QST

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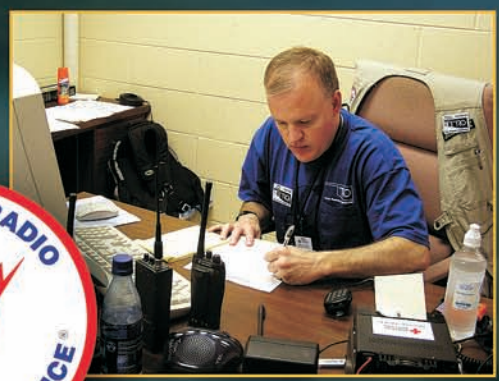
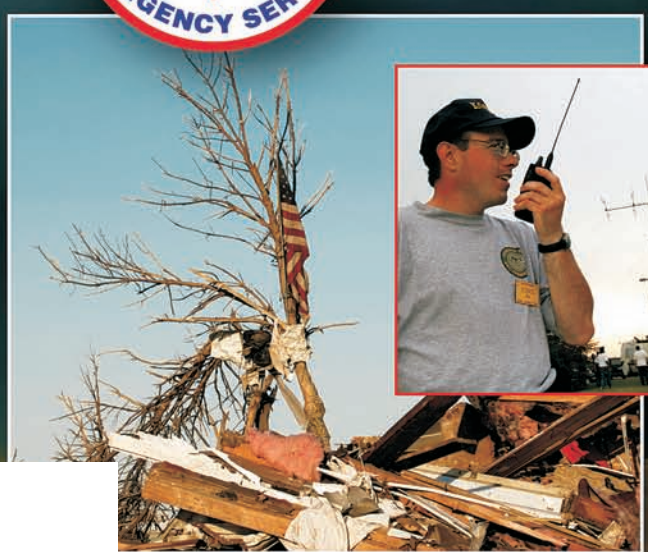
September 2009 WWW.ARRL.ORG

Special Emergency Communications Issue!

QST reviews:

Inside:





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The only other accessory you might want (but won't need).

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The ultimate in amateur radio.

IC-PW1

- 1kW HF/50MHz linear amplifier
- Remote the control head, or leave attached to main unit
- Auto antenna tuner
- 4 Antenna connectors
- 2 Exciter inputs

SP-20

- External speaker
- Built-in audio filters
- 1/4 headphone jack

IC-7800

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- RX: 0.3 - 60 MHz
- Four 32-bit floating point DSP units and 24-bit AD/DA converters
- 3 roofing filters
- 2 identical, independent receivers

SM-20

- Unidirectional, electret condensor-type desktop microphone
- Up/down tuning, PTT button
- Lock setting

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Designed for the track...

IC-RX7 Stylish Scanner with Smart Interface

Sleek, fast, and able to hit the track even during a rain storm! A newly developed user-interface allows you to zip around the track and frequencies, qualifying you for pole position with Li-ion battery performance that will have your friends hitting the pits way before you.

Features:

- 0.150 - 1300.000 MHz*
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...and good for everyday use.

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COMPACT WIDE BAND

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- 1250 Memory Channels

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ADVANCED WIDE BAND

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- 1000 Memory Channels

ICOM®

*Frequency coverage may vary. Refer to owner's manual for exact frequency specs. 30252

hy-gain® ROTATORS

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

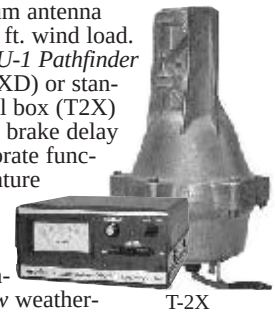
HAM-IV

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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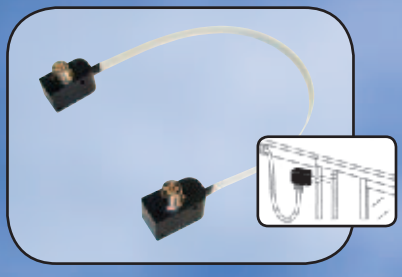
NEW! Automatic Rotator Brake Delay

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.

Life is a JOURNEY. Enjoy the ride!



NEW! COMET CTC-50M
Window Gap Adapter!

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

MALDOL HVU-8
Ultra-Compact 8 Band Antenna!

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

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

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

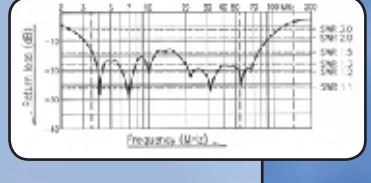
COMET CHA-250B
Broadband HF Vertical!

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

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

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

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



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

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

Max Power: 1000W SSB / 500W FM
SWR: Less than 1.5:1 at center frequency
Rotation Radius: “V” 12’ 6” “H” 17’ 5”
Length: “V” 24’ 5” “H” 33’ 10”
Weight: 11 lbs 14 ozs
Wind load: 3.01 sq feet
Max Wind Speed: 67 MPH

COMET and Maldol

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This Month in QST

September 2009 ♦ Volume 93 Number 9

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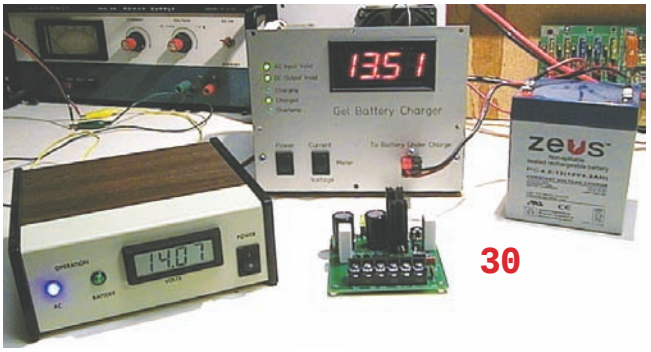
Technical



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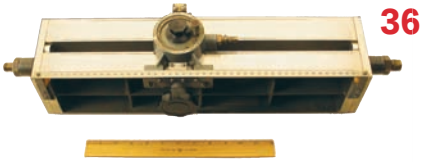

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News and Features

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Public Service

Radiosport

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Our Cover
In this, our third annual Emergency Communications issue, we take a look at how hams respond when all else fails. In the top inset photo, John Grace, KD5VSB, of Tulsa, Oklahoma, helps provide disaster communications for the American Red Cross between Tulsa and a shelter at Camp Gruber in Braggs, Oklahoma during the immediate aftermath of Hurricane Katrina. Photo courtesy of KD5VSB. The other inset photo features Paul Dallavia, KCØWDQ, of Duluth, Minnesota, as he prepares for a training exercise with the Arrowhead Radio Amateur Club. Photo by Paul Walsh, NAØMI.

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.

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

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

NEW

2 m MONO BAND

Best Selling, Reliable Mobile

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

NEW

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FT-1900R

2 m MONO BAND

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Actual Size

NEW 2 m/70 cm DUAL BAND FM TRANSCEIVER

FT-7900R

2 m/70 cm DUAL BAND

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

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

50 W 10 m/6 m/2 m/70 cm* Quad Band FM Mobile

FT-8900R

*70 cm 35 W

QUAD BAND DUAL RECEIVE

50 W 2 m/70 cm* Dual Band FM Mobile

FT-8800R

*70 cm 35 W

DUAL BAND DUAL RECEIVE

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Submersible Construction

- Large Backlit LCD Display for easy operation
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- 800 mW of Loud Audio for noisy field operations
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- Commercial Grade Receivers Performance
- Submersible Construction (3 ft. for 30 min)
- Yaesu Exclusive Power Saving Circuit Design Guarantees Longer Operating time
- Hands Free Operation with Optional VC-24 VOX Headset

Wide Range of available Options includes:
- CD-26 Charger Cradle
- VAC-370B 1.5 Hour Desktop Rapid Charger
- External DC Jack for Cigarette-Lighter adapter E-DC-5B or DC Cable E-DC-6
- FBA-25A Alkaline Battery Case (for 6 X AA cells)
- FTD-7 DTMF Paging Unit

Actual Size

VHF FM 5 W COMPACT HANDHELD TRANSCEIVER

FT-270R

Size: 2.4" (W) x 4.7" (H) x 1.3" (D) Weight: 13.8 oz.

NEW 2m MONO BAND

Compact Field Radio with Top Mounted LCD and Loud Audio

- Compact Design with Top mounted LCD Display
- 5 Watts of Stable RF Power with Minimum Components for Reliability
- 700 mW of Loud Audio for outside field environments
- 200 Memory Channels for serious users
- Yaesu Exclusive Power Saving Circuit Design Guarantees Longer Operating time
- Hands Free Operation with Optional VC-25 VOX Headset

Wide Range of available Options includes:
- External DC jack for Cigarette-Lighter adapter E-DC-5B or DC cable E-DC-6
- 6 X AA size Alkaline Battery Case FBA-25A

ULTRA-COMPACT 5 W 2 m FM HANDHELD TRANSCEIVER

FT-250R

Size: 2.3" (W) x 4.3" (H) x 1.0" (D) / Weight: 12.4 oz.

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"It Seems to Us"

Pecuniary Interest

"'No amateur shall transmit … communications in which the station licensee or control operator has a pecuniary interest, including communications on behalf of an employer.' — FCC Rules, §97.113(a)(3)"

In the April issue we talked about how "no pecuniary interest" — one of the defining principles of Amateur Radio — has been reflected in the FCC rules over the years. Without going into detail at that time we observed that "there are limits to what an amateur can do on behalf of his or her employer." There seems to be some confusion as to what those limits are, so here are the details.

The problem is, we have become victims of our own success. We have developed reliable, cost-effective communications capabilities; it's not an empty boast when we say that our equipment and skills allow us to make contact "when all else fails." As I bragged to a friend the other day, "Give me my radio, a car battery, and a piece of wire and I *will* be able to communicate." Several radio services are available to businesses and other organizations — commercial, government, and non-profit — with a need for backup communications, but in these cash-strapped times it shouldn't surprise us that Amateur Radio is seen by some as an attractive alternative. After all, our equipment is relatively inexpensive, licensing isn't particularly difficult, and the Amateur Radio community has a well-deserved reputation for public service. So, their managers think, all they have to do is to get their employees licensed as amateurs and give them some equipment and training, and they can check off that box on their business continuity plan.

But the rule quoted at the top of the page is pretty clear: communications on behalf of an employer are prohibited. §97.113(a)(2) provides additional emphasis, prohibiting "Communications for hire or for material compensation, direct or indirect, paid or promised, except as otherwise provided in these rules." The "otherwise provided" exceptions are narrowly drawn for occasional "swap net" activity, to allow teachers to use an amateur station in classroom instruction, and to allow the control operator of a club station to be paid for the sort of code practice and bulletin transmissions conducted by W1AW — in fact, the rule was written specifically *for* W1AW.

The FCC itself muddied the water somewhat in 1999 when it declared, in denying a petition to amend §97.113 to permit licensed emergency personnel to operate while engaged in disaster relief on paid duty status, that the amendment was unnecessary because this was already permitted. The Commission reiterated in 2006 that "These individuals are not receiving compensation for transmitting amateur service communications; rather, they are receiving compensation for services related to their disaster relief duties and in their capacities as emergency personnel." This can be reconciled with "no communications on behalf of an employer" only if viewed narrowly, in the context of "transmissions necessary to meet essential communication needs and to facilitate relief actions" as authorized by §97.111(a)(2). Also, of course, communication that is essential to the immediate safety of human life or the immediate protection of property is always permitted when normal communication systems are not available.

In response to numerous requests for clarification — most of them submitted in the hope of hearing a different answer — the FCC recently has spelled it out very clearly. For example, writing on July 16 to a hospital employee who had objected to a Commission staff interpretation that hospital employees cannot transmit communications on behalf of the hospital while they are on duty, Roger S. Noel, Chief, Mobility Division, Wireless Telecommunications Bureau, supported the interpretation and went on to observe: "Moreover, the rule does not draw any distinction based on the station operator's duty status at the time of the transmission." In other words, it doesn't matter whether the employee is on duty or not. In either case, transmitting communications on behalf of an employer is prohibited.

When the ARRL Board of Directors met on July 17-18, the appropriate use of Amateur Radio was very much on the Board members' minds — so much so that the Board authorized President Harrison to appoint an ad-hoc committee to study the issue and prepare suggested guidelines. The committee will be asked to work on an accelerated schedule, reporting to the Executive Committee within 30 days.

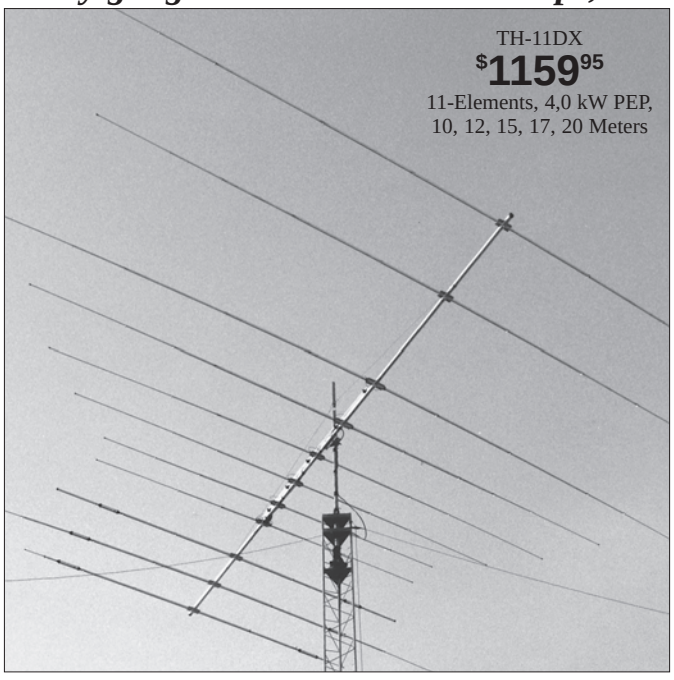
The ad-hoc committee may find a need for additional clarification of the rules, but figuring out what is legal — and what isn't — is not the whole story. When the FCC amended Part 97 in 1993 to give radio amateurs the greater flexibility that we had asked for, they also gave us greater responsibility for avoiding exploitation of our precious resources: our access to the radio spectrum and the equipment and skills to use it responsibly.

The committee will be trying to walk a narrow path. On one side, amateurs must be able to fulfill our mission of providing voluntary emergency communications to the public. On the other, this mission does not extend to providing a cheap alternative to other radio services that were created specifically for the use of business, non-profit and government entities. At the end of the day, the committee's work should help us all understand what it means to be a radio amateur in the 21st century.

David Sumner, K1ZZ
ARRL Chief Executive Officer

hy-gain HF BEAMS . . .

. . . are stronger, lighter, have less wind surface and last years longer. Why? Hy-Gain uses durable tooled components -- massive boom-to-mast bracket, heavy gauge element-to-boom clamps, thick-wall swaged tubing -- virtually no failures!



TH-11DX, $1159.95. 11-element, 4.0 kW PEP, 10,12,15,17,20M

The choice of top DXers.

With 11-elements, excellent gain and 5-bands, the super rugged TH-11DX is *the "Big Daddy" of all HF beams!*

Handles 2000 Watts continuous, 4000 Watts PEP.

Every part is selected for durability and ruggedness for years of trouble-free service.

Features a low loss log-periodic driven array on all bands with monoband reflectors, BN-4000 high power balun, corrosion resistant wire boom support, hot dipped galvanized and stainless steel parts.

Stainless steel hardware and clamps are used on all electrical connections.

TH-7DX, $869.95. 7-element, 1.5 kW PEP, 10,15,20 Meters

7-Elements gives you the *highest average gain* of any Hy-Gain tri-bander!

Dual driven for broadband operation without compromising gain. SWR less than 2:1 on *all* bands.

Uniquely combining monoband and trapped parasitic elements give you an excellent F/B ratio.

Includes *Hy-Gain's* diecast aluminum, rugged boom-to-mast clamp, heavy gauge element-to-boom brackets, BN-86 balun. For high power, upgrade to BN-4000.

TH-5MK2, $759.95. 5-element, 1.5 kW PEP, 10,15,20 Meters

The broadband *five element* TH5-MK2 gives you outstanding gain.

Separate air dielectric *Hy-Q* traps let you adjust for maximum F/B ratio on each band.

Also standard is *Hy-Gain's* exclusive *BetaMATCH*™, stainless steel hardware and compression clamps and BN-86 balun.

TH-3MK4, $469.95. 3-element, 1.5 kW PEP, 10,15,20 Meters

The super popular TH-3MK4 gives you the *most gain for your money* in a full-power, full-size durable Hy-Gain tri-bander!

You get an impressive average gain and a whopping average front-to-back ratio. Handles a full 1500 Watts PEP. 95 MPH wind survival.

Fits on average size lot with room to spare -- turning radius is just 15.3 feet. Four piece boom is ideal for DXpeditions. Rotates with CD-45II or HAM-IV rotator.

Features *Hy-Gain BetaMatch*™ for DC ground, full power *Hy-Q*™ traps, rugged boom-to-mast bracket and mounts on standard 2"O.D. mast. Stainless steel hardware. BN-86 balun recommended.

TH-2MK3, $369.95. 2-element, 1.5 kW PEP, 10,15,20 Meters

The 2-element TH-2MK3 is Hy-Gain's *most economical* full power (1.5kW PEP) full size tri-bander.

For just $339.95 you can greatly increase your effective radiated power and hear far better!

Ruggedly constructed, top-performing, compact 6 foot boom, tight 14.3 foot turning radius. Installs almost anywhere. Rotate with CD-45II or HAM-IV. BN-86 balun recommened.

EXP-14, $599.95. 4-element, 1.5 kW PEP, 10,15,20 Meters

Revolutionary 4-element compact tri-bander *lets you add 40 or 30 Meters!* Has 14 foot boom and tight 17.25 feet turning radius. Fits on roof tri-pod, mast or medium duty tower.

Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

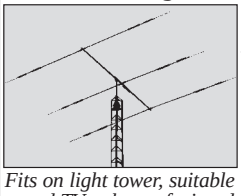
BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

Truly *competitive against giant tri-banders at half the cost!*

QK-710, $179.95. 30/40 Meter option kit for EXP-14.

Compact 3-element 10, 15, 20 Meter Tri-Bander

For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



Fits on light tower, suitable guyed TV pole, roof tri-pod

TH-3JRS, $359.95. Hy-Gain's *most popular* 3-element 10, 15, 20 Meter tri-bander fits on most lots! Same top performance as the full power TH3MK4 in a compact 600 watt PEP design.

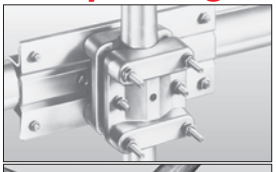
Excellent gain and F/B ratio let *you* compete with the "big guns".

Tooled manufacturing gives you *Hy-Gain* durability with 80 MPH wind survival.

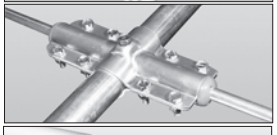
Model No.	No. of elements	avg gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	boom feet	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Sugg. Retail
TH-11DX	11	*For Gain and F/B ratio--See . . .* • www.hy-gain.com • Hy-Gain catalog • Call toll-free 800-973-6572		4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1159.95
TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$869.95**
TH-5MK2	5			1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$759.95
TH-3MK4	**3**			**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$469.95**
TH-3JRS	3			600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
TH-2MK3	**2**			**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$369.95**
EXP-14	4			1500	10,15,20 opt. 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$599.95

Tooled Manufacturing . . . Highest Quality Materials

1. Hy-Gain's famous super strong *tooled* die cast *Boom-to-Mast Clamp*



2. ***Tooled*** *Boom-to-Element Clamp*



3. Thick-wall *swaged* aluminum tubing

Tooled *manufacturing* is the difference between Hy-Gain antennas and the others -- they just don't have it (it's expensive!).

Die-cast aluminum boom-to-mast bracket and element-to-boom compression clamps are made with specially *tooled* machinery.

Hy-Gain antennas feature *tooled* swaged tubing that is easily and securedly clamped in place. All tubing is deburred and cleaned for smooth and easy assembly.

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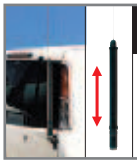

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

- The ARRL Board of Directors met in Windsor, Connecticut, July 17-18. Next month's issue will include a summary of Board actions.
- Julius Genachowski assumed the chairmanship of the Federal Communications Commission June 29. On July 16, he named Ruth Milkman to the position of chief, Wireless Telecommunications Bureau.
- The FCC has released a *Request for Further Comment* and *Further Notice of Proposed Rulemaking* in response to a 2008 US Court of Appeals BPL ruling in favor of the ARRL's *Petition for Review*. Details are in Happenings.
- On June 24, the ARRL asked the US Court of Appeals for the District of Columbia Circuit to order the FCC to comply with the Court's 2008 Access BPL decision.
- Space shuttle *Endeavour* lifted off July 15, heading to the International Space Station with three ham/astronauts aboard.
- The House version of the Radio Spectrum Inventory Act, HR 3125, has been introduced.
- W1AW, the Hiram Percy Maxim Memorial Station, will replace its AMTOR and ASCII transmissions with PSK31 and MFSK16, respectively, effective August 17. In September, W1AW will commemorate the 140th anniversary of the birth of ARRL cofounder Hiram Percy Maxim with an HPM/140 special event.
- As of this writing, a total of 19 representatives have pledged their support for HR 2160, The Amateur Radio Emergency Communications Enhancement Act of 2009.
- The next World Radiocommunication Conference is now scheduled for 2012.
- Four sessions of the ARRL's Teachers Institute on Wireless Technology wrapped up in June.
- Larry E. Price, W4RA, was honored at the Ham Radio 2009 convention in Friedrichshafen, Germany for his many years of service to the IARU, the ARRL and Amateur Radio in general.
- The winner of the *QST* Cover Plaque Award for June is John Miller, K6MM, for his article "A No Excuses 160 Meter Vertical Antenna."
- These online course sessions began August 7: Amateur Radio Emergency Communications Level 1; Antenna Modeling; Radio Frequency Interference; Antenna Design and Construction; Ham Radio (Technician) License Course; Propagation; Analog Electronics, and Digital Electronics.

Media Hits

Allen Pitts, W1AGP

It was an exceptional Field Day for PR this year. Over half of the states came out with proclamations. Many cities, both large and small, also published documents of support and recognition for all the services that their Amateur Radio operators provide. Google news alerts ended up printing out over 35 pages (in small type!) of *just the Web hyperlinks* to printed stories. PRNewswire found hundreds more on various media servers. And then there were the radio and video segments — far more than ever before.

PIOs throughout the country used the main ARRL release material exactly as it was intended. They simply edited in their local information and turned it loose — and it worked! Again and again we spotted segments and paragraphs of the main ARRL release text embedded into local media hits. Additionally, thanks to Kevin Pauley, KB9WVI, Kevin O'Dell, NØIRW, and Dan Carlson, KQ6FM, groups had two special video clips to play with and localize. Several groups, noting the letterbox format, added their local information over or under the central picture. By using little more than a home computer system and some initiative, they scored TV and cable hits in their region.

There is no way we can list all of the hits here. We cannot even fit all of the good ones. In the future, with the coming of the new ARRL Web site, there will be a place I can do that. All of the hits deserve recognition from the local groups! Please be sure to say "Thank You" to the people who voluntarily put forth the effort to make us all look good.

But a few of the very best actions stand out:

- The Field Day logo and caption displayed in the news cycle on the PRNewswire-Reuters news billboards in Times Square in New York City and in Las Vegas on June 15-17 where it was seen by thousands of people. While it may not have brought in any new hams, the ARRL presence on those news boards reminded important people that Amateur Radio is very much alive and well.
- Mike Floyd, W1HAT, and the Marion (OH) Amateur Radio Club took on all comers as they repeated the Jay Leno segment pitting CW against cell phone texting in head-to-head competition. Once again CW easily won. But more importantly, the club's efforts sparked multiple media hits in the papers, on morning TV shows, news broadcasts and radio.
- R. J. Harris, W3HP, of ClearChannel Radio blanketed the Harrisburg, PA region with promotional segments and public service announcements. In just the five days prior to Field Day they played 102 PSAs for Amateur Radio plus on-air segments.
- Coinciding with Field Day was the moonbounce activity celebrating the 40th anniversary of the Apollo 11 moon mission. This also got excellent publicity.
- On June 17, *Discover Magazine* ran a Web article about Amateur Radio as "The Original Social Network." Blogging under the one name "John," the author relates his enjoyment at being a ham and his recent license upgrade. While the article may not give his full name, his call sign, KI6GDQ, does. Nice work, John!
- The Garriott family, Owen and Richard, not only wrote an excellent magazine article, "Two Generations of Hams in Space," but its placement in *The Bridge,* the publication of the Electrical and Computer Engineering Honor Society, was perfect!
- As I said, there is no way we can list all of the hits here. But for ringing the PR bell, the Raytown Amateur Radio Club, KØGQ, and Barbara Rich, KGØUT, has to be in the top five. Not only did they entice WDAF — Fox 4 TV to place Kim Byrns as an embedded reporter with the group through Field Day, they had many live remotes, got the reporter on the air, and Barbara did an excellent job speaking about Amateur Radio on camera.

It was a great Field Day!

JOEL P. KLEINMAN, N1BKE

ARRL Board meets in Connecticut: **The ARRL Board of Directors held its Second Meeting of 2009 in Windsor, Connecticut July 17-18. A detailed report will appear in the October issue.**

SOUTH EAST TEXAS AMATEUR CLUB

Distinguished FD visitor: **Our first Field Day was a total success. Not only did we get to teach a lot of new hams fascinating things about Amateur Radio, we also got to show US Congresswoman Sheila Jackson Lee, who introduced HR 2160 into Congress, just what Amateur Radio operators are capable of doing using unconventional resources when conventional resources are not available. Representative Jackson Lee even got to make her first contact on the GOTA (Getting on the Air) station. — *Robert Martin, KK5TC, president, South East Texas Amateur Club***

COURTESY JOE TAYLOR, K1JT

Marconi Centenary: **Nobel Laureate Joe Taylor, K1JT, was invited to speak at the Centenary celebration, in San Remo, Italy, of the 1909 Nobel Prize in Physics awarded to Guglielmo Marconi. From the left: Guglielmo Giovanelli Marconi (son of Princess Elettra Marconi); Gianni Giuliano, president of the Italian province of Imperia (where the ceremonies were held); Princess Elettra Marconi Giovannelli (daughter of Marconi); Joe Taylor, K1JT; Angelo Sessa, owner of a remarkable collection of early Marconi radio apparatus, some of which is visible in the photo.**

Inside HQ

Why Perform Public Service?

Welcome to our third annual EmComm issue. Although "EmComm" is an abbreviation for "Emergency Communications," much of our EmComm related activities do not occur during emergencies! These activities are better described as Public Service Communications. These are events where there is no emergency situation, but communications assistance is required.

Public Service events include events like walk-a-thons or bike-a-thons that benefit a charity. We also provide communications for parades, bicycle races, marathons and other sporting events. Also included in the Public Service category are ongoing activities such as tracking rockets and weather balloons with APRS.

Amateur Radio operators provide communications at just about any event that requires a skilled cadre of volunteer radio operators. We provide reliable, scalable and often critical communications services. These events involve thousands of participants and occur over a wide geographic area. They require a sophisticated level of communications expertise and hardware such as transceivers, infrastructure and repeaters. We accomplish this because we own and operate our own equipment and we know what frequencies and modes we will be using. We also practice a lot. Another benefit of participating in Public Service events is that you learn how to work with others in the team, learn how to set up equipment quickly and professionally, and become skilled at operating protocols such as nets and traffic handling. These events are a great way to make sure that your equipment is functioning properly and that you know how to operate it correctly.

How do you get involved in these public service events? Usually a local repeater group or club organizes these events. Sometimes a local ham has a direct connection with the sponsoring organization and asks his or her friends for assistance. If you are on a local club or ARES® e-mail list, you will probably get an e-mail asking for your help at the event.

If you are interested in getting involved with Amateur Radio Public Service and Emergency Communications, start by contacting your ARRL Section Manager (SM). The ARRL has established a formal structure for Field Leadership that is divided into 71 geographic Sections. The SM has overall responsibility for Emergency Communications in their ARRL Section. A list of all SMs appears each month in *QST* on page 16. The SM will be able to direct you to the appropriate organization or individual.

If you have any questions about Public Service Communications, our Public Service liaison here at HQ is Public Service Specialist Steve Ewald, WV1X (**wv1x@arrl.org**). Steve edits the *QST* Public Service column each month and he has a lot of experience working with Public Service events. These activities can also be a promotional opportunity for Amateur Radio. We have display materials, brochures and handouts for the general public located at **www.arrl.org/brochures/**.

Tuning up your operating skills and your equipment during Public Service Communications events are excellent ways to prepare for emergency and disaster communications. Why not give it a try?

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.

Membership inquiries and general correspondence should be addressed to the administrative headquarters:
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As an ARRL member, you elect the director and vice director who represent your division on ARRL policy matters. If you have a question or comment about ARRL policies, contact your representatives at the addresses shown.

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HPM/140 Birthday Celebration Event Coming September 2-9

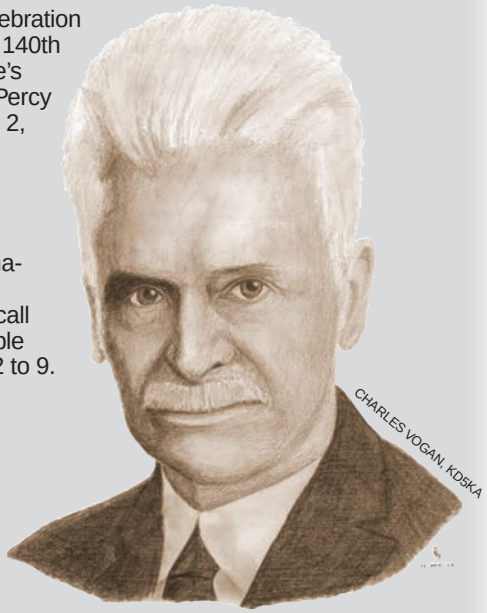
The Hiram Percy Maxim Birthday celebration is back! This year we're honoring the 140th anniversary of the birth of the League's first president and cofounder. Hiram Percy Maxim, W1AW, was born September 2, 1869 and died February 17, 1936, in a Colorado hospital of complications stemming from a throat infection. His widow died just nine days later.

The operating event is open to all amateurs, and the goal is straightforward: Find the stations adding /140 to their call signs, and contact as many as possible during the event period, September 2 to 9.

Who is eligible to sign /140?

- ARRL members who hold ARRL appointments
- ARRL elected volunteers (such as ARRL Directors and Section Managers)
- ARRL Life members
- ARRL Headquarters staff
- VEs, AECs, QSL bureau workers and awards managers who are ARRL members

If you work at least 25 /140 stations, an attractive certificate can be yours! The certificate can be endorsed in increments of 25 QSOs, up to 100.



Charles Vogan, KD5KA, of Penn Laird, Virginia, produced this striking portrait of ARRL cofounder and first president Hiram Percy Maxim, W1AW. Self-taught as an artist, Charles is also an author (and a pastor and a motorcycle enthusiast, among other avocations): He wrote an article on a cross-country motorcycle trip for the February 2002 issue of *QST*, and two feature articles on our Web site. The HPM/140 special event will be September 2-9.

Time Period: 0000 UTC September 2 until 2400 UTC September 9.

Exchange: All stations signing /140 send RS(T), their appointment and their name; others send RS(T) and their name.

Eligibility: All amateur stations may participate. Life members, and those persons holding ARRL appointments, elected positions or ARRL HQ staff, may add /140 to their call signs for the duration of the celebration. Volunteer Examiners, Assistant Emergency Coordinators, QSL Bureau workers, Registered Instructors and Awards Managers who are ARRL members are also invited to participate.

Miscellaneous: /140 stations may be contacted on any band or mode for credit. You can work a station once per band and mode. Repeater contacts are valid for credit, but please be considerate of the users during a repeater's busy periods. All /140 stations are encouraged to be as active as possible on local repeaters and nets.

The certificate is available for making at least 25 contacts with /140 stations, with endorsement increments of 25, and a maximum endorsement of 100. To receive the award, send in a log extract with the date, time, band, call sign worked and exchange for each /140 contact. Include your name, call sign and address, and tell us how many /140 stations you worked. Mail everything to HPM/140 Celebration, c/o W1AW, 225 Main St, Newington, CT 06111-1494. You can also send in your entry on a disk or CD in regular text format.

All entries must be accompanied by a check or money order for $5 (US) payable to ARRL. Please make sure your entry is postmarked by October 9, 2009.

ARRL Field Positions

Are you a Life Member or hold an ARRL volunteer position? Are you an elected or appointed official? If you hold any one of these positions, then you're eligible to sign /140.

Advisory Committee Member (AC)
Affiliated Club Coordinator (ACC)
Assistant Director (AD)
*Awards Manager (AM)
*Assistant Emergency Coordinator (AEC)
Assistant Section Manager (ASM)
Bulletin Manager (BM)
Director
District Emergency Coordinator (DEC)
DXCC Card Checker
Educational Advisor (EA)
Emergency Coordinator (EC)
General Counsel (GC)
Headquarters (HQ) Staff
Honorary Vice President
International Affairs Vice President
Local Government Liaison (LGL)
Monitoring System Volunteer (MS)
Net Manager (NM)
NTS Official (NTS)
Official Bulletin Station (OBS)
Official Emergency Station (OES)
Official Observer (OO)
Official Observer Coordinator (OOC)
Official Relay Station (ORS)
Past Director
Past President
Past Vice President
President
President Emeritus
Public Information Coordinator (PIC)
Public Information Officer (PIO)
QSL Bureau Manager
*QSL Bureau Worker
*Registered Instructor
Secretary
Section Emergency Coordinator (SEC)
Section Manager (SM)
Section Traffic Manager (STM)
State Government Liaison (SGL)
Technical Advisor (TA)
Technical Coordinator (TC)
Technical Specialist (TS)
Treasurer
Vice Director
Vice President
Volunteer Consulting Engineer (VCE)
Volunteer Counsel (VC)
*Volunteer Examiner (VE)

*You must be a current ARRL member to be eligible to sign /140.

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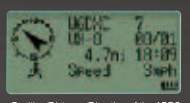
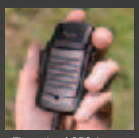


•Position/Distance/Direction of the APRS station picked up from the list

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



•The optional GPS Antenna Unit FGPS-2 attached to the optional Speaker/Microphone MH-74A7A

- **Bluetooth® for Hands-free Operation*1**
- **Barometric Pressure and Temperature Sensors**
- **Waterproof/Submersible IPX7 rated –3 feet for 30 minutes**
- **Dual Ham band Operation (V+V/U+U/V+U) while listening to AM/FM Broadcasts**
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*1 With optional accessories
*2 US Version - Cellular band blocked
*3 Assuming a duty cycle of 6-second transmit, 6-second receive, and 48-second standby (50 MHz 5 W)
* APRS® is a registered trademark of Bob Bruninga WB4APR.

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Submersible 6 m/2 m/70 cm
Tri-Band FM Hand held
VX-7R/VX-7RB 6 m / 2 m / 70 cm Tri-Band
(220 MHz: 300 mW)

5 W Heavy Duty
Submersible 2 m/70 cm
Dual Band FM Hand held (220 MHz: 1.5 W)
VX-6R 2 m / 70 cm Dual Band

5 W Heavy Duty 2 m/70 cm
Dual Band FM Hand held
FT-60R 2 m / 70 cm Dual Band

1.5 W Ultra Compact 2 m/70 cm
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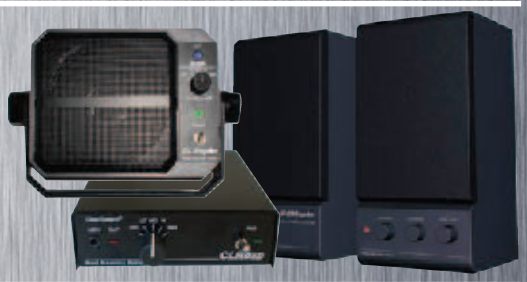

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CORRESPONDENCE

APPRECIATES FIGHT AGAINST FLAWED TECHNOLOGY

♦ The past and possibly ongoing BPL fiasco is an illustrative example of what happens when political appointees — with little to no understanding of the technology they are supposed to oversee — make technology decisions that ignore physics. Assuming the best of motives, the past FCC Executive management fixated on the desire, perhaps even need, to provide inexpensive, widely available access to the Internet. While a laudable goal, they chose to ignore the physics of attaching wideband radiating devices to very long antennas (power lines). Somehow they seemed to feel that they could ignore what would happen (severe HF radio interference to ham radio, military, commercial and virtually all HF radio users) when BPL as proposed was widely deployed. Worse yet, they ignored their own technical staff whose job it was and is to advise them on technical reality.

The ARRL, almost alone, was not willing to simply step aside and allow a disaster to unfold without at least a fight. As our society becomes more and more dependent on complex technologies, it becomes important that those of us who understand technology speak up when we see a disaster unfolding.

KEN AVELLINO, NA7B
Highland, Utah

NEW WAYS FOR AN OLD HAM

♦ I am so excited that W1AW started broadcasting bulletins last month on these "new" modes, PSK-31 and MFSK-16 — these are two of my favorite modes! When I discovered PSK-31 a few years ago, this old ham — I've been licensed more than 40 years — suddenly felt like a Novice again. I felt like a kid in a candy store with an "anything you want" attitude. It's fantastic — the thrill has not yet worn off. Though I do a few SSB nets where I crank the rig up to its full 100 W and strain to hear the other guy through the interference and static, with digital I normally run 30 W and there's no strain at all.

JOHN F. DAVIS, WA8YXM
ARRL Life Member
Davison, Michigan

GOING FAR

♦ While there are many facets to ham radio, its origins are most certainly technical and involve, among other things, a knowledge of electronics theory, as well as antennas and RF propagation. Electronics theory is the heart of this hobby and, in my opinion, belongs front and center in the mix of *QST* articles. Contrary to the statement by Alan Sherman, W2NR ["Correspondence," Jul 2009, page 24], the hobby is definitely "meant to go that far."

My background includes graduate studies in chemistry and biology, but not electronics. Many of us learned radio theory and electronics on our own by reading various ARRL publications and other texts, then fixing old radios and building projects. While I have only been licensed since 1987, my background in radio goes back to the 1950s and I still use the Wen soldering gun that I bought in 1955. Those looking for a more "humanistic approach" may find *People* magazine more to their liking.

JOHN BOYLE, VE3PMA
Portland, Ontario, Canada

♦ I just wanted to chime in on the issue of *QST* being too technical. According to FCC Part 97.1(c), one of the "fundamental purposes" of Amateur Radio is the "encouragement and improvement of the amateur service through rules which provide for *advancing skills in both the communication and technical phases of the art*." If you really believe that the articles in *QST* are too technical, read the same article in *QEX*. I have read the same article written by the same authors in both magazines. The *QST* article was four pages including graphics, while the *QEX* version covered a whopping 11 pages. We can't lose sight of the technical side of our hobby.

RANDY MOYER, KB3DZL
Sunbury, Pennsylvania

BIG PAY OFF

♦ For the past 17 years, I've been bugging my friend Bob to get his ham ticket. I heard "Why don't you give it a rest" a hundred times or more — until last year. Then it was, "Hey JR, tell me the formula for a dipole again," or "When is long path best?" I knew he was on his way. Shortly after, he e-mailed me to say he passed his General class exam and was now KL7BOB.

On a chilly late February morning in 2009, I got him out antenna testing with me in Anchorage. Bob started a big pileup on 17 meters talking about the 10-40 meter vertical coiled dipole we were using. The JAs and VEs were fast and furious, wanting to snag a QSO with Bob. He was totally hooked now. A month later, I got an e-mail from Bob with this short message: "I passed the Extra, and have applied to be a Volunteer Examiner. I am now heavily involved with the local radio club and homebrewing antennas. What's next? Don't bother to answer — we're going to the Yukon for November Sweepstakes, right?"

This proud Elmer is grinning from cheek to cheek. Persistence does pay off!

JOHN F. REISENAUER JR, KL7JR
Anchorage, Alaska

GREEN DAY

♦ Using a hydrogen fuel cell as a source of electricity for Field Day is hardly a 100% "green" operation ["A Green Field Day," Jun 2009, pages 70-71]. While it is true that the chemical combination of the hydrogen with oxygen produces only water, I am surprised that the writers of this article didn't pause to consider where the hydrogen comes from.

We have no chemically uncombined hydrogen available for our use. Rather, it must be obtained from the decomposition of hydrogen compounds; one source is hydrocarbon fuels, but we are trying to minimize their use. The only other source is from the electrolysis of water, where, by the law of conservation of energy, it takes as much, if not more, electrical energy to decompose water by electrolysis as one could then obtain from the reaction of the resulting hydrogen with oxygen, either by burning it or in a fuel cell.

If we ever start using significant quantities of hydrogen as a fuel, this will require vast amounts of electricity, and most electricity is generated by methods that are not usually "green."

GERALD BUCK, WB9AJQ
Racine, Wisconsin

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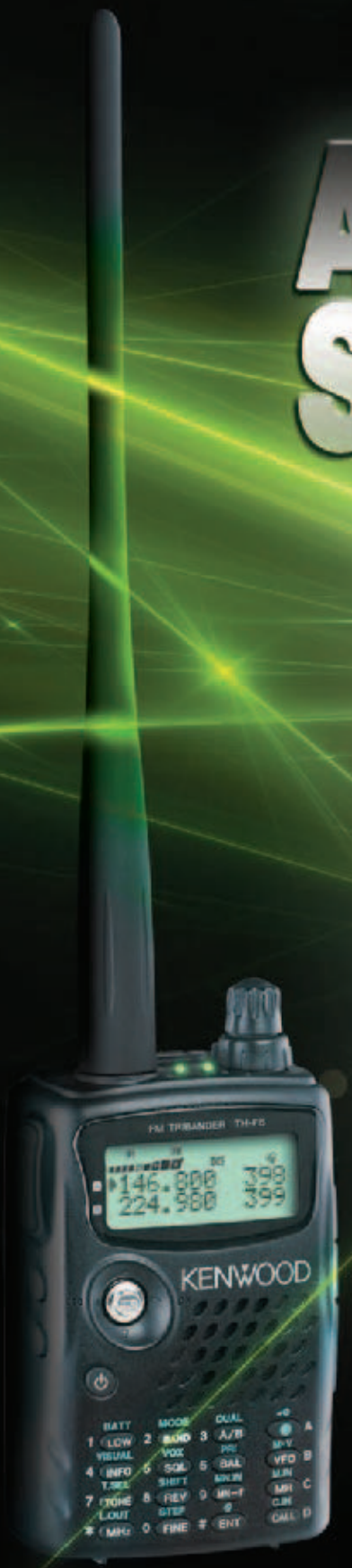
[1]Note that certain frequencies are unavailable. [2]5W output



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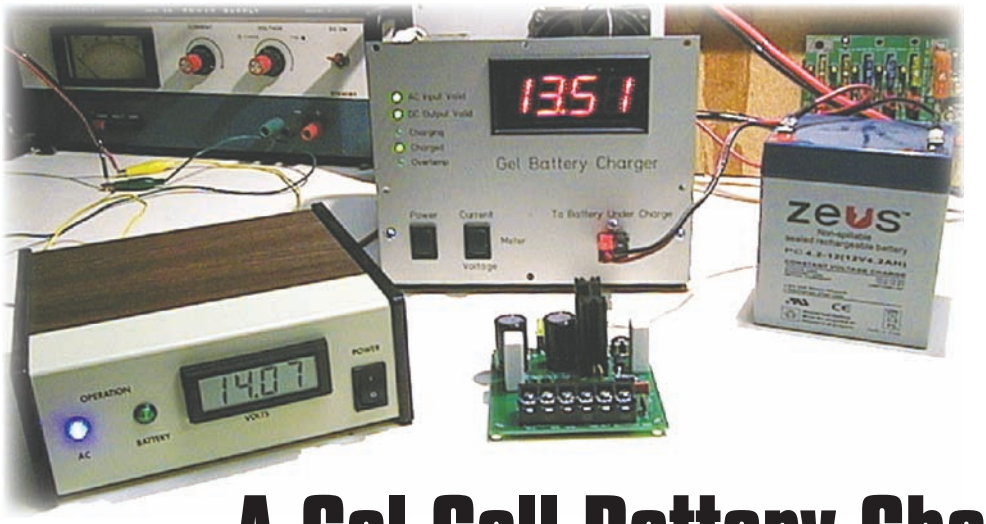

This low power battery charger is ideal for keeping your fleet of gel cells ready to supply emergency power.

A Gel Cell Battery Charger for the Low Power Station

Mike Bryce, WB8VGE

If your shack is anything like mine, you'll soon discover that everyplace you look you'll see gelled electrolyte (gel cell) lead-acid batteries. From a pocket sized 1.2 Ah battery to a back breaking 17 Ah, I usually manage to bring one or more gel batteries home with me from every hamfest.

I use the batteries for just about everything in the shack. From running a low power (QRP) transceiver to backup power for my scanners, there's a gel battery doing the work. I try to keep several charged up and ready to pack along when I hit the 4 × 4 trails or when pitching a tent. They're great for running HF rigs when there's no power from the grid.

A Rose by Any Other Name

While most hams refer to these batteries as "gel cells" they are really classified as *valve regulated sealed lead-acid* (VRSLA) batteries. VRSLA also include absorptive glass mat (AGM) batteries and either type is particularly well suited for this application because they can't spill or leak, don't get damaged in freezing temperatures and do not vent significant hydrogen and thus can be used safely indoors. These batteries are found in computer uninterruptible power supplies, electric scooters and emergency lighting systems. An example is shown in Figure 1.

Figure 1 — An example of the labeling of a gel cell battery. Sometimes the battery itself will have the necessary information on how it should be charged. In this example, they state a maximum of 14.1 V. Notice the "fill caps" are actually vents and not removable caps. This Deka from East Penn Manufacturing is a true gel cell battery.

Charging the Masses

The problem with bringing home all sorts of gel cell batteries is keeping them charged and ready to go. A quick look through the *QST* library database will reveal dozens of battery chargers. Some are quite simple while others require specialized ICs to do the job.

I had been working on a complex battery charger for my emergency power systems when I realized I just needed something sufficient to recharge a 7 Ah battery. The result is the easy to build and simple to operate unit shown in Figure 2. Because the charging current is low, and it's no speed demon when it comes to getting the battery charged, I call this project the QRP Gel Battery Charger.

First off, I can't take credit for this circuit. It's been around since there's been dirt. I've changed things around and added to the basic circuit so that it will now charge my batteries and at the same time run a small load. When the power goes out, the battery under charge will now operate that same load. The switching is accomplished automatically by diodes. The charger has the ability to charge and operate a load at a maximum of 1 A. My charger is assembled on a small double-sided printed circuit board (PCB) as shown in Figure 3. Construction technique isn't critical, however, and even perf board will do.[1]

Depending on the depth of discharge of the battery you plan on recharging and the battery's capacity, a full recharge can take as short as a few or up to 24 hours. I have used this charger to charge 1.2 to 32 Ah gel batteries.

Here's How it Works

The charger is operated from a 16 V, 2 A, ac wall wart transformer. This simplifies the ac connections and wiring. Power

[1]Notes appear on page 32.

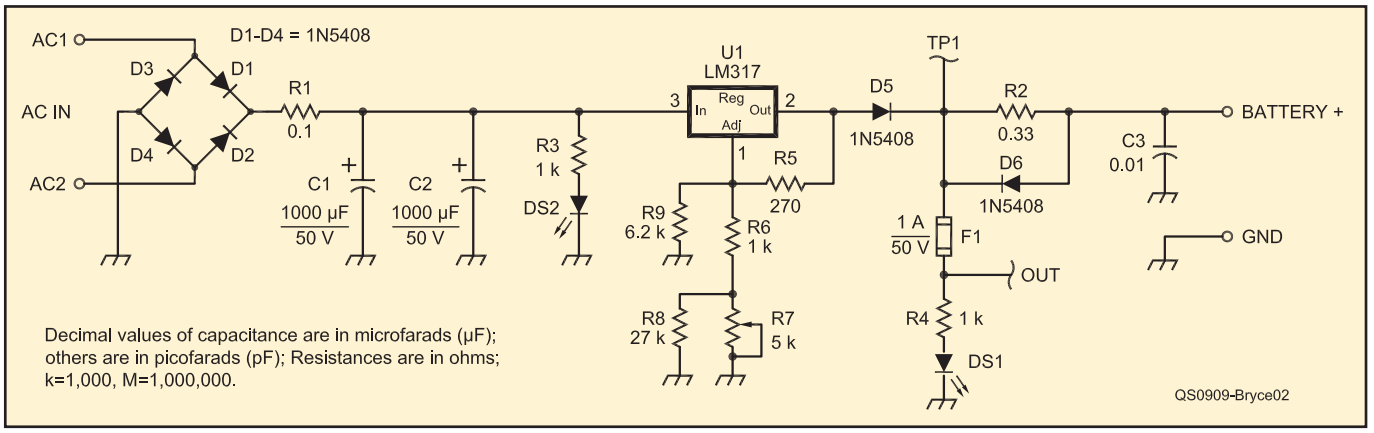

Figure 2 — Schematic diagram and parts list for the QRP Gel Charger. Mouser parts are available from www.mouser.com.

C1, C2 — 1000 µF, 50 V electrolytic capacitor.
C3 — 0.01 µF, 50 V capacitor.
D1-D6 — 3 A, 50 V or higher, diode, 1N5408 suitable.
DS1, DS2 — Light emitting diode.
F1 — See text.
R1 — 0.1 Ω, ¼ W resistor (Mouser 280-prm5-0.1-rc).
R2 — 0.33 Ω, ¼ W resistor (Mouser 280-prm5-0.33-rc).
R3, R4, R6 — 1 kΩ, ¼ W resistor.
R5 — 270 Ω, ¼ W resistor.
R7 — 5 kΩ potentiometer (Mouser 531-pt10mv-5k).
R8 — 27 kΩ, ¼ W resistor.
R9 — 6.2 kΩ, ¼ W resistor.
U1 — LM317 voltage regulator (Mouser 512-lm317T).
Heatsink — Mouser 532-531102B00.
Poly fuse — Mouser 576-030R0135U.
Terminal strip — Mouser 571-814376480.

from the wall wart is directed to a full wave bridge rectifier. R1 is a 0.1 Ω resistor between the diode bridge and the filter capacitors.

The heart of the charger is the popular LM317 adjustable voltage regulator. Resistors R6, R7 and R8 set the output voltage. Diode D5 prevents current flow from the battery from reaching U1.

The output of U1 is routed to two different places. After passing though D5, current flows to the battery via R2. This resistor limits charging current to the battery. With the value shown, current limits at about 500 mA. If a load is connected to the pad marked OUT, then the charger will supply that load up to a maximum of 1 A. The regulator can only supply 1 A combined current to the battery and load. It cannot supply 1 A of current to both at the same time.

To prevent damage to the battery should there be a short circuit on the load, a resettable chemical fuse is used at F1. Provided the battery is fully charged, if the grid power goes down, then power is routed from the battery to the load via D6. When there is dc present at the output pad, LED DS1 illuminates.

Trimmer R7 sets the output voltage to that of a fully charged battery. In my case, I cycle the batteries to about 50% of their capacity. I set the output of the charger to 14.2 V. Batteries used in standby service can float for years at 13.5 to 13.9 V.

Resistor R9 is not used when charging 12 V batteries. This resistor is used to drop the output of the regulator so its output can be used to charge 6 V lead-acid batteries. Just leave this resistor out of the circuit if all you plan to charge are 12 V batteries.

Component Selection

There is nothing carved into stone when it comes to building your own version of the charger. While I used 1N5408 diodes, any 3A, 50 V or higher diode will be just fine. I specified the Mouser parts for R1 and R2 because they fit the PCB layout. You can use axial type resistors and stand them on end to fit the PCB, too.

Capacitors C1 and C2 are specified at 1000 µF at 50 V dc. If you plan on running a load that may draw the maximum 1 A of current, I would increase the value of C1 and C2. You can install 4700 µF capacitors if you desire. They will have the same footprint as the original ones specified.

While a wall wart ac type transformer is ideal, you can use a chassis mount transformer if you prefer. Select one that will have between 14 to 16 V ac output. The higher the transformer voltage the more heat dissipation the regulator will have to deal with. I have used 18 V transformers before and they do work, but the heat sink will get hotter than using a 16 V ac transformer. You also need to get a transformer or wall wart that will provide at least 2 A of current. Check out the surplus electronic shops such as All Electronics.[2] They have a constantly changing supply of transformers and wall wart supplies.

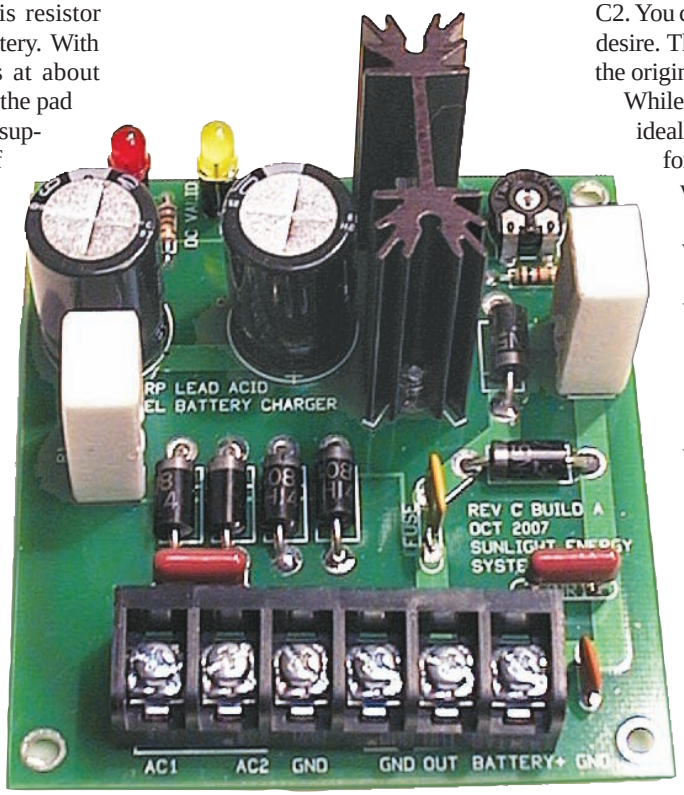

Figure 3 — The assembled QRP Battery charger PCB assembly. The two white blocks are resistors R1 and R2.

Building the Charger

The charger is easily assembled using either perf-board or the available PCB. No matter what method you end up using, you must heat sink U1. The PCB

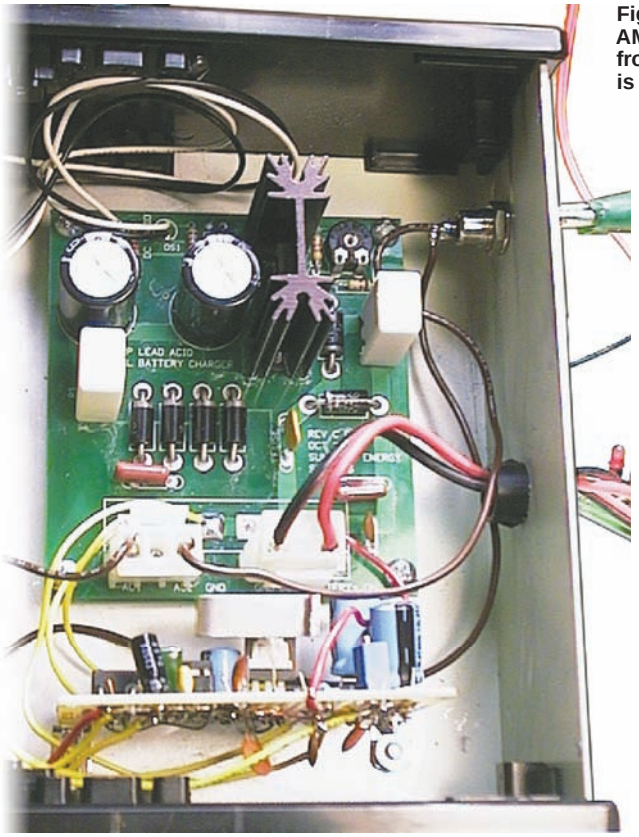

Figure 4 — Inside the QRP Battery charger. This PCB assembly uses the AMP connectors instead of the terminal block for connections to and from the wall wart and battery. The small perf board mounted on the end is the digital meter driver and voltage scaler.

Figure 5 — Here's the charger buttoned up and put to use. The power analyzer shows the voltage to be tracking right on the money. The battery is being charged at a 100 mA rate.

can hold a small heat sink that will keep the regulator cool with modest current. If you don't use the PCB, make sure you either attach some metal to U1, or use the metal chassis for a heat sink. The tab of the regulator is electrically hot so use an insulated TO-220 mounting kit.

I don't like a lot of wires going to and from a PCB, so the PCB can be assembled to use either a terminal strip or AMP type connectors. You can use either one, but not both at the same time.

You should mount the assembled PCB inside a small box as in Figure 4, but I'll have to admit I screwed one assembled PCB down on the workbench under the shelf. With the AMP connectors, I can plug into the wall wart and then into a battery that needs charging. It's not pretty but, by gosh, it's functional.

I did take another PCB assembly and mount it inside an old Ten-Tec clamshell case I had lying around. This time, I installed a small digital meter to monitor the battery's terminal voltage. When the battery's terminal voltage matches that of the charger, the battery is fully charged. A blue LED indicates that power is applied to the charger and the green LED indicates the battery is connected to the charger. In this application, I did not run a lead to operate any loads.

The battery is connected to the charger with a pigtail that terminates into a pair of Anderson Powerpole connectors. The wall wart transformer plugs into the charger's chassis with a coaxial power plug.

Testing and Operating the Charger

It's quite simple to set up and use this charger. You will need a volt-ohm-milliameter (VOM) — a digital one would be best — and a battery that needs to be charged.

Connect the wall wart's output to the AC IN pads on the PCB. Turn on the power (plug in the wall wart) and you should see both LEDs light up. Now using your VOM measure the output voltage at the battery pads. Set the output voltage using trimmer R5. Most of the batteries I have in the shack will be happy with 14.2 V or so.[3] Some need less and some need a tad more. Power down the circuit. Now, set the meter to read current and insert the meter in series with the battery to measure charging current.[4] Power the circuit back up and you will see upwards of 500 mA of current flowing into the battery. The actual amount of current will be determined by how deep the battery has been discharged. After a while the current will begin to drop and the terminal voltage of the battery will rise. When the charger's voltage and the battery's voltage meet, as in Figure 5, current will drop to a low value. The battery is fully charged.

Leave the battery connected to the circuit and unplug the wall wart. The ac LED will go dark while the dc LED will continue to glow. Use your VOM to measure the voltage at the load pads on the PCB. This voltage should be very close to that of the battery.

I have one more of these chargers that floats a 17 Ah battery and runs a bank of old RadioShack scanners. When the power goes out, the scanners switch over to the battery without missing a call. When the power comes back on, the battery gets recharged while the scanners keep on doing their thing.

Notes

[1] A PCB is available from Mike Bryce, WB8VGE, 955 Manchester Ave SW, N Lawrence, OH 44666.
[2] All Electronics at **www.allelectronics.com**, or 888-826-5432.
[3] Sometimes the maximum charging current and voltage are printed on the battery case.
[4] An analog meter can be left in the circuit all the time. A 0 to 1 A meter would be ideal.

Photos by the author.

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

A Junk Box Integrated Station Control System

Control station power and audio signals remotely to help to keep the rats' nest at bay.

Dave Ingebright, WB7ELY

As I leaned under the desk, fumbling to find the ham station power strip POWER switch, it occurred to me that life would be a lot easier if I had desk top remote POWER switches for my computer and ham station power. An added benefit would be to add two other important station switching options — antenna and audio snitching.

The Environment at Hand

Not only was I getting tired of leaning under the desk to turn on and off plug strips for the computer and ham equipment, but I also had needed an easy way to switch audio between two receivers and switch a remote antenna coax relay. The functions could best be actuated from a single small desktop box. Since my home office and ham station are on the same desk, an uncluttered operating position was important. My operations are focused on digital HF modes using an ICOM IC-706 HF transceiver and an ICOM PCR-1000 receiver.

My hilltop location in western Washington is currently configured with two antennas, a 140 foot dipole and Cushcraft R-4 vertical antenna. A surplus coax relay located near the antenna provides remote horizontal to vertical antenna switching about 90 feet from my basement shack.

A Plan Unfolds

The design boiled down to a small switch and indicator based control box sitting on the desk with LEDs showing the position of the switches. A larger box on the floor contains the ac power switching, fuses, audio cables and terminals for the remote coax relay.

This project uses a small aluminum mini box with four double pole switches to run a remote low voltage control system for the ac switching (see Figure 1). Two additional switches take care of receiver audio switching to the PC sound card input and control of the remote coax switch. LED indicators running off the second set of switch contacts indicate the position of the switches. In a separate floor box, two solid state relays (SSRs), a couple of extension cord female ends, fuses and a suitable safe chassis complete the project. [If a metal chassis is used, connect the ac cable ground pin to the chassis as shown in Figure 2. — *Ed.*]

Getting Into the Details

A quick look at the schematic diagram (Figure 2) shows that eight conductors are needed to communicate all the switch positions and also receive LED power from the floor box. I found a used Cat-5 Ethernet cable in my junk box that contains the required eight conductors. This is a nice choice that saves time in wiring up our own custom con-

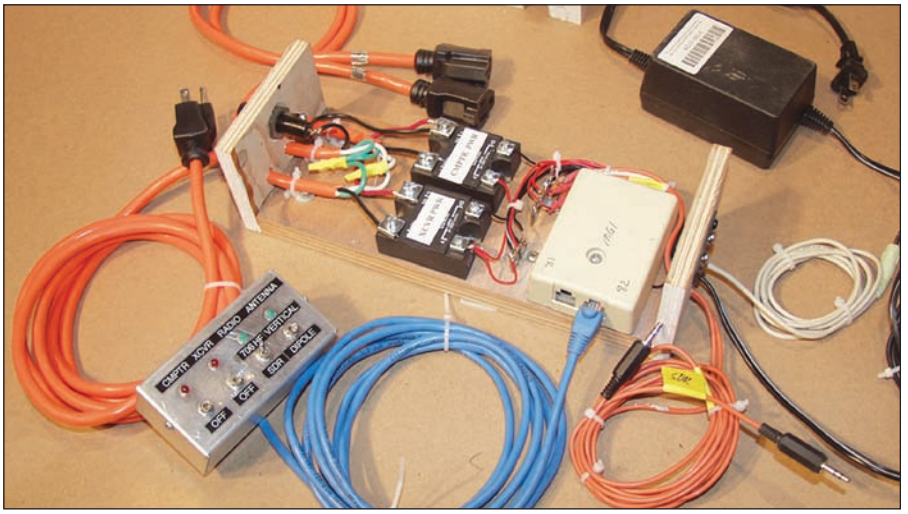

Figure 1 — The aluminum mini box in the lower portion of the photo contains the switches and LED indicators. The wooden box with the ac connections and SSRs is above.

