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AMATEUR RADIO

September 2004

QST reviews

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IC-7800
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Multiple Meter Readouts See the latest in meter technology with the '7800's virtual meter system. These digital meters are visually superior to and of a higher performance than analog. Don't believe it? Log on to www.icomamerica.com/7800 and see for yourself!

Multiple Spectrum Displays You can select a standard spectrum display either centered on your operating frequency or a fixed range to view the band! Choose how you want to SEE the band, and then tune to what signals you see. (Photo shows the fixed range spectrum display.)

CF Card Slot The ultimate way to "take your rig with you". Just pull your CF card from your '7800, slide it into another '7800, and you now have your rig!

Triple Band Stack Registers Memorizes the last 3 used frequencies – quick recall for band hopping, provides the ultimate in multi-mode flexibility.

DUAL RECEIVER CONTROLS

Digital Voice Recorder Controls Simple record and play controls for the internal DVR. Great for quick recording and playback of a call, great for reducing the number of broken calls in your log.

Dual VFO Tuning Knobs Independent tuning knobs for each receiver. There's no mistake about which receiver you are adjusting, as the size difference allows for "no-look" operation!

DUAL RECEIVER CONTROLS

Gentlemen, start your engines. All four of them!

Power your way to front of the pack with Icom's new IC-7800. Cutting edge digital meets the best of world class analog, resulting in an amazing 110dB of receiver dynamic range and a *+40dBm IP3 in the HF bands!* But that's not all. The '7800 has two identical, independent receiver circuits. Receive two different bands simultaneously on different antennas, with no adverse effects from one receiver to the other – take your band hopping and contesting to the next level! There are four 32-bit floating point DSP units with 24-bit AD/DA converters, one each for the main RX, second RX, TX, and spectrum scope, to accelerate data processing to whiplash speeds! Newly designed power amplifiers provide a powerful 200W of output power at full duty cycle and low transmit IMD. So what are you waiting for? Make your move. See your authorized Icom dealer!

Dual Receive Controls Separate key receiver controls are available for each receiver. Controls for volume, RF gain, and DSP controls, the '7800 also has independent controls for the Digital Twin PassBand tuning as well as the 70 dB Manual Notch filters. Whether in a contest, or just hopping around the bands, easy access to receiver controls such as volume, RF gain, and AGC adjustments are at your fingertips.

Dual Digital Twin PassBand Tuning Only Icom brings you Digital Twin PassBand tuning. Adjustments can be made for each receiver without affecting the other receiver.

Independent Digi-Sel Controls Incorporated into the IC-7800 is a newly designed digital pre-selector, with separate controls for each receiver.

Independent Auto Tune Automatically zero beat your CW or AM carrier signals. The '7800 makes sure you're right on the proper frequency for these modes. Each receiver has a separate control.

Independent AGC Settings Multiple AGC settings for each receiver. On-the-fly adjustment for either preset AGC settings, or a completely variable AGC control.

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Casting around for your next strike in a handheld receiver/scanner? Scale up your listening pleasure. On-the-fly, Icom's IC-R20 allows you to digitally record and play back up to 4 HOURS* of whatever you want to tune in on. *Zzzzzzzzzing!*

- **150kHz – 3.3GHz** (cellular blocked)
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- **Dual Watch** – on the R20's easy-to-see, dot-matrix LCD. It, and the keypad, has backlighting
- **Internal Bar Antenna** – for improved low-band reception
- **1250 Memory Channels** – enter by front panel, or by optional PC software
- **Icom's Dynamic Memory Scan (DMS)** – store memories in up to 18 banks of 100, then mix and match your memories to scan as you like. Plus link the banks!
- **1650 mAh Li-Ion battery** – powerful, lightweight, and lasts for many hours of listening pleasure. Recharger included
- **Telescoping Antenna** – multi-angled, with popular BNC connection
- **CTCSS/DTCS/DTMF Decode** – listen in on the repeaters and "channelized" transmissions
- **Pre-Set Most Popular Memories** – fast access to all broadcast TV and FM radio frequencies
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Stop floundering and start listening, even if just for the halibut. With the R20, you'll be shouting WAHOO! Perch yourself at your favorite authorized dealer – they'll net you a reel good deal!

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HAM-IV
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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
$649.95

T-2XD
$1029.95
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
$389.95

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
$949.95
with DCU-1

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

ROTATOR OPTIONS

MSHD, $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.

AR-40

AR-40
$289.95

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
$1379.95

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.**

Digital Automatic Controller

DCU-1
$649.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1 degree 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
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For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

RBD-5
$29.95

NEW! Automatic Rotator Brake Delay

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

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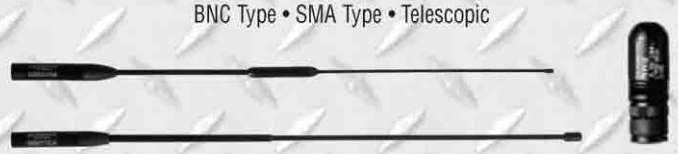

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DIAMOND ANTENNA

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CONTENTS

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See page 15 for detailed contact information.

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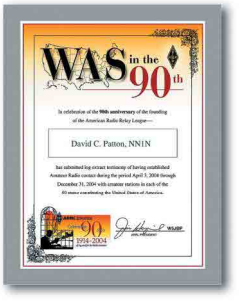
Technical

60

37



44

News and Features

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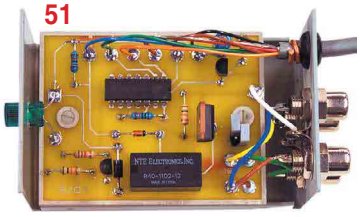
QST Workbench



Operating

Departments

Our Cover
With a host of features, the Hapirat audio panel will increase your operating pleasure—and make your shack neater. The article begins on page 28. Photos by Mark, K5AM, and Lisa Mandelkern.

US & Possessions: Membership in the ARRL, including a one year subscription to *QST*, is available to individuals at $39. Age 65 and over, with proof of age, $36. 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.* Age 65 and over, $900.* Membership and *QST* cannot be separated. Libraries and institutions, $39 per year. Single copies $5.

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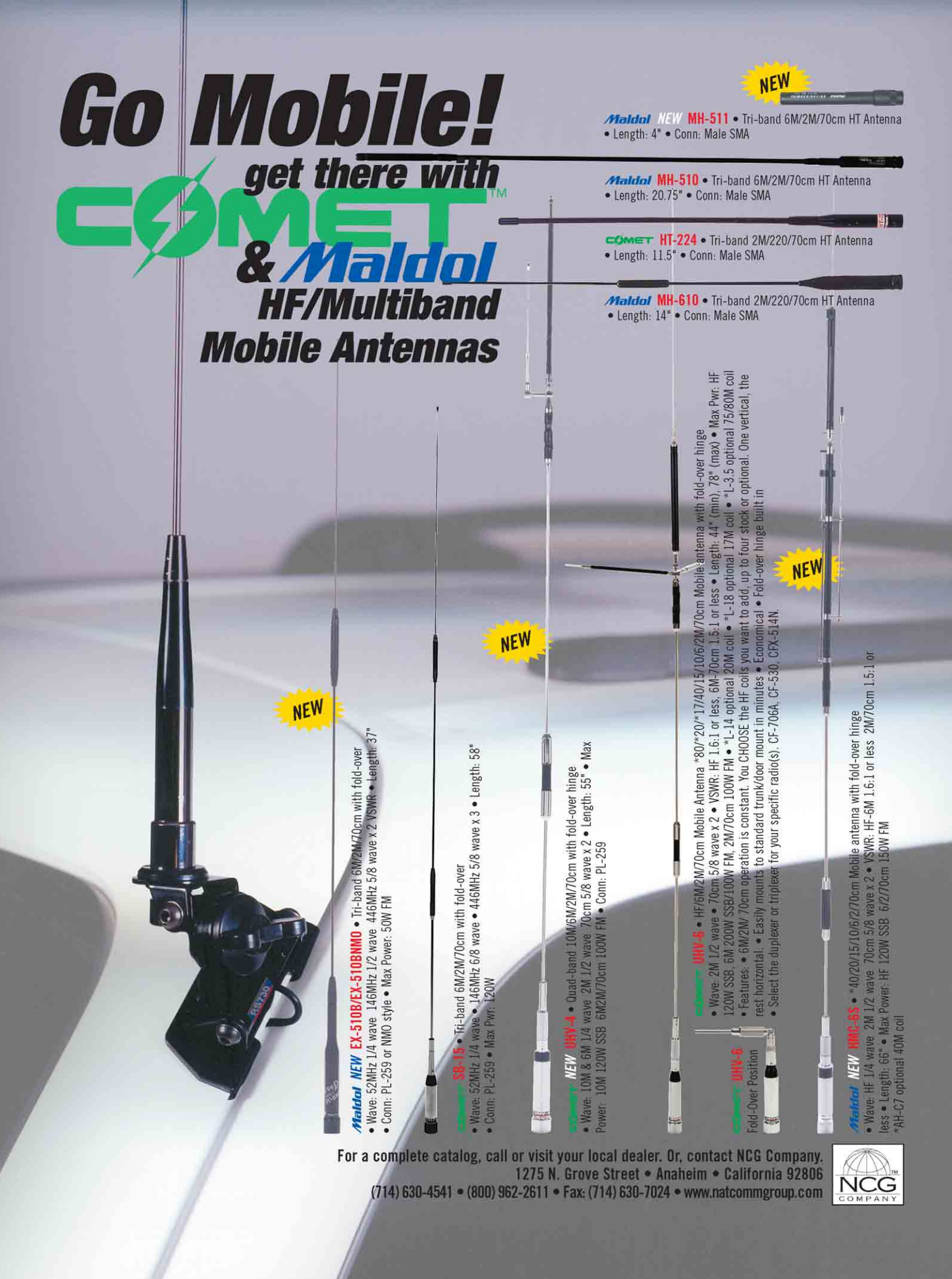

NEW

Maldol NEW MH-511 • Tri-band 6M/2M/70cm HT Antenna
• Length: 4" • Conn: Male SMA

Maldol MH-510 • Tri-band 6M/2M/70cm HT Antenna
• Length: 20.75" • Conn: Male SMA

COMET HT-224 • Tri-band 2M/220/70cm HT Antenna
• Length: 11.5" • Conn: Male SMA

Maldol MH-610 • Tri-band 2M/220/70cm HT Antenna
• Length: 14" • Conn: Male SMA

NEW

Maldol NEW EX-510B/EX-510BNMO • Tri-band 6M/2M/70cm with fold-over
• Wave: 52MHz 1/4 wave 146MHz 1/2 wave 446MHz 5/8 wave x 2 VSWR • Length: 37"
• Conn: PL-259 or NMO style • Max Power: 50W FM

COMET SB-15 • Tri-band 6M/2M/70cm with fold-over
• Wave: 52MHz 1/4 wave • 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 58"
• Conn: PL-259 • Max Pwr: 120W

NEW

COMET NEW UHV-4 • Quad-band 10M/6M/2M/70cm with fold-over hinge
• Wave: 10M & 6M 1/4 wave 2M 1/2 wave 70cm 5/8 wave x 2 • Length: 55" • Max Power: 10M 120W SSB 6M2M/70cm 100W FM • Conn: PL-259

COMET UHV-6 • HF/6M/2M/70cm Mobile Antenna *80/*20/*17/40/15/10/6/2M/70cm Mobile antenna with fold-over hinge
• Wave: 2M 1/2 wave • 70cm 5/8 wave x 2 • VSWR: HF 1.6:1 or less, 6M-70cm 1.5:1 or less • Length: 44" (min), 78" (max) • Max Pwr: HF 120W SSB, 6M 200W SSB/100W FM, 2M/70cm 100W FM • *L-14 optional 20M coil • *L-18 optional 17M coil • *L-3.5 optional 75/80M coil
• Features: • 6M/2M/ 70cm operation is constant. You CHOOSE the HF coil's you want to add, up to four stock or optional. One vertical, the rest horizontal. • Easily mounts to standard trunk/door mount in minutes • Economical • Fold-over hinge built in
• Select the duplexer or triplexer for your specific radio(s). CF-706A, CF-530, CFX-514N.

COMET UHV-6 Fold-Over Position

NEW

Maldol NEW HMC-6S • *40/20/15/10/6/2/70cm Mobile antenna with fold-over hinge
• Wave: HF 1/4 wave 2M 1/2 wave 70cm 5/8 wave x 2 • VSWR: HF-6M 1.6:1 or less 2M/70cm 1.5:1 or less • Length: 66" • Max Power: HF 120W SSB 6/2/70cm 150W FM
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"IT SEEMS TO US..."

Regulation by Bandwidth

At the dawn of the age of radio the concept of bandwidth did not exist. Things were simple: A spark transmitter radiated energy, and a receiver was intended to capture as much of it as possible.

As more stations filled the airwaves the concept of wavelength began to emerge. Transmitted energy could be concentrated at a certain wavelength (the longer the better) and the receiver could be tuned to favor that wavelength. Eventually, amateur stations were consigned to the "short waves" in order to protect longwave navy and commercial stations from interference.

Amateurs were the first to explore the short waves and the first to abandon spark (over the objections of some diehards) in favor of the new "continuous wave" transmitters. By the time of the 1927 Washington International Radiotelegraph Convention the extraordinary value of the short waves, with their unique property of ionospheric propagation, was obvious to amateurs and non-amateurs alike (and is still obvious, except to the proponents of Broadband over Power Lines—but that's another subject). In the first international table of frequency allocations, radio services were separated from one another by frequency (the inverse of wavelength) to avoid interfering with one another. The Washington Convention also adopted this rule: "The width of a frequency band occupied by the emission of a station must be reasonably consistent with good current engineering practice for the type of communication involved."

As the stability of transmitters and receivers improved, receiver selectivity could also be improved to match the receiver's bandwidth with that of the transmitter. By the summer of 1932, the *QST* description of Jim Lamb's high-selectivity "single signal receiver" had set a new engineering standard for radio receivers that surpassed anything then available commercially.

Despite this emphasis on minimizing bandwidth, the rules governing amateur stations did not specify the maximum bandwidth that our signals could occupy—and still do not, with a few exceptions. There is a general rule, §97.307(a), that states: "No amateur station transmission shall occupy more bandwidth than necessary for the information rate and emission type being transmitted, in accordance with good amateur practice." Subbands are defined by emission type, not by bandwidth.

In the 1970s the FCC tried to shift to a regulatory regime based on bandwidth, but the effort ran aground because of two problems. First and probably foremost, the new regime would have outlawed some modes, such as double-sideband AM in the HF bands. That made it very unpopular with a number of amateurs. Second, determining the bandwidth of a transmitted signal requires equipment that was not available to most amateurs. It's one thing to say how wide a signal can be; determining whether a signal is in compliance is something else.

Even the definition of "bandwidth" is not simple. FCC's Part 97 defines it as: "The width of a frequency band outside of which the mean power of the transmitted signal is attenuated at least 26 dB below the mean power of the transmitted signal within the band." The international Radio Regulations define "necessary bandwidth" and "occupied bandwidth"—neither of which aligns with the Part 97 definition of the more general term.

Despite these difficulties, and with the admonition "if it isn't broken, don't fix it" firmly in mind, in July 2002 the ARRL Board concluded that the time had come to regulate amateur subbands by bandwidth rather than by mode. What *was* broken was amateurs' ability to explore new HF digital modes without interminable debates about what was and was not permitted. The existing rules were written in the days of mechanical teleprinters, with provisions for 25-year-old AMTOR and packet radio grafted on. Interpreting them in light of current digital technology is the engineering equivalent of Talmudic scholarship. HF digital work has continued under a provision for specified digital codes to use "any technique whose technical characteristics have been documented publicly," but this provides neither guidance to experimenters nor protection to other amateurs. An Op-Ed by Mark Miller, N5RFX, in May 2004 *QST* explained some of the history, problems with the *status quo*, and the benefits of regulation by bandwidth rather than by mode.

A great deal of work has been done over the past two years to turn the principle adopted by the ARRL Board into regulatory language that will achieve the benefits with as few unwanted side effects as possible. The objective has been to change as little as possible with regard to traditional modes while making provision for digital modes in parts of the bands with maximum bandwidths that are appropriate to those band segments.

The Board reviewed a draft petition for rule making at its January 2004 meeting and asked the Executive Committee to continue polishing the draft. The Executive Committee reviewed a revised draft at its March meeting and found that a few corrections still needed to be made, but took the important step of deciding that a synopsis and explanation of the petition should be made available to ARRL members *before* it is filed with the FCC. Barring a major catastrophe, by the time you read this the synopsis and explanation should be available on the ARRL Web site at **www.arrl.org/announce/bandwidth.html**.

Please look it over and let us know (via the e-mail address that will be provided) if you have any questions or if you think the proposal as drafted might have undesirable consequences. Of course, it's also okay to tell us you like it!—*David Sumner, K1ZZ* QST

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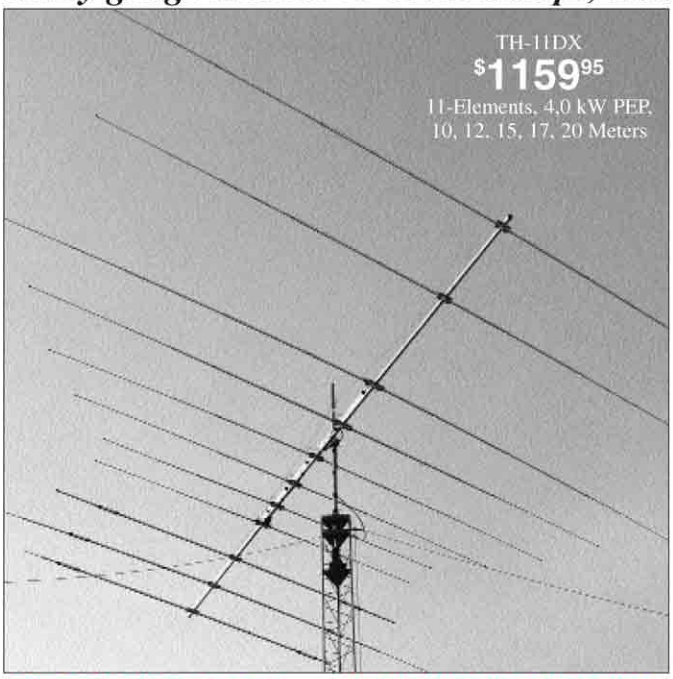

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Every part is selected for durability and ruggedness for years of trouble-free service.

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.

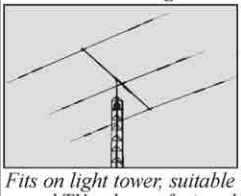
Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

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 Retail
TH-11DX	11	*For Gain and F/B ratio--See...*		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	• www.hy-gain.com		1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$759.95
TH-3MK4	**3**	• Hy-Gain catalog		**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$469.95**
TH-3JRS	3	• Call toll-free		600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
TH-2MK3	**2**	800-973-6572		**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 (or 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.

Durable precision injection molded parts.

Hy-Gain *antennas are stronger, lighter, have less wind surface area, better wind survival, need no adjustments, look professional and last years longer.*

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Small, but ready for Xtra operating fun.

Xtremely "mini" HT delivers "BIG" performance!

DJ-C7T 2m+440 "Pocket-size" HT

Pocket some radio power with the DJ-C7T, the Xciting new dual band mini HT from Alinco. After leading the way in breakthrough miniature electronics technology with its revolutionary "credit card" size transceivers, Alinco creates a new kind of "pocket size" HT that's small in size but BIG in added memories and modes. BIG radio audio quality, too!

Check out the features of this "new generation" DJ-C7T

- Redesigned internal speaker delivers AMAZING audio quality
- SMA antenna port
- 200 Memories
- VFO, Memory and Scan modes
- 39 CTCSS tone squelch (encode+decode) settings
- Tone burst function (1,000, 1450, 1750 and 2100Hz)
- Split function
- Cloning feature
- Lithium-ion battery
- TX range 144 ~ 147.995, 420 ~ 449.995
- Wide-band receive 88.1 ~ 107.995, 108 ~ 173.995, 380 ~ 511.995 includes FM broadcast and AM aircraft bands
- Auto repeater setting

The DJ-C7T is so small, it can fit in a pocket, yet it's a versatile dual-band HT with an enhanced receiver. So, you can enjoy twice the operating fun in half the size. Thanks to Alinco, now you can take a transceiver almost anywhere.

Xciting Xccessories for the DJ-C7T

Included with your HT, you'll find:

- Lithium ion battery pack EBP-58N (3.7V 600mAh)
- AC battery charger (6.0V 0.5A)
- Helical Antenna
- Antenna Cap

Add to the fun with these Xcessories:

EMS-60 Speaker microphone
EME-24 Earphone microphone
EME-18 Earphone
EDH-32 Cigarette lighter cable
ESC-38 Soft case

Actual Size

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ARRL in ACTION

***YOUR* membership at work**

By Steve Ford, WB8IMY, sford@arrl.org

New BPL Video!

A video that clearly and concisely explains and depicts the threat of Broadband over Power Line (BPL) to Amateur Radio is available for downloading free of charge from the ARRLWeb at **www.arrl.org/news/stories/2004/06/18/8/**. Look for the "ARRL Web site" link at the end of the first sentence. Using your mouse, *right click* on the link, and then click on "Save Target As." You'll be prompted to select a folder on your hard drive to save the file. Choose the folder and then click on the **SAVE** button to begin downloading.

The video, *BPL and HF: A Primer*, runs approximately three and one-half minutes (including credits). It's suitable for Amateur Radio club presentations as well as for non-ham audiences, such as the news media, civic clubs, local governments and emergency response agencies. Members of the North Carolina BPL Action Team—Frank Lynch, W4FAL; Tom Brown, N4TAB, and Gary Pearce, KN4AQ—with assistance from Cyndi Pearce, KD4ACW; Danny Musten, KD4RAA, and SoundTrax Studios in Raleigh, North Carolina, shot and narrated the video. It was produced and edited by Flint.Ridge Productions. The file is approximately 18 MB. A high-speed Internet connection is strongly advised for those wishing to download *BPL and HF: A Primer*.

ARRL's Mark Spencer Promotes Amateur Radio in Education at HamCom

Mark Spencer, WA8SME, coordinator of the ARRL Amateur Radio Education and Technology program, was at HamCom 2004 in Dallas to discuss how to persuade schools to embrace Amateur Radio in the classroom. Mark commented, "As I have found everywhere, Morse code is a hook that gets kids to take an interest. The HamCom learn-your-name-in-Morse-code project booth set up by DeGolyer Elementary School is a perfect example. My stump to hams is this: keep your displays and demonstrations simple and reliable, and don't forget Morse code. It gets them every time."

The project booth set up by DeGolyer Elementary School at HamCom 2004. These girls gathered to try the learn-your-name-in-Morse-code display.

ARRL Begins Winlink 2000 Tests at W1AW

In July the ARRL began conducting tests at W1AW using the Winlink 2000 digital communications system to relay simulated emergency traffic. Some of the tests consisted of files sent on HF via PACTOR and relayed by Winlink 2000 back to W1AW on the Internet. Other tests involved VHF packet—sending text and image files from various locations to a Winlink 2000 TELPAC node at W1AW. (See the "Public Service" column in this issue for more information about Winlink 2000.)

The system was demonstrated to several ARRL Directors at their July meeting in Newington. According to Dan Miller, K3UFG, ARRL Emergency Communications Course Manager, tests will continue throughout the year. "We're curious to try different file types and sizes, along with higher data rates for the local VHF/UHF links."

Dan Miller, K3UFG (right), ARRL Emergency Communications Course Manager, demonstrates Winlink 2000 to Paul Benyeda, KB1KDE, of the Manchester (Connecticut) Office of Emergency Management, and his wife Lynne, KA2IIW, who is the Training Management Officer for the Capitol Region Emergency Planning Committee.

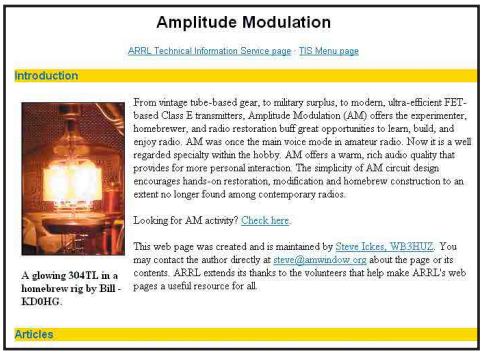
W1AW Checks Out New PACTOR Hardware

A new SCS PACTOR PTC-IIpro controller arrived at W1AW in June, a donation courtesy of SCS (**www.scs-ptc.com**) and Farallon Electronics of Sausalito, California (**www.farallon.us**). Station manager Joe Carcia, NJ1Q, installed the multimode controller for Winlink testing and other digital communication applications. "It is a pretty amazing box," Joe says. "The PACTOR II and III throughput is astonishing. It will do other modes as well, including RTTY, PSK31 and SSTV. The PTC-IIpro will greatly enhance our ability to offer digital communication services to members who visit the station."

The SCS PTC-IIpro controller under test at W1AW.

A New AM Page on the ARRLWeb

Steve Ickes, WB3HUZ, is the creator and Webmaster for a new ARRLWeb page devoted to AM operating. You'll find Steve's handiwork at **www.arrl.org/tis/info/am.html**. On this page you can download classic AM articles from *QST* and browse informative AM Web links.



ARRL Assists Ham Teacher

Elementary school teacher Irene Brown, KF6RNX, needed an idea for her school's spring carnival. Why not let the kids try Morse code? So, the Van Gogh Morse Code and Fine Arts Club was born. Irene didn't have much time to prepare, so she contacted the ARRL for advice.

Irene, KF6RNX, at the school carnival with friend Jon Morris (who managed an adjacent booth).

The League was able to provide Morse code resources, brochures such as *Leap Into Ham Radio* and an "I Sent My Name Using Morse Code" certificate to hand out to the kids.

On June 4, the day of the carnival at Van Gogh Elementary School in Granada Hills, California, Irene was ready with her Morse code booth. Would Morse code attract the kids' interest, considering all the other activities? Here's the story in Irene's words:

"Thanks a million for all the material you gave me for our Van Gogh Morse Code and Fine Arts Club booth at Carnival time! Our booth was a super success. I ran out of pencils and flyers after an hour. Next time I will plan for more.

"The students really had a ball! Some were curious and tried tapping their names out in code, while others helped each other to tap out numbers. I had two keys available for them to use. It was great having the parents and teachers come over to see and inquire about this special treat.

"Again, thank you to the ARRL for the flyers and the certificate ideas. We had a wonderful day!"

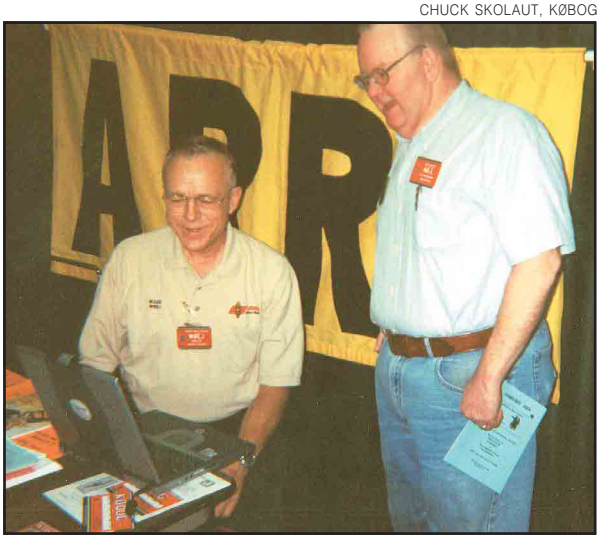
BPL Big Concern at ARRL Iowa State Convention

The specter of Broadband over Power Line (BPL) testing in Cedar Rapids was much on the minds of attendees at the ARRL Iowa State Convention (Hamboree 2004) in June. ARRL officials and Headquarters representatives spent considerable time fielding questions about BPL interference and the League's efforts to lobby for stricter regulation. At the ARRL forum, Midwest Division Director Wade Walstrom, WØEJ, and Dale Svetanoff, WA9ENA, gave an update on the status of BPL activity in Iowa and elsewhere.

Fortunately for Iowa hams, good news was just around the corner. On June 25, Alliant Energy called an early end to its BPL pilot project. See the complete story in "Happenings" in this issue.

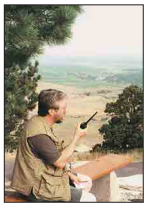
Chuck Skolaut, KØBOG, ARRL Headquarters regulatory correspondent, was also in attendance at the convention. He spoke on the history and purpose of the Official Observers as part of the Amateur Auxiliary. Chuck also explained the basic requirements to become an Official Observer.

CHUCK SKOLAUT, KØBOG


ARRL Midwest Division Director Wade Walstrom, WØEJ (seated) and Iowa Section Manager Jim Lasley, NØJL, at the Iowa State Convention.

Guide to ARRL Member Services

ARRL, 225 Main Street, Newington, CT 06111-1494



www.arrl.org/services.html/ **860-594-0200**

Technical and Regulatory Information Services

A wealth of problem-solving information is available to you on the ARRLWeb at **www.arrl.org/tis/**. Can't find the answer there? Call the Technical Information Service at 860-594-0214 from 9 AM to 4 PM Eastern Time, or e-mail **tis@arrl.org**.

Do you have a question about FCC Rules or local antenna restrictions? See the Regulatory Information Branch on the Web, call 860-594-0236 or e-mail **reginfo@arrl.org**.

ARRLWeb www.arrl.org

Log on for news, information and ARRL services. Members have access to special ARRL Web site features. Place free classified ads. Download and view *QST* product reviews and search the on-line periodicals index.

ARRL E-mail Forwarding

Life in cyberspace is easier when you have your own **arrl.net** e-mail address. When you switch Internet Service Providers, all you have to do is let us know and we'll change your e-mail forwarding automatically. You're spared the hassle of having to tell everyone that you've changed addresses! Sign up on the Web at **www.arrl.org/members-only/emailfwd.html**.

ARRL News

The ARRL News service is the most credible source of news for the amateur community. Breaking stories are available on the ARRLWeb. You can also listen to ARRL Audio News on the Web, or by telephone at 860-594-0384. Have a news tip? E-mail **n1rl@arrl.org**.

QSL Service

The most economical way to send and receive QSL cards throughout the world is through the ARRL QSL Service.

Insurance

The ARRL "All Risk" Ham Radio Equipment Insurance Plan provides protection from loss or damage to your amateur station and mobile equipment by theft, accident, fire, flood, tornado and other natural disasters. Antennas, rotators and towers can be insured too. Call 860-594-0211.

Books, Software and Operating Resources

You can rely on ARRL for the very best publications and products: license manuals, circuit design and project resources, antenna construction ideas, and more. Shop online or locate a dealer near you at **www.arrl.org/shop**. What's the secret for making great publications even better?**—We listen to you!** E-mail your publications feedback, suggestions and product ideas to **pubsfdbk@arrl.org**.

DXCC/VUCC

The DX Century Club and VHF/UHF Century Club award programs are among the most popular Amateur Radio awards in the world.

Volunteer Examiner Coordinator (VEC)

Are you looking for a place to take your license exam? Do you have questions about the examination process? The ARRL VEC network is the largest in the nation.

FCC License Renewal/Modifications Service

At just over 90 days before license expiration, ARRL sends FCC-license renewal notices to ARRL members reminding them to renew. ARRL will also handle duplicate license requests, as well as address or other license changes (upon receipt of a completed and signed Form 605) as a free members-only service.

Educational Materials

A complete line of educational materials are available to schools, clubs and individuals.

Trust in Advertising

ARRL's advertising acceptance process is a unique and respected service provided to both members and advertisers. The ARRL Lab regularly evaluates products for acceptable construction quality, safety, compliance with FCC requirements and performance claims. Members rely on *QST* and other ARRL publications to locate reputable suppliers of Amateur Radio equipment and services.

ARRL Foundation

This is your source for scholarships and other financial grant programs to support Amateur Radio. See **www.arrl.org/arrlf/** on the Web or call 860-594-0397.

Write for *QST*

We're always looking for articles of interest to amateurs. See our Author's Guide at **www.arrl.org/qst/aguide/**. If you have questions, or wish to submit an article for consideration, send an e-mail to **qst@arrl.org** or simply mail your article to *QST* c/o ARRL Hq.

Interested in Becoming a Ham?

Phone toll free 1-800-326-3942, or e-mail **newham@arrl.org**. We'll provide helpful advice on obtaining an Amateur Radio license. See **www.arrl.org/hamradio.html**.

We're at *your* Service

ARRL Headquarters is open from 8 AM to 5 PM Eastern Time, Monday through Friday, except holidays. Call **toll free** to join the ARRL or order ARRL products: **1-888-277-5289** (US), Monday-Friday only, 8 AM to 8 PM Eastern Time. From outside the US, call 860-594-0355. The fax number is 860-594-0303 (24 hours a day, 7 days a week).

If you're in Connecticut, stop by ARRL Headquarters for a visit and tour. Located at 225 Main St, Newington, CT 06111, HQ offers tours at 9, 10 and 11 AM, and 1, 2 and 3 PM Monday through Friday, except holidays. Bring your license and operate W1AW anytime between 10 AM and noon, and 1 to 3:45 PM.

If you have a question, try one of these ARRL Headquarters departments . . .

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Write for QST	Joel Kleinman	860-594-0273	**qst@arrl.org**

Can't find the department you're looking for? Call 860-594-0200 or e-mail **hq@arrl.org**. Sending e-mail to any ARRL Headquarters staff member is a snap. Just put his or her call sign (or first initial and last name) in front of **@arrl.org**. For example, to send mail to Martin Cook, QSL Service Manager, use **n1foc@arrl.org** or **mcook@arrl.org**. If all else fails, send a message to **hq@arrl.org** and it will get routed to the right person or department.

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As an ARRL member, you elect the directors and vice directors 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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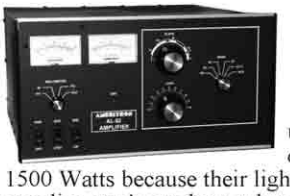

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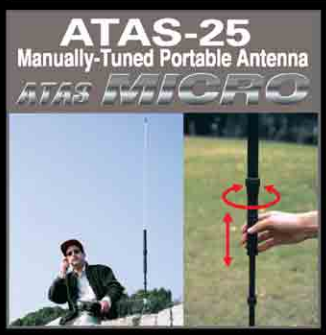

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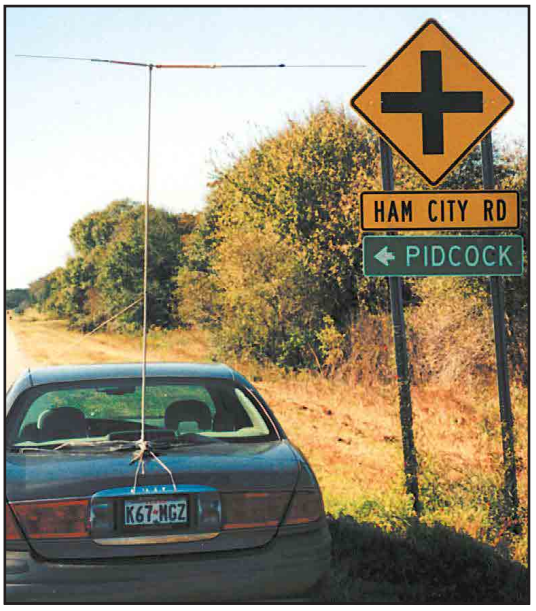
ED WORST, K9EW

And they have their own building! **Ed Worst, K9EW, of Westmont, Illinois, came across these signs near Dodgeville, Wisconsin. Quite a coincidence that the QLF Society happens to share its space with Quality Liquid Feeds. For those who may not be familiar with it, QLF? is a lighthearted way of asking another CW operator if he is sending with his left foot.**

BOB VOSS, N4CD



The place for hams: **Bob Voss, N4CD, of Plano, Texas, came across this intersection in Georgia on this way to a vacation in Florida.**

How Code Used to Sound

By Frank Muratore, KB2EZV

While browsing through an antique shop with my wife, I discovered a small "treasure." There it was, a piece of communication history—a Western Electric telegraph sounder, circa 1900.

After a little (unsuccessful) bargaining I paid the asking price, $20. When I returned home that night, I couldn't wait to apply power to my "jewel." To my dismay, the coils were open. So, I disassembled the unit, found the break in the coils, got some wire-wrap wire and made the repair.

When I re-applied power, to my sheer delight the unit could be made to "click" as when it was new.

At the Dayton Hamvention, I had seen a guy with a similar receiver unit mounted in a wooden box connected to a circuit that triggers it as the sign reads "this is how code used to sound." I decided to seek him out at the next Hamvention (only a couple of months away).

I found the booth but learned that the circuit was not for sale. Instead, I purchased an MFJ code practice oscillator, but realized I also needed an interface. With a little experimenting, I came up with a Schmitt trigger/driver circuit. Now all that remained was the "packaging."

Since a simple box would not do it justice, I constructed the unit shown. First, I added some brass terminals (found conveniently in my junk drawer). These seemed to match the original wood base, as well as provide a convenient means to power the unit. Second, I scrounged a piece of oak I had left over from a home project. The only missing piece was the "container" to tie it all together. Then, it came to me—why not use the plastic cranberry crunch container we had gotten from Knott's Berry Farm? It was certainly "elegant," with its brass sealing ring and heavy-duty clear plastic shell.

I cut out two oak semi-circles and used them to mount the receiver. The pieces I cut the semi-circles from were used to form the "yoke" for the container. Some self-stick felt (obtained at a local fabric shop) and a touch of flat black paint, and I was on my way. I used carpenter's glue for all joints and put four coats of clear varnish on the oak to give it a finished look.

I obtained an "old style" knife switch at the local RadioShack, and the project was complete. Kynar wiring, "wound around a nail," made nice-looking wire coils for the control wires.

Now I can safely say, that the "old receiver unit" got the recognition it deserves! Special thanks to Mark Johnson (ABC) for his Engraving Expertise.

COURTESY KB2EZV

Work in progress: **The driver board location in the base of KB2EZV's sounder restoration project.**

COURTESY KB2EZV

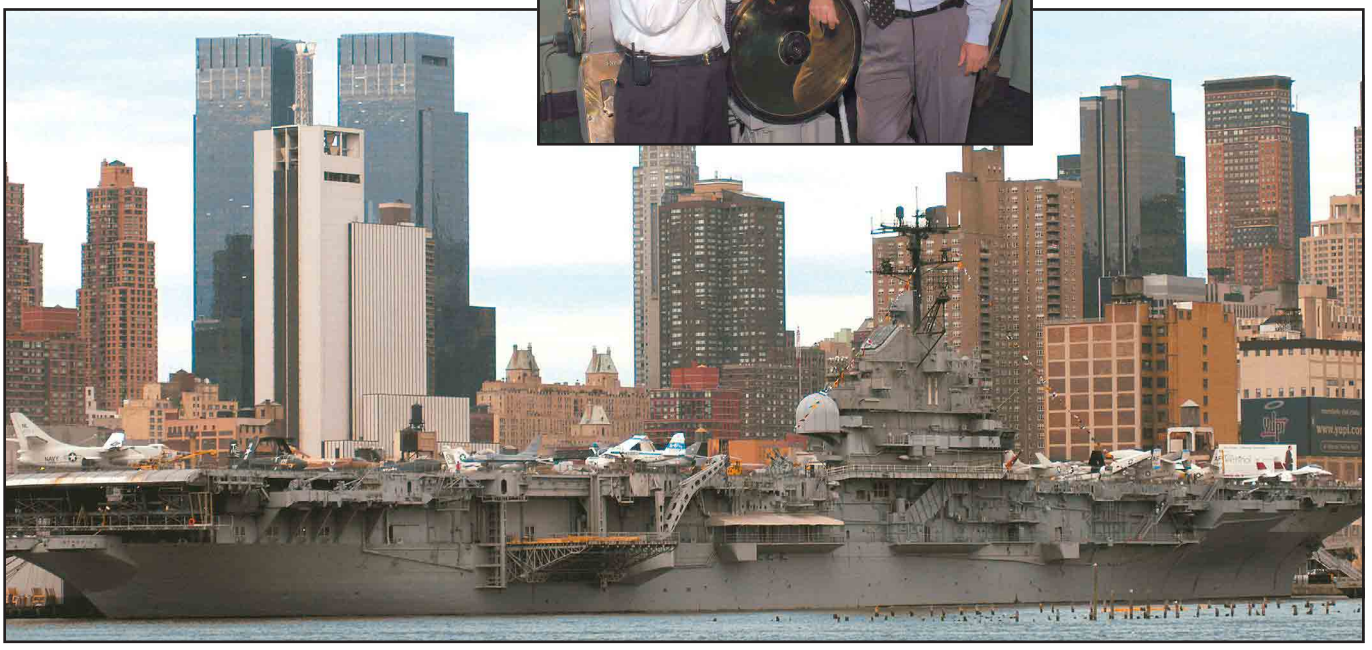
The completed project: **The author's restored circa 1900 telegraph sounder, a far cry from the $20 "bargain" he found at an antique store.**

Intrepid Air and Space Museum Station

Bill Baker, W1BKR, operates the Amateur Radio station aboard the USS *Intrepid*, berthed at New York's Pier 86 at W 46th St. Bill writes: "I am often on the radio, and frequently on the Maritime Mobile Service Net."

Bill Baker, W1BKR (left), and Hugo Catta, AA1XV, in the radio room of the *Intrepid*.

JOE SINNOTT



The USS *Intrepid*, a WW II-era aircraft carrier that's now part of a museum in New York City. There's more about the Intrepid Air and Space Museum at www.intrepidmuseum.org/.

The Western Carolina ARS enjoyed their three-day visit to Enka Middle School in Candler, North Carolina, for the School Club Roundup—as did the students. We were able to nab W1AW on the first day, and all 28 kids got to talk to the operator. [There's a report on the SCR on page 106 of this issue.—*Ed.*]—*Dean Blair, K2JB*

BART Bands Together to Make New Repeater Possible

By David J. Stanford, K7IOU

The BART (Border Amateur Radio Team) group is an informal group that uses the K7CC 146.94 MHz repeater on the northeast side of Tucson. When the repeater took a lightning hit, its owner, John Slusser, WD7F, scrounged some parts to resurrect it. Not long thereafter, another lightning hit took out power supplies, various computer components, the router, an HF transceiver and some other gear.

