QST

DEVOTED ENTIRELY TO AMATEUR RADIO

JULY 2009 WWW.ARRL.ORG

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Inside:

Sun's out, surf's up, the outdoors beckons — perfect time to enjoy Amateur Radio alfresco!

See...

"Getting on the Air"

Page 51

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Official Journal of ARRL The national association for AMATEUR RADIO



NEW IC-7200 HF for the Adventurer

It's what makes the outdoors great!

With a remarkable balance between cost and performance, the IC-7200 opens the door for any new EmComm operator or the long experienced HF operators wanting to work contacts while outdoors. Don't let the small size fool you, this radio is packed full of indoor radio performance. Whether you are involved in emergency planning, on your dream DXpedition, or at your home base, this radio is built for wherever your adventures may take you. *Make your trek to an authorized Icom dealer today!*

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- Flexible Selectable Filter Width and Shape
- 6kHz Roofing Filter
- USB Port for CI-V Format PC Control and Audio In/out
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- Very Compact Design

IC-R2500

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- AM, FM and WFM (Sub)
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- Optional P25 (UT-122)
- Optional DSP (UT-106)

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*Frequency specs may vary. Refer to owner's manual for exact frequency specs.

hy-gain ROTATORS

. . . the first choice of hams around the world!

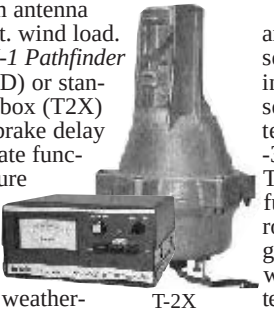
HAM-IV

HAM-IV
$649.95

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

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

TAILTWISTER SERIES II



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

T-2X
$799.95

T-2XD
$1229.95
with DCU-1

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

CD-45II

CD-45II
$449.95

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

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

HAM-V

HAM-V
$1099.95
with DCU-1

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

AR-40

AR-40
$349.95

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

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

HDR-300A

HDR-300A
$1499.95

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

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

ROTATOR OPTIONS

MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $39.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller

DCU-1
$749.95

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

AR-35 Rotator/Controller

AR-35
$89.95

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

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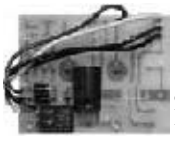
NEW! Automatic Rotator Brake Delay

RBD-5
$29.95



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

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

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Maldol **EM-5M** SO-239 / PL-259
Footprint: 1.1"x .75"
Max Antenna: 40"

For Medium Size Antennas

MODEL / ANT CONN / COAX CONN

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

For Tall or Multi-band HF Antennas

MODEL / ANT CONN / COAX CONN

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

COMET and Maldol Mobile

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This Month in QST

July 2009 ♦ Volume 93 Number 7

QST (ISSN:0033-4812) is published monthly as its official journal by the American Radio Relay League, Inc, 225 Main Street, Newington, CT 06111-1494, USA. Periodicals postage paid at Hartford, CT, USA and at additional mailing offices.

POSTMASTER: Send address changes to: QST, 225 Main St, Newington, CT 06111-1494, USA. Canada Post: Publications Mail Agreement #40612608. Canada Returns to be sent to Bleuchip International, PO Box 25542, London, ON N6C 6B2.

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News and Features

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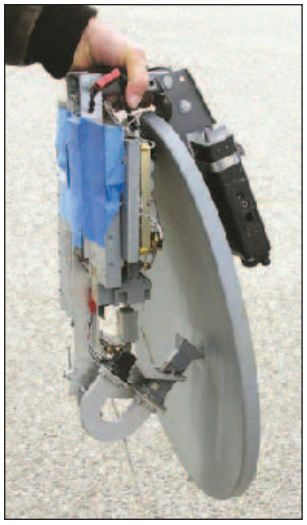

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Our Cover
It's summer and no one wants to be cooped up inside when the weather is this beautiful. *QST* Technical Editor Joel Hallas, W1ZR, enjoys operating 20 meter SSB while sailing along the Connecticut coast of Long Island Sound in his auxiliary sloop *Windfall*. For details about how to get "radio active" on the water, see page 51. Photos by Dan Murdoch. If you prefer to be out and about on the open road, check out page 63 for some travel trailer adventure with your radio.

Departments

US & Possessions: Membership in the ARRL, including a one year subscription to *QST*, is available to individuals at $39. Licensed radio amateurs age 21 and under and the eldest licensee in the household may qualify for the rate of $20. Life Membership, including a subscription to *QST* is available at $975.* Membership and *QST* cannot be separated. Libraries and institutions, $39 per year. Single copies $5.

International
To compensate for additional postage for mailing outside the US, the following rates apply:

Canada: Membership in the ARRL, including a one year subscription to *QST*, $49, payable in US funds. Life Membership, including a subscription to *QST* is available at $1225.* Libraries and institutions, $49 per year.

All Other Countries: Membership in the ARRL, including a one year subscription to *QST*, $62, payable in US funds. Life Membership, including a subscription to *QST* is available at $1550.* Libraries and institutions, $62 per year.

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Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.

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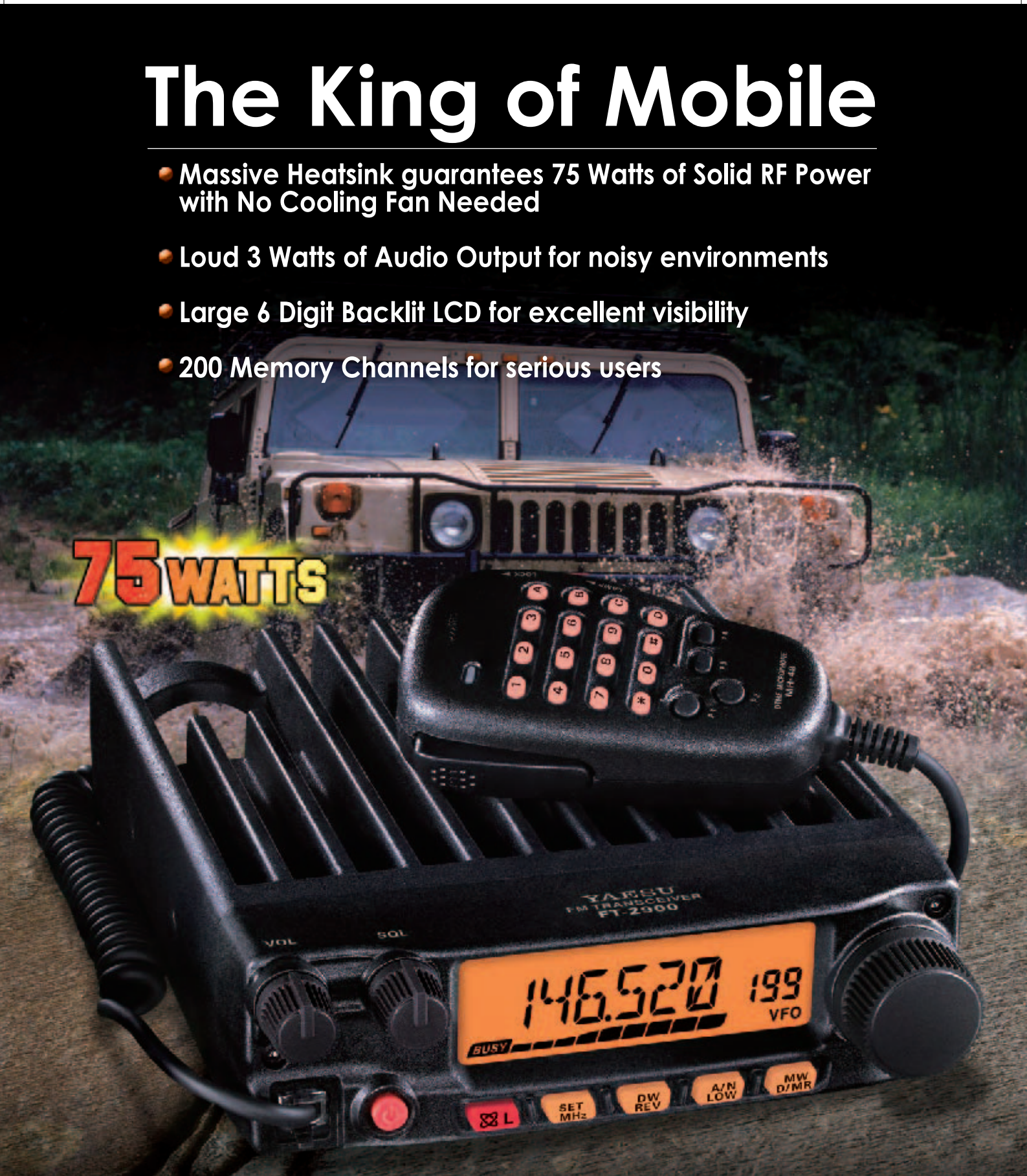

NEW

HEAVY-DUTY 75 W 2 m FM TRANSCEIVER

FT-2900R

Size: 6.3" (W) x 2.0" (H) x 7.3" (D) / Weight: 4.0 lb

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Actual Size

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Wide Range of available Options includes:

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2 m MONO BAND

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"It Seems to Us"

Support HR 2160!

"Who was the first ham to be told he (or she) couldn't put up an antenna? Whoever it was is no longer with us and their identity is lost in the mists of history, but over the ensuing decades they have had plenty of company."

Overcoming neighborhood and local objections to antennas has been a challenge for radio amateurs from the earliest experimenters right up to the present day — and in many places it's getting worse. In 1985, years of persuasion by the ARRL led the FCC finally to issue a Memorandum Opinion and Order preempting overly restrictive local ordinances and state laws that would prevent us from having effective antennas. The Commission found that the federal interest in promoting amateur communications required that "…local regulations which involve placement, screening, or height of antennas based on health, safety, or aesthetic considerations must be crafted to accommodate reasonably amateur communications, and to represent the minimum practicable regulation to accomplish the local authority's legitimate purpose." This limited preemption policy, popularly known as PRB-1, subsequently was written into Part 97 of the FCC Rules.

A majority of the states have codified PRB-1 into their statutes, including several that have gone beyond PRB-1 to specify antenna heights below which local governments may not regulate. Even the statutes that simply restate the PRB-1 policy are very useful, because local land use officials are much more likely to refer to state law than to FCC policy when drafting and applying their local ordinances.

Thus, PRB-1 has been a boon to thousands of amateurs. As a result the amateur community is better equipped and better prepared to be of service in time of need.

One area that PRB-1 did not address is that of restrictive covenants in private contractual agreements. In 1985 the FCC concluded that such restrictions were voluntarily accepted by the buyer or tenant and therefore would not usually concern the Commission. Subsequent efforts by the ARRL and others have not changed the Commission's mind. Rather, we were told, the FCC would only address restrictive covenants if so instructed by Congress.

Interfering in private contracts is not something that most legislators like to do. However, in many parts of the country — particularly those with the greatest population growth — there is nothing voluntary about a buyer's acceptance of such covenants. As a practical matter there is little or no choice; the available stock of desirable residential property is all subject to covenants.

In May 2002 Rep Steve Israel of New York introduced the Amateur Radio Communications Consistency Act to require reasonable accommodation of amateur communications in private land use regulations. His bill attracted 35 co-sponsors before it died at the end of the 107th Congress later that year. Rep Israel reintroduced it the following year in the 108th Congress and 36 co-sponsors signed on, but again it died without action at the end of 2004. On his third attempt we were only able to find 10 co-sponsors and could not move the bill before it died at the end of the 109th Congress in 2006. Clearly, a different approach was needed.

During the 110th Congress the ARRL sought a sponsor for an extension of existing preemption policies that limit restrictions on antennas for television and broadband services. Toward the end of last year we finally found a sympathetic ear in the office of Rep Sheila Jackson-Lee of Texas. Rep Jackson-Lee had been impressed with the work of amateurs during Hurricane Ike and was willing to work with the ARRL to develop legislation for introduction in the 111th.

On April 29 Rep Jackson-Lee introduced HR 2160, the Amateur Radio Emergency Communications Enhancement Act of 2009, on behalf of herself and five original co-sponsors. The bill instructs the Secretary of Homeland Security to undertake a study on the uses and capabilities of Amateur Radio communications in emergencies and disaster relief, including the identification of unreasonable or unnecessary impediments such as the effects of private land use regulations on residential antenna installations, and to make recommendations regarding such impediments. The study would evaluate Section 207 of the Telecommunications Act of 1996 and would recommend whether it should be modified to prevent unreasonable private land use restrictions that impair the ability of amateurs to conduct, or prepare to conduct, emergency communications by means of effective outdoor antennas and support structures at reasonable heights and dimensions for the purpose, in residential areas.

Whether or not you are now affected by restrictive covenants, the ARRL needs all members to get behind this legislation. More information is in "Happenings" this month (page 66). If you are logged into the Members Only section of the ARRL Web site, **www.arrl.org/members-only/** shows the name and address of your member of Congress and provides a link to a sample letter of support for HR 2160. Please write your Representative (there is no bill on the Senate side yet) and ask that they sign on as a co-sponsor. If you are a constituent of the sponsor or one of the co-sponsors, please drop him or her a note of thanks for their early support.

Chwat & Company, the ARRL's legislative relations consultant, is collecting letters for hand delivery to Congressional offices. Send your letter to Chwat & Co or, if you prefer to send it directly to your Representative, please send them a copy. Any of the following three methods will work: as a signed e-mail attachment to **arrl@chwatco.com**, as a fax to 703-685-7594, or by regular mail to John Chwat, Chwat & Co, 625 Slaters Ln Suite 103, Alexandria, VA 22314.

HR 2160 will not solve our antenna problems overnight, but it is a meaningful and realistic step in the right direction. Let's pull together to make it happen!

David Sumner, K1ZZ
ARRL Chief Executive Officer

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

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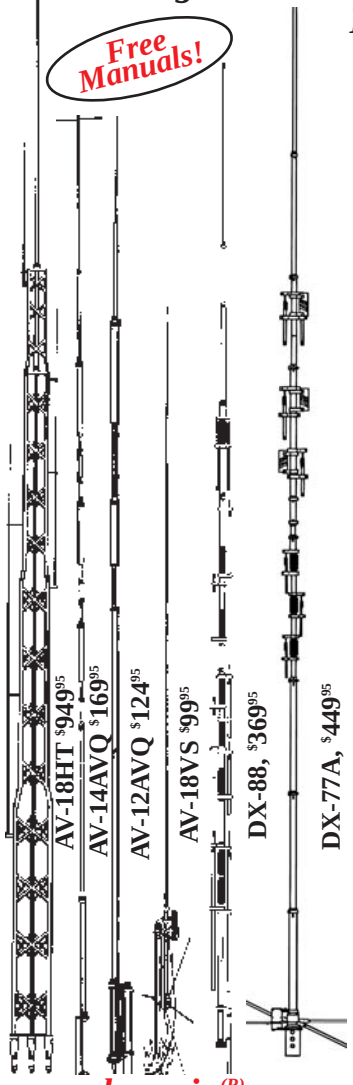


hy-gain(R) Classics

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

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

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

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

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

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

Two year limited warranty.

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

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

AV-14AVQ, $169.95. (10,15,20,40 Meters). 18 ft., 9 lbs. **The** Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $124.95. (10, 15, 20 Meters). 13 ft., 9 lbs. **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

AV-18VS, $99.95. (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

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

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

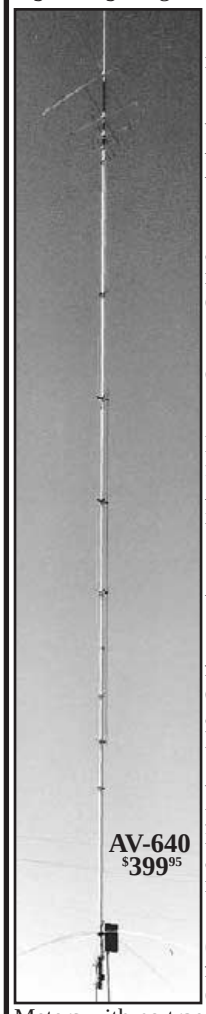
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
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 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

hy-gain(R) PATRIOT

Hy-Gain's new PATRIOT HF verticals are the best built, best performing and best priced multiband verticals available today. For exciting DX make full use of your sunspot cycle with the PATRIOT's *low 17 degree angle* signal.



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

Single coax cable feed. Each band is individually tunable. Extra wide VSWR bandwidth. End fed with broadband matching unit.

Sleek and low-profile

Low 2.5 sq. ft. wind surface area. Small area required for mounting. Mounts easily on decks, roofs and patios.

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

Built-to-last

High wind survival of 80 mph. Broadband matching unit made from all *Teflon*(R) insulated wire. Aircraft quality aluminum tubing, stainless steel hardware.

hy-gain(R) warranty

Two year limited warranty. All replacement parts in stock.

AV-640, $399.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $299.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

- ARRL Chief Executive Officer David Sumner, K1ZZ, visited Representative Sheila Jackson-Lee (D-TX) in her Washington, DC office to express thanks, on behalf of the Amateur Radio community, for her sponsorship of a bill that would "encourage and protect" Amateur Radio public service. To support the bill, HR 2160, the ARRL asked its membership to in turn ask their congressional representatives to be co-sponsors.
- This year's ARRL National Convention at the Dayton Hamvention attracted throngs of enthusiastic hams at the Hara Arena. Details are in the article on page 58.
- In response to a Freedom of Information request from the ARRL, the FCC has released the redacted portions of the studies on which they relied with regard to its BPL rulemaking in 2004. See Happenings for more information.
- The FCC has posted the first list of enforcement actions — 11 RFI-related letters and 7 warning letters to individuals — since Laura Smith took over as FCC Special Counsel.
- The first PIO Excellence Awards were bestowed upon three ARRL public information volunteers who helped explain the role of Amateur Radio to the media and the public.
- An international panel of experts has predicted that Solar Cycle 24 will peak in May 2013 and will be the weakest since Solar Cycle 16 peaked in 1928.
- Southeastern Division Vice Director Sandy Donahue, W4RU, of Dothan, Alabama, passed away on May 4.
- President Obama has announced his intention to nominate Mignon L. Clyburn of South Carolina as an FCC Commissioner.
- The ARRL Foundation Board of Directors has awarded 52 scholarships to students in 21 states.
- ARRL DXCC Manager Bill Moore, NC1L, reports that two 2009 operations have been approved for DXCC credit: Western Sahara (S04R) and North Cook Island (E51QQQ).
- The winner of the *QST* Cover Plaque Award for April is Larry Banks, W1DYJ, for his article "A 20 Meter Moxon Antenna."
- These online course sessions began June 5: Amateur Radio Emergency Communications Level 1; Radio Frequency Interference; Antenna Design and Construction; Ham Radio (Technician) License Course; Analog Electronics, and Digital Electronics.

First Triple Play Award: And the Winner is...

Congratulations to Dave Strout, W2YC, of Williamstown, New Jersey, who earned the first ARRL Triple Play Award. Southern New Jersey Section Manager George Strayline, N3GZ (left) presented the award at the April 1 meeting of the Gloucester County ARC; Dave is a long-time club member.

Competition for the Triple Play Worked All States Award kicked off January 1. It's available to those who confirm contacts with all 50 states using three modes for each state: CW, phone and RTTY/digital. — *tnx Doug Gehring, WA2NPD*

RAY MARTIN, W2RM

Dave Strout, W2YC, accepts ARRL Triple Play Award #1 from SNJ Section Manager George Strayline, N3GZ.

Media Hits

Allen Pitts, W1AGP

- The fallout and commentary following the cutting of fiber optic cables in California continued through April and into May. BusinessInsider.com (NY) had an excellent article by Bruce Perens in which he points out that two-way radios worked while cellular services failed. "A big plus for Morgan Hill was that emergency services had a well-practiced partnership with the local hams." Perens had an even more pointed article on Slashdot.com, a national forum for technical developments and a favorite haunt of gadget fanatics. "Although they are silent on the topic, I hope those responsible for emergency services, be they in business or government, are learning the lessons of Morgan Hill. The first lesson is what stayed up: stand-alone radio systems and not much else."
- Meanwhile, in the *Morgan Hill Times* (CA) Michael Moore wrote an equally acute piece about the hams, saying, "A corps of Morgan Hill's amateur radio operators were among the first responders roused out of bed as soon as local police learned the 911 dispatch center was unable to receive calls from standard communication lines."
- Angela Hill's writing about the event appeared in the *Oakland Tribune*, *Contra Costa Times*, Bay Area News Group and the InsideBayArea.com (CA) Web site. She noted the lack of outrage over the frailty of communications systems that can be so easily compromised. Then, looking for a solution, she writes: "I have it! Emergency hams!" "[Hams] help out in emergencies when the fancy-schmancy high-tech systems go south."
- The lesson was not missed by other cities in the region. Jessica York, a *Times Herald* (Vallejo, CA) staff writer, chimed in. "If this city lost all its phone lines like Santa Clara County recently did, there's at least a 94 percent chance that emergency communications wouldn't miss a beat. That's because of a small army of Ham Radio enthusiasts…"
- An international media hit came from ARRL HQ itself recently when the BBC's World News Service interviewed me about Amateur Radio, the IARU's World Amateur Radio Day and Amateur Radio's role in response to events like the recent Italian earthquake. The interview was broadcast worldwide on their radio services.
- Nunzio Addabbo, W4VYD, has gotten media attention in several places including the *Arizona Daily Star* (Tucson, AZ) for authoring his recent book about the *Ham Radio Heroes,* which tells great stories of Amateur Radio's past.
- As usual, there were dozens of really good personality pieces written about local hams and almost any one of them could (and should) be included here. With the coming redesign of the ARRL's Web site, I hope all of them will be listed there in the future. But one of them stands out: WBOY-TV and the *State Journal* (Charleston, WV) reported on Patty Roberts, KD8KZA, and the actions of Fred Sudor, WV8BU, and friends in providing Patty with radio and computer gear. While Patty has significant personal problems of her own, she daily gives hours to others in volunteer work. She wanted to also work with ARES® and EmComm activities. She got her license, and now she owns a radio too. It was a great story that makes you proud to be a ham.

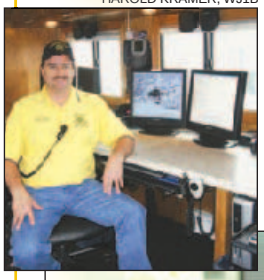
NAB Show Brings Hams (and Others) to Vegas

Once again this year, among the 80,000-plus who showed up at the National Association of Broadcasters convention in Las Vegas was a large contingent of Amateur Radio operators. At the Amateur Radio Operators Reception, ARRL Media and Public Relations Manager Allen Pitts, W1AGP, and Pacific Division Director Bob Vallio, W6RGG, presented the Bill Leonard Professional Media Award to Ted Randall, WB8PUM. Bob Heil, K9EID, of Heil Sound, the major sponsor of the reception, presented Ted with a special microphone. Thanks to NAB Science & Technology VP John Marino, KR1O, the ARRL had a booth in the main hallway of the Las Vegas Convention Center. — *tnx Fried Heyn, WA6WZO*

FRIED HEYN, WA6WZO

Leonard Award presentation: **From the left — Allen Pitts, W1AGP; Ted Randall, WB8PUM; Bob Heil, K9EID, and Bob Vallio, W6RGG.**

HAROLD KRAMER, WJ1B



At the Ecomm Hamfest/ ARRL Utah State Convention: **From the left – ARRL COO Harold Kramer, WJ1B; Rocky Mountain Division Vice Director Dwayne Allen, WY7FD, and RM Director Brian Mileshosky, N5ZGT. Inset — Rick Milligan, KE7IJY, mans the impressively equipped Ecomm van at the Convention, held in Ogden in late April.**

MATT ZUNDEL, KD7HHW

Inside HQ

The ARRL Technical Relations Office

The ARRL Technical Relations Office advocates for and protects our Amateur Radio spectrum both in Washington and internationally. The TRO is located in Fairfax, Virginia just outside of Washington, DC. Its prime directive: Don't lose spectrum.

The office is headed by Brennan Price, N4QX, ARRL Technical Relations Manager. Brennan recently returned to the ARRL after serving on the ARRL staff from 2000 to 2004 as Field and Regulatory Correspondent and Assistant Technical Editor. Brennan is an attorney by trade who has practiced intellectual property and antitrust law. The TRO has one additional staffer, Technical Relations Specialist Jon Siverling, WB3ERA. Jon is an expert on South American spectrum management issues. Chief Technology Officer Paul Rinaldo, W4RI, now retired from the TRO staff, still assists as a consultant when needed. As CTO, Paul keeps up with new technologies and consults with people attempting to incorporate them into Amateur Radio.

The ARRL Technical Relations Office supports other ARRL volunteers and staffers in our advocacy efforts. For domestic spectrum policy matters, the Technical Relations Office works with the ARRL Washington team consisting of ARRL President Joel Harrison, W5ZN; Chief Executive Officer David Sumner, K1ZZ; General Counsel Chris Imlay, W3KD, and John Chwat of Chwat & Company, the ARRL's legislative relations firm. For international spectrum management issues, the TRO receives guidance from Sumner and from International Affairs Vice President Rod Stafford, W6ROD.

The TRO represents the interests of Amateur Radio operators in the United States to an alphabet soup of governmental agencies. These include the US licensing and regulatory authority — the Federal Communications Commission (FCC) along with other Executive Branch agencies such as the State Department. They are Amateur Radio's principal liaison with the NTIA, the National Telecommunications and Information Administration. The NTIA is a US Department of Commerce agency that is responsible for advising the President on telecommunications and information policies.

TRO staff also participates in US delegations to international conferences that allocate spectrum and establish global telecommunication policy. The ITU, The International Telecommunication Union, is the United Nations organization that coordinates the shared global use of the radio spectrum and establishes telecommunications standards and international frequency allocations. Every three or four years, the ITU convenes a World Radiocommunication Conference (WRC) to discuss changes to the allocation of frequencies in the RF spectrum. These WRCs require extensive preparation both domestically and internationally. The TRO actively participates in many of these preparatory meetings regarding Amateur Radio frequencies. They review the agenda, identify issues for study and contribute papers for consideration. The TRO also provides substantial support to the IARU, the International Amateur Radio Union, the organization that represents Amateur Radio internationally.

While not the most visible part of the ARRL's overall operation, the Technical Relations Office is a critical component of our advocacy and defense of frequency efforts both nationally and internationally.

73,

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

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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.

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From QST Magazine, March, 2005

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Wide-Eyed Second-Graders Visit Marconi Shack

During the month of May, the teachers at the Frank J. Carasiti Elementary School in Rocky Point, New York include a program of activities designed to make their students aware of some special things in their community. As part of that program Neil, KC2KY; Stan, W2SCB, and I give a tour of the historic Marconi shack that sits out in front of their school. We work with the second-graders and cover each of the dozen or more classes over three days. Each class consists of about 25 kids and gets a half hour lesson.

The Marconi shack is a 12 foot by 14 foot structure built by Guglielmo Marconi. This was the radio shack used in 1902 for the first attempts at communication with ships at sea from the town of Babylon, New York. It was later purchased by Major Edwin Armstrong, who gifted it to RCA. RCA moved the shack to its Radio Central station at Rocky Point, Long Island. When the facility was closed, the Marconi shack was transferred to the Frank J. Carasiti Elementary School, where it stands now on Marconi Boulevard (aka Yaphank-Rocky Point Road).

For the second grade students, I explain the history of wireless starting at the time of Lincoln, explaining how they sent messages using electricity to carry it through wires. Then I raise the question, "What if you wanted to send messages to ships at sea? You can't have a wire going out to the ship." Here, I explain the concept of wireless to them and teach them a little Morse code.

Next I pass them along to Stan, who tells the kids how Marconi was interested in wireless at a very early age and how he conducted experiments that resulted in a practical system. He goes on to explain when and where the shack was actually built and how Marconi used the shack for radio communication to ships at sea.

If you have the inclination and time to work with kids in a similar manner, I urge you to take the opportunity to do so. I'm sure you will enjoy the experience. — *Richard F. Pav, K2RFP*

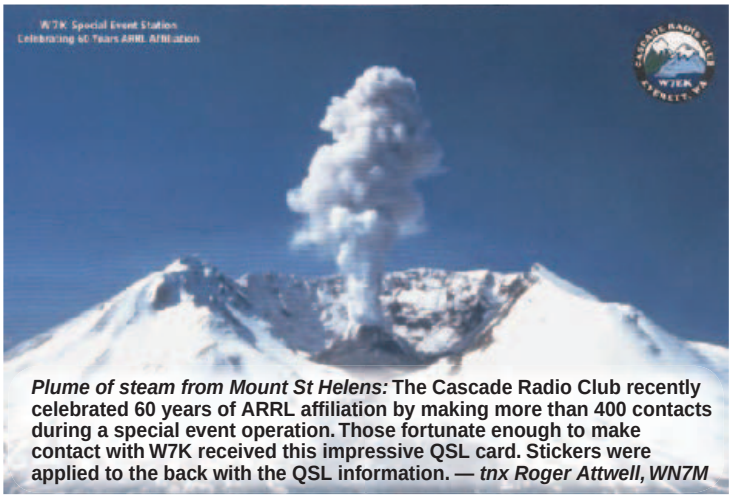
COURTESY RICHARD F. PAV, K2RFP

Dick, K2RFP; Neil, KC2KY, and Stan, W2SCB, in front of the plaque explaining the history of the Marconi shack on Long Island, New York.

ERIC SPERLEY, KA7PBC

QST is deep: **Never one to leave important stuff behind, Scott Sperley, WA7SS, checks out the latest issue of his favorite magazine at 10 meters in Curacao, Netherland Antilles. — *tnx AB7DN***

US GEOLOGICAL SURVEY PHOTO



Plume of steam from Mount St Helens: **The Cascade Radio Club recently celebrated 60 years of ARRL affiliation by making more than 400 contacts during a special event operation. Those fortunate enough to make contact with W7K received this impressive QSL card. Stickers were applied to the back with the QSL information. — *tnx Roger Attwell, WN7M***

ANDY GILLE, DL3GA/AB8AY

He lived at QST: **I took a recent week-long vacation in Portugal, where I stayed at QST (Quinta de Santa Teresinha). Once a farm (quinta), it's now an apartment block. — *DL3GA/AB8AY***

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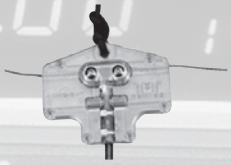

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CORRESPONDENCE

NOT YOUR GRANDSON'S HAM RADIO

♦ I read the review of the Micro-Node IRLP/EchoLink Node by Kent Johnson, W7AOR [June 2009, page 56]. It strongly reminded me of the Op-Ed piece I wrote for *QST* in November 2003, "Let's Put *Radio* Back in Ham Radio." In it, I made the point that Voice over Internet Protocol (VoIP) techniques such as IRLP and EchoLink are not ham radio, but rather are simply a telephone call made through the Internet, which is a worldwide *wired* network. A very small percentage of the total may be radio, such as a repeater link for a few miles at each end. This is certainly not ham radio by my definition. VoIP contacts like this are no different than cell phone-to-cell phone calls that we make every day, and we correctly call them phone calls.

This statement from the review concerns me: "Hams can also join the network directly without using radios. They simply plug microphone/headsets into their computers." Now we have reached such an extreme that no RF at all is involved — two hams just talk to each other through the Internet. My question now is: Why do the users need a ham license? No RF is emitted, so do the FCC rules regarding ham radio operation even apply? I am not saying that hams should not use these innovative techniques, as they can be lots of fun. Just don't call them ham radio. They are a telephone call.

SUMNER WEISMAN, W1VIV
Framingham, Massachusetts

AN INVITATION TO THE PARTY

♦ The article by ARRL Technical Relations Manager Brennan Price, N4QX, about 40 meters really hit the nail on the head ["Party Time on 40 Meters!" April 2009, pages 60-61]. What a joy this band has become for someone who has avoided the phone section for over 40 years. While there are still broadcast stations to contend with — especially during the morning hours here on the West Coast — it is a pleasure to work someone only a few hundred miles away and then slide over and work DX into Europe or the far Pacific. I have made many new friends here and abroad. My modest station of 500 W and a fair amount of wire has opened up many new challenges and offered many rewards in the few weeks I have been operating it. Many thanks go to the ARRL and the others who fought hard to bring this exciting band to us.

SCOTT HENDRICKS, WA7IPM
Milton Freewater, Oregon

BROAD BANDS

♦ I have a broad background in finance and economics, but a so-so technical background. Lately, I have noticed that most of the articles in *QST* have been quite technical, almost requiring a strong electronics understanding. I am sure that I am not alone, and I find it very frustrating reading the articles. Amateur Radio has become almost too technical and for us older guys and may be somewhat difficult to understand at times, even to the point of having to show your longitude and latitude when making a contact. I don't think the hobby was meant to go that far. In future articles, I would like to see a humanistic approach to Amateur Radio where we read about hams doing interesting things and providing service to the nation.

ALAN SHERMAN, W2NIR
West Long Branch, New Jersey

♢ **QST** ***Managing Editor N1BKE responds****: I receive complaints similar to yours from time to time, and about an equal number chastising us for glossing over the technical aspects of Amateur Radio. Our job each month, as we plan the next issue, is to strike a healthy balance between the technical and what we call the "general interest" section — basically, hams having fun with radio. With a limited number of pages available for articles each month, you can see our dilemma. If we stray too far in one direction or the other, we will not be serving the interests of readers on the other side of the fence.*

HEY, WHAT'S THAT GUY DOING?

♦ I frequently enjoy using what I call my "shack-in-a-box" for portable ham radio operations. Since I usually set up in public parks, I often find myself getting strange looks from people passing by. Some people stop and ask me what I'm doing. I recently came up with an idea that would explain what I was doing and at the same time, promote Amateur Radio.

For the past several years, I have created my own QSL cards using one of the many inexpensive software programs on the market. I decided to make simple informational cards that I could carry with me and give out to those who ask about ham radio. The front of the card has a picture of one of my portable operations with the caption, "Hey, what's that guy doing?" On the back of the card, I have a couple of paragraphs that briefly describe what Amateur Radio is all about, including a Web link to the ARRL so they can find out more information.

PAUL HUFF, N8XMS
Livonia, Michigan

THE LAST WORD ON PHONETICS?

♦ I received my June *QST* today and read more twaddle on the phonetic alphabet ["Correspondence," page 24]. When I first started in radio, A was "Ack," B was "Beer." Then the changes started: A became "Adam," then "Able" until NATO changed it to "Alfa" (why didn't B become "Beta"?). I've been hamming (ah! H for "Hamming") for well over 60 years and can't recall ever missing a call — even from Japan.

I belong to the NSW State Emergency Service where we use the phonetic alphabet. It still makes me flinch when a rescue op says "Romeo that," but I know he means "Roger out." So leave it alone — we all smarten up when an emergency occurs. In the meantime, enjoy our wonderful hobby. Use CW and other digital modes where you don't need phonetics.

DAVID PILLEY, VK2AYD
Wauchope, New South Wales, Australia

KEEPING UP TO DATE

♦ I read June 2009's "Inside HQ" column with particular interest ["Emergency Communications Courses Update," page 13]. As it happens, I recently completed the first EmComm course; I bought the book for EmComm II and was in the process of studying it before going through the full course online. Your article was the most complete explanation about what is going on that I have seen to date.

JOE DUNPHY, K9MBA
Clifton, New Jersey

NOT YOUR GRANDFATHER'S HAM RADIO

♦ I just completed a VoIP contact with a ham named Alex in Sweden; it was his first contact. We both really got a big kick out of the QSO: Alex was celebrating getting his ham ticket a week ago in Sweden. At my age of 77, I too was celebrating 50 years of Amateur Radio Service. Isn't this new technology wonderful?

JOE ABAD, K4OLA
Tampa, Florida

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

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Z-11Pro

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. All cables included. ***Suggested Price $179***

NEW! 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***

AT-100Pro

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, allowing you to switch instantly between two antennas. The AT-100Pro requires just 1 watt for operation, but will handle up to 125 watts. All cables included. ***Suggested Price $219***

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NEW! M-7700 For IC-7700. 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-7700 and the virtual meter on your radio can work together. ***Suggested Price $79.99***

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. All cables included. ***Suggested Price $599***

NEW! 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***

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LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver. Has 2,000 memories for instant recall. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers. ***Suggested Price $199.99***

NEW! 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***

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. All cables included. ***Suggested Price $249***

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K6KR*

Robert Dorbecker,
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Rusty Epps, W6OAT

William Gerhold, K2WH

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Walter Groce, AJ1L

Elliot Gross, KB2TZ*

Fried Heyn, WA6WZO
and Sandra Heyn, WA6WZN

Douglas S. Hilton, WDØUG
and Diane S. Hilton, KI4LMO

Thomas H. Hodgson, W3DNN

Geoff Howard, WØCG, PJ2DX

Robert Kares, K3SUH

Christopher J. Karpinsky, AA1VL

Steven Katz, N8WL
and Constance Barsky, WD8ODC

Dave Kersten, N8AUH

Don Lisle, K6IPV*

William Marx, W2CQ

Richard Mondro, K4FQT

Theodore Morris, WB8VNV

Dennis Motschenbacher, K7BV

Art Pahr, K9XJ

Bruce Pfeiffer, N7CPP

Benjamin Poinsett, K3BP

Keith D. Pugh, W5IU

John Putnam, W1DRG

Wendy Quinn, W1DY
and Lawrence Quinn

George Race, WB8BGY
and Barbara Race, WB8UWX

Michael M. Raskin, W4UM
and Sherry L. Raskin, W4SLR*

John P. Rautenstrauch, N2MTG

Alfred Rousseau, W1FJ

Joseph Schroeder, W9JUV

Claudie & Herb Schuler, K2HPV*

Arnold Shatz, N6HC
and Sheryl Shatz, KA6DOW

Walton Stinson, WØCP
and Mary Stinson, KØZV

John Thornton, W6HD
and Jane Thornton, KF6QHP

Robert B. Wareham, NØESQ

James E. Weaver, K8JE
and Janice E. Weaver

John Welch, KE6K

Steven West, W7SMW
and Donna Karam, KC5FTN*

Lee Wical, KH6BZF/7J1AAP

Anonymous: 30

Homebrew Coaxial Dipole for VHF or UHF

Here's a base station antenna you can easily build for 146, 220 or 440 MHz. Performance is equal to a J-pole, but it's smaller, less obtrusive and more weatherproof.

John E. Portune, W6NBC

Hams like to build antennas, especially if they're made from ordinary hardware store items and can be assembled with common hand tools. Here is a homebrew coaxial dipole built from a small stainless whip, a length of threaded table-lamp tubing and some ¾ inch copper and PVC fittings. The one shown is for 440 MHz but it can readily be scaled for 146 or 220 MHz.

For homebrew vertical VHF antennas, coaxial dipoles often play second fiddle to J-poles. That's because the center connection to coax is often difficult to fabricate in the home workshop. Yet both antennas have the same performance. They're both full sized, half wave vertical dipoles, and the coaxial is shorter.

Making a Coaxial Dipole

If you start with a common half wave (λ/2) stainless whip and extend it all the way down through a λ/2 long support tubing, here made from a threaded table lamp tube, the lower part of the whip becomes the center conductor of a short length of rigid coax feeding the center of the antenna. Now connection to normal coax is easily made below the antenna. To form the rigid coax section, you'll need to insulate the center conductor (lower part of the stainless whip) from the lamp tubing with some ¼ inch inside diameter (ID) polyethylene tubing. Hardware stores normally carry it. This short length of rigid coax formed in this way isn't precisely 50 Ω characteristic impedance, but the difference is totally insignificant. The drawing in Figure 1 shows the details.

Assembly Details

The bottom half (λ/4) of the radiating dipole is a coaxial sleeve made from ¾ inch copper pipe and a pipe cap. The coax feed runs up its center to the connector at the bottom of the lamp tubing. Support and insulation of the bottom of the sleeve is provided by a ¾ inch CPVC plastic pipe cap. For those not familiar with CPVC fittings, they're made to mate with copper pipe and can handle high water temperatures. That's not true of common PVC fittings. Most hardware stores now carry CPVC. Drill a ⅜ inch hole in the center top of the copper and the CPVC caps for the lamp tubing to pass through.

The whole antenna is held together by two lamp tubing nuts and a plastic lamp finial, also readily available at hardware stores (see Figure 2). Note that a lamp tubing nut is also required inside the copper pipe cap. Drill a small hole in the middle of the lamp finial for the stainless whip. On the bottom of lamp tubing below the antenna install a 1¼ inch common PVC pipe cap, and secure it with two more lamp tubing nuts. This gives you a way to easily mount the antenna on top of any convenient length of 1¼ inch

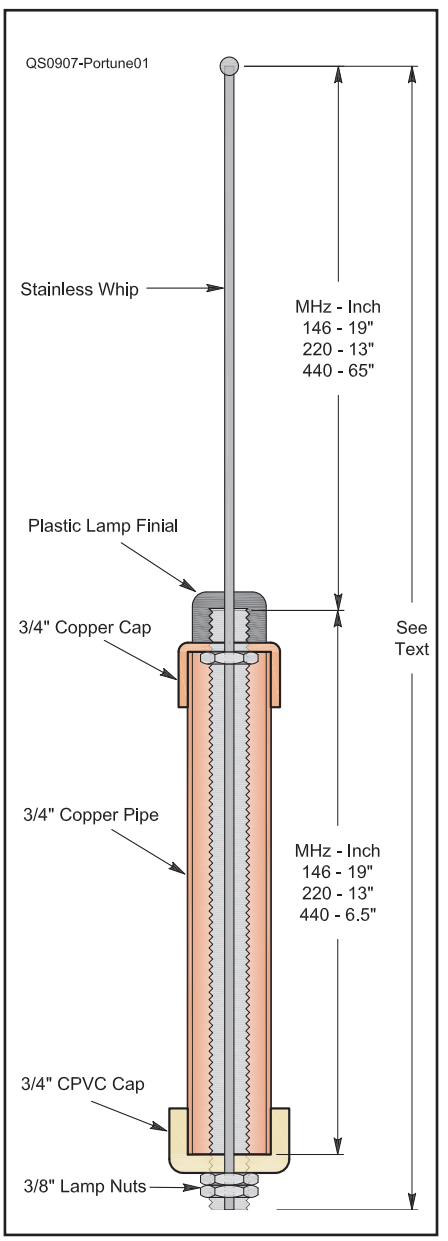


Figure 1 — Dimensioned drawing of coaxial dipole for three bands.

PVC pipe. Run the coax feed down through the PVC pipe.

Hooking it Up

A conventional PL-259 UHF type coax connector for RG-8 coax will actually screw onto the bottom of the lamp tubing. The threads are not a perfect fit, but will tighten satisfactorily. The stainless whip runs down all the way to the very tip of the PL-259 connector. Solder it in there. Before doing so, however, install all the pieces of the antenna onto the threaded lamp tubing.

Many hams may think that stainless steel won't solder. It definitely will with a hot iron and acid flux. Scrape the end of the whip and dip it in hydrochloric swimming pool acid. With a little action from the tip of the soldering iron the whip will tin perfectly well. Before soldering, however, grind two or three small side notches in the bottom end of the whip. A Dremel tool works well for this. The notches will help the solder securely lock the whip into the tip of the PL-259 connector. Neutralize any leftover acid with baking soda solution.

Perhaps surprising to some, it really isn't necessary to solder any other parts of the antenna. There is adequate mating surface at the joints for the RF to cross over efficiently. Do, however, seal all possible water access spots with common silicone RTV glue and or plastic electrical tape.

Make it for the Band You Like

There isn't an exact length required for the lamp tubing or the stainless whip. These merely need to provide enough space for all the pieces of the antenna to go together. I had a 48 inch whip on hand that I used uncut for my 146 MHz coaxial dipole and a similar 17 inch uncut whip for 440 MHz. I merely cut the lamp tubing to an appropriate length to fit the whips. What does matter, however, is the length of the whip above the top of the lamp tubing as well as the length of the coaxial sleeve. These need to be close to a $\lambda/4$. For 440 I used 6½ inches, on 220, 13 inches, and 19 inches for 146 MHz. These antennas are quite broad band and will cover the entire band in each case with these sizes. No cutting or pruning is necessary.

For ruggedness, or perhaps for stealth, you can install the whole antenna inside of 2 inch PVC water or ABS soil pipe and close the ends with end caps. I live in a mobile home park where antennas are not permitted, but my landlord thinks my coaxial dipoles (in ABS pipe) are vent pipes.

Try out one of these homebrew coaxial dipoles. You may find you prefer its smaller size, less obtrusive appearance and superior weatherproofing as compared to a J-pole.

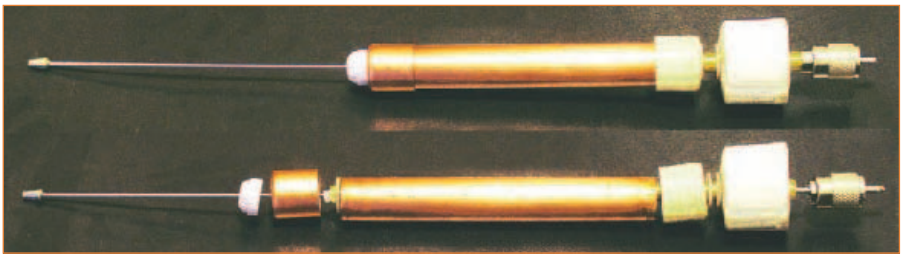


Figure 2 — Details of final assembly of coaxial dipole.

ARRL Member John Portune, W6NBC, received a BSc in physics from Oregon State University in 1960, his General Radiotelephone license in 1961 and his Advanced class amateur license in 1965. He spent five years in England as G5AJH and upgraded to Amateur Extra class in 1985 to become a volunteer examiner (VE). John retired as a broadcast television engineer and technical instructor at KNBC in Burbank and then from Sony Electronics in San Jose, California.

John is active on many bands and modes, predominantly from his HF RV mobile station. He has written various articles in ham radio and popular electronics magazines and remains active as a VE team leader, ham license teacher and Web site designer. You can reach John at 1095 W McCoy Ln #99, Santa Maria, CA 93455, or at **jportune@aol.com**. QST

New Products

REMOTE/METER PANEL FOR N8XJK BATTERY BOOSTERS

◊The R1 Remote/Meter Panel from TG Electronics is designed to work with its current line of N8XJK Battery Boosters. The R1 has illuminated input and output voltmeters, a switch to turn the booster on and off remotely and indicator LEDs. Units can be built with a mounting flange on top or bottom. Price: $79.95 with up to 20 ft of cable. For more information visit **www.tgelectronics.org**.

TEN-TEC RX-400 HF/VHF/UHF RECEIVER

◊ Ten-Tec's RX-400 HF/VHF/UHF DSP receiver is intended for government and commercial service worldwide. Frequency coverage is 2 MHz to 3 GHz. Features include scanning of 100 channels per second, detection bandwidths up to 300 kHz and a wideband IF output that provides 6 MHz of bandwidth and user-programmable AGC characteristics. The RX-400 includes TCP/IP and RS-232 interfaces, and it is packaged in a compact ½ rack enclosure. Priced at under $6000, the RX-400 is said to deliver the performance of MIL-SPEC and tactical receivers in a much more affordable price range. For more information visit **www.tentec.com** or contact Product Manager Tom Salvetti (**TomSalvetti@tentec.com** or tel 304-884-7601).

A Parallel Port Interface for Your Shack

Use Ham Radio Deluxe *to control more than just your radio.*

Al Yerger, WA2EHI

It didn't take too long after implementing remote control of my shack using *Ham Radio Deluxe* (*HRD*) software to realize that I needed to control a little more than just the radio.[1] Antenna selection was the primary objective but there are other things around the shack that would be nice to control as well, such as audio routing and turning the rig and amplifier on and off. Once again Simon is way ahead of me, with some simple computer interfacing — *HRD* can solve the problem.

Most of our computers have a parallel port that we think of as the printer port, LPT1. In fact, connecting a printer is only one possible use for the parallel port. It can also be used with a simple interface to control up to eight output switches. The software in your computer, specifically the BIOS (basic input/output system), actually allows for multiple parallel ports — LPT1, LPT2 and so forth — allowing you to control eight outputs and still reserve a port for your printer. If you don't need to connect a printer, or you use a USB printer, you can control up to 16 outputs.

To take advantage of the second parallel port, or if your computer doesn't have a parallel port, you will need to install a parallel port option card. These are typically inexpensive and usually available online or at flea markets. Unfortunately, RadioShack and most other electronic supply stores no longer stock parallel cards as the demand has fallen since USB has become the preferred method of connecting printers.

Figure 1 — Connector side view of the completed parallel port interface.

Circuit Description

The interface is based upon a 4N33 optical isolator. The 4N33 is relatively inexpensive and easy to obtain through any number of online parts distributors.[2] The basic circuit is shown in Figure 2. To obtain the maximum amount of isolation and avoid ground loops, I decided that the interface should not have a power supply. When a circuit requires external power, depending upon where the power is obtained and how the circuit is connected to the power supply, all of the isolation provided by the optical isolators can be

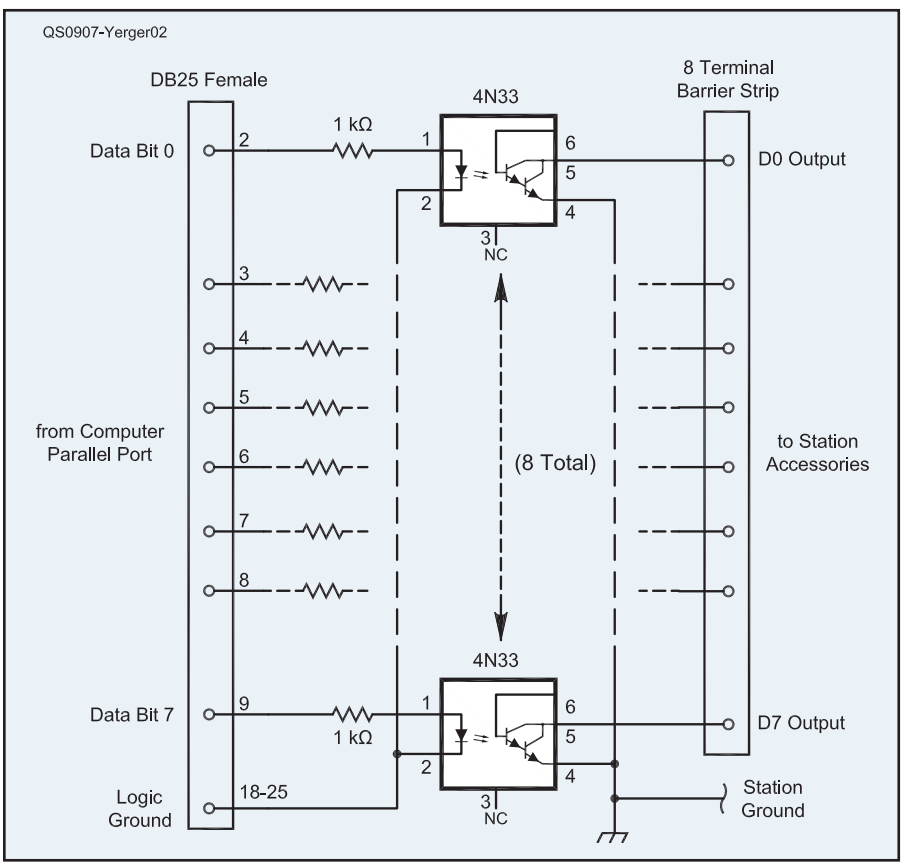


Figure 2 — Parallel port interface schematic.

[1]Notes appear on page 37.

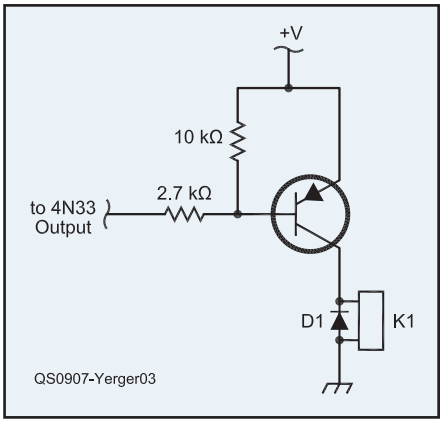


Figure 3 — Schematic of a simple relay driver circuit that can be driven by the interface.

negated. This required us to source the current necessary to drive the LED in the 4N33 from the parallel port itself. This limits the amount of source current available to about 2.3 mA. My parallel port provides about 3.5 V when outputting a high or logic 1. The 1 kΩ series resistor along with the voltage drop of the LED in the 4N33 allows almost exactly 2 mA to flow through the 4N33.

The LED cathodes from all of the 4N33s are tied together and connected back to the parallel port's ground. To ensure that isolation is obtained between the computer and the loads connected to the 4N33 outputs, make sure that the LED cathode is connected only to the parallel port ground. It must not be connected to the interface chassis or to the station ground.

The emitters of all the 4N33s, on the output side of the optical isolator, are tied together and connected to the station ground. Each collector is brought out to its own pin on an eight terminal barrier strip to allow easy connection to external relays or other devices.

At this point we should discuss exactly how much current and voltage the 4N33 output can handle. The specifications sheet for the 4N33 states that the output transistor can handle up to 30 V dc and 150 mA. With the minimal amount of drive current available from the computer port, a more practical limit seems to be about 30 mA. I did some testing and found that at about 29 mA of collector current, the voltage between the 4N33 output and ground, V_{CE} for you engineers, rises to about 1 V. In other words, the transistor is no longer in saturation. I figured that this was a good place to stop. As the load increases from this point, the V_{CE} starts to climb rapidly. I tested it with a relay that had a 60 mA coil current. Although it worked, the voltage across the transistor climbed to over 3 V. Also, avoid any temptation to reduce the value of the 1 kΩ series resistor to drive the 4N33 harder. Trying to source more than 2 mA from the parallel port could damage the computer.

If you need more output current to drive larger relays or other higher current loads, I recommend the circuit in Figure 3.

This is actually a very useful circuit. The transistor type is not critical. Almost any PNP switching transistor that can handle the relay's voltage and current will probably work. I used a RadioShack PN2907, which is rated for 40 V and 600 mA. If the input is pulled low, the transistor will begin to conduct and the relay will be energized. The nice thing is that the input does not have to be pulled completely to ground to saturate the transistor. So even if the output of the 4N33 doesn't go completely to 0 V, the relay will still reliably switch. I usually build this circuit into whatever device I am trying to control, leaving the parallel port interface uncomplicated and uncluttered.

Construction

This is the ultimate in non-critical construction. I built mine in a surplus data switch box. This worked out very well as the switch box already had the DB25 connectors installed and wired to a big rotary switch. I removed the switch but left the wires connected to the DB25s and used them to connect to the optical isolators. Almost half the work was done before I started. The 4N33s and the series resistors were placed on a piece of perforated board. Since I already had the DB25s, enough 4N33s and plenty of space in the box, I decided to build two interfaces into the one box. Again, to avoid ground loops, do not connect the cathodes of the 4N33s from one port to the cathodes of the other port. This way you will have complete isolation between the two interfaces and can connect either to two parallel ports in the same computer, or to parallel ports on different computers with no ground loop problems. The construction is shown in Figure 4.

Connecting to your Computer

The interface is connected to the computer via a standard parallel cable with a DB25 male connector on each end. This is the same type of cable originally used to connect the computer to the printer switch box we salvaged for this project. It turns out that this cable can be one of the hardest items to locate. None of my local stores carry them anymore. You can order a cable online or make one up yourself. If you want to build it, you only really need 9 wires. Connect pins 2 through 9 and any one of pins 18-25 on one DB25 male connector to the same pins on the other connector.

If you buy a cable online, any DB25 male to male straight through cable should work. It doesn't have to be IEEE1284 compatible. In fact, an IEEE 1284 cable will probably get you a cable with a DB25 on one end and a Centronics 36 pin printer connector on the other.

Using the Interface

The interface was designed to operate with *HRD* and it works very nicely. The program has the ability to output specific bit patterns depending upon the frequency or band you select. This allows you to use relays to select the proper antenna based upon your frequency. This can be handy both for remote and local operation, especially when you don't have a radio or amplifier that already does this for you. You can find the utilities to program the bit patterns, and a tool to allow you to test and exercise your interface under the TOOLS pull down menu.

Just click on TOOLS, then click on PARALLEL PORT and then select either the MANAGER to define the bit patterns or MONITOR to test your interface. (See Figure 5.)

When you select the PARALLEL PORT MANAGER a dialog box will open up similar that shown in Figure 6. The program will auto-select only one antenna per frequency range but you define the range so, for example, you can have one antenna for CW and a different antenna for phone. You can also have the choices appear in the SELECTION menu, but this works for local control only and is not available via the remote server.

To create a new antenna selection, pull down the EDIT menu and select NEW. Enter a name, a frequency range and the required

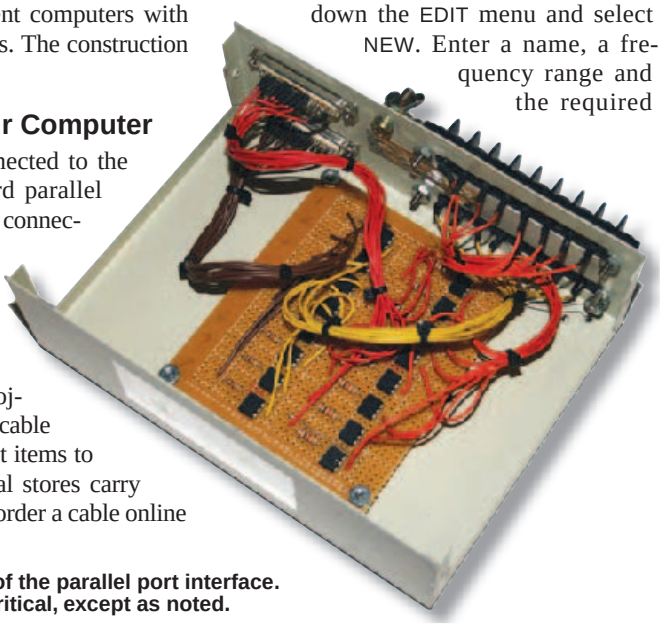


Figure 4 — Inside view of the parallel port interface. The wiring is not at all critical, except as noted.

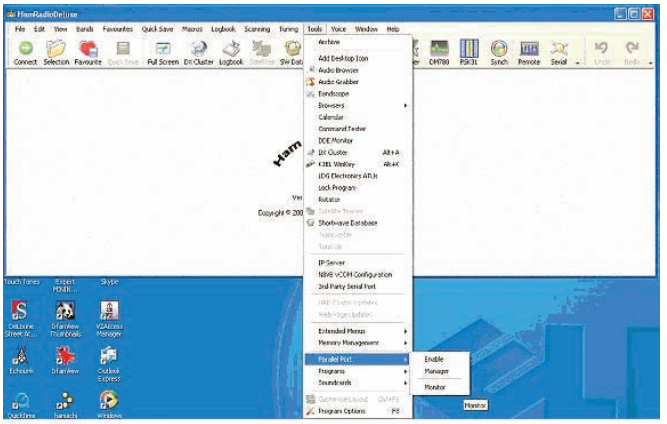


Figure 5 — Screen shot of the *Ham Radio Deluxe (HRD)* select enable function for manager or monitor.

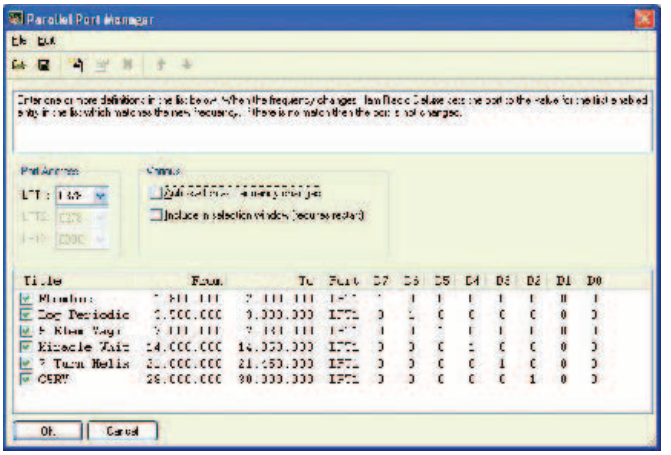


Figure 6 — Screen shot of *HRD Parallel Port Manager* showing the setup menu.

bit pattern. To change an existing definition, select the antenna you want to modify and highlight it by single clicking anywhere on that line. Then pull down the EDIT menu and select MODIFY. Then simply make the desired changes. You can check out these functions before you complete your interface, since the system doesn't really know whether or not anything is actually connected to the parallel port.

To have *HRD* output the bit patterns to the parallel port, simply pull down the TOOLS menu, click on PARALLEL PORT and then select ENABLE.

If you select the Parallel Port Monitor a dialog box similar to Figure 7 will open. By checking or unchecking the boxes below different data bits you can manually change the outputs on the parallel port. This is good for testing and exercising your interface and associated equipment. You can also access this through *Remote Desktop* and use it to control other things connected to your interface, such as relays to control power to your rig, amplifier or for switching audio paths. If you are operating your station remotely, this function is not available between the local and remote computers. You will have to use *Remote Desktop* or a similar program to access the *HRD* parallel port monitor.

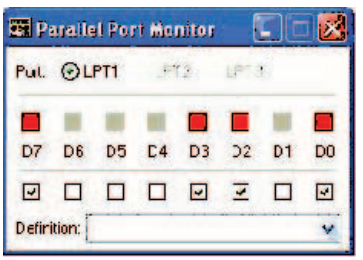


Figure 7 — Screen shot of *HRD* Parallel Port Monitor showing received status information.

Using the Interface with Other Software

Of course you can use the parallel port interface with any program that outputs data bits to the parallel port. There are many programs that utilize the parallel port to output control information. In addition, there are a number of example programs on the Web for those who are inclined to write their own programs.

Connecting the Interface to the Outside World

As was discussed above, the interface provides a low resistance connection to ground when the computer outputs a logic 1 or *high* to the appropriate bit on the parallel port. Low current devices, less than 30 V dc at 30 mA can be connected directly to the interface. If you need high current capability, the circuit in Figure 3 should be used along with an appropriate relay. The rest will depend on how your station is set up and what you want to control.

As an example, I am currently working on modifying an Ameritron RCS4 antenna switch to work with the parallel port and *HRD*.

Notes

[1]*Ham Radio Deluxe* is a software suite that can provide remote transceiver control as well as ancillary functions such as logging. It is available without charge from its developer, Simon Brown, HB9DRV. See **www.ham-radio-deluxe.com** for more information.

[2]I obtained mine from Mouser Electronics, **www.mouser.com**, part number 78-4N33.

ARRL member Alfred T. Yerger II, WA2EHI, was first licensed in 1967 and was issued his current call upon earning his General class license in 1969. After graduating from Orange County Community College in 1974, Al went to work for Motorola and, except for a few years dabbling with microprocessors and software, he has remained in the land mobile communications industry. He is currently employed by Bird Technologies Group as an RF engineer, specializing in interference mitigation and antenna site issues.

Al is on the ARRL speakers' list, was an ARRL assistant director and is on the board of directors of and has served as Director of Engineering for the Rockland Repeater Association. He is also a former president of the Crystal Radio Club. Al is interested in many modes of operation including HF and VHF SSB, satellite, packet, SSTV, FM and repeaters, and most recently the marriage of the Internet and Amateur Radio. He can be reached at 1312 Union Ave, Newburgh, NY 12550-8907 or at **ayerger@bird-technologies.com**. QST

Feedback

◊ In "A Sound Card Interface for FM Transceivers" [Jun 2009, pp 30-31], the correct part number for T1 is Mouser 42XL016-RC.

◊ The Amateur Radio operator shown at the EOC in Fargo, North Dakota during the recent flood emergency [Jun 2009, p 75] is Joe Gregg, NØRF. — *tnx WY7FD*

Strays

I would like to get in touch with…

◊ anyone who remembers my father, Melvin F. Peterson, W6LRA (SK), who lived in Placerville, California. In the 1940s he was active at the Naval Radio Station, Skaggs Island, Sonoma, California. — *Helen Peterson Rowland,* **momcat40@sbcglobal.net**

A High Gain Single Wire Beam

Here's an inexpensive, easy to duplicate, beam antenna that can hang between trees.

Robert Wilson, AL7KK/VE7ZKK

Did you ever want a cheap beam that could be put up between two trees, yet have the gain of a Yagi? Well here it is. I call it a high gain single wire, or HGSW beam. Yes, only one wire is required. A 20 meter version will fit in the same space as a 75 meter dipole.

How it Works

As you may remember, a ⅝ λ antenna will give a sharper pattern and higher broadside gain than a ½ λ dipole. Here I have put three of them in line with certain critical adjustments to allow a 50 Ω feed, and also to allow self-feeding of the end two end sections with shorted 450 Ω phasing stubs. Unlike many antennas, the center point is reactive, but this problem is canceled by using an inductor across the coax feed point. Since the small inductor is only about 5 μH, it is a cheap and easy thing to build. Remarkably, this simple device allows a person to resonate the antenna in any desired portion of the 20 meter band.

EZNEC modeling results indicate that with the antenna at ½ λ (32.8 feet) high, the gain will be about 11.2 dBi with a peak of the elevation lobe at 29°.[1] Azimuth, elevation and SWR plots at ½ λ are shown in Figures 2, 3 and 4. Even more gain is available, and more importantly lower elevation angles of the main lobe, with greater heights. For example at ¾ λ, the peak elevation drops to 20° and to 15° at 1 λ.

The one downside is that rotation is not possible when the HGSW is installed between two trees, or towers. Still, if you want a strong signal in two directions it's tough to beat. Of course, with multiple supports, you could have a number of them for your favorite directions. Your maximum signal will be in a 28° wide beam in each of the two broadside directions.

A second height factor is important. Elevation also tunes the SWR of the antenna. If it is less than a λ/2 high you may need to make center section length adjustments to lower the SWR. Based on my own experience I strongly recommend using a minimum of λ/2 altitude.

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

Building your HGSW

The parts list looks like this: This antenna will require 5 ceramic insulators, 129 feet of 14 gauge antenna wire (I prefer hard drawn copper or copper plated steel wire), 28 feet of 450 Ω window line, 60 inches of 16 gauge enameled copper wire (for the inductor), and a 1⅜ inch diameter by 2 inch long coil form (plastic water pipe or equal). There will be eight insulator connections each with a 6 inch foldover, which should be soldered for strength and conductivity. Last will be a coax connector and a pair of 6 inch 14 gauge wires for the feed point.

Construction details are shown in Figure 1. It is straightforward and will require a total of eight simple insulator connections. Each will have a 6 inch wire foldover twisted and soldered at an insulator. First, make up two sections of wire exactly 46 feet long with insulators at each end. This will give two wires with the correct 45 foot lengths. These will be the two end sections of the antenna. Next, assemble the center section of the antenna by making up two 18½ foot sections of wire and attaching them to a single center insulator, again with a 6 inch overlap each.