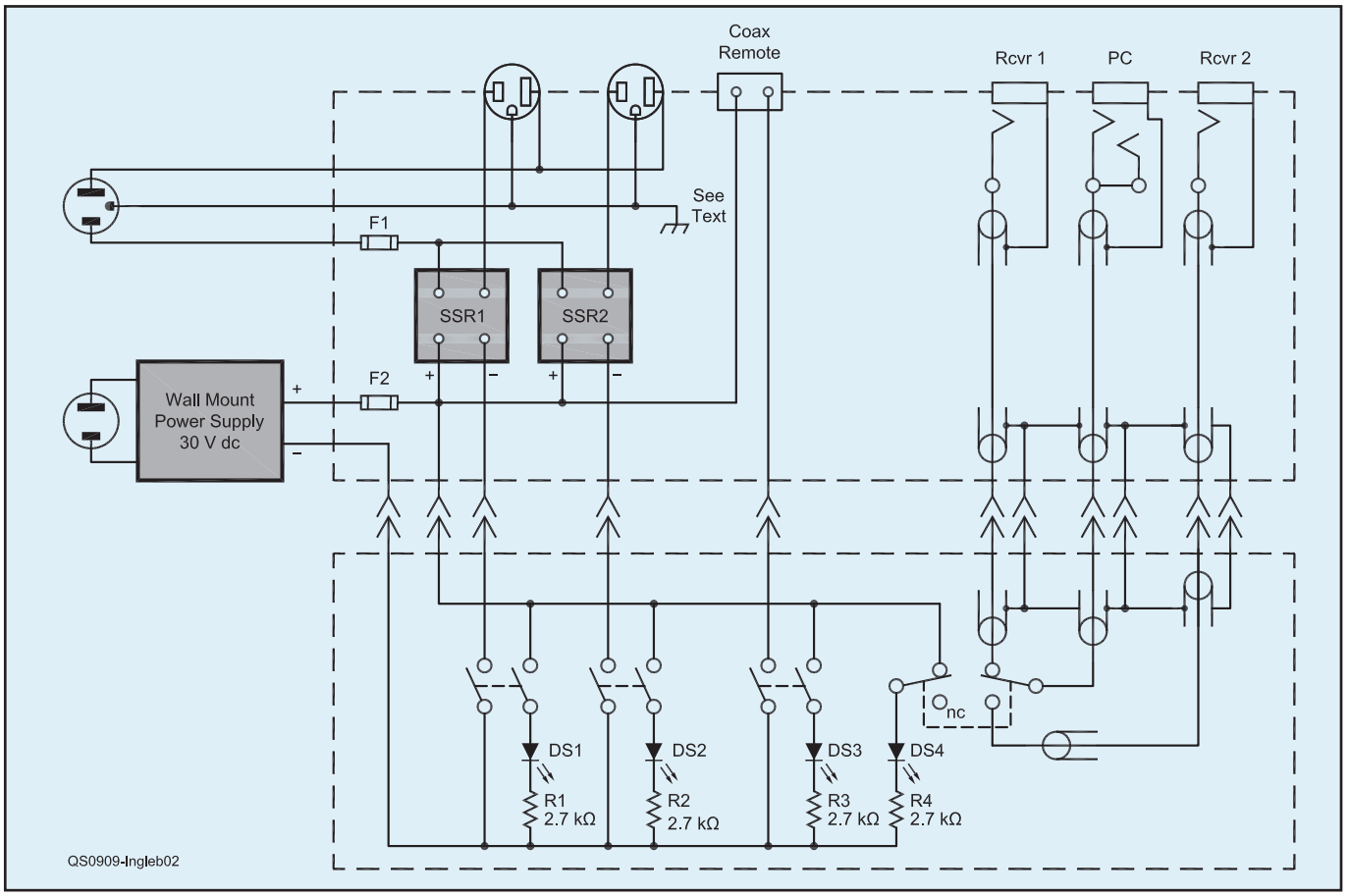

Figure 2 — Schematic diagram of the control box. Parts are listed in Table 1.

nector and provides a nice looking, ready made quick disconnect.

For the power supply, you may use whatever dc control voltage is convenient. Most SSRs require between 10 and 30 V to close their virtual contacts. My remote coax relay had an odd 30 V coil voltage requirement. That made it easy to choose 30 V as the main control voltage.

To properly illuminate the LEDs, the current limiting resistor size needs to be calculated using Ohm's law. My junk box variety LEDs light up very nicely at 10 mA and so the math was:

$$R = (E - V_{LED}) / I \text{ or } (30 - 3)\text{ V} / 0.01\text{ A}$$

$$= 2700\ \Omega \text{ or } 2.7\text{k}\Omega$$

The power rating of the resistor is really not a factor here due to the low current, but let's check anyway. P = I × E, so 0.010 A × 27 V = 0.27 W.

Putting it all Together

Using good construction practice, drill and mount all the components on the minibox. A bit of two part epoxy will hold the LED nicely, but be sure you are done for the day when you mount them, as this type of epoxy usually needs a 24 hour setup time. For the floor mounted box, I chose to mount the SSRs on a ¾ inch rectangle of plywood with a wooden cover, as shown on the top of Figure 1, but any substantial box with a cover may be utilized. Good practice would have you position the ac line components: cords, splices and fuse all at one end of the chassis. Be sure to chamfer the edges of the wire holes to act as a grommet to avoid chafing wear.

Make all the signal and low voltage connections at the other end of the box Don't attempt this project unless you are comfortable working with 120 V ac circuits. Ensure that all connections are adequately insulated and strain reliefs are used on all cable feedthroughs. Add a cover and the project is done. Recheck all wiring and then perform a quick test for functionality.

Each switch should illuminate its LED when switched to ON. Plug a test load into each female cord end and verify that it receives power when the corresponding switch is closed. Using a volt-ohm-milliammeter or digital voltmeter (DVM), verify proper switching of the receiver audio from each source to the PC sound card input. Verify a control voltage output for the antenna relay.

Table 1
Required Parts for Integrated Control System

Quantity	*Description*
1	Cat-5 cable, about 5 feet with one end cut off.
1	Cat-5 receptacle.
2	Fuse holders and suitable fuses.
3	DPST miniature toggle switches.
1	DPDT miniature toggle switch.
2	Solid state relays.
1	Wall wart dc power supply (see text).
1	Minibox, 3 × 4 × 2 inch.
4	2.7 kΩ ½ W resistors (see text).
4	LEDs, any color.
3	Audio cables, 4 feet with ⅛ inch stereo plugs (as needed for specific radios and PCs).
1	Plywood "chassis."

ARRL member Dave Ingebright, WB7ELY, has been licensed since 1976 and holds a General class license. Dave is active with a digital station on the HF bands and 440 MHz UHF with a hilltop UHF repeater. Dave manages an electronics research and development lab for an aerospace manufacturing company. He is an active designer and builder of custom automation and remote control equipment in his spare time. Dave holds a patent on an optically isolated intercom system for flight test aircraft. You can reach Dave at 15819 Jordan Rd, Arlington, WA 98223 or at **treez@hughes.net**.

A Simple Transformer to Measure Your Antenna Current

SWR doesn't give you the whole story — you need an RF current meter.

Paul Danzer, N1II

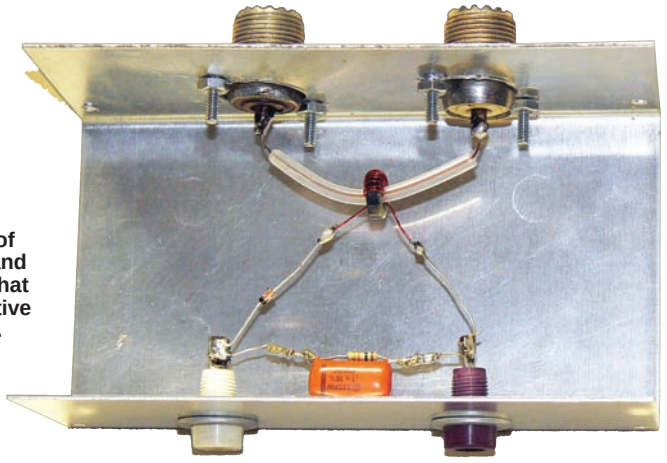

Figure 1 — View of the transformer and simple circuitry that make up the relative RF current meter.

In a recent *QST* article, Eric Nichols, KL7AJ, presented a good idea — monitoring the RF current into your antenna system to insure optimum tuning.[1] Actually, it was the second time it was mentioned to me — George Peters, K1EHW, suggested the same thing to me several months before. At the end of Eric's article, he proposed using a current transformer to do the monitoring.

Making a Current Transformer

This could be as simple as a turn of wire through a ferrite core and several turns of wire around the core to form a transformer.[2] The output of the transformer would be proportional to the current through the wire.

Making it Happen

This seemed simple enough, and the result of one hour's work is shown in Figure 1. The core used was a T37-6. T37 designates the size (0.37 inches OD), picked so the insulated center conductor of RG-58 (or RG-59) would fit comfortably through the core center. The –6 designation relates to the frequency application of the ferrite mix, in this case 2 to 50 MHz.

Searching the ARRL suppliers' data base, it appears that Alstar Magnetics offers this core; an alternate would be a Palomar F37 with mix 61. There is no criticality here — if you want to try it, strip a core from any old source — perhaps from a junked PC power supply or computer cable. It may not be the most efficient RF transformer ever built, but if it works it will do the job.

Wrap 20 turns of 24 gauge enameled wire as the transformer secondary. The secondary is connected to half wave rectifier consisting of a silicon diode (1N914), a 10 kΩ resistor as the load and a 0.1 µF capacitor as a filter (see Figure 2). A high-impedance voltmeter (the $10 variety) is connected to the two pin jacks to serve as an indicator.

The unit shown was tested with a 100 W transmitter on all bands from 80 through 10 meters. Performance across each band was relatively uniform, considering the probable variation of SWR and power though the feed line as the frequency was varied.

Hook up the rest of the circuit as shown in Figure 2 and connect a meter to the terminals.

What we Have

The object here was not to get an exact measure of the antenna current. What I wanted was a relative measure, so I could see if anything was going wrong, or use it as a way to adjust my antenna tuner for the maximum signal to the antenna. Commercial stations use a current meter, mounted at the connection of the feed line to the antenna, to monitor output. Since they know the antenna impedance and their meters are calibrated, they can determine precise power into the antenna.

If you enjoy low power (QRP, typically 5 W or less) or very low power (QRPP, less than 1 W) operation, more turns may be needed and can easily be added.[3] Similarly, if your meter does not have enough sensitivity, more turns may be called for. If after assembly the core is not firmly in place, held by the friction of the secondary on the primary wire, a drop of glue can be used to secure it all together.

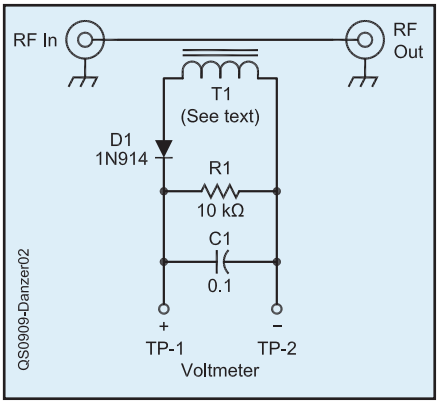

Figure 2 — Schematic diagram of the relative RF current meter. Nothing about the circuit is critical. See text for parts information.

Putting it to Use

The current meter consumes a miniscule fraction of the output power, so, can be left in the line, or removed when not in use. You may even find a meter case and a surplus meter at a hamfest that will work with it to give continuous indication without tying up your bench meter. I suggest writing the relative current indication for each band in your log. Later, if something seems amiss, it is then an easy job to compare your readings to the recorded ones to find out if the problem is in your antenna system.

Notes

[1]E. Nichols, KL7AJ, "Keeping Current with Antenna Performance," *QST*, Feb 2009, pp 34-36.

[2]Each pass through the center of a toroid counts as a full turn.

[3]Low power operators may obtain better results using a germanium diode, such as a 1N34, in place of the silicon diode due to its lower forward voltage drop.

ARRL Member Paul Danzer, N1II, was first licensed in 1953, and now holds an Amateur Extra class license. Paul has been operating 40 meter CW almost constantly since he first started. He uses his years of experience as an electronic engineer to design and build small, one-night ham radio projects. Currently he is a Professor of Computer Science at Housatonic Community College in Connecticut. He can be reached at **n1ii@arrl.net**.

Measuring Radio Frequencies

There was life before frequency counters. Here's how it used to be done.

Bob Shrader, W6BNB

During the years when wireless communications were first being researched, there was apparently no great interest in what frequencies or wavelengths were being used. In 1865 Mahlon Loomis flew two similar kites with similar length metal wires and strings from two mountain tops in Virginia. He probably assumed that the circuits had to be electrically similar, but probably had no idea they were working as ¼ wavelength antennas. He was, however, able to transmit and receive over a distance of about 18 miles with them. He was using only the energy picked up by his kite wires while they hung up in the air and were ungrounded.

When he keyed one of his charged kite wires to ground it discharged, transmitting a short wave train of rapidly weakening RF waves. As the wave train passed across the other kite wire that was grounded through a telegraph sounder, an induced RF wave train current flowed through the sounder coil that was strong enough to make it click. The lengths of his wires are not documented so the frequencies used are unknown, but they were probably somewhere in the medium frequency (MF) or 300 to 3000 kHz range.

In the 1880s, Heinrich Hertz developed apparatus that generated a spark between two small adjacent round metal balls. He noticed that it produced another spark between the two slightly open ends of a metal loop located across the room. He was radiating a dc generated radio frequency (RF) ac spark type wave train signal whose frequency depended on the length of the wiring inductance (L) plus incidental capacitance (C) connecting the two metal balls. Considering the loop size he was probably sending and receiving HF (3-30 MHz) or perhaps VHF (30-300 MHz) spark signals. A year or so later when he developed inductor coil and capacitor tuned LC circuits and antennas, experimental contacts between transmitting and receiving devices greatly increased in distance.

Absorption Wavemeters

In the early wireless days, starting in the 1890s, when tuned RF LC circuits (called inductor-"condenser" circuits then) began to be used, frequency was measured with an *absorption wavemeter*. These were LC circuits — a coil in parallel with a variable capacitor with a flashlight bulb in series with them (see Figures 1 and 2). The capacitor tuning dial was calibrated in frequency or wavelength.

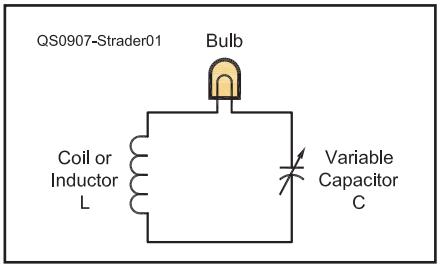

Figure 1 — Circuit diagram of a basic absorption wavemeter.

Figure 2 — General Radio 574 wavemeter, c 1930s, from the ARRL Lab collection. The left side includes inductors for different bands that are positioned on the top as shown to measure within each frequency range.

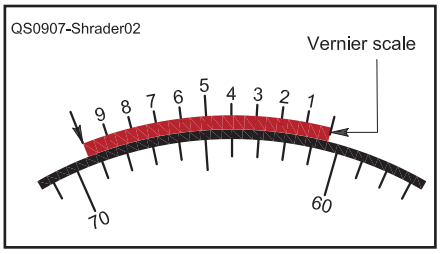

Figure 3 — Mechanical measurement precision can be improved using a vernier scale.

Measuring Transmitter Frequency

To measure the frequency of a spark transmitter, for example, the LC circuit coil could be brought close to an operating transmitter's antenna coil. Enough RF power would be absorbed to make the bulb glow. When the capacitor was tuned to a maximum glow the dial reading indicated the frequency of the transmission. Unfortunately it was easy to blow out the bulb by bringing the wavemeter too close to the coil of an operating transmitter (and do I remember that!). So a stock of new bulbs was usually required. The farther the wavemeter was from the transmitter coil (the dimmer its maximum glow), the more accurate the frequency reading.

Wavemeters were used to measure the frequency of early day spark transmitters, RF alternators, arc converters and, later, vacuum tube transmitters. It was also found that almost any kind of a diode in series with a sensitive dc voltmeter connected across the wavemeter coil gave a peak voltage reading when the LC circuit was tuned to the transmitter's frequency.

Measuring Receiver Frequency

A wavemeter could also measure the frequency of a received signal. First the old time receiver was tuned in to a maximum audible spark type signal. The wavemeter coil was loosely coupled to the receiver's tuned LC detector's circuit. When the wavemeter was tuned across the incoming signal's frequency it absorbed some of the received energy from the LC circuit, weakening the received signal a little, indicating the frequency of the incoming signal. Again, the looser the coupling the less the wavemeter affected the receiver's tuning and the more accurate the frequency reading. When receivers began using oscillating regenerative detectors a slight frequency variation occurred as the wavemeter's resonant frequency was tuned across the detector's oscillating frequency.

Improved Measurement Precision

Better frequency meters have a *vernier* scale above their equally spaced dial markings (see Figure 3). The vernier scale has 9 units compared to 10 units on the meter dial scale that is rotated below it. Suppose the meter peaks with the vernier's 10 arrow at something between 68 and 69 dial marks as shown. Where the two scale numbers form a single line, 3 in this case, it shows the accurate reading to be 68.3 degrees on the meter dial. The 68.3 point on a calibrated frequency versus meter dial reading chart indicates the correct frequency value.

Moving Up the Bands

Modern microwave circuits may use a wavemeter type measurement, although today's frequency counters (explained below) are far more accurate. Microwave frequencies are very high, so long, hollow oblong or round metal *waveguides* are used to carry microwave signals inside them from one point to another. These radio waves produce electron oscillations back and forth on their internal metal side and end walls much as they would along antenna wires or transmission lines, developing standing waves back down the waveguide.

The waveguide shown in Figure 4 is a slotted type. A microwave voltage can be picked up by a short insulated probe inserted down into the slot. The distance in millimeters between two minimum readings (maximums give broader readings) as the probe is moved along the slot will be a ½ wavelength of the RF ac in the waveguide. A slotted coaxial line, such as is shown in Figure 4, could be used in the same way. Twice this length, or a full wavelength, can be converted to frequency by the formula

Frequency in hertz = 300,000,000/λ

where the Greek letter lambda, λ, means wavelength in meters, and 300,000,000 is the speed of light or radio waves in meters per second. (Example: 300,000,000/75 meters = 4,000,000 Hz = 4 MHz)

The old time ship distress and calling frequency of 500 kHz has a λ of 600 meters. An AM broadcast station using a frequency of 1000 kHz has a λ of 300 meters. Compare the frequency and λ bandwidths for some amateur bands as shown in Table 1.

So a 7,045 kHz net would be at 42.58 m! Silly? No, it's just that we are no longer in a wavelength measuring world. Today the net's wavelength would probably be given as λ = 42.58 meters on wavelength calibrated receivers and transmitters (and f = 7045.5612... kHz).

Lecher Wires

Along a somewhat similar idea, VHF and UHF wavelength measurements may use *lecher wires*. With these a low power RF ac is inductively coupled from a transmitter to a coaxial line that ends at two long, tightly stretched, parallel bare copper wires held a couple of inches apart as shown in Figure 6. A flashlight bulb, with two stiff bare copper wires soldered to its two contacts in line, is held by the glass of the bulb, across the parallel wires. As the bulb wires are slid along the parallel wires, the bulb will go through maximum and minimum glows. The distance in millimeters between any two minimums will be the λ/2 of the RF emission. Twice this distance is a full wavelength, convertible to frequency as explained above.

Heterodyne Frequency Meters

An accurately calibrated Colpitts or Hartley variable frequency oscillator (VFO) can be used in the block diagram circuit of the heterodyne frequency meter shown in Figure 7. Such a meter can be used to measure the frequency of signals being received. It can also be used to radiate known frequencies.

The 1 to 2 MHz tunable master VFO ac output is fed through a decoupling amplifier (to prevent outside effects from changing the oscillator frequency) to an active-device mixer or detector stage. The short antenna can either pick up outside RF signals, or

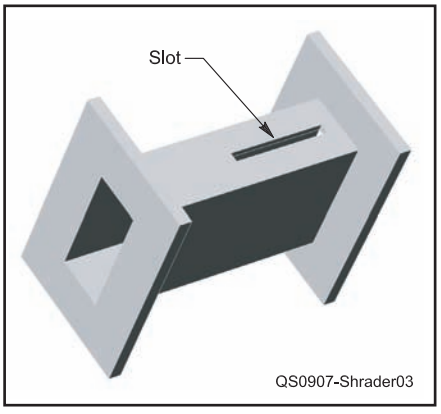

Figure 4 — A slotted waveguide section with an RF voltage probe can be used to measure microwave frequencies.

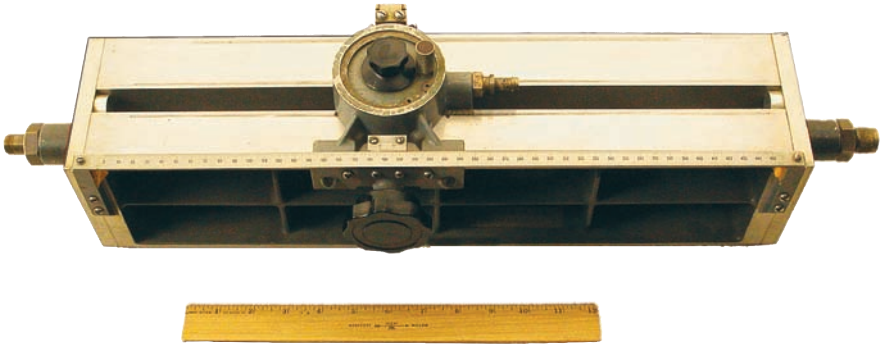

Figure 5 — A slotted coaxial line, this one from the 1950s, is retired from service in the ARRL Lab. It operates in a similar manner to a slotted waveguide section.

Table 1

Frequency and Wavelength of Popular HF Amateur Bands

Band (Meters)	*Frequency Range (kHz)*	*Wavelength Range (Meters)*
160	1800 to 2000	166.67 to 150.00
80	3500 to 4000	85.71 to 75.00
40	7000 to 7300	42.86 to 41.1
20	14,000 to 14,350	21.43 to 20.92
10	28,000 to 29,700	10.71 to 10.10

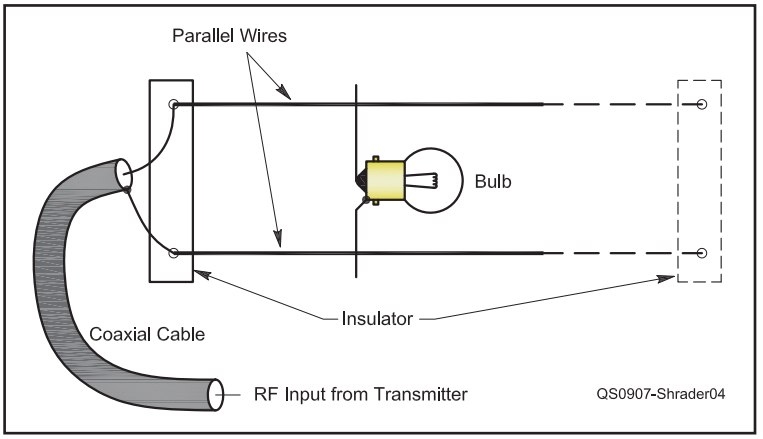

Figure 6 — A lecher wire frequency meter consists of parallel bare copper wires held a couple of inches apart.

radiate the VFO generated frequency. If the VFO and any incoming RF signals are mixed together, their difference can be heard in the earphones if it is at an audible frequency.

As the VFO is tuned past a 1.3 MHz signal, for example, a difference signal will be heard, first as a high pitched whistle (10,000 Hz or more) that decreases to zero frequency, and then increases up to another high pitched whistle and disappears. At the VFO frequency that produces the zero tone frequency, the calibrated VFO dial indicates the frequency of the signal being received. If the incoming signal is 2.6 MHz the VFO will respond similarly because the second harmonic of the fundamental 1.3 MHz VFO output is now mixing or beating against the 2.6 MHz signal. The same is true for a 3.9 MHz incoming signal, and so on.

The operator must know the approximate frequency of the incoming signal being measured to know which harmonic is in play.

Actually, the mixer signal becomes inaudible with many earphones at around 30 Hz both above and below the true *zero beat* frequency. This leaves a silence distance on the dial of about 60 Hz. Midway between the two 30 Hz points on a linear dial is the true zero beat frequency of the signal.

The 100 kHz crystal oscillator produces accurate harmonic signals every 100 kHz across the VFO dial while it is turned on. This can be used to verify dial calibration.

If you wish to tune a receiver to a frequency of, let's say 1.6 MHz, the VFO will radiate that frequency when tuned to the calibrated dial setting of 1.6 MHz. It will also be radiating multiples or harmonics of any of its 1 to 2 MHz oscillating frequencies, but they will be much weaker signals than the fundamental. In some cases the radiated signal from the meter is better identified if it is tone modulated. To provide this, the AF tone oscillator can be turned on to modulate the decoupling amplifier, resulting in a single tone modulated RF signal output.

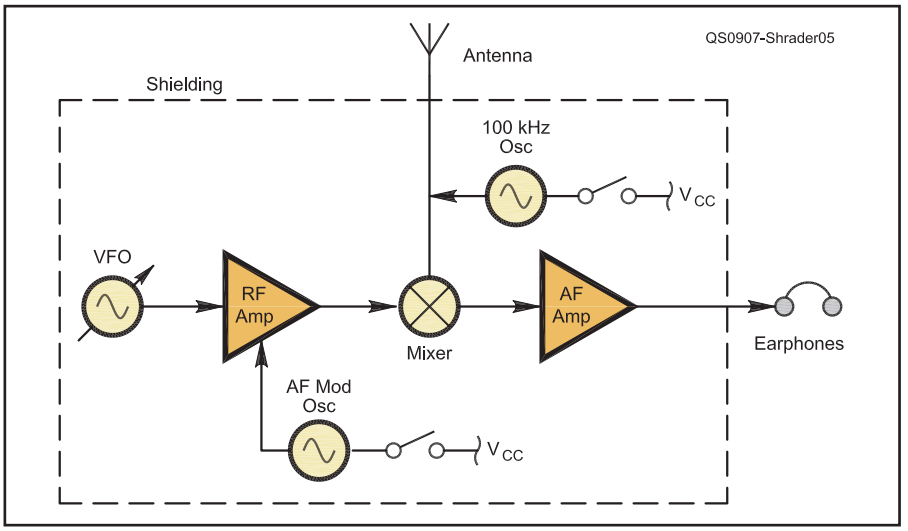

Figure 7 — Block diagram of the heterodyne frequency meter.

The BC-221 Heterodyne Frequency Meter from the WW2 era was a very precise example of such a unit (see Figure 8). These offered much higher frequency accuracy and resolution than the HF receivers and transmitters used in aircraft of US Army Air Forces' WW2 bomber groups. Each aircraft had one aboard that the radio operator could use to set the transmit and receive frequencies of their radios to the proper communications channel. The calibration book (Figure 9) was hand calibrated for each individual unit and typically provided a resolution of multiple scale divisions (using the vernier dial) per kHz, compared to the typical radios 10 kHz resolution. The unit shown is the LM Frequency Meter, a similar unit used by the US Navy.

Digital Frequency Counters

By far the most accurate frequency meter is a digital frequency counter (DFC). It can indicate the frequency of an input ac signal down to the last hertz. A block diagram of a simplified, three significant figures, or 1 to 999 readout, DFC is shown in Figure 10. It uses many digital circuits, including:

- Six decade dividers that divide an ac frequency fed to them by 10,
- A simple divide by two circuit,

Figure 8 — An LM heterodyne frequency meter from the WW2 era. Each line represents 1 kHz at the fundamental range (2 to 4 MHz).

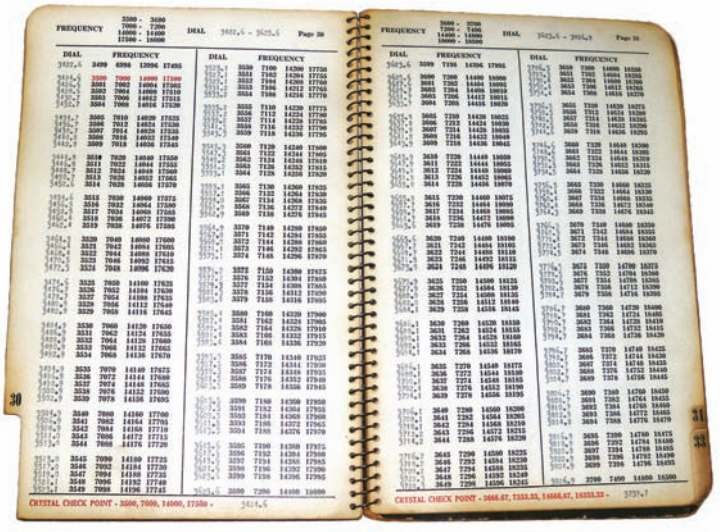

Figure 9 — Calibration book for the LM heterodyne frequency meter in Figure 8. Each line represents 1 kHz at the fundamental range (2 to 4 MHz).

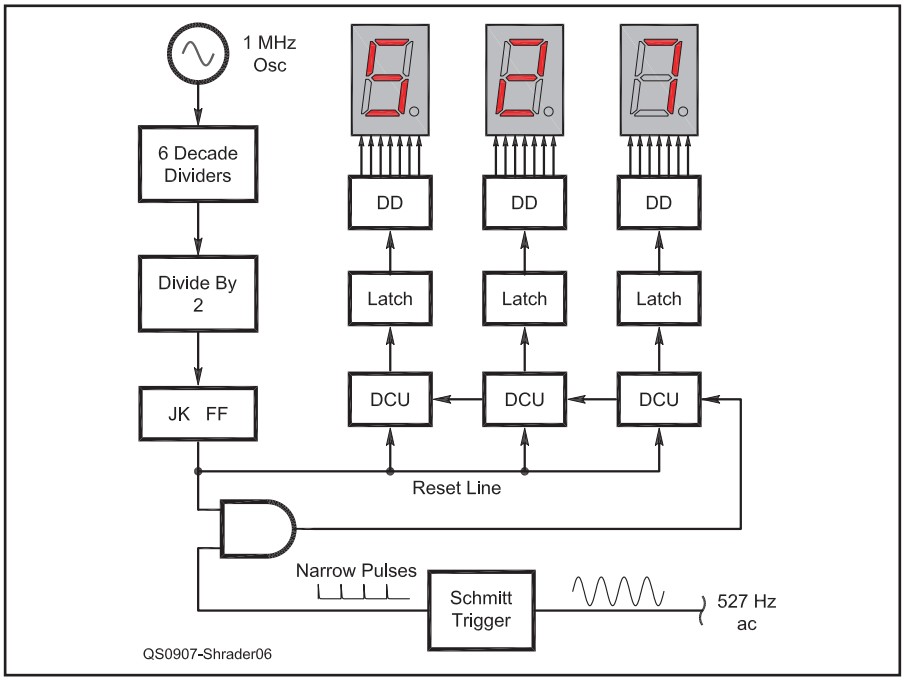

Figure 10 — Block diagram of a simplified digital frequency counter with three digit resolution.

Figure 11 — Typical benchtop digital frquency counter.

- A *JK FF flip flop* circuit to reshape sine wave ac to square wave (on-off) type signals,
- A *Schmitt trigger* circuit to produce a short pulse for any ac cycle fed to it,
- An *AND gate* that produces an output signal only when two signals are being fed to it at the same time,
- Three decimal counting units (DCU) that run up the total binary coded decimal (BCD) ac numbers,
- Three *latches* that can open to allow the BCD numbers to pass through them,
- Three *decoder drivers* (DD) that power the illumination of the three 7-line LED display units.

How might such a system work? First, let's start with no input ac signal applied to the lower AND input. The 1 MHz master crystal oscillator must feed six decade driver circuits in series to produce a precise 1 Hz ac output. The 1 Hz ac runs through a divide by two circuit to produce a precise 0.5 Hz ac signal. This 0.5 Hz ac turns on the JK type flip-flop to produce a precise 1 second ON followed by a 1 second OFF square wave output. These ON-OFF signals are fed to the latches, to the DCU reset lines, and to the top digital AND circuit. But since there is no signal being fed to the lower AND circuit none of the counting register circuits are being fed any signals to count, so no LED display lines are illuminated.

Let's now send a 527 Hz ac signal to the Schmitt trigger. The positive beginnings of each of these cycles are converted to very short pulses that are fed to the lower input of the AND circuit. Now, while the 1 second ON signal is being fed to the upper AND circuit input, 527 pulses will be fed to the DCUs. If the latch circuits were left open these pulses would show as an unreadable blur on the LED displays. But the latch circuits are disabled by the beginning of the 1 second square wave signal. At the end of the 1 second ON period the AND circuit is shut off and the latch circuits are opened. The BCD signals have now developed the 5, then the 2, and then the 7 digital values in the three DCUs. These can now pass through the three open latches allowing the DD circuits to activate the seven required lines of the display LEDs to illuminate the numbers 5, 2 and 7 as shown.

With nine DCUs, latches, DDs and LED display units, frequencies up to 999,999,999 Hz (almost 1 GHz) could be shown. (Counters may have a single count error, shifting them 1 Hz up or down at times.) Commas and decimal points will require their own circuits, which are not shown. Modern digital counters (see Figure 11) may operate up through the VHF, UHF and well into the SHF range. The digital readouts on our modern transceivers may use one very complex IC in their frequency counter type front panel information readout circuits.

Frequency Measurement — There's Always Been a Way

While our modern counters and atomic standards may make us think frequency measurement is a new concept, it is clear that since there have been radio frequencies, there have been a number of methods used to measure them. Even before electronics existed, there have been frequency measurement devices that could provide the resolution and accuracy necessary for the applications of the day.

Robert Shrader, W6BNB, an ARRL member, graduated from Oakland Central Trade School with commercial radio operator licenses in 1932. He taught radio communications courses there until his retirement in 1969. In 1944 he wrote the Manual of Radio and General Electricity *for cadets in the deck department at the US Merchant Marine Academy at Kings Point, New York. In 1958 he authored* Electronic Communication, *the textbook for his Oakland Laney College course, now in its sixth edition. It has also been published in Polish and Spanish. Other published texts include books for technical level electronics, electricity and fire fighting. He has had many articles published by a number of Amateur Radio magazines, including* QST. *You can reach Bob at 11911 Barnett Valley Rd, Sebastopol, CA 95472 or at* **w6bnb@aol.com**.

An HF Roundtable with a Skype Based VoIP Bridge

Combine HF and computer based communication to get the message through.

Carl Ferguson, W4UOA, John Krupsky, WA5MLF, and John Drum, W4BXI

A previous *QST* article by Ray Jacob, W2RJJ, gave us an excellent overview of how EchoLink (**www.echolink.org**) can be used to extend an HF net using a voice over Internet protocol (VoIP) bridge.[1] Rarely does HF propagation provide net or roundtable participants with uniform signal strength and readability. The idea that the Internet could allow participants living too close or too far to join a net or roundtable is most attractive and could be a real plus for flexible EmComm operations.

Using W2RJJ's work as a starting point, several amateurs from the Bell Ringers Net established an EchoLink server using W4UOA's base station computer, a microHam microKEYER interface and a transceiver.[2] Early testing was successful. Audio quality was acceptable and EchoLink's support of COM port keying made transmit control easy. Managing the flow of the received HF and Internet audio did prove problematic, however. The varying HF noise floor required the control operator to continuously adjust EchoLink's squelch to control the EchoLink server's transmit function.

EchoLink also proved more than a little challenging for some users. To use EchoLink, one must create port exceptions in a computer's firewall, and not infrequently, port routing on home networks with multiple PCs. Each of these steps is required to allow a participant's EchoLink client to communicate with the central EchoLink server and other EchoLink users. The same steps are required to route EchoLink traffic to a specific computer if the participant is part of a home network.

It was not long before the discussion turned to alternative options for VoIP transmission. Recalling an earlier work on remote control over the Internet, I quickly remembered Skype (**www.skype.com**).[3,4] In short, initial tests of a Skype based HF VoIP Internet bridge were overwhelmingly positive.

A Skype Based HF VoIP Bridge

Many *QST* readers are already familiar

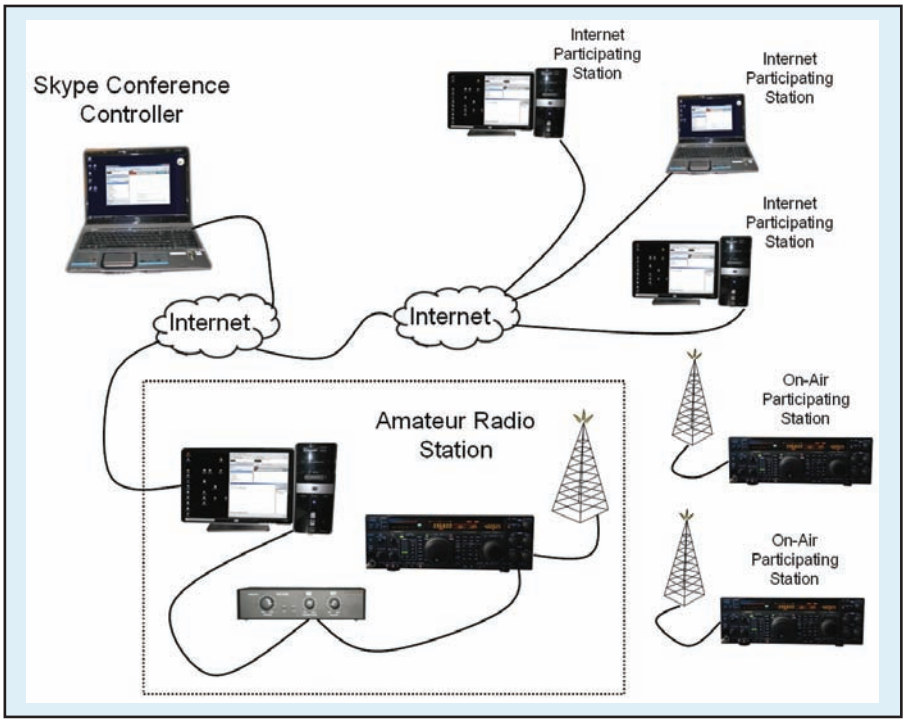

Figure 1 — Pictorial representation of an HF roundtable using a VoIP bridge.

Figure 2 — The W4UOA operating position with the *Skype* software running. The laptop is handling the conference controller function while the base station computer is providing the interface to the transceiver

[1]Notes appear on page 42.

Figure 3 — The *Skype* login screen — here's where you start.

with Skype, a commercial Internet based long distance voice service. Many users characterize Skype as simple to install and as having robust audio quality. In addition to Skype's ease of use for one-on-one Internet audio and text chat, a Skype client can host up to 25 conference participants. Figure 1 shows a pictorial representation of an HF roundtable with a VoIP bridge. The W4UOA operating position with the *Skype* bridge in place are shown Figure 2.

While such a facility can be assembled and managed in several different ways, the following paragraphs give a step-by-step setup of one successful configuration.

System Components

The current configuration uses an FT-1000 MP Mark V, a microKEYER interface from microHAM (**www.microham.com**), a base station computer running *Windows XP Pro* with all updates and patches, and *Skype 3.8.0.154*. The Skype conference controller is a laptop computer running *Vista Ultimate* with all updates and patches, *Skype 3.8.0.154* and a Logitech USB headset with boom mic. The base station and the laptop share a local telco digital subscriber line (DSL) Internet connection.

We suggest Internet participants install the latest release of *Skype* software and use a headset and boom mic of their choice. We also encourage first time Skype users to use Skype's test call feature to check and set their audio levels. The *Skype* login screen and Skype test call contact are shown in Figures 3 and 4 respectively. Once they install *Skype* and log in for the first time, they should communicate their Skype user name to the control operator. These user names will be used to conference the Internet participants into the Internet bridge.

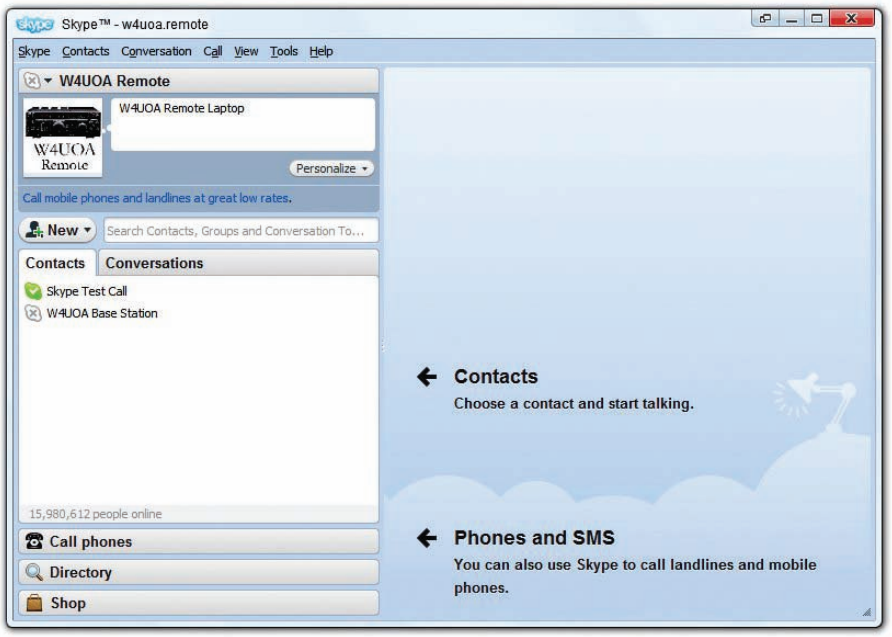

Figure 4 — The *Skype* test call setup screen. This allows the setting of audio levels off the air.

Sequence of Operation

The control operator tunes the transceiver to the desired operating frequency and advises on-air participants that Internet participants will join the roundtable shortly. At this point, the control operator turns the AF gain on the HF transceiver to zero.

Start Skype *on the base station computer and login to the Skype network.* We suggest setting Skype on the base station computer to answer calls only from individuals who appear in the contacts list and to auto-answer all those calls. In the current application only the conference controller will be allowed to connect to the base station computer.

Start Skype *on the conference controller and login to the Skype network.* A second computer to act as a conference controller is necessary because the base station computer can only run one instance of *Skype*. *Skype* on the base station computer links the radio to the soundcard to provide the A to D conversion on the outbound receiver audio and the D to A conversion of the inbound Internet audio.

Use Skype to place a call to the base station computer on the conference controller. Thus the base station becomes the first conference participant. When the base station computer answers, transceiver audio will be heard on the conference controller's headset.

The control operator enables VOX on the transceiver.

Using the conference controller's headset and mic, the control operator should now confirm the transmit and receive audio link to the base station computer. This can be done by contacting several of the on-air participants from the conference controller. Use these contacts to adjust VOX sensitivity and delay as well as transmit and receive audio levels as necessary. At this point, everything

is in place to bring in the Internet participants. The process is very straightforward but a little practice helps.

Working within the base station connection on the conference controller, ADD+ *each Internet participant.* To do this, each participant must already be in the conference controller's Skype contact list. Remind each participant to follow standard communications exchange protocol to ensure proper identification at all times as well as orderly net discipline. Also remind them that they are on an open VOX line and to use Skype's MUTE button as they would a PTT.

Observations on VoIP Based Operations

Our experience suggests that:

- You should practice using Skype in a conference mode — it's just like learning to use a new rig. You will get increasingly comfortable *managing* the HF Internet bridge as you become increasingly familiar with the Skype's menu structure and command buttons.
- New Skype users may find this link useful as they set up their individual systems: **www.skype.com/help/guides/soundsetup.html.**
- It is best to bring Internet conference participants in by calling them from the conference controller as shown in Figure 5 . Encourage interested participants *not* to call you. If they were to call you, you would have to first connect to them one-on-one and then bring them into the conference. It's much easier for the conference controller to bring them directly into the conference.
- You will have to periodically remind Internet conference participants to mute their mics while not talking.

In addition to *Skype*, our roundtable uses two additional applications: *addonChat* and Adobe *ConnectNow* as shown in Figures 6 and 7. Both are available at no cost and add a great deal to the vitality of the roundtable.

A program our group calls the Chat Room, *addonChat*, provides a reliable real time off-air communications path (see Figure 6).[5] It is excellent for fills as well as additional information to augment on-air discussions. In addition to providing a excellent way to exchange Internet links (URLs) and additional details, participants also use it to enrich the already friendly on-air conversation.

ConnectNow (see Figure 7) provides an easy way to share real time video between participants.[6] Up to three users can log in concurrently and share a live video feed from their respective locations. Frequent uses include showing new equipment, equipment layout and other additions to the shack.

Good luck! We have found the *Skype* based HF VoIP bridge, the Chat Room (*addonChat*) and Adobe *ConnectNow* to be great additions to our early morning roundtables.

Notes

[1]R. Jacob, W2RJJ, "Integrating EchoLink into a Single Sideband Net," *QST,* Aug 2008, pp 52-53.

[2]The Bell Ringers (**tparca.org/bellringers/**) are a group of retired and active Bell System employees and friends that gathers weekday mornings for an informal net and on Saturdays for a formal net. On weekdays they can be found on or about 3968 between 0730 and 0900 CT and on Saturdays at 0900 CT on 7230.

[3]C. Ferguson, W4UOA, "Remote Control Over the Internet (RCoIP)," *QST*, Feb 2006, pp 62-63.

[4]See **www.skype.com/intl/en/allfeatures/conferencecall/**.

[5]See **www.addonchat.com**.

[6]See **www.acrobat.com/#/connectnow/ConnectNowBegin**.

ARRL member Carl Ferguson, W4UOA, is Professor Emeritus and Senior Research Fellow of the College of Commerce at the University of Alabama. He holds a BS degree in industrial electronics and an MBA and PhD from the University of Missouri — Columbia. He was first licensed as WAØLNL in 1965, while an undergraduate at Missouri State University. In addition to his interest in Amateur Radio, Carl has been active in computing and computer networking his entire career. You can reach Carl at **w4uoa@bellsouth.net**.

John Krupsky, WA5MLF, was first licensed

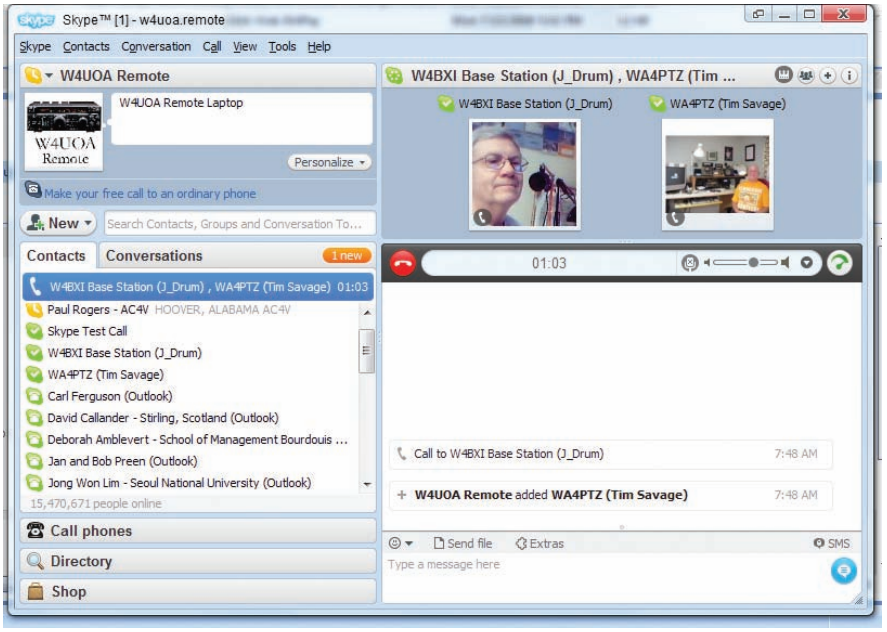

Figure 5 — Screen shot of the conference controller. Skype is used to manage the audio between Internet participants and the base station.

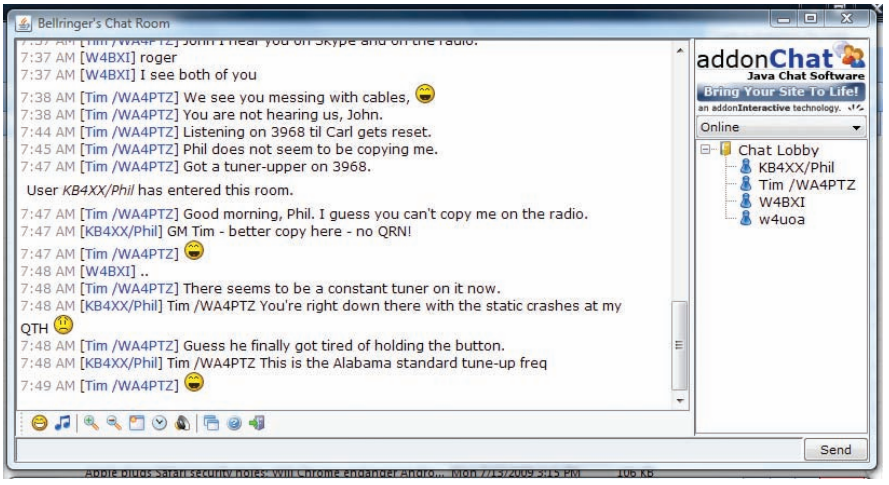

Figure 6 — The *addonChat* chat room provides what we think of as backroom communications between the on air and Internet participants. The chat room is great for fills and comments on the on-air discussions.

in 1965 while in high school. He holds BS and MS degrees in electrical engineering, and served in the US Navy Submarine Service prior to a career in telecommunications. A licensed professional engineer, he retired from BellSouth Telecommunications in 2006, and remains an active member of IEEE. John's ham radio interests include vintage Heathkit equipment, FM repeater maintenance, electronics tinkering, ham-related software applications and soft-ware defined radio. You can reach John at **wa5mlf@arrl.net**.

John Drum, W4BXI, was first licensed as a Novice in 1953 and is a Life Member of ARRL. He graduated in electrical engineering from Virginia Tech, served as a Communications and Electronics Maintenance Officer in the USAF, and then joined the Bell System. He is now retired and enjoys contesting and DXing from Lookout Mountain in Alabama. You can reach John at **w4bxi@aol.com**.

To communicate to the authors about this article, please establish contact via Carl Ferguson, W4UOA, 1622 Alaca Pl, Tuscaloosa, AL 35401 or at **carlferguson@bellsouth.net**. QST

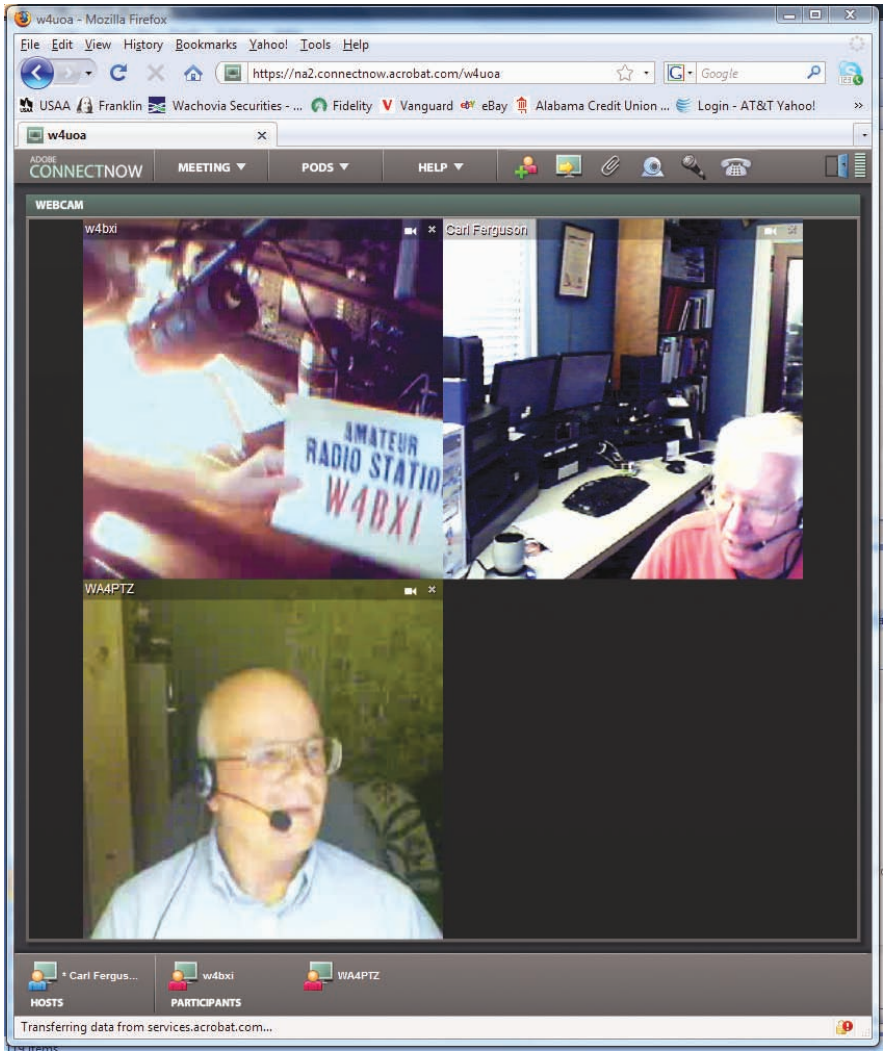

Figure 7 — Adobe ConnectNow allows up to three simultaneous video feeds and numerous other resources. As with *addonChat*, Adobe *ConnectNow* is a available without charge.

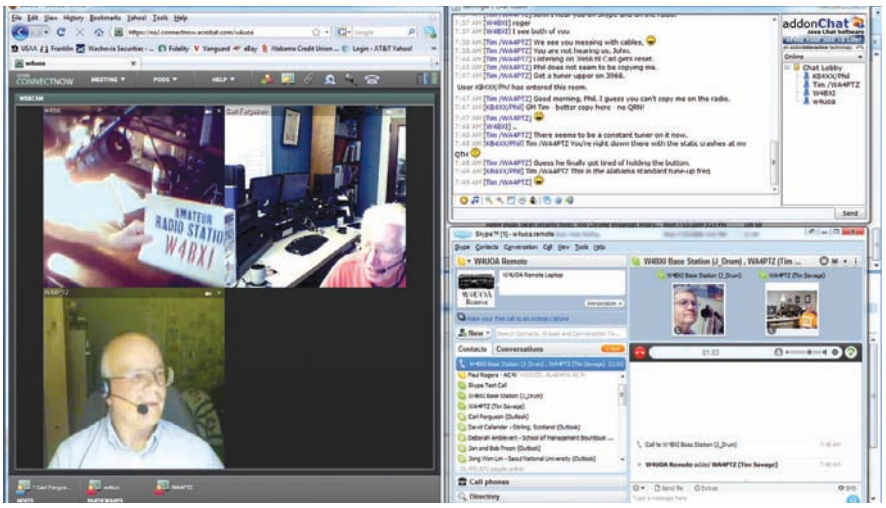

Figure 8 — Real time view of conference controller desktop.

New Products

TEN-TEC HAND MICROPHONES

◊ Ten-Tec's Model 702 and 703 hand microphones feature an omnidirectional, 500 Ω dynamic element and coiled connection cable. Model 702 has an 8 pin connector for use with the Omni-VII and Orion II. Model 703 has a 4 pin connector for use with the Jupiter and many older Ten-Tec transceivers. Price: $39.95 each. For more information or to order, visit **www.tentec.com**.

TEN-TEC MODEL 715 RF SPEECH PROCESSOR

◊ The Ten-Tec model 715 RF Speech Processor is an RF clipping processor designed to operate with most modern HF Amateur Radio transceivers. Built-in transceiver speech processors use AF clipping, compression or RF compression. Model 715 uses RF clipping to achieve a high ratio of average-to-peak power from SSB transmitters. Average SSB output power is said to increase by up to 6 dB, improving readability by stations on the receiving end. In addition, a PASSBAND control allows for tailoring the audio tone of the transmitted signal. Included are an ac power supply and choice of output cable to fit the microphone jack on Ten-Tec, Yaesu, ICOM and Kenwood transceivers. Price: $249. For more information or to order, visit **www.tentec.com**.

PRODUCT REVIEW

SPE Expert 1K-FA Linear Amplifier

Reviewed by Mark Wilson, K1RO
QST Product Review Editor

Not long ago, vacuum tubes ruled the world of RF power amplifiers in the Amateur Radio marketplace. Tube type amplifiers are economical to build at amateur power levels, easy to cool and tolerant of abuse. Depending on the design, one or two vacuum tubes will run comfortably at the legal power limit (1500 W output) for extended periods. Properly cared for, vacuum tubes will last for many years in normal amateur service. It's common to hear amplifiers that haven't been manufactured in decades still on the air. Replacement parts are generally available although there are fewer sources than in years past.

While tube type amplifiers are still plentiful and much loved, in recent years solid state power amplifiers have become increasingly popular. Most of these units are in the 500 to 1000 W power output range. With sophisticated protection circuitry that constantly monitors temperature, current and other key parameters, today's solid state amplifiers are far less prone to damage from excessive drive, mistuned antennas or other problems occasionally encountered during normal amateur operation. In addition, modern switching power supplies provide the required low voltage, high current power source — typically around 50 V at 30 A or more — without the size, weight and heat of a linear power supply with a massive 60 Hz transformer.

Thanks to impedance matching with broadband transformers, solid state amplifiers work over a wide frequency range and lend themselves to instant *auto-tune* band changes by switching in the appropriate output low pass filter. As a bonus, some solid state amplifiers work on 6 meters as well as 160 through 10. All this adds up to a compact, reliable, easy to use power amplifier to complement your HF or HF plus 6 meter transceiver.

The subject of this review is the SPE Expert 1K-FA, a solid state amplifier for 160 through 6 meters. Output power is typically 1 kW PEP for SSB and 900 W for CW on the HF bands. At 6 meters, it's 700 W PEP output. Maximum key-down time is 2 minutes in the FULL (full power) mode, and 5 minutes in the HALF (half power) mode. The manual recommends using the HALF setting for high duty cycle operation such as RTTY and other digital modes, SSTV, AM or FM. The amplifier is manufactured by the Italian firm SPE and currently distributed in the US by SteppIR, best known for their innovative antennas.

We purchased the review amplifier in late 2008 through Bill Leahy, KØZL, of Custom RF Solutions in Arvada, Colorado. Bill's untimely death in an industrial accident in early 2009 put SPE's North American operations in limbo for several months. In April, SPE announced that SteppIR had picked up sales and service for the US, Canada and Mexico — welcome news for current owners as well as prospective buyers. SteppIR will handle warranty issues for previous US and Canadian buyers as well as new purchasers.

Our review amplifier was shipped directly from Italy, necessitating some customs paperwork. SteppIR is stocking and shipping amplifiers from their US location, eliminating this requirement.

Overview

Ads for the SPE Expert 1K-FA call it "the smallest in the world." Although it's easy to dismiss such claims as marketing hype, there's no doubt that this is one compact package. Measuring 5.5 × 11.0 × 12.6 inches and weighing 44 pounds, it's easy to find a spot for the Expert in a "cozy" station or to bundle it up for Field Day or a DXpedition. It's roughly the same size and shape as a transceiver. SPE even provides a padded carrying case with handles for storage and transportation.

Figure 1 shows part of the interior. The power amplifier (PA) module uses six MRF-150 MOSFETs configured as three push-pull amplifiers connected through a combiner. Switchable low pass filters provide harmonic suppression well within FCC limits on all bands. A pi-L network antenna matching circuit on the output works with loads of up to 3:1 SWR on 160 through 10 meters and 2.5:1 on 6 meters, a range comparable with the internal antenna tuners in many transceivers. The internal power supply provides about 44 V dc under load for FULL operation, reduced to just over 30 V in the HALF mode. PA current is around 40 A at full output and 30 A in the HALF mode.

A 5⅛ × 1¾ inch backlit LCD displays important operating parameters, menu choices and settings. The rear panel has jacks for four antennas and connections for two transceivers.

Protection Features

To keep the amplifier safe, a microprocessor-based protection system monitors heat sink temperature, input power, PA voltage and current, reflected power and SWR, RF voltage on the output network and power combiner balance. Exceed any of the parameters and the amplifier protection springs into action.

Temporary problems that can be addressed by the operator are classified as "simple." For example, if the input power briefly exceeds the limit, a beep sounds but the amplifier resets itself automatically and continues to operate. If the problem persists, for example if the SWR is too high, the drive level remains excessive or the temperature reaches the limit, then the fault is considered "serious." For serious faults, the Expert

Bottom Line

With the SPE Expert 1K-FA, you can add power on 160 through 6 meters to your home or portable station. The built-in antenna tuner allows operation with a variety of antennas.

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

switches to standby. An error message with the reason for the fault flashes on the display and is stored in memory so that the operator can find and fix the problem. A "fatal" fault is declared if the microprocessor fails. In this case, the amplifier power switches off and might be restarted by cycling the power switch on the rear panel, but the manual recommends contacting the repair center.

Heat is the enemy of solid state devices, and heat buildup is of particular concern because of the Expert's compact physical design. There simply isn't much spare room inside the case. The rear panel has four small fans, and another three internal fans cool the PA heat sink. Heat sink temperature is one of the parameters always displayed on the LCD so you can keep an eye on it. (You can set the display for Celsius or Fahrenheit.)

In "normal" mode, the fans don't run until the temperature reaches 40°C. At that point, the fans run quietly at low speed. Fan speed increases to medium at 70°C and to high at 83°C. Fan noise is noticeable at medium speed, and headphones are a plus at high speed. In "contest" mode (a menu choice), heavier use is assumed and the fans run at low speed all the time. The medium and high speed thresholds are reduced to 60 and 75°C to help keep the heat from building up with prolonged use. In either mode, the protection circuit switches the power from FULL to HALF when 85°C is reached. If the temperature keeps rising, the Expert will switch to standby until it cools down.

During routine operation (lots of listening, occasional transmitting) in my cool basement location, the temperature tended to hover around 35 to 40°C with the fans off or running at low speed. With prolonged use during a CW contest, including a lot of CQing, I observed temperatures in the low to mid 70s. Running stations and CQing during a RTTY contest brought temperatures to the high 70s and low 80s, but I never hit the power foldback point during normal operation. I did discover something unfortunate about the power handling capability of my "high power" manual antenna tuner and dipole fed with ladder line, though. The sudden antenna tuner failure provided an unexpected opportunity to test the Expert's SWR/reflected power protection — it worked flawlessly.

The Expert comes with a 75 page instruction manual and three page *Quick Start* guide in Adobe Acrobat PDF format on a CD-ROM. There are actually four versions — English, Italian, French and Spanish. The English version is clear and thorough, with lots of illustrations and good use of color.

The Expert operates from 100/115 V ac (about 16 A) and 200/215/230 V ac (about 8 A) ac lines. We requested that the review unit be set for 230 V, which allows operation from about 210 to 250 V. To change settings, remove the bottom cover and rearrange wires on a terminal block according to diagrams in the manual. It's not difficult, but a number of color coded wires are involved and you need to pay close attention.

Two Transceivers

Figure 2 shows the rear panel. Along the bottom are connections for RELAY (TR switching), ALC (automatic level control) and CAT (radio control interface) for two transceivers. At the top right are two SO-239 jacks for RF input. The transceiver connections are referred to as INPUT 1 and INPUT 2. You can select between the inputs manually with a front panel switch or automatically by transmitting with either transceiver. Antenna and tuner settings are stored independently for each input.

The ALC connection is for automatic control of the transceiver's output power to ensure proper amplifier input levels — especially useful with the Expert's low drive requirements and a typical 100 W transceiver. I appreciated the smooth ALC action rather than trying to ride herd on my radio's power control manually.

The CAT jack allows the transceiver to provide operating frequency information to the Expert for seamless automatic band changes. Although you can make your own CAT cable using DB-15 connectors included with the amplifier, SPE offers cables with appropriate connectors for a variety of transceiver makes and models from Elecraft, FlexRadio, ICOM, Kenwood, Ten-Tec and Yaesu. Transceiver type and any necessary parameters are set up through menus. We ordered cables for the Elecraft K3, ICOM transceivers with CI-V and older Yaesu FT-1000 transceivers with a BAND DATA jack. The only issue encountered was with the Yaesu cable and an FT-1000D. With SPE's assistance we found that a "transmit inhibit" pin on the radio end of the cable needed to be grounded. After that everything worked as expected and SPE has changed the cable in production.

Use of the CAT control feature for band switching is recommended but not required. The Expert has a built-in frequency counter that senses RF at the input and changes bands accordingly as soon as you start transmitting. In addition, you can perform manual band selection with front panel switches.

As shipped, the amplifier operates on all bands. Lookup tables contain information on the edges of the amateur bands and are used in conjunction with the frequency counter to comply with FCC regulations prohibiting amplification between 26 and 28 MHz.

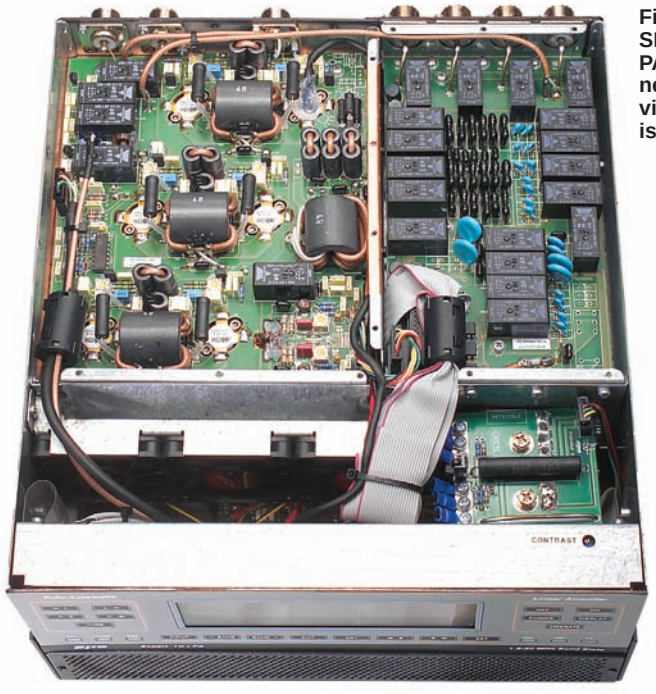

Figure 1 — Inside the SPE Expert 1K-FA. The PA module and output network assembly are visible. The power supply is underneath.