Although it was clear that a new repeater was needed, the cost was more than one person could bear. I sent an e-mail to all users asking for donations—without John's knowledge. The response enabled us to purchase not only a Motorola MSR2000 repeater, but controller, remote switch, software, manuals and test meter.

We presented John with a certificate representing the gift at a surprise party, and the repeater is now on the air and working great. It's been a fun project for all involved, and could not have been accomplished without the generous donations from the repeater users. Details on the conversion can be found at **home.comcast.net/~msr2000/**.

COURTESY DAVID J. STANFORD, K7IOU

The group of repeater users presents John, WD7F, with a certificate at his surprise party. It reads, "Certificate of Recognition in appreciation of your sharing your toys." From the left: Mike WØLTL; Virgil, K7VP; Craig, KD7TXO; Shirley (John's wife); David, K7IOU; Cecilia, K8IOU; Tom, AB7IC; John, WD7F, and Carey, K7CXY.

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VARIANCE APPROVED

♦ Having recently received a notice from the Elizabeth Township (PA) Board of Supervisors that my tower and antenna had to be removed in 10 days, as it was too close to the property line, my wife Marlene, N3GLY, and I obtained a copy of the zoning laws for the Township. After looking through them, several areas were in question. We attended the next meeting of the Commissioners in an attempt to iron out these differences. This was an exercise in futility, as the Board didn't seem to know about PRB-1 or even about Amateur Radio. An interesting side note: Their Zoning Law section for residential "Accessory Use" allowed for placement of gazebos, barbecue pits and "towers and antennas for the reception of electronic signals." In any case, they required us to apply for a code variance.

I then called the ARRL, and was referred to Barney Scholl, K3LA, who gave me several suggestions and represented me at the next meeting of the Zoning Board. Many local amateurs attended. The Board put off any decision until they visited my house to inspect the proposed installation. Several local amateurs attended and an impromptu briefing was given to the Board. Board members noted that they had received more than 100 letters of support from amateurs across the US as well as many from overseas.

After viewing the property and proposed location of the antenna, the Board gave immediate approval to the request for a variance.

I wish to thank the ARRL, all the many amateurs who sent letters of support, our local amateurs who attended the meetings and especially Barney, K3LA, who gave many suggestions and much support.

If you find yourself in a similar situation, don't give up, ask questions and contact other amateurs as well as the ARRL.—*Geno Boyd, WA3IOU, Elizabeth, Pennsylvania*

QUITE A SURPRISE

♦ I recently visited with Sister Augustine in Syracuse, New York, as she was about to celebrate 50 years of being a Dominican Sister. I handed Sister Augustine my business card, and she looked closely at the back, which includes my call sign.

I said, "I notice that you're looking at my Amateur Radio call sign. I'm a ham radio operator and I know the Morse code." I then spelled out her name in code.

She replied: "Before I became a Dominican Sister 50 years ago, I was a radio operator in the US Navy. I also know Morse code." She then proceeded to spell out *my* name in code!—*Joseph Albino, K2GWO, Camillus, New York*

PLAYING TO WIN

♦ I disagree with the implication of K3YWY's comment that "...most entrants have no chance of winning" [Correspondence, Aug 2004, page 24]. The implication is that it doesn't pay to bother entering.

I am an avid contester for very short time periods. What better way to see what your "inadequate" station can do? I am not competing against other hams; I'm competing against myself. How many stations can I work in one hour? Where are they located? Do I get them on the first or second call?

I also do more serious contesting with the Vienna Wireless Society, K4HTA, when they set up for contests. No high power, but well strung high antennas. And on Field Day a VHF tent. But even there my contribution is only a few hours of the total time.

Contests get a lot of stations on the air. Amazing how often a band is dead only because no one tries.—*David L. Wiesen, K2VX, Reston, Virginia*

BUYER (AND SELLER) BEWARE!

♦ I recently saved quite a bit of money (and embarrassment) through the ARRL's Radios Online classifieds. I have used the classifieds many times to add to and subtract from my shack over the years, and have always been satisfied with the results. But this time was different. The money I saved was not from something I bought or sold; it was from something I did *not* buy. Let me explain.

I was cleaning the shack and decided to sell some equipment and posted the ad on the Radios Online site. Literally within hours, I received two responses. The surprising part was that one of them offered to pay me a considerable amount *over* my asking price; even more than the items would cost purchased brand new. Even though I knew it must have been a typographical error, I replied and asked the prospective buyer to confirm the price. He wrote back indeed confirming the price… along with a story that goes like this:

He has this "client" who owes him several thousand dollars, but for some convoluted reason, he is unable to collect it directly from him. Instead, what he is offering is that his client send *me* the total amount he is owed. After I deposit the money in my bank, I deduct the selling price of the equipment plus any shipping costs from the amount owed to him and send him the balance of the money plus the items he purchased. This was just too complex of a process so I wrote back to tell him I was not interested in selling the items under those terms. I still had a backup, however: the other response. When I wrote him to confirm the price, his response was nearly identical except that he did not offer more than my asking price.

Once is a fluke, but twice is not a coincidence! That's when the light bulb went off. I remembered some sort of disclaimer on the Radios Online classifieds that warned sellers to beware of "creative" payment schemes. There is also a link to the United States Secret Service outlining the details of how this "4-1-9" or "Nigerian Advance Fee Fraud" scheme works. Although the fraud outlined on the Web site can involve millions of dollars and travel to foreign countries, the premise is still the same as in my case. Fraud is fraud whether it is a few thousand dollars or a few hundred thousand dollars.

Fortunately, I still have my equipment…and my dignity. The word needs to get out that this fraud is out there and not only *caveat emptor* (let the buyer beware), but also, let the *seller* beware! —*Scott Schultz, NØIU, Wentzville, Missouri*

TRUCKERS ON 10

♦ I have recently been hearing more and more AM radio transmissions from truck drivers and other individuals on the lower end of the amateur 10 meter band. Listening around 28.085 one would get the impression that these frequencies are the new CB radio channel 19. I do not know if this is ignorance on their part or not, but these are still unlicensed and illegal radio transmissions. And they're proliferating like mad. Illegal users also seem to think that any Amateur Radio beacons they happen to hear are other stations trying to interfere with them. In order to be heard *over* the beacon transmissions, they increase

their output power and cause harmful interference to *legal* transmissions.

I think the FCC should start exercising their enforcement of the Communications Act and begin levying large fines to the companies and the individuals that use our precious frequencies illegally. Simply sending them a warning is obviously not working. If ignored, illegal users will outnumber those of us who use this band legally.

As a retired truck driver, I can personally attest that the illegal radios and linear amplifiers being used on our frequencies illegally are being sold at truck stops and CB shops all over the US. Can't the FCC take some positive action and begin leveling substantial fines against these illegal users and those who sell them their gear?

Our 10 meter band will soon be opening to some great propagation. If this trend continues, we will lose yet more of our precious spectrum to illegal "squatters." Do you think they will be satisfied with a few extra kilohertz?—*Jim Ebner, N8JE, Sneads Ferry, North Carolina*

[Editor's Note: The FCC has recently taken action against unlicensed users of the 10 meter band. See "FCC Keeps Up Pressure on Alleged Unlicensed 10 Meter Operators," Happenings, May 2004, page 78.]

FINDING CLIMBERS

♦ I note from the June 2004 *QST* ["A Picture of You," pages 45-47] that the average age of a ham is 58 or so. I exceed that by a few years, and have discovered that now that I have the time and money to install an improved antenna system, I cannot easily locate anyone who has the energy, ambition, skills and strength to assist in the installation of a modest sized tower and antenna. Most of the local hams are about the same age and have "wound down" their climbing, as have I.

The few professional tower installation companies I have located seem not to want to work on such small installations, and the costs, while probably justified, are quite steep.

How can we "older folks" arrange the installation of a 50 foot tower and tribander? I foresee this becoming an increasingly larger concern and an obstacle to increased ham radio participation. —*Marty Feeney, K1OYB, Scarborough, Maine*

WHAT FRATERNITY?

♦ As a newly reactivated ham, I thought you might find my Field Day 2004 experience of interest. I intend this to be constructive and not to fix blame.

I have been a licensed Amateur Radio operator since 1960. I have been heavily involved with ARES in past years. I would hope that my experience in operating and ARES would prove to be a valuable addition to any ham radio club that emphasizes emergency communications and public service.

About five years ago, work and other distractions caused me to become inactive. My interest in ham radio was rekindled when we moved from the East Coast to San Francisco. I was unpacking our belongings when I came upon my 13 year old Santec 2 meter handheld—which amazingly still worked. I began making contacts with fellow hams in the Bay Area and became active in a number of 2 meter nets.

Through one of the nets I learned that a local ham club would be setting up their Field Day site in the city. The location sounded intriguing, as did meeting some of the folks I had heard on the club's net, so I decided to drive over for Field Day. The club had thoughtfully put up directions on their Field Day site including photos of the roads to show me the way, so I figured that they would welcome visitors.

After going down a few wrong dirt roads, I found their location. There was no call-in on their repeater—in fact no one was on the club repeater at all. It was also surprising that they hadn't put up markers or signs along the dirt roads showing the way to the site, but I guessed that maybe they simply didn't have time.

I eventually found the site and parked my car. The Field Day activity had not yet started. Some of the guys were eating, while others sat around shooting the breeze and still others were working on the rigs. I went up to a couple of the folks who didn't look busy to introduce myself. I figured that they would recognize me from my call, since I had checked into their traffic net the past four weeks.

To my amazement, everyone ignored me; no one said hello. Obviously, I was a new face, but no one asked who I was. One person did look at me strangely and asked, "Are you going to operate?" I said, "No. I would like to watch you guys operate if that's okay." He grunted and said nothing.

Meanwhile my old handheld had a microprocessor burp and had locked up. The fix is to the remove the battery, inserting a paper clip in a small hole to reset the radio. I asked a couple of the guys if they had a paper clip or anything small I could use to reset the handheld. Again they ignored me. It was like I wasn't even there.

I gathered up my radio, walked back to the car and went home.

What has happened to the fraternity of Amateur Radio that welcomed newcomers and strangers to our hobby, our clubs and our lives? Perhaps that sprit still lives somewhere, but it didn't exist in this club during Field Day 2004.—*Jeff Fritz, WB1AAL, San Francisco, California* QST

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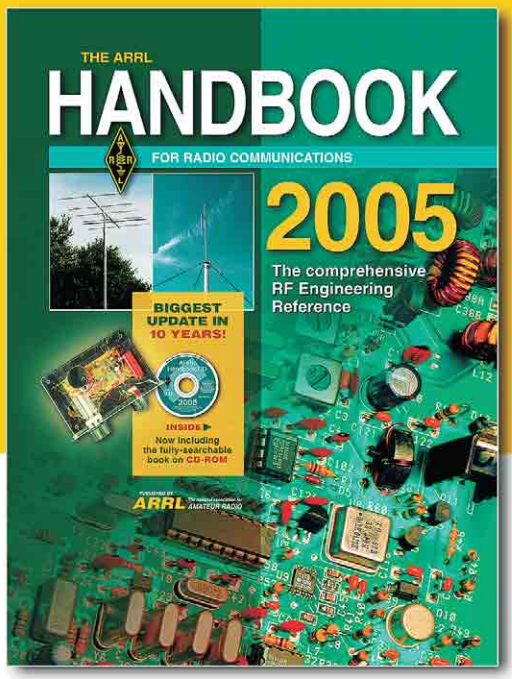

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QST, Product Review, July 2000

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By Mark Mandelkern, K5AM

The Hapirat—An Audio and Computer Control Panel

K5AM built an audio panel to manage the "rat's nest" of cables behind his transceiver and computer and now says that he's a "happy rat."

A modern Amateur Radio station often involves quite a collection of cables, especially if a computer is used for digital work or contesting. These cables frequently need changing for different modes, or for operation without the computer. The clutter of cables behind the rig is often referred to as a "rat's nest." This project provides all the necessary connections in all the various operating configurations without plugging or unplugging any cables. Also, it provides automatic switching for three different microphones, and for a speaker or headphones. Before this panel was built, changing cables in the "rat's nest" was an unpleasant chore—with the Hapirat (an acronym for Ham Audio Panel Interface for Receiving and Transmitting), I am now truly a "happy rat."

Besides the zillions of connecting cables behind the rig, before the Hapirat there was a multitude of little mini-boxes and switches on the operating bench. Microphone switches, filters, preamps, monitor amps, headphone switches, meters, recording controls—all built during the last 56 years of hamming in an attempt to cover all bases and keep up with changing configurations and new modes. Even then, I often had to switch cables for special modes and reset various levels on the mini-boxes or in the computer. Something had to be done to end all this confusion—the Hapirat was the answer!

Operating Features

Arguably, dealing with audio signals has become a completely separate ham shack function. We cannot expect a transceiver to include all the necessary audio and control functions, especially when there are several rigs in the shack, several microphones to choose from and several different operating modes.

Although the features listed below are all important for a comprehensive audio panel, they are not all absolutely necessary; a simple audio panel can be built using only a few desired features. As an example, beginning operation on RTTY or PSK is much easier than it may at first appear; one needs only a computer program, a small circuit and a few cables. And, helpful information is readily available.[1]

Here are the Hapirat operating features:

- Automatic microphone selection—the boom mic is the default microphone, but grab the desk mic or hand mic, push the PTT button, and that mic is automatically connected. A panel switch allows optional manual selection. This automatic circuit is an update of a design previously published by the author in *QST*.[2]
- Separate front panel gain setting for each microphone.
- Adjustable microphone load resistance for each of three microphones—for obtaining the best audio frequency response with a particular microphone and voice characteristics.
- Provision for electret-condenser microphones—pull out any one of the mic load knobs to switch in cartridge power / bias voltage.
- Microphones disabled during computer WAV audio transmissions. (Time for munching!)
- Automatic headphone switching—merely lift the headphones or boom-mic set off the hook switch and it is activated.
- Front panel headphone level control—balance the speaker and headphone levels.
- Front panel level controls for digital receiving, transmitting, recording and voice DX spots.
- Separate transmit audio level control for WAV audio or digital signals—the audio transmit level is critically important for transmitting a clean digital signal. The control uses a special, red, distinctive knob for easy recognition.
- Monitoring of transmitted computer-stored SSB messages, when desired.
- Two-tone generator—for amplifier linearity optimization, to minimize splatter.
- Pulse CW keyer—for amplifier tune / adjustment at a 33 percent duty cycle, to reduce tube dissipation and prevent premature amplifier tube failure. This circuit is an update of a design previously published by the author in *QEX*.[3]
- Separate knobs for all functions—there is no need to change transmitter set-

[1]Notes appear on page 33.

tings when changing microphones, changing modes or recording. And, no need to adjust computer soundboard settings.

- Universal performance characteristics—useful in any station, for any mode; with any operating program; any computer port, any radio.
- Normal radio operation when the computer is off—there's no need to change cables.
- Simultaneous distribution of transmit audio to six or more transceivers—no need to switch cables for different rigs.
- Metering of all audio levels—for receiving, transmitting, monitoring and recording.
- All operating controls on the front panel—there are no internal or rear panel settings, adjustments, jumpers or switches.
- No cable changing is required for any mode or configuration.
- Unique computer modes, with an LED indicator—this avoids undesired transmissions.
- AF amplifier channel—for DX packet cluster spots with a separate speaker.
- More features? There is ample space on the board for adding extra features. The mode switch has two unused positions. There is one spare control on the panel.

Design Features

Every effort was made to choose circuits that would provide high performance and absolute reliability.

Here are the Hapirat design features:

- High-level computer and transceiver audio interfacing with connecting modules, attenuators and isolation transformers—to avoid hum problems.
- No active discrete components—integrated circuits are used exclusively.
- No relays—all solid-state switching.
- Full-logic control—no microprocessor with pre-programmed memories.
- CMOS audio signal switching—no audio signals on the mode switch.
- All components directly accessible—no moving parts!
- Simplicity? No… sorry about that—the panel uses 107 integrated circuits. The Hapirat is simple in operation, however; a single mode switch controls all circuits.

Modes

A single 12-position rotary MODE switch is employed in order to avoid a confusing situation with up to a dozen individual toggle switches. Here are the various modes of operation:

STBY—Standby. The radio functions manually. This mode engages computer standby. Computer outputs such as WAV audio, digital tones, PTT and KEY signals are *not* sent from the computer to the transmitter, no matter what the computer tries to do. This mode is included to prevent undesired transmissions.

SPOT—DX packet cluster spots from a logging program will be heard in the packet speaker.

CP—Computer control enabled.

CPM—Computer control with Monitoring. Same as CP, plus transmit audio monitoring.

2TONE—A two-tone test. Two tones, at 1000 and 1500 Hz, are sent to the transmitter for linearity testing. A heterodyne mixer demodulates the difference frequency of 500 Hz and provides this as a sync signal to the monitor scope for triggering.

1TONE—One-tone test. Only a 1000 Hz tone is sent to the transmitter.

PULSE—A 33 percent pulse generator is on the KEY line for amplifier tuning at reduced dissipation.

REC—Record. Microphone audio is sent to the computer for recording WAV files.

PLAY—The computer sound card sends WAV audio to the headphones or speaker for previewing.

SETUP—This mode is used to pre-set the individual microphone levels using a built-in meter.

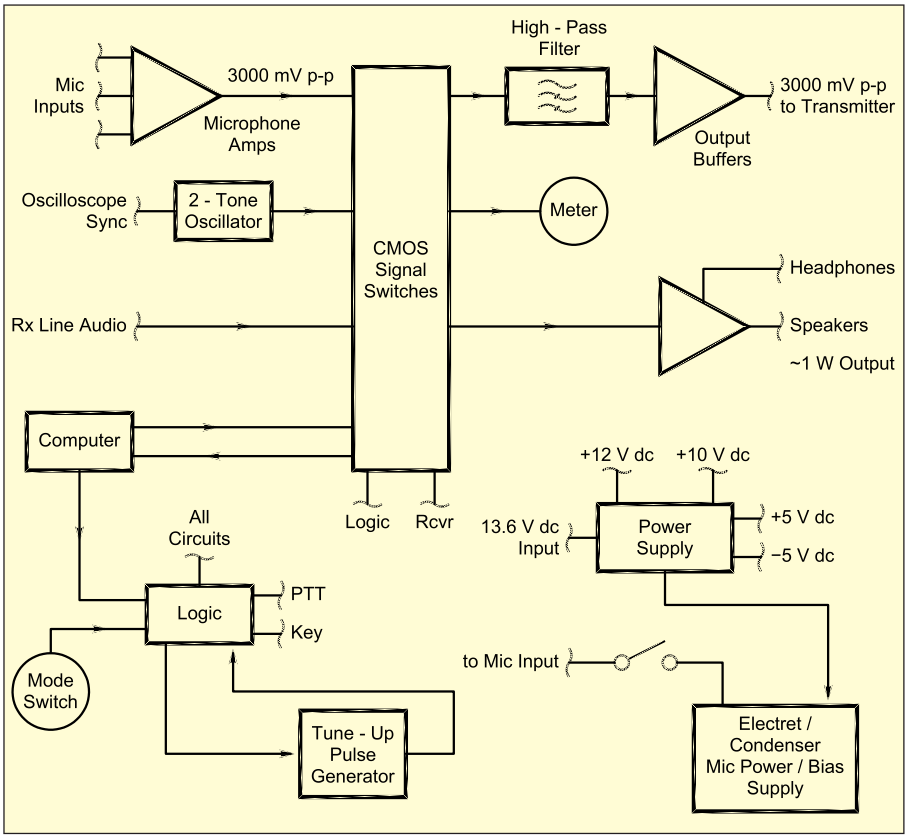


Figure 1—Block diagram of the Hapirat receive and transmit audio panel interface. Switching is done with CMOS IC switches (analog mutiplexers/demux) and audio signal distribution is done at high level (3 V_{p-p}) to minimize hum. The power supply is fed from the station 13.6 V dc supply and outputs all required voltages, including the negative voltage required for the op-amps. This avoids ac within the panel, also in the interest of hum prevention. The AF speaker/headphone amplifier delivers in excess of 1 W output at 0.1% THD. Detailed circuit information is given in the expanded article.[5]

Meter and Indicators

The peak-indicating meter allows careful adjustment of all circuits in all modes. This avoids readjusting the computer settings. I set all computer sound card levels (MASTER, WAV, LINE) to about 1/3 of maximum and never change them.[4]

There are three LEDs on the panel:

Green—Power is applied to the Hapirat.

Yellow—This LED lights whenever the Hapirat is in mode CP or CPM, warning the operator not to press a keyboard F key unless a transmission is definitely desired.

Red—In modes CP and CPM this LED lights whenever the computer sends a PTT command.

Circuit Details

A block diagram of the Hapirat, shown in Figure 1, illustrates the basic design concept. Complete schematics, circuit descriptions and design notes are given in the expanded article.[5] Portions of the circuit might be useful for smaller projects.

For example, you may wish to build only the automatic microphone selector or the two-tone generator for amplifier tuning and linearity checking. The high-level audio signal system for hum and RFI avoidance might be used for any computer interface box.

Microphones

The center microphone jack is for the boom-mic headset; this is the default. When the PTT bar on the desk mic is pressed, the panel automatically switches to the desk mic input. A similar action takes place for the hand mic, which might be hanging from a hook at the front of the operating bench. The panel switch labeled D-AUTO-H can be used to override the automatic circuits. This automatic system is an update of a design previously published by the author in *QST*.[6] Modes REC and PLAY permit convenient experimentation with the microphone LOAD resistance controls.

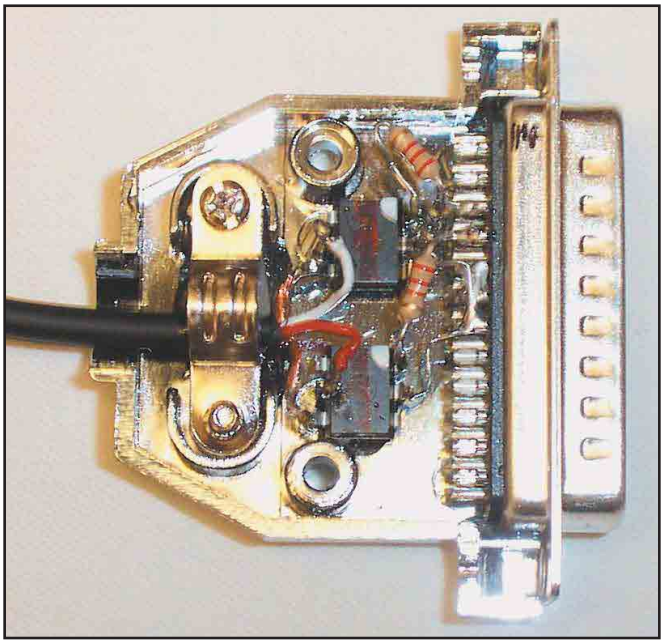


Figure 2—Parallel port plug with optocoupler interface circuit, before the cover is attached. Full construction details are given in the expanded article.[5]

Signal Switching

The Hapirat uses CMOS integrated circuits for signal switching. These switches are very convenient and efficient. One CMOS IC selects one of three microphone inputs, while another selects mic, computer or test tone audio. Other ICs switch the meter circuit input, the receiver digital audio, the recording audio to the computer and the audio to the speaker amplifiers.

Full-logic Control

It took only a few moments to choose logic methods for switching between the various modes. One has only to imagine the complexity of a 13-wafer, 12-position mode switch, the possibility of hum pickup or noise, and the trauma that would result from having to replace the switch someday. It is easy to switch modes with a logic circuit; one 12-position wafer switch is sufficient. The bipolar TTL series was chosen over that of other logic types because it is less susceptible to malfunction from any possible RF that might leak into the circuit. The original TTL family, the 7400 series, is nearly obsolete; the current 74F00 family is used, which is compatible with all bipolar TTL series.

Power Supply

The Hapirat is powered by a 13.6 Vdc supply on the operating bench which powers all the many accessory gadgets. The idea of a self-contained ac supply was rejected, as likely to introduce hum. Inside the panel, a negative voltage rail is obtained from a charge-pump voltage converter IC. Having both positive and negative power rails available for the circuits is very convenient; it avoids the chore of having to establish V/2 potentials for the op-amp circuits and allows dc-coupling and simple control of the audio signal switches.

Transmit Audio Outputs

The Hapirat uses a special method for audio signal transmission to avoid hum problems. This involves amplification, high-level cables, attenuators and isolation transformers to prevent ground loops. The attenuators and isolation transformers are easily built into small modules placed near the transmitters; full construction details for the modules are given in the expanded article.[7] Four high-level outputs are provided. Two low-level balanced outputs are also provided, with isolation transformers inside the Hapirat.

Computer Audio Interface

The TO CP ("to computer") output jack on the Hapirat is used to feed receiver line audio to the computer for digital decoding or to feed mic audio for WAV recording. That selection is done automatically by the MODE switch. An isolation transformer is used in the connecting module to avoid ground loops. The FR CP ("from computer") input jack on the Hapirat is used to feed computer audio into the panel—it also uses an isolating module.

After all the circuits were carefully connected with attenuators and isolation transformers, I was both surprised and perplexed to hear a low level buzz in the packet cluster speaker. What was wrong? It turned out to be the laptop computer with its switching power supply module. It had been previously grounded (by the rig), but it was now floating. The optocouplers and isolation transformers removed *all* the grounds from the computer. A heavy lead to the main station ground bus solved the problem. I learned, therefore, that the goal is not to eliminate *all grounds*, but ground *loops*. The computer did require one good ground.

Computer Control Interface

The interface circuit uses optocouplers; this avoids the possibility of hum resulting from a direct ground connection between the Hapirat and the computer. Bipolar transistors were previously used for the computer interface circuits with no problems, but many operators prefer the optocouplers, so I tried them here. Hearing of so many troubles with the usual optocoupler circuits, I knew that something different was needed to ensure 100 percent reliable operation in all situations.

Most of the troubles reported involved the inability of the optocoupler to sink a moderate current to a low enough voltage, while at the same time drawing minimal current from a parallel or serial port. The solution adopted here was to use optocouplers only to drive IC comparators, then TTL logic and, finally, bipolar transistors to control the transceiver PTT and KEY lines.

Thus the system enjoys the advantages of both methods and the disadvantages of neither. This system has a universal character—there is no dependence on any particular type of computer port. The system will work with a serial port, a parallel port, or any other port in use today or apt to be introduced in the future. When a free serial port is not available, a USB adapter can be used.[8]

An advantage to having the computer

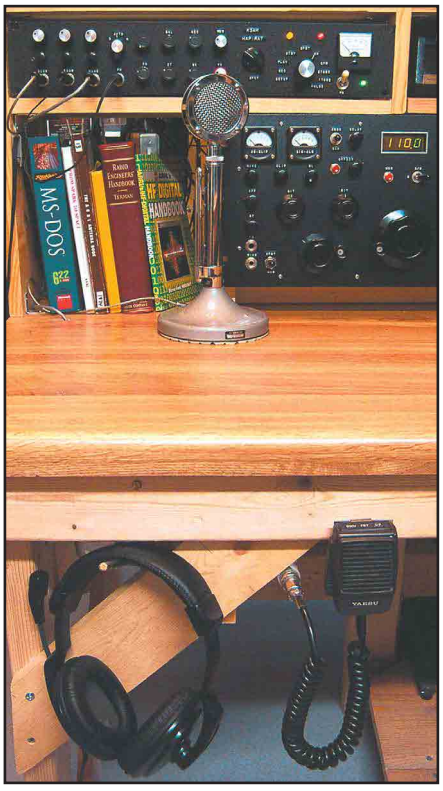


Figure 3—Left end of the K5AM operating bench, with three microphones. All three mics are fitted with Heil elements. When either the desk mic or the hand mic is used and its PTT bar is pressed, that microphone is automatically connected and the others are silenced. When the boom-mic headset is lifted off the arm, a switch, rigged-up to the arm, triggers a Hapirat circuit which switches the speaker off and the headphones on.[9] The operating bench has a pine 2×4 front rail. The phone's hook switch assembly attaches to the rear of the rail, with the arm extending out below the rail. Below the Hapirat is the homebrew transceiver.

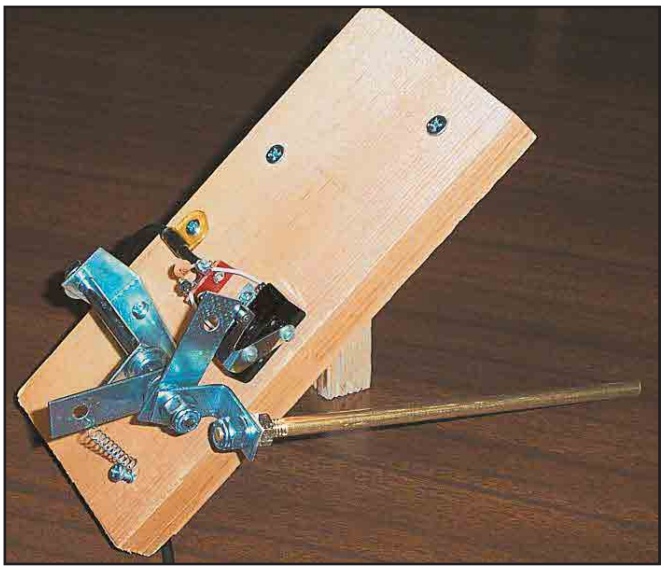


Figure 4—Headphone hook switch assembly. Full construction details are given in the expanded article.[5]

interface operate through the panel is the ability of the MODE switch to disable computer control of the radio, thus preventing unintended transmissions.

An aluminum mini-box, or even a plastic enclosure, would serve well for the optocoupler circuits. The circuits can also be built directly into the computer connector. Figure 2 shows an optocoupler circuit built into a parallel port plug. A similar circuit can be built into a serial port plug.

Speaker and Headphones

Worse than microphone plug changing, and more frequent, is the nuisance of the headphone plug. EME operators, DX hounds, and many others, need their headphones to dig the weak signals out of the noise, but they may not want to wear them all day long! So, we use the speaker while waiting for the fearless hams in the DXpedition boat to land on the reef. Then, when we hear the signal, we grab the headphone plug and frantically plug it into the jack, often scratching the transceiver panel.

To avoid this unpleasant situation, the Hapirat has a separate receiver audio channel for the headphones, with either manual or automatic switching. The boom-mic headset hangs from an arm at the front of the operating bench. The arm is linked to a switch which is connected to the panel; the Hapirat automatically switches from speaker to headphones whenever the phones are lifted off the arm.[9] Figure 3 shows the three microphones and the automatic headphone hook.

There is also a panel switch for manual speaker/phones selection. The center position of this switch is for silence—when the landline rings, or when the static and interference become just unbearable.

Audio Output Channels

The Hapirat has three audio output channels. Two channels are for receiver speaker/headphone audio; the third drives the packet cluster speaker. The audio output level to the receiver speaker is exactly the same as the input from the transceiver; the receiver AF gain control is used as normally. All three audio output channels have very low distortion, less than 0.1 percent.

Headphone Hook Details

Fabricating the phones hook with a switch provides a good opportunity for innovation. Readers might invent a variety of different solutions; an optical switch might be fun to try. This part of the project is not very critical; if an experimental device malfunctions, just unplug it and use the switch on the panel. I took an easy and simple approach; a pine board is often a convenient base for an experiment. Figure 4 shows the hook assembly. Surprisingly, this crude device has turned out to be robust and reliable.

Test Signals

The Hapirat provides audio tones for SSB linearity testing and low-duty-cycle CW pulses for safe amplifier tuning. It also provides a sync output for stabilizing the two-tone oscilloscope display.

Tone Generator

Linearity checking of RF amplifiers to prevent splatter usually requires a two-tone audio generator. A better method to determine the characteristics of an amplifier alone involves two transceivers. The advantage of the two-tone audio, one-transceiver method is that it checks for linearity of the entire system.

The Hapirat includes a low-distortion two-tone generator with tones at 1000 Hz and 1500 Hz, in the mode 2TONE. The oscillators have distortion levels of 0.6 percent—far better than needed for this application.

To obtain a proper scope pattern, the tones must be balanced at the amplifier. To adjust for slight imbalance which might result from the transceiver filter passband, the balance control BAL is on the front panel, along with the level control 2T. A single tone, 1000 Hz, is available in the mode 1TONE.

SSB Linearity Testing

Any oscilloscope can be used. The frequency limit is no problem, because the vertical amplifier isn't used—a sample of the transmitter RF is directly applied to the vertical plates at the CRT.[10] Connect a shielded lead from the Hapirat SYNC output jack to the 'scope trigger input. Set the horizontal sweep speed to 0.5 ms/cm.

CW Keying Waveform Testing

Connect a shielded lead from the transceiver key jack (in parallel with other connections) to the 'scope trigger input. Set the horizontal sweep speed to 5 ms/cm. It is convenient to build a key line junction box using an eight phono jack plate, with all jacks tied together.[11] Cables can be run to the transceiver key jack, the Hapirat, the scope, a straight key, a bug, a separate contest keyer, etc. This is neater than a messy bunch of Y-adapters.

Observing the keying waveform on the 'scope can be helpful in eliminating key clicks caused by poorly designed transceivers. When QSK (break-in) is used, observation at the amplifier output is also necessary, because key clicks are often caused by poorly designed amplifier QSK circuits. There has been a voluminous Internet discussion lately about key clicks caused by top-of-the-line transceivers. Correction of these faults is sometimes difficult. (The author's homebrew transceiver uses separate internal trim pot adjustments for CW waveform rise and fall times.)

Two-tone Oscilloscope Synchronization

Watching a monitor 'scope when two tones are applied to the transceiver always presents a minor, but irritating, problem. The waveform seen on the 'scope is an envelope pattern whose frequency is the difference of the two tones; here it is 500 Hz. The envelope pattern is filled in by the much higher frequency RF wave, which appears only as a solid region.

The problem is in synchronizing the 'scope. The horizontal sweep speed must be set precisely to the beat frequency. This can be quite difficult to do on a simple non-triggered oscilloscope with a small sweep frequency knob. And finally, after tedious adjustment, the display usually begins to drift immediately, since the phase relationship between the two tones and the 'scope's horizontal oscillator is always changing.

To solve this triggering problem, the Hapirat provides a SYNC output; it is connected to the scope external trigger input. The sync signal is a square wave at 500 Hz—it is obtained by demodulating the combined 1000 Hz and 1500 Hz audio signal to recover the 500 Hz beat note. After decades of futile efforts to stabilize two-tone test patterns, the effect is quite astounding.

Pulse Generator

To prevent premature failure of an RF amplifier or HV power supply, it is best to tune up with CW dits at about 40 wpm. A peak-indicating output meter makes this easy. PA tube failures may be caused more often by "brick-on-the-key" tuning than by normal operation. Even better than 50 percent duty cycle CW dits is a 33 percent duty cycle pulse generator, which is included in the Hapirat. Testing at 1500 W PEP output involves only about 330 W of average plate dissipation.

Tuning up with the pulse generator is easiest with a peak-indicating power meter; most of my homebrew amplifiers have built-in peak-indicating meters. I also use an Autek model WM1, which works very well at the pulse rate of this circuit.[12]

Figure 5—The Hapirat fits into the K5AM homebrew station rather well.

Figure 6—The Hapirat construction method, which makes liberal use of perf-board, sockets and wire-wrapping.[5] Note the different style and color of the operating knobs that are designed for easy access and recognition during contest operation.

Figure 7—The rear panel allows convenient connections to the transceiver and the computer. At the upper right are the outputs providing transmit audio for six transceivers.

Construction

The Hapirat is built into an aluminum chassis behind a standard 19 inch rack panel. The circuit board is permanently mounted. The top and bottom plates are both removable, so both sides of the board are accessible. This eliminates the problems of movable boards and stress relief for wires. I call this construction method "no moving parts."

Figure 5 shows how the audio panel fits into the author's homebrew station. Figure 6 shows the chassis with perf-board, sockets and wire-wrapping. Figure 7 shows the rear panel jacks for connection to the transceiver and computer. Most of the Hapirat circuit is wire-wrapped. This is easier than point-to-point

perf-board wiring, and saves space; see Figure 8.

Parts

Every effort was made to use readily available parts. In a few cases where special parts were used, substitutions are possible. In a contest station, reliability is of the utmost concern. The most common failure points are at the plugs, jacks and connectors—it's too bad we can't just solder the whole station together!

This project at first used three 1/8 inch stereo jacks on the rear panel (where 1/4 inch jacks appear now). The small jacks are quite handy, and ready-made cables are available everywhere. Hours and hours were spent with catalogs and Web sites trying to find high quality jacks, plugs and cables. There were no failures, even after several months, but the jacks just didn't have the right feel; the plugs might have come loose. It seemed best to change to high-quality 1/4 inch jacks, even 40 year old junk box jacks, before trouble set in.[13]

Results

The Hapirat has been used with excellent results for over a year; it is a joy to have it on the operating bench. The station operates exclusively using the author's homebrew transceiver, but the audio panel has also been tested with Yaesu, Kenwood and ICOM equipment. Microphones used include the Heil boommics, the Astatic D-104 crystal, the Electro-Voice 664 dynamic and 719 ceramic and the ICOM SM2 electret-condenser microphones.

There is no ready-made circuit board available for the Hapirat. Readers might wish to fabricate a board, perhaps even using surface mount components. The wire-wrap method used here, however, allows for convenient changes and additions. Building "from scratch," with no manufactured board, parts kit or pre-programmed CPU, will provide a level of satisfaction rarely found in today's plug-and-play world. It will usually result in a learning experience and it will help preserve the traditions upon which ham radio was founded.

After years of wrestling with the rat's nest of cables behind the rig and the large number of separate interface and audio devices, I am now truly a happy rat. Complete schematics, circuit descriptions and design notes are given in the expanded article.[14]

Figure 8—Wire-wrapping is easy… if your spouse helps. Thanks, Lisa!

Notes

[1]Steve Ford, *ARRL's HF Digital Handbook,* Newington: ARRL, 2001. Also at **www.arrl.org/shop**; **www.rttycontesting.com**; **www.k9jy.com**; **www.qsl.net/mmhamsoft**; **www.writelog.com**; **www.psk31.com**.

[2]M. Mandelkern, "The AMSAFID: An Automatic Microphone Switcher Amplifier Filter Integrator Distributor," *QST*, Nov 1995, pp 47-49.

[3]M. Mandelkern, "Design Notes for 'A Luxury Linear' Amplifier," *QEX*, Nov 1996, pp 13-20.

[4]There is an easy way to restore your fixed computer soundcard level settings for ham radio, in case they are changed for other uses. The excellent program *Quickmix* by M. Saxon is available at **www.msaxon.com/quickmix**. *Quickmix* will remember your fixed settings for all the sound card levels. With a shortcut for the settings file in your Startup folder, you will automatically be set up for ham radio every time the computer starts.

[5]Full details are in the expanded article: **www.arrl.org/files/qst-binaries/hapirat.zip**.

[6]See Note 2.

[7]See Note 5.

[8]I am currently using a laptop USB port with a type 70607 USB-serial adapter from **www.pccables.com**.

[9]The idea for an automatic headphone system came from Mark Wilson, K1RO. When he saw the system for automatic microphone switching in the manuscript for *QST* in 1995, he asked "What about the headphones?"

[10]See Note 5.

[11]RadioShack part no. 274-370 (**www.radioshack.com**).

[12]**www.autekresearch.com/wm1.htm**.

[13]Is this being over cautious? Well, at first I thought perhaps it was. Then, a few months later, I read a report from a leading contester. Placing only second in a worldwide contest, he lost by less than 1% of the top score. He reported that he missed part of the contest when a 1/8 inch plug came loose from his computer.

[14]See Note 5.

Photos courtesy of the author and Lisa Mandelkern.

Mark Mandelkern, K5AM, was first licensed in 1948 as W9ECV, in Wisconsin. His ham station is completely homebrew; details are at **www.zianet.com/k5am**. *Mark's main operating activity is 6 meter DX, with 134 countries worked. He also enjoys HF DXing and contesting, with DXCC confirmed on 10 bands and a number of top-10 contest awards. Mark is emeritus professor of mathematics at New Mexico State University; his mathematical research is in topology, constructive analysis and the foundations of mathematics. He can be contacted at 5259 Singer Rd, Las Cruces, NM 88007;* **k5am@arrl.net**.

STRAYS

COAST GUARD CLUB

◊ The Coast Guard Club offers free membership to those who have served or are currently serving in the USCG or USCGR and have a ham ticket. Sign up at **www.uscgradio.net** or contact **DGardner@northstate.net** for more information.

YOUTH NET

◊ The ".275 Youth Group" is an informal ragchew group that meets every Saturday at 9 PM EDT (0100 Sunday) on 7.275 MHz ±10 kHz. The duration of the net varies. Anyone young or young at heart is welcome. Also, you can visit our Web pages at **www.n5eil.741.com** and **www.275youthgroup.4t.com**. We encourage youth to use HF and to get to know one another. We also will try to cater to the needs of young hams, such as perfecting the art of Morse code, DXing tips and miscellaneous questions.

Our head net control is Charles King, KG4KCT, in South Carolina, and our Webmaster is Neil Smith, N5EIL, in Texas. Our net contact person is Timothy Little, W8LBO, in Michigan.

We hope that the net will bring many hours of enjoyment to all. For more information, contact Timothy Little at **timothy0little@yahoo.com**, or write to him at 10310 North Bagley Rd, St Louis, MI 48880.—*Neil Smith, N5EIL; Charles King, KG4KCT, and Timothy Little, W8LBO*

By Keith Zimmermann, K5WX

Using Simple Antennas for ISS Contacts

How effective is a simple antenna for space communications? A simple experiment using packet signals from the International Space Station may surprise you.