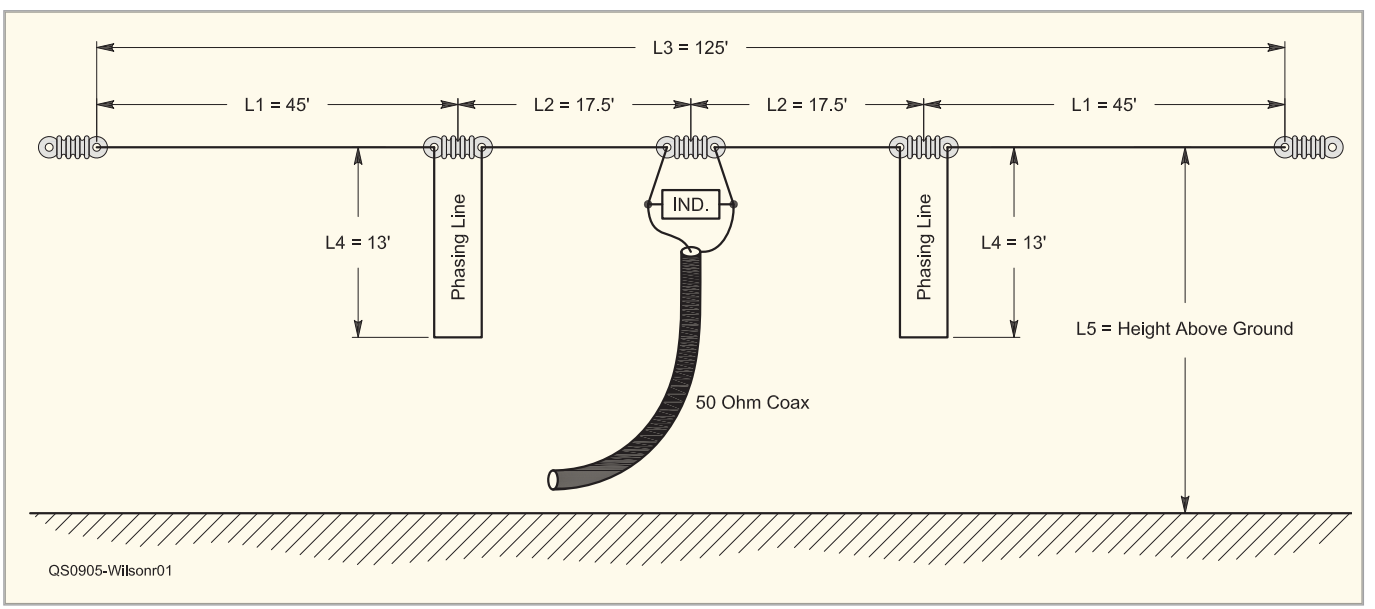


Figure 1 — Drawing of HGSW antenna with dimensions for the 20 meter band.

Table 1

Dimensions of an HGSW Beam for 10 Amateur Bands

Lengths in feet.

Band (meters)	*75*	*40*	*30*	*20*	*17*	*15*	*12*	*10*	*6*	*2*
L1 end (2)	168	89.4	63.2	45	35.3	30	25.6	22.4	12.7	4.37
L2 center (2)	65	34.7	24.6	17.5	13.7	11.7	9.97	8.72	4.95	1.70
L3 total size	467	248	176	125	98	83.3	71.2	62.3	35.4	12.2
L4 stubs	48.6	25.8	18.3	13	10.2	8.66	7.4	6.47	3.68	1.26
L5 height	120	64	45	32	25	21	18	16	10	10
Inductor (µH)	25.9	11.7	7.3	4.9	3.4	2.8	2.2	1.9	0.85	0.13
Gain (dBi)	11.4	11.4	11.3	11.2	11.1	11.0	11.0	11.0	11.4	10.9
Freq (MHz)	3.8	7.15	10.1	14.2	18.12	21.3	24.93	28.5	50.2	146

This center point will be the feed point shown in Figure 1. Here there will be two attachments, first a coax connector, second will be an inductor of 5 µH.

This device for the 20 meter HGSW antenna can be made by wrapping 13 turns of 16 gauge enameled wire around a small section of 1⅜ inch diameter PVC water pipe. The two holes should be drilled 1 inch apart for the ends of the wire. Clean the insulation from the coil tail ends, and attach it with solder across the center insulator. A coax connector on two short pieces of number 14 gauge copper wire should also be soldered across the center insulator as a feed point. Now take the two unconnected ends of the center wire and connect them to one end of the 45 foot wires, again using a 6 inch overlap. The antenna is nearly complete except for the phasing stubs.

The two phasing stubs should be cut so that their active length will be 13 feet from the antenna wire connection to their shorted ends. Connect the ladder line stubs across the appropriate insulators as shown in Figure 1. Strip and prepare the top ends of the ladder line stubs to wrap and solder to the insulators as shown. The lower ends of the two lines should be stripped and bent over and soldered together. The resultant active line length must be 13 feet. The distance from the center insulator to the ladder line should be 17½ feet.

If you have a lot of wind in your area you might want to tie a 1 once lead fishing sinker to the bottom of each of the phasing lines. Alternately a string can be attached and tied to some secure point below the antenna. I have had no problem with my phasing lines except that they curl slightly, which is not ordinarily a serious difficulty.

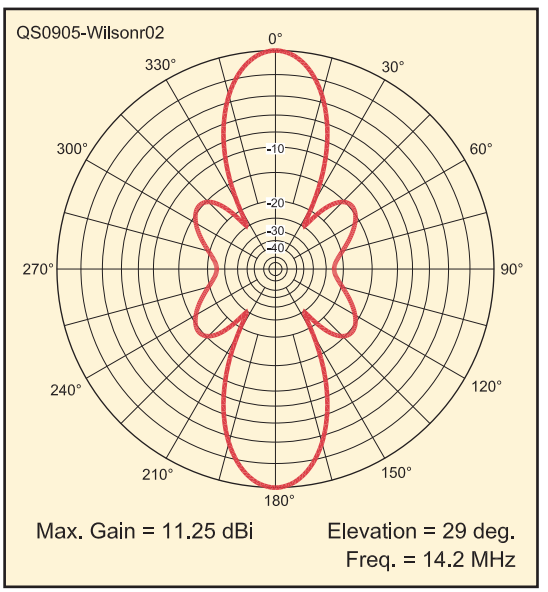


Figure 2 — *EZNEC* azimuth plot of the 20 meter HGSW at a height λ/2.

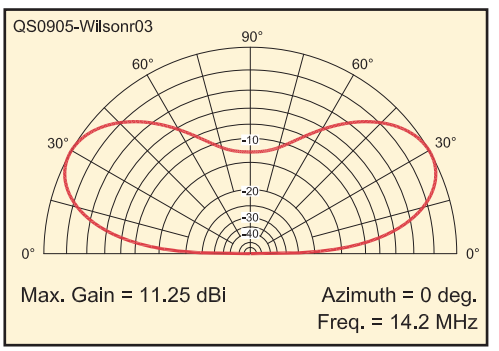


Figure 3 — *EZNEC* elevation plot of the 20 meter HGSW at a height λ/2.

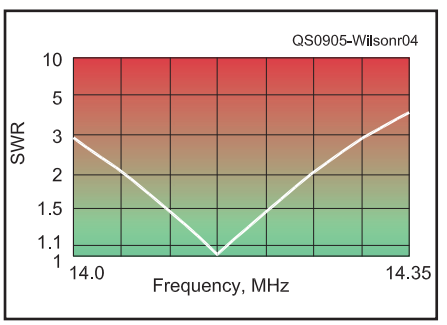


Figure 4 — Predicted SWR of 20 meter *EZNEC* model of HGSW at a height λ/2.

Constructing the antenna took me only one morning. Using a sling shot and clothes line rope to hoist it into the local trees took a couple of hours more. Also I wound up about five turns of coax near the feed point into a 6 inch diameter coil to act as a cheap but effective choke balun. This balun was secured with electrical tape, but tie wraps may be even better in the long term.

The HGSW on Other Bands

Table 1 shows the lengths necessary to build a HGSW beam for 10 amateur bands. These were scaled from the 20 meter model that I built and tested. *EZNEC* was used to calculate the gain and inductor values.

The results have been good with my own beam strung very roughly north and south. I have had contacts on my main east and west beam lobes to Europe and Australia, and even a few contacts way off the main beams too. Note that there are some valuable small side lobes that allow contacts with strong stations in almost all directions, but the two main lobes at right angles to the wire will always be best. If you build an HGSW beam let me know how it works. I think you will enjoy its remarkable low cost, simplicity and the good gain.

ARRL member Robert Wilson, AL7KK and VE7ZKK, was first licensed in 1947 while in high school and now holds an Amateur Extra class license. Over the years he obtained eight years of university study in physics and aircraft technology. Early he was also a passenger ship radio officer. Later he worked for the Department of Defense, the Voice of America and the FAA as an engineer. He also built some of the first U.S. satellites at the State University of Iowa. He has written about 60 magazine articles and a book about low frequency antenna construction.

He can be reached at 1350 South Bagley Creek Rd, Port Angeles, WA 98362 or at **al7kk@yahoo.com**.

An RFI Story with a Happy Ending

One ham's tale about keeping RF from where it doesn't belong.

Richard Kriss, AA5VU

I contacted the "Doctor" at *QST* for help so that I could run my 800 W station without TVI. When I started, anything over 100 W would interfere with the TV's remote control receiver circuits and cause the on-screen menu panel to flash on and off. Thanks to help from the "Doctor" and ARRL Lab RFI Engineer Mike Gruber, W1MG, the problem has been solved. This article describes the steps taken to clear the interference.

How's the TVI Getting to the TV?

The first step was to isolate how the interference was getting into the TV. As recommended, all cables, with the exception of the power cord and the TV coax, were removed. The flashing menu was still present when I transmitted with high power. Mike suggested the use of a common mode choke using an FT-240-43 ferrite core on the power line, based on a detailed article by ARRL Lab Manager Ed Hare, W1RFI.[1] This helped, but did not solve the problem. Another common mode choke was made up to go on the coax input to the TV. It also helped but did not completely solve the problem.

The final source was a cable TV technician-installed wall wart and signal splitter that powers a cable signal booster via the coax. I went to school on the Mike, W1MG, tip and installed another common mode choke where the powered coax is split to go the TV (Figure 4).

[1]Available on the ARRL Web at **www.arrl.org/tis/info/HTML/catvi/index.html**.

Figure 2 — A common mode choke on the power line, right at the receiver, attenuates RF on that path.

Success!

Shazam! I have not seen the flashing menu since installing the common mode chokes. I ran some additional tests, removing the devices one at a time, and no one choke completely solved the problem. It was the combination of all of the above. I appreciate all of the advice from several contributors.

If you are having a TVI issue, my advice is to start by reading W1RFI's article, then try experiments to see what works. To quote Ed, "The common-mode filter or choke may be one of the best-kept secrets in the Western world."

Dick Kriss, AA5VU, was first licensed in 1973 and now holds an Amateur Extra class license. Dick is retired from Lockheed Martin and lives in Austin, Texas. He is a long time ARRL member who earned Triple Play #122 in February and holds DXCC on RTTY and Phone, as well as numerous WAS awards. His current interest is RTTY DX and contesting. You can reach Dick at 904 Dartmoor Dr, Austin, TX 78746-5163 or at **aa5vu@arrl.net**.

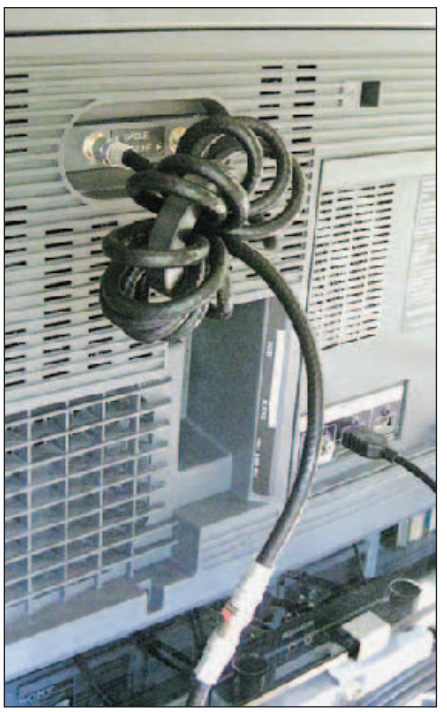


Figure 3 — The common mode choke installed on the coax input to the TV. This helped, but wasn't the final answer.

Figure 1 — The dreaded flashing menu flavor of TVI.

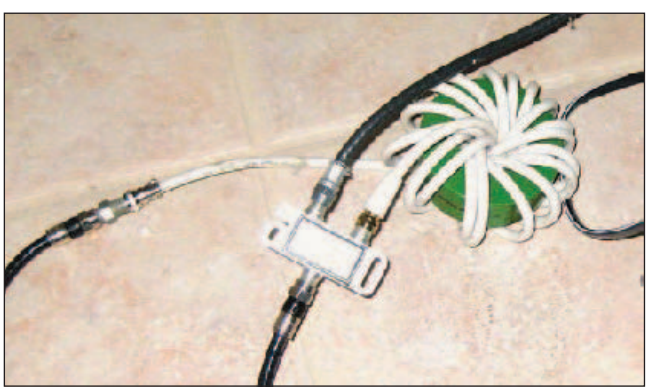


Figure 4 — A common mode choke on the coax cable. Note that an added length of coax was connected with a double female socket to provide a length of the needed turns. QST

PRODUCT REVIEW

Yaesu VX-8R Handheld Transceiver

Reviewed by Brennan T. Price, N4QX
ARRL Technical Relations Manager

About six years after releasing the top-of-the-line VX-7R handheld transceiver, Yaesu's next model retains a somewhat familiar feel.[1] The VX-8R retains the sturdiness of its predecessor and justifiably bears the label of "submersible." Users who liked the display of the VX-7R will feel at home when looking at the output screen of the new model.

Setting initial impressions aside, the VX-8R is a whole new animal, with several welcome changes. Capabilities on 222 MHz have been upgraded to 1.5 W transmit power. A range of Bluetooth accessories permit hands free operation. And users can purchase a customized GPS antenna, enabling the radio to be used not only as a GPS receiver, but a full fledged APRS (Automatic Packet/Position Reporting System) station. With the departure of Kenwood's TH-D7A(G) from the APRS handheld market, this is a welcome development.

ARRL received the Bluetooth accessories just as the deadline for this review arrived. We will put them through the motions and report in a future issue. In the meantime, an evaluation of this radio's traditional handheld operation and its APRS capabilities are in order.

Heed the Wisdom of R.F. Radio

Hi! I'm R.F. Radio, and I'll be helping you along as you learn the many features of the VX-8R. I know you're anxious to get on the air, but I encourage you to read the "Operation" section of this manual as thoroughly as possible, so you'll get the most out of this fantastic new transceiver. Now . . . let's get operating!

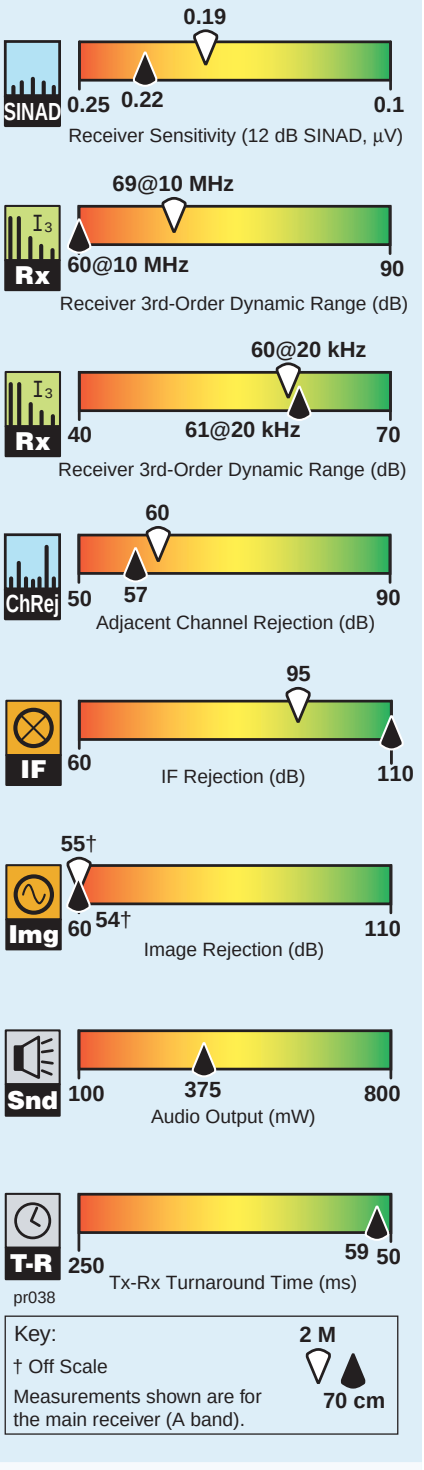
This quote appears at the top of page 13 of the VX-8R *Operating Manual*, next to a cartoon of a handheld transceiver without an antenna — but with hands, feet and eyes, one of which is winking. The advice of R.F. Radio is antithetical to everything in my nature when it comes to Amateur Radio equipment. I like to open it and start operating it as quickly out of the box as I can. On a handheld, I like to power on the equipment, key in the frequency of my favorite repeater, select the CTCSS tone or DCS code needed to access said repeater, make my call and start chewing rags with impunity.

The fact that this approach didn't work out well when I first got my hands on the VX-8R says quite a bit about my lack of patience, and I have to admit that the little cartoon critter is right. The VX-8R's user interface differs a little bit from its predecessors. I had no problem turning on the handheld — the PWR switch is the most prominent button on the front panel (Figure 1). I had no problem tuning a frequency — direct keypad frequency entry and automatic repeater shift are enabled at power-up. So I thought, "Okay, surely holding F and pressing one of the keys will let me select a CTCSS tone." So I tried something that looked like it might work. And another. And yet another. No dice.

So I cracked open the manual and immediately learned a few things that make basic operation of the VX-8R easy. It turns out that pressing (not holding) the F key and then pressing the MODE key enables CTCSS transmission.

[1]B. Price, N4QX, "The Yaesu VX-7R Handheld Transceiver," Product Review, *QST*, Oct 2002, pp 65-67. *QST* Product reviews are available on the Web at **www.arrl.org/members-only/prodrev/**.

Key Measurements Summary



Bottom Line

Yaesu incorporates GPS and APRS capabilities into its new top-of-the-line, feature-packed handheld.

Pressing the F key followed by the 2 key allows for selection of a specific CTCSS tone. The CTCSS tone is selected by rotating the DIAL on top of the handheld — the only rotatable knob on the radio. This DIAL is relatively flat, layered with vulcanized rubber, and easy to grip. It can be turned by the thumb alone or grasped with thumb and forefinger on both edges. The flatness of the DIAL is unusual, but allows for the compact installation of the GPS antenna, as discussed later.

When not used to scroll through a menu or submenu, the DIAL acts as a VFO. When rotated while pressing the VOL button, located beneath the PTT, it also acts as a volume control. Most of the radio's functions and settings are chosen by some combination of keystrokes followed by dial rotation to display the desired value. The manual, replete with R.F. Radio's omnipresent advice, is a required companion.

Beyond the Basics

Once the basics are set, the radio is pleasant to operate and listen to. Two VFOs allow simultaneous monitoring of two different frequencies, even on two different bands. As with its predecessors, the VX-5R and VX-7R, a screw-on antenna loading coil is included for use on frequencies below 54 MHz. Reception is possible from 1.8 to 76 MHz, 108-137 MHz and 137-999.99 MHz, cellular frequencies excepted. AM, narrow FM, and wide FM signals can be received.

Given the size of the radio and the antenna, only the strongest shortwave signals will be detectable, even with the loading coil. An external antenna is needed for more serious shortwave reception. Nevertheless, 89 commonly used shortwave broadcast frequencies have been pre-programmed and listed in the manual. This is helpful if you're in a pinch without a shortwave frequency guide. Also, even though the manual identifies two bands as "TV" bands, most United States amateurs will not be able to use the VX-8R to hear television audio, assuming the DTV conversion takes place as scheduled June 12, 2009 (which should be when this issue of *QST* hits the streets, give or take a few days). There's a separate receiver for the AM and FM broadcast bands, and you can listen to music in stereo or a ball game while waiting for your net to start on the local repeater.

Transmitting is a breeze — just push and talk. The included lithium-ion battery pack provides an ample 1100 mAh of capacity and charges relatively quickly. The amateurs with whom I talked said I sounded good, and they sounded good to me through the speaker on the front panel.

The transmitting capabilities that made the VX-7R unique at its release were 222 MHz capability and AM on 50 MHz. The VX-8R still puts out a full watt of pleasant-sounding AM on six meters. On 222 MHz, maximum power has been raised to a credible 1.5 W, up from the 300 mW provided by its predecessor. When I wrote the review for the VX-7R early this decade, I reported that I could only work very nearby 222 MHz repeaters. As I type this, I am easily making it from my residence in the Clarendon section of Arlington, Virginia, to the WA4CCF 224.82 MHz repeater, miles away in Alexandria. Kudos to

Figure 1 — The VX-8R's display and controls will be familiar to users of previous Yaesu models. With its rugged construction and extensive weatherproofing around the controls and speaker, the VX-8R is ready for outdoor use in any conditions.

Table 1
Yaesu VX-8R, serial number 8N41893

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: Receive (A Band) 0.5-999.99 MHz (cellular blocked); (B Band) 30-76, 108-580 MHz. Transmit, 50-54, 144-148, 222-225, 420-450 MHz.	Receive and transmit, as specified.
Modes: FM, AM, WFM (receive only), data.	As specified
Power requirements: 4-14 V dc; receive, 0.24 A (dual band receive); transmit, 1.9 A (max, high power).†	Receive, 0.39 A @ 7.4 V, 0.7 A @ 13.8 V dc (dual receive, max volume, no signals). Transmit, 1.5 A (13.8 V dc and battery).
Receiver	**Receiver Dynamic Testing**
FM sensitivity: (A Band) 12 dB SINAD, 30-54 MHz, 0.35 µV; 54-76 MHz, 1.0 µV; 59-108 MHz (WFM), 1.5 µV; 137-140 MHz, 0.2 µV; 140-150, 0.16 µV; 150-174 MHz, 0.2 µV; 175-222 MHz (WFM), 1.0 µV; 300-350 MHz, 0.5 µV; 350-400 MHz, 0.2 µV; 400-470 MHz, 0.18 µV; 470-540 MHz (WFM), 1.5 µV; 540-840 MHz (WFM), 3.0 µV; 800-999.990 MHz, 1.5 µV. (B Band) 50-54 and 144-148 MHz, 0.18 µV; 430-450 MHz, 0.2 µV.	For 12 dB SINAD, (A Band) 29 MHz: 0.39 µV; 52 MHz, 0.22 µV; 146 MHz, 0.19 µV; 222 MHz, 0.22 µV; 440 MHz, 0.22 µV; 902 MHz, 0.25 µV; WFM, 100 MHz, 1.25 µV. (B Band) 52 MHz, 0.18 µV; 146 MHz, 0.16 µV; 222 MHz, 0.25 µV; 440 MHz, 0.22 µV.
AM Sensitivity: 10 dB S/N, 0.5-30 MHz, 3.0 µV; 108-137 MHz, 1.5 µV.	10 dB S+N/N, 1-kHz, 30% modulation, (A Band) 1 MHz, 3.4 µV; 3.8 MHz, 3.0 µV; 14 MHz, 1.0 µV; 50 MHz, 0.55 µV; 120 MHz: 0.68 µV; 144 MHz, 0.52 µV; 222 MHz, 0.9 µV; 440 MHz, 0.58 µV. (B Band) 50 MHz, 0.53 µV; 144 MHz, 0.5 µV; 222 and 440 MHz, 0.9 µV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: (A Band) 29 MHz, 67 dB; 52 MHz, 62 dB; 146 MHz 60 dB, 222 and 440 MHz, 61 dB; 902 MHz, 65 dB. (B Band) 52 MHz, 58 dB; 146 MHz, 64 dB, 222 MHz, 65 dB; 440 MHz, 57 dB 10 MHz offset: (A Band) 29 MHz, 59 dB; 52 MHz, 74 dB; 146 MHz, 69 dB; 222 MHz, 71 dB; 440 MHz, 60 dB; 902 MHz, 66 dB. (B Band) 52 MHz, 75 dB; 146 MHz, 78 dB; 222 MHz, 73 dB; 440 MHz, 70 dB.
Two-tone, second-order IMD dynamic range: Not specified.	(A Band) 146 MHz, 84 dB; (B Band) 146 MHz, 91 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: (A Band) 29 MHz, 49 dB; 52 MHz, 57 dB; 146 MHz, 60 dB; 222 MHz, 59 dB; 440 MHz, 57 dB; 902 MHz, 51 dB. (B Band) 52 MHz, 65 dB; 146 MHz, 61 dB; 222 MHz, 63 dB; 440 MHz, 56 dB.

Receiver

Spurious response: Not specified.	IF rejection: (A Band) 29 MHz, 0 dB*; 50 MHz, 1 dB*; 146 MHz, 95 dB; 222 MHz, 92 dB; 440 MHz, 110 dB; 902 MHz, 113 dB. (B Band) 52 MHz, 9 dB*; 146 MHz, 100 dB; 222 MHz, 88 dB; 440 MHz, 93 dB. Image rejection: (A Band) 29 MHz, 72 dB; 52 MHz, 97 dB; 146 MHz, 55 dB; 222 MHz, 49 dB, 440 MHz, 54 dB; 902 MHz, 10 dB. (B Band) 52 MHz, 122 dB; 146 MHz, 62 dB; 222 MHz, 52 dB; 440 MHz, 55 dB.
Squelch sensitivity: Not specified.	At threshold, 52 MHz, 0.13 µV; 146 MHz, 0.14 µV; 222 MHz, 0.27 µV, 440 MHz, 0.13 µV.
Audio output: At 10% THD into 8 Ω: 200 mW at 7.4 V dc; 400 mW at 13.8 V dc.	375 mW at 10% THD into 8 Ω (battery); THD 4% at 50% volume setting.

Transmitter

Power output: 50/144/430, 5.0 W HI, 2.5 W L3, 1.0 W L2, 0.05 W L1. 222 MHz, 1.5 W. 50 MHz AM, 1.0 W (fixed)	With battery pack: 52 MHz, 5.1 / 2.5 / 1.0 / 0.04 W. 52 MHz AM, 1.0 W. 146 MHz, 4.6 / 2.5 / 0.9 / 0.03 W. 222 MHz, 1.4 / 1.0 / 0.5 / 0.05 W. 440 MHz, 5.1 / 2.6 / 1.0 / 0.04 W.
Spurious signal and harmonic suppression: At least 60 dB HI and L3; 50 dB L2 and L1.	HI, 50 MHz, –57 dBc, 146 MHz, –56 dBc, 222 MHz, –63 dBc, 440 MHz, –66 dBc. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 59 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	80 ms.

Transmitter Dynamic Testing

Size (height, width, depth): 3.7 × 2.4 × 0.9 inches; weight, 8.5 ounces.

Price: VX-8R, $375; CT-136 GPS antenna adapter, $30; FGPS-2 GPS unit, $80.

†FNB-101LI battery pack (7.4 V, 1100 mAh Li-ion) and NC-86B battery charger supplied. Available options: Replacement FNB-101LI, $55. FNB-102LI battery pack (7.4 V, 1800 mAh Li-ion), $65; CD-41 desktop drop-in rapid charger (2.5 hours), $30; FBA-39 battery case (3 AA cells; TX power limited to 1 W), $25; EDC-5B cigarette lighter cable with noise filter, $25; EDC-6 external dc power cable, $8.

*The 47 MHz IF is close to 10 and 6 meters, so this level of performance is to be expected.

Figure 2 — The VX-8R with the FGPS-2 GPS antenna, coupled by the CT-136 antenna adapter. Note that there is ample room to turn the DIAL, thanks to its flat design. The GPS antenna can also be attached to the MH-74 speaker/mic, which then plugs into the MIC/SP jack on the transceiver.

Yaesu for providing greater capability on this beautiful band.

GPS Fun

Between the DIAL and the SMA jack for the antenna, there is a jack labeled MIC/SP. This jack can accommodate an external microphone and speaker (model MH-74A7A) or, with appropriate adapters, can provide audio and PTT signals for an external packet TNC. It can also accommodate a GPS antenna adapter (model CT-136).

Either the external microphone and speaker or the GPS antenna adapter can accommodate a GPS antenna unit (model number FGPS-2). I utilized the CT-136 to put the GPS antenna through its paces. You can see how the antenna is coupled to the radio in Figure 2. The CT-136 includes a mounting plate for securing the GPS antenna in place. It is possible to install and use the GPS antenna without it, but the plate seems to add a desirable degree of stability. Installing the mounting plate requires removing the rubber cap that normally protects the MIC/SP jack and the base of the SMA connector. The rubber cap is easy to lose, so users who want to use the GPS antenna only momentarily should put it in a safe place.

From the frequency display, pressing (but not holding) the MENU key once brings up the GPS display. As with many GPS receivers, it takes a few minutes to get a GPS reading once the radio is turned on with the GPS antenna attached, as the VX-8R has to spend time to find and download initialization data from visible GPS satellites. Once the VX-8R computes a fix of its position, the GPS display shows latitude and longitude coordinate, speed and direction (if moving), altitude and UTC time.

Properly equipped, the VX-8R makes a nice, if barebones, GPS receiver. But users should take note: with the FGPS-2 attached, current consumption increases by about 40 mA, according to the helpful R.F. Radio on page 76 of the manual. Therefore, for fixed APRS operation, the user will probably want to store position coordinates in memory and leave the GPS antenna detached. That 40 mA adds up to about a 20% reduction in battery life!

APRS — At Home and On the Run

You can operate APRS with the VX-8R without attaching the GPS antenna, assuming a fixed location. But the GPS antenna allows for a truly portable APRS experience in a nicely compact package. After one run through the appropriate menus, APRS operation with the VX-8R is a breeze.

Pressing the MENU button twice from the frequency display (or once from the GPS display) brings up an APRS station list on the screen. From this point, pressing and holding the menu allows the setup of basic APRS parameters — call sign and SSID (Secondary Station ID — for example, N4QX-3), the desired symbol to be displayed, any comment to be sent with APRS transmissions, and whether the position is fixed or determined by the internal GPS.

Another reason to read the manual before

throwing yourself into this radio: If you enter 144.390 MHz (or, if you're reading outside North America, the prevailing APRS frequency where you are) into the "A" VFO, you will hear packets but neither send nor decode them. The reason: The built-in AX.25 modem can only operate on the "B" VFO. This permits simultaneous voice and APRS operation — the voice channel on A, and APRS on B. The volume on each VFO can be controlled independently, so it's possible to receive packets in the background without their sound disrupting an ongoing QSO.

During APRS operation, the LCD shows a list of the last 40 stations received, and another screen shows the usual APRS information for each one. Details include direction and distance to the received station, time and date the beacon was received and status. Various filters can be applied to the station list as well.

There is also an APRS messaging capability. There are two ways to enter text. The manual suggests rotating the DIAL and pressing the MODE key to move to the next character. This method is slow, and I found myself wishing for direct keypad entry, as you would send a text message on a cell phone.

On a lark, I tried just that — and it worked! It turns out that this text entry option is covered elsewhere in the manual, in a section describing messaging outside of APRS. Users of the VX-8R can communicate a set of customizable text messages point-to-point with other users of the VX-8R, as well as users of the VX-3R or FTM-10R/SR. The messaging feature isn't completely free form — all members of the network must use a supported transceiver, must store the same messages into the same message slots on each radio, and operate on the same frequency. Further, each member must be programmed into a master list, and the programming has to be the same from radio to radio — typos muck up the works.

Nevertheless, it is neat to have so many non-voice communication options on such a small radio. The display of APRS data and messages is easy to read and is comparable to the old Kenwood TH-D7A(G). The radio is easily connectible to a computer to enable a more traditional APRS display. And targeted text messaging among a small group of amateurs can add a new dimension to traditional simplex operation.

Other Cool Things

The VX-8R carries forward all the scanning and searching capabilities that users of the VX-7R have grown accustomed to. Plenty of frequencies can be stored into memory — 900 standard channels, and over 100 more "frequency skip" and "home" memory channels. I can't imagine storing that many frequencies into memory, but if it works for you, you've got plenty of capacity. Each memory channel can be labeled with a helpful text display.

The VX-8R offers two Morse code training features. There are a variety of similarly sized electronic Morse tutors, many of which offer more variety. Nevertheless, there is appeal in having a tutor at hand in your radio. The "CW Learning" setting repeats a particular character — letter, digit or symbol — from 1 to 9 times, at a pitch from 400 to 1000 Hz, at any speed from 4 to 40 WPM. That's great for learning a particular character, but I suspect most users would soon want to graduate to the "CW Training" feature, which sends characters in random groups of five. Random code groups are a great way to master or sharpen CW receiving skills.

In 2002, I dumped the VX-7R into a bucket of water to test its claim of submersibility. I was reluctant to repeat such a potentially destructive test this time around, as I am now remote from ARRL Headquarters and can't obtain a replacement radio as quickly or efficiently if necessary. Nevertheless, the VX-8R retains the sturdiness of its predecessor. The buttons (all 21 of them on the front panel and all four of them on the side) actuate with an audible and satisfying click when firmly pressed — and only when firmly pressed. The case is rugged, and the radio survived my butterfingers on several occasions. Yaesu calls the VX-8R a "heavy duty" transceiver, and my experience validates that claim.

Finally, the VX-8R is also capable of VOX transmission. My experience is that this worked relatively well, although VOX operation in a noisy environment has some obvious drawbacks. Nevertheless, if hands-free operation in a quiet environment is desirable, it can be done.

The Next Generation Has Arrived

With the VX-8R, Yaesu has significantly and credibly updated their top-of-the-line handheld. Although billed as a "triple-band" radio, the enhanced 222 MHz capability is useful and welcome, and essentially makes the VX-8R a quad-band radio for North Americans. While APRS in a handheld is not new, the cleverly designed and coupled optional GPS antenna is a nice innovation. The Bluetooth accessories, which we'll cover in a future review, should allow convenient hands-free operation. A lot of advancements have been packed into this radio. It requires patience to learn to use them to their fullest, but patience is rewarded. In the years since we reviewed the VX-7R, users have come to expect more from their handheld transceivers. The VX-8R has been worth the wait.

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

Array Solutions QSK-MASTER External QSK TR Switch for HF Amplifiers

Reviewed by David Sumner, K1ZZ
ARRL Chief Executive Officer

Most HF transceivers on the market today are equipped to operate full break-in (QSK) on CW. It was much easier to configure a station for QSK when separate transmitters and receivers were in vogue; early transceiver designers did not even attempt the feat. Traffic handlers pioneered QSK operation so the receiving operator could interrupt if he or she missed a character. DXers find it very useful to know what's going on while they're transmit-

ting: they can listen for QRM on their transmit frequency and can stop sending if the DX station answers someone else (don't you wish everyone did?). CW ragchews can be more natural if, as in face-to-face conversations, each party can drop in a comment at will.

Full Break-In for Any Amplifier

Some transceivers are better than others in having a clean CW signal and in avoiding truncation of dits and dahs when operated at high speed in QSK mode. For many years *QST* Product Reviews have included ARRL Lab tests of the QSK feature. On the whole, performance has improved over time. However, amplifiers capable of QSK operation are another matter. It is not simply a matter of design; the components required for full power QSK are rather expensive. Only a minority of amplifier purchasers are interested in the feature, so it is often left out for the sake of competitive pricing. Also, amateurs tend to hang onto their amplifiers longer than their transceivers; a well treated amp will last for decades. The result is that there are loads of ham shacks with transceivers that are capable of full break-in operation but with amplifiers that are not.

Array Solutions developed the QSK-MASTER to target this market. The product has a couple of features that may make it attractive even if you don't plan to operate QSK.

The basic idea is simple. When you begin to send CW, your transceiver controls one or more relays inside your amplifier to switch the amp into the line between the transceiver and the antenna. The amplifier also switches from standby to transmit, which usually involves bias switching. Things must occur quickly and in the right sequence in order for the amp to be in the line by the time the transmitter output signal reaches the amplifier input. Typical mechanical relays are not fast enough, nor are they designed to take the punishment that switching between every dit and dah represents.

Hooking it Up

The QSK-MASTER is housed in a small blue box (3⅜"H × 6¼"W × 4"D) that is typical of Array Solutions products (see the title photo and Figure 3). Inside is a Jennings high current/high speed vacuum relay. In operation the Jennings relay takes the place of the relay inside the amplifier that switches the amp in and out of the line. Other circuitry controls the bias switching, which is desirable but not always necessary depending on the amplifier. Using the QSK-MASTER to control amplifier bias requires a modification to the amplifier, which in most cases would be straightforward but should only be performed by someone experienced in servicing high power equipment. Other than connectors, all of the other components are mounted on a single printed circuit board; there are no surface-mount components. An ac power supply is built in. There are a few jumpers inside the box that most purchasers will not have to touch, but if you do (for example, to set it up for 220 V operation) they are easily accessible by removing two screws.

Figure 3 — Rear panel connections are made with standard UHF connectors and phono plugs. See Figure 4 for connections to the other station equipment.

Figure 4 shows the interconnections among the QSK-MASTER, transceiver and amplifier. I used the QSK-MASTER with an old Ameritron AL-1200 amplifier and two different transceivers: a Yaesu FT-1000MP and an ICOM IC-756PROIII. In each case the hookup was very easy, requiring just two short coaxial cables with PL-259 connectors and a shorted RCA plug to key the internal relay in the AL-1200. In CW operation the AL-1200 draws very little plate current when in transmit mode but not actually transmitting, so I did not perform the bias control mod.

Table 2
Array Solutions QSK-MASTER

Manufacturer's Specifications	*Measured in the ARRL Lab*
Power requirement: 120/240 V ac.	120 V ac (default) at 5 W max.
Frequency coverage: 1.8-54 MHz.	As specified.
Modes of operation: CW, SSB, data modes.	As specified.
RF power capability: 2500 W	Tested at 1500 W.
Residual SWR: Typically <1.1:1, 1.8-30 MHz, <1.2:1, 50 MHz.	28 MHz, 1.07:1; 50 MHz, 1.2:1.
Insertion loss: <0.1 dB.	50 MHz, 0.08 dB
Enable delay: <5 ms, typically <3 ms from amp enable control.	3.3 ms.
Disable delay: <5 ms, typically <3 ms from amp disable control.	2.5 ms.
Size (height, width, depth) 3.375 × 6.25 × 4 inches.	
Weight: 1.7 lbs with ac line cord.	
Price: $375.	

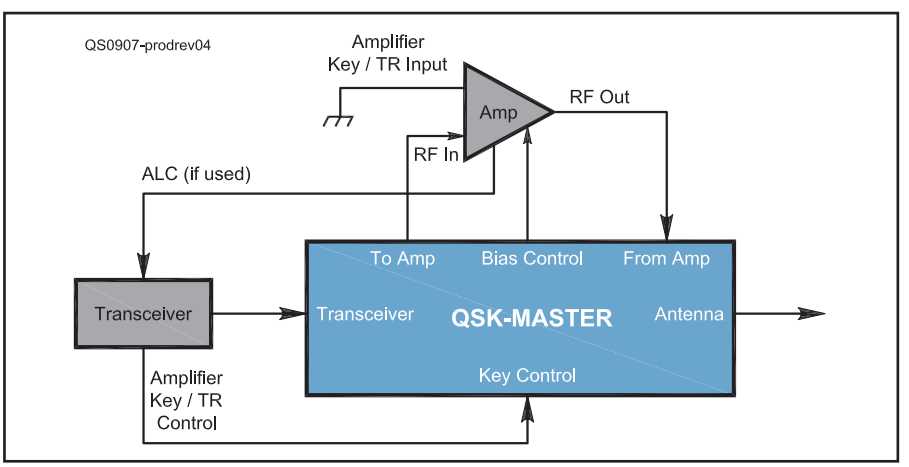


Figure 4 — Interconnections with the transceiver and amplifier. As explained in the text, use of the Bias Control feature is optional and may require amplifier modification. If the Bias Control feature is not used, a shorted cable or plug may be used to enable the amplifier TR switching during operation.

Bottom Line

The QSK-MASTER from Array Solutions offers owners of older RF power amplifiers a way to add flawless full break-in (QSK) operation without equipment modification

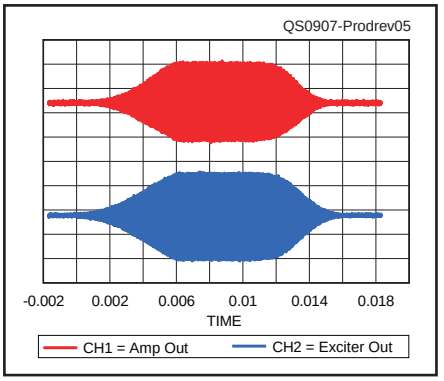


Figure 5 — Simultaneous waveforms of the amplifier output (upper trace) and exciter output (lower trace) while sending a string of dits at 60 WPM. The exciter used was an ICOM IC-746PRO and the amplifier was an Alpha 88. No key clicks or effects on the shaping were observed.

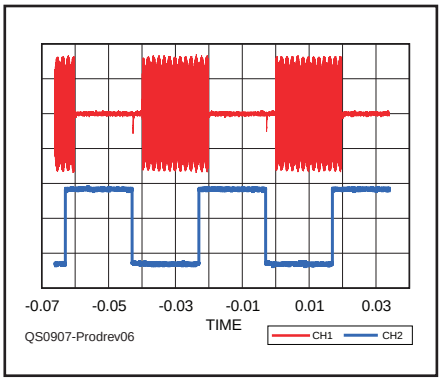


Figure 6 — This plot shows AMP ENABLE keying of the QSK-MASTER (lower trace) and the output waveform from a signal generator keyed at 60 WPM (upper trace) to test switching speed (3.3 ms enable and 2.5 ms disable).

Smooth Operation

In both cases the QSK-MASTER did exactly what it was supposed to do. I was able to use the break-in feature of the transceivers while running full power. Careful monitoring of the transmitted signal revealed no degradation in signal quality. The ARRL Lab verified that the relay inside the QSK-MASTER switched 3.3 milliseconds after being enabled by the transceiver, somewhat faster than either transceiver produced output power, and 2.2 milliseconds after being disabled. (If required, the latter delay can be lengthened by changing an internal jumper.) The Lab also observed no key clicks and no effect on the shaping of the CW signal at a keying speed of 60 words per minute (Array Solutions rates it to 80 WPM). See Figures 5 and 6.

While the QSK-MASTER is intended mainly for serious CW operators who want to operate full break-in, it is also useful in other ways. The amplifier switching circuitry in some transceivers, the '756PROIII among them, is not rated to handle as much voltage and/or current as some amplifiers require; in such cases an interface is needed. The QSK-MASTER meets this need. Another problem it solved for me is that when using my old AL-1200 with the '756PROIII, the internal amplifier relay is slow enough that the PROIII does not "see" the amplifier input quickly enough after beginning to transmit. This causes truncation at the beginning of any transmission. With the QSK-MASTER in the line this problem disappears, even when not operating QSK.

You may not need a product like the QSK-MASTER in your shack, but if you do you will appreciate its quality and versatility.

Manufacturer: Array Solutions, 2611 N Beltline Rd, Ste 109, Sunnyvale, TX 75182; tel 214-954-7140, fax 214-954-7142; **www.arraysolutions.com**; e-mail **sales@arraysolutions.com**.

K1EL Winkeyer USB CW Keyer and Interface Kit

Reviewed by Bruce Prior, N7RR
ARRL Technical Advisor
n7rr@arrl.net

The K1EL Winkeyer USB is designed to attach to a PC USB port and provide an interface between a number of *Windows*-based Morse applications (logging and contesting programs, for example) and up to two transceivers. The unit provides PTT switching signals as well as accurately timed Morse outputs. The Winkeyer USB can also function as a standard keyer controlled by paddles.

K1EL Systems is a part-time enterprise that has been developing and selling keyer kits for about five years. Their premier Winkeyer USB kit stuffs lots of features into a very small and economical package.[2] A companion Winkeyer USB-HV (high voltage) kit is also available for keying older tube-type transmitters. The review unit is the regular version, designed for use with solid-state rigs.

Building the Kit

The kit with circuit board revision D arrived via Priority Mail 10 days after it was ordered. The core surface-mount chip is preinstalled on the circuit board, making it a straightforward, but still non-trivial kit to build. All user-installed circuit board components are on leads that are inserted through the board and soldered.

The instructions for constructing the Winkeyer USB kit are not elaborate. For example, the first installation instruction reads: "Follow the silkscreen and carefully install all 18 resistors, then solder, and trim leads." This assumes that the builder knows how to read resistor color codes.

The silkscreened labels on the high quality and fairly spacious solder-masked circuit board are clear (Figure 7). Two short lengths of wire for connecting the SPEED potentiometer to the circuit board were not supplied with the kit. Those were minor glitches. It is a well-designed product with a classy enclosure.

I spent less than 3½ hours building the kit. A critical instruction that the memory buttons must be installed on the *bottom* of the circuit board includes a helpful photograph

Bottom Line

Acting as an interface between your contesting or logging software and up to two transceivers, the K1EL Winkeyer USB connects to your PC's USB port and provides accurate CW keying and isolated PTT signals. Plug in a paddle, and it's a feature-packed standalone keyer too.

[2]See the K1EL website at **www.k1el.com**. K1EL keyers have their own fan club. A discussion group can be accessed at **groups.yahoo.com/group/k1el_keyers/**.

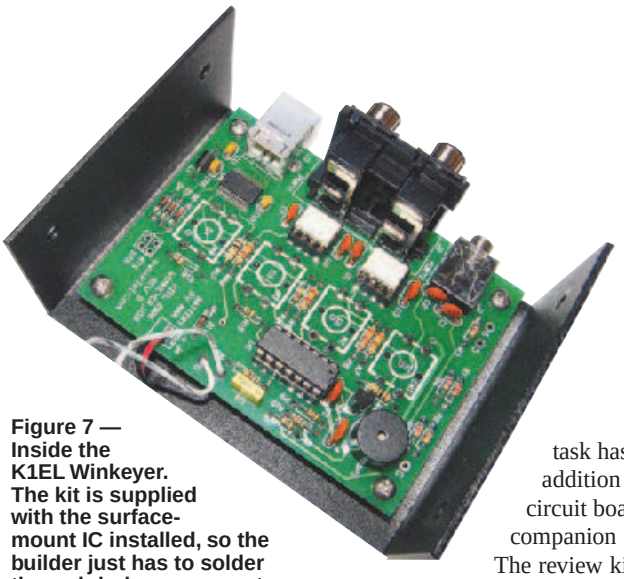


Figure 7 — Inside the K1EL Winkeyer. The kit is supplied with the surface-mount IC installed, so the builder just has to solder through-hole components.

Figure 8 — The rear panel includes PTT and key connec-tions for two radios, plus a USB jack for the computer connection and a stereo 3.5 mm jack for a paddle.

to emphasize that important point. Several other illustrations enhance the ease of kit construction.

The keyer provides optically isolated push-to-talk (PTT) and keying outputs for two separate transceivers. The switching between those two rigs can be controlled by software command rather than requiring cables to be unplugged and plugged. PTT hang-time can be adjusted.

Figure 8 shows the rear panel. Transceiver PTT and key connections are made with standard phono cables. The keyer paddle connects via a 3.5 mm stereo phone jack, and the computer connects via a standard USB jack. Power is supplied by the PC USB port, or from an internal battery pack.

Two Keyers in One Box

We can think of the Winkeyer USB as two keyers in one box. One is the stand-alone version with three internal AAA cells powering it for a very long time, thanks to its miserly current consumption of less than 2 mA while keying and less than 1 µA when it is "asleep" between keying. There is also a "deep sleep" mode for transporting the keyer. The keyer lacks an old fashioned on-off switch, which I prefer. Users can easily install one by substituting a switched 10 kΩ SPEED potentiometer for the one supplied with the kit and wiring the supply voltage in series with the switch.

The second keyer in the box is the USB version. The USB operating capability is important enough to be included in the keyer's name. When the K1EL Winkeyer USB is plugged into a computer USB port, the keyer is both powered by and controlled by the computer. Earlier versions of the Winkeyer USB required opening the enclosure and changing a jumper to choose between independent and computer-connected modes. Now that task has been made automatic by the addition of diodes on the revision D circuit board. A 3 foot USB cable and a companion CD are included with the kit. The review kit included an optional 6 foot USB extender cable to reach a more distant computer.

Much of the discussion on the excellent Yahoo discussion group (see Note 2) dwells on interfacing the K1EL Winkeyer USB with different flavors of software, including logging and contest programs. Perhaps the most important reason to use the Winkeyer USB as an interface between those programs and a transceiver or transmitter is to take advantage of its Morse timing parameters to produce the most readable code for operators on the other end of the circuit.

Flexible Operation

The fun really begins after construction. This is a very capable keyer, and there's a lot to learn. For example, the Winkeyer USB can be configured a variety of operating modes: Iambic A, Iambic B, Ultimatic, Straight Key (which also serves with a two-pole paddle as Bug mode), Dit Priority and Dah Priority.[3]

Six messages can be stored in nonvolatile memories, any of which may serve as a beacon with repeat intervals from 0 to 99 seconds. A wide array of embedded commands can be included in those memories, including calls to other memories, speed changes, incremented serial numbers and many more. Here's an example of embedded commands: To program a CQ message that repeats after an 8 second pause, I inserted the following into message slot 2: CQ CQ DE N7RR N7RR K/B08/2. That produces CQ CQ DE N7RR N7RR K. The /B08 then produces an 8 second pause, then the /2 makes the message in slot 2 repeat.

[3]In Ultimatic mode, a keyer sends a series of dits or dahs matching the lever that was closed last when both paddles are squeezed. I don't know of any keyers built into transceivers that include Ultimatic keying, a mode that has been known for decades. Ultimatic mode was available on the AEA MM-3 MorseMachine, although it wasn't labeled Ultimatic. Both the Island Keyer II (**home.att.net/~jacksonharbor/ik2.htm)** and the NØXAS Pico-Keyer Plus (**www.hamgadgets.com**) can be set up for Ultimatic keying.

A very useful timing parameter (J) determines, in relation to one dit length, how long the keyer will wait for the next keying input. One dit length is a J value of 50, and 99 is just under two dit lengths. I find that a J value of 30 allows me to send more accurate Morse via a paddle. This parameter helps filter out paddle key bounce and other minor sending errors.

Especially at higher speeds, Morse elements can be shortened noticeably at the transmitter output because of transmit/receive switching in modern transceivers. The Winkeyer USB allows the uniform addition of character lengths up to 31 ms with the V parameter to compensate for that phenomenon. Dit and dah weighting with the W parameter can be adjusted in a fashion that doesn't change the words-per-minute rate. There is another subtly different parameter, Y, that changes the ratio between dits and dahs. Thus the normal 1:3 dit-to-dah ratio can be adjusted from 1:2 through 1:4.

The speed range of the potentiometer on the K1EL Winkeyer USB can be configured for any 30 WPM range between 5 and 99 WPM. For example, if the lower limit is set for 7 WPM, then the top speed controlled by the potentiometer would be 37 WPM. The keyer can also be set for extremely slow machine-readable QRSS mode, where one dit lasts for a range of periods from 3 to 60 seconds. QRSS is typically used for weak signal beacon experiments. Very fast Morse (HSCW) is also possible, using speeds ranging from 200 WPM to 1200 WPM. HSCW is sometimes used for high-quality but short-duration meteor-scatter propagation.

In short, the finished K1EL Winkeyer USB is packed with many features as a stand-alone electronic keyer in a small but rugged enclosure with a modest footprint. Connected to a computer through a USB port, the same keyer capabilities can be combined with powerful logging and contesting functions. Contesters and DXers can take advantage of this keyer's two optically isolated outputs to control separate transceivers without switching plugs on the fly.

Manufacturer: K1EL Systems, 43 Meadowcrest Dr, Bedford, NH 03110, **www.k1el.com**. *Price*: K1EL Winkeyer USB Kit, $68; Winkeyer USB-HV Kit, $78. QST

W1ZR

THE DOCTOR IS IN

Q Roger, W5RDN, asks: I have heard that if you have an antenna that will load up on 40 meters, it will also load up on 15 meters. Does that hold true in all cases?

A For sure not in all cases, depending largely on the matching arrangement. Even the classic 40 meter wire dipole doesn't always work well on 15. There are a number of issues.

First, three times the center (7.15 MHz) of 40 meters is at the very top of, not the center of 15 meters, so there is a bit of a problem finding a length that works well across both bands. Next, the resonant impedance of a 3λ/2 dipole is above 100 Ω, so it's not as good a match to 50 Ω coax as is the λ/2 case.

Figure 1 shows a comparison between the 40 and 15 meter *EZNEC* SWR plots of a 66 foot high, 67.2 foot long, 40 meter dipole of 14 gauge bare wire cut for the middle of 40 meters.[1] Figure 2 is a similar pair of plots of a 3λ/2 dipole (68.6 feet) cut to work on 15 meters. It is likely that a length can be found that will work across both bands, especially if it is used with a transceiver with even a limited range internal antenna tuner. Generally, the best compromise length can be found by trimming it for the lower middle of 15 meters.

Note in Figure 3 that the azimuth pattern of a 3λ/2 dipole is not the same as the usual λ/2 case. While different, the pattern can be useful and provides a bit of additional gain in its prime directions.

Q Ralph, K9ZO, asks: I was rereading the May 2008 "The Doctor is IN" column and found the question concerning licensing of beacons. Along a similar vein, how should packet cluster transmitters be licensed and controlled? Technically should the node be my call at my station location? Could it be a club call which has a mailing address, but no permanent station location? How should the control operator situation be handled? I'm at work all day, so could not monitor.

A Packet cluster stations are not included in the recent clarification of repeater rules because, unlike repeaters, they do not transmit simultaneously on a different frequency than the receive frequency. Packet cluster stations, including dedicated "digipeaters" receive data, store it and then retransmit on the same frequency at a slightly later time. This is referred to as a "store and forward" operation.

Digital message forwarding stations are covered under Part 97.219 and 97.221. They can be under automatic control, which is defined in 97.3(a)(6): "Automatic control. The use of devices and procedures for control of a station when it is transmitting so that compliance with the FCC Rules is achieved without the control operator being present at a control point."

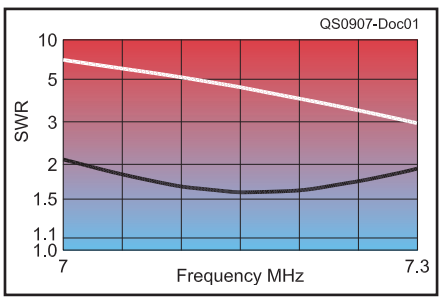


Figure 1 — Comparison between the 40 (black) and 15 meter (white) *EZNEC* SWR plots of a 66 foot high, 67.2 foot long, 40 meter dipole.

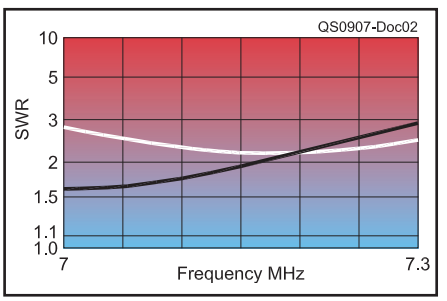


Figure 2 — Comparison between the 40 (black) and 15 meter (white) *EZNEC* SWR plots of a 66 foot high, 68.6 foot long dipole cut for 3λ/2 on 15 meters.

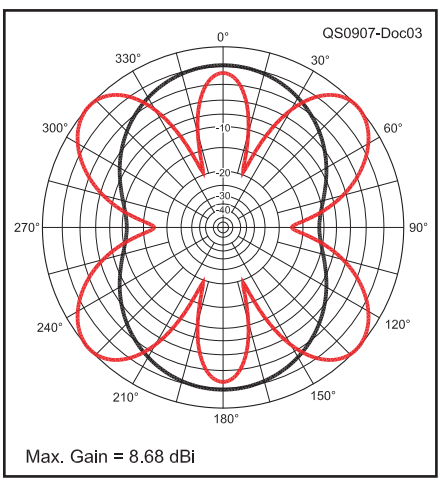


Figure 3 — Comparison between the 40 (black) and 15 meter (red) azimuth patterns of a 40 meter λ/2 dipole.

Q Ron, N3AEA, asks: I've heard the term "fully neutralized" regarding tube amplifiers. Can an amplifier be partially or not quite fully neutralized?

A As noted in the February 2009 Doctor column, an amplifier will oscillate if the vector product of gain and feedback is greater than 1. I suppose that one might define "fully neutralized" as the case in which the net feedback is exactly zero. Note that it doesn't have to be exactly zero to not cause problems, just well below that threshold.

I suspect many amplifiers could be better described as "adequately neutralized," in that they are neutralized sufficiently that they are stable across their operating range. Most neutralizing methods, especially with tetrode tubes that, because of the screen grid between grid and plate, have less feedback coupling in the tube, often suggest moving neutralizing wires until there is no evidence of instability. Even with more precise adjusting, the neutralizing capacitor is not likely to be easily set to provide absolute minimum feedback, even if a coupling null is detected. Perhaps "fully neutralized" is a term that came from the advertising department, rather than the engineering staff!

Q Jim, K2TL, asks: I own a desktop automatic antenna tuner that I am quite pleased with. My problem seems to be due to the close proximity of an HF antenna that is *not* connected to the auto tuner. When I transmit to the other antenna, even at about 60 W, the auto tuner goes into a tune mode. I think RF is getting into the auto tuner by being picked up on the antenna that is connected to the tuner even though it isn't being used.

A While I'm not familiar with your specific model tuner, I can easily imagine what it's doing. The tuner is designed to sense forward and reflected power at the port connected to the radio and adjust so that the reflected power is close to zero.

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

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

If the antenna is picking up radiation from a close antenna, it will come down the feed line, pass through the tuner network, and look to the SWR sensor just like reflected power. It is likely that, if you're using a different antenna system, that the radio is not terminating the tuner. In that case, the power is 100% reflected back toward the antenna from the open circuit and thus the sensor sees forward and reflected power being equal. It then tries its heart out to tune for minimum reflected power. Of course the forward and reflected power ratio will be the same no matter what it does, so hopefully it will eventually time out or switch to "plan B."

If you have a way of setting it not to tune until you want it to, that would be the easiest solution. Next would be to just power it down when not in use. I much prefer the semi-auto mode in which tuning is initiated only when you push the TUNE button.

Most auto tuners specify that tuning be done at reduced power — typically 10% of the tuned rating. There's nothing worse while transmitting after changing frequency, or if the antenna moves in the breeze and you hear the tuner relays clicking at 1.5 kW!

Q Barry, W6YE, wonders about the worldwide 40 meter band allocation. He asks: Does Japan have different rules from the US for emissions on 40 meters? I was listening to 40 meters last night (about 0700 GMT) and conditions must have been just right, because I could hear Japanese amateurs on SSB. The thing that puzzles me is that their frequencies were between 7040 and 7060 kHz. The US band definitions don't allow SSB below 7125 kHz. I guess this is a situation where even if you can hear 'em, you can't work 'em...

A That's not surprising. While frequency allocations on some bands are similar throughout the world, in general the allocations are based on International Telecommunication Union (ITU) region. There are three such regions (see Figure 4). While Region 2 (including North and South America) has a 40 meter allocation of 7000-7300 kHz, Region 1, including Europe and northern Asia, and Region 3, Australia and the South Pacific, were recently expanded from 7000-7100 kHz to 7000-7200. The 7200-7300 kHz segment is still allocated for the 41 meter international broadcast band in those regions.[2,3] Region 2 is also the only part of the world with an 80 meter allocation from 3500 to 4000 kHz. In Region 1 it is 3500-3800 kHz, and in Region 3, 3500-3900. The remainder of our MF and HF bands have the same allocations in each region.

[2]B. Price, N4QX, "Party Time on 40 Meters," *QST*, Apr 2009, pp 60-61.

[3]Note that the rules are different for some US territories outside the US mainland.

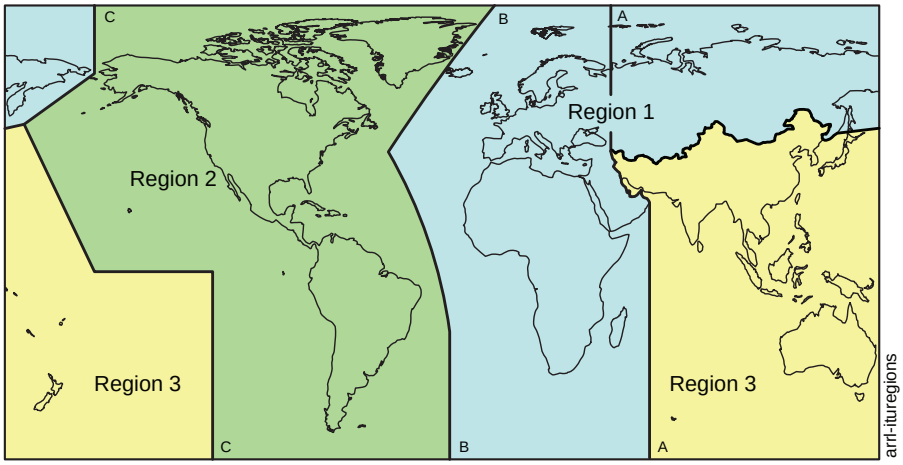


Figure 4 — Map showing the three ITU regions that band allocations are defined in.

The other thing is that while international agreements establish the amateur bands, they don't establish the sub bands by mode. That is left to national regulatory organizations, such as our FCC. Many countries have no mode boundaries, as is the case with 160 meters in the US. The International Amateur Radio Union, of which the ARRL is the US member-society, has established band plans for all regions. These plans, in most countries are voluntary, as is our plan for 160 meters. They generally have phone operation suggested above 7030 to 7050 depending on region. Thus it is quite reasonable to find non US amateurs from most parts of the world, including other parts of North America, operating SSB, just where you heard them.

Sometimes, if the DX stations realize that the band is open to the US, you will hear someone from afar calling CQ with SSB on perhaps 7050 and announcing that they are listening on 7130 kHz, so they can work US amateurs.

Q Marcus, KI6WDX, asks: I'm a new ham and find making all of the various radio connections can sometimes seem a bit confusing in spite of talking with other operators. I've assembled the PL-239 UHF coaxial connectors, but what I need to know is how snug must the plug tip be as it's inserted into the receptacle? I have two antenna switching modules in my mobile ham shack and when the plugs are inserted into their sockets, the feeling I is between firm to somewhat loose. Some say that the tip should not feel that tight, but not loose. I'm not sure exactly what that answer meant. I would think that the entire center connector would want a metal-to-metal contact around its entire tip body. What's your view?

A In my experience, the issue is usually with the socket rather than the plug. The SO-239 socket has spring fingers intended to provide a slight pressure fit against the center pin. After many insertions, the springs, especially on bargin connectors, get "tired" and the pressure is reduced, resulting in a fit that feels loose on insertion. That can be accelerated if solder is left on the outside of the pin, so always use a fine file or emery cloth to remove any that gets on the outside of the pin. It also sometimes helps to round the square corners of the end of the pin, since they sometimes protrude and can stretch the socket.

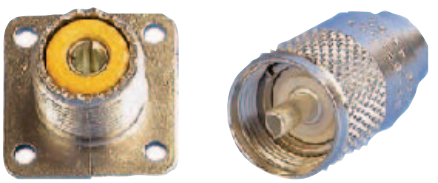


Figure 5 — UHF type connector pair; SO-239 socket on left, PL-259 plug on right. Note the four spring fingers that make the socket's inner connection.

In my experience, the loose fitting connectors often work adequately for HF — perhaps because they are not perfectly centered and on tightening get pushed against one side or the other. Nonetheless, like you, I prefer a connector that feels like it is a bit snug. To get an idea of how they should feel, I would buy a new high quality (I always select Amphenol, although there may be others that are as satisfactory) and see what it feels like with a new PL-259 (see Figure 5).

It is sometimes possible to move loose springs inward slightly with a jeweler's screwdriver to increase the pressure, but I expect that will provide at best temporary improvement. If feasible, I usually replace the OEM sockets with new top quality items if they get loose.

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; www.arrl.org/tis/. QST

SHORT TAKES

Ultra-RX1 Ultrasonic Receiver

It's somewhat uncommon to find a product that is both educational and practical. With the Xtal Set Society's Ultra-RX1 ultrasonic receiver you enjoy both attributes, plus an extra dimension of sheer fascination.

The Ultra-RX1 is essentially a direct-conversion audio receiver. It uses a piezoelectric transducer to receive ultrasound in a range from 35 to 45 kHz. The ultrasonic audio signal is fed to a mixer/oscillator stage that converts it to frequencies that human hearing can detect. The converted audio is also amplified to a level sufficient to drive a set of headphones. This is all accomplished in a package that is only about 3 inches wide by 4½ inches long.

Building the Ultra-RX1

The Ultra-RX1 is only available as a kit, but it is a relatively easy kit to build. There are no coils to wind and all the components are the traditional through-hole variety.

The manual states that one must own a volt-ohm meter (VOM) to test the kit at various stages. The manual also suggests the use of an oscilloscope. I have both, but I limited my tests to those that required the VOM. This seemed perfectly adequate. In fact, if you don't mind taking a gamble and building the kit without performing the recommended tests along the way, you wouldn't need anything more than a soldering iron.

Including pauses for testing, I managed to finish the Ultra-RX1 in about two hours. The kit is well within the skills of a beginner and has the potential to serve as an educational tool to hook curious minds on the wonders of electronics and simple receivers, not to mention the strange world of ultrasound (more about that in a moment). The Xtal Set Society even includes a plastic enclosure with the kit; all you need to supply is a 9 V battery.

The Ultra-RX1 "On the Air"

I knew I was in for a unique experience as soon as I soldered the last component and plugged in my headphones. The Ultra-RX1 came to life with a *pop*, followed by a gentle hiss.

The manual suggests that your first test involve a set of car keys. If you are old enough to remember when televisions used ultrasonic remote controls, you probably also recall that the sound of jingling keys would sometimes make your TV behave as though it was demonically possessed. That's because all those metal keys bouncing into each other generated a copious amount of ultrasound. Sure enough, I shook my keys in front of the Ultra-RX1 and it converted the ultrasound to something resembling the mad tinkling of a wind-blown glass chandelier.

The receiver provides VOLUME and TUNING controls in the form of miniature 10 kΩ trimpots. The audio output stage has more than enough gain to create a deafening noise, so the VOLUME control is a blessing. The TUNING control functions like a receiver VFO, although most of the ultrasound sources I encountered were broad enough to occupy the full receiver bandwidth, making tuning unnecessary.

As I roamed my supposedly quiet house with the Ultra-RX1, I found ultrasound everywhere. Compact fluorescent light bulbs sounded like warbling birds. My microwave oven generated sharp snapping noises. The family TV alternated between whirring and buzzing.

