul 10, 2359Z-2359Z, TC2Ø1ØVS. Istanbul, Republic of Turkey. TCSWAT. ISAF Youth Sailing World Championship. All Bands. Certificate. TCSWAT/Op. A. K. Tevfik, TA1HZ, PO Box 73 Karakoy, Istanbul 34421, Republic of Turkey. Contacts can be used for ISAF Youth Sailing World Championship Istanbul 2010 Award. **www.ta0u.com/2010/eng/pdf/TC2010VS.PDF**

Jul 10, 1700Z-2200Z, WD2K. Philmont, NY. Rip Van Winkle Amateur Radio Society. Philmont NY Community Day. 28.350 21.350 14.235 7.235. QSL. Rip Van Winkle ARS, PO Box 153, Ghent, NY 12075. **www.rvwars.com**

Jul 10-Jul 11, 1200Z-1200Z, W2GSB. Southold, NY. Great South Bay Amateur Radio Club. Custer Institute Special Event Station. 14.225 7.175 3.850 14.070 PSK. QSL. W2GSB Custer, PO Box 1356, Babylon, NY 11704. **www.gsbarc.org**

Jul 10-Jul 11, 1400Z-2100Z daily, W8MRM. Trenton, MI. Motor City Radio Club. Trenton Mid-Summer Festival. 14.240 14.040 7.240 7.040. Certificate. Motor City Radio Club, PO Box 337, Wyandotte, MI 48192-0337. **w8m4m.org**

Jul 10-Jul 11, 1600Z-1600Z, K4H. Hancock County, TN. Hancock/Hawkins County Amateur Radio Emergency Service. 1st Annual County Hunter Day; Rare Hancock County TN Field Exercise!18.150 14.250 7.220 3.850. Certificate and QSL. Kevin Evans, KJ4HKE, 248 Browns Mountain Rd, Greeneville, TN 37745.

Jul 12-Jul 17, 1200Z-1200Z, GB1SKT. South Knighton, DE, Great Britain. RSGB. South Knighton Shutter Telegraph. 14.180. QSL. John Wakefield, Oakhurst, Lower Common Rd, West Wellow, Romsey, UK SO51 6BT, Great Britain. **www.qrz.com/db/gb1skt**

Jul 17, 0930Z-1530Z, W3ACH. Chambersburg, PA. Cumberland Valley Amateur Radio Club. Chamberfest. 147.120 14.260 7.260. Certificate. Chambersfest-Cumberland Valley Amateur Radio Club, PO Box 121, Chambersburg, PA 17201. **www.w3ach.org**

Jul 17, 1400Z-1900Z, NC4MC. Candor/Troy, NC. Montgomery Amateur Radio Society. Annual Candor NC Peach Festival. 14.250 7.250 147.090 442.20. QSL. Donald Grady, 120 Woodline Dr, MARS QSL REQ, Troy, NC 27371.

Jul 17, 1500Z-2100Z, K8V. Defiance, OH. Defiance County Amateur Radio Club. Berry Observatory On The Air. 14.235 7.250 3.875 28.400 D-Star: Reflector 12C. Certificate. K8V, 1778 Maumee Dr, Defiance, OH 43512. Electronic certificate via email **k8von@live.com** (include contact info). **k8von.webs.com**

Jul 17-Jul 18, 1600Z-2200Z, WØNOZ. DeSmet, SD. Huron Amateur Radio Association. Laura Ingalls Wilder Pageant. 14.265 7.265. Certificate and QSL. Huron Amateur Radio Association, PO Box 205, Huron, SD 57350. $2 with QSO info; we'll supply envelope and postage. **huronarc.info**

Jul 17-Jul 18, 1300Z-2300Z, WØWIT. Forest City, IA. WIT Radio (WITCARS). 14.263 7.253 3.970 147.27. 2010 Winnebago-Itasca Travelers Club Grand National Rally. QSL. Frank Krizan, 1005 Talley Rd, Garland, TX 75044. **www.orgsites.com/ia/witcars**

Jul 17-Jul 18, 1400Z-2000Z, K3MJW/50. New Kensington, PA. Skyview Radio Society. 50th Anniversary of Skyview Radio Society. 21.264 14.264 14.045 7.264. QSL. Skyview Radio Society, 2335 Turkey Ridge Rd, New Kensington, PA 15068. **www.skyviewradio.net**

Jul 17-Jul 18, 1700Z-0500Z, W5O. Coldwater, MI. Branch County Amateur Radio Club. BCARC 50th Anniversary. 147.55 21.325 14.250 7.225 3.850, 28.325 if conditions permit. Certificate. Arnie Hayward, NS8T, 242 Marshall St, Coldwater, MI 49036. **www.branchcountyarc.com**. $2, send no postage or envelope.

Jul 17-Jul 19, 1500Z-0100Z, W9AWE. Golden, IL. Western Illinois Amateur Radio Club. Celebrate the vintage years near the windmill built in 1872. 28.350 14.250 7.250 3.885 AM. QSL. WIARC-QSL, PO Box 3132, Quincy, IL 62305. **www.w9awe.org**

Jul 22-Jul 25, 1400Z-2100Z, W3C. Cambridge, MD. Easton Amateur Radio Society. 100 years of power boat racing in Cambridge, MD. 28.350 21.250 14.250 7.200. QSL. EARS, PO Box 311, Easton, MD 21601. **k3emd.com**

Jul 24-Jul 25, 0800Z-1200Z, N8B. North Bass Island (Lake Erie), OH. Massillon Amateur Radio Club. North Bass Island OH006. 14.050 14.040 7.250 7.025. Certificate. Tom Phelps, 235 Leonard Ave NW, Massillon, OH 44646. Massillon Amateur Radio Club members will qualify the Island (US Islands OH006). **www.north-bass-island.com**

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

Jul 24-Jul 25, 1400Z-0100Z, K9G. Mitchell, IN. Hoosier Hills Ham Club. Mercury 7 Suborbital Flight of Virgil "Gus" Grissom. 14.270 7.200 3.900 146.730. Certificate. Ray W. Robison, 1608 H St, Bedford, IN 47421. **rwr@kiva.net**

Jul 24-Jul 25, 2359Z-2359Z, TC150SLH. Istanbul, Republic of Turkey. TCSWAT. The 150th Anniversary of Sile Lighthouse. All Bands. Certificate. TCSWAT/Op. A. K. Tevfik, TA1HZ, PO Box 73 Karakoy, Istanbul 34421, Republic of Turkey. Contacts can be used for the TC150SLH Award. **www.ta0u.com/2010/eng/PDF/TC150SLH.PDF**

Jul 24-Jul 26, 0000Z-0000Z, W9IMS. Indianapolis, IN. Indianapolis Motor Speedway Amateur Radio Club. Brickyard 400. 21.340 14.240 7.240 3.840. QSL and certificate. Indianapolis Motor Speedway ARC, PO Box 18495, Indianapolis, IN 46218-0495. **www.w9ims.org**

Jul 28-Aug 1, 1300Z-2100Z, W9ZL. Oshkosh, WI. Fox Cities Amateur Radio Club Inc. EAA Aiventure 2010 — World's Largest Airshow & Fly-in. 14.250 7.270 52.550 FM 146.520. Certificate. FCARC Airventure 2010, PO Box 2346, Appleton, WI 54912. **www.fcarc.us**

Jul 29-Aug 4, 1800Z-1800Z, W9AWE. Mendon, IL. Western Illinois Amateur Radio Club. Adams County Fair. 14.250 7.250. QSL. Western Illinois Amateur Radio Club — QSL, PO Box 3132, Quincy, IL 62305. **www.w9awe.org**

Jul 30-Jul 31, 2359Z-2359Z, TC2Ø1ØIIM. Istanbul, Republic of Turkey. TCSWAT. Island Museum. All Bands. Certificate. TCSWAT/Op. A. K. Tevfik, TA1HZ, PO Box 73 Karakoy, Istanbul 34421, Republic of Turkey. Contacts can be used toward the Istanbul 2010 European Capitol of Culture Award. **www.ta0u.com/2010/eng/pdf/TC2010IIM.PDF**

Jul 31, 1300Z-1900Z, K3SMT. Stoystown, PA. Somerset County Amateur Radio Club. Stoystown Lions 10th Antique Tractor Festival. 7.215 14.215. Certificate. Somerset County ARC K3SMT, Tractor QSL, PO Box 1241, Somerset, PA 15501. **www.k3smt.org**

Jul 31, 1400Z-2100Z, W9A. Berne, IN. Adams County Amateur Radio Club. Annual Swiss Days. 14.270 7.270. QSL. Adams County Amateur Radio Club, c/o 3496 E 900 S, Geneva, IN 46740. **wb9kqo.com**

Jul 31-Aug 1, 1400Z-2200Z, K4CG. Alexandria, VA. Mount Vernon Amateur Radio Club. The 220th Birthday of the US Coast Guard. 14.250 10.110 7.270. QSL. US Coast Guard TISCOM, 7323 Telegraph Rd, Alexandria, VA 22315. **k4us@mvarc.com** or **www.mvarc.com**

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9 ×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information. *Note: Some clubs may ask for a nominal fee to cover the cost of the certificate or QSL. Request will be made on air during the event or on the club's Web site.

Special Events Announcements: For items to be listed in this column, use the ARRL Special Events Listing Form, at **www.arrl.org/special-events**. A plain text version of the form is also available at that site. You can also request a copy by e-mail or send a self-addressed, stamped envelope (SASE) (Special Requests, ARRL, 225 Main St, Newington, CT 06111; write "Special Events Form" in the lower left-hand corner.) Off-line completed forms can be mailed, faxed (Attn: Special Events) or e-mailed.

Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; a special event listing for **Sep** *QST* would have to be received by **Jul 1**. In addition to being listed in *QST*, your event will be listed on the *ARRLWeb* Special Events page. Note: All received events are acknowledged. If you do not receive an acknowledgment within a few days, please contact us.

Special Events listed in this issue include current events received through May 13. You can view all received Special Events at **www.arrl.org/special-events**.

Strays

THE ANNUAL GOLDEN PACKET EVENT

◊For decades, packet radio has not fit well within the Field Day rules. So, in 2009 we launched an annual APRS field day with its own rules called the Golden Packet event. The name is from the original 1980s award for the first cross-country packet. Demonstrating long-haul packet capability without the Internet, the first 2009 event targeted the 2000 mile length of the Appalachian Trail from Georgia to Maine with just fourteen 100 mile or so links.

On July 25, 2010, we hope to extend this event nationally to other parts of the 50,000 miles of long linear national trails such as the mountains of the Pacific Crest Trail or the Continental Divide Trail and others. Check the Web page for planning in your area.[1]

For maximum range, the best height above average terrain is usually a zigzag across valleys rather than straight along the ridges (see green line on the map). The *path* tool on Google Earth is a great way to plan your event and see the RF paths and ground clearance. A station is simply an APRS digipeating radio and an APRS handheld transceiver for backup messaging.

The 2009 event was a blast. Hams set up on mountain tops from Alabama to Maine. The southern states were linked, but a Virginia mountain was not manned due to rain. West Virginia through New York were in contact even without a critical New York site. Stations on Mount Greylock and Mount Washington in New England were manned but isolated because neighboring links had issues and there was no team that took on the final position on Mount Katahdin in Maine. The packets worked, APRS messaging worked, the voice communications worked and EchoLink worked for coordination. Everyone can't wait to try again on July 25, 2010.

RORIE SHAFFER, KC2UML

The Golden Packet assault team on Governor Dick Hill in central Pennsylvania (from left: Bob Bruninga, WB4APR; AJ Bruninga, WA4APR, and Bethanne Bruninga, WE4APR; with KC2UML behind camera).

Until then, you can get a taste for APRS in your area live. Just enter your city name into any of the APRS Internet sites.[2,3] — *Bob Bruninga, WB4APR*, **wb4apr@arrl.net**

[1]Golden Packet page: **aprs.org/at-golden-packet.html**

[2]APRS Internet viewer: **aprs.fi**
[3]OpenAPRS viewer: **openaprs.net**

AT THE FOUNDATION

The ARRL Foundation Scholarship Program Goes Electronic!

In early May the ARRL Foundation awarded 65 scholarships valued at $71,250. Even as letters were mailed to the winners, changes to the application process were already underway. Beginning in October 2010 all applications will be submitted electronically through the ARRL Web site.

Descriptions of all of the available scholarship awards along with application forms and instructions can be found only on the Web at **www.arrl.org/scholarship-program**. Students should complete and submit the application form on the Web at **www.arrl.org/scholarship-application**. High school or college transcripts are required for all applications and must be submitted to the Foundation electronically to **foundation@arrl.org**. Likewise, any letters of recommendation should be sent to the same e-mail address. All documents must be marked with the applicant's Amateur Radio call sign.

High School seniors applying for the William R. Goldfarb Memorial Scholarship are required to complete a separate scholarship form and submit both a complete transcript and a Free Application for Federal Student Aid (FAFSA) or SAR based on the family's most recent available Federal Tax filing.

Clubs and individuals are encouraged to share information about the ARRL Foundation Scholarships in their area.

The application period opens October 1, 2010 and closes promptly on February 1, 2011. Winners are notified by mail by mid-May 2011 and the complete list of awards is posted on the Web at **www.arrl.org/annual-scholarship-winners**.

Questions about the ARRL Foundation Scholarship Program can be sent via e-mail to **foundation@arrl.org**.

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

CONVENTION AND HAMFEST CALENDAR

Abbreviations
Spr = Sponsor
TI = Talk-in frequency
Adm = Admission

Alabama (Cullman) — Jul 24
D F H R S T V

8 AM-3 PM. *Spr:* Cullman ARC. Cullman County Fairgrounds, Sportsman's Lake Rd. *TI:* 145.31 (100 Hz). *Adm:* $5 per car; $2 each for walk-ins. Tables: $10. Charles McBrayer, WB4PED, 614 6th Ave SE, Cullman, AL 35055; 256-708-1000; fax 256-775-0312; **cmcbrayer@corrwireless.com**; **www.qsl.net/cullmanarc**.