I have found that simple antennas *can* be used for 2 meter packet and voice contacts with the International Space Station (ISS). Just be sure to have realistic expectations of the performance of a simple antenna compared to an elaborate tracking beam array! What can you expect from an old Ringo antenna or a small, fixed 4 element beam when it comes to sending your signal up to an object that is 250 miles above the Earth and moving at 17,000 miles per hour? Surprisingly, these simple antennas can perform fairly well. Understanding each antenna's strengths and weaknesses will go a long way toward making the chase of the ISS or satellite contact an enjoyable experience.

Some History

The ISS is also called *Zarya,* which means sunrise in Russian. The first components of the ISS were launched from the Baikonur Cosmodrome on November 20, 1998. Led by the United States, the ISS has utilized the resources of 16 nations: US, Russia, Canada, Japan, 11 nations of the European Space Agency and Brazil. It has been continuously manned since November 2000. Its orbit allows it to circle the Earth approximately every 100 minutes.

The ISS carries a packet radio station using the call sign RSØISS-3. The worldwide downlink is 145.800 MHz FM. The worldwide packet uplink is 145.990 MHz FM. The voice uplink is 144.490 MHz in ITU Region 2 (including the US) and Region 3 (including Australia). The voice uplink in Region 1 (Europe) is 145.2 MHz. The current crew includes Flight Engineer Mike Fincke, KE5AIT, and Commander Gennady Padalka, RN3DT. Why not take your 2 meter packet station and simple antenna and give it a try?

Antennas Tested

Everyone expects a vertical to be omnidirectional with a low angle of radiation. However, how low is low? Will the ISS packet station signal disappear as the space station climbs higher than 45° above your vertical antenna? How will a simple, 4 element fixed beam perform? Will it only hear the space station during the occasional pass when it is traveling directly in front of the beam?

To answer these questions, a simple experiment was undertaken using packet radio signals as the source of data for analyzing the performance of simple antennas. The goal was to gather enough data to allow a graphical analysis of the antenna pattern.

Two antennas were tested: A Cushcraft Ringo and an Arrow 4 element Yagi. Each was erected 30 feet above the ground for a two week period.

A Ringo antenna (model AR-2 manufactured by Cushcraft) is a half-wave vertical that has been around a long time. You can often find them at ham swapfests or on eBay.com for just a few dollars. A new one costs about $50. It is an omnidirectional antenna with a manufacturer's predicted angle of radiation of 16°.

A 4 element, 2 meter Yagi will provide some directivity to your 2 meter signal. This antenna is relatively simple to build or can be purchased for under $50. Check out *The ARRL Antenna Book* and *The ARRL Handbook*[1] for plans for constructing your own antenna. The antenna tested

[1]*The ARRL Antenna Book*, 20th Ed., 2003. Available from your local dealer or from the ARRL, 225 Main St, Newington, CT 06111; tel (toll-free in the US) 888-277-5289 or 860-594-0355; **pubsales@arrl.org**; **www.arrl.org/shop**. ARRL order no. 9043. *The 2004 ARRL Handbook for Radio Communications*, ARRL order no. 1964.

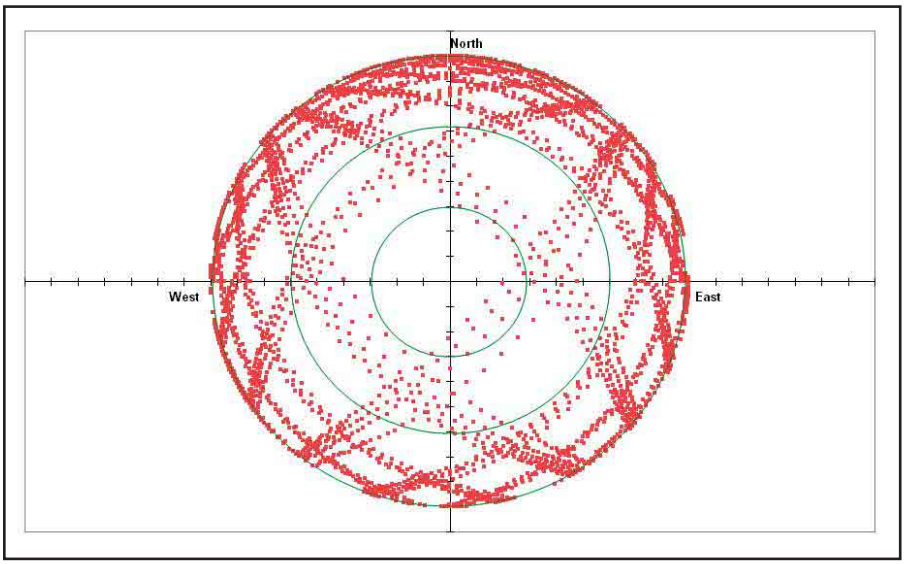


Figure 1—The circular plot shows the location of the ISS at 10 second intervals for 2 weeks of ISS passes. The edge of the plot represents the horizon. The center of the plot is a point directly overhead. The tick marks along the cardinal directions represent every 10° of elevation above the horizon.

was a 4 element beam (model 146-4S manufactured by Arrow Antenna). It was end-mounted with the elements in the vertical orientation. The antenna was pointed directly west. The estimated angle of radiation for this antenna should be lower than the Ringo. The forward gain of the antenna is predicted to be at least 9 dBi. In addition, signals off the side and back of the antenna should show decreased signal strength compared to an omnidirectional vertical antenna.

The Experiment

During each antenna experiment, the location of the ISS was calculated at a 10 second interval for each orbital pass. The location of the ISS was calculated in terms of elevation above the horizon and azimuth (compass direction) from my location. This provided a simple three-dimensional location of the spacecraft with respect to the test antenna for each 10 second interval of a pass.

The packet downlink frequency (145.800 MHz) was monitored continuously for packets from the ISS. Every packet received was time-stamped to the nearest second. The packet TNC's (terminal node controller) clock was maintained at ±1 second with respect to WWV. Since there was no local packet activity on the downlink frequency, it was easy to capture every instance of a packet from the ISS without the possibility of interference.

There was also sufficient activity on all North American passes to ensure that a reasonable opportunity always existed for a packet signal to be digipeated through the ISS packet station. If a packet was received during a 10 second interval of a pass, then that interval was marked as a "heard" data point. If no packets were received during a 10 second interval, then that interval was marked as a "not heard" data point. No changes were made in any equipment or settings for the equipment during the tests. The resulting combination of "opportunities to hear" the packet signals versus the "actual received packet signals" was analyzed graphically.

Graphical Data

By graphically analyzing the data, one can easily see a number of interesting facts. First, look at the plotted data in Figure 1 showing the location and elevation of the spacecraft during orbital passes. The edge of the circular plot represents the horizon. North is at the top of the figure. The center of the figure is a point directly overhead. It was somewhat surprising to see that there were relatively few passes in which the ISS climbs higher than 30° above the horizon with respect to my location. That means that a non-tracking antenna with a medium angle of radiation will not be extremely handicapped. Second, look at the plotted data in Figures 2 and 3 showing when packets were heard from the ISS. The location of the spacecraft at these instances provides important information on plotting your own strategy for making contacts through the ISS.

Experimental Results

The ISS is generally above your horizon and in your "line-of-sight" about six times each day. These are your windows of opportunity to digipeat your signal through the ISS packet station. Figure 1 illustrates the location (azimuth or compass heading from my station location) and the elevation (degrees above the horizon) of the ISS during "visible" passes over a two week period when the Ringo was being tested. Each red dot represents a position at a 10 second interval. Notice how many of the passes skirt the edge of the horizon? Notice how few "dots" there are in the center of the figure? This is indicative of few occurrences of the ISS passing "overhead." It is clear that the medium to low-angle passes occur much more frequently than the "overhead" passes. If your signal is focused at these lower angles of elevation, you will increase your chances of hearing and digipeating the ISS.

Figure 2 shows the experimental results for the Ringo antenna. The blue squares on the graph illustrate the location of the ISS when a packet was heard during a 10 second interval at my station. The red dots represent the location of the ISS for the "not heard" packets. Figure 2 tells me that the Ringo is basically omnidirectional; there was no preferential direction for the "heard" packets. This figure also tells me that the Ringo had some trouble "hearing" the ISS packets when the ISS was at a low angle above the horizon. Notice how there are more "not heard" packets (red dots) along the edge of the graphic. These dots along the edge of the graphic represent the ISS at or just above the horizon. This confirms the reputation of the basic Ringo antenna for not having a very low angle of radiation. Finally, the blue squares in the center illustrate that the Ringo heard packets relatively well during "overhead" passes. Again, this confirms that the Ringo has a medium angle of radiation and that the antenna is omnidirectional.

For terrestrial contacts, one wants to keep the power radiating at low angles of radiation on 2 meters. Power directed up into space on 2 meters is largely wasted radiation if you're trying to hit the repeater across town! However, the Ringo's medium angle of radiation works in favor of the casual Amateur Radio operator who wishes to make contacts through the ISS packet station but does not want to invest in an expensive tracking array.

Figure 3 shows the experimental results using the 4 element Yagi antenna. The Yagi was mounted at the same height above ground as the Ringo and directed exactly west (270°). A 4 element Yagi has more forward gain at lower angles of radiation than the Ringo antenna. In addition, one would expect to see fewer packets received off the side of the beam antenna. Figure 3 confirms these assumptions. The graphic shows that the Yagi "heard" more packets than the Ringo when the ISS was at a low elevation above the horizon and in the

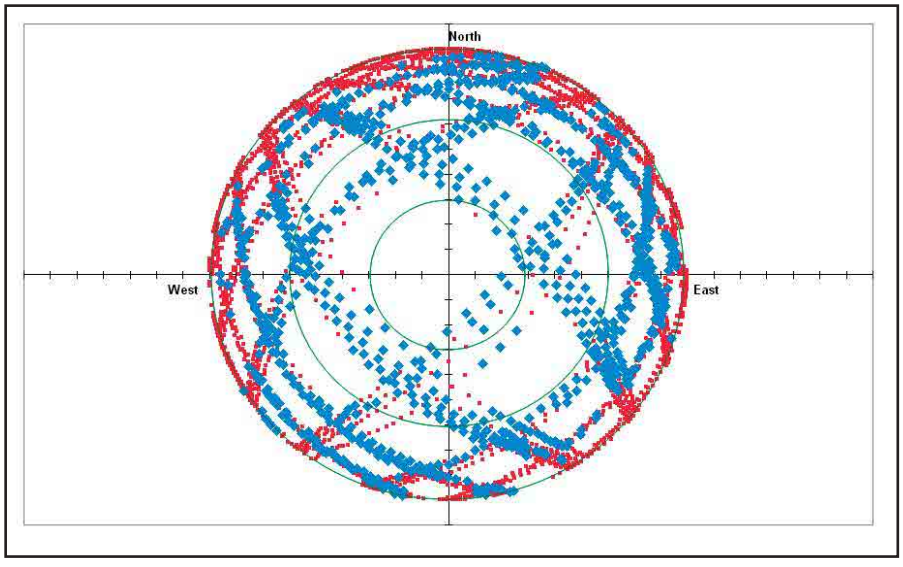


Figure 2—This plot for the Ringo antenna shows the "heard" packets (blue dots) and the "not heard" packets (red dots) during the ISS passes over a two week period.

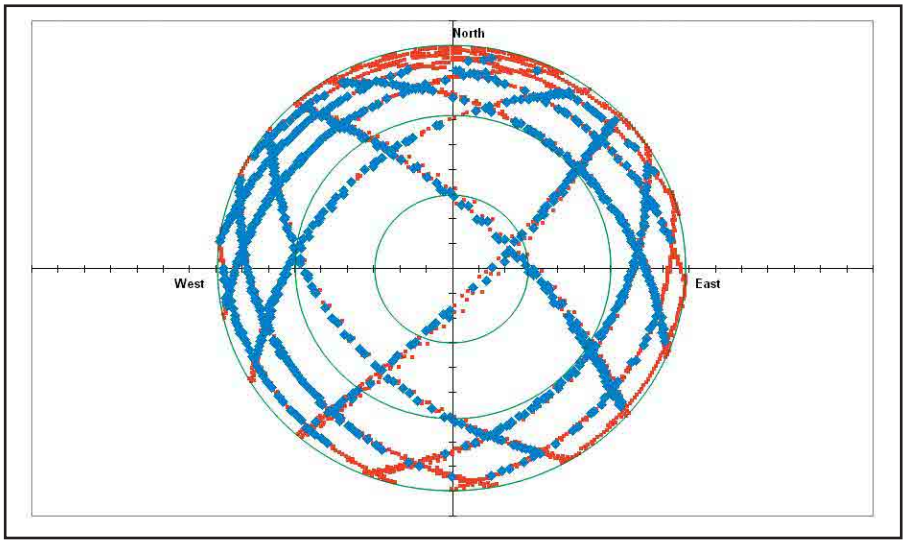


Figure 3—This plot for the 4 element Yagi antenna shows the "heard" packets (blue dots) and the "not heard" packets (red dots) during the ISS passes over a two week period.

westerly direction. Figure 3 also shows that there were more "not heard" packets for occurrences when the ISS was north or south of the antenna (off the side of the beam).

Summary

These tests demonstrate how a simple antenna can be used for contacts through the ISS. The Ringo antenna, with its medium angle of radiation above the horizon and its omnidirectional nature, has provided the author with many digipeated contacts. Running only 25 W from an amplified handheld transceiver, packet contacts have been made throughout the United States and Mexico. The best ISS passes for this antenna are passes in which the ISS climbs higher than approximately 5° above the horizon.

The 4 element, fixed direction Yagi performs relatively well for low-angle passes in its preferred direction. For a Yagi pointed directly west, the best opportunity for success in digipeating through ISS will be orbits when the ISS passes to the west of your location at a low angle above the horizon.

In conclusion, an inexpensive vertical antenna or a small, fixed-direction Yagi will allow you the opportunity to hear the ISS packet station and digipeat through it. While those Amateur Radio operators with the large tracking arrays may be able to effectively radiate more power at the ISS station, those with a simple antenna and a little operating savvy can still succeed.

Information on configuring and operating your packet station for ISS contacts may be found on the Web at the Houston AMSAT site at **www.amsatnet.com/**. In addition, current information on satellite tracking is available at **www.amsat.org/**. A fun Web site with lots of good information is the ISS Fan Club site at **www.issfanclub.com/**.

Reference

Frank H. Bauer, Lou McFadin, Will Marchant and Carolynn Conley, *2001: An Amateur Radio Space Odyssey on the International Space Station*. Available for downloading at **www.amrad.pt/amsat01.pdf**.

Keith Zimmermann, K5WX, was first licensed in 1969. He holds an Extra Class license and a BS and MS in Atmospheric Sciences and Engineering from the University of Texas at Austin. He is a meteorologist and a Professional Engineer at the Texas Commission on Environmental Quality. Keith is the Secretary of the Quarter Century Wireless Association (QCWA) Chapter 67 in Central Texas. He can be reached at 6006 Danwood Dr, Austin, TX 78759-4727, or by e-mail at **k5wx@arrl.net**.

STRAYS

VAN DONATION AIDS MARYLAND CLUB

◊ When Maryland Public Television was ready to replace its 1986 Ford communications van, the Carroll County ARC threw its hat into the ring, citing the club's need for a mobile comms platform in which to support emergencies, community and club functions, and to spread awareness of Amateur Radio at local schools, carnivals and parades. Governor Robert Erlich awarded the van to the club, and although it needed some repair, it came with an onboard 4 kW generator, a 42 foot telescoping tower, storage cabinets and room for two operating positions.—*Joe Erbaugh, N3YIM, Secretary, CCARC*

COURTESY JOE ERBAUGH, N3YIM

The former Maryland Public Television van that was donated to the Carroll County ARC.

QST congratulates...

◊ Dr Frederick Niswander, K7GM, of Greenville, North Carolina, who has been named dean of the College of Business, East Carolina University. Niswander is an award-winning teacher and widely cited scholar in accounting. Before beginning his academic career, he was a successful financial officer in the private sector and a member of the ARRL HQ staff.—*Tnx W4RA*

◊ Dan Ogletree, K4DWO, who has been awarded a four-year Air Force ROTC scholarship to Middle Tennessee State University. His twin brother, James, K4JWO, has been awarded a four-year Navy ROTC scholarship to Vanderbilt University. Both are recent graduates of the Siegel High School honors program in Murfreesboro, Tennessee.—*Tnx K4PWO*

◊ Walt DuBose, K5YFW, and Gerry Creager, N5JXS, who were recognized at the West Gulf Division Forum at HamCom in June for their service in the High Speed Multimedia initiative. Each received a framed certificate from ARRL President Jim Haynie, W5JBP.—*Tnx K8OCL*

◊ Wayne Johnson, WB5OFN, of Fort Smith, Arkansas, who has received the NOAA Environmental Hero Award. Johnson has been weather net control operator and the link between the National Weather Service in Tulsa and the Amateur Radio storm spotters for the past 30 years.—*Tnx KD5OEZ*

◊ Gene McPherson, NØMHJ, ARRL Emergency Coordinator from Meade County, South Dakota, who chairs the LEPC, which has developed a public service announcement that has aired on local television and radio. The PSA, which promotes the purchase and use of Weather Radios, won the "Mark Trail Award" from NOAA.—*Tnx NØPV*

◊ J. Allen, VY1JA, of Whitehorse, Yukon Territory, who recently earned his TaeKwon-Do Fourth Dan Certificate at age 58.

◊ David Sweigert, N9FAA, of Maple Shade, New Jersey, who has earned a Master's degree in Information Security, *cum laude*, from Capella University.

◊ Ernie Martin, WAØAUU, of Cresco, Iowa, president of the Tri-State Amateur Radio Club, who recently received one of 10 "Making A Difference" Awards from the United Way of Olmsted County, Minnesota.

By Paul Danzer, N1II

A 6 Meter Halo

Following up on last month's look at the 50 MHz band, here's a practical antenna.

75 + 03 = 6

That's a strange equation—but no stranger than 6 meters, not quite an HF band and not quite a VHF band. The *03* in the equation is the year this antenna was built. The *75*? One of my old *Handbooks* is a prized (at least by me!) 1975 *ARRL Handbook*, an edition that includes a description of a *6* meter halo.

The last time I was on 6, my rig was a *Benton Harbor Lunchbox*, as we called the inexpensive Heath transceivers of the time. Now I wanted to use the 6 meter capability of my new rig, but there was no room on my house for another rotatable antenna. The list shows what I was looking for. It turns out that a halo was an obvious choice.

1. Inexpensive (okay…cheap)
2. Omnidirectional
3. Horizontal polarization to be able to work locals
4. Only one trip to the nearby home supply store
5. No exotic components to be ordered
6. Easy to tweak without 6 meter test equipment

The 1975 Handbook Design

Figure 1 is a copy of the *Handbook* design; the accompanying table is the list of dimensions. The halo is described as basically a half-wave dipole, bent into a circle. As I later found out, with the dimensions and matching capacitor as shown, my halo had an SWR of less than 1.2:1 at 52 MHz—quite a bit higher in frequency than the 50.000 to 50.600 MHz suggested by the ARRL band plan.

Now that I had an idea what the antenna looks like, a trip to the local home supply store turned up 20 feet of copper tubing for around $15 and $^3/_4$ inch PVC pipe with fittings under $2 each and some fittings under a dollar. The result is shown in Figure 2. Note that the PVC mounting structure is not quite symmetrical. Lesson learned—when you paint on the PVC adhesive and insert the PVC pipe in the fitting, make sure it is *exactly* where you want it the first time. Once the pipe is

Figure 2—The halo from the rear. A copper strap connects the matching section to the halo on the left.

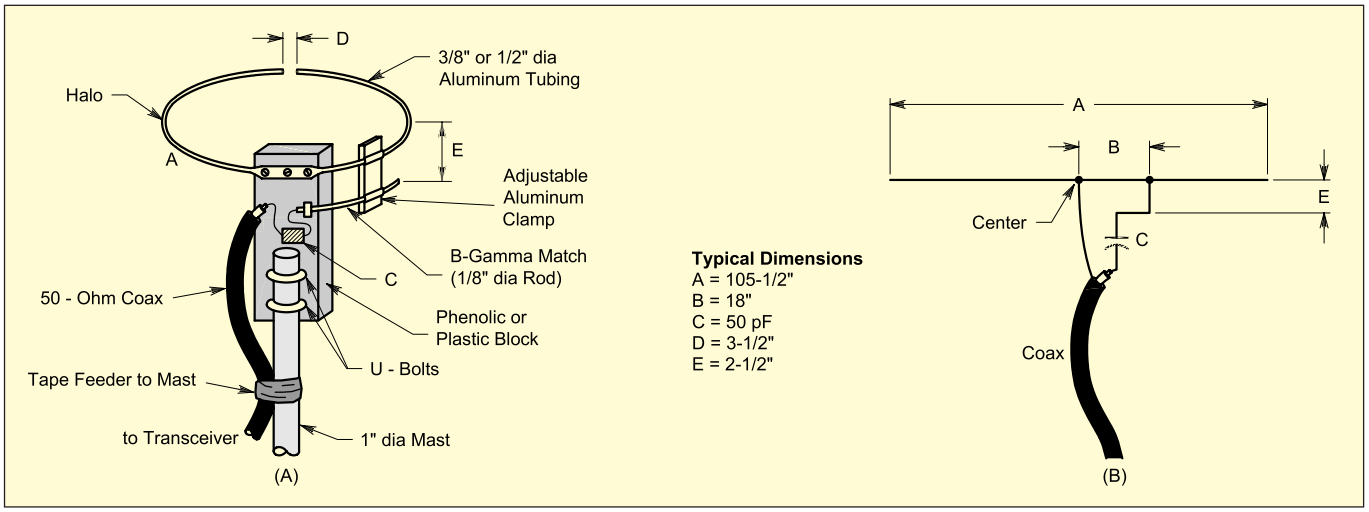


Figure 1—The 6 meter halo, as published in *The 1975 ARRL Handbook*.

Figure 3—A block of wood and a hammer was the precision tool used to flatten the far ends of the halo.

Figure 4—Details of the feed connection. The flattened tube approach could be used instead of the clamp shown on the loop on top.

Figure 5—The loop mounting structure. A word of caution—plan how you will assemble the square carefully. With PVC adhesive, you don't get a second chance!

Major Parts List

1 roll of 1/2 inch OD copper tubing. Normally available in 20 foot rolls. If you measure it, it actually measures very close to 1/2 inch in outside diameter.

Two lengths of 3/4 inch *schedule 40* PVC pipe. Normally white, it comes in 10 foot lengths, and actually measures approximately 1 1/32 inches OD. You might get away with only one 10 foot length, but any left over makes fine insulators for future projects.

Fittings for PVC pipe:

2—L fittings

4—T fittings (an L fitting may be used for one of the T fittings, if you do not plan to add a second 2 meter halo on top of the 6 meter unit; see text)

6—copper 1/2 inch pipe clamps. Four are used to connect the end of the gamma match to the dipole with a short length of copper braid. Once you have the antenna working, you could remove the clamps and using a torch, solder the braid directly from the gamma element to the dipole. Two clamps connect the ground side of the SO-239 to the center of the dipole. As shown, one of these clamps has a hole drilled in its center and is bolted to the PVC pipe through this hole. As the text says, these clamps may be eliminated by flattening the dipole at this point and, after drilling a hole in the flat area, bolting it (and the connecting braid) directly to the PVC pipe.

1—SO-239 coax socket, plus stiff hardware cloth or aluminum to hold the socket.

Approximately 12 inches of copper braid (tinned).

Matching capacitor—see text.

Assorted screws, lock washers and nuts. Common practice is to claim that only stainless-steel hardware should be used. I generally use junk-box hardware, but only after washing the hardware with a degreaser, then detergent and water. After drying it well, I assemble the antenna and then coat the hardware with an outdoor paint product (spray Rust-Oleum is a good choice). I have even successfully used spray Krylon. No, it won't last forever, but few of my antennas have a lifespan of over 5 years or so—after that I get bored with them.

inserted, the adhesive action is nearly instantaneous—you cannot move or turn the PVC pipe or fitting; it's there forever!

A question arose: What to bend the dipole around to get a circle? Actually, you will find the tubing is quite stiff. If you bend it by hand, it will come out very close to a circle—by itself.

The center of the dipole is mounted with a 1/2 inch copper pipe bracket. Simply flattening the middle with a hammer and block of wood, as was done at the ends, however, would be my construction choice next time. Then a single screw would be enough to mount the center of the halo. A PVC T is used to fasten the vertical pipe to the horizontal stiffener pipe. The top end is left open, so you can add more structure above the antenna later if you want to—perhaps a second halo for 2 meters.

The center mounting and feed arrangement is shown in Figure 3. Braid connects the coax fitting outside to the center of the halo (on top), and two capacitors in series are shown connecting the center of the SO-259 to the matching element. The two capacitors were later replaced by a single capacitor. The coax connector is mounted on a junkbox piece of stiff aluminum grill material.

The far end of the loop is shown in Figure 4. An X fitting was used, although a plain T would have done just as well. Two short pipe stubs are glued into the sides of the filling, and the copper tubing screwed to the pipe stubs. The two ends of the loop were flattened with the hammer and a block of wood.

The *Handbook* text suggests tuning can be done by changing the size of the gap between the loop ends. To try this tuning method, you could extend the two stubs. Then by taping (temporarily) the copper tube ends to these stubs, you could see the effect of changing the gap. If you are satisfied with results, mark, drill and screw it together.

The PVC supporting structure was made in the form of a square, slightly less than 18 inches on each side. The left side pipe in Figure 5 is strapped to the tower, and thus the loop is separated from the tower by about 18 inches. For top mounting, you can skip the structure to the left and just use a single piece of pipe.

Tuning and Matching

The halo is basically a half-wave dipole, bent in a circle. Since no insulator is used to separate the two sides of the dipole, a gamma match connects the 52 Ω feed to the dipole.

The only 6 meter instrumentation available to me was the SWR position on the rig. A 1970s vintage Heathkit VHF power meter/SWR bridge later verified the SWR readings, however. Somehow this piece of test equipment seemed appropriate!

To tune the antenna system, a variable capacitor was used in place of the two series capacitors shown in Figure 3. The final value, under 20 pF, resulted in an SWR of less than 2:1 over the range of 50.000 to 50.400 MHz—fed with LMR400 cable.

The only difficulty was finding a capacitor of the correct value (or close to it) with a voltage rating of a few hundred volts. Most capacitors available in retail stores these days seem to be rated at 25 or 50 V—not a good choice for a 100 W input. A healthy covering of Silastic was put on the exposed SO-239 connector and the feed capacitor. The presence of the Silastic did not seem to affect the SWR, and should provide a degree of waterproofing.

Performance and Future Plans

The final step in any antenna project is to see how well it works. As soon as I could, I raced down to my shack, ran the feed line through the door and anxiously tuned to band to see what I could work. And the answer was—nothing! It was 3 o'clock on a rainy June afternoon. Most people were either at work or, if they were home, had the sense to take a little siesta. But, of course, that evening and the next morning, the proof of the antenna's performance is in my log.

As for the future? For the most part I used brass screws and bolts. Replacing them with stainless would be a good idea. One trick I've used for years is to spray all hardware with an outdoor varnish. This seems to prevent corrosion for a few years.

The next step? Perhaps a 2 meter version, stacked over the 6 meter unit. But first I will have to get another rig...

Photos courtesy of the author.

Paul Danzer, N1II, has been a licensed ham for over 50 years. Paul has both Bachelor's and Master's degrees in EE, and after many years as an electronic engineer, he now teaches at Housatonic Community College in Connecticut. When he was on the ARRL HQ staff, Paul wrote and edited ARRL books. He is also an ARRL Technical Advisor. He can be reached at 2 Dawn Rd, Norwalk, CT 06861; **p.danzer@ieee.org**.

NEW BOOKS

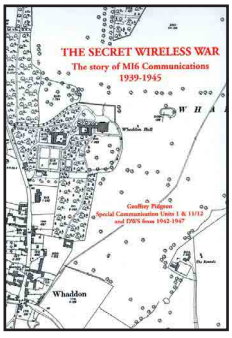
THE SECRET WIRELESS WAR THE STORY OF MI6 COMMUNICATIONS—1939-1945

By Geoffrey Pidgeon

Published by UPSO, London, UK. 416 pages, 8½ × 11½ inches, 194 black-and-white photographs and illustrations. ISBN 1-84375-252-2. Available from the ARRL, order no. 9437, $54.95 plus shipping. Order toll-free 888-277-5289 or order on-line at **www.arrl.org/shop**

Reviewed by André Kesteloot, N4ICK, ARRL Technical Advisor

◊ If you enjoy old tube radios, World War II stuff, true espionage stories with lots of fascinating details and photographs of wonderful communications equipment, this book is definitely for you. What Geoffrey Pidgeon has put together is a book replete with personal memories, photos of people and equipment he worked with while enrolled in MI-6 during WW II, and chapters written by specialists such as Siegfried Maruhn, an Enigma operator for Rommel's Afrika Korps (who eventually ended up, in 1988, as the White House correspondent for several West German newspapers) or based on extensive debriefings of long-time MI-6 employees such as Pat Hawker, G3VA, of *RadCom* Technical Topics fame.



In 1942, the author joined Section VIII of MI-6 as an apprentice and found himself working at the Bletchley Park/Hanslope Park complex, where Enigma-encrypted German Abwher transmissions were intercepted, deciphered, labeled "Ultra" and finally relayed—by riders on motorcycles—to a very few authorized readers. The author rose through the ranks, first drilling holes in metal chassis, then wiring radio sets, and finally installing them in automobiles and airplanes. The book also includes introductory chapters, to name but a few, on British Intelligence through the ages, encryption, black propaganda and a 500 kW medium-wave transmitter originally built by RCA for WJZ in New Jersey but eventually installed in the UK.

This volume—an album that has taken six years to compile and produce—is a remarkable compendium of human stories related to these heroic years when the interception of radio transmission to and from spies of both sides would determine the outcome of gigantic battles and decide the survival, or death, of tens of thousands of men.

One of the appendices is devoted to the description, with many photographs, of the various transmission sets that were issued to British agents working overseas. Old timers, in addition to watering at the mouth over the photographs of "suitcase transmitters" sporting RCA metal tubes and beautiful dials, will relish the photographs of the 1940 Packard Sedans that were converted to mobile wireless units, each fitted with a short-wave transmitter built at Bletchley Park and an HRO receiver.

If, perchance, your bookshelves were to be, like mine, already saturated, this book could certainly find its place on the coffee table.

STRAYS

TONY ENGLAND, WØORE, HONORED BY IEEE

◊ Former shuttle astronaut Dr Anthony W. England, WØORE, of Dexter, Michigan, has received the 2004 IEEE Judith A. Resnik Award. Tony received the award, according to the IEEE citation, "For significant contributions to the development and application of spaceborne microwave radiometry to remote sensing." The award is named in honor of IEEE member Judith Resnik, who was an engineer and a NASA Mission Specialist on the shuttle *Challenger*, which exploded in 1986.

Better known as Tony to hams around the world, Dr England was the second astronaut to operate ham radio in space. A mission specialist on the *Challenger* in August 1985, his NASA biography lists his recreational interests as "sailing and Amateur Radio." Tony was behind the thrust to adopt the acronym SAREX for the Shuttle Amateur Radio Experiment program. His goal for the program was to heavily weight it toward contacts for boys and girls and schools in order to interest them in science and Amateur Radio.

Owen Garriott, W5LFL, the first astronaut to use ham radio in space, back in 1983, pioneered, along with Tony and Roy Neal, K6DUE (SK), the successful campaign to incorporate Amateur Radio stations aboard shuttles. Their knowledge, experience and influence helped get approved, built and then operating the equipment that allowed hams to understand, to some extent, the thrill of space.

Tony, who holds an Amateur Extra class license, is an electrical engineer and computer scientist. He is currently a professor of atmospheric, oceanic and space sciences at the University of Michigan. He was a graduate fellow at MIT prior to being selected as a scientist-astronaut by NASA in August 1967. He helped develop and use radars to probe the Moon on Apollo 17, and has led field trips in Antarctica to study glaciers. He was co-winner with Garriott of the 2002 Dayton Hamvention Special Achievement Award. *—Rosalie White, K1STO (tnx Charlie Sufana, AJ9N, for spotting the IEEE news item)*

The Hiram Percy Maxim Birthday Celebration Event

Find the /135 stations September 2-12.

The Hiram Percy Maxim Birthday celebration is back! This year we're honoring the 135th anniversary of the birth of the League's first president and one of its key founders, Hiram Percy Maxim, W1AW, born September 2, 1869. (Maxim 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 /135 to their call signs, and contact as many as possible during the event period, which is September 2 to 12.

Who is eligible to sign /135?

- 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 (see sidebar, "ARRL Field Positions" below).

If you work at least 25 /135 stations, a new, attractive certificate can be yours! The certificate can be endorsed in increments of 25 QSOs, up to 100. It should be noted that the certificate has been newly designed, since 2004 is not only the 135th Celebration of HPM's birth, but the ARRL's 90th Anniversary as well.

Time Period: 0000 UTC September 2 until 2400 UTC September 12.

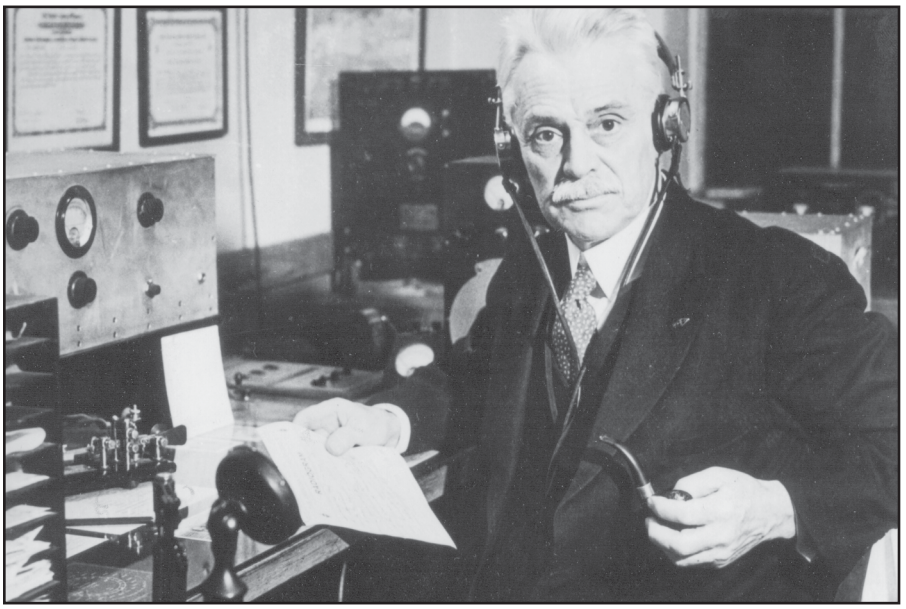
Exchange: All stations signing /135, send RS(T), their appointment and their name; others send RS(T) and their name.

Eligibility: All amateur stations may participate. Life members, and those persons holding ARRL appointments, elected positions or ARRL HQ staff, may add /135 to their call signs for the celebration. VEs, AECs, QSL Bureau workers, Registered Instructors and Awards Managers who are ARRL members are also invited to participate.

Miscellaneous: During 2004, the ARRL is celebrating its 90th anniversary. During this time, W1AW is normally signing /90 until 2359Z December 31, 2004. However, during the 135th Birthday Celebration time period, W1AW will sign /135. 90th Anniversary activity continues beginning September 13, 2004.

/135 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 /135 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 /135 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 /135 contact. Include your name, call sign and address, and tell us how many /135 stations you worked. Mail everything to HPM 135 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 16, 2004.

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 /135.

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 /135. QST

By Joel P. Kleinman, N1BKE

W1AW Vintage/AM Station Ready for Visitors

Thanks to Joe Walsh, WB6ACU, and Bob Heil, K9EID, visitors to W1AW can fire up, or just ogle, some premier vintage ham gear.

Ready for visitors: **At the left, the venerable Johnson Valiant transmitter and customized Heil microphone. The Valiant first appeared in 1957 and sold for a cool $439 (or you could buy a kit for $359). At the right, the National NC-303 receiver, which cost $449 when it came on the scene in 1959.**

The rumors were swirling around ARRL HQ the morning of June 18: When would the 18-wheeler be arriving, and where would they park to unload the vintage/AM gear for the new visitor operating position at the Maxim Memorial Station, W1AW?

When Larry Yaw, W9AMR; Jeff Wynegar, KA9TOC, and Jeff Benedict, AA9JC, arrived with the gear in 'TOC's SUV, the rumor of the 18-wheeler proved to be just that—someone's idea of how boatanchors *could* have made the trip!

Although the arrival of the vintage station was a bit less dramatic than the rumors had indicated, the event was historic nonetheless. It took under two hours from their arrival for Larry, W9AMR, only a little bleary-eyed from the overnight trip from his home in South Bend, to make the first contacts from W1AW/90.

Idea to Reality in Three Months

The story began in early March when, during a visit to ARRL HQ, rock guitarist Joe Walsh, WB6ACU, and microphone designer Bob Heil, K9EID, discussed the possibility of a W1AW AM/Vintage station with ARRL Chief Executive Officer David Sumner, K1ZZ. Following the visit, Joe and Bob rolled up their sleeves, and by April 26, two prime pieces of late '50s-era gear, a National NC-303 receiver and E. F. Johnson Viking Valiant transmitter, were ready for the start of a cross-county trek. From Studio City and then Long Beach, California, the first stop was the Heil Sound plant in the St Louis area. Transportation for this leg *was* via a big rig—courtesy of trucker Larry Kilman, WD9HHN, who makes the Long Beach to St Louis run weekly.

After a custom Heil microphone was added to the complement of gear, the vintage station headed for the Dayton Hamvention, where KA9TOC and W9AMR took custody. The gear spent the next several weeks in 'AMR's repair and restoration shop in South Bend, Indiana. Once Larry had cleaned it, made minor repairs and added a transmit/receive changeover relay, it was thoroughly tested until he deemed it ready for delivery to W1AW. "It wasn't really a restoration; more of a repair," he commented.

The station was loaded into 'TOC's vehicle on June 17, and the three 9-landers drove all night, arriving in Newington around 10 AM on Friday the 18th. A welcoming committee of area vintage/AM enthusiasts, including *QST* Technical Editor Stu Cohen, N1SC; Lab Manager Ed Hare, W1RFI; Product Review Editor Joel Hallas, W1ZR, and W1AW Station Manager Joe Carcia, NJ1Q, greeted the three drivers and their complement of vintage gear.

Larry, W9AMR, fittingly made the first contact, with W1ZR, on 40 meters. The three Hoosiers stayed in the area overnight and put W1AW/AM on 40 and 75 meters before heading back home

COURTESY BOB HEIL, K9EID

The journey begins: **In 6-land, Joe Walsh, WB6ACU, (left), hands off the vintage station to truckers Larry Kilman, WD9HHN, and Mike Dickey.**

Setting up: **Jeff, KA9TOC, positions the Valiant transmitter on its temporary resting place. The Heil custom mike was a gift of K9EID. Studio 3, one of the visitor operating studios, can be seen behind the glass.**

COURTESY BOB HEIL, K9EID

Next!: **Bob Heil, K9EID, takes custody of the gear from Mike and Larry in Fairview Heights, Illinois.**

The tubes are glowing**: Just before making the first-ever contact with the vintage station, Larry, W9AMR, tunes up the transmitter.**

Saturday, June 19. Asked how he felt about being part of the occasion, Larry commented: "It's awesome. I was very happy when Joe and Bob asked me to part of this. It's an honor and a privilege."

On behalf of the ARRL and all who will visit the new vintage/AM station, we would like to express our appreciation to Joe Walsh, WB6ACU, and Bob Heil, K9EID. Their contribution has made it possible for visitors to W1AW to see and operate the station they may have used—or perhaps only dreamt about—40 or more years ago.

Photos by the author unless noted otherwise.

Joel P. Kleinman, N1BKE, is managing editor of QST. *He can be reached at* **jkleinman@arrl.org**.

COURTESY BOB HEIL, K9EID

Dayton to South Bend: **At the Dayton Hamvention, Jeff, KA9TOC, and Larry, W9AMR, take the Valiant from the Heil Sound Hummer. From Dayton, the two 9-landers brought the gear to Larry's repair shop in South Bend, Indiana.**

JOEL HALLAS, W1ZR

Unloading: **After the overnight trip from South Bend to Newington, 'TOC and 'AMR unpack the NC-303 from Jeff's SUV.**

"This is W1AW/AM": **W9AMR logs the very first contact from the new station with Joel Hallas, W1ZR, on 40 meters.**

The welcoming committee: **A partial list of the vintage/AM enthusiasts who visited W1AW June 18 to witness the installation of the vintage station (not in the order shown in the photo): Larry, NE1S; Bruce, W1UJR; Bob, K1KBW; Terry, W2PFY; Bill, KC2IFR; Jeff, KA9TOC; Jeff, AA9JC; Larry, W9AMR; Joe, WA2PJP; Bob, W1QWT; Bill, K1KV; Jim, WA1UQM; Phil, AJ1N; Norm, W1GYY; Bill, KE1GF; Gerhard, AB1CB; Wayne, WA1SSJ; Steve, WA1QIX; Ken, W2DTC; Tom, K1JJ; Sandy, AC1Y, and Dale, KW1I.** ***Tnx Dale, KW1I.***

Visiting W1AW

You can visit W1AW to see the historic station and perhaps operate one of the three state-of-the-art visitor operating positions—or the new vintage/AM station—during regular visiting hours. FCC-licensed amateurs may operate the station from 10 AM through 11:45 AM and from 1 PM through 3:45 PM Monday through Friday, except holidays. Be sure to bring your current FCC amateur license or a photocopy. Headquarters and W1AW are closed on New Year's Day, Presidents' Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

AMI presentation: **Dale Gagnon, KW1I, of Bow, New Hampshire, presents W1AW Station Manager Joe Carcia, NJ1Q, with a certificate designating W1AW as a member of AM International.**

STRAYS

FOREST SERVICE REPORT AVAILABLE ON THE ARRLWEB

◊ An article entitled "Fire Shelters Weaken Transmissions from Hand Held Radios," by Ted Etter, is available for downloading from **www.arrl.org/FandES/field/FireTechTips.pdf**. The article, which first appeared in the December 2003 issue of *Fire Tech Tips*, is posted with permission from the US Department of Agriculture Forest Service. Our thanks to Bruce Jewell, W4KPA, for providing the article.