I took the Ultra-RX1 to ARRL Headquarters and subjected it to a spark gap generator devised by Test Engineer Bob Allison, WB1GCM. I was curious to see how well the receiver could detect electric arcing, the kind that bedevils hams unfortunate enough to live near defective power lines. With Bob's ancient Model T spark coil buzzing furiously, I used the Ultra-RX1 to listen to its distinctive ultrasonic signature from at least 40 feet away. If you mounted the Ultra-RX1 at the focal point of a parabolic reflector, you may be able to achieve much greater range, making the receiver a highly effective power line noise hunter.

As the Ultra-RX1 manual describes, the receiver can be used to listen to Mother Nature's ultrasonic symphony as well. When this review was written, we were still in the clutches of a New England winter and the creatures that generate ultrasound had yet to appear. By summer I anticipate enjoying a cacophony of ultrasonic "music" in the backyard as insects emerge and bats take flight!

Listen to a New World

The Ultra-RX1 isn't an Amateur Radio product per se, but it has practical ham applications in locating troublesome arcing. Much like an RF receiver, this fascinating little device expands your limited senses, allowing you to eavesdrop on a world that other creatures take for granted.

Manufacturer: The Xtal Set Society, PO Box 3636, Lawrence, KS 66046; tel 405-517-7347; **www.midnightscience.com**. *$69.95.* QST

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

W1ZR

GETTING ON THE AIR

It's Time to Take to the Water

"Just because it's boating season doesn't mean you have to leave ham radio behind."

Many boaters are hams, and many hams are boaters. This shouldn't be a surprise, since both activities attract those interested in expanding their skills and overcoming challenges. An Amateur Radio station aboard can provide additional enjoyment to the ham, while serving as a secondary communications medium for the boater.

The Flavors of Amateur Radio Afloat — First Steps

The decision to make a boat radio equipped need not involve major effort or expenditure. Beware though, as with any other aspect of ham radio, it can have a tendency to keep growing. You know your land station will never be quite done; why should your boat station be different?

Starting Gradually — the Handheld Station

It shouldn't take much imagination to envision taking along your VHF handheld transceiver. Such a radio can be used to check in with the local repeater group or to keep in touch with other ham boaters as you go off for a weekend. You will likely find ham channels less crowded than marine ship-to-ship channels, a real plus.

Most current VHF handhelds can monitor marine channels as well as NOAA weather alerts, so there can be additional benefits for the boater. With two marine receivers, you can monitor for calls on your usual ship channel, while you leave your VHF marine transceiver set to Channel 16, the calling and distress channel.

Moving Aboard

Of course it isn't a great leap to installing a mobile sized amateur VHF transceiver next to your VHF marine radio. I *assume* you have a VHF marine transceiver. If not, start with a marine VHF. At current prices there's no excuse for anyone in coastal waters not to be so equipped — it is the basis of all emergency services afloat. A cell phone, or even an Amateur Radio station is no substitute. Your VHF amateur transceiver mounts and hooks up just the same way as your VHF marine set. The marine frequencies (156-162 MHz) are close enough to our 2 meter band (144-148 MHz) that I have had good luck using my sailboat's mast mounted marine antenna on 2 meters, using a small coax switch.

This works mainly because the loss in the mismatched coax going to the top of the mast masks the high SWR. Because of the benefit of added height, and resulting long line of sight distance, I don't notice the lost power. Power boaters, or sailors with lower antenna mounting positions, may do better with a wideband antenna designed to cover the range. We reviewed one such antenna with a 128 to 162 MHz bandwidth in *QST*, but there are now a number that show up on a Google search.[1] Another possibility would be to use a marine antenna and a 2 meter antenna tuner, although I'm not aware of any currently being manufactured.[2]

Moving to an MF through UHF Marine Mobile Station

The current marketplace offers some really great transceivers designed for mobile operation that cover from MF through VHF or even UHF. Arguably the radio itself can be installed with about the same effort as a VHF/UHF mobile, and doesn't cost a whole lot more. Thus, if you think you may want to move in that direction, there is a good argument for starting with an HF through VHF set, even if you just use it for VHF at first. For one thing, you are less likely to lose it over the side than the handheld. Figure 1 shows my all-band radio mounted adjacent to the marine VHF set.

What Kind of Radio for Your Craft?

There are as many choices for your boat as for your home station. After all some boats are larger than some homes. In my case, with *Windfall*, a 25 foot diesel auxiliary sloop, I wanted to use a single radio for HF and 2 meter operation. In addition, I wanted to be able to operate from below in the cabin as well as from the cockpit, while underway. That led me to a transceiver with a removable faceplate that could be placed in either location, although there might be other ways of meeting both objectives.

The current marketplace offers three transceivers that fill that bill. ICOM offers the IC-706MkIIG and the IC-7000, while Yaesu provides the FT-857. I purchased my transceiver before the current offerings were available, and selected the IC-706MkII as best for my setup at the time. All arrangements I'll discuss would apply equally to any such transceiver.

How About a Marine HF SSB System

Vessels that travel outside of the line-of-sight coverage of Marine VHF FM radios

[1]J. Hallas, W1ZR, "Product Review — Shakespeare HS-2774-1 Wideband VHF Marine Antenna," *QST,* Aug 2006, pp 61-62.

[2]MFJ used to provide a V/UHF tuner, the MFJ-922. It is, however, no longer listed. Another possibility would be to adapt one of John Stanley's hairpin tuners — see J. Stanley, K4ERO, "Hairpin Tuners for Matching Balanced Antenna Systems," *QST,* Apr 2009, pp 34-36. Connect the shield of the coax going to the antenna switch to the center of the transmission line loop. Tap the center conductor part way up either side until a match is achieved.

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Figure 1 — The amateur transceiver is located adjacent to the VHF marine set, secured below the side deck. The small coax switch that transfers the antenna to either radio can be seen on the right.

often make use of marine HF SSB radios for ship-to-coast station and ship-to-ship service. ICOM offers three HF SSB marine transceivers that can be used on the amateur bands, for example. Their latest, the M802 requires a few keystrokes to be able to transmit on the amateur bands.[3] The other two operate on amateur and marine frequencies right out of the box. Once amateur operation is enabled, the M802 VFO tunes continuously as the typical amateur VFO, not in preset channels as do other marine sets. The M802 also offers a removable control panel, allowing the installation flexibility of the amateur transceivers previously discussed. The SGC SG-2000 also offers operation on amateur frequencies and a remote mounting front panel.

While the marine radios offer benefits of being usable for multiple services, there are some drawbacks that should be considered. First, they are considerably more expensive. Second, they do not offer the control flexibility we are used to. They aren't set up for adjustable selectivity or the easy split operation of even the most basic of amateur gear.

If you have a need for such a system, you might as well have the extra capability to be able to operate on the ham bands. Note that, unlike the VHF marine radios in US waters, users of HF marine SSB radios are required to have an FCC ship station license, as well as a commercial operator's license, or restricted radio operator's permit. Note also that these licenses do not allow operation on amateur frequencies. An FCC amateur license of the appropriate class is still required. While there is no prohibition against using gear type accepted for marine operation in the amateur bands in the US, that may not be the case in other countries. If you are outside of the US you are advised to check with the appropriate agency.

[3]To enable transmission on amateur frequencies for one session only (when the radio is powered down it will close again), hold down MODE and 2 and power the unit on. To enable transmission on amateur frequencies permanently, hold down MODE and 2 and TX and power on. The unit will now remain amateur enabled even when powered down.

Power Source

The first difference between a VHF only transceiver and one of the all-banders is the power requirement. While both are designed to operate from a (fully charged) vehicle battery, the all-bander will pull around 20 A key down, versus typically 10 A for the typical 50 W FM transceiver. This translates into a need for heavier primary wire — typically 10 gauge or larger, depending on the distance. Note that the total current drain for a 100 W SSB transmitter and a 40 W FM transmitter will be about the same over time, depending on speech patterns and compression settings, because of SSB's lower duty cycle. Thus, either can discharge a battery in about the same time.

Speaking of current drain and battery discharge, perhaps it's a good time to discuss battery performance. If you need your battery to start your engine, and expect to operate with the engine off, I recommend that you consider using a different battery for operating your radio equipment than that used for engine starting. The radio battery system should use a battery of the deep discharge type, not a starting battery, to provide maximum life. A starting type battery is designed to provide a short burst of high current and then get quickly recharged. They will not survive many of the deep discharge cycles that the radio battery will undergo.

On *Windfall*, I have two batteries and both are gelled electrolyte deep discharge type.[4] Whenever I'm aboard without the engine running, I have the battery switch on BATTERY 2, saving BATTERY 1 for starting the engine. While the engine is running, I switch to BATTERY 1 & 2 to have the alternator recharge both batteries. So far I haven't needed a jump start.

Another issue is operation from a partly discharged battery. It doesn't take a battery that isn't being recharged from the alternator long to sag to 12 V or less, even though it still has a lot of energy. If you expect to operate for more than an hour or so (think Field Day), consider adding a battery boost regulator to your system. It will provide 13.8 V to your radio equipment as long as the battery provides 10.5 V, about the limit to maximize battery life. We reviewed some in *QST* recently.[5]

Maritime HF Antenna Systems

HF antenna systems for boats usually require a bit of thinking, and have been a stumbling block to some. Unlike the back yard, trees are not in abundance, although sailboats come equipped with at least one

[4]A deep discharge battery works fine as a starting battery for my small diesel. The starting requirements for some larger engines may require a higher current than the deep discharge battery can supply. Check your engine manufacturer if in doubt. While more expensive than flooded cell batteries, gel or AGM batteries have a number of advantages over other types. They can stay aboard all winter without worry about freezing and they can't spill.

[5]P. Salas, AD5X, "Product Review — Battery Boost Regulators from TG Electronics and MFJ Enterprises," *QST*, Nov 2006, pp 46-49.

artificial "tree." On *Windfall*, I took advantage of having the mast down one winter to have my rigging shop install insulators at both ends of my backstay. To avoid variable coupling to the topping lift (line from top of mast to end of boom), I replaced the stainless topping lift with one made from low stretch synthetic material.

Those without an insulated stay, or without a mast for that matter, have a number of choices. Once again, we are fortunate that the marine HF SSB channels cover the same general range as our HF amateur bands. Marine electronics dealers sell a number of appropriate antennas and tuners that are suitable for either service. SGC lists marine HF whips in 7, 9 and 28 foot lengths. Digital Antenna offers whips at 16 and 24 foot lengths, while Shakespeare offers models at 17.5, 23 and 28 feet. Most of these antennas require a cabin bracket up 3 or 4 feet from the base in addition to a base support. One model of the 23 foot Shakespeare HF antenna includes a deck bracket that can support the full antenna, making it a possibility for use on the fantail of a sailboat, or on a powerboat without a deckhouse.

Another possibility for sailboats is to hoist a temporary wire up the mast. Keep the base to some uncluttered corner so that the wire will be as far as feasible from the mast and any wire rigging that will at best distort the pattern.

All of these antennas will require a ground connection and an antenna tuner for reasonable operation on more than one frequency range.

Ground Systems

The ground connections will very much depend on the nature of the craft, as well as its electrical system. The optimum would be a short connection to a solid metal hull. Even if the craft is insulated by layers of paint, the capacitance to ground would work very well. I wasn't sure of exactly what I would need, so I thought I would start simple and add ground arrangements until I had something that would work.

I located my automatic antenna tuner aft, near the entrance arrangement for the backstay wire, on the same side of the craft as the battery system and the engine ground stud. I ran the ground braid from the tuner directly to the engine ground where it met up with all the other ground wires. This gave me the capacitance of the engine block to the seawater, including a seawater path through the cooling system, the connection through the wet propeller shaft and propeller as well as all the power wiring capacitance to the water surface. I was prepared to add sheets of aluminum inside the fiberglass hull to provide additional capacitance, but found what I had worked well. The test was being able to work into the Antique Wireless Association on a summer afternoon using 25 W AM. This is a tough shot, more than 300 miles, from home with 120 W and a good dipole. While every little bit could help more, this was deemed good enough for W1ZR/MM.

W1NCY

Figure 2 — Here the control head has been attached to a bracket mounted on the bulkhead adjacent to the cabin table. It makes a perfect spot for CW operation, or for contest logging.

DAN MURDOCH

Figure 3 — A bracket is mounted to a board cut to fit in place of the lowest companionway drop board. With this arrangement, I can operate while underway. Once contact is established, hit the LOCK button or you will be sure to knock the tuning knob while you multitask!

The Antenna Tuner

I use an aftermarket automatic antenna tuner midway between the ground connection and the antenna feed. It is very convenient, although the tuner that goes with the radio may have a slight edge on that score. If you think you may want to move to a marine SSB, consider the fact that they put out up to 150 W, so you may want to start with a tuner that will handle that rather than the 100 W that some amateur tuners are limited to. ICOM makes a few designed to work with their marine sets that will either work directly, or with a few connection changes, with their amateur equipment. Of course they also offer the AH-4, which is well suited if you don't expect to need the 150 W capacity. In a similar vein, Yaesu provides the FC40 waterproof antenna tuner that is designed to interoperate with their FT-857 or '897 radios. Other manufacturers, including LDG, MFJ and SGC offer autotuners that will work with any radio.

Operating Afloat

As with a home station, you will need a comfortable location from which to operate. I can quickly set up to operate either from the radio location for quick casual contacts, or from the cabin while at anchor (Figure 2). While I'm at the helm, the movable faceplate makes it easy to operate from there (Figure 3).

If you operate outside US territorial waters, you will need to familiarize yourself with the frequency allocations that shift with the region. You will also need to identify yourself as *maritime mobile*, if you are in the maritime areas outside of our jurisdiction. Note that if you travel into the territorial waters of another country, you need an appropriate permit from that government to operate there and are subject to that country's regulations.

The *maritime mobile* suffix is not appropriate while within US waters. No special identifying suffix is required for US amateurs in portable or mobile operation within the US, but I use *marine* mobile, since it is descriptive and within the rules.

Enjoy both hobbies this summer, but make sure you don't get distracted and watch where you're headed, especially if within Long Island Sound, where I set sail! QST

NØAX

HANDS-ON RADIO

Experiment #78 — Bridge Circuits

Bridges are never far away in radio. There are SWR bridges, impedance bridges, noise bridges and other bridge circuits inside many pieces of equipment. Just as with their full sized cousins, electronic bridges require balance to be useful and that's the subject of this column.

Half-Bridges

The simplest way to begin is to discuss a bridge circuit with which you're already familiar, even though you might not know it. The half-bridge is really just a fancy name for a *voltage divider* as shown in Figure 1. For this discussion, we'll use the general case of the input to the divider an ac signal and both components in the divider being impedances; Z_1 and Z_X, where Z_1 is known and Z_X is unknown. The usual formula for the output voltage from a two-impedance divider is $V_{out} = (V_{gen} \times Z_X) / (Z_X + Z_1)$.

The utility of the bridge is not in developing a particular output voltage, but rather in using the output voltage to measure the value of an unknown impedance, Z_X. To do that, we have to rearrange the equation a little:

$$Z_X = \frac{Z_1}{\frac{V_{gen}}{V_{out}} - 1}$$

This makes sense: If $V_{out} = 0$, then $Z_X = 0$. If $V_{out} = V_{gen}$ then Z_X is infinite. If $V_{out} = V_{gen}/2$ then $Z_X = Z_1$. The only problem with this method of measurement is that it requires a very precise knowledge of three things — the values of V_{gen}, V_{out} and Z_1 — to make a precise measurement of Z_X. Since Z_1 is a fixed value, it can be measured once and would not change much. Voltages are more difficult to generate and maintain at a precise amplitude. Wouldn't it be nice if we could make those constraints go away somehow?

A Sense of Balance

The invention of the full bridge in Figure 2 by Christie in 1833 and its popularization by Wheatstone 10 years later was a major advance in electrical measurement. In those early days, precision instrumentation just didn't exist. It was possible to laboriously calibrate resistances and voltages against standards, but high precision bench-top voltmeters were decades in the future. The major advance of the full bridge circuit was to eliminate two of the precision measurements — those of the voltages — by converting the measurement from one of value to one of *balance* instead.

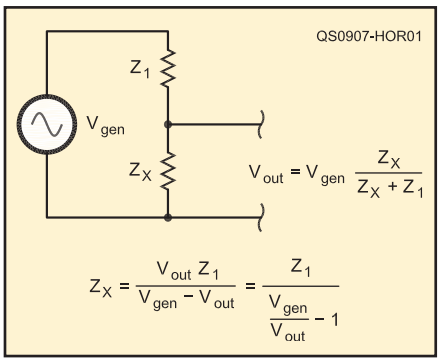

Figure 1 — The basic half-bridge is nothing more than a voltage divider. The unknown impedance can be determined from the input and output voltages and the value of the known impedance.

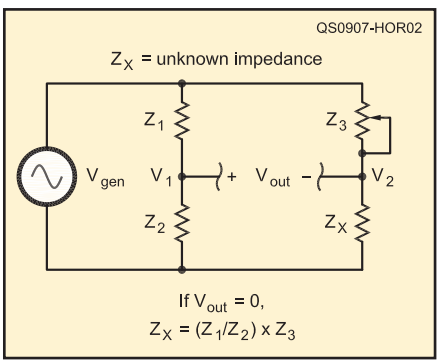

Figure 2 — The Wheatstone bridge consists of two parallel voltage dividers. Output is taken from the midpoints of the dividers. A calibrated impedance, Z3, is adjusted until the bridge is balanced ($V_{out} = 0$), at which point the value of the unknown impedance is equal to that of the calibrated impedance.

If instead of one voltage divider, there are two identical dividers — side by side and driven by the same voltage — the voltage at the midpoint of the dividers V_1 and V_2 will be exactly the same. That condition won't change, no matter what the value of the *excitation voltage*, V_{gen}! For sure, the absolute value of the midpoint voltage will change, but those two values will be the same and the output of the bridge, $V_{out} = V_1 - V_2$, will be exactly 0 V. With a means of detecting when the output voltage is 0 V, both voltage measurements have been eliminated in a stroke!

This made very precise measurements possible to the early experimenters because it is much easier to make an instrument that detects the presence and polarity of small amounts of voltage than it is to make an instrument that can tell you that value of voltage. If such an instrument (called a *galvanometer*) is connected between V_1 and V_2, it is easy to tell if the bridge is balanced ($V_{out} = 0$) with a very high precision. Even in the mid 1800s, it was possible to balance a Wheatstone bridge to less than 1 mV of error.

Furthermore, the two dividers don't even have to be identical for the bridge to be balanced. It is only necessary that the *ratios* of the impedances in each divider be the same. For example, in Figure 2, if $Z_1 = Z_2 = 10$ kΩ and $Z_3 = Z_X = 1$ kΩ, V_{out} will still be zero because the voltage at both divider midpoints will be $V_{gen}/2$ and V_{out} will still be zero.

If $V_{out} = 0$ the bridge is balanced and the value of the unknown impedance is related only to the other impedances: $Z_X = (Z_1 / Z_2) \times Z_3$. Z_1 and Z_2 are fixed and so their ratio is known and becomes a constant. Thus, the procedure for measuring the unknown impedance, Z_X, requires only that the bridge be brought into balance and the value of Z_3 measured. Measurement bridges use a calibration scale for Z_3 so its value can be read directly, without having to be measured separately.

Bridge-Building

Let's make a simple bridge and find out how that works. We'll build the circuit of Figure 2 with $Z_1 = Z_2 = 2.2$ kΩ and a 5 kΩ potentiometer as Z_3. (The potentiometer can have a linear or tapered resistance characteristic — the type of variation of resistance with shaft rotation.) Use a "panel mount pot" with a shaft and if you have one and a knob to fit the shaft that has a position indicator as shown in Figure 3.

Before assembling the circuit, take an index card, punch a hole for the pot's bushing in the center of the card, and attach it to the pot with the mounting nut and washer. Attach the knob to the shaft so that the position indicator is as close as possible to the

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index card. Short two terminals of the pot as shown in Figure 2 so that the pot becomes a variable resistance.

Now create a calibration scale for the pot. Attach a digital ohmmeter and set the pot to one end of the scale. Make a mark on the index card at that point and label it with the resistance shown on the ohmmeter. Set the pot to the other end of the scale and label that point, too. Starting at minimum resistance, adjust the pot in steps of 500 Ω, labeling each step on the index card, until you reach maximum resistance. You'll have something that looks like Figure 3, although if you have a tapered resistance pot, the calibration marks won't be equally spaced around the knob. If you like, go back and add more calibration marks.

Connect the calibrated pot as Z_3 in the circuit, set it to 2.5 kΩ, and attach a voltmeter to measure V_{out}. Set the meter to its most sensitive voltage scale, perhaps 300 mV full scale. Dig into your parts box and pull out any resistor between 2 and 3 kΩ, such as a 2.7 kΩ unit. Connect that as your unknown, Z_X, and apply 5 V dc to the bridge as V_{gen}. Adjust the calibrated pot until the bridge is balanced — at a meter reading as close to 0.000 V as you can set it. You will find the adjustment to be surprisingly sensitive. Once the bridge is balanced, the calibrated scale will show the value of the resistor attached as Z_X.

Verify that the balance point of the bridge is independent of the value of V_{gen}. Adjust your power supply output voltage with the bridge balanced. It shouldn't change the balance at all, except perhaps for any thermal effects in the resistors. (I told you it was sensitive.) Return V_{gen} to 5 V and make sure the bridge is still balanced. Fire up your soldering iron. When it is good and hot, touch the tip of the iron to the unfortunate resistor connected as Z_X. As the resistor heats up, its value will also go up. Pop quiz — if the value of Z_X goes up and Z_3 doesn't change, does V_{out} change in the positive ($V_1 > V_2$) or negative direction?[1] If you have a can of compressed air or contact cleaner or freeze-spray, chill Z_X and watch the balance tip in the other direction.

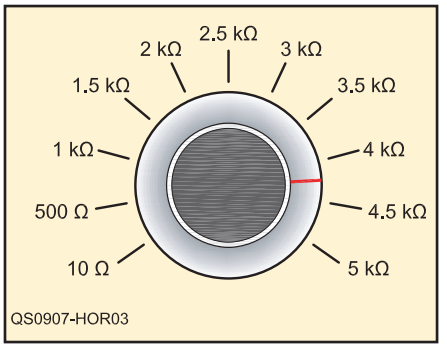


Figure 3 — A panel-mount potentiometer can be calibrated as a variable resistance by using an index card to create a resistance scale.

Now try other values for Z_X. Make a bit of a game out of it by collecting a handful of resistors at random and measure them without looking at the value markings. Did you grab some resistors for which you couldn't get a satisfactory balance? Perhaps the value was higher than 5 kΩ and the potentiometer didn't have enough range. Or maybe the value was very low (say below 100 Ω) and it was difficult to adjust the pot for a precise balance.

There is a solution. Remember that the dividers don't have to be identical for the bridge to balance, only the ratios of the two impedances must be the same. You can expand the range of the bridge by changing Z_3 to a larger or smaller value of potentiometer. Calibrate the pot as before and see if those high or low value resistors are any easier to balance.

Parts List

- Two each 2.2 kΩ, ¼ W resistors.
- Panel mount potentiometer, 5 kΩ and index card.
- Selection of resistors as test samples.

Recommended Reading

Pretty amazing how much fun you can have with four resistors, isn't it? There are many variations on the basic Wheatstone bridge circuit. Begin by reading the Wikipedia entry on the Wheatstone bridge (**en.wikipedia.org/wiki/Wheatstone_bridge**) and then following the links to other bridges. Also read the entries about the Wien Bridge Oscillator, a different bridge application.

Next Month

We've studied and used L networks in past experiments.[2] They are the basis for the more general Pi and T networks more commonly found in amateur equipment. We'll hook up to those circuits next month.

[1] V_{out} changes in the negative direction because V2 gets larger while V1 stays the same.

[2] Previous Hands-On Radio columns and a complete parts list for all experiments are available to ARRL members at **www.arrl.org/tis/info/HTML/Hands-On-Radio**. QST

NEW PRODUCTS

PERFORMANCE EHNANCEMENTS FOR YAESU FT-2000 and FT-2000D

◊ Vertex Standard has announced the Performance Enhancements 2000 program to upgrade the operating system DSP firmware for its Yaesu FT-2000 series of HF and 6 meter transceivers. The new firmware implements the same DSP technology included with the FTDX9000 series radios. It includes improvements to SSB mode noise reduction, beat tone reduction in the digital notch filter, AGC settings, VOX settings, RTTY monitor, parametric equalizer, front panel indicators, and other features. Radios currently shipping from Yaesu include PEP2000. Owners of older radios may visit **www.yaesu.com** and download PEP2000 from the FT-2000 Files area. No hardware changes are required. New manuals are also available in the Files area.

TELESCOPING WHIP ANTENNA FROM MFJ

◊ The MFJ-1953 telescoping whip is designed for use with mobile motorized ("screwdriver") antennas. The whip is 8 feet long when fully extended and 2 feet collapsed. It has a ⅜ × 24 stud compatible with most antenna brands. Price: $24.95. To order, or for your nearest dealer, call 800-647-1800 or see **www.mfjenterprises.com**.

NIFTY! *MINI-MANUAL* FOR MFJ-259B and MFJ-269 ANALYZERS

◊ Nifty! Ham Accessories has added *Mini-Manuals* for the MFJ-259B and MFJ-269/269PRO antenna analyzers to its line of quick reference guides. The 8 page antenna analyzer *Mini-Manuals* include sections on measuring antenna SWR, cable loss, capacitance/inductance, frequency and impedance. Other sections cover advanced modes. The manuals measure 4.5 × 8 inches and are laminated for durability and weatherproofing. Price: $12.95 each. For more information, see your favorite dealer or visit **www.nifty accessories.com**.

AG1YK

HINTS & KINKS

HELP YOUR ICOM IC-27/37/47 REGAIN ITS VOICE

◊The most common problem leading to the "junking" of many of the above workhorse FM transceivers is their mechanically weak volume control potentiometers (pots). Turning the radio on and off via the volume pot's tandem rotary switch over the transceiver's useful life invariably results in an open or intermittent wiper. The net result is little or no receive audio, leading owners to believe their receivers are completely dead.

When I owned my first IC-37A in the mid-1990s, I experienced this very problem and purchased an exact replacement potentiometer/switch from ICOM. The replacement pot was mechanically identical to the original (a bad sign). Performing the repair was also a tedious job, requiring a complete removal of the front panel, unbundling a wiring harness and removing a daughterboard containing both original volume and squelch controls. Three hours and a splitting headache later, I vowed to never do this type of repair again. Until I sold that IC-37A at a hamfest in 2003, I always turned it off and on with my dc supply and never did anything with the volume control except turn it up or down a bit.

In 2008 I got a good deal on several 222 MHz radios on eBay. Two of them were IC-37As and both had the volume pot issue! I learned that ICOM no longer sells the replacement volume potentiometer/switch for these radios. It turns out that there *is* a simpler way to get your radio "talking again." You have two choices.

As shown in Figure 1, a miniature, 10 kΩ audio taper, shafted potentiometer can be mounted vertically on insulating foam, double-stick tape in the top-left-rear of the transceiver (where the optional voice synthesizer would normally mount). I drilled a hole to pass its ¼ inch diameter shaft, centered 1 inch to the right and 1⅛ inches forward from the back left corner of the transceiver's top cover. To guarantee that the pot would "stay-put" during knob twists, I also placed dabs of RTV adhesive between the pot's circular body (left and right sides) and the power amplifier housing behind it. Alternately, a small trimmer pot can be used in the other location shown if you don't want to drill holes. Option two still maintains volume adjustment via a "diddle-stick." The trimmer pot's is located under the plastic access cover between the processor RESET button and scan options dip switch. (A dab of RTV adhesive is used to secure the trimmer pot in place.)

TONY BOGUSZ, W9MT

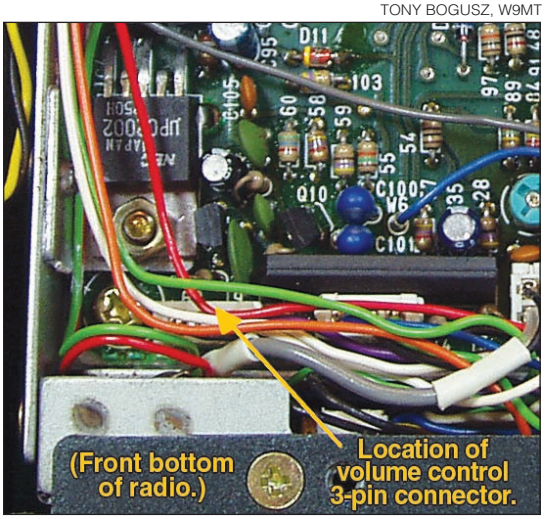


Figure 2 — Volume pot connector and wire locations.

Figure 2 shows where to splice in your new volume control. Unplug the connector at the point shown on the bottom side of the transceiver. On it will be a purple wire, a white wire and a black wire. The black wire (ground) goes to one end of your new pot. The white wire goes to the middle (wiper) tab and the purple wire goes to the remaining tab. Carefully clip these three wires, leaving their excess lengths within the wire bundle from which they emanate. If you desire 1 inch more lead-length to splice to, the front panel will need to be removed allowing clipping of these three wires directly at the original volume control's daughterboard.

I used two cuttings of #28 twisted pair Kynar wire-wrap wire to connect to my new volume control pot, doubling up on the ground (black) wires. Otherwise, three twisted wires or two skinny runs of shielded cable/coax are necessary to keep crosstalk down. This way, the length of the run to the new pot is not critical. Plug the three pin connector back into place after insulating your splices. The turning on and off of the transceiver is maintained by the original volume pot's tandem rotary switch. (That function never breaks!)

Now you'll get many more years of enjoyment out of a great family of VHF/UHF FM transceivers with *no* further unexpected silencing of your receive audio. — *73, Tony Bogusz, W9MT, 5129 N Oketo Ave, Harwood Heights, IL 60706-3632,* **w9mt@arrl.net**

TONY BOGUSZ, W9MT

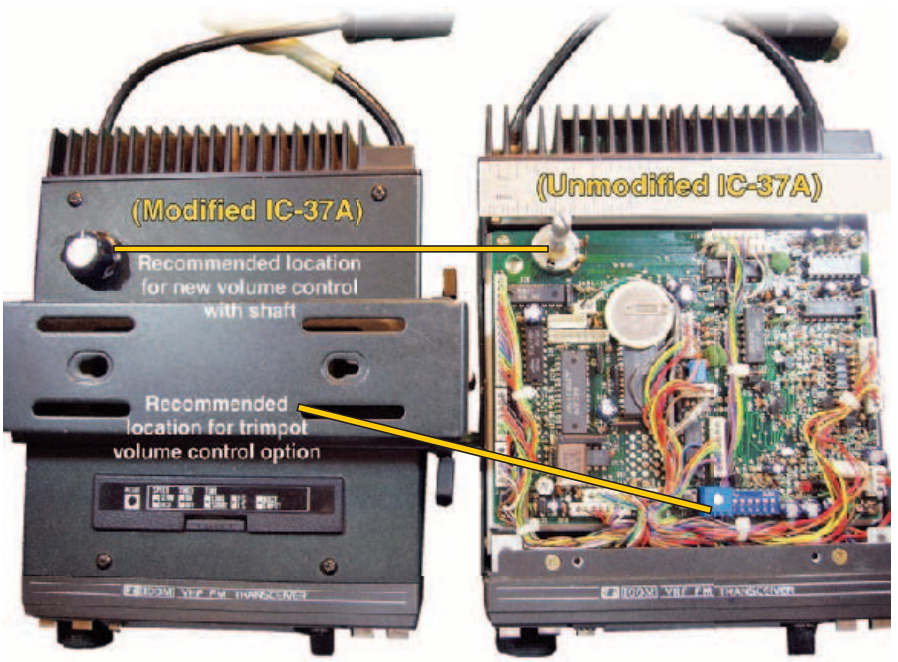


Figure 1 — Placement options for the new volume potentiometer.

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

TRAFFIC CONE ANTENNA STAND

◊I was preparing for our local Prince Georges County ARES/RACES go-kit "show-n-tell" and I needed a lightweight, cheap (about $10), easily disassembled and stored antenna support for my newly completed WB6IQN DBJ-1 dual-band J-pole antenna.[1]

At my local "big box" hardware store I noticed bright orange, 12 inch "plumbers' cones" (see Figure 3) for sale (about $8) and realized that I could use one to make a perfect antenna stand for my DBJ-1!

To make my cheap and quick antenna stand, you will need the following parts:

- Five #8-32, ¾ inch machine bolts and nuts
- Five #8 washers
- One 12 inch traffic cone
- Two 10 inch lengths of galvanized steel hanger strap
- One 1 inch or ¾ inch PVC pipe cap (see text)

I made my version of the DBJ-1 from scrap 1 inch PVC pipe instead of the ¾ inch pipe Edison Fong, WB6IQN, calls for in his article. I also cut the pipe 1 foot longer than the antenna to allow mounting from the bottom, below the shorted matching stub of antenna element. I figured that mounting below this "zero impedance" point would reduce the effects of the hardware on the performance of the antenna.

As it turned out, the 1 inch pipe fits snugly through the hole at the top of the cone. If you are planning to use ¾ inch pipe for your DBJ-1, the fit through the cone's top hole will probably not be as snug as mine is but a tight fit is not critical because the antenna is attached to the stand at the bottom support.

I made the bottom support by drilling a hole through the center of a 1 inch PVC pipe cap (flat-top caps work best) and bolting it to the center holes of the two 10 inch, galvanized steel hanger straps with a machine bolt and washer (see Figure 4). (If you made your DBJ-1 from ¾ inch PVC pipe, just substitute a ¾ inch PVC pipe cap.)

Next, I centered and bolted the completed support to the bottom of the cone with four machine bolts and washers (see Figure 5). I placed washers over the ends of the bolts on the top of the cone so that tightening the nuts would not "cut" through the cone's surface.

Figure 6 displays the completed antenna stand with the antenna installed. Assembly is easy; just push the antenna through the top of the cone and into the support's PVC cap. Just don't push the antenna into the cap too far or you may have to use a hammer to remove the antenna from the stand later!

To remove the antenna from the stand, I found that it's easiest to lay the antenna on its side, grasp the PVC cap through the support straps and twist while pulling the antenna out of the stand.

If you plan to install the antenna and stand on a roof or other windy area, you may want to consider placing cinder blocks or bricks on the corners of the cone to keep the antenna stable.

Well, my antenna stand was a hit at our show-and-tell and it's now a permanent part of my go-kit. — *73, Jesse N. Alexander, WB2IFS/3, 7804 Westover Ln, Clinton, MD 20735,* **wb2ifs@arrl.net**. *Photos 3-6 by WB2IFS/3*

[1]E. Fong, WB6IQN, "The DBJ-1: A VHF-UHF Dual-Band J-Pole." *QST*, Feb 2003, pp 38-40.

Figure 3 — The modified 12 inch plumbers' cone.

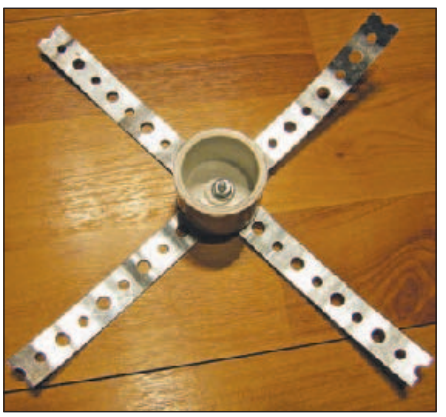


Figure 4 — The construction of the antenna base support.

Figure 5 — The antenna base support bolted to the bottom of the cone.

Figure 6 — The completed antenna stand.

REVIVING A YAESU VX5 TURN-ON BUTTON

◊My Yaesu VX5 handheld transceiver developed the peculiar problem it would not turn on reliably. I mentioned it to Paul Danzer, N1II, who had a similar problem. He bought a VX6 to replace his. He gave me his defective VX5 saying I could take it apart to see if I could cure the ills. I did that with no luck. I had a second VX5 at the office that had a similar on/off problem. I went home and did a factory reset on both VX5s. The problem was cured on both. I reprogrammed the Norwalk repeater into memory on one of them to test it. Doug Troughton, N2RDF, was on. I explained what I had done, and to my surprise he said his VX5 has the same problem. I bet this could happen to the VX6 or VX7 also. To reset the VX5: with the power off, hold down the 4, VFO and MR buttons at the same time then push power-on. This is tricky because the power-on is the problem to start with. Eventually it will come on. You then press FW. You do lose all programming using this method. — *73, George Peters, K1EHW, 41 Barbara Dr, Norwalk, CT 06851-5306,* **k1ehw@arrl.net**

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

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

Dayton DREAM Believer

Hams from around the world gather in Dayton for the 2009 ARRL National Convention and the 57th annual Dayton Hamvention®.

S. Khrystyne Keane, K1SFA
ARRL News Editor

Oh,what can it mean to go to Dayton where our good times start and end? On Friday, May 15 at 9 AM, the doors of Hara Arena, home of the 2009 ARRL National Convention and the Dayton Hamvention®, opened to let in the hordes of hams who had made the trek to Dayton. Even though the beautiful sunny morning gave way to wet weather later in the three-day event, spirits weren't dampened as amateurs from all corners of the globe hiked Hara's myriad aisles in search of a new antenna, a new radio, another addition for the shack; each ham searching for the bargains that could be found right around the next corner.

Ahhh, Dayton. Hams who have never been to the annual Hamvention dream about going some day. Those who make their first trip out to southwestern Ohio say that it was more than they ever could dream it to be. And the regulars? The ones who come every year? Well, they tell that even though the attendance numbers have decreased slightly from a decade before, it's still one show not to be missed.

There is nowhere in the amateur universe as big as the Dayton Hamvention. This year, the Dayton Amateur Radio Association (DARA), sponsors of Hamvention, were definitely dreaming big. From the Hamvention theme — DREAM: **D**igital **R**adio **E**nabling **A**mateurs to do **M**ore — to the youngsters taking their Technician license exams to forum attendees to bargain hunters, Hamvention visitors clearly had themselves a blast.

An impressive forum schedule is one of the key features of the Dayton Hamvention. In keeping with this year's theme, numerous forums featured digital radio. ARRL Publications Manager and *QST* Editor Steve Ford, WB8IMY, presented a forum on digital contesting. Tying in with this, Shelby Sommerville, K4WW, led a forum on RTTY, both from the operating side and from the contesting side. ARRL Southeastern Division Director Greg Sarratt, W4OZK, piloted a multi-level forum on D-STAR.

MARVIN FORCE, KB8MUV

FCC Special Counsel for Amateur Radio Enforcement Laura Smith gets on the air at W1AW/8. Jerry Bodey, N8OWV, served as Control Operator.

Richard Garriott, W5KWQ, experienced his dream of going into space last year. This year, Garriott — a guest of the ARRL and AMSAT at Dayton — regaled convention crowds about his journey to a place that most can only imagine. Garriott spoke and signed autographs at the ARRL EXPO area, the ARRL Youth Lounge, as well as the ARRL and AMSAT forums. He also spoke at a Saturday afternoon forum, telling how he fulfilled his lifelong dream of experiencing space travel. By combining Amateur Radio and spaceflight, not only did Garriott go into space, he spoke with more than 200 hams from the International Space Station (ISS).

2009 ARRL National Convention

Invited by DARA to hold the ARRL National Convention at Hamvention, ARRL made the ARRL EXPO area the place to be. From Field Day to Scouting to international activities to kit building, there was never a dull moment.

"While our ham radio interests may be many and varied, the 2009 ARRL National

Former Youth Editors ARRL Rocky Mountain Division Director Brian Mileshosky, N5ZGT (left), and Andrea Hartlage, KG4IUM, met up with current ARRL Youth Editor Duncan MacLachlan, KUØDM.

Private astronaut Richard Garriott, W5KWQ, took time to sign autographs and meet youngsters at the ARRL Youth Lounge ARRL ARISS Program Manager Rosalie White, K1STO, was Garriott's guide throughout the event.

AMY HURTADO, KB1NXO; JOE EISENBERG, NØNEB (INSET)

ARRL hosted a reception for more than 100 key donors on Thursday, May 14 at Meadowbrook Country Club. At the event, ARRL welcomed 13 new members of the ARRL Maxim Society and enjoyed remarks by newly elected IARU President Tim Ellam, VE6SH (inset photo). From the left: David Sumner, K1ZZ; Ti-Michelle Connelly, NJ6T; Dick Isely, W9GIG; Bob Locher, W9KNI; Frank Donovan, W3LPL; Bruce Butler, W6OSP; Tommy Porter, W8KYZ; Don Lisle, K6IPV; Dave Bell, W6AQ; Sam Bell, W6QLT; Frank Butler, W4RH; Craig Thompson, K9CT; Tom Hutton, N3ZZ; Carter Craigie, N3AO; Kay Craigie, N3KN; Harry Flasher, AC8G, and Joel Harrison, W5ZN.

Convention demonstrated the very best of our united Amateur Radio Service," said ARRL Sales and Marketing Manager Bob Inderbitzen, NQ1R, after the show. "ARRL members love a good party — and the Convention achieved that at the highest level."

Calling the National Convention a "great success," Inderbitzen said that the ARRL's huge exhibit area was clearly the place to be: "The ARRL National Convention team included more than 100 volunteers, elected officials and staff — all in bright red shirts and smiling faces. Attendees enjoyed meeting with program representatives across the wide variety of Amateur Radio interests, such as public service, contesting, ARRL Field Day, volunteer examining and more."

If You Build It, They Will Come...

The busiest place in the ARRL EXPO was definitely the kit building area. Led by ARRL Test Engineer Bob Allison, WB1GCM, with assistance from *QEX* Editor Larry Wolfgang, WR1B, as well as Mark Spencer, WA8SME, and Nathan McCray, K9CPO, of the ARRL Education and Technology Teachers Institutes, helped guide the builders. Robert Gold MD, WØKIZ, Scotty Cowling, WA2FDI, Steve Bible, N7HPR, and others also spent time helping the kit builders. Hams (and non-hams, too!) sat down in front of a circuit board and soldering iron to build either a 24 hour clock or electronic keyer. "We saw a lot of people of all ages — including a large number of kids — coming over to build," Allison said. "A large majority had never built a kit before. They were so excited to be able to build something that they can use immediately."

Wolfgang added: "There was quite a range of ages (and prior building experience) among those who built kits. There was one young man of about 8 or 9 building a clock, with help from his mother. When he installed his first resistor and soldered it to the board and clipped the leads, he exclaimed 'I learned how to solder!' The excitement of completed, working projects was evident throughout all three days. Many attendees stopped to ask what we were doing, and indicated their enthusiasm for the effort, especially for the young builders who were experiencing a bit of the thrill of building their own project."

An International Flavor

The ARRL National Convention featured an expanded IARU exhibit area this year. Led by new IARU President Tim Ellam, VE6SH, and Vice President Ole Garpestad, LA2AR, the booth was staffed by representatives from the three IARU Regions: The Deutscher Amateur Radio Club (DARC) from Germany represented Region 1, the ARRL represented Region 2 and the Japan Amateur Radio League (JARL) represented Region 3.

"It was exciting to see how many people were coming over and visiting us," Ellam said. "With the JARL processing applications for the IARU's Worked All Continent (WAC) and 5-Band WAC awards, there was definitely a steady flow of amateurs here. The 2009 ARRL National Convention marked the first time we have offered the WAC and 5-Band WAC awards on the spot. It is definitely exciting to be able to walk away with your award certificate in hand." According to JARL's Masa Ebisawa, JA1DM, more than 30 WAC and 5-Band WAC applications were processed.

In addition to the WAC awards, Ebisawa and Hiro Tamama, JA1SLS, also processed applications for certain JARL awards, while the DARC sponsored a world flag identification contest and the ARRL offered a RUFZ CW copying competition throughout the event.

DXCC Staff and Volunteer Card Checkers counted more than 13,000 cards at the DXCC table.

"It's certainly well known that hams from all over the world come to Dayton for the Hamvention," said ARRL International Vice President Rod Stafford, W6ROD. "We truly have an international flavor in the ARRL EXPO, though, as this is the first time that we have had representatives from all three IARU regions to be with the IARU booth. We were glad to see many hams stop by and visit with IARU representatives from all corners of the globe.'

Youth Power!

As in recent years, the ARRL once again offered a Youth Lounge for young people of all ages to come discover Amateur Radio. Whether you were 1 or 100, licensed or not, all were welcome at the Youth Lounge. Here, visitors could make Morse code bracelets, participate in a fox hunt, talk with other young amateurs or just escape the "parental units" for a while.

"The ARRL Youth Lounge was among my favorite exhibits," Inderbitzen said. "The youth activities were organized once again by co-chairs and father-daughter team Scott Hartlage, KF4PWI, and Andrea Hartlage, KG4IUM. They rallied together volunteers and dozens of enthusiastic young people. The young hams and prospective hams networked with each other to exchange ideas and had a lot of fun. In many ways, the youth exhibit represented a bright future for our Amateur Radio Service."

The ARRL premiered something new at this year's convention: ARRL Youth Editor

Duncan MacLachlan, KUØDM, the third ARRL Youth Editor (ARRL Rocky Mountain Division Director Brian Mileshosky, N5ZGT, and Hartlage previously served in the position), MacLachlan brought his unique perspective to those who couldn't attend via his blog and Twitter updates.

"I had a blast," MacLachlan said. "I spent Saturday morning cruising around, checking out the vendors and the various booths. The folks at the ICOM booth invited me to operate a new radio for a bit, which was amazing. The youth turnout has been tremendous! Besides seeing several young hams wandering around — and even talking to a few I recognized — the youth lounge was hopping. They were busy all day. You saw kids running around with handheld transceivers and Yagis looking for the hidden 'fox.'"

MacLachlan also had the opportunity to speak one-on-one with Richard Garriott, W5KWQ, for about 20 minutes: "Richard, who was on the International Space Station for a short mission, was active on the air and had many stories to tell about operating in space. If you look at PR videos, they often show school children talking to the ISS, but it was very cool to hear stories of those on the other end."

Hams and non-hams of all ages enjoyed the opportunity to build their choice of a 24 hour clock or electronic keyer from a kit.

W1AW/8

While 2009 was not the first time W1AW/8 was at Hamvention, it was the first time it was located within the ARRL exhibit area. With just about 500 contacts completed over the course of the three days, operating W1AW/8 was indeed a popular activity. Primarily on 20 and 40 meters SSB and CW, the station saw many hams, as well as those not yet licensed (with a control operator), stop by to operate.

ARRL President Joel Harrison, W5ZN, tried his hand at W1AW/8.

"We had been planning for months on just how to make W1AW/8 at the 2009 ARRL National Convention to be a 'special' Special Event," said W1AW Station Manager Joe Carcia, NJ1Q. "I know I had a lot of fun meeting new people who really enjoy what W1AW stands for. I also met a fair number of hams who had visited W1AW in Newington, and it was great to see them again in Dayton."

Carcia said that without the support of the volunteers from DARA, W1AW would not have been on the air. "I'd really like to thank Jerry Bodey, N8OWV, and Marv Force, KB8MUV, and their team of dedicated volunteers for the support we received throughout the whole weekend."

Go the DX

Hams started queuing up for DXCC card checking even before the Hara doors officially opened. According to DXCC Manager Bill Moore, NC1L, ARRL DXCC staff and Volunteer Card Checkers processed almost 200 DXCC applications and counted more than 13,000 cards. The team handled at least 160 endorsements.

For the first time ever, ARRL members were able to drop off their foreign station QSL cards at Dayton to be sent through the ARRL Outgoing QSL Bureau. ARRL staff members would then transport the cards from Dayton to the Outgoing QSL Bureau, saving hams the shipping costs to Newington. According to ARRL Membership and Volunteer Programs Manager Dave Patton, NN1N, about 75 pounds of cards (approximately 11,250) were dropped off and delivered to Newington.

"In addition, we received several comments from satisfied members concerning Logbook of The World," Moore said. "They said that in the past year or so, it has been easier to use and they are using it more and more."

Hamvention

Even with the economy, it was very crowded at Dayton. With most, if not all, of the inside exhibits filled, there was barely any room to get through the aisles. Many hams seemed interested in new technologies, such as software defined radio and digital, and these exhibit booths were packed three rows deep throughout much of the show. Popular exhibits included Yaesu, FlexRadio and Elecraft, as well as booths that made call sign badges and did embroidery.

According to ARRL Technical Editor Joel Hallas, W1ZR, one of the most impressive exhibits was from LUSO Tower, featuring their heavy duty power tilt-over crank-up towers. "These massive hot-dip galvanized towers are offered in a range of sizes, starting with a raised height of 72 feet," Hallas said.

With more than 45 different forums offered at Hamvention, there was truly a forum for everyone and everything. The forums are created and presented by Amateur Radio operators, offering a chance for fellow hams to meet some of the innovators that continue to push the technological envelope and improve ham radio, as well as to learn from the people who are finding interesting ways to use Amateur Radio. In keeping with the DREAM theme, digital forums at Hamvention included sessions on TAPR, SDR, APRS, D-STAR, SSTV, RTTY and a new ARRL Forum on Digital Contesting, while the Antenna forum featured a session on digital antennas. Hams also got the chance to meet FCC Analyst William Cross, W3TN, and Laura Smith, the FCC's Special Counsel for Amateur Radio Enforcement, at the FCC Forum on Saturday afternoon.

Hamvention staff allocated more than 1700 outdoor flea market spaces to vendors. With everything from vacuum tubes to tie wraps available, you can find just about anything at the Hamvention flea market, whether you knew you needed it or not.

With only three days to wander what seem like the never-ending hallways at Hara Arena and the miles of aisles of the flea market, there's never has enough time to explore all that Hamvention has to offer. But that's why there's always next year! Go ahead and mark your calendars for 2010 when Hamvention will return to Hara Arena from May 14-16.

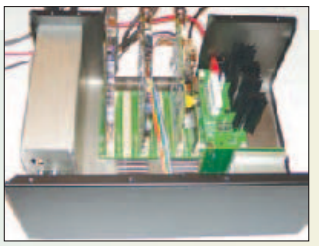
Photos by S. Khrystyne Keane, K1SFA, except as noted. QST

What's New at Dayton 2009?

Joel R. Hallas, W1ZR

HF Transceivers

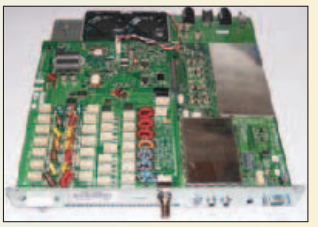
AMSAT and **TAPR** have collaborated to make new modules available for their progressive High Performance Software Defined Radio (HPSDR) project. The new modules include the Mercury high speed direct sampling front end, the LPU power regulator board and the Pandora custom enclosure kit. All hardware and firmware is open source, allowing modification by the experimenter. The modules operate via PC control using a special version of *PowerSDR* software. With the modules currently available, the setup can operate as a ½ W high performance transceiver from dc to 60 MHz.



AMSAT/TAPR HPSDR

FlexRadio Systems has added a new model to their line of high-performance software defined radios. The new Flex-3000 HF and 6 meter transceiver is a compact 100 W transceiver nicely sized to pair with a laptop PC. This makes a great combination for travel or a compact home setup. The '3000 shares the software and performance of the larger Flex-5000, but doesn't have the cabinet capacity (see inside view) to be expanded with accessories such as a second receiver.

In addition to new hardware, FlexRadio Systems has developed a new more visually appealing version of their *PowerSDR* radio operating software.



FlexRadio Flex-3000

ICOM introduced their new IC-7600 HF and 6 meter transceiver, a radio that brings together a number of enhancements borrowed from the very successful up-market IC-7700 and '7800. The IC-7600 uses the virtual meter that stunned us on the '7700 and '7800. In addition, it offers improved near-in dynamic range through the use of three roofing filters, the narrowest at a width of 3 kHz.

ICOM AMERICA

ICOM IC-7600

Palstar AT5Kplus

HF Antennas Tuners

Palstar introduced a new manual antenna tuner, the AT5Kplus. This tuner, adapted from a special order automatic government model, is rated at 4500 W from 1.8 to 52 MHz.

Ten-Tec showed off the latest version of its 238 series antenna tuner. The 238C has a newly designed front panel offering improved metering. Included is a dual-needle wattmeter simultaneously showing forward and reflected power along with selectable peak power reading capability.

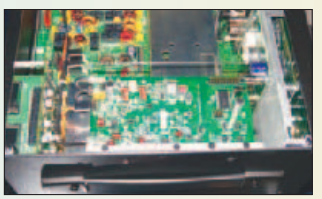
Ten-Tec 238C

VHF Transceivers

Alinco introduced its new tri-band handheld transceiver. The DJ-G7 covers the 144, 430 and 1200 MHz bands with up to 5 W out on the lower bands and 1 W on 1200 MHz. The wideband receiver covers from 530 kHz to 1299 MHz, with the usual exclusions.

Alinco DJ-G7

Elecraft announced a new 2 meter transverter module, the K144XV, shown on the bottom edge of the photo. This 10 W output transceiver fits entirely within the K3 HF and 6 meter transceiver, above the optional second receiver. The K144XV covers the full 144-148 MHz frequency range supporting all operating modes. If the K3 includes the optional second receiver, the K3 can simultaneously monitor a local 2 meter repeater while operating on HF. With the K144XV installed, the K3 becomes a 160 to 2 meter all mode transceiver.



Elecraft K144XV

ICOM announced its next generation of D-STAR V/UHF handheld and mobile/base transceivers, including a new D-STAR capable 50 W dual band transceiver, the ID-880H. It has a removable faceplate to allow easy mobile mounting and offers wide-band receive including WFM and AM in addition to transmitting on the 2 meter and 70 cm bands.

ICOM also unveiled a new D-STAR ready dual band handheld transceiver, the IC-80AD. It is designed to work together in networks with the new dual-band ID-880H D-STAR capable mobile or base transceiver.

ICOM ID-880H

Yaesu announced two new 2 meter mobile FM transceivers. The FT-1900R (shown) is a rugged 55 W single band set with 3 W of audio output, while the FT-2900R ups the ante to 75 W of RF output. For those who want 2 meter and 70 cm capability, the new FT-7900R provides 50 W output on 2 meters and 45 W on 70 cm, and has a removable front panel.

Yaesu also introduced two new handhelds. The FT-270 is a 5 W, 2 meter transceiver that is submersible to 3 feet for 30 minutes and is said to be built to commercial standards. The FT-250R is also a 5 W, 2 meter transceiver that has the display screen on top of the unit, rather than in the middle of one side.

Yaesu FT-1900R

Which Way is Swaziland?

How do you know where your signal is going to go?

Steve Sant Andrea, AG1YK

"Did he say 3DØ?" you whisper while listening in your Connecticut shack. The weak one comes drifting back again. You raise the audio, trim the passband, increase the noise reduction and listen again. A little clearer now — he's a 3DAØ. You pull out your *ARRL Operating Manual* and check the prefix. 3DAØ is Swaziland.

"Swaziland? Where's that?" The *Operating Manual* indicates it is near South Africa. "Do I need it? — Yes."

You grab the rotator controller and swing it from its easterly heading toward the south and Africa. Amid the grumbling of the rotator the S1 signal slowly fades away. Straining your ears, you try every trick you know to dig it out of the mud — nothing. Grumbling about the lousy propagation you swing the beam farther south to try your luck on South America.

Don't Blame the Sun

While propagation certainly isn't helping matters, you lost Swaziland because of your 8th grade geography teacher. That beautiful map of planet Earth is a great teaching tool and gives a clear picture of all the continents and countries (see Figure 1). Unfortunately, that is not how radio waves see the world.

The Earth is round because of gravity. Maps are flat so we can roll them up and put them away. The problem is that if you take something round and squash it flat, certain distortions occur. If you have ever thrown an orange against a wall you can see what I mean.

To make maps we have to take the round surface of the earth and place it on a flat piece of paper — without all the gooey mess. Over the centuries different methods have been developed to do this. The Mercator projection is used for that world map in geography class because it preserves the shape of the continents, except near the poles.

To a radio wave the world doesn't look that neat and tidy. The Mercator map would have you believe that the way to reach southern Africa is to beam south by southeast. After all, Swaziland is near the southern tip of Africa, which is almost at Antarctica.

But your signal doesn't know north, south, east or west. It will follow the shortest line around the curve of the Earth. This line is referred to as a *great circle path*. The *great circle path* is shown on an *azimuthal equidistant* map. An *azimuthal equidistant* map from W1AW to Swaziland is shown in Figure 2. The actual signal path is the red line between Newington and Swaziland.

Notice two things. First, as you get farther from Newington the continents look stranger. Second, the north geographic pole is straight up. On the Mercator map most continents aren't distorted but north is not straight up. From W1AW it is actually off to the east.

In order for your signal to go from W1AW to Swaziland you have to rotate your beam a little south of east (102°). You heard 3DAØ because your antenna was pointed in that direction already. By visualizing that 8th grade world map and swinging the beam to the south, you actually put the *side* of the beam facing the needed entity — exactly what you don't want to be doing.

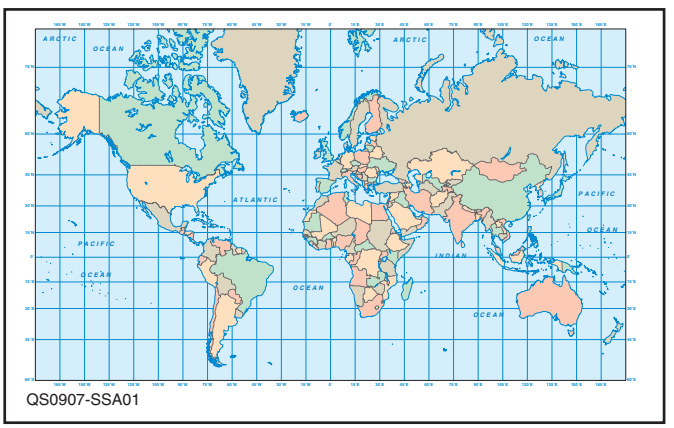


Figure 1 — The world seen using the familiar Mercator projection.

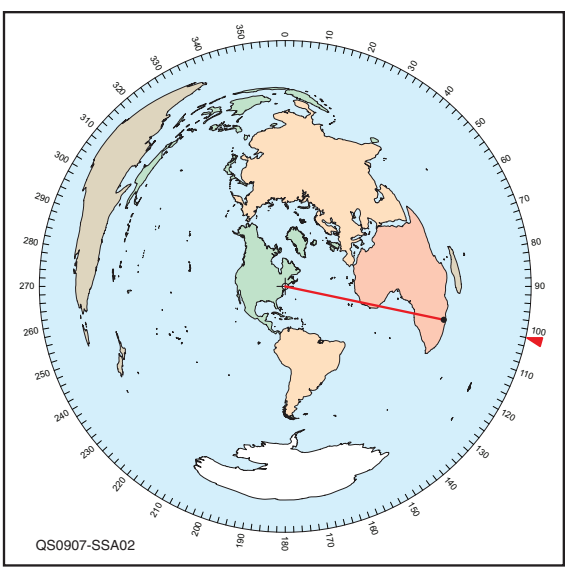


Figure 2 — An *azimuthal equidistant* map showing the *great circle path* between W1AW and Swaziland. Note the bearing indicator on the outer edge. This is the bearing you set on your rotator controller.

The Right Path

To figure out the bearing to different locations, you need to use an *azimuthal equidistant* map that is centered on your location. The *ARRL Operating Manual* has a set of generic maps in the "References" section. These will probably work okay for you since the beamwidth of amateur antennas is not so narrow as to require a precise heading.

There are also a number of resources available on the Internet. Joe, NA3T, and Michael, NV3Z, have a neat little *azimuthal equidistant* map maker at **www.wm7d.net/azproj.shtml**. The FCC also has a bearing calculator at **www.fcc.gov/mb/audio/bickel/distance.html**. This calculator won't produce a map but will give you the bearing to your DX. With both of these tools you do need to determine your home location's latitude and longitude to use as the "center" of the map, since the bearing to Swaziland is different from Connecticut compared to, say, Arizona. Many ham radio logging programs also have the ability to either generate a map of or a bearing to a specific location.

With your antenna on target you are ready to get every last photon out of that weak one.

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

The Teardrop QTH

Combining a mini-power rig with a mini-sized camper for some ham radio fun and adventure.

Ron Parks, WB5DYG

Figure 1 — The Teardrop QTH plugged in and ready to QSO.

Figure 2 — The 115 V ac "shore-power" outlet strip and 12 V dc fuse/distribution box installed in the Teardrop's cabin.

I awoke in the night to the resonant rumblings and siren song of the wind as it gradually played its way into my sleepy consciousness. My bed shuddered a bit under its embrace and over my head a steady kaleidoscope of light played down upon me. For perhaps a few seconds the spectacle numbed any reaction, but as I awakened further I realized I was safely tucked away in my small camp trailer, parked in Albuquerque, New Mexico at the Duke City Hamfest (**www.qsl.net/dchf**). I was looking forward to a day of fellowship with the ham radio fraternity, catching up with old friends and maybe a "boat anchor" or two from the flea market to cache away for the home shack.

This was my third night on the journey, having spent two nights on the way in the Arizona Rim Country northeast of my home in the Phoenix area. The itinerary included a total of nine nights in the cozy and comfortable camper, departing after the 'fest with Bob, WA5SCP, and Paul, K5TCU, for several nights in the beautiful Jemez Mountains of New Mexico before returning home.

Sitting up in the semi-darkness, I punched on the receiver and was rewarded with the warm, comforting sounds of 40 meter CW singing through the night. All was well with the world — I was off on yet another ham radio adventure in my tiny Teardrop QTH (see Figure 1).

Camping and Ham Radio — A Marriage Made in Heaven

From my early days as a teenage ham, camping and ham radio have been on the same playing field. As an Amateur Radio Explorer (Explorer Post 296, Albuquerque, New Mexico, circa 1971) we often camped and took along our various radios. Now, mind you, "portable" HF radio in 1971 had an entirely different meaning than what it does today. Basically it required strong backs to haul the big tube rigs up the hill and a heavy generator to fire them up. Now I know why the old timers really kept us kids around. HF field operations for us back then were mostly restricted to the annual Field Day effort. How things have changed.

Today you can pack up your entire HF rig in a small bag or case along with a simple battery pack, throw your antenna in the trees or clamp it to a picnic table and be on the air. The current crop of near pocket-sized powerhouses do things we couldn't even dream of in 1971. It is a great time to be an Amateur Radio operator. Your choices of when and where and what modes to operate are nearly limitless with even the simplest of setups.

One of the superb things about taking your rig to the woods is that you are away from the ever present scrutiny of zoning officials, homeowner's associations and neighbors who assume even your modest antenna is the perpetrator of all sorts of consumer electronics maladies and possibly the reason their hair is turning gray. But I think the best thing for us urbanites about getting out of town is the reduced noise floor.

Getting away from the electromagnetic jungle of your city environment will give your radio life you never knew it had. You may wonder if you hooked up your antenna since the band seems so quiet, that is until the weak ones start booming in your ears like never before. Want to give yourself a huge boost in signal to noise ratio? Pack up the rig and head for the hills.

Enter the Teardrop QTH

A couple of years ago my buddy Scott, KE7MRO, picked up a small Teardrop trailer. The trailer was used but in imma-

culate condition. I told Scott if he ever wanted to sell the thing to call me first; he did and it has now become my mobile ham shack.

Teardrop trailers have a history that hails all the way back to the 1930s. You can find them to this day in sizes from one person sleepers to full-sized travel trailers. Teardrops have an almost cult following with many clubs and organizations around the country. I have found this small trailer to be quite the curiosity in the campground, the gas station and even the grocery store parking lot. A day rarely passes when I am out that I don't give several "tours" of it to curious onlookers who wander by, making for a great opportunity to pitch Amateur Radio. "So you are telling me you can talk to the other side of the world from inside that little bitty thing? No Internet? No cell phone? No satellite dish?"

My Teardrop was made in 2005 by Pleasant Valley Teardrop Trailers (**www.pleasantvalleytrailers.com**) and is about 8 feet long. When I purchased it from Scott it was pretty much in stock condition. The trailer's mattress and bunk will sleep two but is very comfortable for one person. It sports a galley area in the rear and storage cabinets inside. I immediately set out to add the things I needed for what I consider comfort as well as the pursuit of ham radio fun.

Powering the Teardrop

The stock Teardrop had no electrical whatsoever other than AAA cell powered LED lighting inside and of course vehicular turn signals, side markers and brake lights. I wanted to have some additional camp lighting on the outside, a vent fan to keep things cool inside and power for radios.

The first task was to add an 85 Ah sealed lead acid battery to the tongue of the trailer. The battery box was no problem but finding a battery tray proved to be challenging. I could find all sorts of battery trays for vintage cars (with vintage prices to match) but no generic tray to mount on a trailer. A trip to the local home supply emporium solved the problem. Using some thick hardwood, U-bolts and corner braces mounted with the edges up to provide a "frame" for the battery box, I was in business. Some metal straps and a tie-down ratchet with nylon strap to hold the battery down rounded out the setup.

The battery power was then routed into the Teardrop. I ran a fused 8 gauge two-conductor cable under the trailer following the vehicular lighting lines to the rear where there is an entry area behind a kick panel for wiring the brake lights. All cables were placed in split-loom (tubing) for protection and screwed to the underside of the trailer with cable clamps. From the kick panel area the battery cable was routed to an inside cabinet where I mounted a plastic project box containing a standard 12 V dc fuse/distribution block. The fuse block uses standard "bladed" automotive fuses and provides six circuits for distribution where needed.

Also installed was a standard 115 V, 15 A RV power inlet that is routed to a fused power strip inside the cabinet close to the dc fuse box. This allows me to plug into "shore power" where available and use a dc power supply in place of the battery (see Figure 2).

While not specifically ham radio related, for comfort in the warmer climates I installed a Fan-Tastic Vent Fan in place of the stock skylight/vent. Even on the lowest of the three settings this exhaust fan brings plenty of fresh, cool air in through the side windows. Drawing only 1.8 A it is easy on the battery and I can testify to the fact that it is very quiet electrically. I have found very little to no RF hash anywhere in the spectrum with this fan running. The Fan-Tastic Vent support folks are also first-rate and will take care of any issue you may have on the spot.

A Radio for the Teardrop

I wanted to put some sort of receiver permanently in the trailer. My main travel transceiver is the Yaesu FT-817 but it is not the kind of rig I would want to dedicate to a project like this. The '817 goes pretty much everywhere I go with or without the trailer and is a main player at my home station. Out on the shelf in the garage sat a RadioShack DX-394 General Coverage Receiver that had not been used recently. It is not a stellar performer by any stretch of the imagination, but after a few modifications from the Yahoo DX-394 group (**http://groups.yahoo.com/group/RADIOSHACKDX394**) it was a perfect choice to leave mounted in the Teardrop for casual tuning around.

I enjoy utility shortwave listening as well as ham radio and have found some of the utility and military stations to be great propagation indicators. I have also been working lately on copying CW "by ear." The always ready-to-roll DX-394 has been great to fire up at night. The quiet of the camp site allows the sweet sounds of CW to finally start writing sentences in my head.