Arizona State Convention
July 16-17, Williams
D F H R S T V

The Arizona State Convention, sponsored by the Amateur Radio Council of Arizona, will be held at the Williams Rodeo Grounds, 800 Rodeo Rd. Doors are open for setup on Thursday (Jul 15) at 5 PM; public Friday and Saturday dawn-dusk (grounds), 9 AM-5 PM (hall). Features include meetings, seminars, commercial vendors, huge swap, VE sessions, Barbeque dinner (Saturday, 6:30 PM), on-site dry camping ($20 per space), Grand Canyon Train Trip (Sunday, Jul 18). Talk-in on 146.78 (91.5 Hz). Admission is free. Contact Lee Ilse, KD7OED, 3785 E Mohawk Dr, Sierra Vista, AZ 85650; 520-236-1237 or 602-881-2722; **kd7oed@arrl.net**; **www.arca-az.org/main/july_hamfest.html**.

California (Santa Maria) — Jun 19
F H R T

8 AM-3 PM. *Spr:* Satellite ARC. Elks Lodge 1538, 1309 N Bradley Rd. *TI:* 145.36 (131.8 Hz). *Adm:* Free. Tables: $15 (includes parking space). John Portune, W6NBC, 1095 W McCoy Ln, Space 99, Santa Maria, CA 93455; 805-348-1641; **jportune@aol.com**; **www.satellitearc.com**.

Coming ARRL Conventions

July 3
Eastern Pennsylvania Section, Marysville*

June 17-20
YLISSB, Columbia, SC*

August 13-14
New Mexico State, Albuquerque

August 15
Kansas State, Salina

August 21
West Virginia State, Weston

August 21-22
Southeastern Division, Huntsville, AL

August 22
Western Pennsylvania Section, New Kensington

August 27-29
New England Division, Boxborough, MA

September 10-11
W9DXCC, Elk Grove Village, IL

*See June *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

Colorado (Monument) — Jul 17
D F H Q S V
Set up 6 AM; public 8 AM-1 PM. *Spr:* Pikes Peak RAA. Lewis-Palmer High School, 1300 Higby Rd. *TI:* 146.97 (100 Hz). *Adm:* $5. Tables: advance $12, door $17. Dan Scott, WØRO, 1644 Gold Camp Rd, Colorado Springs, CO 80906; 719-635-0871; fax 719-375-1114; **w0ro@arrl.net**; **www.ppraa.org**.

Connecticut (North Haven) — Jul 24
D F H R T
Set up 6 AM; public 8 AM. *Spr:* B&B Hamsters. Holiday Inn, 201 Washington Ave. Yankee Peddler Hamfest. *TI:* 147.36. *Adm:* $7. Tables: $15 (6-ft). John Bee, N1GNV, 30 Tremont St, Meriden, CT 06450; 203-440-4468; **jbee@qsradio.com**; **www.yankeehamfest.com**.

Florida (Milton) — Jul 23-24 D F H R S T V
Friday 5-9 PM; Saturday 8 AM-2 PM. *Spr:* Milton ARC. Santa Rosa County Auditorium, 4530 Spikes Way. 15th Annual Hamfest. *TI:* 145.49 (100 Hz). *Adm:* $4. Tables: $8. Robert Perry, KAØAGC, 6646 Elm St, Milton, FL 32570; 850-390-1665 (phone and fax); **ka0agc@bellsouth.net**; **www.miltonarc.org**.

Georgia (Ellijay) — Jul 31 D F H R S T V
7 AM-2 PM. *Spr:* Ellijay ARS. Ellijay Lions Club and Fairgrounds, 1729 S Main St. *TI:* 145.17 (100 Hz). *Adm:* $5. Tables: $2. David Barlitt, KF4AWU, 50 Jones Rd, Ellijay, GA 30536; 706-273-6830; **kf4awu@ellijay.com**; **www.ngamtn.com/w4hhh/**.

Illinois (Aurora) — Jul 11 D F H R T V
8 AM-2 PM. *Spr:* Fox River Radio League. Aurora Central Catholic High School, 1225 N Edgelawn Ave. Special Event Station. *TI:* 147.21 (103.5 Hz). *Adm:* advance $6, door $8. Tables: $10. Dean Holste, KC9EOQ, Box 673, Batavia, IL 60510; 630-966-8521; **kc9eoq@arrl.net**; **www.frrl.org/hamfest**.

Illinois (Peotone) — Jul 18 D F H Q R S T V
8 AM-2 PM. *Spr:* Kankakee Area Radio Society. Will County Fairgrounds, Wilmington/Peotone Rd. 27th Annual Hamfest. *TI:* 146.94 (107.2 Hz). *Adm:* advance $6, door $8. Tables: $10. Carl Schroeder, K9CS, 1505 N 2000 East Rd, Watseka, IL 60970; 815-473-4263; **karsfest@live.com**; **www.w9az.com**.

Illinois (Quincy) — Aug 7 D F H Q R T V
8 AM-2 PM. *Spr:* Western Illinois ARC. Eagles Alps, 3737 N 5th St. *TI:* 147.03 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $10. Todd Clevenger, AB9QW, Box 245, Camp Point, IL 62320; 217-593-7490; fax 217-223-1546; **toddc@psba.com**; **www.w9awe.org/Events.html**.

Iowa (Cedar Rapids) — Aug 1
D F H Q R S T V
8 AM-1 PM. *Spr:* Cedar Valley ARC. Teamsters Hall, 5000 J St SW. *TI:* 146.745, 146.52. *Adm:* $5. Tables: $10. Rick Olney, NØXZL, 1574 W Mt Vernon Rd, Mt Vernon, IA 52314; 319-396-8979; **rolney@qwest.net**; **cvarc.rf.org**.

Louisiana (Slidell) — Jul 17 D F H Q R S V
8 AM-2:30 PM. *Spr:* Ozone ARC. John Slidell Park Gymnasium, 105 Robert Blvd. *TI:* 147.27 (114.8 Hz). *Adm:* $5. Tables: $7. Ron Riviere, WB5CXJ, Box 3087, Slidell, LA 70459; 985-640-5858; **wb5cxj@yahoo.com**; **www.w5sla.net**.

Maine (Thomaston) — Jul 24 D F H R T V
8 AM-noon. *Spr:* Pen Bay ARC. Thomaston American Legion Post, 65 Starr St. 26th Annual Hamfest. *TI:* 145.49 (91.5 Hz). *Adm:* $5. Tables: $5. Norman Smith, NY1B, Box 166, Friendship, ME 04857; 207-354-6853; **ny1b@toast.net**; **penbayarc.org**.

Maryland (West Friendship) — Jul 18
F H Q R T V
6 AM-3 PM. *Spr:* Baltimore RA Television Society. Howard County Fairgrounds, Rte 144. Hamfest/Computerfest. *TI:* 147.03, 224.96, 448.325. *Adm:* $6. Tables: $35. Ed Rosen, N3GXH, c/o BRATS, Box 5915, Baltimore, MD 21282; 410-461-1212 (phone and fax); **hamfest@bratsatv.org**; **www.bratsatv.org**.

Massachusetts (Cambridge) — Jul 18. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); **w1gsl@mit.edu**; **www.swapfest.us**.

Michigan (Escanaba) — Aug 7 D F H R S
9 AM-2 PM. *Spr:* Delta County ARS. Bay de Noc Community College, 2001 N Lincoln Rd. *TI:* 147.15 (100 Hz). *Adm:* $5. Tables: First table is free, $5 for each additional. John Anderson, WD8RTH, Box 295, Wells, MI 49829-0295; 906-789-9148; **wd8rth@dcars.org**; **www.dcars.org/hamfest**.

Minnesota (Brainerd) — Jul 24 D H R V
9 AM-1 PM. *Spr:* Brainerd Area ARC. National Guard Armory, 1115 Wright St. 10th Annual Hamfest. *TI:* 147.225. *Adm:* $5. Tables: $10. Al Doree, WØRC, 33247 E Shamineau Dr, Motley, MN 56466; 218-575-2404; **doreeaj@brainerd.net**; **www.brainerdham.org**.

Minnesota (St Paul) — Jul 24 F
8 AM-noon. *Spr:* Magic Repeater Group. Art's (KAØJLB) Yard, 37 Hatch Ave. Yard Sale. *TI:* 145.17. *Adm:* Free. Tables: Free. George Lavallee, NØSBU, 5578 141st St N, Hugo, MN 55038; 651-429-5948; **n0sbu@arrl.net**; **www.magicrepeater.net**.

Central States VHF Society Conference
July 23-25, St Louis, MO
D F H Q R S
The Central States VHF Society Conference (44th Annual Conference), sponsored by the Central States VHF Society, will be held at the DoubleTree Hotel St Louis at Westport, 1973 Craigshire Rd. Doors are open Friday 7:30 AM-Sunday 10 AM. Features include Thursday night Social/River Boat Dinner Cruise (Jul 22), technical presentations, antenna range, noise figure testing/pre-amp workshop, Getting Started in VHF/UHF Weak Signal Operations Program, Rover Row/Dish Bowl, poster sessions/table-top displays, dealer/vendor area, flea market, Friday and Saturday morning breakfast buffet, Friday luncheon, Saturday eve banquet, hospitality suite. Talk-in on 144.2. Registration is available online. Contact Ron Ochu, KOØZ, 5 Cricklewood Ln, St Peters, MO 63376; 636-397-2510; **ko0z@arrl.net**; **www.csvhfs.org**.

Missouri (Warrensburg) — Jul 17 D H R S V
8 AM-1 PM. *Spr:* Warrensburg Area ARC. Johnson County Fairgrounds, E State Hwy 50. *TI:* 146.88 (107.2 Hz). *Adm:* $5. Tables: $10. Keith Raihala, NØVJ, 457 NW 501st Rd, Warrensburg, MO 64093; 660-864-1911; **n0vj@arrl.net**; **waarci.org**.

Missouri (Washington) — Jul 18
D F H R T V
6 AM-1 PM. *Spr:* Zero Beaters ARC. Bernie E Hillerman Park, Grand Ave. 48th Annual Hamfest. *TI:* 147.24 (141.3 Hz). *Adm:* Free. Tables: $10-$25 (outdoor covered pavilion). Craig Brune, NØMFD, Box 1305, Washington, MO 63090; 636-221-1101; fax 636-239-0060; **n0mfd@arrl.net**; **www.zerobeaters.org/hamfest.pdf**.

Montana State Convention
July 16-18, Essex
D F H Q R S T V
The Montana State Convention (76th Annual Glacier-Waterton International Peace Park Hamfest), sponsored by the Great Falls Area ARC, will be held at the Glacier Meadow RV Park, US Hwy 2 (Mile Marker 191). Doors are open sunup-sundown. Features include vendors; dealer displays; tailgating; transmitter hunts; lots of seminars (QRP, APRS, ATV, Repeater Linking, DXCC); meetings (QCWA, annual hamfest, ARES, ARRL, RAC); high speed CW contest; old equipment and Beer Bottle auctions; DXCC, VUCC, and WAS field card checking; VE sessions; camping; Saturday eve potluck and barbeque dinner. Talk-in on 146.52. Admission is $23 in advance, $28 at the door. Tables are $5. Contact George Forsyth, AA7GS, Box 1763, Great Falls, MT 59403; 406-868-2212; fax 406-453-8661; **aa7gs@arrl.net**; **gwhamfest.org**.

Nebraska (North Bend) — Jul 17 D F H R
9 AM-12:30 PM. *Spr:* Pioneer ARC. St Charles Parish Center, 8th and Locust Sts. 13th Annual Flea Market. *TI:* 146.67. *Adm:* $2. Tables: $5. Rich Mehaffey, KBØARZ, 230 W 11th St, North Bend, NE 68649; 402-652-3410; fax 402-352-8713; **4randjme@futuretk.com**; **www.k0jfn.com**.

New Jersey (Augusta) — Jul 11
D F H Q R T
8 AM. *Spr:* Sussex County ARC. Sussex County Fairgrounds, 37 Plains Rd. *TI:* 147.3 (151.4 Hz). *Adm:* $7. Tables: $20. Dan Carter, N2ERH, 8 Carter Ln, Branchville, NJ 07826; 973-948-6999 (phone and fax); **hamfest@scarcnj.org**; **scarcnj.org**.

New Jersey (Toms River) — Aug 8
D F H R T V
6 AM-1 PM. *Spr:* Jersey Shore ARS. Riverwood Park, Riverwood Rd. *TI:* 146.91 (127.3 Hz). *Adm:* $5. Tables: $15. Don McGlaughlin, K2HCW, Box 811, Ocean Gate, NJ 08740; 732-237-9448; **k2hcw@comcast.net**; **jsars.org**.

New York (Alexander) — Jul 24 D F H R T V
7 AM-3 PM. *Spr:* Genesee Radio Amateurs. Alexander Volunteer Fire Department Grounds, 10708 Rte 98. 30th Batavia Hamfest. *TI:* 146.52. *Adm:* $5, under 12 free. Harold Hay, W2ABQ, c/o Genesee Radio Amateurs, Box 572, Batavia, NY 14021; 585-343-2844; **abqhay@rochester.rr.com**; **sites.google.com/site/gramradioamateursinc/Home**.

New York (Frankfort) — Jul 17 D F H R T V
8 AM-2 PM. *Spr:* Utica ARC. Herkimer County Fairgrounds, Cemetery St. RadioComm 2010. *TI:* 146.76. *Adm:* $5. Tables: $2. Marty Benedict, W2MVB, 315 Marion St, Herkimer, NY 13350; 315-866-5924 (phone and fax); **w2mvb@arrl.net**; **www.uticaarc.org**.

New York (Trumansburg) — Aug 7
D F H Q R S T V
7 AM-1 PM. *Spr:* Tompkins County ARC. Trumansburg Fairgrounds, NYS Rte 96. Contests. *TI:* 146.97 (103.5 Hz). *Adm:* $5. Tables: $2.50. Kevin Romer, KC2MLC, 6462 SR 227, Trumansburg, NY 14886; 607-387-3379; fax 607-387-5631; **kc2mlc@arrl.net**; **www.tcarc-ny.org/hamfest**.

North Carolina (Cary) — Jul 17 F H R T V
8 AM-1:30 PM. *Spr:* Cary ARC. Ritter Park, 301 W Lochmere Dr. 38th Annual Swapfest. *TI:* 146.88. *Adm:* $4. Tables: $10. Herb Lacey, W3HL, 1022 Medlin Dr, Cary, NC 27511; 919-467-9608; **w3hl@arrl.net**; **www.qsl.net/n4nc**.