Figure 2 — The rear panel includes connections for two radios and up to four antennas. The four cooling fans, plus three more inside the case, remove heat effectively.

Antennas and Tuner

At the upper left are SO-239 jacks for four antennas (ANT 1 to ANT 4). During initial setup, you use a menu to select the antenna for each band. If you have more than one antenna for a band, you can enter two choices and switch between them with the front panel ANT switch. If you don't have an antenna for a particular band, select NO and the amplifier won't go into transmit if you try to operate there.

The automatic antenna tuner is always in line, and during setup you need to store the settings for your antennas for each band. The bands are divided into segments (the manual gives details) and you can store settings for each segment. Furthermore, you need to store tuner settings separately for each input, even if you are using the same set of antennas. All tuning operations are done with the amplifier in STANDBY and require only a few watts from the transceiver. Setting up the tuner for all the band segments (126 total for 160 through 6 meters) is a bit tedious, but once accomplished, everything tracks your transceiver's operating frequency and you're done until something in your antenna system changes.

The antenna tuner and antenna switching are active whenever the amplifier is turned on, so you can use them with your transceiver even if you have the amplifier in STANDBY. With the amplifier turned off, the transceiver on INPUT 1 is connected to the antenna on ANT 1. Manual adjustment of the antenna tuner is possible using front panel switches to adjust inductance and capacitance. For manual tuning the LCD shows inductance and capacitance values.

Single Operator, Two Radios

A popular contest strategy is SO2R, a single operator using two radios. The idea is to be able to call CQ on one radio while using a second radio to tune around for multipliers or new contacts on a different band. With the right interfaces and switching systems and some practice, it's a very effective way to boost your score by taking advantage of the time spent waiting for your computer or memory/voice keyer to send a CQ or exchange message.

Normally SO2R is accomplished with two transceivers, two amplifiers and some sort of switching system that allows flexibility to use different radios on different bands but prevents transmitting with both radios simultaneously. Effective SO2R operation requires several antennas, as well as good separation between antenna and bandpass filters to prevent interference between the stations or damage to receivers.

The Expert already has connections for two radios with independent settings for each. There's an SO2R jack on the back of the amplifier for an antenna (such as a multiband vertical) separate from the main antennas on ANT 1 to ANT 4. The transceiver connected to the active input uses the main antennas and antenna tuner. The other transceiver is connected to the SO2R antenna and can use that antenna for receiving while the active radio is transmitting.

For example, say you're running stations on 40 meters in the early evening on the main radio (INPUT 1) and tuning for multipliers on 20 meters with the radio on INPUT 2 and SO2R antenna. After finishing a 40 meter contact, you key your transmitter to call the multiplier on 20. The Expert senses the relay closure on INPUT 2 and automatically switches to that radio. The INPUT 2 CAT connection tells the amplifier to switch to 20 meters and select the appropriate antenna. The SO2R antenna switches to the radio on INPUT 1 so you can continue to listen to activity on your run frequency. When you're done working the multiplier, key the 40 meter transmitter to call another CQ and everything switches back.

RS-232 Port

A rear panel RS-232 port works with *Expert Console*, a *Windows* application for interfacing the amplifier with a PC, that's included on the CD-ROM. *Expert Console* replicates the amplifier front panel, including all operating parameter displays and switches. Using the software, you can turn power on and off, change bands, select antennas, operate the tuner and so on.

The CD-ROM also includes a 28 page document entitled *Expert 1K-FA Communication Protocol Specifications* for those who want to incorporate amplifier monitoring or control in their own software.

In the Lab

Lab test results are shown in Table 1. The Expert met FCC spectral purity requirements with no problems, and close-in two-tone IMD performance is good compared with other solid state amplifiers we've reviewed.

Power output ratings are "typical" which means to expect "around 900 W" on CW or "around 1000 W" PEP on SSB, depending on band selected and operating conditions. This was the case except for 40 meters, where at most we initially saw 830 W on the Lab power measurement setup. At the time we were dealing with the late Bill Leahy at Custom RF Solutions, and he suggested that we try adjusting the ALC parameters from a special service menu. That did the trick and brought 40 meters in line with the other bands.

Two other related items are worth mentioning. First, the internal power meter measures RF at the *input* to the antenna tuner. The tuner components introduce some loss, so actual power at the antenna jack can be 100 to 200 W lower. For example, the internal meter might show 1200 W PEP while an accurate meter on the output indicates 1000 W PEP. Through menu settings it's possible to apply a correction factor for more realistic readings with the internal power meter. Second, the power drifted down a bit as the amplifier components warmed up. During prolonged CW contest operation at higher temperatures, the output settled in closer to 800 W than 900 W. Readjusting the antenna tuner with the Expert warmed up helped some.

Table 1
SPE Expert 1K-FA, serial number 084499569

Manufacturer's Specifications	Measured in ARRL Lab
Frequency range: All amateur frequencies, 1.8 to 54 MHz.	As specified.
Power output: 1000 W PEP, 900 W CW for HF, 700 W PEP for 50 MHz.	As specified for SSB and CW.
Driving power required: Not specified.	28 to 32 W typical.
Spurious and harmonic suppression: Better than 50 dB HF, 60dB 50 MHz.	51 dBc worst case for HF, 60 dBc for 50 MHz. Meets FCC requirements.
Third order intermodulation distortion (IMD): 36 dB below PEP	3rd/5th/7th/9th: 42/43/49/56 dB below PEP.
Primary power requirements: 100/115 V ac, 16 A, 200/215/230 V ac, 8 A.	
Size (HWD): 5.5 × 11.0 × 12.6 inches (height, width, depth); weight, 44 lb.	
Price: $3850; transceiver interface cables, $19.	

Using the Expert 1K-FA

The lower edge of the LCD always displays the current input, band, antenna, CAT type, FULL or HALF power mode and heat sink temperature. In STANDBY, SWR is displayed; that changes to PA gain in OPERATE. During operation the LCD can show power output and PA current, or reflected power and PA voltage.

Once the transceiver, antenna and tuner settings are selected, operation is pretty much automatic. The amplifier tracks the transceiver frequency and makes the appropriate adjustments. Drive power adjustments are handled by the ALC.

The Expert's various instruction sheets

make it clear that this amplifier is intended for SSB and CW operation or short transmissions with high duty cycle modes. That meets the needs of most amateurs. If your operating style includes extended periods of high duty cycle transmission, then it's not the right choice. I had no problems using the Expert for extended periods in SSB, CW and RTTY contests. The short breaks for listening between contacts or CQs kept the temperature well within the safe range.

Manufacturer: SPE (Societa Per L'Elettronica), Via di Monteverde, 33, 00152 Rome, Italy; **www.radio-ham.eu**. *US Distributor:* SteppIR, 2112 116th Ave NE, Ste 1-5, Bellevue, WA 98004; tel 425-453-1910; **www.steppir.com**.

Antenna Accessories from Array Solutions

Reviewed by Phil Salas, AD5X
QST Contributing Author
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As your antenna system evolves, you may find the need to add remote antenna switches, preamps and automatic antenna tuners (autotuners). Unless you initially planned for future accessories when you first designed your antenna system, adding these accessories may be difficult. Enter Array Solutions with their Bias-T Plus, Bias-T Master and ATD-1 Auto-Tuner Disconnect antenna system accessories.

Bias-T Plus and Bias-T Master

The Bias-T Plus and Bias-T Master pairs permit you to inject and extract a dc voltage on your antenna's coaxial feed line for controlling or powering remote equipment. This method is convenient because it eliminates the need to run a separate power cable. One unit mounts inside the station, and the other at the antenna. Included with both pairs are an ON/OFF switch assembly and power cord for the dc injection unit in the station, and a power cord for the dc extraction unit at the far end. Figure 3 shows one of the Bias-T units (Plus and Master versions look identical).[1]

The Bias-T Plus is specified to handle up to 2000 W of RF power and introduce an SWR of less than 1.1:1 from 1.8 to 148 MHz when inserted in the antenna line. It can handle dc current up to 400 mA and is probably more appropriate for remote switches and mast mounted preamps through 2 meters. The Bias-T Master is very similar, but is probably more appropriate for remote antenna tuners as it handles dc current up to 1.5 A. It's rated for legal limit power levels from 1.8 to 54 MHz at less than 1.1:1 SWR across this range.

Both the Bias-T Plus and Bias-T Master sets handle up to 50 V dc and are polarity insensitive, so you can inject either a positive or negative voltage on your coaxial cable. This is handy for antenna switches or other devices that use different polarity dc power sources for various remote control functions. For example, an antenna switch might require no voltage for position A, +12 V for position B and –12 V for position C. If you do inject a negative voltage or want to flip your voltage polarity, you should use a dedicated wall transformer with both polarities isolated from your normal station power supply. Figure 4 shows a typical application.

Both Bias-T pairs are mounted in weatherproof plastic boxes. Because the RF paths inside the units use microstrip design, a metal box is unnecessary for good broadband impedance performance. Three specially selected high-current inductors provide the RF-to-dc isolation in the Bias-T Plus and Bias-T Master. These inductors are chosen to keep resonances out of the ham bands for the specific ranges covered. Additionally, the Q of the inductors is such that there is little or no power dissipation in the inductors even at full legal limit. Internal views of the Bias-T Plus and Bias-T Master are shown in Figures 5 and 6, respectively.

I swept both units with my AIM-4170C antenna analyzer, and the results are shown in Figures 7 and 8. As these devices are normally used in pairs, the sweeps include two cascaded units terminated in precision 50 Ω loads. The two important curves to look at are the SWR (red) and return loss (blue) curves. As you can see, performance is excellent across their individually specified frequency ranges.

Bottom Line

The Bias-T Plus and Bias-T Master from Array Solutions offer a way to get power to a remotely mounted autotuner, antenna switch or preamplifier without running an additional cable. The ATD-1 Auto-Tuner Disconnect can help protect a valuable autotuner at the antenna base from damage.

ATD-1 Auto-Tuner Disconnect

Another interesting accessory is the Array Solutions ATD-1 Auto-Tuner Disconnect shown in Figure 9. Several years ago lightning struck a cable television box about 100 feet from my house. The energy from that strike exploded the ceramic doorknob capacitors used in matching section of the Butternut vertical I had at the time. A major reason I've been hesitant to use an outdoor remote automatic antenna tuner is that I've worried about nearby lightning hits caus-

[1]If your coax cable passes through a lightning arrestor on its way outside, make sure you have one that can pass dc. Most manufacturers make models that can pass dc, as well as ones that shunt dc to ground.

Figure 3 — The Bias-T Master and Bias-T Plus are housed in a weatherproof NEMA enclosure. The system uses two of these units — one in the shack and one at the antenna.

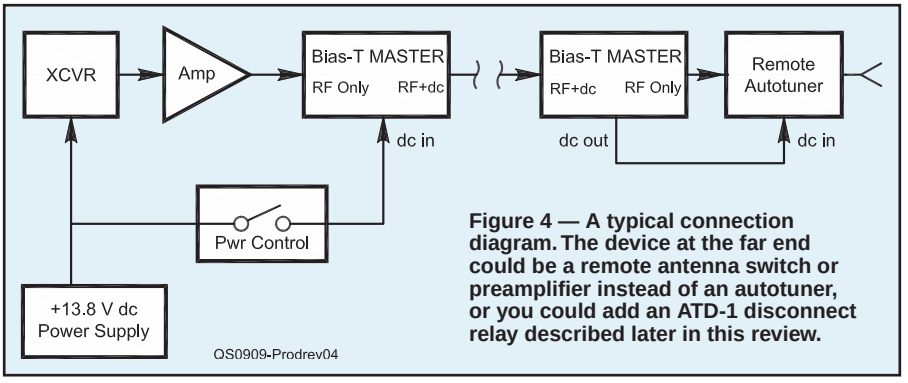


Figure 4 — A typical connection diagram. The device at the far end could be a remote antenna switch or preamplifier instead of an autotuner, or you could add an ATD-1 disconnect relay described later in this review.

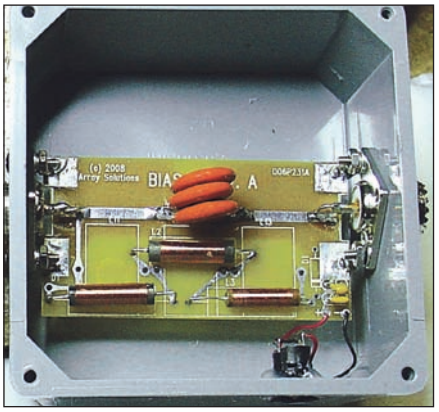


Figure 5 — Bias-T Plus internal view.

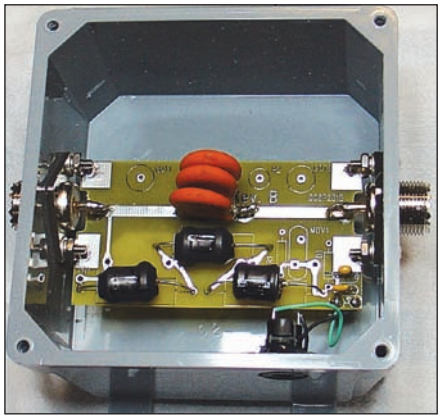


Figure 6 — Inside view of the Bias-T Master.

ing damage to such an expensive device. Of course, I could always run outside and disconnect and ground the autotuner output when it is not being used. I'm not sure I'd always remember or take the time to do this, and it is an inconvenience.

The ATD-1 solves this problem. It incorporates a special relay that shorts the autotuner output and antenna input to ground when power is removed. The ATD-1 has a 3.1 kV peak voltage breakdown rating. A standard coaxial dc jack provides the control voltage input to the ATD-1 (11.5-14 V dc at 125 mA). A 6 foot dc power cord is provided with the unit. Screw terminals are used to connect the unit between the antenna tuner and antenna feed point, and grounding is accomplished through the aluminum mounting plate. Figure 10 shows the ATD-1 mounted with a remote autotuner at the base of my 43 foot vertical antenna.

The power-handling capability of the ATD-1 will vary as a function of the actual antenna impedance. In most cases the ATD-1 can handle full legal limit power even with a high antenna SWR. However, highly reactive antennas can have a very high feed point voltage. As the antenna becomes shorter, the capacitive reactance becomes higher and so the resultant voltage drop across the magnitude of the impedance increases. With an electrically short 43 foot vertical on 160 meters, the capacitive reactance is approximately 600 Ω and the radiation resistance is approximately 3 Ω. Adding in 10 Ω of ground loss (probably better than most hams can achieve), the peak voltage breakdown of the ATD-1 will occur at about 200 W. If the ground or matching losses increase, the frequency is increased or the antenna length is increased, more power can be applied before breakdown occurs. As an example, on 80 meters the ATD-1 can easily handle 1500 W when used with a 43 foot antenna.

If you can measure your antenna's SWR (using an SWR meter or antenna analyzer) then the ATD-1 can handle 1500 W of power. If the antenna SWR is so high that it is not measurable, you should determine the power handling capability of the ATD-1 for your untuned antenna. To do this, first use readily available antenna modeling software such as *EZNEC* to determine the input impedance of your antenna.[2] Next add your approximate ground loss into the resistive portion of the impedance. Now calculate the current into the total resistive part of the impedance at your power level. (When properly matched, there is no reactance.) Once you know this, calculate the peak voltage across the antenna impedance and compare it to the 3.1 kV peak breakdown rating of the ATD-1. Here's an example:

A 43 foot antenna has an impedance of

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

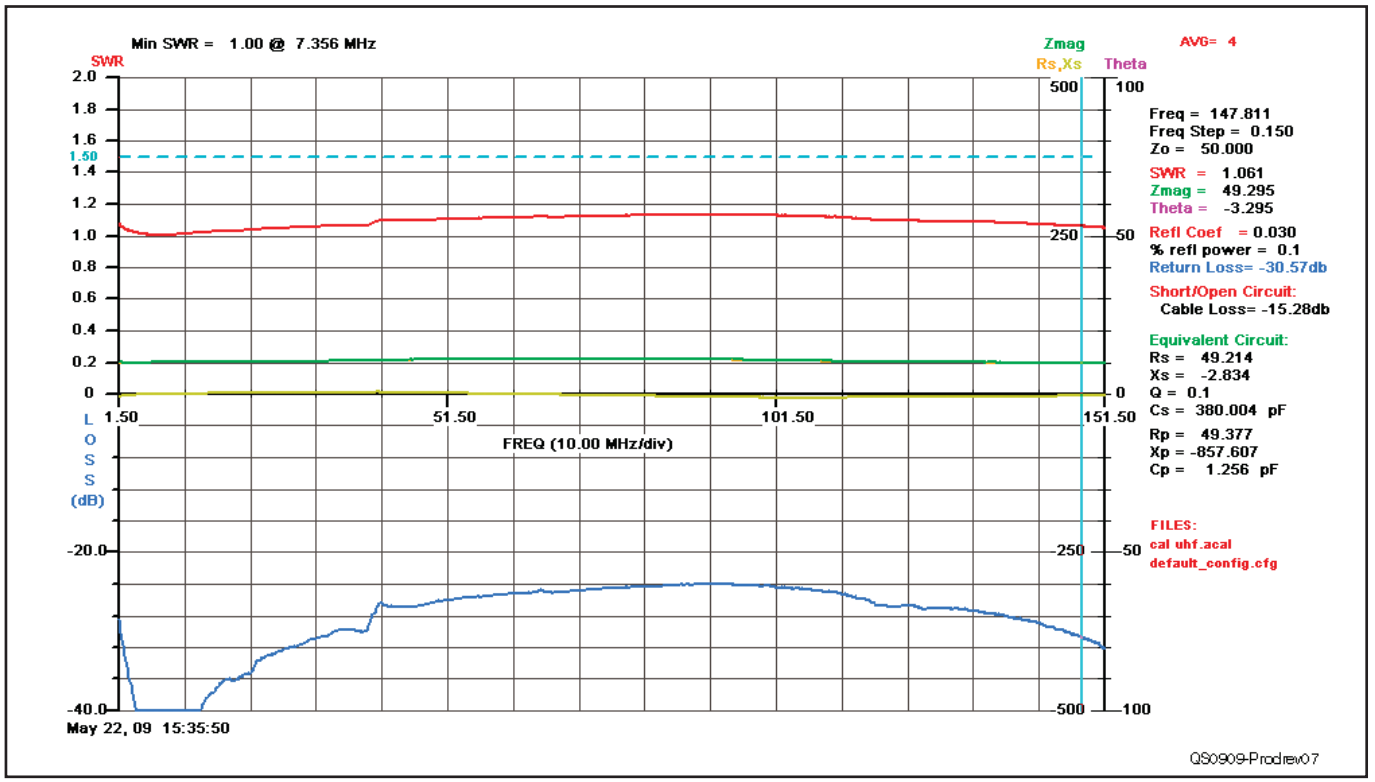


Figure 7 — Swept response through 151.5 MHz of two Bias-T Plus units cascaded. This display shows SWR (top, red line) and return loss (bottom, blue line).

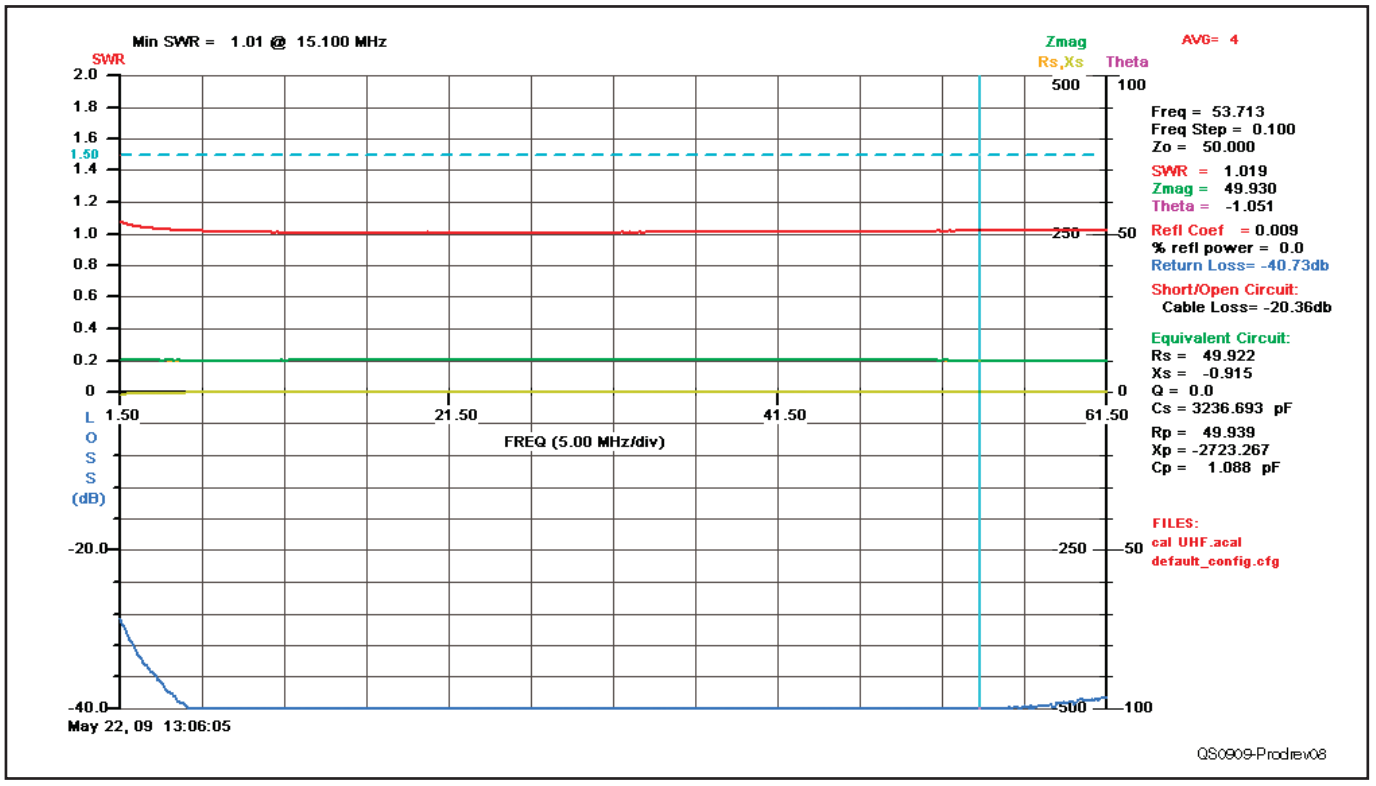


Figure 8 — Swept response through 61.5 MHz of two Bias-T Master units cascaded. This display shows SWR (top, red line) and return loss (bottom, blue line).

Figure 9 — The ATD-1 is also housed in a weatherproof NEMA enclosure and is slightly larger than the Bias-T units. The two screw terminals are for connection between the autotuner and antenna, and the metal plate on the back attaches to ground. There's a coaxial jack for power on the left side.

about 12 –*j*200 Ω on 80 meters. Assuming 10 Ω ground loss, the impedance becomes 22 –*j*200 Ω. If this is properly matched with a lossless remote autotuner or lossless matching network, all power will be delivered into the real 22 Ω portion of this impedance.

At 1500 watts, $I = \sqrt{P/R} = \sqrt{1500/22} = 8.3$ A RMS. The magnitude of the impedance is $|Z| = \sqrt{22^2 + 200^2} = 201$ Ω. Therefore, the

Figure 10 — The ATD-1 mounted with an autotuner at the base of the author's 43 foot vertical antenna.

voltage at the base of the antenna (and across the ATD-1) can be determined:

$$V_{RMS} = I \times |Z| = 8.3 \times 201 = 1670\ V_{RMS}$$

$$V_{PEAK} = \sqrt{2} \times 1670 = 2360\ V_{PEAK}$$

The calculated 2360 V_{PEAK} is less than the 3100 V_{PEAK} breakdown rating of the ATD-1. And, of course, autotuners or even discrete matching networks are not lossless, which means there is even more margin.

To see how the ATD-1 really performed, I ran a breakdown test on 160 meters by connecting the ATD-1 in series with an inductive matching network placed at the base of the antenna. I drove this from my ALS-600 amplifier in the shack and gradually increased power until the amplifier tripped out because of the sudden SWR increase when the relay arced-over (the ALS-600 protection circuitry works well.). This occurred consistently at about 400 W. As the calculated breakdown was 200 W, this implies that my ground loss is higher than 10 Ω, or the ATD-1 relay breakdown voltage is conservative, or my matching network is not lossless, or probably a combination of all these factors. In any case, there is plenty of design margin for most remote autotuners on the market.

Summary

Powering and protecting remote devices can be an issue, especially if an unplanned remote device such as a preamp, remote switch or remote autotuner is added to an existing antenna system. The Array Solutions Bias-T Plus, Bias-T Master, and ATD-1 Auto-Tuner Disconnect accessories can make installation of these devices relatively painless and might just be part of the solution for your updated antenna system.

Manufacturer: Array Solutions, 2611 N Beltline Rd, Ste 109, Sunnyvale, TX 75182; tel 214-954-7140; **www.arraysolutions.com**. Price: Bias-T Master, $150; Bias-T Plus, $150; ATD-1, $165. QST

W1ZR

THE DOCTOR IS IN

Q Falk, VE3GNS, asks: Due to severe real estate limitations, I have trouble putting anything up in the way of full size horizontal antennas. I understand that a half wave dipole does not need to be straight, but wonder how far you can go and still have it work? For example, can I bend a 20 meter dipole into a horizontal square and still have a working antenna? Are there any strange feeding problems? Can I go further and make this a multiband antenna? I have, and can put up, an aluminum 40 foot mast and perhaps use some kind of an X shaped support to hold the wires.

A Yes, you can do just as you propose, although it is slightly more complicated in one respect. Figures 1 and 2 show the *EZNEC* model results of the elevation and azimuth patterns of a 20 meter standard dipole at 40 feet over typical ground, along with the patterns of the same antenna built into a square, as you propose. I used a side length of 8.4 feet with a 5 inch gap opposite the feed point. This will be a high voltage point, so use a good insulator here.

As you might expect, the square antenna tends to fill in what would be the nulls off the ends of the straight dipole. The directivity is thus less dramatic with the square much closer to omnidirectional, being just 3.7 dB down on the "ends." The result is slightly less gain in the forward directions, down about a 1.6 dB, a small price for the added azimuth coverage, if you only have one antenna for the band.

Now to the complication. As with most shortened antennas, the square has a lower impedance at resonance than the standard dipole as shown in Figure 3. The impedance at resonance is about 10 Ω.[1] If you have a very short run of low loss coax, you could feed it directly to your tuner (50 feet of low loss LMR400 coax, for example, would have a loss of about 0.5 dB at 14 MHz with the 5:1

[1]This will vary with height, but will likely to be about 15 to 20% of the impedance of a standard dipole at the same height.

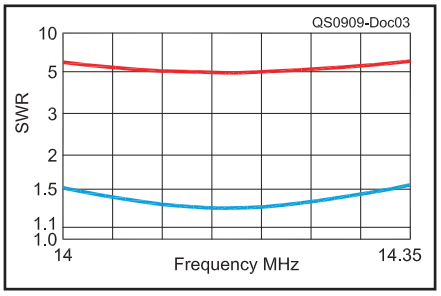


Figure 3 — Standing wave ratio (SWR) of the straight (blue) and square (red) 20 meter dipoles. This provides the only challenge to using the square configuration, but it can be easily overcome.

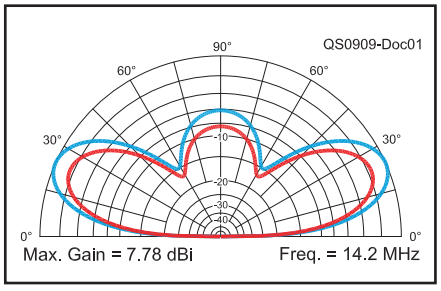


Figure 1 — Elevation plots of the straight (blue) and square (red) dipoles for 20 meters. Each is at a height of 40 feet.

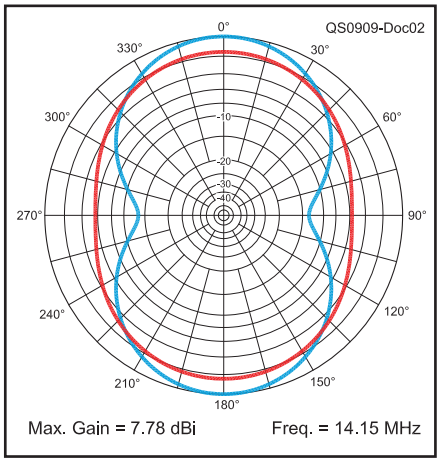


Figure 2 — Azimuth plots of the straight (blue) and square (red) dipoles for 20 meters. Each is at the 24° peak of the elevation response.

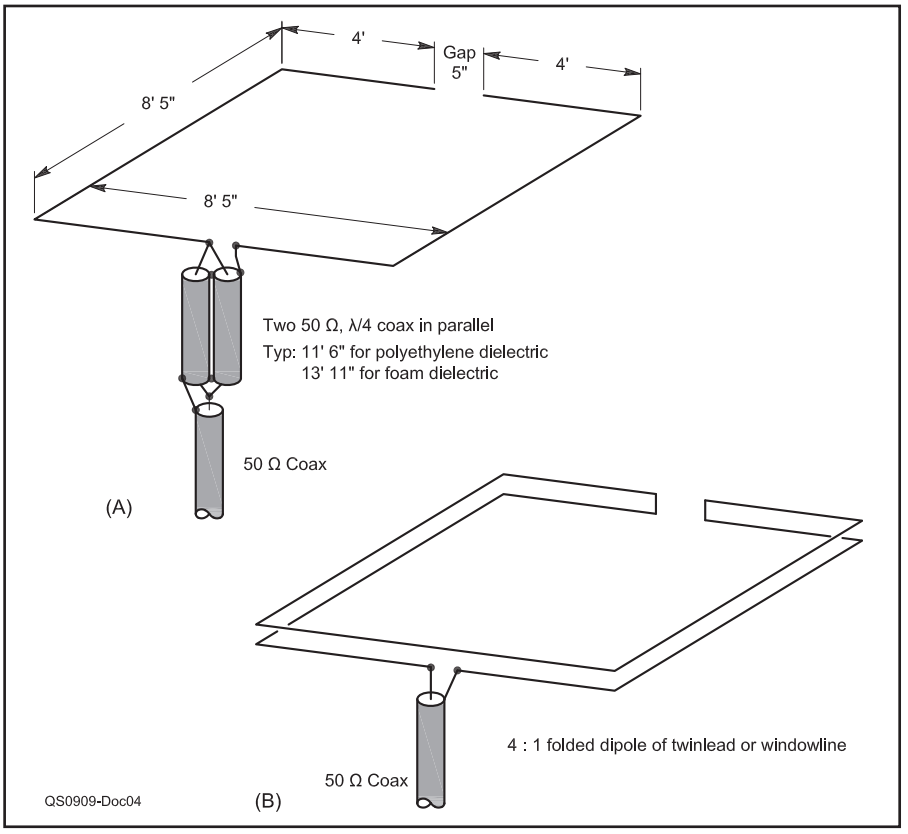


Figure 4 — At (A) dimensions and details of the square dipole with λ/4 matching section for use with 50 Ω coax. The dimensions assume 14 gauge bare wire. For insulated wire, the wire lengths should be reduced 2 to 4% depending on thickness and type. At (B) a folded dipole version for direct coax connection. Both solutions are best for a single band. In each case, the coax should include a common mode choke at or near the feed point for best results.

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

SWR, while window line would have a loss of 0.9 dB for the same length).

Alternately, you could use a λ/4 matching section. For the matching section, you would want a line with a Z_0 of 22.3 Ω, not too easy to find. Fortunately, you can hook two λ/4 wave sections of 50 Ω coax in parallel for 25 Ω and end up with an SWR of about 1.25:1 at the other side of the section. See Figure 4 for the details. Don't forget to reduce the matching section length by the relative velocity factor of the line — typically 0.66 for regular coax, around 0.85 for foam — check the manufacturer's data sheet on the Internet to get the exact value for your cable.

Another possibility for single band use would be to use a two wire folded dipole. It should raise the impedance to about 40 Ω, close enough for direct use of 50 Ω coax.

As to multiband use, the use of a λ/4 transformer or folded dipole limits the ability to use the antenna on multiple bands with coax feed. Another possibility is a 1:4 (*not* 4:1) balun.[2] If you use direct coax feed, or the balun, you could try parallel square dipoles on the other bands. If you use ladder line and a tuner, you will find that the single 20 meter square dipole works well on 20 meters and all higher HF bands. On 17 and 15 meters it is almost omnidirectional, while on 12 and 10 it starts to look more like a dipole pattern — all with dipole or higher gain.

Q Mario, VE2FZH, asks: Is an antenna tuner of any use in a receiving system with a long wire or dipole antenna? If not, should I disable it while strictly receiving?

A This is one of those "that depends" kind of questions. A mismatched receive antenna will result in a reduction of both signal and atmospheric noise reaching your radio. If the atmospheric noise is much stronger than the internal noise in your radio, the resulting signal to noise ratio will be almost the same, even though the signal will be weaker. It is often the case, especially on 20 meters and above, that the external noise may not dominate and you won't hear weak signals that you might have heard with the tuner properly tuned.

It is somewhat more complicated with a transceiver with an internal *automatic* tuner. There may be no way to adjust it without transmitting, especially a problem if listening outside the amateur bands. That means that in listening mode, unless it remembers the settings for each band, you may have a mistuned tuner. That can be much worse than no tuner. If it's easy to bypass the tuner, try it each time and see which is better. Sometimes it will be with the tuner; other times on other bands it will be better without.

Q Bruce, KDØGHI, asks: I have just started studying for my Amateur Extra class license and have run into what appears to be a contradiction with material I previously used for my General class license.

In the 9th edition of *The ARRL License Manual,* it is stated that the packet rate on the 2 meter band is 1200 baud while the General class material states that it is 9600 baud. Can you help me out with this confusion?[3]

A 1200 baud packet is the typical rate used on 2 meters, not the maximum allowed rate. This allows one to conveniently connect the packet modem through the mic jack of nearly any 2 meter radio. At higher data rates, it is often necessary to insert the data signal directly into the modulator, bypassing the input circuitry of the radio, which may add unwanted distortion. Some radios have a data jack for this purpose.

The FCC rules for the Amateur Radio Service (see **www.arrl.org/FandES/field/regulations/news/part97**) state that:

> 5) A RTTY, data or multiplexed emission using a specified digital code listed in §97.309(a) of this Part may be transmitted. The symbol rate must not exceed 19.6 kilobauds. A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in §97.309(b) of this Part also may be transmitted. The authorized bandwidth is 20 kHz.

Q Tony, KH6IKH/8, asks: I am relocating my Amateur Radio station to the second floor of my retirement development community building. One of my club members suggested I contact you regarding the new ground for my station. Can I connect my station to the "safety ground" at the nearest ac outlet? What about a cold water pipe that I can get to about 20 feet away? What about an artificial ground such as that offered by some manufacturers?

A The best ground very much depends on what problem you are trying to solve. There are really three distinct types of grounds to consider. In some cases, they can be resolved by a single connection — but usually not if you're on the second floor!

■ *A safety ground*. This is designed to protect the operator and others from electrical shock if an ac power lead comes in contact with an equipment chassis. If all chassis are bonded together and tied to the electrical service ground, such a failure should result in a blown fuse and not an electrocuted operator. If your building is wired to code, a connection to a chassis that is wired to the "green wire" of its power cable should be able to serve that function. You can check the connectivity of the plug's ground pin to the chassis with an ohmmeter. You can also check to make sure the socket is properly grounded with an inexpensive ac outlet tester.

■ *Lightning protection ground*. This is harder to do on the second floor. The best way is to run your antenna cables to a ground level panel that has a short heavy wire to a number of radial wires and ground rods. Lightning arrestors at this location could shunt significant lightning induced current to ground before it gets to your radio equipment. This ground should also be tied to the power system ground. Note that it is difficult, but not quite impossible, to construct a lightning protection ground system that will allow all your equipment to survive a direct strike.

To keep from having induced coupling on the coax going to your ground system from coupling to the feed up to your station, keep the two runs as separate as possible. If, as I would guess, you can't do all that, the best you may be able to do is have arrestors on power and antenna leads at your station. You may not be able to tell how your electrical lines are routed through the building, but if they make a short run to the service panel it will be the most effective. Then do three other things:

- Don't operate during a thunderstorm.
- Disconnect antennas and power from your equipment when not in use, ground cables if feasible, but don't go near the connections during a storm!
- Sign up for the ARRL "All Risk" Ham Radio Equipment Insurance Plan.

■ An "RF" ground. This is the kind of ground that eliminates RF from your equipment cabinets and from getting into mic and switching lines potentially causing lock-up or feedback. This type of ground does not need to be dealt with if you install antennas far enough from equipment and utility wiring to avoid direct coupling, and keep common mode currents off the shields of your coax by using baluns or common mode chokes at appropriate spots. If you don't have any RF symptoms you don't need to address this kind of grounding, although it can't hurt. If you do have "RF in the shack" problems, ¼ wave insulated radials for each band with problems, or the electrical equivalent, an artificial ground, can be helpful.

[2]While these are not commonly available, Jerry Sevick, W2FMI, describes their construction in his book *Transmission Line Transformers*, available from your ARRL dealer or the ARRL Bookstore, ARRL order no. TLT4. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

[3]*The ARRL Extra Class License Manual,* 9th Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 1352. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

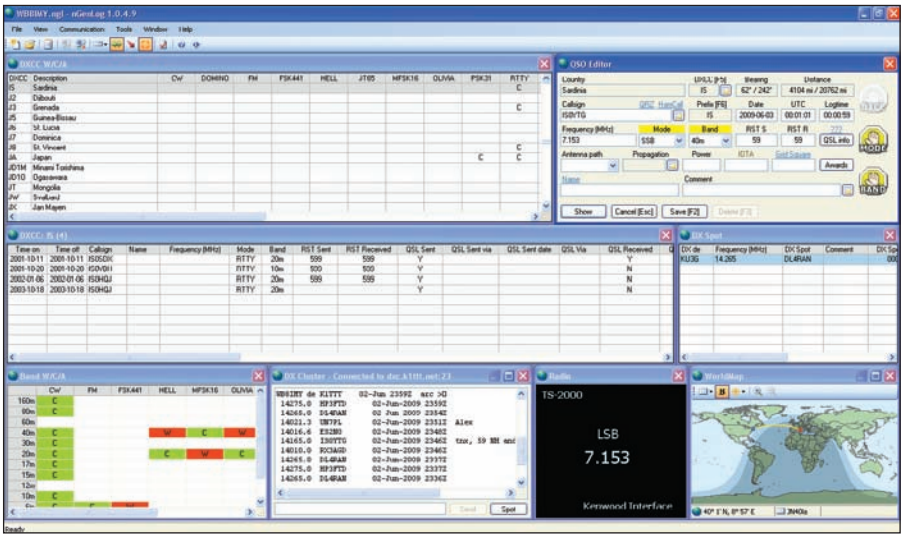
Do you have a question or a problem? Ask the Doctor! Send your questions (no telephone calls, please) to "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/. QST

SHORT TAKES

nGenLog for *Windows*

Amateur Radio software development continues at an astonishing pace. It has become a challenge to keep *QST* readers informed about all the new releases, especially in a printed magazine that's published once a month. The "targets" aren't just moving, they're flying.

The Internet is fueling this growth. It fosters collaboration and feedback from the entire Amateur Radio world at lightning speed. *nGenLog* is among the latest software products to emerge from this Internet synergy. Like other products from a growing number of small ham businesses, the commerce engine that drives *nGenLog* exists strictly in cyberspace.



The *nGenLog* desktop display. You can arrange the individual windows any way you desire.

Flexible Station Logging

nGenLog is primarily a logging application, but it also offers a number of other useful tools. You begin by purchasing the software at the *nGenLog* Web site and downloading the application. In an effort to thwart software pirates, the software license you purchase is specifically registered to your call sign; no one else can use it.

Once the *nGenLog* file is installed safely on your hard drive, the first task is to configure its desktop display to your liking. For this review I had *nGenLog* display the primary log (you can set up several different logs), a DXcluster window, a world map and transceiver control. The DXcluster function offers an extensive list of Internet clusters to which *nGenLog* can connect to harvest the latest DX spots. When someone posts a spot, it appears in a separate window with color highlighting to indicate the mode (SSB, CW, etc). With transceiver control enabled, you simply double click your mouse cursor on the spot information and your radio instantly tunes to the spot frequency. *nGenLog* supports of several Elecraft, Kenwood, Yaesu, ICOM and TenTec transceiver models.

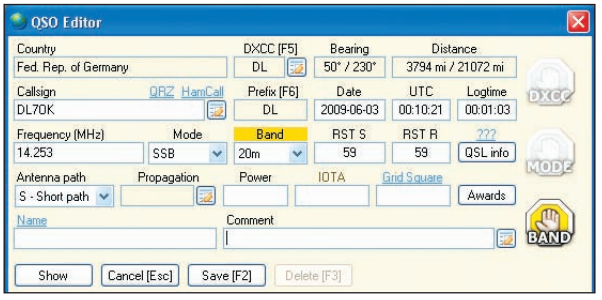
If you enter a call sign into the logging window, *nGenLog* immediately tells you whether you need the contact for award credit on the band or mode in question. It does this through colored "alert" icons that you'd be hard pressed to ignore.

I used the ADIF import function to bring in 5000 entries from another logging program. Seconds after starting the import routine *nGenLog* had seamlessly incorporated the data and was displaying the results. I particularly like the way *nGenLog* displays color-coded worked/confirmed data in rows by bands and columns by modes. And when I say "modes," I mean just about any conceivable operating mode — even rarities like the digital modes Throb and Clover. This is the first logging application I've ever seen that went out of its way to track contact data over such an extensive range of modes.

QSLing — Electronic and Otherwise

Like many logging programs these days, *nGenLog* supports ARRL's Logbook of The World. Once you have it configured with your password, *nGenLog* makes it remarkably easy to transfer data to and from Logbook. A couple of mouse clicks and you're done.

You can manage your paper QSLs in *nGenLog*, tracking cards sent and received. The software will print QSL labels in a number of sizes for those times when you need to process a batch of cards as quickly as possible.



When you type a call sign into the logging window, *nGenLog* instantly lets you know if you need this contact for award credit on the band or mode in question.

Try Before You Buy

I found *nGenLog* to be not only easy to use, but visually attractive as well. Since all opinions vary, you may want to download the free *nGenLog* demo program and give it a test drive first. The demo version is limited to saving only 50 QSOs in each log file, but this is more than enough to give you a sense of how the software works.

It is worth noting that *nGenLog* takes an innovative "community" approach to software support. At the *nGenLog* Web site you'll find support forums where you can get help directly from the developers and other *nGenLog* users. This seems to be a growing trend in Amateur Radio software (there's the influence of Internet culture again). I didn't have a need to seek support, but it is nice to know it is so conveniently available.

Manufacturer: nGenLog, **www.ngenlog.com**. *$69. System requirements:* Windows XP *or* Vista *with a 1 GHz Pentium processor, 256 MB RAM and Microsoft* .NET Framework 3.5 *(free from Microsoft).* QST

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

Your Voice *Can* Be Heard!

"You can get through even with a very modest radio system installation."

Bruce Pontius, NØADL

If you have not been participating in on-the-air activities much because you don't have a big gun station, there is no reason for you to be left out. Surprising and satisfying results have been obtained with only a modest station and a simple, low cost, antenna system. Even in the current low sunspot environment with poor propagation conditions, joining maritime mobile, general traffic, and emergency preparedness nets is easy and rewarding, as is participating in special events.

Getting on the Air

As the spring contest season approached this year, I was reviewing results from past contests and was reminded of the excitement and fun of all those contacts with stations and people from around the world. Whether you are involved in a contest or general operating, it is great to have a distant station acknowledge your call on the first try, but still great even if it takes three or four tries to get the station to say: "The N zero station — go ahead." The frequency suddenly falls silent and your transmission is in the clear with easy readability. The exchange is completed with perhaps a few comments such as: "Enjoy the contest," or "Your signal is 5 × 9 with good audio. We are running a kilowatt here into a five element Yagi at 70 feet — have a good day." Then you get to say: "Thank you for the good signal report. I am running 100 W into a hidden wire antenna — 73." Yes, there have been fewer contacts recently than in some previous years, due to the low sunspot activity at the bottom of the current solar cycle. Still, there is enough activity and long distance propagation to allow many successful contacts — but only if you get on and try.

During the later years of the last solar cycle, as the radio propagation supporting ionization was waning, I was able to work all states and work all continents on three and almost four bands, with a low height, hidden wire antenna and 100 W.

How Much Difference do Big Towers, Big Antennas, High Power and Big Budgets Really Make?

Well, quite a bit, really. But not enough to drive us away and let only the big boys play! Let's see just how much (or how little) difference it might make when you try to make a contact while other, bigger, louder stations are also in there attempting to contact the desirable distant station.

Clear Channel Reception — The Background

First, how does a typical received signal seem to the distant operator as a function of signal strength at the receiver when just the one signal is present in the passband? Figure 1 shows a typical listener's response. The RST (readability, signal strength and tone) signal quality reporting method, as listed in many publication including the ARRL Web, is used as a basis for these discussions.[1] The readability list was expanded somewhat for use in this article.

Keep in mind that the quality of a voice signal is also important for phone operation. A clean, clear, low distortion voice transmission is easier to copy than a louder but distorted one. Sometimes over use of compression in the transmitter (or overdriving the RF amplifier at one or more points in the chain) can cause difficult reception.

In Figure 1, dark green represents great reception with easy copy, lighter green is good, yellow is marginal and red is poor or no copy. The white line in Figure 1 shows how a typical radio receiver audio output sounds and how well the signal can be understood. It represents the situation of a single signal in the presence of typical background noise, without the complications of other interfering signals.

In Figure 1, R is the reference level set up for a 3 × 2 signal — quite weak, but readable with considerable difficulty, requiring a few tries for the distant operator to get your call sign and signal report correctly. Following the graph along you can see that a 5 dB (factor of 3.2 in signal power) increase makes a noticeable improvement. An increase of 7 dB (5 × the signal) gets the signal up into the yellow zone where, with no interference, it can be readily copied with reasonable effort. A 10 dB increase (10 × the signal) makes it to the 4 × 4 line where copy is easy, and so forth up the signal strength curve.

An interesting aspect is the reverse consideration. If a signal is on the upper portion of the receiver response curve at which automatic gain control (AGC) action is prevalent, the receiver output audio quality does not change much with even 5 or 10 dB changes in signal strength. This is due to AGC action that typically has a threshold level at around 4 × 4 and the +11 dB line.

The automatic gain control response of one of the receivers used in these tests is shown in Figure 2. This is typical of the receiver AGC action in HF transceivers. All signals above the point at which the curve flattens (the AGC *threshold*) are equally loud. More time may be available for weaker stations to be heard in between strong signal calls, when the strong signals are coming and

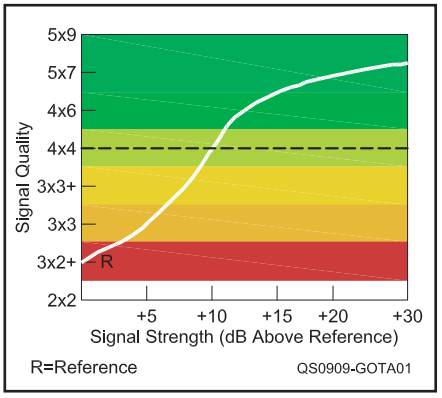


Figure 1 — Signal quality as a function of received signal strength. The standard RST system is used for ratings and comparisons.

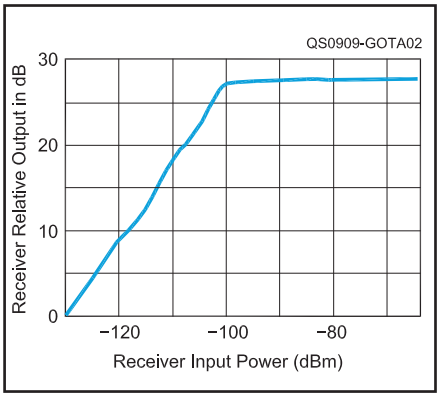


Figure 2 — Typical AGC response in a receiver. Note that the audio output remains constant over a wide range of input signals.

[1] **www.arrl.org/FandES/field/forms/fsd220.html**.

Table 1

Representative 20 Meter Amateur Stations and Effective Radiated Power (ERP) — Antenna Gain at 10° Elevation

Station #	Transmit Power (W)	Antenna Type	Antenna Height (ft)	Antenna Gain (dBi)	ERP (W)	Signal Above #1 (dB)
1	100	Dipole	35	2.5	178	0
2	100	End-fed wire	Variable	0	100	–2.5
3	100	3 el Yagi	35	7.7	589	5.2
4	1500	3 el Yagi	50	10.2	15,707	19.5
5	1500	7 el Yagi	75	16	59,716	25.3

going. This characteristic of receivers, along with the RST response discussed above, is what gives a weaker signal a chance.

Below the AGC threshold (around –100 dBm in Figure 2) there is about 30 dB of output variation from the receiver noise level to the start of AGC action, as shown in the graph. The output stays almost constant (depending on receiver design) from the –100 dBm threshold all the way up through very strong input signals.

When a Strong Station (or two) Is Also Calling The Distant Station

W1BIG (big gun) is blasting away at full power while W1MOD (modest station) is trying to participate. Propagation conditions and other parameters are such that W1BIG is putting an S9 signal into the distant operator's receiver. But what about W1MOD? Where is she? Well down the RST curve, but how far? That, of course, depends on the differential in the received signal strengths and the manner in which the receiver and listener respond to the differences. For purposes of discussion, we are assuming the same propagation conditions for W1BIG and W1MOD. We are only considering the effect of differences in the effective radiated power.

If W1BIG and W1MOD stations are putting the same power into the distant operator's receiver, then both are heard equally — no problem. When the W1BIG signal is received at an S-9 level and the W1MOD signal is 10 dB less than W1BIG, W1MOD can still be heard quite well, and could make the contact. The readability is lowered due to the mutual interference of simultaneous signals in the passband.

Even when the W1MOD signal is 20 dB lower than the W1BIG signal, an attentive, cooperative, distant operator would be able to copy the weaker call sign, or at least parts of it, and perhaps acknowledge it. This could be the situation in which a lower power station has been trying for a while, during which time several big signal stations have called, made their contacts and moved on, only to be sequentially replaced by another big gun. Finally, a courteous, considerate operator might give the smaller signal a chance, since parts of the call could have been heard in between, and sometimes even under, the other calls. This is possible because the receiver is operating up along the flat portion of the AGC response shown in Figure 2 and the 20 dB weaker signal does not sound a lot different than the big one during breaks in the big signal calling. With W1MOD 15 dB below W1BIG the call can be heard and perhaps even partially copied when underneath during a W1BIG call. At 10 dB lower, both calls can be heard, and at 6 dB under, the weaker signal call can be copied even during W1BIG calls.

The discussion applies when there are one or two other calling stations in addition to yours. The situation degrades significantly as the number of stations calling increases. In the case of the cacophony of a real pile-up of big stations there might not be breaks during which you can be heard. You might as well look for another frequency and try again. Perhaps look for a station operating split.[2] Split frequency operation by the distant or DX station provides a better chance for the astute operator of a modest station since they don't need to call on exactly the frequency that the big guns are fighting over. See *The ARRL Operating Manual* for discussions of operating techniques for successful communication.

When signal levels being received fall down to well below S-9, that is, perhaps 20 dB below S-9, the situation for copying W1MOD is not as good. It seems harder to copy the signals even when they are equal. It is quite understandable that the readability of W1MOD would decrease rapidly as the differences in signal strength between W1BIG and W1MOD get greater, since the average power in the W1MOD signal has now fallen below the threshold of the AGC response in the receiver and the audio output from the weaker signal drops.

These discussions have considered the "hunt and pounce" technique in which one answers CQs or other stations at the end of a contact. Calling CQ on a fairly clear frequency could yield similar results.

How Much Difference Might We Expect Between Stations?

Table 1 summarizes the differences between a range of station sizes to show what you might expect. We have picked 20 meters and a take-off angle of 10° to show the benefit of higher antennas.[3] A typical modest station (station #1 in Table 1) consists of a dipole at 35 feet above the earth and a 100 W transceiver. This serves as the reference system since it is a traditional installation for a beginner.[4] With the tendency toward smaller lots and community rules about towers and antennas (and/or expectations) a modest station may resort to a hidden end-fed wire instead of a dipole. This system (station #2), properly installed, can be within a few dB of our dipole based station.[5] A chart was developed with a number of different system designs showing effective radiated power (ERP) and comparisons for each.

Summary and Conclusion

You don't need to be intimidated by powerhouse stations. If you can hear them reasonably well, you *can* work them. This is especially true if not too many others are calling.

[2]D. Traver, WV2B, "Working Split: What's the Secret?" *QST*, May 2001, pp 63-64.

[3]The peak antenna gain is higher than that in Table 1, but it is at higher angles that are less useful for long haul contacts.

[4]D. Hedin, WØYF, "Dollars and Decibels," *QST*, Apr 2004, pp 40-42.

[5]B. Pontius, NØADL, "Surprising Results with a Low, Hidden Wire Antenna," *QST,* Nov 2005, pp 31-35.

ARRL member Bruce Pontius, NØADL, holds a BSEE and has been involved in the development of semiconductors and radio equipment and systems for many years. You can reach Bruce at 15802 N 50th St, Scottsdale, AZ 85254, e-mail **bepontius@cox.net**.

NØAX

HANDS-ON RADIO

Experiment #80 — Battery Capacity

What makes a *good* battery? The most common answer is battery capacity, or as it is commonly evaluated, battery *life*. What battery life really means is *the time over which a battery can operate a specific piece of equipment in a specific manner*. The life of a battery can vary greatly, depending on how the equipment is used, so battery lifetime in hours or days isn't really very useful. What determines lifetime is battery capacity.

The units of battery capacity are in amp-hours, abbreviated Ah and represented by the letter C in equations. This is a measure of how much energy the battery stores, similar to watt-hours or kilowatt-hours that measure energy in your home. Large batteries are rated in amp-hours while smaller batteries, like AA or coin cells are rated in milliamp-hours or mAh.

Energy and Charge

There is something a little strange about Ah. Amperes (coulombs / second) times hours (3600 seconds / hour) yields coulombs, not joules. How do you get energy from charge? Amp-hours is really a measure of charge. It tells you how many electrons are available to deliver energy from the battery as they flow through your circuit.

The energy carried by any one of those electrons is determined by the electro-motive force (EMF) that pushes it through the circuit. You can measure the EMF as the open circuit battery terminal voltage, V_{OC}, with no load attached. For example, a high-impedance voltmeter attached to the terminals of an alkaline cell might read 1.55V. The current drawn by the meter is very small and its effects can be neglected. That means there is 1.55 V of EMF available to push the electron from wherever it resides in the battery, out through the negative terminal, through the external circuit, and back into the battery. (Actually, that specific electron may never make it all the way around the circuit. Even at 1 A of current flow through a 20 gauge wire, individual electrons are only moving at about ⅕ mm/s.)

Since Ah or mAh gives you charge, the number of available electrons, to find the total amount of energy available, multiply V_{OC} by the Ah rating by 3600 sec / hr. A typical AA battery is thus rated to store a theoretical maximum of 1.55 V × 2 Ah × 3600 s / hr = 11,160. That's a lot of energy and a good reason to respect batteries!

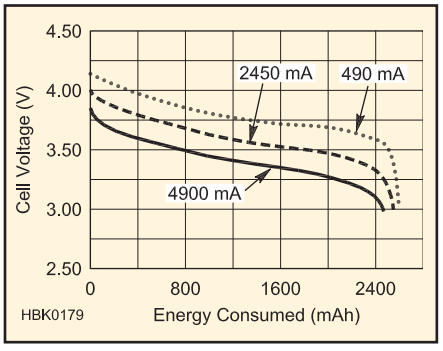


Figure 1 — Typical Li-ion battery discharge curves at three discharge rates.

Table 1

Battery Types

Chemistry	*Nominal Voltage (V)*
NiCd	1.2
NiMH	1.2
Carbon zinc	1.5
Alkaline	1.5
Lead acid	2.1
Li-ion	3.5-3.7

Chemistry Types

Where does the 1.55 V come from? Why not 1.2 or 1.8 V? The battery's open circuit voltage is determined by its internal chemistry, meaning the types of chemicals stored in the battery, and the chemical reaction that occurs as electrons are allowed to flow between the battery terminals. Due to the differing affinity for electrons by the atoms making up the chemicals, electrons will flow from one atom to another if there is a path between the atoms. The media that makes up the path is called the *electrolyte* and it is usually a liquid, paste or gel.

The voltage that drives the electrons from one atom to another is called the *electropotential* and it depends on the exact chemicals used. Table 1 lists the chemistry of several common battery types and the nominal voltage you can expect from a fully charged battery supplying a light load. Table 2 compares the capacities of different types of battery chemistry and cell sizes.

Discharge Curves

Battery capacity is a useful number, but it does not represent the more complex behavior of a battery in actual use. The calculation of stored energy assumes that battery voltage is constant until the battery is discharged. Battery voltage is not constant, however; rather, it slowly drops as more and more energy is delivered because the internal resistance of the battery increases as the chemicals supplying the electrons are used up. Battery voltage

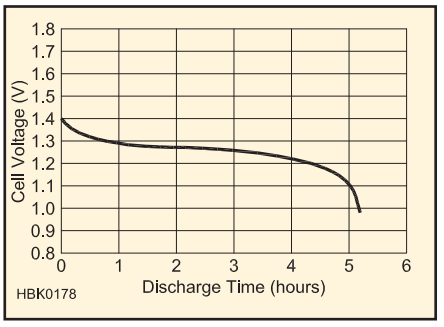


Figure 2 — Typical NiMH battery discharge characteristic. The load on the battery must also be specified for actual discharge curves.

Table 2

Typical Battery Capacity

Cell Size	*Chemistry*	*Nominal Capacity (mAh)*
AAA	Alkaline	1000-1300
AAA	NiCd	250-350
AAA	NiMH	800-1200
AA	Alkaline	2000-3000
AA	NiCd	600-1000
AA	NiMH	1700-2700
C	Alkaline	6000-8000
C	NiCd	2000-3500
C	NiMH	3000-5500
D	Alkaline	12000-20000
D	NiCd	5000
D	NiMH	3000-12000
9 V	Alkaline	500-650
9 V	NiCd	120
9 V	NiMH	200-350

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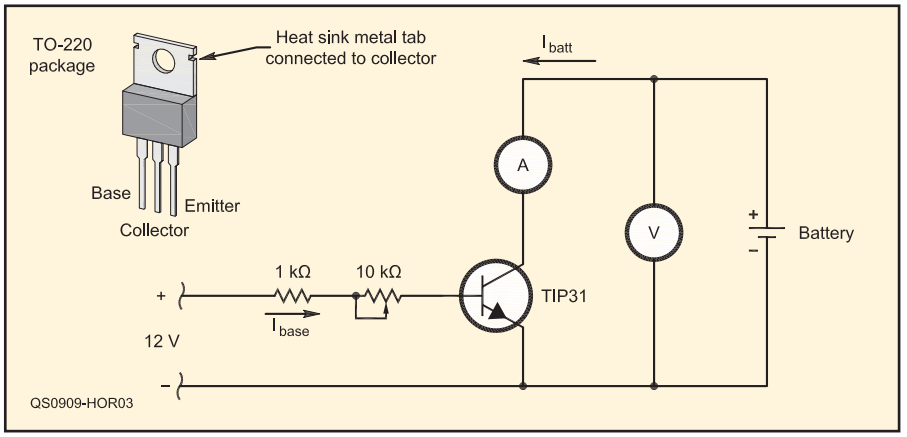


Figure 3 — This circuit draws a constant value of battery current, controlled by the 10 kΩ potentiometer.

eventually drops to a level at which the equipment it is supplying no longer works and the battery is considered dead. Even though there may be additional energy left in the battery, it can't be delivered at a high enough voltage to operate the equipment. This is the battery's end-of-life voltage.

If the battery's terminal voltage under load is plotted versus the amount of energy used, the result is a discharge curve. Typical discharge curves for a rechargeable lithium ion (Li-ion) battery are shown in Figure 1. At higher battery current, terminal voltage falls to the end-of-life level faster than for a lower current, even though the same amount of energy has been used. If the end-of-life voltage is 3.25 V, only 2100 mAh can be delivered if discharged at 4900 mA, but 2550 mAh is available at a discharge rate of 490 mA. The discharge curve can also be plotted against time as shown in Figure 2. Different types of batteries can be compared by drawing identical currents from them and comparing the times at which they reach their end of life voltage.

Battery Up!

We're going to do two battery test experiments. The first will illustrate how a specific type of battery performs at different current levels. The second will compare different types of batteries. Start by acquiring a fresh trio of alkaline AA cells to sacrifice in the name of science. To control current through the batteries, connect the circuit in Figure 3 using a battery holder or clip leads and a rubber band to make the battery connections. Use a pair of locking pliers as a heat sink for the transistor as in Experiment #381.[1] Set the meter reading current to a scale appropriate for measuring about 100 mA.

Measure and record battery voltage. Note the time, set the 10 kΩ pot to maximum resistance, and apply power. Reduce the pot's resistance until current is about 200 mA — you can fine tune with the power supply voltage if the adjustment is too sensitive. Adjusting the TIP31 base current to keep battery current approximately constant, record battery voltage and current once per hour until battery voltage drops to 1.0 V — our end of life value. For a 2000 mAh battery, it should take no more than 2000 mAh / 200 mA = 10 hr. (You can suspend the test by turning off the power supply.) Graph the results as in Figure 2.

Reset the pot to maximum resistance and swap in a fresh battery. As before, note the battery voltage, then adjust base current until the battery current is 500 mA and record battery voltage every 30 minutes or so until battery voltage reaches 1.0 V. Repeat with a battery current of 1 A. You should now have three discharge curves that look somewhat like those in Figure 2.

Why not just hook up a fixed value resistor and measure voltage versus time? Because battery voltage changes as the battery is discharged, the amount of battery current would also change according to Ohm's law. A constant current is a better and more repeatable test.

Now find some different types of AA batteries, such as carbon zinc, NiCd, and NiMH and repeat the 500 mA current test. Compare the discharge curves. Which battery type is better?

Parts List

- Transistor, TIP31 or equivalent.
- Potentiometer, 10 kΩ, preferably linear taper.
- Resistor, 1 kΩ, ¼ W.
- Batteries, three each, size AA — alkaline, carbon zinc, NiCd and NiMH.

Recommended Reading

Here's a treat for readers interested in electro history. Check out the Wikipedia (**www.en.wikipedia.org**) entry on the *Baghdad Battery*, an ancient artifact that may or may not have been used for electrical purposes 800 years before Alexander Volta created the first galvanic pile and got a kick out of some frog legs.

Next Month

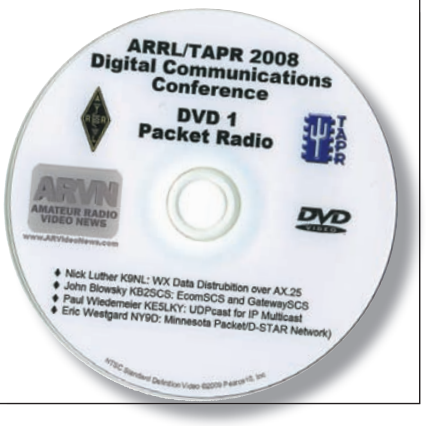
It's still antenna season out there in many places, so let's revisit transmission lines with some handy gadgets called synchronous transformers that are used for impedance matching chores. QST

[1]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**.