SETI LEAGUE AWARDS

◊ To encourage amateur participation in the growing fields of radio astronomy and SETI (Search for Extraterrestrial Intelligence), the SETI League is offering special QSL cards to commemorate confirmed reception of a variety of extraterrestrial signals—manmade, natural and even alien.

Any SETI enthusiast documenting radio reception of an artificial satellite, manned or unmanned space probe, natural astrophysical phenomenon or Earth transmission bounced off the Moon or another planet, is eligible to apply for a QSL Card from The SETI League, Inc. The card, bearing the club call sign W2ETI, indicates the nature of the signal being confirmed. Reception must have been accomplished with equipment normally used for, or capable of being used for, radio astronomy. And the signal must be received directly from a source in space, not via relay or retransmission. The Extraterrestrial Century Club (ETCC) award is also available for properly documented detection of five unique extraterrestrial radio signals. Endorsements are issued for the documented detection of a total of 10, 15, 25, 50 and 100 such unique sources. For more information, see the SETI League Web site at **www.setileague.org/**.

ARLHS CONVENTION IN OCTOBER

◊ For details on the third annual ARRL-sanctioned Amateur Radio Lighthouse Society Convention 2004, to be held in October on North Carolina's Outer Banks, see **arlhs.com/convention2004/registration.pdf**. Visit the ARLHS Web site for information on this organization: **arlhs.com**.

QST congratulates...

◊ Barry Fletcher, ZS1FJ, who has been awarded the Multisource-ICOM Excellence Award for his achievements as a world renowned DXer and his major contributions to numerous South African and international DXpeditions.

◊ The Tulsa (Oklahoma) ARC, which is celebrating its 80th anniversary this month. TARC became an ARRL-affiliated club back in 1932. *—Red Brungardt, W5UW, Secretary, TARC*

◊ Robert Smithwick, W6CS, of Los Altos Hills, California, who has been presented with the University of Illinois Humanitarian Award for his work as founder and long-time executive director of MediShare International (a group that provides medical equipment, instruments, pharmaceuticals and supplies to Third World Hospitals) and other community work.

◊ Michael Adams, WA2MWT, who has been presented with the National Weather Service (Upton, New York) Skywarn Active Award. Mike serves as director of Emergency Management for the Borough of Ramsey, Bergen County, New Jersey.

By Steve Ford, WB8IMY

The Road to Worked-All-States—90th Anniversary Style

You still have time to earn the Worked-All-States in the 90th award. All it takes is a little dedication. It also helps to follow the footsteps of those who've already reached the goal.

This year marks the 90th anniversary of the founding of the ARRL, and in celebration the League is offering the Worked-All-States in the 90th award for certifying that you have made two-way contact with at least one station in each of the 50 United States between 0000Z April 3, 2004 and 2359Z December 31, 2004. No QSLs are necessary. You simply fill out the application according to the contacts you've logged (better known as the honor system).

As you can probably guess, some states are easier to find than others. States like California and Texas are a snap. Hams in Vermont, Delaware, Wyoming, Alaska, Hawaii and other "rare states" may take longer to find. Contests offer excellent opportunities to fill your log. If you make even a casual effort in the CW or Phone Sweepstakes this November, you can work most of the country in a hurry. Also, watch for special-event stations in desirable states and try some of the nets described in this article.

Stories of the Winners

One of the best ways to get advice on winning the Worked-All-States in the 90th award is to speak with hams who've already reached the lofty summit. I contacted several amateurs who were among the first to earn the award.

Jerry, K5QM

I was the first amateur in the US to earn the Worked-All-States in the 90th award. My station consists of a Ten-Tec Orion transceiver, a Ten-Tec Titan III amp and a Heil Studio One microphone. I have a 54 foot crank-up tower that is shunt fed for 160 meters. At the top of the tower I have a Force 12 beam and a wire sloper for 75 meters.

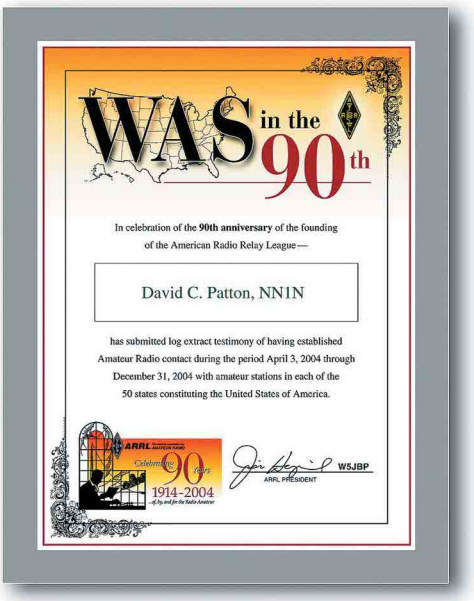
I started hunting the award on 75 meters on the Geratol net (**www.skyport.com/geratol/geratol1.html**), then I began a daily routine of starting early and working late to search for the rest. I wasn't really in much of a rush to finish. In fact, I began with the intention of simply giving out Oklahoma to all the eager seekers when I noticed that my log was filling up with a variety of states. After getting them all worked, I thought I might as well turn in the application!

Marty, AE6IP

My station furniture consists of a microwave cart, a tray table and an office chair—all tucked away in a corner of my home office. The tray table holds a laptop, which I use for logging, digital modes and rig control. The microwave cart holds an ICOM IC-706MKIIG transceiver driving an ICOM AT-180 antenna tuner and feeding a Butternut HF6V vertical antenna, which is mounted about 15 feet up at the center of the roof of my one-story home. I use a Heil Traveler or an ICOM microphone with a pair of Sony MDR-V5 headphones or a Sounds Sweet speaker, as conditions dictate. For digital modes, I use a RIGblaster Pro interface between the laptop and the '706.

I became interested in Worked-All-States in December 2003 when I first encountered the "Hank's Helping Hand" (HHH) net, a WAS and DX assistance net. The HHH net is described on the HHH Web site at **www.hhhnet.net**.

I have recently completed my HHH WAS award, which requires possession of QSL cards. I am very pleased to now be a member of the HHH, which is one of the many nets that exemplify the amateur spirit at its best. I became aware of Worked-All-States in the 90th from the announcement in *QST* and decided to apply. Using the help of the HHH net, I was able to make all of the contacts I needed within a few weeks on 40 meters. As soon as I had made the last contact, I filed the electronic application with Headquarters. Now that I have all of the cards, I am going to also file for the standard ARRL WAS award, with a 40 meter SSB endorsement.



As you are probably aware, 40 meters can be challenging at this time of the year, but nets like HHH and the 3905 Century Club Net (**www.3905ccn.com/**) offer support and encouragement—and plenty of awards for paper chasers.

Bob, KD9UC

I started recording my contacts when the award window opened on April 3. I decided to try for Worked-All-States in the 90th to help fill in my quest for awards on the OM International Sideband Society (OMISS) nets. That is to say, I tailored my OMISS award search to include contacts that would also be eligible for credit toward the Worked-All-States in the 90th. On May 1, I bagged my last WAS 90 state: Alaska.

I was usually limited to one or two calls on each OMISS net. Most of the contacts

Jerry, K5QM, was the first amateur to earn Worked-All-States in the 90th.

Jim, W9AVM, hunts contacts from his station in a 1936 log cabin.

Marty, AE6IP, operates from his station in a corner of his home office.

were on 40 meters (25), then 75 meters (16) and 20 meters (8) with 1 contact on 15 meters. All except three were OMISS members and all contacts were made on OMISS nets except for my long-sought Maine contact: AA1KS on 20 meters (a lighthouse on Moose Island).

All contacts were made with an ICOM IC-746 PRO transceiver at 100 W. My 75 and 40 meter antenna is a homebrew Windom Half Square at 40 feet. A homebrew 5 band Hex-beam up 35 feet is my primary antenna for 20 and 15 meters. I live on a wooded lot where the Windom is suspended from 65 foot trees; the Hex-beam is under the tree canopy as well.

I attribute the speed at which I obtained the 90th award to the OMISS nets (**www.omiss.net/**) and the fact that I'm retired and have the extra time for Amateur Radio!

Dan, KK5CP

How did I qualify for the Worked-All-States in the 90th award? Well, have you ever heard of the 3905 Century Club?

The 3905 Century Club is mainly a WAS and DX club that holds daily nets on different bands and modes. The purpose of the nets is to make contacts with all states and exchange QSL cards. We have our own QSL bureaus. This guarantees fast (and free) exchange of QSL cards.

Being twice-a-week net control station on the 40 and 75 meter SSB nets, as well as the 20 meter RTTY nets, I have certain privileges: net control can make *two* calls during one round; regular check-ins are limited to one call per round. That gives me twice the opportunity to find desired states. Even so, the folks who check in regularly can pile up their state totals very quickly.

For antennas, I use a G5RV at 55 feet for 40 and 75/80 meters. For 160 meters I use a 240 foot dipole at about 50 feet. For the higher frequencies, I have the 5-band 2-element Butternut Butterfly beam.

Jim, W9AVM

My station is in a 1936 log cabin in northwest Wisconsin. I have been enjoying the hobby for 52 years and have obtained my Dad's old call through the vanity program. The station is outfitted with an ICOM IC-746 transceiver, a tri-band beam at 60 feet, wire antennas at 35 feet and an Ameritron 811 amplifier.

I enjoy competing for awards and I was able to complete the Worked-All-States in the 90th in three weeks due mostly to contacts made on the OMISS net. Other states were obtained by the "search and pounce" method.

Patty, W5AZO

We have a modest station in Richardson, Texas, with just a Kenwood TS-520SE transceiver and a G5RV antenna. Despite the lack of high RF power and directional antennas, I worked mostly in evenings and weekends to gather the contacts I needed for the Worked-All-States in the 90th. It took about two weeks.

The hardest "last stations" for me were Alaska, Hawaii, Arkansas, Nebraska, Mississippi and Georgia. I don't understand why some of those were so difficult, but I guess propagation was against me! So, I checked into the 3905 Century Club net on 40 meters (7235 kHz) for those special harder-to-find stations. I found the 3905 folks more than happy to help me realize my dream. They asked me to list the states I still needed and, in short order, I had those stations calling *me*.

Looking for hard-to-find stations during a contest is another way to get to WAS quickly, but sometimes it's more rewarding to get them slowly, just one at a time.

Bruce, W9BRT

I have an all-Ten-Tec station, with the 580 Delta as the centerpiece. Believe it or not, I earned the Worked-All-States in the 90th award with *indoor antennas*. My attic antenna farm consists of a G5RV Junior for 40 and 20 meters, and a homebrew 44-foot coil-loaded dipole for 75 meters.

When I saw the article in *QST* on the Worked-All-States in the 90th award, I decided that I had to have it! I used the OMISS (OM International Sideband Society) net as the vehicle to make contacts. I worked the OMISS net every night to quickly build my state roster. All contacts were made using just 50 W output!

Time to Get Started

For more information about the Worked-All-States in the 90th award, go to **www.arrl.org/awards/#was-90**. By the time you read this article, you'll have four months left. Better get started!

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

By Dave Patton, NN1N, and Rick Lindquist, N1RL

ARRL Board Okays Volunteer Grassroots Lobbying Effort

The 2004 second meeting of the ARRL Board of Directors was held in Windsor, Connecticut, July 16-17.

The ARRL Board of Directors has formalized a grassroots congressional lobbying program—with an initial focus on BPL. Acting July 16 during its second meeting of 2004—held in Windsor, Connecticut, and chaired by ARRL President Jim Haynie, W5JBP—the Board acknowledged the need to "immediately begin a BPL grassroots lobbying campaign" this year. To establish a coordinating structure, the Board created the positions of Division Congressional Action Chair, Congressional Action Coordinator and Congressional Action Assistant. The Board authorized the League's 15 division directors to appoint qualified volunteers to these positions. Hudson Division Director Frank Fallon, N2FF, who headed the Ad Hoc Committee on Grassroots Lobbying, sees the creation of a national "political machine" as a practical way to protect Amateur Radio spectrum.

Listening to discussion from the front table are Vice President Craigie, N3KN, First Vice President Harrison, W5ZN, President Haynie, W5JBP, and Executive Vice President Sumner, K1ZZ.

"We're really, in essence, changing the culture of how we operate," Fallon said after the meeting. "We're going to use our members as constituents to talk to key legislators." Fallon said the campaign will zero in on BPL in the near term but eventually could expand to support bills dealing with spectrum protection and deed covenants, conditions and restrictions (CC&Rs), and their impact on amateur antennas.

"It can be more effective for two or three constituents to walk into a lawmaker's office to pitch their cause," Fallon said, adding that such contacts also open the door to later meetings between members of Congress or their staff members and League officials. He said first and second tier contact lists already are under development.

The committee's report notes that the FCC alone no longer decides Amateur Radio's fate. "There was a time when good technical arguments to the FCC could win the day for us," the report says. Over the last decade, however, Congress and, more recently, the Executive Branch, have become involved in spectrum and telecommunications issues. "Politics has raised its head," the report continues. "We find now that we must engage in the political/legislative as a pragmatic solution to protect our spectrum from pollution and grabs by business interests."

Under the plan the Board adopted, the Division Congressional Action Chair, one in each ARRL division, would be a cabinet-level volunteer with some experience in lobbying activities. There would be at least one Congressional Action Coordinator in each state, ideally selected in consultation with section managers. These volunteers also would be members of the director's cabinet. Working with the director, the Congressional Action Coordinator will designate and develop a number of Congressional Action Assistants to "accomplish the mission of getting the ARRL message to legislators," the ad hoc committee report explained.

"A key task of the Congressional Action Coordinator and his or her team will be to bring about face-to-face meetings with key congressional committee members," the ad hoc committee report says. Fallon says that while arranging personal get-togethers with members of Congress often is difficult, meeting with key aides is not. "Making these initial contacts is at the core of our grassroots campaign," the

ad hoc committee said in its report.

"In effect, the 'grassroots team' will be opening the door for President Jim Haynie and others to deliver our message in Washington," the committee report predicts.

Fallon said the grassroots lobbying effort will fold into a comprehensive broadband over power line strategy, which the Board discussed at length but did not make public. The Board expressed the hope that the lobbying effort could be up and running by fall.

Other members of the ad hoc committee included Great Lakes Division Director Jim Weaver, K8JE; West Gulf Division Vice Director Dr David Woolweaver, K5RAV; ARRL General Counsel Chris Imlay, W3KD; Western Washington SM Ed Bruette, N7NVP; North Texas SM Roy C. Rabey III, AD5KZ, and James "Mike" Lout, WB5RFK. The committee consulted with John Chwat of Chwat & Company, which represents the ARRL on Capitol Hill.

"ARESCOM" Plan to Enhance Emergency Communication Capability

The Board adopted a resolution encouraging further development and expansion of an inaugural network to enhance the emergency communications capability of the ARRL Amateur Radio Emergency Service (ARES). The Board had designated an ad hoc committee, dubbed "ARESCOM," to develop an augmented ARES telecommunications system that would include rapid and accurate handling of long-range emergency communications between states, nationally and internationally. ARESCOM recommended deployment of a digital e-mail system based on *Winlink 2000* software.

The Board's motion encouraged the deployment of e-mail via Amateur Radio—as exemplified by *Winlink 2000*—"as an additional emergency capability provided to agencies served by ARES."

In its report, the committee said situations arise when ARES must "pass message traffic across the nation quickly and accurately," and it said the need for such a nationwide capability within ARES is likely to increase in light of the ARRL's Citizen Corps partnership with the Department of Homeland Security.

A two-part series appearing in the August and September 2004 issues of *QST*, "Winlink for ARES," by ARRL South Texas Section Emergency Coordinator Jerry Reimer, KK5CA, outlines an enhanced ARES network that would include e-mail capability over HF links. *Winlink 2000*—a worldwide Amateur Radio digital radio e-mail system—already is widely used by the blue water boating and recreational vehicle communities to pass e-mail around the world.

"The momentum is moving strongly in favor of our recommended digital message source," said the report of the committee, chaired by Great Lakes Division Vice Director Dick Mondro, W8FQT.

Members of the ARRL Programs and Services Committee witnessed a *Winlink 2000* demonstration at ARRL Headquar-

Summary of Major Board Actions

The complete Minutes of the 2004 Second Meeting of the Board, *Moved and Seconded*, are published on the ARRLWeb at **www.arrl.org/announce/board-0407/**. If you do not have Internet access you may request a written copy of the Minutes by writing to: ARRL Secretary, 225 Main St, Newington, CT 06111.

Minute	*Purpose*	*Action*
Organizational		
9	**Grassroots Lobbying Campaign** *Creates new field organization positions to assist with lobbying at the federal level.*	**Approved**
11	**2005 ARRL National Convention** *Names the Dayton Hamvention as the venue for the 2005 ARRL National Convention.*	**Approved**
14	**Travel and Expense Policy** *Updates ARRL's travel policy.*	**Approved**
20	**Amateur Radio Emergency Service® (ARES®)** *Strengthens controls on the use of these trademarked names and programs.*	**Approved**
21	**ARES Emergency Communications Program** *Plans for enhancing ARES emergency communications programs.*	**Approved**
22	**Review of Industry Advisory Council** *Committee appointed to study modernization of IAC and its objectives.*	**Approved**
23	**Long Term Member Award Program** *Updates the long term member recognition program.*	**Approved**
25	**By-law 24** *Revised to provide recall mechanism for vice directors.*	**Amended**
26	**Amateur Radio Interference Assessment Ad-Hoc Committee Discharged with Thanks** *Oversight responsibilities transferred to Electromagnetic Compatibility Committee.*	**Approved**
28	**Request to FCC for Low Frequency Experimental License** *ARRL to ask FCC for permission to experiment on the LF bands .*	**Approved**
29	**Petition for Data Security Option for Transmissions above 50 MHz** *ARRL to petition FCC to allow encryption of some transmissions above 50 MHz.*	**Approved**

President Haynie and the Vice Presidents gather for a photo with outgoing ARRL Chief Operating Officer Mark Wilson, K1RO. Mark has been on staff in Newington for 24 years. (L-R) Jim Haynie, W5JBP; Mark Wilson, K1RO; Joel Harrison, W5ZN; Kay Craigie, N3KN; Rod Stafford, W6ROD, and Dave Sumner, K1ZZ.

Radio Amateurs of Canada President Daniel Lamoureux, VE2KA, recently returned from a trip to teach the IARU's Amateur Radio Administration Course in Tehran, Iran. Lamoureux was a guest of the Board at the meeting. ARRL Chief Technology Officer Paul Rinaldo, W4RI, is at the right.

Awards and Recognition

15	***2002 Doug DeMaw ,W1FB, Technical Excellence Award*** to Robert Sommer, N4UU, and the team of Bob Larkin, W7PUA, Larry Liljequist, W7SZ, and Ernest Manly, W7LHL	**Conveyed**
16	***2002 Professional Educator of the Year Award*** to Nicholas Lance Jr, KC5KBO	**Conveyed**
17	***2002 Herb S. Brier Instructor of the Year Award*** to Donald P. Wright Jr, AA2F	**Conveyed**
18	***Philip J. McGan Memorial Silver Antenna Award*** to Michael J. Duff, KG4SLH	**Conveyed**
19	***2002 Hiram Percy Maxim Award*** to Andrea L. Hartlage, KG4IUM, and Jay Thompson, W6JAY	**Conveyed**
27	***2002 Microwave Development Award*** to Brian D. Justin Jr, WA1ZMS and Dr John Champa, K8OCL	**Conveyed**

ters the day before the Board meeting. ARESCOM said it wants to adapt the already-proven communications network to meet the needs of served agencies and other organizations involved in providing disaster communications.

"The digital network will provide a value-added service for ARES and will continue to be viewed very positively by our served agencies," the committee said in its report. "This allows ARES to be viewed as modern and necessary instead of antiquated and invasive."

The ARRL Board extended the committee's charter until its January 2005 meeting so ARESCOM can complete an implementation plan that ensures that ARES has "the prominent role" in managing the national network and that ARES officials at all levels as well as appropriate ARRL Headquarters staffers have an opportunity to formally critique the network's operation to ensure it meets the requirements of ARES and its served agencies.

In addition, *Winlink 2000* technical experts are to "positively address the results and findings of this critique," ARESCOM will develop a plan "to assure timely upgrading of the network as new technologies emerge and future ARES requirements evolve" and it will complete necessary negotiations and agreements to assure ARRL access to the *Winlink 2000* software.

The Board praised ARESCOM for exceeding its expectations by demonstrating a working network that implements the basic capabilities of the comprehensive program it had requested. It also commended the committee's members for their "efforts and expertise" in inaugurating the system.

ARRL Long-Term Membership Recognition

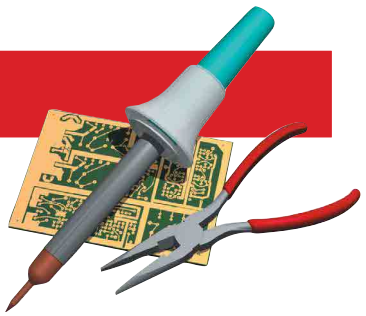
The Board approved a system to automatically recognize long-term League membership and to express appreciation of that support through a system of awards. Ten-year League members will get a certificate, while 25 year and 40 year members will receive a certificate and a pin. Those logging 50, 60 or 70 years as ARRL members will receive a certificate, a pin and a one-year Diamond Club membership. Plaques would be available to 50, 60 and 70 year members at cost plus shipping. The new program is expected to be phased in over the next few years, starting with those who have been members 50 years or more.

During the meeting, Director Fallon was presented with a 40 year membership certificate and pin.

Other Business

In other business, the ARRL Board of Directors:

- designated the next Dayton Hamvention as ARRL National Convention 2005. Hamvention will take place May 20-22 at Hara Arena near Dayton, Ohio. President Haynie appointed an ad hoc planning committee to report to the Board by September 1.
- directed the filing of an application with the FCC for an experimental license authorizing low-frequency operation for specified Amateur Radio stations.
- directed the filing of a petition with the FCC to permit security of data for computer-to-computer communications on domestic transmissions above 50 MHz.
- approved revised wording for bylaw 24, to add provide for the recall of a vice director.
- established as policy that ARES groups and any group using the ARES logo shall formally acknowledge ARES as an ARRL program, including in their bylaws or other organizational documents, and agree to abide by all rules and guidelines the League establishes. Since both ARES and Amateur Radio Emergency Service are registered ARRL service marks, ARES groups are to utilize the ® symbol in any printed or electronic media and note that the logo is used by permission. All ARES records, membership rosters and other data pertaining to the ARES program, wherever located, are the property of the ARRL.
- resolved to have President Haynie appoint a study committee to recommend effective means of promoting "constructive relations and open lines of communication" between the League and the Amateur Radio industry. The committee will solicit input from the Industry Advisory Council and report to the Board at its January 2005 meeting. ARRL Vice President Kay Craigie, N3KN, will chair the panel. Other members include First Vice President Joel Harrison, W5ZN; Rocky Mountain Division Director Walt Stinson, WØCP; ARRL CEO David Sumner, K1ZZ, and ARRL Sales and Marketing Manager Dennis Motschenbacher, K7BV.
- recognized and thanked ARRL Chief Operating Officer Mark Wilson, K1RO, for his longstanding service and dedication to the League and wished him well in his future endeavors. Wilson has announced that he'll be leaving ARRL in September to move to New Hampshire. He's been a member of the ARRL Headquarters staff for 24 years. QST



The Doctor is IN

Q Joe, WB2OSM, has a question about equipment cables and keeping them all neat and orderly. He writes: How do people keep all those power and RF cables straight and accessible at the back of their equipment? All of mine are interwoven and tangled and I have an impossible task determining what goes where. Troubleshooting becomes a mess and it's hazardous reaching around the back of that "rat's nest."

A There's no easy answer here, but there are several ways to make the task of wiring between equipment and power supplies easier. First of all, RF cables should be as short as possible—don't use a 20 foot length of coax when a 5 foot length will do. Secondly, minimize the interconnection length of both ac and dc power cables by using junction boxes. In the case of ac lines, use UL approved ac distribution strips; making sure that the current rating of the strips will accommodate the total current demand of the devices they feed. Use caution here; there are quite a few inexpensive ac power strips available and they are usually intended for low-current computer applications. Some amateur gear draws considerably more current than these strips can comfortably accommodate. Also, be careful about the so-called "surge protectors" used in some of these strips. Most are MOV devices designed as sacrificial components. If the surge voltage is high enough they will short and self-destruct, and they can't be used again.

As with ac distribution, a well-designed dc distribution system can pay off in the long run. Whether you chose to use commercially available dc junction/distribution boxes or decide to build your own, it's a good idea to label each of the junctions or the cables so you know where that power is going. That will simplify troubleshooting later. Most modern dc distribution panels are fused—and there's another caveat: Make sure you've a supply of those fuses available. That holds for ac equipment fuses, as well. There's nothing like blowing a fuse in the middle of a contest and not having a replacement!

Cable labeling at both cable ends is a worthwhile consideration. A cable label can be as simple as a hand-written label covered with transparent tape. If you're really serious, there are cable labels available commercially.[1] There are even nylon cable ties available that have tags suitable for labeling. Properly labeled cables will make it a lot easier to remove or replace equipment during servicing, modification or just plain cleaning.

Speaking of servicing—I would hope that you disconnect all ac power from those power strips *before* doing anything blind behind the operating table. It's very easy to think you're safely unplugging a piece of gear behind a crowded operating bench; partially pull that ac plug with its blades exposed and, zap—unintentionally find yourself directly across the ac line! It's happened to me—but only once.

The best approach to operating table design is to allow a walk-around space behind the equipment. That way you can comfortably and safely get behind the gear to do what's necessary. Few of us have that luxury of space, so do the next best thing. Make it easy to move the operating table(s) by putting wheels under the table legs. I use this approach in my basement station and it's made a difficult job easy. Heavy-duty support (platform) casters are available that go under virtually any style table leg. These are even available for carpeted floors. A slight tug then moves the whole equipment table away from the wall, providing ready and easy access. A typical platform caster is shown in Figure 1.

Figure 1—A platform caster useful for supporting and moving the operating table. One is required at each leg.

And finally, consider making a wiring diagram of all those interconnections. Broadcasters call these "single-line" drawings and they rely on them for power distribution as well as RF, audio, pulse and video interconnections at their stations. Engineering personnel at these facilities wouldn't think of doing anything behind an equipment rack without them. There's good reason to consider doing the same for your station.

Q Bob, KD3JK, has a question regarding meters: I found a meter calibrated for 50 A dc with the notation at the bottom reading USE WITH EXTERNAL SHUNT, FS=50 MV. I figure the FS=50 means full scale = 50. I am unsure as to MV. Is that microvolts or millivolts? Can you suggest what I need to do to make the meter useable with my battery back up power supply?

A The meter in question is most certainly a voltmeter having a full-scale reading of 50 mV (millivolts) or 0.05 V. In order to use this as an ammeter, you'd need an external shunt, which, unfortunately, it appears you don't have. We can use Ohm's Law, however, to calculate the resistance of the external shunt to make the meter read 50 A full scale.

$R_s = V_{fs}/I$, so $R_s = 0.05\ V/50\ A = 0.001\ \Omega$. In other words, the external shunt resistance would have to be 1 mΩ (0.001 Ω) to give the meter a 50 A full-scale reading. It's not easy finding a 0.001 Ω shunt, so I'd suggest using a piece of copper wire across the meter terminals. Using the copper wire tables

[1] **www.eiminc.com/pagepanduit.htm**; **www.hubbell-premise.com/HubbellCableLabel.asp**; **www.globalvideoconf.com/Cable%20Labels.htm**.

from *The ARRL Handbook*,[2] p 24.8, we see that #16 copper wire has a resistance of 4.018 Ω/1000 feet at 25° C. Dividing by 1000, that equals 0.004018 Ω per foot. Dividing again, by 4, we find that the same 16 gauge copper wire has a resistance of 0.001 Ω for a 3 inch length. We should also concern ourselves with the power handling capability of the shunt. The maximum power that the shunt will dissipate at full current is $P_s = I^2R_s$. In this case that's $(0.001) \times (50)^2$ or 2.5 W. Three inches of 16 gauge wire will easily dissipate 2.5 W, although at 20 A this will be less than 0.5 W. Put that wire across (in parallel with) your meter and you'll have a usable ammeter with a full scale current reading of 50 A.

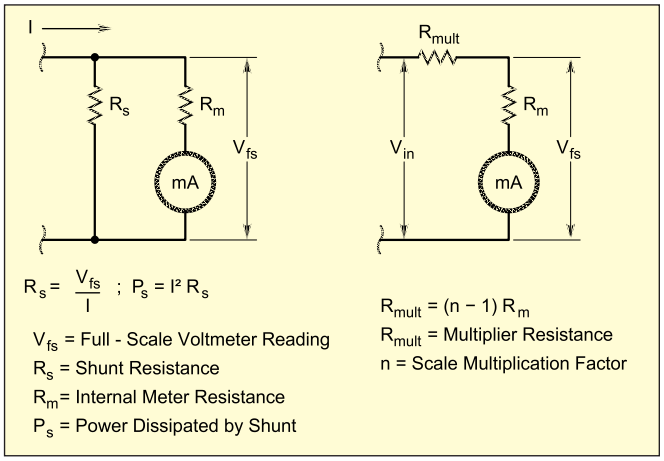


Figure 2—A meter current shunt and voltage multiplier.

In order to use the same meter as a higher voltage (50 V) voltmeter, you'd have to know its internal resistance—not always easy to measure safely without damaging the meter. *The ARRL Handbook*, p 26.4, describes a test setup to measure the internal resistance of a meter safely. My guess is that meter has an internal resistance of about 1000 Ω, but this still needs to be measured. After the internal resistance is determined, the value of the multiplier will be $R = R_m (n - 1)$, where R_m is the internal resistance of the meter and n = the multiplication factor of the scale (1000, in this case, to result in a full scale reading of 50 V). An educated guess would be that a 1 MΩ (1×10^6 Ω) multiplier resistor would result in a 50 V full scale reading for this instrument. You could try that, using a 2 MΩ potentiometer and a variable power supply. Set the power supply voltage to the full-scale reading you want and vary the potentiometer until the meter reads that voltage full scale. Then accurately measure the potentiometer reading and use the measured value for your multiplier. Be sure to set the potentiometer to its maximum resistance value first and set the power supply to its lowest voltage reading. Gradually bring the supply up in voltage and bring the potentiometer down in resistance. Remember that the voltage multiplier goes in *series* with the meter, while the current shunt is in *parallel* with the meter. The Figure 2 schematic shows both voltage multipliers and current shunts. I hope this helps. Good luck!

QDwight, W9PFF, writes: I am slowly giving up ham radio because of loss of hearing. Electronic aids provide nearly normal hearing for conversation, but any room, house or people noises, especially kids and television, prevent me from hearing ham radio well enough to participate. I wear two behind-the-ear (BTE) aids that do not provide good telephone or television usage. Do you know of a company that has equipment for people like me with hearing difficulties? My hearing is spoiling a hobby I have always loved. My hearing aid dealer is not helpful.

AA company called Advanced Bionics does make a special microphone that you may be able to use with headphones or a small speaker—it apparently works well with cell phones and is designed for BTE type hearing aids.[3]

To address your other concerns, I might suggest something like the MFJ-616 Speech Intelligibility Enhancer.[4] It is basically a speech bandwidth (300 Hz-2.4 kHz) 4-band equalizer and amplifier with a L/R balance control. It can be used with most stereo headphones, so if you can find ones that will overlap your BTE hearing aid, it should help a great deal. The device will also feed a pair of small (4 inch), wide-range speakers and these might even be better for you. The MFJ-616 was reviewed in April 2001 (p 81) and is shown in Figure 3. Everyone's hearing situation is unique and the answer here probably lies in experimentation to find a combination of hardware and control settings that work best for you. I'd like to emphasize that these recommendations are not a substitute for a thorough clinical evaluation by a hearing professional. I hope this helps.

Figure 3—One example of a commercially available intelligibility enhancer and equalizer, the MFJ-616. Devices such as this are useful for compensating for hearing loss in the speech range.

QHomer, WB4UHV, asks: I recently built a quad for 2 meters (7-element) from an ARRL link. There was no mention of any probable matching difficulties but my SWR is way out of line (using a Bird meter). I have looked for matching systems for quads but can't seem to find any. All the references seem to say that a quad's feed impedance is 52 Ω. Is that correct?

AYes, many quad designs are a relatively decent match to 52 Ω with a direct feed. The impedance of a full wave loop ranges from 100 to 300 Ω, depending on its height above ground. Adding the reflector and directors generally lowers that impedance to a value around 50 Ω. The direct feed is the simplest and easiest to get working—so it is the most popular. Here is a link, however, for feeding a quad with a gamma match: **www.cvarc.org/quad/cubquad.html**. You should view the formulas for matching networks as starting values—a bit of trial and error is often needed to get a good match.

You might try building another antenna and start with just the driven element, so you can measure the impedance of a single quad loop. Then you can add elements and see the SWR drop. Pay particular attention to the driven element's proximity to surrounding objects, its height above ground, and the dressing of the transmission line away from the feed point. Use a VHF RF analyzer (like the Autek RF5, Kuranishi BR-200 or the MFJ-249) to determine the real resonant frequency of the antenna, its feed impedance, and the SWR. Good luck!

[3]**www.hearingexchange.com/articles/henews-090702.htm**.
[4]**www.mfjenterprises.com/products.php?prodid=MFJ-616**.

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/.

[2]Available from your local dealer or the ARRL Bookstore. Order no. 1964. Telephone toll-free in the US 888-277-5289, or 860-594-0355, fax 860-594-0303; **www.arrl.org/shop/**; **pubsales@arrl.org**.

By Paul Hewitt, WD7S

Improved Amplifier Interfacing for the Yaesu Mark V FT-1000MP

A simple interface circuit to increase the flexibility of using this popular transceiver with multiple accessories including the FTV-1000.

While reviewing the owner's manual for my new Mark V FT-1000MP and FTV-1000 6 meter transverter, I found that the transceiver supplies only one HIGH SPEED KEY line for break-in (QSK) capable amplifiers. Although the voltage and current limits on this key line are quite low, they would be fine for my homebrew auto-tune HF amplifier and the four port sequencer I use for controlling my 50 MHz amplifier and mast mounted preamp. Unfortunately, there was no easy way to switch the key line between the two when I changed bands.

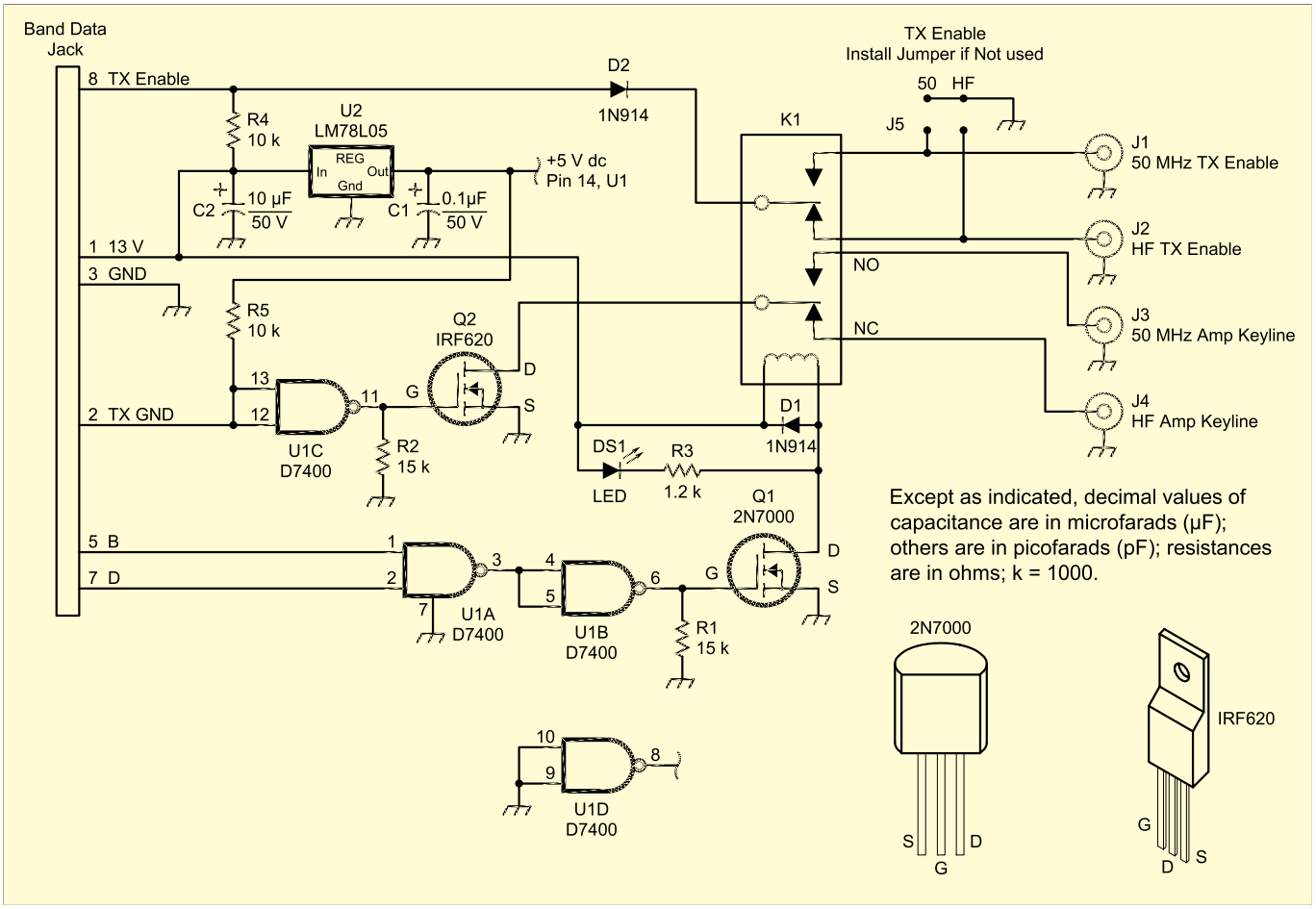


Figure 1—Schematic of the keying interface. All resistors are 1/4 W. Part numbers are Mouser unless otherwise specified. Mouser Electronics, 1000 N Main St, Mansfield, TX 76064; tel 800-346-6873; local 817-804-3888; www.mouser.com/; sales@mouser.com.

J1-J4—RCA phono jacks, panel mount.
J5—0.100" snap header stock.
K1—DPDT relay, 12 V dc (Mouser 526-R40-11D2-12).
Q1—2N7000 (Mouser 625-2N7000.
Q2—IRF620 (Mouser 511-IRF620.
U1—M74HC00B1 quad NAND gate, DIP 14 package (Mouser 511-M74HC00).
U2—LM78L05, 5 V regulator, TO-92 package.
Misc—LMB CR-321-P enclosure (Mouser 537-CR321).

Another problem arose when I decided to use the transceiver's TX ENABLE line with the sequencer. This enable or handshake line holds off the transceiver's RF until it is grounded by the sequencer, but it also must stay grounded for my HF amplifier. Again, there is no easy way to switch the line between a high state for sequencer usage and a low state for the HF amp. This TX ENABLE line simplifies the use of the sequencer by not having to use a foot switch or cut into the microphone cable PTT line, a big help in minimizing my station's large nest of wires. Certain QSK amplifiers, such as those of Acom and Ten-Tec, also use this TX ENABLE line. Although a double pole, double throw switch could solve these problems, I didn't want to have to remember yet another switch while changing bands.

Table 1
Pinout of the BAND DATA jack

Pin	*Function*
1	+13 Vdc
2	TX GND
3	GND
4	DATA A
5	DATA B
6	DATA C
7	DATA D
8	TX ENABLE

This interface provides automatic steering for the TX GROUND and TX ENABLE lines between HF and 50 MHz amplifiers, or sequencers. It requires no outside voltage source and connects directly to the transceiver or transverter BAND DATA jack. The circuit allows the TX ENABLE line to be user configured as either high or low for HF and 50 MHz. The circuit also contains a high-speed buffer for the AMPLIFIER KEY line that is capable of controlling 200 V at 1 A. This voltage/current rating should make the interface safely compatible with any commercial or home-brew amplifier using a positive voltage at the TX GROUND jack.

The Circuit

A search of the Internet yielded several examples of automatic antenna and filter switching schemes using the binary coded decimal (BCD) information available at the BAND DATA jack on the transceiver or transverter. Unfortunately none supported the 50 MHz band position. I also found several AMPLIFIER KEY line buffers available but none that perform automated switching of the key line or that support the use of the TX ENABLE line.

Table 2
BCD band data and decimal equivalent

Band (MHz)	*D*	*C*	*B*	*A*	*Decimal*
50	1	0	1	0	10
28	1	0	0	1	9
24	1	0	0	0	8
21	0	1	1	1	7
18	0	1	1	0	6
14	0	1	0	1	5
10	0	1	0	0	4
7	0	0	1	1	3
3.5	0	0	1	0	2
1.8	0	0	0	1	1

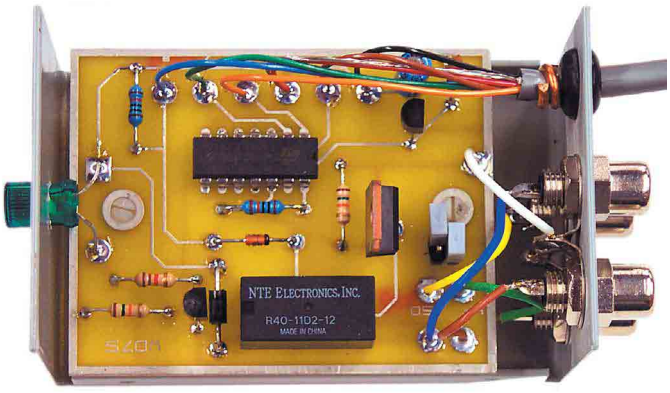


Figure 2—Completed PC board mounted in its enclosure.