The DX-394 was mounted in a large plastic panel, with a cutout for the radio along with two 12 V dc outlets, an LED battery test gauge and switches for external porch lights and other accessories. This plastic piece was cut to fit perfectly between two cabinet doors, after I removed a section of wallboard that was simply screwed on the inside of the cabinet (see Figure 3).

Figure 3 — The homebrewed receiver panel with various accessories and a speaker.

Teardrop QTH Antenna Farm

One thing I wanted to do is support more than one antenna at a time. I am a big fan of the Buddistick version of the well-known Buddipole antennas (**www.buddipole.com**). It has been a great performer for me clamped to picnic tables, BBQ grills and now on the Teardrop trailer.

I mounted a standard ball-type antenna mount on the Teardrop with the connections passing into the internal cabinet. I included a modified five-way binding post on the mount to attach the Buddistick counterpoise to. The Teardrop, other than the bottom frame, is mostly wood and fiberglass so adjusting the counterpoise length and telescoping element allows the antenna to be easily adjusted with little effect from the trailer itself. I

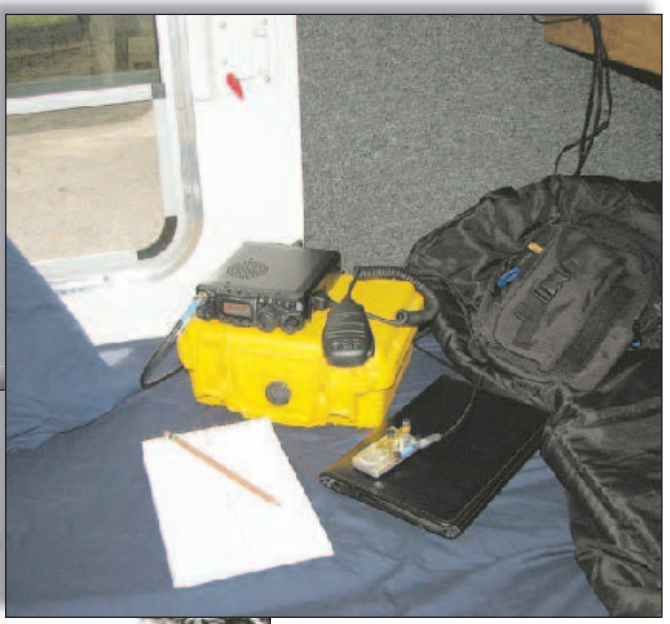


Figure 5 — Too early for bed. The FT-817 set up on the Teardrop's bunk all ready to radio.

Figure 4 — The Buddistick and external antenna connections mounted on the outside of the trailer.

primarily operate 40 meter CW and 20 meter PSK31 and the Buddistick does an excellent job on the trailer.

In addition to the ball mount I installed two standard UHF bulkhead pass-through connectors through the wall of the Teardrop. Once again, I visited the home supply store and found an outdoor outlet cover that accommodated the two connectors perfectly with a watertight door. This allows me to connect to external wire antennas as well as to antenna mounts on my truck. One of the Buddistick elements makes a great 6 meter quarter-wave antenna when mounted on the truck and the two antenna ports on the FT-817 allow me to have both 20 and 6 meters available at the same time. I carry extra sections of coax for running from the Teardrop antenna ports to the truck mounts or other antennas (see Figure 4).

On the Air

As mentioned earlier, today's small rigs make getting on the air away from home easy and painless. My Yaesu FT-817 sits right beside me on the Teardrop bunk, connected to two antennas at once and plugged into the trailer's ample battery supply (see Figure 5). I enjoy low power (QRP) operating and am amazed at the contacts I can make with my mini-sized rig running mini-sized power from inside this mini-sized camping trailer. And if the weather is nice and I want to get outside, the picnic table or my truck tailgate still makes a good operating position while using the power and antenna mount on board the trailer.

The good news is you don't need to have a camper or other RV to get out and enjoy ham radio away from the big city noise and traffic. Grab your rig and take a trip to your local national forest or state park area. Most parks have both overnight camping and day-use areas. Be sure to keep in mind that the weather can change rapidly in many of these areas and any threats of lightning mean it is time to pack it in.

Make sure your antennas and such comply with park regulations and don't create "hanging hazards" for your camping neighbors. Many camping areas these days no longer allow anything to be hung in the trees, one of the main reasons I went to the vertical Buddistick for my camping radio fun.

One final hint: Not everyone out in the wilds enjoys the sound of radio signals and static the way you and I do. Wear headphones and you will find you not only don't bother anyone else (like your sleeping spouse) but you add even more to the "signal to noise" ratio you have already drastically improved by getting away from town. Getting out for some R and R (Relaxation and Radio), even just for the day, is just plain ham radio fun at its finest. Besides, your steaks always taste better off that grill out in the woods.

Every now and then I wake up in the night to the concert of the singing wind and imagine I see a million twinkling stars strewn across a crystal clear limitless sky through my side door window. As I sit up to hit the power button on my receiver to enjoy the melody of 40 meter CW ringing clearly through the deep of the night I awaken and realize it was just a dream. I am at home with the spouse asking "What is wrong with you now?" Ah — but I hear the Teardrop QTH down there in the garage gently calling CQ, CQ, CQ — it is time to hitch up and hit the road again.

All photos by Ron Parks, WB5DYG.

Ron T. Parks, WB5DYG, an ARRL member, has worked in the electronics field for over 30 years as a technician, field engineer, technical support specialist and writer. He has been a licensed amateur since 1971 and resides in Gilbert, Arizona working for a local police agency as an investigator providing electronic surveillance support. Ron's ham radio Web site is at **www.rontpmedia.com/wb5dyg** *and he can be reached via e-mail at* **wb5dyg@arrl.net**.

HAPPENINGS

Congress Considering Bill to "Promote and Encourage" Amateur Radio Public Service

On Wednesday, April 29, Representative Sheila Jackson-Lee (D-TX) introduced a bill that would help smooth the way for ham radio operators to provide emergency communications and other forms of public service. If passed, HR 2160, the *Amateur Radio Emergency Communications Enhancement Act of 2009* would (according to its full title) "promote and encourage the valuable public service, disaster relief, and emergency communications provided on a volunteer basis by licensees of the Federal Communications Commission in the Amateur Radio Service, by undertaking a study of the uses of Amateur Radio for emergency and disaster relief communications, by identifying unnecessary or unreasonable impediments to the deployment of Amateur Radio emergency and disaster relief communications, and by making recommendations for relief of such unreasonable restrictions so as to expand the uses of Amateur Radio communications in Homeland Security planning and response." The bill has been referred to the Committee on Energy and Commerce.

If enacted into law, HR 2160 would instruct the Secretary of Homeland Security to undertake a study and report its findings to Congress within 180 days. The study would spell out uses and capabilities of Amateur Radio communications in emergencies and disaster relief. The study shall:

- Include recommendations for enhancements in the voluntary deployment of Amateur Radio licensees in disaster and emergency communications and disaster relief efforts.
- Include recommendations for improved integration of Amateur Radio operators in planning and in furtherance of Department of Homeland Security initiatives.
- Identify unreasonable or unnecessary impediments to enhanced Amateur Radio communications — such as the effects of private land use regulations on residential antenna installations — and make recommendations regarding such impediments.
- Include an evaluation of Section 207 of the Telecommunications Act of 1996 (Public Law 104-104, 110 Stat 56 [1996]).
- Recommend whether Section 207 should be modified to prevent unreasonable private land use restrictions that impair the ability of amateurs to conduct, or prepare to conduct, emergency communications by means of effective outdoor antennas and support structures at reasonable heights and dimensions for the purpose in residential areas.

The Secretary of Homeland Security shall utilize the expertise of the ARRL and shall seek information from private and public sectors for the study.

On May 7, 2009, ARRL Chief Executive Officer David Sumner, K1ZZ, visited with Representative Sheila Jackson-Lee (D-TX) to thank her for sponsoring HR 2160.

The bill currently has six co-sponsors: Madeleine Bordallo (Guam), Brett Guthrie (R-KY), Mary Jo Kilroy (D-OH), Zoe Lofgren (D-CA), Blaine Luetkemeyer (R-MO) and Bennie Thompson (D-MS). Representative Thompson is Chairman of the Committee on Homeland Security. Representatives Jackson-Lee, Lofgren and Kilroy are members of that committee.

"Representative Jackson-Lee was very impressed with the radio amateurs she encountered on a visit to an Emergency Operations Center in Houston during Hurricane Ike last September," said ARRL Chief Executive Officer David Sumner, K1ZZ. "We are grateful to her and to the six co-sponsors for their support of Amateur Radio and the encouragement that their bill offers."

ARRL President Joel Harrison, W5ZN, concurred: "We are excited to have Representative Sheila Jackson-Lee introduce HR 2160. It is extremely encouraging to have the support of a number of original co-sponsors — including several members of the House Homeland Security Committee — who recognize the importance of Amateur Radio's long history of public service."

During a visit to Representative Jackson-Lee's office May 7, ARRL Chief Executive Officer David Sumner, K1ZZ, thanked her, on behalf of the Amateur Radio community, for sponsoring the bill. She explained that her interest came from seeing Houston area amateurs in action providing disaster relief communications following a hurricane and that she was glad to help.

FCC RELEASES UNREDACTED BPL CASE STUDIES AFTER ARRL FOIA REQUEST

On May 1, the FCC released the redacted portions of the studies on which they relied with regard to their Broadband over Powerline (BPL) rulemaking in 2004 after ARRL filed a Freedom of Information Act request on March 31 for the studies. In October 2007, the US Court of Appeals for the District of Columbia Circuit heard ARRL's case against the Commission, stating, among other things, that the FCC not only withheld the internal studies until it was too late to comment, but had yet to release portions of studies that may not support its own conclusions regarding BPL. The FCC claimed that the studies were "internal communications" that it did not rely upon in reaching its decision to adopt the BPL rules. In its April 2008 ruling, the Court ordered the FCC to release the studies.

In its decision, the Court agreed with the ARRL that the FCC had failed to comply with the Administrative Procedure Act (APA) by not fully disclosing for public comment the staff studies on which it relied and that "there is no APA precedent allowing an agency to cherry-pick a study on which it has chosen to rely in part." Writing for the

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

FCC News

President Obama Nominates New FCC Commissioner

On April 29, President Barack Obama announced his intention to nominate Mignon L. Clyburn of South Carolina as an FCC Commissioner. If her nomination confirmed by the Senate, Clyburn will fill the seat of Democrat Jonathan Adelstein. Adelstein is leaving the FCC to serve as head of the Department of Agriculture's Rural Utilities Service (RUS).

Clyburn, the daughter of House Majority Whip Representative James Clyburn (D-SC), has served on the Public Service Commission of South Carolina since 1998. The Public Service Commission regulates South Carolina's investor owned public utilities, including providers of telecommunications services. Before her election to that body, she spent 14 years as the publisher and general manager of *The Coastal Times*, a weekly newspaper in Charleston, South Carolina.

In 1998, Clyburn was elected by the South Carolina General Assembly as a Commissioner to represent the Sixth Congressional District; she has been re-elected three times, chairing the Commission from 2002-2004. She is a past chair of the Southeastern Association of Regulatory Utility Commissioners, and is presently the chair of the Washington Action Committee of the National Association of Regulatory Utility Commissioners (NARUC). Clyburn also serves on NARUC's Audit Committee and Utilities Market Access Partnership Board.

FCC Commissioner Nominee Mignon L. Clyburn

Calling Clyburn a "fine public servant," Obama said she was "a welcome addition to my team as we work to put America on a path towards prosperity and keep our nation safe. I am honored [Clyburn] will be joining my administration and look forward to working with [her] in the months and years ahead."

Acting FCC Chairman Michael Copps congratulated Clyburn, saying, "She is an excellent choice, and the experience she brings from her service on South Carolina's Public Service Commission will be an invaluable asset as we address the many challenges and opportunities that are before us. I wish her a successful Senate confirmation and look forward to working with her over the coming months and years in serving consumers and the public interest."

Clyburn graduated from the University of South Carolina with a Bachelor of Science degree in Banking, Finance & Economics in 1984.

three-judge panel of Circuit Judges Rogers, Tatel and Kavanaugh, Judge Rogers summarized in the Court's decision that "The Commission failed to satisfy the notice and comment requirements of the Administrative Procedure Act ('APA') by redacting studies on which it relied in promulgating the rule and failed to provide a reasoned explanation for its choice of the extrapolation factor for measuring Access BPL emissions." The Court concluded that "no precedent sanctions such a 'hide and seek' application of the APA's notice and comment requirements."

Judge Tatel agreed with Judge Rogers, saying, "[I]n this very case the Commission redacted individual lines from certain pages on which it otherwise relied...there is little doubt that the Commission deliberately attempted to 'exclude [ ] from the record evidence adverse to its position'"

Almost a year after the Court's decision, the FCC had done "literally nothing" about releasing the complete studies. When President Obama came into office in January 2009, new Freedom of Information Act (FOIA) guidelines were put in place. Using these new guidelines, the ARRL filed an FOIA request on March 31 for the studies. The FCC responded to the FOIA request and released the unredacted studies the last week of April.

In one study concerning Main.net's BPL system, the FCC found that the system exceeded Part 15 limits, but referenced a comment provided by a BPL provider's Chief Technical Officer, considering the point — "[i]f distance scaling were based on distance to the pole ground wire rather than the nearest part of the BPL system, measurements would have passed with 1 dB margin at the selected quasi-peak measurement location." The FCC redacted a statement made by its own FCC staff that labeled the CTO's comment as "invalid," yet retained the comment.

Another unredacted study from 2003 in Allentown, Pennsylvania, plainly showed that BPL was not a point source, noting: "NOT A POINT SOURCE. Emissions exhibit no noticeable decay 230 m down from the coupler." In the redacted version, this information was deleted, but all other information, including a graph, was left intact.

A slide regarding Access BPL showed the same thing, but all information had been redacted from the file, leaving just a blank page. The unredacted study concluded that "The tested overhead PLC devices do not act as point sources. Emission from line shows virtually no decay 230 m from coupler. Differential two-wire signal injection affects the polarization of radiated emissions from overhead devices."

"Comparing the redacted and unredacted documents will take some time," ARRL Chief Executive Officer David Sumner, K1ZZ, said, "but this shows exactly what prompted Judge Tatel to say what he did. We are continuing to analyze all the documents and we'll see just what has been going on."

ARRL SOUTHEASTERN DIVISION VICE DIRECTOR SANDY DONAHUE, W4RU (SK)

The ARRL is sad to report that Southeastern Division Vice Director Sandy Donahue, W4RU, of Dothan, Alabama, passed away on May 4. He was 63. Donahue, an ARRL Life Member, had served as Vice Director since January 2002 and as Georgia Section Manager from 1997-2001. In his professional life, Donahue worked at a television station in Atlanta for almost 25 years before retiring.

Licensed for almost 50 years, Donahue received his first call sign — WA4ABY — at age 15. Exhibiting a lifelong commitment to public service throughout his amateur career, he always supported the ARRL and the Amateur Radio Service. Donahue was a fixture at every major hamfest in Southeastern Division — and many across the country — as well as many of the smaller ones in his area, promoting the ARRL. He spent the weekend of May 2-3 at the BirmingHamfest 2009.

Former Southeastern Division Director and current ARRL Honorary Vice President Frank Butler, W4RH, appointed Donahue as an Assistant Director in 1982. "We spent hours and hours together at the ARRL table at so many hamfests and conventions," Butler recalled. "Sandy became my Vice Director in 2002, and in the next six years, I got to really know him. Over the past 26 years, we must have sold a ton of ARRL books, study guides, operating aids, pins, patches and stickers. Sandy was always promoting the League to hams, en-

ARRL Southeastern Division Vice Director Sandy Donahue, W4RU (SK)

couraging them to become active members of the ARRL. He took great pride in the number of people who joined the ARRL through him."

Butler said that after a hard day's work at the ARRL booth, "all Sandy ever wanted was a good dinner! He loved to eat, and he showed me many fine places to do that, from Atlanta to Birmingham, to Orlando to Miami! I'm glad we got to do that again the last weekend of his life — at the BirmingHamfest 2009."

Current Southeastern Division Director Greg Sarratt, W4OZK, fondly remembered Donahue: "I was happy to say that I spent this past weekend with Sandy where he spent the last day of his life doing what he loved — in the ARRL booth, representing the ARRL at the Birmingham, Alabama hamfest, catching up with old friends. Sandy was, as usual, in rare form all weekend, joking and having a good time."

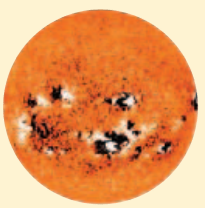
Sarratt said that on Sunday, May 3, "Breakfast began with Sandy surrounded by a group of friends, where he, as usual, did his dead level best to get the best of me with a joke. On this occasion, he managed to succeed, and, in fact, he continued to enjoy this until we parted ways at the conclusion of the hamfest. Sandy could relate to all hams, both old and young. He — and his sense of humor — will be sorely missed."

ARRL Chief Executive Officer David Sumner, K1ZZ, said that even before Donahue sought elective office in the ARRL, "Sandy was a fixture at conventions and hamfests, promoting the League and supporting the association in any way he could. Sandy thought of the ARRL as his family, and he was an important part of it."

Jeff Beals, WA4AW, was a long-time friend of Donahue's. "I've known Sandy for more than 25 years," he told the ARRL. "He was very, very devoted to Amateur Radio, especially the public service side: Emergency Communications, traffic handling and helping out wherever and whenever he could. We had a lot in common." Beals currently serves as an Assistant Section Manager and Affiliated Club Coordinator in the ARRL's Southern Florida Section.

ARRL Technical Relations Manager Brennan Price, N4QX, said that Donahue was one of the three ARRL Volunteer Examiners who administered his first license exam back in 1997: "He was helpful after the exam as well, always eager to share his experience with a variety of Amateur Radio activities with me and other impressionable young hams at the Georgia Tech Amateur Radio Club. While I suspect that his stories were sometimes accompanied by a degree of exaggeration for dramatic effect, I enjoyed them and will miss them."

In Brief



• **Scientists Predict Solar Cycle 24 to Peak in 2013**: At the annual Space Weather Workshop held in Boulder, Colorado in April, an international panel of experts led by NOAA's Space Weather Prediction Center (SWPC) predicted that Solar Cycle 24 will peak in May 2013 with a maximum sunspot number of 90. If the prediction proves true, Solar Cycle 24 will be the weakest cycle since Solar Cycle 16, which peaked in 1928, and ninth weakest since the 1750s, when numbered cycles began. The panel predicted that the lowest sunspot number between cycles — the solar minimum — occurred in December 2008, marking the end of Solar Cycle 23 and the start of Solar Cycle 24. If the prediction holds up, at 12 years and seven months Solar Cycle 23 will be the longest since 1823 and the third longest since 1755. Solar cycles span 11 years on average, from minimum to minimum. An unusually long, deep lull in sunspots led the panel to revise its 2007 prediction that the next cycle of solar storms would start in March 2008 and peak in late 2011 or mid-2012. The persistence of a quiet sun also led the panel to a consensus that Solar Cycle 24 will be what they called "moderately weak."

• **Internet Search Engine Celebrates Birthday of Samuel F. B. Morse:** Internet search engine Google reconfigured their home page on April 27 to honor the 218th birthday of Morse code creator Samuel F. B. Morse (April 27, 1791-April 2, 1872). Morse, a native of Charlestown, Massachusetts, conceived the basic idea of an electromagnetic telegraph in 1832. Experiments with various kinds of electrical instruments and codes resulted in a demonstration of a working telegraph set in 1836 and introduction of the circuit relay, making transmission possible over any distance. With his creation with Alfred Vail of the American Morse code, the historic message "What hath God wrought?" was successfully sent from Washington to Baltimore.

SECTION MANAGER NOMINATION NOTICE

To all ARRL members in the Alabama, Alaska, Delaware, East Bay, Kansas, Michigan, New Mexico, Santa Barbara, Tennessee and Western Massachusetts Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

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

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 4, 2009. If more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 2009, to full members of record as of September 4, 2009, which is the closing date for nominations. Returns will be counted November 24, 2009. Section Managers elected as a result of the above procedure will take office January 1, 2010.

If only one petition is received from a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 2010. If no petitions are received from a Section by the specified closing date, such Section will be resolicited in the January 2010 *QST*. A Section Manager elected through 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* QST

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 2010-2012 term in the Central, Hudson, New England, Northwestern and Roanoke 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 14, 2009*. 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 21, 2009*. Only original documents can be accepted; *no facsimiles of any kind are acceptable*. On Monday, August 24, 2009, 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 4, 2009, to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

3. *Ethics and Elections Committee to certify eligibility*. In accordance with the Bylaws, an Ethics and Elections Committee, composed of three directors not subject to election this year, is responsible for the conduct of the election. This year, the Ethics and Elections Committee consists of Greg Sarratt, W4OZK, chair; Brian Mileshosky, N5ZGT, and Jay Bellows, KØQB.

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, 2010.

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, 2009. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1, 2009 and, to be valid, must be received at HQ by noon Eastern Time on Friday, November 20, 2009. 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, 2009, 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, 2009, giving their current *QST* address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern and Roanoke divisions but your *QST* goes elsewhere, let the ARRL Secretary know as soon as possible, but no later than September 10, 2009, 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:

Central — Dick Isely, W9GIG and Howard Huntington, K9KM

Hudson — Frank Fallon, N2FF and Joyce Birmingham, KA2ANF

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

Northwestern — Jim Fenstermaker, K9JF and Bill Sawders, K7ZM

Roanoke — Dennis Bodson, W4PWF and Patricia Hensley, N4ROS

For the Board of Directors:

May 19, 2009

David Sumner, K1ZZ
Secretary

"Spring Training" — A Grand Slam in Connecticut

Oscar Fuller, KO1F
ko1f@arrl.net

On this late March day the weather was a bit iffy as the attendees started to arrive. Spring had been threatening but winter was trying to hold on in western Connecticut. The weather outlook for the day was in question but not the activities and special programs arranged for the over 65 attendees of the Connecticut Amateur Radio Emergency Service (ARES®) "Spring Training" event. Ham radio emergency communicators gathered in Southbury, Connecticut, to spend the day attending focused workshops and touring specialized emergency communications vehicles. The Connecticut Region 5 ARES team planned the event and the State of Connecticut — Department of Emergency Management and Homeland Security (DEMHS) was the host for the day.

We all know communications is the key to success in any emergency situation. When critical systems are down or backup communications are needed, Amateur Radio operators volunteer their time, skills and equipment to support their federal, state and local emergency management teams. In addition, we provide support to the American Red Cross, The Salvation Army and other agencies in times of crisis. Amateur Radio emergency operators take pride in being able to set up communications and operate when all other systems and communications fail. ARES radio operators volunteer time and energies to serve others by bringing our unique skills to solve the critical need for reliable communications during emergencies.

Using a spring training baseball theme, members gathered for a full day of education, updates, demonstrations and workshops. The Connecticut Region 5 DEMHS headquarters building was the venue for this event. Robert Kenny — Region 5 DEMHS Coordinator — hosted the event that drew emergency operators from all corners of western Connecticut. This "sold out" event turned out to be one of the best of its kind in recent memory. Through a series of workshops, operators were able to focus on one theme — improving emergency communications skills. This event was expertly planned and executed with subject matter experts assembling to share their knowledge and insights on various topics with the attendees.

Over the past few months, one of the buildings at a Connecticut state medical complex known as the Southbury Training School has undergone renovation and preparation to house the new DEMHS Region 5 Headquarters. Part of this building's role is to provide a venue for events, meetings and training that support the mission of DEMHS and other state emergency organizations. This ARES event was the first meeting of this size to use this updated facility.

Over a cup of coffee the idea was born. Dave Hyatt, K1DAV (DEC for Region 5); Harlan Ford, W1QH (ADEC for Region 5), and Oscar Fuller, KO1F (EC for Danbury) talked about pulling together an event where attendees could pick and choose from a rich selection of topics. The idea was on the agenda at the next Region 5 ARES meeting. It quickly picked up momentum and within a few days a team had been recruited to make this happen. The Connecticut Region 5 ARES team began the project in ernest.

With the team assembled, the planning for this effort was kicked off in early January with the support of Robert (Bob) Kenny (Connecticut Region 5 DEMHS Coordinator) and Paul Estefan (Danbury, Connecticut Emergency Management Director). Estefan has developed and supported a team of local hams to staff the Danbury EOC in times of need.

Paul provided continuing support throughout the operation. He comments that, "Danbury continues to be in the forefront of finding creative ways to utilize these volunteers to support the city operations and provide needed backup. The Danbury ARES team is an excellent example of the kind of support that any municipality could develop. They are well organized, well trained and always on hand when needed and give the city that extra cushion of communications support when needed."

Bob Kenny has worked with regional hams to assist with the design and implementation of the Amateur Radio station, as an integral part of its communications plans and capabilities, in the newly refurbished regional headquarters. This "sold out" event

TOM WILSON, KB1QXN

The "go kits" were on display at Spring Training and the attendees were invited to judge them according to several categories, each with its own prescribed criteria. Bill Covey, W1GTT, and Wayne Gronlund, N1CLV, were awarded the winning certificates.

TOM WILSON, KB1QXN

Dave Brown demonstrates the Connecticut State Tactical On-scene Communications System.

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

clearly demonstrated the ability of the facility to house this type of large-scale training. More importantly, it was an excellent opportunity to build an even stronger relationship with their Amateur Radio communications partners here in Connecticut.

ARRL provided program support and donated various publications to be used at the workshops. Betsey Doane, K1EIC, the ARRL Connecticut Section Manger was on hand to participate in the program. Betsey remarked, "The idea of having a real professional day of training for Connecticut emergency communicators intrigued me from the start. The announcement fliers were wonderfully motivating — Spring Training and a baseball theme. The planning was thorough, arduous and very detailed. EC Oscar, KO1F, worked with DEC Dave, K1DAV, and a team of enthusiastic and committed ops: ADECs Harlan, W1QH; Dave, K1DJW; Tom, KB1QXN; PIO Dana, KA1WPM, and Ann, N1RFP, who many call the DEC's right hand op. Indeed, the planning paid off — the event went off right on schedule and absolutely engaged everyone who attended in some real focused learning and just plain fun."

In addition, Wayne Gronlund, N1CLV, the ARRL/ARES Section Emergency Coordinator, was there to lend support and participate by hosting the recognition portion and closing session of the program.

Workshops

Each Spring Training attendee had selected four workshops to attend. Given the offerings for the day, it was difficult to choose which to attend. Many wished they could go to all of the different classes. Workshop selections included:

- NVIS (Near Vertical Incident Skywave) by Chuck Rexroad, AB1CR
- Propagation and Space Weather by Pete Kanderfer, KB1PCK
- D-Star by Scott Honaker, N7SS
- Data Communications by Ned Bassic, KA1CVV, and John Kalotai, N1OLO — Representatives from West Mountain Radio of Norwalk
- Emergency Power: This workshop included three topics — Solar Power by Bill Thoren, N1TIW; Battery Power by Rosty Slabicky, N2FEX; and again, the West Mountain Radio team (Ned Bassic and John Kalotai) provided hands-on training on using Powerpole technology.
- WiFi/APRS by Ken Weith, KD1DD and Bill Covey, W1GTT, was on the workshop agenda along with RF Safety/RFI by Ed Hare, W1RFI.
- Dave Brown, Connecticut Department of Emergency Management and Homeland Security and State Training Supervisor presented an overview of the state ICALL/ITAC system (a state interagency communications system) to the attendees. He provided real hands on training on the State Tactical On-scene Communications System.

Added Features

In addition to the eight workshops that were a part of the day, three demonstration vehicles were on hand for tours, demonstrations and questions from the attendees. Spring Training participants were encouraged to bring their personal "jump kit" or "go kit." Thirteen jump kits were on display and ready for the competition. The attendees then "judged" the kits in a good-natured competition. Certificates were awarded based on type of communications modes (HF/VHF/Digital) and one for "Best-in-Show." The real objective of the competition was to create a forum for discussion, sharing ideas and to show what is possible when ingenuity and clever packaging combines with radio technology.

When the day was over, attendees received their certificate of completion and were very complimentary of the events of the day. Trainers received handsome plaques complete with Oscar's special woodworking touch. Everyone thought the experience was special. And indeed, it was — it will be remembered for a very long time. Many talked of the need to do this more often and keep the information coming — all went away wanting more.

EDUCATION AND TRAINING OFFERED AT EMCOMMWEST

Opportunity knocked early this year when EMCOMMWEST accepted the chance to host the 2009 ARRL Pacific Division Convention on May 1-3, 2009, in Reno, Nevada. Since 1999, EMCOMMWEST has established itself as one of the premier training and educational events in the region for Amateur Radio operators and others interested in various aspects of emergency communications.

This year, for the first time, the ARRL Pacific Division Convention (Pacificon) was held together with EMCOMMWEST, which opened the door for even more opportunities. Nearly 700 attendees came to explore pertinent topics about emergency communications and to meet and greet ARRL officials.

Under the event management and guidance of Don Carlson, KQ6FM (Nevada Section Emergency Coordinator and Public Information Coordinator) the team of organizers and coordinators developed an impressive number of forums and speakers that included Riley Hollingsworth, K4ZDH, who retired just last year from the FCC as its Special Counsel for Amateur Radio rules enforcement. Hollingsworth discussed the Official Observer/Amateur Auxiliary program in a forum and — at the Saturday evening banquet — he shared some of his perspectives on the world of Amateur Radio.

Convention attendees were also able to discuss ARRL matters with Pacific Division Director Bob Vallio, W6RGG, and Vice Director Andy Oppel, N6AJO. Steve Ewald, WV1X, of ARRL Headquarters and the Section Managers and Section Leaders representing all seven Pacific Division Sections were also at the convention and EMCOMMWEST.

To support the theme of emergency communications, subjects such as "ARES from an Emergency Manager's View," "How to Build an EMCOMM Team from Scratch," and "How to Design a Great Exercise" were offered. In addition, operating tips for net control stations, instruction on traffic handling and forums on a variety of communication modes, operating activities and allied served agencies and communication organizations were all covered during the weekend.

The opportunity to learn and to have a great time knocked and the Pacific Division Convention and EMCOMMWEST 2009 answered. QST

2008 Simulated Emergency Test Results

One of the main goals of a simulated emergency test is to provide a public demonstration — to served agencies and through the news media — of the value to the public that Amateur Radio provides, particularly in time of need.

Just below, you'll read an actual (and well-crafted) news release that explains the who, the what, the when, the where and the why of the Charlestown, Rhode Island, Amateur Radio community's involvement in the 2008 ARRL Simulated Emergency Test (SET).

The additional reports and results presented in this article help document Amateur Radio's on-going efforts to meet and exceed two other important goals of the ARRL SET: (1) To find out the strengths and weaknesses of ARES, NTS, RACES and other groups in providing emergency communications. (2) To help radio amateurs gain experience in communications using standard procedures and a variety of modes under simulated-emergency conditions.

2008 SET Top Ten

Section	*Points*
ARES Activity	
Wisconsin	5,143
Connecticut	3,416
Michigan	3,266
Alabama	2,805
Tennessee	2,618
North Carolina	2,034
Western Washington	1,612
Indiana	1,591
Ohio	1,532
Georgia	1,364
Section/Local Nets	
Connecticut	1,210
North Carolina	1,095
Wisconsin	843
Virginia	521
West Texas	505
Michigan	494
Tennessee	453
Western New York	409
Western Pennsylvania	342
New Hampshire	333

Charlestown Radio Hams Shine during Statewide Drill

John Lindholm, W1XX, Charlestown EC

Simulated Hurricane Zed bore down on the South County coastline this past Saturday, but Charlestown's radio amateurs did not flinch in maintaining statewide communications.

Under federal funding, the Rhode Island Emergency Management Agency conducted a statewide drill September 13, primarily to test communications capabilities statewide. Dubbed ShelterCom, evaluators were dispatched to 25 participating Rhode Island towns to monitor response to the emergency situation. Charlestown's ham radio team of communicators under the direction of its coordinator, John Lindholm, W1XX, of South Kingstown, were in full readiness as the drill commenced at 9 AM at the town's Emergency Operating Center (EOC) at the police station.

When it was announced at 11 AM that all commercial circuits such as police radios, cell phones and the internet statewide were simulated inoperable, the Charlestown ham radio team's radios remained fully operational powered by a gas generator and batteries. Radio communication was thus maintained throughout the exercise not only with a local temporary shelter transfer point at the Senior Community Center — ultimately moved inland to higher ground — but also with statewide agencies such as the Red Cross headquarters in Middletown.

Perhaps the local highlight of the event was the dramatic performance by Charlestown's Bud Cooney. At 12:01, an emergency situation was reported from a Jamestown shelter of a patient experiencing renal failure. The nurse at that facility requested specific medical direction from the emergency room at South County Hospital. With all phone lines down, Cooney raced in his mobile unit to Wakefield, and arriving at the door of the emergency room, simulated an exchange of life saving medical information with the nurse in Jamestown. All this was conducted via the statewide Amateur Radio Emergency Service network that ties together all the towns' EOCs.

Other volunteer members of the team manning the radios were Joseph Deslaurier, KA1OYJ; Elizabeth Bray, KB1PFP; John Zabriskie, W1JPZ, and Andy Checchia, KB1QBT — all of Charlestown — and Donald Watson, KW2G, of South Kingstown.

A preliminary on-site review was conducted by evaluators at the conclusion of the exercise at 3 PM to pinpoint those areas that need improvement. Though there was certainly room for improvement, the consensus was that in a major catastrophe, when all else fails, trained volunteer radio amateurs, provide the last line of defense. Charlestown EMA Director Kevin Gallup was quoted: "Our team of dedicated volunteer radio amateurs proved themselves to be reliable and professional in exercising their communicating skills. They are a valuable community resource."

Hawaii Regional Planning Exercise

Eric Grabowski, KH6CQ
Big Island ARES DEC

On 23 October, I attended a tabletop exercise which was part of the Department of Homeland Security's Office of Emergency Communications Interoperable Communication Technical Assistance Program. The event was held at the `Imiloa Astronomy Center in Hilo, Hawaii.

This exercise followed a process designed to provide public safety agencies with assessments of and improvements to the communications they would need during a major disaster or critical incident. It also gave participants an opportunity to evaluate current communication concepts, plans, and capabilities for a response to a large-scale critical incident in the county of Hawaii. This exercise focused on key emergency responder coordination, critical decisions, and the integration of local, state, and federal assets necessary to mitigate, prepare for, respond to, and recover from incidents in order to save lives and protect public health following the incident.

Outcomes from this exercise included a better understanding of disaster coordination and communications interoperability in the Hawaii Regional Planning Zone, a gap analysis of those communication plans, policies, and capabilities that require improvement, and an improvement plan template in accordance with the Homeland Security Exercise and Evaluation Program. Also present and representing the Amateur Radio community were Bob Schneider, AH6J, ARRL SM, and Harvey Motomura, AH6JA, Big Island ARES DEC.

Obion County in Tennessee Scenario

Excerpts from report by Ron Steinberg, W9RVR, EC, Obion County and ADEC, District 2.

The Tennessee Section Emergency Coordinator (SEC) Lowell Bennington, WD4DJW, supplied the scenario called "Perfect Storm" to build the basis of our SET. The time and date was set for October 4, 2008, at 7 AM CDST to 12 CDST for our participation. The main participants announced were Tennessee ARES members, Tennessee Emergency Management and Army MARS (Military Affiliate Radio System). We were instructed to get as much local emergency management and local emergency and government participation as possible. No communications were allowed to pass via traditional non-emergency methods like telephone, fax, e-mail or cell phone.

Obion and Lake Counties decided to work with Dyer, Crockett, Gibson and Weakley Counties for this SET. Six of our eight members worked on this SET in the local Obion County area. We manned the local Emergency Operations Center (EOC) at the sheriff's dispatch office along with a secondary communications site at the Baptist Memorial Hospital in Union City along with mobile operations serving the local communities.

The main scenario was for two Category 5 hurricanes coming into Tennessee. One of these came from the Gulf of Mexico and the other from the Atlantic after landfall in South Carolina. The claimed results from this were major flooding, wind damage, power and communication outages along with road closings and detours. We detailed our own scenario with two major cities in our county, South Fulton and Union City, their fire and police departments, and the county EMA and Sheriff's office. We used detailed instances of flooding, fires, plane crash, train wreck, tornadoes, looting and civil unrest to build interest for local participation.

All ARES members responded that were available to an 8 AM call out. Our #1 mobile team was initially dispatched to South Fulton to dispatch their messages back to the EOC. Two operators were assigned to each of two main transfer points. Two were located at the Sheriff's Obion County EOC and two were manning the secondary station at Baptist Memorial Hospital in Union City.

Messages were passed from South Fulton Fire and Police departments to the EOC and then on to the state as required. Communications were set up with Weakley, Gibson, Crockett and Dyer Counties for relay of their messages and for mutual aid (ARES-MAT). Our link to MARS with Dave Colvett, K4WWV (in Bertrand, Missouri) was established and announced to other counties. Our link to MARS was maintained on VHF and HF and was kept open and active for 5½ hours.

Overall, this SET was one of the best we've attended. The addition of MARS lightened the load at the receiving end and enabled quick responses from state authorities. I really liked the MARS digital Winlink 2000 direct connection to the State EOC and the freedom to work up our own detailed scenario. The replies from the SEC and TEMA kept everyone on their toes and worked out very well.

For an explanation of SET scores, log onto **www.arrl.org/FandES/field/forms/#ec_set.**

ARES Activity

Area	Reporter	Points	Section Points
Atlantic Division			
Eastern Pennsylvania			**64**
Schuylkill Co	W3GMC	64	
Maryland-DC			**564**
Allegany	K3UEZ	268	
Anne Arundel Co	N3SEO	179	
Kent Co	KB3ENU	117	
Southern New Jersey			**835**
Mercer Co	KB2EGI	185	
Burlington Co	KB2TSV	167	
Cumberland Co	N2MHO	155	
Gloucester Co	N2RO	109	
Ocean Co	WX2NJ	86	
Salem Co	KB2EAH	81	
Atlantic Co	N2JVM	52	
Western New York			**897**
Chenango Co	K2DAR	275	
Oneida, Madison Co	AB2QZ	275	
Onondaga Co	WA2PUU	253	
Herkimer Co	N2ZWO	94	
Western Pennsylvania			**187**
Erie Co	WX3E	243	
Indiana Co	KB3JOF	204	
Blair Co	KA3EJV	191	
Fayette Co	KA3WOI	143	
Crawford Co	WW3S	134	
Beaver Co	N3TN	113	
Armstrong Co	KA3KSY	81	
Huntingdon Co	N3OGT	60	
Mercer Co	KX8V	18	
Central Division			
Illinois			**442**
Dekalb Co	W9ICU	207	
Wabash Co	AI9H	146	
Kane Co	KC9FQV	89	
Indiana			**1591**
Wayne Co	W1IDX	324	
Union Co	WN9L	324	
Whitley Co	WB9UNL	234	
Vanderburgh Co	WB9EFH	192	
Orange Co	WB9FHP	138	
Tippecanoe Co	N9GKE	137	
Allen Co	K9RFZ	112	
Vigo Co	WT9I	95	
Henry Co	W9MKA	35	
Bartholomew Co	N9CJT	Narrative	
Wisconsin			**143**
Racine/Kenosha	KB9MMA	423	
Sauk Co	N9ROY	351	
Milwaukee Co	WB9ODQ	297	
West Central WI	KB9ULF	287	
SE Wisconsin	N9VE	245	
St Croix Co	N9XYX	244	
Juneau Co	WD9JIB	222	
District E	KC9ESN	197	
Dane Co	KB9UAJ	183	
Walworth Co	N9ZXP	179	
Marathon Co	KB9VBR	170	
Chippewa Co	W9RMA	154	
Fond du Lac	W9GPI	152	
Waukesha Co	NZ9I	146	
Ozaukee Co	KB9RHZ	143	
Section level	KB9ENO	137	
Pierce Co	KC9CIF	129	
Jefferson Co	KC9IKI	125	
Kewaunee Co	N9JKX	123	
Green Co	KC9YI	119	
Richland Co	W9MZ	118	
Adams Co	N9OEW	117	
Burnett Co	NØJOF	115	
Price Co	AG9G	109	
Rock Co	N9GQ	108	
East Central	N9NCU	103	
Juneau Co	KC9IVJ	70	
Sheboygan	KB5ZJU	69	
Polk Co	KB9KJE	66	
Buffalo Co	N9UNW	52	
Trempealeau Co	N9UNW	52	
Ashland Co	KC9GSK	39	
Winnebago Co	K9NL	35	
La Crosse Co	N9UNW	33	
Oconto Co	KC9IPS	31	
Dakota Division			
Minnesota			**40**
Steele Co	NØUW	40	
Delta Division			
Arkansas			**416**
Cross Co	W5WPN	227	
Pope Co	W4RZ	189	
Louisiana			**79**
Grant Parish	AC5PW	79	
Mississippi			**452**
Lamar Co	KC5TYL	141	
Lauderdale, Clark Co	KD5GWM	107	
Alcorn Co	WB5CON	102	
Union Co	W5LMW	102	
Tennessee			**2618**
Williamson Co	W4UR	355	
Hamilton Co	NT4M	294	
Obion Co	W9RVR	249	
Blount Co	KF4QVI	209	
Rutherford Co	N9DGK	186	
Wilson Co	K4GF	159	
Monroe Co	K4SEY	137	
Jefferson Co	K4AMT	135	
DeKalb Co	KC4GUG	122	
Loudon Co	KM4H	109	
Weakley Co	K5BSE	98	
Giles Co	KG4NXV	91	
Maury Co	Bill Reed	86	
Claiborne, Union	NX6R	86	
Greene Co	KI4PDH	77	
Gibson Co	KI4PCW	75	
Weakly Co #2	K5BSE	75	
Franklin Co	KG4UQZ	75	
Great Lakes Division			
Kentucky			**49**
District 2	AA2FU	49	
Michigan			**3266**
Calhoun Co	KC8COT	1126	
Alcona Co	W8SZ	616	
Kalamazoo	KB8SFR	355	
Saginaw Valley	KC8YVF	197	
Benzie Co	K8BTE	187	
Allegan Co	AB8SF	138	
Osceolo Co	N8NJA	117	
Mecosta Co	KB8TYJ	110	
Luce Co	KC8QZG	96	
Livingston Co	N8WWX	71	
Manistee Co	WB8DRM	56	
Alger Co	W8RDR	50	
District 8	NS8V	42	
Delta Co	N8XAH	32	
Lucas Co	WN8RUG	32	
Houghton Co	N8WAV	23	
Iron Co	KD8FIT	18	
Ohio			**1532**
Gallia Co	KB8AUZ	390	
Erie Co	K8HLH	326	
Clark Co	N8NSD	255	
Greene Co	W8LLY	226	
Hancock Co	N8PTJ	102	
Seneca Co Ottawa Co	KC8BUJ	84	
Sandusky,	W8DAG	71	
Morrow Co	N8EMR	46	
Lucas Co	WN8RUG	32	
Hudson Division			
New York City/Long Island			**602**
Nassau Co	W2KFV	291	
Town of Southold	N2QHV	182	
Town of Islip	KB2SCS	80	
Huntington	WB2LUA	49	
Northern New Jersey			**587**
Monmouth Co	N2SMV	169	
Hunterdon Co	WB2AZE	154	
Passaic Co	N2IAG	123	
Borough of Ramsey	WA2MWT	78	
Englewood	W2CC	63	
Midwest Division			
Iowa			**255**
Polk Co	KCØFRL	123	
Des Moines Co	NØEJD	85	
Linn Co	NØGUD	47	
Kansas			**164**
Riley, Clay, Geary Co	WØPBV	164	
Missouri			**827**
Jackson Co	KØUAA	324	
St Charles	N0PNP	202	
St Louis Co	KCØQMU	117	
Lafayette Co	KCØUNF	100	
Johnson	KBØVZP	84	

Area	Reporter	Points	Section Points
Nebraska			**156**
Lancaster Co	KØGND	156	
New England Division			
Connecticut			**3416**
Region 5	K1DAV	716	
Danbury	W1QH	430	
Region 3	KB1KIX	351	
Region 4, South	N1MIE	281	
Region 1, Zone 2	W1GIG	181	
Region 1	NN1H	169	
Region 1, Zone3	KC1EOC	155	
Orange	KB1QEX	132	
Statewide SKYWARN	K1SJW	132	
Region 4, North	KB1JDX	124	
West Haven	W1HVN	112	
New Haven	N1HAW	103	
Region 3, NW	W1FTE	97	
Winsted	KA1WPM	76	
Brookfield	W1QK	74	
Litchfield Co SKYWARN	K1SJW	67	
Branford	N1HUI	60	
Southbury	W1NG	56	
Windham Co SKYWARN	KB1DGY	55	
Hartford Co SKYWARN	K1PAI	45	
Eastern Massachusetts			**927**
Sectionwide	KD1CY	927	
Maine			**396**
Sagadahoc	AA4AK	167	
Washington Co	N1EP	133	
Penobscot Co	WA1URS	96	
New Hampshire			**1157**
W Rockingham Co	KA1UVH	269	
Hillsborough Co	WD4JZO	240	
Mt Washington Valley	KB1IIR	195	
Central NH	N1RCQ	171	
Strafford Co	K1SRJ	121	
Southern Grafton Co	AA1KL	83	
Manchester	KB1LSQ	78	

Area	Reporter	Points	Section Points
Rhode Island			**247**
Charlestown	W1XX	125	
Westerly	KB1MAO	122	
Northwestern Division			
Oregon			**1117**
Lane Co	N7MQ	314	
Douglas Co	KB7WDR	302	
Coos Co	W7WVF	178	
West Lane Co	K1WZ	142	
Marion Co	WS3X	103	
Tillamook Co	WX7EM	78	
Western Washington			**1612**
Pacific Co	N7CVW	555	
Whatcom Co	KC7UHN	480	
Federal Way	KC7NA	138	
Grays Harbor Co	N7UJK	136	
Kirkland	WA7NIW	115	
Island Co	K7ACT	99	
San Juan Co	K2SPR	89	
Pacific Division			
East Bay			**155**
Oakland Co	WB6NER	155	
Nevada			**229**
Douglas & Carson Co	KA7AJQ	176	
Southern Nevada	KB7REO	53	
Pacific			**158**
Hamakua District	WH6N	88	
Maui Co	KH6H	70	
Sacramento Valley			**235**
Sacramento Co	N6SNO	235	
San Joaquin Valley			**199**
San Joaquin Co	N5FDL	199	
Roanoke Division			
North Carolina			**2034**
Mecklenburg Co	WB2NHQ	254	
Alamance Co	N4MIO	245	
Cleveland Co	K4ZXN	284	
Union Co	K4RLD	270	
Area 14	K4BNP	162	
Cabarrus Co	KA4ATT	148	

Area	Reporter	Points	Section Points
Pamilico Co	KJ4JK	129	
Eastern Branch	W9EF	114	
Orange Co	N6LUZ	99	
Stanly Co	KC4TDC	96	
Moore Co	N4YYL	86	
Caldwell Co	KO4YTU	58	
Lee Co	WB4JFX	57	
Polk Co	W3GYK	32	
Virginia			**1194**
Virginia Beach	WA4TCJ	312	
Hampton	KC4F	219	
Albemarle Co	AD6JV	168	
Stafford Co	N3GQ	147	
Spotsylvania Co	KI4AFE	127	
Williamsburg Co	KC4CMR	122	
York Co	WB4UHC	99	
West Virginia			**312**
Lincoln Co	N8IKT	164	
Raleigh Co	W8LIZ	102	
Barbour Co	K8RWW	46	
Southeastern Division			
Alabama			**2805**
Shelby Co	N4HUB	264	
Lee Co	WX4AL	281	
Blount Co	AB4WL	253	
Tuscaloosa Co	WS4I	246	
Calhoun Co	KG4EUD	213	
Central AL SKYWARN	WB5NMZ	209	
Lowndes Co	WQ4V	202	
ALERT	WD4NYL	197	
Mobile Co	KD4DLJ	184	
Russell Co	WX4JIM	171	
Madison	K4RGG	168	
Lamar Co	KI4IKM	145	
Cullman Co	W4GEL	143	
Covington Co	KE4HIE	129	

Area	Reporter	Points	Section Points
Georgia			**1364**
Gwinnett Co	WB4QDX	339	
Henry & Clayton Co	AJ4GT	228	
Banks Co	KK4Z	190	
Camden Co	WD8LQT	149	
East Central District	KJ4AMN	135	
Newton Co	WA4UJC	110	
Paulding, Douglas Co	K4DMF	98	
Pulaski Co	W4OY	69	
Putnam Co	KF4EOH	46	
Northern Florida			**207**
Clay Co #1	W4NEK	133	
Clay Co #2	W4NEK	74	
Southern Florida			**713**
Broward Co	WA2DXQ	337	
Palm Beach Co	N4QPM	156	
Indiana River Co	WA4ASJ	145	
St Lucie Co	W4ZE	75	
West Central Florida			**229**
Manatee Co	AC4MK	229	
Southwestern Division			
Arizona			**197**
Yavapai Co	WA6ZZJ	197	
Los Angeles			**228**
Northeast District	N6ALO	122	
Gabriel Valley	N6ALO	106	
Orange			**188**
Mission Viejo	WA6RUZ	188	
West Gulf Division			
North Texas			**533**
Wichita Co	KE5KNV	419	
Irving	KA5OZC	114	
South Texas			**289**
Burnet, Llano Co	K5RIK	167	
Brazos Co	KB5N	122	
West Texas			**560**
Midland Co	W5ZOX	560	

Section/Local Nets

Area/Net Name	Net Mgr	Points	Section Points
Atlantic Division			
Maryland-DC			**29**
Kent ARES	KB3ENU	29	
Southern New Jersey			**90**
New Jersey Phone	W2CC	90	
Western New York			**409**
CNYTN	WA2PUU	176	
OCTEN	KA2ZNZ	169	
CARES	K2DAR	64	
Western Pennsylvania			**342**
Blair ARES	KA3EJV	85	
Indiana Co	KB3QJZ	85	
Armstrong Co	KA3KSY	53	
WPA South	N8PSU	51	
Beaver Co	N3TN	38	
Huntington Co	W3VI	30	
Central Division			
Illinois			**66**
RADIO	AB9NH	66	
Indiana			**286**
Whitley Co	WB9UNL	134	
Orange Co	WB9FHP	83	
Harrison Co	KB9JLF	69	
Wisconsin			**843**
RCARES	KB9MMA	406	
Milwaukee Co	WB9ODQ	189	
ARES-RACES	W9IXG	179	
SE WI District	N9VE	150	
Sauk Co	N9UDO	125	
Pine Valley	W9MZ	119	
Dane Co	KC9FKV	114	
FDL ARES/RACES	W9GPI	112	

Area/Net Name	Net Mgr	Points	Section Points
Badger Emergency Net	WD9FLJ	108	
West Central	KB9ULF	102	
OZARES	KB9RHZ	97	
WI9ELK	N9ZXP	89	
Waukesha Co	NZ9I	86	
NW WI ARES/RACES	KB9JKE	81	
WI Sr Leadership	KB9ENO	80	
Central WI	KC9ESN	77	
St Croix Co	—	70	
Jefcares	KC9IKI	65	
Polk Co	KC9GHQ	60	
Sheboygan Co	KB5ZJU	58	
W9CVA ARES/RACES	W9JRW	53	
Pierce, St Croix	KA9CIF	50	
Ashland Co	KC9GSK	44	
Nuclear Disaster Drill	N9JKX	43	
Kewaunee Co	N9JKX	30	
Oconto Co	KC9IPS	27	
Delta Division			
Arkansas			**88**
Cross Co	W5WPN	88	
Louisiana			**29**
Grant Parish	AC5PW	29	
Tennessee			**453**
Blount Co	KF4QVI	158	
Claiborne/Union Co	AJ4IJ	104	
DeKalb Co	KC4GUG	67	
Giles Co	KG4NVX	41	
Monroe Co	K4SEY	39	
Franklin Co	KG4UQZ	23	
Haywood Co	KI4WPH	21	
Great Lakes Division			
Michigan			**494**
Alcona Co	W8SZ	286	

Area/Net Name	Net Mgr	Points	Section Points
MI VHF Traffic	AC8AR	121	
Benzie Co	K8BTE	87	
Ohio			**142**
FARA	N8FMJ	142	
Hudson Division			
Northern New Jersey			**90**
New Jersey Phone	W2CC	90	
Midwest Division			
Kansas			**169**
Kansas Phone/Sideband	NØKFS	169	
Missouri			**103**
Jackson Co	KØUAA	103	
Nebraska			**101**
E Nebraska 2 Meter	KBØDNP	101	
New England Division			
Connecticut			**1210**
CPN/CT ARES	AB1CR	194	
Region 3 East	AB1GL	188	
ECTN	KA1RMV	161	
Region 4	W4MCT	160	
Conn Phone Net	N1DIO	91	
WESCON	KA1GWE	86	
Region 4, North	KB1JDX	84	
Region 1, Zone 2	W1GIG	69	
New Haven SKYARN	N1HAW	68	
Nutmeg VHF	K1HEJ	69	
Bridgeport	KC1EOC	40	
Maine			**145**
Emergency Comm	K1HZU	145	

Area/Net Name	Net Mgr	Points	Section Points
New Hampshire			**333**
W Rockingham	KB1FEM	134	
Central NH	N1RCQ	66	
Strafford Co	K1SRJ	61	
VTNH	KM1N	47	
SGARES	AA1KL	25	
Northwestern Division			
Western Washington			**116**
Federal Way ECRT	KC7N	94	
AuxiliaryEmerg Comm	W7EOC	22	
Roanoke Division			
North Carolina			**1095**
Tarheel Emergency Net	W4DNA	332	
Union Co	K4RLD	190	
Cleveland Co/Shelby	K4ZXN	174	
Metrolina 2 Meter	WB2NHQ	155	
Alamance ARES	N4MIO	146	
K4OBG ARES	KC4TDC	66	
Central Carolina ARCT	K4ITL	32	
Virginia			**521**
Virginia Beach	WA4TCJ	452	
Williamsburg	KC4CMR	69	
Southeastern Division			
West Central Florida			**521**
Manatee ARES	AC4MK	101	
West Gulf Division			
North Texas			**89**
Irving RACES/ARES	KA5OZC	89	
West Texas			**505**
W5EOC	W5ZOX	505	

This Month in Contesting

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

MAIL BAG: MULTIPLIERS IN CONTESTS

I've received several e-mails in the past few months from folks just starting out in contesting, including Tim Hendel, KC4BBI, in Huntsville, Alabama. Tim asked about multipliers in contests: What are they? Why are they important? How do they work?

The idea of contesting is to make as many contacts as possible within the contest period. There's more to a successful contest effort than merely making a lot of contacts, however; it's also important to see how diverse an area you can work. This is where multipliers come in.

Most amateurs seem to enjoy having operating goals. The ARRL offers awards for working all US states, 100 DX countries and 100 Maidenhead grid squares on the VHF bands, among others. Numerous clubs around the world offer similar awards. Contest rules award extra points for making contacts in multiple geographic areas.

Add to Multiply

Let's say you and a friend across town are going to enter the ARRL Sweepstakes contest in November. In Sweepstakes, you get two points for each contact you make. The other aspect of Sweepstakes is to try to make a contact with all 80 ARRL sections. Each time you make a contact with a new section, it counts as a new multiplier and you make a note of it.

You make 100 contacts in Sweepstakes, and talk to 20 different ARRL sections. You multiply your total contact points times the number of different ARRL sections.

100 contacts × 2 points per contact
= 200 contact points
200 contact points × 20 ARRL
Sections = 4000 points

Working multipliers is an important part of contesting strategy. The more multipliers you work, the higher your score goes up for each contact you make. In our example above, with 20 multipliers in your log, each new contact you make is worth 2 contact points × 20, or 40 points. If you were to have 30 multipliers, each contact is worth 2 contact points × 30, or 60 points.

This can pay off in some interesting ways. Staying with our Sweepstakes example, let's suppose your friend across town decides for a "quantity over quality" approach and focuses on working as many stations as possible, not worrying about multipliers. At the end of the contest, your friend has 250 contacts in the log with 31 ARRL Sections, for a total score of 15,500 points.

You, however, are wise to the importance of multipliers, and choose a more methodical approach. You manage only 185 contacts, but work 42 ARRL Sections. 185 contacts × 2 = 370 contact points × 42 multipliers = 15,540 points. Your friend across town made 65 more contacts than you did, but because you worked more multipliers, you actually beat your friend by 40 points.

General Rules of Multipliers

1) Multipliers vary from contest to contest. Multipliers can be countries, states, counties, islands, CQ zones, ITU zones, grid squares or a host of other geographic entities. Some contests use multipliers that have nothing to do with geography. For example, the CQ WPX contest uses call sign prefixes as the multiplier. A K7 station becomes just as important to work as a WB1 or DL5. It's always a good idea to read the rules for each contest well in advance, so you know what to keep an ear out for.

2) You only get credit for a multiplier the first time you log it. For example, you're in Sweepstakes and your first 5 contacts are a station in Iowa, then in Illinois, then Nebraska, then Illinois, then Kentucky. While you have made 5 contacts, you only get 4 multipliers; your second contact with Illinois doesn't count as a multiplier.

3) Some contests keep track of multipliers separately by band. This means if you're in the ARRL DX Contest and you make your first contact with a station in England on 20 meters, your first contact with a station in England on 15 meters would also count as a new multiplier. Again, read the rules of each contest to make sure you know what to listen for.

4) Most major contest logging software alerts you to a new multiplier when you type in a call you are going to work. Some also offer the ability to see a list of available multipliers and check new multipliers off when you log one. This becomes very handy later in the contest, giving you a quick glance of what multipliers you may still need.

Multipliers are critically important to a high score in any contest. The ideal contest strategy is a combination of calling CQ to log lots of stations combined with scanning the bands for needed multipliers. By finding the right balance of these two techniques, you will see your contest scores improve dramatically, and your totals for awards like Worked All States and DXCC will rise quickly. Next contest you enter, pay attention to those multipliers!

Do you have a contest-related question? Drop me a line and I'll consider it for publication in my column.

Operating Tip of the Month

*"**Fill It Up!** If you aren't sure if you copied a part of the contest exchange correctly, ask for a repeat. It's much better to ask for a fill and log the information correctly than to take a guess and risk penalties for logging incorrect data during the log-checking process. Take the time to get it right the first time."*

CONTEST CORRAL

in association with the *National Contest Journal*

July 2009

Start and Finish	HF	VHF+	Contest Title	SSB	CW	Dig	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 4, 8 PM - Jul 5, 2 AM	7		070 Club Firecracker PSK31 Sprint			✘	RST and S/P/C	**www.podxs070.com**
Jul 4, 0000Z - Jul 4, 2400Z	1.8-28		Venezuelan Indep Day Contest	✘	✘		RS(T) and serial	**www.radioclubvenezolano.org/concurso.htm**
Jul 4, 1100Z - Jul 4, 1700Z	28		DARC 10-Meter Digital "Corona"			✘	RST and serial	**www.darc.de/referate/ukw-funksport**
Jul 4, 1100Z - Jul 5, 1059Z	3.5-28		DL DX RTTY Contest			✘	RST and serial	**www.drcg.de**
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 5, 1100Z - Jul 5, 1700Z	28		DARC 10-Meter Digital Corona			✘	RST, serial	**www.darc.de/ukw-funksport**
Jul 10, 2000 EDT - Jul 10, 2400 EDT	3.5-28		FISTS Summer Sprint		✘		RST, S/P/C, name, FISTS number or pwr	**www.fists.org**
Jul 11, 1200Z - Jul 12, 1200Z	1.8-28		IARU HF World Championship	✘			RST and IARU zone	**www.arrl.org/contest**
Jul 12, 2000Z - Jul 12, 2400Z	1.8-28		QRP ARCI Summer Hombrew		✘		RST, S/P/C, QRP number or power	**www.qrparci.org**
Jul 18, 0700Z - Jul 18, 1459Z	7-28		Russian Radio Team Championship	✘	✘		RS(T) and ITU zone or 3-letter code	**www.srr.ru/CONTEST/**
Jul 18, 1200Z - Jul 19, 1200Z	3.5-28		DMC RTTY Contest			✘	RST and serial	**www.digital-modes-club.org**
Jul 18, 1500Z - Jul 18, 1700Z	1.8-28		Feld-Hell Monthly Sprint			✘	RST, S/P/C, Feld-Hell member nr or age	**www.wa6l.com/contests**
Jul 18, 1800Z - Jul 19, 0600Z	3.5-28		NA RTTY QSO Party			✘	Name and S/P/C	**www.ncjweb.com**
Jul 18, 1800Z - Jul 19, 2100Z		50,144	CQ WW VHF Contest	✘	✘	✘	4-digit grid square	**www.cqww-vhf.com**
Jul 19, 2000Z - Jul 19, 2159Z	14		CQC Great Colorado Gold Rush		✘		RST, serial, category, CQC member nr	**www.cqc.org/contests/gold2008.htm**
Jul 20, 0100Z - Jul 20, 0300Z	1.8-28		Run For the Bacon - Monthly		✘		RST, S/P/C, Flying Pig nr or power	**www.fpqrp.com/fpqrprun.php**
Jul 25, 0000Z - Jul 26, 2400Z		144	144 MHz Digital EME Championship			✘	TMO or RST and R	**www.DUBUS.org**
Jul 25, 1200Z - Jul 26, 1200Z	3.5-28		IOTA Contest	✘	✘		RS(T), serial, IOTA number if island	**www.rsgbhfcc.org**
Jul 26, 1700Z - Jul 26, 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 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, additional contests and a downloadable PDF version online at www.arrl.org/contests

Sean's Picks

■ **State QSO Parties this month: None**
2009 is the Year of the State QSO Party! Visit **www.arrl.org/ysqso for details**.

■ **DL DX RTTY Contest (July 4-5):** Sponsored by the DL RTTY Contest Group, this is a great event to make some digital QSOs. Everybody works everybody on 80-10 meters using RTTY, PSK31 and PSK63.

■ **MIQRP July 4 Sprint (July 4-5):** Every July 4, the Michigan QRP Club hosts this 4 hour event on HF CW. Make some fireworks with just a watt or two!

■ **FISTS Summer Sprint (July 10 EDT):** Another excellent QRP sprint. If you've never tried QRP before, you will be surprised what you can work. Try it!

■ **IARU HF World Championships (July 11-12):** Phone and CW on 160-10 meters in only 24 hours. It's the biggest DX event of the summer months. Don't miss out — there's plenty of DX to be worked as well as dozens of IARU Member Society headquarters stations.

■ **CQ WW VHF Contest (July 18-19):** One of the greatest VHF contests around. Concentrate your efforts on 6 and 2 meters at the height of the Sporadic-E season. An excellent event for operating portable from your favorite hilltop.

■ **IOTA Contest (July 25-26):** The flagship event for the Islands On The Air awards program, this contest focuses on working…well, islands! DXpeditions all around the world will put very rare islands on just for this event. This should be on every contester's calendar.

In the July/August "Contesting 101"

This Month in the *NCJ*'s Contesting 101: Staying QRV: Station and Operator Maintenance. Kirk Pickering, K4RO discusses tips and tricks for keeping your station and yourself in top form when not competing. Contesting 101 can be found in the *National Contest Journal*, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

JULY 2009 QUALIFYING RUNS

♦ W1AW Qualifying Runs are 10 PM EDT Wednesday, July 1 (0200Z July 2) (35-10 WPM) and 9 AM (1300Z) Friday, July 17. The West Coast Qualifying Run will be transmitted on 3590 kHz by station W6SX at 9 PM PDT Wednesday, July 8 (0400Z July 9). Unless otherwise indicated, code speeds are from 10-35 WPM.

2008 ARRL 10 Meter Contest Results

Ken Harker, WM5R
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Is it Solar Cycle 24 yet? Solar scientists first observed a sunspot that fits the criteria for the new solar cycle back on January 4, 2008. More recently, solar scientists have announced that the solar minimum has been deeper and longer than average, with almost no sunspot activity in the past year. Whether it is, or it is not, a new solar cycle, when the dates for a radio contest come around you know that Amateur Radio operators will show up. On December 13-14, 2008, it was time to play the game that is radiosport. 1885 Amateur Radio stations took their chances on propagation on the 10 meter band, eager for contacts around the globe.

Despite poor conditions on the higher frequency HF bands, radio contesting continues to grow in popularity and activity. One could understand, however, if the ARRL 10 Meter Contest didn't follow suit. After all, the band is a lot more challenging at solar minimum. But contesters must love a challenge now and then. Activity in the contest improved in 2008. A total of 1,885 logs were entered in the 2008 ARRL 10 Meter Contest, an increase of 299 logs, or 19%, from 2007. The increase in log submissions means that this is likely to be the first solar cycle minimum in which the overall number of logs submitted in the ARRL 10 Meter Contest stays above 1000.

The three Single-Operator Low-Power categories remain the most popular, accounting for a little over half of all log submissions. The most popular of all the categories for DX stations is the Single-Operator CW-Only Low-Power category. At the peak of Solar Cycle 23, the Phone-Only categories were more popular than they have been during the current solar minimum.

Records

A total of 18 new DXCC entity records were set in 2008, scattered in all parts of the globe except South America. Two new records were set in Africa, five in Asia, five in Europe, five in North America, and one in Oceania. There were no new W/VE Division records set in 2008. There were, however, four new W/VE section records set, all in Single-Operator QRP categories. (See **www.arrl.org/contests/results** for the complete set of contest records.)

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Florida Contest Group	4,388,168	63
Potomac Valley Radio Club	2,490,294	70
Northern California Contest Club	636,430	53
Medium Category		
Frankford Radio Club	1,487,258	19
Central Texas DX and Contest Club	1,272,142	21
Minnesota Wireless Assn	1,141,858	48
Yankee Clipper Contest Club	992,058	36
Society of Midwest Contesters	958,604	40
Grand Mesa Contesters of Colorado	833,048	18
Alabama Contest Group	718,622	14
South East Contest Club	647,136	12
Tennessee Contest Group	590,450	28
Contest Club Ontario	563,104	27
North Texas Contest Club	405,824	7
Mad River Radio Club	336,878	12
Louisiana Contest Club	324,470	5
Central Arizona DX Assn	306,264	14
Central Virginia Contest Club	209,928	6
Southern California Contest Club	185,146	19
Texas DX Society	166,688	3
Hudson Valley Contesters and DXers	159,956	11
Maritime Contest Club	148,680	10
Western New York DX Assn	143,980	5
CTRI Contest Group	141,298	5
Kentucky Contest Group	49,414	6
Carolina DX Assn	45,324	6
Hampden County Radio Assn	38,378	11
Willamette Valley DX Club	38,044	6
Order of Boiled Owls of New York	34,462	3
North Coast Contesters	32,568	3
Oklahoma DX Assn	25,842	4
Rochester (NY) DX Assn	24,542	4
Six Meter Club of Chicago	13,284	6
East Coast Canada Contest Club	4,996	3
Local Category		
Iowa DX and Contest Club	203,892	3
Midland ARC	154,270	7
Low Country Contest Club	153,898	9
Mother Lode DX/Contest Club	130,894	8
West Park Radiops	87,172	5
Western Washington DX Club	50,920	7
Metro DX Club	48,266	6
Austin ARC	38,666	4
Athens County ARA	23,340	4
Redmond Top Key Contest Club	21,830	3
Lincoln ARC	19,510	4
Portage County Amateur Radio Service	16,716	8
West Allis RAC	15,792	5
Spokane DX Association	14,658	4
Bergen ARA	10,238	4
Meriden ARC	9,446	3
Panhandle ARC	3,120	3

DX Categories

Most of the increase in DX participation in the ARRL 10 Meter contest in 2008 came from European stations, and Europe now accounts for over half of all the DX logs entered in the contest. Were conditions in Europe better this year? Or did the contest benefit from the increase of interest in HF radiosport? It seems that the latter is the more likely explanation. Five new DXCC entity records were set in 2008 in Europe, but all were newly claimed records and all were based on entries that made fewer than 50 contacts.