New Products

ARRL/TAPR DIGITAL COMMUNICATIONS CONFERENCE DVD SET FROM ARVN

◊ The 2008 ARRL/TAPR Digital Communications Conference (DCC) was a three-day event held in the Chicago area that showcased the latest developments in Amateur Radio digital communications. Amateur Radio Video News (ARVN) has produced a set of six DVDs that include the conference presentations — 21 in all. Producer Gary Pearce, KN4AQ, arranged the DVD content around topics including packet radio, software defined radio, APRS, Winlink, D-STAR and satellites. One DVD documents several introductory sessions on HF digital voice, D-STAR, DPRS and D-RATS. Another documents the three-hour Sunday Seminar, an in-depth look at the development of the Mercury HPSDR software defined receiver. The DVDs are professionally produced with quality video, audio and navigation menus. Intended for individual viewing or club meeting programs, the DCC video collection offers a fascinating look at what amateurs are doing with digital communications technology. Detailed information on contents of each DVD and a sample video are available on the ARVN Web site. Price: $15 per DVD or $75 for all six. For more information or to order, visit **www.ARVidNews.com**.



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HINTS & KINKS

ASSEMBLING TYPE N CONNECTORS

◊ Going through the April 2008 issue, I read the article on the proper assembly of N connectors with interest as I use them extensively at work.[1] I have a different method:

Everything up to combing out the braid is the same, but I do not pre-trim the braid. I find I can comb the braid over the clamp, and then use a straight screwdriver or other straight blade to push the braid tight into the corner at the base of the clamp's rim (see Figure 1). This causes the extra braid length to extend outward radially where I trim it flush with very sharp side cutters.

I do not pre-tin the center conductor. It makes it difficult to slide on the center pin. I do spray the copper conductor and pin with circuit cleaner (or alcohol) to remove any machining oils that interfere with heat transfer in soldering. This is usually adequate to get a nice quick flow of solder. Be careful not to slop or glob on too much. Leave the iron on the pin long enough to see the solder flow. If necessary, you might have to remove some of the solder on the surface of the pin for it to slide into the outer connector body.

[In the April article, the author suggests turning the connector body instead of the nut. Following a number of knowledgeable comments from readers, the author reports that he is now convinced that it is preferable to turn the nut while holding the body and cable steady. — *Ed.*]

Assemble the tower-top ends of your cable inside on the bench so you are not fumbling with that task up on the tower. I place a short (2 inch) piece of heat shrink tubing over the back shell of the connector to ensure weather tightness. Be sure to double wrap the connection with electric tape/Coax-Seal. You can cut the cable to length on the end that goes to the shack and assemble that end much easier.

If you are making cables up for 144 MHz or higher I recommend you upgrade to a better coax than RG-213. I like Times Microwave LMR-400 but many prefer Belden 9913 (be sure to get the version that uses solid foam insulation as opposed to the old air dielectric with polyethylene spiral bead). RF Parts (**www.rfparts.com**) makes a good connector that fits these two cables, which are equal in RF performance. Its part number is RFN-1002-1si (male). Both LMR-400 and 9913 are larger than RG-8, so the 82-202 connector will not fit. If you insist on UHF then I recommend Amphenol (**www.amphenolrf.com**) over generic brands for better soldering. I prefer the TNC to BNC as a much better connector for RG-58. Yes, they cost a bit more ($5.50-$6) but the increased performance and reliability are well worth it. With practice, you will prefer their assembly to the old PL-259 (UHF) connector. — *73, Ed Cole, KL7UW, PO Box 8672, Nikiski, AK 99635-8672,* **ecole@cispri.org**

EDWARD COLE, KL7UW

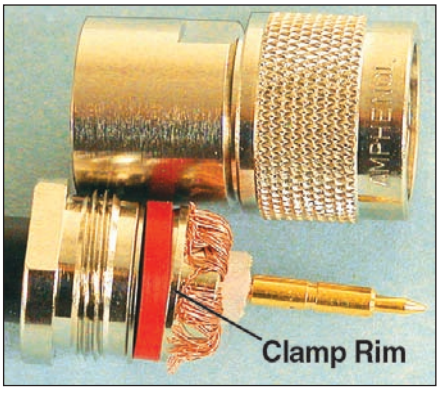


Figure 1 — Use a flat headed screwdriver to press the braid onto the clamp's rim, and then trim off the excess braid that extends over the rim.

[1]J. Hallas, W1ZR, "Those Type N Coax Connectors," *QST*, Apr 2008, p 69.

RS-232 TRANSMIT CONTROL

◊ Here is a method of controlling a transmitter when using digital soundcard modes (see Figure 2).

I am using a PCMCIA RS-232 card in my laptop, as the computer does not have a built-in serial port. The circuit may have to be "adjusted" if your serial port is very different from mine. RS-232 outputs vary.

The output of the Request To Send (RTS) pin changes from about +6 V dc on transmit to −6 V dc on receive. The LED "rectifies" this voltage so there is only forward current (about 12 mA with my adapter) on transmit, sufficient to operate the relay. It also provides a "free" on-the-air light. If the light is not desired you can use a 1N34 diode for D1. The entire circuit will fit into the adapter hood for the connector.

Pin numbers are given for DB9 and DB25 serial ports for RTS control of the push to talk (PTT) transmit control. Other serial functions can be used by changing to the appropriate pins. This system works for me using the *MULTIPSK*, *EASYPAL* and the Digital Master portion of *Ham Radio Deluxe*. The needed parts are:

D1 — 1.8 V dc red LED 20 mA (Radio Shack 276-0330) or 1N34 diode

RY1 — 5 V dc 250 Ω, 20 mA (Radio Shack 275-232) — *73, Scott McCann, W3MEO, 160 Shields Ln, Queenstown, MD 21658-1278,* **achess@juno.com**

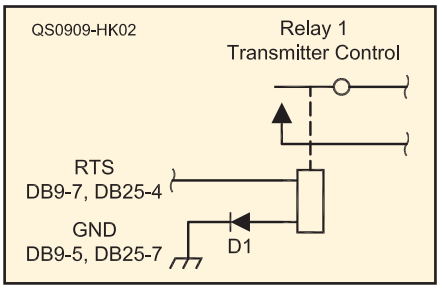


Figure 2 — The diagram of the RS-232 transmit control circuit.

ATTACHING FRONT PANELS

◊ In the March issue of *QST*, a "Hints and Kinks" hint involved using double sided tape to fasten the faceplate to a project case.[2] The picture showed exposing all of the tape before sticking the faceplate on. I would recommend only exposing the top row of tape to allow easy alignment before sticking to the exposed tape. Then just remove one adjacent tape backing at a time pressing the faceplate

[2]F. Boyer, N3QK, "Making Front Panels — The Easy Way," *QST*, Mar 2009, pp 75-76.

from the top down and from the center out to the edges this will help eliminate air pockets from forming. — *73, Dave Palmgren, N8DP, 6132 Co 420 - 21st Rd, Gladstone, MI 49837,* **n8dp@arrl.net**

GARBAGE BAG TIE RESCUES PTT BUTTON WOES

◊ For the January sweepstakes, I had borrowed an ADI AR-247 222 MHz radio to coordinate contacts (QSOs). In the middle of the contest, the PTT button on the microphone stopped working. Fighting a momentary panic, I carefully unscrewed the back of the microphone and surmised that the foam pad behind the button was compressing. I quickly rummaged through a junk box and found a polyethylene garbage bag tie that seemed to be the right thickness. I cut a small shim and placed it between the PTT micro switch and the foam pad. After reassembling the microphone, I was back on the air, coordinating QSOs.

Most interestingly, another ham who had lent me the manual from his AR-247 reported to me that he had the same problem and had resorted to using a microphone from another rig. I gave him the remainder of my "shim stock" to fix his microphone. — *73, Michael Davis, KB1JEY, 533 Tennis Ave, Ambler, PA 19002-6016,* **michael.davis@alumni.duke.edu**

TEMPORARY OPEN-WIRE FEED-LINE CONNECTORS

◊ Over the years we have used 450 Ω open-wire feed line to connect our dipole antennas for events like Field Day. Each time the tent or the antenna is at a slightly different location or height causing the feed line that is permanently attached to the antenna to be the wrong length. Each time we have had to cut, which is easy, or start looking for the soldering iron to add a piece of feed line. After our last Field Day I decided there had to be a better way.

The first part of the solution is to have a quick connect system. I chose European style terminal strips in 10 mm pitch because in three terminal increments it will match the spacing of the open-wire conductors with the center terminal unused. Prepare the connector by cutting off three terminal sections. Remove the screws from the center section (see Figure 3). The screws don't just fall out, so you either have to tap the terminal strip on an object or use a dental pick. When the screws are removed the center metal insert will come out, leaving only plastic between the two outside sections. Save the extra inserts and screws in a small plastic bag with your connectors.

STAN POZERSKI, KD1LE

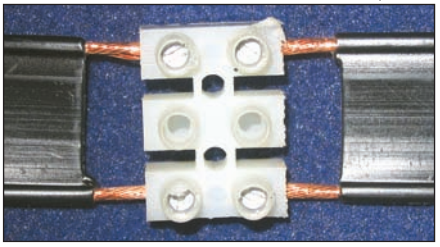


Figure 3 — A three connector segment of a terminal strip being used to join two sections of open-wire line.

The second part of the solution is to have pre-measured pieces of open-wire feed line to add to a run that is too short. I have pieces of 60, 30, 20 and 10 feet, which I marked for length. I put one of these connectors on each piece of feed line that is attached to an antenna and the pieces I regularly use as add-ons so they will be ready.

We have tested the connector in an RF field (the microwave test) and at full legal power on 10 meters with the connector at the voltage node and a SWR of 9:1. We have tested the mechanical connection under strain to over 40 pounds pull without separation. These terminal strips are available in 12 connection strips from Jameco (**www.jameco.com**) P/N 215029 and Digi-Key (**www.digikey.com**) P/N WM59151-ND and you can make four connectors per strip. This connector can make the use of open-wire feed line easier even in ad hoc situations. Thanks to Bob Reif, W1XP, for the strain and RF testing. — *73, Stan Pozerski, KD1LE, PO Box 527, Pepperell, MA 01463-0527,* **spozerski5090@charter.net**

REPAIRING SLUG-TUNED COILS WITH DENTAL FLOSS

◊ Many miniature slug-tuned coils and transformers use a thin strand of rubber band-like material running the length of the tuning slug to secure it in place and keep it from vibrating out of adjustment. When working on older radios, I often find that the rubber has become brittle and disintegrates when the slug is turned.

A quick, simple and readily available replacement is waxed dental floss. It is durable and the wax provides just the right "stickiness." One strand is usually not enough, but it is easy enough to twist several stands together for the needed thickness. I find that four strands twisted tightly together are usually about right for miniature coils. Remove the slug, put the twisted strands into the center of the coil perpendicular to the threads and thread the slug back into place. Snip off the excess, adjust the slug as necessary for the circuit and you're in business. — *73, Richard Manner, KGØXO, PO Box 630724, Highlands Ranch, CO 80163,* **RLManner@yahoo.com**

MORE ON THE ADI AR-447

◊ Recently I received an e-mail from Don Dorward, VA3DDN, regarding the "Hot Sun — Cold Solder" hint in last April's column.[3] This hint involved an ADI AR-447 transceiver that had developed a display malfunction. In the hint the problem was attributed to a cold solder joint. Don pointed out that even at a temperature of 250°F, solder will not soften enough to create a cold joint, but that repeated heating and cooling of a poor solder joint can cause it to fail. He also made me aware that this display problem has been addressed on various Amateur Radio Web sites and that the problem is actually a poor connector between the display and the circuit board. Apparently, separating this connector and applying some conductive grease will solve the problem. — *Ed.*

[3]J. Conlon, WB7NPF, "Hot Sun — Cold Solder," *QST*, Apr 2009, p 82.

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

Feedback

◊ In "Diamonds in the Sky" [Aug 2009, pp 30-32], the mast holes at the 46¼ inch point (H) should be marked and drilled at 0 and 180° instead of 90 and 270° as described in the text.

◊ In "Getting on the Air — It's Time to Take to the Water" [Jul 2009, pp 51-54], footnote 1 should refer to Aug 2008 *QST* rather than 2006.

THANK YOU

ARRL FOUNDATION

ARRL wishes to recognize the following generous donors whose contributions in 2008 totaled $1000 or more. Their continuing commitment supports ARRL operations and program not covered by member dues. Their names and call signs were inadvertently left off the list of donors that appears in the *2008 ARRL Annual Report.*

Francis Donovan, W3LPL

Charles Heath, K6ZIZ
The Allen-Heath Memorial Foundation

Glenn E. Wolf, N5RN

Bike 54, Where Are You?

Why tell *when you can* show.

Steve Ford, WB8IMY

The Automatic Packet/Position Reporting System (APRS) is not new. It began as a tool to track moving objects by taking position data from Global Positioning System (GPS) receivers and retransmitting it using packet radio technology. At the receiving end, the position data was translated into colorful icons on computer-generated maps. Each time the receiving station received a new data packet, the icon was automatically repositioned on the screen.

APRS these days has evolved into a multipurpose digital network, but it still does a bang-up job in its original application — tracking moving objects.

Digital-savvy hams have put APRS to work helping communities and charitable organizations manage large-scale operations such as parades, marathons and other activities that benefit from the ability to track the participants. The plunging costs of GPS receivers have made this kind of APRS assistance more affordable. These days you can find portable GPS receivers selling at $100 or less. The only requirement is that the receiver offer a data port that sends information in the NMEA-0183 format. To create a portable APRS tracker, all you need is a *position encoder* and an ordinary 2 meter FM transceiver (see Figure 1). The position encoders are available from companies such as Byonics (**www.byonics.com**) and typically sell for less than $80, sometimes much less.

There are also transceivers that have APRS functionality built-in, such as the Kenwood TM-D710A and Yaesu VX-8R. You just hook up the GPS receiver and you're ready to go. And take a look at the RPC Electronics RTrak we reviewed in the March 2009 *QST*.[1] This unit is a total APRS package complete with GPS receiver, encoder and transmitter (**www.rpc-electronics.com**).

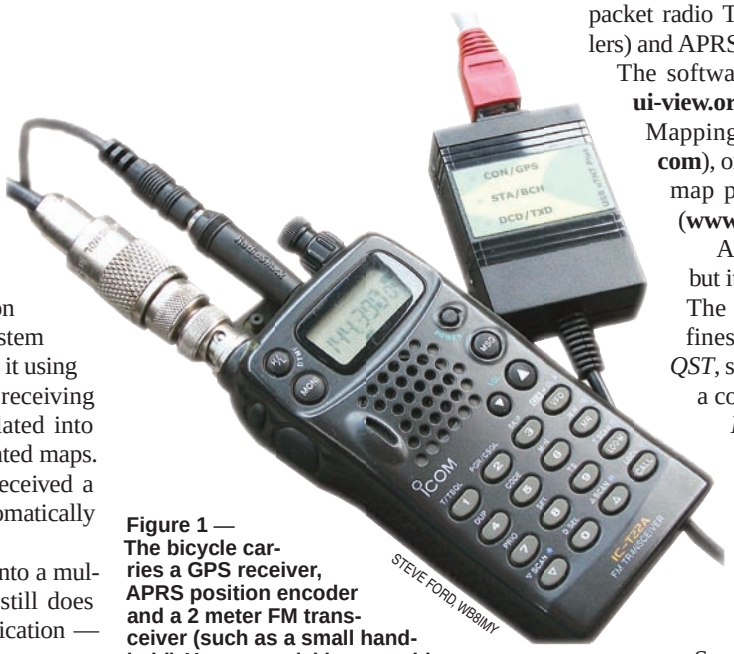


Figure 1 — The bicycle carries a GPS receiver, APRS position encoder and a 2 meter FM transceiver (such as a small handheld). You can quickly assemble an APRS tracker by connecting a GPS receiver to an APRS position encoder and a 2 meter FM transceiver (GPS receiver not shown). At the receiving station, a 2 meter transceiver with a packet radio TNC decodes the incoming data and displays the bicycle's position on a software map.

The bottom line is that you want a package you can easily put aboard a bike, parade float, car or whatever. That usually means something relatively lightweight that can run for several hours on battery power.

You'll notice that I haven't mentioned computers. Computers are only necessary at the receiving stations, presumably at the event command center and a few other locations. They'll need 2 meter FM rigs (144.39 MHz is the primary APRS frequency), packet radio TNCs (terminal node controllers) and APRS software with detailed maps.

The software might be *UIView* (**www.ui-view.org**) with maps from Precision Mapping (**www.undertowsoftware.com**), or a combined APRS software/map package such as *APRSPoint* (**www.aprspoint.com**).

All this may sound elaborate, but it is much easier than it seems. The details go beyond the confines of a single-page article in *QST*, so I'd recommend you pick up a copy of the *ARRL VHF Digital Handbook*.[2] It will give you advice on how to set up mobile and fixed APRS stations along with a good overview about how the APRS network operates.

APRS in Action

So what does all this look like when it's put to work? See Figure 2. This APRS screen was captured during a charity bike event in Connecticut called the Angel Ride. For this event there were portable APRS trackers installed on various vehicles. At the same time, the Angel Ride hams also coordinated using FM voice through a wide-coverage repeater. You can listen to a 2 minute sample of the repeater activity here: **www.arrl.org/files/qst-binaries/Bike Ride.mp3**.

You can do the same thing at your next event. Just set up a few tracking units and strategically located receiving stations to allow officials to view the action. Voice management is terrific, but humans are visual creatures. We like seeing what is going on around us. With APRS in your public service toolbox, your group will become even more attractive to communities and charitable organizations in your area.

STEVE FORD, WB8IMY

Figure 2 — A glimpse of Angel Ride APRS activity with *UIView* software. Notice the three bike mobiles designated ARSAG, along with the ROVER and SHADOW mobiles.

[1]L. Wolfgang, WR1B, "RPC Electronics RTrak All-In-One APRS Tracker," *QST*, Mar 2009, p 66.

[2]Available from your local ARRL dealer, or from the ARRL Bookstore, ARRL order no 1220. Telephone toll-free in the US 888-277-5289 or 860-594-0355, fax 860-594-0303; **www.arrl.org/shop**; **pubsales@arrl.org**.

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

School Club Roundup 2008

Conditions presented challenges, but for many, an SCR to remember!

Lew Malchick, N2RQ
n2rq@arrl.net

♦Thursday of School Club Roundup week, Joe Beichner, AA3TH, and I arrived at school early to get the radio gear ready. A severe windstorm hit our area. The school had no electricity, and the students were coming with a two-hour delay. We drove 20 miles to Joe's house, grabbed his generator, a couple of batteries, and drove back to the school.

Here's what the scene in the art room looked liked: Joe at the radio, the kids gathered around, the only light was from the window and two candles. A power cable was strung out of the window to the small portable generator pounded by wind-driven sleet. The coax draping out of the window was connected to a long wire hanging in a tree. Nobody in the building had e-mail, text messages, the Internet was down, cell phones were not working, and we were talking to the world! It was a school club roundup to remember! — *Gloria, N3IOP, trustee, W3NCS*

♦We had a rough time this year. On Wednesday, a severe windstorm blew down our antenna, so we were not able to work the entire contest. But we did manage to help a few of the students get on the air for the first time, and we were able to work some hams who were thousands of miles away — in Alaska and Ireland, for instance. — *Tom, KA3WSQ trustee, KB3PYS*

♦This was our first year participating in the School Round Up [October 2008] and we can't say enough about the excitement that filled the air. We received one of the ARRL's ETP grants and literally had the station set up only a week before SCR began. Despite the relatively poor band conditions we were able to make several DX QSOs. We explored the 10, 15, 20 and 40 meter bands with sporadic success. We didn't score big points, but the thrill of contacting DX such as Sierra Leone, Estonia, Montenegro or Bonaire more than made up for it! We spent a lot of time "learning by doing." — *Troy, W9KVR, 8th grade science instructor / trustee W9GRS*

♦This was our second time around for SCR [February 2009] and despite the less than ideal conditions on 20 m SSB, we had a blast! We doubled our QSOs, played around with RTTY and PSK, and picked up a few new states for our total on the year! Many of our students enjoy PSK and RTTY, which has helped them overcome some of the "microphone phobias" that tend to arise with SSB. We had more total QSOs, more school QSOs, more DX, and added new states toward our WAS goal. We took advantage of the relatively decent 20 m band conditions in the mornings before school to work European DX, mostly on digital. We plotted each QSO on a map and noticed the pattern. Talk about a teachable moment! There is already talk of throwing up a "wire" so we can get 40 m and 80 m after school hours.

DAVID JONES, N4JED

Control Operator Doug Moore, K4WVS, guides 7th grade student Aaron Britton as he operates K4WBM on PSK31. Sixth grade student Winter Blake looks on.

The SCR has helped connect some of our more seasoned hams with a budding youth movement and we look forward to seeing what lies in store for the future! — *Troy, W9KVR, 8th grade science instructor / trustee W9GRS*

♦Even though we had rough conditions (constant S-9 noise level) the enthusiasm of the student operators never dipped, thanks to all the great hams who took the time to visit. It was another fantastic week of Amateur Radio. Our radio room was visited by classes from every grade level, K-6. Our principal even got into the act as she took part in one of our QSOs. And the look on students' faces when Richard Garriott on the ISS answered our call was priceless. SCR is a fantastic way to keep up the interest in Amateur Radio. A big thank you to the Amateur Radio community. — *Bruce, K3TLM, advisor, Cowanesque Valley School ARC, KB3BRT*

SCR: It's a Wrap

The October 2008 session of the School Club Roundup, the first SCR session of the 2008-2009 school year, had about the same number of entries compared to 2007 — from 29 up to 30. KB3BRT (Cowanesque Valley) and N6KKS (Kermit King) exchanged leading elementary school positions. K4WBM (William Byrd MS) moved up to lead in the middle/intermediate school division. WI5ND (Wagoner Windtalkers) took the lead from WB4HS (William Byrd HS) in the high school division, nearly exchanging scores.

In the college group, there were 8 entries, up from 4, and the score by W6YX at Stanford, as well as the top 3, all increased over 2007. Our perennial DX college/university entry from ON4HTI, STARcom, was again the solo entry.

There were 33 entries in February 2009. W3NCS returned in the elementary schools category to overtake N6KKS and KB3BRT, the 2008 leaders. K4WBM led the middle school category for the third consecutive time. WI5ND also lead for the third time in a row among high schools. For the first time in years, we had a DX high school entry, from MXØSSW. WD5AGO (Tulsa Community College) lead the college/university category.

Sometimes we get distracted by the competition and miss the main mission of the SCR. The School Club Roundup is intended to encourage on-air experience for young operators and potential operators. We applaud every operator who makes an attempt to get young people on the air. The number of contacts or score is secondary. We noted a drop in log submissions, especially from high schools in the February session. In a follow up, we found that a number of stations chose not to send in entries because their scores were too small.

There were numerous stories concerning poor weather or propagation. In the best ham radio tradition, W3NCS overcame a power failure that knocked out lights, phone and Internet service in North Clarion County Elementary School (PA) to make 303 QSOs, more than three times the next elementary school. This was the largest number in at least two years.

Next SCRs on the Way

The next SCR sessions will be October 19-23, 2009 and February 8-12, 2010. There's more information at **www.arrl.org/scr**. Join the **SCR-L@yahoogroups.com** discussion group. The SCR is sponsored by the Council for the Advancement of Amateur Radio in the New York City Schools and the ARRL Hudson Division Education Task Force. QST

JOTA 2009

Preparing for JOTA 2009, Scouts look back at 2008.

Debra Johnson, K1DMJ

JOTA (Jamboree on the Air) is an annual on-the-air operating event in which about a half million Scouts and Guides throughout the world make contact by means of Amateur Radio. 2009 will be the 52nd anniversary of this worldwide event.

JOTA can be a part of other organized Scouting activities or can be a standalone event. It can be a lot of fun outdoors in a tent, campground or park, or indoors at a club station or museum. Wherever it is, JOTA can light up some young faces with fun while teaching about Amateur Radio, as these stories attest.

JOTA 2008

♦ The Buffalo Trail Council hosted their "Mom and Me" event for Cub Scouts and their moms at their Hughes Aquatic Base in Colorado City, Texas. My dad, Scott, KD5MHM, an Assistant Scoutmaster for our Troop 270, organized an event for the Cubs to earn their JOTA patch. I was "volun-told" to assist. My dad's plan was for me to be the contact to assure, given band conditions, that each Cub would make a Boy Scout contact.

I "disappeared" and contacted the Cubs on UHF. I made a point to use each Cub's name when I made the reply contact, saying: "Hello, <Cub name>, my name is Devin." Each Cub Scout got a big grin on their face. Dad told me that, after the first contact in each group, there was a mad dash to be next on the mic.

All told, I made contact with 55 Cub Scouts, helped them learn about Amateur Radio, SKYWARN, Emergency Communications and the fun of being a ham. — *Devin Johnson, KE5SYM*

♦ Approximately 1100 Boy Scouts, Webelos and adults annually attend the North Star District Camporee and JOTA event and many have earned both their ham license and Eagle badge. The Near Space Ventures team demonstrated Amateur Radio using HF and VHF for contacts using PSK31, SSTV, SSB. Near Space Ventures and Venture Crew 360 launched Venture Star 6, a high altitude balloon tracked via APRS and carrying a camera, a simplex repeater and other experiments. WØNSV-11 reached 104,495 feet and traveled about 75 miles east before being recovered 3 miles South of Indian Grove, Missouri. — *Keith D. Kaiser, WAØTJT*

♦ Over 300 youths and adults participated in the multiple districts Camporee and JOTA event at McIntosh Reserve near Whitesburg, Georgia. About 75 Boy Scouts completed their Radio Merit Badge after attending classes then talking on one of eight ham stations. The event included Girl Scouts, Boy Scout Venture Crew, Scout Troops and Cub Scout Packs including Webelos Scouts camping with Boy Scouts.

A sixth grade Girl Scout, Katie, maintained a contact for 45 minutes talking to all the boys working on the merit badge. In the final ID process I complimented her through the control operator, to which she replied: "I never knew that talking to boys could be so much fun." The comment was heard by a number of adults and Scout leaders nearby and caused much laughter. — *Jay Langley, N5NRL*

Debra Johnson, K1DMJ, is Manager of the ARRL Education Services Department. She can be reached at **djohnson@arrl.org**.

DEB KAISER, WØDLK

Keith Kaiser, WAØTJT, prepares Venture Star 6 for launch.

DON BURKE, KB1LXH

The Taunton (Massachusetts) Area Communications Group with the Whitman Amateur Radio Club teamed together to provide Scouts a chance to participate in JOTA at Camp Norse. Paul Moss, KB1MTW, of Whitman, the control operator, holds the microphone while Assistant Cub Master Don Burke, KB1LXH, Pack 49 Taunton, watches as his son, Webelos Scout Noah Burke, 10 years old, speaks on the air.

2009 Jamboree on the Air: Climate Change Challenge C3

October 17-18, 2009

The World Scouting Web site at **www.scout.org/jota** is the official resource for the Jamboree on the Air. As the title suggests, World Scouting's theme for JOTA this year is the environment. JOTA is a testimony to the international dimension of Scouting, and World Scouting Headquarters is adopting the "C3" theme to engage millions of Scouts worldwide in the vision of creating a better world by protecting the environment and taking positive action against climate change. The radio and Internet discussions that will take place during the JOTA will enhance the participants' awareness of environmental issues. Visit the World Scout Web site for late breaking details on JOTA and for a special JOTA kit with educational tools based on the content of the World Scout Environment Programme.

Refer to ARRL's Scouting (**www.arrl.org/scouts**) and JOTA (**www.arrl.org/scouts/jota**) Web pages for general information, frequencies and suggestions on ham radio related activities. And don't forget to write an after action report for our "JOTA Story" page at **www.arrl.org/scouts/jota/Stories**. You'll find more stories and photos there that have been shared from previous JOTA activities. QST

Keeping Safe: Tower Safety

Taking the proper safety precautions around your tower can save your life.

S. Khrystyne Keane, K1SFA

When we talk about safety and Amateur Radio, we usually mean one of three types: Tower and antenna safety, electrical safety and RF safety. It's no secret that when around high towers and high voltage, your awareness should be high, as well. I like to have fun with my friends when I'm on-the-air or helping out as ground crew, but I am always aware of my environment and the safety hazards that are always present.

The summer of 2009 brought us two tower tragedies: Larry Prelog, KE4PM, of Niles, Michigan, and Jim Mullin, W8KKK, of Clifford Township, Ohio, both died in tower accidents. It doesn't matter if it's a 30 foot tower or a 130 foot tower: If you are not wearing the proper safety equipment — and wearing it correctly — you are risking your life.

Tim Duffy, K3LR, knows this all too well. When he was 16, he was retrieving a 2 element quad on top of a 40 foot guyed tower when the aluminum wire guys stretched, toppling the tower. Three days in the hospital and 27 stitches in the back of his head later, Duffy doesn't take tower safety lightly. "Many people asked me how I survived falling from a tower," he recounted. "Then I tell them what really happened — the tower fell, I just happened to be on top of it. I had my safety belt on, nice and tight; when I landed, I was still tied to the tower. I was very lucky, but many are not. I learned my lesson well."

On the Tower

You need to be attached to the tower 100% of the time; wearing only a climbing belt that you have to take off and reattach when moving past guys is not safe enough. The ARRL recommends using a hard hat, a positioning lanyard, a fall arrest (FA) lanyard and a fall arrest harness (FAH), also known as a full body harness, when climbing a tower. Along with the waist safety belt and D-rings, the FAH has adjustable suspenders, leg loops and a D-ring between the shoulder blades to hold the FA lanyard; some even have hip, saddle, chest and shoulder D-rings. Always wear the proper size of harness that fits you — snug, but not too tight.

Positioning lanyards are available in fixed or adjustable lengths. They are used as to fix the climber in a stationary position on the tower so that they are close enough to their work area to prevent a fall. FA lanyards can be fixed-length or shock-absorbing. A shock-absorbing FA lanyard has stitched loops that yield gradually, decelerating to avoid a sudden stop at the end of a fall. A person who is falling can generate a lot of force in a short time, so the FA lanyard needs to be attached *above* you, allowing enough slack for moving around the tower. This will minimize the distance of any fall. When climbing, attach the FA lanyard as high above you as you can and then climb up to it. Next, attach the positioning lanyard, detach the FA lanyard and repeat the cycle until you reach the top.

Never punch additional holes or alter your FAH or climbing equipment in any way. Store your climbing gear in a dry clean area when not in use. Inspect it often for defects; if any part of it is cracked, frayed or worn in any way, destroy the damaged piece and replace it with a new one. Read thoroughly all instruction and inspection manuals that are provided when you purchase climbing equipment. Remember — a climbing harness is to protect you in a fall. Treat it as if your life depends on it, because it does.

On the Ground

Before you begin your tower work, meet with your ground crew and explain to them what you will be doing. Your ground crew should wear hard hats in case you drop something when you are on the tower.

The ground crew should not do anything unless directed to do so by the climber. This includes handling ropes, tidying up and moving hardware. Always keep your eyes on the climber so you can move if anything happens to fall. It's also a good idea for the climber and ground crew to communicate via radio. This ensures that the climber's directions will be heard and understood, and not lost in the ambient noise caused by the wind.

Today, Duffy has many tall towers at his Pennsylvania QTH. "I do lots of my own antenna work," he said, "I always have a ground crew and I use an approved safety harness and climbing belt that is always attached to the tower. I never lend my climbing belt or safety harness to anyone — my life depends on it."

A complete tower structure system is only as safe as its weakest link, so frequent inspection of anchors and guy wires is a must. Hidden dangers such as subsurface corrosion and missing bolts often go unnoticed; the prudent ham will carefully inspect the anchorage system before climbing, much like a pilot does a walk around their "bird" each time a flight is made. Having a Registered Structural Engineer review your installation is money well spent.

This article isn't meant to supply all the answers. Please consult these references before determining whether an antenna support structure is safe to climb, and if so, whether you have taken all precautions to avoid a potentially deadly accident: *Tower Design Standard*, ANSI/TIA/EIA 222-G (this is the most current standard); *US Coast Guard Tower Manual* (more than 200 pages with good illustrations) (**www.isddc.dot.gov**); *Fall Protection Standards*, ANSI/ASSE Z359 (**www.asse.org**), and *Fall Protection*, OSHA (Ref: 29 *CFR* 1926 Subpart M) (**www.osha.gov**). The *2010 ARRL Handbook* will have a revised safety chapter; *The ARRL Antenna Book* includes valuable tower safety information, as well.

Our thanks to ARRL Volunteer Consulting Engineer Bill Shaheen, N1CQ, for his contributions to this article.

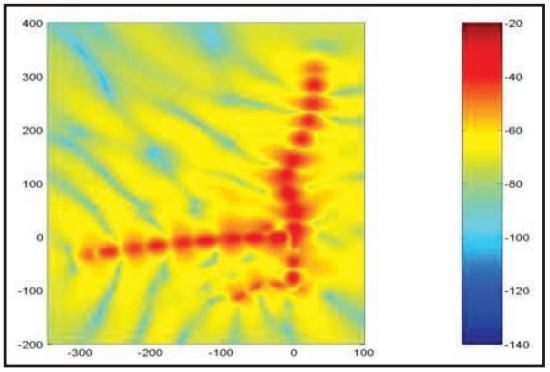
S. Khrystyne Keane, K1SFA, is the ARRL News Editor. She can be reached at **k1sfa@arrl.org**.

Tower Safety Tips

- Always have at least one person serving as ground crew for all tower work. This person is the one who will call 911 in case of emergency.
- Never climb a tower in high winds.
- Get off the tower *anytime* you hear thunder, since this signals that lightning is close.
- Never throw things off the tower.
- Never climb or work on a tower when tired.
- When climbing, use your leg muscles to push you up — not your arm muscles to pull you up.
- Always have an emergency plan — know your location and directions by road name to your location. Make sure your ground crew knows this information, too. "I am working on Fred's 20 meter tower behind his barn" makes it difficult for rescuers to find you.

FCC Continues BPL Debate

On July 17, the FCC issued a *Request for Further Comment and Further Notice of Proposed Rulemaking* (*FNPRM*), addressing the issues remanded to them by the US Court of Appeals. In October 2007, the ARRL took the Commission to court concerning the Commission's Orders adopting rules governing broadband over power line (BPL) systems. In April 2008, the Court agreed with the ARRL on two major points and remanded the rules to the Commission. Writing for the three-judge panel of Circuit Judges Rogers, Tatel and Kavanaugh, Judge Rogers summarized: "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."



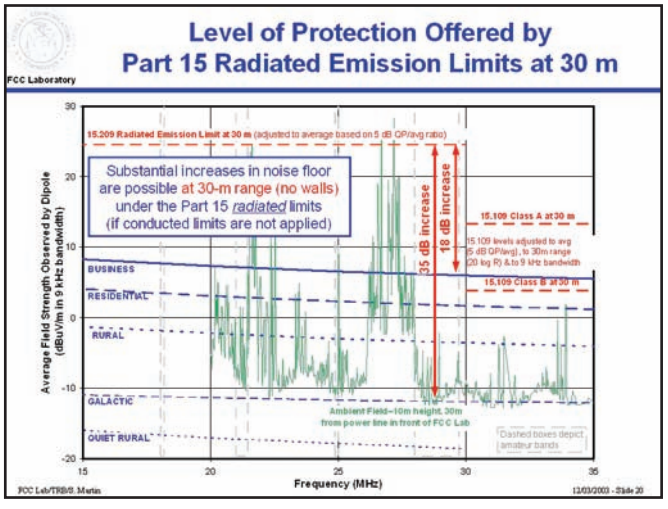
This bird's-eye plot of the complex pattern of field strength peaks and nulls around a very realistic model that the NTIA developed of a real power line that was carrying BPL near Allentown, Pennsylvania shows that the measurement of four points to determine the way field strength varies with distance is simply unworkable. The peaks and nulls, shown in dB relative to 1 µV per meter, do not fall off cleanly with distance and a measurement made at right angles to the power line does not follow the pattern that actually occurs from the line, where the peaks and nulls are typically skewed at some other angle from the power lines. The angles of the overhead power lines used in this model can be seen, but trying to measure the extrapolation from this system would be a virtual impossibility to get right. — *Ed Hare, W1RFI*

New Information?

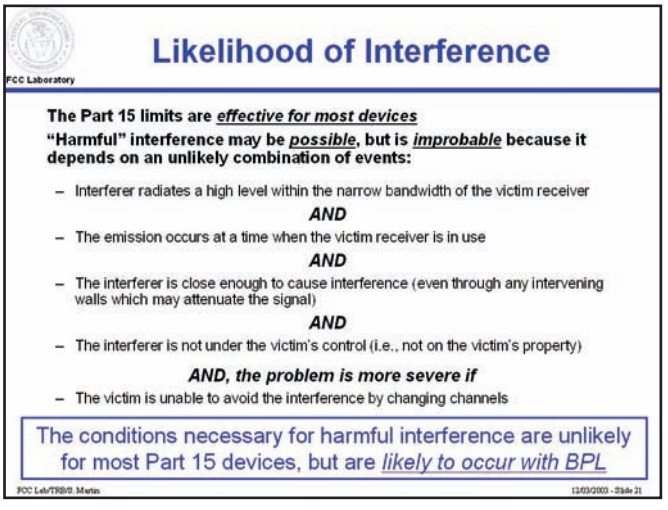
The Court found, among other things, that the FCC not only withheld the internal studies until it was too late to comment, but had yet to release portions of studies that may not support its own conclusions regarding BPL. The FCC claimed that the studies were "internal communications" that it did not 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 March 2009, when the FCC still had not released the redacted portions of the studies as ordered by the court, the ARRL filed a Freedom of Information Act request for the studies. Six weeks later, the FCC released the redacted portions of the studies.

To contend with the Court's ruling, the Commission is now requesting comment on the information in those studies as it pertains the FCC's BPL decisions. The Commission is "also placing into the record certain additional materials that contain preliminary staff research and educational information" that was not previously made available. It is these records that concern ARRL Laboratory Manager and BPL expert Ed Hare, W1RFI.

"At the same time the FCC released the new *FNPRM*, it also released 800 MB of previously unseen FCC internal staff reports on BPL," Hare said. "Although the FCC tries to downplay the work of their own staff by



This slide, from a 2003 presentation by FCC Lab staff, shows that noise at the FCC Part 15 emissions limits for carrier-current devices was an increase of noise of 35 dB at the location tested. Another slide from the same presentation showed a 28 dB noise increase from a BPL system measured.



This slide, from the same presentation, explains that BPL is not the same as most other noise sources regulated by Part 15 of the FCC's rules. Interference is likely to occur from BPL deployments if it is using spectrum that is in use locally.

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

FCC News

♦**Genachowski Sworn In As New FCC Chairman**: On June 29, US Supreme Court Justice David Souter — in one of his last official duties on the high court — swore in Julius Genachowski as the new Chairman of the Federal Communications Commission. Genachowski, who clerked for Souter after finishing law school, will complete the four years remaining in the term of outgoing FCC Commissioner Jonathan Adelstein. Both Genachowski and current FCC Commissioner Robert McDowell — Genachowski for his initial term and McDowell for his first full term — were confirmed by the US Senate on June 25. McDowell was sworn in on July 2, with Chairman Genachowski doing the honors.

FCC Chairman Julius Genachowski

Genachowski took the opportunity to list his goals as Chairman the day after he was sworn in: "As the country's expert agency on communications, it is our job to pursue this vision of a more connected America, focusing on the following goals: Promoting universal broadband that's robust, affordable and open; pursuing policies that promote job creation, competition, innovation and investment; protecting and empowering consumers and families; helping deliver public safety communications networks with the best technology to serve our firefighters, police officers, and other first responders; advancing a vibrant media landscape, in these challenging times, that serves the public interest in the 21st century, and seizing the opportunity for the United States to lead the world in mobile communications. We will be fair. We will be open and transparent. Our policy decisions will be fact-based and data-driven. We will strive to be smart about technology; smart about economics and businesses; smart about law and history; and smart every day about how our actions affect the lives of consumers. We will use technology and new media to... improve overall operations of the FCC — running efficiently, communicating effectively, and opening the agency to participation from everyone affected by the FCC's actions."

saying that these reports are only the opinion of one FCC staffer, these conclusions about BPL from the FCC Lab were made by FCC technical people with strong experience in measurement techniques and interference assessment. This is generally good engineering, with a clear objective of providing the Commission with accurate technical information about BPL."

According to Hare's preliminary review of the *FNPRM*, the FCC's own technical findings clearly spell out that BPL operating at the FCC limits has a very strong potential to cause interference to licensed radio users: "These reports show that BPL causes interference to a number of licensed services for significant distances from BPL noise sources and that the noise from BPL at antennas that are about 100 feet from wires carrying BPL operating at the FCC limits will represent an increase in noise of about 30 dB in most cases."

Hare said that other slides show that radiated noise from overhead power lines increases significantly above the noise at ground level. "Based on these internal FCC technical analyses, the present rules and test methods — when coupled with inappropriate distance extrapolation — simply do not protect licensed users from interference," he said. "The Commission was well aware of the content of these presentations when it issued a BPL *Report and Order* that discounted ARRL when the League made many

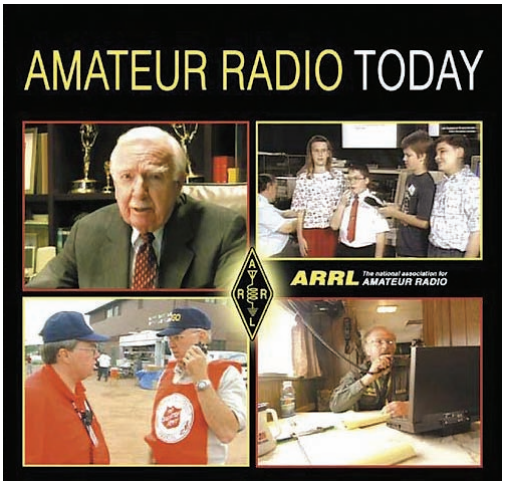
WALTER CRONKITE, KB2GSD (SK)

Legendary CBS newsman Walter Cronkite, KB2GSD, the "Most Trusted Man in America," passed away July 17 after a long illness. He was 92. The avuncular Cronkite anchored *CBS Evening News* for 19 years until 1981 when he retired. During that time, he reported on such subjects as the Kennedy assassinations, the Civil Rights movement, the Apollo 11 lunar landing, Vietnam and the Vietnam-era protests, the Arab-Israeli Six Day War, Watergate and the Begin-Sadat peace accords.

Cronkite, an ARRL member, narrated the 6 minute video *Amateur Radio Today*. Produced by the ARRL in 2003, the video tells Amateur Radio's public service story to non-hams, focusing on ham radio's part in helping various agencies respond to wildfires in the Western US during 2002, ham radio in space and the role Amateur Radio plays in emergency communications. "Dozens of radio amateurs helped the police and fire departments and other emergency services maintain communications in New York, Pennsylvania and Washington, DC," narrator Cronkite intoned in reference to ham radio's response on September 11, 2001. "Their country asked, and they responded without reservation."

In 2007, ARRL Hudson Division Director Frank Fallon, N2FF, presented Cronkite with the ARRL President's Award. This award, created in 2003 by the ARRL Board of Directors, recognizes an ARRL member or members who "have shown long-term dedication to the goals and objectives of ARRL and Amateur Radio" and who have gone the extra mile to support individual League programs and goals. Cronkite was selected to receive the award in recognition of his outstanding support of the ARRL and Amateur Radio by narrating the videos *Amateur Radio Today* and *The ARRL Goes to Washington*. "It was quite a thrill to make this presentation to Cronkite," Fallon said. "He has long been recognized as the 'most trusted man in America,' so lining our causes to his face, name and voice has been a great help."

A private memorial service was held July 23 in New York City. Cronkite will be cremated and his remains buried in Missouri next to his wife Betsy, who passed away in 2005. The family requests that donations be made to the Walter and Betsy Cronkite Foundation through the Austin Community Foundation (**www.austincommunityfoundation.org**), which will distribute contributions to various charities the couple supported.



Walter Cronkite, KB2GSD (SK), narrated the ARRL video *Amateur Radio Today*.

of the same technical points in its filings."

Extrapolation Factor: FCC Looking to Compromise?

One of the major points of difference between ARRL and the FCC has been the measurement extrapolation factor below 30 MHz that is applied to measurements made at distances from power lines or other radiating sources to determine what the value of that measurement would be at a distance of 30 meters. This is the distance in the FCC rules for which maximum permitted emission are specified. The FCC believes that this factor should be 40 dB/distance decade.

Hare explained why this is incorrect: "The FCC's test method measures BPL emissions at ground level, using a loop antenna located 1 meter off the ground. Amateurs know that a low horizontal antenna radiates more energy upward than it does toward the horizon, and that a measurement made of a radiating power line at 1 meter off the ground is not a good indicator of the noise levels that will be present at angles upward from that same power line, where HF antennas are most apt to be located. The 40 dB extrapolation factor and the lack of any correction for height result in a BPL system that will significantly exceed the FCC emission limits at the very point where most amateur HF antennas are located."

In response to its remand of a portion of BPL measurement procedure, the FCC is "also providing an explanation of our reasons for selecting 40 dB per decade as the extrapolation factor for frequencies below 30 MHz. We further explain why we believe the studies and technical proposal submitted earlier by the ARRL do not provide convincing information that we should use an extrapolation factor that is different from that which we adopted," noting the existence of "more recent studies" they say prove their point.

In the *FNPRM*, the FCC states that they are "re-examining the current extrapolation factor in light of the recently issued technical studies addressing the attenuation of BPL emissions with distance and efforts by the IEEE to develop BPL measurement standards." Using these studies and older ones, the FCC said that "there can be considerable variability in the attenuation of emissions from BPL systems across individual measurement sites that is not captured in the fixed 40 dB per decade standard."

Based upon this "considerable variability," the FCC has opened a 30 day comment period, asking if they should change their rules to "adjust the extrapolation factor downward to 30 dB or some other fixed value and, as an alternative, also allow use of a special procedure for determining site-specific BPL extrapolation values using *in situ* measurements."

Hare notes that the *FNRPM* is creating a complex way to look for a simple solution to a complex problem. "It's ironic that the *FNPRM* discusses the 'considerable variability' in attenuation at BPL sites, then proposes that a measurement of a mere four points within that variability can determine the supposedly actual extrapolation. The NTIA Phase II study that is the 'newer study' that the FCC is relying on for part of its justification for 40 dB/decade shows an environment extremely more complicated than that. Trying to apply any measurement of extrapolation to this complex environment is a recipe for failure — and possible 'cherrypicking' of results that will allow those making measurements of BPL systems to provide any value of extrapolation they want, in either direction. I serve on the IEEE committee that developed the draft for this extrapolation-measurement method and I did not stand alone in not supporting the approach that the P1775 Working Group has sent to ballot. At this point, the working group is in the process of resolving and rebutting the numerous comments received in the still-unresolved IEEE ballot."

Even though the FCC is inviting comments, they state that they "do not believe that the studies and technical proposal submitted earlier by the ARRL provide convincing information that we should use an extrapolation factor that is different from (and, specifically, less than) 40 dB. We believe that [other] studies [we have relied on] further validate the use of 40 dB as the extrapolation factor. In addition, the sufficiency of our rules for ensuring compliance is further validated by the fact that we have not had any new complaints of interference for more than two years."

Hare has worked extensively with the BPL industry to help it address interference. "If the FCC thinks that the falling off in BPL complaints is due to the sufficiency of its rules, it is mistaken," he said. "In response to ARRL's input and offers of help, the industry has essentially stopped using the amateur bands in US deployments. The FCC's own video documentation of interference (see it at **www.arrl.org/tis/info/HTML/plc/BPL_FOIA.html**) from BPL that is operating under the rules the FCC put forward should be more than sufficient to show that the rules as written are not good ones. The industry has reduced the interference from BPL by doing more than the rules require. By not using the amateur bands and by improving the filtering of BPL systems well beyond the inadequate requirements of the present rules, the industry and ARRL have shown that it is possible to operate BPL systems without widespread interference problems."

Hare said that what is needed now "are good rules and industry standards that reflect this successful model. That is not seen in this *FNPRM*. Rules that reflect the industry practice of not using the amateur bands and that specify state-of-the-art filtering could protect radio services and support this still-nascent BPL industry." QST

In Brief

- **Eleven New Cosponsors Pledge Support for HR 2160**: Since the August issue of *QST* was released, HR 2160, *The Amateur Radio Emergency Communications Enhancement Act of 2009*, gained 11 new Congressional co-sponsors — W. Todd Akin (R-MO-2), Michael Arcuri (D-NY-24), John Boozman (R-AR-3), Bob Filner (D-CA-51), Michael Honda (D-CA-15), Dennis Moore (D-KS-3) Thaddeus McCotter (R-MI-11), Charlie Melancon (D-LA-3), Peter Welch (D-VT), David Wu (D-OR-1) and Don Young (R-AK) — bringing the total number to 19. Introduced in April by Sheila Jackson-Lee (D-TX-18), HR 2160 is also sponsored by Roscoe Bartlett (R-MD-6), Madeleine Bordallo (D-Guam), Bart Gordon (D-TN-6), Brett Guthrie (R-KY-2), Mary Jo Kilroy (D-OH-15), Zoe Lofgren (D-CA-16), Blaine Luetkemeyer (R-MO-9) and Bennie Thompson (D-MS-2).

- **What's New at Dayton 2009: The Unabridged Version**: The July 2009 issue of *QST* had a one page overview of some of the major pieces of equipment introduced at the Dayton Hamvention®. There is no way a single person can track down everything on display that's new in the time available, but *QST* Technical Editor Joel Hallas, W1ZR, did find quite a bit more — much more than can be squeezed into the available *QST* page. "For the expanded Web article, we reported on many other categories of interest, including new VHF and antenna-related equipment, as well as many categories of accessories," he said. "You'll find a description of the rest of the new items I tracked down during a very busy three days at Dayton when you go to the Web site" (**www.arrl.org/files/qst-binaries/QS0709NewatDayton.pdf**).

Pandemic: Planning for the Future

Carl Aveni, N1FY, Assistant Section Manager, Eastern Massachusetts
caave@peoplepc.com

The recent focus on the H1N1 flu (aka Swine Flu) has sparked some rethinking about our concepts of disaster preparedness. We were lucky this past spring because the H1N1 virus that impacted the United States was relatively mild. While the overall numbers seemed large, comparatively speaking, the impact was no worse than a regular seasonal flu episode.

In some of the circles that are monitoring the H1N1 virus, there is growing concern that the virus will mutate to such a degree that the fall flu season could be much more serious, that is, be more virulent, more widespread and thus be more damaging. This also raises more serious concerns. We have not experienced a wide-ranging public health emergency in this country in decades. The lesson that we should be learning from the H1N1 issue is that *we are not properly prepared* to deal with the nearly unlimited possibilities that face us in the public health arena. H1N1 isn't the only potential virus that could cause a pandemic but the issues surrounding this discussion are applicable to whatever we may face.

Those of us in the Amateur Radio Emergency Service (ARES®) are constantly training for disasters in which various portions of local infrastructure have been damaged or destroyed. Go-kits are put together and checked often. Relationships are developed with served agencies and organizations. Optimal sites for relaying critical information are scoped out and practiced. In typical disasters, these preparations serve us well. Much of the current training we experience has to do with trees and wires down, power outages, flooding, wind damage, issues that are visible, damage that is concrete.

A pandemic flu is not a disaster in the sense of any typical ARES® response that has been planned for or even contemplated in most circles of volunteer emergency communications. In public health emergencies, it is the human equation that is impacted the most, not infrastructure. It has been estimated that 40 percent or more of the work force could be out with sickness at any one time.

Most likely (at least initially) there will not be any infrastructure impact or damage. Instead, large numbers of people, including Amateur Radio operators, will be knocked out of action by the illness. (In the long run, if enough personnel are out of action for a long enough period, maintenance of equipment necessary for everyday activities will be affected and the equipment will begin to break down.)

By and large, Amateur Radio operators are not maintenance crews trained to repair infrastructure systems of various types. Those are not our roles during emergencies. One glowing example of this was the transition to digital television. It was not our role as Amateur Radio operators to run around the neighborhood installing digital converters. (Individually we may have known how to do this, but in our capacity as Amateur Radio operators, we were not supposed to be doing this.) We are trained communicators. In all of the emergency communications courses I have taken or taught, the emphasis has been on receiving and transmitting messages for those we serve. We do not make decisions about "what" is passed along. We "communicate" the messages.

A Different Type of Response is Called For

Throughout a pandemic flu event, there may not be a role for a typical ARES® response. The mantra that we have grown accustomed to, "When All Else Fails," will not apply. After all, hams can also get sick. As in any disaster planning, we will need to ensure the safety of our families first. We will be no good to those we serve if we are constantly worried about our families, so preparedness steps must be put into place prior to all our other commitments. After our individual and family preparedness steps are addressed, planning support for public health should be our focus.

We will be establishing relationships with hospitals, Medical Reserve Corps, vaccine injection sites/points of distributions (PODs), the American Red Cross, and others as part of the larger emergency management effort. In this way we will get to know what their needs will be and how we can serve those needs (even from home stations as hams themselves become ill). Identifying triggers for activation and developing protocols for any public health emergency, such as a pandemic flu, will be key. Then, we will need to develop an exercise plan that will test the activation and response protocols/procedures, including coverage from home stations (which very well could be of prime importance during a pandemic in which in-home sheltering or isolation is put into place), as well as simplex relays if repeaters go down.

During the annual Simulated Emergency Tests (SETs) we have found that the development of a network of home stations relaying messages was a big help. Working as remote bases, a network of home stations obviates the need for deployment to field operations where the exposure to the illness could be expanded. Once these plans have been developed, they should be exercised "…to work out the bugs." Sharing these plans and lessons learned from the exercises with surrounding areas will be helpful in establishing mutual aid pacts.

A couple of caveats should be mentioned. Many of us who find the area of emergency communications in the public sector rewarding have offered our services to many agencies, depending upon the nature of the disaster. Unfortunately, in a public health disaster, our allegiances can be spread out over many agencies. Therefore, we multiple-hat wearers will need to clearly define our priorities as to which agencies we will be able to serve.

ARES® groups will need to clearly define

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

their agreements with served agencies in terms of what is expected, what capacities are actually available and an understanding that we may not be able to support all those that require our services. In any Memorandum of Understanding between a served agency and ARES®, it should be clearly stated that we are *volunteers*, and as such, have the right to refuse to respond because of "personal reasons." Such reasons may be having medical issues of our own that might prevent us from responding to a particular problem, having to care for family members, fear, etc. This discussion with the served agency must be held prior to any agreement being reached and clearly understood during drills, exercises and actual events.

While our desire to serve is strong, we don't have the same safeguards afforded to paid response personnel. For instance, in a pandemic situation one possibility to consider is the potential for inoculations to public safety personnel, if deemed appropriate to the situation. For ARES®, this will be a key consideration. Does the agency you serve plan to offer this to your group? What other medical safeguards are available to you as volunteers? What testing will be available if you become ill in the performance of the mission? These are all critical questions to ask before, during and after any response.

As a public health event expands and grows in severity, and as systems begin to break down, we will need to keep in mind that we too will be impacted by the failure of all those systems. For related information, check these links: **www.flu.gov** and **emergency.cdc.gov**.

GLOBALSET COINCIDES WITH WORLD AMATEUR RADIO DAY

IARU Region 1 invited the Headquarters stations of IARU Member-Societies, and the Emergency Operation Centers of Emergency Communications Groups (ECGs), to participate in the 2009 Global Simulated Emergency Test (SET). According to IARU Region 1 Emergency Communications Coordinator Greg Mossop, GØDUB, the GlobalSET, which took place on April 18, 2009, was not a contest but an emergency communications exercise to develop skills needed to provide an international emergency network.

The 2009 GlobalSET was scheduled for April to tie into World Amateur Radio Day. The theme of the 2009 World Amateur Radio Day is Amateur Radio: Your Resource in Disaster and Emergency Communication. "This is an ideal opportunity to showcase the work of emergency communications groups around the world," Mossop said.

During the planning stages of GlobalSET, Dennis Dura, K2DCD, Manager, Emergency Preparedness and Response, asked Field Organization Team members Chuck Skolaut, KØBOG, and Steve Ewald, WV1X, to help with and organize ARRL's participation. ARRL Headquarters' Maxim Memorial Station, W1AW, served as the official ARRL and ARES® representative for this event.

STEVE EWALD, WV1X

Chuck Skolaut, KØBOG, operating W1AW during the GlobalSET.

Under Dennis' guidance, Chuck recruited and registered Amateur Radio operators and stations associated with Emergency Communications Groups in the United States. We also created a component of the exercise by inviting ARRL Sections to become involved. We asked section leaders to designate up to two stations per section to take part. There were 27 emergency communications groups and 14 ARRL sections represented. Thanks to everyone who officially registered and participated.

Each officially registered participating station was asked to send messages to their IARU regional headquarters station using the standard protocols and message formats. For Region 2, TGØAA in Guatemala served as the Region 2 Headquarters. Stations and operators that were designated to represent their ARRL sections in this event were asked to listen for and try to contact W1AW.

As a side benefit, the GlobalSET also provided a demonstration and study of propagation. "Later in the morning, W1AW contacted TGØAA after propagation improved on 20 meters," Ewald said. "In the meantime, Chuck Skolaut, operating W1AW on 80 and 40 meters, contacted several registered GlobalSET stations. KØLN, with North Dakota Section Manager Lynn Nelson, WØCQ, at the mic, made contact with W1AW on both 20 and 40 meters."

OPERATIONS IN NEW JERSEY AND PENNSYLVANIA

Pennsylvania Emergency Management Agency's Eastern Area RACES volunteer Chris Post, WZ3Q, and PEMA Eastern Area Director Anthony Camillocci, KA3BPN, participated in the GlobalSET. In a span of 60 minutes, Chris communicated with, passed or received messages with seven stations that included State EOCs in Iowa and South Carolina, ARRL Headquarters in Newington and international stations in Guatemala and Cuba.

Dick Montgomery, N3DV, the Eastern Territory SATERN Coordinator, in New Jersey, described his operating experience. "NJ2SA contacted OEM stations in eastern and central US (New Jersey, Florida and Iowa), Central America (Guatemala and Cuba) and South America (Uruguay) and, of course, GBØNRC in England. I also heard many European stations calling GBØNRC on 14.300 MHz and many Canadian and US stations calling W1AW on 75 meters."

In summary, Dick said, "I think the GlobalSET was an excellent opportunity to prove to each other, and to ourselves, that with 100 W, a will and an antenna, you don't need to be on top of a solar cycle to work the world or get help when needed." QST

Amateur Radio's Role in Alabama Interoperability Exercise

When a Cat 5 "hurricane" hit Mobile Bay, Amateur Radio was ready.

Greg Sarratt, W4OZK

It was a meeting of hearts, minds and radios the week of May 4-8, which brought together emergency responders and support personnel in Robertsdale, Alabama for an essential communications interoperability training and full-scale exercise. Sponsored by The Alabama Department of Homeland Security, its goal was to help improve emergency preparedness communication in the State of Alabama.

Personnel gathered in a field near the Baldwin County Emergency Operations Center (EOC) to test the quality and effectiveness of communications between State agencies and support personnel. The exercise was a simulated Category 5 Hurricane, entering Mobile Bay and causing statewide damage.

Those in attendance included Alabama Emergency Management, Alabama National Guard, Alabama Department of Public Safety, FEMA Region IV, eight Alabama Regional Communication vehicles, Alabama ABC Board, Virtual Alabama, Alabama Civil Air Patrol, Sheriff's office and ARRL Amateur Radio Emergency Service® operators from SEMA Region 1 and other regions throughout the state.

Alabama regional communication vehicles with generator.

A Response to Communications Failure

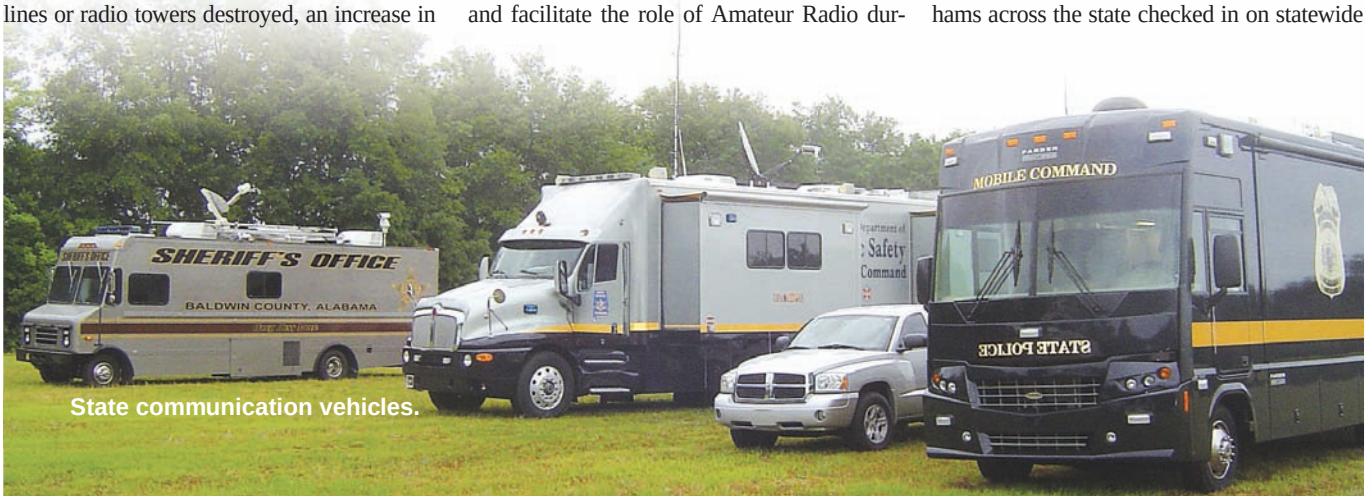
A communications emergency can be caused when a critical communication system failure has the potential to put the public at risk. This failure can include, but is not limited to, overload or damage to critical day-to-day communication systems, caused by telephone lines or radio towers destroyed, an increase in a communication system that causes overload, or the failure of any key component in a system that can cause widespread consequences.

During Hurricane Katrina, Amateur Radio volunteers played a key part in making sure that communications between agency personnel continued uninterrupted and that the public received the help and the timely response needed in this type of catastrophic event. The Alabama Department of Homeland Security recognized this need, and chose to include Amateur Radio in this exercise.

Greg Sarratt, W4OZK, ARRL Southeastern Director, and Patti Link, KI4JEO, District Emergency Coordinator for Region 1, worked diligently, in conjunction with other amateur volunteers and alongside professional partner agencies, to help coordinate and facilitate the role of Amateur Radio during the exercise. W4OZK acted as the liaison at the Incident Command Point to make sure all efforts were coordinated effectively with served personnel incident commanders. KI4JEO, working in the Baldwin County EOC, coordinated amateurs from Region 1, and beyond, for dispatch with Alabama DHS Regional Communication vehicles, as well as dispatch to other pertinent locations in the nine county affected area.

Alabama ARRL Section Manager Jay Isbell, KA4KUN, was dispatched to a mock reception center site 60 miles north of the incident and Alabama ARRL Section Emergency Coordinator Les Rayburn, N1LF, manned the radio at the State EOC.

Alabama District Emergency Coordinators, County Emergency Coordinators and hams across the state checked in on statewide



State communication vehicles.

HF net on 3.965 MHz and into multiple D-STAR nets. Amateurs also conducted local nets and scenarios in conjunction with the full-scale exercise in Region 1.

Dennis Dura, K2DCD, Emergency Preparedness and Response Manager, played a key role at ARRL Headquarters by making sure that any and all resources were at the fingertips of the volunteers and agencies involved. He stayed connected into the multi-day exercise through telephone, e-mail and D-STAR. Dura tested the Major Disaster Emergency Coordinator (MDEC) concept by appointing W4OZK to that role. He also tested new ARRL procedures between the field, Section and ARRL Headquarters, and they worked well within the design parameters. The hands-on approach of the ARRL Emergency Preparedness and Response Manager gives the field much needed resources, short response time and added credibility.

Prior Training Proved Critical

This was a typical full-scale exercise including rain, mud, two snakes, bugs, heat, humidity and hundreds of people everywhere, but we learned the critical value of prior training and practice for public service events. Those participating had to deal with real events, however, as major thunderstorms occurred throughout Alabama that caused the activation of multiple ARES® groups. Serious flooding caused the evacuation of many government offices in the State Capitol.