North Carolina (Fayetteville) — Aug 7
D F H R T V
8 AM-noon. *Sprs:* Cape Fear ARS and Methodist University. Methodist University (Reeves Auditorium), 5400 Ramsey St. 12th Annual Swapfest. *TI:* 146.91 (100 Hz). *Adm:* Free. Tables: Free. David Cowart, KR4OE,

637 E Raynor Dr, Fayetteville, NC 28311; 910-624-1394; **kr4oe@nc.rr.com**.

North Carolina (Waynesville) — Jul 24
D F H Q R S T V

8 AM-4 PM. *Spr:* Western Carolina ARS. Haywood County Fairgrounds, 758 Crabtree Rd (NC Rte 209). 35th Annual Hamfest. *TI:* 147.39 (94.8 Hz). *Adm:* advance $5, door $6. Tables: $10. Randy Harris, KI4VLW, 7 W Maple Dr, Asheville, NC 28805; 828-298-6685; **rtsp71@aol.com**; **www.wcars.org/hamfest.html**.

North Dakota (International Peace Garden) — Jul 9-11
H R T V

Friday 6 PM-Sunday noon. *Sprs:* North Dakota and Manitoba ARCs. CCC Lodge and Campgrounds, West Loop Rd (ND side). 47th International Hamfest, Mobile Judging Contest, 2 Mtr Transmitter Hunt, scavenger hunt, dance (Saturday eve), camping. *TI:* 146.52, 146.64. *Adm:* $13 (US or Canadian). Richard Holder, VE4QK, 204-268-1702; **ve4qk@mts.net**; **www.mts.net/~holderr/ihf.htm**.

Ohio (Cuyahoga Falls) — Aug 8
F T

8 AM-2 PM. *Spr:* Cuyahoga Falls ARC. Emidio and Sons Party Center Parking Lot, 48 E Bath Rd. *TI:* 147.27. *Adm:* $5. Tables: Free. Frank Tompkins, W8EZT, 124 Chart Rd, Cuyahoga Falls, OH 44223; **tailfest2010@cfarc.org**; **www.cfarc.org/tailgate2010.html**.

Ohio (Elyria) — Jul 17
D F H S T

8 AM-1 PM. *Spr:* Northern Ohio ARS. Lorain County Community College Campus, Spitzer Conference Center, 1005 N Abbe Rd. 46th Annual Hamfest. *TI:* 146.7. *Adm:* $6. Tables: $10. Darlene Ohman, KA8VTS, 4122 Bush Ave, Cleveland, OH 44109; 216-398-8858; **dohman@roadrunner.com**; **www.noars.net**.

Ohio (Randolph) — Jul 25
D F H R S V

8 AM-2:30 PM. *Spr:* Portage ARC. Portage County Fairgrounds, 4215 Fairgrounds Rd. *TI:* 145.39. *Adm:* advance $5, door $6. Tables: $15. Joanne Solak, KJ3O, 9971 Diagonal Rd, Mantua, OH 44255; 330-274-8240; fax 330-274-8527; **kj3o@arrl.net**; **hamfair.com**.

Ohio (Van Wert) — Jul 18
D F H R T

Set up 6 AM; public 8 AM. *Spr:* Van Wert ARC. Van Wert County Fairgrounds, Rte 127 S. *TI:* 146.85. *Adm:* $5. Tables: $10. Stephen Kouts, WA8WKF, Box 347, Van Wert, OH 45891-0347; **techserv@embarqmail.com**; **w8fy.org**.

Oklahoma Section Convention
July 23-24, Oklahoma City
D F H Q R S V

The Oklahoma Section Convention ("Ham Holiday 2010"), sponsored by the Central Oklahoma Radio Amateurs, will be held at the Biltmore Hotel and Conference Center, 401 S Meridian Ave. Doors are open Friday 4-8 PM, Saturday 8 AM-3 PM. Features include 35th Annual Ham Holiday, flea market, vendors (contact **kc5qcv1@att.net** for details), technical and non-technical programs, DXCC/WAS card-checking, VE sessions. Talk-in on 146.85 (141.3 Hz). Admission is $8 in advance, $10 at the door; under 16 free with paying adult. Tables are $15 in advance, $20 at the door (if available). Contact Bill Wilburn, N5NUK, 6417 N Warren Ave, Apt #243, Oklahoma City, OK 73116; 405-843-4705; fax 405-841-2624; **n5nuk@sbcglobal.net**; **www.HamHoliday.org**.

Pennsylvania (Kimberton) — Jul 18
D F H R T

Sellers 7 AM, buyers 8 AM-noon. *Spr:* Mid-Atlantic ARC. Kimberton Fire Company Fairgrounds, Rte 113 and Firehouse Ln. Valley Forge Hamfest and Computer Fair. *TI:* 145.13, 147.06 (131.8 Hz). *Adm:* $6. Tables: $10. Mike Pilotti, KF3CD, 983 Crownpointe Ln, West Chester, PA 19380; 610-696-5040; fax 610-344-7755; **kf3cd@arrl.net**; **www.marc-radio.org**.

Pennsylvania (Pittsburgh) — Jul 11
F H R T

8 AM-2 PM. *Spr:* North Hills ARC. Northland Public Library, 300 Cumberland Rd. 25th Anniversary Hamfest. *TI:* 147.09 (88.5 Hz). *Adm:* Free. Tables: $5 per space. Albert Smochko, K3YUB, 107 Iola St, Glenshaw, PA 15116; 412-760-7055; **k3yub@verizon.net**; **nharc.org**.

Pennsylvania (Somerset) — Jul 18
D F H R T V

Set up 6 AM; public 8 AM-1 PM. *Spr:* Somerset County ARC. Somerset County Technology Center, 281 Technology Dr. *TI:* 147.195 (123 Hz). *Adm:* advance $4, door $5. Tables: $10. Stew Saylor, AK3J, 156 Sequoia Ln, Apt 1, Friedens, PA 15541; 814-444-0637; **ssaylor@earthlink.net**; **www.k3smt.org/hamfest/HamfestFlyer2010.pdf**.

Pennsylvania (Wilkes-Barre/Lehman) — Jul 4
D F T V

Set up 6 AM; public 8 AM-3 PM. *Spr:* Murgas ARC. Luzerne County Fairgrounds, Rte 118. 31st Annual Hamfest and Computerfest. *TI:* 146.61 (82.5 Hz), 146.52. *Adm:* $6. Tables: $15 (until Jun 22), $20 (after Jun 22). Bill Sweeney, KB3KUJ, 15 Tedrick St, Pittston, PA 18640; 570-510-1680; **murgasarc@gmail.com**; **www.qsl.net/k3ytl**.

South Dakota (Clear Lake) — Jul 24
F H R T V

8 AM-3 PM. *Spr:* Deuel County ARC. Clear Lake City Park, 107 3rd Ave N. Camping. *TI:* 444.95 (136.5 Hz). *Adm:* $5. Tables: Free. Robert Schmidt, NØTAW, Box 427, Clear Lake, SD 57226; 605-695-0219; fax 605-874-2449; **rjtaw1@itctel.com**; **www.w0gc.org**.

South Dakota (Sioux Falls) — Jul 17
H R T

9 AM-noon. *Spr:* Sioux Empire ARC. Roadway Express Truck Stop, I-29, Exit 73 Tea. *TI:* 146.895 (146.2 Hz). *Adm:* Free. Tables: Free. Brian Ward, KCØVDE, Box 89533, Sioux Falls, SD 57109; 605-371-6883; fax 605-221-4265; **kc0vde@arrl.net**; **www.w0zwy.org/swapmeet**.

Texas State Convention
August 6-7, Austin
D F H Q R S T V

The Texas State Convention (Austin Summerfest 2010), co-sponsored by the Austin ARC and the Texas VHF-FM Society, will be held at the Austin Airport Marriott South, 4415 South IH-35. Doors are open Friday 6-9 PM (registration 5 PM), Saturday 8 AM-4 PM. Features include indoor swapfest; outdoor tailgate swap area; ARRL Forum; special guest from ARRL HQ Dave Patton, NN1N, MVP Manager; sessions (WX, DX, ARES, QRP, Software Defined Radio); annual Texas VHF-FM Society meeting; VE sessions (Saturday, 12:30 PM, all elements; Larry Gunter, WB5BEK, **wb5bek@arrl.net**). Talk-in on 146.34/.94. Admission is $8 in advance, $10 at the door. Tables are $10. Contact Joe Makeever, W5HS, 8609 Tallwood Dr, Austin, TX 78759; 512-345-0800; **w5hs@arrl.net**; **www.austinsummerfest.org**.

Virginia (Berryville) — Aug 1
D F H Q R T V

6 AM-4 PM. *Spr:* Shenandoah Valley ARC. Clarke County Ruritan Fairgrounds, Business Rte 7. 60th Annual Berryville Hamfest, Ruritan's Famous Chicken and Beef BBQ. *TI:* 146.82. *Adm:* $6. Tables: $10-$20. Teresa Orndorff, KJ4DOR, c/o SVARC, Box 139, Winchester, VA 22604; 540-533-0961; fax 540-869-7067; **hamfest2010@comcast.net**; **www.svarc.us/hamfest**.

Virginia (Vinton) — Jul 31
D F H R T V

8 AM-1 PM. *Spr:* Roanoke Valley ARC. William Byrd Middle School, 2910 E Washington Ave. *TI:* 146.985 (107.2 Hz). *Adm:* advance $5, door $6. Tables: $10. Phillip Roark, K4WFO, 405 Yorkshire St, Salem, VA 24153; 540-387-4487 (phone and fax); **k4wfo@arrl.net**; **www.w4ca.us**.

Washington (Chehalis) — Jul 10
D F H R T V

9 AM-1 PM. *Spr:* Chehalis Valley ARS. Southwest Washington Fairgrounds, 2555 N National Ave. Consignment Auction (10:30 AM). *TI:* 147.06 (110.9 Hz), 146.52. *Adm:* $3. Tables: $7. John Ellingson, K7OSK, 18140 Mi Lane, Rochester, WA 98579; 360-273-5929; **radiokids@comcast.net**; **www.cvars.org**.

Wisconsin (Chippewa Falls) — Jul 24
R T

8 AM-noon. *Spr:* Chippewa Valley ARC. Lake Hallie Eagle's Club, 2588 Hwy 53. *TI:* 147.375 (110.9 Hz). *Adm:* $5. Joe Peloquin, KC9JFP, 141 Terrence St, #4, Chippewa Falls, WI 54729; 715-720-2866; **kc9jfp@charter.net**; **w9cva.org**.

Wisconsin (Oak Creek) — Jul 10
D F H R

6 AM-3 PM. *Spr:* South Milwaukee ARC. American Legion Post #434, 9327 S Shepard Ave. 43rd Annual Swapfest. *TI:* 146.52. *Adm:* $5. Robert Kastelic, WB9TIK, 7410 S Clement Ave, Oak Creek, WI 53154; 414-764-3871; **wb9tik@sbcglobal.net**; **www.qsl.net/wa9txe**.

To All Event Sponsors

Before making a final decision on a date for your event, you are encouraged to check the Hamfest and Convention Database (**www.arrl.org/hamfests-and-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, donated ARRL gift certificates and handouts.

For hamfests: Once the form has been submitted, your ARRL director will decide whether to approve the date and provide ARRL sanction. *For conventions:* Approval must come from your director and the ARRL executive committee.

The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **July 1** to be listed in the **September** issue. Information in this column is accurate as of our deadline; contact the sponsor or check the sponsor's Web site for possible late changes, for driving directions and for other event details. Please note that postal regulations prohibit mention in *QST* of prizes or any kind 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 *ARRLWeb* banner advertising. Call the ARRL Advertising Desk at 860-594-0207, or e-mail **ads@arrl.org**. QST

75, 50 AND 25 YEARS AGO

July 1935

- The cover photo shows a ham checking his mobile antenna.
- The editorial discusses the upcoming world radio conference at Cairo, and how the A.R.R.L. will push for more amateur frequencies. The editorial concisely explains that "The whole question of international allocation is a bughouse."
- In "Design for Higher Performance in the Super-Regenerative Receiver," G. W. Fyler, W2HLM, tells about a new three-tube U.H.F. circuit developed by General Electric for the 30 to 42 Mc. police radio band.
- "Radio Equipment of General Utility," by H. A. Robinson, W3LW, discusses flexibility in the design and construction of portable-station and entertainment radios.
- J. Herbert Hollister, W9DRD, presents "A Four-Band Exciter" that features band switching and fixed tuning.
- H. Selvidge, W9BOE, tells us about "An Experimental Station on Wheels," a mobile radio laboratory. The futuristic-looking vehicle is clad in copper, with chromium-plated fittings!
- George Grammer, W1DF, describes the RK-28, a "New Transmitting Pentode" that provides 200 watts output with low excitation.
- E. S. Van Deusen, W3ECP, presents "A Complete Battery-Operated Portable Station."
- "W1XR," by Alexabnder McKenzie, W1BPI-W1XR, tells about the experimental station atop Mount Washington, New Hampshire. W1XR, on a frequency near the 56 Mc. ham band, is in frequent contact with U.H.F. hams.

July 1960

- The cover photo shows the mobile rig built by KØEMK (described in this issue).
- The editorial gives a tip of the hat to the League's volunteer leaders, and encourages the recruitment of new hams into those ranks.
- In "Antenna Patterns from the Sun," D. W. Bray, K2LMG, and P. H. Kirchner, W2YBP, discuss the use of solar noise for plotting the vertical patterns of V.H.F. antenna arrays.
- Lew McCoy, W1ICP, tells us how to improve the performance of low-cost receivers by using "A Crystal-Controlled Converter for 14 through 28 Mc."
- In "Improved Selectivity for Older Receivers," John Palmer, W1SGN, gives us information on the use of half-lattice crystal filters,
- George Symes, KØEMK, describes his compact and attractive rig that covers 80 through 10 meters, in "50 Watts — Mobile."
- Barney Stones, KØOSA, tells us "How to Make a Sideswiper," a double-contact key for electronic keyers or for old-style "sideswiper" back-and-forth manual keying.
- S. E. McCallum, K4URX, presents his 35 foot "Lightweight Utility Mast."
- James Aagaard, K9OJV, describes the conversion of obsolete commercial gear in "Two-Meter F.M. for Noise-Free Local Comunication."
- A "Strays" item shows photos of the station of K2YFM, a fine example of a low-profile ham station. The station equipment is in a typical bookshelf unit, but covered by false-front panels made from old book bindings when not in use.