Single-Operator Mixed-Mode

A familiar contest call sign to many, Vitor, PY2NY, took the overall DX victory in the Single-Operator Mixed-Mode QRP category. Second place went to Dusan, YT2RX, operating from Serbia. Bobrov, RW3AI, took third place with 43 contacts from Moscow, Russia. The top entry was Asia was Yoshirou, JH7RTQ, of Fukushima City, who barely outscored two countrymen for fifth place overall.

In the Single-Operator Mixed-Mode Low-Power category, Alejandro, LU5WW, operating from the club station of the Radio Club Puerto Madryn, LU6WG, took the victory this year from Argentina with 411 contacts and 98 multipliers. Two Brazilian stations had a very close competition for second and third places worldwide. Second place went to Alex, PY2SEX (70,560 points), operating from Campinas, near Sao Paulo. Also located in Sao Paulo state, Alan Laure, PY2LSM, was just behind (68,880 points) for third place. The top European score was from Zeky, 9A5ST (9636 points), operating from Croatia, for an eighth place overall finish.

Worldwide victory in the Single-Operator Mixed-Mode High-Power category went to a station from central Europe this year. Manfred, DK2OY of Gelting, Germany, edged out his South American competition with 253 QSOs and 58 multipliers. A close second place went to Pedro, CE3BFZ (45,430 points), from Santiago, Chile. Third place went to Paul, PY3DX (43,032 points), with 216 QSOs and 66 multipliers from Puerto Alegre, Brazil. Last year's category winner, Vidi, ZS1EL, came in 10th place this year, the best finish in the 2008 contest for any station from southern Africa.

Single-Operator Phone-Only

Fourteen stations outside the United States and Canada entered the Single-Operator Phone-Only QRP category in 2008. The winner this year was Francisco, TG9ANF, of Guatemala City, the only entrant in the category with over 100 QSOs.

Winning the Single-Operator Phone-

W/VE

Mixed Mode, QRP

KR4OW	99,684
W2MF	44,574
K4CIA	30,500
K3TW	25,696
VA3DF	23,500
NØUR	20,332
WØRU	9,240
W5ESE	7,896
NA4BW	7,450
WA6FGV	5,472

Mixed Mode, Low Power

W4TAA	241,752
N4DL	217,566
K2PS	189,240
W3EP	153,640
WD5K	132,300
NØNI	125,164
WØETT	81,774
WQ5L	80,028
K4MF	70,330
K4ADR	65,130

Mixed Mode, High Power

WE3C	435,488
WØAIH (NE9U, op)	376,704
K4EA	320,488
WB9Z	264,870
K8LEE	256,048
WØEWD	255,420
N4PN	244,622
N8II	230,076
W4LT	200,502
WØBH	180,432

Phone Only, QRP

KE2OI	8,320
KØHW	5,150
W7YA	4,400
WWØWB	3,984
KBØOLA	2,944
N8MWK	2,944
KKØQ	1,376
W6QU (W8QZA, op)	1,368
KD4OFG	1,120
W8JMF	1,020

Phone Only, Low Power

WD4IXD	97,818
AJ3T	38,184
K4DMH	34,944
W4GKF	28,880
W3LL	26,796
W5TMC	26,524
AC5O	22,400
WB2RHM	18,040
KAØFSP	17,792
N5MT	17,760

Phone Only, High Power

NR5M	157,294
W5PR	127,904
WØSD	123,960
K5TR (WM5R, op)	115,472
K8CC (N8NX, op)	93,830
K4WI	92,400
NØQO	89,000
N8RA	87,696
N2EOC	83,172
WO4DX	76,496

CW Only, QRP

N5TW	23,904
W5GAI	22,620
N8AP	18,760
NØJK	18,408
W7JI	16,256
N9SF	11,232
N9TF	7,644
N1TM	6,624
WO2N	6,300
K2SM	5,600

CW Only, Low Power

W2TX	137,984
WK2G	120,320
WB4TDH	117,744
N4IJ	63,288
K4PG	59,312
KØMF	56,016
W3BGN	55,488
K9OM	52,096
K7HP	44,208
K4FT	40,480

CW Only, High Power

K1TO	386,808
N4BP	284,064
K1ZZ	211,012
K4LQ	181,260
K5NA	172,704
W2UP	136,192
WJ9B	128,316
N5AU	114,460
WØZA	107,100
W9WI	103,896

Multi-operator

NX5M	434,304
W4UH	386,496
N4CJ	325,248
K4FJ	303,732
W5RU	297,600
N4ARR	292,136
N2MM	216,240
W5YAA	198,370
W4EE	150,300
K3WW	147,732

DX

Mixed Mode, QRP

PY2NY	20,020
YT2RX	4,576
RW3AI	2,652
EW6CU	684
JH7RTQ	588
JK1TCV	230
JH8FAJ	150
PE2KP	42

Mixed Mode, Low Power

LU6WG (LU5WW, op)	132,104
PY2SEX	70,560
PY2LSM	68,880
NP3CW	50,848
CE3DNP	41,958
HK3O	15,392
LW4HBR	13,912
LW5EE	12,480
9A5ST	9,636
EA7KJ	7,296

Mixed Mode, High Power

DK2OY	47,792
CE3BFZ	45,430
PY3DX	43,032
PY1NB	25,370
DL4WA	25,116
OE3GCU	12,012
FM5AN	11,808
UX2IO	11,100
HA1YI	11,078
ZS1EL	10,430

Phone Only, QRP

TG9ANF	13,794
LV6D (LW3DC, op)	4,278
PY2BN	936
F4FEY	540
I5KAP	540
EA3FF	414
JA2DLM	336
DF1RK	306
VK4ATH	200
IK3XTY	170

Phone Only, Low Power

HI3CCP	117,828
LQ5H (LU3HS, op)	38,308
LV5V (LU5VV, op)	24,840
VP5JM	24,816
AY8A (LU8ADX, op)	23,618
ZV2C	16,626
CE4ETZ	11,440
PU2MTS	10,800
CE2WZ	9,044
PU2LEP	7,848

Phone Only, High Power

LR2F (LU2FA, op)	70,980
P4ØK	45,632
LS2D (LU4DJB, op)	45,384
PY5EW	22,256
PW2P	18,568
EC1KR	17,360
HQ2W	12,400
VK8AA (VK2CZ, op)	11,662
GØAEV	9,912
PY5ZD	7,776

CW Only, QRP

LW3EX	8,052
S59D	1,792
YO4XT	1,560
US5VX	1,512
YO8WW	960
YO5ALI	792
G4DBW	540
9A2EY	264
PP5VX	240
F5UKL	240
PAØRBO	240

CW Only, Low Power

PJ2T (WØCG, op)	103,040
PY1NX	59,944
LW1E	44,440
HR9/WQ7R	27,264
PY2XC	20,064
XE2S	16,272
J39BS	14,256
9A5MT	12,992
EA4TX	8,960
RV3LO	6,348

CW Only, High Power

LU1HF	343,184
PY2WC	98,112
P43JB	82,468
S57DX	44,772
OL5M (OK1GI, op)	28,236
F5IN	27,448
9A2U (9A7KNB, op)	20,016
HA8FK	15,660
EA3NT	15,616
EA4KA	14,352

Multi-operator

CW5W	406,000
CX5BW	246,840
LS1D	218,790
CV5K	212,550
PP5MS	183,736
PY3MHZ	135,090
LQØF	129,990
LR4E	98,358
IO5O	32,240
HQ2GL	26,978

Only Low-Power category this year was Tino, HI3CCP who finished the contest with 1107 QSOs in 54 multipliers from Santiago in the Dominican Republic. Second place went to Victor, LU3HS, operating with the contest call sign LQ5H from Cordoba, Argentina. A very close third place finish went to Jorge, LU5VV, operating with contest call sign LV5V from Bariloche, Argentina. Jorge's score of 24,840 points just edged out fourth place finisher Jody, VP5JM (24,816 points).

In the Single-Operator Phone-Only High-Power category, overall QSO totals were slightly up from the top totals in 2007. This year, the victory went to Roberto, LU2FA (70,980 points), operating with contest call sign LR2F from Rosario, Argentina. Kay, K6KO, using her Aruban call sign P4ØK (45,632 points), came out in second place. Dan, LU4DJB, took third place with 45,384 points, operating with the contest call sign LS2D from Buenos Aires, Argentina. David, VK2CZ, operating with the call sign VK8AA from the city of Darwin in Australia's Northern Territories, had one of the best results for Oceania, finishing eighth overall with 11,662 points.

Single-Operator CW-Only

Eight of the top ten scores in the category came from Europe, including three from Romania. Overall DX victory in the category, however, went to Walter, LW3EX, the only station in the category to make over 50 QSOs. Janko, S59D, took second place in the category, the best showing by a Slovenian station in the contest. Cristian, YO4XT, came in third place with 27 contacts.

Only one DX station in the Single-Operator CW-Only Low-Power category made over 100,000 points this year: Geoff, WØCG/PJ2DX, who operated at the Caribbean Contesting Consortium's contest station PJ2T on the island of Curacao in the Netherlands Antilles. Second place went to Soni, PY1NX (59,944 points), operating from Rio de Janeiro, Brazil. Mario, LU8DPM, using his contest call sign LW1E, took third place in 2008 with 44,440 points.

Operating from San Francisco, Argentina, Juan, LU1HF, made 978 QSOs to an amazing 89 multipliers for a total score of 343,184 points, the highest score of any DX Single-Operator effort. Second place went to Wal, PY2WC (98,112 points), operating from Aruja in Sao Paulo state in Brazil. Operating from Oranjestad, Aruba, Joop, P43JB, came in third place (82,468 points).

Multi-operator Single-Transmitter

The winner of the Multi-operator category in 2008 was the four-person CW5W team in Cerro Largo, Uruguay, operating from the station of Jorge, CX6VM, and scoring 406,000 points. Second place went to the nearby team of Gustavo, CX7AT, and station owner Pedro, CX5BW, with 246,840 points. Third place went to the two person team at LS1D: Tim, LW9EOC, and Daniel, LU3CT.

W/VE Categories

On Wednesday, December 11, 2008, the worst winter storm in a decade disrupted power for millions in New England. The storm was so severe that a week afterward, nearly 100,000 people were still without power. Many contesters in W1 and W2 watched helplessly as antennas and even towers succumbed to the ice. Despite this major disaster, activity from the New England Division actually increased, from 91 logs in 2007 to 100 logs in 2008. Activity in the Hudson Division increased from 59 to 64 logs.

The top overall score from Canada was made by Gilles, VE2TZT, of Ile-Bizard, Quebec, who scored 91,530 points in the Single-Operator Mixed-Mode High-Power category. Doug, VA3DF, came in fifth place in the Single-Operator, Mixed-Mode QRP category, the only Canadian with a Top Ten score.

Single-Operator Mixed-Mode

David, KR4OW, had the winning W/VE score in the Single-Operator Mixed-Mode QRP category in 2008. Manuel, W2MF, nearly doubled the Southern New Jersey record and finished in second place for W/VE. Third place went to William,

K4CIA, of Raleigh, NC.

In the Single-Operator Mixed-Mode Low-Power category, victory in the category went to William, W4TAA in West Central Florida. Gary, N4DL, also in the West Central Florida section, took second place with just over 800 contacts in his log. Third place went to last year's third-place finisher, Pete, K2PS, of Southern New Jersey.

With 1163 QSOs in the log, John, WE3C, operating from Eastern Pennsylvania, won the Single-Operator, Mixed-Mode High-Power category this year (435,488 points). Scott, NE9U, operating the well-known WØAIH contest station in Wisconsin, took second place (376,704 points). Neal, K4EA, in Georgia had the third highest score (320,488 points).

GREG RYAN, VK8HLF

Figure 1 — How's this for a "skyhook"? David, VK2CZ, operated as VK8AA in Australia's Northern Territories with this monster beam. The antenna was 85 feet long and it was 140 feet in the air, thanks to the crane.

Dan, K1TO, returned to first place in the W/VE Single-Operator CW-Only High-Power category in 2008. Second place this year went to Bob, N4BP, of South Florida. In third place, Dave, K1ZZ, had the best result in the contest for any station in New England.

Multi-operator Single-Transmitter

The five-operator team at NX5M earned its fourth consecutive victory in the W/VE Multi-Operator Single-Transmitter category. Earning the second-place spot was a three-person team at W4UH in South Florida. Chris, N4CJ (who also holds the call sign G4BUE) was joined by his wife June, MØBUE, in a two-person effort from West Central Florida that resulted in a third-place finish.

Single-Operator Phone-Only

Winning the QRP category was John, KE2OI, of Southern New Jersey, with an impressive 40 multipliers. James, KØHW, of South Dakota took second place (and set a new South Dakota section record score. Larry, W7YA, of the Orange section in southern California, makes a repeat appearance in third-place.

Peter, WD4IXD, won the Low-Power category from North Florida with just under 1000 contacts in the log. Robert, AJ3T, from Western Pennsylvania, took second place with 450 QSOs. Third place went to Douglas, K4DMH, of Northern Florida.

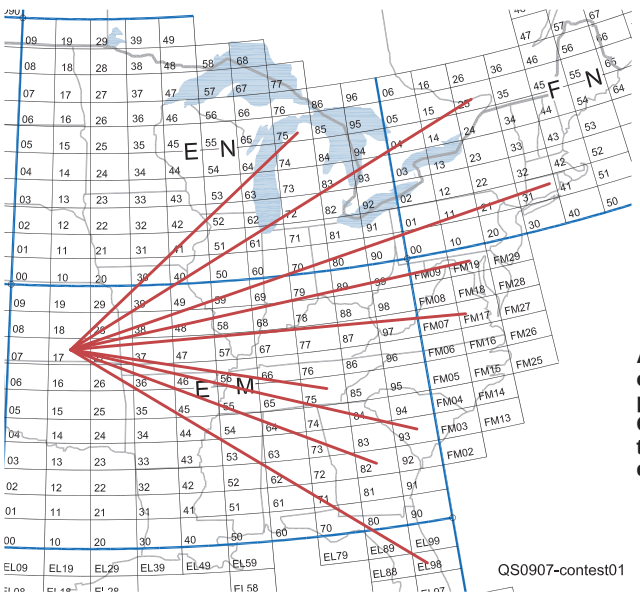
In the Single-Operator Phone-Only High-Power category, George, NR5M, operating from a location northwest of Houston, made 1338 QSOs to 59 multipliers for 157,294 points and first place. Chuck, W5PR, took second place (127,904 points) with 1150 QSOs in 56 multipliers. Ed, WØSD, of South Dakota moved up from fourth place to third place (123,960 points) this year.

Single-Operator CW-Only

After a four-year run by Dale, KG5U, the Single-Operator CW-Only QRP category victory went to Tom, N5TW (23,904 points). Second place (22,620 points) went to Skip, W5GAI. In third place, Spencer, N8AP, made 18,760 points from Michigan.

In the Single-Operator CW-Only Low-Power category, first place went to John, W2TX, of South Florida. Merrill, WK2G, of West Central Florida moved up to a second-place spot in 2008. Third place went to Leonard, WB4TDH, of West Central Florida.

JON JONES, NØJK



A good Sporadic-E opening on Sunday produced many QSOs throughout the Midwest and east coast.

ARRL Affiliated Clubs Competition

This year, there were 19 clubs in the Local Club category. The Central Virginia Contest Club took the top prize in 2008. The Iowa DX and Contest Club came in a very close second place and last year's category winner, the Midland Amateur Radio Club of Midland, TX finished third this year.

Twenty-nine clubs qualified for the Medium category. The Frankford Radio Club won first place with 1,487,258 points from 19 logs. Last year's category winners, the Central Texas DX and Contest Club, came in second place. The Minnesota Wireless Association took third place with 48 logs and 1,141,858 points.

Three clubs entered the Unlimited Club category, and moving up from a third-place Medium Club finish last year, the Florida Contest Group took a commanding victory. The Potomac Valley Radio Club came in second place with 2,490,294 points from 70 log submissions. Third place went to the Northern California Contest Club with 636,430 points.

You can find the official list of contest club names on the ARRL Contest Branch web site. If your club is not listed, contact **contests@arrl.org**, and the team at the Contest Branch will help make sure that your club meets the Affiliated Club requirements and is updated on the list.

Are You Ready for Next Year?

Will conditions on the 10 meter band be any better in December, 2009, than they were in December, 2008? Even if the solar numbers don't look spectacular, you can be sure that thousands of contesters will show up. On December 12-13, 2009, the band will once again come alive with signals from all parts of the globe. QST

2009 ARRL January VHF Sweepstakes Results

Whether by ground wave, tropo or E-skip, contacts were flying everywhere January 17-19.

Jan Carman, K5MA
jcarman@capecod.net

Observations made previously regarding participation in the January VHF SS competition continue for the 2009 event, held January 17-19. Winter weather conditions often make the January VHF SS event a challenge, particularly for the participants in the Rover categories.

Along with the football playoffs, another very significant distraction this year was the scheduling of the NAQP (North American QSO Party) SSB contest during the same weekend. Not everyone is strictly HF or VHF/UHF oriented, your author included!

The total number of QSOs made was 67,394. The total number of QSOs made, however, is much less important than is the number of logs submitted, which has a direct correlation with the number of participants. High log submissions indicate a healthy environment for building more interest in Amateur Radio contesting. The number of QSOs made is much more a function of radio conditions. A total of 650 logs were submitted for this year's event, which represents the lowest total in five years.

Propagation

Conditions for the 2009 event seem almost identical to 2008, judging from the comments of the participants as well as my own observations. Other than the few sporadic-E events that occurred, almost all contacts were made by either ground wave or tropo-scatter.

The sporadic-E openings reported were generally brief in duration. Graham, KE4WBO/R, of Jupiter, FL running a Rover operation from Florida grid EL96 heard an E-skip burst from N3DB (Shadyside, MD) for a brief, five-minute period before he faded away. Paul, K1TOL, of Turner, ME worked as far west as NØPB in EM39 (Holiday, MO). He also worked Chris, KC9JTL, of Westby, WI. This sporadic-E cloud faded a few grids east of EM18. Jon, NØJK, in Wichita, KS reported working W9RM in EN52 (Hampshire, IL) on 6 meter SSB Sunday morning via meteor scatter. Jon created a map of the brief 6 meter opening centered approximately on the Pennsylvania-Ohio border in FN03 (see Figure 1).

JON JONES, NØJK

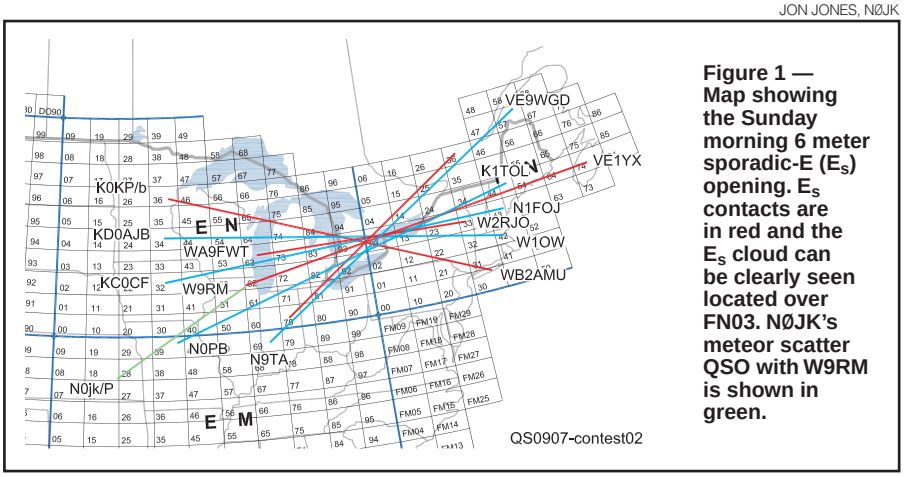


Figure 1 — Map showing the Sunday morning 6 meter sporadic-E (E_s) opening. E_s contacts are in red and the E_s cloud can be clearly seen located over FN03. NØJK's meteor scatter QSO with W9RM is shown in green.

DAVID PALM, W9HQ

Christopher Palm, KC9JTL, and dad David, W9HQ, entered their first-ever VHF contest. Despite a few visits from Murphy, they earned fifth place Limited Multi-operator honors in the Central Division, and had a lot of fun. Look for them in the June VHF QSO Party.

Glen, KCØIYT/R, of Apple Valley, MN did a Rover operation in two Minnesota grid squares on the bands from 50 MHz through 10 GHz. Glen noted that on the 5760 MHz and 10 GHz bands, he was only able to make QSOs when the snow was falling. He made no QSOs when the snow was not falling!

Single-Operator

Bob, K2DRH, from Albany, IL retains his top position again this year in the Single Operator, Low Power category with a score of 159,305 points, just slightly lower than his top score last year. Bob led the multiplier category with the top spot on the 50, 144, 222, 432, 902 and 1296 MHz bands. Bob was also the QSO leader on the

Single Operator, Low Power

K2DRH	159,305
N1DPM	111,339
WA3NUF	99,591
W3SZ	54,834
AF1T	51,450
WB2SIH	42,984
KC9BQA	35,236
WA3QPX	29,625
W3PAW	25,830
N3RG	24,009

Single Operator, High Power

K1TEO	354,040
K3TUF	232,101
K1RZ	200,976
K3DNE	126,960
WB2RVX	97,519
WZ1V	87,914
KA1ZE	74,550
N2GHR	72,000
WA3DRC	67,184
K4QI	59,631

QRP Portable

N3YMS	21,168
W3RGA	6,965
W6BVB	2,340
W9SZ	1,850
W4RXR	1,392
KJ4BEE	931
WB2AMU	663
K6ALF	495
K3EGE	408
NØKIS	286

Limited Multi-operator

K1JT	102,582
KB1DFB	58,168
W1QK	25,071
W9RM	22,695
W4NH	19,491
N8RA	17,836
W3HZU	17,520
K2BAR	13,992
WY3P	12,432
KA2LIM	10,890

Multi-operator

N3NGE	568,764
K5QE	238,290
KBØHH	46,350
KE1LI	43,890
K7ND	26,432
K6LRG	20,148
N2BJ	15,184
KB8O	12,712
AG4V	11,115
N9UHF	9,855

Rover

N6NB/R	395,624
AF6O/R	384,223
W6XD/R	355,160
KK6KK/R	353,304
K1DS/R	136,136
N3IQ/R	125,658
N5AC/R	88,752
N6TEB/R	84,750
AE5P/R	83,850
WDØACD/R	76,196

Limited Rover

KI6UZV/R	113,544
K4GUN/R	14,711
KO4MA	13,776
N6ORB/R	10,336
KC2QZF/R	7,805
NE3I/R	5,112
KK6MC/R	2,938
K6JRA	2,574
N6ZE/R	2,112
N2CEI/R	1,024

Unlimited Rover

W6YLZ/R	395,760
W6TE/R	227,850
AE5BN/R	129,008
K9JK/R	10,304
KI6USR/R	2,967

Affiliated Club Competition

Club	*Score*	*Entries*
Unlimited Club Category		
Mt Airy VHF Radio Club	1,823,418	60
Medium Club Category		
North East Weak Signal Group	812,400	21
Potomac Valley Radio Club	675,775	24
Northern California Contest Club	272,245	11
Badger Contesters	233,248	27
Society of Midwest Contesters	219,014	14
North Texas Microwave Society	160,245	9
Rochester VHF Group	156,098	13
Roadrunners Microwave Group	154,225	5
Yankee Clipper Contest Club	124,368	14
Northern Lights Radio Society	114,056	12
Pacific Northwest VHF Society	112,794	20
Contest Club Ontario	94,873	13
Florida Weak Signal Society	78,415	10
Six Meter Club of Chicago	24,091	11
Bergen ARA	15,064	4
Mad River Radio Club	11,701	3
Minnesota Wireless Assn	186	3
Local Club Category		
Nacogdoches ARC	563,145	7
Eastern Connecticut ARA	107,249	4
Murgas ARC	78,589	4
Chippewa Valley VHF Contesters	29,202	4
Granite State ARA	11,464	6
Burlington County Radio Club	9,203	8
Raritan Bay Radio Amateurs	8,738	5
Metro DX Club	2,990	3
West Park Radiops	2,923	3
Meriden ARC	2,497	4
Ventura County Amateur Radio Society	2,158	3
Mother Lode DX/Contest Club	1,270	3
Portage County Amateur Radio Service	1,028	4
Central Texas DX and Contest Club	292	3

50 MHz band. Fred, N1DPM, of Feeding Hills, MA took second place with 111,339 points, about 23k points better than his score last year. The third-place position goes to Phil, WA3NUF, of Warminster, PA with 99,591 points, down substantially from his second-place finish last year with 158k points. The fourth-place position goes to Roger, W3SZ, of Reading, PA with 54,834 points, less than half the score he produced last year. Dale, AF1T, of Henniker, NH took the fifth-place position with 51,450 points, down from his 63k point effort in 2008.

With only a few exceptions, the Top Ten Single Operator, High Power category entrants did better than their Low Power counterparts this time around. I guess if you shout louder, you are heard better — particularly when propagation conditions are poor! Leading the Top Ten High Power category this year is Jeff, K1TEO, of Trumbull, CT with a score of 431,100 points, soundly beating his 354k point score from last year. This result is amazing when you consider the extremely poor conditions this year with very few long-range openings. The second-place High Power position goes to Phil, K3TUF, in Ephrata, PA with a score of 232,101 points, down only slightly from his 2008 third-place score. The third-place position goes to Dave, K1RZ, of Damascus, MD with 203,196 points, just slightly higher than his fourth-place finish last year. The fourth spot in the High Power race is awarded to Ed, K3DNE, of Westminster, MD with 126,960 points, up from his seventh place position last year. Fifth place is awarded to Mike, WB2RVX, of Voorhees, NJ with 97,519 points, up by 10k points from his 2008 score. Ron, WZ1V, of Bristol, CT takes the sixth position with 87,914 points, down substantially from his 119k finish last year.

Limited Multi-operator

Entrants in the Limited Multi-operator (LM) category can only operate on a maximum of four bands. There were a total of 36 band-entries covering the bands 50 through 432 MHz, which represents six fewer entries than last year. The top scoring entry in the LM category for 2009 is Joe, K1JT, of Princeton, NJ with a score of 102,582 points — the head of the pack in this category. Joe's entry in the 2008 competition was in the Single Operator, High Power category. Second place goes to Kim, KB1DFB, of Dayville, CT with 58,168 points, beating his 2008 second-place entry by just over 12,000 points. The third-place finisher is Daniel, W1QK, of Brookfield, CT with 36,600 points. Fourth place goes to Keith, W9RM, of Hampshire, IL with 22,695 points, and the fifth-place winner is

Division Leaders

Single Operator, Low Power

Atlantic	WA3NUF	99,591
Central	K2DRH	159,305
Dakota	NØKP	12,500
Delta	N4QWZ	16,400
Great Lakes	WZ8T	12,994
Hudson	WB2SIH	42,984
Midwest	NØPB	14,630
New England	N1DPM	111,339
Northwestern	KG7P	3,171
Pacific	K1YQP	17,346
Roanoke	K4LY	22,560
Rocky Mountain	WJ7L	2,128
Southeastern	W2BZY	12,420
Southwestern	K6TSK	9,879
West Gulf	W3XO/5	11,186
Canada	VE3SMA	11,501

Single Operator, High Power

Division	CALL	SCORE
Atlantic	K3TUF	232,101
Central	K9EA	31,106
Dakota	WØGHZ	31,760
Delta	K5RUS	882
Great Lakes	K8EB	51,566
Hudson	N2GHR	72,000
Midwest	KØJRD	12,261
New England	K1TEO	354,040
Northwestern	N7EPD	32,340
Pacific	KC6ZWT	20,880
Roanoke	K4QI	59,631
Rocky Mountain	KU7Z	352
Southeastern	WJ9B	22,052
Southwestern	KG6DHQ	2,916
West Gulf	K5LLL	53,064
Canada	VE3ZV	22,848

Single Operator, QRP Portable

Atlantic	N3YMS	21,168
Central	W9SZ	1,850
Dakota	NØHJZ	72
Delta	W4RXR	1,392
Hudson	WB2AMU	663
Midwest	NØKIS	286
New England	N1QLM	135
Roanoke	KJ4BEE	931
Rocky Mountain	N5QO	4
Southwestern	W6BVB	2,340
West Gulf	WK5F	28

Limited Multi-operator

Division	CALL	SCORE
Atlantic	K1JT	102,582
Central	W9RM	22,695
Dakota	WØVB	7,938
Hudson	K2BAR	13,992
Midwest	NØLD	1,242
New England	KB1DFB	58,168
Northwestern	K7HPT	2,295
Rocky Mountain	ACØGI	320
Southeastern	W4NH	19,491
West Gulf	WD5IYF	4,323

Multi-operator

Atlantic	N3NGE	568,764
Central	N2BJ	15,184
Dakota	WØPHD	368
Delta	AG4V	11,115
Great Lakes	KB8O	12,712
Hudson	N2GCZ	7,548
New England	KE1LI	43,890
Northwestern	K7ND	26,432
Pacific	K6LRG	20,148
Roanoke	W4YCC	1,700
West Gulf	K5QE	238,290
Canada	VA3WLD	5,412

Rover

Atlantic	K1DS	136,136
Central	KB9C	28,826
Dakota	KCØIYT	7,946
Great Lakes	NE8I	7,750
Midwest	WRØI	5,797
Northwestern	K7MDL	1,134
Pacific	N6NB	395,624
Roanoke	W8ZN	53,739
Southeastern	K4RSV	120
Southwestern	N6TEB	84,750
West Gulf	N5AC	88,752
Canada	VE3OIL	21,900

Limited Rover

Atlantic	KC2QZF	7,805
Central	WB9TFH	100
New England	K1LYV	100
Pacific	KI6UZV	113,544
Roanoke	K4GUN	14,711
Rocky Mountain	KK6MC	2,938
Southeastern	KO4MA	13,776
Southwestern	N6ZE	2,112
Canada	VE3RKS	432

Unlimited Rover

Central	K9JK/R	10,304
Pacific	W6YLZ	395,760
Southwestern	KI6USR	2,967
West Gulf	AE5BN	129,008

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

N1DPM	111,339	A
WA3NUF	99,591	A
W3SZ	54,834	A
AF1T	51,450	A
WB2SIH	42,984	A
K1TEO	354,040	B
K3TUF	232,101	B
K1RZ	200,976	B
K3DNE	126,960	B
WB2RVX	97,519	B
N3YMS	21,168	Q
W3RGA	6,965	Q
WB2AMU	663	Q
K6ALF	495	Q
K3EGE	408	Q
K1JT	102,582	L
KB1DFB	58,168	L
W1QK	25,071	L
N8RA	17,836	L
W3HZU	17,520	L
N3NGE	568,764	M
KE1LI	43,890	M
N2GCZ	7,548	M
WB3IGR	6,120	M
W2WHS	1,023	M
K1DS/R	136,136	R
N3IQ/R	125,658	R
K2QO/R	71,910	R
K2TER/R	39,934	R
NN3Q/R	22,792	R
KC2QZF/R	7,805	RL
NE3I/R	5,112	RL

Southeast Region
(Delta, Roanoke and Southeastern Divisions)

K4LY	22,560	A
N4QWZ	16,400	A
W2BZY	12,420	A
N4TUT	7,308	A
K4ZOO	6,480	A
K4QI	59,631	B
KE2N	43,990	B
W3IP	26,290	B
WJ9B	22,052	B
KØVXM	17,982	B
W4RXR	1,392	Q
KJ4BEE	931	Q
W4NH	19,491	L
AG4V	11,115	M
N4JQQ	2,139	M
W4YCC	1,700	M
KØXXX	527	M
W8ZN	53,739	R
K4RSV	120	R
K4GUN/R	14,711	RL
KO4MA	13,776	RL
N2CEI/R	1,024	RL

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

K2DRH	159,305	A
KC9BQA	35,236	A
WO9S	21,225	A
K9MU	20,080	A
WA9FIH	13,750	A
K8EB	51,566	B
K8MD	32,421	B
K9EA	31,106	B
W9GA	28,747	B
VE3ZV	22,848	B
W9SZ	1,850	Q
K9PLS	108	Q
W9RM	22,695	L
W9VW	4,224	L
N9TF	1,978	L
NT9E	1,530	L
KC9JTL	1,060	L
N2BJ	15,184	M
KB8O	12,712	M
N9UHF	9,855	M
W8RU	7,524	M
VA3WLD	5,412	M
KB9C	28,826	R
VE3OIL/R	21,900	R
NE8I	7,750	R
NZ9I	1,683	R
KC9AXZ	261	R
VE3RKS/R	432	RL
K9JK/R	10,304	RU

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

NØPB	14,630	A
NØKP	12,500	A
W3XO/5	11,186	A
KØSIX	9,516	A
WB5ZDP	9,471	A
K5LLL	53,064	B
W5LUA	46,240	B
WØGHZ	31,760	B
WØZQ	28,938	B
KØJRD	12,261	B
NØKIS	286	Q
NØJK	100	Q
NØHJZ	72	Q
WK5F	28	Q
N5QO	4	Q
WØVB	7,938	L
WD5IYF	4,323	L
NØLD	1,242	L
ACØGI	320	L
K5QE	238,290	M
KBØHH	46,350	M
WØPHD	368	M
KC5MVZ	44	M
N5AC/R	88,752	R
AE5P/R	83,850	R
WDØACD/R	76,196	R
NH6VJ/R	57,528	R
KE5CLQ	52,059	R
KK6MC/R	2,938	RL
AE5BN/R	129,008	RU

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

K1YQP	17,346	A
K6TSK	9,879	A
W6OMF	9,284	A
K6XN	4,032	A
KG7P	3,171	A
N7EPD	32,340	B
KC6ZWT	20,880	B
W7GLF	12,600	B
NU6S	12,496	B
K7CW	9,163	B
W6BVB	2,340	Q
K7HPT	2,295	L
K7ND	26,432	M
K6LRG	20,148	M
W6YX	6,765	M
VE6AO	1,495	M
N6NB/R	395,624	R
AF6O/R	384,223	R
W6XD/R	355,160	R
KK6KK/R	353,304	R
N6TEB/R	84,750	R
KI6UVZ/R	113.544	RL
N6ORB/R	10,336	RL
K6JRA	2,574	RL
N6ZE/R	2112	RL
AAØBV	420	RL
W6YLZ/R	395,760	RU
W6TE/R	227,850	RU
KI6USR/R	2,967	RU

W4NH, the Fourlanders Contest Team from Alpharetta, GA with 19,491 points.

Chester, N8RA, of New Hartford, CT turned in a sixth-place total of 17,836 points, followed closely by W3HZU, the Keystone VHF Club of York, PA with 17,520 points in seventh place. The final Limited Multi-operator Top Ten entries include K2BAR, the Bergen ARA of Washington Township, NJ; WY3P, the Carroll County Contesters from Sykesville, MD, and Kenneth, KA2LIM, of Bee Valley, NY with 10,890 points, down from his 37k point entry in 2008.

Multi-operator

In the Multi-operator category, participants can operate on any number of bands. There are a total of 53 entries in this category for 2009, up from 27 entries in 2008. The top scoring entry for 2009 is Leonard, N3NGE, operating in Morgantown, PA with a total score of 568,764 points, up slightly from his 2008 score of 545k points. Second place in this category goes to the station of Marshall, K5QE of Hemphill, TX with 238,290 points, down by nearly a factor of two from his 2008 performance. Third place in the Multi-operator category goes to Gary, KBØHH, of Anthony, TX with 46,350 points, up substantially from 2008. The fourth-place Multi-operator entry goes to Paul, KE1LI, of Pomfret Center, CT with 43,890 points. The fifth spot goes to James, K7ND, of Fox Island, WA with 26,432 points.

Expanded Reports Available

Read more details about the contest at **www.arrl.org/contests**, including Soapbox stories and all of the scores as both line scores and in a searchable database. If you'd like a printout of the line scores, send a self-addressed, stamped envelope to ARRL Contest Results, 225 Main St, Newington, CT 06111. Please be sure to include the contest name and year.

QRP Portable

The only 2008 competitor who entered QRP Portable once again in 2009 is Bill, K3EGE, from Elverson, PA. Bill ended up in ninth position this year, down from his fourth position finish in 2008. The top position in the QRP Portable competition goes to Nicholas, N3YMS, of Felton, DE with 21,161 points. His score is substantially higher than all of the other Top Ten competitors in this category. The second place finisher is Patrick, W3RGA, of Snydertown, PA with 6965 points. Third place goes to Vladimir, W6BVB, of Laguna Hills, CA with 2340 points, followed by Zack, W9SZ, of Urbana, IL with 1850 points in the number four spot. Tom, W4RXR, of Pulaski, TN finished in the fifth spot with 1392 points.

Rover

In the Rover category, no more than two operators are permitted, but operation on all bands is allowed. There was a very high level of competition at the top of this category, with the top four scores bunched very close together. These scores were significantly higher than those produced in the 2008 event. The leading score was produced by Wayne, N6NB/R of Tustin, CA with 395,624 points, followed by Ron, AF6O/R with 384,223 points, Art, W6XD/R with 355,160 points, and Robert, KK6KK/R with 353,304 points. The W6XD/R score for the 2008 VHF SS competition was 185,790 points, which indicates the improved level of performance this group has been able to achieve. The fifth-place score was turned in by Richard, K1DS/R of Blue Bell, PA with136,136 points, followed by N3IQ/R, the Rovers of Maryland club in the sixth position with 125,658 points.

In the Limited Rover category, operators may use their choice of no more than four bands. The leading score in this category was produced by Carrie, KI6UZV/R, of Joshua Tree, CA with 113,544 points, which is substantially higher than the top score in the 2008 event in this category by almost a factor of four! Second place is awarded to Steve, K4GUN/R, of Spotsylvania, VA with 14,711 points, up significantly from his 2008 score of 7335 points. Fourth place is awarded to David, N6ORB, of Martinez, CA with a score of 10,336 points, followed

by Steven, KC2QZF/R, from Clarence Center, NY in the number five position with 7805 points, up substantially from his 1558 point score in 2008. Robert, NE3I/R, of Collegeville, PA claimed the sixth position with 5112 points.

The final category is Unlimited Rover, which permits more than two operators. In this year's event, there were five Unlimited Rover entries, up from only one entry in this category in 2008. The top score was submitted by Michael, W6YLZ, of Winnetka, CA, with 395,760 points. Second place goes to David, W6TE/R, of Fresno, CA, followed by William, AE5BN/R, from Lufkin, TX; John, K9JK/R, in Palatine, IL, and the LB Contesters (Club) of Pasadena, CA, KI6USR.

Affiliated Club Competition

This year's ARRL Affiliated Club competition results indicate an increase of one additional club entry in the Medium Club category over that posted in 2008, and a drop of six in the Local Club category. The Unlimited Club category had only one entry for the past several years, and that is the largest of the VHF/UHF clubs; the Mt Airy VHF Radio Club based in the Philadelphia area. The Mt Airy Club fielded 60 entries for 2009, down three member entries from 2008, and a total Club score of 1,823,418 points, averaging 30,390 points per member entry.

The Medium Club competition for 2009 includes 17 clubs, up one from 2008. The North East Weak Signal Group (NEWS Group) posted the top score with 21 entries and a total Club score of 812,400 points, averaging 38,686 points per member entry. This club continues to lead the category with a large group of enthusiastic members. Third place was taken by the Northern California Contest Club with 272,245 points from 11 members. Other leaders in the Medium Club group include Badger Contesters, Society of Midwest Contesters, North Texas Microwave Society and the Rochester VHF Group in positions four through seven.

The Local Club category fielded 14 entries two of which posted outstanding scores. Last year, the total was 20 entries. The leading Local Club for 2009 is the Nacogdoches ARC (Texas) with a score of 563,125 points from seven entries, resulting in a per-member average of 80,449 points! This is a huge effort for a small club, and the Nacogdoches ARC should be congratulated for this very successful result. The second-place position is awarded to the Eastern Connecticut ARA with a total score of 107,240 points from four members, also representing an outstanding effort. Other high scoring Local Club entries include the Murgas ARC with 78,598 points, the Florida Weak Signal Society with 78,415 points and the Chippewa Valley VHF Contesters with 29,202 points.

An Invitation To HFers

The bottom of the present solar cycle seems to be going on forever, even though we all realize that eventually the sunspots will once again bring back improving HF conditions. This is a very good time to become acquainted with VHF+ contesting and operating in general. QST

2009 ARRL RTTY Roundup

"To attract good fortune, spend a new coin on an old friend, share an old pleasure with a new friend, and lift up the heart of a true friend by writing his name on the wings of a dragon." — *Chinese Proverb*

Jay Townsend, WS7I
ws7i@arrl.net

Logs Surge Again

Another participation surge wasn't expected this year! Last year, RTTY Roundup was voted "Best in Class" on its anniversary and 1246 logs were submitted, but this year the ARRL had something new up their sleeve. Frank, N2FF, broke the news on the RTTY Reflector on December 3: There would be a new Worked All States award starting on January 1 and it would be called the Triple Play.

Coupled with some excellent club activity, the result was yet another record-breaking turnout. A total of 1555 logs were received for processing, leading to one new World record, 20 new Division records, 55 new Section records and new QSO total number records in three of the four categories of competition!

Special Performances

Perhaps the longest running win record in the history of Radio-Sport has now come to an end.

Having shared the operating position with a number of high-level RTTY operators over the years, it is always both sad and a joy to see a record fall. For 14 straight years, Don Hill, AA5AU, won First Place World Single-Op Low-Power as well as First Place US/VE. This year the weather finally got to Don, although he made a supreme effort to get his station back together after losing his towers (again) to the latest hurricane.

American and Canadian Highlights

Single-Op Low-Power (SOLP)

We knew it was going to be close as the 3830 High Claimed Scores had Chad, WE9V, trailing AA5AU by only 156 QSOs but Chad was ahead by 10 multipliers. When the smoke cleared Chad had nipped Don with a 1100-point victory, setting a new Central Division Record and winning the NM7M Memorial Plaque. Don, AA5AU, secured the Delta Division crown. Steve, N9CK, placed third in the Top Ten.

Sponsored Plaque Winners

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

Category	*Winner*	*Sponsor*
Overall Winners		
W/VE Single Operator High Power - W7RM Award	W1UE	EWARG
W/VE Single Operator Low Power - NM7M Memorial	WE9V	Jim Reisert, AD1C
W/VE Multi-operator High Power	N6DE	John Lockhart, WØDC
DX Single Operator High Power	P49X (WØYK, op)	Gary Belcher, KH6GMP
DX Single Operator Low Power	HI3TEJ	Bob Wruble, W7GG (SK)
DX Multi-operator High Power	S53M	Larry L. Lindblom,WØETC — Memorial by the Tennessee Contest Group
Japan Single Operator High Power	JA6ZPR	Troy Amateur Radio Association N2TY
Japan Single Operator Low Power	JA1OVD	Bill Eddy, NY2U and Karen Smith KS2O; Richard S. Carter WA2COI Memorial
W/VE Division Winners		
Atlantic Division Single Operator Low Power	N2WK	Orleans County Amateur Radio Club
Central Division Single Operator High Power	AI9T	Don Hill, AA5AU
Dakota Division Single Operator Low Power	NØAT	W2JGR Memorial by Don Hill, AA5AU
Delta Division Single Operator High Power	KI5XP	Roland Guidry, NA5Q
Delta Division Single Operator Low Power	AA5AU	Frank Fallon, N2FF
Great Lakes Division Single Operator High Power	AB8K	Southwest Ohio DX Association
Hudson Division Single Operator Low Power	N2FF	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	W1ECT	CTRI Contest Group
New England Division Multi-operator High Power	K1TTY	Cuzco Contest Club, WK1Q
Northwestern Division Single Operator High Score	W7RY	Pat Shinners, W7GTO
Pacific Division Single Operator High Power	WK6I	Northern California Contest Club
Pacific Division Single Operator Low Power	K7GQ	Doug Faunt, N6TQS
Roanoke Division Single Operator High Power	K4GMH	Mike Sims, K4GMH

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

Single-Op High-Power (SOHP)

Four out of the five all-time QSO totals were set this year in High-Power. Charlie, KI5XP, had 2211; Dennis, W1UE, at W1KM had 2164; Mike, K4GMH, 2026; and Ty, K3MM, had 2018. Dennis, W1UE, operating at W1KM again, wins the W7RM Memorial plaque. Charlie held off Ty, K3MM, who placed third overall in High-Power. Placing fourth this year was Mike, K4GMH.

Multi-Single Low-Power (MOLP)

Earl, N5ZM, and his operating buddy Glenn, N5RN, clinched their fourth victory in a row again, setting both a new US/VE record and Delta Division Low-Power record. Taking the Midwest Division was Toni, NØNI, who once again placed second overall in Multi-Single Low-Power, setting a new total-QSO record, yet still a bit off the pace with multipliers. Third overall went to KB9AX who also came in third as well in the all-time QSO numbers while winning the Central Division plaque.

Multi-Single High-Power (MSHP)

Operating from the K6IDX station, Dean, N6DE, set several records by winning the Pacific Division with a record as well as setting an all-time High-Power QSO record of 1729. Mike, K5NZ's group, was down quite a bit from last year's run, but still managed to be second from Texas. W4QG was next from Northern Florida setting a new Southeastern Division record.

DX Overview and Continental Highlights

Leading the DX community and the entire contest again this year is Ed, P49X (WØYK). Ed told us last year that he thought that the 3000 QSO barrier was close. With the increase in participating stations this year he set the new all-time and all-category record

of 3166 QSOs. Ed also set the new World Single-Operator High-Power record as well as South American record of 387,004 — just short of 400,000 points.

Africa

With a new African continental record and second place overall Single-Operator Low-Power was 5C5W, operated by Mohamed, CN8KD. In ninth place overall and setting a new Canary Island record was Heijo, EA8OM. There was also a new Senegal record made by 6W7RV. Turning to the Single-Operator High-Power category, we have Barry, ZS2EZ, getting the win and a new Senegal record set by Peter, 6W2SC.

Asia

Leading the Asian continent was JA1OVD in the Single-Operator Low-Power category. Setting a new India record was Nandu, VU2NKS. From Cyprus, Steve, ZC4LI, won the Single-Operator High-Power Asian trophy. JA1XRH was the Multi-Single Asian victor in Low-Power. Prasad, VU2PTT, from Bangalore set a new record for India. Setting a new Japanese record and seventh overall was JA6ZPR in the Multi-Single High-Power group.

Europe

In the Single-Operator Low-Power category it was Vlad, UA3PAB, taking the European honors and placing fifth overall. Northern Ireland station 2IØSAI was sixth overall while setting a new country record. YT2U placed seventh overall, while UT5EPP out of the Ukraine was eighth in overall. Europe Single-Operator High-Power was won as well as second place in High-Power overall by Nikola, 9A5W. Capturing overall third place was IQ2CJ with IK2NCL operating. Winning the continent of Europe in the Multi-Single Low-Power category was UZ4E. IZ1OMY was third overall while IW1QN was in fourth place.

Nine out of Top Ten for Europe

Utilizing their spotting skills to the maximum, S53M set a new fifth place in multipliers all-time as well as a new fourth-place all-time QSO total in the Multi-Single High-Power category. Daniel, OL6X, was in second place with a new Czech Republic record. EI6HB is now all-time fifth place in MSHP QSO totals while setting a new Ireland record and taking third place overall.

North America

HI3TEJ was first overall in Single-Operator Low-Power, setting a new QSO record in this category as well as a new Continental and Dominican Republic record, placing #5 overall for 2009. Setting a new Grenada record, J39BS was fourth overall in Single-Operator Low-Power. Manny, NP2KW, in a part time operation, set a new US Virgin Island Single-Operator Low-Power record.

Grabbing the Single-Operator High-Power category was 4A1DXXE operated by XE2K. Hector took tenth place overall and also set the new record for Mexico. The crew from KP2D won the Multi-Single Low-Power category once again and notched a fifth all-time QSO total record for the category. Placing sixth overall was XE1ZVO.

Oceania

It was a pretty light turn out from Oceania this year. From Down Under it was VK5NPT winning the Single-Op Low-Power category. This helped a lot to provide the Australian country multiplier. KH6MB had a nice showing and won Single-Operator High-Power. Setting a New Zealand record and capturing his category was John, ZL1BYZ, who along with his packet won the Multi-Single High-Power category and made many stations happy.

South America

Winning the South American trophy and third place overall in Single-Op Low-Power was ZX2B with Wanderly, PY2MNL, at the keyboard. Out of Aruba, P49X set a new Aruba record to go with Ed's other accomplishments this year. Fourth overall, winner Ramon, PZ5RA, set a new Suriname Single-Operator High-Power record.

LU3DY took the Multi-Single Low-Power category this year and got the trophy. The other station of note was PY2IQ, grabbing a new Brazil record. Returning home this year after activating Suriname last year the 4M5DX group won the trophy for Multi-Single High-Power while setting a new Venezuela record.

Club Competition

This year saw the NCCC enter (and win) in a category that heretofore had not been entered in the RTTY Roundup — Unlimited Club. The Potomac Valley Radio Club (PVRC) captured the Medium Club competition again this year in a tight race with the Society of Midwest Contesters (SMC). And in the Local Club category it was the Orleans County ARC beating out the Eastern Washington ARG.

Next Year

Conditions will hopefully be a little bit better next year and 15 meter openings should give contesters some breathing room on 20 meters. Decent solar conditions will help by bringing more operators to the RTTY Roundup, and build on its increasing popularity. Start the new decade with a win! Next up in the record department is the 400,000 point mark — will it be yours? Whatever route you choose, be ready for the 2010 running of the ARRL RTTY Roundup, January 2-3. QST

Single Operator

W/VE—Low Power	
WE9V	189,582
AA5AU	188,475
N9CK	151,737
N2WK	141,449
NØAT	141,174
N2QT	140,708
KA4RRU	133,812
AB4GG	120,510
KB7Q	116,932
KØTI	115,346
W/VE—High Power	
W1UE	272,640
KI5XP	266,936
K3MM	249,500
K4GMH	241,879
W5AP	197,106
WK6I	194,236
K6LL	182,832
AI9T	182,546
KK5OQ	178,869
K1FWE	176,670
DX—Low Power	
HI3TEJ	183,885
5C5W (CN8KD , op)	146,133
ZX2B (PY2MNL, op)	134,512
J39BS	79,734
UA3PAB	68,222
2IØSAI	60,135
YT2U	59,565
UT5EPP	56,364
EA8OM	55,640
EU8RZ	55,556
DX—High Power	
P49X (WØYK, op)	387,004
9A5W	174,510
IQ2CJ (IK2NCJ , op)	138,156
PZ5RA	132,135
IZ4JMA	114,342
YO9HP	112,887
US5IQ	110,670
YTØA (S56A, op)	110,670
LTØH (LU3HY, op)	104,562
4A1DXXE (XE2K , op)	91,680

Multi-operator

W/VE—Low Power	
N5ZM	151,646
NØNI	140,392
KB9AX	120,848
WD4LBR	93,436
VE1OP	87,045
N3KAE	84,102
KE7AJ	83,629
N9LAH	72,960
K8ZZ	69,615
WØRAA	64,616
W/VE—High Power	
N6DE	192,416
K5NZ	175,150
W4QG	169,533
WØSD	167,860
ABØRX	166,896
K1TTY	162,540
W4RM	153,352
W6YX	148,698
W7ZR	145,024
K7BTW	140,344
DX—Low Power	
KP2D	93,240
UZ4E	54,984
IZ1OMY	41,952
IW1QN	40,421
LZ9R	39,399
XE1ZVO	25,364
RZ4HZW	23,375
SN5I	22,852
DLØBI	20,444
SP9CTS	13,950
DX—High Power	
S53M	160,398
OL6X	144,584
EI6HB	140,798
IW9HIK	115,992
LZ2BE	106,590
LY1R	91,326
JA6ZPR	88,920
UZ2I	73,980
SN3C	69,580
EU1AZ	67,320

Club Competition

Club	*Score*	*Logs*
Unlimited Club		
Northern California Contest Club	3,307,797	86
Medium Club		
Potomac Valley Radio Club	1,778,086	37
Society of Midwest Contesters	1,762,408	44
Yankee Clipper Contest Club	1,631,104	32
Minnesota Wireless Assn	1,058,281	35
Florida Contest Group	965,343	16
Contest Club Ontario	839,570	21
Tennessee Contest Group	788,856	20
Frankford Radio Club	550,160	12
Grand Mesa Contesters of Colorado	472,695	12
Alabama Contest Group	441,499	8
BC DX Club	415,830	9
Central Texas DX and Contest Club	390,715	6
Maritime Contest Club	380,018	6
Louisiana Contest Club	366,607	3
Dominion DX Group	358,192	8
Southern California Contest Club	324,624	11
CTRI Contest Group	289,683	7
Low Country Contest Club	226,012	6
Western Washington DX Club	197,867	7
Mad River Radio Club	186,503	8
South East Contest Club	177,766	9
Contest Club Du Quebec	160,039	7
Willamette Valley DX Club	109,097	4
Kentucky Contest Group	106,530	5
Oklahoma DX Assn	71,006	3
Hudson Valley Contesters and DXers	43,830	3
Local Club		
Orleans County Amateur Radio Club	294,392	4
Eastern Washington ARG	243,066	4
Central Arizona DX Assn	206,583	4
Boeing Employees ARS - St Louis	182,301	4
Iowa DX and Contest Club	169,153	3
Rochester (NY) DX Assn	132,486	5
Midland ARC	120,247	4
Spokane DX Association	113,665	3
Bergen ARA	54,956	4
Nanaimo Amateur Radio Association	35,297	3
Dauberville DX Assn	12,932	3

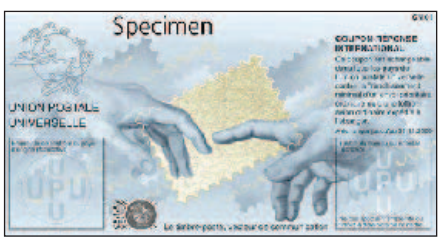
W3UR

HOW'S DX?

International Reply Coupons

Most DXers are familiar with the International Reply Coupon (**www.g3swh.org.uk/irc.html**), more commonly known as the IRC. The IRC was first introduced on October 1, 1907. Its purpose in Amateur Radio, but even more so for DXers, is as an international system of postage. The Universal Postal Union (UPU) designs, prints and distributes the IRCs to the UPU member nations (**www.upu.int/members/en/members.html**).

A DXer in one country could theoretically send one IRC from his country to a DXer in another country. The receiving station can then take the IRC to his post office and exchange it for postage for "the minimum postage for an ordinary priority letter-post item or an ordinary airmail letter sent abroad for the reply." In most countries one IRC is sufficient for the minimal size envelope back to the sender. There are some countries that require more, even though this conflicts with the UPU. Bill, W9OL, and James, N6DHZ, have Web pages (**www.qsl.net/w9ol/IRC_Chart.htm** and **www.n6dhz.com/irc-chart.html**) that are good references for how many IRCs or green stamps ($) to send overseas.



The Beijing model No. 2 International Reply Coupon with the Michelangelo two fingers about to touch, framed in a postage stamp becomes invalid December 31, 2009.

The new Nairobi model IRC that is expected to go on sale on July 1, 2009.

Over the years the IRC has been modified or updated and, yes, even gone up in price. The current IRC is called the "Beijing model No. 2" International Reply Coupons, with the Michelangelo "two fingers about to touch, framed in a postage stamp." This IRC costs $2.10 in the United States and has been available for purchase since the July-August 2006 time frame. These IRCs are valid through December 31, 2009 and will no longer be available after August 31, 2009. In other words, they must be turned in to the post office by the end of this year; otherwise they will be worthless.

DXers who have these current IRCs should get rid of them by September, so the receiving stations can redeem them for proper postage, as they must be submitted by December 31, 2009. QSL managers should not try to put them back into the DX market at this point. They should be turning them in to their post offices for proper postage. Everyone has been fairly warned about this Ponzi scheme (I mentioned it previously in April's column) and it is time for everyone to clear their current stock of IRCs.

A new IRC design was displayed in Geneva on August 8, 2008 at the plenary meeting of the 24th Universal Postal Congress. The new Nairobi model was created by Luxembourg's Rob Van Goorand, a graphic artist. The new IRCs are expected to go on sale on July 1, 2009, and are expected to be valid until December 31, 2013.

CYCLE 24

I received the following e-mail from Robert Welsh, N3RW:

> As one who thoroughly enjoys your *QST* column 'How's DX?,' I thought your readers may find this information interesting regarding the next sunspot cycle:
>
> Of the various technical journals I receive as an assistant professor of physics and astronomy, the latest edition of *Space Weather Quarterly*, published by the American Geophysical Union, arrived yesterday. In it is an article by S. Watari of the Nat'l Institute of Information & Communications Technology, Tokyo. Watari's article is titled, "Forecasting Solar Cycle 24 using the relationship between cycle length and maximum sunspot number."[1]
>
> I'll quote the passages that are pertinent to us DXers:
>
> 1. The parameters characterizing the solar cycle are its length and maximum sunspot number. There is a good negative correlation between length of the solar cycle and the maximum monthly sunspot number of the next cycle (corr coefficient = − 0.661; where a corr. coefficient of 1.0 = implies perfect correlation). This suggests that the length is an important parameter in determining the variations of solar activity. Using this relationship, I forecast lower solar activity in cycle 24 than in cycle 23.
>
> 2. Summary: The results of this study indicate that the maximum sunspot number for Cycle 24 would be about 101, the next solar maximum would occur around July 2012, and the length of the cycle would be about 11 years. The length of cycle 23 seems to be longer than the average cycle length. According to our forecast, the maximum SSN of cycle 24 is less than that of cycle 23's mean of 120.8.
>
> 3. Watari lists the forecasts of solar max for cycle 24 as follows; from the Solar Cycle 24 Panel of scientists:

Time of Maximum	*Maximum SSN*	*Maximum 10.7 cm Solar Flux*
October 2011	140 ± 20	187
August 2012	90 ± 10	141

DX NEWS FROM AROUND THE GLOBE

3D2 — FIJI ISLANDS

JA1NLX is going to Mana Island (OC-121), Fiji Islands where he will be QRV as 3D2YA from June 29 to July 3. He will be on 3.5 through 28 MHz using CW and RTTY. A Web page has been set up at **www.**

[1]S. Watari, "Forecasting Solar Cycle 24 using the relationship between cycle length and maximum sunspot number," *Space Weather*, 6, S12003, doi:10.1029/2008SW000397. (2008)

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

ne.jp/asahi/ja1nlx/ham/3D2_Main_2009.html. QSL via JA1NLX, including LoTW.

3DAØ — SWAZILAND

David Hutchinson, GI4FUM, aka EI4DJ and 3DAØDJ, plans an expedition for August with the 3DAØSS call sign. He will be on from the international scout camp at Hawane Resort near Manzini, operating July 31-August 11. The site is "scrubland on a hillside." David thinks there will be plenty of wooden poles available for supporting wire antennas and building "scout pioneering type towers."

5R — MADAGASCAR

World traveler Wayne, W5KDJ, is heading next to Madagascar. He'll be QRV as 5R8KD from July 1 to 15, plus or minus a day or two. Wayne will be operating on 1.8 through 50 MHz using CW and RTTY. QSL via W5KDJ, including LoTW and eQSL.

8R — GUYANA

Last month I mentioned the rumor of a four man American team heading to Guyana

for a 6 meter DXpedition. Dave, N3DB, a serious 6 meter man, says things are solid enough to announce his planned Guyana operation for June 16-July 6. He has made his airline reservations and 8R1WD is working on it hard from his end. Dave is hoping for the 8R6SM call sign but he has no idea what the government there will assign. He's thinking 8R1DB or 8R1BP might be possibilities too.

There will be two teams, W3CMP and N3DB June 16-27, then K4RX, and AC4TO, June 27-July 6. Operations on 50.120 or 50.104 MHz are early possibilities as to their preferred frequency. It will depend on local conditions and other signals on the band. Six meters will be the emphasis, thus the choice of dates, during the good 6 meter propagation season. There will be HF operating as well, but never during 6 meter openings or times when those are possible, which probably means HF operations will mostly be at nighttime. K4RX and N3DB may try 160 meters a few times. They will have a 6 meter beacon during their off times.

Dave is completing work on the amplifier, a Heathkit SB-200 converted to 3CPX800. Rigs will likely be ICOM IC-7000 and IC-706MKIIG transceivers for team one and an IC-7000 and Elecraft K3 transceiver with preamp for the second team. The operation will be from Georgetown, grid GJ06, with Internet access. They will concentrate heavily on working out to northern Europe, 5B/4X and farther east and the west coast of North America — W6/7 and VE7. Dave says, "Obviously others as well but those are our particular objectives as they need it [8R] most." This is the first 6 meter expedition to 8R since 2000 and, says Dave, should have the best antenna and power yet. The team's Web site is located at **www.6meterbeaconproject.org/8r2009.html**. N3DB will handle the QSL chores for this DXpedition.

C6 — BAHAMAS

C6APR will be in the RSGB IOTA contest from Crooked Island (NA-113), Bahamas. This will be a multioperator, mixed mode, high power, DXpedition entry with operators W2GJ, K3IXD, W3PP and K4QO. They will be on the island from July 23 to 27. Before and after the contest they will be on as C6APR on 3.5 through 28 MHz using CW and SSB. C6AXD will be only on RTTY and C6AQO will be QRV on 6 meters (grid FL22). All of their calls will be good for Bird Rock Lighthouse (BAH-005) as well as IOTA NA-113 and grid locator FL22tt. All QSLs go via K3IXD.

FP — ST PIERRE AND MIQUELON ISLANDS

K9OT and KB9LIE, Paul and Peg, will be on Miquelon Island, FP, July 10-18. They will sign FP/K9OT and FP/KB9LIE and participate in the IARU HF World Championship Contest. They will be on 160-6 meter CW and SSB, with K9OT preferring 30 meter CW and lower and KB9LIE liking 40, 20 and 17 meter SSB. They will be in room five at the Motel de Miquelon, formerly called the Maxotel. QSL direct with return postage, via the bureau or LoTW. No eQSL. **http://hamradio.pnpfarms.com**.

GD — ISLE OF MAN

Stewart, GM4AFF, is heading to the Isle of Man where he will be QRV as GDØF in the RSGB IOTA Contest on July 25 and 26. He'll be single op all band SSB 24 hours, an island entry. QSL via MØCMK.

IW4BLZ HEADING NORTH

Operator Maurizio, OY/IW4BLZ, will be on the Faroe Islands July 27-29 and Iceland with the call sign TF/IW4BLZ July 31-August 11. Maurizio will operate on 80-6 meters. QSL to his home call, direct or bureau.

JW — SVALBARD

Robert, LA9QNA, will be in Longyearbyen, Svalbard and QRV as JW9QNA from July 17 to 22. He'll be on 20 meter RTTY and participating in the CQ WW VHF Contest from the JW5E station. QSL via LA9QNA.

KL7 — ALASKA

The Russian Robinson Club plans to have Ogliuga Island (NA-233), Alaska, on the air between July 23 and August 5, with the KL7RRC call sign. N3QQ, RA3NAN, RU4SU and UA9OBA plan to be on 160-6 meters and the IOTA contest July 25-26. They have a Web page at **www.na-234.com/contact_chuginadak_expedition.html**.

TWITTER

Twitter is a social networking and microblogging service (**http://en.wikipedia.org/wiki/Twitter** and **http://twitter.com**) that DXpeditions and other DXers are now using. Some of the more interesting DX related ones are: DX_World, NCDXF, DAILYDX and dxmon just to name a few. Recent DXpeditions like K5D, 4U1UN and VK9LA have all been on Twitter.

WØDXCC UPDATE

Here is an update to last month's article of the 2009 WØDXCC and Contest Central meeting, which will be held in Rochester, Minnesota on Saturday, July 18. Scheduled to speak are:

John Devoldere, ON4UN, on low band DXing
Dean Straw, N6BV, on HF antennas
Carl Luetzelschwab, K9LA, on sunspots and propagation
Rob Sherwood, NCØB, on HF receivers
Ward Silver, NØAX, on contesting

A DX banquet with speeches given by Desecheo Island DXpedition members Glenn Johnson, WØGJ, and Ralph Fedor, KØIR, with other members also attending.

Complete details can now be found at **www.rahrahrochester.com/events/2009_W0DXCC_and_Contest/index.aspx**.

ZF — CAYMAN ISLANDS

Dave, W9CGI, is heading to the Cayman Islands in late July. He plans to start up at ZF2GC on July 29 through August 10. Dave will be on SSB and PSK running 50 W into a portable antenna. Listen for him on 18 through 28 MHz. QSL via W9CGI.

WRAP UP

That's all for this month. A special thanks to KE3Q, N3DB and W9CGI for helping to make this month's column possible. Don't forget to send your DX news, photos, club newsletters and what-nots to **Bernie@dailydx.com**. Until next month, see you in the pileups! — *Bernie, W3UR*

W3ZZ

THE WORLD ABOVE 50 MHz

Long Distance E_s Propagation on 50 MHz at Solar Cycle Minimum — *Part 1*

Six meter DXers recognize that Joe Craft, CT1HZE/DL8HCZ, has one of the strongest, most consistent signals from Europe into North America, especially the Midwest, Southwest and Western US. From his location near the Atlantic coast of Portugal in IM57nh Joe has become one of the most astute observers of 6 meter propagation in the world. In the next two columns I am extremely pleased to present Joe's observations on long distance (more than single hop) propagation during the Northern Hemisphere summer sporadic E (E_s) season in 2008.

Here, based on extensive data from his own 6 meter E_s operations Joe argues that multiple hop E_s can explain transhemispheric 6 meter contacts in excess of 6000 km and even those of 10,000 km or more. He contends that this can be done without invoking either longer individual hops associated with F2 propagation or partially ductal/chordal propagation such as Summer Solstice Short Path (SSSP) recently described by Han, JE1BMJ.