Several months of planning went into this exercise. AL DHS followed the National Incident Management System (NIMS) where Amateur Radio was an equal partner from the start. The Incident Command System (ICS) including communications forms were used in the exercise. The detailed ARES® Incident Action Plan can be viewed at **www.arrl-al.org/ARES_AL_DHS_explan09.pdf** and the hotwash report is at **www.arrl-al.org/ARES.html**.

At the after action review, no stone was left unturned for the entire exercise and the lessons learned for all players proved invaluable. The Alabama Department of Homeland Security Director, Jim Walker, finished the hotwash with an inspiring speech.

The exercise proved to be a much-needed assessment of what works, and doesn't work, in Alabama emergency communications. Amateurs and state emergency personnel walked away with valuable information and tools to help further emergency communications effectiveness. There is still a lot of work to be done, but this exercise brought Alabama closer to better communications interoperability and provided some new ideas and ways to be more successful in the future.

Unified Front Required

It is crucial to have the knowledge from FEMA ICS courses and ARRL Emergency Communications training or we are basically in the Stone Age at today's incident site. We have to provide a unified front of quick, reliable and competent operators to be a valued useful partner. Amateur Radio and public safety players utilized "plain language" for their communication language. A dedicated ICS "COM-L, Communications Leader" established the parameters to address the needs that arose, and ICS forms were used throughout.

The biggest surprise in the event was the order to turn off the normal statewide radio system to see how things would function. This is where Amateur Radio really rose to the occasion!

Photos by the author.

Greg Sarratt, W4OZK, serves as director of the ARRL Southeastern Division. He can be reached at **w4ozk@arrl.org**.

Participants' Comments

♦ "As a person new to emergency communications, and an Extra Class Amateur Radio operator, I found this exercise to be very informative and insightful. I really enjoyed learning about all that goes into creating interoperability between first responders and support personnel. It is a very exciting area that I am anxious to learn more about and become an active participant in. I didn't realize, until this exercise, exactly how large a part Amateur Radio plays in the safety of our State and of our citizens. It is inspiring to me to just be a part of such a worthwhile and valuable exercise and to work with so many great Amateur volunteers. There is still much to learn, but I look forward to the challenge." — *Blanche Bearden, N4LUV*

♦ "While the simulated exercise provided valuable experience in a broad range of Amateur Radio modes and techniques, the most valuable lesson learned by all the operators was how vital a role Amateur Radio has in communications interoperability. The respect afforded each and every amateur operator is due in part to the long history Amateur Radio has of aiding and assisting our communities during times of local, regional, and national disasters." — *Patti Link, KI4JEO*

♦ "It was a great exercise and we learned a great deal during the week. This was a good test of the ARES® processes and improvements since Katrina in a full-scale exercise with other agencies. Everyone shared and learned about each other's communications capabilities. The relationships built and lessons learned here are invaluable to the Amateur Radio Service." — *W4OZK*

♦ "Since the major hurricanes in recent years, the State of Alabama and the Southeast Region IV of FEMA have really accepted Amateur Radio as a prime player in any major disaster. Under the direction of Alabama Section Emergency Coordinator Les Rayburn, N1LF, Alabama ARES® has grown from several independent groups helping their local Emergency Management Agency or National Weather Service Forecast Office into a well organized first responder team. The state Emergency Management Agencies and other critical served agencies are helping with radios and training for local hams to step in and man critical emergency communications systems. Amateur Radio is being accepted as a critical tool during times that the daily manpower and technical resources are stretched beyond their design." — *Jay Isbell, KA4KUN, Alabama Section Manager*

♦ "The Alabama Department of Homeland Security full-scale exercise was a success for the Amateur Radio Emergency Service. Valuable relationships were formed with many partner agencies and valuable lessons were learned. The inclusion of Amateur Radio from the beginning of the planning effort many months prior was clearly a nod to the value of the resource we bring to any disaster. Headquarters involvement in this planning was also vital to play out the relationship with the Alabama Section in a response of this magnitude. It tested the coordination linkages and resource allocations that HQ would provide during any catastrophic event that impacts a significant region of the United States. In this exercise, we involved through the Northern Florida Section Manager, Paul Eakin, KJ4G, the resourcing requests that would be brought in from adjacent areas, in addition to the actual response efforts the NFL Section would be facing due to the track of this simulated hurricane. Considerations for the response were discussed in an ongoing series of conference calls and e-mails that involved the Alabama Section Leadership, the Northern Florida Section Manager, the MDEC and ARRL HQ. The HQ Disaster Response Coordination Team that was put into place during the 2008 hurricane season was alerted and placed on standby for this exercise. The most important element of this exercise came from a partner agency perspective: "Hams added innovative ways to solve partner communications problems." — *Dennis Dura, K2DCD, Manager, ARRL Emergency Preparedness & Response*

Your Place in the ARRL Field Organization

Where do you fit in?

Harold Kramer, WJ1B

SMs, SECs, DECs, AECs, ECs, PIOs. You may have heard these abbreviations at Emergency Communications and Public Service events. But what do they mean? They are the initials of the volunteer leadership positions in the ARRL Field Organization. The ARRL Field Organization is comprised of almost 9000 volunteer officials. Who are these folks and what exactly do they do for Amateur Radio? Quite a bit, as it turns out.

These volunteers are Official Emergency Stations (OES), Technical Specialists (TS), Public Information Officers (PIO), Section Traffic Managers (STM), Official Observers (OO), Local Government Liaisons (LGL) and others. Those in Emergency Communications volunteer leadership positions are also part of the Field Organization.

The ARRL Field Organization Emergency Communications response is structured around the Amateur Radio Emergency Service (ARES).[1] ARES is an ARRL sponsored program that began in 1935. In fact, as codified in the FCC Rules, EmComm is one of the fundamental reasons for our existence:

> §97.1(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

Local radio amateurs organize and support Emergency Communications through their local ARES organization. ARES organizations consist of licensed operators who have volunteered their knowledge, expertise and personal equipment for pubic service and emergency communications duties. You do not need to be an ARRL member to join ARES. Every Amateur Radio operator, regardless of license class, is eligible for membership in an ARES unit.

ARRL Sections and ARES

ARES is a hierarchical organization structured around an ARRL section. ARES groups can also be affiliated with a served agency, an ARRL affiliated club or other organized groups. A served agency can be a non-profit or non-governmental organization (NGO) that has a formal working agreement with the Amateur Radio operators in the area for communications assistance. These detailed agreements define Amateur Radio's role in the agency's emergency response.

Some examples of served agencies include The American Red Cross, The Salvation Army and ARMY MARS. The ARRL has formal Memoranda of Understanding (MOUs) at the national level with many of these organizations. Today, many ARES groups assist first responders directly. Many are located within a regional EOC (Emergency Operations Center) with amateurs working alongside EmComm professionals.

How to Volunteer

Interested in joining ARES or in another volunteer position? Contact your Section Manager (a list appears on page 16 of each issue).

Interested in running for Section Manager? Terms end on a rotating basis. The most recent Section Manager Election Notice appears on page 71 of the August 2009 issue.

On the ARRLWeb: For more on the ARRL Field Organization, see **www.arrl.org/FandES/field/org**.

The ARRL Section Manager appoints amateurs to local ARES leadership positions. What is a Section Manager (SM)? The ARRL has established a formal structure for Field Leadership that divides the USA and its territories into 71 geographic sections. Most sections cover a single state, but some large states, such as California and Florida, have multiple sections. Section Managers are elected every two years by the ARRL members in their section. SMs are responsible for all Field Organization matters in their ARRL section including, among other duties, oversight of emergency and public service communications, volunteer supervision and appointments, government and public relations, and liaison with ARRL affiliated clubs. If you would like to get involved with Amateur Radio Emergency Communications, contact your SM.

Section Emergency Coordinators (SEC) and District Emergency Coordinators (DEC)

Because of the SM's wide span of responsibility, in most sections the SM appoints a Section Emergency Coordinator (SEC) to manage Emergency Communications in the section. Today, the ARRL has 63 working SECs. The reason that we do not have 71 is that some SEC positions are currently vacant and, in some smaller sections, the SM assumes both roles. The SEC's job is to advise the SM on all section emergency policy and planning, including creating a section emergency communications plan, encouraging amateurs to establish a local emergency communications organizations, working with the Section Traffic Manager on emergency and traffic nets in the section, and recommending, monitoring and evaluating candidates for ARES Leadership positions.

SECs are responsible for an entire section. In the larger sections, they in turn usually

[1]Amateur Radio Emergency Service and ARES are registered trademarks of The American Radio Relay League, Inc.

appoint District Emergency Coordinators (DEC) to cover a smaller geographic area or districts. The ARRL Field Organization has 442 DECs as of this writing. Districts may be within a governmental planning area, like a FEMA district, or they may be aligned with repeater coverage or other geographical boundaries.

Emergency Coordinators (EC) and Assistant Emergency Coordinators (AEC)

The next rung down on the ARES leadership ladder within each section is the Emergency Coordinator or EC. ECs are usually also appointed by the SEC. There are currently over 2200 volunteer ECs in the ARRL Field Organization. An EC is usually responsible for a specific county, city or other geographic area. ECs can also be assigned to specific areas of responsibility such as training or they can be assigned to emergency operations districts within a given section. ARES Leadership also appoints Assistant Emergency Coordinators or AECs. These leadership appointments ordinarily slice geographic areas even finer but AECs may be assigned any responsibilities that ARES Leadership requires.

SIDNEY KO, KØSID

Ham radio-ARC cooperation: **The Emergency Communication Services Amateur Radio Club (WB2QBP) and the American Red Cross in Greater New York field communications group teamed up during Field Day 2009 at Eatons Neck, New York. Field Day is the largest emergency preparedness exercise in the world.**

What You'll Do as an ARES Volunteer

ARES units activate before, during and after an emergency. ARES groups also participate in organizational meetings and drills such as the ARRL Simulated Emergency Test. They operate during the year to keep their operating skills sharp and their equipment and networks in optimum condition. Traditionally, ARES handled all emergency messages, including those among government emergency management officials. In today's EmComm world, however, amateurs are called upon to handle many different types of communications activities including using the newer digital modes and digital networks, both RF and Internet based.

Continuing Ed

For those interested in learning more about Amateur Radio Emergency Communications, the ARRL offers both online and CD-ROM-based courses. The basic course is called *Introduction to Amateur Radio Emergency Communications*, Level 1. It is an online course and requires Internet access. It is designed to raise awareness of EmComm issues and provide additional knowledge and tools for any emergency communications volunteer. Every student enrolled in the course is assigned a mentor/instructor to review their student activities and guide them through the course. This course takes approximately 25 hours to complete over an 8 week period, and the cost is $50 if you an ARRL member and $85 if you are not. In many areas, this course is offered in the field by various EmComm organizations.

Until a few months ago, we offered two additional emergency communications courses, Emergency Communications Level 2 and Level 3. These are now being extensively revised and will be combined into a single online course tentatively called Public Service and Emergency Communications Management for Radio Amateurs. This course should be available late in 2009.

The ARRL also offers an overview course on CD called *ARRL Digital Technology for Emergency Communications*, written by Steve Ford, WB8IMY. This is not an online course but it does require a computer and a Web browser. This course will acquaint you with the newest digital modes and methods that Amateur Radio operators are using for Emergency Communications.

FEMA, the Federal Emergency Management Agency, offers many online, distance learning courses about Emergency Communications. See **training.fema.gov/IS/**. These courses are free and open to the public. Many ARES units, NGOs, governmental agencies, served agencies and other Amateur Radio communications organizations are now requiring these courses as part of their volunteer training.

Another new CD based course that recently debuted is called *PR-101*. This course was developed by the ARRL Public Relations Committee. It covers Public Relations topics including basic news releases, media relations, Web sites and audio and video production. It provides volunteer Public Information Officers (PIOs) with the basic skills that they need. Although it was specifically created for PIOs, anyone can take this course. It costs $19.95. More information is at **www.arrl.org/shop/?item=0133**.

The real strength of ARES and other Amateur Radio Emergency Communications activities, such as RACES and the NTS, are radio amateurs who are well trained, well organized and well prepared to act when we are needed most.

Harold Kramer, WJ1B, is ARRL Chief Operating Officer and a former Emergency Coordinator for the town of Cheshire, Connecticut. He can be reached at **hkramer@arrl.org**.

Universal Ham Radio Text Messaging Initiative

Texting any ham, anywhere, anytime, using any device by call sign.

Bob Bruninga, WB4APR

This article introduces a broad new Amateur Radio initiative to find ways to seamlessly connect many of the dozens of existing Amateur Radio text messaging capabilities together. The goal is to permit any ham radio operator anywhere at anytime using any text messaging device to text message any other ham radio operator's text capable device, anywhere using only call signs.

We are not just hams with single focus interests; we are communicators with experience, resources, intuition and initiative to help establish communications anywhere at any time. Although we have our own frequencies and radios, our diversity of frequencies is not just our best asset, it is also a curse. With thousands of frequencies available, how can we find each other when needed?

After 9/11 and Katrina it was clear that Amateur Radio needs immediate responsive communications to simply locate and establish initial communications. Although the Automatic Position Reporting System (APRS) provides an excellent tool for in-the-blind mutual exchange of location status and frequency information, it is only a small subset of the many other systems in Amateur Radio. What is needed to allow contact anywhere, anytime is a local and global text-messaging-by-call-sign capability that makes it possible to connect people independent of frequency and system. Fortunately, APRS provides this capability on a single local/national APRS calling frequency; anytime, anywhere. We just need to link this system to all other ham radio texting systems, not just APRS, to make this an all ham radio system.

A previous article summarized all of the capabilities of specialized mobile and handheld APRS radios.[1] This article shows how mobile and handheld text messaging, at least for the purpose of initial local/global contact, can be extended beyond just ham radios to all manner of personal electronic systems, cell phones, iPods, BlackBerrys, Wi-Fi, palmtops, laptops and more. Surely, every ham radio operator can find at least one of the following techniques, devices or systems useful.

Figure 1 — This image is just a sample of some of the text messaging systems used by Amateur Radio operators to communicate. This Universal Text Messaging Initiative hopes to seamlessly integrate and cross connect these systems so that any ham can send a message to any other ham anytime, anywhere using any device on any network by call sign alone.

ARRL Call Sign E-mail Registration

Fortunately, the ARRL and some other ham radio organizations have greatly simplified the end-to-end connectivity of ham radio operators by providing e-mail call sign registration services. These services allow members to associate an e-mail address with their call sign so anyone who knows their call sign can e-mail them. Combining these services with the global APRS network is a big step in the direction of universal end-to-end text-messaging using some of the radios and existing systems as detailed below.

Organic APRS Messaging

First, of course, are all the APRS clients and radios. As discussed in the previous article, APRS integrated radios are designed specifically to send and receive messages on their front panel as shown in Figure 1. On the TH-D7 handheld, (in use since 1998), a text message is sent by pressing the MSG button, selecting INPUT on the MSG menu, selecting an existing call or entering the call sign of any APRS ham radio operator anywhere. Your message will be delivered via the local/global APRS system in real time.

[1]Notes appear on page 74.

D-STAR users can also inject messages into APRS via *D-RATS* software and the DPRS interface.[2,3]

Text Messaging Displays with Any Radio

But it is not just APRS radios that can be used for text messaging. Many new devices can add APRS messaging displays to any mobile radio. The HAMHUD device is an add-on heads-up display that can be used with a number of Terminal Node Controllers (TNC) or transceivers. The Byonics TinyTracker-4 and Argent Open-Tracker-2 now have two-way message displays that bring plug-and-play APRS functionality, including text-messaging, to any radio. In addition, the Kenwood RC-D710 APRS display head (see Figure 2) can be purchased separately from its radio and can be plugged into the external audio interfaces of any other radio as well. All of the APRS hardware and functionality is in the display head itself

DTMF and Paging Radio Messaging

In addition to the APRS radios and add-on hardware, there are other radios with text messaging capability. The Yaesu FT-51R family and TH-78A handheld transceivers (from the 1990s) have built-in DTMF text messaging and paging using the keypad and radio display.

A simple gateway program would convert paging text messages and local information to and from the global APRS network to these radios. For convenience, the signaling method of these radios is being integrated into the APRStt (TouchTone®) system, which is a gateway between any Dual-tone Multifrequency (DTMF) radio and APRS.[4]

With an APRStt gateway nearby, data or messages are entered on the keypad of any radio and any data and messages are returned to the user by voice synthesis. Even the ham that shows up with an old IC-2AT handheld transceiver should be able to participate in many APRS supported events or receive his text messages just like playing back voice messages on his telephone.

Some newer radios use the Digital Code Squelch (DCS) codes to send and receive text messages. Again, gateway software can be written to integrate these radios into the global APRS network and from there communicate with not only themselves but any other APRS radio, DTMF radio, cell phone, BlackBerry, etc. Known radios with the DCS-Text Message capability are the VX-8R, VX-3R and FTM-10R/SR.

Messaging on Palm-Pocket and Laptop Devices

Hams often carry a variety of wireless devices compatible with the Wireless Fidelity (Wi-Fi) network. These stations may also maintain Amateur Radio connectivity and text messaging via a variety of application programs. For example, the application *APRSXO* gives APRS message capability to the One-Laptop-per-Child XO laptop. This interface not only provides APRS text messaging but also an approximate geographic position to the APRS system as well. See Jack Zielke's, KG4GJY, Web page for installation and operation.[5]

APRS E-mail Messaging to Anywhere

In addition to normal APRS text messaging, any APRS or compatible station can send brief e-mail messages to any cell phone or Internet user. Just address your APRS message to one of the e-mail engines below and make the first word of the message be the recipient's e-mail address followed by the message. This is automatically diverted from the APRS Internet System (APRS-IS) by the e-mail engine and sent via conventional e-mail. The APRS sender receives an ack for the message.

WU2Z E-mail Engine	The original APRS E-mail system. Send to EMAIL
AE5PL E-mail Engine	Send to "AE5PL-EM."
APRSlink on WLNK-1 using the "SP" command	Send to "WLNK-1"

Internet to APRS Messaging

Although sending e-mail from any APRS client to any other ham radio operator anywhere in the world is easy, there are different issues when sending general e-mail from the Internet back to APRS because of concerns over security and FCC rules particularly with respect to authenticating the sender.[6] Here are some existing systems:

findU.com Messaging

The original APRS online global information system called *findU.com* written by Steve Dimse, K4HG, now supports Web based messaging from a browser.[7]

OpenAPRS.net

Another global APRS online resource written by Greg Carter, NV6G, has full messaging support.[8] Just sign up for a free account. *OpenAPRS* includes a "Friends List" that will display when *OpenAPRS* has detected one of your friends sending APRS messages to let you know when they are online.

Winlink E-mail

An APRS interface called *APRSlink* was designed by Lee Inman, KØQED, that allows any APRS radio to be used to send and receive e-mail via Winlink.[9] This centralized global interface requires no user software or special interface, it is simply a technique that any APRS radio operator can use to log in and send/receive e-mail from the front panel of his radio.

E-mail Messaging from Cell Phones

The three Internet to APRS systems mentioned above allow text messaging from any computer Web browser or APRS radio to APRS message. But the final key element in the Universal Text Messaging Initiative for ham radio is the ability to originate e-mail from any system and have it arrive on the front panel of any APRS radio or other Amateur Radio text messaging or chat system.

This is a harder nut to crack, since it has to be fully functional for ham radio related e-mail and yet be secure from all the spam and other malicious trash that can arrive in someone's e-mail box. The objective of this article is to pave the way for the future of these

Figure 2 — The Kenwood RC-D710 APRS display head can be purchased separately from the TM-D710 radio and can be plugged into the external audio interfaces of any radio. All of the APRS hardware and functionality is in the display head itself. Here it is shown connected to an Alinco handheld transceiver to provide front panel APRS, text-messaging capabilities and e-mail to the operator.

systems so that we can send and receive text messages using only call sign addressing no matter what the device and no matter where we are. This includes cell phones, palm-tops, Blackberrys, pagers and any other portable device. A few systems are in development.

APRS Messages to Your Cell Phone

Frank Rossi, N3FLR, receives all his APRS messages via his cell phone (or pager). First he set up the RSS capability at *findU.com* to watch for any APRS messages to him.[10] Then he set up YahooAlert for a pager and used his phone's text e-mail address as the destination for these messages.[11] When *findU* sees a message to him on APRS it generates an RSS feed that YahooAlerts catches and then forwards the RSS message as text to his cell phone.

APRS Messages and the iPhone

Greg, NV6G, has announced a beta-application for the iPhone and David Ponevac, AB3Y, has an application that not only sends and receives APRS messages, but also provides position reporting as well.[12]

APRS Messaging on Windows Mobile 5 and 6

Lynn Deffenbaugh, KJ4ERJ, author of *APRSISCE* has an APRS-IS client (beta) running for Windows Mobile 5 and 6 specifically tested on the AT&T Tilt and maybe the SmartPhone (Motorola Q).[13] See his mobile KJ4ERJ-12 on *findU.com, APRS.FI* or send him a message via APRS.

Messaging via Satellite

There have been many Amateur Satellites capable of relaying text messaging. Since most of these satellites are accessible from nearly anywhere on earth a few times a day and there are Internet gateway ground stations listening around the world, these satellites are excellent ways to get a message out of a wilderness area.[14,15] The most viable such satellite at this time is via the ISS when it is in packet mode where the live downlink messages are visible on the Internet.[15] There is even a Satellite Simulated Emergency Test called SSET to see how many amateurs can get an APRS e-mail delivered via satellite using only their APRS handheld transceiver or mobile rig.[16]

Other APRS Tactical Situational Awareness

Using the above methods lets us send and receive not just text messages but all manner of local and global information to the mobile/portable ham radio operator no matter where he is. Here are some of those additional items useful to the traveling operator:

- Local situational awareness (the global APRS system — who is nearby.)
- Local/Global Message capability by call sign (this article)
- Display of locally recommended voice frequency for travelers.[17]
- Ability to check-in, receive messages, e-mail and do basic functions from any DTMF radio using APRStt or other text paging radios (FT-51R and TH-78A).[18]

Travelers Voice Repeater Frequencies

One of the most useful data available to the APRS traveler is the mobile radio front panel display of the locally recommended travelers' voice repeater frequency in the area. This Local Information Frequency Initiative displays recommended voice repeaters and other RF assets of value to the traveler such as the local *IRLP, EchoLink* and *Winlink* frequencies, or net times or meetings in progress (see Figure 3).

The *IRLP* and *EchoLink* nodes identify not only their node numbers and call signs, but also their tone, range and other information. By pressing the button to see the POSIT screen, you would see the distance and direction to the node. The APRS objective here has always been human-to-human local real-time information and communications to the mobile operator (not just vehicle tracking).

GPS Trackers are Two-Way Too

Even the early transmit-only APRS trackers should be configured to facilitate two-way human communications. The text portion of any tracker beacon should contain the voice communication channel that the operator is monitoring. This way, all who see the tracker position packet can also see his frequency and establish two-way contact. Often this can simply be the APRS Voice Alert frequency, which is automatically included in every APRS radio.[19]

Handheld Event Data Entry via Messaging

Text messaging on radios, cell phones and laptops can not only convey messages and frequencies, but can also provide excellent data entry in the field for Amateur Radio at special events.[20] A few simple text messaging or DTMF paging key strokes can report numbers, scores, times, IDs and all manner of data at events supported by ham radio. These error-free transmissions are more efficient than voice in most cases. For example, scores are entered on the keypads of handheld transceivers and these messages appear at net control on the display head of a TM-D700 radio. One of the operators at net control can copy this error-free information directly from the display or automatically to custom software for the event.

Figure 3 — For travelers, APRS radios display the locally recommended voice frequency object that includes the tone, range and net times as shown here on a TH-D7.

Conclusion

APRS has had handheld text messaging now for over 10 years. Some other ham radios have had DTMF text message for over 15 years. It is time we tie all this together into a Universal Ham Radio Text Messaging System. The local and global APRS backbone exists. All we need are a few authors to write the interfaces and gateways to the variety of devices. The only address needed for contact and text messaging is simply a call sign. For more information see **www.aprs.org/aprs-messaging.html**.

Notes

[1]B. Bruninga, "Maximizing the Mobile Motorist Mission," *QST*, Sep 2008, pp 30-33.
[2]**www.d-rats.com/wiki/FrontPage** — Messaging on D-STAR to APRS
[3]**www.aprs-is.net/DPRSInterface.aspx** — Cross connects DPRS data in the APRS-IS
[4]**www.aprs.org/aprstt.html** — The APRS TouchTone System
[5]**http://zielkeassociates.com/~jack/aprs-xo/**
[6]**www.aprs.org/messages/message-issues.txt** — Issues for Internet to APRS messaging
[7]**www.findu.com/cgi-bin/entermsg.cgi?** — Provides a .CGI link for message entry
[8]**www.openaprs.net** — An online message capability via the OpenAPRS.net system
[9]**www.winlink.org/aprslink** — Provides a *Winlink* APRS packet radio EMAIL capability
[10]**http://rss.findu.com** — An RSS output capability on **Findu.com**
[11]**http://alerts.yahoo.com** — An e-mail alert system on YAHOO!
[12]**http://ibcnu.us** — The iPhone APRS application by Greg, NV6G
[13]**http://groups.yahoo.com/group/aprsisce/join** — APRS on the AT&T Tilt phone.
[14]**www.aprs.org/astars.html** — APRS Satellites
[15]**www.ariss.net** — ISS APRS downlink
[16]**www.aprs.org/sset.html** — Satellite Simulated Emergency Test (e-mail from your radio)
[17]**www.aprs.org/localinfo.html** — Shows local repeater information on the traveler's APRS radio
[18]**www.aprs.org/FT51-TH78.html** — Using the FT-51R and TH-78A for text messaging
[19]**www.aprs.org/VoiceAlert3.html** — APRS Voice Alert back-channel for instant contact
[20]**www.aprs.org/aprsevent.html** — Using APRS messaging for data reporting at scout and other events

All photos courtesy of Bob Bruninga, WB4APR.

Bob Bruninga, WB4APR, holds an Amateur Extra class license and is a Life Member of the ARRL. Bob is considered the "Father of APRS," the automatic position reporting system. He is the director of the US Naval Academy Satellite Lab. Bob can be reached at 115 Old Farm Ct, Glen Burnie, MD 21060 or at **bruninga@usna.edu**. QST

2009 Simulated Emergency Test

The Annual ARRL SET is October 3-4. Are you ready?

Steve Ewald, WV1X

It's time to get ready for the 2009 ARRL Simulated Emergency Test! ARRL Field Organization leaders are planning an event that will actively involve members of the Amateur Radio Emergency Service® (ARES®), the Radio Amateur Civil Emergency Service (RACES), the ARRL National Traffic System (NTS), and many other related groups that prepare for and respond to emergencies. Public service agencies and organizations in your community, ARRL Section or state will also be invited to participate. You, too, are invited to be a part of this ARRL-sponsored nationwide exercise on October 3-4, 2009, or whenever it is held in your area.

NORM VANSICKLE, KC5KLL

One of the goals of SET is to provide a public demonstration — to served agencies and the public — of the value of Amateur Radio. The DeSoto County RACES/ARES group in Mississippi took part in a successful open house with the Nesbit Fire Department to show how Emergency Management deploys to provide public service and communications support. Left to right: Tommie Rodgers, KE5NBD; Bennett Anderson, KE5MXY; Ken Johnson, KBØZTX; Jack Thompson, N5UOV, and Layne Cooper.

Become a Part of the Training

Although October 3-4 is the focal point weekend, ARRL Sections, ARES teams and nets may conduct their exercises anytime — and especially during September through December. If you don't know who to contact, please touch base with your ARRL Section Manager and/or Section Emergency Coordinator or Section Traffic Manager for assistance. See page 16 of *QST* for Section Manager contact information or consult the ARRLWeb for the referrals to your Section Leadership officials. The place to start is **www.arrl.org/sections/**. From there, you'll find links to ARRL section pages with appropriate contact information.

There can be role for you no matter what your level of experience. After all, it is a training opportunity to try out something new under simulated emergency conditions, learn or practice useful skills in traffic handling, net operation and observe emergency communications protocols and management.

Scenarios Establish the Scene

ARRL Field Organization officials in your area and Section are planning the simulated emergency scenarios that will be used during the SET event. These scenarios are designed to help you gain valuable operating experience or to practice what you have learned previously or to put your Amateur Radio Emergency Communications Course training into action.

In any emergency (real or simulated), there are often a number of public service or public safety agencies and organizations that are also involved in the response. ARRL Section Leaders and local or district-level leaders are encouraged to work closely with these served agencies, and the SET is a great chance to demonstrate the capabilities of Amateur Radio in the community and beyond. For more information on whom the ARRL maintains a National Memoranda of Understwnding with, check this page: **www.arrl.org/FandES/field/mou/**.

National Preparedness Month

National Preparedness Month is an annual nationwide effort held each September to encourage Americans to take simple steps to prepare for emergencies in their homes, businesses and schools. Once again this year, ARRL is a coalition member. National Preparedness Month 2009 is sponsored by the US Department of Homeland Security. The goal of the month is to increase public awareness about the importance of preparing for emergencies and to encourage individuals to take action. Throughout September and the months surrounding it, Homeland Security will work together with a wide variety of organizations, including local, state and federal government agencies and the private sector, to highlight the importance of family and business emergency preparedness as well as to promote individual involvement through events and activities across the nation. More information can be found at **www.ready.gov.**

You are encouraged to consider this year's ARRL Simulated Emergency Test and all preparations as well as post exercise evaluations as a demonstration of your readiness and Amateur Radio's readiness. Be an active participant in SET, and join others nationwide in National Preparedness Month.

Additional background on the annual SET is presented in the article, *2008 Simulated Emergency Test Results*. See July 2009 *QST*, pp 72-75. Also, guidelines and specific SET reporting forms for the ARRL Section and Field Leaders will be posted at **www.arrl.org/FandES/field/forms**. Please report your SET activities to your Section Leaders and to HQ. QST

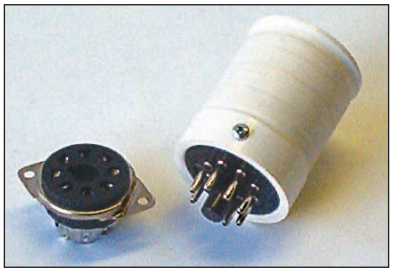
Update to 2008 SET Results

Here's an update to the 2008 SET Results article [Jul 2009, pp 72-25]. An ARES activity report from Wood County, West Virginia, should have appeared in the results. Ken Harris, WA8LLM, reported 264 points in the 2008 Wood County Simulated Emergency Test.

New Products

PLUG IN COIL FORMS FROM NATIONAL RF

◊ National RF offers new plug-in coil forms machined of high-impact plastic and mounted to a standard 8 pin octal plug. The form measures just slightly over 2 inches in height with a coil diameter of 1.5 inches. An area of 1.3 inches is machined for the actual coil, or coils, to be wound. In addition, a groove machined in at the top provides a convenient finger grip for inserting or removing the coil



from a socket. Matching octal sockets are available as well. These plug-in coils are not intended as restoration forms for older equipment. They are intended for the experimenter who needs to insert different coils to change the frequency of operation in home-built receivers or transmitters. Several packages are available. For pricing and ordering information, visit **www.nationalrf.com**.

CONNECTOR INSTALLATION PREP TOOL FOR LMR-400 COAX

◊ The CST-400 (part number 3192-004) All-In-One Combination Prep Tool is designed for use with the LMR-400 line of low loss coaxial cables including standard LMR and DB, FR, PVC, LLPL and -75 varieties. It can also be used for the first strip step on LMR-400-Ultraflex. The tool allows preparation of LMR-400 cables for either crimp or clamp connector attachment and is suitable for use with virtually all LMR-400 connectors. It provides a consistently sharp cut of the cable dielectric and includes a built-in deburring tool. Price: $98. See your favorite cable and connector dealer or visit **www.timesmicrowave.com**.

HAM RADIO REFERENCE FOR PALM OS PDA

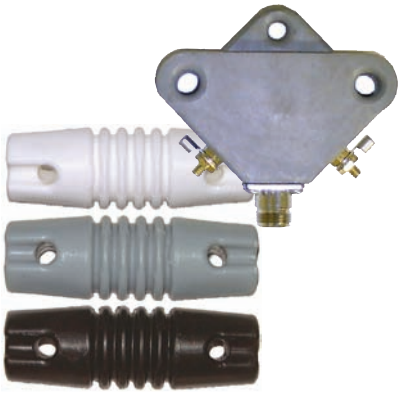
◊ Ham Radio Reference 2009 (HRR Ver 3.4) is a Palm OS application that includes a variety of helpful resources. Menu One includes calculations for dipoles, ¼ λ verticals, slopers, loop, two element quad, or radial lengths, as well as dish antennas (aperture, gain, bandwidth). Menu Two includes operating references such as the ARRL contest schedule, CW abbreviations, phonetic alphabet, Q signals and RST reports. Menu Three includes basic electronics calculations — coils, capacitors, decibels, Ohm's Law and so on. Requires Palm OS 3.0 or later and the Mathlib.prc math library (available for free download). For more information, visit **www.qsl.net/kb7avt/software.htm**.

MFJ HIGH CURRENT SWITCHING POWER SUPPLY

◊ The MFJ-4275MV is rated for 75 A maximum and 70 A continuous, with load regulation better than 1% and ripple <12 mV peak-to-peak at rated load. Voltage is adjustable from 4 to 16 V dc with a front panel control. The power supply includes protection from short circuits, overload and high temperature. It has backlit voltage and current meters, as well as binding posts, Anderson PowerPole connectors and a cigarette lighter socket for power connections. The MFJ-4275MV measures 5.5 × 9.75 × 9.5 inches (HWD) and weighs 10.5 pounds. Price: $399.95. To order, or for your nearest dealer, call 800-647-1800 or see **www.mfjenterprises.com**.

ANTENNA INSULATORS FROM JETSTREAM

◊ The Jetstream JTNCE1G center insulator for dipoles uses a type N connector and is rated for 2000 W. It is made of a gray UV-resistant plastic and has screw terminals for the antenna wire connections. "Super Dog" end insulators for dipoles and other wire antennas are available in three colors: black, white and gray. Each end insulator is three inches long. Model numbers are JTWDOG (white), JTBDOG (black) and JTGDOG (gray). Price: JTNCE1G center insulator, $15.95. End insulators, $1. For more information, see your favorite dealer or visit **www.jetstream-usa.com**.



ENHANCED PACTOR MODEM FROM SCS

◊ German manufacturer Special Communications Systems (SCS) and North American distributor Farallon Electronics have released an enhanced PTC-IInet HF Pactor/VHF packet radio modem. New firmware for the PTC-IInet enables the unit to integrate into 10/100/1000 baseT Ethernet networks. The PTC-IInet is fully compatible with *Airmail2000*, allowing network operation with *Airmail* and similar applications as if you were linked to the modem directly with a USB or serial cable. A user can operate from anywhere in a building with a laptop computer and WiFi network or remotely by linking across the Internet. Price: $1495 with Pactor III installed. For more information, visit **www.farallon.us**.

QSL CARD ALBUMS FROM K4AVU

◊ Paul Marsha, K4AVU, is offering QSL card albums that will display up to 200 QSL cards. The basic album ($33 including shipping) includes 25 inserts that hold four cards each. Additional inserts are available and the album capacity is 1½ inches. For more information or to order, contact **k4avu@windstream.net**.

This Month in Contesting

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

SLOW SPEED CW

"What Hath God Wrought?" was the first message sent by Morse code on May 24, 1844, by telegraph between Washington DC and Baltimore. Since then, it saw its rise as cutting-edge technology throughout the early 20th century, became a staple in radio communications through the 1960s, and was ultimately replaced for official use in the late 20th century, leaving amateurs as the primary user and guardian of this mode.

If one were to listen to the nay-sayers, CW is an anachronism at best, and dead at worst. The Radiosport community seems to think otherwise; participation in the ARRL DX CW Contest has risen from 1745 entries in 1995 to over 3100 in 2009, an all-time high, achieved during the bottom of the sunspot cycle. The CW portion of the bands remains active during the week with plenty of DX to work and people to ragchew with. Why? One simple reason: CW is fun!

If you have been participating in phone contests for a while and are looking for a new challenge, CW contesting may be what you're looking for. But how does one new to CW or the owner of a rusty fist get started? One of the best ways is the slow speed Sprint, offered by the Northern California Contest Club. While the name sounds like an oxymoron, the *SNS (Slow-speed NCCC Sprint)* is a weekly 15-minute practice session held every Thursday evening beginning at 10 PM local time on the East Coast (7 PM West Coast) specifically to help amateurs better their CW copying skills in a contest-like environment. The SNS is held as a preliminary event to their regular Thursday NCCC Sprints.

The rules are simple: Work as many stations as possible in 15 minutes. As with other Sprint formats, you are not allowed to sit on one frequency and call CQ; you must change frequencies after no more than two QSOs. To help keep things moving, you are allowed to work a station already in your log, provided you make at least one QSO with a different station first. Remember, this is just a practice session; no scores are kept, no awards are given. Many contest veterans participate in this event specifically to give out QSOs to newcomers.

Activity centers around 14,040, 7040 and 3540 kHz (±3 kHz). The rule of thumb is to spend 5 minutes on each band, starting on 20 meters and working your way to 40 and 80 meters. It is recommended that sending speeds are kept below 23 WPM, but many send even slower than that. Remember: The primary objective is to work on your CW, not win anything, so send at a speed you are comfortable with. Don't be afraid you are sending too slowly; there's no such thing in this on-air practice.

If you enjoy the slow-speed practice session, you are more than welcome to stick around and get in on the main NCCC Sprint ("NS"), which is held for 30 minutes beginning at 10:30 local time on the East Coast (7:30 local time on the West Coast). The NS will have stations sending CW at faster speeds, but the official rules encourage all participants to listen for slower CW. If there is a major contest coming up on a weekend, the NS will often mimic that contest's exchange, to help you get ready for the big weekend! These two events are an excellent way to dip your toe into the waters of CW contesting. For complete information and rules on the NS and the SNS, visit the Northern California Contest Club's Web site at **www.ncccsprint.com** and look for the link for their Sprint.

Other Avenues

There are plenty of other contests you can enter where slower CW is welcomed. State QSO parties are generally a little more laid back than a major DX contest. Some pro-CW organizations such as the Straight Key Century Club and FISTS sponsor their own events. You don't need to be a member to participate in their events, and as they are concerned with the preservation of CW, they will be happy to work you at any speed. Many QRP (low power) clubs sponsor contests, such as the QRP-ARCI, the Flying Pigs QRP Club, the Northern California QRP Club and several others. While many QRP events require you to transmit with 5 W or less, some do have a 100 W category. There is a lot of moderate-speed CW to be found in these events as well. For all of these options, check the ARRL Contest Corral for a list of monthly contests that occur on CW and a link to the official rules on the sponsor's Web site.

Slow CW in Major Contests

Working slow CW in a major contest is a bit like riding a moped on the freeway; you need to be careful or you'll get run over. Still, there are plenty of things you can do to work stations during a major CW contest. Generally speaking, slower stations hang out in the upper portion of the CW bands, above .050 for any given band (7.050, 21.050, etc). Listen for slower CQs there, or call CQ yourself at a slower speed. Another good technique is to listen to a station work several callers in a row, so you can get their information before you call them. This works especially well in contests where the exchange is the same for every QSO.

Another trick I've heard on the air before is to simply send QRS, the Q-signal for "send slower," to the station you want to work. This generally works best if the station you want to work is calling CQ with few takers. And lastly, the golden rule of CW is to never send faster than you are able to copy.

CW Contesting Without a Radio?

Improving your CW skills in a competitive environment doesn't necessarily have to take place over the air. The CW trainer *RUFZ* is a free software program for your PC that sends 50 call signs in CW, one at a time. If you copy a call correctly, the program increases the sending speed by 1 or 2 WPM. If you make an error, the speed is lowered by 1 or 2 WPM. People routinely post their scores on the RUFZ Web site, and that has become a competition itself. RUFZ has proven so popular and effective at improving CW skills that it is now a significant part of the High-Speed Telegraphy (HST) competitions around the world. Just think: You can work on your code-copying skills any time you want, post your scores, and check each week to see how you are doing. For more information on this program, visit **www.rufzxp.net**.

CW has been a fixture in radio for a hundred years. If your CW needs a bit of improvement, consider some of the options we've discussed this month; you just might find CW contesting every bit as enjoyable as Phone or RTTY contesting, and open the door to new avenues of fun.

In the September/October "Contesting 101"

This Month in the NCJ's Contesting 101: ***Station Integration.*** Kirk Pickering, K4RO, shows you how to integrate your shack's PC with your rig to maximize contest efforts and fun, too. Contesting 101 can be found in the *National Contest Journal*, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

Operating Tip of the Month

*"**Finger Foods:** We all get hungry during those serious contest efforts. Keep your foods light and manageable; crackers, apple slices, or small sandwiches are easy to handle, take less time to chew and swallow, and don't clutter up the operating desk with dishes. Consider a straw for your beverages, too."*

CONTEST CORRAL

in association with the *National Contest Journal*

SEPTEMBER 2009

Start and Finish	HF	VHF+	Contest Title	SSB	CW	Dig	Exchange	Sponsor's Web Site
Sep 5, 0000Z - Sep 6, 2400Z	3.5-28		All Asia Contest	✘			RS and age ("00" for YL)	www.jarl.or.jp/English
Sep 5, 0000Z - Sep 5, 2400Z	3.5-28		Russian Radio RTTY WW			✘	RST and oblast or WAZ zone	www.radio.ru/cq/contest/rule-results/index2.shtml
Sep 5, 1100Z - Sep 5, 1700Z	28		DARC 10-Meter Digital "Corona"			✘	RST and serial	www.darc.de/referate/ukw-funksport
Sep 5, 1200Z - Sep 6, 0400Z	1.8-28	50+	Colorado QSO Party	✘	✘	✘	Call sign, name, and county or S/P/C	www.ppraa.org/coqp
Sep 5, 1300Z - Sep 6, 1300Z	1.8-28		IARU Region I Field Day	✘			RS and serial	See IARU Society Web pages
Sep 6, 1800Z - Sep 7, 0300Z	1.8-28	50+	Tennessee QSO Party	✘	✘	✘	RS(T) and county or S/P/C	www.tnqp.org
Sep 7, 2300Z - Sep 8, 0300Z	1.8-28	50	Labor Day Sprint		✘		RST, S/P/C, MI QRP nr or power	www.qsl.net/miqrpclub
Sep 11, 8 PM - Sep 12, 2 AM	3.5		070 Club KA3X Memorial Sprint			✘	RST and S/P/C	www.podxs070.com
Sep 12, 0000Z - Sep 13, 2400Z	3.5-28		WAE DX Contest	✘			RS and serial	waedc.de
Sep 12, 1400Z - Sep 13, 2400Z	3.5-28	144	Arkansas QSO Party	✘	✘	✘	RS(T), county or S/P or "DX"	www.arkanhams.org
Sep 12, 1600Z - Sep 12, 2400Z	3.5-28	50,144	Ohio State Parks On the Air	✘	✘	✘	"Ohio" or S/P/DX and Park ID	parks.portcars.org
Sep 12, 1800Z - Sep 14, 0300Z		**50+**	**ARRL September VHF QSO Party**	✘	✘	✘	**Grid square**	www.arrl.org/contests
Sep 12, 1800Z - Sep 12, 2400Z	1.8-28		Second-Class Operators Sprint		✘		RST, S/P/C, SOC nr or power	www.qsl.net/soc
Sep 12, 1900Z - Sep 13, 0400Z		50+	QRP ARCI VHF Contest	✘	✘	✘	Grid square	www.qrparci.org
Sep 13, 0000Z - Sep 13, 0400Z	**3.5-14**		**North American Sprint**		✘		**Call signs, serial, name, and state**	www.ncjweb.com
Sep 19, 6 AM - Sep 20, 12 Mid		**10G+**	**ARRL 10 GHz and Up Contest**	✘	✘	✘	**6-char grid locator**	www.arrl.org/contests
Sep 19, 1200Z - Sep 20, 1200Z	3.5-28		Scandinavian Activity Contest		✘		RST and serial	www.sk3bg.se/contest/sacnsc.htm
Sep 19, 1300Z - Sep 20, 2100Z	3.5-28	50+	South Carolina QSO Party	✘	✘	✘	RS(T) and county or S/P/C	w4cae.org
Sep 19, 1600Z - Sep 20, 2400Z	1.8-28	50	Washington State Salmon Run	✘	✘	✘	RS(T) and county or S/P/C	www.wwdxc.org
Sep 19, 1700Z - Sep 19, 2000Z	1.8-28		Feld-Hell Monthly Sprint			✘	RST, S/P/C, Feld-Hell member number	www.feldhellclub.org
Sep 19, 1800Z - Sep 20, 1800Z	1.8-28	50+	QCWA Fall QSO Party	✘	✘	✘	Call sign, year lic'd, name, chptr or S/P/C	www.qcwa.org/qso-party.htm
Sep 20, 0000Z - Sep 20, 0400Z	**3.5-14**		**North American Sprint**	✘			**Call signs, serial, name, and state**	www.ncjweb.com
Sep 20, 1300Z - Sep 21, 0700Z	1.8-28	50,144	Classic Exchange		✘		Name, RS, S/P/C, type of equipment	qsl.asti.com/CX/
Sep 21, 7 PM - Sep 21, 11 PM		144	Fall VHF Sprint	✘	✘	✘	Grid square	www.svhfs.org
Sep 26, 0000Z - Sep 27, 2400Z	3.5-28		CQ WW RTTY Contest			✘	RST, CQ zone and State/VE area (US/VE)	www.cqwwrtty.com
Sep 26, 1200Z - Sep 27, 1200Z	1.8-28		CIS DX Contest		✘	✘	RST and CIS area code or serial	www.cisdx.srars.org/cisdxc.pdf
Sep 26, 1200Z - Sep 27, 1200Z	3.5-28		Scandinavian Activity Contest	✘			RS and serial	www.sk3bg.se/contest/sacnsc.htm
Sep 26, 1400Z - Sep 27, 2000Z	1.8-28	50,144	Texas QSO Party	✘	✘	✘	RS(T), county or S/P/C	www.txqp.net
Sep 27, 1300Z - Sep 28, 0700Z	1.8-28	50,144	Classic Exchange	✘			Name, RS, S/P/C, type of equipment	qsl.asti.com/CX
Sep 29, 7 PM - Sep 29, 11 PM		222	Fall VHF Sprint	✘	✘	✘	Grid square	www.svhfs.org
Sep 29, 0000Z - Sep 29, 0400Z	3.5-28		Fall QRP Homebrewer Sprint		✘		RST, S/P/C, and power	www.njqrp.org

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:*** Arkansas, Colorado, South Carolina, Tennessee, Texas, Washington
2009 is the Year of the State QSO Party!
Visit **www.arrl.org/ysqso** for details!

■ **All-Asia DX Contest, Phone (September 5-6):** Sponsored by JARL, this event focuses your efforts on all Asian countries. Exchange is a signal report and your age; YLs send 00.

■ **IARU Region 1 Field Day (September 5-6):** Help our amateur friends in Europe, the Middle East and Africa celebrate their efforts to operate in the field like we did back in June!

■ **Worked All Europe DX Contest, Phone (September 12-13):** Point those beams to Europe and see how many you can get in the log! This unique event also features "QTC," or the reading back of your log to European stations so they earn extra points.

■ **ARRL VHF QSO Party (September 13-15):** With the sporadic-E season mostly behind us, this event tends to highlight tropospheric propagation. Climb a hill or drive around with a rig, or set up shop at home and work stations on 6 meters and up!

■ **North American Sprint, CW (September 13):** Four hours of CW mayhem! This one is fast-paced and frenetic.

■ **CQ WW RTTY Contest (September 26-27):** The first of the three great DX contests sponsored by *CQ Magazine*. If you've never tried RTTY before, this is a good one to start with. Lots of DX to be had in this event.

SEPTEMBER 2009 QUALIFYING RUNS

♦ W1AW Qualifying Runs are 10 PM EDT Friday, September 4 (0200Z September 5) (10-40 WPM) and 7 PM (2300Z) Wednesday, September 16. The West Coast Qualifying Run will be transmitted on 3581.5, 7047.5, 14,047.5, 18,097.5 and 21,067.5 kHz by station K6KPH at 2 PM PDT (2100Z) Saturday, September 19. Unless otherwise indicated, code speeds are from 10-35 WPM.

2009 ARRL DX Phone Results

The Buzz is Back!

H. Ward Silver, NØAX
nØax@arrl.org

If you go fishing, sooner or later, no matter how many days in a row you've come home with a minnow-sized catch, the waters will provide a bounty. The weekend of March 7 and 8 was one of those unexpected radio bounties!

New US-VE Records for 2009

Category	Call District	Call	New Record	Old Record	Year Set
SO-Assisted	VE	VY2TT (op K6LA)	3,013,644	2,975,535	1996
SO-20	All	KQ2M	1,012,368	933,525	2004
SO-40	9th	WB9Z	123,024	106,677	1991
SO-160	2nd	W2MF	22,692	21,960	1985

New DX Records for 2009

Category	Continent	Call	New Record	Old Record	Year Set
SO-20	EU	CU2A (OH8NC, op)	649,650	567,180	1992
SO-20	AN	R1ANC	39,960	—	—
SO-40	All	KH7XS (K4XS, op)	438,480	250,101	1997
SO-80	EU	CU2X (OH2BH, op)	367,560	208,008	2007
SO-160	EU	F6CTT	62,034	39,516	1993
SO-160	AF	AO8A (EA8AH, op)	50,544	8,100	1997
MM	SA	PJ2T	8,113,770	3,533,928	1997

Who's Out There?

By any standards you care to use, this was a banner year!

DX QSOs with US-VE: 518,421 — up by 27%

US-VE QSOs with DX: 414,323 — up by 40%

Not only were more QSOs reported, but a higher fraction of US-VE QSOs were submitted to the log-checkers: 80% this year compared to 72% in 2008.

US-VE logs: 1491, up by 20%

DX logs: 1177, up by 45%

That's a total of 2568 logs, up by a whopping 25% in a single year!

The 6Y1V Multi-Two team logged 3805 unique US-VE calls on 20 meters, an increase of 28% over last year. Also on 20 meters, the W3LPL Multi-Multi team logged 2446 DX calls and that's a 35% increase!

The Bands Played On

The bands got a shot in the arm from the quiet conditions this year — much better on Saturday (A_P = 1, avg K = 0.3) and about the same on Sunday (A_P = 8, avg K = 2.6) than last year. That helps in two ways; first, the band openings are generally longer and stronger, and second, having a good first day keeps the interest level up for Sunday.

What was actually experienced this season was an ionospheric antipasto of conditions and abilities. Down on 160 and 80 meters, the low-banders took advantage of low D and E-layer absorption to rack up a few records as shown. For the middle frequencies of 40 and 20, propagation was classic F-layer, worldwide skip. Moving up, the propagation changed to very low-angle propagation on 15 meters, such as chordal hops and transequatorial modes. At the top of the HF spectrum, 10 meters took on VHF-like characteristics with sporadic-E (E_s) providing spot openings at southern latitudes. It's not often that one weekend serves up such a smorgasbord for us to sample!

Write-up Notes and Features:

Look to the online extended version of these results (**www.arrl.org/contests/results**) for the following features:

- Regional analysis for every Region and Continent.
- A set of Top Ten call signs since 2002 is available as a downloadable PDF file.
- Changes in QSOs and multipliers as a percentage of the 2002 totals are shown.
- DX categories are being tracked from year to year.
- A new accuracy plot displays score reduction against validated QSOs.
- Soapbox is presented from all electronic logs.

Records

Record scores at the bottom of the cycle? Zounds! Four in North America and six elsewhere. KQ2M claimed two new 20 Meter, Single-Band records for *all* of US-VE in the CW and SSB weekends. Offshore, KH7XS set a thumping new Single-Band, 40 Meter World record! PJ2T now owns the Multi-Multi record for South America, as well. Four new European single-band records were set as CU2A (OH8NC, op) and CU2X (OH2BH, op) cleaned up on 20 and 80 meters. 160 meter records got clobbered by EA8AH from the Canary Islands, and by F6CTT in France.

K6LA set a new Canadian record in Single-Op, Assisted as VY2TT. WB9Z broke his old Single-Band 40 Meter record from 1991 and on 160 meters W2MF broke the Single 160 record from 1985, the oldest

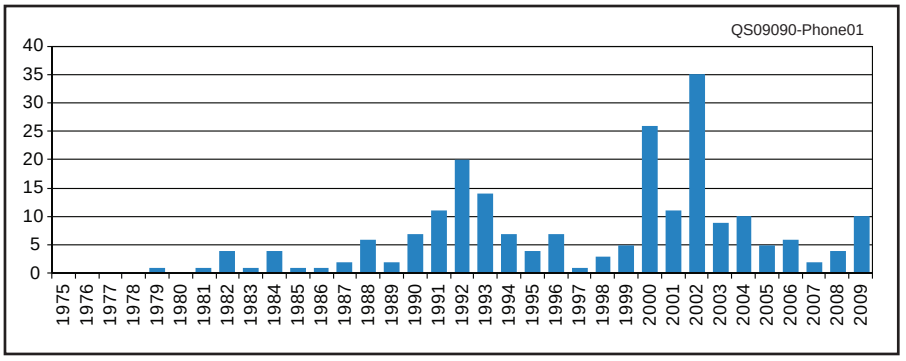


Figure 1 — Records set by year

record broken. Figure 1 shows the variation in record-setting for all existing records.

Caveats

Spotting network connections (aka "packet") are nearly ubiquitous in the contester's shack. In fact, many logging software programs are configured to connect by default. If you receive *any* information from the spotting network about the operation of another contest competitor, you *must* submit your entry in the Single-Operator, Assisted category.

Remote stations are popping up everywhere along with the software and Internet bandwidth to support effective remote operation. Know the rules for remote operating: You must identify properly based on the location from which you transmit, you must be fully licensed to transmit from that location and have full permission from the station owner, and all receiving and transmitting antennas must be located at a single site.

US and VE Overview

There was a roughly 50% increase in the winning scores across the board. In many categories, the two or three leading scores were all greater than the 2008 top score! The Web version of the results shows how the Single-Operator entries were distributed across the categories.

This year was very good for the LP operators from 160 through 20 meters, especially for Single-Op, Low-Power operators. You can see the effect of the superb low-band conditions by the increase in the number of 80 meter and 40 meter Single-Band logs shown in Figure 2. Even with the excellent 20 meter conditions, some operators chose to drop down a band or two. The higher 40 meter and 80 meter log submissions balance the drop in 20 meter logs.

BILL SMITH, W9VA

Jim, K9PPY (right) is running while Bill, W9VA (left) hunts (and hunts) for the elusive 10 meter opening at PSØF. They managed 11 QSOs and 7 multipliers on 10 meters.

When conditions are decent, it might be the QRP stations that reap the greatest reward. NØKE made his first appearance in the QRP Top Ten and took home the top spot from Colorado. VA3DF continues his five-year run in the Top Ten, placing 2nd this year with 72 countries on 20 meters alone, ahead of 2007 category winner N1TM, making his 7th straight Top Ten appearance in third this year. Other new faces in the Top Ten include NN7SS (op K6UFO in WWA), N4IJ (OK), and WF4U (UT). NØUR returns to the Top Ten for the first time since 2002. The West was surprisingly strong this year with six of the ten table settings, including W6QU (op W8QZU, SDG) and KA5PVB (WTX). The north-central region wasn't left out as KT8K (MI) and NØUR (MN) filled out the roster.

Single-Op, Low-Power is always a hotly contested category, regardless of conditions, placing a premium on geography. While two Texans, N5AW (NTX, 4th) and WD5K (STX, 7th), corralled the middle of the Top Ten, it was N1UR (VT) claiming the top spot for the third time in four years — and he took off last year! WD5K was as far west as the Top Ten went, with no further representation from West until the 26th spot! N1PGA (WMA, 6th last year) and K2PS (SNJ, 7th last year) made a run and duked it out for 2nd and 3rd place, but well off the N1UR pace. N4TZ (IN) anchored the middle — his home away from home for six out of the last eight contests. N1SV (EMA) follows, returning to the Top Ten after a four-year absence. W1NT (WMA) is a new call in the Top Ten at eighth, prevailing in a very tight three-way race over regular Top-Tenners N4XL (SC) and W3LL (MDC) in 9th and 10th.

High-Power winner VY2ZM (MAR, op K1ZM) looks to be mighty hard to beat. Repeating the results of his previous Top Ten appearance in 2002, KM3T operated K5ZD to a solid second-place finish. AA1K (DE) had his best finish yet, appearing in the Top Ten every year since 2002 when I started writing up the results — maybe with a few sunspots? Fellow Canadians VO1MP (NL) and Mr New Prefix VE3AT operating VC3A tied up the third and fourth spots: VO1MP's fourth straight Top Ten appearance and VE3AT's sixth! Westerner K3CR (op LZ4AX) retained 6th place on the list from WPA and it's nice to see K3ZO following him after a three-year absence. Newcomers KK1L (VT), W3GQ (NC) and VY2SS close out the list this year.

Single-Op, Assisted winner W2RE's (ENY) strategy clearly favored running and the 400+ QSO margin was enough to overcome the nearly 40 additional multipliers in the log of 2nd place NN3W (at the N3HBX station in MDC). There was a real horse-race for 2nd and 3rd, with VY2TT (op K6LA) setting a new Canadian record, but falling short of NN3W by the slimmest of totals. And then there is the annual run for the EPA roses between K3WW and AA3B. Each of these fellows has made the SOA Top Ten in seven out of the last eight years with K3WW prevailing in every head-to-head competition, but AA3B came as close as he ever has this year — stay tuned to see if AA3B will prevail in 2010! A bit farther west, there was a tight race as VA3DX grabbed 7th just ahead of N8TR (OH), before the Top Ten swung back east to K2PLF (ENY) and closed with N3AD (EPA).

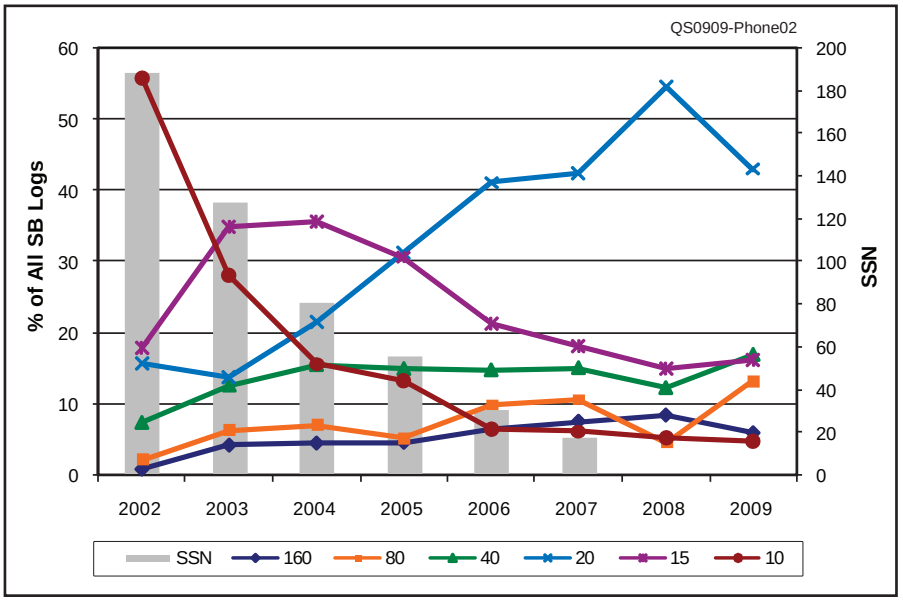


Figure 2 — Single-band US-VE logs, 2002-2008. SSN is an abbreviation for smoothed sunspot number.

US-VE Single-Band

This year there was a big surge of interest in single-band entries; 235 logs were submitted and that is an increase of nearly 80 over 2008's 154 — up 50%! Figure 2 shows that 20 meter logs made up a lower fraction of the total due to increased interest in 40 meters and 80 meters. Even 15 meters grabbed a bit more of the pie. This is a very healthy trend!

W/VE

Single Operator
High Power

VY2ZM (K1ZM, op)	4,591,875
K5ZD (KM3T, op)	3,212,040
AA1K	2,398,200
VO1MP	2,337,300
VC3A (VE3AT, op)	2,244,480
K3CR (LZ4AX, op)	2,116,500
K3ZO	1,777,554
KK1L	1,080,288
W3GQ	839,700
VY2SS	741,474

Single Operator
Low Power

N1UR	1,365,372
N1PGA	882,900
K2PS	787,845
N5AW	730,296
N4TZ	688,170
N1SV	579,870
WD5K	453,495
W1NT	394,935
N4XL	391,152
W3LL	381,843

Single Operator
QRP

NØKE	155,832
VA3DF	130,524
N1TM	120,960
W6QU (W8QZA, op)	66,600
NN7SS (K6UFO, op)	63,450
N4IJ	48,672
WF4U	45,630
KT8K	23,232
KA5PVB	22,656
NØUR	16,740

Single Operator
160 Meters

W2MF	22,692
W1NA	22,509
K5RX	9,384
KK4SI	8,496
N2WN	7,434
K1HAP	6,708
W3GH	6,174
VE3CUI	972
W7DR	912
VE2DWA	816

Single Operator
80 Meters

KU2M	87,780
AA4MM	64,575
NØNI	51,408
KM1R	42,975
AA4V	39,951
N3YD	31,968
N8OO	27,900
NJ1H	27,783
KØKT	21,594
W2/E78WW	19,320

Single Operator
40 Meters

WB9Z	123,024
W6YI	99,960
WU2X	97,929
K4AB	61,677
W6PU	41,730
WDØBGZ	37,233
K8DJC	32,670
AC5O	32,640
VE6JY	29,988
AC8Y	27,783

Single Operator
20 Meters

KQ2M	1,012,368
K2XA	527,022
VE3XN	364,746
W8ZN	352,800
WØEWD	291,375
W1NR	216,039
VE5ZX	214,524
N7AT (K8IA, op)	189,000
W9EXY	188,574
K6HNZ	174,558

Single Operator
15 Meters

K4EA	93,912
K5TR (WM5R, op)	75,816
N4PN	65,649
N4BP	45,180
K9OM	44,280
KC7V	22,815
WA2AOG	15,750
KC6R	14,514
N2CU	14,445
K7BG	13,755

Single Operator
10 Meters

W5PR	9,867
NA4CW	3,840
K4WI	1,890
K4MF	1,680
W7ISG	1,221
W6GMT	1,023
K4JRB	1,014
NN1N	90
ND6S	63
W8REG	18
WAØFQK	18

Single Operator
Assisted

W2RE	3,272,328
NN3W (@ N3HBX)	3,060,288
VY2TT (K6LA, op)	3,013,644
K3WW	2,305,422
AA3B	1,975,446
K3PP	1,528,740
VA3DX	1,436,400
N8TR	1,409,628
K2PLF	1,358,775
N3AD	1,251,747

Multioperator
Single Transmitter

K1LZ	3,943,164
W3BGN	3,111,828
W1QA	2,722,830
N1FD	1,489,176
K1KI	1,326,234
W6WB	1,010,625
KD9ST	908,088
W2ZQ	809,784
VE3RM	765,348
W2XL	690,108

Multioperator
Two Transmitters

WE3C	6,019,992
N3RS	4,507,461
W4RM	3,431,106
K8AZ	2,759,328
NR4M	2,565,171
KB1H	2,518,431
NE3F	1,984,140
KØTV	1,793,412
W5WMU	1,654,044
NK7U	1,312,464

Multioperator
Multi Transmitter

W3LPL	7,152,327
K3LR	6,718,464
W1FJ	4,387,500
K1RX	3,991,044
K1TTT	3,831,624
W3PP	2,457,369
N6BV	1,986,012
WØAIH	1,857,600
N8RA	1,106,595
WX3B	384,846

Single-band entries are an excellent way to learn those unusual and marginal openings such as gray line and long path openings or even scatter modes on the higher bands.

Still somewhat anemic from the lack of solar UV, 10 meters is still a source of interesting propagation over any 48-hour period. Winner W5PR apparently soaked up whatever propagation happened to be available from STX because he doubled last year's winning score and handily outdistanced the rest of the crew. NA4CW (SFL) and K4WI (AL) traded places from last year's standings. This year, at least there were enough 10 meter logs to have a full Top Ten — keep the faith! We actually have a Top Eleven with W8REG and WAØFQK tied in the 10th spot.