July 1985

- W4HHK's cover photo of the Moon has the caption, "EME: You can do it."
- The editorial discusses "Novice Enhancements" that are being considered.
- "Up Front in *QST*" notes that Don Wallace, W6AM, is a Silent Key. Don's contributions to ham radio were noted in the August 1981 "How's DX?" column.
- Harold Price, NK6K, in "What's All This Racket about Packet?" tells the reader about that fast-growing mode.
- Jim Stewart, WA4MVI, presents "A Basic Approach to Moonbounce."
- In "The Fine Art of Improvisation," Doug DeMaw, W1FB, helps us find ways to save time and money in solving electrical and mechanical construction problems.
- Douglas Rowlett, WB5IRI, and Linda Rowlett, N5FST, tell us how to "Construct the 'Ultimate' DC Power Supply," which delivers a wide range of voltages at very high current.
- J. R. Sheller, KN8Z, clears up the misconceptions about QSK, break-in, and semi-break-in, in "What Does QSK Really Mean?"
- Doug DeMaw continues his "First Steps in Radio" series, with Part 19, "Equipping Your First Ham Station."

Al Brogdon, W1AB ♦ Contributing Editor

Field Organization Reports

APRIL 2010

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**.

695 W7TVA
549 W4CAC
455 KØIBS
430 KK5NU
345 KB2FED
340 KA2ZNZ
333 KT5SR
325 N2LTC
320 KI4KWR AK2Z
305 K8RDN
290 KT2D
288 NC4VA
285 K2DYB
277 W2MTA
274 N4HUB
254 WB8RCR
246 K7OAH
245 K2HAT
240 K7BFL
225 K2HJ
217 KB2ETO
210 AC6C W5DY KB2RTZ
209 WD8USA
205 KD1SM
200 WA2BSS
196 KØLQB
190 WB9JSR
182 WD8BCS
175 KD1LE KC7ZZ
172 KB2BAA
170 W1PLW W4AGA
167 K2ABX
165 K9LGU
164 W4LHQ
160 AG9G N5NVP KGØGG W4AVD
155 WD9FLJ KC2SFU
150 WB2KNS KK3F WB6OTS W4DNA
146 KB5PGY
145 WØLAW KE5HYW WA2UJC
143 KF7GC
140 N2JBA WM2C K8DD
138 KD7OED
135 W5KAV N2GJ K7VC W3YVQ
134 W2SFD KB1KRS
130 WB2FTX K6JT K4IWW W4FAL
125 NN7H W7EKB W4OTN
124 W7JSW
122 KK1X
121 N3RB
120 KA4FZI W8UL N8IO W1GMF KW1U N1LKJ N1IQI WI2G KB8GT
115 W4WNE N5EEO K2BRG K2TV
112 KI4DHS
111 N2VC
110 N7EIE KCØM W7QM N7BEC W7GB N2YJZ WE2G KE4CB N2GS K1HEJ K4DND KC5OZT WB8HHZ N8OD K4GK K5KV K1YCQ KK5GY K8VZI WB8WKQ W2EAG
108 K4BEH KA2SZQ
107 KB1NMO
105 KB3LNM NA7G
102 N2DW
101 W2CC N2RDB
100 W7GHT N1JX N5OUJ N4ABM WB8SIQ WG8Z AA3SB WB4FDT K4BG K5MC WC5M WØCLS NØMEA WAØVKC N3SW W3TWV K4SCL N7IE K2AN WB8OIF W8CPG W2DSX KC2UQV N9MN W1SGC WB4GHU KI4YV W4TTO
99 AD4BL K2GW
98 KB9KEG W3CB NX8A
96 WØSJS
95 K4DFL KJ4DRW W2KFV AAØM
92 N8NMA
91 KC2SYM
90 KI6RUW W9ULK N9VC NX9K KA1GWE N3KB K4MSG N9AUG N8DD WD8Q K3IN N3ZOC WB4BIK NIØI WA2CUW K1JPG KA1EHR
NR2F NU8K W3GQJ W8IM KØBXF
89 KB3LFG
84 WDØGUF
80 K7MQF WA3EZN WØADZ KCØZDA K4DHB KD8CYK KD8LZB K8KV KJ4HGH
79 K6RAU KBØDTI
78 KI4JQB KJ7NO NS7K WD8DHC
77 N8SY KS3Z
76 KC4PZA
74 W5ESE
73 W1PLK
72 KA3NZR
70 W8DJG KC8UR NØMHJ N3NTV KØPTK KØOR KØRXC NØUKO KD7ZUP KB2CCD KA2EJD K5GLS KØDEU NØDLK NØDUW NØDUX NUØF KAØFUI KBØJKO W2LIE KJ4MNW N2VQA

The following stations qualified for PSHR in previous months, but were not properly recognized in this column: (Mar) N2RDB 132, WD8JAW 129, KK5GY 110, KO4OL 100, W2SFD 100, N5OUJ 100, WB4FDT, W6SX 89. (Feb) N2RDB 129, W6SX 91, (Nov 2009) W6SX 70.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, EMA, ENY, EWA, GA, ID, IN, KS, LA, MDC, ME, MDC, MI, MO, NC, NFL, NLI, NNJ, NNY, NTX, OH, OK, ORG, SD, SFL, SJV, STX, SV, TN, UT, VA, WCF, WI, WMA, WNY, WPA, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: AZ, EWA, GA, IN, KS, LA, MDC, KS, ME, MI, MO, MN, NC, NLI, NTX, OH, SD, SFL, SV.

Brass Pounders League

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

KA9EKG 1259, N1IQI 1666, WB5NKD 1247, KK3F 1125, W8UL 946, WB8WKQ 774, KW1U 730, WB9JSR 723, N1LKJ 720, W1GMF 672, WB5NKC 643, KCØM 508.

Stations earning BPL by Originations plus Deliveries: K8LJG 113, NM1K 107.

The following stations qualified for BPL in March, but were not properly recognized in this column: N1IQI 1666, WB5NKD 1158, KK3F 1125, W8UL 946, KW1U 730, N1LKJ 720, W1GMF 672, WB5NKC 632

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

WB1FBO **Rogerson**, Francis C. Jr, Ponce Inlet, FL
KB1GBR **Loveridge**, Mark S., North Weymouth, MA
N1JH **Hopkins**, John W. H., Concord, NH
W1OOQ **Madison**, Woodrow J. "Woody," Derry, NH
W1OOY **Ryder**, LeRoy H., Westminster, MA
WA1OPN **Sabonaitis**, Gayle A., Worcester, MA
KB1SML **Falkowski**, Robert T., Central Falls, RI
N1SYA **Kaufman**, Stanley, Newington, CT
KB1TDX **Sgro**, Peter J. Jr, Middleboro, MA
♦W1XS **Bell**, Thomas A., North Attleboro, MA
WA1YDU **Hart**, Richard E., Portsmouth, RI
K2BNR **Layton**, Albert K., Oil Springs, KY
K2CEC **Langheier**, Dennis J., Orchard Park, NY
K2DHR **O'Brien**, Kenneth G., Rochester, NY
KB2E **Brumley**, Charles Knox "Chuck," Saranac Lake, NY
♦KJ2E **Skrypak**, Joseph C., Andover, NJ
NP2EN **Roberson**, Charles H., Vallejo, CA
W2IDX **Schreier**, Bernard, Boynton Beach, FL
W2JWX **Sterman**, Solomon A., Brooklyn, NY
W2OIL **Vadney**, David K., North Plainfield, NJ
KN2P **Greenberg**, Saul, Pembroke Pines, FL
WB2PJC **Pettit**, Carlton E. "Carl" Sr, Medford, NJ
K2UZM **Schlafer**, Donald H. Sr, Guilford, NY
♦N2YL **Ferdinand**, Linda S., North Chatham, NY
♦KB2ZAK **Saylor**, Louis C. Jr, Gresham, OR
KA2ZPM **Clark**, John R., Vestal, NY
WB3BTX **Mewherter**, Adam M., Atlanta, GA
WB3CJB **Speck**, Donald L., Huntingdon, PA
W3HOX **Yundt**, Andrew J. "Jack," Ephrata, PA
♦KJ3Q **McDaniel**, Donald L., Saint Cloud, FL
♦W3QO **Moore**, Allen W. Jr, Palm Bay, FL
WA3UYF **Faria**, Nilo S., Reisterstown, MD
K3YQD **Leggat**, William T. Sr, Dunmore, PA
KA3YQG **Larkins**, Louis P., Brookhaven, PA
W4ACG **Smith**, John V., Saint Petersburg, FL
♦K4AFX **Dries**, Lawrence E. "Larry," Fort Lauderdale, FL
KJ4AMJ **Pleffner**, Robert D., Ocala, FL
KF4ASL **Norris**, Betty G., Lansing, NC
K4AUC **Long**, Harry R., Richmond, VA
KD4CE **Kemp**, Ronald E., Creston, NC
W4CIJ **Mork**, Ralph G., Wilmington, NC
WA4CQK **Brannock**, George F., Mount Airy, NC
N4CR **Peake**, Bernard C. "Bernie," Melbourne, FL
WA4CWQ **Barrett**, Stewart P. Jr, Augusta, GA
WB4DBR **Granade**, James Raymond Sr, Augusta, GA
KC4EEA **Bleil**, Richard E. "Rick," Hertford, NC
KI4FKK **Saunders**, Thomas E. Jr, Burlington, NC
♦KD4GTT **Wilson**, Allan B., Santa Monica, CA
K4IBG **Ingram**, Alto B., Crossville, TN
K4IDJ **Uhland**, William C. "Bill," Lawrenceville, GA
KG4IFQ **Smith**, Floyd A., Memphis, TN
W4IYD **McClung**, Wayne C., Albany, GA
N4KTI **Stonestreet**, Glenn S., Mobile, AL
KA4LOK **Barker**, Walter G., Dublin, VA
KN4LY **Clemmons**, Allen D. Jr, Boiling Spring Lake, NC
W4MB **Haviland**, Robert P., Holly Hill, FL
KE4MBZ **Spruill**, Aubrey L., Griffin, GA
KB4NIA **Williams**, Larry O., Chattanooga, TN
KG4NVR **Ingle**, Henry B., Bassett, VA
WA4OBR **Stentz**, George S. Sr, Greensboro, NC
WD4PJV **Clark**, Charles, Raleigh, NC
K4RWF **Ray**, Wilfred A., Elizabethtown, KY
K4SF **Englund**, John B., Fairfield, CT
W4VGX **Malik**, Joseph, Wilmington, NC
KY4VT **Crane**, John S., Hampton, VA
K4ZLC **Anderson**, Gerald A. "Andy," Snow Lake Shores, MS
N5CPE **Guillaume**, John Batiste "J.B." Jr, Jarreau, LA
K5KBJ **Smith**, Thomas Warren, Highlands Ranch, CO
WB5LCQ **Duval**, Scott, Lancaster, CA
KE5LEU **Foster**, Harold D., Eufaula, OK
W5MOO **Poston**, Charles A., Port Arthur, TX
N5NBW **Sandberg**, Martin "Sandy," Dallas, TX
WA5VET **Farris**, Charles O. Jr, Geronimo, OK
♦K5VT **Thompson**, Dr Vinson C. "Vince," Phoenix, AZ
KE5WHI **Quimby**, William D., Corpus Christi, TX
♦WW5WW **Williams**, William J. "Bill," Gainesville, TX
♦W6AAQ **Johnson**, Donald K., Esparto, CA
KA6ADX **Kagebine**, Betty L., Chino, CA
W6AIO **McWard**, Raymond W., Cupertino, CA
WD6BEA **Litzenberger**, Alfred N., San Luis Obispo, CA
WA6EIL **Rivera**, George R. Sr, Hacienda Heights, CA
KG6ELF **Carpentero**, Filomeno T., Ontario, CA
AE6G **Diehlman**, Frederick D. Jr, Fresno, CA
KI6GJT **Seim**, James R., Danville, CA
W6KCF **Blackmore**, James D., Prescott, AZ
KA6OQJ **Ruegg**, James A., Arcata, CA
AE6QP **Heins**, Paul A., Clovis, CA
KF6QT **Bezman**, Dr Harry S., Calabasas, CA
KI6RW **Fisher**, Robert, Weldon, CA
KC6SFG **Williamson**, Daniel P., Pasadena, CA
♦KI6T **Stilwell**, Gary A., Fair Oaks, CA
W6UY **Moses**, Donald, Rancho Palos Verdes, CA
KE6UYL **Wells**, Lorraine, Bakersfield, CA
W6YLL **Gordon**, William S. "Bill," Los Gatos, CA
W6ZVD **Hodges**, Joseph C., Irvine, CA
WB7ALO **Harrington**, Donald C., Lake Havasu City, AZ
♦KC7CP **Coler**, Bernard A., Scappoose, OR
W7HYW **Haass**, Herbert J., Casper, WY
NS7I **Hall**, Palmer, Scottsdale, AZ
♦W7KQ **Sasek**, Bernie J., Tucson, AZ
♦W7LSK **Dockstader**, William M. "Bill," Marysville, WA
♦W8AP **Goldstone**, George H., Bloomfield Hills, MI
K8BPX **Reinhart**, David C., The Villages, FL
K8BWF **Back**, Dennis, Middletown, OH
KC8CGH **Young**, Roger, Lansing, MI
N8CKS **Norman**, Nona M., Elyria, OH
KG8DP **Harville**, Mark R., Columbus, OH
AJ8J **Sunden**, Walter G., Columbus, OH
K8KKC **Hensel**, Donald W., Saint Clair Shores, MI
W8LKX **Lamb**, Raymond N., Cincinnati, OH
K8MCS **Richert**, Thomas L., Port Huron, MI
W8MEE **Wright**, Paul C. Jr, Columbus, OH
K8MFK **Warsalla**, Franklin G. Sr, Port Huron, MI
N8NH **Hockler**, Norman, Galion, OH
K8PV **Varney**, Paul Thomas "Tom," Wellington, OH
KB8Q **Caswell**, Arthur L., Durand, MI
♦WA8SSI **Beach**, William C. "Bill," Cincinnati, OH
KB8WNH **Meachen**, Charles F., Port Clinton, OH
W8ZRI **Barnhart**, John H., Salisbury, NC
WA9FWG **Smith**, Glen D., Evansville, WI
KC9GPC **Gulsrud**, Kevin G., Sextonville, WI
KC9KII **Beltz**, Karen J., Taycheedah, WI
W9MSJ **Esler**, George A., Kaukauna, WI
♦W9OER **Haines**, Frederick B., Vermont, IL
W9WAQ **Rothschadl**, Allen T., Lake Mills, WI
♦W0AEH **Hatfield**, Alan E., Lakewood, CO
N0CIM **Briggs**, Bob, Liberty, MO
♦K0CNB **Johnsen**, Arthur H., Minneapolis, MN
K0ERM **Dekker**, Dave, Mobridge, SD
W0EZM **Babylon**, Robert D., Lee's Summit, MO
WB0FLG **Bohm**, Donald F., Merrifield, MN
NZ0G **Leslie**, Paul L., Superior, NE
N0HMT **Kelley**, Henry B. "Bus," Wamego, KS
W0IYX **Landon**, Robert B., Rancho Palos Verdes, CA
NO0J **Barber**, James W. "Bill," Salem, IA
♦W0JCY **Patterson**, Delton L., Wichita, KS
K0LAD **Dressler**, Dennis, Topeka, KS
W0MXJ **Wemmer**, Russel C., Sedan, KS
WN0NW **Johnson**, Marvin W., Overland Park, KS
♦WB0RJR **DuBrul**, Robert A., Everton, MO
W0SUI **Larson**, Rey W., Red Wing, MN
N0TOV **Link**, William C. Jr, Durham, CA
KB0UOE **Jentzsch**, Jewel C. "Chuck" Jr, LaCygne, KS
KB0WNC **Carter**, Virgil R., Smith Center, KS
VE3UT **West**, Albert E., Toronto, ON, Canada
DJ2IB **Nagel**, Andreas, Dobel, Germany
ZP5RG **Jensen**, Malcolm C., Asuncion, Paraguay