A careful look at the pinout for the BAND DATA jack in Table 1 shows that everything needed for amplifier interfacing is available there. This jack is normally used for interfacing to Yaesu's automatic HF and 50 MHz solid state amplifiers. Table 2 shows the BCD data information used by the Yaesu amplifier for selecting the various bands. My needs required that I only had to decode the 50 MHz band selection to operate a DPDT relay. As can be seen in Table 2, the 50 MHz band is assigned the binary number 10. Although the automatic antenna switching examples I found used 1 of 10 (0-9) BCD decoders, they were useless for decoding the BCD number 10 assigned to 50 MHz band selection. Since no other numbers above 10 are output at the band data jack, it is possible to use an AND gate connected to the B and D data pins to detect 50 MHz operation.

Figure 1 shows the schematic of the amplifier interface. A search of my junk box yielded no AND gates but did yield some 74HC00 quad NAND gates. Recalling some digital basics, I knew I could configure two NAND gates as one AND gate, and U1 of Figure 1 is configured this way. Only when both inputs of U1A are high (50 MHz) will pin 6 of U1B also be high. This turns on MOSFET Q1, which grounds the low end of K1's coil and lights LED DS1. The LED was added for confirmation of operation only and may be omitted. Diode D1 is included to protect Q1 from the relay coil's reverse voltage spike. With K1 energized,

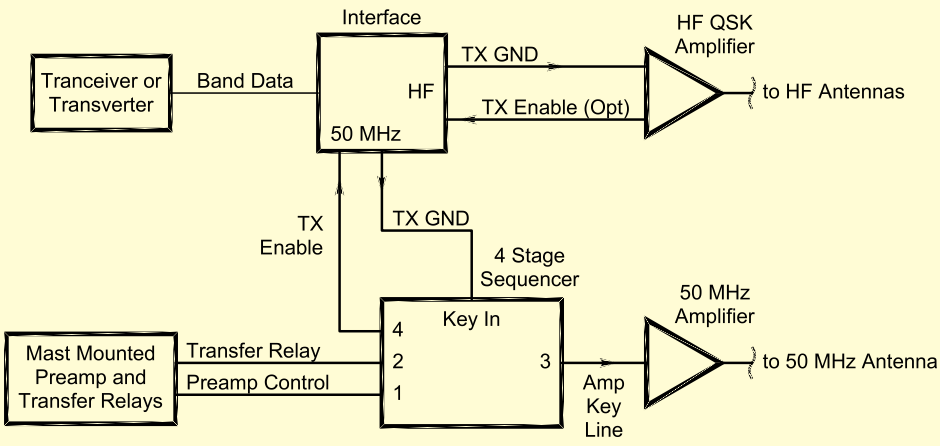


Figure 3—Typical interconnections for the keying interface.

the TX ENABLE and TX GROUND lines are connected (steered) to the 50 MHz RCA jacks at the rear of the enclosure. During HF operation the relay is de-energized and the TX ENABLE and TX GROUND lines are connected to the HF RCA jacks.

I decided to add some buffering to the transceiver's low current TX GROUND line in case I ever wanted to use another QSK amplifier with higher current or voltage keying requirements. One of the spare NAND gates, U1C, is configured as an inverter and used to turn on MOSFET Q2 when the gate's input is pulled low by the transceiver TX GROUND line. The inverter's input pull-up resistor, R5, limits current on the TX GROUND line to less than 1.0 mA. The IRF620 N-channel MOSFET I chose as the buffer switch has a 200 Vdc drain-to-source maximum rating. When biased on with the 5 Vdc supplied by the inverter, it will handle 1 A of current without heat sinking.

The TX ENABLE line has D2 in series with it to keep unwanted voltage out of the transceiver in case the wrong plug is inadvertently inserted into one of the TX ENABLE jacks. The interface allows for user-configured use of the TX ENABLE line for either HF or 50 MHz operation. This was included for those amplifiers that use a handshake line for full-break-in QSK. Either the HF or 50 MHz TX ENABLE line use can be enabled or disabled by 0.1 inch jumpers on the PC board. Resistor R4 is used to "pull up" the TX ENABLE line and must be in place to activate the TX ENABLE line operation by the transceiver.

Operating voltage for K1 is obtained from the 13 Vdc pin on the BAND DATA jack. The 13 Vdc supply is also routed to U2, a low current 5 V regulator that supplies regulated 5 Vdc to U1.

Construction

The entire circuit was built on a 2.0 × 2.65 inch PC board[1] as shown in Figure 2. The simplicity of this circuit makes perfboard construction an attractive alternative. The PC board is enclosed in a 1.5 × 2 × 3.25 inch (HWD) painted enclosure. The entire board could be mounted within the sequencer or in any other convenient location. Panel-mount RCA phono jacks are used for all connections to the amplifier and sequencer. The connection to the transceiver uses six-conductor shielded alarm wire with an eight-pin DIN plug matching the BAND DATA jack. If shielded wire is not used, be sure to add ferrite beads to all BAND DATA lines. Be sure to use the correct DIN plug to prevent damaging the transceiver's jack. A standard eight-pin DIN plug has a different pin pattern than the one used by Yaesu and *cannot* be substituted.

[1]Bare PC boards are available from the author for $5 plus $1.50 postage.

Operation

Operation of the interface is straightforward and completely transparent once set up. Figure 3 illustrates typical interconnections between amplifiers and the sequencer. Consult your HF amplifier's QSK documentation to determine if the TX ENABLE line is needed for your amplifier. If it is not needed, be sure to disable it by installing the corresponding jumper to ground on the PC board. Be sure to use shielded lines for all interconnections.

Although the interface was designed for the Mark V FT-1000MP to FTV-1000, the interface will also work with the FT-920 HF and 6 meter transceiver, as its BAND DATA jack is identical.

Paul Hewitt, WD7S, has been an electronics experimenter since age 8 and has always enjoyed it. He became licensed about 16 years ago when time finally allowed it. Paul owns and operates a construction company that specializes in custom beachfront homes. You may contact Paul at PO Box 1735, Bandon, OR 97411; **wd7s@worldnet.att.net**.

NEW PRODUCTS

EASYLOG5 LOGGING/DXING/CONTESTING SOFTWARE

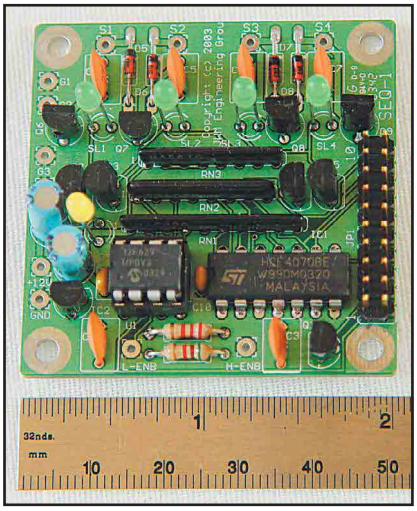
◊ Microware Software s.n.c. recently announced the release of *EasyLog5*, a new version of its advanced contact logging, contesting and awards tracking software. Version 5 features a new user interface that provides options and functionalities not available in previous versions. Version 5 is also said to offer improved performance during real-time operations such as DXspot voice announcement and cluster connections. Even though *EasyLog5* is designed to take full advantage of the latest operating systems like *Windows 2000* and *Windows XP*, it is compatible with older *Windows* operating systems: *Win95, Win98, WinME* and *WinNT4*.

Features include built in voice and CW keyers, a new improved radio control interface, a DX cluster spot window (with filtering capabilities) and automatic tracking of DXCC, WPX, WAZ and WAC awards. There's also a world map with DXCC, IOTA, world-wide locator grid, gray line and sunrise/sunset indications.

To purchase *EasyLog5*, or to download a free trial version, visit **www.easylog.com** and click on the flag corresponding to your language. For more information, contact Microwave Software s.n.c., Villanova d'Asti, Italy; **sales@easylog.com**.

TRANSMIT/RECEIVE MICROPROCESSOR CONTROLLED SEQUENCER

◊ JWM Engineering Group has announced the availability of the Model SEQ-1 Transmit/Receive Microprocessor Controlled Sequencer. The SEQ-1 is designed to provide a programmable transmit receive sequence for transceivers connected to VHF transverters to avoid transmitter power damaging transverter components. This unit provides one "heartbeat" and four visual outputs for confirmation of operation, and the ability to program a variable time delay value for the control outputs.



The SEQ-1 provides four sequenced open-collector outputs to control system switching. Open-collector outputs enable direct control of relay coils. Each output is capable of switching up to 35 V at 600 mA continuously. Also provided is the ability to invert the active output state of any of the four outputs.

The transmit-receive sequence can be initiated with either low-enable (ground to transmit) or high-enable (from 2.0 V to 14 V positive voltage to transmit) input.

Price: $39.95. For more information, see **jwmeng.com/seq1.html**.

Experiment #20: The Differential Amplifier

In all of our operational amplifier experiments, a *differential amplifier* (DA) was lurking behind the op-amp's input terminals. Sporting high gain and high input impedance, the DA applied its gain to only the *difference* in voltage at its inputs; ignoring any voltage that those inputs had in common. All this from just a pair of transistors and four resistors!

Terms to Learn

Common-mode—a signal that appears equally at both inputs of a differential amplifier or on both connections to a signal source.

Common-mode rejection ratio (CMRR)—the ratio of differential-mode gain to common-mode gain, usually expressed in dB.

Differential-mode—a signal that appears as a difference in voltage between the inputs of a differential amplifier or between connections to a signal source, also called *normal mode*.

Background

In many applications, it's useful to measure or amplify just the difference in voltage between two points, ignoring any voltage that is present at both points. For example, a low-level microphone signal with a dc offset or carrying ac hum needs to be amplified, while the offset or hum is ignored. For this job, a difference or differential amplifier is used. The ideal DA has high-gain, infinite input impedance, and only amplifies the difference in voltage at its inputs. This can be approximated with the simple circuit of Figure 1. This is an emitter-coupled DA, a pair of common-emitter (CE) amplifiers that share a path for their emitter currents. The output of the DA can remain differential (taken between the transistor collectors) or be converted to *single-ended* (referenced to ground) by only using one collector output.

Let's refresh our understanding of the CE amplifier circuit before proceeding. From our first experiment, the gain of the CE amplifier is $A_V \approx R_C/R_E$ and the transistor collector current is $I_C = \beta I_B$. This is true for each of the amplifiers, even if they share most of their emitter resistance in R_1. The sharing of R_1 is important.

Returning to Figure 1, consider what happens when the voltage at the base of transistor 1 goes up slightly and drops the same amount at the base of transistor 2. This is just what happens when a small differential signal is applied. I_{C1} goes up and I_{C2} goes down—the same amount. This leaves the voltage at point A (where the two currents combine) unchanged. That means we can treat point A as an ac ground, as long as both transistors aren't driven into cutoff or saturation and remain in their active regions. Thus R_1 doesn't affect gain, only collector current. The only difference in the CE amplifier's gain is that the input signal is actually twice the input at either transistor, so the differential gain, A_{DM} is:

$$A_{DM} \approx R_C/2R_e \qquad [1]$$

How do we calculate transistor collector current? The quiescent current (with no signal applied) can be determined by using Kirchhoff's Voltage Law (KVL)—the sum of voltages around any current path is zero. Let's do a KVL from the transistor base, through R_E and R_1, through the negative supply V_{EE}, and back to the base.

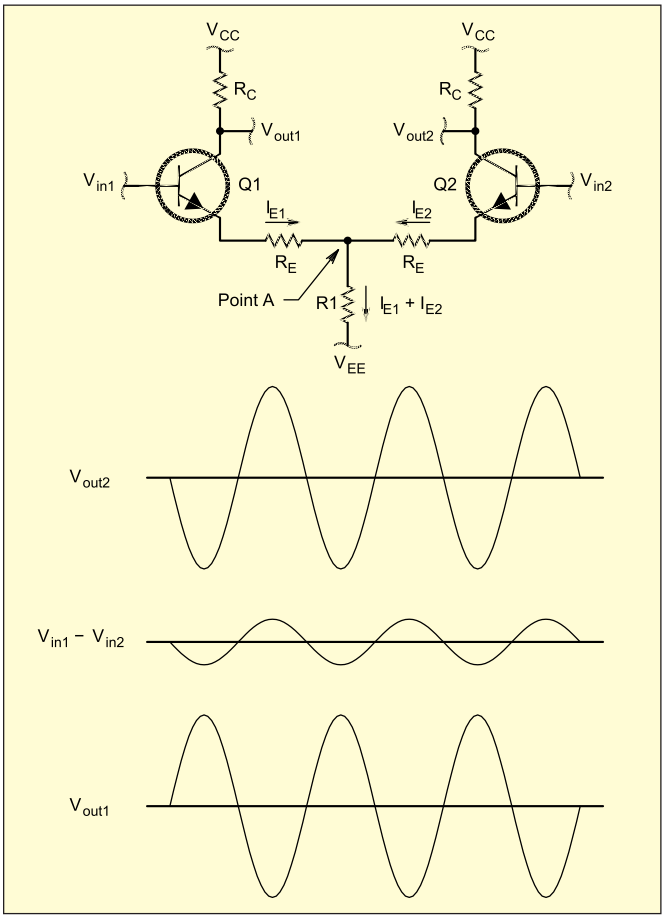


Figure 1—The basic emitter-coupled differential amplifier circuit. The outputs from the collectors are equal and out of phase for an input signal appearing between the transistor bases.

$$V_B + V_{BE} + R_E I_E + 2(R_1 I_E) - V_{EE} = 0$$

The base is at zero volts, so $V_B = 0$. If the transistor is in its active region, $V_{BE} \approx 0.7$ V. The voltage drop across R_E from the emitter current follows. The next term accounts for the sharing of R_1, in which emitter current from both transistors flows. If the transistors and resistors are matched, the current will be the same in each transistor and so each contributes half of the voltage across R_1. Making these substitutions and solving:

$$I_E = (V_{EE} - 0.7) / (R_E + 2R_1) \qquad [2]$$

If the β of the transistors is large (>100), we can make the simplifying assumption that $I_C = I_E$. Because we want high gain, equation 1 says that R_E must be small, so a further simplification results in:

$$I_C = (V_{EE} - 0.7) / (2R_1) \qquad [3]$$

We can now design a DA with a specific gain and collector current.

Design and Build a Differential Amplifier

- Start by selecting the power supply voltages. This experi-

H. Ward Silver, NØAX ♦ 22916 107th Ave SW, Vashon, WA 98070 ♦ n0ax@arrl.org

ment requires both positive and negative voltages. The usual case is that the voltages are balanced—I used ±12 V, but that's not required. If you are using a +12 V supply, you can create a negative supply with batteries. Make V_{EE} at least –6 V to keep the resistor values reasonable.

- Choose a collector current—2 mA is a reasonable value. Find R_1 by using Equation 3. 2 mA = (12 – 0.7) / ($2R_1$) so R_1= 2.98 kΩ. Use a standard value from 2.7 to 3.3 kΩ. I used a value of 3 kΩ.
- Choose a gain—let's try for 30. We assumed that R_E is small compared to R_1, so use 100 Ω (or 0.1 kΩ). Using Equation 1, R_C=2(0.1)30 = 6 kΩ. Use a standard value from 5.6 to 6.8 kΩ. I used a 6.2 kΩ resistor.
- Check your circuit's dc performance to be sure your calculations are okay. Ground the base of each transistor so that no signal is applied. Be sure V_{BE} is close to 0.7 V. Check I_C by measuring the voltage across R_C: I_C=V_{RC}/R_C. In my case I_C=11.2/6.2=1.8 mA. Also, measure the voltage at point A. Don't proceed unless your collector current and base current are close to your expected values.
- Apply a small 1 kHz signal of 100 mV or less to one transistor input as shown in Figure 2A. Observe the output voltage at each transistor collector with an oscilloscope. You should observe that the collectors have identical waveforms, 180° out of phase. Be sure that the output waveforms are undistorted, reducing the input signal if necessary. Measure the input voltage, V_{IN}. Check point A to observe that the dc voltage is unchanged.
- Even though we aren't applying a true differential signal (one transistor base is still grounded), we can still measure differential gain, A_{DM}, by measuring the output between the two collector outputs. Use a voltmeter to measure the ac voltage between the two collectors or use the ADD function of your oscilloscope. I measured A_{DM} = (V_{C1}–V_{C2})/V_{IN} = 32.
- Measure the ac voltage at point A. It will be very small, confirming that point A is effectively an ac ground due to the balancing act of the two transistors.

Common Mode Rejection

Gain is one thing, but rejecting unwanted signals is another. A common-mode signal is one that is present at both inputs in the same amount. Good examples of common-mode signals include 60 Hz ac hum, dc offset, or noise picked up by a long input cable. In any case, it's important to keep those signals from contaminating the amplifier output.

Let's return to the description of how the DA amplifies differential input signals a few paragraphs ago. Remember that it was important that the symmetry of the emitter current changes kept point A at a fixed voltage. For common-mode signals, both emitter currents change in the *same* direction and point A changes, too. This means that the circuit's common-mode gain formula must include R_1.

$$A_{CM} = R_C / (2R_1+R_E)$$

If we ignore R_E because it is small compared to R_1,

$$A_{CM} \approx R_C / (2R_1) \quad [4]$$

For the circuit we constructed, A_{CM} should be about 6/(2×3)=1—much smaller than the differential gain of 30.

The ratio of differential to common-mode gain is called the *common-mode rejection ratio* or CMRR and is typically measured in dB. Larger values are better.

$$CMRR = 20 \log (A_{DM} / A_{CM}) \quad [5]$$

Measuring CMRR

- IConnect your input signal to the bases of *both* transistors as shown in Figure 2B.
- Increase the input voltage to 0.5 V (check to be sure the collector voltage of each transistor is undistorted).

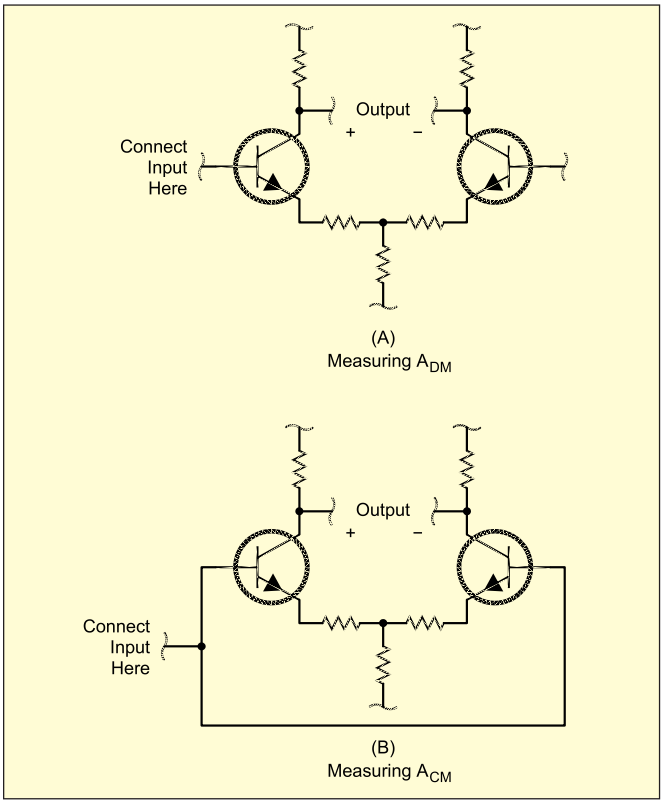


Figure 2—The two methods of connecting the circuit to measure differential gain (A) and common-mode gain (B).

- Measure the voltage between the collectors using a voltmeter or the oscilloscope's ADD feature. Calculate A_{CM}. My measured common mode gain was 0.6.
- Calculate CMRR in dB. My CMRR was 20 log (32/0.6)= 34.5 dB. This is pretty good for a simple circuit with unmatched resistors and transistors! It says that common mode signals are rejected by a factor of 50.

A circuit with better selection of transistor gains and resistor matching can have even better performance. Experiment with different transistors or match the pairs of resistors for R_C and R_E to see what effect this has on A_{CM}.

Improving CMRR

Last month, we created a current source and I mentioned that they were used in op-amps. In fact, they are often used in place of R_1, creating a very high effective resistance due to their very low compliance. That means the common-mode gain of the circuit will be very low, as shown by Equation 4.

Suggested Reading

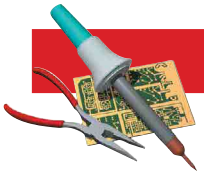
Chapter 2 of *The Art of Electronics*, by Horowitz and Hill, has a very good discussion of differential amplifiers, including the use of current sources. Section 2.5 of *Experimental Methods in RF Design*, by Hayward, Campbell and Larkin also illustrates the differential amplifier.

Shopping List

- Two 2N3904 NPN transistors (RadioShack 276-2016).
- Miscellaneous 1/4 W resistors.

Next Month

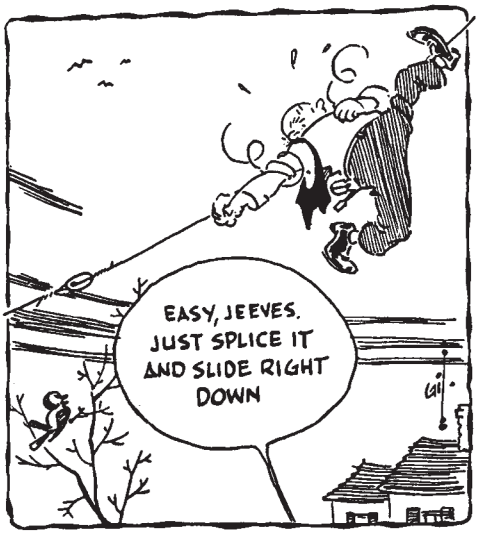
Now it's time to extend our experiments beyond low-frequency signals to RF and the simplest impedance matching method—the L network. For this experiment, you'll need to have access to an antenna analyzer, such as the MFJ-259, that can display SWR in the 10 meter band.



By Van Field, W2OQI

HF Antennas 101

Here are 10 tips and truisms that every ham should know.



1. An antenna does *not* have to be resonant to work. The only reason to make an antenna resonant is to eliminate the need for an impedance-matching device such as an *antenna tuner*. Actually, a non-resonant wire dipole antenna fed with open-wire line and an antenna tuner is a great multiband antenna. See the article "The Classic Multiband Dipole Antenna" by WB8IMY in the March 2004 *QST*.

2. Two wires are needed to power a lamp. The same is true of your antenna. The best antenna configuration calls for feeding energy from the transmitter to a balanced antenna, such as a dipole. If you can do this with a balanced, parallel-wire feed line, so much the better. However, many of us choose coaxial cable for convenience sake. The problem with coaxial cable is that it is not a balanced two-wire feed line. In fact, coaxial cable can be said to consist of *three* wires: the center conductor, the outside of the shield and the inside of the shield. RF travels on the surface of a conductor. In a parallel wire arrangement (such as ladder line), there is a balanced RF field between the two conductors. But with coax, the field is between the center conductor and the inside of the shield. This leaves outer surface of the shield braid free to get into trouble. Since it is connected to one side of the antenna, the outer braid becomes part of the antenna and the result can be RF feeding back to your station (see W2DU's excellent book, *Reflections II*). This is the reason some hams prefer to use a 1:1 balun (*bal*anced-to-*un*balanced transformer) at the center of the dipole to isolate the unbalanced coaxial feed line.

3. Antenna "gain" is derived by shaping and aiming RF where you want it to go. For example, so-called "beam" antennas get their name from the fact that they concentrate RF energy in a particular direction, like a flashlight. Other types of antennas, including wire antennas, can exhibit "shaped" radiation patterns (and therefore gain) as well. Take a look at the latest edition of *The ARRL Antenna Book* and you'll see what I mean.

4. The function of an antenna tuner is to effect a match between the output of a transceiver and the input of an antenna system. Modern transceivers can only deliver full power into a 50 Ω load. Antenna tuners are variable-impedance transformers that allow you to transform the antenna system impedance (which can be almost anything) to 50 Ω for the transceiver. Some antenna tuners exhibit a wide impedance-matching range. Others, such as the ones typically built into HF transceivers, have quite narrow ranges.

5. A wire antenna doesn't always have to be center fed. For instance, you can feed a long wire at the end with a two-wire feed line. Connect one conductor of the feed line, but not the other. You'll need an antenna tuner at the other end of the feed line to provide a 50 Ω impedance for your radio. This type of antenna used to be called an end-fed Zepp. To work well, however, the ground side of the antenna tuner needs to be connected to a network of radial wires, or a counterpoise.

Another old-time antenna is an off-center-fed dipole, called a Windom way back when. Cut a wire a half wavelength long, find the center and connect a single wire 14% off center. This also requires a counterpoise for good results. The impedance is about 600 Ω, so you'll definitely need an antenna tuner.

6. A dipole antenna does not have to be perfectly horizontal. That's the way it is usually depicted in books and magazines, but you can bend the legs of the antenna up, down or sideways. The antenna can also be on an incline, or even vertical. The shape of the antenna and its height above ground will affect its impedance at the feed point, so you may need to experiment to obtain a low SWR, if you are feeding it with coax.

7. Vertical antennas shorter than a half wavelength need a ground system. This usually takes the form of radial wires, either elevated or buried. Beware of short vertical antennas that claim to operate without radials. These designs tend to be inefficient. Yes, they "work" in the sense that they radiate some RF, but you'll enjoy much better performance with a good radial system.

8. With vertical antennas there is no such thing as too many radials. The more radials you install, the more efficient your antenna system. Yes, you can reach a point where the benefits of adding more radials levels off, but that number is somewhere around 100!

9. Having a 1:1 SWR does *not* mean you have a good antenna. A 1:1 SWR only means that you have an impedance match between your transceiver and your antenna system. It says nothing about how well your antenna is working. For example, a vertical antenna with a poor ground system can be tuned to the point where you'll measure a 1:1 SWR at your station, but the antenna is so inefficient, most of the RF is being wasted as heat!

10. Always use the best feed line you can afford. Resist the urge to be penny wise and pound foolish. This is particularly true of coax. Better (less lossy) coax will cost more, but this is the cable that is carrying your precious RF signal to and from your antenna. A good investment now will pay off in better antenna system performance.

You can contact the author at 17 Inwood Rd, Center Moriches, NY 11934-3335; **w2oqi@optonline.net**.

DX Engineering Radial Plate

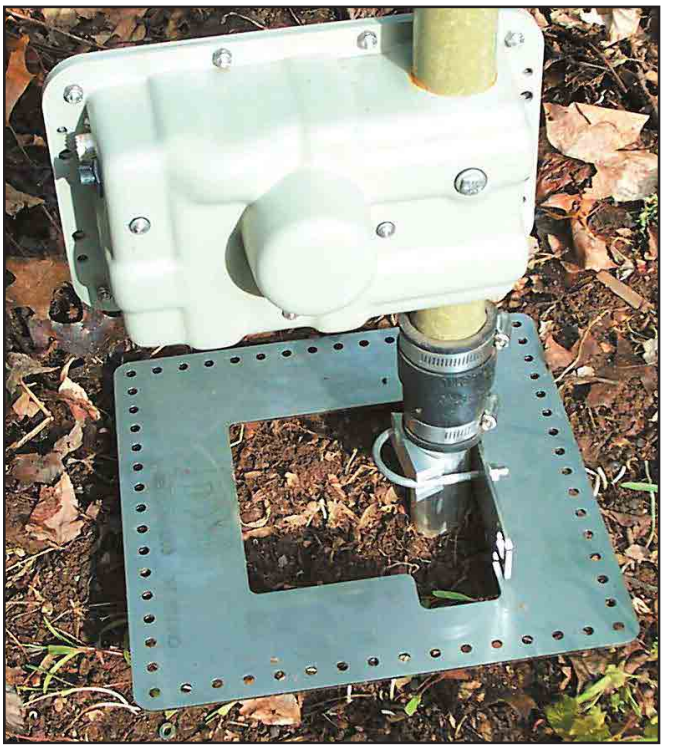
If you have a ground-mounted vertical antenna, you can never have too many radials (at least within reason). Radials create the ground return that is essential to good vertical performance.

Bringing many wires together at a single point and ensuring a low-resistance connection to the ground side of your antenna isn't always as easy as it seems. The more radials you install, the more difficult the process can become. Thankfully, DX Engineering has provided the means to install radials and connect them to your antenna as painlessly as possible.

The Plate

The DX Engineering Radial Plate measures 12 inches square and about 1/16 of an inch thick. It is made of laser-cut stainless steel and features 60 holes around the perimeter for radial connections, as well as a vertical bracket for securing the plate to the vertical antenna mast using the optional DXE-SAD-175A 1 3/4 inch saddle clamp and stainless U bolt. The Plate also includes a cutout for an optional SO-239 coax connector. This is a nice option for homebrew antenna designs. You could even install a threaded bulkhead connector in the cutout and use it as a kind of elegant coax "pass through."

The Plate comes with 20 1/4-inch stainless-steel bolts, nuts and washers. You can order more from DX Engineering, but 20 are probably enough for most installations if you connect more than one radial per bolt.



The Plate in position at the base of the antenna, prior to attaching radials.

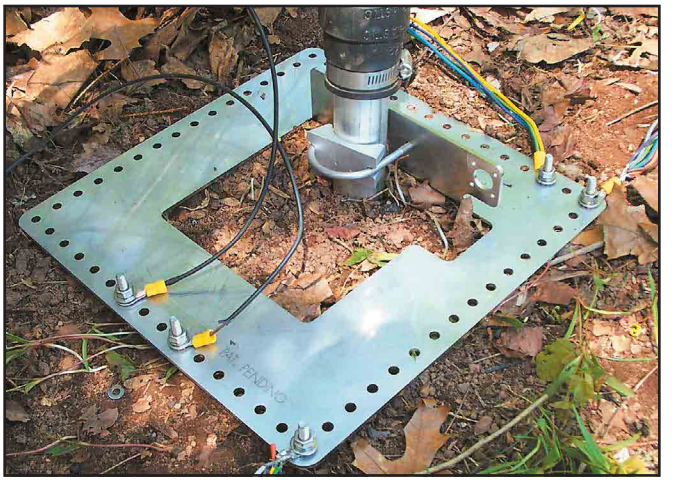
Installation

I used the DX Engineering Radial Plate with my Fluidmotion SmallIR vertical antenna. Installation was straightforward—I removed the antenna from the base mast, slipped the Radial Plate over the mast, then reattached the antenna. With a little assistance from my wife, that operation required all of 30 seconds.

With the Radial Plate in place, I went wild with radial wires, laying them every which way across the new spring grass. I combined each set of two radials at the Plate and secured them with bolts and washers. Despite the use of locking washers, the bolts still had a tendency to turn when I tightened the nuts. I solved that annoyance by grabbing the bolt heads with ViceGrips during the tightening process.

The bolts are inserted from the underside of the Plate, so you definitely *do not* want to secure the Plate to a mast before you've finished the last radial. You need to be able to lift the Plate slightly to insert each bolt.

Thanks to Vise-Grips and an electric screwdriver, I was able to attach all of my 35 radial wires in less than 30 minutes by attaching several on individual bolts. There was only one more wire to attach—a short piece between one of the Plate bolts and the ground screw on my SmallIR antenna. With that accomplished, I slipped the U bolt over the base mast, threaded the nuts and tightened it onto the Plate. Done!



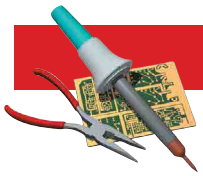
The finished installation.

Conclusion

The DX Engineering Radial Plate substantially reduces the drudgery of installing a network of radials for your antenna system. The connections are both electrically and mechanically secure. And, if you have spare holes remaining, it is easy to add more radials in the future.

Manufacturer: DX Engineering, PO Box 1491, Akron, OH 44309; tel (orders only, Monday-Friday 1200-2030 UTC) 800-777-0703; **www.dxengineering.com**. *Radial Plate: $49.95; 1 3/4 inch Saddle Clamp and Stainless U-bolt: $5.83; SO-239 Chassis Mount Socket: $4.90; Package of 20 additional nuts, bolts and washers: $4.95.*

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



HINTS & KINKS

A PORTABLE OPERATING LAMP

◊ Do you like operating at night while camping, but you can't see your log in the dark? Here's a neat little project that doesn't cost very much and recycles one of those ever-present Altoids tins that are finding their way into a lot of low-power (QRP) projects these days. It's a simple construction project that's easy to build. Figure 1 is a picture of the completed project.

First, procure one high-intensity white LED, 8 inches of RG-402 (1/8 inch miniature, semi-rigid coax), one SPST toggle switch, and your choice of batteries and holders to fit in the Altoids tin. If you can't come up with a piece of RG-402, use small-diameter copper tubing. Use the smallest you can get from your local plumbing supplier and thread an appropriate length of Teflon insulated wire through the center of it. (Use Teflon-insulated wire because you will be soldering to the copper tube and you don't want to melt the insulation on the center wire.) If you wish, you can substitute a high-intensity yellow LED for the white one—as a "bug light."

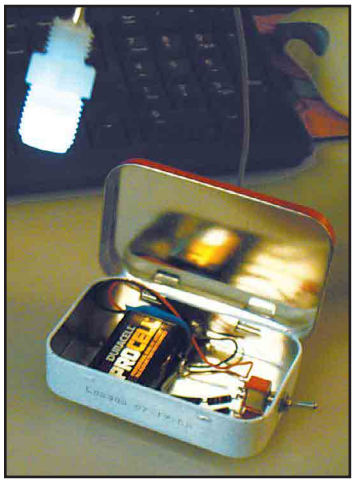


Figure 1—A photo of WØEB's battery powered operating light.

Prepare the ends of the RG-402 by carefully removing 1/4 inch of the outer jacket from one end and 1 1/2 inches of the jacket from the other end. Shorten the anode lead of the LED to about 1/4 inch and solder it to the center conductor of the RG-402. Leave the cathode lead of the LED long and solder it alongside the shield of the RG-402. Cover this joint and—all but the very tip of the LED—with appropriately sized heat-shrinkable tubing. Or, if you can find a translucent nylon plumbing fitting, use it for a cute shade, as I did. Use your imagination. I've found that "hot" glue works wonders to attach things like this.

Carefully punch a very small hole in the rear (not the bottom) of the Altoids tin. Insert the RG-402 or copper tubing through this hole and carefully solder it to the bottom of the tin. I also soldered the jacket to the can where it comes through the small hole in the back. This helps stabilize the "gooseneck."

Install the toggle switch in another hole that you have carefully punched or drilled in the can. Connect the normally open switch contact to the center conductor of the RG-402 through a 1 kΩ, 1/4 W resistor (if using 9-12 V), or a 100 Ω, 1/4 W resistor if you're using a couple of AA cells. [The value of the current limiting the resistor will depend on your power source and the specific LED you use—it will range anywhere from 33 Ω to 1 kΩ.—*Ed.*] Connect the positive lead of your battery connector to the "common" terminal of the switch and solder the negative supply lead directly to the tin.

Check to be sure you've assembled everything correctly, then install your battery or batteries. The LED should light nicely when you close the switch. If you use a 9 V battery and a 1 kΩ resistor, you can also install a coaxial power connector to externally power the LED. In this case, use an SPDT, "center-off" switch, connect the 1 kΩ resistor from the center (C) contact of the switch to the center conductor of the "gooseneck," connect the positive lead of the 9 V battery to one of the normally-open (NO) contacts, and the positive lead of the coaxial power jack to the other NO contact. With all of the negative leads grounded to the tin you shouldn't need a wire from the negative terminal of the coaxial power jack, unless the mounting nut is internally isolated from the negative contact (some of them are). The switch center position is now OFF and the NO positions select between battery power and the external power supply.— *Jim Sheldon, WØEB, 2029 East Evanston Dr, Wichita, KS 67219;* **w0eb@cox.net**.

FLOAT CHARGING AND BATTERY BACKUP WITH A RIGRUNNER

◊ I recently discovered that powering my home station through a RIGrunner makes adding a large gelcel battery for automatic back-up power very easy. [Most other commercially available dc distribution panels will work as well.—*Ed.*] Both the RIGrunner and MFJ versions of these dc distribution panels are shown in Figure 2.

In his series of articles on standby battery power (*QST,* March through May 1990; available on the ARRL Web site under the TIS/Emergency Power section), W4MLE shows that a gel cell battery can be safely floated across a regulated 13.8 V dc power supply for battery back up. Since all of the outputs on a RIGrunner are individually fused and can also be used as inputs, it's easy to have a regulated power supply and a gel cell connected to the power bus simultaneously. This not only allows operation when ac power disrupted, it also allows the battery to provide power for peak loads, assist in surge protection, and filter any residual ripple from the power supply.

To do this, I simply plugged my Astron RS-35 35 A, 13.8 V dc power supply into the RIGrunner input position using a 35 A fuse. I then connected my 85 Ah gel cel to position 2 of the RIGrunner using a 40 A fuse in that position.

As W4MLE mentions in his sidebar in the April 1990 *QST*, your power supply might need to be protected from reverse current flow when ac power is lost. Installing a hefty diode in

Figure 2—A couple of commercially available dc distribution panels. The RIGrunner (top) and the MFJ products are shown. They are both suitable for the application described.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor ♦ h&k@arrl.org

the line from the power supply is one way to do this. [Be aware that the diode will dissipate about 18 W at 35 A (assuming a 0.5 V forward junction drop) and will need to handle the full load current of the supply, so you will need a suitable heat sink. A Schottky high-current rectifier having low forward drop would be the choice here. Also, make sure that the float supply is turned on before connecting it across the battery. This will avoid the inrush current through the dc supply filter capacitors and possible regulator damage.—*Ed.*]

If you use the popular Astron line of linear power supplies, it's even easier. They use a 723 IC for regulation. Adding a 10 kΩ, 1/2 W resistor between pin 4 of the IC and the wiper of the voltage-adjust potentiometer restricts the current flow to protect the IC. To do this, merely disconnect the power supply from everything, open the case and locate the "L" shaped trace between pin 4 of the IC and the wiper of R5. Cut the trace on the circuit board with a Dremel tool or Xacto knife and bridge the gap with the 10 kΩ resistor.

As is mentioned, a fuse is also needed between the power supply and the battery to protect the crowbar SCR if the over voltage crowbar circuit ever fires. The fuses on the RIGrunner automatically perform this function for you!

So I now have automatic standby power, improved surge protection, peak load supply and better filtering…all for the cost of 10 kΩ resistor! Thanks to Michael Tracy, KC1SX, at ARRL HQ, for his help with this.—*Gary Wilson, K2GW, Section Emergency Coordinator, Southern New Jersey Section*; **k2gw@arrl.net**

HOMEBREW THUMBSCREWS MADE WITH "WIRE NUTS"

◊ The radio I recently purchased for mobile use includes a mounting bracket with small metric screws to attach the radio to the bracket. I didn't want to purchase a quick release bracket, so I needed a way to easily remove the radio without the need for a screwdriver. I couldn't find thumbscrews to fit the radio, so I built my own. Each is made by using a wiring nut as the knob and fixing the screw inside the nut with epoxy. (Rather than wire nuts, you could use caps from toothpaste tubes, or anything of appropriate shape. Since wire nuts and caps come in many different colors, you can select a color that works well for your application.)

After mixing the epoxy, I filled the wire nut with it and inserted the screw into the nut. (Be careful to orient the screw so that it's coaxial with the nut.)

After allowing the epoxy to set (even "5 minute" epoxy is stronger after curing 24 hours) the screw-nut interface seems strong enough hold the radio with no problem.—*Dan Trigilio, W6DAN, 948A Kennedy Dr, Capitola, CA 95010-12317;* **w6dan@arrl.net**

Figure 3—Softening the wire nut plastic with a heat gun. Epoxy is used to bond the hardware to the wire nut.

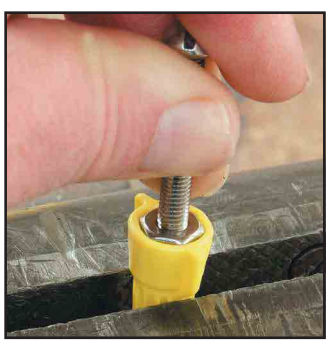


Figure 4—Pushing the hardware nut into the softened wire nut. This ensures that the plastic conforms to the outside dimensions of the nut. The same technique can be used for screws.

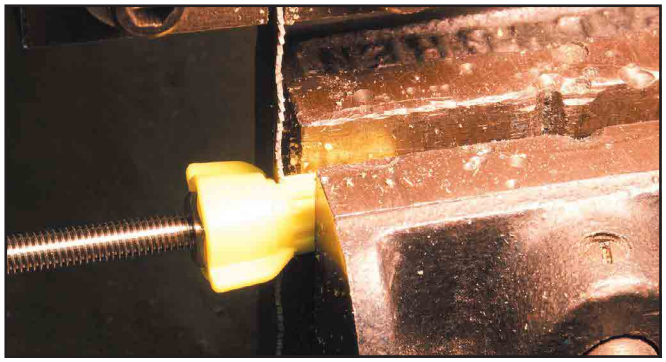


Figure 5—Trimming extra length from the plastic wire nut to make a smaller fastener.

Figure 6—A collection of hand-friendly fasteners for mobile and portable installations.

Editor's note: This is a wonderful idea! Soon after receiving it, I was installing a whip antenna on my station wagon (a Subaru Legacy). My Rube Goldberg solution required some weather-tolerant hardware that could assemble and disassemble without tools. I purchased suitable stainless-steel hardware, then attached wire nuts as shown in the photos. The result is hand-friendly hardware that is completely rust free. (Because this was for use on a moving vehicle, I chose aircraft nuts, which have nylon inserts to prevent them from working loose.)

In addition, I chose the nuts and wire nuts for a tight fit. I softened each wire nut with a heat gun (Figure 3) and pushed an aircraft nut into it (Figure 4). This makes the wire nut conform to the shape of the aircraft nut for more strength.