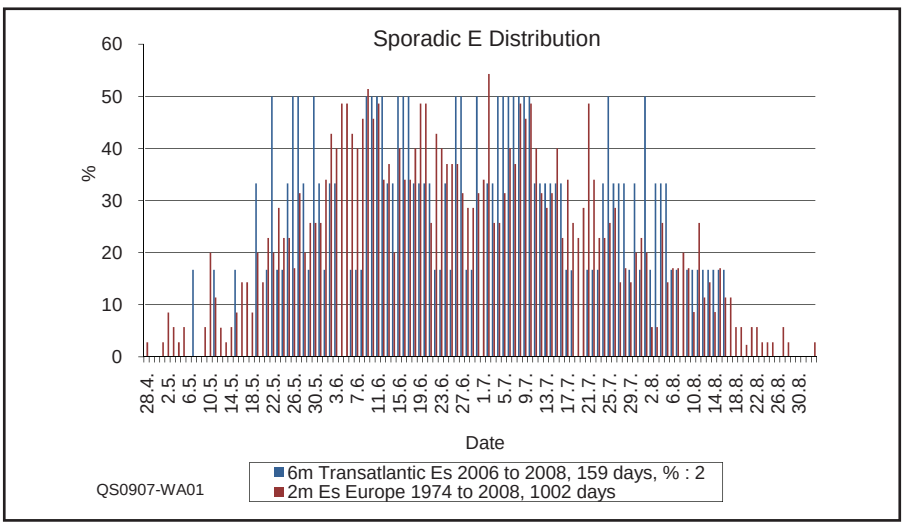


Figure 1 — Distribution of European 2 meter E_s and 6 meter Transatlantic E_s days.

During the past few years many 6 meter DX contacts have covered distances up to 6000 km to over 10,000 km. The vast majority occurred during the summer E_s season, from May to August in the Northern Hemisphere. Although this implies that 6 meter contacts above the typical maximal one hop distance (2300 km), ie, multihop or chordal hop propagation, are also caused by E_s, several radio amateurs have questioned this assumption.

Some suggested that ordinary F2 propagation is the responsible mode; others postulated the existence of another new duct-like mode, which may exist in the middle of the extraordinary long paths approaching 10,000 km. Due to the lack of data it has not been possible so far to study a statistically significant distance distribution of long distance 6 meter contacts (QSOs) that took place in the solar cycle minimum. There are two main reasons for this: This propagation is rare so not many such contacts are usually made, and there are very few geographical regions which allow distance distributions in relation to possible hops to be examined.

Mechanisms of Long Distance Propagation

F2?: Europe-Caribbean contacts would not be very suitable as the assumed touchdown points of the first two hops are in the ocean and thus there is no proof that they actually exist. One could not derive reliable results from the Caribbean islands because they are so geographically scattered that no definite distance distribution could be measured. It is thus no surprise that the opinion that all this propagation is F2 comes from a very well-known Caribbean resident 6 meter DXer.

To him it must appear that he works directly into Europe and the Mediterranean on a single or at most two very long F2-like hops because there are no land bodies and thus no beacons in the middle of the path. F2 maxima on these paths are well-known to peak in autumn and early winter, however, and a high Solar Flux Index is needed to enable 6 meter F2 propagation, at least in the temperate EU and NA areas. Thus, F2 should be excluded as a possible mechanism in this case.

Chordal Ducting (SSSP)?: The other amateurs who postulate an unknown special propagation mechanism are probably inspired by the amazing 6 meter propagation between Japan and Europe, and Japan and NA, which usually occurs around the summer solstice. Han, JE1BMJ, has introduced the name Summer Solstice Short Path (SSSP) propagation to describe these contacts. Despite the similarity between the peak of this propagation in June/July and normal 6 meter and 3 meter/2 meter mid-latitude E_s, the exotic path over arctic regions possibly inspired them to think about unknown propagation modes.

Here we also have the problem that long segments of the observed paths go over uninhabited areas in northern Russia where no 6 meter operators or beacons exist. From the view of a JA operator, not much or nothing is heard from possibly the first three hops, except some indications of Russian 48 MHz TV transmitters, which mostly are also not really on the right path line. This observation provides more than ample reason for the

This Month

July 18-19	CQ World Wide VHF Contest
July 23-25	43rd Central States VHF Society Conference, Elk Grove Village, IL
* July 26	Good EME conditions

*Moon data from W5LUU

Gene Zimmerman, W3ZZ ♦ 33 Brighton Dr, Gaithersburg, MD 20877 ♦ w3zz@arrl.org; (301-948-2594)

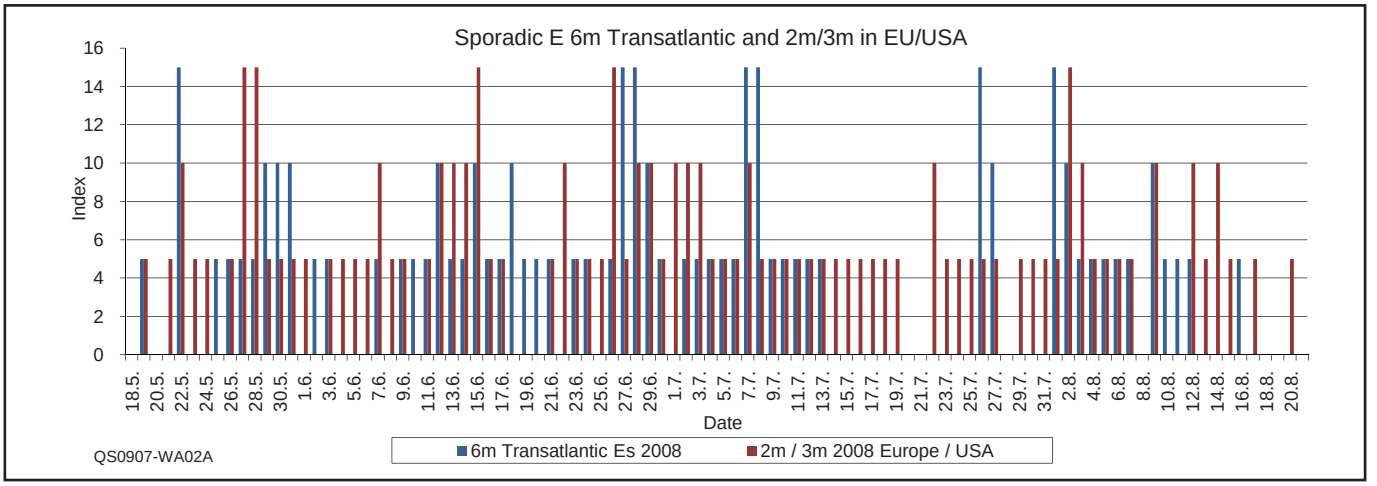


Figure 2 — 6 meter transatlantic E_s and 2 meter/3 meter E_s in NA/EU — a nearly identical season.

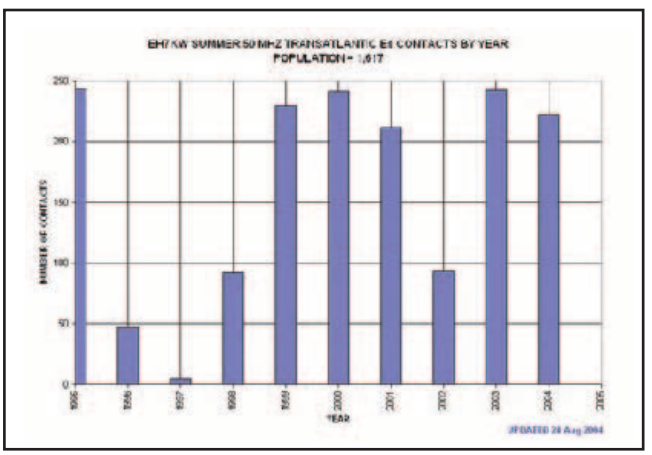


Figure 3 — EA7KW transatlantic 6 meter QSOs 1995 to 2004.

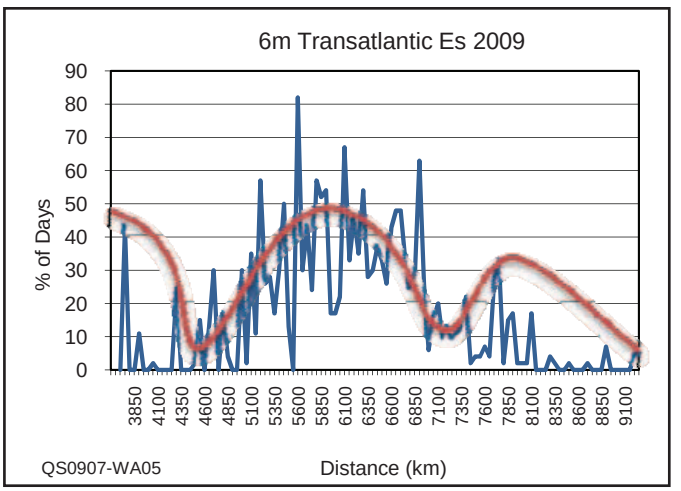


Figure 5 — Distance distribution of the 848 North American 6 meter 2008 "squaredays" from Figure 4. Bold curves indicate the assumed second, third and fourth E_s hop. Note the nice distribution of the third hop with the sharp decay at 7000 km distance.

JAs to consider that something different or special is occurring similar to our operator in the Caribbean. But as we will see in the analysis, while chordal propagation may be occurring it is not an absolute necessity for such long transpolar contacts.

Data and Methods

Let's now look at the data. A comparison between the distribution of the 159, 6 meter transatlantic E_s days from the years 2006-2008 as observed by CT1HZE and the long term distribution of 1002, 2 meter E_s days from central Europe from the last 35 years is shown in Figure 1. Although the 6 meter data are only from 3 years, one can clearly see that the distribution is quite similar to the 2 meter one.

A comparison between the 58 days in 2008 with 6 meter transatlantic propagation (again as observed from CT1HZE) and days with 3 meter (commercial FM) and/or 2 meter E_s propagation (in NA and/or EU) is shown in Figure 2. The days were classified simply with an index of 5, 10 or 15 equivalent to subjective expressions like "decent," "good" and "strong" depending on the length of the openings and number of QSOs worked. One can see that the 6 meter transatlantic season covers the same period as the 2 meter/3 meter summer E_s season.

One of the best locations for transatlantic propagation is definitely the Iberian Peninsula. Well-known DXer José, EA7KW, has observed 6 meter transatlantic propagation on several days every summer for the last 15 years. From 1995 to 2004 he counted 1617 transatlantic E_s contacts (Figure 3). There was a clear minimum in 1997 with about 10 QSOs and the good years brought some 240 QSOs, eg 1995, 2000 and 2003. Although this figure covers "only" 10 years it is remarkable if we compare it with the 35 year long graph of 2 meter mid-latitude E_s published by CT1HZE in *DUBUS* magazine (**www.dubus.org**).[1]

[1]J. Craft, CT1HZE, "Midlatitude Sporadic E on VHF in correlation to the 22 year magnetic cycle of the sun," *DUBUS*, January 2008, pp 9-22 and "Midlatitude Sporadic E in correlation to meteor mass input," *DUBUS*, Apr 2008, pp 188-199.

One can see that 1997 is a long term minimum for 2 meter E_s and 6 meter transatlantic E_s. The better years also show some good agreement, but a more detailed analysis would definitely be necessary. Although a relatively large number of QSOs took place in the summers before 2005 as mentioned above, there are probably insufficient data to show a narrow scaled distance distribution that covers paths into a possible third and fourth hop.

In 2006, 2007 and especially in 2008 the number of QSOs between Portugal and North America far exceeded the numbers in previous years. In 2008 between May 19 and August 16 CT1HZE had more than 1900 QSOs with NA (and a few with SA). On 58 different UTC calendar days 6 meter transatlantic propagation was observed; the band was open for a total about 6386 minutes (>106 hrs).

The band was observed for over 1500 hours and the missed band openings are assumed to be only about 3 to 4 hours (based on cluster data and information from other EA and CT stations). On 46 of the 58 of

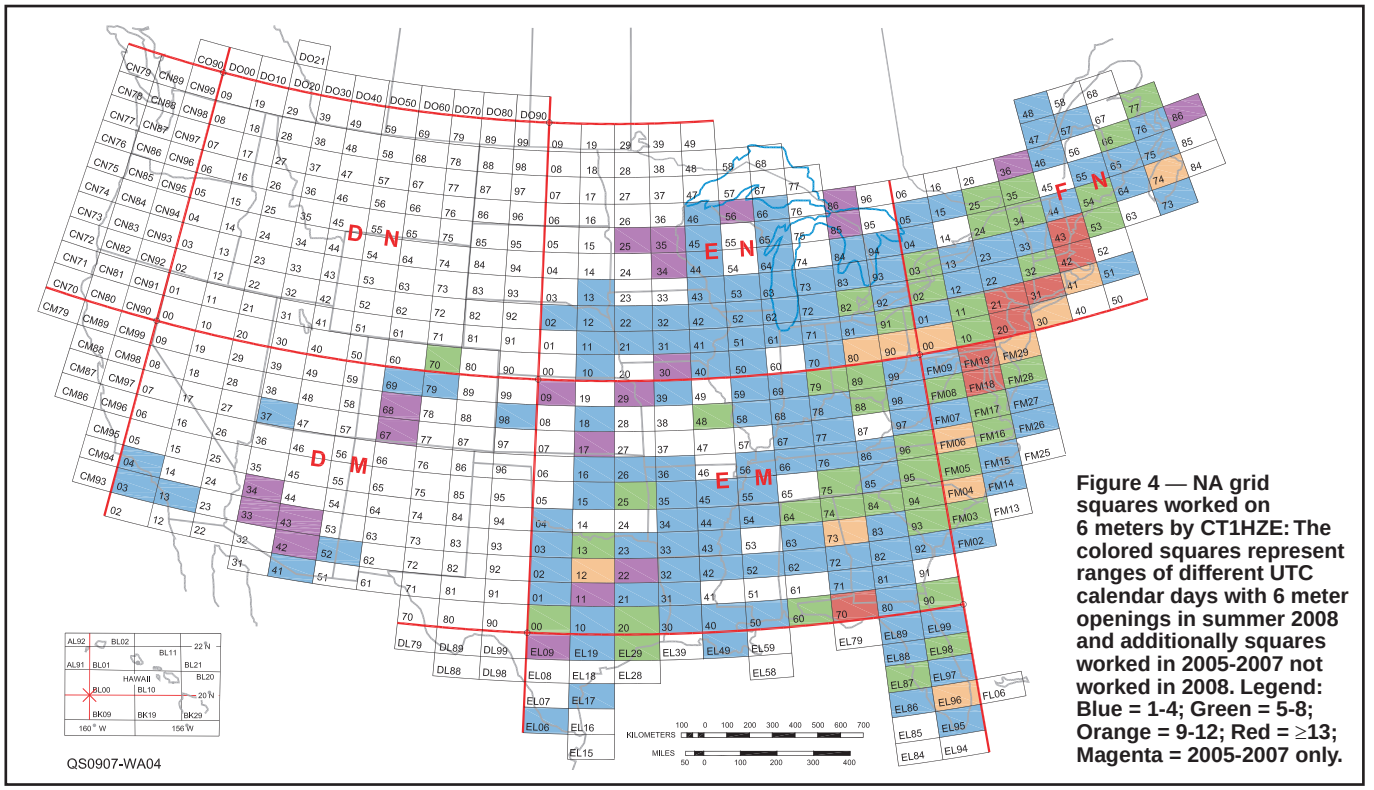


Figure 4 — NA grid squares worked on 6 meters by CT1HZE: The colored squares represent ranges of different UTC calendar days with 6 meter openings in summer 2008 and additionally squares worked in 2005-2007 not worked in 2008. Legend: Blue = 1-4; Green = 5-8; Orange = 9-12; Red = ≥13; Magenta = 2005-2007 only.

the above-mentioned days there was propagation to the USA, Canada and Mexico (about 1700 QSOs). The data from QSOs on these days were used in the study presented here.

Stations from the closest part of NA heard were in VO1, Newfoundland and the VO1ZA beacon at a distance of about 3750 km. The best DX were stations in California in grids DM03, 04, 13 at over 9250 km. The high number of QSOs provides sufficient data for distances from 4000-9000 km. As a first step the number of days with 6 meter propagation per grid square was counted (Figure 4). At first glance one can see many days for the East Coast, fewer for W5, 8 and 9, fewer again for WØ and 7 and least for W6. Surely this is what one would expect as the longer distances are the most difficult for a number of simple reasons such as path loss.

Using days with at least one contact per square rather than individual 6 meter QSOs was the approach chosen to average QSO numbers with extremely active stations, like N3DB, K2MUB, K1TOL, K1SIX, VE1YX etc a bit. Since some of them were worked 3 or 4 times on a single day this would distort the picture unnecessarily.

The next step was the calculation of the distance between CT1HZE (IM57nh) and the middle of each of the 161 different NA grids worked in 2008, eg, FN41mm, EM70mm or EL98mm. This sufficiently averages the different locations of the stations that were worked from the same square. The number of days per 100 km slot was counted (Figure 5).

Next month Joe will describe in detail the results and conclusions from these data. Be sure to keep a copy of this column handy so you can follow along.

ON THE BANDS

Finally there is some enhancement to talk about. Let's take a look.

Tropospheric Ducting. Ron, K5LLL (EM10) reports the first trans-gulf propagation from TX to FL on April 4 with the best Qs with KF4YOX (EL96) on 902 and 2304. The best tropo was the last week in April. Ron worked several north FL grids (EL87, 88, 89, 98, 99) and EM60 during the 432 Sprint and then N4TUT (EL98) on 1296 and KQ4PI (EL99) on 222 through 3456. Steve, N4JQQ (EM55) was into EM70, EL99, 96 on 2 through 432. On the 25th Todd, N4QWZ (EM66) worked EM27, 51, 60 and EL29 on bands between 2 and 432. Russ, K4QI (FM06) was working many in FL on 2/432 and hearing FL work into southern New England. From April 26-28 southern FL was loud and Russ made contacts with EL98 on 1296 and EM50 on 432.

6 Meters. Six meters slowly stirred to life in April. On the fourth Julio, NP3CW, worked TEP into LU and CX. Jon, NØJK (EM17) notes a contact with EN44 on the 22nd and considerable north/south E_s propagation east of the Rockies. On the 28th Chip, K7JA (DM03) worked into AZ, NM and northern Mexico (XE2OR – DL98). Jon, NØJK reports that the K6FB beacon was heard in Hawaii on the 29th.

HERE AND THERE

2008 CQ World Wide VHF Contest. This popular contest uses just 6 and 2 meters and begins at 1800Z July 18 and ends at 2100Z July 19. Exchange grid squares; one point per 6 meter contact, two points per 2 meter contact. Details, rules and log sheets can be found in the June issue of *CQ* or at **www.cq-amateur-radio.com**. When there is a strong E_s opening, this contest can generate activity levels as large as the June ARRL VHF QSO Party. Join in and see.

Central States VHF Society 2008 Conference. The 43rd annual CSVHFS conference will be held in Elk Grove Village, Illinois near Chicago, July 23-25. This big VHF conference brings together many of the leading VHFers in the country. The program is always interesting and the banquet speaker this year is avid VHFer and ARRL President Joel Harrison, W5ZN. More details can be found at **www.csvhfs.org/conference/index.html.**

Mali TZ DXpedition. Arliss, W7XU, reports that he and Ed, WØSD, and perhaps one or two others will be active from Bamako, Mali from June 26 to July 5. They will concentrate on 6 meters in a country that has not been worked previously from North America on 6 meters.

Guyana 8R DXpedition. Dave, N3DB, is leading an expedition to 8R (GJ06wt) from June 16-July 6. He and Chris, W3CMP, will operate from June 16-27 and Terry, K4RX, and Ken, AC4TO, will operate from June 27-July 6. The call sign is not yet known. The emphasis will be on northern Europe, Eastern Europe and the Middle East and the West Coast of North America (W6/7 and VE7). They will have ICOM IC-7000/IC-706 transceivers for Team I and IC-7000 and Elecraft K3 transceivers for Team II. They expect to have a homebrew amplifier running several hundred watts. QSL via N3DB. Further details are available in the How's DX?" column and at **www.6meterbeaconproject.org/8r2009.html**. QST

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Jun 15-Jun 30, 0000Z-0000Z, Muscatine, IA. Muscatine Amateur Radio Club, WØM. 60th Anniversary of Muscatine Amateur Radio Club. 146.910 28.310 7.258 3.970. Certificate. Muscatine Amateur Radio Club, c/o Jerry Schroder, 1092 Ripley Ct, Muscatine, IA 52761. **www.muscatinehams.org**

Jun 19-Jun 28, 0000Z-2359Z, Mount Union, PA. Camden Bullock, N3C. Creation 2009. 28.350 14.250 7.200 3.825. QSL. Camden Bullock, N2CLB, 134 Springwood Dr, Fredericksburg, VA 22401. **www.creationfest.com/ne**

Jun 25-Jun 27, 1800Z-1800Z, McDade, TX. Naturist Amateur Radio Club, NU5DE. AANR-Southwest Nudist Convention. 28.462 14.265 7.265. Certificate. Naturist Amateur Radio Club, PO Box 200812, Austin, TX 78720-0812. **www.nu5de.org**

Jun 25-Jul 4, 2300Z-2300Z, Kluane Lake, YT, Canada. North Country DX Association, Yukon Chapter, VY1/K7Y. Field Day and Jacquot Island activation from the Yukon. 14.260 7.260 3.960. QSL. John Reisenauer Jr, KL7JR, 3705 Arctic Blvd #1830, Anchorage, AK 99503. **kl7jr@yahoo.com**

Jun 27-Jun 28, 1800Z-1800Z, Fresno, CA. Salvation Army, N6S. Fresno SATERN EOC Field Day. 21.290 14.290 7.190 3.890. QSL. Dan Pruitt, AE6SX, 4834 N Diana St, Fresno, CA 93726. **k6cme@yahoo.com**

Jul 1-Jul 5, 1300Z-0359Z, 13 East Coast States, US. Original 13 Colonies Group, K2A TO K2M. 13 Original Colonies Special Event. 14.213 21.313 7.213 3.613. Certificate. Ken Villone, KU2US, PO Box 185, Conesus, NY 14435. *Certificate available for contacting all 13 colonies.* **www.QRZ.com/KU2US**

Jul 1-Jul 9, 1300Z-0300Z, Sevierville, TN. 470 Amateur Radio Group, W4H. 1st Fourth of July "QSO Party" of the 470 ARG. 28.400 14.260 7.260 3.960. QSL. Rick Sawaya Sr, 2005 Spence Mountain Lp, Sevierville, TN 37876. *Area operators will participate using their own call signs.* **www.470arg.com**

Jul 4, 1230Z-1900Z, Ashland, KY. River Cities Amateur Radio Association, K4S. Family Fun Time for All in Central Park. 14.240 7.140. Certificate. RCARA, PO Box 615, Ashland, KY 41105. **www.summermotion.com** *or* **www.rcara.org**

Jul 4, 1300Z-2300Z, Van Wert, OH. Van Wert Amateur Radio Club, W8FY. Holiday at Home Van Wert County Museum. 14.244 7.244 7.044 146.700 EchoLink 315705. Certificate. Van Wert Amateur Radio Club, PO Box 602, Van Wert, OH 45891. **www.w8fy.org**

Jul 4, 1330Z-2100Z, Troy, MT. Lincoln County Amateur Radio Group, KK7XT. 100th Anniversary of Lincoln County, Montana. 14.250 14.065 7.175. QSL. Bill Cunnane, 622 Michigan Ave, Libby, MT 59923.

Jul 4, 1400Z-2000Z, Bangor, ME. Pine State Amateur Radio Club, N1ME. Bangor 175th Anniversary. 14.273 7.190 3.940. QSL. Pine State Amateur Radio Club, 461 Main St, Old Town, ME 04468. **www.n1me.com**

Jul 4, 1400Z-2200Z, Smithville, TN. DeKalb County Amateur Radio Club, K4F. 38th 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 4, 1500Z-2100Z, Missoula, MT. Hellgate Amateur Radio Club, W7PX. Independence Day at Fort Missoula. 14.260 7.250. QSL. W7PX, POB 3811, Missoula, MT 59806-3811. **www.w7px.org**

Jul 4, 1600Z-2359Z, San Diego, CA. USS *Midway* (CV 41) Museum Radio Room, NI6IW. Commemorating Independence Day and 233 years of freedom. SSB 14.320 7.250 CW 14.060 7.055 PSK-31 7.070-7.080 RTTY 14.080 7.080 2m/70cm SOCAL rep WIN. QSL. USS *Midway* (CV 41) Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101. **af6ha@yahoo.com**

Jul 7-Jul 12, 1600Z-0500Z, Philipsburg, PA. Philipsburg Amateur Radio Association, W3P. Philipsburg 2009 Heritage Days Event. All bands 80m to 2m CW SSB FM. QSL. David Runk, AA3EJ, 887 Decatur St, Philipsburg, PA 16866. **www.philipsburg-ara.org**

Jul 8-Jul 12, 0000Z-1800Z, McDade, TX. Naturist Amateur Radio Club, NU5DE. Nude Awareness Celebration — Nude Recreation Week. 28.465 21.365 14.265 7.265. Certificate. Naturist Amateur Radio Club, PO Box 200812, Austin, TX 78720-0812. **www.nu5de.org**

Jul 10-Jul 13, 2300Z-1700Z, Deception Pass State Park, WA. PNW QRP Group, K7S. West Coast QRP Field Event – Salmoncon. 14.060 10.116 7.030 3.560. QSL. Doug Phillips, 25120 SE 14th St, Sammamish, WA 98075-8010. *Runs in concert with* Lobstercon.

Jul 10-Jul 20, 0000Z-0000Z, East Glacier Park, MT. Great Falls Area Amateur Radio Club, W7G. 75th Annual Glacier Waterton Hamfest. 50.125 28.400 14.250 3.880. QSL. George Forsyth, AA7GS, PO Box 1763, Great Falls, MT 59403. **aa7gs@arrl.net**

Jul 11-Jul 12, 1400Z-2100Z daily, Trenton, MI. Motor City Radio Club, W8MRM. Trenton Mid-Summer Festival. 14.240 14.040 7.240 7.040. Certificate. Motor City Radio Club, PO Box 337, Wyandotte, MI 48192-0337. **w8mrm.org**

Jul 12, 1100Z-1800Z, Vernon, CT. Jesus Festival, KB1KIT. Family Fun and Worship. 145.110 145.550. QSL. John Winkley, 105 Oxford Dr, East Hartford, CT 06118.

Jul 12-Jul 19, 1300Z-2200Z, Asunción, Paraguay. Mennonite World Conference, ZP15MWC. 15th Mennonite World Conference. 28.450 21.350 14.290 7.080. QSL. Helmich de Vries, PAØHEL, Knoopshöfte 4, Almelo 7605 AN, Netherlands. **www.mwc-cmm.org**

Jul 15-Jul 18, 1500Z-0400Z, Houston, MO. Ozark Mountain Amateur Radio Club Inc, KØF. Old Settlers Reunion (County Fair). 14.270 7.270 3.970. Certificate. Don Shelhammer, WØQMK, 411 Craig Rd, Raymondville, MO 65555.

Jul 16-Jul 17, 1900Z-0000Z, Manchester, MI. Chelsea Amateur Radio Club, W8C. 56th Anniversary of the Manchester Chicken Broil. 14.250 7.190. Certificate. WD8IEL Chelsea ARC, PO Box 43, Chelsea, MI 48118. **www.wd8iel.net**

Jul 16-Jul 18, 1200Z-1700Z, Romsey, England. RSGB, GB1TT. Over 200 years since the Admiralty Shutter Telegraph was installed. 14.180. QSL. John Wakefield, 'Oakhurst' Lower Common Rd, West Wellow, Romsey SO51 6BT England. **john.m0xig@telegraph.eclipse.co.uk** *or* **www.qrz.com/gb1tt**

Jul 17-Jul 18, 1500Z-2100Z, Winona, MN. Winona Amateur Radio Club, Inc, N2B. Great River Shakespeare Festival. 21.275 14.275 7.275. Certificate. Leslie Hittner, KØBAD, 1340 Conrad Dr, Winona, MN 55987. **www.w0ne.org**

Jul 17-Jul 21, 1330Z-2345Z, Bethpage, NY. Grumman Amateur Radio Club, WA2LQO. Celebrating the Apollo 11 moon landing 40th anniversary. 14.240 7.240 3.940 3.840. Certificate. Raymond Schubnel, 70 Dewey St, Huntington, NY 11743. **www.qsl.net/wa2lqo**

Jul 18, 1300Z-1800Z, Wapakoneta, OH. Reservoir Amateur Radio Association, K8QYL. 40th Anniversary of Neil Armstrong landing on the moon. 14.320 7.180 3.920. Certificate. Ann Vogel, 14455 CR 66A, St Marys, OH 45885.

Jul 18-Jul 19, 1200Z-1200Z, Southold, NY. Great South Bay Amateur Radio Club, W2GSB. International Year of Astronomy at the Custer Institute. 14.260 14.050 7.265 3.925. QSL. Great South Bay Amateur Radio Club, PO Box 1356, West Babylon, NY 11704. **www.gsbarc.org**

Jul 18-Jul 19, 1300Z-2300Z, Forest City, IA. Winnebago-Itasca Travelers Ham Club, WØWIT. 40th Anniversary of Winnebago-Itasca Travelers Club. 14.263 7.253 3.970 147.27+. QSL. Frank Krizan, 1005 Talley Rd, Garland, TX 75044. **www.orgsites.com/ia/witcars**

Jul 18-Jul 19, 1300Z-2200Z, Holyoke, MA. Hampden County Radio Association, W1NY. American Legion Post 351 29th Annual Catfish Derby. 14.260 7.185. QSL. Hampden County Radio Association, PO Box 562, Agawam, MA 01001. **www.post351catfishderby.com**

Jul 18-Jul 19, 1600Z-2200Z, DeSmet, SD. Huron Amateur Radio Association, WØNOZ. Annual Little House on the Prairie Pageant. 14.265 7.265. Certificate. Huron ARA Inc, PO Box 205, Huron, SD 57350-0205. **www.huronarc.info**

Jul 18-Jul 26, 1400Z-2100Z, Cleveland, OH. NASA Glenn Amateur Radio Club, NA8SA. 40th Anniversary of Apollo 11 Moon Landing. 14.280 7.280 3.880 1.880. QSL. NA8SA, NASA Glenn Amateur Radio Club, 21000 Brookpark Rd MS 50-4, Cleveland, OH 44135. **www.grc.nasa.gov/WWW/Clubs/NA8SA**

Jul 20-Jul 31, 1700Z-0200Z, Warren, OH. Warren Amateur Radio Association, W8P. 20th Annual Packard Car Show and the 10th Anniversary of the National Packard Museum. 14.325 7.235 146.970. Certificate. WARA, PO Box 809, Warren, OH 44483. **kc8lrh@hotmail.com** *or* **www.w8vtd.org**

Jul 24-Jul 25, 1300Z-2000Z, Berne, IN. Adams County Amateur Radio Club, W9A. Annual Swiss Days in Berne – sister city of Bern, Switzerland. 14.270 14.035 7.270 7.035. QSL. Adams Co Amateur Radio Club – W9A, Church of the Nazarene, 604 Sprunger St, Berne, IN 46711. **wb9kqo.com**

Jul 24-Jul 26, 1500Z-0300Z, Indianapolis, IN. Indianapolis Motor Speedway Amateur Radio Club, W9IMS. 16th running of the 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.com**

Jul 25, 0000Z-2359Z, Fairmont, WV. The Mountaineer Amateur Radio Association, W8SP. MARA 90th anniversary – oldest Amateur Radio club in West Virginia. 40 20 15 10 m gen portion. QSL. Charles T. McClain, K8UQY, Rt 4, Box 161, Grafton, WV 26354.

Jul 25, 1200Z-2359Z, Waynesville, NC. Haywood County Amateur Radio Club, N4P. 75th Anniversary of Great Smoky Mountain National Park. 14.278 7.275. Certificate. Bill Harmon, PO Box 1435, Waynesville, NC 28786-1435. *The special event station will be located at the site of the Asheville, NC Hamfest (Haywood County Fairgrounds).*

Jul 25, 1300Z-2000Z, Rural Retreat, VA. Virginia Appalachian Wireless Association, W4VAW. Celebrating the home of Dr (Charles) Pepper. 18.142 14.242 7.242 145.895. QSL. Edward R. Schaack , KA4HOD, 214 E Buck Ave, Rural Retreat, VA 24368. **www.vawa.org**

Jul 29-Aug 2, 1300Z-2100Z, Oshkosh, WI. Fox Cities Amateur Radio Club, W9ZL. Airventure 2009 Experiment Aircraft Association Airshow. 14.270 7.250 52.550. Certificate. FCARC EAA Airventure 2009, PO Box 5233, Appleton, WI 54912-5233. **www.fcarc.us**

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

AB1FM

EXAM INFO

Put Your Party Hats On — the ARRL VEC Program Celebrates Its Silver Anniversary

Twenty Five Years of Amateur Radio History

It's been a quarter of a century since the ARRL was authorized by the FCC to give Amateur Radio exams. Prior to today's volunteer-based examination system, the FCC conducted the testing at its field offices around the country on specified schedules. In the early 1980s as FCC staffing and funding were reduced and exam opportunities were cut to a minimum, the future of Amateur Radio became uncertain.

In late 1982, Congress passed the Goldwater-Wirth Bill and it was signed into law by President Ronald Reagan. This bill, known as Public Law 97-259, amended the Communications Act of 1934, permitting the FCC to accept the voluntary services of licensed radio amateurs in preparing and administering examinations. The amateur community would conduct the testing itself, under a new Volunteer Examiner (VE) Program drafted by the ARRL with the FCC staff.

VEC Program Timeline

■ On July 21, 1984 the ARRL and FCC sign Volunteer Examiner Coordinator (VEC) Memorandum of Agreement at the ARRL National Convention in New York City. The agreement officially authorizes ARRL to accredit VEs and coordinate exam sessions. Over 4000 Advanced and Extra class licensees apply to serve.

■ The first ARRL VEC exam session was held on September 2, 1984, at the ARRL Pacific Division Convention in California. The ARRL VEC was on its way.

■ In 1986 the FCC turns question pool maintenance over to the VECs. They create a question pool committee to manage and maintain the question pools. Their first product, a revised Extra class pool, is released 24 months later.

■ March 21, 1987: The FCC splits the 50 question Element 3 Technician/General exam into two separate 25 question exams.

■ February 14, 1991: Demonstration of Morse code proficiency was removed from the Technician license requirements. The first no-code Technician licenses are issued by FCC.

■ July 1, 1993: FCC amends service rules to include Novice exams in the VEC system. General class licensees are now eligible to become accredited VEs in the program.

■ December 20, 1994: VECs are permitted to file session data and applications electronically to FCC. Previously, session documents were mailed to FCC. License processing time plummets from 10 to 14 weeks to 7 to 12 days.

■ Early 1995: FCC announces new rules for a Vanity call sign program and the first fees required for amateur licenses. In a 10 month period ARRL VEC ships over 9000 requests for vanity forms. The first set of vanity licenses are issued in June 1996.

■ July 16, 1996: VECs are allowed to file license modifications, changes and renewals electronically to FCC, expanding their assistance to the Amateur Radio community.

■ January 1, 1997: RF safety standards for Amateur Radio become effective. Five questions are added to each exam and question pools are expanded with a new subelement.

■ August 18, 1997: FCC implements 1×1 special event call sign rules. Five VECs are authorized to be administrators of the special event call signs program.

■ April 15, 2000: FCC simplifies the amateur service license structure. The six license class levels are condensed to three levels — Technician, General and Amateur Extra classes. New Novice, Technician Plus and Advanced level licenses will not be issued. Thirteen and 20 WPM Morse code exams are eliminated; the 5 WPM code exam is required at the General class level. Amateur Radio experiences a growth spurt in the wake of licensing restructuring.

■ January 22, 2001: FCC privatizes the issuance of club station licenses and accepts the services of three VECs as Club Station Call Sign Administrators (CSCSA). With the exception of Vanity requests, all new, renewal and modification applications for Club, Military Recreation and RACES station licenses must go through a CSCSA.

■ December 3, 2001: FCC implements the Commission Registration System (CORES). Anyone doing business with the FCC must register their taxpayer identification number in CORES and receive a Federal Registration Number (FRN).

■ 2003: The International Telecommunication Union (ITU) revises the *Radio Regulations* to eliminate the international requirement to demonstrate Morse code proficiency to qualify for an Amateur Radio license. This leaves each country to decide whether to drop the requirement from its domestic regulations. Some countries choose to retain a Morse code requirement even though it would no longer be an international treaty obligation.

■ February 23, 2007: FCC eliminates the Morse code exam requirements for Amateur Radio licenses in the US. The written examinations remain for the three classes of license. Public interest in obtaining an Amateur Radio license increases.

Today's VEC Program

The ARRL is one of 14 VEC organizations across the country, but it is by far the largest and most prominent. Today, our VEC program is more than just Amateur Radio examinations. The ARRL VEC Program serves the FCC and supports the Amateur Radio community in many ways. We are special event call sign coordinators, club call sign administrators, question pool writers and a knowledgeable information source for a wide range of licensing issues. Test sessions are now plentiful and can be scheduled according to local needs. The VE system has made a positive difference in Amateur Radio.

When I started with the ARRL VEC back in 1986, we averaged about 55 sessions a week and had about 10,000 VEs in our program. Now we typically administer about 150 sessions a week and our VEs are over 30,000 strong. Since that fateful day in July 1984, the ARRL VEC has accredited more than 50,000 VEs, who have administered more than 1,250,000 exam elements at more than 90,000 test sessions. It still amazes me after all these years how important the VEC program is to Amateur Radio and how well it works. It's a system that has withstood the test of time.

On our 25th anniversary we applaud the volunteers whose dedication and service make the VE program successful. Your hard work and contribution of countless hours of your time helps ensure the future of Amateur Radio. Your efforts matter and we thank you. We're delighted to celebrate this important milestone and are excited by the promise of the next 25 years. QST

ARRL VEC Staff

Maria Somma, AB1FM
Manager

Perry Green, WY1O
Assistant Manager

Pete Warner, K1HJW
Service Representative

Ann Brinius, Lisa Riendeau, Amanda Grimaldi, China Chaney
Service Representatives

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WB8IMY

ECLECTIC TECHNOLOGY

Your Own D-STAR "Hot Spot"

To get the most out of D-STAR, you need more than a transceiver. You need a D-STAR repeater to spread your signal throughout the local area and potentially link you into the global D-STAR network. The ability to connect to the network is particularly attractive because it allows you to talk to distant D-STAR users, even those on the other side of the world, with nothing more than a D-STAR handheld such as the ICOM IC-92AD.

A D-STAR repeater is an expensive proposition, though. Unless someone happens to be flush with cash, it usually requires a group effort to gather the necessary funding and set up the system. So until you or your friends put a D-STAR machine on the air, you're locked out of the network, right?

Not necessarily.

Thanks to the folks who run the W9ARP repeater system Web site in Lafayette, Indiana (**http://w9arp.com**), I've become aware of an innovative alternative — a D-STAR *hot spot*. A hot spot is not a D-STAR repeater. Instead, it behaves more like a simplex node familiar to users of EchoLink and IRLP.

See Figure 1. A D-STAR hot spot consists of a 2 meter or 70 cm analog FM transceiver with 9600 baud data capability (there are lots of these rigs available at affordable prices), a *Windows* PC running the hot spot software and an Internet connection. The heart of the hot spot is a GMSK node adapter designed by Satoshi Yasuda, 7M3TJZ. The adapter is strictly a homebrew project; Satoshi is selling the PC boards at his Web site at **http://d-star.dyndns.org/rig.html.en**, but the builder has to source the parts. The hot spot software, along with a lot of helpful setup information, is available by joining the free GMSK node adapter group on Yahoo at **http://groups.yahoo.com/group/gmsk_dv_node/**.

With the hot spot up and running, the digital transmissions from your D-STAR radio will be received by the analog FM rig, decoded and passed to the D-STAR network via the Internet. Anything coming back from the network will be transmitted to your D-STAR radio as a data stream from the analog radio. You'll be able to listen to, and talk on, any D-STAR repeater that's connected to the Internet and running *DPlus* software (quite a few systems are configured this way).

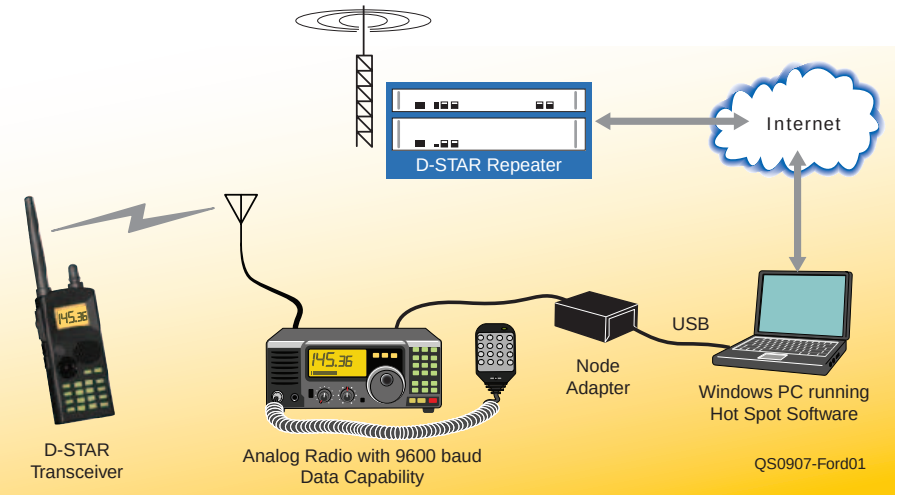


Figure 1 — A D-STAR hot spot consists of an analog FM transceiver with 9600 baud data capability, a *Windows* PC running the hot spot software and an Internet connection. Thanks to the hot spot, the digital transmissions from your D-STAR radio will be received by the analog FM rig, decoded and passed to the D-STAR network via the Internet.

With the analog FM transceiver connected to a decent antenna, your simplex hot spot should be capable of good local coverage. This is hardly a replacement for a D-STAR repeater, but it is a useful substitute until one shows up in your area.

Twisted Radio Waves

Some portions of the RF spectrum are becoming crowded, and spectrum being the finite resource that it is, scientists and engineers are always looking for ways to squeeze more juice from the orange, so to speak.

Physicist Thomas Leyser at the Institute of Space Physics in Uppsala, Sweden, thinks he has discovered a method of transmission that can carry more digital information than is currently possible. The secret involves the creation of *twisted* radio beams.

Leyser and his co-workers created their first twisted radio beams at the High Frequency Active Aural Research Project (HAARP) facility in Alaska. They journeyed to HAARP because they needed to use its array of 360 separate antennas. They created the so-called "twisted" signal by firing the HAARP antennas in a staggered time sequence in a circular pattern instead of having all of them transmit the same signal at once. The time delay effectively rippled around the array so that the beam emerged as a helical wave front.

To confirm that the radio beam had this characteristic shape, the team studied the effects it had on the ionosphere above the array. "The twisted beams excited plasma turbulence in the ionosphere that was consistent with the ring-shaped beams and different from that excited by regular beams," Leyser said.

The twists remain coherent across vast distances and can store digital information encoded into the pitch of the twist. What's not yet clear is how much extra information can be transmitted using twisted beams. In theory, huge amounts of data could be sent, according to Leyser.

This might be an interesting subject for Amateur Radio research. Leyser says, for example, that a set of three dipoles on, say, 70 cm could be sequenced to create a twisted beam for high density data transmissions between fixed points. QST

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

K2TQN

VINTAGE RADIO

Rodney Pratt, K2AFK, Satellite Pioneer

When I started to put this month's column together, it was supposed to be about a microphone that I had bought on eBay. But after meeting the seller by e-mail, I found a great story. I'll still share the microphone story, but the story about its prior owner is so much better.

Rodney Pratt became interested in ham radio through his uncle, Corby Pratt (first licensed in 1930, later call K4WV). Rodney showed an aptitude for building electrical and radio projects while in high school. Later he attended Broome County Technical Institute in Binghamton, New York, now known as Broome Community College.

PRATT FAMILY

Rodney Pratt, K2AFK

To put himself through Broome Tech he went to work for several local radio stations. Working the night shift, he was responsible for keeping them on the air at all times. He would maintain the station and install new equipment, study for school and sleep when time and work permitted. After graduating from Broome Tech he went into the Army where he worked in communications for 2 years.

After the Army he attended Clarkson College in Potsdam, New York and earned a degree in Electrical Engineering (Class of '57). At Clarkson, Rodney quietly showed his ham radio talents. Living with the Knight family, he befriended their son Frank Knight who had become bedridden. Rodney helped him get his ham license and set him up with a ham station so he could be part of the outside world. Frank Knight never regained his mobility but their friendship and radio contacts continued until Frank's death. Over the years Rodney continued to teach ham radio to others.

Air Force Space and Missile Pioneers Award

His story continues with the following from the Clarkson University Fall 2004 issue of the *Clarkson* magazine, "Barely three years after he graduated from Clarkson with a B.S. in Electrical Engineering in 1957, Rodney C. Pratt helped make satellite communications history. On August 12, 1960, at a receiver in Floyd, New York, Rod personally tuned in the world's first intercontinental voice message transmitted via satellite. Rod was a prominent member of the team that helped develop intercontinental voice transmission at nearby Griffiss Air Force Base in Rome. For his groundbreaking achievements, Rod received the Air Force Space and Missile Pioneers Award and was inducted into the Air Force Space and Missile Pioneers Hall of Fame on September 1, 2004.

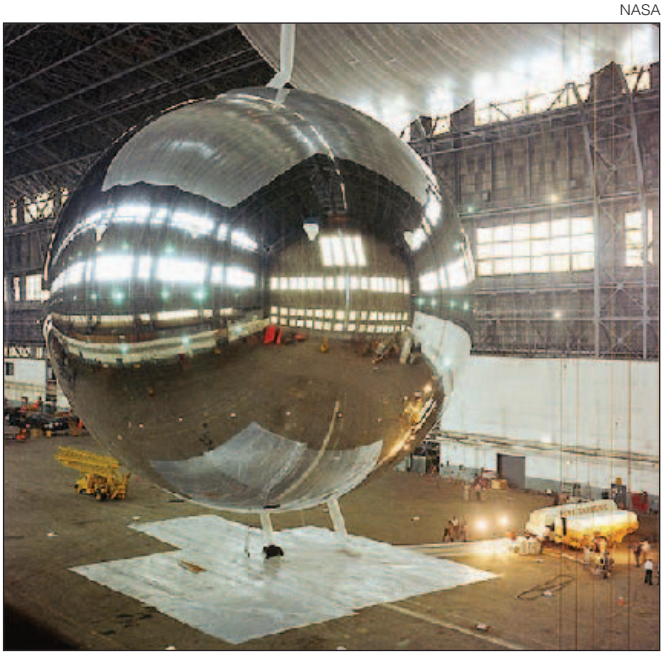
Rod was among six people inducted in a ceremony at Air Force Space Command Headquarters at Peterson Air Force Base in Colorado. In all, just 36 individuals have received this honor, which recognizes individuals who played a significant role in the early history of Air Force space and missile development."

Speaking in *Clarkson* magazine about the trip to accept the award, Rodney said: "The trip my wife, Phyllis, and I took for my induction was very memorable. What I enjoyed most was meeting all of the other inductees (13 current and former). They were down-to-earth people who accomplished some remarkable things. To young budding scientists, I would like to say these people had a work ethic that did not allow them to go home at 5 P.M. when there was more work to be done."

Echo I Balloon Satellite

Rod worked as an electrical engineer, primarily in the field of satellite communi-

NASA



The Echo I satellite before launch. Rod, operating at an Air Force Annex in Floyd, New York received the first voice communication reflected off the Echo I satellite.

RALPH DIETER, K1RD

Rod and his wife, Phyllis, at a dinner get together of the "Roaming Romans" net, August 2005.

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

PRATT FAMILY

Rod's, K2AFK, home shack, included the Ten-Tec Pegasus with PC capabilities, "which he just loved having and using," remembers his spouse, Phyllis.

PRATT FAMILY

Rod's, K2AFK, ham shack at his vacation camp.

cations (SATCOM), at Rome Air Development Center, Griffiss AFB, from 1957-1985. He was involved with the design and development of the first SATCOM ground terminals for experimentation with the Echo I balloon satellite. (A 100 foot diameter balloon made of Mylar polyester film. It was a passive communications satellite that functioned as a reflector only.) [See **http://lws.gsfc.nasa.gov/news/solar_sails_conf/Muller.pdf** for a fine overview of the Echo projects. — *Ed.*]

The historic first voice message was transmitted from Trinidad. The signal was bounced off the satellite and received by Rodney Pratt on a 30 foot antenna at the Floyd, New York site. Rodney continued to upgrade the Trinidad-Floyd SATCOM link to conduct successful two-way communications using Echo II and went on to a distinguished career in satellite communications. When active satellites began to emerge, Rodney was instrumental in setting up terminals and links between them and basically helped invent the incredible satellite networks we all have come to count on for our everyday use.

From the *Clarkson* magazine:

> In the late '70s, Rod represented the Air Force in exchanges of satellite communication ideas among the United States, United Kingdom, Canada and Australia. In 1980 he was named project manager for Project 1227, the terminal segment of the extremely complex USAF Advanced Space Communications Program, where he accepted responsibility for development of airborne terminal technology for future MILSATCOM systems. In that capacity, notes an Air Force summary, he was instrumental in finding solutions to three longstanding deficiencies in SATCOM systems: inadequate anti-jam protection, insufficient capacity and excessive terminal costs.

JOHN DILKS, K2TQN

Howard F. Anderson's, W1BVS, 1932 microphone that was one of K2AFK's ham shack treasures.

Roaming Romans

After retirement, Rodney would talk on his ham radio with his friends who retired from work on the "Roaming Romans" net. It started as a weekly net about 1968. After most members finally retired it became a daily net. According to his friend Ralph Dieter, K1RD, "It goes on today after 45 years — with the survivors."

Ralph Dieter also said this of Rodney, "Rod was on the air the morning he died, he was talking to us on the usual morning net and went for a cup of coffee — he did not return. Rod was one of the old fashioned good guys!"

His obituary from the *Rome Observer* would read:

> The late Rodney C. Pratt is also in the hall of fame. He was an electronics engineer at the Rome Air Development Center from 1957 to 1985 and distinguished himself in the field of satellite communications development during the years when such communications was in its infancy. His initial achievement was the tuning in of the first intercontinental voice transmission from a ground site in Trinidad bouncing off an Echo 1 Balloon Satellite to an RADC site in Floyd, New York, on August 12, 1960.
>
> The site is marked with a state historical marker recalling the scientific breakthrough.
>
> This achievement encouraged him to improve satellite communication links to include two-way communication and inclusion of several other links as well. Pratt received the Air Force Space and Missile Pioneers Award and was inducted into their hall of fame in 2004.
>
> Mr. Rodney Pratt, who died in May of 2007, exemplified high standards of scientific achievement over a long and distinguished career, which has resulted in his election to the Rome Science Hall of Fame, reads Pratt's plaque, which is currently hanging in City Hall.

The Microphone

There is not too much room left for the microphone story. I first found out about it from Rodney's wife, Phyllis, when she contacted me and asked for information about it. I forwarded her the February 2003 "Old Radio" column where I had a photo of a similar one. Later she sold the microphone on eBay and I was the lucky winner. It took a while, but I finally located the original November 1932 *QST* article that it was built from.[1] It was written by Howard Anderson, W1BVS. Rodney picked the microphone up years ago and it was one of his ham shack treasures.

Visit my Web page, **www.k2tqn.com**, for more information about Rodney Pratt, the microphone and links to various articles.

[1]H. F. Anderson, W1BVS, "A Sure-Fire Condenser Microphone," *QST*, Nov 1932, pp 22-24.

W1GHZ

MICROWAVELENGTHS

Assembling a Microwave Transverter System

In the last "Microwavelengths," we discussed transverter system design, starting with system calculations and proceeding to breadboarding the system for testing. After we are satisfied that the system is working, it is time to package up the transverter for use. The package might be a nice cabinet for a home station, a weather resistant box for mounting on a tower, or a rugged enclosure for portable use.

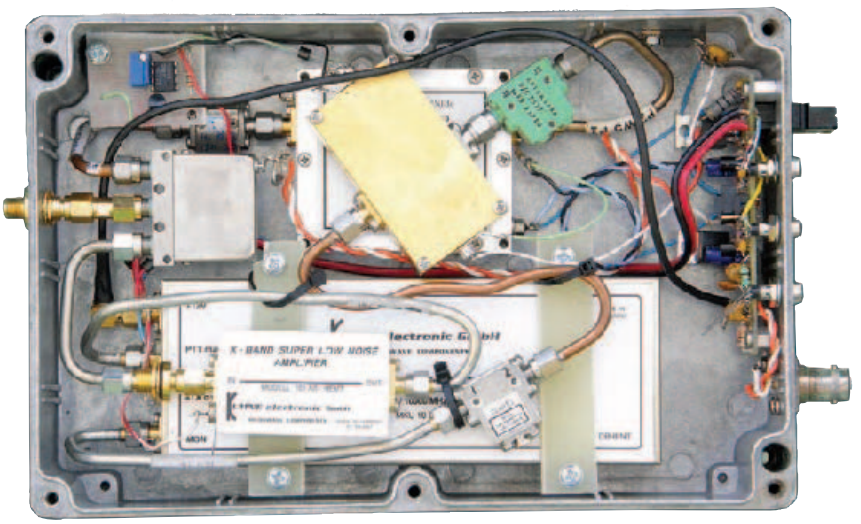


Figure 1 — Compact 10 GHz transverter in die-cast box.

Size and Time

The two most important considerations at this point are making sure that the box is big enough and allowing enough time for assembly. Don't buy a box until you are sure it is big enough. New enclosures are rather pricey, so take the time to do some planning first.

And allow plenty of time — I've found that it takes about 3 weeks of my spare time to do a proper job assembling and packaging up a transverter. Your first one might take longer, so don't wait until the night before a contest. If it is the night before the contest and you're thinking of packaging up your transverter: don't. Use the breadboard. It works, you'll find out what doesn't work and you'll get a better night's sleep.

3D Jigsaw Puzzle

Assembling a transverter is like putting together a 3D jigsaw puzzle inside a box, without a picture of the finished puzzle. Unless you are really good at 3D visualization, some trial and error is required.

First, estimate how big a box might be needed; then, tape some cardboard or foam-core together to make that size box. Next, start fitting the pieces inside, keeping in mind that they must be cabled together. Most microwave systems use semi-rigid coaxial cable, which must be bent carefully with a minimum bend radius of perhaps ½ inch. Allow room for the cable bends and for access to tighten the connectors with a small wrench. If the estimate was too large or small, just cut some more cardboard and try again.

Once you get a configuration that looks like it might fit, take some pictures with your digital camera. Then mark the outlines and mounting holes on the cardboard — it may

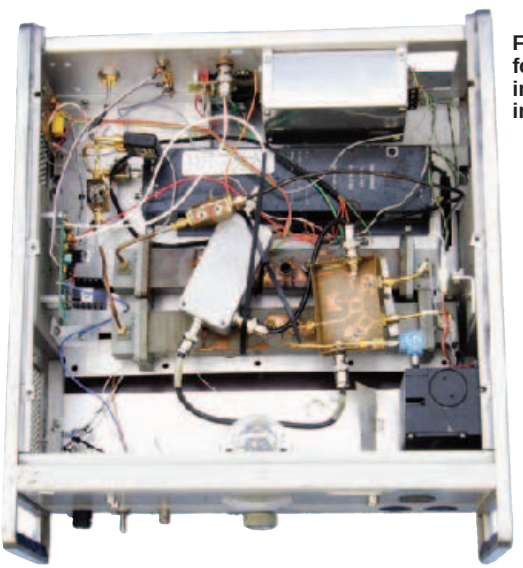


Figure 2 — Transverter for 5760 MHz packaged in recycled HP instrument cabinet.

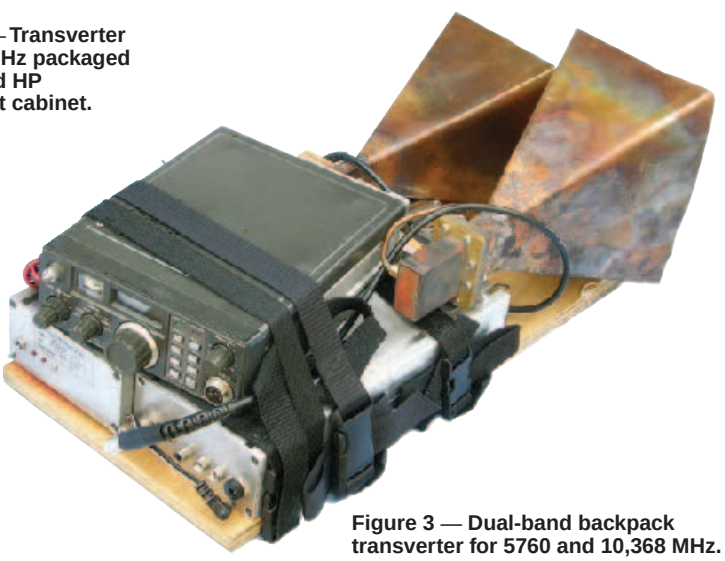


Figure 3 — Dual-band backpack transverter for 5760 and 10,368 MHz.

Paul Wade, W1GHZ ♦ 161 Center Rd, Shirley, MA 01464 ♦ w1ghz@arrl.org

Figure 4 — California-style transverter — open construction on back of dish.

be useful as a template for drilling holes in a metal box.

Tripod Mount

Most portable systems are mounted on a tripod for ease in aiming. A threaded hole on the bottom of the box with the standard ¼-20 tripod thread will be convenient. If the metal is too thin for a robust thread, a T-nut mounted in some plywood is a good alternative. For balance, the threaded hole is usually centered, so place it before adding the other components and make sure the tripod bolt won't hit anything inside.

Affordable Enclosures

Metal enclosures are preferred for RF shielding, but will have problems with internal condensation if left outdoors — there is always some moisture trapped inside. For tower mounting, some microwavers prefer weather-resistant PVC junction boxes, found in the electrical department of building supply stores. Others make sure that there is always enough power dissipated to keep the internal temperature above the dew point, either by the equipment or a small heater such as a light bulb.

For smaller transverters, aluminum die-cast boxes are ideal: rugged, yet easy to machine, even with hand tools. The prices are fairly reasonable and weather-resistant versions are available. My 10 GHz transverter, shown in Figure 1, is small and light enough to mount on the feed arm of an offset dish. It has a DB6NT transverter module and preamp, a DL2AM power amplifier and a sequencer at the far right. Getting everything in the box required a bit of work with a precision shoehorn, especially after I found that the transverter did not have enough drive for the power amplifier. I had to build the intermediate amplifier (in the gold case) and fit it into the already crowded box.

Larger enclosures can be very expensive, so I suggest applying some creativity if one is needed. At most hamfests, a range of obsolete equipment and old test equipment is looking for new homes at low prices. Instead of thinking of them as large, heavy and useless, envision them as slightly used enclosures with some excess parts inside. I've acquired some usable cabinets this way, typically for less than $5. Figure 2 is a 5760 MHz transverter I built a few years ago in the cabinet of a defunct TWT amplifier — and it puts out more power than the amplifier ever did. A combination of home-brew and surplus components is included. The enclosure has sufficient room for adding a few improvements over the years.

Hams with some metalworking skill can make an enclosure by bolting together a frame of angle aluminum and sheet metal skins, or even by welding. Those with woodworking skills can make a wooden box or frame. Figure 3 is a simple two band backpacking rig for 10 GHz and 5760 MHz I assembled on a sheet of plywood, complete with homemade copper horn antennas. The whole assembly is held together with nylon straps, for easy changes, and mounts on top of a tripod. Both transverters are from Down East Microwave. The problem with backpacking is that batteries adequate for extended operation are awfully heavy.

Figure 5 — WB6CWN with handheld 10 GHz rig and severe case of dish envy.

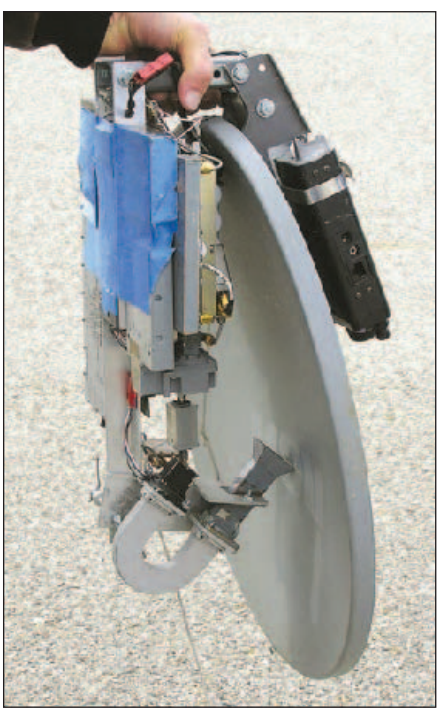


Figure 6 — WB6CWN handheld 10 GHz rig folded up.

Fair Weather Operation

If your portable operation is only during good weather (don't even consider operating from Mt Washington), no enclosure is necessary. Some of the California microwavers just mount the components on the back of the dish. The rig in Figure 4 is a fine example.

At the other extreme is the handheld 10 GHz rig in Figure 5 built by Frank Kelly, WB6CWN. Complete with NiCd batteries, everything folds right into the concave side of the 18 inch DBS dish when not in use (see Figure 6). Frank keeps the batteries charged from the cigarette lighter outlet in his car and the oscillator running continuously so he is always ready to operate.

Your Transverter

Unlike a jigsaw puzzle, there is no single answer here. Each transverter may be unique. The available components are different, as are individual goals — one may prefer enough space to work comfortably, another might prefer a compact system and a few build electronics that is more like jewelry.

The important thing is to make a system that works and makes contacts. Take the time to do it properly and then get on the air. QST

CONVENTION AND HAMFEST CALENDAR

Abbreviations
Spr = Sponsor
Tl = Talk-in frequency
Adm = Admission

Alabama (Cullman) — Jul 25 D F H R T V
8 AM-3 PM. *Spr:* Cullman ARC. Cullman County Fairgrounds, Sportsman's Lake Rd. 3rd Annual Mid-Summer Swapfest. *Tl:* 145.31. *Adm:* $5 per car. Tables: $10. Charles McBrayer, WB4PED, 614 6th Ave SE, Cullman, AL 35055; 256-708-1000; fax 205-237-3943; **cmcbrayer@corrwireless.com**; **www.qsl.net/cullmanarc**.

Arizona State Convention
July 17-18, Williams
D F R S V
The Arizona State Convention, sponsored by the Amateur Radio Council of Arizona, will be held at the Williams Rodeo Grounds, 800 E Rodeo Rd. Doors are open for setup on Thursday (Jul 16) at 5 PM; public Friday and Saturday 7 AM-6 PM. Features include meetings, seminars, commercial vendors, huge swap, VE sessions (Saturday, 9 AM-noon, Railside RV Ranch in the Recreation Room; all classes of licenses), ARCA Barbeque (Saturday, 6:30 PM), on-site dry camping ($20 per space), Grand Canyon Train Trip (Sunday, Jul 19). Talk-in on 146.78 (91.5 Hz). Admission is free. Contact Lee Ilse, KD7OED, 3785 E Mohawk Dr, Sierra Vista, AZ 85650; 520-378-1643 or 602-881-2722; fax 520-533-1589; **kd7oed@arrl.net**; **www.arca-az.org/arca/main/convention.asp**.

Colorado (Monument) — Jul 18 F R S V
8 AM-1 PM. *Spr:* Pikes Peak RAA. Lewis-Palmer High School, 1300 Higby Rd. *Tl:* 146.97 (100 Hz). *Adm:* $5. Tables: $12/$17. Rob Roller, N7LV, 4680 Falls Church Rd, Colorado Springs, CO 80920; 719-282-0204; **swapfest@ppraa.org**; **www.ppraa.org**.

Connecticut (North Haven) — Jul 25 F T
8 AM. *Spr:* B&B Hamsters. Holiday Inn, 201 Washington Ave. Yankee Peddler Hamfest. *Tl:* 147.36. *Adm:* $7. Tables: $15. John Bee, N1GNV, 30 Tremont St, Meriden, CT 06450; 203-440-4468; **jbee@qsradio.com**; **www.yankeehamfest.com**.

Florida (Fort Pierce) — Aug 8 S V
8 AM-2 PM. *Spr:* Fort Pierce ARC. Indian River State College, 3209 Virginia Ave. *Tl:* 147.345, 444.8 (both 107.2 Hz). *Adm:* $5. Tables: $15 (with electricity), $10 (without electricity). Pete Amar, KD4SPW, 1046 Trinidad Ave, Ft Pierce, FL 34982; 772-465-5204 or 772-519-1530; fax 772-564-0587; **kd4spw@aol.com**; **www.qsl.net/w4akh**.

Florida (Milton) — Jul 17-18 F V
Friday 5-9 PM; Saturday 8 AM-2 PM. *Spr:* Milton ARC. Santa Rosa County Auditorium, 4530 Jimmy's Way. 14th Annual Hamfest. *Tl:* 145.49. *Adm:* $4. Tables: $8. Ken Dunn, K4SVX, 4814 Williams Rd, Milton, FL 32571; 850-994-5726; **k4svx@inbox.com**; **www.miltonarc.org**.

Georgia (Ellijay) — Aug 8 F V
7 AM-2 PM. *Spr:* Ellijay ARS. Ellijay Lions Club, 1729 S Main St. *Tl:* 145.17 (100 Hz). *Adm:* $5. Tables: $2. Dave Meadows, K4LDI, 401 Vanilla Ln, Ellijay, GA 30536; 706-276-4043 (phone and fax); **dmeadows@ellijay.com**; **www.ngamtn.com/w4hhh/**.

Illinois (Aurora) — Jul 12 H V
8 AM. *Spr:* Fox River Radio League. Aurora Central Catholic High School, 1225 N Edgelawn Ave. 80th Anniversary. *Tl:* 147.21 (103.5 Hz). *Adm:* advance $6, door $8. Tables: $10. Dean Holste, KC9EOQ, 805 Laurel Dr, Aurora, IL 60506; 630-966-8521; **kc9eoq@arrl.net**; **www.frrl.org/hamfest**.

Illinois (Bolingbrook) — Aug 2 F Q V
8 AM-1PM. *Spr:* Bolingbrook ARS. Bolingbrook High School, 365 Raider Way. 24th Annual Event. *Tl:* 147.33, 224.54 (114.8 Hz). *Adm:* advance $6, door $8. Tables: $10 (without power), $15 (with power). Tom Ballard, N9LJY, 19 W 609 Dystrup Ave, Lemont, IL 60439; 630-739-3740; fax 630-759-8133; **tb1301@comcast.net**; **www.k9bar.org**.