There was more life in 15 meters as shown by K4EA's winning score from GA. QSOs were up by about 20% and multipliers by a third to near-DXCC levels — particularly welcome and it shows that it doesn't take much "extra" propagation to work some good DX at any time of the solar cycle. K5TR (operated by WM5R in STX) squeezed in between K4EA and N4PN, also in GA, to grab second. While there was obviously a lot of empty space on the band, there was still enough action to fatten those scores "considerable" over last year and give K7BG the first rung of the ladder from up north in MT.

Last year's 20 Meter winner, K2XA (ENY), bulked up both his QSOs and multipliers, but it wasn't nearly enough to withstand the charge of category winner and record-setter KQ2M (CT). The Top Ten was populated with entries from all across the US and Canada, a reflection of the great conditions on the "Queen of the Bands." Third through 5th places marched across the continent to the southwest — VE3XN, W8ZN (OH) and WØEWD (IA) — before returning to W1NR in EMA. VE5ZX turned in a nice score from northerly Saskatchewan. K8IA operating at N7AT in 8th and K6NHZ in 10th were the most westerly scores. W9EXY almost caught N7AT from IL.

The game has changed on 40 meters with the opening of 7.100-7.200 MHz to many ITU Region 1 amateurs. WB9Z (IL) took full advantage to push his 1991 record up a notch or two and wriggle by last year's winner W6YI (SDG). 3rd place WU2X (ENY) would have been last year's winner! K4AB (AL) in 4th came in ahead of westerners W6PU (NM) and WDØBGZ (CO). A photo-finish between K8DJC (OH) and AC5O (LA) for 7th and 8th were followed by VE6JY from Alberta and AC8Y on the East Coast in VA. It is good to see top scores from all over the continent.

Keeping up with the big score trend, KU2M (NNJ) tripled last year's 80 meter winning score that would have just squeaked into the box in 8th place this year! NØNI finished just behind 2nd-place AA4MM (NFL), almost

DX

Single Operator
High Power

P49Y	5,771,094
KH7X (KH6ND, op)	4,672,764
KP2M (N2TK, op)	4,390,173
FS5KA (W1SJ, op)	4,327,599
TO5A (NH7A, op)	3,541,359
CT1ILT	1,704,144
OA4SS	1,451,313
HP1WW	1,123,842
KH6FI	1,123,785
OX2A	914,007

Single Operator
Low Power

P4ØA (KK9A, op)	5,558,235
TI5N (W5AJ, op)	3,691,881
HI3TEJ	2,756,160
J88DR	2,510,757
HK6P	1,265,376
8P6EX	1,102,143
PY1NX	1,032,102
J7Y (K1LI, op)	1,022,616
KH6/ACØW	687,675
PW2P (PY2XAT, op)	654,684

Single Operator
QRP

F5BEG	41,160
JR4DAH	10,260
DL4VCG	6,561
JH1APZ	5,913
MM3XXW	4,032
YO3JW	1,701
VK4ATH	1,680
OK1DVM	684
IZ2FME	660
I5KAP	627

Single Operator
160 Meters

ZF2AH	126,150
KV4FZ	62,556
F6CTT	62,034
AO8A (EA8AH, op)	50,544
E77DX	39,150
CU2AF	29,412
SN3R (SP6HEQ, op)	23,940
LN9Z (LA5KO, op)	17,442
S56P	7,920
EA1DVY	3,657

Single Operator
80 Meters

CU2X (OH2BH, op)	367,560
GM3PPG (G4BYB, op)	157,740
YW4V	113,031
HG3M (HA3MY, op)	112,896
EI7M	110,313
SP3GEM	100,452
SN7Q	87,780
YV5MSG	47,376
WP4I (WP3C, op)	40,770
IZ4NIC	39,429

Single Operator
40 Meters

KH7XS (K4XS, op)	438,480
KP4KE	297,711
GW7X (GW4BLE, op)	254,664
S53F	238,950
YW5W (YV5TX, op)	218,022
ZL3A (ZM3A, op)	215,640
HQ9R (WQ7R, op)	203,832
OM3PC	175,896
E7ØT	151,956
F5BZB	137,376

Single Operator
20 Meters

CU2A (OH8NC, op)	649,650
TM9R (F5FLN, op)	458,964
S5ØK	409,005
E76C	406,080
E71A	340,560
NL7V	315,720
IR1R (IK1HJS, op)	304,878
TG9ANF	279,624
WP4EDD	275,040
CT7A (CT1IUA, op)	261,540

Single Operator
15 Meters

ZX5J (PP5JR, op)	488,166
LU2QC	482,298
AY5F	387,720
LTØH (LU3HY, op)	356,760
PY2LSM	340,194
LS1D (LW9EOC, op)	334,260
AY4D (LU4DX, op)	320,193
PY1KN	249,039
KH7Y	142,137
PY6HD	96,432

Single Operator
10 Meters

LU1HF	113,337
LU9DAG	50,148
LR2F (LU2FA, op)	27,948
PU2MTS	26,136
ZV2C (PY2CX, op)	20,097
CA6BMF	13,671
PU2LEP	12,180
LTØD (LU6DU,op)	10,368
HP1RIS	3,192
PP5JN	2,856

Single Operator
Assisted

PJ4G (K2NG, op)	5,663,196
LT1F (LU1FAM, op)	2,779,923
ZX2B (PY2MNL, op)	1,876,980
ZPØR (ZP5AZL, op)	1,166,778
EE7E (EA7RU, op)	887,757
LQØF (LU5FF, op)	832,608
YR9P (YO9HP, op)	640,068
KL7FH (KL7Z, op)	625,356
KP2BH	568,980
WP4SK	520,020

Multioperator
Single Transmitter

V26F	5,351,616
VP5H	5,027,778
4B2S	4,855,680
HI3K	4,634,100
PSØF	3,473,388
CT9L	2,807,028
TO2T	2,777,724
C6ANM	2,720,340
VP9I	2,632,032
T46G	2,237,079

Multioperator
Two Transmitters

6Y1V	9,015,138
TM6M	3,828,285
TI8M	3,621,102
ZY7C	3,591,567
V48M	3,322,872
PS2T	1,692,552
JA1YPA	618,240
KP3VA	461,910
OK7K	316,899
EA3EJI	255,150

Multioperator
Multi Transmitter

PJ2T	8,113,770
KL7RA	4,473,588
CS2C	3,777,996
9A1A	2,579,355
HG1S	1,262,196
SO8A	951,528
RW2F	841,428
JA3YBK	614,460

setting a new 10th-district record. 4th-place KM1R's (CT) held off AA4V (SC) and N3YD (WPA). N8OO with a big score from south-central LA just nipped NJ1H (NH) and KØKT (IA). And how would you like to try to push the call sign W2/E78WW through the QRN on 75 meters?

Claiming the Top Spot on Top Band this year, W2MF (SNJ) moved up from 2nd-place last year with 50% more QSOs and a score to match, setting a new 2nd-district record! New Englander W1NA (EMA) took MF's spot in second, while K5RX held fast with a repeat of last year's 3rd-place finish just ahead of KK4SI (NFL). The quiet conditions spread the wealth around as N2WN appears in the box from TN before K1HAP (NH), W3GH (WPA), and VE3CUI restored normalcy. But zut alors! W7DR adds SV in 9th place from all the way out west before VE2DWA closes out the Top Ten.

Multioperator

Multioperator, Single-Transmitter entries, once nearly ¾ of all MO logs, now only make up half. 2009 brought a new call to the MS mix as K1LZ's active and growing team appeared on top of the list from EMA followed by 2007 winner W3BGN returning to the MS mix. W1QA made it a three-peat in third. N1FD moved up five spots this year — that hard work paid off — followed by K1KI (CT) and last year's 6th-place W6WB (EB) repeating as the West Coast representative in the category. KD9ST (IL) is the last western station in the list, followed by W2ZQ (SNJ), VE3RM, and W2XL (ENY) in 8th through 10th places.

"Multi-Two" continues to accumulate "market share" with a full third of the multioperator entries, its highest ever. A repeat in the top spot, WE3C (EPA) is going strong after five years of Top Ten finishes, all at third place or higher. N3RS (EPA) also repeats in second place for the third straight year. Another consistent presence in the Top Ten box, the W4RM (VA) team placed third, followed by a new call, K8AZ (OH). Fifth place went to NR4M (VA) who edged KB1H (CT) and NE3F (EPA). Farther on down the list, KØTV (NH) made it six straight years of MS Top Ten, W5WMU (LA) entered as a team this year, and NK7U (OR) keeps the West Coast in the hunt with an entry from the relocated and rebuilding station.

After four years of finishing second to K3LR (WPA), W3LPL's MDC team retook the top spot in the Multi-Multi high roller's derby for the first time since 2002! Seven of this year's Top Ten stations have "made the box" four or more times since 2002, including the 2009 inductee to the CQ Contest Hall of Fame, WØAIH (WI — 8th). W1FJ (EMA) in 4th prevailed over K1RX (NH) who was locked in a tough race with K1TTT (WMA), followed by W3PP (DE). There are also three new call signs in the MM Top Ten this year; N6BV (EB — 7th), N8RA (CT — 9th), and WX3B (MDC — 10th).

Affiliated Club Competition

In the Unlimited Club category, it was the Yankee Clipper Contest Club reclaiming the top spot, breaking the 200-log barrier and zooming to a decisive victory! Frankford Radio Club and Potomac Valley Radio Club were 2nd and 3rd. Adding 37 logs, the Society of Midwest Contesters moved up to 4th place and serving notice that they might be challenging for the Sweepstakes gavel again this year, too. That's how to do it — get everybody you can on the air and sending in their logs!

Even with fewer logs in 2009, the North Coast Contesters held off the howling mob to stay atop the Medium Club mountain. They were followed by the upwardly-mobile Mad River Radio Club (4th to 2nd) and the Hudson Valley Contesters and DXers (5th to 3rd).

A new Local category club, the Southeastern Ohio DX Association, surged to the top and claimed the gavel with 7 big entries averaging nearly 3 Mpts each! In 2nd and 3rd are two other clubs that weren't on the 2008 radar — the Kansas City DX Club and the Northeast Wisconsin DX Association. It goes to show that a Local club can form (or re-form) quickly and make a run at a national title.

DX Overview

The most appropriate remark to make from the DX point of view is, "Wow!" With 1177 logs submitted — a 45% increase over 2008 — and QSOs way up everywhere you look, the contest had to be even more fun from outside the US-VE boundary. It's all about rate and volume of QSOs! 62 multipliers was the maximum number worked by any DX station this year — 63 is the maximum possible.

In second place last year, F5BEG put together a very strong win in the SOAB-QRP category, adding nearly 50% to his score — his best, having placed in the Top Ten every year since 2002. Having made the Top Ten for seven of the last eight years, JR4DAH moved up from sixth to second — it's always a struggle for Asian stations to place highly in the ARRL DX contests, so this is a nice finish, as for countryman JH1APZ in 4th. A new call in the DX QRP Top Ten, DL4VCG made a debut appearance in third. The remaining six calls — MM3XXW, YO3JW, VK4ATH, OK1DVM, IZ2FME, and I5KAP — are all new to the QRP Top Ten; welcome! Unlike the LP and HP categories, Europe and Asia do quite well in QRP.

The Low-Power Top Ten was dominated by stations sprinkled around the Caribbean — seven out of the top eight spots. A tip of the author's cap to the winner,

Continental Leaders By Category

Continent/Class	*Call*	*Score*
Africa		
Single Operator High Power	EA8CDI	619,518
Single Operator Low Power	V51YJ	96,363
Single Operator 160 Meters	AO8A (EA8AH, op)	50,544
Single Operator 40 Meters	ZS4JAN	36
Single Operator 20 Meters	J5UAP	144,078
Single Operator 15 Meters	3V8SS	936
Single Operator Assisted	EA8BZH	28,992
Multioperator Single Transmitter	CT9L	2,807,028
Antarctica		
Single Operator 20 Meters	R1ANC	39,960
Asia		
Single Operator High Power	JAØJHA	910,767
Single Operator Low Power	JH4UYB	176,490
Single Operator QRP	JR4DAH	10,260
Single Operator 80 Meters	JF2IWL	11,625
Single Operator 40 Meters	UAØCM	3,696
Single Operator 20 Meters	JA7FTR	163,548
Single Operator 15 Meters	7J2YAF (JA1KSO, op)	7,308
Single Operator Assisted	JF2QNM	103,587
Multioperator Single Transmitter	JAØQNJ	311,817
Multioperator Two Transmitters	JA1YPA	618,240
Multioperator Multi Transmitter	JA3YBK	614,460
Europe		
Single Operator High Power	CT1ILT	1,704,144
Single Operator Low Power	IZ2FOS	320,229
Single Operator QRP	F5BEG	41,160
Single Operator 160 Meters	F6CTT	62,034
Single Operator 80 Meters	CU2X (OH2BH, op)	367,560
Single Operator 40 Meters	GW7X (GW4BLE, op)	254,664
Single Operator 20 Meters	CU2A (OH8NC, op)	649,650
Single Operator 15 Meters	E73O	2,754
Single Operator Assisted	EE7E (EA7RU, op)	887,757
Multioperator Single Transmitter	IR4T	1,866,600
Multioperator Two Transmitters	TM6M	3,828,285
Multioperator Multi Transmitter	CS2C	3,777,996
North America		
Single Operator High Power	KP2M (N2TK, op)	4,390,173
Single Operator Low Power	TI5N (W5AJ, op)	3,691,881
Single Operator 160 Meters	ZF2AH	126,150
Single Operator 80 Meters	WP4I (WP3C, op)	40,770
Single Operator 40 Meters	KP4KE	297,711
Single Operator 20 Meters	NL7V	315,720
Single Operator 15 Meters	CM8WAL	27
Single Operator 10 Meters	HP1RIS	3,192
Single Operator Assisted	KL7FH (KL7Z, op)	625,356
Multioperator Single Transmitter	V26F	5,351,616
Multioperator Two Transmitters	6Y1V	9,015,138
Multioperator Multi Transmitter	KL7RA	4,473,588
Oceania		
Single Operator High Power	KH7X (KH6ND, op)	4,672,764
Single Operator Low Power	KH6/AC0W	687,675
Single Operator QRP	VK4ATH	1,680
Single Operator 40 Meters	KH7XS (K4XS, op)	438,480
Single Operator 20 Meters	AH7C	152,130
Single Operator 15 Meters	KH7Y	142,137
Multioperator Single Transmitter	VK6ANC	206,064
South America		
Single Operator High Power	P49Y	5,771,094
Single Operator Low Power	P4ØA (KK9A, op)	5,558,235
Single Operator 160 Meters	LU2DVI	90
Single Operator 80 Meters	YW4V	113,031
Single Operator 40 Meters	YW5W (YV5TX, op)	218,022
Single Operator 20 Meters	LU1DK	248,940
Single Operator 15 Meters	ZX5J (PP5JR, op)	488,166
Single Operator 10 Meters	LU1HF	113,337
Single Operator Assisted	PJ4G (K2NG, op)	5,663,196
Multioperator Single Transmitter	PSØF	3,473,388
Multioperator Two Transmitters	ZY7C	3,591,567
Multioperator Multi Transmitter	PJ2T	8,113,770

W/VE Region Leaders

Tables list call sign, score, and power (A = QRP, B = Low Power, C = High Power).

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

VY2ZM (K1ZM , op)	4,591,875	C
K5ZD (KM3T, op)	3,212,040	C
AA1K	2,398,200	C
VO1MP	2,337,300	C
K3CR (LZ4AX, op)	2,116,500	C
N1UR	1,365,372	B
N1PGA	882,900	B
K2PS	787,845	B
N1SV	579,870	B
W1NT	394,935	B
N1TM	120,960	A
VE9QRP	15,264	A
K3TW	11,055	A
N1URA	5,814	A
WB7OCV	4,488	A

Southeast Region (Delta, Roanoke and Southeastern Divisions)

W3GQ	839,700	C
K5RQ	663,369	C
K4YYL	659,634	C
N4PQX	426,114	C
W4KW	378,882	C
N4XL	391,152	B
NA4K	278,460	B
WB4JFS	249,480	B
AB4GG	172,617	B
N4IG	162,936	B
KG4JGQ	16,683	A
WB5NMZ	4,464	A

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

VC3A (VE3AT, op)	2,244,480	C
K9BGL	655,557	C
VE3KZ	434,655	C
K8FL	231,636	C
K2UR	210,210	C
N4TZ	688,170	B
VA3YP	345,990	B
KD9MS	289,008	B
VE3TW	187,458	B
WR4F	172,710	B
VA3DF	130,524	A
KT8K	23,232	A
K9GY	1,440	A
AF9J	504	A

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

NN7ZZ (N5LZ, op)	489,648	C
KØRH	276,450	C
AD5XD	275,730	C
VE4EAR	253,368	C
KØDEQ	202,470	C
N5AW	730,296	B
WD5K	453,495	B
VE5SF	133,458	B
KØBJ	127,680	B
NTØF	122,265	B
NØKE	155,832	A
N4IJ	48,672	A
WF4U	45,630	A
KA5PVB	22,656	A
NØUR	16,740	A

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

N6AA	512,295	C
WA7LT	508,032	C
K5RR	498,624	C
VE6BBP	387,072	C
K6XX	346,368	C
K7JE	158,472	B
W7RV	122,958	B
AA6K	92,394	B
KE7NO	90,720	B
N6RV	89,748	B
W6QU (W8QZA, op)	66,600	A
NN7SS (K6UFO, op)	63,450	A
K6MI	1,350	A
VE6STP	126	A

Sponsored Plaque Winners

Thanks to the generous sponsorship of numerous clubs and individuals, we are pleased to announce the winners of a sponsored ARRL DX SSB plaque. The ARRL wishes to thank the plaque sponsors for their continued commitment to the ARRL Plaque Program. Without their support and dedication, the Plaque Program would not be possible.

Plaque Category	Plaque Sponsor	Winner
World Single Operator High Power	North Jersey DX Association	P49Y
World Single Operator QRP	QRP-ARCI	F5BEG
World Multioperator Single Transmitter	Carl Cook, AI6V & Sue Cook, AI6YL	V26F
World Multioperator Unlimited	Stanley Cohen, W8QDQ	PJ2T
World 1.8 MHz	Fred Race, W8FR, In Memory of ZL2BT	ZF2AH
World 14 MHz	Don Wallace, W6AM, Memorial Award	F5BZB
World 21 MHz	Long Island DX Association	ZX5J (PP5JR, op)
World 28 MHz	North Shenandoah DX Association NS4DX	LU1HF
W/VE Single Operator High Power	Frankford Radio Club	VY2ZM (K1ZM, op)
W/VE Single Operator Low Power	Dauberville DX Association	N1UR
W/VE Single Operator QRP	Jeffrey Briggs, K1ZM	NØKE
W/VE Single Operator Assisted	Pete Carter, K3VW Memorial	W2RE
W/VE Multioperator Single Transmitter	Steve Adams, K4RF	K1LZ
W/VE Multioperator Two Transmitter	John Rodgers, WE3C	WE3C
W/VE Multioperator Unlimited Transmitter	Western New York DX Association	W3LPL
W/VE 28 MHz	Ralph Fontaine AF7DX	W5PR
W/VE 3.5 MHz	Jeffry Briggs, VY2ZM	KU2M
Asia Multioperator Single Transmitter	Yankee Clipper Contest Club	JAØQNJ
North America Multioperator Single Transmitter	Nick Lash, K9KLR	V26F
Oceania Single Operator High Power	W7EW / W7AT	KH7X (KH6ND, op)
Japan Single Operator Low Power	Western Washington DX Club	JH4UYB
Great Lakes Division Single Operator	Northern Ohio DX Association	K8FL
New England Division Single Operator Low Power	CTRI Contest Group	N1UR

Unsponsored plaques may be purchased by the plaque winner. If you wish to purchase an unsponsored plaque or order a duplicate plaque, contact ARRL Contest Branch Manager Sean Kutzko, KX9X, at 860-594-0232 or by e-mail at **kx9x@arrl.org**. The cost for plaques is $75 (includes shipping).

KK9A operating P4ØA as he has for a fifth straight year — to first place! The score of 5.55 Mpts would have placed a very close 2nd in the SOAB-HP category! W5AJ piloted TI5N to second place — his first Top Ten appearance since 2005. In third and cementing his WRTC-2010 credentials was HI3TEJ followed by J88DR (G3TBK, op) repeating his 2008 4th-place finish. Europe was shut out of the SOAB-LP Top Ten again — there was no EU representative last year, either — but IZ2FOS was close at 15th place. Ten places back was the top Asian LP score, JH4UYB, and another ten places below was the top African entry, V51YJ.

All five of the top spots in High-Power were traveling operators making a bit of fun for the folks back home while wrangling the pileups abroad. AE6Y made Aruba even more radio-active this year, taking the top spot at P49Y and giving the island a double first-place finish for the first time since 2005 when W2GD and KK9A pulled it off. KH6ND returned to the KH6YY station for his first Single-Op win in this contest since 2004. N2TK repeated his 2008 third-place finish from KP2M. W1SJ piloted FS5KA back to the Top Ten after a 2006 third-place finish and NH7A returned to TO5A for a sixth-straight Top Ten finish. CT1ILT was the top European entry in this category — surprisingly hard to crack from across the Atlantic. Absent from the Top Ten since 2005, OA4SS is back this year from Lima, Peru. HP1WW and KH6FI almost fought to a draw in 8th and 9th place while one of the first Top Ten finishes by a Greenland station in recent memory was turned in by OX2A. Just barely out of the Top Ten, JAØJHA leads all Asia HP entries in 11th place and EA8CDI was the top African entry in 13th position.

K2NG kept the southern Caribbean front and center from Curacao as first-place Single-Op, Assisted PJ4G outdistanced his South American competition. LT1F, ZX2B, ZPØR, and LQØF formed a crowd in the midsection of the SOA Top Ten, as well, with EE7E squeezing into fifth-place. It took a great effort from YR9P to place 7th from the southern reaches of Eastern Europe. KL7Z signed KL7FH, as he placed eighth from Alaska — another sign of good conditions. The Top Ten was filled out by two island stations, KP2BH and WP4SK. JF2QNM lead for Asia at 29th and EA8BZX was the top African. There were no entries from Oceania.

DX Single-Band

The farther south you are, the better 10 meter propagation to the US and Canada will be and LU1HF has won the category four straight times. Two of his countrymen followed as LU9DAG finished 2nd and LR2F 3rd. PU2MTS gave LR2F a sharp challenge, only nine QSOs and one multiplier off the pace. It was all South America for the rest of the way with the notable exception of HP1RIS making the box from Panama.

The 15 meter race was very tight with ZX5J managing to hold off LU2QC's extra three multipliers even though LU2QC was a little farther south with a slight propagation edge. In fact, Argentina took four of the top seven positions in the guise of AY5F, LTØH, LS1D and AY4D. Brazil and Argentina tied with four calls each in the Top Ten; after 1st place we find PY2LSM, PY1KN, and PY6HD. Only KH7Y managed to crack the South American dominance of this category

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Yankee Clipper Contest Club	172,901,439	202
Frankford Radio Club	163,867,134	147
Potomac Valley Radio Club	104,516,001	166
Society of Midwest Contesters	27,802,428	107
Florida Contest Group	26,199,330	84
Contest Club Ontario	23,467,464	66
Northern California Contest Club	19,645,713	92
Minnesota Wireless Assn	19,203,147	80
Tennessee Contest Group	13,970,439	59
Medium Category		
North Coast Contesters	28,573,668	16
Mad River Radio Club	18,619,062	32
Hudson Valley Contesters and DXers	17,762,265	41
Southern California Contest Club	15,752,592	36
Central Texas DX and Contest	12,138,363	19
Order of Boiled Owls of New York	10,202,253	16
Carolina DX Assn	10,157,613	36
Rochester (NY) DX Assn	9,819,210	8
Central Arizona DX Assn	8,008,590	37
South East Contest Club	7,790,904	30
Maritime Contest Club	7,658,814	17
Willamette Valley DX Club	5,929,626	17
East Coast Canada Contest Club	4,585,071	6
Western Washington DX Club	4,515,729	16
North Texas Contest Club	4,450,197	14
Louisiana Contest Club	4,107,786	6
Alabama Contest Group	3,932,166	17
Mother Lode DX/Contest Club	2,951,403	20
CTRI Contest Group	2,438,304	9
Grand Mesa Contesters of Colorado	2,141,121	12
Contest Group Du Quebec	1,921,206	7
Utah DX Assn	1,910,640	13
South Jersey Radio Assn	1,566,294	3
BC DX Club	1,507,017	7
Texas DX Society	1,138,392	5
Western New York DX Assn	1,078,395	12
Bergen ARA	1,068,582	15
Oklahoma DX Assn	780,036	4
Alberta Clippers	688,737	3
Saskatchewan Contest Club	634,905	4
Kentucky Contest Group	607,086	7
Redmond Top Key Contest Club	341,889	6
Missouri DX and Contest Club	302,745	5
Allegheny Valley Radio Association	201,210	4
Eastern Iowa DX Assn	133,605	3
Pacific Northwest VHF Society	22,434	3
Local Category		
Southwest Ohio DX Assn	2,066,235	7
Kansas City DX Club	819,570	5
Northeast Wisconsin DX Assn	683,778	4
Northern Arizona DX Assn	504,855	6
Metro DX Club	491,634	7
Southern California DX Club	487,497	3
Northern Rockies DX Association	439,605	6
Badger Contesters	378,492	5
West Park Radiops	375,240	10
Low Country Contest Club	306,162	7
Austin ARC	279,861	3
Sterling Park ARC	267,267	7
Spokane DX Association	255,285	6
Portage County Amateur Radio	177,744	7
South Jersey DX Assn	106,920	4
Meriden ARC	133,425	4
Great South Bay ARC	45,096	4

in 9th place. Not until 20th place do we find 7J2YAF leading the Asian continent, with E73O as the top European and 3V8SS making the DXers happy by soloing from Africa. CM8WAL was the lone North American entry in the category.

Europe returned to the single-band winner's circle with a vengeance on 20 meters, taking the first five positions and eight of ten slots overall. CU2A was operated well by OH8NC, placing first by a sizeable margin with a huge 3571 QSOs and a new record. A bit farther east, TM9R also found 61 multipliers, but wasn't able to keep up with the CU2A juggernaut. S5ØK and E76C ran a very, very close race for 3rd from the Balkan region and E71A wasn't far behind in 5th. NL7V broke into the Top Ten from Alaska — a rare occurrence on 20 meters. Europeans filled seven positions in the Top Ten and North Americans three. JA7FTR was the top Asian entry in 29th place and Oceania appears in 33rd with AH7C with J5UAP leading Africa in 35th.

Big scores filled the 40 Meter Top Ten this year, lead by KH7XS with K4XS at the microphone setting a new World record. Although ZL3A came close last year (and placed 6th this year), this is the first time in a while that an Oceania station has won the category. Truly a world-wide band, the continental representatives bounce around from North America in 2nd (KP4KE), to Europe in 3rd and 4th (2002 winner GW7X and S53F), to South America (YW5W), before returning to Oceania. Asia, on the other hand, has a tougher time with the interference from radar and other intruders on the band. UAØCM was the top Asian entry in 39th place and ZS4JAN was the sole African entry.

80 meters is another band that did an about-face from 2008. This year's Top Ten includes seven Europeans, two South Americans and one Caribbean station. Congratulations to Old Timer OH2BH with a resounding win and record from the big CU2X station. GM3PPG fit comfortably in 2nd place in front of a closely spaced trio of YW4V, HG3M and EI7M. A bit farther east saw Polish stations SP3GEM and SN7Q finish 6th and 7th, before YV5MSG and WP4I returned the action to the Caribbean shores. IZ4NIC closed out the Top Ten this year.

The competition really heated up this year as the Big Guns decided to give Top Band a try. ZF2AH switched from 80 meters in 2008 to take the win on Top Band in 2009 ahead of 2008 winner KV4FZ who just barely eluded the clutches of F6CTT in 3rd. Europeans finally got a chance to join in the fun as F6CTT's score is nearly 48 times larger than the top 2008 EU score! In fact all of the remaining Top Ten scores are from Europe and all are substantially larger than would have been possible in 2008. AO8A won 40 meters in 2008 and place 4th on 160 this year, the only African score and LU2DVI made a repeat appearance as the only South American score this year, but not in the Top Ten.

DX Multioperator

No small part of the Yankee Clipper Contest Club's rise to the gavel this year is the contributions of category winner V26F and 8th place C6ANM; about 8 Mpts! Right on their tails and about a hundred miles south, the VP5H team of Minnesota Wireless Association members actually made a few more QSOs, but didn't quite keep up on the multiplier total. The 4B2S team moved up a couple of places this year from Mexico to take third. HI3K made a third consecutive appearance in the Top Ten while PSØF is new to the Multi-Single Top Ten. Spending some time in the Madeiras, the German team at CT9L was the top African entry. Keeping their feet warm in the Caribbean sands was a French team at TO2T, while the VP9I team traveled east from Frankford Radio Club territory. And it's nice to see a Cuban team at T46G making the Top Ten, the first in a long time, if ever. Just off the pace was the European leader IR4T in 11th place. JAØQNJ lead all Asian entries in 33rd position and three places farther down the list finds VK6ANC as the top Oceania MS entry.

Multi-Two and Multi-Multi

In what may turn out to have been the swan song of KY1V's big 6Y1V station, the team took home the walnut once again with a two-category-dominating score — both M2 and MM — nice job! The action got very thick, very fast after that as TM6M, TI8M, ZY7C, and V48M — teams from EU, NA, and SA — all scrambled for 2nd through 4th place. This was one of the most competitive Multi-Two Top Tens in years and shows how popular this category is rapidly becoming. Asia was represented in the Top Ten by JA1YPA, as high as any team from Asia has placed in this category on my watch. Oceania and Africa didn't field an M2 team this year. While MS teams tend towards the traveler, seven of the Top Ten M2 scores show operators from right there at home this year.

In Multioperator, Multi-Transmitter, the big noise was made by the Caribbean Contest Consortium at PJ2T. This is their sixth first-place finish in M2 or MM in the past seven years, surely one of the most successful station-building efforts ever. KL7RA in second made the first Alaskan appearance in a multi-op Top Ten since 2005, a ringing endorsement of the new station going up on the Kenai Peninsula. A string of five EU stations follows, led by CS2C in 3rd place with a hardworking duo of Czech operators beating larger teams. JA3YBK lead Asia with another two-operator team, completing the eight Multi-Multi entries received this year.

Concluding Remarks

I found the enthusiasm and excitement palpable in this year's results. The ionosphere smiled and contesters smiled back. It's one of the reasons that I look forward so much to the coming solar cycle in which we will find many more stations joining our ranks and moving participation-based records to levels completely out of reach in past years. Will we see another 10,000-QSO Single-Operator, All-Band tally? Certainly. What will be the new Multi-Multi record — 25 Mpts? 30 Mpts? As every HF operator knows, the sky *is* the limit!

Keep it ever so — see you on the 6th and 7th of March next year! QST

W3UR

HOW'S DX?

ZYØF — A Tropical Island Adventure

Alex Dalamasso, PY2WAS

The planning for our DXpedition to Fernando de Noronha, a tropical island in the Atlantic Ocean off the coast of Brazil, started 8 months before it took place. The first step was to define the team and get the proper license. The team was defined with four members: Bob Grimmick, N6OX; Fabio Ferreira Dos Santos, PY2AAZ/AC2AC; Anderson Serevincis, PY2TNT, and Alex Dalmasso, PY2WAS. License was granted as ZYØF.

From that point on, we exchanged lots of e-mails to prepare a checklist, establish the number of stations working simultaneously and scheduling our operations on the island.

Bob was the first one to arrive on June 8, 2009, but he did not bring a station as previously agreed. Instead, he brought critical accessories for this DXpedition including all nine band-pass filters. Fabio was the second to arrive on June 10, but because of some storms in New York City his flight was delayed and he missed his connection in Miami. Alex arrived on the night of June 10. Anderson arrived on June 11. Upon their arrival Bob and Alex assembled the 33 foot Spiderbeam aluminum pole with an MFJ-1777 antenna and made hundreds of contacts on that first night.

The prominent Morro do Pico is the highest point (323 meters) and is located on the northeastern side of Fernando de Noronha.

In the morning of June 11, Bob and Alex started the exhaustive work of assembling the second pole (54 foot Spiderbeam fiberglass pole) and hung a rope between the two poles, hanging four wire antennas. It rained a lot on Fernando de Noronha and the lawn seemed like a swamp. The mud reached our shin after each step. The ground was so wet that it could not absorb such a large amount of water. Sometimes, the sun shined but it was quickly covered by another dark cloud.

When we finished the stretching of the fourth antenna, the fiberglass pole's clamps did not support the weight and tension and the pole collapsed, bringing down all of the antennas. It was really frustrating, as it happened at the end of the 11th and we had not operated yet. Once again, we were left with the aluminum pole and two antennas, the MFJ-1777 and MFJ-1778. Fortunately, Anderson and Fabio arrived that night. Unfortunately, the airline lost their baggage. Thankfully, Fabio brought his radio in a

The ZYØF team (from left), Anderson, PY2TNT; Fabio PY2AAZ; Bob, N6OX, and Alex, PY2WAS, had few moments to enjoy the sun.

Bob, N6OX, is having fun running the pileup on 40 meters SSB.

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hand bag so finally we had two stations. Propagation that night was really bad. We made just over 200 QSOs.

Except for 20 meters in the morning, propagation from Fernando de Noronha Island was zero. Then, we decided to quickly visit Andre, PYØFF, who lives on the island. Andre has a terrific station and was very kind to the entire team. Coming back to the DXpedition shack, we planned a new configuration for the assembly of our antennas and put everything into place.

Fabio and Anderson handled one station and Bob and Alex the other. Now, there were three antennas, an Alpha Delta dipole for 40 and 80 meters, a delta loop for 80 meters and a dipole for 160 meters. Finally, the ZYØF team started to face huge pileups from Friday morning on. We used a tiny linear amplifier (RM LK-500), which improved our signals significantly. At the end of day, Anderson's baggage arrived as well as the third ICOM IC-7000, new switching power sources and another tiny linear (ZAMIN ABL-800).

On June 13 propagation started to improve. The pileups were very intense and managing them exhausted the team. The much anticipated digital mode transmissions started and Fabio was delighted with the pileups on BPSK31. It was a great day with more than 1500 QSOs. That night Fabio's baggage arrived. Good news as he was then able to assemble the 3 element Yagi from Super Antennas.

Finally on June 14 propagation seemed to be 10 times better than it was Wednesday to Friday. After some outstanding pileups, Alex and Bob gathered some poles and antennas and left the island at 1500Z; Fabio and Anderson stayed there with the Yagi antennas and did a wonderful job on 21 MHz and 28 MHz with huge pileups. They left the island on June 15 at 1500Z.

Considering all the obstacles, this DXpedition was a real success. The ZYØF team showed team building, commitment, pileup skills and an extreme ability to survive below so much water. By the way, Fernando de Noronha is a beautiful island, with wonderful beaches and clear, green and transparent waters. See you on the next DXpedition.

All photos courtesy Alex Dalmasso, PY2WAS.

TIME TO DUMP YOUR OLD IRCs

It's time to get rid of all "Beijing model No 2" International Reply Coupons (IRC). You know the one with the Michelangelo "two fingers about to touch, framed in a postage stamp." DXers should no longer be using them and need to use them up ASAP in order to give QSL managers and those DX stations who receive them plenty of time to redeem them before the December 31, 2009 deadline. Be aware that some post offices in some countries may already be saying they can no longer exchange them. This goes against the UPU, but it has happened in the past. Don't get left holding the bag.

DX NEWS FROM AROUND THE GLOBE

3B6 AND 3B7 — AGALEGA AND ST BRANDON

By the time you read this Rachid, 3B8FQ, will be wrapping up his operation as 3B7FQ from St Brandon on August 30. If you miss him don't worry as there is a strong possibility he will be going to Agalega Island as 3B6FQ in November of this year. QSL 3B7FQ and 3B6FQ via K5XK, per information on **QRZ.com**.

3D2/C — CONWAY REEF

Conway Reef has not been QRV since late 2001. Twenty years after the first activation of Conway Reef, 3D2CR, another expedition to Conway is planned for October 3-11. Seven operators, including DK9KX (ex-3D2CR), will be on 160-6 meters SSB, CW and RTTY. There will be no EME or digital modes on 6 meters this time. More details can be found at **www.conwayreef2009.de**.

4W — EAST TIMOR

Chris, VK4FR, who works for the Australian Armed Forces and is stationed in Dili, East Timor periodically, has obtained permission to operate with his new call 4W6FR. Look for him to be QRV in his spare time through October 2009. He will be mostly on SSB and digital modes on 20 and 30 meters. QSL via VK4FW either direct mail or OQRS at **www.odxg.org**.

CEØZ — JUAN FERNANDEZ

The November 2009 XRØZN DXpedition to Juan Fernandez Island has been pushed back to next year. It is now expected to take place somewhere in the March/April 2010 time frame. Details were found at **www.la6fja.eu/dx/XR0ZN**.

FO/A AND FO/M — AUSTRAL AND MARQUESAS ISLANDS

Wojciech, SP9PT, reports that a group of Polish radio amateurs, SP3CYY, SP9PT and SP9-31029 (SWL), along with FO5QB, will be on from Tubuai in the Austral Islands (OC-152) as TX5SPA from September 29 to October 12 and on Nuku Hiva in the Marquesas Islands (OC-027) as TX5SPM from October 16-22. They will concentrate on the lower bands and working Europe. Other parts of the world will not be ignored. They plan on being on CW, SSB, RTTY and maybe PSK31 on all the higher bands too, if propagation makes it worthwhile. The participants are paying all the costs and no sponsors are being accepted, so "We are going there for our own pleasure with our own money." Check out their Web site at **http://fo2009sp.pl**.

FO/A AND ZK2 — AUSTRAL ISLANDS AND NIUE ISLAND

Don, G3BJ, and Hilary, G4JKS, will be on vacation in the South Pacific this month. They will be active as FO/G3BJ from the Austral Islands (Rurutu and Tubuai) from September 4-16 and as ZK2BJ from Niue from September 18-25. Operation will be mainly on CW on 3.5 through 28 MHz, but not on 17 and 12 meters. This is a vacation activity and operation is likely to be mainly when the bands are open to Europe. Equipment is limited to 100 W (K3) and a Butternut HF6 but the locations are at the sea edge.

CHANGE OF PREFIXES OF ILES EPARSES

As of 2005, the "Iles Eparses" (Bassas da India, Europa Island, Glorioso Islands, Juan de Nova Island and Tromelin Island), better known as the French "Scattered Islands in the Indian Ocean," are now under the authority of France's Terres Australes et Antarctiques Francaises (TAAF). The future call signs will be issued as follows:

Glorioso FR/G will become FT#G
Europa FR/E will become FT#E
Tromelin FR/T will become FT#T
Juan de Nova FR/J will become FT#J

There will be no change for FT#W (Crozet), FT#Y (Terre Adelie, Antarctica), FT#X (Kerguelen) and FT#Z (Amsterdam).

FT#G — GLORIOSO ISLANDS

The much anticipated FT5GA, Glorioso Island DXpedition, which was last scheduled to take place in July, has once again been postponed. It's possible something could happen in late August or shortly afterward. Watch your favorite DX rag for updates on this most wanted DXCC Entity.

JW — SVALBARD

LA8FOA and LA6RHA from SYLRA, the Scandinavian YL Radio Amateurs, are planning an expedition to Svalbard, JW, September 6-13. This will be following the September 3-6 SYLRA meeting in Kolbotn near Oslo. They plan to recruit a group of women operators, possibly including their OMs, to go to Longyearbyen on Svalbard. They have gotten the JW1SYL call sign. They note it is one of the most remote parts of Norway, yet easy to get to.

PG5M HEADING FOR THE PACIFIC

The dates for PG5M's Pacific DXpedition are September 6-27, when he will get on from three different DXCC entities. First, September 6-7, Fiji, OC-016; then Tarawa, Western Kiribati (OC-015), September 8-14. Again, Fiji September 15-16; next, September 17-23 on Tuvalu, OC-015. Finally, back to Fiji September 24-27. The requested call signs for the three QTHs are T2G, T3ØG and 3D2G. Gerben describes this as an "ultra light solo DXpedition," and will be CW only. QSL via bureau or direct via his home call, PG5M. For direct, enclose at least 2 USD for return postage. He has a Web site at **www.dx.to**.

SV9 — CRETE

To celebrate 50 years of Amateur Radio, Ron, WB2GAI, will be activating Crete August 21 to October 5. His call sign will be SV9/WB2GAI/p, operating 80-17 meters CW. QSL via the bureau.

T8 — PALAU

Look for Mori, JA2ZS, to be QRV as T88ZS from Palau September 19-22. Activity will be on 3.5 through 50 MHz and possibly 1.8 MHz, on CW and SSB. QSL via JA2ZS, either direct or via the bureau.

WRAP UP

That is all for this month. A special thanks to F5NQL, F5OGL, G3BJ, JA2ZS, K5XK, KE3Q, PG5M, VK4FW, WB2GAI and *The Daily DX* for this month's news. Until next month, see you in the pileups! — *Bernie, W3UR*


W3ZZ

THE WORLD ABOVE 50 MHz

The Unfixables

Every year without exception I get letters and e-mails from the community concerning a small but recurring number of problems that appear to have no permanent solution. I call these eternal problems, the unfixables. Most of them are important, but no matter how much energy you commit there are major impediments you cannot overcome. In some cases it's human nature, in some cases it's lack of knowledge and in some cases it's bureaucratic inaction. Since some of it requires education, this column will help the community educate the newcomers. Let's now take another look at these undying problems.

Ragchewers on the Calling Frequencies

Absent enhanced propagation, all VHF+ bands tend to be occupied less than we'd like. VHF+ antennas also tend to have quite narrow beamwidths. Thus many years ago the community decided it would be a good idea to have a central place on each band where one could call CQ and look for activity. These are the calling frequencies with one or more per band. The concept is to call, make contact on that frequency and then move as quickly as possible to an adjacent frequency far enough away that you will not interfere with other stations using the calling frequency to establish contact.

The problem is that a small number of operators call and work stations on the calling frequency and do not move off. The problem tends to be somewhat geography specific. On the Northern east coast, not many stations violate the rules because they will soon be told in no uncertain terms that they are occupying the calling frequency. However outside the Northeast on 2 meters and above you would think that everyone's tuning knob has been rusted in place. One rarely finds anyone operating on any frequency *but* the calling frequency. In some cases the violator is a new operator who does not know any better. Here the community can help by educating him/her. In some cases, however, it is an experienced operator who refuses to move. There is not much you can do to remedy that problem.

On 6 meters there is a bureaucratic problem as well. In the US the calling frequency is 50.125. Due to an error when this was codified in the early 1990s this appears in the ARRL band plans as the domestic SSB calling frequency when in practice and in intention it should be just the domestic calling frequency (for both SSB and CW). Pat Rose, W5OZI, deserves great credit for trying to fix this mistake but thus far to no avail.

In this case as in all the other cases where there is a violation of normal operating procedures you should follow the same process: Identify yourself. Explain that the operator's behavior is outside the norms *and explain why*. Do it politely and many will not make the same mistake twice. You will not get much of a positive response if you are a 'band mother' and scream unidentified at the operator: "Get off the calling frequency." You will just be adding to the problem. The same applies to most of the other unfixables we will be discussing.

Working non-DX in the 6 Meter DX Window

Working DX on 6 meters is on par with 160 meters and both are quite a bit more arduous than the other HF bands. Signals are often weak, spotty geographically and may not last very long. For those reasons a small band of frequencies on both bands, a DX window, was set aside for working stations outside one's own country (1830-1835 kHz on 160, 50.100-50.125 MHz on 6 meters). On 6 meters the DX window was originally supposed to encompass only intercontinental contacts like US to Europe. As it has evolved contacts with DX within the continent are now acceptable but this excludes contacts between the US and Canada. Just like the ragchewers on the calling frequencies there remain American stations who insist on working other Americans in the window. That covers up the DX and prevents a lot of people from working the weaker DX stations. For those who are new and do not know about the DX window, it is the job of the experienced operators to educate them. For the others there is no hope.

Two other problems deserve discussion here. One is that some stations operating in the US with licenses from other countries or US possessions/states never sign portable. This is a favorite complaint of former "World Above" columnist Bill Tynan, W3XO/5. Thus, a KH6 in Texas or KP4 in Georgia generate a lot of unneeded attention because everyone thinks they are in Hawaii or Puerto Rico. The same is true of stations portable in a far away district on 2 meters and above. Is that W3 you hear in MD or in Iowa? You might not care if the former but the latter might be of great interest on 70 cm. This is less important for a W1 portable in New Jersey but it is quite meaningful for a W1 portable in Montana.

Bernie, W3UR reports the other problem; that is, the habit of some stations showing up and sending random CQs on a rarish DX station's frequency (where DX may be a foreign country or even a rare domestic grid) within a few minutes of a packet spot. This is often observed with experienced operators so there is no excuse. If you have already worked the DX by all means leave the frequency so others can work it. If you can't hear the DX, wait until you can and don't call CQ on the DX station's frequency. This is a matter of common sense as well as common courtesy.

This Month

Sep 6	Moderate EME conditions*
Sep 12-14	ARRL September VHF QSO Party
Se 19-21	ARRL 10 GHz and Up Contest
Sep 20	Moderate EME conditions*
Sep 21	144 MHz Fall Sprint
Sep 29	222 MHz Fall Sprint

*Moon data from W5LUU

QSL Cards

The VHF+ world is filled with interesting and attainable awards, VUCC, WAS, WAC, WAZ (only 25 zones is needed) among them. Like the vast majority of awards these require confirmations, which means QSL cards for the most part. Keith, K6GXO, is only the latest to send me e-mail bemoaning the fact that many of the contacts he QSLs do not return his requests even though he like most others sends an SASE with his card. This has been a problem for both HF and VHF

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since time immemorial. Some operators will not QSL no matter what you do. I have sent blank QSLs already made out that the other operator need only sign and put in the SASE that I provide and still have no QSL to show for that contact. So we start with the certainty that we cannot get confirmation for every card we send. In recent years the problem has been exacerbated by the sharp rise in mail costs. Particularly in the US the Postal Service keeps raising the costs faster than the rate of inflation and reducing the level of service. As many in private industry have discovered to their dismay that is one almost certain method to put yourself out of business.

One of Keith's comments is his inability to get accurate address information based on the significant number of cards that are returned as undeliverable. Here there is little we can do. The two major sources of amateur addresses are Buckmaster and **www.qrz.com**. The former is a profit-maker that provides addresses free over the Web based on FCC listings. We can hardly complain that their listings are no more accurate than the FCC's. The same is true for qrz.com, which has provided free call lookups for more than 15 years and depends on a small amount of advertising and donations to cover the bandwidth. Thus, we should be grateful for the information we get, which is largely quite accurate.

For specific stations that are very active or have QSL managers, Bernie, W3UR, of the *Daily DX* maintains a page free to the public at **www.dailydx.com/routes.html**; the list maintained by IK3QAR is also very useful — **www.ik3qar.it/manager/**. Both pages have a wealth of useful links.

As noted QSLing is an expensive and somewhat chancy process. Is there an alternative? Yes — the ARRL maintains Logbook of the World (LoTW). You can upload your logs to LoTW and it will tell you how many contacts you have that are confirmed by other logs uploaded to LoTW. These contacts count toward ARRL Awards and WAC, the same as QSL cards. The big problem is that LoTW does not support VUCC, the most expensive and QSL intensive award that any VHFer will encounter. What about eQSL? The ARRL does not recognize eQSL confirmations for any of its awards.

What can you do? By all means educate those who do not yet know the norms. But do so politely and they will become part of the solution not part of the problem. Keep reminding those who defy the norms; some of them will also stop their bad behavior. If you want the ARRL to do something to fix these unfixables where they have the power to do so, talk to your representatives: contact information for your SM and your Division Directors appear in the front of *QST* and at **www.arrl.org** on the Web.

ON THE BANDS

6 meters. Each summer brings a different pattern of openings and this summer is no different. Let's now look at some of the highlights and details so far.

From Johan, ON4IQ, comes word that his brother Geert, ON4GG, has now become probably the first European station to claim WAS. Geert worked KB7Q in North Dakota on June 25 for state #50. Geert now needs to collect the last few cards for the award. Geert is running a IC7800 at 200 W and 4×6M9KHW 9 el yagis at 24 meters AGL at a hilltop location. The total array gain is close to 26 dBi including ground gain. Further information on the array is at **www.on4iq.com**. All contacts are terrestrial except for three on digital EME; KH6 was via F2 long-path. Johan lacks only Wyoming to have all 50. Congratulations to both!

Second this has been a summer rich in DXpeditions. These include both non-US operations and grid DXpeditions associated with the Fred Fish Memorial Award. Among these are 8R1DB/8R1TO, 5JØBV, V29JKV, C37NL and TZ6EI. Many have just ended and I hope to have complete details and pictures in a later column reviewing the summer festivities.

Third a pattern that has been evident for the past few years persisted this summer: a significant advantage for stations across the southern tier of states. Japan was workable on several occasions in the southwest, Midwest and Southeast especially Florida but the early opening [called SSSP by JE1BMJ] was hardly in evidence this year in the northeast and middle Atlantic. Hawaii worked several times in the East last year was much less in evidence beyond the West. Conversely conditions to Europe were superior in the south compared to the East. This was a particularly good year for Europe in the Caribbean.

In summary 6 meters was open essentially every day this June. Continental double hop was evident on almost half the days: June 9,10,11,12, 13,14,15,19,23,26,27,29 (thanks to K3CB, K4QI, K6QXY, K6LMN, N6KW/7, KJ6HI, K7JA). Hawaii reached the mainland also about half the days: June 6, 7, 9, 10, 13, 14, 16, 20, 23, 24, 27, 29 (thanks W5ZN, K6QXY, K7JA, NØJK). JAs made it into the West Coast, the West, the Southwest and Southeast on 10 days: June 1, 2, 14, 15, 16, 17, 18, 21, 23, 26, 28 (thanks W4GF, K5XX, W5ZN, K6QXY, KØHA, NØJK). The Mediterranean path to Europe reached far inland from the West Coast to Montana to NM and TX. Stations in the Caribbean and Europe ran up some amazing daily totals. Finally, I continue to get good reports of stations with small antennas working lots of E_s like Mark WD4ELG (FM06) with his 2 el Hex Beam and Kai, KE4PT (EL96) with his indoor dipole. Thanks to my correspondents for the details and the propagation reflectors for fill-in details.

Some very long contacts appeared in June. Chip, K7JA (DM03) worked CU2 on the 19th and 5 EA8s on the 22nd. The southwest had terrific conditions into Europe on June 12. Several worked the C37NL expedition, among them Arnie, N5KA (DM65) and Pat, W5OZI (EM00). Al, K7ICW (DM62) worked France and John, W5UWB (EL17) worked EA that day. W7KNT (DN26) worked into Europe as far as Ukraine on the 16th. Dave, W7CAR (CN86) worked into G/GM that day. Ken, AC4TO heard and was heard by 4J9M (LN40) on June 9.

When conditions peaked, some huge numbers were generated. For instance Ken, KE2N, reports that Pedro NP4A worked ~400 Europeans on June 7. Chip, K7JA (DM03) worked 54 JAs on June 21. Julio, NP3CW, worked 235 Qs in the US and Europe on the 22nd. On June 23 Tony, XE1GRR, DL80 had 113 Qs from ME to VE7. Joe, W5HNK (EL29) with 17 countries in 41 grids writes that June 26 was the best opening he has experienced in his 46 years on 6 meters. The same day ON4IQ and his brother ON4GG worked 67 US grids and 6 Caribbean grids that day alone. Joe, CT1HZE IM57 worked 250 North American Qs as far west as CN87, DM03,13,14. Al, K3TKJ FM28 worked 413 Europeans, many 5 and 10 watters, east to 4X, 5B, OD5 (see Figure 1). Mike, K4PI EM73 had 100 Europeans from GA.

Figure 1 — The partially complete super stack at K3TKJ on 6 meters. A 225 ft high rotatable tower with 9 element 6M9KHW 50 foot boom M² Yagis at 138, 165, 192 and 219 feet and a single 6M9KHW at 30 feet. The bottom Yagi will be replaced by 4 6M9KHW Yagis at 121, 94, 67 and 40 feet making a stack of 8 in all. The top stack is averaging 15 dB of gain over a single 6M9KHW at 90 feet on another tower on most paths.

2 Meter E-Skip. June was a good month for 2 meter E_s in the US with at least 7 separate openings. June 1 Russ, K4QI (FM06) worked EN 37 while DX Sherlock (**www.vhfdx.net/esmapsna.html**) shows EN12-FN10. On June 9 Chip, K7JA DM03 worked W3XO and K5VH both EM00. Bill, W3XO, worked stations in DM03,04,13 between 2353Z/June 9 to 0045Z/June 10. During the ARRL VHF contest Phil, NØKE DM69 worked stations in EN32,52,61 from 1554-1604Z (thanks NØIRS). On June 21 Jay, KØGU DN70 worked EN52,74,82, 83,92 and FN03 from 0021-0036Z (ODX=1316 mi) and heard K2ERG FN13fd at 1419 mi. DX Sherlock also notes EN04-EN80. On June 22 George, KU4VQ reports that three stations in EL99 worked KP4EIT FK68 at ~2020Z. JD, NØIRS EM29 was into FL — EL86,89 EL95,97,99. The DXworld Reflector **dxworld.com/144prop.html** showed EL96-EM26,39 EN22; EL97-EM27; and EN44-EL86,87. The biggest opening was June 26/27 with stations working in all directions across the E_s cloud. Representative paths included EN76-EN52, 53,56,74,82 EM89; EN83 EM89-EM12,13; DM78-EM72,81; DM98-EM81; EM74-EN61. European 2M E_s was again almost too numerous to count. A more detail report on Europe will appear in the upcoming summer review in a later column.

Tropospheric ducting. Always be ready for tropospheric ducting openings in the late spring, summer and fall. Vic, WB4SLM EM82 noted strong local enhancement to EM84/85 on 2304 on June 1. By June 2 the APRS map at **www.mountainlake.k12.mn.us/ham/aprs/path.cgi?map=na** was bright red in the Southeast and Vic worked to EM95 on 2304/1296/902, EL98 on 1296 and FM07 on 2 meters. Russ, K4QI (FM06)

worked EL98 on 432/1296 on June 3. Russ also reports south Florida on 2 and above on June 20 from his EM85 portable QTH.

HERE AND THERE

ARRL September VHF QSO Party. This competition has the best tropo conditions of any ARRL VHF contest. The contest starts at 1800Z September 12 and ends 0300Z September 14. More details may be found in August 2009 *QST*, or at **www.arrl.org/contests/rules/2009/sepvhf.html**.

ARRL 10 GHz and Up Contest. The second weekend of this contest begins at 0600 local time September 19 and ends at midnight local time September 21. Look at the August "World Above 50 MHz" column and **www.arrl.org/contests/rules/2009/10-ghz.html**.

Fall Sprints. Sponsored by the Southeastern VHF Society, the first two Sprints, 144 and 222 MHz, are on September 21 and 29, respectively, from 7 to 11 PM local time. Scoring is the same as last year. Complete rules are at **svhfs.org/fall_sprint_rules.htm**.

G4UPS SK. One of England's premier DXers, Ted Collins, G4UPS, passed away on June 3. Ted was one of the first Gs I worked on 6. He will be missed by all. Farewell, Ted!

222 MHz Standings

Published 222 MHz standings include call sign district leaders as of July 1, 2009. For a complete listing, check the Standings Boxes on The World Above 50 MHz Web pages at **www.arrl.org/qst/worldabove/**. To ensure that the Standings Boxes reflect current activity, submit reports at least every 2 years by e-mail to **standings@arrl.org**. Printed forms are available by sending a request with an SASE to Steve Ford, WB8IMY, Standings, ARRL, 225 Main St, Newington, CT 06111.

Call Sign	State	States Worked	DXCC Entities Worked	Grids Worked	DX (km)
1					
W1AIM	VT	20	2	56	2,021
K1WVX	CT	10	1	16	691
2					
K1JT	NJ	21	2	60	1,727
K2OVS	NY	3	1	3	250
3					
W3ZZ	MD	36	2	109	1,871
WA2FGK	PA	28	2	77	—
4					
K4RF	GA	37	2	105	1,968
AA4ZZ	NC	34	2	103	1,987
K4QI	NC	34	2	95	—
AA4H	TN	27	2	80	1,737
K4XR	AL	22	2	73	1,550
K0VXM	FL	10	1	41	1,747
KC4AYX	TN	9	2	—	1,289
W4SW	VA	9	1	23	641
KE4WBO	FL	2	1	8	1,013
5					
W5LUA *	TX	50	—	—	—
K5UR	AR	42	2	220	—
W5RCI	MS	38	2	139	1,970
K5SW	OK	33	2	135	2,059
W5ZN	AR	26	2	84	2,250
W5UWB	TX	23	2	63	2,197
K5YY	AR	22	1	78	1,560
WA5VJB	TX	18	—	—	1,830
K5LLL	TX	17	2	70	2,089
K5QE	TX	17	1	—	—
W3UUM	TX	14	1	64	1,619
WD5AGO	OK	12	2	30	1,975
AA5AM	TX	7	1	24	1,100
AA5JG	OK	2	1	5	101
6					
KR7O	CA	9	3	40	1,638
KC6ZWT	CA	9	2	52	1,371
K6QXY	CA	4	3	30	3,794
N6ZE	CA	1	1	13	583.5
7					
W7MEM	ID	7	1	20	1,664
KI7JA	OR	5	2	24	1,300
8					
K2YAZ	MI	23	2	76	2,167
KB8O	OH	12	2	22	816
K8ROX	OH	12	2	15	1,239
N8PUM	MI	3	2	16	1,390
9					
N9LR	IL	38	2	135	1,808
KA9UVY	IL	27	1	61	1,536
AA9MY	IL	25	2	64	1,751
K9SM	IL	22	2	59	1,096
W9RPM	WI	18	2	75	1,400
KB9TLV	WI	6	1	25	577
Ø					
WØSD *	SD	50	6	89	7,345
KØALL	ND	30	2	—	—
NØLL	KS	25	2	109	1,900
KØAWU	MN	23	2	70	2,008
KBØPE	MO	21	1	65	1,033
KØFF	MO	18	1	52	1,174
KØRZ	CO	16	2	55	2,002
WØRT	KS	15	2	21	1,940
KØGU	CO	10	1	18	1,913
Canada					
VE3KH	ON	15	2	51	1,093
VE2PIJ	PQ	9	2	33	694

*Includes EME contacts
— Not given

ARRL VEC Volunteer Examiner Honor Roll

The ARRL VEC Honor Roll recognizes the top 25 Volunteer Examiners according to the total number of exam sessions they have participated in since their accreditations. Since each session requires an average time commitment of 2-4 hours or more, the thousands of hours these VEs have invested is extraordinary! Whether you are one of our VE Teams that test once a week, once a month or once a year, we want to express our warmest appreciation to all volunteers for their generous contributions to the ARRL VEC program.

If you are an ARRL VE, you can see your session stats online at **www.arrl.org/arrlvec/veparti.php**.

If you're not a VE, become one! See **www.arrl.org/arrlvec/become-a-ve.html**.

Examiner	Sessions	Accreditation Date
Sammy Neal, N5AF	487	20-Nov-1984
Royal Metzger, K6VIP	368	29-Apr-1985
Harry Nordman, ABØSX	367	9-Jan-2002
Frank Glass, K6RQ	353	29-Apr-1985
Karen Schultz, KAØCDN	339	6-Sep-1984
Glenn Schultz, WØIJR	329	28-Sep-1984
Franz Laugermann, K3FL	311	1-Dec-1991
Paul Maytan, AC2T	302	6-Sep-1984
John Mackey, Jr, KSØF	296	1-Oct-1990
Kevin Naumann, NØWDG	295	17-Nov-2002
John Moore, III, KK5NU	288	21-May-1995
David Laurel, KA6RHF	287	22-Apr-1985
Leonard Scarpelli, W6IO	285	1-Nov-1992
Victor Madera, KP4PQ	285	1-Mar-1992
John Hauner, KØIH	273	11-Jan-1985
David Bartholomew, ABØTO	271	22-Mar-2002
Daniel Calabrese, AA2HX	267	1-Nov-1991
Gerald Grant, WB5R	266	4-Jan-1985
David Fanelli, KB5PGY	265	1-Oct-1991
Scott Swanson, K6PYP	260	1-Dec-1992
Ralph Schutte, N6NAD	260	22-Aug-1997
Leslie Dale, NI5S	257	6-Sep-1984
Roy Johnson, N1IKM	256	24-Jul-1995
Mary Lewis, W7QGP	255	12-Aug-1985
Michael Faucheaux, N5KBW	255	15-Jul-1996
Gary Mangels, AD6CD	255	30-Jul-1997

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Through Dec 31, 0100Z-2359Z, Republic of Macedonia. Macedonia Telegraphic Group, Z3ØMCWG. 15th Jubilee of MCWG. 28.080 24.900 21.020 18.080 14.020 10.120 7.020 3.520 1.820. QSL. Valdimir Kovaceski, Z35M, Sava Kovacevic 47 G/55, 1000 Skopje, Republic of Macedonia. *Special Event began February 20, 2009.* **www.qrz.com/z30mcwg**

Aug 15, 1500Z-2100Z, Van Buren, IN. Grant County Amateur Radio Club, KC9ICP. 37th Annual Popcorn Festival. 146.79 14.260 7260. QSL. Bruce Tisdale, 3418 Wildwood Dr, Marion, IN 46952. **btisdale@indy.rr.com** *or* **www.GrantARC.com**

Aug 15-Aug 16, 1400Z-0200Z, Sandusky, OH. Sandusky Radio Experimental League, W8LBZ. 77th Anniversary of the Club. 28.325 21.225 14.225 7.225. Certificate. Sandusky Radio Experimental League, 2909 W Perkins Ave, Sandusky, OH 44870.

Aug 22, 1800Z-2300Z, Deming, NM. Deming Amateur Radio Club, W5DAR. 30th Annual Great American Duck Race. 14.270. QSL. Dave Jorgensen WD5COV, 18645 Cortex Rd SE, Deming, NM 88030. **www.w5dar.org**

Sep 3-Sep 14, 0000Z-2359Z, Salt Lake City, UT. Utah DX Association, K7T. 82nd anniversary of the invention of the electronic TV. 14.260 7.240. QSL. Wesley Wilkinson, W7WES, 7363 Galaxy Hill Rd, West Jordan, UT 84081. **w7wes@yahoo.com** *or* **www.udxa.org**

Sep 5-Sep 7, 1330Z-2030Z, Prairie Grove, AR. W5C. 58th Annual Clothes Line Fair. 14.265 14.260 7.265 7.260. QSL. Joe Dunn, KD5TLH, 12358 W Ervan Beeks Rd, Farmington, AR 72730. **bjoedunn@hotmail.com**

Sep 5-Sep 7, 1800Z-2000Z, Brevort Twp, MI. Lake Effect Amateur Radio Club, N8T. North Country Trail/Mackinac Bridge Segment Walk. 14.240 14.070 7.240. Certificate. Lake Effect ARC/N8T, 36 Southfork St, Marquette, MI 49855. *This 5 mile segment of the NCT is open to hiking on Labor Day each year.* **www.lakeeffectarc.info/N8T-2009.htm**

Sep 5-Sep 7, 1900Z-1900Z, Paradise, AZ. Cochise Amateur Radio Association, K7RDG. 30th anniversary of trek to Ghost Town of Paradise. 21.315 18.115 14.315 7.230. Certificate. Cochise ARA, PO Box 1855, Sierra Vista, AZ 85636-1855. **www.k7rdg.org**

Sep 7, 1400Z-2100Z, Muskegon, MI. Muskegon Area Amateur Radio Council, K4C. Cars for Cancer Car Show. 14.245 7.270 146.940. QSL. Muskegon Area Amateur Radio Council, Attn: K4C, PO Box 691, Muskegon, MI 49443. **w8zho@arrl.net**

Sep 7, 1200Z-2359Z, Nutley, NJ. Robert D. Grant United Labor Amateur Radio Assn, N2UL. CQ Labor Day. 28.460 14.260 7.250 EchoLink W2NJR-R. Certificate. RDGULARA, 112 Prospect St, Nutley, NJ 07110-0716.