For looks, I trimmed away the extra length of the wire nut (Figure 5). Several of my completed fasteners are shown in Figure 6. They assemble and disassemble quickly when I must remove the antenna from the car.

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

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

A New Generation of Balanced Antenna Tuners

Joel R. Hallas, W1ZR
Assistant Technical Editor

Paul Danzer's article[1] in the April 2004 issue of *QST* brought to paper a concern many of us have had for some time—the use of baluns at the output of antenna tuners. As noted in his article, if the balanced load is near the balun's design impedance (typically 200 Ω for the usual 4:1 balun) all is well. Unfortunately, the typical random sized center-fed antenna with random length ladder line feed has an impedance at the feed point that varies dramatically with frequency. The result can be heating and loss (and occasional damage) at the balun. These effects were well documented in a series of *QST* articles by Frank Witt[2] and later in a performance evaluation of unbalanced tuners with both balanced and unbalanced loads.[3]

Bottom Line

A new breed of antenna tuner available in different flavors from multiple manufacturers addresses concerns about using baluns with high SWR to feed balanced antenna systems.

From the top the MFJ-974H, the Palstar AT1500BAL and AT4K. On the right, they are being scrutinized by their logical ancestor, the Johnson Matchbox.

So How Do We Fix the Problem?

As Danzer noted, the classic solution has been the use of an inherently balanced tuner. The commercially manufactured E.F. Johnson Matchbox tuners of the '50s worked reasonably well in their day, and over the bands that they covered (we didn't have the 60, 30, 17 and 12 meter bands back then). Now at least three manufacturers have begun offering balanced antennas tuners of a different configuration. For this review we selected the MFJ-974H and the Palstar AT1500BAL and AT4K. Interestingly, each of the three uses a different architecture, and each is different from the design of the old Matchbox! In addition to those units, SGC has announced a low power self-contained auto-tuner, the SG-211, which shares the design concept of the AT4K and will be the subject of an upcoming Short Takes column. We thought it would be good to evaluate the performance of the medium and high-power units and provide a comparison to the old Johnson tuner.

What's in the New Tuners?

Glad you asked! As noted, each of the tuners uses a different design configuration. Each can be directly compared to some of the common unbalanced configurations. Note that the power ratings and price of the Palstar tuners put them in a different category from the MFJ units and thus, direct comparisons may not be appropriate. Both the MFJ and the Palstar AT1500BAL are fully balanced tuners—the MFJ a dual T section design with shunt L, and the Palstar a dual L section with shunt C. The Palstar AT4K tuner takes a completely different approach. It uses the insulated unbalanced scheme suggested in Paul's article and described in detail in *The ARRL Antenna Book*.[4] The

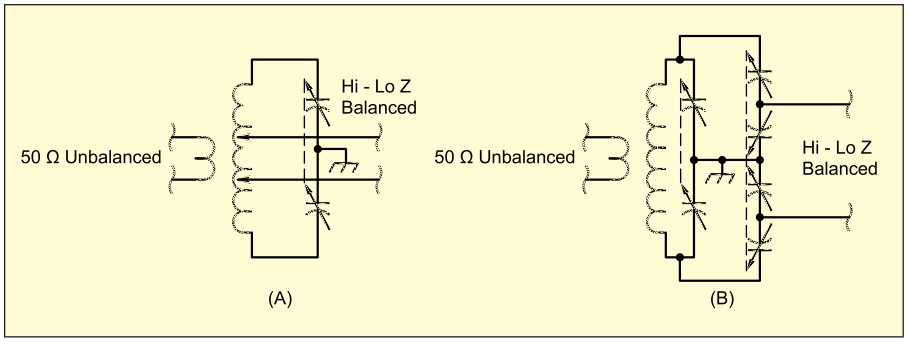


Figure 1—At A, the traditional balanced antenna tuner. At B, the Johnson Matchbox antenna tuner. Simplified view without bandswitching.

[1] P. Danzer, N1II, "Open Wire Feed Line—A Second Look," *QST*, Apr 2004, pp 34-36.
[2] F. Witt, AI1H, "How to Evaluate Your Antenna Tuner—Parts 1 and 2," *QST*, Apr 1995, pp 30-34 and May 1995, pp 33-37.
[3] R. Lindquist, N1RL, "Product Review—*QST* Compares: Four High-Power Antenna Tuners," *QST*, Mar 1997, pp 73-77.
[4] *The ARRL Antenna Book*, 20th edition, Chapter 25, pp 15-18, Available from the ARRL Bookstore for $39.95 plus $8 shipping in the US, $10 elsewhere. Order number 9043. Telephone toll-free in the US 888-277-5289, or 860-594-0355; **www.arrl.org/shop**; **pubsales@arrl.org**.

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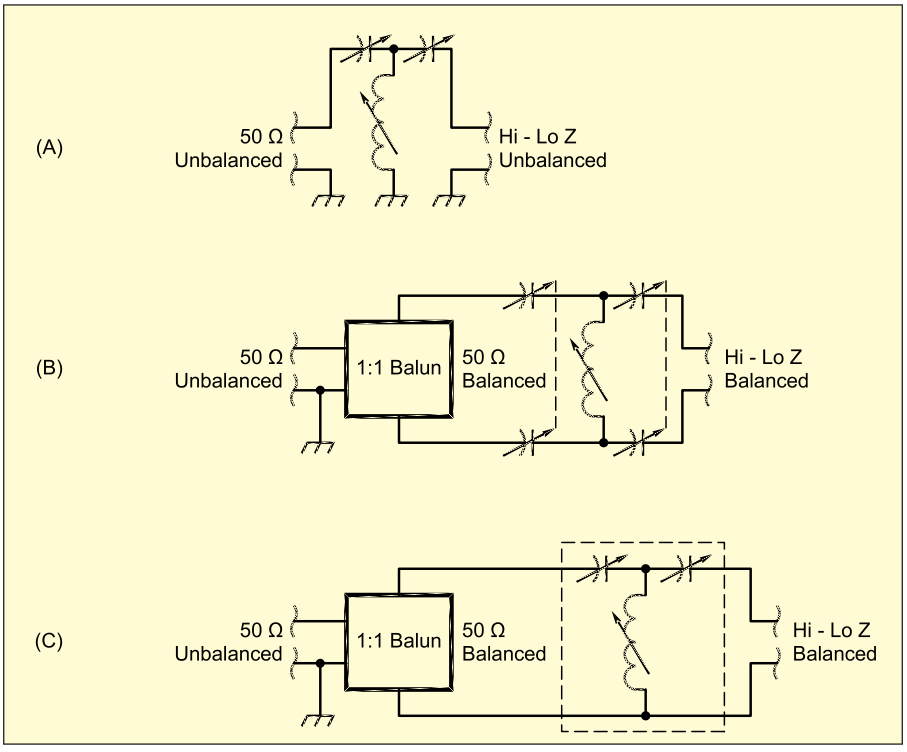

Figure 2—At A, an unbalanced T-network tuner. At B, a balanced T-network tuner. At C, an unbalanced T-network tuner for balanced loads.

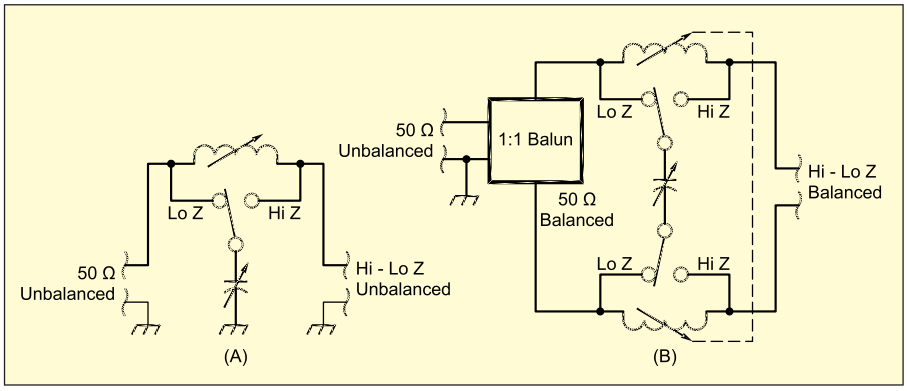

Figure 3—At A, an unbalanced L-network tuner with switched capacitor. At B, a balanced L-network tuner with switched capacitor.

relationship of the designs to their more commonly encountered unbalanced configurations are shown in simplified schematics in Figures 1 through 3.

The other differences between the units are in their ratings. The MFJ tuner covers 160 through 6 meters, while the Palstar tuners top out at 10 meters. Both Palstar tuners are rated at 1500 W or greater (the AT4K has a reduced rating below a 25 Ω load) while the MFJ tuner is rated at 300 W PEP, 150 W CW. The ratings of the Johnson Matchboxes were established in a day when amateur power levels were specified based on average dc power input, rather than the current PEP RF output power. A "275 W" Johnson matchbox was thus rated to work with transmitters running 275 W dc input, or about 200 W average output. This was in the day of plate modulated AM service, so that rating further translates to 800 W PEP under today's rules. Similarly, a "kW Matchbox" would likely be rated today as a 3 kW PEP tuner.

MFJ-974(H) BALANCED ANTENNA TUNER

MFJ provides two versions of their '974, with ('974H) and without ('974) the capability to cover 160 meters. Both are rated at 300 W PEP, and 150 W CW. At only 7½ inches wide, it takes up a small amount of desk space. Interestingly, it has about the same shape as the old 275 W Johnson Matchbox, but is 1 to 2 inches smaller in each dimension.

As noted above, this unit uses a T section design as in Figure 2B, so it is not necessary to switch capacitors from one side to the other as the impedance changes from high to low. The inductor is varied by selecting among 12 steps. The H model has an extra inductance for 160 meters that changes the tuning range as needed. A cross-needle two-range (30 and 300 W full scale) power/SWR meter can be set to read peak or average power. Both the power level and null matched the meter on my transceiver quite closely.

The capacitors are direct (1:1) drive, with plastic gearing between the ganged units. I found them easy to turn and to get a null. I used the old trick of tuning for maximum receive signal, first with the L switch, then with the capacitors. MFJ provides a page of nominal settings by band that you may find helpful. When you switch to adjusting the tuner while transmitting, be sure to note their caution about not changing the inductor switch with power applied. You may burn the contacts otherwise. I also make it a practice to always tune at reduced power to avoid hitting my finals with a heavy mismatch at full power. When you have it set, turn up the power and confirm that all is well.

One caution that applies to all T section tuners is to note that multiple settings can result in low SWR. Unfortunately, some will have higher losses than others. The rule of thumb is to use the setting with the smallest inductance (the L switch position on this tuner) and highest capacitance that will provide a match.

One limitation of the switched rather than roller inductor is that you can't get values in between. I didn't find that much of a problem, as I was always able to get to 1.5:1 or better SWR with my antennas.

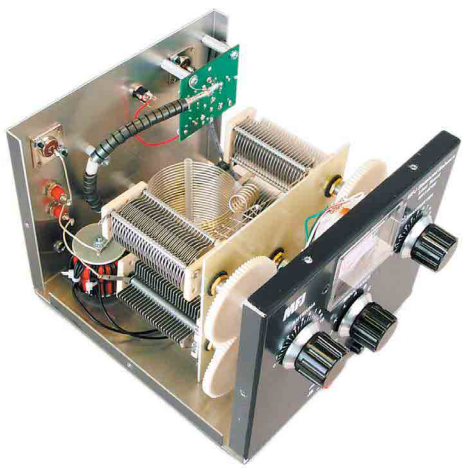

Figure 4—MFJ-974H, inside view.

Table 1
MFJ-974H Balanced Antenna Tuner

Manufacturer's Specifications	Measured in ARRL Lab
Input load range: 12 to 2000 Ω.	See below.
Output SWR range: Not specified.	See below.
Frequency coverage: 1.8 to 54 MHz.	See below.
Input power: 150 W average, 300 W PEP.	Not tested.
Size: 6 × 7.5 × 9 inches (HWD).	

SWR	Load (Ω)		160 Meters	80 Meters	40 Meters	20 Meters	10 Meters	6 Meters*
8:1	6.25	Power Loss % SWR BW % Imbalance**	55 0.9 0	41 0.6 0	32 1.0 0	20 2.0 0	16 2.0 0	Not Tested
4:1	12.5	Power Loss % SWR BW % Imbalance	40 0.6 0	33 0.9 0	23 1.4 0	<10 2.8 0	10 3.4 0	Not Tested
2:1	25	Power Loss % SWR BW % Imbalance	25 0.8 0	22 1.1 0	<10 3.2 0	<10 4.9 0	<10 2.4 0	Not Tested
1:1	50	Power Loss % SWR BW % Imbalance	22 1.1 0	15 1.4 0	32 2.1 0	20 2.1 0	<10 12 0	<10 10 0
2:1	100	Power Loss % SWR BW % Imbalance	18 1.1 0	<10 1.7 0	<10 4.1 0	<10 7.0 0	<10 25 0	Not Tested
4:1	200	Power Loss % SWR BW % Imbalance	17 1.1 0	<10 2.8 0	<10 2.5 0	<10 9.1 0	<10 10 0	Not Tested
8:1	400	Power Loss % SWR BW % Imbalance	12 1.5 0	<10 3.4 0	<10 7.5 0	<10 7.0 0	<10 3.7 0	Not Tested
16:1	800	Power Loss % SWR BW % Imbalance	10 1.9 0	<10 4.3 0	<10 8.3 0	<10 7.7 0	<10 3.7 0	Not Tested
32:1	1600	Power Loss % SWR BW % Imbalance	<10 2.1 0	<10 2.6 0	<10 5.6 0	10 4.4 0	11 3.0 0	Not Tested

Notes
Power losses are expressed as a percentage. A 10% power loss represents less than half (0.46) a dB.
The SWR bandwidth is the percentage of the measurement frequency that can be changed with the SWR staying under 1.5:1.
*The ARRL test fixture is only usable at 50 Ω on 6 meters.
**As defined in F. Witt, "Evaluation of Antenna Tuners and Baluns—An Update," *QEX*, Sep-Oct 2003, pp 3-14.

As you make adjustments, I suggest you log the settings for each frequency in a table such as the one supplied in the back of the manual. You may want to make photocopies or set up a spreadsheet so you will be able to repeat the process for your next antenna. If you find that you can't get a match at some frequency, try adding 6 feet of ladder line at a time. The different length will move the impedance around and may solve the problem, but you will have to retune on the other bands and hope to find a length that will tune properly on all bands.

Balanced loads are connected via standard (3/4 inch) spaced multipurpose binding posts. These accept wire ends, or dual banana plugs, a handy connector for balanced feed lines at this power level.

The '974H also provides a capability to match unbalanced loads and provides a coax connector for that purpose. It is necessary to provide a jumper between the lower balanced load binding post and the ground terminal to complete the unbalanced hookup. Note that the output is not switched, so an antenna should be connected to either the coax connector or the balanced jacks, but not both.

Note that while the '974 is specified to match a wide range of impedances on 6 meters, neither the Lab nor W1ZR could test at any impedance other than 50 Ω. I tried the unbalanced connection arrangement with my coax-fed G5RV. It worked fine until I tried it on 160 meters, not one of the bands the antenna is supposed to operate on. I was able to quickly find a match at low power. When I turned up the power past 70 W, arcing was evident inside the unit. I opened it up and was surprised to find that rather than the expected arcing tuner element, I found the arcing source was at the metering circuit board. The unit went back to MFJ for repair under their warranty. Upon return, it worked fine at 100 W (my maximum power with the transceiver) and I was told by MFJ that a signal wire had been dressed too close to the meter board and arced. It was repositioned and MFJ installed the intended tie-wrap to hold it away from the meter board. The tuner was retested and had exhibited no problems.

Manufacturer: MFJ Enterprises Inc, 300 Industrial Park Rd, Starkville, MS 39759; tel 800-647-1800; fax 662-323-6551; **www.mfjenterprises.com**. Price: MFJ-974, $179.95; MFJ-974H, $199.95.

PALSTAR AT4K ANTENNA TUNER

Unlike the other tuners in this review, the AT4K might best be described as an *unbalanced tuner designed to feed unbalanced or balanced loads*. This sounds con-

Table 2
Palstar AT4K Balanced/Unbalanced Antenna Tuner

Manufacturer's Specifications	Measured in ARRL Lab
Input load range: 8 to 2000 Ω.	See below.
Output SWR range: Not specified.	See below.
Frequency coverage: 1.8 to 30 MHz.	See below.
Input power: 2500 W single tone.	Not tested.
Size: 5 × 15 × 16 inches (HWD).	

SWR	*Load (Ω)*		*160 Meters*	*80 Meters*	*40 Meters*	*20 Meters*	*10 Meters*
8:1	6.25	Power Loss %	24	14	10	10	34
		SWR BW %	1.1	2.6	6.4	4.9	0.5
		Imbalance	0.6	0.7	0	0.6	5.2
4:1	12.5	Power Loss %	12	<10	<10	<10	18
		SWR BW %	1.9	4.0	17	8.5	0.7
		Imbalance	0	0.4	0	0.4	1.7
2:1	25	Power Loss %	<10	<10	<10	<10	<10
		SWR BW %	3.0	7.4	39	21	1.5
		Imbalance	0	0.2	0	0.5	0
1:1	50	Power Loss %	<10	<10	<10	<10	<10
		SWR BW %	5.5	16	69	42	3.0
		Imbalance	0.3	0	0	0.4	0.3
2:1	100	Power Loss %	<10	<10	<10	<10	<10
		SWR BW %	6.1	26	49	44	10
		Imbalance	0.4	0	0	0	0
4:1	200	Power Loss %	<10	<10	<10	<10	37[1]
		SWR BW %	6.9	22	24	32	0.8
		Imbalance	0.5	0	0	0	3.4
8:1	400	Power Loss %	<10	<10	<10	<10	Note 1
		SWR BW %	7.8	15	14	15	
		Imbalance	1.5	0.3	0	0	
16:1	800	Power Loss %	<10	<10	<10	<10	Note 1
		SWR BW %	7.2	10	10	8.5	
		Imbalance	2.6	0.5	0	0	
32:1	1600	Power Loss %	<10	<10	<10		
		SWR BW %	4.4	6.9	5.6	No Match	No Match
		Imbalance	4.9	0	0		

Notes

[1]According to the owner's manual for the AT4K, the matching range is limited on 10 meters. In testing, it was found that matches (SWR <1.5:1) could be obtained on 10 meters with some higher impedance loads by using a large amount of inductance. However, it is very likely that the tuner was close to self-resonance under these conditions, and this type of operation should be avoided due to the high losses in the tuner.

Power losses are expressed as a percentage. A 10% power loss represents less than half (0.46) a dB.

The SWR bandwidth is the percentage of the measurement frequency that can be changed with the SWR staying under 1.5:1.

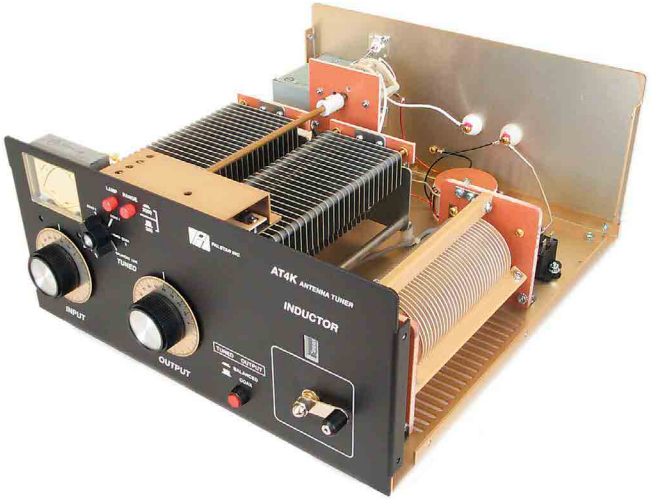

Figure 5—Palstar AT4K, inside view.

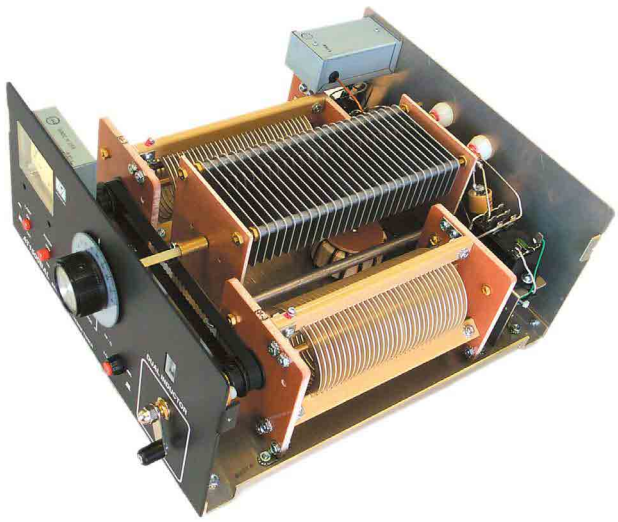

Figure 6—Palstar AT1500BAL, inside view.

tradictory, but really isn't, as described in footnotes 1 and 4. If you just think of this tuner as a "four-terminal black box" (see Figure 2C) connecting a balanced load to a balanced source, followed by a 1:1 balun going to the transceiver, you may get the picture. An unbalanced T section, isolated from ground within the box, performs the required impedance transformation to match the impedance at the bottom of the balanced transmission line to 50 Ω to operate properly through the internal balun. This tuner also provides a heavy duty relay to connect the common points of the input, output and inductor to the chassis to convert it to a typical T section tuner for unbalanced loads.

An additional feature, not found in any of the other tuners in this review, is antenna switching capability. The AT4K has a single pair of balanced output terminals, but also has three coax outputs. Two can be tuned, or switched to straight through, while the third provides straight though operation only. This is a great spot to connect a dummy load, or a well matched Yagi.

The inside view gives a sense of the heavy duty construction of this massive tuner. The rotary inductor is fabricated from silver plated strip stock, rather than the usual wire, and the rolling contact is designed to grip a significant portion or the coil, not just the edge. The inductor is driven by a smooth turn-count dial reading out to $^1/_{10}$ of a turn and resetable in between. As with its sister units, the capacitors are driven by 5:1 reduction drives with 0 to 100 logging scales.

One design challenge with a tuner built of these large parts is to keep the minimum capacitance low enough so the unit will meet specifications at 10 meters. As shown in the data, Palstar has done a reasonably good job with this, but the limitations should be noted. I found that this unit could match all my antennas, balanced or unbalanced, except on 17 and 10 meters where not all impedances are within range. Again, a change in transmission line length may move your impedance to a value within the tunable range. The metering was consistent with my other wattmeters, both in position of reflected null and forward power. I was able to easily return to a previous setting using the resolution of the dial scales.

PALSTAR AT1500BAL BALANCED ANTENNA TUNER

The Palstar AT1500BAL is of the configuration shown in Figure 3B. It is a legal limit device and a look inside makes

Table 3
Palstar AT1500BAL Balanced Antenna Tuner

Manufacturer's Specifications	Measured in ARRL Lab
Input load range: 160 to 20 meters, 2500 ±*j*2500 Ω.	See below.
20 meters 1000 ±*j*1000 Ω; 10 meters, 500 ±*j*500 Ω.	See below.
Output SWR range: Not specified.	See below.
Frequency coverage: 1.8 to 30 MHz.	See below.
Input power: 1500 W PEP.	Not tested.
Size: 6.5 × 12.5 × 15 inches (HWD).	

SWR	*Load (Ω)*		*160 Meters*	*80 Meters*	*40 Meters*	*20 Meters*	*10 Meters*
8:1	6.25	Power Loss % SWR BW % Imbalance	No Match	No Match	<10 9.9 0.3	<10 6.6 0	<10 5.4 0
4:1	12.5	Power Loss % SWR BW % Imbalance	No Match	No Match	<10 1.3 0	<10 1.3 0	<10 10 0
2:1	25	Power Loss % SWR BW % Imbalance	<10 1.5 0	<10 46 0	<10 42 0	17 19 0	<10 13 0
1:1	50	Power Loss % SWR BW % Imbalance	<10 >100 0.3	<10 >100 0	<10 >100 0	<10 >100 0	<10 20 0
2:1	100	Power Loss % SWR BW % Imbalance	<10 >100 0	<10 54 0	<10 58 0	<10 56 0	<10 61 0
4:1	200	Power Loss % SWR BW % Imbalance	<10 >100 0.2	<10 29 0	<10 26 0	<10 30 0	<10 3.7 0
8:1	400	Power Loss % SWR BW % Imbalance	<10 17 0	<10 23 0	<10 18 0	<10 20 0	13 1.7 0
16:1	800	Power Loss % SWR BW % Imbalance	<10 11 0	<10 11 0	<10 13 0	<10 13 0	18 4.0 0
32:1	1600	Power Loss % SWR BW % Imbalance	<10 5.6 0	<10 8.0 0	<10 7.8 0	<10 5 0	No Match

Notes
Power losses are expressed as a percentage. A 10% power loss represents less than half (0.46) a dB.
The SWR bandwidth is the percentage of the measurement frequency that can be changed with the SWR staying under 1.5:1.

me believe that it can handle serious power. The rotary inductors, two edge-wound silver plated ball-bearing monsters, driven by a toothed fiberglass belt and turns counting dial take up a lot of the interior space. The rest is largely occupied by a 450 pF 4.5 kV variable driven by a smooth 5:1 vernier dial. The inductors and capacitor are made in-house and work very well. I was particularly impressed with the resetability of the controls. The turns counter reads out to tenths of a turn, and can be easily reset to $^1/_2$ a tenth out of the 32 turns end-to-end. The vernier drive has a dial with 100 divisions and no perceivable backlash. Once you make up a table of tuning values by frequency, retuning should be a snap.

I found the tuner easy to use at W1ZR, matching all reasonable antenna configurations I tried. I am only able to test at the 500 W level and, as expected, encountered no difficulties. The cross-needle meter (300 and 3000 W full scale ranges for forward average power) agreed closely with those on my equipment. One note, on many tuners, power is only required for meter lighting. On this unit, relays are used—both to switch capacitors from one end to the other and to switch in additional capacitance. The tuner will work only in the "high impedance/no extra capacitance" mode if you neglect to plug in the supplied wall-wart or connect an external 12 V dc supply. I found I needed to exercise both relays to tune my antenna on all bands.

Just after we purchased the AT1500BAL tuner for evaluation, Palstar added the AT1KBAL tuner to their line. In spite of their product numbers, they both are specified to handle the US legal limit. There is a key difference, however. The AT1KBAL tuner has the capacitors on the output side only. This results in a tuner that is designed to match from around 100 Ω up[5] and is similar to an early balanced tuner described by Measures.[6]

Palstar has informed us that later this year they will replace the AT1500BAL and the newer (and not tested) AT1KBAL with a new balanced tuner, the model BT1500A. This tuner will share the basic architecture and design of the AT1500BAL. It will make use of a new switched two-section variable capacitor designed to reduce minimum capacitance. This is intended to im-

[5]Most center-fed antennas longer than 0.5 λ are likely to meet this criterion. Very short antennas, or some low impedance driven arrays (8JK, for example) may have problems with this configuration, depending on feed line length.

[6]R. Measures, AG6K, "A *Balanced* Balanced Antenna Tuner," *QST*, Feb 1990, pp 28-32.

Table 4
E. F. Johnson 275 W Matchbox, Balanced Antenna Tuner

Manufacturer's Specifications	***Measured in ARRL Lab***
Input load range: 25 to 1250 Ω.	See below.
Output SWR range: Not specified.	See below.
Frequency coverage: 80, 40, 20, 15 and 10 meters.	See below.
Input power: 275 W dc input.	Not tested.
Size: 7 × 10 × 10.5 inches (HWD).	

SWR	*Load (Ω)*		*80 Meters*	*40 Meters*	*20 Meters*	*15 Meters*	*10 Meters*
4:1	6.25	Power Loss % SWR BW % Imbalance	No Match	No Match	No Match	No Match	No Match
2:1	12.5	Power Loss % SWR BW % Imbalance	No Match	No Match	No Match	<10 4 0	<10 4 0
1:1	25	Power Loss % SWR BW % Imbalance	<10 2 0	No Match	<10 >5 0	<10 >5 0	<10 3 0
2:1	100	Power Loss % SWR BW % Imbalance	<10 2 0	<10 4 0	12 >5 0	<10 >5 0	<10 3 0
4:1	200	Power Loss % SWR BW % Imbalance	11 2 0	<10 4 0	<10 >5 0	<10 >5 0	11 3 0
8:1	400	Power Loss % SWR BW % Imbalance	12 2 0	<10 4 0	<10 >5 0	<10 >5 0	11 3 0
16:1	800	Power Loss % SWR BW % Imbalance	<10 2 0	<10 4 0	<10 >5 0	<10 >5 0	11 3 0
32:1	1600	Power Loss % SWR BW % Imbalance	<10 2 0	<10 4 0	No Match	No Match	No Match
64:1	3200	Power Loss % SWR BW % Imbalance	<10 2 0	No Match	No Match	No Match	No Match

Notes
Power losses are expressed as a percentage. A 10% power loss represents less than half (0.46) a dB.
The SWR bandwidth is the percentage of the measurement frequency that can be changed with the SWR staying under 1.5:1.

Table 5
E. F. Johnson kW Matchbox, Balanced Antenna Tuner

Manufacturer's Specifications	Measured in ARRL Lab
Input load range: 50 to 2000 Ω.	See below.
Output SWR range: Not specified.	See below.
Frequency coverage: 80, 40, 20, 15 and 10 meters.	See below.
Input power: 1000 W dc input.	Not tested.
Size: 12.5 × 17.25 × 11 inches (HWD).	

SWR	Load (Ω)		80 Meters	40 Meters	20 Meters	15 Meters	10 Meters
4:1	6.25	Power Loss % SWR BW % Imbalance	No Match	No Match	No Match	No Match	No Match
2:1	12.5	Power Loss % SWR BW % Imbalance	No Match	No Match	<10 2 0	13 2 0	<10 4 0
1:1	25	Power Loss % SWR BW % Imbalance	No Match	<10 2 0	<10 2 0	<10 2 0	<10 4 0
2:1	100	Power Loss % SWR BW % Imbalance	<10 1 0	<10 2 0	<10 2 0	<10 2 0	<10 4 0
4:1	200	Power Loss % SWR BW % Imbalance	<10 1 0	<10 2 0	11 2 0	<10 2 0	<10 4 0
8:1	400	Power Loss % SWR BW % Imbalance	<10 1 0	<10 2 0	<10 2 0	14 2 0	11 4 0
16:1	800	Power Loss % SWR BW % Imbalance	<10 1 0	<10 3 0	<10 2 0	11 2 0	11 4 0
32:1	1600	Power Loss % SWR BW % Imbalance	<10 1 0	<10 2 0	<10 2 0	No Match	No Match
64:1	3200	Power Loss % SWR BW % Imbalance	<10 2 0	No Match	No Match	No Match	No Match

Notes
Power losses are expressed as a percentage. A 10% power loss represents less than half (0.46) a dB.
The SWR bandwidth is the percentage of the measurement frequency that can be changed with the SWR staying under 1.5:1.

prove the tuning range, particularly on 10 meters. It will also have the inductors driven in tandem, removing the requirement for the drive belt and said to make for smoother tuning. Palstar expects to offer the BT1500A as their only balanced tuner once material for the others is exhausted.

Manufacturer: Palstar Inc, 9676 N Looney Rd, PO Box 1136, Piqua, OH 45356; tel 937-773-6255; fax 937-773-8003; **www.palstar.com**. Price: AT4K, $895; AT1500BAL, $695.95; AT1KBAL, $595.

E. F. JOHNSON MATCHBOX ANTENNA TUNERS

Before WW II, the E. F. Johnson Company of Waseca, Minnesota, manufactured high quality variable capacitors, inductors and ceramic parts for electronics. By 1950 they were advertising their innovative Viking I transmitter in *The ARRL Radio Amateur's Handbook* and the next year their Matchbox antenna tuner for $48.95. A kW version was advertised in 1957.

These tuners were based on the classic prewar balanced tuned circuit tuner (Figure 1A), but with an added twist. While the classic tuner of the day used plug-in coils to change bands, and manually attached tap points on the coil to change impedances, the Matchbox was bandswitching and had a unique differential capacitor arrangement to adjust the transformation ratio from the front panel, as shown in Figure 1B. Models were available with and without SWR metering and the units included a TR relay useful for the typical separate transmitter and receiver setups of the day.

By the '60s, the typical amateur antenna system had become one designed for resonant matched operation using coaxial cable without antenna tuners. Radios moved from AM to SSB, and Johnson changed their focus from amateur equipment to the commercial two-way FM radio market. Their tuners are still a popular item at flea markets and on electronic auction sites.

While not exactly a part of this review, Matchbox data reported by Witt in his earlier article is presented for comparison. As noted in the tables, the Matchbox tuners work well, but over a typically smaller impedance range than their modern counterparts. They also do not have band switch positions for any of the newer bands, although there is enough tuning range so they can typically cover 17 and 12, but not 30 or 60 meters. Within these limits, however, they can still be put to good use. Until the units discussed in this review became available, the Matchboxes were the only commercial tuner in wide use specifically designed to work with balanced antenna systems. QST

TECHNICAL CORRESPONDENCE

A SIMPLE, WELL-BEHAVED CRYSTAL OSCILLATOR

By John A. Clark, K2AOP, 6226 E Carolina Dr, Scottsdale, AZ 85254

◊ This oscillator configuration has evolved in the long quest for a simple and reliable crystal oscillator with good frequency stability. Many versions of oscillators were tested and evaluated. Most came up short because of excessive frequency change and erratic operation from power supply variations, susceptibility to loading changes or because they were too complicated to be practical.

The Pierce has seldom been considered because the major components must be at elevated voltage, but it winds up a champ if you use a P-channel FET as the active element. As shown in Figure 1, this configuration puts the critical components at ground potential. The oscillator is also fully isolated from the output by the grounded gate buffer and source coupling between stages. Frequency and output amplitude remain quite constant over the range of 5 to 40 V because the FET has a drain characteristic that minimizes change in current and gain with supply voltage.

The price that is paid for the wide range is an output of only 0.8 V_{P-P} and the lack of a perfect sine wave shape. A tuned transformer in place of the 1 kΩ output resistor and capacitor could correct this. The remaining hurdle left to overcome, as with all oscillators, is the control of the effects of temperature.

The oscillator starts smoothly at around 2.0 V and consumes about 2.5 mA. It works with fundamental crystal frequencies between 1 and 20 MHz and maintains a reasonably constant output amplitude of about 0.8 V_{P-P} from 5 to 40 V dc. The frequency change from a 0.1 V dc power source change is:

0.5 PPM @ 5 V dc
0.2 PPM @ 12 V dc
0.1 PPM @ 20 V dc

The resistors I used were 1/10 W metal film for the 1 kΩ and 1/10 W carbon for the 2.2 MΩ (higher wattages will work). Capacitor values are 100 pF and 0.01 µF. The 18 pF and 100 pF capacitors at the crystal are starting values for setting frequency. The crystal should be a parallel-resonance type and made for use with a load capacitance of 18 to 24 pF. The author's assembled oscillator is shown in Figure 2. [Editor's note: The oscillator was tested in the ARRL Lab and exhibited performance equal to or better than K2AOP's claims. Phase noise could not be checked as the phase noise characteristics were better than the test equipment we have available.]

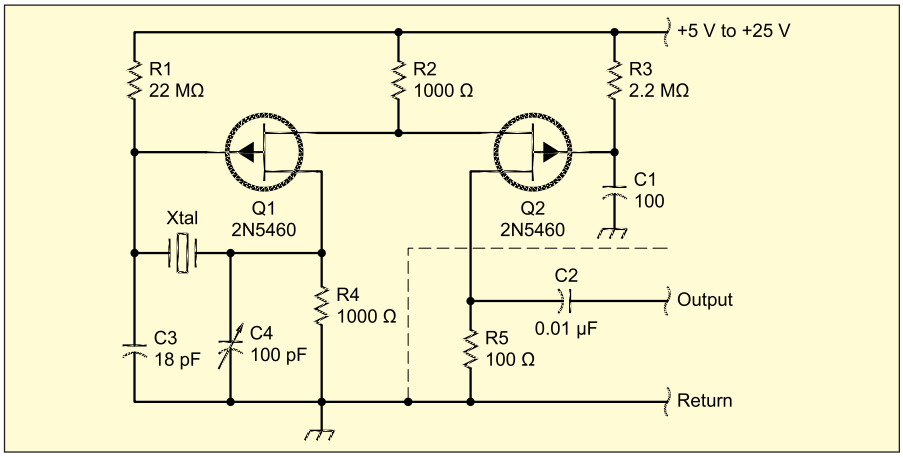

Figure 1—The K2AOP FET oscillator. A buffer isolates the oscillator from the output. The oscillator exhibits excellent frequency stability and low output voltage change with supply voltage. It operates over a supply voltage range of 4-50 V dc.

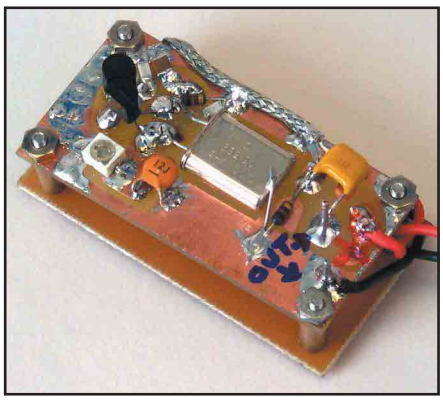

Figure 2—The assembled K2AOP oscillator. This example uses a 10 MHz crystal.

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

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

FEEDBACK

◊ In the Product Review of the ICOM IC-7800 [Aug 2004, p 65], some test data was incorporated into Table 1 but was not reflected in the text. The text reference to intermodulation distortion should read: "The two-tone third-order IMD, an indication of the capability to receive a weak signal near a strong one, was measured at 104 dB at 14.1 MHz with 20 kHz spacing and a respectable but not quite the best we've seen of 89 dB at 5 kHz spacing."

◊ The price of *The Artful Solderer* [New Products, Aug 2004, page 44] is $19.99, not $10.99 as indicated.

STRAYS

ATTENTION COUNTY HUNTERS

◊ With the decline of the sunspot activity and worsening propagation on 20, the county hunters have set up a new frequency, 10.114 MHz, for working mobile stations around the country. All are welcome to join in and work the mobiles as they give out contacts from the 3077 counties in the USA. The 30 meter frequency is in addition to the normal CW county hunting frequencies of 14.0565 and 7039 MHz. More information on county hunting is available at **www.countyhunter.com**.—*N4CD*

HE CHECKED OUT *THE ARRL ANTENNA BOOK*

◊ As reported in the Medford (Oregon) *Mail Tribune*, the last book checked out of Medford's 92 year old Carnegie Library was *The ARRL Antenna Book*. The article said that Dave Johnson, a ham radio operator from Central Point, was given a certificate stating he was the library's last patron. The new Jackson County library opened a few weeks later.—*Tnx Cliff Nunn, K5OVK*

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FCC Turning Blind Eye in BPL Proceeding, ARRL Charges

ALAN ERICKSON, WBØOAV

A BPL extractor.

The ARRL says the FCC apparently has already made up its mind about broadband over power line (BPL) and "wants no bad news" about the technology. In reply comments filed June 22 on the FCC's *Notice of Proposed Rule Making* in ET Docket 03-47, the League called on the Commission to take "a fresh look" at BPL before enabling its deployment. Again asking the FCC to put the proceeding on hold for a year, the League recommended that the Commission in the meantime require BPL providers to conduct FCC-monitored interference testing with all stakeholders. The ARRL charged that while an overwhelming majority of comments oppose BPL due to interference concerns, the FCC continues to rely on what the League called "vacuous assurances that BPL would not cause harmful interference." Test data and a growing record of unresolved complaints indicate otherwise, the ARRL said.

"ARRL is of the view that this proceeding has been prejudged and will, in the end, be decided not on the technical issues that should control the outcome of this proceeding, but on the politics of the matter," the League commented. "Given the evidence on the Commission's table, it cannot now authorize BPL at the radiated emission levels proposed, and without substantial restrictions."

Among those restrictions, the League recommended keeping BPL altogether away from all Amateur Radio allocations, should the FCC decide to authorize BPL under its proposed rules. As an alternative, the FCC should guarantee that an interfering BPL system can be shut down immediately in the face of a valid complaint, "not after a BPL provider has taken months to discover that the interference cannot be resolved," the League said.

To date, the ARRL contended, the FCC has seemingly ignored the League's BPL technical studies as well as the National Telecommunications and Information Administration (NTIA) Phase 1 BPL study that clearly demonstrate BPL's interference potential. Five additional technical evaluations accompanied the ARRL's reply comments.

"The Commission is obligated by the Administrative Procedure Act to look for fire where it is shown a good deal of smoke," the League said. "Here there is far more than smoke in the record." Any decision in the BPL proceeding "must be supported by substantial evidence," the ARRL asserted.

The League said the results of both its studies and the NTIA's "are entirely consistent." Referring to the NTIA Phase 1 analysis, the ARRL said it's "quite reasonable to assume that the interference potential of BPL systems to fixed HF Amateur Radio stations is on the order of 460 meters (approximately 1509 feet) from the nearest BPL device." No proposals address BPL interference mitigation for mobile stations, the ARRL noted.

While commenting extensively on—and in some instances agreeing with—the NTIA's late-filed comments, however, the League said they depict an agency that must "balance dual and, in this case, conflicting roles" as the White House telecommunications policy advocate. The League questioned the NTIA's contention that BPL is a "win-win" situation and that its deployment would lead to lower power line noise.

"Not so," the ARRL countered. "Licensed radio services operating in the sensitive HF environment should not have foist upon them a substantial interference risk from unlicensed devices or systems whatsoever." The League said replacing one interference source with another in the same bands is "not in any way beneficial."

The ARRL also faulted the FCC for neglecting to acknowledge or respond to a mounting number of interference complaints, most from amateur licensees living in BPL field trials areas. "The Commission has, as of this writing, adjudicated not a single one and has ignored repeated requests from licensed radio amateurs for even a confirmation of receipt of their complaints!" the ARRL emphasized. The League also expressed little confidence in utilities that have failed to resolve power line noise complaints to do any better with BPL complaints. The League suggested such BPL complaints deserved careful analysis, but not the Commission's cold shoulder.