Illinois (Carlinville) — Aug 1 V
7 AM-1 PM. *Sprs:* Macoupin and Montgomery County ARCs. Macoupin County Fairgrounds, IL State Route 4. *Tl:* 444.25 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $5. Dawn Knotts, KC9MWN, c/o Macoupin County ARC, Box 253, Carlinville, IL 62626-0253; 217-368-2307; fax 217-368-2722; **dknotts4@verizon.net**; **k9mce.org**.

Central States VHF Conference
July 23-25, Elk Grove Village, IL
D F R S
The Central States VHF Society Conference (43rd Annual Conference), sponsored by the Central States VHF Society, will be held at the Holiday Inn Elk Grove Village Hotel, 1000 Busse Rd. Doors are open Thursday evening, all day Friday and Saturday. Features include Thursday night social (poolside pig roast), technical presentations, antenna range, noise figure testing/pre-amp workshop, rover row/dish bowl, poster sessions/table-top displays, dealer/vendor area, flea market, Friday luncheon, Saturday eve banquet, hospitality suite. Talk-in on 144.2 SSB. Registration is $45 in advance, $50 at the door. Contact Kermit Carlson, W9XA, 1150 McKee St, Batavia, IL 60510; 630-879-0983; fax 630-879-0000; **w9xa@yahoo.com**; **www.csvhfs.org**.

Illinois (Peotone) — Jul 19 F H S V
8 AM. *Spr:* Kankakee Area Radio Society. Will County Fairgrounds, Wilmington/Peotone Rd. 26th Annual Hamfest. *Tl:* 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 (Peotone) — Aug 9 D F H V
6 AM-3 PM. *Spr:* Hamfesters RC. Will County Fairgrounds, Wilmington/Peotone Rd. 75th Anniversary Hamfest. *Tl:* 146.52. *Adm:* advance $6, door $8. Tables: $15. Mr Kerry Nelson, AA9SB, 3404 Hazel Ln, Hazel Crest, IL 60429; 708-335-4574 (phone and fax); **kw_nelson@earthlink.net**; **www.hamfesters.org**.

Illinois (Quincy) — Aug 8 F Q R S T V
8 AM-2 PM. *Spr:* Western Illinois ARC. Eagles Alps, 3737 N 5th St. *Tl:* 147.03 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $10. Danny Pease, NG9R, Box 231, Camp Point, IL 62320; 217-430-2046; **dpease@adams.net**; **www.w9awe.org/Swapfest2009.pdf**.

Indiana (Indianapolis) — Jul 11 F S V
6 AM-3 PM. *Spr:* Indianapolis Hamfest Assn. Camp Sertoma, 2316 S German Church Rd. *Tl:* 146.76. *Adm:* advance $6, door $8. Tables: $15. Bob Blake, N9FIM, 11064 Indian Lake Blvd, Indianapolis, IN 46236; 317-261-6658; **bob9fim@att.net**; **www.indyhamfest.com**.

Iowa (Cedar Rapids) — Aug 2 D F H R S V
8 AM-2 PM. *Spr:* Cedar Valley ARC. Teamsters Hall, 5000 J St SW. *Tl:* 146.745. *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**.

Kentucky (Lawrenceburg) — Aug 9 S V
8 AM-2 PM. *Spr:* Bluegrass ARS. American Legion Post #34, 725 W Broadway (US Rte 62). *Tl:* 145.39, 146.76. *Adm:* advance $5, door $6. Tables: advance $15, door $25. Jeanie Dalton-Pugh, KB8QLC, Box 4411, Lexington, KY 40544-4411; 859-619-8164; **kb8qlc@arrl.net**; **www.BluegrassARS.org**.

Louisiana (Leesville) — Aug 8 F S V
7:30 AM-2 PM. *Spr:* West Central Louisiana ARC. First United Methodist Church of Leesville, 202 N 5th St. 34th Annual Hamfest. *Tl:* 145.31 (203.5 Hz), 146.52. *Adm:* $5. Tables: $5. Lonnie Jacobs, W5LPJ, 12326 Lake Charles Hwy, Leesville, LA 71446; 337-239-0734; fax 337-239-4888; **w5lpj@cebridge.net**; **www.wclarc.com**.

Louisiana (Slidell) — Jul 18 D F Q S V
8 AM-2:30 PM. *Spr:* Ozone ARC. Slidell City Auditorium, 2056 Second St. QLF contest.

Coming ARRL Conventions

July 4
Eastern Pennsylvania Section, Bressler*

June 18-21
YLISSB, Spokane Valley, WA*

August 14-15
New Mexico State, Albuquerque

August 15-16
Alabama Section, Huntsville

August 16
Kansas State, Salina

August 22-23
West Virginia State, Weston

August 23
Western Pennsylvania Section, New Kensington

*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

Tl: 147.27 (114.8 Hz). *Adm:* $5. Tables: $7. Mike King, W5PY, 592 Marina Dr, Slidell, LA 70458; 985-641-0831 or 985-640-7708 (cell); **w5py@arrl.net**; **www.w5sla.net**.

Maine (St Albans) — Aug 8 F R T V
8 AM-noon. *Spr:* Piscataquis ARC. Snow-Devils Snowmobile Club, 9 Bryant Rd (Rte 152). 25th Annual Hamfest, dry camping. *Tl:* 146.52. *Adm:* $5. George Dean, WA1JMM, 39 Railroad Ave, Brownville, ME 04414; 207-441-6112; **wa1jmm@roadrunner.com**; **www.qsl.net/parc/**.

Maryland (West Friendship) — Jul 19 F H V
8 AM-2 PM. *Spr:* Baltimore RA Television Society. Howard County Fairgrounds, Rte 144. Hamfest/Computerfest. *Tl:* 147.03, 224.96, 448.325. *Adm:* $6. Tables: $35. Les McClure, W3GXT, c/o BRATS, Box 5915, Baltimore, MD 21282; 410-461-1212 (voice and fax); **hamfest@bratsatv.org**; **www.bratsatv.org**.

Massachusetts (Cambridge) — Jul 19. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); **w1gsl@mit.edu**; **www.swapfest.us**.

Michigan (Escanaba) — Aug 1 F
9 AM-2 PM. *Spr:* Delta County ARS. Bay de Noc Community College, 2001 N Lincoln Rd. Meetings. *Tl:* 147.15 (100 Hz). *Adm:* $5. Tables: $5. John Anderson, WD8RTH, Box 295, Wells, MI 49894-0295; 906-399-4490; fax 906-786-9614; **wd8rth@dcars.org**; **www.dcars.org**.

Michigan (Hale) — Aug 8 F T V
8 AM. *Spr:* Iosco County AR Enthusiasts. Plainfield Township Hall, 220 N Washington (M-65). *Tl:* 146.64. *Adm:* advance $4, door $5. Tables: $7. Clifford Dolliver, N8HA, 3636 F-30, Glennie, MI 48737; 989-735-3186; **n8ha@centurytel.net**; **w8icc.com**.

Minnesota (Brainerd) — Jul 18 F V
9 AM-1 PM. *Spr:* Brainerd Area ARC. National Guard Armory, 1115 Wright St. 9th Annual Hamfest. *Tl:* 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**.

WØ DXCC and Contest Central Convention

July 18, Rochester, MN

D F H Q S V

The WØ DXCC and Contest Central Convention, co-sponsored by the Twin Cities DX Assn, the Minnesota Wireless Assn, and the Rochester ARC, will be held at the Rochester University Center, 855 30th Ave SE. Doors are open 7:30 AM-9 PM. Features include a full day dedicated to HF Contesting and DXing, vendors, DX and Contest meeting, workshops, DX banquet (6 PM, $25), many special all-star guest speakers, VE sessions, DXCC QSL card checking, handicapped accessible. Talk-in on 146.82 (100 Hz). Admission is $25 in advance, $35 at the door. Contact Scott Wright, KØMD, 1224 Meadowlark Ct SW, Rochester, MN 55902; 507-292-0568; **drscott.wright@gmail.com**; **www.w0dxcc.com**.

Minnesota (St Paul) — Jul 25 F
8 AM-noon. *Spr:* Magic Repeater Group. Art's (KAØJLB) Yard, 37 Hatch Ave. *Tl:* 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**.

Missouri (Warrensburg) — Jul 18 V
8 AM-1 PM. *Spr:* Warrensburg Area ARC. Johnson County Fairgrounds, E Hwy 50. *Tl:* 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**; **www.waarci.org**.

Missouri (Washington) — Jul 19 F V
6 AM-2 PM. *Spr:* Zero Beaters ARC. Bernie Hillerman Park, Grand Ave. 47th Annual Hamfest. *Tl:* 147.24 (141.3 Hz). *Adm:* Free. Tables: $22. Ron Rodgers, NØYCX, 300 Westend Ave, Union, MO 63084; 636-583-4250; **washingtonhamfest@sbcglobal.net**; **www.wa0fya.org**.

Montana State Convention

July 17-19, Essex

D F Q R S T V

The Montana State Convention (75th 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). Features include vendors; dealer displays; tailgating; bunny hunts; lots of seminars (QRP, APRS, ATV, Repeater Linking, DXCC); meetings (QCWA, annual hamfest, ARES, ARRL, RAC); contests (high speed CW); old equipment auction; DXCC, VUCC, and WAS field card checking; VE sessions; hamfest pins and t-shirts; camping; potluck and barbeque. Talk-in on 146.52. Admission is $20 in advance, $25 at the door. Tables are $5. Contact George Forsyth, AA7GS, 207 2nd Ave S, Great Falls, MT 59405; 406-868-2212; fax 406-453-8661; **aa7gs@arrl.net**; **www.gwhamfest.org**.

New Jersey (Augusta) — Jul 12 D F R
8 AM-2 PM. *Spr:* Sussex County ARC. Sussex County Fairgrounds, 37 Plains Rd. *Tl:* 147.3 (151.4 Hz). *Adm:* $7. Tables: $20. Dan Carter, N2ERH, 8 Carter Ln, Branchville, NJ 07826; 973-948-6999; **hamfest@scarcnj.org**; **www.sussexhamfest.org**.

New York (Alexander) — Aug 1 F V
6 AM. *Spr:* Genesee Radio Amateurs. Alexander Firemens Grounds, 10708 Rte 98. 28th Annual Hamfest and Computer Show, foxhunt, demonstrations. *Tl:* 147.285. *Adm:* advance $6, door $7. Tables: $10. Rob McLean, KC2MHH, 220 W Main St, Batavia, NY 14020; 585-343-1347 (phone and fax); 585-300-7348 (cell); **kc2mhh@verizon.net**; **www.geocities.com/gram_radio_club/index.html**.

New York (Frankfort) — Jul 18 D F T V
8 AM-1 PM. *Spr:* Utica ARC. Herkimer County Fairgrounds, Cemetery St. RadioCom 2009, Arts and Crafts Fair in addition to hamfest. *Tl:* 146.76. *Adm:* $5. Tables: $6. Martin Benedict, W2MVB, 315 Marion St, Herkimer, NY 13350; 315-866-5924; fax 315-866-5923; **w2mvb@twcny.rr.com**; **www.uticaarc.com**.

New York (Howard) — Aug 8 D F V
7 AM-1 PM. *Spr:* Keuka Lake ARA. Howard Community Building, 7481 Hopkins Rd. On-site overnight camping (no hookups; no extra charge). *Tl:* 145.19 (110.9 Hz). *Adm:* $5. Tables: Free. Richard Torrey, W2RMT, 2 Whitney Valley Ext, Almond, NY 14804; 607-276-6011; **hamfest@xdrcertified.com**; **www.klara.us**.

New York (Trumansburg) — Aug 1 D F R T V
8 AM-3 PM. *Spr:* Tompkins County ARC. Trumansburg Fairgrounds, 2150 Trumansburg-Ithaca Rd (NYS Rte 96). Crystal radio build, foxhunt. *Tl:* 146.97 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $10. Kevin Romer, KC2MLC, 6462 SR 227, Trumansburg, NY 14886; 607-387-3379; fax 607-387-5631; **kc2mlc@arrl.net**; **tcarc.compcenter.com/hamfest.htm**.

North Carolina (Cary) — Jul 18 F T V
8 AM. *Spr:* Cary ARC. Ritter Park Pavilion, 301 W Lochmere Dr. 37th Annual Swapfest. *Tl:* 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 8 F H V
8 AM-noon. *Spr:* Cape Fear ARS. Methodist University (Reeves Auditorium), 5400 Ramsey St. 11th Annual Swapfest. *Tl:* 146.91 (100 Hz). *Adm:* Free. Tables: Free. David Cowart, KR4OE, 637 E Raynor Dr, Fayetteville, NC 28311; 910-624-1394; **kr4oe@arrl.net**.

North Carolina (Salisbury) — Jul 11 F R T V
8 AM-3 PM. *Spr:* Rowan ARS. Salisbury Civic Center, 315 Martin Luther King Jr Ave S. *Tl:* 145.41 (136.5 Hz). *Adm:* advance $4, door $5. Tables: $5. Ralph Brown, WB4AQK, 1621 Emerald St, Salisbury, NC 28144; 704-636-5902; **rkbrown5902@bellsouth.net**; **www.rowanars.org**.

North Carolina (Waynesville) — Jul 25 S V
8 AM-4 PM. *Spr:* Western Carolina ARS. Haywood County Fairgrounds, 758 Crabtree Rd (NC Route 209). 34th Annual Hamfest. *Tl:* 146.91 (91.5 Hz), 147.39 (94.8 Hz). *Adm:* advance $5, door $6. Tables: $10. Dean Blair, K2JB, 20 Coffey Pl, Asheville, NC 28806; 828-423-3082; fax 828-670-9909; **k2jb@arrl.net**; **www.wcars.org/hamfest.html**.

North Dakota (West Fargo) — Aug 1 D F H S V
8 AM-2:30 PM. *Spr:* Red River Radio Amateurs. Red River Valley Fairgrounds, 400 15th St W. *Tl:* 145.35, 444.875 (both 123 Hz). *Adm:* $7. Tables available. Kent Olson, KAØLDG, 7702 Forest River Rd, Fargo, ND 58104; 701-298-0956 (phone and fax); **qtipf16@q.com**; **www.rrra.org**.

Ohio (Columbus) — Aug 1 S V
8 AM-2 PM. *Spr:* Voice of Aladdin ARC. Aladdin Shrine Center, 3850 Stelzer Rd. *Tl:* 147.24. *Adm:* $5. Tables: Free. James Morton, KB8KPJ, 6070 Northgap Dr, Columbus, OH 43229; 614-846-7790; fax 614-846-2074; **kb8kpj@arrl.net**; **aladdinshrine.org/hamfest.htm**.

Ohio (Elyria) — Jul 18 D F
8 AM-1 PM. *Spr:* Northern Ohio ARS. Lorain County Community College Campus, Spitzer Conference Center, 1005 N Abbe Rd. 45th Anniversary Hamfest. *Tl:* 146.7. *Adm:* $6. Tables: $10. Darlene Ohman, KA8VTS, 4122 Bush Ave, Cleveland, OH 44109; 216-398-8858; **dfohman@att.net**; **www.noars.net**.

Ohio (Randolph) — Jul 26 D F Q R S V
8 AM-2:30 PM. *Spr:* Portage ARC. Portage County Fairgrounds, 4215 Fairgrounds Rd (SR 44). Portage Hamfair. *Tl:* 145.39. *Adm:* advance $5, door $6. Tables: $15. Joanne Solak, KJ3O, 9971 Diagonal Rd, Mantua, OH 44255; 330-274-8240; fax 330-274-8527; **kj3o@arrl.net**; **hamfair.com**.

Ohio (Van Wert) — Jul 19 F
Set up 6 AM; public 8 AM. *Spr:* Van Wert ARC. Van Wert County Fairgrounds, 1055 S Washington St (US Rte 127 S). *Tl:* 146.85. *Adm:* $5. Tables: $10. Louie Thomas, WD8LLO, 208 N Chestnut St, Van Wert, OH 45891; 419-238-2812; or Stephen Kouts, WA8WKF, **skouts@bright.net**; **www.w8fy.org**.

Oklahoma Section Convention

July 24-25, Oklahoma City

D F Q S V

The Oklahoma Section Convention ("Ham Holiday 2009"), sponsored by the Central Oklahoma Radio Amateurs, will be held at the Moore-Norman Technology Center, 13301 S Pennsylvania Ave at SW 134th. Doors are open Friday 4-8 PM, Saturday 8 AM-3 PM. Features include 34th Annual Ham Holiday, flea market, vendors (contact **kc5qcv@cox.net** for

details), technical and non-technical programs, displays, WAS card-checking, VE sessions. Talk-in on 146.82 (151.4 Hz), 147.21 (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 #243, Oklahoma City, OK 73116; 405-843-4705; fax 405-841-2624; **n5nuk@sbcglobal.net**; **www.HamHoliday.org**.

Oregon (North Bend) — Jul 18 F V
10 AM. *Spr:* Coos County RC. North Bend Middle School, 1500 16th St. *Tl:* 146.61, 147.28 (146.2 Hz). *Adm:* $3. Tables: $15. Marilyn Mansker, KE7OAM, 96900 Sitkum Ln, Myrtle Point, OR 97458; 541-572-3406; **ke7oam@yahoo.com**; **www.coosradioclub.net**.

Pennsylvania (Erie) — Jul 11 D F T V
7 AM-noon. *Sprs:* Wattsburg Wireless and Union City Wiresless Assns. Greene Township Municipal Bldg, 9333 Tate Rd. 8th Annual Hamfest, foxhunting. *Tl:* 146.7 (186.2 Hz). *Adm:* advance $4, door $5 (under 16 free). Tables: $5. Ron Rycek, KB3QBB, 1412 Grant Ave, Erie, PA 16505; 814-833-6829 (phone and fax); **kb3qbb@arrl.net**; **www.nw-pa-hamfest.com**.

Pennsylvania (Kimberton) — Jul 12 F
7 AM-noon. *Spr:* Mid-Atlantic ARC. Kimberton Fire Company Fairgrounds, Rte 113 and Firehouse Ln. Valley Forge Hamfest and Computer Fair. *Tl:* 145.13, 147.06 (131.8 Hz). *Adm:* $6. Tables: $10. Mike Pilotti, KF3CD, 212 Amanda Ln, Phoenixville, PA 19460; 610-935-4429; fax 610-254-8539; **kf3cd@arrl.net**; **www.marc-radio.org**.

Pennsylvania (Matamoras) — Aug 9 T
8 AM. *Spr:* Tri-State ARA. Matamoras Airport Park, 9th St Extension. *Tl:* 145.35 (100 Hz). *Adm:* $5. Tables: $15. Tom Olver, W2TAO, Box 711, Sparrowbush, NY 12780; 800-614-7508; **tristateara@gmail.com**; **www.k3tsa.com**.

Pennsylvania (Pittsburgh) — Jul 12 F
8 AM-2 PM. *Spr:* North Hills ARC. Northland Public Library, 300 Cumberland Rd. 24th Annual Hamfest. *Tl:* 147.09. *Adm:* Free. Tables: first space free, $5 per table thereafter. Cathy Heiles, KB3OYS, 134 Easley Rd, Pittsburgh, PA 15237; 412-486-2785; fax 412-647-9268; **nharchamfest@hotmail.com**; **nharc.org**.

Pennsylvania (Somerset) — Jul 19 F R V
8 AM-1 PM. *Spr:* Somerset County ARC. Somerset County Technology Center, 281 Technology Dr. NBEMS Digital Demo. *Tl:* 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/index.shtml**.

South Dakota (Clear Lake) — Jul 25 F V
8 AM-6 PM. *Spr:* Deuel County ARC. Clear Lake City Park, 100 3rd Ave S. Camping. *Tl:* 147.315, 444.3 (both 136.5 Hz). *Adm:* $5. Tables: Free. Robert Schmidt, NØTAW, Box 427, Clear Lake, SD 57226; 605-874-2778; fax 605-874-2449; **rjtaw1@itctel.com**; **www.w0gc.org**.

Tennessee (Athens) — Jul 18 F T
7 AM-noon. *Spr:* McMinn County ARC. Athens Regional Park. Hwy 30 E. 5th Annual Hamfest. *Tl:* 145.31 (141.3 Hz). *Adm:* Free. Tables: $5. Scott Duckworth, NA4IT, 522 Co Rd 783, Etowah, TN 37331; 423-263-1989; **kg4fzr@yahoo.com**; **www.mcminnarc.com/fest/fest.html**.

Texas State Convention
August 7-8, Austin
D F S T V
The Texas State Convention (Austin Summerfest 2009), 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 5-9 PM, Saturday 8 AM-4 PM. Features include indoor swapfest, outdoor tailgate swap area, ARRL Forum, 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**.

Texas (Texas City) — Jul 11 D F R S V
8 AM-2 PM. *Spr:* Tidelands ARS. Doyle Convention Center, 2010 5th Ave N at 21st St. Left foot CW contest, hidden transmitter hunt. *Tl:* 147.14 (167.9 Hz), 442.025 (103.5 Hz). *Adm:* advance $4, door $5. Tables: $7. Joe Wileman, AA5OP, 1010 24th Ave N, Texas City, TX 77590; 409-945-6794; **aa5op@yahoo.com**; **www.tidelands.org**.

Virginia (Berryville) — Aug 2 F R T V
6 AM-5 PM. *Spr:* Shenandoah Valley ARC. Clarke County Ruritan Fairgrounds, Business Rte 7. 59th Annual Hamfest and Computer Show, Ruritan's Famous Chicken and Beef BBQ. *Tl:* 146.82. *Adm:* $6. Tables: $10. Laura Stewart, N4LLS, c/o SVARC, Box 139, Winchester, VA 22604; 540-533-2626; fax 540-869-7067; **hamfest@svarc.us**; **www.svarc.us/hamfest**.

Virginia (Vinton) — Aug 1 F S V
8 AM-3 PM. *Spr:* Roanoke Valley ARC. William Byrd Middle School, 2910 Washington Ave. *Tl:* 146.985 (107.2 Hz). *Adm:* $5. Tables: $10. Karen Anderson, KI4GOT, 9089 Blacksburg Rd, Catawba, VA 24070; 540-384-7477; **ki4got@arrl.net**; **www.w4ca.us**.

Washington (Chehalis) — Jul 11 D F V
9 AM-1 PM. *Spr:* Chehalis Valley ARS. Southwest Washington Fairgrounds, 2555 N National Ave. Consignment Auction. *Tl:* 147.06 (110.9 Hz). *Adm:* $3. Tables: $5. John Ellingson, K7OSK, 18140 Mi Lane, Rochester, WA 98579; 360-273-5929 (phone and fax); cell 360-791-7934; **k7osk@boatanchor.com**; **www.cvars.org/swapmeet.htm**.

Washington (Spanaway) — Aug 8 D V
9 AM-2 PM. *Spr:* Radio Club of Tacoma. Bethel Junior High School, 22001 38th Ave E. Country Store, consignment. *Tl:* 147.28 (103.5 Hz), 147.5. *Adm:* $5. Tables: $30. Rick Rose, KE7EMW, 9019 Meadow Rd SW, Lakewood, WA 98499; 253-581-7673; **hamfest@w7dk.org**; **www.w7dk.org**.

Pacific Northwest DX Convention
August 7-9, Spokane Valley, WA
H S
The Pacific Northwest DX Convention (54th Annual Event), sponsored by the Spokane DX Assn, will be held at the Mirabeau Park Hotel and Convention Center, 1100 N Sullivan Rd. Doors are open Friday 1 PM to Sunday 1 PM. Features include hospitality suite; DXCC card checking (including 160 meter card checking); commercial displays; seminars; special guest speakers including ARRL HQ Contest Branch Manager Sean Kutzko, KX9X; Saturday eve banquet with guest speaker Mike Mraz, N6MZ ($40); Sunday brunch ($20). Admission is $25. Contact Gary Elliott, K7OX, Box 19358, Spokane, WA 99219; 509-838-0303; fax 509-922-6201; **k7ox@msn.com**; **www.sdxa.org**.

West Virginia (Huntington) — Aug 8 F V
8:30 AM-1 PM. *Spr:* Tri-State ARA. Veterans Memorial Fieldhouse, 2590 5th Ave. Hamfest and Computer Show. *Tl:* 146.76 (131.8 Hz). *Adm:* $6. Tables: $10. Karl Labor Sr, KD8BZX, 4693B Darnell Rd, Huntington, WV 25705; 304-736-1013; fax 304-736-0807; **DEI18@comcast.net**; **www.qsl.net/tara**.

Wisconsin (Oak Creek) — Jul 11 F R
6 AM-2:30 PM. *Spr:* South Milwaukee ARC. American Legion Post #434, 9327 S Shepard Ave. 42nd Annual Swapfest, extremely limited free overnight camping available. *Tl:* 146.52. *Adm:* $5. Verne Teske, W9RYA, 3260 Carol Ct, Oak Creek, WI 53154; 414-762-3235; **ryatex@aol.com**; **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.html**) 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/FandES/field/hamfests/regform.html** 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 publications 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

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

K1AAA **Pendleton**, Natalie, New York, NY
K1AMO **Katz**, Jacob "Jack" J., Fairfield, CT
N1FMV **Pichette**, William R., Florence, MA
N1HLY **Chase**, William H. Sr, Saco, ME
W1ISV **DeGeorge**, Lawrence J., Jupiter, FL
KA1ISY **Thompson**, George E., Norwood, MA
W1NXP **Talbot**, Nathan W., Westborough, MA
WN1T **Keddy**, Earle W., Worcester, MA
N1WOJ **Pescatore**, Mary L., Warwick, RI
♦WC1W **Chadwick**, Wilbur "Will" M., Union, ME
K1YCS **Chase**, Norman L., Bristol, ME
W1ZLZ **Berry**, Gordon M. Sr, Seymour, IN
NP2AO **Kurtz**, Lawrence A., Punta Gorda, FL
K2AOV **Rigby**, Merle L., Endicott, NY
♦WB2EFI **Taylor**, Thomas D., Panama City, FL
W2FBE **Alsdorf**, Charles E., Trenton, NJ
W2IRG **Golden**, John R., Pittsford, NY
♦W2JCI **Rosenbaum**, Daniel I., River Edge, NJ
W2KFG **O'Brien**, John P., Clarks Summit, PA
KB2NFP **Kohl**, Harold J. Sr, Churchville, NY
KB2OAH **Verstreet**, Joyce S., Rochester, NY
♦WB2PYU **Kanniainen**, Paul, Clinton, NY
WA2RAY **Hazen**, Marlin E., Rochester, NY
W2SCI **Briemer**, Lucille M., Rochester, NY
KB2SGP **Key**, Lois R., Hoffmeister, NY
KA2UBJ **Melman**, David S., Rochester, NY
W3BZS **Thomas**, James E., Harrisburg, PA
W3EHD **Anderson**, Harold W., Wyncote, PA
WA3FAA **Nevitt**, Howard R. Sr, Telford, PA
N3FT **Lytle**, Robert A., Portland, OR
WB3HBE **Mikesell**, Floyd B., Zelienople, PA
K3IHA **Castree**, John E., Mays Landing, NJ
W3NNL **Bader**, Clifford J., West Chester, PA
W3SA **Haase**, Robert H., Wayne, PA
exW3VFD **Hoffman**, Ed, Cockeysville, MD
W4AAS **Kneale**, Thomas J., Huntsville, AL
KA4AKA **Silvers**, Max Ben, Raleigh, NC
N4AZT **Stackhouse**, William "Bill" B., Goldsboro, NC
WA4BDF **Crance**, Calvin L., Lynchburg, VA
KA4BYA **Hill**, M. D., Cecilia, KY
WA4CLN **Love**, Hollis G., Manchester, TN
N4DBB **Vakos**, David L., Rio Rancho, NM
KD4DUJ **Blackley**, Serenus B. Jr, Charlotte, NC
WD4EIZ **Goggans**, Ray, Fort Payne, AL
W4FIG **Rice**, Preston C., Birmingham, AL
KZ4G **Vest**, David L., Ashland, KY
K4GOX **Raynor**, Arthur D., Bartow, FL
WA4IRU **Garrison**, Billie V., Fayetteville, TN
KE4KKC **Stallard**, David T., Knoxville, TN
KC4KVN **Coalson**, Sharon A., Anniston, AL
WW4L **Strong**, John Hugh, Catawba, NC
KM4ML **Rucker**, Richard, Fairfax, VA
W4MNG **Young**, Burford A., Chattanooga, TN
AA4P **Goings**, Joel D., Moultrie, GA
KE4PDC **Hannon**, Charles E., Wilmer, AL
KE4RJY **Southwell**, Kenneth C., Port Charlotte, FL
♦W4RU **Donahue**, Nelson "Sandy" E., Dothan, AL
♦N4TN **Jones**, Donald W., Kingsport, TN
♦K4TTT **Albury**, Richard "Rik" C., Carrollton, TX
KD4UK **Hamilt**, Robert L., Highlands, NC
KF4WPU **Grant**, George "Sonny" B., Claxton, GA
W4WYX **Strippelhoff**, Carl "Skip" Henry, Lexington, KY
KE4ZOM **Colwell**, Billy C., Rock Island, TN
KU4ZR **Dean**, Wilfrid "Will" Jr, Onancock, VA
♦KC4ZUG **Lyle**, William H., Milton, FL
KD5AYN **Myers**, Nancy S., Ada, OK
WB5CBD **Walters**, Frederick K. Jr, Cloudcroft, NM
K5DYW **Reynolds**, Lowell, Valliant, OK
KD5HNZ **Malloy**, Jim, East Wenatchee, WA
K5IBF **Steward**, Rodney D., MD, Oklahoma City, OK
K5IBQ **Pulliam**, J. Gordon, Norman, OK
W5JBI **Borchers**, Leonard W., Seguin, TX
W5LUE **Dye**, Jack M., Fort Worth, TX
KT5Q **Sterling**, Austin "Earl" E. Sr, Waco, TX
W5UZW **Peavey**, Captain Everett "Art," Des Moines, IA
W5VLW **Bonner**, Delma J., Idabel, OK
K6DMH **Barham**, Richard "Dick" C., Modesto, CA
KB6FNI **Conley**, Arthur J., Armona, CA
♦KB6GRZ **Parker**, William H., Gardena, CA
NR6J **Anderson**, Ronald E., Torrance, CA
W6MNE **Shacklett**, Frank, Coeur d'Alene, ID
W6NDR **Eisley**, Glenn E., Fresno, CA
KE6NLT **Thompson**, Mary E., Vallejo, CA
WA6PII **Edmisten**, Dorothy J., Apple Valley, CA
KF6RNS **Superson**, Stanley W., LaCanada, CA
W6RTO **Goff**, John "Jack" F., Essexville, MI
WB6UWA **Thomas**, Caius Leonard, LaJolla, CA
K6VBT **Coltin**, Charles Lee, Lytle Creek, CA
K7AO **Spalteholz**, Kenneth G., Silver Springs, NV
K7CVB **Clinger**, David Lee, West Jordan, UT
WI7C **Sparks**, Morton D., Clearfield, UT
K7DHG **Bitter**, Charles R. Jr, Scottsdale, AZ
KE7OPP **Johnson**, James F., Encampment, WY
♦AD7WX **Chesire**, Brian M., Tucson, AZ
♦N7XS **Servel**, Xavier "Bud" F., Chubbuck, ID
NF8D **Stover**, Alan C., Whitehall, MI
N8ERK **Strasko**, John S., Elyria, OH
W8FBI **Young**, James H., Pulaski, TN
N8JEU **Wolking**, Alice Joan, Cincinnati, OH
♦K8LIX **Joseph**, Bernard W., Harrison Township, MI
W8NBX **Kloiber**, Joseph E., Hendersonville, NC
K8QMC **Popa**, Dennis R., North Troy, VT
WD8RFS **Huston**, David B., Ely, MN
KQ8TC **Culek**, Timothy A., Willoughby, OH
exWN9DXG **Gradischnig**, Frank Charles III, Des Moines, IA
K9ILV **Schlessinger**, George D., Milwaukee, WI
AB9KF **Mills**, Harry D., Lexington, NC
W9LOV **Shimp**, Dale H., Spring Hill, FL
♦K9LTN **Hajek**, Robert J. Sr, Oregon, IL
W9MYY **Zyck**, Walter J., Orland Park, IL
WB9PKH **Seamans**, Melvin O., Fort Atkinson, WI
K9SGH **Marsh**, William A., Edgewater, FL
W9SUU **Sheridan**, Robert B., Westmont, IL
WA9YQA **LaBruyere**, Melburn "Mel" E., Belleville, IL
♦WØAR **Bergren**, Albert "Lee" L., Kansas City, MO
KDØDFM **Garufi**, Vince Jr, Wellsville, MO
NØEIQ **Kachelmyer**, Paul, Mankato, MN
NØEKX **Halbmaier**, Wayne, Rochester, MN
KØGAY **Pritchett**, Tommy A., Wichita, KS
WØGBY **Oberhelman**, Lorin "Obie" E., Independence, MO
NØGVX **Snow**, Ralph L., Overland Park, KS
WØHUU **Dunlap**, David E., Waseca, MN
NØJSV **Norr**, Harry, Minneapolis, MN
KØKRW **Stevens**, John C., Dodge City, KS
♦KØLNQ **McCright**, George H. Jr, Raytown, MO
NØLVT **Olivier**, Arie J., Sioux Center, IA
WØMJP **Woodfill**, Jared S., Malvern, IA
WAØN **Jauhola**, Melvin H., Virginia, MN
KØOAV **Berggren**, Donald J., Saint Paul, MN
KAØUDR **Fairall-Gordon**, Terrie L., Arvada, CO
KØUEM **Hart**, Neal H., Arvada, CO
WØYPT **Olson**, Telmer, Monona, IA
G3TFM **Scadden**, Robin, Somerset, Great Britain

♦ 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 1.8175, 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 at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **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.

During 2009, Headquarters and W1AW are closed on New Year's Day (January 1), Presidents' Day (February 16), Good Friday (April 10), Memorial Day (May 25), Independence Day (July 3), Labor Day (September 7), Thanksgiving and the following day (November 26 and 27) and Christmas Day (December 25).

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				

75, 50 AND 25 YEARS AGO

July 1934

■ The cover photo shows a simple but effective tuning device — a flashlight bulb link-coupled to the transmitter's output coil.
■ The editorial discusses various subjects, including a cautionary tale of a ham being caught helping his friends cheat on a Class C amateur exam.
■ D. A. Griffin, W2AOE, reports on tests of "Automatic DX Relay Work for the Ham," wherein messages have been received at and retransmitted from an experimental station.
■ T. F. Cushing, W1HMO, reports on the success of the "First Boston – New York 56-Mc. Relay," accomplished after two years of work and planning by D. B. Whittemore, W2CUZ.
■ "Progress on 28 Mc" reports on the first 10 meter transatlantic ham contacts in years.
■ "A Modern Transportable Station," by Harvel Baker, W7ALH, describes his small and lightweight station.
■ W. S. Upton, Radio Operator on the SS *Frank H. Buck*, tells about "Ham Radio in Japan," following his visit with J2HZ.
■ John Shanklin, W3CIJ, describes "A 14-Mc. Rotary Beam Antenna for Transmitting and Receiving." The antenna uses wire elements in two bays of three elements each, supported by homemade pine girders.
■ "Amateur Radio Stations" tells about the station of D. Reginald Tibbets, W6ITH. Tibbets is the chief engineer of the San Francisco – Oakland Bay Bridge Construction Radiotelephone System, which uses frequencies near the 5 meter ham band during the bridge's construction.

July 1959

■ The cover photo shows League President Goodwin Dosland, WØTSN, at the W1AW mike.
■ The editorial explains the regrettable necessity of the increase in ARRL dues to $5 per year.
■ Edward Noel, W8GRY, describes "An 800-Watt P.E.P. Input Amplifier" that uses two 7094s in parallel.
■ "Station Control Circuits," by Paul Barton, W6JAT, tells us how to integrate the station's transmitter, receiver, and antenna into a neat package.
■ Carl Vail, W9MUR, describes "A Modern High-Selectivity Receiver" that features H.F. crystal filters and hang A.V.C.
■ Robert Richardson, W4UCH, tells how to use "High-Power Triode Amplifiers for 50 Mc." His rig uses two 6C21s, a large triode developed during WW II as the pulse modulator for the SCR-584 fire-control radar.
■ L. F. Worthington, W4HDX, reports on a club-project portable station, "The SPARC 6-Meter Transceiver."
■ U.S. Army Col. Guy Blencoe, DL4GX, tells about taking his Collins KWM-1 to a rare DX spot and operating as I1EZZ/M1, in "San Marino Calling."
■ Terry Tatum, W6LKJ, comes up with an ingenious way for physically handicapped hams to send C.W., in "Dialing the Code." His system uses 19 modified rotary telephone dials in series, with various letters on each dial.

July 1984

■ The cover photo reminds us of the ARRL National Convention that will take place later this month, with a painting of astronaut Owen Garriott, W5LFL, behind the Manhattan skyline.
■ The editorial reports on "A New Constitution for IARU."
■ Richard Schellenbach, W1JF, and Frank Noble, W3MT, tell about "Digital Switched-Capacitor Filters — A Construction Project." The SCF provides low-pass and notch filtering in the receiver's audio output.
■ Russ Hamilton, K3RH, reports on "A Bit Pattern Analysis Program for the Apple and the C 64."
■ In "The Half-Delta Loop Goes Rectangular," Jan Gunmar, SMØAQW, tells how he modified the original VE2CV design to fit his urban lot.
■ Lawrence Studebaker, WB9GHU, reports on how he obtained "Simple, Low-Cost Computer Control for the ICOM IC-720."
■ Doug DeMaw, W1FB, treats the new ham to solid information in two articles, "First Steps in Radio — Part 7: Meet the Versatile Diode," and "Setting up Your Station."
■ Michael Moon, KA7QZK, also helps the new ham get started at lost cost, with "No-Budget Hamming."

Al Brogdon, W1AB ♦ Contributing Editor

Field Organization Reports

APRIL 2009

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/FandES/field/pshr/.**

505
AC8AR
412
KØIBS
373
NC4VA
369
W2MTA
350
KK5NU
AK2Z
335
N2LTC
333
KI4GEM
307
K5SFM
302
W4CAC
295
KA2ZNZ
280
WB7WOW
272
N4HUB
259
AC6C
251
KD1SM
250
KC8NTE
240
K7BFL
235
K2HJ
229
WB8RCR
218
KB2ETO
206
K7DAH
198
KT5SR
197
KØLQB
195
KI4HGO
194
KAØDBK
185
KB2RTZ
KD8AAD
181
K2ABX
180
KE7DVV
176
W2KFV
175
K9LGU
K7EAJ
170
W5DY
KK1X
165
KE5HYW
N7CM
KA8ZGY
N1UMJ
164
NY3H
160
KGØGG
AG9G
WD9FLJ
K8RDN
155
N5NVP
152
K4DND
KI4GWC
150
WB5ZED
148
KK7DEB
W7ELI
147
N2RDB
146
N4EJF
145
W2DWR
KD1LE
W2LIE
144
W9AL
143
WD8USA
142
W7JSW
140
KB2BAA
KK3F
W1PLW
K2YYD
136
K4DLF
135
W3YVQ
W4DNA
K8MFK
130
WB2FTX
WØLAW
W4ZJY
KA5EXI
W4FAL
K2BRG
125
NN7H
W7EKB
WB9JSR
124
K2GW
WA4UJC
123
KI4ZJI
122
K6JT
120
N2GJ
KB9KEG
KA4FZI
W8UL
KB5KKT
K2UL
K4IWW
KW1U
W1GMF
K1YCQ
N1LKJ
119
WB2KNS
K7BC
117
N3RB
115
W5PY
N2VGA
114
KA2EJD
112
WC5M
111
W5HUD
N5MEL
N2DW
W3CB
110
W7QM
N7BEC
W7GB
K5KV
WB6UZX
W6DOB
KK5GY
KE4PAP
K2VX
N7XG
N7YSS
K1HEJ
KB1NMO
KF7GC
W2EAG
K4GK
KB2EV
N9MN
WB4GHU
N1IQI
107
AB1AV
106
WØSJS
N7JCO
105
N2GS
KE4CB
KI4JOO
WB2HPI
101
W3TWV
WB8OIF
100
W7GHT
WØCLS
NØMEA
N6OUJ
K2AN
W9ILF
NA9L
N1JX
N8IO
N8OD
WB8SIQ
K4SCL
W7RCC
NX1Q
AA3SB
WB4FDT
NN7D
KI4YV
W4TTO
NR2F
KB2KLH
K2TV
W2DSX
KM1N
96
AD4BL
K5MC
WA1JVV
95
W2CC
WG8Z
KB2LNM
KI4PRX
94
W5XX
93
K6RAU
K9EOH
W9WXN
92
KJ7NO
91
W5GKH
AC8AL
N7IE
90
NIØI
N8DD
WD8Q
WA2CUW
WA2NDA
KA1RMV
KA1GWE
N3ZOC
K3IN
K4BG
WB4BIK
K8VFZ
WD8DHC
K1JPG
NU8K
W1SGC
W3GQJ
W9IM
NA7G
88
KB8NDS
87
N8NMA
86
K4BEH
85
KD8FNN
84
KC4PZA
NS7K
82
KS3Z
81
KBØDTI
80
K7MQF
W5CDX
WA9WNE
AB8SY
79
KC5OZT
78
N7EIE
WDØGUF
77
KI4JQB
KB3KKY
KB1KRS
75
KB5PGY
KB3MXM
W4QAT
WB2WAK
74
W6SX
73
WF2T
72
KE5DKV
W5ESE
71
KE5PWL
KC2CHA
70
WØADZ
NØDUW
NØDUX
NUØF
KAØFUI
KBØJKO
NØMHJ
KØPTK
KØOR
KØRXC
NØUKO
WAØVKC
KD7ZUP
N3SW
W7VSE
NM1K
N2VQA

The following stations qualified for PSHR in previous months but were not recognized in this column: (Mar) KAØDBK 194, W5PY 121, K5KV 110, W5HUD 110, N5MEL 110, K5MC 100, W4KLB 100, N5NVP 91, N4MEH 90, WC5M 85.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AL, AR, CT, EB, EMA, EPA, EWA, GA, ID, IL, IN, KS, LA, MDC, MI, MN, MO, MS, NC, NFL, NH, NLI, NNJ, NNY, NTX, OH, OK, OR, SD, SFL, SNJ, STX, SJV, TN, UT, VA, WCF, WI, WMA, WNY, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: AZ, EWA, GA, IN, KS, MDC, ME, MI, MO, MT, NC, NLI, NM, NTX, NV, OK, SD, SFL, STX, VA, WPA, WTX.

Brass Pounders League

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

KK3F 1935, N1IQI 1482, WB5NKD 1332, KA9EKG 1267, W1GMF 1096, N1UMJ 1082, K7BDU 1015, WB5NKC 909, KW1U 885, W8UL 805, WB9JSR 723, W7QM 544, N8IXF 518.

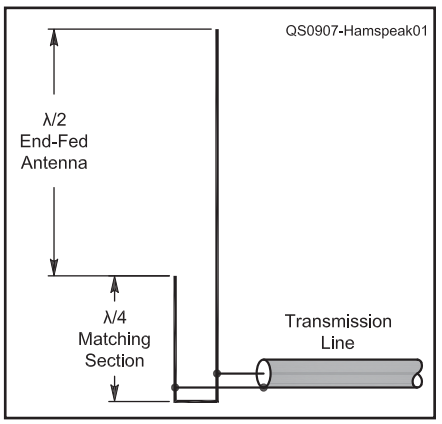
The following station qualified for BPL in March, but was not recognized in this column last month: K7BDU 870.

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/qst/glossary.html**.

Homebrew Coaxial Dipole for VHF or UHF

J-pole — Single element, vertical half wave antenna end fed with a quarter wave matching section of open wire or window line. It is generally used on VHF and UHF bands and takes its name from the shape of the matching section that is parallel with the antenna element.



[1]*The ARRL Handbook for Radio Communications,* 2009 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 0261 (Hardcover 0292). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

PL-259 — Male UHF type coax connector. Part of a coaxial cable connector family developed before WWII for the "ultrahigh frequencies" then starting at 30 megacycles (now MHz).

RG-8 coax — Coaxial cable type with 50 Ω characteristic impedance and 0.405 inch outer diameter. Compatible with a PL-259 without need for a sizing adapter.

Getting on the Air — It's Time to Take to the Water

Automatic antenna tuner — Device connected between radio equipment and antenna system to transform the antenna system impedance to the value that the radio is designed to operate with, usually 50 Ω. In an auto tuner, rather than a manual one, the mismatch is sensed automatically, resulting in adjustments being made without operator intervention.

NOAA weather alerts — Broadcast of weather forecasts and alerts by the National Weather Service of the National Oceanic and Atmospheric Administration. These are transmitted continuously on seven fixed channels in the 162 MHz range: 162.400, 162.425, 162.450, 162.475, 162.500, 162.525 and 162.550 MHz. See **www.nws.noaa.gov/nwr/nwrbro.htm** for more information and to determine which channels are active in any area. Most modern marine VHF and amateur 2 meter transceivers cover these channels.

SWR — Standing wave ratio. A measure of how well a load, such as an antenna, is matched to the design impedance of a transmission line. An SWR of 1:1 indicates a perfect match. Coaxial cables, depending on length, type and frequency, can often work efficiently with an SWR of 3:1, sometimes higher. Transmitters sometimes require an SWR of 2:1 or less for proper operation. See **www.w2du.com/Chapter01.pdf**.

A High Gain Single Wire Beam

λ/2 dipole — Kind of antenna approximately an electrical half wave long. Often fed in the center, but sometimes in other locations. This antenna is popular by itself, but is often a single element in multielement antennas. It is also often used as a standard against which other antennas are compared.

Phasing stubs — Transmission line used to delay a signal to provide the proper phase for connection between elements of a driven array.

A Parallel Port Interface for Your Shack

LED — Light emitting diode. Semiconductor device from which light is emitted when current flows. 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**.

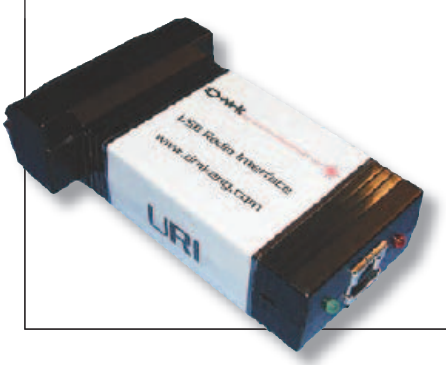
Logic 1 — One value of the two possible levels of binary digital logic — the other being 0. In the typical transistor-transistor logic family, a voltage range of 2.5 to 5 V represents a logic 1, binary 1, TRUE or ON state, while a voltage between 0 and 0.4 represents a logic 0, binary 0, FALSE or OFF state.

Optical isolator — 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 signal amplitude. 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.

New Products

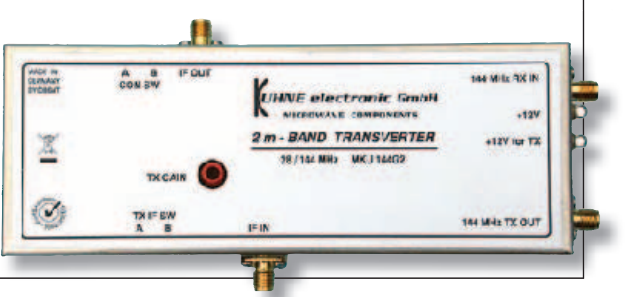
USB RADIO INTERFACE FROM DMK ENGINEERING

◊ The USB Radio Interface (URI) allows a standard FM transceiver to be connected to a host computer via USB interface. The host PC must be running available *Linux* software. The URI may be used for remote radio control or linking two or more radios in repeater mode. Audio can be passed through VoIP/Ethernet. The URI uses a full-duplex USB audio controller that provides one channel of receive audio and two channels of transmit audio. Radios that have separate voice and CTCSS signals are supported, or the second audio channel may be used as a line monitor. Amateur price: $70. For more information, visit **www.dmkeng.com**.



DB6NT 2 METER TRANSVERTER MODULE

◊ The MKU 144 G2 transverter module from Kuhne Electronic is intended to be the basis for a high performance VHF station. Technically skilled amateurs can set up a 144 MHz station using the transverter module and a power amplifier such as the Kuhne MKU PA 1317-60 HY or MKU PA 1317-120 HY. The MKU 144 G2 will work with most HF transceivers that have a transverter output port. It can use separate transmit and receive IF connectors or one common IF port. VHF frequency range is 144-146 MHz with an IF range of 28-30 MHz. IF input power is 2-50 mW or 60-2000 µW, and 144 MHz output power is 100 mW. Noise figure is 0.9 dB with 25 dB conversion gain. For more information visit **www.db6nt.de**.



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- Internet WIRES compatible

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- Li-ION Battery - EAI system
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• 160-6M @ 200W • Four 32 bit IF-DSPs+ 24 bit AD/DA converters • Two completely independent receivers • +40dBm 3rd order intercept point

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• 100W HF/6m Transceiver, gen cov. receiver • Dual DSP 32 bit • Three roofing filters- 3, 6, 15khz • 5.8 in WQVGA TFT display • Hi-res real time spectrum scope

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(800) 854-6046
Eric, K6EJC, Mgr.
Magnolia between
S. Victory & Buena Vista
burbank@hamradio.com

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2210 Livingston St., 94606
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(800) 854-6046
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I-880 at 23rd Ave. ramp
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So. from Hwy. 101
sunnyvale@hamradio.com

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- 100W HF, 6M, 2M • 50W 70CM
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TM-V71A 2m/440 Dual Band
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- "Five in One" programmable memory
- 1,000 multifunction memory

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- Standalone 1200/9600 bps TNC w/ APRS firmware
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FLASH! Now with 12m and 10m built-in! Complies with new FCC rules!

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NEW!

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- Built-in Power supply (110 or 220v)
- 2 Ant ports selectable
- auto band switched w/ most ICOM/Kenwood/Yaesu tcvrs

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KAM XL

- DSP modem offers great performance on Packet 300/1200,G-tor,Pactor, Amtor,PSK-31
- RTTY, Navtex, ASCII, Wefax, CW, GPS NMEA-0183 and more!

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KPC-3 Plus/KPC-9612 Plus

High-performance, low power TNC.
Great for packet, and APRS compatible.

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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

$20. mail-in rebate*

*good thru 6/30/09

IC-R5 Sport

Wide Band Receiver

- Wide RX .150–3309 mHz*
- 1250 memories
- Alphanumeric labels
- DMS scan
- AM, FM, WFM

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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
- SMA connector
- Rain resistant IPX4 standard
- CTCSS and DTSC decode is built in
- Built-in ferrite rod antenna [AM] reception

GEOCHRON

Detailed illuminated map shows time, time zone, sun position and day of the week at a glance for any place in the world.Continuously moving – areas of day and night change as you watch.

- Mounts easily on wall. Size: 34 1/2" x 22 1/2"

US TOWER

Shown with Optional Rotor Base

MA-40

40' Tubular Tower

Call For Latest Pricing!

MA-550

55' Tubular Tower

Handles 10 sq.ft. at 50mph
Pleases neighbors with tubular streamlined look

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TX-455

55' Freestanding Crank-Up
Handles 18 sq. ft. @ 50 mph
No guying required
Extra-strength const.
Can add raising and motor drive acces.

Towers Rated to EIA Specifications
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43 Foot Multi-Band 10 to 160 Meter Vertical

- 6063 T832 corrosion-resistant aircraft aluminum tubing and stainless steel hardware
- 43 ft. optimal length vertical radiator for multi-band operation
- Easy tuning design—correct length and taper
- No coils or linear loading elements
- Rugged fiberglass base insulator—not cheap plastic!
- Freestanding—just like the other guy's
- Requires DXE-UN-43 UNUN Balun for multi-band use with your wide range tuner

DXE-MBVE-1 .....Only **$299.50**

OPTIMIZED FOR MULTI-BAND VERTICALS

New!

Special Multi-Band UNUN Vertical Matching Network

- Superior to other multi-band vertical UNUNs
- Higher efficiency design especially for multi-band/tuner verticals
- Full 1.8 to 30 MHz coverage
- Better impedance matching allows your tuner to provide higher system performance
- Use it to improve performance of competitive 43 foot multi-band verticals
- Direct replacement for other multi-band UNUNs—fits existing mounting hole pattern
- Optional mounting bracket fastens directly to antenna element

Multi-Band Vertical UNUN

DXE-UN-43 ..... **$99.95**
DXE-UN-BRKT UNUN mounting bracket assembly; **$20.95**
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Best Antenna Value Anywhere!

DX Engineering now stocks replacement parts for all BTV antennas

Easiest assembly and tuning of any multi-band vertical!

4BTV (10, 15, 20, 40m) **$124.95**
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Current Baluns and Feedline Current Chokes

- 5, 10 and 10 kW+ Baluns and Current Chokes
- High efficiency, low loss—W8JI design
- All standard ratios available

Feedline Current Chokes

- Reduce RFI and pattern distortion
- Three power levels up to 10 kW
- Rugged aluminum housings
- Stainless steel hardware
- Tuner versions for high antenna VSWR available

Starting at just $84.95 for FCC050-H05-A

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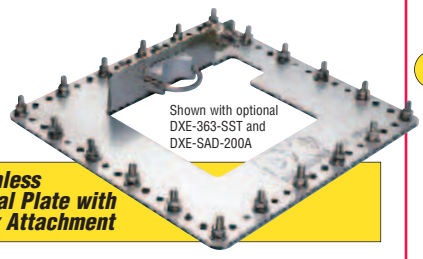
Radials for Top Vertical Performance!

Complete Radial Kits with Wire Lugs Attached Available now at DXEngineering.com



Stainless Radial Plate with Coax Attachment

NOT CHEAP ALUMINUM! GUARANTEES BEST RADIAL SYSTEM CONDUCTIVITY OVER TIME

Makes radial attachment a snap!

- Fits 2" pipe, 4x4 and 6x6 posts
- 0.125" thick 304 stainless steel
- Accommodates up to 120 radials
- Patented high current coax connection to radials

DXE-RADP-1P Complete with 20 stainless bolt sets..... **$54.50**
DXE-RADP-1HWK 20 sets of 1/4" stainless hardware ... **$7.50**
DXE-SSVC-2P Stainless Saddle Clamp for attachment to round tube 1.0" to 2.0" O.D. **$11.45**
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DXE-VFCC-H05-A Vertical Feedline Current Choke..... **$94.95**
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**
DXE-STPL-100P Steel Radial Wire Anchor Pins, 100 pack..... **$16.00**
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Biodegradable Anchor Pins Also Available

FAMOUS HIGH PERFORMANCE VERTICAL ANTENNA SYSTEM

Hy-Gain Hy-Tower 5-Band 50 Foot Vertical

New!

hy-gain

The Hy-Tower is an omnidirectional, self-supporting vertical radiator that operates on 10 through 80 meters. Add a loading coil and 160 meter operation is possible. The use of stub decoupling systems allows band switching on 10, 15, 20, 40, and 80 meters. The stubs isolate various sections of the vertical antenna so that an electrical 1/4 wavelength (or odd multiple of 1/4 wavelength) exists on all bands. On 20 meters, the 80 meter section acts as a 3/4 wave radiator.

- Tilt base allows easy assembly before raising antenna into position
- Stainless steel hardware
- Maximum Power: 1 kW AM, 2 kW PEP
- Overall Height: 53 feet

The Hy-Tower is drop-shipped directly from Hy-Gain. DX Engineering will e-mail you a shipping quote when you place your order.

HYG-AV-18HT **$899.95**

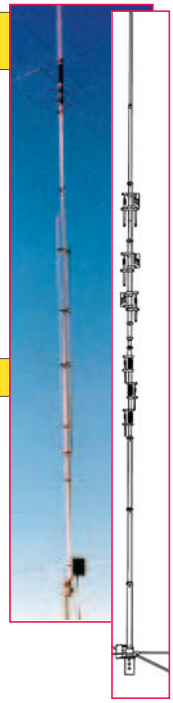
Check Our Prices Before You Buy!

MULTI-BAND, NO-RADIALS VERTICAL ANTENNAS

Patriot HF 8-Band No-Radials Vertical

- Quarter wave stubs on 6, 10, 12, and 17 meters
- Efficient end loading coil and capacity hats on 15, 20, 30, and 40 meters
- Effective counterpoise system replaces radials and grounding
- No lossy can traps
- End loading of the lower HF bands allows efficient operation
- Maximum Power: 1,500W
- Overall Height: 25.5 feet

HYG-AV-640..... **$379.95**



7-Band, No-Radials Vertical

- Operates on 10, 12, 15, 17, 20, 30, and 40 meters
- No ground radials required
- Off-center feed design
- High efficiency high-power traps
- Heavy-duty tiltable mast clamp for tubing up to 2 1/8" O.D.
- Easily raised and lowered
- Exceptional bandwidth on 40 and 20 meters
- Maximum Power: 750W average, 1,500W PEP
- Overall Height: 29 feet

HYG-DX-77A..... **$439.95**

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**

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Sunspots Sighted! Are you ready for DX?

REPAIR OR BUILD YOUR OWN ANTENNAS!

6063 Aluminum Tubing

- High strength Type 6063-T832 drawn aluminum tubing
- Sections with 0.058 inch wall thickness are perfect for telescoping antenna elements
- Most sizes are pre-slit on one end for element clamps
- Available in 3 and 6 foot lengths

Aluminum Tubing, 0.058" Wall, 3 Foot Length

Part Number	Diameter/End Type	Price	Cost/Foot
DXE-AT1240	0.375", no slit	$2.70	$0.90
DXE-AT1241	0.500", one end slit	$3.30	$1.10
DXE-AT1242	0.625", one end slit	$3.60	$1.20
DXE-AT1243	0.750", one end slit	$3.90	$1.30
DXE-AT1244	0.875", one end slit	$4.20	$1.40
DXE-AT1245	1.000", one end slit	$4.50	$1.50
DXE-AT1246	1.125", one end slit	$4.95	$1.65
DXE-AT1247	1.250", one end slit	$5.55	$1.85
DXE-AT1248	1.375", one end slit	$6.15	$2.05
DXE-AT1249	1.500", one end slit	$6.75	$2.25
DXE-AT1250	1.625", one end slit	$7.65	$2.55
DXE-AT1251	1.750", one end slit	$8.40	$2.80
DXE-AT1252	1.875", one end slit	$9.15	$3.05
DXE-AT1253	2.000", one end slit	$9.90	$3.30
DXE-AT1254	2.125", one end slit	$11.40	$3.80

Aluminum Tubing, 0.058" Wall, 6 Foot Length

Part Number	Diameter/End Type	Price	Cost/Foot
DXE-AT1189	0.375", no slit	$5.40	$0.90
DXE-AT1205	0.500", one end slit	$6.60	$1.10
DXE-AT1206	0.625", one end slit	$7.20	$1.20
DXE-AT1207	0.750", one end slit	$7.80	$1.30
DXE-AT1208	0.875", one end slit	$8.40	$1.40
DXE-AT1209	1.000", one end slit	$9.00	$1.50
DXE-AT1210	1.125", one end slit	$9.90	$1.65
DXE-AT1211	1.250", one end slit	$11.10	$1.85
DXE-AT1212	1.375", one end slit	$12.30	$2.05
DXE-AT1213	1.500", one end slit	$13.50	$2.25
DXE-AT1214	1.625", one end slit	$15.30	$2.55
DXE-AT1215	1.750", one end slit	$16.80	$2.80
DXE-AT1216	1.875", one end slit	$18.30	$3.05
DXE-AT1217	2.000", one end slit	$19.80	$3.30
DXE-AT1218	2.125", one end slit	$22.80	$3.80

Aluminum Tubing, 2.000" Diameter, 0.125" Heavy Wall

Part Number	Length/End Type	Price	Cost/Foot
DXE-AT1255	3', no slit	$14.85	$4.95
DXE-AT1204	6', no slit	$29.70	$4.95

All Stainless Steel Element Clamps

DXE-ECL-020	1/2" and smaller tubing	$1.90
DXE-ECL-040	5/8" tubing	$1.90
DXE-ECL-060	3/4" and 7/8" tubing	$1.90
DXE-ECL-10SS	1" and 1 1/8" tubing	$1.90
DXE-ECL-12SS	1 1/4" tubing	$1.90
DXE-ECL-16SS	1 3/8" and 1 1/2" tubing	$1.90
DXE-ECL-20SS	1 5/8" and 1 3/4" tubing	$1.90
DXE-ECL-24SS	1 7/8" and 2" tubing	$1.90
DXE-ECL-28SS	2 1/8" and 2 1/4" tubing	$1.90
DXE-ECL-32SS	2 3/8" and 2 1/2" tubing	$1.90
DXE-ECL-36SS	2 5/8" and 2 3/4" tubing	$1.90
DXE-ECL-40SS	2 7/8" and 3" tubing	$1.90
DXE-ECL-44SS	3 1/4" maximum tubing	$1.95

65 ft. Telescopic Aluminum Tubing Kit

- 65 ft. slow taper from HD 2" O.D. base to 7/8" O.D. top
- Build your own vertical antennas or arrays
- Use with DXE Insulated Base Assemblies

DXE-ATK65 ..... $194.50

Insulated Vertical Base Assemblies for 2" O.D. Antenna Masts

Standard Base

- Tilt Base optional
- Two DXE-CAVS-1P mounting clamps required to attach base to mounting post

DXE-VE-BASE ..... Only $99.50

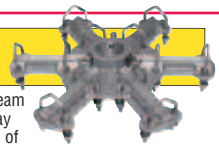
DXE-CAVS-1P	V-Saddle Clamp	$8.95
DXE-TB-3P	Tilt Base Assembly	$62.50

Heavy Duty Base

- Tilt Base included
- Two DXE-CAVS-2P mounting clamps required to attach base to mounting post

DXE-VA-BASE		$149.50
DXE-SSVC-2P	V-Saddle Clamp	$11.45

Hexagonal 5-Band HF Beam Antenna Kits



The DX Engineering Hexagonal Beam kits provide a fast, economical way to build the latest, hottest version of an antenna concept that has been around since the 1980s. Hexagonal Beam component packages provide an easy, step-by-step approach for designing your own antenna or upgrading an existing installation. The Total Antenna Packages allow you to build a complete one band or five band (20 through 10 meters) system.

New!

- Balanced in the wind—reduces torque load on the rotor
- Small turning radius—has a turning radius of 11 feet
- Light weight—less than 25 pounds fully assembled
- Can be turned with a light duty rotor—save money
- Has full length elements—no lossy coils or traps
- Requires no matching network—direct single 50 Ω coax feed
- Low noise results—approaches performance of closed loop antennas
- Good results at 20 to 30 feet above ground

DXE-HEXX-1HBP	Hub Package	$99.95
DXE-HEXX-1SCP	Spreader and Center Post Package	$199.95
DXE-HEXX-1WRP	1-Band Wire & Wire Guide Package	$75.95
DXE-HEXX-5WRP	5-Band Wire & Wire Guide Package;	$149.95
DXE-HEXX-5CFP	5-Band Coax Feeder Package	$194.95
DXE-HEXX-1TAP	1-Band Total Antenna Package	$359.95
DXE-HEXX-5TAP	5-Band Total Antenna Package	$599.95

Receive Antenna Interface for Transceivers

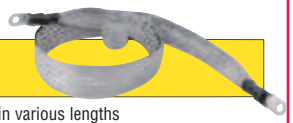
New!

Now you can add a dedicated receive antenna to HF transceivers which lack a separate RX antenna input port! The DX Engineering RTR-1 Receive Antenna Interface is a unique, multi-purpose switch unit which automatically or manually switches the RF output antenna connector on any HF transceiver between reception using a separate receiving antenna system and transmitting with a standard transmitting antenna. The RTR-1 enables operators the improved reception that a low noise receiving antenna system offers. Connection to a Beverage, receive four-square, active receive antenna, other receiving antennas and accessories is now possible.

- Heavy stainless steel enclosure
- Fast switching—QSK CW operation to 200 watts
- Supports CW full break-in
- Failsafe—prevents transmitting into receive antennas

DXE-RTR-1	Receive Transmit Relay Switch *Introductory Price*	$139.95
DXE-PSW-12D1A	AC Adapter 12VDC/1000mA	$19.99

Ground Strap Assemblies



- Three widths available in various lengths
- Ground your rig for RFI and lightning protection
- Ideal for vehicle noise reduction with mobile systems, ground radial plate or balun to antenna
- Preassembled with lugs for both #10 and 1/4" bolt sizes
- Call to order custom cable/connector assemblies

See DXEngineering.com for complete information!

Low Loss Coax Cable Assemblies

- All connectors are soldered, not crimped
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- All cable assemblies are high voltage tested to handle full rated power
- Watertight seal between connectors and coax
- Call to order custom cable/connector assemblies

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New!