♦ Life Member, ARRL

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation or to ARRL. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Gail Iannone ♦ Silent Keys Administrator ♦ sk@arrl.org

W1AW Schedule

W1AW's schedule is at the same local time throughout the year. From the second Sunday in March to the first Sunday in November, UTC = Eastern US Time + 4 hours. For the rest of the year, UTC = Eastern US Time + 5 hours.

♦ **Morse code transmissions:** Frequencies are 1.8025, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 WPM.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code bulletins are sent at 18 WPM.

♦ **W1AW Qualifying Runs** are sent on the same frequencies as the Morse code transmissions. West Coast Qualifying Runs are also transmitted monthly. See "This Month in Contesting" in this issue for further details on the Qualifying Runs. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. The initial certificate is available for a $10 fee. Subsequent endorsement stickers are available for a $7.50 fee.

♦ **Digital transmissions:** Frequencies are 3.5975, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent using 45.45-baud Baudot, PSK31 in BPSK mode and MFSK16 on a daily revolving schedule.

Keplerian elements for many amateur satellites will be sent on the regular digital frequencies on Tuesdays and Fridays at 6:30 PM Eastern Time using Baudot and PSK31.

♦ **Voice transmissions:** Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Notes:** On Fridays, UTC, a DX bulletin replaces the regular bulletins. W1AW is open to visitors 10 AM to noon and 1 PM to 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy. In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW code practice and CW/digital bulletin transmission audio is also available real-time via the *EchoLink Conference Server* **W1AWBDCT**. The conference server runs concurrently with the regularly scheduled station transmissions.

During 2010, Headquarters and W1AW are closed on New Year's Day (January 1), Presidents' Day (February 15), Good Friday (April 2), Memorial Day (May 31), Independence Day (observed July 5), Labor Day (September 6), Thanksgiving and the following day (November 25 and 26) and Christmas (observed December 24).

For more information, see **www.arrl.org/w1aw.html**.

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	DIGITAL BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	DIGITAL BULLETIN				
6:45 PM	7:45 PM	8:45 PM	9:45 PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

HAMSPEAK

The following are brief descriptions of Amateur Radio related terms found in this month's issue of *QST*. More information on most can be found in *The ARRL Handbook*, or other specialized ARRL publications.[1] See also **www.arrl.org/ham-radio-glossary**.

The Doctor is IN

Balun — A *bal*anced-to-*un*balanced transformer. Generally used to couple from a balanced antenna such as a dipole to an unbalanced (with respect to ground) transmission line, such as coaxial cable.

Battery boost regulator — Electronic device that operates from a discharging battery and outputs a constant voltage, typically 13.8 V dc, as the input voltage is reduced.

Coax — Coaxial cable. Type of unbalanced transmission line in which one conductor is a wire in the center of a dielectric with a circular cross section. The dielectric is surrounded by a tubular conductor, often made of flexible braid. In some cable types, this outer conductor is covered by a protective insulating jacket.

Computer aided design (CAD) — Software tooling that, in the ultimate configuration, takes requirements documents as inputs and generates numerical input data for computed aided manufacturing systems that control automated production machinery. Often refers to a subset of the process that generates manufacturing and assembly drawings as well as electronic schematics and board layouts.

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.

On-off keyed CW — Telegraphy sent by turning a transmitter on and off with the on times corresponding to the desired dits and dahs.

PEP (peak envelope power)—The average power supplied to the antenna transmission line by a transmitter during one RF cycle at the crest of the modulation envelope taken under normal operating conditions.

Steady state signal — A signal that is always present. In the ideal, but unrealizable, case it means a signal that has always been present at the same amplitude, phase and frequency. In practical terms it means a signal that doesn't vary over a relatively long period of observation.

Wattmeter — Measuring instrument that measures power in watts. In the Amateur Radio world, it generally refers to a meter used to measure the power from a transmitter. It often includes the capability to measure both forward and reflected power so SWR of an antenna system can be determined.

The Portable Omni Box

Charge controller — Circuitry that manages the charging of a storage battery under charge from a variable source to keep the battery from being overcharged or discharging back toward the source. An automotive voltage regulator — between alternator and battery — is a kind of charge controller, as is specialized circuitry that goes between a solar power source or wind turbine and a battery.

Continuity tester — Rudimentary electrical test instrument that provides a go/no-go indication of connection between two points in an electrical circuit. The usual indicator is a light or buzzer.

Dummy load — Sometimes called dummy antenna. Device designed to accept and dissipate the power from a transmitter without radiating it. Generally used for transmitter testing to avoid interfering with other spectrum users.

Expanded voltmeter — Analog display with the voltage region of interest covering a major portion of the meter scale.

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

PCB — Printed circuit board. Technique for wiring circuits in which the connections are made by etching away unneeded copper from a lamination of copper and insulating material, typically fiberglass or phenolic. The remaining *traces* of copper form the connections between components.

Pelican case — Brand of hard sided travel case for sensitive equipment. Interior foam can be removed to custom fit particular equipment.

Signal generator — Electronic device designed to generate a signal for calibration, alignment or troubleshooting. Available in ranges throughout the audio and RF spectrum, many have calibrated frequency and amplitude scales.

VOM — Volt-ohm-milliammeter. Basic multifunction test instrument that measures volts, ohms and milliamperes.

The Classic Universal Sound Card Interface

Computer serial port — Computer data port, also known as a COM port generally used for the interconnection of peripheral equipment. In recent PCs, often superseded by a UNIVERSAL SERIAL BUS port (see USB).

Darlington-connected pair — Two transistors with the collectors tied together and the emitter of one transistor connected to the base of the other. The effective current gain of the pair is approximately the product of the individual gains of the two devices.

LED, light emitting diode — Semiconductor device from which light is emitted when current flows. These were originally used in place of incandescent bulbs as indicator lights. They now can be used in place of larger light bulbs and form the basis of some display screens. See **hyperphysics.phy-astr.gsu.edu/hbase/electronic/leds.html**.

Optocoupler — Circuit element containing a light emitting diode (LED) and a photodiode. The input signal is routed to the LED which transmits light to the photodiode corresponding to the input data. The photodiode, often with an amplifier, provides an output signal corresponding to the input but with no electrical path between them. The input and output are thus isolated eliminating undesired paths or ground loops across the device.

PSK31 — Digital transmission protocol used for keyboard to keyboard communication sent via phase shift keying. Designed to be used with PC sound cards and associated software.

Push-to-talk — Method of transmit receive-switching in which a button or lever on the microphone is used to actuate the circuitry used to make the transmission.

Sound-card-based digital modes — Radio transmission modes that can be supported by computer-generated audio tones that appear at the computer sound interface. Most digital modes, as well as SSTV, can be generated using PC software through this arrangement.

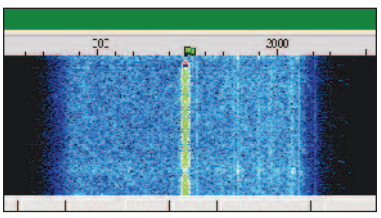
Sound card interface — Device that provides interconnection, control and ground isolation between a radio and a PC sound card. The sound card is a generic name for an audio to computer processing interface device. Originally available as an internal plug-in accessory card for a PC, the functionality is now generally available in the PC itself. Advanced models are often configured as an external device from the connected PC.

Switching power supply — Power supply design type that uses the input power to operate an oscillator, usually operating in the tens of kHz, to allow use of smaller and lighter transformers.

USB — Universal serial bus. Connection arrangement intended to allow computer peripherals to be connected to a PC. Originally supplied as a more compact replacement for RS-232 type serial connections on laptop PCs, it is commonly found on all recent PCs. See **www.usb.org**.

VOX — Voice operated transmit. Transceiver subsystem that switches the unit from receive to transmit mode automatically in the presence of a signal at the microphone. See J. Hallas, W1ZR, "Getting to Know Your Radio: Over to You — Transmit/Receive Switching" *QST*, Feb 2006, pp 65-66 for more information.

Waterfall display —Spectrum display in which the horizontal display remains frequency, but time varying samples of signal amplitude, indicated by color and intensity, cascade down the screen as a function of time giving the appearance of a waterfall. QST



[1] *The ARRL Handbook for Radio Communications,* 2010 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 1448 (Hardcover 1462). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

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- auto band switched w/ most ICOM/Kenwood/Yaesu tcvrs

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High-performance, low power TNC.
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IC-R20 Wide Band Receiver

- Wide RX .150–3304 mHz*
- SSB, CW, AM, FM, WFM
- 32mb digital recorder
- 1,000 memories
- VSC • 100 ch/sec. scanning

IC-R6

Wide Band Receiver

- 100khz-1309.995Mhz* *(cell band blocked)
- 1300 Memories with alphanumeric labels
- VSC scan
- 100 channel/sec scan speed
- AM,FM, WFM

NEW!

IC-RX7 Wide Band Receiver

- 0.150-823.995 MHz, 849.0-868.995 MHz, 894.0-1300.000 MHz
- FM, WFM AM
- 100 channels per second/ 30 steps per second scan speed
- 1650 Memory channels
- 3 x AA Ni-Cd or alkaline cells
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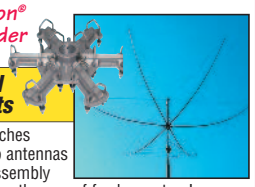

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- Low noise results—approaches performance of closed loop antennas
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- Good results at 20 to 30 feet above ground

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- Order from us and the other guys—We guarantee that you'll send theirs back!

3 foot lengths .058 wall - 3/8" to 2 1/8" OD

6 foot lengths .058 wall - 3/8" to 2 1/8" OD

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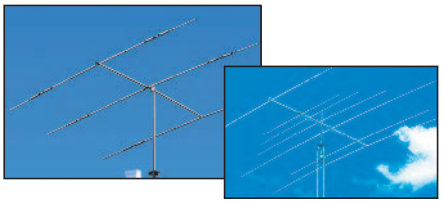

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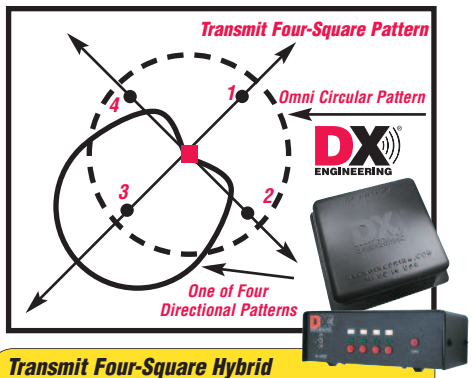

Transmit Four-Square Hybrid Controller—4 Directions plus Omni

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- Drop-in replacement for Comtek—easy upgrade
- Proven DX Engineering RF relays—high performance
- RF Shielded weatherproof housing—unique protection

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DXE-TFS4-80-P	80 Meter Four-Square Controller with Control Console	**$559.00**
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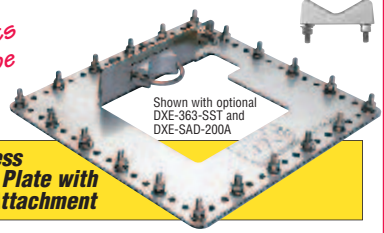

Shown with optional DXE-363-SST and DXE-SAD-200A

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DXE-VFCC-H05-A	Vertical Feedline Current Choke	**$134.95**
DXE-RADW-500K	Radial Wire Kit, 500 feet of wire, 20 lugs, 100 steel anchor pins	**$61.90**
DXE-RADW-1000K	Radial Wire Kit, 1,000 feet of wire, 40 lugs, 200 steel anchor pins	**$123.95**
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- Coax Prep Tool

DXE-RFS-TS2P	Complete Receive Four-Square Package	**$1,650.00**

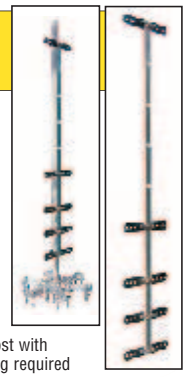
Receiving System Components

DXE-F6-1000	75 Ω, F6 style direct bury flooded cable, 1,000 ft.	**$149.95**
DXE-F6-CTL	75 Ω F6 cable by the foot	**$0.19/ft.**
DXE-SNS6-25	Watertight F6 Connectors, 25 pack	**$25.50**
DXE-SNS-CT1	F6 Connector Installation Tool	**$52.00**

See Our Complete Selection of Components and Tools at DXEngineering.com

FOR HEXAGONAL BEAMS

NEW! DX Engineering 5-Band RIGID Feedpoint System



Our patent-pending rigid feedpoint system is made for use with 5-Band, G3TXQ-design hexagonal beam antennas. Now standard on DX Engineering's 5-Band Mark 2 HEXXAGONAL Beam Antenna, it is a direct replacement for your old-tech coax cable feeder.