"What ARRL is unwilling to tolerate is the continuation of the Commission's sweeping of these complaints 'under the rug,' which is exactly what has happened in this proceeding," the League commented. The Commission must put its zeal over BPL aside and "take a fair look at them before any action is taken in this proceeding."

"The Commission has not proposed any rules which would predictably and reliably protect HF and low-band VHF radio systems from interference," ARRL concluded. "The interference resolution mechanisms that are adopted should be real, rather than merely illusory."

Utility Cuts Short BPL Trial That Attracted Amateur Complaints

Alliant Energy has called an early end to its broadband over power line (BPL) pilot project in Cedar Rapids, Iowa. The "evaluation system" went live March 30, and plans had called for keeping it active until August or September. Alliant shut it down June 25. Ongoing, unresolved HF interference from the system to retired engineer—and BPL "poster child"—Jim Spencer, WØSR, and other amateurs prompted the ARRL to file a complaint to the FCC on Spencer's behalf demanding the BPL trial be shut down and the utility fined.

Alliant Energy's BPL Project Leader Dan Hinz says the ARRL complaint "certainly was a factor" in the utility's decision to pull the plug prematurely but "not

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the overriding factor." The main reason, he said, was that Alliant accomplished most of its objectives ahead of schedule. The primary purpose of the Cedar Rapids evaluation was to gain an understanding of BPL technology and what issues might be involved in a real-world deployment, Hinz explained. But, he added, regulatory uncertainty and other unspecified technical issues also factored into the choice to end the pilot early.

Hinz said Alliant was "moshing the data" to compile a written evaluation of the Cedar Rapids pilot, but the company has no plans at this point to move forward with BPL. Alliant did not partner with a broadband services provider, and it has no other BPL test systems in operation. The system used Amperion BPL equipment.

According to Spencer, five fixed Amateur Radio stations within proximity of the BPL evaluation system and two mobile stations formally reported BPL interference on HF. "The radio amateurs and Alliant Energy cooperated by sharing interference information," he said. "Alliant Energy turned the BPL evaluation system off twice to allow collection of extensive BPL frequency and signal level data—with and without BPL." He said Alliant and Amperion tried various "notching" schemes to rid amateur frequencies of the BPL interference with only limited success.

The system included both overhead and underground BPL links to feed 2.4 GHz wireless "hot spots" for end user access. Hinz said the area's topography presented some challenges, especially with the wireless links. "I think in the end, we actually over-challenged ourselves with this specific pilot location," he said. And, despite "substantial progress" in mitigating interference, Alliant decided at this point that "it wasn't worth the extra effort" to resolve the thornier technical issues, Hinz added.

As for any broader implications, Hinz says he's always viewed BPL as a "strategic deployment technology," not one a company could roll out just anywhere and expect to be competitive with existing broadband services such as cable and DSL. "At least that's how we were looking at it," he said. "You have to find the right areas with the right topography with the right concentration of certain types of customers," he said.

"It's never been in my mind that BPL has to compete with the speeds of cable today," Hinz added. "It has to compete with the speeds of cable and the next best thing tomorrow as well, if it's going to be usable well into the future." He hinted that Alliant might want to take another look at BPL once the FCC has put BPL rules and regulations into place, and the technology has further evolved.

The ARRL's formal complaint to FCC Enforcement Bureau Chief David H. Solomon called on the Commission not only to close down Alliant's BPL field trial system but to fine the utility $10,000 for violating the Communications Act of 1934 and FCC Part 15 rules. Commenting on the termination of the Cedar Rapids BPL trial, ARRL CEO David Sumner, K1ZZ, pointed out that Alliant had tried for more than 12 weeks to fix the interference problem to a station 600 feet from its installation.

"In the end," Sumner noted, "the interference was not eliminated except by shutting down the BPL system. Could the case against BPL deployment be any clearer?"

Spencer said he was happy with Alliant's decision, and he was gracious in expressing appreciation to the utility for working with him. "And thanks also to the ARRL and the Cedar Rapids BPL Steering Committee for their knowledge and efforts in making a truly professional evaluation," he added. Still outstanding are some chronic power line noise problems Spencer has experienced.

For additional information, visit the "Broadband Over Power Line (BPL) and Amateur Radio" page on the ARRL Web site, **www.arrl.org/bpl**.

ALAN ERICKSON, WBØOAV

Jim Spencer, WØSR, can enjoy Amateur Radio again from his Cedar Rapids, Iowa, shack, now that Alliant Energy has terminated its BPL field trial.

ARRL, FCC SUBSTANTIALLY AGREE ON WIDE-RANGING PROPOSALS

The ARRL has told the FCC that it substantially agrees with the Commission's proposed wide-ranging changes to Part 97 Amateur Service rules. The League filed comments June 15 in the so-called "omnibus" *Notice of Proposed Rule Making and Order* (*NPRM&O*) in WT Docket 04-140, released April 15. The proceeding addresses several largely unrelated Amateur Radio petitions for rule making, including some filed by ARRL. Although the *NPRM&O* does *not* take up comprehensive Amateur Radio restructuring, the League said it sets the stage for the FCC to act on a far-reaching restructuring plan. While complimenting the Commission for a well-considered document, the League pointed out that some petitions will have been on the table for between three and four years before the FCC concludes the proceeding.

"It is hoped that other petitions filed subsequent to those addressed in the instant Notice and which are pending before the Wireless Telecommunications Bureau can be more expeditiously addressed," the ARRL commented.

In a significant item related to license restructuring, the *NPRM&O* recommended adoption of the ARRL's "Novice refarming" plan, spelled out in RM-10413. The League's later license restructuring petition, RM-10867, incorporates refarming—a realignment of HF subbands. Noting that the approaching low point of the sunspot cycle typically means a migration to the "substantially overcrowded 80 and 40-meter bands," the ARRL urged the FCC to act swiftly on the ARRL-proposed band realignments.

"The proposed changes will assist greatly in redistribution of some of this overcrowding," the ARRL told the FCC. The League said its refarming proposals "will benefit all licensees," and it expressed gratification that the FCC agreed with the petition.

Under the now FCC-endorsed ARRL plan, current Novice and Technician Plus (ie, Technician with Element 1 credit)

licensees could operate on the 80, 40, 15 and 10-meter General-class CW allocations at up to 200-W output. The plan also would mean changes in the 80, 40 and 15-meter phone bands for General and higher class operators.

The ARRL strongly favors the proposed FCC adoption of a rule to limit the number of applications a licensee may file on a given day for the same vanity call sign. Some amateurs have filed multiple applications for the same call sign on the same day to greatly enhance their chances of getting their first call sign choice.

"This manipulative practice clearly should be discouraged," the ARRL said. "While it is unclear to ARRL why this practice has not been prohibited by order, it should be prohibited now." The League further suggested the FCC expand the scope of its proposed rule change to preclude the filing of more than one application on a single day for the same call sign choice(s). The FCC's proposed rule addressed only the first choice. The ARRL further recommended that the FCC dismiss the vanity applications of any violators.

The League advised the FCC against adopting a Quarter Century Wireless Association petition to let amateurs to designate a specific Amateur Radio club to acquire their call sign in memoriam after they die. The ARRL said such as change would effectively give licensees property rights over their FCC-assigned call signs. "Vanity call signs are not assignable, and the Commission's rules do not permit trafficking in call signs," the League commented.

The ARRL praised the FCC for proposing to essentially eliminate its rules prohibiting manufacture or marketing of Amateur Radio Service power amplifiers capable of operating between 24 and 35 MHz. "The proposed amendments are welcome and will enhance amateur use of the 10 meter and 12 meter amateur bands," the League commented. "It will also allow amateurs to enjoy the benefits of construction projects without unnecessary restrictions."

Although it had opposed an earlier, broader proposal, the League now says it supports a proposed amendment to permit auxiliary operation on 2 meters above 144.5 MHz—with the exception of the satellite subband 145.8 to 146.0 MHz—in addition to frequency segments already authorized. Kenwood Communications had asked for the change in 2001 as part of an effort to make legal the use of its *Sky Command* system, which permits users to operate certain Kenwood equipment remotely via a VHF/UHF handheld transceiver. The ARRL said the proposal would "enhance the development of sophisticated amateur communication systems."

The League said the FCC should retain its rule requiring a public announcement of test locations and times as a means to prevent abuses. The ARRL also called on the Commission to require volunteer examiners and Volunteer Examiner Coordinators, such as ARRL-VEC, to submit or forward exam session paperwork within 10 days. The FCC proposed eliminating both requirements.

The ARRL proposed in RM-10413 and the FCC supported a rule change to permit spread spectrum (SS) emissions in the 222-225 MHz band. Current rules prohibit SS emissions below 420 MHz. However, the League disagreed with an FCC proposal to also permit SS on 2 and 6 meters.

The League further asked the FCC to make two changes relating to World Radiocommunication Conference 2003 actions to bring the language of Part 97 into line with the international *Radio Regulations*.

A copy of the League's comments in WT 04-140 is available on the ARRL Web site.

ASTRONAUT RADIOS BIRTH ANNOUNCEMENT, CELEBRATES SPECIAL FATHER'S DAY IN SPACE

International Space Station astronaut Mike Fincke, KE5AIT, and his wife Renita became parents for the second time on June 18. Unable to contain his paternal pride, Fincke briefly altered the beacon message on the RSØISS Amateur Radio packet system aboard the spacecraft to transmit "It's a girl! Tarali Fincke" about once every minute as the ISS circled Earth.

"Sure beats a stork sign in the front yard," quipped ISS Ham Radio Project Engineer Kenneth Ranson, N5VHO, at Johnson Space Center. Fincke is the first US astronaut to celebrate the birth of a child from space. Father's Day was Sunday, June 20. Tarali is the couple's second child. She'll join a brother, Chandra, in the Fincke household.

Fincke said his childrens' names have astronomical significance. "Her name is Tarali Paulina, and Tara is the Indian dialect meaning star," he radioed Mission Control in Houston shortly after the birth. "Our first boy, his name is Chandra, which means moon. So, my wife had already given me the moon, and now she's given me a star, and it's a privilege to happen aboard the International Space Station."

Of Indian heritage, Renita Fincke, an engineer for Wyle Laboratories, works at

[continued on page 72]

NASA

Proud papa: **Mike Fincke, KE5AIT, at one of the two NA1SS Amateur Radio on the International Space Station operating positions. Fincke and Padalka made several dozen VHF and UHF contacts during Field Day, marking the first time both ARISS stations were on the air at the same time. Fincke also has made several casual QSOs on 2 meters as well as several ARISS school group contacts.**

NASA/BILL INGALLS

Renita Fincke with son Chandra, who's wearing a flight suit bearing an Expedition 9 patch, in Moscow April 21 to see the *Soyuz* vehicle carrying her husband dock with the ISS.

NEW VANITY CALL SIGN FEE EFFECTIVE AUGUST 6

The FCC regulatory fee to obtain an Amateur Radio vanity call sign on August 6 rose from $16.30 to $20.80 for the 10-year license term. The FCC announced the new fee in a *Report and Order* (*R&O*) in MD Docket 04-73, "Assessment and Collection of Regulatory Fees for Fiscal Year 2004."

The FCC says it anticipates 7800 applications for FY2004—2000 fewer than the previous fiscal year. Revenue collected from the vanity call sign regulatory fees in FY2004 was expected to rise by more than $2100, the FCC said.

All applications received at the FCC on or after August 6, 2004, must be accompanied by the new, higher fee.

THE FCC TURNS 70

The FCC turned 70 years old July 1—the effective date of the Communications Act of 1934. Passed by Congress on June 19 of that year, the Act established the FCC as an independent US government agency.

Although amended since, the Act—all 333 pages of it—remains in effect and establishes the authority of the FCC to, among other things, grant telecommunication licenses. Echoing the international *Radio Regulations*, it also spells out the official definition of an amateur station: "The term 'amateur station' means a radio station operated by a duly authorized person interested in radio technique solely with a personal aim and without pecuniary interest."

Upon its creation 70 years ago, the FCC directly inherited the personnel, funds and records of the Federal Radio Commission (FRC), then just seven years old. The FRC had shared regulatory duties with the Department of Commerce and the Interstate Commerce Commission. The Communications Act of 1934 put all the responsibilities under one roof. Most of the significant changes the Communications Act of 1934 introduced affected broadcasting.

Directly responsible to Congress and charged with regulating interstate and international communications by radio, television, wire, satellite and cable, today's FCC jurisdiction covers all 50 states, the District of Columbia and US possessions.

The August 1934 issue of *QST* expended surprisingly little ink announcing the regime change to the Amateur Radio community. "The radio part of the law is almost exactly the same as before, and there is no change in any amateur regulation," a short article said. "The League kept in close touch with this legislation as it progressed, and is assured that nothing in the new law adversely affects Amateur Radio."

FCC CHAIRMAN REAFFIRMS SUPPORT FOR BPL

Speaking July 15 in Menlo Park, California, FCC Chairman Michael K. Powell again asserted that broadband over power line technology "holds the great promise to bring high-speed Internet access to every power outlet in America." Powell's statement followed a demonstration of BPL technology at AT&T Labs cosponsored by Pacific Gas and Electric Company and AT&T.

"What I saw today has the potential to play a key role in meeting our goals to expand the availability and affordability of broadband," Powell said. "The future is bright for powerline broadband. We'll continue at the FCC to explore ways to support this technology while protecting other services from interference."

Pacific Gas and Electric Company and AT&T are partnering in a BPL field trial.

Amateur Enforcement

♦ **Commission proposes to fine California ex-ham:** A new chapter has begun in the West Coast chronicle of Jack Gerritsen. The FCC now wants to fine him $10,000 for violating the Communications Act of 1934. The Commission says that's because Gerritsen doesn't have an Amateur Radio license but continues to operate—despite numerous complaints from Los Angeles-area amateurs. The Bell, California, man—who was very briefly KG6IRO in 2001—contends the FCC acted improperly in setting aside his Technician license. He claims he still holds a valid ham ticket until the Commission affords him a hearing to decide its fate. The FCC says otherwise.

"Gerritsen's positing of arguments challenging the set-aside of his Amateur license does not give him any right to operate a radio station without a license issued by the Commission," the FCC said. It issued a *Notice of Apparent Liability for Forfeiture* (*NAL*) June 15.

On its own motion, the FCC's Wireless Telecommunications Bureau set aside its November 7, 2001, license grant to Gerritsen a week after issuing it. Citing §1.113(a) of its rules, the FCC based its action on complaints about the operation of Gerritsen's station. It also said Gerritsen's 2000 conviction for interfering with police communications raised questions about his qualifications to be a Commission licensee. FCC Special Counsel Riley Hollingsworth says Gerritsen's Amateur Radio license application remains in "pending" status.

Gerritsen cites a different section of the FCC's rules to claim it cannot take away his operating authority without first granting him a hearing. He continues to use KG6IRO, although the call sign appears in the FCC's Universal Licensing System as "terminated." His history of radio-related problems extends back to 1999, when he was arrested and subsequently convicted in the state court of interfering with police radio communications. The FCC says it continues to receive complaints of unauthorized operation of KG6IRO.

♦ **FCC affirms $11,000 fine:** The FCC has ordered Daniel Granda, KA6VHC, of Whittier, California, to pay an $11,000 fine for alleged "willful and repeated" violations of the Communications Act of 1934 and Amateur Service (Part 97) rules. The Commission's July 9 *Forfeiture Order* followed a *Notice of Apparent Liability* (*NAL*) issued March 31 (see "FCC proposes $11,000 fine for California amateur," Jun 2004 *QST*, p 75). Granda did not respond to the *NAL* nor to earlier FCC correspondence, and the FCC said it was affirming the forfeiture based on the information it had before it.

"The noted violation involves Mr Granda's failure to respond to official Commission correspondence and causing intentional interference to Amateur Radio communications," the FCC *Order* said.

In its earlier *NAL*, the FCC asserted that on at least eight occasions, Granda "willfully and maliciously caused interference to other stations and conducted activity in an effort to obtain exclusive use" of a 1.25 meter repeater pair. Agents from the Los Angeles field office used direction-finding techniques to track interfering signals to Granda's residence and inspected his station, the FCC said. The Wireless Telecommunications Bureau has set aside the renewal of Granda's Amateur Extra class license, which expired last November. His renewal application has reverted to "pending" status.

The FCC gave Granda 30 days to make arrangements to pay the fine. If he fails to do so, the case could be referred to the US Department of Justice for collection.

[continued from page 70]

Johnson Space Center. Until her husband returns to Earth in October, she says she'll help him experience the first few months of their daughter's life via teleconferences, video and e-mails.

"This is a wonderful, exciting adventure for both of us," she said. "I hope that everything is successful for his mission, that he comes home safely." The couple has been married since 1999.

NASA and Russian mission controllers extended congratulations to Fincke, who is NASA ISS science officer and flight engineer. He and ISS Commander Gennady Padalka, RN3DT, have been in space since April.

During a June 30-July 1 space walk, Fincke and Padalka successfully replaced a gyroscope power control module. The space walk preempted a scheduled Amateur Radio on the International Space Station (ARISS) school group QSO with youngsters at the Tulsa Air and Space Museum in Oklahoma, which will be rescheduled. The first attempted space walk by Fincke and Padalka a week earlier was cut short when a problem developed with Fincke's Russian spacesuit. The nearly six-hour space walk marked the first time that primary control of the event transitioned between flight controllers in Moscow and Houston. The ISS was essentially on autopilot while the crew worked outside.

OHIO ARRL SECTION MANAGER ANNOUNCES BPL TEAM ORGANIZATION

Amateur Radio operators in the Cincinnati area have organized a Broadband Over Power Line (BPL) team to monitor a planned BPL deployment. In announcing the move in mid-July, ARRL Ohio Section Manager Joe Phillips, K8QOE, says the group will study the effects of a BPL rollout in two neighborhoods by utility Cinergy Corp. The new group, consisting of a half dozen engineering professionals and some 20 others, will operate as a subcommittee of the Greater Cincinnati Local Interference Committee (LIC). Phillips tapped Kirk Swallow, W8QID, of Colerain Township, to head the BPL/LIC effort.

"Kirk has been operations manager for several electronics cellular and satellite firms," said Phillips, "and his experience with directing professional engineers makes him well qualified to handle this assignment." Phillips says the Greater Cincinnati LIC has a long successful record in handling repeater interference problems. "This BPL problem, however, represents new and special challenges in interfering with the spectrum," he added.

In March, articles in *The Wall Street Journal* and the *Cincinnati Enquirer* announced the BPL rollout by Cinergy and its BPL partner Current Technologies. Cinergy and Current said they hoped to offer the service to between 60,000 and 1.5 million Cincinnati-area customers by year's end and eventually to some 24 million potential customers elsewhere who are served by smaller utilities.

Phillips says the customer count is not clear at this point. Cinergy has been charging $40 a month—as opposed to a typical non-discounted $44 per month charge for cable Internet service—and that many of the subscribers are utility employees who get the BPL service at no cost.

The new BPL/LIC team will work with Phillips and ARRL Great Lakes Division Director Jim Weaver, K8JE, to serve as a clearing house for BPL suggestions, comments and information from the Amateur Radio community. "We in Cincinnati are getting lots of calls and notes from all sections of the US, as this city has the biggest BPL offering from the largest utility," Phillips noted. The team also will cooperate with the ARRL Laboratory to monitor and investigate BPL in the affected area using "the highest professional standards," Phillips said.

"This allows our testing results to be credible to all persons interested in BPL—which includes Cinergy Corporation," he said. "By adhering to the highest professional standards, we may have information about the effects of BPL on the spectrum which is not available elsewhere." Phillips said being able to produce "credible" technical data and information is key to any effort to convince Cinergy of BPL's harmful interference potential and that the technology won't boost the company's bottom line.

Phillips said several technical companies in the area already have offered the BPL/LIC team the use of state-of-the-art spectrum measurement equipment.

Team leader Swallow has been an amateur licensee for 50 years. He is a past president of Queen City Emergency Net and an active DXer who serves on the ARRL DX Advisory Committee. In 2002, Phillips awarded several members of the Greater Cincinnati LIC certificates of merit after they successfully tracked down the source of an unusual HF interference problem involving AM broadcaster WLW and Cinergy Corporation's equipment.

HAWAII'S GOVERNOR VETOES AMATEUR RADIO ANTENNA BILLS

Hawaii Gov Linda Lingle has vetoed two Amateur Radio antenna bills. Both pieces of legislation would have provided limited opportunities for amateurs living under private deed covenants, conditions and restrictions (CC&Rs) to erect antennas. HB 2773 would have opened the door for amateurs living in condominiums to make arrangements with the homeowners' association board to install an antenna without having to change the CC&Rs—often a more difficult process.

Media Hits

■ Amateur Radio concerns about BPL technology were included in a recent article in *The Morning Call* of Allentown, Pennsylvania. The well-balanced piece covered the upside of installing BPL in a downtown Allentown hotel, but it also pointed out the downside for Amateur Radio users and cited "intense opposition" voiced by ARRL.

■ WECT, the NBC television affiliate in Wilmington, North Carolina, aired a story about "Museum Ships Weekend." Interviewees included Jack Jacobs, WD4OIN, who was busy enjoying the event—operating from the Battleship USS *North Carolina*, which is permanently berthed in the Cape Fear River.

■ "Ham radio operators talk to the world" was the title of a feature in Indiana's *South Bend Tribune*. Alan Seifert, NY9A, and his experiences in ham radio were the focus of the piece, and he covered topics from worldwide friendships to emergency service, to his own efforts to get more young people involved. The article also included information about licensing, and listed Seifert's phone number and ARRL's Web address for more information about Amateur Radio.

■ Members of the Forx Amateur Radio Club in North Dakota got a plug for their efforts during a severe weather incident in the Grand Forks area. The *Grand Forks Herald* reported that hams were helpful as they funneled information to the emergency operations center.

In Brief

● **Dave Bowker, K1FK, wins *QST* Cover Plaque Award:** The winner of the *QST* Cover Plaque Award for June is Dave Bowker, K1FK, for his article "A 75 foot Top Loaded Vertical Antenna." Congratulations, Dave! The winner of the *QST* Cover Plaque award—given to the author or authors of the best article in each issue—is determined by a vote of ARRL members. Voting takes place each month on the *QST* Cover Plaque Poll Web page, **www.arrl.org/members-only/qstvote.html**. Cast a ballot for your favorite article!

● **John D. Kraus, W8JK, SK:** Radio astronomer, antenna designer, cosmic explorer and author John D. Kraus, W8JK, of Delaware, Ohio, died July 18. He was 94. While he enjoyed a worldwide reputation, Kraus is perhaps best known in Amateur Radio circles for his bi-directional wire beam antenna—often dubbed the '8JK array. Other important Kraus designs include the corner reflector and helix antennas. The Michigan native was a pioneer of radiotelescope design and the father of the "Big Ear" radiotelescope.

Following an early fascination with radio, Kraus first became licensed as 8AFJ. He later was granted the now-famous W8JK call sign. A graduate of the University of Michigan, he joined the faculty of the Ohio State University 1946, serving as a professor of electrical engineering and astronomy and founding and directing the OSU Radio Observatory. In that capacity, Kraus designed and oversaw construction of the Big Ear on land owned by Ohio Wesleyan University. Kraus's classic textbook *Antennas*, now in its third edition, has been an engineering school staple for decades and can be found in virtually every antenna engineer's library. Among his other titles are *Electromagnetics*, *Radio Astronomy*, *Big Ear*, *Big Ear Two* and *Our Cosmic Universe*.

Kraus also wrote several articles for *QST*. He did a "recap and update" of his W8JK antenna in the June 1982 issue. An article in the July 1970 issue describes a "W8JK 5-Band Rotary Beam Antenna." A 1934 *QST* article by Kraus highlights "Amateur Radio in the Soviet Union." Kraus was a fellow of the IEEE and a member of the National Academy of Engineering. In 1996, Dayton Hamvention honored Kraus as the recipient of its Special Achievement Award. In 2001, *CQ* named Kraus to the inaugural class of its Amateur Radio Hall of Fame. In 1978, after the "Big Ear" detected the still-unidentified "Wow!" signal that suggested the possibility of intelligent life elsewhere in the universe, Kraus launched *Cosmic Search*, a magazine devoted to the search for extraterrestrial intelligence. The Big Ear fell victim to development pressures and was torn down in 1998.

● **Actor Marlon Brando, KE6PZH/FO8GJ, SK:** One of the best-known names in cinematic and Amateur Radio circles—Marlon Brando, KE6PZH/FO8GJ—died in Los Angeles July 1. He was 80. Although born Marlon Brando Jr, he appears in the FCC database as "Martin Brandeaux." A General class licensee in the US, he was on the air occasionally over the years as FO8GJ from his private island in French Polynesia. In an interview with Larry King on CNN in 1994, Brando confirmed his continued interest in Amateur Radio. In response to a caller's question, he said ham radio provided him with the opportunity to just be himself. The iconoclastic actor was best known for his roles as Stanley Kowalski in "A Streetcar Named Desire," a dockworker in "On the Waterfront," and Vito Corleone in "The Godfather." He was nominated for eight Academy Awards and won two.

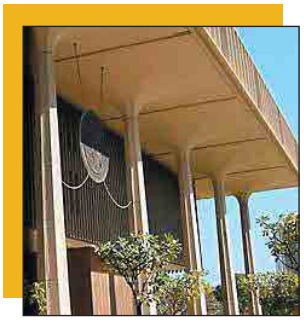
● **"SigAlert" developer Loyd C. Sigmon, ex-W6LQ, SK:** "Sig Alert" inventor Loyd "Sig" Sigmon, ex-W6LQ, of Bartlesville, Oklahoma, died June 2. He was 95. A partner with Gene Autry in Golden West Broadcasting in the 1950s, Sigmon came up with an electronic system using a tape recorder and a radio receiver to let LAPD dispatchers send bulletins to broadcasters over the regular police radio frequency—then 1730 kHz—alerting them to traffic conditions and emergencies. Activated by the dispatcher, the SigAlert transmission—accompanied by a special receiver-activation tone—would notify stations via a red light or a buzzer. Now in use throughout California, the system—which has since become computerized—has been duplicated in other areas of the US. —*CalTrans; news reports*

● **ARRL receives Citizen Corps grant:** The ARRL learned in July that it will receive a $3000 grant from the Corporation for National and Community Service (CNCS) via the New York State Citizen Corps to recognize Amateur Radio operators in the Empire State who have been involved in emergency-related activities. The funds will provide ARRL emergency communications vests to 200 New York ham radio volunteers. The four ARRL New York Section Managers will select the recipients. The grant will recognize ARRL members in New York who have completed emergency communications training, participated in drills and Simulated Emergency Test exercises and supported New York agencies during emergencies such as the September 2001 terror attacks and the August 2003 power failure. The ARRL has a *Statement of Affiliation* with Citizen Corps and is a current recipient of a three-year Homeland Security training grant.

HB 2774 would have granted similar rights to the relatively few amateurs who live under CC&Rs in agricultural-zoned property. Lingle, a Republican, invoked the same reason for refusing to sign both bills into law.

"This bill is objectionable because it amounts to an inappropriate and unacceptable governmental intrusion into the contractual affairs of the property owners," Lingle said July 13 in her veto messages to HB 2773 and HB 2774. "This measure would allow the installation of antennas in an owner's unit, notwithstanding objections by other owners."

The two measures, sponsored by Rep Ken Hiraki (D-28), had undergone substantial changes in wording from that proposed in the original legislation. Following lengthy negotiations and a House-Senate conference, HB 2773 passed the Senate May 3 on a 25-0 vote and the House 37-14. On the same day, HB 2774—essentially completely reworded from its original text—also received unanimous Senate approval, while House members okayed the measure 35-16.



The Hawaii State Capitol

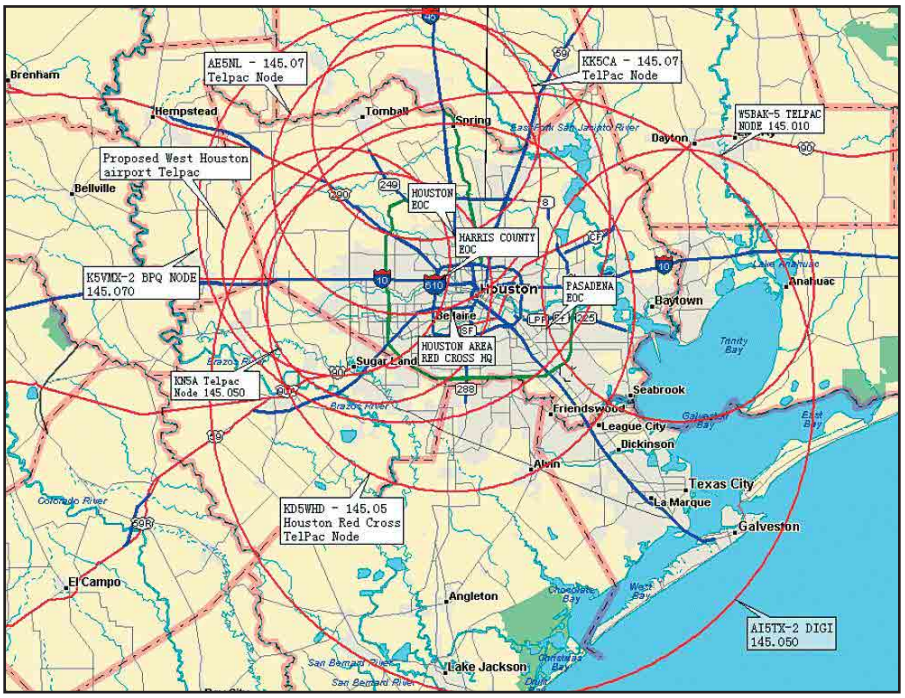
After they'd cleared the legislature, ARRL Pacific Section Manager Kevin Bogan, AH6QO, said that while the two pieces of legislation represented only incremental improvement in the antenna situation for Hawaiian amateurs living under CC&Rs, they also could provide a basis for further gains later.

Both measures would have required homeowners' association boards to provide a written explanation if they denied permission to install an amateur antenna, and Bogan called the final versions "a nudge toward reasonable accommodation" by homeowners' association boards.

Lingle said in her essentially identical veto messages that purchasers of property in planned communities should be able to rely upon CC&Rs when deciding whether to buy a unit and "not have to worry about subsequent legislative bills that trump the governing documents by permitting certain people to erect antennas on property within the subdivision."

Winlink for ARES—Part II

By Jerry Reimer, KK5CA
ARRL South Texas Section Emergency Coordinator
Note: Part I appeared in August 2004, QST, *pp 82 –83.*



The map showing the Harris County (Texas) ARES Winlink 2000 Digital Packet Network.

Sharing the Knowledge

A presentation was prepared for the ARRL West Gulf Division convention in Austin, Texas in August 2003. On July 23, 2003, the ARRL Board of Directors said there are situations when ARES "…must have the capability to pass traffic across the nation quickly and accurately." This was the perfect statement to introduce the power of the Winlink 2000 modules and features to the ARRL, NTS and ARES leadership assembled at the convention. Compact disks containing the presentation, plans, instructions and software, were distributed to the sixteen ARES Emergency Coordinators in attendance. During the weeks following the convention, additional TELPAC gateway stations became operational in several other Texas cities and counties.

A revision to the Section Emergency Plan recommends ARES groups in the largest population counties utilize Paclink, TELPAC Internet gateway stations and possibly a local PMBO. Less populated counties are encouraged to consider at least one Winlink capable HF PACTOR station. All ARES groups should have portable digital message terminal capabilities, using Airmail or Paclink and hardware controllers. With the various available Winlink 2000 module combinations, an ARES group can now provide maximum flexibility to meet nearly any digital message requirement, local or nationwide.

Paclink

Introduced at the September 2003 ARRL/TAPR Digital Communications Conference, Paclink, a Winlink 2000 client module, interfaces commercial e-mail programs such as MS *Outlook* or MS *Outlook Express* to packet radio. This provides a countywide and nearly transparent, Internet substitute for those agencies using it. Paclink serves as a miniature e-mail server on any *Windows 2000 Pro*, *XP Pro* or *XP Home* edition. It can operate as a single fixed or mobile user, or may be located on a single computer on a LAN that supports multiple user computers within a served agency. To the e-mail program, Paclink is set up as a separate account, just as would be set up for any other e-mail account. The same e-mail program can be used for normal Internet e-mail and for packet. The Paclink mini-server program simply gives the e-mail program access to packet radio, where it continues to use the SMTP e-mail protocol uninterrupted. This greatly simplifies training new users amid the confusion and stress of an emergency incident. It allows the served agency employees to use their *own* e-mail program in their *own* offices transparently, and without having to quickly learn unfamiliar procedures.

Because Paclink may use the optional *AGW Packet Engine* (AGWPE) as a control interface, it enables a wider variety of hardware packet controllers to be used, including packet controller emulation with the computer sound card. Paclink uses the new Microsoft .NET Framework 1.1, which is downloadable as an update for *Windows 2000* or *XP*.

To the e-mail program, Paclink appears as a separate account, much as would be set up for different e-mail users or POP3 servers. The same e-mail program can be used for normal Internet e-mail and for packet. Paclink simply gives the e-mail program access to the packet radio account.

Installing and initially configuring Paclink is a bit more challenging than installing a simple terminal program and hardware TNC, but the capabilities it provides are astounding.

ARES Dedicated Winlink PMBO

To reduce any possible vulnerability and dependence upon the nine existing Winlink mail servers, an ARES dedicated Winlink PMBO has been established in Harris County. Intended to operate primarily on VHF FM, this PMBO distributes ARES digital messages both locally and across the Internet.

Like politics, emergency incidents are overwhelmingly local events. The presence of an ARES dedicated PMBO all but guarantees the ability to move digital messages among the local ARES groups and their customers, quickly and accurately, even when Internet access is not available. When outside Internet access is available, customers outside the local area are served as easily, and nearly as

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quickly, as are local customers. Should all else fail, messages may still be moved beyond the affected area on HF using an SCS PACTOR 3 controller to a myriad of existing Winlink HF PMBOs.

An Addition to ARES Capabilities

Winlink 2000 is proving to be an outstanding addition to the capabilities of ARRL Field Services, providing nearly real-time radio e-mail service for all served agencies and the public. It can work in harmony with the resources of the existing manually operated NTS (National Traffic System) and the NTS Digital services to cover all parts of our county, region and country with ARES providing the connections to the served agencies within the ARRL Sections. Winlink 2000 can greatly enhance the operation of all these combined resources. It is robust in speed, interoperability and ease of use, and can survive the loss of infrastructure. It can provide those we serve with what they need.

With encouragement and support from Harris County Emergency Management and many selfless Amateur Radio operators, the plan continues towards full implementation. Periodic workshops are providing the knowledge and hands-on experience enabling ARES members and the agencies they serve to become confident and efficient in using this system.

There are many packet compatible terminal programs and hardware TNCs with unique features. Some of these are well suited for keyboard-to-keyboard communications. None can approach the integration with the existing Internet e-mail infrastructure and provide our community's served agencies with the capabilities of the Winlink 2000 TELPAC and Paclink modules. Where an existing packet radio network exists, Winlink can become operational very quickly, but an existing packet network is not a requirement. The only question remaining to be answered is which other ARES groups will recognize the imperative need of their served agencies for a flexible and powerful digital message system and simply implement the components of an already existing, reliable and operationally proven digital system. Perhaps, it would be best to ask the agencies we serve. After all, the customer is king!

References

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MOVING TARGET 2004

By Frank Drake, Jr, KL7IPV
Las Vegas Radio Amateur Club Public Information Officer

On April 1, 2004, local emergency services, FEMA and other national organizations held an emergency exercise to test the reactions and capabilities of Nevada's and national emergency services. Personnel in Las Vegas, Laughlin, Carson City, Nevada and Bullhead City and Kingman, Arizona were involved in the exercise called "Moving Target 04." The major incident took place in Laughlin, Nevada, involving a terrorist plan to explode a large dirty bomb in that area. The exercise took place when the terrorist bomb exploded prematurely along the Colorado River in Laughlin and required the response of all agencies. Ham radio operators in Laughlin and Las Vegas were on hand to support the exercise.

Prior to the exercise, amateurs were asked to sign up to take part in the exercise and were told no more than the name of the exercise and the time of the event. The probable location was known but the timetable and the scenario were unknown to all. Amateur operators were stationed in Laughlin and Las Vegas hospitals, the Clark County Health District and the Clark County Government Center Building. Howard Mark, K3HM, coordinated the amateurs assigned to Lake Mead Hospital, Sunrise Hospital and other hospitals. Coordinating the use of Amateur Radio operators in the Clark County Government Center Building (CCGC) and the Laughlin was Clark County Nevada ARES Emergency Coordinator Charlie Kunz, AA5QJ.

In the Clark County Government Center, the upper level of the building housed the Emergency Communications Center (ECC) for Amateur Radio operators. The building's cafeteria in the lower level had a section separated from the rest of the floor for use by emergency services from Las Vegas Metro Police Dept, Clark County Fire Dept, Clark County Health District, FBI, FEMA by telephone, Clark County, Nevada, ARES and others involved in the exercise.

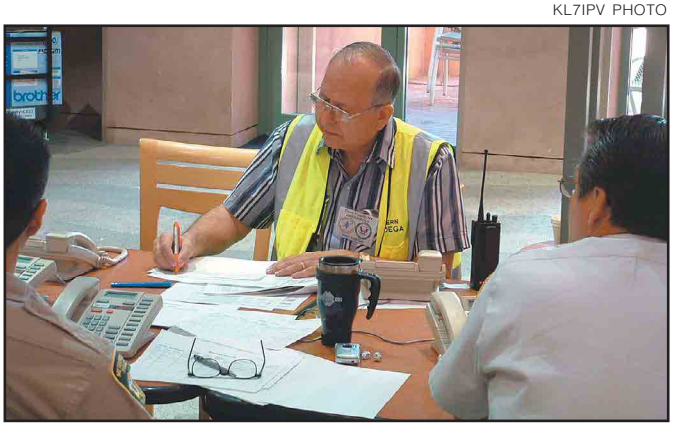
The exercise was coordinated by the Clark County Office of Emergency Management (CCOEM) in the CCGC and as each part of the scenario was completed, the next step was allowed to proceed. Jim O'Brien, CCOEM Manager, instructed when the next step was to start. Vern Garman, KØEGA, was in the section with FEMA and the others. Vern was the interface for the Amateur Radio community and was in direct contact with the ECC. The ECC relayed to him all traffic received from the amateurs at the hospital locations, CC Health District and CC Laughlin. As each step advanced, Vern let each location know the step and coordinated the Amateur Radio activity with the activity of the exercise.

In the ECC, Amateurs manned radio and computers that allowed them to communicate with each of the hospitals, the various emergency services in Southern Nevada, government agencies in Carson City, Nevada and Bullhead City, Arizona and the CC in Laughlin. Radio was used on 40 meters to communicate to Carson City, CB REACT radio on standby

KL7IPV PHOTO

Art Sheldon, K7ZE (left), and Jack Cook, N8RRL, watch the two computer monitors as the exercise progresses.

KL7IPV PHOTO



Vern Garman, KØEGA, was the interface for the Amateur Radio community and was in direct contact with the Emergency Communications Center.

for local communications, VHF and UHF radios on local repeaters located on 7 surrounding mountain tops and 1 repeater in Arizona. Repeaters were also used for the 927 MHz frequencies. Simplex VHF frequencies were used as well, giving the Amateur Radio operators 20 assigned frequencies for the exercise. Two computers allowed the amateurs to follow the events as they occurred from Laughlin and also be in touch with every agency within the CCGC on the closed in-house EOC Web and the Internet. The total communications effort encompassed all the technologies open to the Amateur Radio operators and showed the capabilities available when Amateur Radio ops are asked to participate in an emergency.

The exercise went as expected and the response to the effort was well received by all the agencies involved. The exercise was resolved and closed at approximately noon. Each location of radio operators was secured and most amateurs were released shortly thereafter. Vern Garman, KØEGA, stayed and took part in the final critique. The exercise critique ended at approximately 4 PM.

The Final Message

This was the final message to all after the event took place: "Thank you very much for your participation and execution of the Moving Target 04 exercise which took place yesterday in Laughlin and Las Vegas. We couldn't have done it without you."

From the County's Official Press Release:

"Representatives from more than 30 organizations will participate in a hazardous materials exercise dubbed 'Exercise Moving Target.' The exercise scenario depicts a national threat alert that terrorists may have access to a 'dirty bomb' that they plan to detonate in a metropolitan area in the western United States.

"For the purpose of exercise play only, on the morning of April 1, a white van loaded with terrorists and a radiological dispersion device are traveling through Laughlin. A routine traffic accident investigation on the corner of State Route 163 and Casino Drive in Laughlin prompts the anxiety-ridden terrorists, whose van is close to an accident, to detonate their dirty bomb.

"The explosion creates massive damage, a crater that measures four feet deep and a chaotic scene. First responders arrive on the scene to battle a blaze with the initial thought that this may be the vehicle law enforcement has been looking for.

"One of the training objectives of this exercise is for Clark County's Office of Emergency Management and the Nuclear Waste Division of Comprehensive Planning to refine our impact assessment studies," said Jim O'Brien, Office of Emergency Management Manager.

"Under the Nuclear Waste Policy Act, Clark County is responsible for assessing economic, social, public health, safety and environmental impacts that are likely to result from the Yucca Mountain Project.

"Clark County plays a leading role when emergencies happen, particularly when they rise to the level of a statewide or national crisis. Since the events of September 11th, we have continued to facilitate various exercises, with a stronger emphasis on terrorism and hazardous materials,' said O'Brien."

Amateur Radio was able to provide backup communications to all participating agencies with the 29 Clark County ARES/RACES and 5 Mohave County ARES/RACES volunteers. We tested the capabilities of communications systems including the ARES/RACES, Tri-State 440 MHz, and the MCARS VHF linked repeaters.