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TIG-SL-CABRJ4	RJ-45 mic connector	$14.95
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TIG-SL-CAB8PD	8-pin DIN	$14.95
TIG-SL-CAB13I	13-pin DIN Icom	$19.95
TIG-SL-CAB13K	13-pin DIN Kenwood	$19.95
TIG-SL-CAB6PM	6-pin mini-DIN	$14.95
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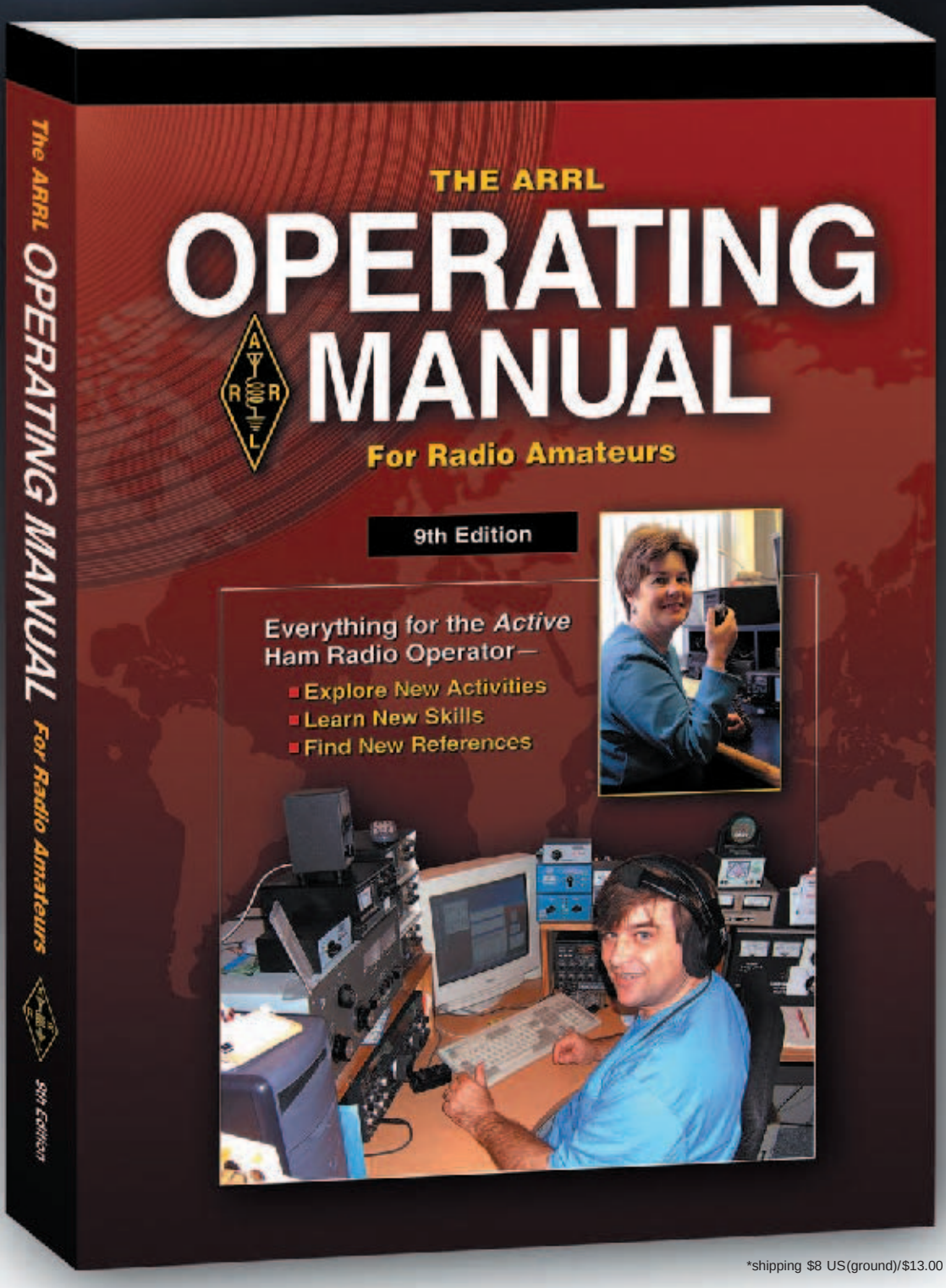

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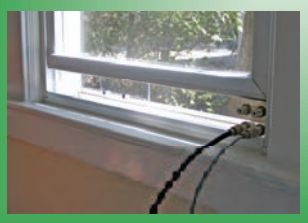

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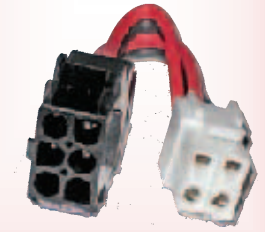
Power Cables and Connectors for ICOM, Yaesu, Kenwood, Alinco, and others. Most HF, FM Mobile, and Handheld rigs. Red/Black Zip Cord in many sizes. Hard to find plugs and cables for older radios like the Kenwood TS-520/TS-820 and Yaesu FT-747/FT-757.

Connectors and cables for many air, marine, commercial and public service radios, too!



6-Pin to 4-Pin Power Adapter

Many new HF radios, including the IC-7000, FT-450, and TS-480, are using a new 4-pin plug for DC Power. If your shack is already wired up with the "standard" 6-pin plug, this is the adapter you need. Other configurations are also available.

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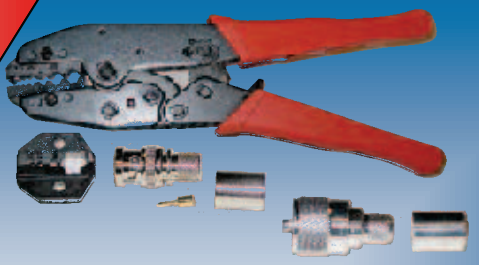

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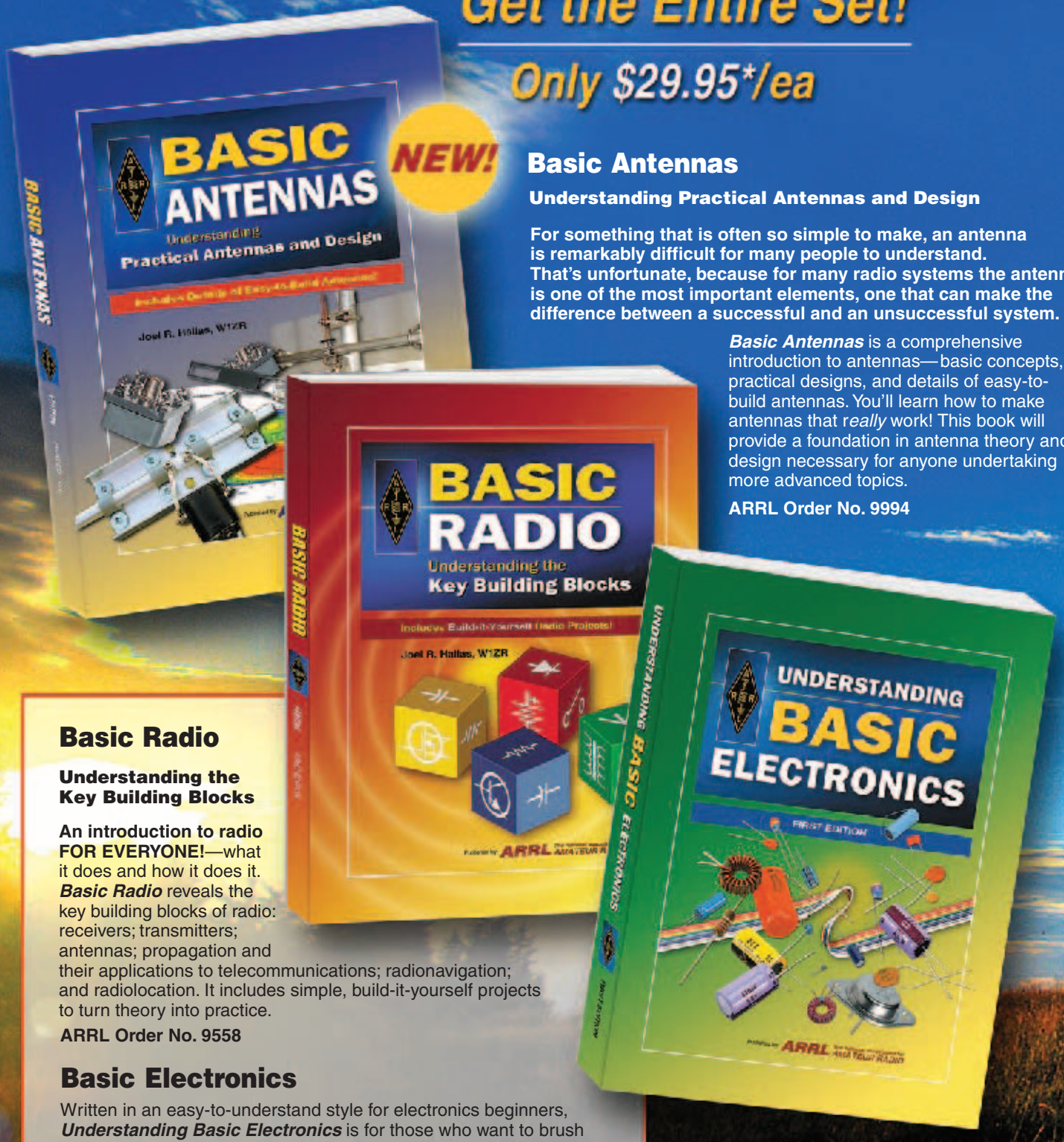

Basic Antennas

Understanding Practical Antennas and Design

For something that is often so simple to make, an antenna is remarkably difficult for many people to understand. That's unfortunate, because for many radio systems the antenna is one of the most important elements, one that can make the difference between a successful and an unsuccessful system.

Basic Antennas is a comprehensive introduction to antennas—basic concepts, practical designs, and details of easy-to-build antennas. You'll learn how to make antennas that *really* work! This book will provide a foundation in antenna theory and design necessary for anyone undertaking more advanced topics.

ARRL Order No. 9994

Basic Radio

Understanding the Key Building Blocks

An introduction to radio FOR EVERYONE!—what it does and how it does it. ***Basic Radio*** reveals the key building blocks of radio: receivers; transmitters; antennas; propagation and their applications to telecommunications; radionavigation; and radiolocation. It includes simple, build-it-yourself projects to turn theory into practice.

ARRL Order No. 9558

Basic Electronics

Written in an easy-to-understand style for electronics beginners, ***Understanding Basic Electronics*** is for those who want to brush up on electronics principles. With the foundation it helps you create, you'll be ready to learn more advanced concepts.

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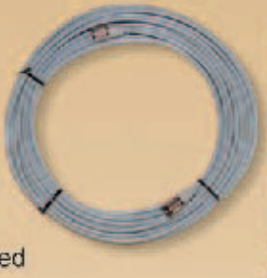

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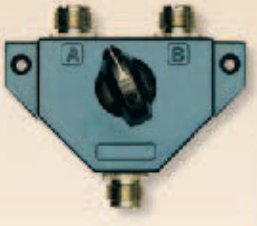

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IC-80AD

IC-V8 SPORT 2M FM HT

- TX: 144-148 • RX: 136-174 • Power: 0.5-5.5W
- AA Battery Case • Memories: 107

IC-80AD 2M/440 D-Star & FM HT

- TX: 144-148, 420-450 MHz
- RX: 0.495-999.990 MHz (cell blkd)
- Power: 5/2.5/0.5/0.1W
- Improved User Interface
- Optional HM-189GPS Speaker Mic adds GPS capabilities

IC-706 MK II-G Multimode Mobile

- TX: HF/6M/2M/440 MHz • RX: 0.03-199, 400-470 MHz
- Power: 100W (HF/6M), 50W (2M), 20W (440 MHz)
- Memories: 107 • AF-DSP • IF Shift • Preamp/attenuator
- RMK-706 included!

IC-703 PLUS

HF/6M QRP Portable Transceiver

• TX: HF/6M • RX: 0.03-60 MHz • Power: 10W @ 13.8VDC, 5W @ 9.6VDC • Memories: 105 • Built in HF automatic antenna tuner • BP-228 optional large capacity battery & AH-703 optional antenna makes this radio perfect for field day operation

IC-756PROIII HF/6M Base

- TX: HF/6M • RX: 0.03-60 MHz • Power: 5-100W
- Memories: 101 • 5 inch color screen • 32-bit floating DSP
- Real time spectrum scope • Automatic antenna tuner
- Improved 3rd order intercept point

IC-V8000 2M FM Mobile

- TX: 144-148 MHz • RX: 136-174 MHz
- Power: 75/25/10/5W • Memories: 207

ID-880H 2M/440 FM Analog & D-Star Digital Dual Bander

• TX: 144-148, 430-450 • RX: 118-173.995, 230-549.995, 810-999.99 MHz (cell blkd) • Power: 50/15/5W
- Memories: 1052 • D-Star Digital Ready
- Improved User Interface

IC-910H VHF/UHF All Mode

- TX: 144-148, 430-450 (1240-1320 with UX-910 option)
- RX: 136-174, 420-480 (1240-1320 with UX-910 option)
- Power: 5-100W on 2M, 5-75W on 440 (1-10W on 1.2 GHz with UX-910 option)
- Memories: 328 • Modes: SSB, CW, FM, FM-N
- Perfect for Satellite Operation

IC-7600 HF/6M Base

- TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
- Memories: 101 • 5.8 inch color screen
- High-resolution real time spectrum scope using a dedicated DSP unit • Automatic antenna tuner
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- Power: 5/2/0.5W • Memories: 209

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- TX: 144-148 • RX: 136-174
- Power: 5/2/0.5W • Memories: 200
- Extra large LCD display & speaker

FT-1802M 2M FM Mobile
- TX: 144-148 • RX: 136-174
- Power: 50/25/10/5W • Memories: 221

FT-2800M 2M FM Mobile
- TX: 144-148 • RX: 137-174
- Power: 65/25/10/5W • Memories: 221

FT-7800R 2M/440 FM Mobile
- TX: 144-148, 430-450 MHz
- RX: 108-520, 700-999 MHz (cell blkd)
- Power: 50/20/10/5W (2M), 40/20/10/5W (440 MHz)
- Memories: 1055 • YSK-7800 included!

FT-817ND
HF/VHF/UHF Backpack QRP
- TX: HF/VHF/UHF • RX: 0.1-56, 76-154, 420-470 MHz
- Power: 0.7-5W • Memories: 200
- Field operation with AA batteries or Ni-MH pack

FT-450 100W HF/6M Portable/Base
- TX: HF/6M • RX: 0.03-56 MHz • Power: 10-100W
- Memories: 500 • IF DSP Technology
- Selectable AGC, IF width & shift, contour, digital noise reduction, manual notch filter and clarifier
- Optional Auto Antenna Tuner (ATU-450)

FT-450AT
- The FT-450 except ATU-450 Antenna Tuner is installed

FT-950 100W HF/6M Base
- TX: HF/6M • RX: 0.03-56 MHz • Power: 10-100W
- Memories: 100 • Auto Antenna Tuner
- 32-bit Floating Point DSP • Requires 12VDC PS
- Built-in high stability TCXO • Optional DMU-2000 Data Management Unit displays various operational conditions
- Optional MTU tune units for 160M, 80/40M and 30/20M bands allowing you to pull through weak signals

FT-2000 100W HF/6M Base
- TX: HF/6M • RX: 0.03-60 MHz • Power: 10-100W
- Memories: 99 • Auto Antenna Tuner • 32-bit Floating Point DSP • Dual In-Band Receive • Internal Power Supply

FT-2000D 200W HF/6M Base
- FT-2000 except RF output is 200W and supplied power supply is external

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The FT-2000 (100 watts) and FT-2000D (200 watts) are the 2nd Generation in the proud lineage of the FTdx9000 Series! Featuring extensive DSP filtering, factory installed antenna tuner and power supply and a host of outstanding ergonomic and performance features, the FT-2000 series radios are destined to be the centerpiece of your HF/50 MHz station!

DMU2000 Data Management Unit **889.95**
FH2 Remote Keypad **84.95**
SP2000 External Speaker **175.95**
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YF122C 500 hz CW filter **159.95**
YF122CN 300 hz CW filter **164.95**

FT950

The FT-950 has been developed to fit the needs of both the casual and serious DX enthusiasts as well as new licensees desiring a top notch first radio to discover the magic of the HF and 50MHz bands. This superb radio features DSP filtering, 100 Watts of power output, factory installed antenna tuner and many of the outstanding ergonomic and performance features first introduced in our FTdx-9000 and FT-2000 flagship radios.

DMU2000 Data Management Unit **889.95**
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The FT-450(AT) is an amazing compact radio that bundles the most desirable IF DSP features of the FT-2000 and FT-950 into a convenient sized lightweight package. Suitable for home, portable, or mobile use, the economical FT-450(AT) is a rugged 100 watt HF/50MHz radio unequalled in its price class. Available with or without factory installed antenna tuner.

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FT897D

The FT-897D is a rugged, innovative, multiband, multimode portable transceiver for the amateur radio MF/HF/VHF/UHF bands. Providing coverage of the 160-10 meter bands plus the 6 m, 2 m, and 70 cm bands and it's capable of 20-Watt portable operation using internal batteries, or up to 100 Watts when using an external 13.8-volt DC power source.

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CT62 Computer Interface Cable **32.95**
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MD100A8X Desk top mic **139.95**
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YF122S 2.3 kHz SSB Filter **164.95**

FT857D

The FT-857D, the world's smallest HF/VHF/UHF mobile transceiver, provides base station-type performance from an ultra-compact package that's ideal for mobile or external battery portable work. Wide frequency coverage, outstanding receiver performance, and the convenience of optional remote-head operation make the FT-857D the expert's choice for high-performance mobile operation!

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ATAS120 Auto tuning antenna **289.95**
CT39 Packet Cable **9.95**
CT62 Computer Interface Cable **32.95**
FC30 Auto antenna tuner **189.95**
JTPS28 Jetstream Power Supply **84.95**
MH59A8J Remote Control Mic **64.95**
YF122S 2.3 kHz SSB Filter **164.95**
YSK857 Separation Kit **39.95**

FT817ND

The world's first self-contained, battery-powered, Multi-mode Portable Transceiver covering the HF, VHF, and UHF bands! Providing up to five watts of power output, designed for operation on the 160-10m HF bands, plus the 6m, 2m, and 70 cm bands.

CSC83 Soft Case **23.95**
CT39 Packet Cable **9.95**
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FNB72 Ni-Cd Battery Pack **59.95**
MH36E8J DTMF Mic **56.95**
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Heavy-Duty 144Mhz FM Xcvr, High power output, a huge, easy-to-read display, WIRES™ Internet Linking Access capability are yours with the rugged new FT-2800M!

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MLS100 External Speaker **46.95**
MX2 Hustler 2m Mag Mount **32.95**

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The FT-1802M is a ruggedly-built, high-performance 50-Watt 2-meter mobile FM transceiver with outstanding receiver performance and crisp, clean audio. Optimized for ease of operation day or night, the FT-1802M is one tough radio for operating in a tough world!

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Compact yet incredibly rugged, the VX-150 2-meter handheld is derived from our Vertex commercial transceiver line, providing exceptional receiver performance along with clean, clear transmit audio. Built to withstand the rigors of outdoor use. The illuminated keypad provides easy viewing during nighttime operation.

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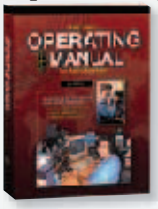

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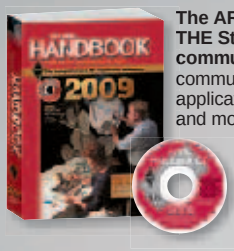

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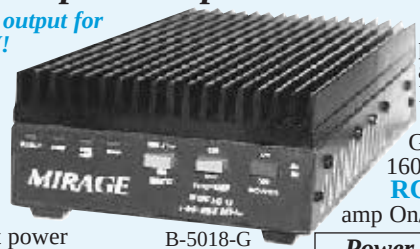
Exclusive MIRAGE *ActiveBias*™ circuit gives *crystal clear SSB* without splatter or distortion.

B-5018-G is legendary for its ruggedness and is fully protected -- high SWR or excessive input power automatically bypasses the B-5018-G to prevent damage.

Heavy-duty heatsink spans entire length of cabinet. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Has adjustable delay *RF sense* Transmit/Receive switch *and* remote external keying. 16-20 Amps at 13.8 VDC.12x3x5½ inches.



B-5018-G
$329.95

B-1018-G, $409.95. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.25-10 Watt rigs.

B-2518-G, $329.95. Same as B-5018-G but for 10 to 25 Watt mobile or base. 160 Watts out for 25 Watts in.

RC-2, $49.95. Remote Control. On/Off,pre-amp On/Off, selects SSB/FM. With 25 foot cable.

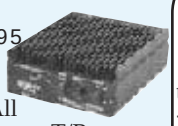
Power Curve -- typical output power in Watts

B-1018-G	25	50	140	150	160	160	--	--	--	--
B-2518-G	5	7	40	60	80	100	125	160	160	160
B-5018-G	--	2	15	25	40	50	70	100	130	160
Watts In	.25	.5	3	5	8	10	15	25	35	50

35 Watts for 2 Meter HT

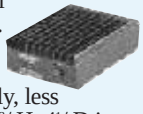
For handhelds up to 8 Watts. 35 Watts out for 3-8 Watts in (18 W out/1W in)! 18 dB *GaAsFET* preamp. All modes: FM, SSB, CW. RF sense T/R switch. Reverse polarity protection. Includes mobile bracket, 1 year warranty. 5¼Wx1¾Hx4¾D in.

B-34-G
$119.95



35 Watts, $99.95, FM only

B-34, $99.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛Wx1¾Hx4¼D in



MIRAGE Dual Band 144/440 MHz Amp

Boost your *dual band* 144/440 MHz handheld to a powerful mobile/base -- 45 Watts on 2 Meters/ 35 Watts on 440 MHz! Works with all FM handhelds to 7 Watts. Includes *full duplex* operation -- lets you talk on one band, listen on other at same time. Auto band selection, RF sense T/R switch, single connector, reverse polarity protection, 5Wx1¾Hx5D in. Mobile bracket. One year warranty.

BD-35
$179.95

100 Watts for 2M HT

100 Watts out for 2-8 Watts in! Great for HTs up to 8W. FM, SSB, CW. 15 dB *GaAsFET* preamp, RF sense T/R, high-SWR protected.

B-310-G
$229.95

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the *finest* antenna tuner made!

. . . the VECTRONICS HFT-1500

- ***High Current Roller Inductor***
- ***SSB*Analyzer Bargraph™***
- ***Cross-Needle Meter***
- ***6 Position Antenna Switch***
- ***Built-in 4:1 Balun***
- ***Gear driven Turns Counter***

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a super durable paint that won't scratch or chip.

Attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the front panel. You won't leave a mark!

Arc-Free Operation

Two 4.5 kV transmitting variable capacitors and a massive roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you quickly fly from band to band. A precision 5-digit gear driven turns counter lets you accurately retune.

HFT-1500
$479.95

Large comfortable knobs and smooth vernier drives make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

You can tune your SWR down to the absolute minimum! **Why?** Because all network components -- roller inductor and variable capacitors are fully adjustable.

Tune any Antenna

You can tune any *real* antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, Yagis, quads, long-wires, whips, G5RVs, and more.

SSB*Analyzer Bargraph™

Exclusive 21 segment bargraph lets you visually follow your instantaneous voice peaks. Has level and delay controls.

Accurate SWR/Power Meter

A shielded directional coupler and backlit Cross-Needle meter displays accurate SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

6 Pos. Ceramic Antenna Switch

Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

Built-in Balun

A heavy duty two ferrite core 4:1 balun feeds dual high voltage Delrin terminal posts for balanced lines. 5.5x12.5x12 inches. One year limited warranty.

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Order the HFT-1500 from Vectronics. Try it for 30 days. If you are not completely satisfied, return it for a full refund, less shipping and handling -- no hassles.

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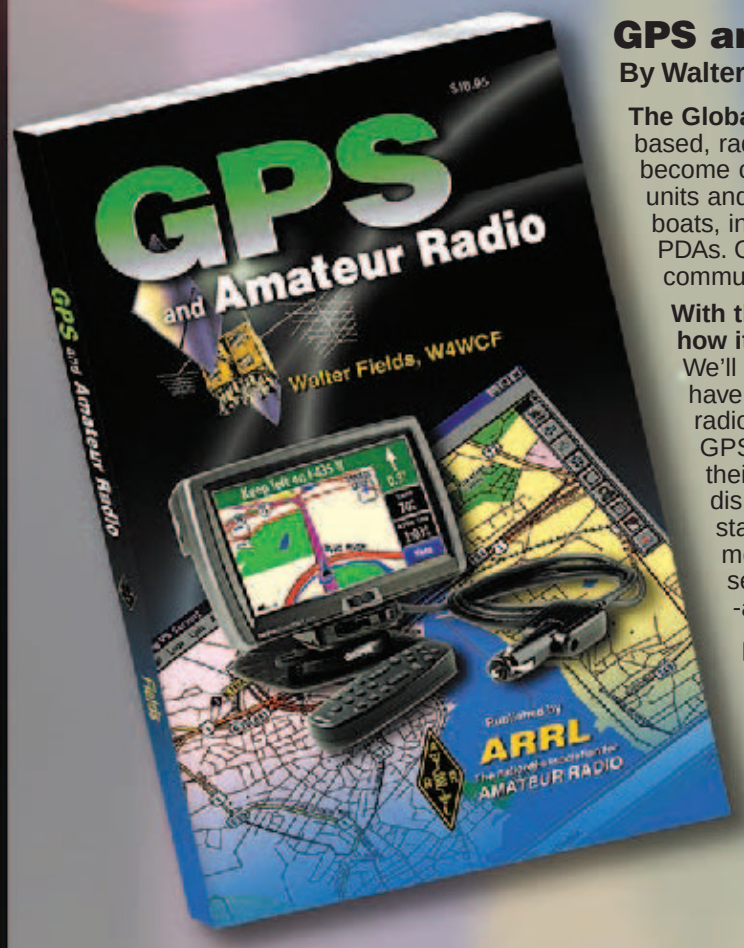
ARRL's Feature of the Month!



GPS and Amateur Radio

By Walter Fields, W4WCF

The Global Positioning System (GPS) is a satellite-based, radio navigation system. GPS devices have become commonplace in consumer electronics. GPS units and GPS technology is used in our cars, on our boats, in cell phones, in our personal computers and PDAs. GPS has improved the way we navigate, communicate, and move about the planet.

With this book, you'll explore GPS: its history, how it works, and navigating with a GPS receiver. We'll also examine how Amateur Radio operators have made use of GPS technology. A popular ham radio application is APRS. By connecting inexpensive GPS receivers to their radio gear, hams transmit their positions and other information, which is then displayed on maps at the receiving stations. The result is an effective method of direction finding for public service activities such as search-and-rescue—and for fun!

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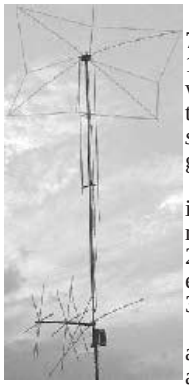
10 Bands -- 1 MFJ Antenna!

Full size performance…No ground or radials Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna . . . Separate full size radiators . . . End loading…Elevated top feed… Low Radiation Angle…Very wide bandwidth…Highest performance no ground vertical ever . . .



MFJ-1798
$299.95

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators. This forms a very large equivalent radiator and gives you incredible bandwidths. Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands. Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation. You can mount it from ground level to roof top and get awesome performance.

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ *6-Band* Halfwave Vertical Antenna

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed

MFJ-1796
$229.95

MFJ-1796, is only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments, small lots, trailers. Perfect for field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

MFJ-1796W, $229.95. WARC Band version for 12, 17, 30, 60 Meters only.

MFJ-1792, $189.95. Full size 1/4 wave radiator for 40 Meters. 33 ft., handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $209.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

6-Band, 40-2 Meters ***Rotatable*** Mini-Dipole

Low profile 14 feet . . .7 ft. turning radius . . . 40, 20, 15, 10, 6, 2 Meters…1500 Watts . . .

MFJ-1775
$249.95

MFJ-1775 is inconspicuous and low profile -- not much bigger than a TV antenna and is easily turned by a lightweight rotator like Hy-Gain's *AR-35*.

It's no Wimp! Its *directivity* reduces QRM/noise and lets you *focus* your signal in the direction you want -- work some *real* DX.

You can operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters -- and run *full 1500 Watts* SSB/CW on all HF bands!

Features automatic band switching and uses highly efficient end-loading with its *entire length* always radiating. With 6 and 2 Meters thrown-in, you have ham radio's most versatile *rotatable* dipole!

Each HF band uses a separate, efficient end-loading coil wound on fiberglass forms with *Teflon*™ wire, and capacitance hats at each end (no lossy traps). 6 and 2 meters are *full-length* halfwave dipoles.

Built-to-last -- incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing radiator. Assembles in an afternoon. Adjusting one band has little effect on other bands.

MFJ-1775W, $249.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ *80/40/20* Meter ***Rotatable*** Dipole

MFJ-1785
$369.95

Now you can operate the *low bands* on 80, 40, and 20 Meters with a true rotatable dipole that'll blend in with the sky! Take advantage of excellent low band propagation during this low sunspot cycle. Handles 1500 Watts SSB/CW. 80/40 meter end-loading coils are wound on fiberglass forms with *Teflon*™ wire, and resonated with capacitance hats to ensure an extremely low-losses. Full-size on 20 Meters gives incredible DX. Balun included! 33 ft., low-profile, inconspicuous. Easily rotatable with a medium duty rotator like Hy-gain's AR-40.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$419.95

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes. Enjoy DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you the highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning. Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

Cover 40-15 Meters MFJ-1788, $469.95. Like MFJ-1786 but covers 40-15 Meters continuous. Includes remote control.

MFJ's G5RV Antenna

MFJ-1778
$44.95

Covers all bands,160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 M as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

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MFJ . . . the world leader in ham radio accessories!

MFJ high-accuracy *Digital* SWR/Wattmeter

MFJ's high-accuracy digital SWR/Wattmeter gives you three 10-bit frequency compensated power ranges!

MFJ-826B
$179.95

New!

An optimum power range is automatically selected. Each range has full 10-bit resolution. A low range (25 Watt full scale), a mid-range (250 Watt full scale) and a high-range (1500 Watts full scale) covers the entire amateur power spectrum with high accuracy.

A built-in frequency counter selects the appropriate frequency compensated data set to insure highest accuracy for each band. It also displays your transmitted frequency and provides digital frequency readout for older rigs and QRP rigs such as MFJ-9420/9040/9340.

True peak or average forward and reflected power, SWR and frequency are *simultaneously* displayed.

Bargraphs makes tuning antenna tuners, amplifiers and transmitters easy. You can select bargraphs to display forward and reflected power *or* forward power and SWR *or* SWR only.

MFJ's PeakHold™ freezes high-est forward power displayed (bar segment also) for 1, 2 or 3 seconds.

MFJ's *TrueActive*™ peak reading circuit gives you *true* peak or average power.

When SWR is greater than 1.5 to 3 (selectable) an alarm LED lights and buzzer sounds.

Has large high-contrast *backlit* LCD display.

Use 12 VDC or 110 VAC with optional MFJ-1312D, $15.95. 6½Wx2⅝Hx6D inches.

MFJ *giant* SWR/Wattmeter

World's *largest HF SWR/Wattmeter has giant 6½ inch meter!*

This one you can SEE! Extra-long scales gives you highly accurate SWR and power measurements. Huge numbers makes reading easy across your shack.

Like your analog watch, one glance at the meter needle gives you fast and accurate readings without actually reading the scale.

MFJ's exclusive *TrueActive*™ peak reading circuit captures *true* peak or average forward and reflected power readings.

Has 20/200/2000 Watt ranges for accurate QRP or QRO operation.

MFJ-868
$149.95

Exclusive MFJ Wattmeter *Power Saver*™ circuit turns on meter only when RF power is being measured.

Covers 1.8-30 MHz. Use 9 volt battery or 12 VDC or 110 VAC with MFJ-1312D, $15.95. 7Wx5½Hx5D in. SO-239 connectors.

New!
Giant 144/220/440 MHz SWR/Wattmeter
MFJ-867, $159.95. Like MFJ-868 giant SWR/Wattmeter, but covers 144/220/440 MHz.

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$59.95

Lighted 3" Cross-Needle Meter, SWR/Watts, 1.8-200 MHz, Fwd/Ref pwr, 30/300W. Compact.

MFJ-862
$59.95

Lighted Cross-Needle Meter, SWR/Watts, 144/220/440 MHz, 30/300 Watts Fwd, 60/6 W Ref.

MFJ-864
$99.95

Lighted Cross-Needle,SWR/Watts, 1.8-60/144/440 MHz, 30/300W Fwd, 6/60W Ref. Hook up HF&VHF/UHF rigs.

MFJ-815C
$109.95

Lighted 3" C/N Meter, SWR/Watts, 1.8-30 MHz, 300/3000W Fwd, 60/600W Ref. True Peak.

MFJ-812B
$39.95

VHF SWR Wattmeter, 2M/220 MHz, built-in field strength meter, Fwd/Ref, Pwr in 2 30/300W ranges.

MFJ-4416 *Super* Battery Booster

Boost battery voltage as low as 9 Volts back up to 13.8 VDC! Keeps your transceiver at full power output, compensates for run down battery, wiring voltage drop, car off . . .

MFJ-4416
$139.95

Boost battery voltage as low as 9 Volts back up to 13.8 VDC! Keeps your transceiver at full power output, provides full performance/efficiency, prevents output signal distortion and transceiver shutdown. Compensates for run-down battery, wiring voltage drop or when car is off. Provides up to 25 Amps peak with 90% efficiency. Selectable 9/10/11 Volts minimum input voltage prevents battery damage from over-discharging. RF sense turns MFJ-4416 off during receive to save power and increase efficiency. Adjustable 12 to 13.8 VDC output pass-through voltage improves efficiency and lets transceiver run cooler. Has output over-voltage crowbar protection. *Anderson PowerPoles*® and high-current 5-way binding posts for DC input, regulated output. 7¾Wx4Hx2⅛D inches.

100 Watts SSB from cigarette lighter socket!

MFJ-4403
$119.95

4-Farad capacitors supply 25 Amps needed for 100 Watts SSB peaks and replenished by 10 Amps average from cigarette lighter socket. Protects against reverse/over voltage, voltage transients, short circuits. Provides super noise/ripple filtering.

MFJ AC Line RFI Filter

Eliminate obnoxious power line and computer hash and noise by 6 S-units!

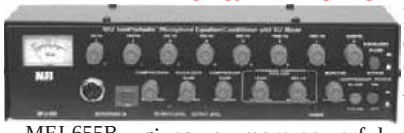
MFJ-1164B
$79.95

Filters and reduces AC power line RFI, hash, noise, transients, surges generated by computers, motors, RF transmitters, static/lightning by 30 db and up to 60-80 dB with a good earth ground. Super fast, *nano-second* overvoltage protection. Four 3-wire 15A, 120VAC outlets.

Transceiver Surge Protector

MFJ-1163, $69.95. Protects your expensive transceiver from damaging power surges. Capacitive decoupling and *ultra-fast* MOVs protection. 4 AC outlets.

MFJ all-in-one *Transmit Audio Console*



MFJ-655B
$219.95

MFJ all-in-one *Transmit Audio Console* gives you an *8-Band Equalizer* for full quality ragchewing audio *or* powerful, pileup penetrating speech . . . Adjustable *Noise Gate* gives you transparent, back-ground noise reduction . . . Clean low-distortion *Compressor* gives you more powerful, richer, fuller sounding speech and higher average power SSB . . . Smooth *Limiter* keeps audio peaks from over-driving your transmitter, prevents SSB distortion and splatter. *Universal Mic-Interface* lets you use any microphone with any transceiver. Has low-noise preamp, mic voltages, PTT jack, impedance matching, level controls, RF/audio isolation, VU meter, headphone monitor, auxiliary input.

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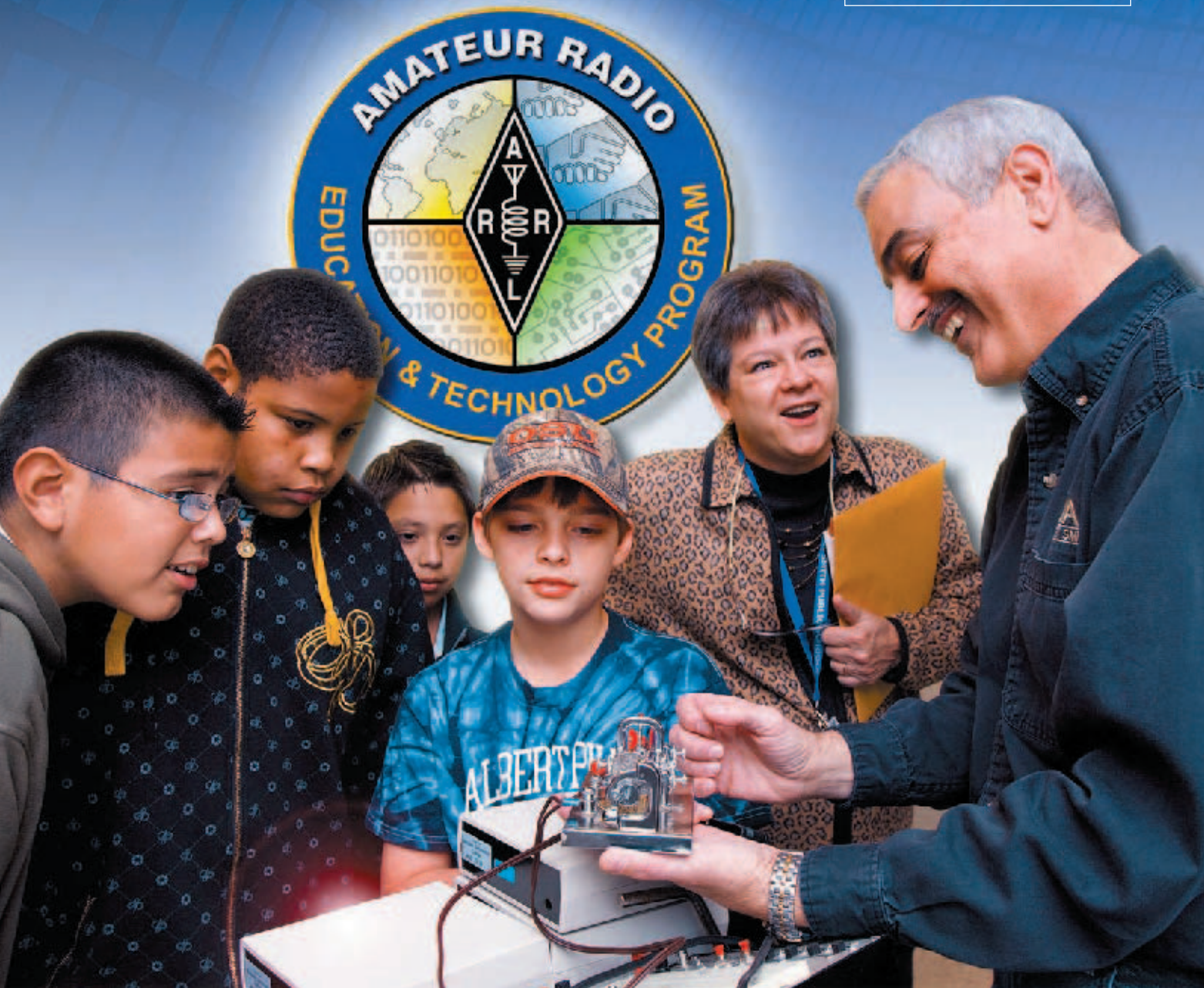

MFJ *IntelliTuner*™ Automatic Tuners

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-998 1500 Watt *Legal Limit IntelliTuner*™

Only the MFJ-998 gives you fully automatic antenna tuning for your legal limit full 1500 Watts SSB/CW linear amplifier!

MFJ-998 $699.95

Ultra-fast Automatic Tuning

Instantly match impedances from 12-1600 ohms using MFJ's exclusive *IntelliTune*™, *Adaptive Search*™ and *InstantRecall*™ algorithms with over 20,000 *VirtualAntenna*™ Memories.

Safe auto tuning protects amp

MFJ's exclusive *Amplifier Bypass Control*™ makes tuning safe and "stupid-proof"!

Digital/Analog Meters

A *backlit* LCD meter displays SWR, forward/reflected power, frequency, antenna selected, an auto-ranging bargraph power indication, and much more.

Has quick-glance auto-ranging Cross-Needle SWR/Wattmeter.

MFJ VirtualAntenna™ Memory

MFJ new *VirtualAntenna*™ Memory system gives you 4 antenna memory banks for *each* of 2 switchable antenna coax connectors. Select up to 4 antennas on each antenna connector. Each antenna has 2500 memories, 20,000 total. Has binding post for end-fed long wire antennas.

Download & Upgrade Remotely

Download from internet and upgrade your MFJ-998 firmware as new features are introduced.

Plus Much More!

Built-in radio interface controls most transceivers.

Automatically bypasses with excessive tuning power.

Use balanced line antennas with external **MFJ-912, $59.95**, 1.5 kW 4:1 balun.

Small 13Wx4Hx15D inches easily fits into your ham station. 8 pounds. Requires 12-15VDC at 1.4 amps maximum or 110 VAC with **MFJ-1316, $21.95**.

for 600 Watt amps

AL-811/ALS-600/ALS-500

MFJ-994B $359.95

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.

***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.

300 Watt...Best Seller

Digital Meter, Ant Switch, Balun

MFJ-993B $259.95

The *world's best selling* automatic antenna tuner is *highly acclaimed the world over* for its ultra high-speed, wide matching range, reliability, ease-of-use! Matches virtually *any* antenna.

300 Watt *Extra*...Wide Range

SWR/Wattmeter, 10000 VA Memories

MFJ-991B $219.95

Extra *wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

200 Watt ...Compact

Digital Meter, Ant Switch, Wide Range

MFJ-929 $219.95

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.

200 Watt ...Econo

Small, Ant Switch, 20K VA Memories

MFJ-928 $199.95

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.

200 Watt *MightyMite*™

Matches IC-706, FT-857D, TS-50S

MFJ-925 $179.95

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!

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.

Free MFJ Catalog

Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

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300 Industrial Pk Rd, Starkville, MS 39759 **PH:** (662) 323-5869
Tech Help: (662) 323-0549
FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. ***Add shipping.***

http://www.mfjenterprises.com for instruction manuals, catalog, info

MFJ-989D 1500 Watt *legal limit* Tuner

World's most popular 1500 Watt Legal Limit Tuner just got better -- much better!

MFJ-989D
$389.95

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter with no price increase. Easily handles *full* 1500 Watts SSB/CW over 1.8-30 MHz.

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.

New high voltage *current balun* lets you tune balanced lines at high power -- 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.

MFJ *Differential-T™* *1.5kW* Tuner

MFJ-986
$349.95

Simple two knob tuning makes antenna tuning foolproof and easier than ever! Handles 1.5 kW PEP SSB/CW amplifier output, 1.8-30 MHz. *AirCore™* roller inductor, *Differential-T™* capacitor, lighted peak/average Cross-Needle SWR/Wattmeter, Six position antenna switch, balun. $10^{3}/4$Wx$4^{1}/2$Hx15D".

MFJ *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, Six position antenna switch, balun, Lexan front panel, 1.8-30MHz. $10^{3}/4$x$4^{1}/2$x$10^{7}/8$ in.

MFJ *Fully Balanced* *1.5 kW* Tuner

MFJ-976
$499.95

MFJ-976 is a *fully balanced* wide range (12-2000 Ohms) antenna tuner that gives you *superb* current balance. Handles *full* 1.5kW SSB/CW, 1.8-30 MHz. Tunes *all* balanced lines -- 600 Ohm *open wire* line, 450/300 Ohm *ladder* lines, 300/72 Ohm *twin lead*. Also tunes wires/coax fed antennas. Cross-Needle meter.

MFJ 2500 Watts *ContinuousCarrier™* Tuner

Silver plated Edge-Wound Roller Inductor . . .1000/500 pF Variable Capacitors . . . Antenna Switch . . . 4-Core Balun . . . true Peak Cross-Needle Meter . . . Dummy Load . . . Extremely Wide Matching Range . . .

MFJ-9982
$699.95

The MFJ-9982 ContinuousCarrier™ antenna tuner handles 2500 Watts continuous carrier output on all modes and all HF bands into most unbalanced antennas -- even on 160 Meters where even the best antenna tuners fail!

The MFJ-9982 gives you every feature you'll ever want in a high power tuner -- wide matching range, 1.8 to 30 MHz coverage, 6-position antenna switch, 4-core balun, dummy load, true peak/average lighted SWR/Wattmeter, 6:1 reduction drives with detailed logging scales, 3-digit turns counter, extra large knobs.

New Components, New Technologies

The *Heart and Soul* of the MFJ-9982 is its roller inductor and variable capacitors.

MFJ's high power, high-Q *continuous current AirCore™* roller inductor is no ordinary roller inductor! It's edge wound from thick .06-inch *silver-plated* solid copper strap.

It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn up ordinary roller inductors.

Self-insulating construction reduces stray capacitance -- keeps self-resonant frequencies high and out-of-the-way. Dual, *silver-plated* compression wheels give ultra low-resistance contacts. New fast-tune crank knob.

High-current, *high-capacitance* 1000 pF and 500 pF air variable capacitors have low minimum capacitance and are self-insulating.

These newly developed air variable capacitors give you *very high efficiency* on 160/80 Meters *and* MFJ's patent pending innovation gives you *extremely wide matching range* on 10/12/15 Meters at 2500 Watts -- a feat *only* the MFJ-9982 has achieved.

Hi-Voltage/Current Antenna Switch

The antenna switch is completely isolated to handle high-voltage, high impedance antennas. High-current, low impedance antennas are handled by parallel sets of high-current contacts of *two* ceramic switches.

New 4-Core Balun

Powerful balun -- Four $2^{1}/2$ inch cores, 12-gauge *Teflon™* wire. Run balanced lines at full 2500 Watts SSB/CW continuous, 24/7.

New Balanced Line Feed-Thru Insulator

Allows massive transmitter currents to flow directly to the antenna without passing through lossy screws or bolts.

TrueActive™ Peak Reading Circuit

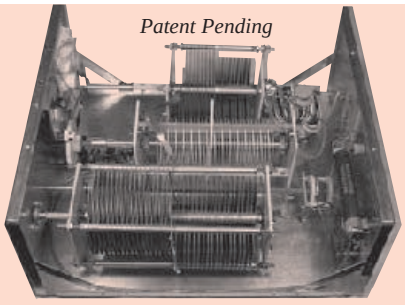
New *TrueActive™* circuit reads *true* peak or average power on all modes. *Cross-Needle* meter reads SWR/forward/reflected power.

1500 Watt Dummy Load

1500 Watt air-cooled non-inductive 50 Ohm resistor. 100W/10 min., 1.5kW/10 sec.

New Cabinet maintains high Q

New roomy cabinet maintains high Q. Vent holes. Heavy gauge, .08 inch aluminum braced chassis. Vinyl cover, non-stripping PEM nuts, heavy 10-gauge and copper strap wiring throughout. $13^{3}/4$Wx7Dx$16^{1}/4$D inches. 15 pounds.



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MFJ . . . The World Leader in Ham Radio Accessories

MFJ-259B *1.8-170 MHz* SWR Analyzer

World's most popular SWR analyzer is super easy-to-use

Reads SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . frequency counter . . . side-by-side meters . . . Battery charger . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . .

World's most popular SWR analyzer! The famous MFJ-259B gives you a complete picture of your antenna's performance. You can read your antenna's SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously.

You can 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.

It has built-in frequency counter, Ni-MH/Ni-CD charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance from HF to VHF -- 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Call your favorite dealer for your best price!

MFJ-259B $289.95

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and more!

Free Manual: call, write or download

MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1312D, $15.95. Its rugged all metal cabinet is a compact 4x2x6¾ in.

How good is the MFJ-259B?

MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

More MFJ SWR Analyzers™

MFJ-249B, $269.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $159.95. Like MFJ-249B but SWR meter only. No LCD/frequency counter.

MFJ-219B, $119.95. UHF *SWR Analyzer* covers 420-450 MHz. External frequency counter jack. 7½x2½x2¼ in. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $24.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Takes guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*.

Genuine MFJ Carrying Case

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories. Made of special foam-filled fabric -- 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 so you can use your MFJ *SWR Analyzer*™ without taking it out of your case.

MFJ-99, $60.85. Accessory Package for MFJ-259/B/249/B/209. Includes MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1312D 110VAC adapter. ***Save $5!***

Tunable Measurement Filter

MFJ-731, $99.95. *Exclusive* MFJ tunable RF filter allows accurate SWR and impedance measurements 1.8-30 MHz in presence of strong RF fields. Virtually no effect on measurements. Works with *all* SWR Analyzers.

MFJ *No Matter What*™ warranty

MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

Free MFJ Catalog

Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

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1.8-170 MHz *plus* 415-470 MHz SWR Analyzer

All-in-one handheld antenna test lab lets you quickly check/tune HF, VHF, ***UHF*** antennas anywhere. Measures: SWR, Return Loss, Reflection Coefficient, R, X, Z, Phase Angle, Coax cable loss, Coax cable length, Distance to short/open in coax, Inductance, Capacitance, Resonant Frequency, Bandwidth, Q, Velocity Factor, Attenuation, more!

MFJ-269 $389.95

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More hams use MFJ SWR Analyzers™ than any others in the world!

MFJ Dummy Load/Wattmeter

1.5 kW Dry Dummy Load has built-in precision, true peak-reading SWR/Wattmeter switchable to external antenna!

MFJ-267
$159.95

World's most versatile 1.5 kW dummy load has a *built-in* true peak reading SWR/Wattmeter that you can switch and use independently!

You'll find tons of uses!

Tune up your transceiver, linear amplifier or antenna tuner into a safe 50 Ohm dummy load at *full power*. Then instantly switch to your antenna and monitor SWR, forward and reflected power.

Use for testing/tuning transmitters, transceivers, amplifiers, antenna tuners, baluns, transformers, filters, matching networks, coax, stubs, transmission lines and antennas.

The 50-Ohm dry dummy load works DC to 60 MHz. SWR is below 1.3:1 at 30 MHz. Can handle 100 Watts for ten minutes or 1500 Watts for ten seconds. Comes with power derating curve.

Extra-large three-inch lighted Cross-Needle meter reads SWR (1:1 to 8:1), forward and reflected power *simultaneously*.

Reads *true peak* PEP or average power on 300/3000 Watts forward and 60/600 Watts reflected power ranges 1.8-54 MHz.

High accuracy comes from a carefully designed directional coupler, an accurate active-peak reading circuit and a precision d'Arsonval meter movement.

RF tight perforated aluminum cabinet. 4½Wx3½Hx10½D inches. Uses 12 VDC or 120 VAC with **MFJ-1312D, $15.95.**

MFJ HF/VHF/UHF Dummy Loads

Dry 300 Watt *HF /VHF* Dummy Load

MFJ-260C
$39.95

Air-cooled, non-inductive resistor in a perforated metal housing; Has SO-239 connector. Full load for 30 seconds. Silk-screened derating curve to 5 minutes. Handles 300 Watts. SWR is below 1.1:1 to 30 MHz, 1.5:1 from 30 to 650 MHz. Compact 2¼x2¼x7 inches.

MFJ-260CN, $49.95. With type "N" connector.

Dry 1.5 kW *HF/VHF/UHF* Dummy Load

MFJ-264
$74.95

Ham radio's most versatile 50 ohm *dry* dummy load. Works with all radios from 160 Meters through 650 MHz. SWR below 1.3 to 650 MHz and below 1.1 at 30 MHz. Handles 100 watts for ten minutes, 1500 Watts for 10 seconds. 3Wx3H x9D inches. Has SO-239 connector.

MFJ-264N, $84.95. With type "N" connector.

Oil-Cooled 1 KW CW, 2 KW SSB VersaLoad™

MFJ-250X
$49.95

Run 1KW CW or 2 KW PEP for 10 minutes. Run *continuous duty* with 200 Watts CW or 400 watts PEP. Transformer oil not included. Low VSWR to 400 MHz. Under 1.2:1 to 30 MHz. SO-239 connector. Safety vent with cap, carrying handle. 7½Hx6⅝D inches.

MFJ-250, $69.95. Includes transformer oil (no PCB).

3 GHz, 300 Watts Dry Dummy Load

MFJ-263
$99.95

New high-tech metal film resistor gives low SWR up to 3 GHz at 300 Watts! Mounted on large heavy-duty air-cooled heatsink. SWR is less than 1.1 DC to 1 GHz, 1.2 at 1.5 GHz and 1.5 at 3 GHz. Handles 125 Watts *continuous* and 300 Watts for ten seconds. High quality *Teflon*® N connector. 10¾Wx2¼Hx5¼D in. New!

MFJ Frequency Counters

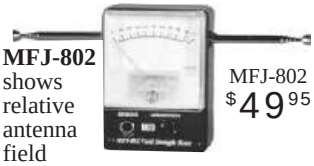
MFJ-886
$129.95

MFJ-886 covers 1 MHz to 3 GHz with 300 MHz direct count, 0.1 Hz resolution. 4 gate times. 10-digit high-contrast 3/4 inch LCD display. Lock display button. Bargraph shows RF field strength. Includes rechargeable Ni-Cad batteries, charger, telescopic antenna. Black anodized aluminum. 2¾x2¼x1¼ inches.

MFJ-888
$199.95

MFJ-888, like MFJ-886, but covers *10 Hz*-3 GHz. Measures frequency/ period, has 50/1M Ohm input, auto hold, LED backlight, beeper. 2¾x4¼x1¼ inches

Field Strength Meters



MFJ-802
$49.95

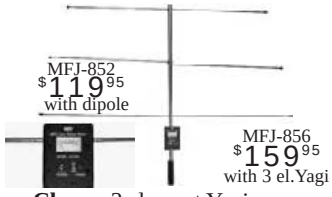
MFJ-802 shows relative antenna field strength. Use to determine radiation pattern. Has large 3 inch meter. Telescoping *dipole* reduces influence of surrounding objects and is more reliable and repeatable than monopole. Sensitivity control. Jack for remote sensor.

MFJ-802R, $34.95.

MFJ-801
$29.95

MFJ-801 has 1¾ inch meter, sensitivity control, 20 inch extended telescoping monopole antenna.

Find Power Line Noise fast!



MFJ-852
$119.95
with dipole

MFJ-856
$159.95
with 3 el.Yagi

Choose 3 element Yagi or compact telescoping dipole to quickly pinpoint noise. Walk or drive with these handheld, directional noise finders to search out leaky insulators, loose hardware and corroded ground lines quickly. Track noise directly to pole, transformer, insulator or others. Has field-strength meter, headphone jack to listen or record. Operates in optimum 135 MHz region. Sensitive .3uV receiver, 70 dB AGC.

81 dB Step Attenuator

MFJ-762
$89.95

81 dB Attenuator in 1 dB steps. 50 Ohms. Usable to 500 MHz. 250 milliwatt maximum input. BNC connectors. Shielded stages. Connect between receiver and antenna and use S-meter as a precision calibrated field strength meter. Prevent receiver blocking, cross-modulation. Determine gain/loss, ideal for fox hunting. Evaluate linearity. Isolate circuits. Extend range of sensitive equipment. Measure input/output level differences.

Compact Cross-Needle SWR/Wattmeters

MFJ-822
$59.95

MFJ-822, $59.95. Large 3-inch *lighted* Cross-Needle meter covers 1.8-200 MHz in 2 power ranges: 30/300 Watts. Read forward, reflected power, SWR *simultaneously*. Compact 3¼Wx3¼H x3¼D inches takes little space. Perfect for home, mobile or portable use. SO-239 connectors. Use 12 VDC for lamp (cable included).

MFJ-842, $59.95. Like MFJ-822, but covers 140-525 MHz, 15/150 Watt ranges.

25-1300 MHz Discone Antenna

MFJ-1868
$59.95

Ultra wide-band antenna receives 25-1300 MHz. Perfect for scanners. Transmit 50-1300 MHz. Handles 200 Watts. Ideal for 6/2/1¼ Meters, 70/33/23 CM ham bands. Excellent for testing various transmitters on single coax. SO-239, 50 feet coax, stainless steel elements.

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MFJ *Pocket size* Morse Code Reader™

Hold near your receiver -- it instantly displays CW in English! Automatic Speed Tracking . . . Instant Replay . . . 32 Character LCD . . . High-Performance Modem . . . Computer Interface . . . Battery Saver . . . More!

Is your CW rusty?

Relax and place this tiny pocket size MFJ Morse Code Reader near your receiver's speaker . . .

Then watch CW turn into solid text messages as they scroll across an easy-to-read LCD display.

No cables to hook-up, no computer, no interface, nothing else needed!

Use it as a backup in case you mis-copy a few characters - - it makes working high speed CW a breeze - - even if you're rusty.

Practice by copying along with the MFJ-461. It'll help you learn the code and increase your speed as you instantly see if you're right or wrong.

Eavesdrop on interesting Morse code QSOs from hams all over the world. It's a universal language that's understood the world over.

MFJ *AutoTrak*™ automatically locks on, tracks and displays CW speed up to 99 Words-Per-Minute.

Simply place your MFJ-461 close to your receiver speaker until the lock LED flashes in time with the CW. Digs out weak signals. Phase-Lock-Loop even tracks slightly drifting signals.

MFJ-461 $89.95

Of course, nothing can clean up and copy a sloppy fist, especially weak signals with lots of QRM/QRN.

The MFJ-461's serial port lets you display CW text full screen on a bright computer monitor -- just use your computer serial port and terminal program.

When it's too noisy for its microphone pickup, you can connect the MFJ-461 to your receiver with a cable. A battery saving feature puts the MFJ-461 to sleep during periods of inactivity. It wakes up and decodes when it hears CW.

Uses 9 Volt battery. Fits in your shirt pocket with room to spare - smaller than a pack of cigarettes. Tiny $2^1/_4$x$3^1/_4$x1 inches. $5^1/_2$ ounces.

Super easy-to-use! Just turn it on -- it starts copying instantly!

MFJ-26B, $9.95.

Soft leather protective pouch. Clear plastic overlay for display, push button opening, strong, pocket/belt clip secures MFJ-461.

MFJ-5161, $16.95. MFJ-461 to computer serial port cable (DB-9).

MFJ-5162, $7.95. Receiver cable connects MFJ-461 to your radio's external speaker 3.5 mm jack.

MFJ-5163, $10.95. Cable lets you use external speaker when MFJ-461 is plugged into radio speaker jack. 3.5 mm.

MFJ Morse Code *Reader and Keyer* Combination

Plug MFJ's CW Reader with Keyer into your transceiver's phone jack and key jack.

Now you're ready to compete with the world's best hi-speed CW operators -- and *they won't even know you're still learning the code!* Sends and reads 5-99 WPM.

Automatic speed tracking. Large 2-line LCD shows send/receive messages. Use paddle or computer keyboard.

Easy menu operation. Front panel speed, volume controls. 4 message memories, type ahead buffer, read again buffer, adjustable weight/sidetone, speaker. RFI proof.

MFJ-464 $199.95 *(Keyboard, paddle not included.)*

MFJ-551, $39.95. RFI suppressed keyboard, a must to avoid RFI problems.

MFJ Iambic Paddles

MFJ-564 Chrome
MFJ-564B Black
$69.95

MFJ *Deluxe Iambic Paddles*™ feature a full range of adjustments in tension and contact spacing. Self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. Works with all MFJ and other electronic keyers.

***Miniature* Travel Iambic Paddle**

MFJ-561, $24.95. $1^3/_4$W x $1^3/_4$D x $^3/_4$H inches. *Formed* phosphorous bronze spring paddle, stainless steel base. 4 ft. cord, 3.5 mm plug.

MFJ Code Oscillator

MFJ-557 $39.95

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base -- stays put on your table! Portable. 9-Volt battery or 110 VAC with MFJ-1312D, $15.95. Earphone jack, tone and volume controls, speaker. Adjustable key. Sturdy. $8^1/_2$x$2^1/_4$x$3^3/_4$ inches.

MFJ-550, $14.95. Telegraph Key Only with adjustable contacts. Handsome black.

MFJ *Pocket* Morse Tutor

Learn Morse code anywhere with this tiny *MFJ Pocket-sized Morse Code Tutor*™! Practice copying letters, numbers, prosigns, punctuations or any combination or words or QSOs. Follows ARRL/VEC format. Start at zero code speed and end up as a high speed *CW Pro!* LCD, built-in speaker.

MFJ-418 $89.95

MFJ *ClearTone*™ Speaker

MFJ-281, $12.95. Makes copying easier, enhances speech, improves intelligibility, reduces noise, static, hum. 3" speaker, 8 Watts, 8 Ohms.

MFJ 24/12 Hour Station Clock

MFJ-108B, $21.95. Dual 24/12 hour clock. Read UTC *and* local time *at-a-glance.* High-contrast 5/8" LCD, brushed aluminum frame. Batteries included. $4^1/_2$Wx1Dx2H in.

MFJ Deluxe CW Keyer

Deluxe MFJ Keyer has all controls on front panel for easy access -- speed, weight, tone, volume knobs, and tune, semi/auto, on/off push-buttons. You get all keyer modes, dot-dash memories, self completing dots and dashes, jam-proof spacing, sidetone, built-in speaker, type A or B keying. RF proof. Solid state keying. 7x2x6 in.

MFJ-407D $79.95

MFJ-401D, $69.95. MFJ Econo Keyer II has front-panel volume/speed controls (8-50 wpm), tune switch. Internal adjust weight, tone. Solid state keying. Tiny 4x2x$3^1/_2$ in.

Keyer/Paddle Combo

MFJ-422D $189.95

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As we get older, high frequency hearing loss reduces our ability to understand speech. Here's why . . .

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To dramatically improve your ability to understand speech, you must:

First, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

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The MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

A balance control and separate 2½ Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

By boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

Even if you *don't* have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more.

Here's what *QST* for April, 2001 said . . . *"I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . ."*

Immuned to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch. 10Wx2½Hx6D". Needs 12 VDC.

MFJ-1316, $21.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

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Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" . . . Contest by pressing a few buttons and save your voice.

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You can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by the *Stop Button*, your microphone's PTT/VOX, remote control or computer.

Has jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

Your mic's audio characteristics do not change when your MFJ-434B is installed.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

New! **It's** easy to use -- just plug in your 8 pin round or modular mic plug, set the internal jumpers for your transceiver and plug in the appropriate (included) cable for your rig.

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MFJ-73, $34.95. MFJ-434B Remote Control with cable.

60 dB Null ***wipes out*** noise and interference

MFJ-1026
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Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network.* You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, $15.95. 6½x1½x6¼ in.

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An Open Letter to ARRL Members...

We live in interesting—and very challenging—times. Each morning the news brings us new financial concerns. However, I want to reassure you that your ARRL is sound and totally devoted to serving you.

Thank you for your loyalty as a member. Your voice and support, added to thousands of hams, keeps the ARRL strong and steady.

Your participation in ARRL enables us to represent and serve you as we have since 1914. The traditions of ARRL and Amateur Radio are rich indeed.... and your continuing support keeps those cherished traditions alive—and helps us open the doors to new opportunities.

Become part of the Diamond Club and invest in our flexibility to apply your contribution where it is needed most—in the ARRL Lab, at W1AW, to protect our frequencies or to provide services and programs to support Amateur Radio.

It's a question of the personal responsibility we have for each other and for the continuing health and strength of ARRL. I am confident that you will do your part and be as generous as you are able.

Thank you! I look forward to welcoming you into the Diamond Club by mail, by phone or on the web at: **www.arrl.org/diamondclub**.

73,

Mary

For more information, contact:

Mary M. Hobart, K1MMH
Chief Development Officer
ARRL
225 Main Street
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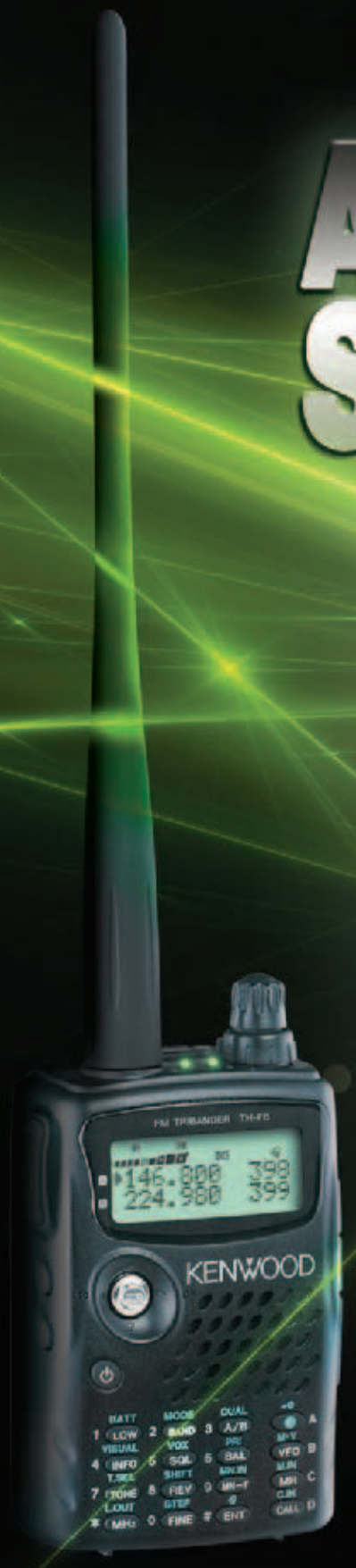

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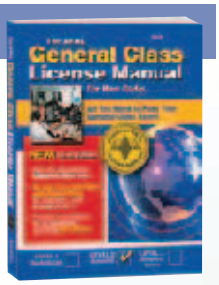

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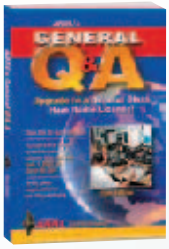

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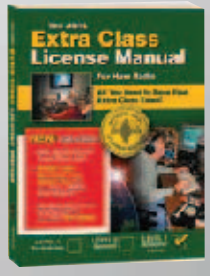

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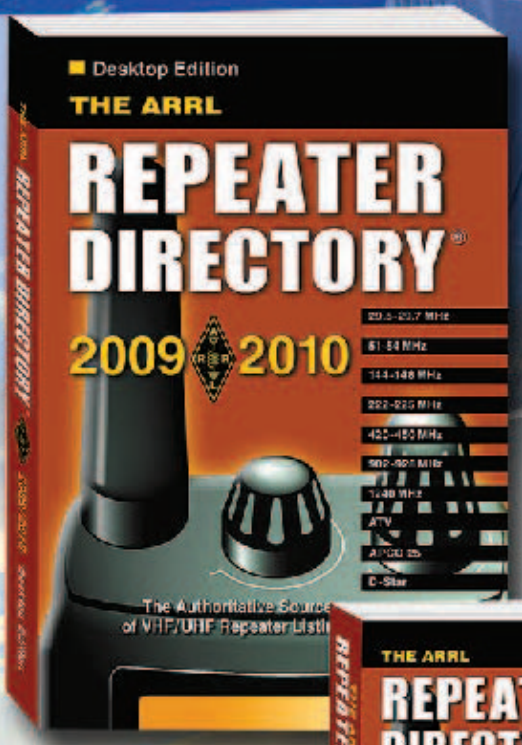

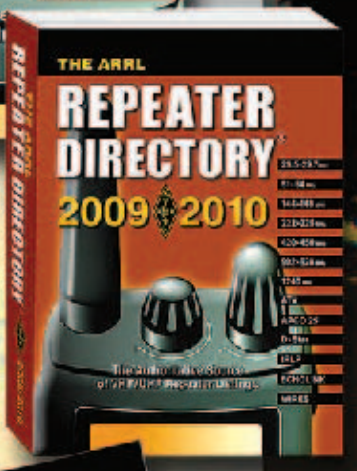

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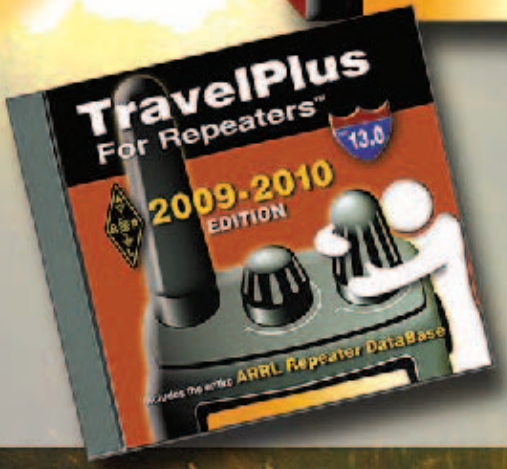

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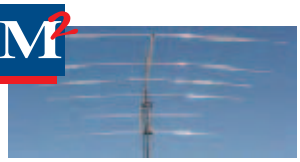

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