Sep 9-Sep 12, 1200Z-1200Z, Wickham, HA, England. RSGB, GB1WT. Over 200 years since Admiralty Shutter Telegraph Installed. 14.200. QSL. John Wakefield, MØXIG, Oakhurst, Lower Common Rd, West Wellow, Romsey, HA SO51 6BT, England.

Sep 11-Sep 13, 1300Z-2200Z, Galveston, TX. Leslie Bartosh, AD5WB, N5I. One year anniversary of Hurricane Ike. 14.280; 40 15 10 m possible depending on conditions. QSL. Leslie Bartosh, AD5WB, 17 Campeche Dr, Galveston, TX 77554. **ad5wb2@yahoo.com**

Sep 11-Sep 13, 1700Z-1700Z, Lincoln City, IN. Tri State Amateur Radio Society, W9OG. Commemorating the 200th Anniversary of Lincoln's Birthday. 14.175 14.050 7.175 7.050. QSL. Dennis Martin, 5577 Victoria Ct, Newburgh, IN 47630. **tars@w9og.net** *or* **www.w9og.net**

Sep 12, 1400Z-2200Z, Herndon, VA. Sterling Park Amateur Radio Club, K4H. Celebrating 150 years of Railroading in Herndon. 14.265 7.265 3.865. QSL. Bill McCourt, 1554 Twisted Oak Dr, Reston, VA 20194.

Sep 12, 1600Z-2359Z, San Diego, CA. USS *Midway* (CV 41) Museum Radio Operations Room, NI6IW. USS *Midway* Commissioning 1945, National POW/MIA Remembrance Day and Tin Can Sailors National Reunion. SSB 14.320 7.250 PSK-31 7.070 CW 14.060 7.055 D-STAR 2 m/70 cm SOCAL rep. QSL. USS *Midway* Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101. **kk6fz@arrl.net**

Sep 12-Sep 13, 1500Z-0300Z, Inver Grove Heights, MN. South East Metro Amateur Radio Club, WØB. Cold War Memorial at the site of the B-52 crash on 9/16/58. 21.352 14.252 7.252 3.952. Certificate. WØCGM Special Event, 1655-68th St West, Inver Grove Heights, MN 55077. **www.semarc.org**

Sep 12-Sep 20, 0100Z-2359Z, San Bernardino, CA. Citrus Belt Amateur Radio Club, W6A-R and W6W. 10th Annual Route 66 On The Air Special Event. 21.366 14.266 7.266 3.866. Certificate. Citrus Belt Amateur Radio Club, PO Box 3788, San Bernardino, CA 92413. **www.w6jbt.org**

Sep 13, 1500Z-2030Z, Babylon, NY. Great South Bay Amateur Radio Club, W2GSB. Operating from the Babylon Village Country Fair. 14.260 3.850 7.250 14.070 PSK. QSL. W2GSB/BVF, PO Box 1356, West Babylon, NY 11704. **www.gsbarc.org**

Sep 18-Sep 20, 0000Z-2359Z, Santa Ana, CA. W6APD/KM6HB, K6P. National POW-MIA Recognition Day. 21.350 18.150 14.253 7.250. QSL. Mark McMullen, KM6HB, PO Box 27271, Santa Ana, CA 92799. **km6hb@arrl.net**

Sep 18-Sep 20, 1800Z-1700Z, Kenton, OK. Oklahoma City Astronomy Club, NØT. 26th Okie-Tex Star Party. 7.200 14.235 28.440. Certificate. Oklahoma City Astronomy Club, PO Box 22804, Oklahoma City, OK 73123-1804. *First Star Party Special Event. All invited. Stop by if you're in the area.* **ac0j@hotmail.com** *or* **www.okie-tex.com**

Sep 18-Sep 21, 0000Z-2300Z, Marquette, MI. Lake Effect Amateur Radio Club, N8T. North Country Trail Volunteer Trail Building Adventure. 14.070 7.240. QSL. Lake Effect ARC – N8T, 36 Southfork St, Marquette, MI 49855. **www.LakeEffectARC.info/N8T-2009.htm**

Sep 19, 1200Z-2000Z, Gladeville, TN. Short Mountain Repeater Club, W4YXA. Operating on Stewarts Ferry Pike for 7th Annual Gladefest. 28.400 14.250 7.220 3.820. QSL. James Gondek, 3016 Tracon Dr, White House, TN 37188-4050. **www.shortmountain.org**

Sep 19, 1200Z-2000Z, Portland, ME. Portland Amateur Wireless Association, W1KVI. Relaunch of Club Radio Room. 21.350 14.045 7.250 3.860. QSL. Michael J. Russo, PO Box 1605, Portland, ME 04104. *SSB and CW.* **www.w1kvi.org**

Sep 19, 1600Z-2100Z, Ravenna, OH. Portage Amateur Radio Club, K8B. Annual Ravenna Balloon-A-Fair and Parade. 7.250 14.250 21.250 145.390. Certificate. Gregg Gary, WB8YYS, PO Box 6336, Akron, OH 44312-0336. **wb8yys@arrl.net** *or* **www.portagearc.org**

Sep 19-Sep 20, 1300Z-2100Z, Apple Orchard, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza Apple Orchard Mile Post 76.5. 14.243 7.243. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Blue Ridge Bonanza, VA. Roanoke Valley Amateur Radio Club, W4CA. Rock Fish Gap Mile Post 0. 14.228 7.228. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Blue Ridge Bonanza, VA. Covington Amateur Radio Club, W4CA. Buena Vista Mile Post 45.6. 14.233 7.233. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. w**ww.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Blue Ridge Music Center, VA. Franklin Amateur Radio Club, W4CA. Blue Ridge Bonanza Blue Ridge Music Center Mile Post 213. 14.273 7.273. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Buena Vista, VA. Covington Amateur Radio Club, W4CA. Blue Ridge Bonanza Buena Vista 45.6. 14.233 7.233. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Doughton Park, NC. Forsythe Amateur Radio Club, W4NC. Blue Ridge Bonanza Doughton Park. 14.278 7.278. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Peaks of Otter, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza Peaks of Otter Mile Post 84. 14.248 7.248. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1300Z-2100Z, Rock Fish Gap, VA. Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza Rock Fish Gap Mile Post 0. 14.228 7.228. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **www.w4ca.us**

Sep 19-Sep 20, 1500Z-0300Z, Richmond, VA. Richmond Amateur Radio Club, W4ZA. 80 years as a ham radio club doing public service. 14.250 14.050 7.250 7.050 3.850 3.550. QSL. A. C. McNeer, K4YEF, 7817 Brentford Dr, Richmond, VA 23225. **www.rarcpio.net** *or* **www.rarclub.net**

Sep 24-Sep 27, 1300Z-2200Z, Kingwood, WV. Preston County ARES, W8B. 68th Annual Preston County Buckwheat Festival. 14.265 14.040 7.265 7.040. Certificate. William Beardslee, NN8W, 109 Western Dr, Kingwood, WV 26537.

Sep 26, 1400Z-2100Z, Pennville, IN. Jay County Amateur Radio Club, W9JCA. Balbec Days celebrates the Underground Railroad. 14.205 7.190. Certificate. Darrell Borders, PO Box 214, Portland, IN 47371.

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

WB8IMY

ECLECTIC TECHNOLOGY

A D-STAR Repeater in Space

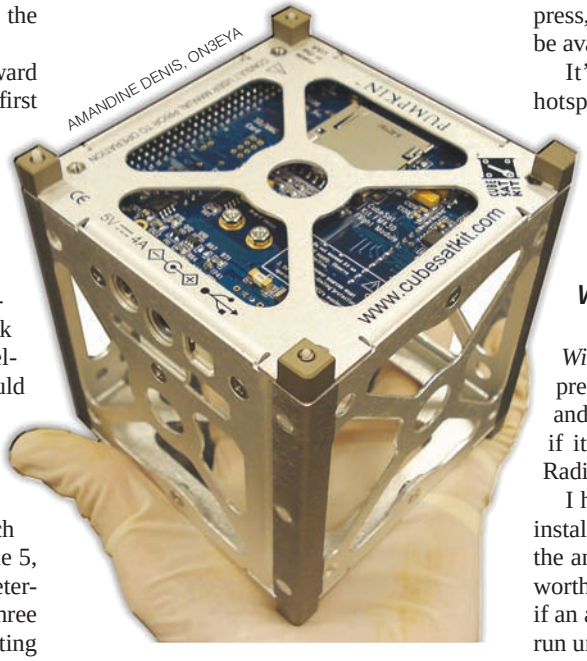
Things are percolating these days in the amateur satellite community.

Amateurs in Belgium are looking forward to the launch of OUFTI-1, the world's first D-STAR satellite. The tiny 1-kilogram CubeSat is being designed and built by students at the University of Liege. In case you're wondering, OUFTI is an acronym for Orbital Utility For Telecommunication Innovation.

The satellite will function as an orbiting D-STAR repeater with a UHF uplink and VHF downlink. OUFTI will be traveling in a relatively low orbit, but it should give hams about 10 minutes of access time during each overhead pass.

OUFTI is presently scheduled to ride aboard the maiden flight of the Vega launch vehicle from Kourou, French Guyana next spring. Compared to Ariane 5, the Vega is a small launcher. The 30-meter-tall rocket has four propulsion stages (three solid and one liquid). They're anticipating that Vega will deploy OUFTI in an orbit that should give the satellite at least a 1-year lifespan before reentering the atmosphere.

D-STAR activity has been growing in the US and overseas, so there are plenty of hams already equipped to try OUFTI. That doesn't mean that you'll be able to communicate with the satellite using a handheld D-STAR radio and a "rubber duck" antenna. Chances are you'll need a dual-band Yagi antenna, such as the popular Arrow II portable beam (**www.arrowantennas.com**), to enjoy consistent success. For the latest OUFTI updates, check their Web site at **www.leodium.ulg.ac.be/cmsms/**.



The OUFTI-1 D-STAR satellite under construction. It is presently scheduled for launch in 2010.

SumbandilaSat

Your first challenge will be to pronounce the name of this new South African satellite. (Say it five times fast!) In the Venda language, "Sumbandila" freely translates to "Pathfinder."

SumbandilaSat is sponsored by the Department of Science and Technology and is being built at SunSpace in cooperation with the University of Stellenbosch. Among its array of experiments is an Amateur Radio FM repeater with a 2-meter uplink and 70-cm downlink (just like OSCAR 51).

If all goes as planned, SumbandilaSat may be in orbit by the time you read this. The launch was originally scheduled for May, and then bumped to July. Shifting launch schedules are common, so don't be surprised if the flight is delayed yet again. You'll find more information online at **www.amsatsa.org.za/SZASAT.htm**.

XW-1 Status

Speaking of delays, you may recall my column earlier this year where I discussed the Chinese XW-1 Amateur Radio satellite, the one that will feature an SSB/CW linear transponder, FM repeater and digital store-and-forward system.

According to Project Manager Alan Kung, BA1DU, the launch has been postponed to December. This is a potentially exciting satellite, so keep your eyes peeled for updates.

D-STAR Hotspot Update

In my July column I described a D-STAR hotspot designed around a GMSK node adapter created by Satoshi Yasuda, 7M3TJZ. Not long after the issue went to press, Satoshi's boards sold out, but they will be available again soon.

It's important to point out that these hotspots are not D-STAR systems per se. D-STAR *compliant* might be a more accurate description. The Hot Spot does not provide call sign routing or slash routing, and the traffic does not appear on **dstarusers.org**.

Windows 7

Microsoft says it will release its new *Windows 7* operating system this fall. The pre-release reviews have been very positive and hams are already contacting me to ask if it is compatible with current Amateur Radio software.

I haven't had the nerve to download and install the *Windows 7* "release candidate," so the answer is "I don't know." For what it is worth, my contacts at Microsoft tell me that if an application will run under *Vista*, it will run under *Windows 7*.

For *Windows XP* users, Microsoft is presently testing something called *XPM*. When it is ready, *XPM* will be offered as a *Windows 7* add-on to provide complete *XP* compatibility. This is not to say that your current *XP* applications won't run under *Windows 7*, but apparently *XPM* is designed to provide as close to a 100% guarantee as reasonably possible. No word about a price tag for *XPM*, if any.

Get Your News in Morse Code!

Chris Kantarjiev, K6DBG, has done a very cool thing for Morse aficionados. He took the CNN "breaking news" feed that they supply to Twitter and used a custom application to convert it to Morse code at various speeds. You can listen to the Morse news feeds by pointing your Web browser to **http://cw.dimebank.com:8080**.

The audio is streamed in a *WinAmp* "playlist file" format. It tried to get it to work with *Windows Media Player* without success, although others have managed to do so. The solution for me was to download and install the free *WinAmp* media player at **www.winamp.com**. When you install *WinAmp*, say "yes" when it asks if you want to associate it with all media files. With *WinAmp* installed, Chris's Morse news feed worked like a champ. QST

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

K2TQN

VINTAGE RADIO

Displaying Your Collection

Nothing is more impressive than a vintage station that shows some planning went into the display, one that is carefully laid out and is convenient to use. And, of course, having highly desirable equipment puts the icing on the cake. Collins radios are highly desirable and almost everybody wants to collect a Collins station. And some of the nicest displays are desks that were sold as Collins accessories by dealers.

The first display was made by a company called Design Industries Inc of Dallas, Texas. They manufactured a nice designer-styled Collins desk that I saw advertised in several magazines back in the 1960s and '70s. The one shown here is the President model. They also had an Ambassador model that only allowed one row of radios.

PETER ZILLIOX, K5PZ

Pete Zilliox's desk in his new California QTH.

Back then I couldn't afford the desk and didn't need one anyway because I couldn't afford the S-line to go in it. Today the same desk is very scarce and is almost unaffordable for most of us. There must be a few of them still in existence, but so far I have found only one available and it was listed for sale on the Internet.

I contacted the owner, James P. Cessna, KB8N. He was offering it with a complete Collins station. The combined cost was reasonable, but by then I had all the Collins gear I needed; I decided to pass on the package deal. James was kind enough to provide some photos of it for this column. The photo of the rear shows the detail of the construction in case someone talented in woodwork wants to replicate it. (If anyone does this or has a set of plans, please e-mail me.)

PETER ZILLIOX, K5PZ

Pete Zilliox with his desk in 2006.

The premise of the design, I think, was to get spousal approval for locating the station in the den or a corner of the living room. When it was closed up it resembled a desk and was a fine looking piece of furniture. Opened, it was all ham station. My spouse, Sherry, liked it and said it was okay for me to buy it, but she wanted all the other junk removed from the house first — another reason I passed on it. (She was really saying no.)

The second display was made by "Hoss-Trader Ed" Moory, a big ham radio and Collins dealer in De Witt, Arkansas. Ed was a good friend of Art Collins, WØCXX (SK). Art had a big desk built in the Collins shop, but was not interested in selling furniture. Ed Moory was the one who instigated the tooling up and copied the Collins console. That resulted in a "handful" being built. The original cost was $895 and it was called the Nova-K.

I saw one for auction on eBay in 2006 that claimed it had once been at W1AW. Even though it seemed way too big for my shack, I really wanted to bid on it. Eventually a major Collins collector from Texas, Peter Zilliox, K5PZ, was the successful bidder. I contacted him and kept in touch so I could write about this fabulous desk.

The desk has an interesting history. The eBay seller said it had first been at the New York World's Fair in 1964-65. Then it was moved to ARRL Headquarters and placed in the W1AW station building in the late '60s and early '70s. It was the guest operating position and was full of Collins S-line equipment.

The eBay ad said it was big and very heavy. Pete provided the Nova-K Console measurements: The large top section is 88 inches × 36 inches, the L-shape secretary's extension is 41.5 inches × 18 inches, the large top section is 28.5 inches off the floor and the L-shape secretary's extension is 25.5 inches off the floor.

The Nova-K's Story

In an e-mail interview, Pete had this to say:

Tell me about your trip to pick it up (or how did you get it home?)

"A brand new Volvo tractor (3500 miles on the odometer) big rig from North American Van Lines picked it up in Connecticut and dropped it off at my house in Texas. All I did was read a credit card number over the telephone."

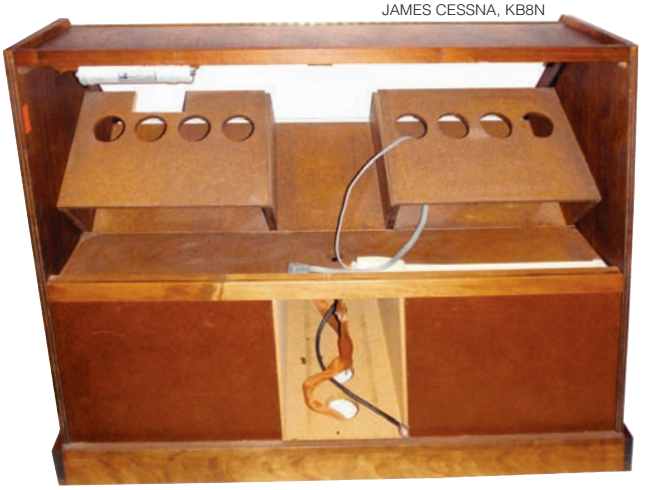
Why did you want it in the first place?

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

JAMES CESSNA, KB8N

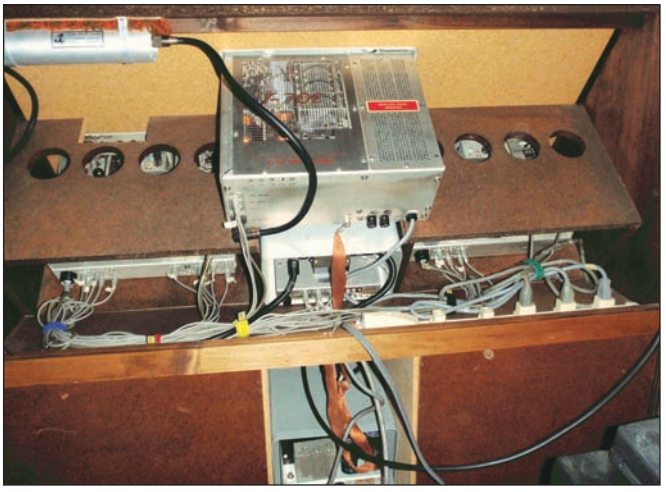
Design Industries "President" desk.

JAMES CESSNA, KB8N



A talented woodworker could replicate this.

JAMES CESSNA, KB8N



Rear view showing cable layout.

PETER ZILLIOX, K5PZ

Photo of an earlier K5PZ Collins shack.

"I've always wanted one of these consoles since I first saw one in Collins literature and one in person. My good friend Joe Beler, W5JB (SK) had one in his home here in Dallas. My knees weakened every time I visited his shack and saw it. That console ended up in California in a well-known Collins collector's shack."

I seem to remember seeing your name at ARRL. Did you work there?

"Yes, I worked at the ARRL HQ as a Lab technician/Summer Intern Student '69, '70 and '71. I reported to Doug DeMaw and my bench was adjacent to Lew McCoy's. My projects appeared in *QST* and the *Handbook*. A picture of me appeared for several years in the Mobile Section of the *Handbook*, standing next to Lew McCoy's Camaro."

Was the desk at W1AW when you worked there?

"Yes, it was. I worked in the ARRL Headquarters Lab and I very rarely went over to W1AW. I never had a chance to work a QSO at the station. Visitors could only operate at certain times and it never seemed to work out."

What is in the future for you and the desk?

"I decided against refinishing the wood because the distressed look has some historic significance to it. I may rotate which equipment is in the console. But I definitely plan on using the console on the air for the foreseeable future."

How did you talk your spouse into it?

"We are newlyweds, 4 months now. [This was in 2006 — *Ed.*] She kind of knew what she was getting herself into after seeing my radio room prior to marriage."

And is there anything else you'd like to say?

"If there is enough interest, I might consider documenting the desk's construction and see about making a production run of knock-off consoles, if the market warranted."

Conclusion

While writing this column I found another Nova-K for sale. Kissing-up to Sherry by promising her that I would remove the junk from my operating station in our home, replace the carpeting and give the room a fresh coat of paint, she agreed that I could get it. In a couple of months, if all goes well, I'll have a photo of my Collins station for you.

You can check my Web page for larger photos of these desks and updates as I find items of interest about them. Visit **www.k2tqn.com** and please e-mail me with any additional information you discover. — *K2TQN* QST

AT THE FOUNDATION

Each year the ARRL Foundation reviews hundreds of scholarship applications from radio amateurs seeking to pursue advanced education. The 2009 awards have been made to 58 qualified students representing more than $62,200 in scholarships that will help young hams studying electronics, engineering, communications, computer technology and related subjects. In addition, the award of the William R. Goldfarb Memorial Scholarship was made to Dean LaBarba, KI6CUX. These young radio amateurs excel in academics, contributions in community service and activities in Amateur Radio. We offer heartiest congratulations and wish each of them the best of luck!

The application period for the 2010 scholarship awards opens October 1, 2009 and closes promptly on February 1, 2010. All the information about ARRL Foundation Scholarships, including application instructions and forms, can be found on the Web at **www.arrl.org/arrlf/scholgen**. Candidates should review the descriptions of all the scholarships and apply only those for which they qualify. Note that a recent transcript is required of all candidates. The William R. Goldfarb Memorial Scholarship is open only to high school seniors who must complete the application for that award and include a FAFSA or SAR based on the most recent family financial information, along with a full high school transcript.

A special note for Amateur Radio Clubs: You can help young hams in your area by including this scholarship information in your next club newsletter, and share it with members, especially students and their parents, at your next club meeting.

Aleda Leis, KB3SAY
The You've Got A Friend in Pennsylvania Scholarship

Alesha Blair, KG4UJI
The Carole J. Streeter KB9JBR Scholarship

Alex Brech, KCØYLD
The Dayton Amateur Radio Association Scholarship

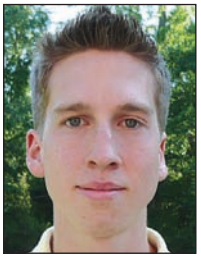
Andrea Hill, KD8FJS
The YASME Foundation Scholarship

Andrew Grimmett, KD8GQA
The Gary Wagner, K3OMI Scholarship

Anthony Tran, KI6SYT
The Charles N. Fisher Memorial Scholarship

Celeste Carruth, KB1QKY
The New England FEMARA Scholarship

Chris Lee, KI4RSZ
The Charles Clarke Cordle Memorial Scholarship



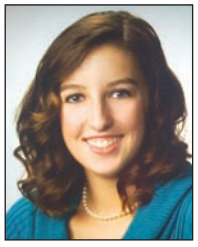
Daniel Ellis, KG4IVC
The ARRL Foundation General Scholarship

Daniel Garfield, W8DMG
The Thomas W. Porter, W8KYZ Scholarship

David Clark, KD7NZK
The Central Arizona DX Association Scholarship

Eddie Schnell, KC2TGD
The Dr. James L. Lawson Memorial Scholarship

Elizabeth Alpert, KG6JDH
The William Bennett, W7PHO Memorial Scholarship

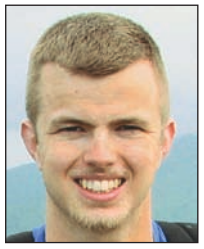


Emily Stewart, KCØPTL
The Dayton Amateur Radio Association Scholarship

Frederick J. Meyer, KG6ECE
The L.B. Cebik, W4RNL and Jean Cebik, N4TZP Memorial Scholarship

Ian Blodger, KD8AII
The Zachary Taylor Stevens Sholarship

Jacob Wagner, KD8CDC
The K2TEO Martin J. Green Memorial Scholarship



Jeremy Schotter, KC9GIC
The Edmond A. Metzger Scholarship

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

John Hays, KC9LVZ
The Peoria Area Amateur Radio Club Scholarship

Jonathan Baize, AD5OJ
The Richard W. Bendickson Memorial Scholarship

Josiah DeVore, KJ4IEB
The IRARC Memorial Joseph P. Rubino WA4MMD Scholarship

Justin Hughes, KE5VBT
The Mississippi Scholarship

Kathryn Ankenbauer, KD8AHA
The YASME Foundation Scholarship

Kerry Manderbach, KØXOK
The Paul and Helen L. Grauer Scholarship

Lisa Capobianco, KB1HZY
The New England FEMARA Scholarship

Matthew Pepper, KJ4FUT
The L. Phil Wicker Scholarship

Michael Hodgen, KD7UUB
The YASME Foundation Scholarship

Michaline Sierakowski, KC9ARP
The Six Meter Club of Chicago Scholarship

Morgan Pinkerton, KE5OVF
The Thomas and Judith Comstock Scholarship

Nick Bauer, KC9GZY
The Dayton Amateur Radio Associatiaon Scholarship

Noah Jaffe, W4IEI
The YASME Foundation Scholarship

Rachel Jackman, KC8RVT
The Albert H. Hix, W8AH Memorial Scholarship

Rebecca Rich, KBØVVT
The PhD Amateur Radio Association Scholarship

Reid Morine W4RSM
The Challenge Met Scholarship

Richard Pellerin, KE5HSZ
The Louisiana Memorial Scholarship

Daniel Fourie, KI6SSK
The ARRL Foundation General Scholarship

Robert Giuliani, K1RJG
The New England FEMARA Scholarship

Robert Hoops, W3EGL
The You've Got a Friend in Pennsylvania Scholarship

Sabra Perry, KD7JPR
The Mary Lou Brown Scholarship

Scott Button, KF3CP
The Bill Salerno, W2ONV Memorial Scholarship

Scott Durham, KCØQIL
The Irving W. Cook WAØCGS Scholarship

Thomas Catanach, KD5HHZ
The Scholarship of the Morris Radio Club of New Jersey

Tom Fielitz, KC8YAK
The Dayton Amateur Radio Association Scholarship

William Nelson, KC9HVW
The Earl I. Anderson Scholarship

William J. Fisher, W4WJF
The YASME Foundation Scholarship

Not pictured: Henry Ferland III, KB1HOY
The Yankee Clipper Contest Club, Inc. Youth Scholarship

ARRL FOUNDATION

CONVENTION AND HAMFEST CALENDAR

Abbreviations
Spr = Sponsor
TI = Talk-in frequency
Adm = Admission

Alabama (Attalla) — Sep 12 V
8 AM-3 PM. *Spr:* Gadsden ARC. Etowah County Fairgrounds, Griffin St SE. Sales and trades of equipment, fellowship. *TI:* 147.16 (100 Hz). *Adm:* Free. Tables: Free. Dave Waits, K4VMV, 2169 Cove Cir E, Gadsden, AL 35903; 256-492-9562; **k4vmv@bellsouth.net**; **garc.org**.

Alabama (Headland) — Oct 3 F T V
8 AM-1 PM. *Spr:* Wiregrass ARC. Headland Town Square, 10 Park St. ARRL info booth. *TI:* 145.43. *Adm:* Free. Tables: $5. James Nelson, KE4GWW, 415 Gwaltney Dr, Dothan, AL 36303; 334-685-1642; **ke4gww@arrl.net**; **www.wb4zpi.org**.

Arkansas (Little Rock) — Sep 19 F R T V
8 AM-3 PM. *Spr:* Central Arkansas Radio Emergency Net (CAREN). Catholic High School, 6300 Father Tribou St. *TI:* 146.94. *Adm:* $1. Tables: $5. Mark Barnhard, KD5AIV, 12563 Southridge Dr, Little Rock, AR 72212; 501-221-3909; **mbarnhard@aristotle.net**; **www.carenclub.com**.

Delta Division Convention
September 11-12, Mena, Arkansas
D F R S T V

The Delta Division Convention, sponsored by the Queen Wilhelmina Hamfest Assn, will be held at the Queen Wilhelmina State Park, 3877 Hwy 88 W. Doors are open Friday 7 AM-4 PM, Saturday 7 AM-3 PM. Features include 40th Annual Event, flea market, vendors, tailgate area, Arkansas Repeater Council Meeting, forums, VE sessions, Friday night BBQ under tent, Saturday eve banquet in lodge (special guest speaker, come see who it is), special singing and ice cream social, plenty of RV and tent camping. Talk-in on 146.79 (100 Hz). Admission is free. Space under tent is $10 (bring your own tables); $5 for space outside tent. Contact Larry Rogers, N5BRD, 2316 Old Hardscrabble Rd, Greenwood, AR 72936; 479-996-9674; **n5brd@centurytel.net**; **www.qwha.org**.

California (Lincoln) — Sep 12 F H V
7 AM-noon. Sprs: Western Placer ARC, River City AR Communications Society, and Yuba-Sutter ARC. Lincoln High School, 790 J St. Sacramento Valley Hamfest. *TI:* 146.64 (156.7 Hz). *Adm:* Free. Tables: $10. Steve Harding, KT6Z, 236 Chambers Dr, Lincoln, CA 95648; 916-434-2878; **kt6z@arrl.net**; **www.svhamfest.org**.

Colorado (Longmont) — Sep 27 F V
8 AM-noon. *Spr:* Boulder ARC. Boulder County Fairgrounds Exhibit Building, 9595 Nelson Rd. 56th Annual Event, ARRL table. *TI:* 146.7. *Adm:* $5. Tables: advance $10, door $15. Michael Derr, W3DIF, 13815 Meadowbrook Dr, Broomfield, CO 80020; 303-404-2161 (phone and fax); **mderr44995@aol.com**; **www.qsl.net/w0dk**.

Connecticut (Newtown) — Sep 13
D F H R S T
Set up 7 AM; public 8:30 AM-12:30 PM. *Spr:* Candlewood ARA. Edmond Town Hall, 45 Main St (Rte 6). Western CT Hamfest, batteries special. *TI:* 147.3 (100 Hz). *Adm:* $6, under 10 free. Tables: $15, tailgating $10 (each ncludes 1 admission). Joe de Groot, AB1DO, 30 Sunnyview Dr, Redding, CT 06896-1742; 203-938-4880; fax 203-938-4886; **ab1do@arrl.net**; **www.danbury.org/cara/hamfest.html**.

Florida (Odessa) — Sep 26 F T
8 AM-2 PM. *Spr:* Suncoast ARC. Gunn Hwy Flea Market, 2317 Gunn Hwy. Pasco County Hamfest. *TI:* 146.64. *Adm:* $5. Tables: $1. Ron Wright, N9EE, 8849 Gum Tree Ave, New Port Richey, FL 34653; 727-376-6575 (phone and fax); **mccrpt@verizon.net**; **www.qsl.net/sarc/**.

Florida (Orlando) — Sep 12 F H T
Set up 7 AM; public 8 AM-2 PM. *Spr:* AR Unit of Bahia Shrine. Bahia Shrine Center, 2300 Pembrook Ave. *TI:* 147.39 (103.5 Hz). *Adm:* $4. Tables: $6. Warren Hill, W4WHH, 177 Hanging Moss Dr, Oviedo, FL 32765; 407-365-6682; **w4whh@arrl.net**; **www.bahiashrine.org/~radio/Tailgate.htm**.

Florida (Tampa) — Aug 29 F V
8 AM-1 PM. *Spr:* Tampa ARC. Tampa ARC Clubhouse, 7801 N 22nd St. *TI:* 147.105 (146.2 Hz). *Adm:* $2. Tables: $3. William Bode, N4WEB, 14302 Capitol Dr, Tampa, FL 33613; 813-382-9262; fax 813-878-4020; **n4web@hamclub.org**; **www.hamclub.org**.

Florida (Titusville) — Sep 26 T V
7 AM. *Spr:* North Brevard ARC. Jess Parish Medical Center, 951 N Washington Ave. ARRL table. *TI:* 147.33 (107.2 Hz). *Adm:* Free. Bob Jones, N6USP, 4743 Cambridge Dr, Mims, FL 32754; 321-264-2622; fax 321-383-1864; **n6usp@bellsouth.net**; **www.northbrevardarc.org/tailgateparty.htm**.

Georgia (LaGrange) — Oct 3 S V
9 AM-1 PM. *Spr:* LaGrange ARC. Oakside Baptist Church Gym, 1921 Hamilton Rd. *TI:* 146.7 (141.3 Hz). *Adm:* Donation. Tables: $10. Gary Pike, KA4KBX, Box 926-OLH, Roanoke, AL 36274-0926; **lagrangehamfest@yahoo.com**; **www.lagrangeradioclub.org/LaGrange_Hamfest_Flyer_2009.pdf**.

Hawaii (Waimea/Kamuela) — Sep 12 F V
9 AM-1 PM. *Spr:* Big Island ARC. Waimea Senior Center, Hwy 19. *TI:* any of BIWARN system repeaters. *Adm:* Free. John Buck, KH7T, Box 489; Kamuela, HI 96743-0489; 808-885-9718; **kh7t@arrl.net**; **www.arrl.org/sections/?sect=PAC**.

Illinois (Belvidere) — Sep 12-13 V
Saturday 6 AM-4 PM; Sunday 6 AM-3 PM. *Spr:* Chicago FM Club. Boone County Fairgrounds, US Rtes BR 20 and IL 76. Radio Expo 2009. *TI:* 146.76 (107.2 Hz), 147.255 (114.8 Hz), 444.725 (107.2 Hz). *Adm:* advance $8, door $10. Tables: $20. Mike Brost, WA9FTS, 5127 N Monterey Dr, Norridge, IL 60706; 708-457-0966 (phone and fax); **mikeb2006@comcast.net**; **www.chicagofmclub.org**.

Coming ARRL Conventions

August 14-15
New Mexico State, Albuquerque*

August 15
Southwestern Division, Santa Barbara, CA*

August 15-16
Alabama Section, Huntsville*

August 16
Kansas State, Salina*

August 22
West Virginia State, Weston*

August 23
Western Pennsylvania Section, New Kensington*

October 11
Connecticut State, Wallingford

*See August *QST* for details.

W9DXCC Convention
September 18-19,
Elk Grove Village, Illinois
Q R S

The W9DXCC Convention (57th W9DXCC DX Convention and Banquet), sponsored by the Northern Illinois DX Assn, will be held at the Holiday Inn, 1000 Busse Rd (Rte 83). Doors are open Friday eve for Welcome Reception at 7:30 PM, Saturday registration at 8 AM, convention begins at 9 AM. Features include forums and presentations with world-renowned speakers; ARRL News and Views; DXCC, WAS, and VUCC card checking; CW Copying Contest; Hospitality Suites (Friday and Saturday eves at 10 PM), banquet (Saturday, 6:30 PM; special guest speaker ARRL President Joel Harrison, W5ZN). Talk-in on 147.36. Admission is $60 in advance, $65 at the door (convention and banquet); $35 in advance, $40 at the door (convention only). Contact Bill Smith, W9VA, 2635 Crestwood Ln, Riverwoods, IL 60015; 847-945-1564; **w9va@aol.com**; **www.w9dxcc.com**.

ARRL/TAPR Digital Communications Conference
September 25-27, Chicago, Illinois
H S

The 2009 ARRL/TAPR Digital Communications Conference will be held at the Holiday Inn Hotel Elk Grove Village, 1000 Busse Rd, Elk Grove Village, IL (tel 847-437-6010). Technical and introductory sessions Friday and Saturday followed by a Friday evening Social and Saturday evening Banquet. The Sunday seminar focuses on a topic and provides an in-depth four-hour presentation by an expert in the field. Register in advance by calling the Tucson Amateur Packet Radio (TAPR) at 972-671-8277, or online at **www.tapr.org/dcc**.

Illinois (Logan) — Oct 10 F T V
7 AM-1 PM. *Spr:* Little Egypt ARS. Old Logan Grade School, Logan Rd. *TI:* 146.805 (88.5 Hz). *Adm:* $5. Tables: $5. Jason Sample, KF9CZ, 7551 Grammer Rd, Sesser, IL 62884; 618-525-6871; **jasons@clintonelectricinc.com**; **www.learsradio.com**.

Illinois (Peoria) — Sep 19-20 D F Q R S V
Saturday 6 AM-4 PM, Sunday 6 AM-2 PM (commercial buildings open 8 AM Saturday and Sunday). *Spr:* Peoria Area ARC. Exposition Gardens, 1601 W Northmoor Rd. 51st Peoria Superfest. *TI:* 147.075 (103.5 Hz). *Adm:* advance $6, door $8. Tables: $20. John Coker, N9FAM, 133 Vonachen Ct, E Peoria, IL 61611; 309-369-7428; **n9fam@comcast.net**; **www.peoriasuperfest.com**.

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

Indiana (Bedford) — Oct 4 F V
6 AM-2 PM. *Spr:* Hoosier Hills Ham Club. Lawrence County 4-H Fairgrounds, US Hwy 50 W. 48th Annual Hamfest, free chili supper (Saturday eve). *TI:* 146.73 (107.2 Hz). *Adm:* $8 (under 13 free). Tables: $10. Keith Harris, N9KH, 1618 Windwood Dr, Bedford, IN 47421; 812-275-3415; **n9kh@comcast.net**; **www.hoosierhillshamfest.org**.

Indiana (Crown Point) — Oct 10 V
8 AM-1 PM. *Spr:* Lake County ARC. Lake County Fairgrounds, Industrial Arts Building, 889 S Court St. All indoors. *TI:* 147.0 (131.8 Hz), 146.52. *Adm:* $5. Tables: Free (electricity available). Rich Gilles, KA9SVS, 156 S Ridge St, Crown Point, IN 46307; 219-662-0594; **paris156@yahoo.com**; **www.qsl.net/w9lj**.

Iowa (Mondamin) — Sep 20 D F R
8 AM-noon. *Spr:* Boyer Valley ARC. Mondamin Community Center, 200 Maple St. 11th Annual Flea Market. *TI:* 145.13. *Adm:* $2. Tables: $4. John Pixley, ABØVX, Box 181, Logan, IA 51546; 402-636-2001; **ab0vx@arrl.net**; **www.bvarc.net**.

Iowa (West Liberty) — Oct 4 F T V
7 AM-1 PM. *Sprs*: Muscatine and Washington Area ARCs. Muscatine County Fairgrounds, 101 N Clay St. Saturday eve (Oct 3) hotdog roast at 6 PM. *TI:* 146.91, 146.85 (192.8 Hz). *Adm:* $5. Tables: $10. Tom Brehmer, NØLOH, 1114 E Tenth St, Muscatine, IA 52761; 563-263-3097; **n0loh@arrl.net**; **www.muscatinehams.org/hamfest.html**.

Kansas (Chanute) — Oct 3 F
11 AM-3 PM. *Spr:* Chanute Area ARC. Zion Lutheran Church Activity Center, 1202 W Main St. *TI:* 146.745 (100 Hz). *Adm:* $2. Tables: Free. Keith Rather, KBØZAI, 7630 220th Rd, Chanute, KS 66720; 620-431-0930; **klrather85@midwest-connections.com**; **www.caarc.org**.

Kansas (Wichita) — Oct 3 F V
8 AM-1 PM. *Spr:* Valley Center ARC. Sweetbriar Bingo Hall, 2349 N Amidon. 8th Annual Hamfest. *TI:* 146.94. *Adm:* $2. Tables: $5. Jim Cochran, KØRH, 3600 W 77th St N, Valley Center, KS 67147; 316-755-2283; **k0rh@cox.net**; **www.vcarc.org**.

Kentucky (Richmond) — Sep 19 F V
8 AM-1 PM. *Spr:* Central Kentucky ARS. Madison County Fairgrounds, KY Rte 52. *TI:* 145.37 (192.8 Hz). *Adm:* $6. Tables: $5. Mike Rogers, KE4ISW, 144 Allen Douglas Dr, Richmond, KY 40475; 859-624-9156; **ke4isw@arrl.net**; **www.qsl.net/ckars/hamfest/**.

Kentucky (Shepherdsville) — Sep 12 D F S T V
9 AM-2 PM. *Spr:* Greater Louisville Hamfest Assn. Paroquet Springs Conference Centre, 395 Paroquet Springs Dr. *TI:* 146.7 (79.7 Hz). *Adm:* advance $6, door $7. Tables: $10. Bob Myers, c/o Greater Louisville Hamfest Assn, Box 34444, Louisville, KY 40232-4444; 502-935-6710; **GLHA09@LouisvilleHamfest.com**; **LouisvilleHamfest.com**.

Louisiana (Kenner/New Orleans) — Oct 3 D F R S T V
Set up Friday 5-7 PM; public Saturday 8 AM-2 PM. Sprs: New Orleans ARC, Westside ARC, and Thibodaux ARC. Knights of Columbus Hall, 3310 Florida Ave. *TI:* 146.82 (114.8 Hz). *Adm:* $5. Tables: $10 ($5 tailgating). Tyler Chutz, KE5WWX, 504-281-8328; **tyler@noarc.info**; or Joe Glorioso, N5OZG, 504-288-7084 or 504-708-4527 (hamfest hotline); **joen5ozg@bellsouth.net**; **www.cqtopia.com/nolahamfest/**.

Louisiana (Pineville) — Oct 10 S V
8 AM-3 PM. *Spr:* Central Louisiana ARC. Kees Park, Hwy 28 E. *TI:* 147.33 (173.8 Hz). *Adm:* Free. Tables: $10. Bryan Haviland, KE5NTY, 935 Retreat St E, Pineville, LA 71360; 337-739-1657; **bryan.j.haviland@gmail.com**; **www.clarc.us**.

Maine (Alexander) — Sep 19 F V
8 AM-noon. *Spr:* St Croix Valley ARC. Alexander Elementary School, Rte 9. *TI:* 147.33 (118.8 Hz). *Adm:* $5. Tables: $20. Mike Sanford, KB1GEO, 40 Hill Side St, Baileyville, ME 04694; 207-427-3058; **kb1geo@aim.com**; **www.stcroixvalleyamateurradioclub.org/**.

Maine (Windsor) — Sep 12 F V
8 AM-1 PM. *Spr:* Augusta ARA. Windsor Fairgrounds, Ridge Rd (SR 32). Meetings, overnight camping with hookups. *TI:* 146.88 (100 Hz). *Adm:* $5. Bill Crowley, K1NIT, 150 Maple St, Farmingdale, ME 04344; 207-623-9075; **k1nit@arrl.net**; **w1tlc.com**.

Maryland (West Friendship) — Oct 4 F T V
7 AM-4 PM. *Spr:* Columbia ARA. Howard County Fairgrounds, 2210 Fairgrounds Rd. *TI:* 147.135 (156.7 Hz). *Adm:* $6. Tables: $20 (indoors). Dave Prestel, W8AJR, 10160 Tanfield Ct, Ellicott City, MD 21042; 410-552-2652; fax 410-981-5146; **info@carafest.org**; **www.carafest.org**.

Massachusetts (Cambridge) — Sep 20. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); **w1gsl@mit.edu**; **www.swapfest.us**.

Michigan (Adrian) — Sep 20 F R T V
7 AM-4 PM. *Spr:* Adrian ARC. Lenawee County Fairgrounds, 602 Dean St. 37th Annual Ham Radio Swap. *TI:* 145.37 (85.4 Hz). *Adm:* $5. Tables: $10 (tailgating $5). Marjie Willey, KB8TMM, 307 Pentecost Hwy, Onsted, MI 49265; 517-467-6303; **maggie214@frontiernet.net**; **www.w8tqe.com**.

Michigan (Grand Rapids/Lowell) — Sep 12 F S T V
8 AM-1 PM. *Spr:* Grand Rapids ARA. Kent County Fairgrounds, 225 S Hudson St. *TI:* 147.26 (94.8 Hz). *Adm:* $6. Tables: $10. Jack Amelar, NY8D, Box 3282, Grand Rapids, MI 49501-3282; 616-897-6885; **grahamfest09@w8dc.org**; **www.grahamfest.org**.

Minnesota (Rush City) — Sep 12
9 AM-noon. *Spr:* East Central Minnesota ARC. Rush City High School, 51001 Fairfield Ave. 17th Annual Rush City Radio Rendezvous. *TI:* 145.33 (146.2 Hz). *Adm:* Free. Tables: Free. Larry Jilek, KAØMEN, 51835 Belle Isle Dr, Rush City, MN 55069; 320-358-4205; **lj@ecenet.com**; **ecmarc.us**.

Montana (Bozeman) — Oct 3 F H S V
8 AM-4 PM. *Spr:* Gallatin Ham Radio Club. Sacajawea Middle School, 3525 South 3rd Ave. 13th Annual Hamfest, foxhunt. *TI:* 146.88 (100 Hz). *Adm:* $3. Tables: $10. Bob Leo, W7LR, 6790 S 3rd Rd, Bozeman, MT 59715; 406-586-8012; **w7lr@aol.com**; **www.w7ed.com**.

New Jersey (Mullica Hill) — Sep 20 F Q T V
8 AM-2 PM. *Spr:* Gloucester County ARC. 4-H Fairgrounds, 275 Bridgeton Pike (Rte 77). *TI:* 147.18 (131.8 Hz). *Adm:* $6. Tables: $10. Harry Elwell, K2ATX, 819 Thoreau Ln, Williamstown, NJ 08094; 856-513-0407; fax 866-849-4493; **hamfest@w2mmd.com**; **www.w2mmd.com**.

New Jersey (Wall Township) — Oct 3 F T V
6 AM-1 PM. *Spr:* Ocean-Monmouth ARC. Infoage Learning Center, Project Diana Site, Marconi Rd. *TI:* 145.11 (127.3 Hz). *Adm:* $5. Tables: $10. Jeff Harshman, N2LXM, 5 The Arborway, Ocean, NJ 07712; 732-996-0637; **n2lxm@juno.com**; **www.omarc.org**.

New Mexico (Alamogordo) — Sep 5 F H R V
7 AM-2 PM. *Spr:* Alamogordo ARC. Otero County Fairgrounds, 401 Fairgrounds Rd. 25th Annual Hamfest. *TI:* 146.8. *Adm*: Free. Larry Moore, WA5UNO, 1830 Corte Del Ranchero, Alamogordo, NM 88310; 575-437-0145; **www.alamohams.org**.

New Mexico (Roswell) — Oct 3 R T
7 AM-3 PM. *Spr:* Pecos Valley ARC. Pecos Valley ARC Clubhouse, 1 Cahoon Park. *TI:* 146.94. *Adm:* Free. Rich Brown, KE5IAY, 152 Bittersweet Rd, Lake Arthur, NM 88253; 575-703-0204; **ke5iay@swwmail.net**; **www.dfn.com/pvarc/**.

New York (Horseheads) — Sep 26 D F H R T V
Flea market 6 AM-2 PM; vendor building 8 AM-2 PM. *Spr:* ARA of the Southern Tier. Chemung County Fairgrounds, Grand Central Ave. 34th Annual Elmira International Hamfest/Computerfest, bunny hunt, overnight camping. *TI:* 147.36, 146.7. *Adm:* advance $5, door $6. Tables: $14 (by Sep 15), $17 (after Sep 15). Elliott Blauvelt, N2OJM, c/o 2009 Hamfest, Box 614, Horseheads, NY 14845-0614; 607-739-5626; fax 607-739-4469; **2009hamfest@arast.org**; **www.arast.org**.

New York (Pompey/Syracuse) — Sep 19 D F H R S V
8 AM-2 PM. *Spr:* Radio Amateurs of Greater Syracuse. Pompey Hills Fire Department, Henneberry Rd. 54th Annual Hamfest, awards. *TI:* 147.3. *Adm:* $5. Tables: 8-ft $10. Viv Douglas, WA2PUU, c/o RAGS, Box 88, Liverpool, NY 13088; 315-698-4558; **ragsonline@hotmail.com**; **ragsinreview.com**.

EmComm East Convention
October 3, Rochester, New York
S V

The EmComm East Convention, sponsored by the Monroe County ARES, will be held at St John Fisher College, 3690 East Ave. Doors are open 9 AM-5 PM. Features include an Amateur Radio emergency communications conference where Amateur Radio operators involved in EmComm can attend training sessions on

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 **September 1** to be listed in the **November** 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**.

technical topics, learn from served agencies, obtain VE testing for license upgrades, and interact with other EmComm operators from all over the area. Special guest from ARRL HQ COO Harold Kramer, WJ1B. Talk-in on 146.61, 444.45 (both 110.9 Hz). Admission is $30. Contact Jeff Wigal, WY7Q, Box 10011, Rochester, NY 14610; 585-241-9873; **info@emcommeast.org**; **www.emcommeast.org**.

North Dakota (Grand Forks) — Oct 3 F R S V
8:30 AM-noon. *Spr:* Forx ARC. Zion United Methodist Church, 1001 24th Ave S. *Tl:* 146.94. *Adm:* $5. Tables: Free. Karen Noss, NØTKP, 1113 4th Ave N, Grand Forks, ND 58203; 701-775-7781 (phone and fax); **klnoss@gra.midco.net**; **www.wa0jxt.org**.

Ohio (Berea) — Sep 27 F R S V
8 AM-2 PM. *Spr:* Hamfest Assn of Cleveland. Cuyahoga County Fairgrounds, 164 Eastland Rd. Hamfest/Computer Show. *Tl:* 146.73 (110.9 Hz). *Adm:* $6. Tables: $20. William Beckman, N8LXY, c/o Hamfest Assn of Cleveland, Box 81252, Cleveland, OH 44181-0252; 800-CLE-FEST; **www.hac.org**.

Ohio (Cincinnati) — Sep 20 D F R S V
Set up 6 AM; public 8 AM-3 PM. *Spr:* Greater Cincinnati ARA. Diamond Oaks Career Development Center, 6375 Harrison Ave. ARRL Booth, hidden transmitter hunt. *Tl:* 146.88, 145.37. *Adm:* $6. Tables: $8 (per flea market space), $20 (commercial). Stan Cohen, W8QDQ, 2301 Royal Oak Ct, Cincinnati, OH 45237-2939; 513-531-1011 or 513-531-3834; fax 513-531-3834; **stanco49@zoomtown.com**; **www.gcara.org**.

Great Lakes Division Symposium
September 12, Findlay, Ohio
S V

The Great Lakes Division Symposium, sponsored by the Findlay Radio Club, will be held at the Findlay Center for Business and Technology, 1700 Fostoria Ave. Doors are open 9 AM-5 PM. Features include seminars on many aspects of Ham Radio especially for the new ham but something for everyone, VE sessions. Talk-in on 147.15. Admission is free. Contact Bill Kelsey, N8ET, 3521 Spring Lake Dr, Findlay, OH 45840; 419-423-4604; **n8et@arrl.net**; **www.w8ft.org**.

Ohio (Findlay) — Sep 13 D F S
8 AM-2 PM. *Spr:* Findlay Radio Club. Hancock County Fairgrounds, 1017 E Sandusky St. 67th Annual Hamfest. *Tl:* 147.15. *Adm:* $6. Tables: $20. Bill Kelsey, N8ET, 3521 Spring Lake Dr, Findlay, OH 45840; 419-423-4604; **n8et@arrl.net**; **www.findlayradioclub.org**.

Ohio Section Conference
September 19, Reynoldsburg
R

The Ohio Section Conference, sponsored by the ARRL Ohio Section, will be held at the State Fire Academy, 8895 E Main St. Doors are open 9 AM-3 PM. Features include discussions by ARRL division and section officials with members of the Ohio section, awards for 2009, pizza lunch. Talk-in on 146.88, 146.76. Admission is free. Contact Frank Piper, KI8GW, 496 Hillview St, Pickerington, OH 43147; 614-589-4641; **ki8gw@arrl.org**.

Pacific Northwest VHF Conference
October 9-11, Seaside, Oregon
F R S

The Pacific Northwest VHF Conference (16th Annual Conference), sponsored by the Pacific Northwest VHF Society, will be held at the Shilo Inn, 30 North Prom. Doors are open Friday 6-8 PM, Saturday 8 AM-4 PM, Sunday 8-10 AM. Features include Friday eve dinner, tailgate swapmeet in parking lot, technical presentations, great programs, top-notch speakers and interesting round-table discussions, PNWVHFS Annual Meeting, free buffet lunch (Saturday), annual awards presentation, Saturday evening dinner (6-8 PM), Sunday morning "Farewell Breakfast" (8-10 AM). Talk-in on 146.58 FM simplex. Admission is $40 in advance, $50 at the door (includes lunch). Contact Scott Honaker, N7SS, 14014 89th Ave SE, Snohomish, WA 98296; 425-330-5439; fax 360-668-6073; **n7ss@arrl.net**; **pnwvhfs.org**.

Pennsylvania (Brownstown) — Oct 3 F T
8 AM. *Spr:* Red Rose Repeater Assn. West Earl Township Community Park, 189 S State St (Rte 772 E, Talmage). *Tl:* 147.015 (118.8 Hz). *Adm:* $1 (tailgaters $3). Tables: $5. Dave Phillips, W3CWE, 344 N George St, Millersville, PA 17551; 717-872-6578; **w3cwe@comcast.net**; **w3rrr.org**.

Pennsylvania (Butler) — Sep 13 D F R
8 AM-3 PM. *Spr:* Butler County ARA. Unionville Fire Department Grounds, intersection of PA Rte 8 and Unionville Rd. 2nd Annual Swapfest. *Tl:* 147.36 (131.8 Hz). *Adm:* $5. Jim Love, W1JHL, 206 Reiber Rd, Renfrew, PA 16053; 724-482-2656; **w1jhl@arrl.net**; **w3udx.org**.

Mid-Atlantic States VHF Conference
September 26, Plymouth Meeting, Pennsylvania
R S

The Mid-Atlantic States VHF Conference, sponsored by the Mt Airy VHF Club (PACKRATS), will be held at the Mt Carmel Club, 1210 E Ridge Pike. Doors are open 8 AM-9 PM. Features include Friday night Hospitality Room (7 PM, Marriott Courtyard); presentations for experts and beginners alike; conference topics include VHF, UHF and microwave construction, operating, digital modes, EME, antennas, roving and more; continental breakfast (8 AM); lunch; buffet banquet Saturday eve with speaker. Admission is $60 until Sep 18; $70 after Sep 18. Contact Rick Rosen, K1DS, 206 Kimberton Dr, Blue Bell, PA 19422; 610-270-8884; **rick1ds@hotmail.com**; **www.packratvhf.com**.

Pennsylvania (Stroudsburg) — Sep 12
F H R V
8 AM-1 PM. Sprs: Eastern Pennsylvania ARA and Pocono ARK. Stroudsburg Jr High School, 1198 Chipperfield Dr. 9th Annual Hamfest, Special Event Station. *Tl:* 147.045 (131.8 Hz). *Adm:* $5. Tables: $6 and $10. Jerry Truax, N3SEI, Box 139, Bartonsville, PA 18321; 570-620-9080; fax 570-620-1089; **cameras@ptd.net**; **www.qsl.net/n3is/hamfest/index.html**.

Pennsylvania (Wrightstown) — Sep 27
D F R T
Sellers 6 AM; public 7 AM-1 PM. *Spr:* Mt. Airy VHF Club. Middletown Grange #684, 576 Penns Park Rd. 38th Annual Hamarama. *Tl:* 146.52. *Adm:* $5, non-ham spouses and under 13 free (sellers add $10 per car space). Tables: $15 (indoor). Rick Rosen, K1DS, 610-270-8884; **packrats_w3ccx@yahoo.com**; **www.packratvhf.com/Hamarama/hamarama.html**.

Rhode Island (Forestdale) — Sep 19 F
8 AM-2:30 PM. *Spr:* Rhode Island Amateur FM Repeater Service. VFW Post 6342, 98 School St. Auction (11 AM-2:30 PM). *Tl:* 146.76. *Adm:* Free. Tables: $5. Rick Fairweather, K1KYI, 106 Chaplin St, Pawtucket, RI 02861; 401-864-9611; **k1kyi@arrl.net**; **www.qsl.net/riafmrs**.

South Carolina (Rock Hill) — Oct 3
D F R T V
7 AM. *Spr:* York County ARS. Faith Assembly of God, 2800 Faith Blvd. *Tl:* 147.03. *Adm:* $7. Tables: $20. Sheila Parrish, KG4CDF, 2358 J P Dirt Rd, Edgemoor, SC 29712; 803-328-5983; **coy@navacore.net**; **www.rockhillhamfest.com**.

SEDCO Convention
September 26, Pigeon Forge, Tennessee
S

The SEDCO Convention, sponsored by the Southeastern DX and Contesting Organization, will be held at the MainStay Suites and Conference Center, 410 Pine Mountain Rd. Features include a fellowship of DXers and contesters, speakers, dinner, RV parking (across the street; 865-428-8350). Admission is $25 (Rosie, KA4S, 865-681-2279). Contact Lynn Lamb, W4NL, 3134 Allen Dr, Maryville, TN 37803; 865-681-2279; **w4nl@charter.net**; **www.sedco.homestead.com**.

Texas (Lubbock) — Sep 12 F R T V
9 AM-1 PM. *Spr:* South Plains ARC. Stidham Memorial Clubhouse, 1110 98th St. *Tl:* 443.075 (88.5 Hz). *Adm:* Free. Tables: $7 (for space). John Habbinga, KC5ZRQ, 7704 Canton Ave, Lubbock, TX 79423; 806-392-6205; fax 806-745-6194; **kc5zrq@gmail.com**; **www.w5lcc.net**.

Texas (Paris) — Oct 9-10 D F H R T V
Friday 5-9 PM, Saturday 8 AM. *Spr:* Paris Texas Radio Group. Red River Valley Fairgrounds, 570 E Center St. 5th Annual Hamfest, music, camping. *Tl:* 147.04 (100 Hz). *Adm:* $2. Tables: $15. Richard Lenoir, KI5DX, 2150 Plum St, Paris, TX 75460; 903-783-0968; **ki5dx@yahoo.com**; **www.paristexasradio.com/hamfest**.

Virginia Section Convention
September 12-13, Virginia Beach
D F S T V

The Virginia Section Convention, sponsored by Tidewater Radio Conventions, will be held at Virginia Wesleyan College, 1584 Wesleyan Dr. Doors are open Saturday 9 AM-5 PM, Sunday 9 AM-3 PM. Features include hamfest and electronics flea market, vendors, tailgating ($15 per space), forums and programs, VE sessions (both days). Talk-in on 146.97. Admission is $5 in advance, $8 at the door. Tables are $25 each. Contact Carl Clements, W4CAC, 4500 Wake Forest Rd, Portsmouth, VA 23703; 757-484-0569; fax 757-673-7426; **w4cac@arrl.org**; **www.vabeachhamfest.com**.

Washington State Convention
September 26, Spokane Valley
D F R S V

The Washington State Convention, co-sponsored by the Kamiak Butte Amateur Repeater Assn, NW Tri-State ARO, Palouse Hills ARC, Inland Empire VHF Radio Amateurs, Spokane DX Assn, University High School ARC, Lilac City ARC, and the Panoramaland ARC will be held at University High School, 12420 E 32nd Ave. Doors are open for setup Friday 7-9 PM, Saturday 8 AM; public Saturday 9 AM-5 PM. Features include commercial and non-commercial vendors, seminars and displays, Open-Cry Auction, VE sessions (11 AM; Mary, AA7RT, 509-991-2192; **aa7rt@arrl.net**), radio test gear table, post hamfest dinner (5 PM), free off-street parking for cars and RVs, refreshments. Talk-in on 147.24, 146.52. Admission is $5, 18 and under free. Swap tables are $5 before Sep 5, $7.50 after Sep 5; commercial tables are $12 before Sep 5, $15 after Sep 5. Contact Betsy Ashleman, N7WRQ, 3903 E 48th Ave, Spokane, WA 99223; 509-448-5821; **n7wrq@aol.com**; **www.kbara.org**.

Wisconsin (Cedarburg) — Sep 12 F T
Set up 6 AM; public 8 AM-1 PM. *Spr:* Ozaukee RC. Fireman's Park, W65 N796 Washington Ave. Ham and Hobby Outdoor Swapfest. *Tl:* 146.97 (127.3 Hz). *Adm:* $5. Tables: None to buy (sell from your vehicle). Gabe Chido, WI9GC, W58 N985 Essex Dr, Cedarburg, WI 53012; 262-377-2784; **wi9gc@yahoo.com**; **www.ozaukeeradioclub.org**.

75, 50 AND 25 YEARS AGO

September 1934

■ The cover photo shows two hams installing a mobile station in and on a car. If you look closely at the antenna (which is being positioned on the grill), you can see its open-wire feed line.

■ The editorial discusses the ever-increasing problem of ham-band congestion, suggesting that improvements in operating techniques and in technical details in the station equipment will help.

■ R. B. Dome presents his ideas on "Increased Radiating Efficiency for Short Antennas," by using top-loading in his home station antenna.

■ "Firing up on the Newly Opened Ultra-High Frequencies," by Ross Hull, describes some of his successful experimental gear for the ultra-highs of 2½ and 1¼ meters.

■ Ludlum Smith, W6BJM, suggests "Another Simple Solution of Break-in," using keying of the crystal oscillator.

■ The success of recent ham conventions is described, in "The Convention Season Progresses."

■ "Second A.R.R.L. Field Day Results" reports that 36 entries were sent to HQ. W6DIS/6 turned in the highest score, making 58 QSOs!

■ The "Amateur Radio Stations" column cast admiring glances at W2DC, Scotia, New York; W4MS, Pensacola, Florida; and ON4BZ, Brussels, Belgium. ON4BZ is one of Europe's most active DX stations.

September 1959

■ The cover photo shows Lew McCoy's latest goodie for the Novice — a five-band crystal-controlled rig.

■ The editorial discusses the current state of reciprocal amateur licensing. Most nations in the world have it, but not the USA. Hams visiting from other countries don't understand why we don't.

■ Lew McCoy, W1ICP, describes his latest design for the Novice (and other hams), in "75 Watts Novice — 100 Watts General." The shielded design uses a 6AG7 oscillator to drive a pair of military surplus 1625s in parallel. (You can still find new 1625 tubes at hamfests for 25 cents.)

■ Myrton Billings, W2BIV, gives us some very good mechanical tips about building antennas, in "Apartment-House Antenna Precautions."

■ Ralph Rosenbaum, W5ECP, tells us how to get "Break-In at Its Best."

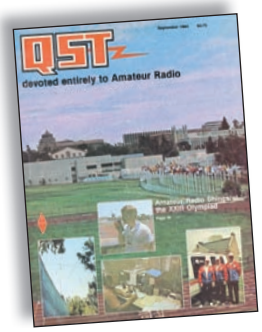
■ Ed Tilton, W1HDQ, describes his nifty new rig, "A 40-Watt Transmitter for 220 Mc."

■ Carl Ericson, W2PPL, updates the idea of the "Q5'er," with his "Tunable-I.F. Receiver Using the BC-453."

■ Donald Goshay, W6MMU, describes "A Crystal-Controlled Converter for 1296 Mc."

■ This month's ads show an abundance of modern equipment available to the ham, such as the E. F. Johnson 6N2 Thunderbolt (1000 W amplifier for 6 and 2 meters), the Heathkit Cheyenne and Comanche mobile twins, the Collins 32S-1 and 75S-1 twins, and the Cosmophone 1000 self-contained 1 kW transmitter-receiver. The Cosmophone features dual VFOs, for "split" operation.

September 1984



■ The cover photo shows how "Amateur Radio Shines at the XXIII Olympiad."

■ The editorial discusses "Spectrum Management," and how FCC and NTIA decisions impact ham radio.

■ David Munyon, W7DVB, describes his new high-power amplifier, in "A Cathode-Driven Tetrode for 6 Meters."

■ Doug DeMaw continues to educate the masses, with his latest pair of tomes, "Electronic Switching and How It Works," and "Radio Antennas and How They Operate" (the latter is Part 9 of Doug's "First Steps in Radio" series).

■ Chuck Hutchinson, K8CH, describes his simple but effective antenna, "A Tree-Mounted 30-Meter Ground-Plane Antenna."

■ Curt Holsopple, K9CH, tells us about "Taking a Test under the ARRL Volunteer Examiner Program."

■ Jay Holladay, W6EJJ, gives us a short report on how "Amateurs Support Los Angeles Olympics."

■ "Happenings" reports "HF Phone Bands Expanded!"

■ "How's DX?" columnist Ellen White, W1YL, reports on "Kermadec 1984."

■ "The New Frontier" reports a "New 1296 World Record" — N6CA and KH6HME finally made contact, after years of trying! Congratulations and kudos on their perseverance!