- Durable stainless steel/Teflon® construction (patent pending)
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- Weatherproof, low-loss, high power balanced connections
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DXE-HEXX-5FFP 5-Band Rigid Feedpoint System.....**$194.95**

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DXE-UT-80N	2-Piece N Connector Tool	**$22.95**
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That's where people like David Freidman, KE7GOY, came in. Friedman, Disaster Response Coordinator for the Muttshack Animal Response Team, was faced with coordinating the evacuation of 15,000 animals. He turned to his radio, naturally, and to Depiction mapping and simulation software.

"Depiction really came through for us"
David Friedman, KE7GOY

The pets were transferred into 133 refrigerated tractor trailers, each containing 94 cages and transport crates. Without Internet access, the Muttshack team had no immediate knowledge of

road blockages. Using reports sent in over the radio, Friedman used Depiction's ability to automatically recalculate routes around obstacles to coordinate transport between 19 different pickup points and sheltering in Shreveport.

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NEW! AT-600Pro

The LDG AT-600Pro will handle up to 600 watts SSB and CW, 300 on RTTY (1.8 – 30 MHz), and 250 watts on 54 MHz. It will match 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 the AT-600Pro with longwires, random wires and antennas fed with ladder line just by adding a balun. It has two antenna ports with a front-panel indicator, and separate memory banks for each antenna. Easy to read LED bar-graph meters showing 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 Icom interface cable, DC power cable and coax jumper. ***Suggested Price $359.99***

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Powered by four AA internal Alkaline batteries (not included), no additional cables required. A coax jumper cable is also induced for fast hook up. ***Suggested Price $129.99***

NEW! Z-11ProII

The Z-11Pro, 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. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $179.99***

NEW! AT-100ProII

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-100Pro requires just 1 watt for operation, but will handle up to 125 watts. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $229.99***

radio not included

FT Meter 2.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Still Only $49***

FTL Meter For Yaesu FT-857(D) and FT-897(D). 4.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Suggested Price $79.99***

NEW! M-7600 For IC-7600. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7600 and the virtual meter on your radio can work together. ***Suggested Price $79.99***

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. ***Suggested Price $159.99***

IT-100

Matched in size to the IC-7000 and IC-706, the IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible. ***Suggested Price $179.99***

YT-100

An autotuner for several popular Yaesu Radios. An included cable interfaces with your FT-857, FT-897 and FT-100 (and all D models) making it an integrated tuner, powered by the interface. Just press the tune button on the tuner, and everything else happens automatically: mode and power are set, a tune cycle runs, and the radio is returned to its original settings. It's the perfect complement to your Yaesu radio.
Suggested Price $199.99

AT-200Pro

The AT-200 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 a function key on the front panel allows you to access data such as mode and status. Includes Icom interface cable, DC power cable and coax jumper.
Suggested Price $249

See AT-1000Pro Review in Nov. '08 CQ

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 Icom interface cable, DC power cable and coax jumper.
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IC-T90A

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- SSB, CW, RTTY and AM (2-40W)

IC-208H *2M/440 FM Mobile*
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- RX: 118-173, 230-549, 810-999 MHz (cell blk)
- Power: 55/15/5W (2M), 50/15/5W (440 MHz)

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FT-250R

FT-270R

FT-250R 2M FM HT

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- Increased audio output & added "Memory Only" mode

VX-3R

VX-8GR

VX-3R Compact 2M/440 FM HT

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Huntsville Hamfest
August 21-22, 2010

South Hall, Von Braun Center, Huntsville, Alabama

Program Highlights

- **Huntsville Hamfest:** Featuring huge new equipment dealer show, many major manufacturers, giant flea market. Huge forum slate including ARRL, public service, DX, technical and contesting topics.
- **DX Card Checking:** Representatives will be available to field check your DX cards for DXCC credit. Visit the NADXC booth for information.
- **Hospitality Suites:** Huntsville Hamfest will host Hospitality Rooms at the Holiday Inn across the street from the VBC on Friday and Saturday nights.
- **2010 YHOTY (Young Ham of the Year):** An award intended to recognize a young ham who has demonstrated his or her dedication to Amateur Radio through his or her activities.
- **Talk-in station:** Our always welcoming and always helpful talk-in crew (they haven't lost a visitor yet) will be operating as K4BFT on the 146.94 repeater for complete talk-in information. Back-up frequency is 147.30. No PL required during the hamfest weekend.

- **HAYLARC YL Breakfast:** The Huntsville Area Young Ladies Amateur Radio Club (HAYLARC) invites all YLs attending the Huntsville Hamfest to join them for a Dutch breakfast Sunday, 7:00 AM at Shoney's.
- **Meet Our Special Guest:** ARRL President, Kay Craigie, N3KN.
- **DX Banquet Saturday Night:** Sponsored by the North Alabama DX Club, featuring Tom Harrell, N4XP, speaking on the K4M DXpedition to Midway Island. The DX Banquet will be held at the Holiday Inn across the street from the Von Braun Center.

Hotels

Holiday Inn Downtown
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- ✓ Bridge Street Centre – Upscale Shopping Mall
- ✓ Huntsville Botanical Garden
- ✓ Huntsville Museum of Art
- ✓ Cathedral Caverns State Park
- ✓ Historic Huntsville Depot Museum and Alabama's Constitution Village

Parking: The parking garage across the street from the VBC will be open with a parking fee of $5. The South Hall where the Hamfest is located has a 500 space ground level garage with a parking fee of $5. Elevators carry you up to the hamfest.

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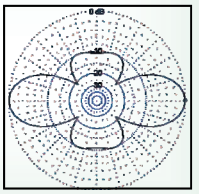
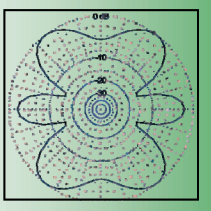


EZNEC Rocket 88™ Antenna plot at 35 feet over typical ground on 20 Meters. 10.43 dBi gain (4.98 dBi free space).



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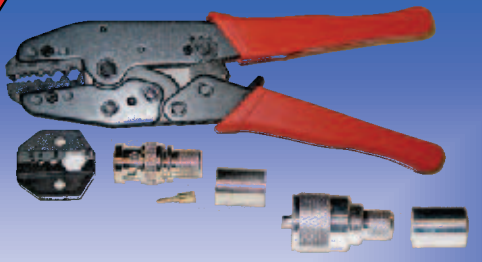

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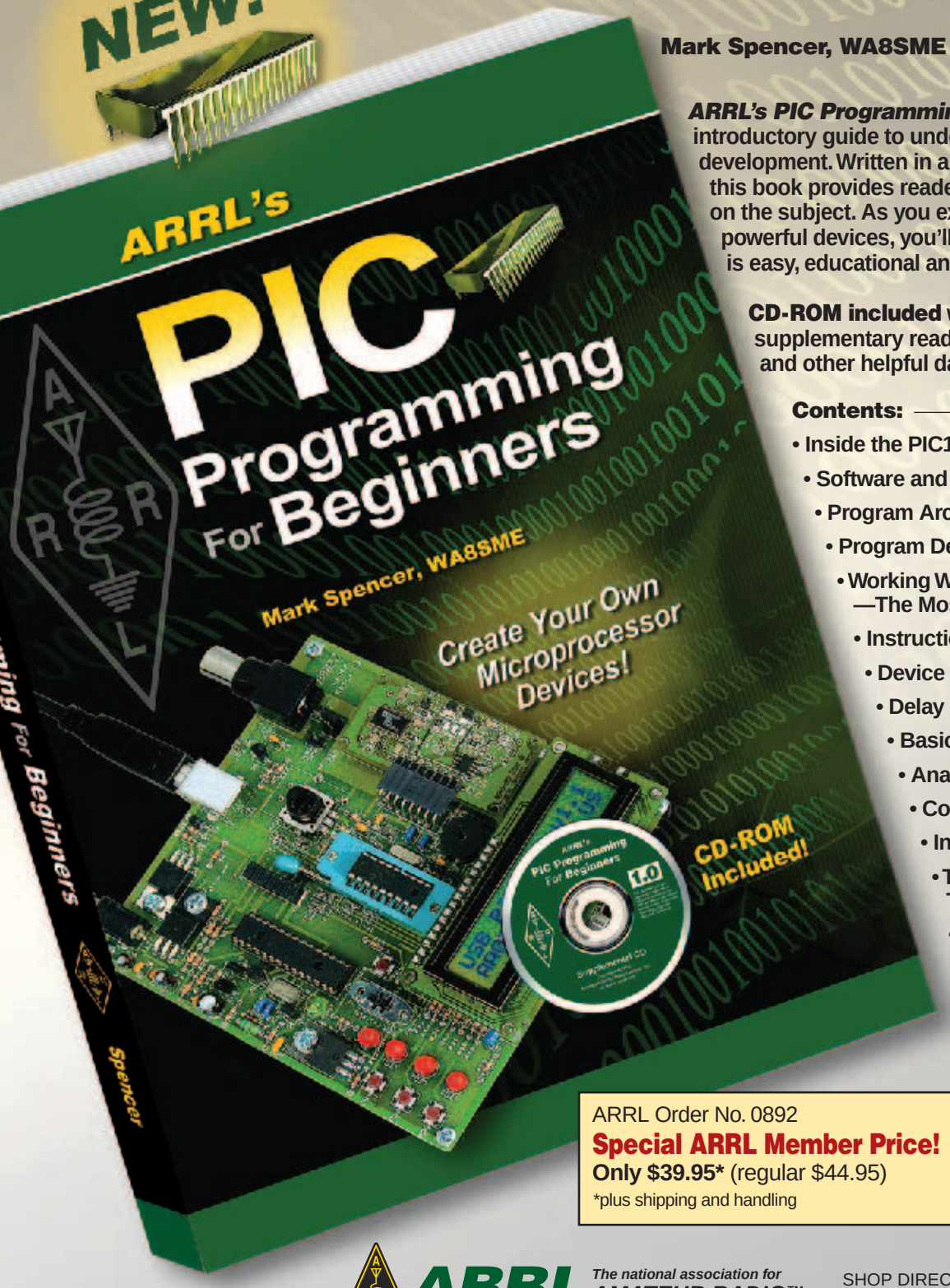

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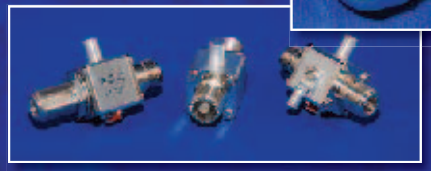

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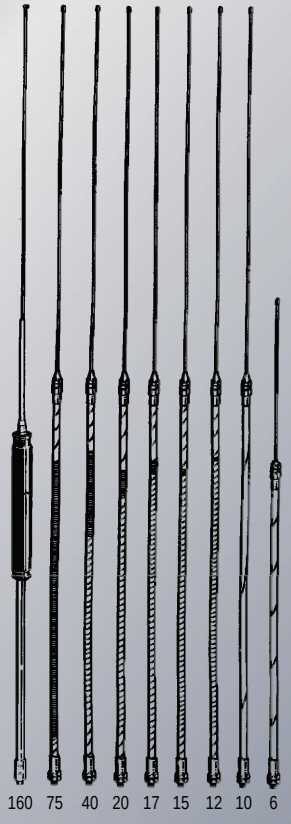

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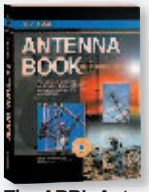

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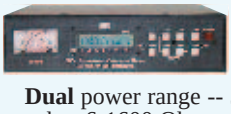

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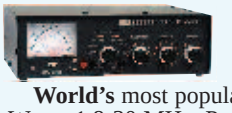

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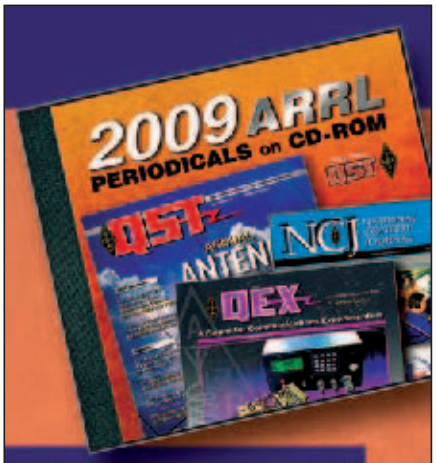

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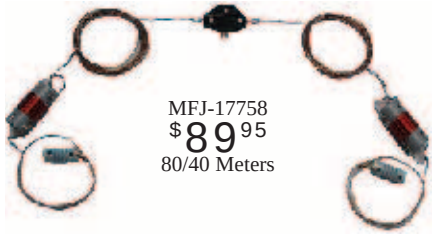

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Antenna Switches

MFJ-1704
$79.95
4-Positions

MFJ-1704 heavy duty *antenna switch* lets you select 4 antennas or ground them for static and lightning protection. Unused antennas automatically grounded. Replaceable lightning surge protection. Good to 500 MHz. 60 dB isolation at 30 MHz. 2.5 kW PEP. Less than .2 dB insertion loss, SWR below 1.2:1. SO-239 connectors. Handy mounting holes. 6¼Wx4¼Hx1¼D in.

MFJ-1702C
$39.95
2-Positions

MFJ-1702C Like MFJ-1704, but for 2 antennas. 3Wx2Hx2D"

MFJ-1700C
$99.95

MFJ-1700C *Antenna/ Transceiver Switch* lets you select one of six antennas and one of six transceivers in any combination. Plug in an antenna tuner or SWR wattmeter and it's always in-line for any antenna/transceiver combination. Has lightning surge protection. Handles 2 kW PEP SSB, 1 kW CW, 50-75 Ohm loads. Unused terminals are automatically grounded. 1.8 to 30 MHz. SO-239 connectors. 4¾W6½Hx3D inches.

MFJ-1701
$69.95

MFJ-1701 *Antenna Switch* like MFJ-1700C but lets you select one of six antennas only. 10Wx3Hx1½D inches.

33 ft. Telescoping fiberglass Mast

3.8 feet collapsed, 3.3 lbs.

MFJ-1910
$79.95

Super strong fiberglass mast has huge 1¾ inch bottom section. Flexes to resist breaking. Resists UV. Put up *full size* inverted Vee dipole/vertical antenna in minutes and get *full size performance!*

Make your own antennas

Dipoles, G5RV, Random Wire, Doublets, Beverage Antennas, etc.

MFJ-16C06, $4.56. 6-pack authentic *glazed ceramic* end/center antenna insulators.
MFJ-16B01, $19.95. Custom injection-molded UV-resistant center insulator has built-in coax connector and hanging hole.
MFJ-18G100, $24.95. 100 ft. of flexible, 7-strand, 14-gauge solid copper antenna wire.
MFJ-58100X, $49.95. 100 ft. 50-Ohm RG-8X with PL-259s on each end.
MFJ-18H100, $34.95. 100 feet, 450 Ohm ladder line, 18 gauge copper covered steel.

Lightning Surge Protectors

Ultra-fast gas discharge tube shunts 5000 amps peak. Less than 0.1 dB loss. Up to 1000 MHz. SO-239s. **MFJ-270, $29.95.** 400W PEP. **MFJ-272, $39.95.** 1500W PEP.

Free MFJ Catalog

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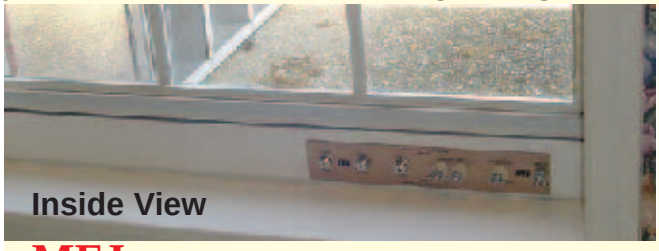
FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. ***Add shipping.***

http://www.mfjenterprises.com for instruction manuals, catalog, info

MFJ Weather-Proof *Window Feedthrough Panels*

Weather-proof window feedthrough panels bring coax, balanced lines, HF/VHF/UHF antennas, random wire antennas, ground, rotator/antenna switch cables and DC/AC power into your hamshack without drilling through walls!



MFJ Weather-Proof *Window Feedthrough Panels* mount in your window sill. Lets you bring all your antenna connections into your hamshack *without* drilling holes through walls.

Simply place in window sill and close window. One cut customizes it for any window up to 48 inches. Use horizontally or vertically. Connectors are mounted on inside/outside stainless steel plates and attached to a 4 foot long, 3½ inch high, ¾ inch thick *pressure-treated* wood panel. Has excellent insulating properties. Weather-sealed with a heavy coat of long-lasting white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Includes window locking rod.

Inside/outside stainless steel plates ground all coax shields. Stainless steel ground post brings ground in.

MFJ-4603 Universal Window Feedthru Panel

MFJ-4603 $89.95

Four 50 Ohm *Teflon*(R) SO-239 coax connectors lets you feed HF/VHF/UHF antennas at full legal power limit.

A 50 Ohm *Teflon*(R) coax *N-connector* lets you use any antenna up to 11 GHz, including 450 MHz, UHF, satellite, moon bounce and 2.4/5.8 GHz Wi-Fi antennas.

A 75 Ohm, 1 GHz *F-connector* makes it easy to bring in television, Satellite, HD, cable TV and FM radio signals.

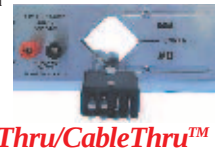
A pair of high-voltage *ceramic feedthru insulators* lets you bring in 450/300 Ohm balanced lines directly to your antenna tuner.

Has random/longwire antenna *ceramic feedthru insulator*.

***5-way** binding posts* lets you supply 50 Volts/15 Amps DC/AC power to your outside antenna tuners/relays/switches.

Stainless ground post brings in ground connection, bonds inside/outside stainless steel panels together and drains away static charges.

MFJ's exclusive *Adaptive Cable Feedthru*™ lets you bring in rotator/antenna switch cable, etc. without removing connectors (up to 1¼X1⅝ in). Adapts to virtually *any* cable size. Seals out rain, snow, adverse weather.



3 Coax, Balanced Line, Random Wire

Best Seller! 3 *Teflon*(R) coax connectors for HF/VHF/UHF antennas. Separate high voltage *ceramic* feed-thru insulators for balanced lines and longwire/random wire, Stainless steel ground post.

MFJ-4602 $69.95

6 Coax

6 high quality *Teflon*(R) coax connectors for HF/VHF/UHF antennas. Stainless steel ground post. Full 1500 Watt legal limit.

MFJ-4601 $59.95

4 Balanced Line, 2 Coax

4 pairs of high-voltage *ceramic* feed-thru insulators for balanced lines and 2 coax connectors.

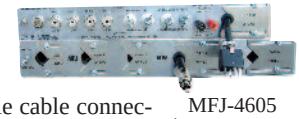
New! MFJ-4600 $79.95

5 Cables, any-size

5 *Adaptive Cable Feedthrus*™. Pass any cable with connector: 2 cables with large connectors up to 1¼x1⅝ inches and 3 cables with UHF/N size coax connectors. Seals out weather.

MFJ-4604 $99.95

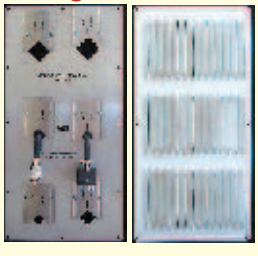
All-Purpose FeedThru/CableThru™



***Stacks** MFJ-4603 **and** MFJ-4604!* Gives you every possible cable connection you'll ever need through your window without drilling holes in wall -- including UHF, N and F coax connectors, balanced lines, random wire, ground, DC/AC power and cables of any size for rotators, antenna switches, etc.

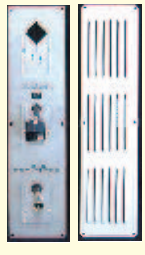
MFJ-4605 $159.95 New!

Bring cables thru eave of your house



MFJ-4616
shown with standard full-size vent (not included) it replaces. For *6 Cables*
$26.95

MFJ-4613
shown with standard half-size vent (not included) it replaces. For *3 Cables*
$14.95



Replace your standard air vents on the eave/sofitt of your house with these *MFJ AdaptiveCable*™ *Air Vent Plates* and…

Bring in coax, rotator, antenna switch, power cables, etc. *with connectors* up to 1¼x1⅝ inches!

Sliding plates and rubber grommets adjust for virtually any cable size to seal out adverse weather, insects and varmints. Use existing vent hole, mounting screws and screw holes.

AdaptiveCable™ *Wall Plates*

MFJ-4614
For 4 Cables
$34.95

Bring nearly any cable -- rotator, antenna switch, coax, DC/ AC power, etc. -- through walls *without removing connectors* (up to 1¼x1⅝ inches). Sliding plates and rubber grommets adjust hole size to weather-seal virtually any size cable.

Includes *stainless steel* plates for each side of wall, sliding plates, rubber grommets, weather stripping and screws.

MFJ-4612
For 2 Cables
$24.95

MFJ-4611
For 1 Cable
$14.95

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http://www.mfjenterprises.com for more info, catalog, manuals, dealers

1.8-170 MHz *plus* 415-470 MHz
MFJ HF/VHF/UHF Antenna Analyzer

All-in-one handheld antenna test lab lets you quickly check and tune HF, VHF, UHF antennas anywhere. Covers 1.8-170 MHz and 415-470 MHz

Measures: SWR…Return Loss…Reflection Coefficient…Antenna Resistance(R), Reactance(X), Impedance(Z) and Phase Angle(degrees) . . . Coax cable loss(dB) . . . Coax cable length . . . Distance to short or open in coax … Inductance . . . Capacitance . . . Resonant Frequency . . . Bandwidth . . . Q . . . Velocity Factor . . . Attenuation . . . Has: LCD readout . . . frequency counter . . . side-by-side meters . . . Ni-MH/Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . One year No Matter What™ warranty . . .

You can instantly get a complete picture, check and tune any antenna from 1.8 to 170 MHz and 415 to 470 MHz -- an MFJ-269 exclusive -- with this rugged easy-to-use hand-held antenna test lab! You can measure virtually every antenna parameter.

You won't believe its capability and versatility. This rugged handheld unit literally replaces a workbench full of expensive delicate test equipment.

SWR Analyzer

You can read SWR, return loss, reflection coefficient and match efficiency at any frequency simultaneously at a single glance.

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!*

Coax Analyzer

You can determine velocity factor, coax loss in dB, length of coax and *distance to short or open in feet (it's like a built-in TDR).*

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 loss of coax 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!*

Inductance/Capacitance Meter

Measures inductance in uH and capacitance in pF at RF frequencies, 1.8-170 MHz.

Frequency Counter/Signal Source

You can also use it as a handy frequency counter up to 170 MHz and as a signal source for testing and alignment.

Digital and Analog displays

MFJ-269
$389.95

A high contrast LCD gives precision readings and two side-by-side analog meters make antenna adjustments smooth and easy.

415 to 470 MHz Range features

Just plug in your UHF antenna coax, set frequency and read SWR, return loss and reflection coefficient simultaneously. You can read coax cable loss in dB and match efficiency.

You can adjust UHF dipoles, verticals, yagis, quads and others and determine their SWR, resonant frequency and bandwidth.

You can test and tune stubs and coax lines. You can manually determine velocity factor and impedances of transmission lines.

You can adjust/test RF matching networks and RF amplifiers without applying power.

Has easy-to-read LCD *logarithmic* SWR bargraph and SWR meter for quick tuning.

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!*

Super Easy-to-Use

Select a band and mode. Set frequency. Your measurements are instantly displayed! Smooth reduction drive tuning makes setting frequency easy.

Take it anywhere

Take it anywhere - to remote sites, up towers, in cramp places. Fully portable -- battery operated, compact 4Wx2Dx6¾ in., weighs 2 lbs. *Free* "N" to SO-239 adapter.

Has battery saver, low battery warning and built-in charging circuit for rechargeables.

Use 10 AA Ni-MH or Ni-Cad or alkaline batteries (not incl.) or 110VAC with MFJ-1312D, $15.95.

MFJ SWR Analyzer Accessories

MFJ-39C, $24.95.
Tote your MFJ-269 anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories. Made of special foam-filled fabric, the MFJ-39C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm. Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends. Has clear protective window for frequency display and cutouts for knobs and connectors.

MFJ-66, $24.95.

Plug these MFJ dip meter coupling coils into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate *band switched* dip meter. Set of two coils cover 1.8-170 MHz depending on your MFJ-269 *SWR Analyzer*™.

MFJ-99C, $40.90.
SWR** Analyzer Power Pack.* 10 Pack MFJ *SuperCell*™ Ni-MH batteries, and power supply for SWR analyzers. ***Save $5!

MFJ-98, $60.85.
MFJ-269** Accessory Pack.* MFJ-39C *custom* Carrying Pouch, MFJ-66 dip coils, power supply for MFJ-269. ***Save $5!

MFJ-98B, $88.90.
MFJ-269** Deluxe Accessory Pack.* Complete accessory pack! MFJ-39C Pouch, 10 Ni-MH batteries, dip coils, power supply. ***Save $7!

MFJ-269*PRO*™ Analyzer

Like MFJ-269, but has extended coverage in UHF range ***(430 to 520 MHz)*** and ruggedized cabinet that protects LCD display, knobs, meters and connectors from damage.

MFJ-269*PRO*
$419.95

MFJ-259B HF/VHF Antenna *SWRAnalyzer*™

MFJ-259B
$289.95

The world's most popular antenna analyzer gives you a complete picture of your antenna performance 1.8 to 170 MHz.

It's Super easy-to-use -- makes tuning your antennas quick, painless and easy.

Read antenna SWR, complex impedance, return loss, reflection coefficient. Determine velocity factor, coax cable loss in dB, length of coax and distance to short or open in feet. Read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information. Built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

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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...Wide Range

SWR/Wattmeter, 10000 VA Memories

Extra *wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

MFJ-991B $219.95

200 Watt...Compact

Digital Meter, Ant Switch, Wide Range

World's fastest compact auto tuner uses MFJ *Adaptive Search*™ and *InstantRecall*™ algorithms. 132,072 tuning solutions instantly match virtually any antenna with near perfect SWR.

MFJ-929 $219.95

200 Watt ...Econo

Small, Ant Switch, 20K VA Memories

High-speed, wide matching range and compactness at low cost! Leave in-line and forget it -- your antenna is *always* automatically tuned! 2-position antenna switch.

MFJ-928 $199.95

200 Watt *MightyMite*™

Matches IC-706, FT-857D, TS-50S

No *extra space needed!* Just set your IC-706/7000, FT-857D, TS-50S on top of this matching low-profile automatic tuner -- it's all you need for a completely automated station using *any* antenna! Just tune and talk!

MFJ-925 $179.95

G5RV Antenna

MFJ-1778 $44.95

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 Meters as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

200W...Weather-sealed

for Remote/Outdoor/Marine

MFJ-926 $399.95

Fully *weather-sealed for remote Outdoor/Marine use*! Tough, durable, built-to-last the elements for years.

200 Watt...Remote

Coax/Wire Ant, No pwr cable needed

MFJ-927 $259.95

Weather protected fully automatic *remote* auto tuner for wire ***and*** *coax* antennas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.

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MFJ TUNERS

New, Improved MFJ-989D 1500 Watt *legal limit* Antenna Tuner

World's most popular 1500 Watt Legal Limit Tuner just got better -- much better -- gives you more for your money!

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. It easily handles *full* 1500 Watts SSB/CW, 1.8 to 30 MHz, including MARS/WARC bands.

New dual 500 pF *air variable capacitors* give you twice the capacitance for more efficient operation on 160 and 80 Meters.