Al Brogdon, W1AB ♦ Contributing Editor

Field Organization Reports

MAY 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/.**

620 W7TVA
590 AC8AR
399 W4CAC
390 W4DNA
375 WB7WOW
365 NC4VA
335 N2LTC
334 N4HUB
320 N1UMJ
315 KA2ZNZ
310 KI4GWC
296 W9AL
286 W2MTA
270 W5DY
260 KB2RTZ
255 KI4GEM
250 AK2Z
246 K4DND
240 K7BFL W2LC
210 N7CM K7EAJ
205 KI4KWR
200 KI4HGO KB2BAA
199 KI4PRX KB2ETO
195 K7OAH
192 KØLQB WD8USA
190 N7EIE WB9FHP K2HJ
186 WA2BSS
183 KA8ZGY
182 W7JSW
180 W2DWR KI4ZJI K8MFK
177 WB8RCR
175 KE5HYW
174 K5SFM
172 KØIBS
169 KA5EXI
165 WD9FLJ
162 K2GW
164 K7BC
161 KC7ZZ
160 KBØGG
155 K9LGU
153 W2SFD
152 KD8BIW WD8JAW
151 W4SOU
150 KB1NMO
140 AG9G W6DOB W1PLW K4IWW K8AMR
135 NN7H W3YVQ
134 N2JBA
130 KB2EV N8IO KK1X K6JT WØLAW W4ZJY W4FAL WB9JSR
125 N7BEC W7EKB WM2C N4LFJ
123 WB2KNS
121 KJ7NO
120 W8UL KW1U W1GMF N1LKJ N3RB WB2FTX K2UL KA4FZI
116 WA4UJC
115 N4ABM
110 WB4GHU W7QM W7GB N2YJZ N8OD WD8Q N5NVP WC5M W5PY K5KV K1HEJ N1IQI K2VX KK5GY K2ABX K4GK K4BG W7ELI N7XG N7YSS KF7GC
108 K6RAU NØZIZ
107 N2VC K5MC
106 KK5NU
105 W8IM N2DW W5HUD N5MEL KE4CB
104 KK7DEB NA7G
103 KB9KEG KD1SM
102 KB3MXM WB8OIF
101 KC5OZT
100 N9MN NR2F W1SGC W7GHT K4SCL NX1Q N5OUJ N1JX WB6UZX NA9L KK3F WB4FDT AA3SB K2AN KB2KLH K2TV W2DSX WØCLS NØMEA KI4YV W4TTO N8NMA KM1N W4KLB
99 W5ESE
98 K9EOH
97 W3CB KB8GT
95 WG8Z W5GKH
92 W9ILF WA1JVV
91 N2GS W2CC
90 K1JPG NU8K W3GQJ W6SX N8DD WB8SIQ KA1RMV KA1GWE W9WXN KB3LNM N3ZOC WA2CUW WA2NDA K4BEH WB4BIK N3SW WD8DHC N4MEH
89 KS3Z
86 KB1KRS N7IE K8RDN
84 KB3KKY W7VSE KO4OL
83 N2VQA
82 AD6BL KI4JQB KB8NDS KD8AAD
80 K7MQF N9VC KE5PWL NM1K WDØGUF KA3NZR WA9WNE K8KV WB8WKQ
79 K3IN
78 KT5SR W4QAT
77 KD7THV
76 NX9K KB5PGY KI4QAU
75 KBØDTI
74 K4DLF
73 W8CPG
72 W4TY KC4PZA
70 WØADZ NØDUW NØDUX NUØF KAØFUI NIØI KBØJKO NØMHJ KØPTK KØOR KØRXC NØUKO WAØVKC KD7ZUP NS7K

The following stations qualified for PSHR in May, but were not recognized in this column: KGØGG 160, KC4PZA 125, W4KLB 100, WØCLS 100, NØMEA 100, NIØI 90, N4MEH 90, WØADZ 70, NØDUW 70, NØDUX 70, NUØF 70, KAØFUI 70, KBØJKO 70, NØMHJ 70, KØPTK 70, KØOR 70, KØRXC 70, NØUKO 70, WAØVKC 70, KD7ZUP 70.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, EB, ENY, EPA, EWA, GA, ID, IN, KS, KY, LA, MDC, ME, MI, MN, NC, NFL, NH, NLI, NNJ, NNY, NTX, NV, OH, KY, OK, OR, SC, SD, SFL, SNJ, STX, SV, TN, UT, VA, WI, WCF, WMA, WNY, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: AZ, EWA, GA, IL, IN, KS, LA, MDC, MI, MO, MT, NC, NV, OH, SFL, SD, TN, VA, WPA, WTX, WV.

Brass Pounders League

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

KK3F 1918, KA9EKG 1350, K7BDU 1131, W4ZJY 931, WB5NKD 920, WB5NKC 837, KW1U 837, W1GMF 728, KT2D 715, N1IQI 637, W7QM 581, WB9JSR 561, N1UMJ 560.

The following stations qualified for BPL by achieving 100 or more points by originations plus deliveries: K8LG 125, NM1K 115.

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

NF1C **Preston**, Geraldine "Gerry" A., Washburn, ME
W1ECI **Tencza**, John W., South Windsor, CT
W1HWY **Nelson**, Rudolph "Rudy" S. Jr, Stacy, NC
♦WA1IKJ **Charland**, Raymond D., Prospect, CT
W1NCA **Klumbis**, Anthony J., Providence, RI
W1PUM **Raye**, John F., Simsbury, CT
N1QVC **Carter**, Leroy G., Westbrook, CT
N1VBY **Rocklin**, Kenneth W., Branford, CT
KC2EST **Jenney**, Ronald W., Cortland, NY
♦W2EUF **Franklin**, Richard E., Cranford, NJ
KB2HKI **Wacht**, Rudy A., Harford Mills, NY
NX2K **Brizzi**, Thomas, Paramus, NJ
K2MB **Bouchard**, Maryan H., Cherry Hill, NJ
KF2MN **Gardner**, Fred L. Jr, McGraw, NY
KD2MQ **Ellison**, Dr David S., Rome, NY
♦WA2NHC **Aberasturi**, Leon A., Tenafly, NJ
W2QPR **Borelli**, Joseph W., Fair Lawn, NJ
AE2S **Anselmo**, Paul, Middletown, NJ
W2SYL **Longley**, Franklin A., Rome, NY
WB2TOJ **Semonche**, Ronald M., Washington, NJ
W2WHW **Mandale**, William R., Wayne, PA
K3BHL **Malesic**, Anthony W., Steelton, PA
KZ3C **Ferguson**, James A., Erie, PA
♦K3COU **Shafer**, Donald R., Parker, PA
W3DID **Shelton**, Lawrence A., Owings Mills, MD
KA3FHA **Rheam**, Howard "Skip" W., Landisburg, PA
W3GWW **Wetherell**, Glenn W. Sr, Aberdeen, MD
N3JOJ **Moore**, Allen B., Huntingdon, PA
W3NSI **Rowland**, Lynford H. Jr, Solomons, MD
♦K3NW **Williams**, Norman A., Hudson, FL
WA3UCI **Walter**, Ralph E., North East, PA
♦W3UT **Poulin**, Raymond J., Middletown, MD
WD4BSJ **Markwalter**, Robert E., Bristol, TN
W4COC **Boone**, Thomas N. Jr, Greensboro, NC
N4DKE **Spanos**, Charles S., Montevallo, AL
K4DL **Jensen**, Dennis C., Oak Harbor, WA
WB4DUI **Scott**, Conrad W., Mount Juliet, TN
W4FKY **Krantz**, Charles V., Lynchburg, VA
KD4FTD **Field**, John A. Sr, Ocala, FL
KO4FU **Thomas**, Arnold E., Ardmore, TN
W4IRL **Carter**, Robert C., Atlanta, GA
K4JDI **Wisner**, Whayne Taylor, Louisville, KY
N4MAR **Kershner**, Frank L., Apex, NC
KB4MII **Shaver**, Louise C., Fernandina Beach, FL
♦W4NO **Tunstill**, Don, Huntsville, AL
WB4OUF **Lambert**, Francis "Frank" A. Jr, Raleigh, NC
WA4PEY **Oppert**, George Louis Jr, Taylor, AL
KE4PM **Prelog**, Larry M., Niles, MI
♦WI4P **Stevens**, Douglas P. Jr, Loxahatchee, FL
N4SDI **Wren**, Dennis, Titusville, FL
KF4YLL **Mitchell**, Carl K., Fort Payne, AL
KD4ZRF **Mosier**, Bobby Crawford, Camden, SC
WJ5AN **Sterneckert**, Jan M., San Antonio, TX
KC5BYC **Arndt**, John E., Mission, TX
KJ5EI **Ball**, Glenn F., Meridian, MS
W5HBO **Noble**, Frank G. Jr, Bay City, TX
W5IC **Gault**, William C., Manor, TX
WA5NIL **Parker**, Edward Sr, Terry, MS
KD5STO **McGarrah**, Linda L., Springdale, AR
N5TD **Schlieper**, Charles R., Temple, TX
KB5W **Leist**, James J., Gautier, MS
♦N6AE **LaFrentz**, Paul H., Hesperia, CA
KB6CEG **Word**, William Ray, Twain Harte, CA
♦KA6FYY **Moore**, P. L., Simi Valley, CA
KE6HTR **Christensen**, Carolyn S., Goleta, CA
KD6IBS **Schafer**, Henry "Hank" A., Fortuna, CA
W6IP **Atwood**, Richard A., Desert Hot Springs, CA
KF6JVP **Sowell**, Rickey Lee, Pine Grove, CA
W6KUT **Andress**, Edwin A., Poway, CA
KZ6P **Carmean**, Don L., Medford, OR
WA6POR **Melnick**, David S., Lafayette, CA
KF7AM **Taylor**, Donald H., Greenville, CA
*WA7BAV **Flatt**, Jerry O., Henderson, NV
AB7CF **Dennison**, Robert G., Long Beach, WA
KB7HGC **Oberman**, Oscar F., Eugene, OR
W7JAK **Francis**, Jack E., Clovis, CA
KB7JG **Hoel**, Jim, Greenbank, WA
KO7L **Gibson**, Darrel E., Newdale, ID
K7LUM **Lum**, Marilyn, Portland, OR
KD7MIW **Knight**, Irvin R., Bainbridge Island, WA
WB7NKP **Hull**, Larry L., Twin Falls, ID
W7ROE **Tarrant**, William C., Butte, MT
W7RXO **Skoch**, James W., Portland, OR
KB7SLS **Boyce**, James M., Las Vegas, NV
KE7U **Ivey**, Frank D., Sierra Vista, AZ
♦W7VU **Oliver**, Ronald J., Myrtle Point, OR
KA8AAR **Hinch**, William J., Huntington Woods, MI
K8BHP **Clark**, Earl L., Detroit, MI
W8BXO **Weston**, Dr Earl E., Ypsilanti, MI
N8CTI **Williams**, Steven C., Coldwater, MI
W8CWD **Dolson**, William L., Saginaw, MI
W8DAK **Krieger**, David A., North Ridgeville, OH
KD8DJU **Wilder**, John W. Jr, Youngstown, OH
WA8HGG **Osterbrock**, Jack B., Cincinnati, OH
W8IDT **Raysin**, Elwyn B., Sandusky, MI
W8JOM **Hopper**, Graham A., Negaunee, MI
KB8NMV **Recklies**, Rudy, Columbiana, OH
KB8NXY **Kinney**, Charles E., Lady Lake, FL
N8PFA **Dellinger**, Ernest, Maumee, OH
K8PGA **Adams**, Paul G., Akron, OH
K8QOE **Phillips**, Joseph J. Jr, Fairfield, OH
W8SSA **Rockwell**, Dr Perry J. Jr, Platteville, WI
KC8TLO **Ziegler**, C. Osman "Ossie," Niles, MI
♦WA8YCG **Jacobs**, William H., Independence, WV
W8ZFE **Hineline**, Robert J., Perrysburg, OH
WB9DNE **Bollinger**, Charles S., South Whitley, IN
K9DON **Ellis**, Donald R., Indianapolis, IN
N9EY **Henderson**, Charles O., Elkhart, IN
KC9KFN **Wallace**, Arthur E., Antioch, IL
N9LQM **Zimmerman**, Elizabeth A., Connersville, IN
W9RVR **Steinberg**, Ronald R., South Fulton, TN
K9TDX **Hilmes**, Raymond A., Belleville, IL
W9UPV **Placko**, Milton M., Chicago, IL
W9UQI **Miller**, Ernest L., Corydon, IN
K9VLE **Zuccarello**, Ralph A., Elgin, IL
W9ZCH **Beatty**, Ned E., Island Lake, IL
WØAIC **Sultz**, Jerry R., Wichita, KS
WØEPV **Brown**, Edward B., Topeka, KS
WØIUL **Biege**, Ray R. Jr, Plano, TX
NØJT **Trampler**, John B. Sr, Springfield, MO
KBØPFR **Fox**, Henry C., Fort Collins, CO
KBØSPU **Love**, Charles A., Grove, OK
WAØTJU **Honeycutt**, Richard M., Leavenworth, KS
♦VE3BWH **Jones**, Horace A., Iroquois Falls, ON, Canada

♦ 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

Strays

W1AW TO ADD NEW DIGITAL MODES TO TRANSMISSION SCHEDULE

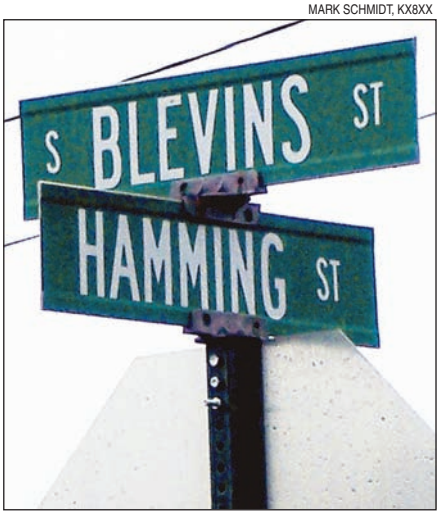
◊ Effective August 17, W1AW, the Hiram Percy Maxim Memorial Station, will replace its AMTOR and ASCII transmissions with PSK31 and MFSK16, respectively. RTTY (Baudot) will continue to be the first digital mode used in the transmission schedule. The frequencies used by W1AW for all its digital transmissions will remain the same. "All regular 6 PM and 9 PM (ET) digital transmissions will begin with RTTY," according to W1AW Station Manager Joe Carcia, NJ1Q. "PSK31 and MFSK16 will be sent as time allows. The Tuesday and Friday Keplerian data bulletins will be sent using RTTY and PSK31." The W1AW operating schedule complete with times and frequencies can be found at **www.arrl.org/w1aw.html**.

I would like to get in touch with…

◊ anyone with access to the schematic package that was offered to go with "An Advanced General-Coverage Amateur Receiver," by John Pitts, W6BD [SK], in the November 1970 issue of *QST*. — *John Landrigan, KA4RXP, 5180 Park Ave, Ste 200, Memphis, TN 38119-3530,* **jlandrigan@pol.net**.

◊ anyone who has a Motorola service/instruction manual for a solid-state digital tone generator, model no. S1333A, serial no.71-433. — *Rich Ballieu, WBØTML, PO Box 630, Sioux Falls, SD 57101*

MARK SCHMIDT, KX8XX



"This street," writes Mark, KX8XX, of Tustin, Michigan, "is in the village of Marion, Michigan."

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**.

The Doctor is IN

Antenna tuner — Device that sits between an antenna and a transmission line, or a transmission line and a radio, and transforms the impedance to match the radio or line.

ARRL "All Risk" Ham Radio Equipment Insurance Plan — ARRL sponsored insurance program to cover your amateur station and mobile equipment in case of loss or damage by theft, accident, fire, flood, tornado and other natural disasters. You can even insure antennas, rotators and towers. See **www.arrl.org/FandES/field/regulations/insurance/equipment.html** for more information.

Baud — Digital signaling rate in symbols per second. For the special case in which a symbol represents a single bit (binary signaling), Baud equals the data rate. In most codes, however, multiple bits are sent within each symbol using multiple amplitudes, frequencies or most commonly phases. In this case, the data rate is a multiple of the symbol rate.

Half wave dipole — Antenna approximately half a wavelength long, usually fed by connections to each side at the center. Often used as an antenna itself, it is also a reference standard for the performance of other antennas.

Quarter wave matching section — Section of mismatched transmission line used to provide impedance transformation. This special length has the property that if a resistive load below the line Z_0 is connected to one end, the impedance at the other end will be the same multiple above the Z_0.

A Gel Cell Battery Charger for the Low Power Station

AC wall wart — Small power supply unit for low power equipment with integral plug for standard ac wall socket. Colloquially named due to its appearance as a protrusion from a wall socket.

Adjustable voltage regulator — A voltage regulator is a circuit that provides a fixed output voltage from an input voltage that varies. Generally the output voltage is somewhat less than the minimum input voltage. For low power systems, the regulator is generally on a single inexpensive integrated circuit (IC). A variable regulator allows the output voltage to be adjusted, usually by changing the resistance on a pin of the IC.

[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**.

Absorptive glass mat (AGM) battery — One technology of valve regulated sealed lead-acid (VRSLA) batteries. In AGM batteries, the electrolyte is kept in contact with the electrodes by being within a mat structure that is fixed between the electrodes.

AMP type connectors — Tyco Electronics trade name for connectors usually used to connect low level signals to PC boards.

Anderson Powerpole connectors — Trade name for a kind of electrical plug-in connector designed for low power loss and ease of interconnection. By their design they are "genderless"; that is, any connector can plug into any other of the same size. The 30 A size are very popular for dc circuits. For more information, see **www.andersonpower.com**.

Clamshell case — Equipment case that splits into two halves, one top and half the sides, the other bottom and half the sides.

Float charge — Low level battery changing condition in which a charger is charging a fully charged battery with just enough current to make up for any internal losses and thus keep the battery fully charged.

Gelled electrolyte (gel cell) lead-acid batteries — Battery technology in which the acid based electrolyte is maintained in a jellied form with the gel located between adjacent battery plates.

Heat sink — Mechanical structure designed to aid in rapid heat transfer of a device to the surrounding air often with multiple fins to increase surface area. Heat sinks are usually thermally bonded to a device with significant heat dissipation such as a power transistor.

Perf board — Phenolic material with predrilled holes designed to facilitate wiring up components for prototypes and other low quantity development.

Valve regulated sealed lead-acid (VRSLA) batteries — Classification of recombinant battery technology including the gel and AGM types.

Volt-ohm-milliameter (VOM) — Basic test instrument that can be switched to measure the electrical voltage, resistance or current in different ranges. Originally an analog instrument, VOMs are commonly available in digital form.

A Junk Box Integrated Station Control System

Cat-5 Ethernet cable — Jacket containing four twisted wire pairs designed for use with gigabit (or lower data rate) Ethernet local area networks.

Digital voltmeter (DVM) — See VOM.

LED — Light emitting diode. A diode 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**.

Solid state relay (SSR) — Semiconductor device that uses switching transistors to serve the function provided by an electromechanical switching relay.

Measuring Radio Frequencies

BCD — Binary coded decimal. Collection of 10 of the 16 possible four bit binary words representing the decimal digits 0 through 9. Thus 0000 is 0, 0001 is 1, 0010 is 2, 0011 is 3 and 1001 is 9. So 39 decimal is 0011 1001 in BCD.

Colpitts variable frequency oscillator — Classic oscillator circuit in which the feedback is provided by a signal from a portion of the tuned circuit set by a capacitive voltage divider.

Hartley variable frequency oscillator — Oscillator circuit with frequency established by a parallel tuned circuit and feedback by a tap on the coil.

Regenerative detector — Radio receiver detector, especially popular during the 1930s, using an oscillating detector to provide additional sensitivity and selectivity compared to other receivers of the period. See **www.techlib.com/electronics/regen.html**.

Resonant frequency — The frequency at which a circuit of a resistor, capacitor and inductor has an impedance that is only resistive. The inductive and capacitive reactances are equal and opposite.

Waveguide — A low loss transmission medium particularly suited for microwave signals. Rather than travel as electrical signals in coax cable, signals in waveguides are launched as electromagnetic waves. The waveguides are metallic rectangular or other cross section duct looking structures, often $\lambda/2$ wide at their design frequency.

Zero beat — The condition in which two heterodyning signals are of the same frequency. The beat note that would be formed at the difference frequency will disappear because f1 – f2 = 0.

A Simple Current Transformer to Optimize Power to Your Antenna

Ferrite core — Ceramic material made from compounds of iron oxide often used as a core in an electromagnetic structure. Commonly found in the shape of rods, toroids or beads that can surround wires to increase inductance to common mode currents. Inductors formed on ferrite donut shaped toroids have the useful property that the magnetic fields stay within the core material making them self shielding.

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.arrl.org/tis/info/pdf/49470.pdf**.

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NEW LOCATION!

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Corner of 43rd Ave & Peoria
phoenix@hamradio.com

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6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr. 22191
(703) 643-1063
(800) 444-4799
Steve, W4SHG, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
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224 N. Broadway, 03079
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(800) 444-0047
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(no purchase necessary)

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- HF 100W (20W battery)
- Optional P.S. + Tuner • TCXO Built-in

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- 3 roofing filters built-in
- DMU-2000 Compatible

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FT-8800R 2M/440 Mobile

- V+U/V+V/U+U operation
- V+U full duplex • Cross Band repeater function
- 50W 2M 35W UHF
- 1000+ Memory channels
- WIRES ready

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Competitive pricing!

VX-3R 2M/440 HT

- Ultra-Compact Dual-Band HT w/ Wide band RX
- 1.5W RF out 2m/ 1w RF out 440
- WiRES Compatible
- 1000 Memory channels
- AA Battery compatible w/Optional FBA-37

NEW!

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FT-60R

- 2m/440 HT
- 5W Wide-band receive
- CTCSS/DCS Built-in
- Emergency Auto ID

Low Price!

VX-7R/VX-7R Black

50/2M/220/440 HT

- Wideband RX - 900 Memories
- 5W TX (300mw 220Mhz)
- Li-Ion Battery
- Fully Submersible to 3 ft.
- Built-in CTCSS/DCS
- Internet WIRES compatible

Now available in Black!

VX-6R

2M/220/440HT

- wideband RX – 900 memories
- 5W 2/440 , 1.5W 220 MHz TX
- Li-ION Battery - EAI system
- Fully submersible to 3 ft.
- CW trainer built-in

NEW Low Price!

VX-8R

50/144/222/440 Handheld

- 5w (1W 222)
- Bluetooth optional
- waterproof/submersible 3 ft 30 mins
- GPS/APRS operation optional
- Li-ion Hi-capacity battery
- wide band Rx

NEW!

FT-857D

Ultra compact HF, VHF, UHF

- 100w HF/6M, 50w 2M, 20w UHF
- DSP included • 32 color display
- 200 mems • Detachable front panel (YSK-857 required)

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FT-7900R 2M/440 Mobile

- 50w 2m, 45w on 440mHz
- Weather Alert
- 1000+ Mems
- WIRES Capability
- Wideband Receiver (Cell Blocked)

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FT-2000/FT2000D HF + 6M tcvr

- 100 W w/ auto tuner • built-in Power supply
- DSP filters / Voice memory recorder
- 200W (FT-2000D)
- 3 Band Parametric Mic EQ • 3 IF roofing filters

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FT-450AT HF + 6M TCVR

- 100W HF/6M • Auto Tuner built-in • DSP Built-in
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IC-706MKIIG All Mode Transceiver

• Proven performance • 160-10M*/6M/2M/70CM • All mode w/DSP • HF/6M @ 100W, 2M @ 50W, 440 MHz @ 20W • CTCSS encode/decode w/tone scan • Auto repeater • 107 alphanumeric memories

IC-7800 All Mode Transceiver

• 160-6M @ 200W • Four 32 bit IF-DSPs+ 24 bit AD/DA converters • Two completely independent receivers • +40dBm 3rd order intercept point

IC-746PRO All Mode 160M-2M

• 160-2M* @ 100W • 32 bit IF-DSP+ 24 bit AD/DA converter • Selectable IF filter shapes for SSB & CW • Enhanced Rx performance

IC-7000

• 160-10M/6M/2M/70CM
• 2x DSP • Digital IF filters
• Digital voice recorder
• 2.5" color TFT display

IC-7600 All Mode Transceiver *New!*

• 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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• 160-10M • 100W • Simple & tough with IF DSP • AGC Loop Management • Digital IF Filter • Digital Twin PBT • Digital Noise Reduction • Digital Noise Blanker • USB Port for PC Control

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• 160-10M* @ 100W • 12V operation • Simple to use • CW Keyer Built-in • One touch band switching • Direct frequency input • VOX Built-in • Band stacking register • IF shift • 101 memories

IC-7700 Transceiver. The Contester's Rig

• HF + 6m operation • +40dBm ultra high intercept point • IF DSP, user defined filters • 200W output power full duty cycle • Digital voice recorder

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• D-STAR DV mode operation • DR (D-STAR repeater) mode • Free software download • GPS A mode for easy D-PRS operation • One touch reply button (DV mode) • Wideband receiver

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• 75 watts • Dynamic Memory Scan (DMS) • CTCSS/DCS encode/decode w/tone scan • Weather alert • Weather channel scan • 200 alphanumeric memories

IC-2200H 2M Mobile Transceiver

• 65W Output • Optional D-STAR format digital operation & NEMA compatible GPS interface • CTCSS/DTCS encode/decode w/tone scan • 207 alphanumeric memories • Weather alert

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• D-STAR & GPS upgradeable 2M/70CM • 50/15/5W RF output levels • RX: 118-173.995, 375-549.995, 810-999.99 MHz** • Analog/digital voice with GPS (optional UT-123) • 500 alphanumeric memories

IC-92AD Analog + Digital Dual Bander

• 2M/70CM @ 5W • Wide-band RX 495 kHz - 999.9 MHz** • 1304 alphanumeric memories • Dualwatch capability • IPX7 Submersible*** • Optional GPS speaker Mic HM-175GPS

IC-T90A Triple Band Transceiver

• 6M/2M/70CM @ 5W • Wide-band RX 495 kHz - 999.999 MHz**

IC-80AD 3G D-STAR Dual Bander *New!*

• D-STAR DV mode operation • DR (D-STAR repeater) mode • Free software download • GPS A mode for easy D-PRS operation

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2M @ 7W • CTCSS/DTCS encode/decode w/tone scan • Also available in a sport version and a 70CM version (IC-U82)

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- Standalone 1200/9600 bps TNC w/ APRS firmware
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High-performance, low power TNC.
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- 32mb digital recorder
- 1,000 memories
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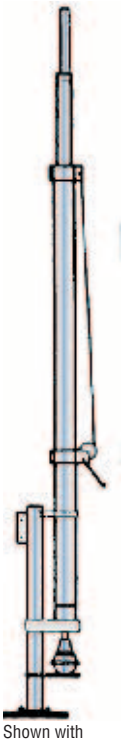

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DXE-8040VA-1	Dual Band High Performance Vertical Antenna	**$799.00**
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- Tunable above and below 7 MHz range for MARS and CAP frequencies
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- Self-supporting design withstands winds up to 60 MPH without guying

DXE-4030VA-1 ..... just **$299.50**

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A complete plug and play package with DX Engineering's 43 foot high performance vertical antenna, tilt base, and antenna mounted tuner to deliver maximum power with low SWR.

- 6063 T832 corrosion-resistant aircraft aluminum tubing and stainless steel hardware
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- Handles up to 200 watts with ease
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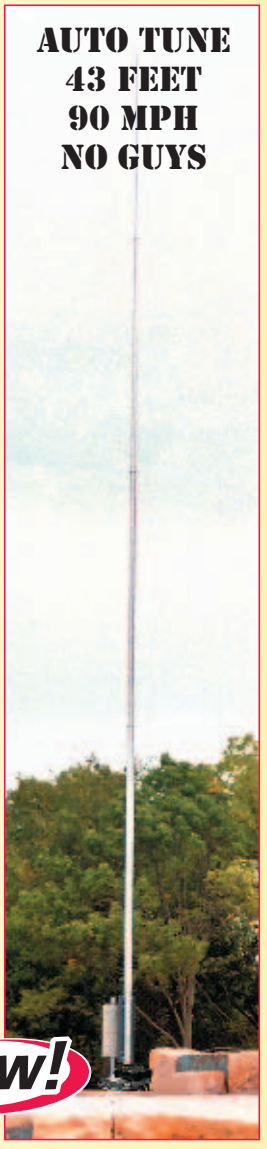

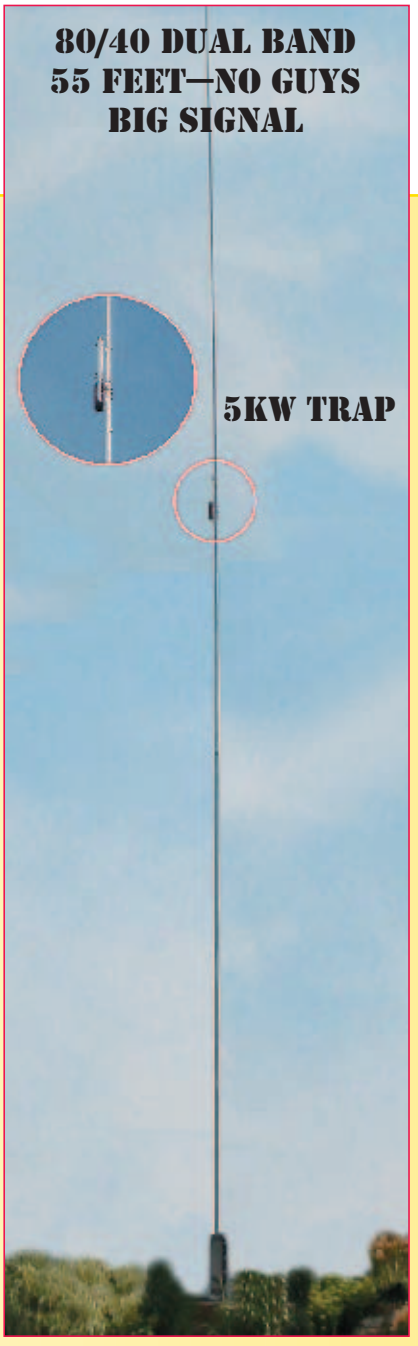

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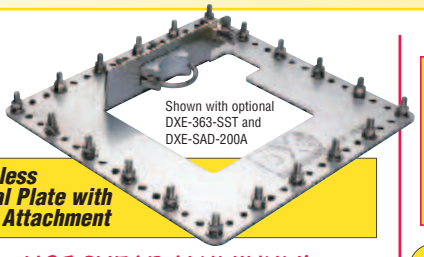
HUS-5BTV	(10, 15, 20, 40, & 75-80m)	**$159.95**
HUS-6BTV	(10, 15, 20, 30, 40, & 75-80m)	**$189.95**
DXE-A0K-DCF	SO-239 Add-On Kit for BTV Base	**$22.95**
DXE-CBC-8XU2	Jumper, Radial Plate to DCF	**$18.99**
DXE-A0K-17M	17m Add-On Kit for BTVS	**$69.95**
DXE-A0K-60M	60m Add-On Kit for BTVS	**$74.95**

Hustler BTV Direct Coax Attachment All Stainless **$22.95**



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- 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**

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Radials for Top Vertical Performance!

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- All cable assemblies are high voltage tested to handle full rated power
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Build the G3TXQ Broadband Design Hexxagonal Beam© with Highest Quality Professionally Engineered Components at Lower Cost Than the Competition!

HEXXAGONAL DX ENGINEERING BEAM©

REPAIR OR BUILD YOUR OWN ANTENNAS!

6063 Aluminum Tubing

- High strength Type 6063-T832 drawn aluminum tubing
- Sections with 0.058 and 0.120 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

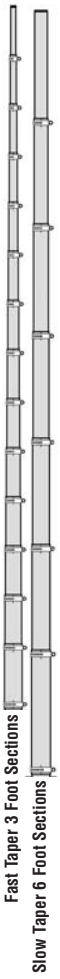
Aluminum Tubing, 2.000" Diameter, 0.125" Heavy Wall

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

Aluminum Tubing, 0.120" Wall, 6 Foot Length

Part Number	Diameter/End Type	Price
DXE-AT1311	1.5", no slit	$23.85
DXE-AT1312	1.75", no slit	$28.20
DXE-AT1313	2.0", no slit	$33.00
DXE-AT1314	2.25", no slit	$37.45
DXE-AT1315	2.5", no slit	$42.50
DXE-AT1316	2.75", no slit	$46.95
DXE-AT1317	3.0", no slit	$51.40

Visit DXEngineering.com for stainless steel Element Clamps that fit exact tubing sizes!



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

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DXE-CAVS-1P V-Saddle Clamp $9.95

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- Tilt Base included
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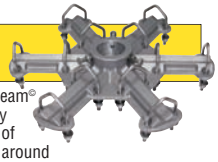
Hexx© 5-Band HF Beam Antenna Kits



The DX Engineering Hexxagonal Beam© kits provide a fast, economical way to build the latest, hottest version of an antenna concept that has been around since the 1980s. Hexxagonal 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
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- 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

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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

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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
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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!

Coaxial Cable Prep Tools

New!

- Precision, two-step operation
- No nicks or scratches to conductor
- Premium, long lasting cutter blades
- For foam or solid dielectric cable preparation

DXE-UT-8213	Cable Stripper for RG-8, RG-213, etc	$39.95
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PSK-31 SSTV WSJT

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- 8-position switch, controller included
- Better than 1.1:1 SWR below 30 MHz

5 kW Key-Down RF Switch

- Better than 70 dB of port-to-port isolation
- High impact, copper coated thermoplastic housing

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- Weatherproof, RF shielded stainless steel housing

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a hastily-built platform on a tiny outcropping in the middle of the Pacific, with nothing around but emptiness for hundreds, even thousands, of miles. If it looks intimidating by day, imagine it by the dark of night! Fortunately, the BS7H DXpedition had the comforting glow of IC-7000 compact HF/VHF/UHF transceivers to keep them on their toes.

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200 Watt (50W AM) • Full Duty Cycle • 32 Bit IF-DSPs + 24 Bit AD/DA Converters • Single Receive • 3 Roofing Filters • +40 dBm 3rd Order Intercept Point • Selectable, "Build Your Own" Filter Shapes • USB Flash Memory Card

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the rooftop of the world. The Kingdom of Bhutan is located in the eastern Himalayas, and was closed to ham radio until 1999. A52A was the first DXpedition to this mysterious land in decades. The team was limited to 100 watts of power but still managed to log over 82,000 QSOs!

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- Enhanced RX Performance
- Selectable IF Filter Shapes SSB + CW

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- Built-in DSP

*60M excluded

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- HF + 6M at 100W (40W AM), 2M at 50W (20W AM), 70CM at 20W (8W AM)
- All Mode, Full Duty Cycle
- 99 Alphanumeric Memory Channels
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- Built-in DSP

*60M excluded

IC-7200 HF + 6M

- 100 Watt (40W AM)
- Full Duty Cycle
- 32 Bit IF-DSP + 24 Bit AD/DA Converter
- Digital Twin Passband Tuning
- IF-DSP and Digital Functions Built-in
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- *Digital Plus - USB for Rig Control Plus Audio*

IC-703 " PLUS" QRP HF + 6M

- <10 Watts Output Power
- RX: 0.030 - 60.0MHz**
- 105 Alphanumeric Memory Channels
- DSP Auto Notch and Noise Reduction
- Built-in Antenna Tuner

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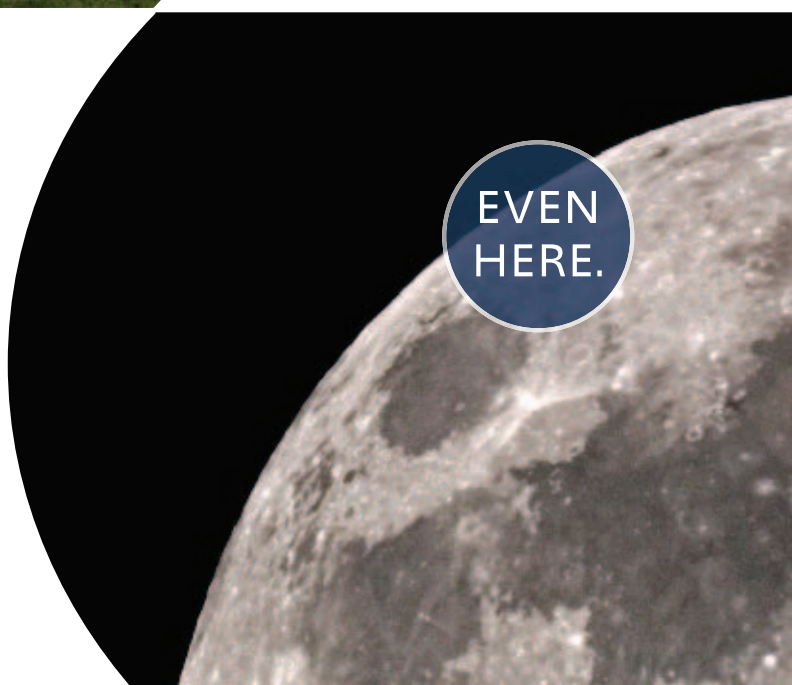

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It's been a slow start for solar cycle 24. While our giant rotund friend has been slumbering, Icom's been busily working on a new generation of digital-enhanced HF technology. Already remarkable when these slow evenings run quiet, Icom's Digital Signal Processing (DSP) and their no-mechanical-filters-needed advantages will really shine when our toasty neighbor starts showing his spots – and the bands get crowded. Hear it for yourself! For nearly 50 years, Icom has stood for innovation, reliability, and value. Trust Icom for the best in DC-to-daylight fun. For the love of ham radio.

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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***

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***

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***

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***

radio not included

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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***

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Suggested Price $199.99

AT-200Pro

The AT-200 features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and a function key on the front panel allows you to access data such as mode and status. All cables included. ***Suggested Price $249***

See AT-1000Pro Review in Nov. '08 CQ

AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. All cables included. ***Suggested Price $599***

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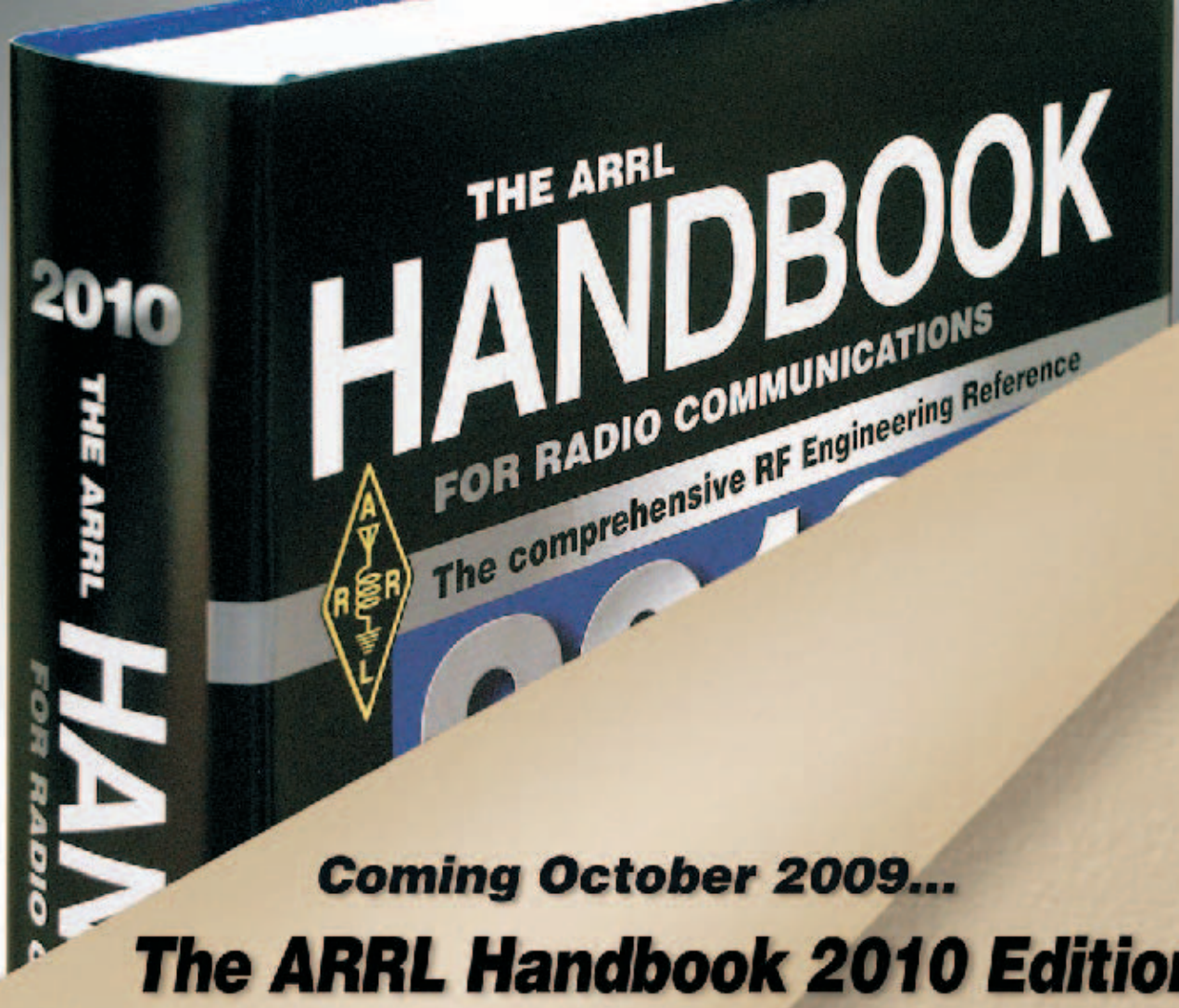

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• Optional HM-189GPS Speaker Mic adds GPS capabilities

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• RX: 0.495-999 MHz (cell blkd)
• Power: 5/2.5/0.5/0.1W
• Optional HM-175GPS Speaker microphone adds GPS capabilities

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• TX: 144-148 • RX: 136-174 • Power: 7W
• Memories: 200 • D-Star with optional UT-118

IC-91A 2M/440 FM Dual Band HT

• TX: 144-148, 420-450 MHz • RX: 0.495-999 MHz (cell blkd) • Power: 5/0.5W • Memories: 1304
• D-Star upgradable with optional UT-121

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
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IC-2200H 2M FM Mobile

• TX: 144-148 MHz • RX: 118-174 MHz
• Power: 65/25/10/5W • Memories: 207
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Y1-5K+	1:1	5 kW Current Yagi balun	160-6m	$56.95
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SP-222	222	<.9	20	650/200 W	310.00
SP-7000	70cm	<1.0	20	500/100 W	310.00
SP-33	903	<.9	20	100/10 W	480.00
SP-23	1296	<.9	20	100/10 W	480.00
SP-13	2304	<.9	18	50/10 W	480.00
LNA145	144	<.4	20	NA	299.00
LNA435	432	<.4	20	NA	299.00
MHP-145	144	<.5	20	1.5 KW PEP	590.00

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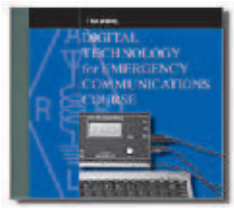

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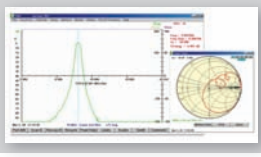

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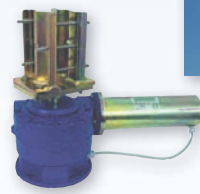

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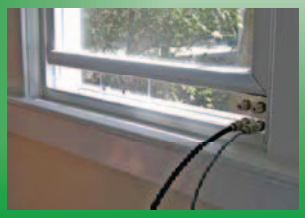

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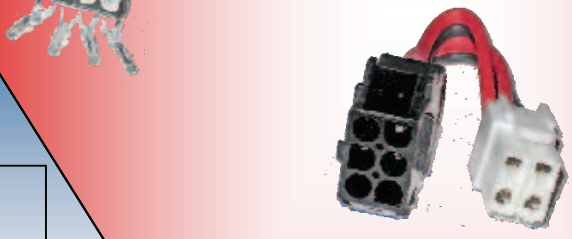
Connectors and cables for many air, marine, commercial and public service radios, too!



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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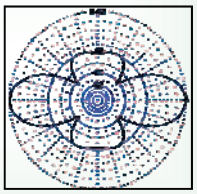
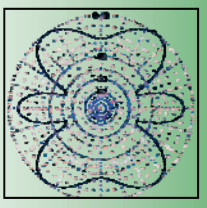
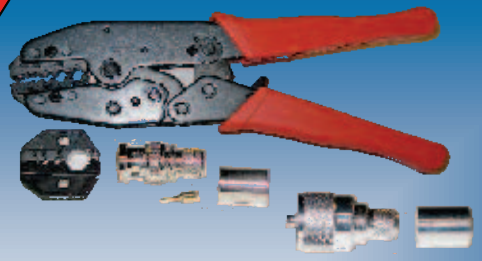


EZNEC Rocket 88™ Antenna plot at 35 feet over typical ground on 20 Meters. 10.43 dBi gain (4.98 dBi free space).



EZNEC G5RV Antenna plot at 35 feet over typical ground on 20 Meters. 7.33 dBi gain. That's more than 3 dB *below* the Rocket 88™!



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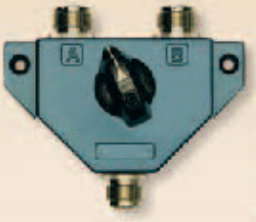

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MH34B4B Speaker Mic 33.95
VC25 Vox Headset 62.95

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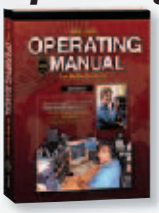

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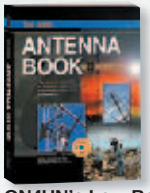

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Continued on page 138

TRY SOMETHING DIFFERENT

A programme for everyone!

Islands have always excited the imagination. They evoke a sense of mystique and romance to those of us who live in crowded cities and commute on busy roads. For the radio amateur, contacting islands encourages the imagination to run riot with visions of a remote station set up, perhaps, on a tropical beach among palm trees or, for the daring, a rocky Antarctic island in a blizzard at - 40°C. This, surely, is what amateur radio is all about!

The **Islands on the Air** (IOTA) programme began over 45 years ago when a British short wave listener, Geoff Watts, set up a highly rewarding and fun awards programme.

If you want to get into the IOTA programme it is really easy to get started!

The IOTA programme is based on the simple idea of collecting QSL cards or QSOs you make from and to the 1000s of islands around the globe. The idea is that you start to collect the cards and when you reach certain numbers you can apply for an IOTA award. There are many different award levels but the IOTA 100 Islands certificate is the start for many. If you prefer you can collect rare islands or even from geographical areas.

IOTA AWARDS receive certificates and trophies to mark your success

You don't even need an amateur radio licence to participate in IOTA, as shortwave listeners can also participate. So you can get started straightaway! If you want to start finding these QSOs try tuning to 14.260MHz (20m) which is the main IOTA meeting frequency. There are a number of other meeting frequencies which are in the table below.

There is far more to this fascinating programme than can be written here so if you would like extra information on IOTA please visit

www.rsgbiota.org

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ARRL Publications—continued from page 136

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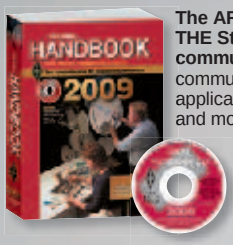

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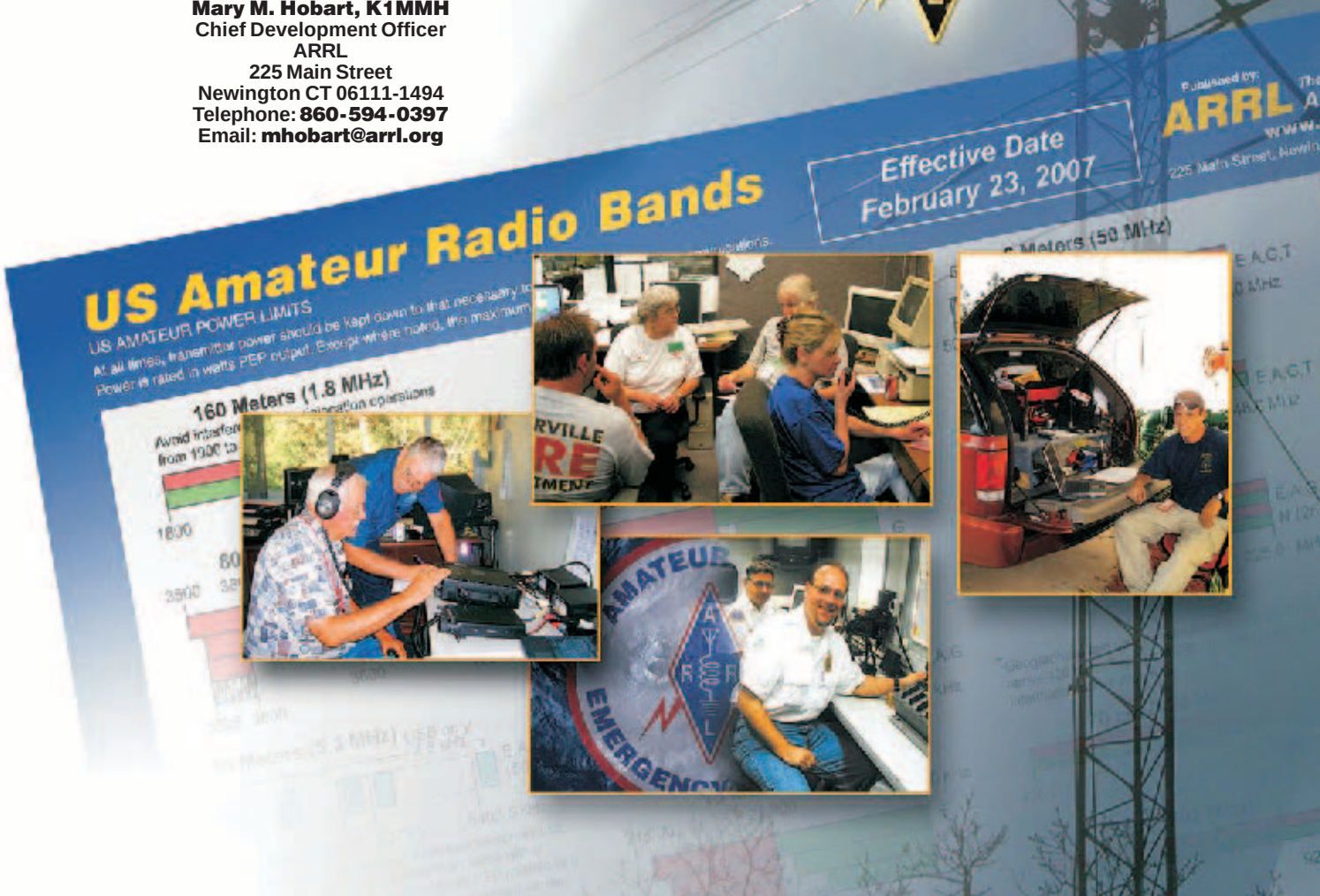

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A wide-range automatic or manual antenna tuner *at your rig* easily matches this antenna for all bands 160-6 Meters. There's no physical tuning adjustments on the antenna -- you simply put it up!

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Weighs just 20 pounds -- you can easily put it up by yourself because its corrosion resistant *6063 aircraft aluminum* tubing and stainless steel construction make it light *and* super-strong.

Assembles in an hour

You can easily assemble it in an hour! Ground mounting lets you completely hide its antenna base in shrubbery. Includes ATB-65 high-strength antenna mount. Requires ground system -- at least one radial. More extensive ground system will give much better performance.

Great for Stealth Operation in antenna restricted areas

This very low-profile antenna is perfect for stealth operation in antenna restricted areas. Hide it behind trees, fences, buildings, bushes. Use it as a flagpole. Telescope it down during the day. Put it up at night and take it down in the morning before the neighbors even notice!

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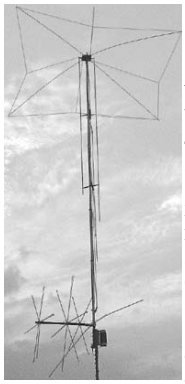

MFJ-1798
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Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

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.

Free MFJ Catalog

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MFJ . . . the world leader in ham radio accessories!

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

For 600 Watt amps like Ameritron AL-811/ALS-600/ALS-500M. Matches 12-800 Ohms. 10,000 *Virtual Antenna*™ memories. Cross-Needle SWR/Wattmeter. 10Wx2¾Hx9D inches.

MFJ-994B $359.95

***No Matter What*™ Warranty**

Every MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

300 Watt...Best Seller

Digital Meter, Ant Switch, Balun

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.

MFJ-993B $259.95

300 Watt...Wide Range

SWR/Wattmeter, 10000 VA Memories

Extra *wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

MFJ-991B $219.95

200 Watt ...Compact

Digital Meter, Ant Switch, Wide Range

World's fastest compact auto tuner uses MFJ *Adaptive Search*™ and *InstantRecall*™ algorithms. 132,072 tuning solutions instantly match virtually any antenna with near perfect SWR.

MFJ-929 $219.95

200 Watt ...Econo

Small, Ant Switch, 20K VA Memories

High-speed, wide matching range and compactness at low cost! Leave in-line and forget it -- your antenna is *always* automatically tuned! 2-position antenna switch.

MFJ-928 $199.95

200 Watt *MightyMite*™

Matches IC-706, FT-857D, TS-50S

No *extra space needed!* Just set your IC-706/7000, FT-857D, TS-50S on top of this matching low-profile automatic tuner -- it's all you need for a completely automated station using *any* antenna! Just tune and talk!

MFJ-925 $179.95

G5RV Antenna

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 Meters as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778 $44.95

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

200W...Weather-sealed

for Remote/Outdoor/Marine

Fully *weather-sealed for remote Outdoor/Marine use*! Tough, durable, built-to-last the elements for years.

MFJ-926 $399.95

200 Watt...Remote

Coax/Wire Ant, No pwr cable needed

Weather protected fully automatic *remote* auto tuner for wire ***and*** *coax* antennas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.

MFJ-927 $259.95

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MFJ TUNERS

New, Improved MFJ-989D 1500 Watt *legal limit* Antenna Tuner

World's most popular 1500 Watt Legal Limit Tuner just got better -- much better -- gives you more for your money!

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. It easily handles *full* 1500 Watts SSB/CW, 1.8 to 30 MHz, including MARS/WARC bands.

New dual 500 pF *air variable capacitors* give you twice the capacitance for more efficient operation on 160 and 80 Meters.

New, improved *AirCore*™ *Roller Inductor* gives you lower losses, higher Q and handles more power more efficiently.

New *TrueActive*™ peak reading Cross-Needle *SWR/Watt-meter* lets you read *true* peak power on all modes.

MFJ-989D $389.95

New high voltage *current balun* lets you tune balanced lines at high power with no worries.

New *crank knob* lets you reset your roller inductor quickly, smoothly and accurately.

New larger 2-inch diameter *capacitor knobs* with easy-to-see dials make tuning much easier.

New cabinet maintains components' high-Q. Generous air vents keep components cool. $12^{7}/_{8}$Wx6Hx$11^{5}/_{8}$D inches.

Includes six position ceramic antenna switch, 50 Ohm dummy load, indestructible multi-color Lexan front panel with detailed logging scales and legends.

The MFJ-989D uses the superb time-tested T-Network. It has the widest matching range and is the easiest to use of all matching networks. Now with MFJ's new 500 pF air variable capacitors and new low loss roller inductor, it easily handles higher power much more efficiently.

***No Matter What*™ Warranty**

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More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

MFJ-986 $349.95

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. $10^{3}/_{4}$Wx$4^{1}/_{2}$Hx15 in.

MFJ-962D *compact* kW Tuner

MFJ-962D $299.95

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. $10^{3}/_{4}$x$4^{1}/_{2}$x$10^{7}/_{8}$ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 $219.95

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. $3^{1}/_{2}$Hx$10^{1}/_{2}$Wx$9^{1}/_{2}$D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E $179.95

More *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, custom inductor switch, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. $3^{1}/_{2}$Hx$10^{5}/_{8}$Wx7D inches. **MFJ-948, $139.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E $139.95

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek $10^{1}/_{2}$Wx$2^{1}/_{2}$Hx7D in.

MFJ-945E HF/6M *mobile* Tuner

MFJ-945E $129.95

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 $119.95

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

MFJ-901B *smallest* Versa Tuner

MFJ-901B $99.95

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-902 *Tiny Travel* Tuner

MFJ-902 $99.95

Tiny $4^{1}/_{2}$x$2^{1}/_{4}$x3 inches, full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire. **MFJ-904H, $149.95.** Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. $7^{1}/_{4}$x$2^{1}/_{4}$x$2^{3}/_{4}$ inches.

MFJ-16010 *random wire* Tuner

MFJ-16010 $69.95

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 $99.95

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $69.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921/924 $89.95

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in.

MFJ-931 *artificial* RF Ground

MFJ-931 $109.95

Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Creates artificial RF ground or electrically places far away RF ground directly at rig. **MFJ-934, $209.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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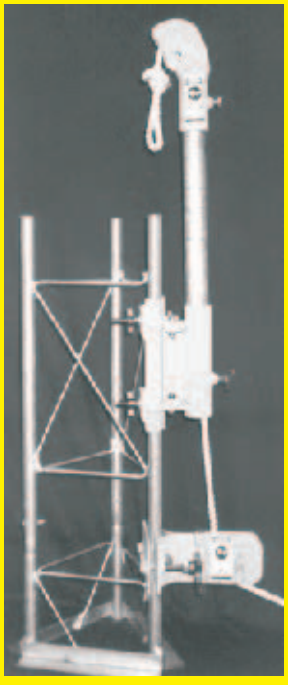

Ginpole for Rohn 25-55 and round leg towers up to 2" O.D. Shown here with optional base pulley. Also ginpoles for BX type Towers.

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Model 40A-HP	Model 100A-HP	Model 200A-HP
10-40 Mtrs.	10-80 Mtrs.	10-80 Mtrs.
1.5 Kw P.E.P.	1.5 Kw P.E.P.	1.5 Kw P.E.P.
$389	$389	$409

EXTENDED COVERAGE

Model 75A	Model 300A	Model 400A
10 -80 Mtrs.	10 -160 Mtrs.	10 -160 Mtrs.
250 watts P.E.P.	250 watts P.E.P.	250 Watts P.E.P.
$389	$389	$409

Note: Mounts are not included.

Tarheel Antennas available in Black, Red, White, and Silver

Little Tarheel-HP
500 Watts P.E.P.
7.0 Mhz - 54.0 Mhz
$379

Ground Radial Kit
$59.00

Stainless Steel construction with 20 lugs for connections and comes with 10 radials for Normal 10-80 operation.

Little Tarheel II Shown Mounted on Diamond K400-3/8C
Note: Mount not included

Little Tarheel II
200 Watts P.E.P.
3.5 Mhz - 54.0 Mhz
$379

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.

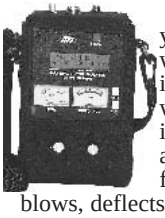
MFJ-219B, $119.95. UHF *SWR Analyzer* covers 420-450 MHz. External frequency counter jack. 7½x2½x2¼ in. *Free* "N" to SO-239 adapter.

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.

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MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

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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

More hams use MFJ SWR Analyzers™ than any others in the world!

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
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Lighted Cross-Needle Meter, SWR/Watts, 144/220/440 MHz, 30/300 Watts Fwd, 60/6 W Ref.

MFJ-864
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MFJ-812B
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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.

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Eliminate obnoxious power line and computer hash and noise by 6 S-units!

MFJ-1164B
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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 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
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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

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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*(R) N connector. 10¾Wx2¼Hx5¼D in. New!

MFJ Frequency Counters

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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.

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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.

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MFJ-801 has 1¾ inch meter, sensitivity control, 20 inch extended telescoping monopole antenna.

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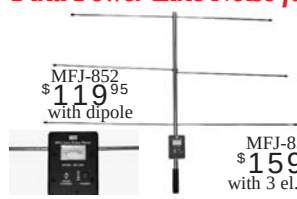

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with 3 el.Yagi

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

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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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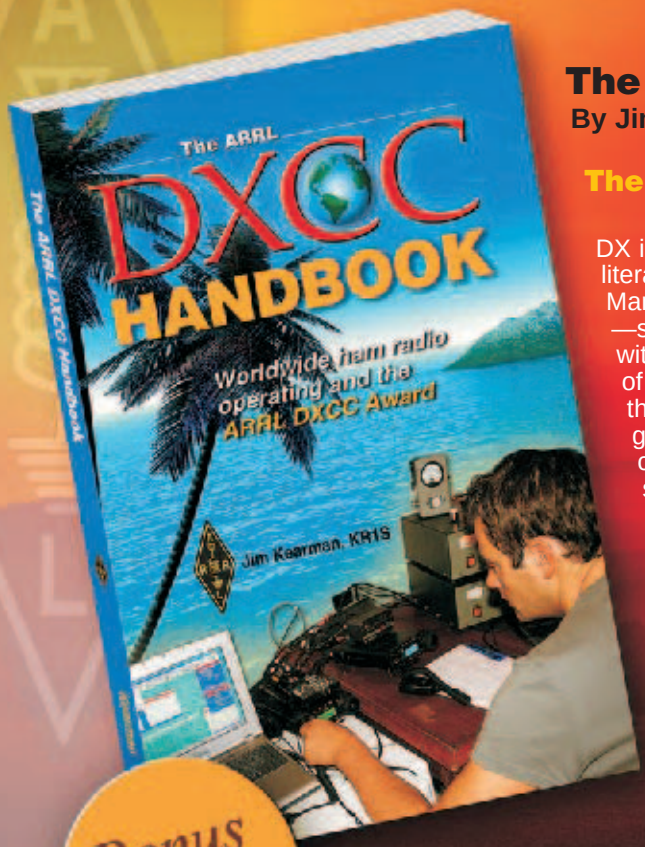

The ARRL DXCC Handbook

By Jim Kearman, KR1S

The Thrill of Working DX!

DX in ham radio shorthand means distance, literally talking to people in distant lands. Many radio amateurs enjoy the lure of DXing—seeing how far away we can communicate with other Amateur Radio operators. It's a way of determining how well our stations—and we, the operators—perform. DXing is a full-time goal for some hams and a just-for-fun challenge for others. The pinnacle of DXing success is the ARRL DX Century Club, or DXCC award.

We hope this book will inspire you to try DXing, and that you'll use it as a guide to beginning your own DX journey.

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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 2¼x3¼x1 inches. 5½ 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. 1¾Wx1¾D x¾H 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. 8½x2¼x3¾ 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. 4½Wx1Dx2H in.

MFJ Deluxe CW Keyer

MFJ-407D $79.95

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-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 4x2x3½ in.

Keyer/Paddle Combo

MFJ-422D $189.95

Best of all CW worlds -- a *deluxe MFJ Curtis*™ *keyer* that fits right on *Bencher paddle*! Adjustable weight and tone, front panel volume and speed controls (8-50 WPM), built-in dot-dash memories, speaker, sidetone, semi-automatic/tune or automatic modes. Use 9V battery or 110 VAC with MFJ-1312D, $15.95. 4½x2⅝x5¼ in.

MFJ-422DX, $99.95. **MFJ** *Curtis*™ Keyer only, fits on your Bencher paddle or MFJ-564 (chrome) or MFJ-564B (black) paddles above.

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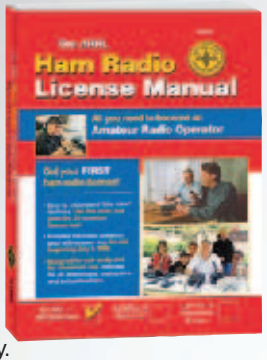

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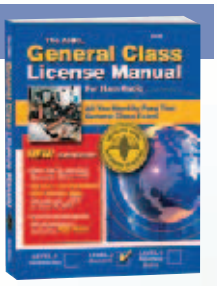

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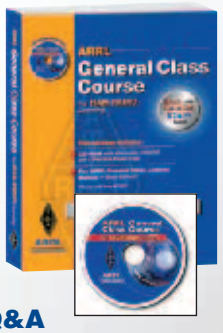

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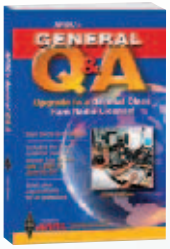

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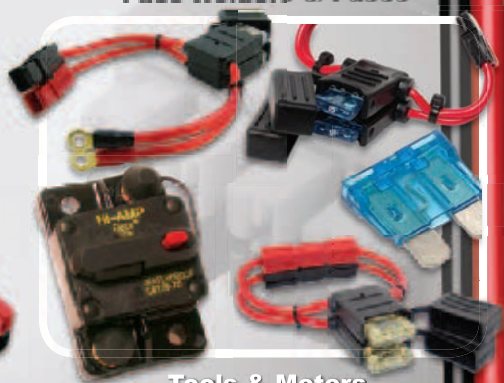

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