New, improved *AirCore™ Roller Inductor* gives you lower losses, higher Q and handles more power more efficiently.

New TrueActive™ peak reading Cross-Needle *SWR/Wattmeter* lets you read *true* peak power on all modes.

MFJ-989D
$389.95

New high voltage *current balun* lets you tune balanced lines at high power with no worries.

New crank knob lets you reset your roller inductor quickly, smoothly and accurately.

New larger 2-inch diameter *capacitor knobs* with easy-to-see dials make tuning much easier.

New cabinet maintains components' high-Q. Generous air vents keep components cool. $12^{7}/_{8}$Wx6Hx$11^{5}/_{8}$D inches.

Includes six position ceramic antenna switch, 50 Ohm dummy load, indestructible multi-color Lexan front panel with detailed logging scales and legends.

The MFJ-989D uses the superb time-tested T-Network. It has the widest matching range and is the easiest to use of all matching networks. Now with MFJ's new 500 pF air variable capacitors and new low loss roller inductor, it easily handles higher power much more efficiently.

***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-986 Two knob ***Differential-T™***

MFJ-986
$349.95

Two knob tuning (differential capacitor and *AirCore™* roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. $10^{3}/_{4}$Wx$4^{1}/_{2}$Hx15 in.

MFJ-962D ***compact*** kW Tuner

MFJ-962D
$299.95

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore™* roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. $10^{3}/_{4}$x$4^{1}/_{2}$ x$10^{7}/_{8}$ in.

MFJ-969 300W ***Roller Inductor*** Tuner

MFJ-969
$219.95

Superb *AirCore™* Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune™*, antenna switch, dummy load, 4:1 balun, Lexan front panel. $3^{1}/_{2}$Hx$10^{1}/_{2}$Wx$9^{1}/_{2}$D inches.

MFJ-949E ***deluxe*** 300 Watt Tuner

MFJ-949E
$179.95

More *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, custom inductor switch, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune™*, scratch proof Lexan front panel. $3^{1}/_{2}$Hx$10^{5}/_{8}$Wx7D inches. **MFJ-948, $139.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E ***super value*** Tuner

MFJ-941E
$139.95

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek $10^{1}/_{2}$Wx$2^{1}/_{2}$Hx7D in.

MFJ-945E HF/6M ***mobile*** Tuner

MFJ-945E
$129.95

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

MFJ-971 ***portable/QRP*** Tuner

MFJ-971
$119.95

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

MFJ-901B ***smallest*** Versa Tuner

MFJ-901B
$99.95

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-902 ***Tiny Travel*** Tuner

MFJ-902
$99.95

Tiny $4^{1}/_{2}$x$2^{1}/_{4}$x3 inches, full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire.

MFJ-904H, $149.95. Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. $7^{1}/_{4}$x$2^{1}/_{4}$x$2^{3}/_{4}$ inches.

MFJ-16010 ***random wire*** Tuner

MFJ-16010
$69.95

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 ***6 Meter*** Tuners

MFJ-906
$99.95

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $69.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

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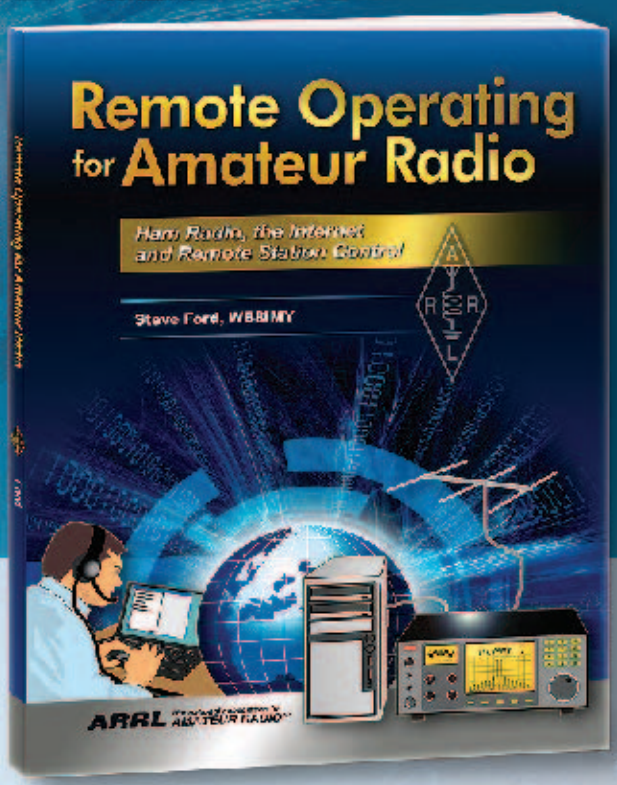

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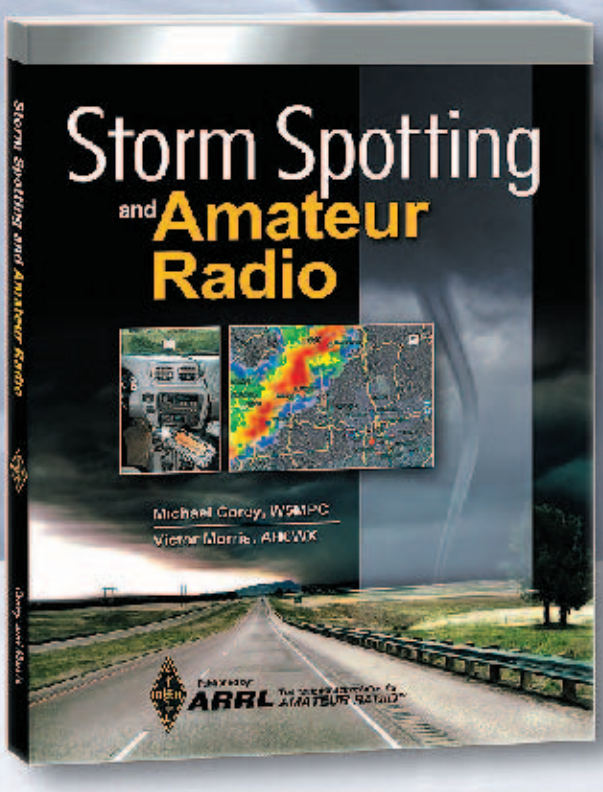

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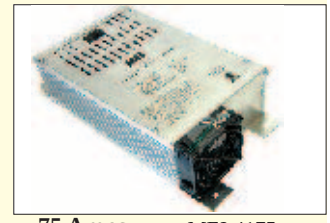

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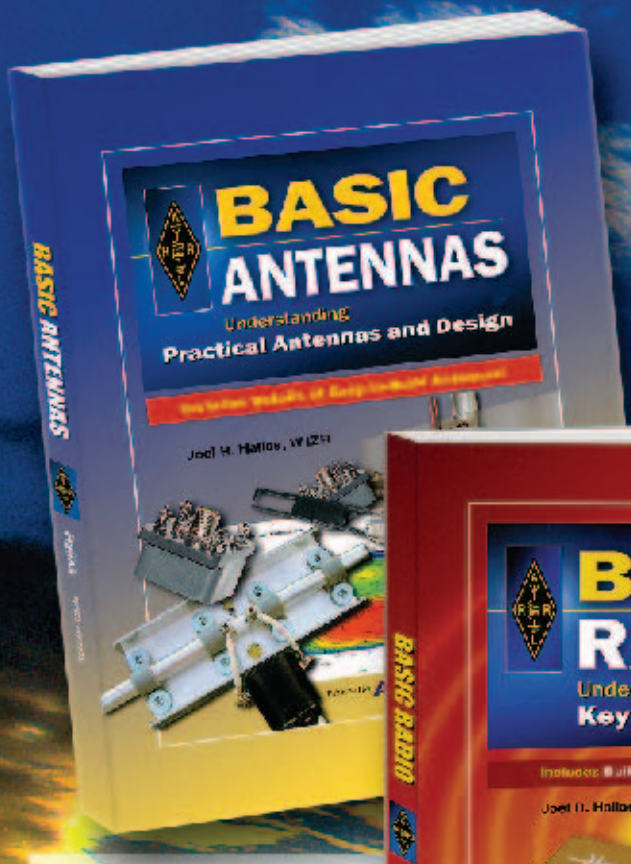

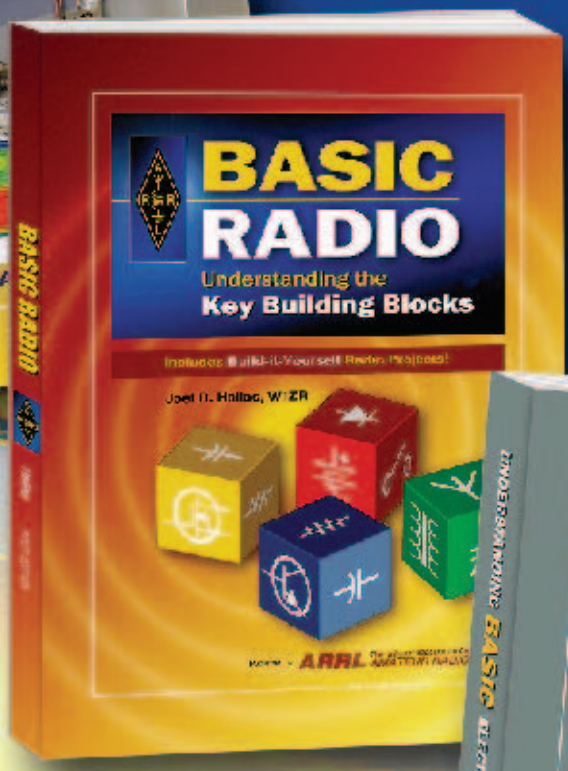

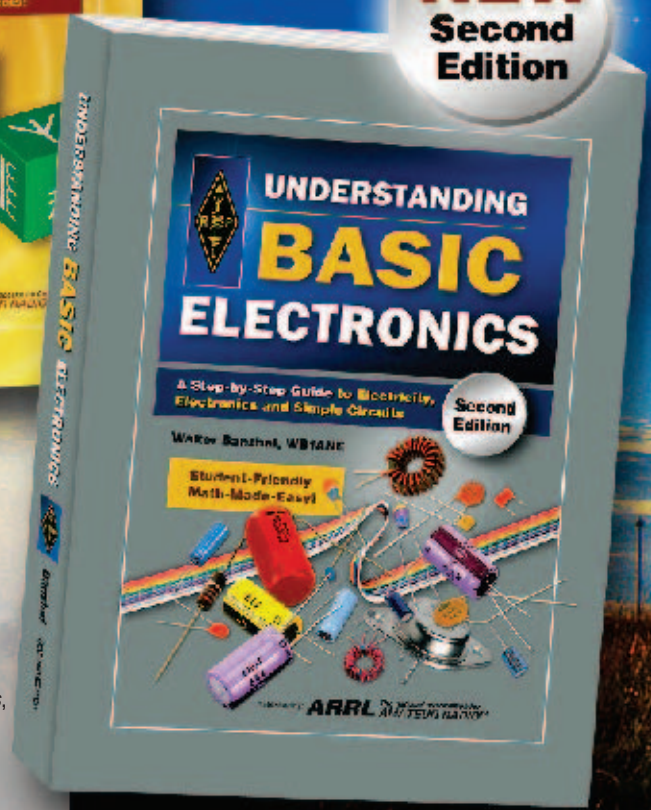

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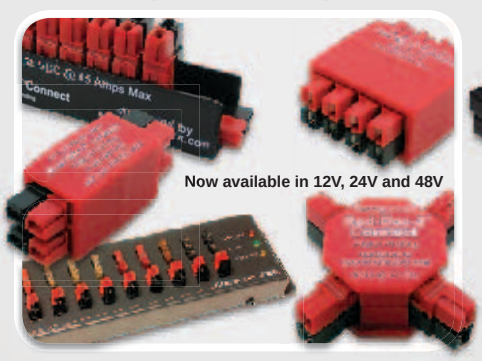

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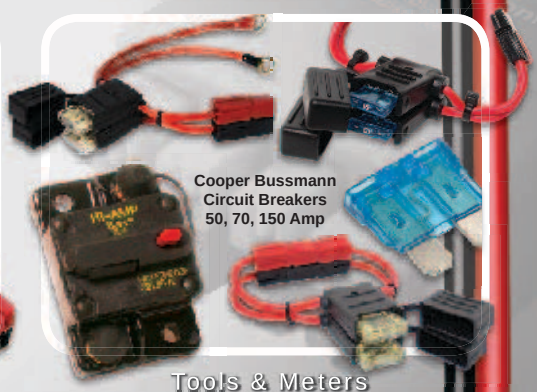

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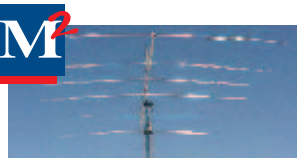

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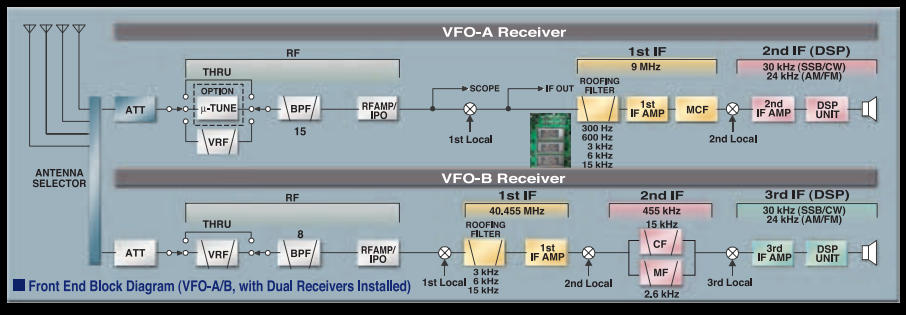

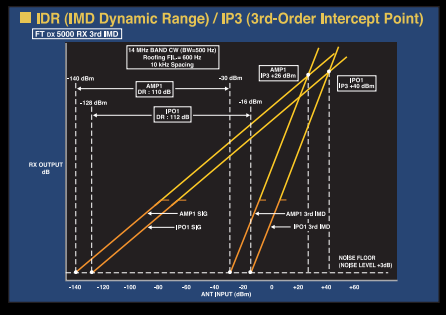

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