Thanks to Charlie Kunz, AA5QJ; Dan Starr, AA7I; Art Sheldon, K7ZE, and Vern Garman, KØEGA, for their help in producing the summary of this article.

Field Organization Reports

Compiled by Linda Mullally, KB1HSV

Public Service Honor Roll
June 2004

This listing is to recognize radio amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 6 categories (as reported to their Section Managers). Please note the maximum points for each category:
1) Participating in a public service net, using any mode. —1 point per net session; maximum 40.
2) Handling formal messages (radiograms) via any mode. —1 point for each message handled; maximum 40.
3) Serving in an ARRL-sponsored volunteer position: ARRL Field Organization appointee or Section Manager, NTS Net Manager, TCC Director, TCC member, NTS official or appointee above the Section level. —10 points for each position; maximum 30.
4) Participation in scheduled short-term public service events such as walk-a-thons, bike-a-thons, parades, simulated emergency tests and related practice events. This includes off-the-air meetings and coordination efforts with related emergency groups and served agencies. —5 points per hour (or any portion thereof) of time spent in either coordinating and/or operating in the public service event; no limit.
5) Participation in an unplanned emergency response when the Amateur Radio operator is on the scene. This also includes unplanned incident requests by public or served agencies for Amateur Radio participation. —5 points per hour (or any portion thereof) of time spent directly involved in the emergency operation; no limit.
6) Providing and maintaining a) an automated digital system that handles ARRL radiogram-formatted messages; b) a Web page or e-mail list server oriented toward Amateur Radio public service —10 points per item.

Amateur Radio stations that qualify for PSHR 12 consecutive months, or 18 out of a 24- month period, will be awarded a certificate from Headquarters upon written notification of qualifying months to the Public Service Branch of Field and Educational Services at ARRL HQ.

845 AB2IZ
555 W7TVA
545 N2LTC
435 KC2HUV
410 N2YJZ
392 W2MTA
378 N2YBB
370 KB2DQ
365 KA2ZNZ
340 K4BEH
330 KC2MBC
322 AD5KE
290 K8AE
280 K2MPE
275 WB1CHU
265 W5IM
250 WA9ZTY
240 KB2KOJ
KZ7T KB2SNP
236 KA2GJV
234 KC2MHI
231 WA1QAA
227 N7EIE
225 WB1CHU KB2CCD N2ECR
221 NN2H
220 W2FPG
WB2ZCM W2LC
215 N2QZ
205 WI2G
204 KK3F AL7N
203 W5OMG
202 KB5PGY K2ABX
200 W8MMN KB3GFC W7ARC
AC5XK KB2SNP
195 K9JPS
191 KA0DBK
190 N8IO
185 K2AN KC2MQU
177 KA2BCE
176 N2JRS
171 KC0HOX
170 N3YTD K5ER
159 AD4BL
158 KC8VOA
156 KB5JBV
154 NC2F
153 KD5CZM
150 N2JBA WA2YBM N1LKJ K5DPG
149 K7EAJ
143 K8KHZ KB2ETO
142 KA9RZL
140 K9LGU K7BFL KA5KLU WB5ZED
139 WB4NCW
138 N9VE
135 WB7WOW KE4JHJ
133 NN7H KO4SY
131 KA0O KV5AN
130 W3ZQN N9RGX WX4J W4EAT N2GJ
125 N1IST
124 WB8RCR
120 K2UL KW1U W1GMF K9FHI AG9G N5OUJ K4IWW AD4XV W4DAC AC5VN W3BBQ N2AKZ
118 KD5TXD KD5ONS
115 WA2YL W7QM N8IY N3RB WA9JWL
111 N7LV
110 WD8Q N3SW N1IQI KB9KEG W9BHL KC5OZT KD4CQJ WX4H W7GB K3JL K6YR W5GKH AD5IS W0UCE AB0WR NF5B N5KWB K5MC AF4NS WA5OUV KE4OLE AB4XK N7CM N7YSS
109 N0ZIZ
WB2KNS
108 KB5ILY
107 K2GW WA2GUP W5CU
106 W3CB
104 N8FXH W5PY
102 W2DWR KB0DTI N4FNT
100 WN0Y WA8SSI K1YCQ N1TPU W9CBE KB5TCH W4ZJY NR2F N9MN W7GHT N5SIG AA8SN KG4OQA KC2EOT WB2QIX KK5GY KG4OTL W4CAC N4ABM K0IBS KB4LCI K3SS N1VXP K4SCL W1QU KB2KLH KC2GOW
99 W0HXB
98 W1ALE
96 KJ7SI K8CQF WD4LSS AI4DV
95 WG8Z AA3SB K3CN KK1A
94 W6QZ W4NTI
92 W9NXC
91 W2CC WA1JVV
90 KCUTL W3TWV N3KB N3WK N3OR WA2CUW W2QOB W9RCW W4CKS K2BCL W8IM K1JPG KF4WIJ N7YSS W7ZIW W5UYH WB7VYH W6ZOH KF6OIF KG2D WB2IJH K4FUM WB4GGS W4WXA N1JX K2VX KA1GWE KA1RMV N7DRP
89 WB2LEZ W7VSE
88 N0QR
86 WB6UZB
85 AA3GV K9DQ
K2YYF W5XX AF2K W2DSX
84 AE5V
82 K3IN W4FAL
81 KC2IYC KA7TTY W3NJ K4WKT KC7SGM
80 WW3JC N3ZOC AB7AN K7MQF K7GXZ W8CPG K8KV AA4YW WA0LYK W2MTO NX1Q KC4ZHF KD7ZLF
76 KI0BK AC5SU
75 KA2YKN WB4BIK
74 K6JT
73 KC6SKK WA1YOF K4DND
72 KC6NBI K4BMH
71 W4DLZ
70 KB1CVH W4DGH KC8BTE N2VDK

The following stations qualified for PSHR in previous months, but were not recognized in this column: (April) AB0WR 110, KB0DTI 97, AB0UY 95, N0ZIZ 93, KI0BK 92, WA0LYK 80. (May) KZ7T 310, K4BEH 120, AF4NS 110, N1YQU 100, K4FUM 90, W4WXA 90, K4WKT 90, WB4GGS 90, W9NXC 90, WB4BIK 80.

Section Traffic Manager Reports
June 2004

The following ARRL Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, DE, EMA, ENY, EPA, EWA, GA, ID, IL, IN, KS, LA, MDC, ME, MI, MO, MS, NC, NE, NFL, NH, NLI, NNJ, NNY, NTX, OH, OK, ORG, SB, SDG, SFL, SJV, SNJ, STX, TN, VA, VT, WCF, WI, WMA, WNY, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports
June 2004

The following ARRL Section Emergency Coordinators reported: AK, AZ, CO, EWA, GA, IN, KY, LA, MI, MO, NC, NE, NFL, NLI, NNJ, SD, SFL, SJV, SNJ, STX, SV, VA, VT, WMA.

Brass Pounders League
June 2004

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
KK3F	26	1166	1122	44	2358
WB5ZED	70	1127	1054	42	2293
KA5KLU	0	954	883	37	1874
N2LTC	0	789	789	43	1621
KW1U	0	805	722	3	1530
N1IQI	0	365	1129	0	1494
W1GMF	0	382	998	35	1415
W4EAT	0	693	668	3	1364
AB0WR	0	541	623	0	1164
N5SIG	12	599	460	56	1127
K7BDU	16	535	562	6	1119
K9JPS	0	524	32	511	1067
AE5V	3	497	426	40	966
W4DAC	9	430	413	26	878
WX4H	0	324	464	11	799
KF4WIJ	0	345	342	21	708
W7TVA	51	233	206	78	568
NRZF	70	198	254	7	529
KA2ZNZ	34	233	226	23	516
W9IHW	0	252	43	216	511

BPL for 100 or more originations plus deliveries: KK5GY 186.

The following station qualified for BPL in previous months, but was not recognized in this column: (May) WB4GGS 502. (April) K2YFF 133.

Six Meters—The Longest Path Comes of Age

The fall season is coming and with it, if the sunspot cycle were at a more propitious point, would come F2 DX on 6 meters. Last month we saw that Cycle 23 is now clearly headed for minimum territory. So outside of the summer E_s season, what are we to do? Six meter DX does not depend on the sun alone. The moon now has an important role to play, even if your six meter array does not weigh 500 kg. New digital technology (JT44, JT65) developed by Joe Taylor, K1JT, has put 6 meter EME within hailing distance of almost every station with several hundred watts of power and a reasonably long Yagi.

To describe this opportunity, I turn to Lance Collister, W7GJ, who lives in one of the worst possible locations for 6 meter E_s and F2 propagation—western Montana. Lance has been one of the leaders in popularizing 6 meter digital EME activity. Let's see what he has to say about working 6 meter DX throughout the sunspot minimum.

A Little History: Since the first 50 MHz amateur moonbounce contact in 1972 between W5SXD and K5WVX, 6 meter EME has been the province of only the very largest stations with antenna systems that were prohibitively difficult to erect and keep in the air. The advent of the JT65 mode (the most sensitive of several programs included in the WSJT digital communications suite) has extended 6 meter EME capability to many otherwise ordinary 6 meter stations. Whether you are planning a DXpedition to a rare DXCC entity, or would simply like the thrill of working halfway around the world when everyone thinks the band is dead, 6 meter EME is definitely worth investigating.

First let's consider a problem that is not really a problem: antennas fixed on the horizon. I'll show how that may actually be of considerable benefit.

Aiming at the moon: What if you cannot elevate your antenna? We all know that EME contacts require both stations to point their antennas at the moon simultaneously. For stations without antenna elevation control, that is easier than it appears. To keep it simple, there are at least two times each month when stations anywhere in the world can arrange schedules with each other when they are both aiming on the horizon. A number of available computer programs can figure out such common-moon window times.

W7GJ

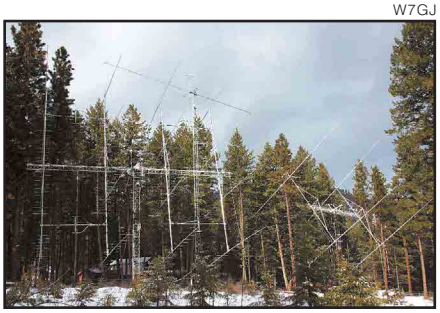


Figure 1—The W7GJ antenna farm. The 4 9 element 6 meter Yagi array is to the right. The 16 Yagi 2 meter array is to the left, a single 11 element is at center rear.

The Hidden Advantage of Antennas that do not Elevate: Antennas aimed at the horizon enjoy extra "ground gain" from the addition of incoming signals reflected up from the ground in front of the antenna. This extra 3-6 dB gain depends on a variety of local factors, most particularly the flatness and conductivity of local terrain. Depending on the antenna height, one can see ground gain at certain specific elevations. For most stations, those elevations are generally below 20° and involve only the first two vertical lobes. This hidden advantage effectively increases array size by two to four times, which lets small stations successfully work EME. Many such contacts have been completed with stations on one or both ends pointed at the horizon.

Generally speaking, for a single 6 meter Yagi between 6 and 20 meters above flat ground, there will be ground-gain lobes peaking between 4 and 7° (main lobe) and 11-15° (second lobe) elevation. The higher lobe is typically only about 1 dB down from the main lobe, and usually has 3-4 dB more gain than the "free space" gain of the antenna (the gain the antenna would have if it had absolutely no interaction with the ground, as if it were pointed skyward). Consequently it is impractical to consider tracking the moon with an array of fewer than four antennas: You lose nearly the gain of the extra antennas as soon as you elevate off the horizon.

W7GJ (see Figure 1) has completed 6 meter EME contacts with dozens of single Yagi stations while the moon was in their second ground-gain lobe. Actually, for reasons discussed below, the second lobe sometimes works better for EME than does the main lobe. A single good Yagi offers two chances for the moon to line up with a lobe while the antenna is aimed on the horizon. A recent example of success between two horizon-only stations was the June contact between K4RX (single Yagi aimed at his moonset) and JM1SZY (a pair of Yagis aimed at his moonrise).

Now, let's discuss what it takes to make 6 meter EME contacts, what external problems affect our chances of a successful contact and how we actually go about setting it up.

Station Hardware and Software: Successful EME operation is a real possibility if your station has about 750 W output, a low-loss feedline running to a computer-designed Yagi with a boom 1.5 wavelength (WL) or more in size, a sensitive receiver (1.0 dB or better noise figure), and the ability to run the JT65 digital mode. Although there is still nothing easy about 6 meter EME, using JT65 instead of CW definitely increases your chances of success considerably. Virtually all 6 meter EME stations now use this much more sensitive digital mode.

To hear weak signals well, especially if you can elevate your antenna, you will probably want to use a good, low-noise external receive preamplifier. Internal preamps in many HF/VHF transceivers trade sensitivity for strong-signal handling capabilities. At those times of the month when EME conditions are best, a good low-noise preamp (which can be installed right in the shack) can provide some extra signal-hearing capability. Nonetheless, W7GJ has completed contacts with stations that don't use external preamps—the best advice is to listen for your own echoes and judge your results.

The most straightforward way to assess station performance and to figure out what other stations you can work is the convenient "EME Calculator" located in the "EME ECHO MODE" screen of the *WSJT* program. You can run the EME Calculator by downloading the program (see JT65 in Table 1), even if your station interfaces

This Month

September 11-13	September ARRL VHF QSO Party
September 26	Good EME conditions*

*Moon Data from W5LUU

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Table 1
Resources for 6 Meter EME and Digital Operation

Type	*Location/Company*	*URL*
General	W7GJ Web site	**www.bigskyspaces.com/w7gj**
	ON4IQ Web site	**www.on4ant.com**
	IW5DHN Web site	**www.qsl.net/iw5dhn/**
Hardware		
6 m preamplifiers	Advanced Receiver Research	**www.advancedreceiver.com/**
	LNA Technology	**www.lnatechnology.com/**
HF/6 m power amps	ACOM	**www.hfpower.com/new/a1000.htm**
	Yaesu	**www.yaesu.com**
	ICOM	**www.icomamerica.com/amateur/amps/index.html**
6 m power amps	Command Technologies	**www.command1.com/products.htm**
	Linear Amp UK	**www.intertronicsolutions.com/amateur/**
Computer-optimized antennas	M^2	**www.m2inc.com/index2.html**
	C3I	**c3iusa.com/antacces.phtml**
	Trident	**www.tridentantennas.co.uk/**
Digital interfaces	West Mountain Radio	**www.westmountainradio.com/**
Software		
Digital communications	JT65/WSJT suite [K1JT]	**pulsar.princeton.edu/~joe/K1JT/**
Moon tracking	W7GJ Web site	**www.bigskyspaces.com/w7gj/tracker.htm**

W7GJ's more detailed article on 6 meter EME can be found in the Spring 2004 *CQ VHF* magazine, pp 16-20.

are not yet configured to use the digital modes.

Once you have your station configured to run JT65, you should wait until your local moonrise or moonset and use the software to listen for your own echoes in the EME-ECHO-MODE. The software will automatically control your station and show a record on the screen of what it detects and how loud it was.

You can also use the same technique that has been used for ages: As the moon moves through your antenna pattern on the horizon, send a short series of CW dashes and listen for your echoes 2.5 seconds later. It is much more difficult to hear the aural echoes so persevere—it just takes time. If your echoes are detectable, it is a good bet that you will succeed with other stations.

Factors Affecting 6 Meter EME Conditions: Because of all the things that can adversely affect the propagation at 50 MHz, 6 meters is perhaps the most challenging and unreliable band for EME. Given the marginal signal levels, EME attempts should be scheduled to avoid as many disruptive factors as possible.

Noise, both QRM and QRN, is one of the most detrimental limitations for 6 meter EME activity on the horizon. QRN includes power-line noise, automobile-ignition noise and arcing contacts in consumer devices; QRM includes commercial/industrial sources, local broadcast stations, computers and wireless devices. Avoiding noise sources is not always possible.

Terrestrial Propagation Generators like E_s, a disturbed magnetic field (high K or A indices) and even tropospheric inversions can produce small, but significant, degradations of EME paths. With marginal signals, any degradation can be too much. While some of these conditions occur without warning, some can be avoided. Using the higher-angle lobes from a horizontal antenna (or elevating the antenna, if you have that capability) will send the wave through somewhat less atmosphere and may be a useful ploy.

Signals passing through the ionosphere undergo a rotation of polarity known as *Faraday rotation* (discussed in this column in January 2004). The change from horizontal to vertical polarization is usually fairly rapid—a matter of 10-20 minutes on 6 meters—so most of the time you are unlikely to be stuck cross polarized for very long. Since polarity switching is not practical on 6 meters, the best advice is to wait it out.

Finally, EME signal-path losses vary in a well-understood pattern depending on the *moon's orbit around the earth*. Each lunar month, the moon moves from apogee (point of furthest approach) to perigee (point of closest approach). While this movement is only a small percentage of the average distance from the Earth to the moon, path loss at perigee is some 2 dB less—a very significant amount for EME, where signal levels are already at the threshold of detectability. At different times of the month, the moon travels through "quieter" and "noisier" parts of the sky. A compilation of these two factors leads to the calculation of a parameter called degradation, a comparison of the EME path loss at the "optimum" situation where the moon is at best perigee and moving across the quietest part of the sky. This degradation figure of merit is translated by W5LUU to a set of moon "conditions" that appear in the "This Month" table of each "World Above 50" column. An estimate of this degradation is shown on the JT65 screen and in the *TRACKER* moontracking program (see Table 1).

Scheduling: JT65 modes can detect and decipher signals you cannot hear, and many 6 meter EME stations operate in limited time windows because they cannot elevate their antennas. Therefore, most 6 meter EME contacts involve schedules. The best place to request schedules is either via the JT44 EME page at **www.chris.org/cgi-bin/jt44eme** or directly with the other station via e-mail. Frequencies must be individually chosen to avoid other scheduled contacts. They must also account for band plans and official restrictions in other parts of the world.

Stations on the air: Given the decrease in sunspot activity and the generally poor geomagnetic location for working DX, more than one-third of W7GJ's 6 meter countries have been worked via EME. Some of them, such as OHØ, CY9, ES

and 9A have been visited by 6 meter DXpeditions. With the advent of HF/VHF radios and amplifiers, both fixed stations and DXpeditions have taken up 6 meter EME. We hope that more DXpeditions will both take 6-meter-capable gear and consider 6 meter EME skeds. A few of the larger or more active 6 meter EME stations are listed in Table 2. Missing are some of the stalwarts like K6QXY and SM7FJE, whose arrays are currently down.

Resources: The Web provides a rich source of information about all aspects of 6 meter EME and JT65/digital operations. Table 1 provides the data sorted by category.

Six meter EME is difficult but rewarding. The combination of hardware technology and new software that can hear into the noise has expanded its reach to stations of more modest physical capabilities. The sensitivity of the software continues to expand and additional decibels may be achieved by the time you read this. For those countries whose power restrictions may limit EME possibilities, this opens yet another door. Doing it the easy way on F2 won't be an option for the next several years, but the moon is always there. What are you waiting for?

Table 2
Sample of Some Larger 6 Meter EME stations.

Many of these stations are capable of working single Yagi stations on JT65 mode.

Call	*Grid*	*Antennas*	*Elevation*
USA			
W1JJ	FN42nl	2×9 el Yagi	yes
WA4NJP	EM84dg	4×11m boom Yagis	yes
N6RMJ	DM14cp	4×5 el Yagi	no
AA7A	DM43bo	3.2 WL rope Yagi	10-35°
K7AD	DN06kf	1×21m boom Yagi	no
K7BV/1	FN31vi	4×7 el Yagi	yes
W7ALW	DN36au	4×7 el Yagis	yes
W7GJ	DN27ub	4×6M9KHW Yagis	yes
KØGU	DN70mq	4×6M9KHW Yagis	no
DX			
ES6RQ	KO28wa	4×6 el Yagis	yes
IW5DHN	JN53gi	4×7JXX6 Yagis	yes
JM1SZY	PM95so	2×10 el Yagis	no
SM7BAE	JO65	8×9 el Yagis	yes
VE6JW	DO33en	4×9 el Yagis	yes
ZS6NK	KG46rc	2×2.5WL Yagis	to 50°

ON THE BANDS

This has been one of the most desolate Junes on record. Yes, there was a reasonable amount of E_s, and yes, there was some DX, but last year spoiled me. My thanks to those who sent me information and to N3DB, K4KLK, N5TEY, K6LMN and G4UPS not otherwise acknowledged.

6 meters. Very little happened during the first 10 days. Things didn't improve much during the contest—E_s was very spotty, and you can blame me, because I moved to 6 meters at K8GP. We had only 210 E_s QSOs out of 900 total contacts on 6. K4QI (FM06) noted double-hop E_s on June 1, 19-22 and during the VHF contest. Gary, N3JPU (FM19), also spotted double-hop on the 19th and Bill KØHA (EN10) had almost 300 contacts with both coasts on the 20th. The Magic Band did dispense some magic. Dave, W6OAL, (DM79) worked VE7SL (CN89) on June 9 with his beam pointed east toward a line of thunderstorms on the western Kansas border; VE7SL was inaudible direct path. Is this some form of backscatter from an E_s cloud associated with the storm? While working stations in the Caribbean, Gary, NW5E (EL98), and Scott, W4SO (EL96), along with K4MM (EL97) heard but did not work a station signing 5Z4JG peaking at 130°. While Gary doubts its veracity, even if it was a pirate it was a DX (maybe African) pirate. On June 25 Jay, KØGU (DN70), heard LZ2CC/B at 1550Z and then was called by SP9HWY (JO90nh) at 1632Z, a distance of 8553 km. On June 27 Jay became the only station west of the Mississippi to work 7XØAD at a time when even the East Coast was barely hearing them. On June 28 Al, K7ICW (DM26), was working stations in northern VE2 when he heard but did not work F6FHP peaking at about 20° south of normal. Auroral E was noted in Europe at that time, but no European video was audible.

There were some but not many openings to the States from the Caribbean, most particularly June 11, 20 and 30 as reported by NØJK, KØHA, NP3CW and N1TKK/KP4. Bill, NC1L, relays a bandmap of CO2OJ's contacts on the 20th noting Oscar's contacts with DO33, DM5, DM33, DM43 and DM90 west of the Mississippi. DX openings to Europe tended to cluster in VE1 and the East Coast. significant openings appeared on June 15, 25, 26 and 27. Bob, VE1YX (FN74), reports 33 contacts with 12 countries and the first North America contact with 7XØ (7XØAD). Dennis, K7BV/1 (FN31), finished installing his quad of 4×M^2 JHV Yagis and was greeted by 19 countries including 5B4 and SV9 on June 26-27. From the middle of the black hole, John, W9JN (EN54), found a good opening on June 26 to England and southern Europe, as did Chuck, KØSQ, and WØBN (both EN34) to EA and 9H on June 28. On the West Coast, Bob, K6QXY, reports KLØRG (CO45) on June 22, and K7ICW worked 3 KL7s on June 27. JAs were worked by KR7O (DM09) and N9JIM (CM87). Finally, there were DXpeditions to liven up the month. As reported by Steve, W1RA, a few lucky US stations worked the tremendous operation of Jose, EH7KW, at 7XØAD. The good news is that 7XØAD will have a permanent 6 meter station. Jimmy, W6JKV, filled many logbooks in the US and Europe from J79KV. The Dry Tortugas appeared with the rare EL84 grid square. And Chris, VP9/W3CMP, put on another big show in Bermuda with 414 Qs in 27 countries, mostly Western/Central Europe and the Caribbean outside of the US/Canada. Chris reports that he made the first VP9 to OK contact with OK1KT and that VP9GE can now rotate his 13B2 2 meter beam.

Tropospheric ducting: Chip, K7JA, and Dan, N6PEQ (both DM03), report hearing the KH6HME 2 meter beacon on June 4. By June 5 the Propagation Reflector at **dxworld.com** reported that KH6HME was working into Southern California. Otherwise, I received no indications of tropo' anywhere in the States.

2 meter E_s: Lucky, W7CNK (EM15) worked WA7GSK in DN13 on June 26 around 1700Z. This is the first report of 2 meter E_s in the US I have received this season. Meanwhile 2 meters continues to go "gangbusters" in Europe. The DK5YA page (**www.dk5ya.de**) highlights E_s openings on June 4, 10, 15, 23, 24, 25, 26 and 27. The ones on the 23rd, 24th and 27th were of substantial size with multiple clouds forming at different times in different areas. On June 23 opening existed for most of the time somewhere between 0918 and 1736Z. On the 24th the band was open from 0605 to 1626Z. Our turn is coming. Wait till next month.

EME: Wayde, K3MF, reports that he gave K6PF his last state (MD) with a CW contact on June 25. Maryland is always a difficult one on 2 meters. Lance, W7GJ, worked the 6 meter DXpedition team of LA8AV and OHØJFB from OHØ on JT65A and then ES6RQ, who has a new 4-Yagi array.

HERE AND THERE

ARRL September VHF Contest. After a mediocre June, we are due some good tropo' conditions in the September contest. This annual bash begins at 1800Z September 11 and ends at 0300Z September 13. Further details can be found in August 2004 *QST*, p 107, or at **www.arrl.org/contests/rules/2004/sepvhf.html**.

WSJTGROUP Spring Rally. Tip, W5UFH, has announced the very successful results of the WSJTGROUP rally during the Eta Aquarids Meteor Shower. All contacts reported used WSJT mode FSK441A. The logs indicate that 76 unique grids and 84 unique stations participated. Twelve stations chose to operate in the "Unassisted" category while 16 stations operated "Assisted." The high-score stations for each time zone receive certificates. Contrary to some beliefs, high power is not needed for high-speed meteor contacts: 19 stations operated in the Low Power Category and 12 were high scoring stations in their Time Zone. For complete results of this event, go to **www.qsl.net/wa5ufh/Rally/NAHSMS.htm**.

Six Meter EME Schedules

Paul, ZS6NK (**paulus@pixie.co.za**), is looking for JT65 schedules on 6 meters. He has two 2.5 WL Yagis that can elevate to 50° and has completed a contact with a single 2.5 WL Yagi station running 1 kW.

Echo in Orbit!

There is a new star in the Amateur Radio satellite firmament: AMSAT-ECHO now known as AMSAT-OSCAR 51.

As this column goes to press, the newest ham satellite appears to be in excellent health. I was able to copy 9600-baud telemetry from Echo at 435.150 MHz using just a groundplane antenna in my attic. Echo was not yet transmitting at full power, but I was still treated to signals peaking at about S5.

Beating Swords into Plowshares with Dnepr

Echo was one of eight satellites launched June 29 from the Baikonur Cosmodrome on a Russian Dnepr rocket. The satellites were all successfully separated and placed in orbit within 30 minutes of launch. Echo's traveling companions included two US satellites, three Saudi Arabian satellites, one Italian satellite and one French spacecraft.

The launch was the fourth successful firing of the 200-ton Dnepr booster. The Russian-Ukrainian rocket was developed from the old RS-20 intercontinental ballistic missile code-named SS-18 by NATO.

The mighty SS-18 was originally designed to carry up to 10 Multiple Independently Targeted Reentry Vehicles (MIRVs), each carrying a thermonuclear warhead. But with the end of the Cold War, the Russians have turned missiles like the SS-18 into reliable vehicles for reaching low Earth orbit.

The Future of Echo

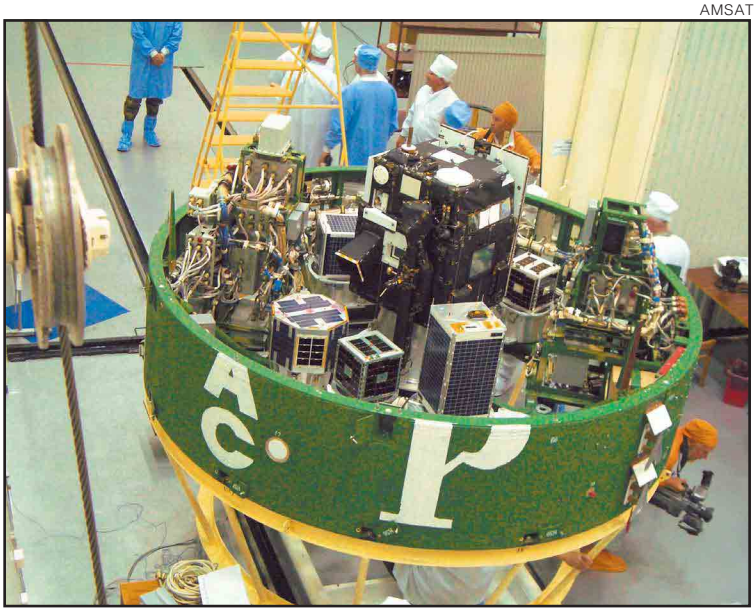
By the time you receive this issue of *QST*, Echo will likely have completed its commissioning phase and may be ready for use. If all goes as planned, we'll have the most powerful orbiting FM repeater in Amateur Radio history.

Echo has other features that many hams are eager to try. In addition to digital communications (such as APRS), Echo offers an experimental 10-meter uplink that some intend to use for PSK31.

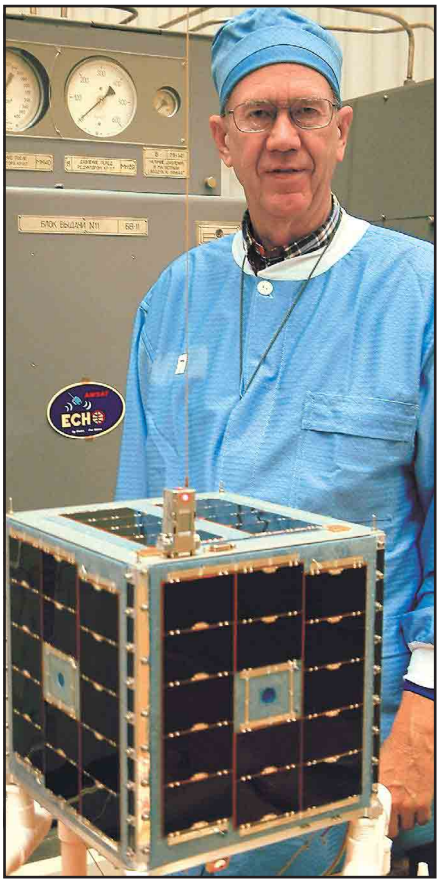
For those of you who want to enter the Echo orbital elements into your tracking software manually, here is the latest set in two-line format:

```
1 28375U 04025K   04187.15185066 -.00000116  00000-0 -21944-4 0   106
2 28375  98.2603 256.5527 0084037 197.8869 161.9405 14.40370682   659
```

AMSAT



Dnepr's cargo is ready to fly.



Chuck Green, NØADI, prepares Echo for launch.

The Dnepr booster is a recycled SS-18 intercontinental ballistic missile.

Echo frequencies are:

Analog
435.225 MHz FM Voice Downlink,
145.920 MHz FM Voice Uplink +
67 Hz CTCSS tone

Digital
435.150 MHz FM Downlink
145.860 MHz FM Uplink

You'll find more Echo information on the newly revamped AMSAT-NA Web site at **www.amsat.org**.

Congratulations to AMSAT! As AMSAT-NA president Robin Haighton, VE3FRH, said, "It's great to be back in space." QST

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

Disseminating NEXRAD Data via Packet

*Nick Luther, K9NL (***luthern@msoe.edu***) of Oshkosh, Wisconsin, is the guest contributing editor for this installment of Digital Dimension.*

My ARES group has provided severe weather support for many local events. Every time we operate from a remote location, it is a challenge to acquire current weather data. In our area, National Weather Service (NWS) text products are readily available on packet. Radar data is not. We have used a commercial satellite system, but it is not tailored to our needs. If we could send the relevant Next Generation Weather Radar (NEXRAD) data over packet, all our problems would be solved.

This is not a new idea. Hams have implemented many packet systems, which disseminate Radar Coded Messages (RCM)—a NEXRAD product. During a severe weather event, RCM data is unacceptable. It is generated once every 30 minutes and only contains reflectivity information.

The NEXRAD system produces dozens of other products. Velocity products, the characteristic of Doppler radar, are especially useful. Strong, opposite velocity indications in close proximity indicate that a storm is rotating. This information can also be obtained by another NEXRAD product, the Tornado Vortex Signature (TVS). The ideal packet weather information distribution system should be able to handle various NEXRAD products, as well as text products like watches and warnings.

To make this system useful in a severe weather event, all this data needs to be delivered quickly over 1200 baud packet. Reflectivity files from the NWS range in size from about 20 to 30 kB. At a minimum, this transfer will take three minutes. With new radar scans occurring every five or six minutes, it is not feasible to transmit entire data files. The data can be compressed, cutting its size approximately in half. This is still far from ideal. Fortunately, there is a solution.

Strip the Data

NEXRAD reflectivity and velocity data use a radial coordinate system. The data is organized into 367 radials, which are each organized into range bins, ie, the pixels of this coordinate system. If your location with respect to your local NEXRAD site is such that you only need a fraction of those radials to cover your entire area, then you are in luck. Just remove the extra radials and send the stripped-down data over packet. For example, if a 90° section of radar is adequate, then you only need one-fourth of the data. After this data is compressed, its size will be a mere 3 to 5 kB and the 1200 baud transfer time will be approximately 30 seconds.

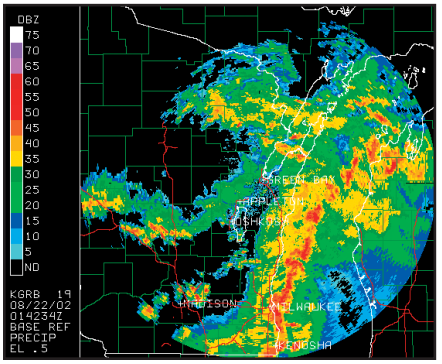


Figure 1—This "before" figure shows unprocessed NEXRAD data obtained from the NEXRAD site in Green Bay, Wisconsin.

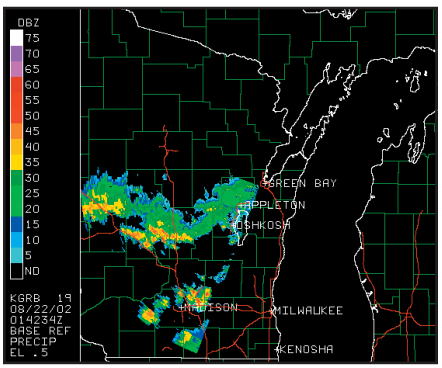


Figure 2—This "after" figure shows the result of using *LibNNids* to remove all but a 90-degree section of the NEXRAD data.

Processing Software

As is, the NEXRAD data is not in a usable form; however, software is available to create viewable images from it. One popular package is *GEMPAK*, which is available from the University Corporation for Atmospheric Research at (**www.unidata.ucar.edu/**). *GEMPAK* is not appropriate for this system. It is slow, extremely large and not available for Microsoft *Windows*. New conversion software is required.

To solve this problem, I wrote a *Linux* library called *LibNNids*. On my computer, I can process a frame of radial NEXRAD data with *LibNNids* in about 1 second, whereas *GEMPAK* takes dozens. *LibNNids* plots the same maps on the image and overall its output is comparable to *GEMPAK*. Most importantly, I have ported *LibNNids* to *Windows*.

The Next Step

NEXRAD data is available from the NWS via the Internet via FTP. I have written software with Aaron Heise, KB9QWC, that downloads the data. However, downloading the data from these servers is slow, even for such small data files. A superior acquisition method is required.

The NWS uses a satellite system called NOAAPort to distribute this data to its weather forecast offices. The signal is unencrypted for all to use. NOAAPort uses C band—the same band that was used by old satellite television—with a QPSK modulation scheme. Remember those big dishes? If you have one in your backyard, this could be a way to put it to use.

If you are neither ready to design your own NOAAPort receiver, nor pay thousands of dollars to buy the required equipment, your local NWS office may have the solution for you. Previous packet NEXRAD distribution systems have acquired data directly from NWS computers and transmitted the data over packet from that site.

The problem of processing NEXRAD data in a superior dissemination system is solved. The details of transmitting the data over packet are easily worked out. If you have a good working relationship with your local Warning Coordinator Meteorologist, you may have access to the data in real time. Once that is accomplished, you have a first-class NEXRAD data distribution system. Your remote ARES operations will have real time radar data, and your severe weather spotters in the field can have access, too!

(Visit **www.k9nl.net/radar/** *to download the software that K9NL and KB9QWC have developed.)*

Stan Horzepa, WA1LOU ♦ One Glen Ave, Wolcott CT 06716-1442 ♦ wa1lou@arrl.net, www.tapr.org/~wa1lou

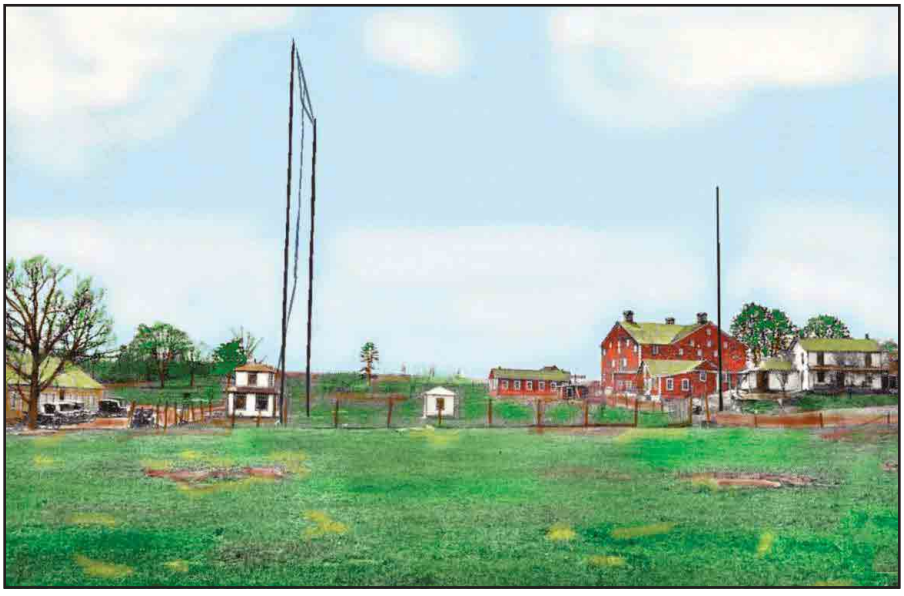
Ham Radio on the 1923 Farm

Today, almost every home has electricity. But in 1923 that wasn't the case, especially in rural areas. Country folks would wait many years to enjoy commercial electricity and all the convenient appliances that came with it.

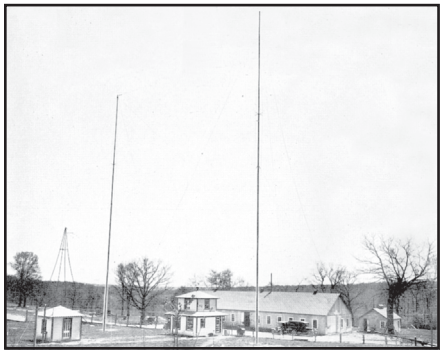
What was it like for the ham radio operator, living on a farm? Most of them struggled to find the money to purchase a few dry-cell batteries to light the tube in their set. Or if one was so fortunate, he had a wind generator to charge a string of wet-cell batteries.

Harry Myers was the exception to this. He lived in the middle of Pennsylvania's burgeoning oil industry. Like many hams, he was resourceful and inventive. He developed, patented and manufactured a winch that attached to a Ford tractor. The winch sold very well, providing Harry with the money to build an impressive station.

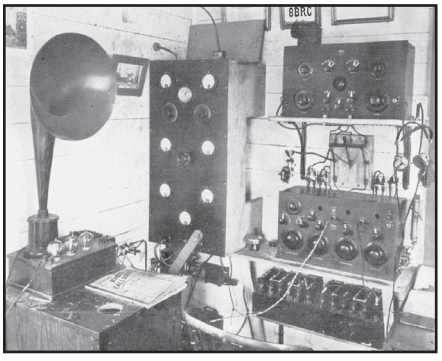
What follows is Harry's self-published 4-page brochure trying to get fellow hams to relay messages through his station, and also to promote his winch business. The great thing for us is, it gives a close look at a complete 1923 ham station in the country. Nothing has been edited, so enjoy his words as they were written.



View No. 1



View No. 2



View No. 3

RADIO 8-BRC, Harry S. Myers

Located at Van, Pennsylvania, near Oil City.

View No.1 shows the Station at a broadside glance, also shows the Receiving Antenna at the residence, which is used for reception of Concerts, at the extreme right.

This antenna is of original design, and is of well insulated Fan type. The poles are of steel tubing welded at each joint making it practically a solid tube.

The Masts are insulated from the ground, also the guy wires are provided with porcelain insulators at 50 foot spacing, which does not materially add much to the cost of construction except the price of installation.

You will note by this scene that my station is located in the woods, and almost away from any electrical disturbances, except lightning, of which we are well supplied during the Summer months.

View No.2 gives a closer glance at the radiating system. The steel poles shown herewith are of steel tubes commencing at $6^{5}/_{8}$" dia. at the bottom and gradually reducing to $2^{3}/_{4}$" at the top. These sections are welded at joints, which make them practically one solid tapering tube. The total length of the poles, including the Flag Pole extension, is 137 feet.

A section 5 feet long having been first imbedded in concrete at the bottom of each pole which makes a very rigid base for the long poles.

The task of raising these poles was a very dangerous job, and took three days to complete. This job required a network of guys, and a very substantial tackle arrangement. The source of power was a FORDSON TRACTOR equipped with a Myers Winch, (home product), and the job was performed very satisfactorily without bending the poles.

Each pole was provided with integral pulley, and equipped with a $^{3}/_{8}$" dia. galv. wire cable for pulling up the antenna.

The antenna is composed of 8 wires with a 4 wire lead in. These being joined 90 feet from the ground.

The huge counterpoise is a 180 degree 100 ft. radius, using 19 wires each equipped with a long porcelain insulator, aside from the main span wire being insulated from the steel posts set in concrete, and which are provided with adequate anchoring means or dead men.

This counterpoise is ten feet from the ground.

View No.3 gives a fair idea of the operating position of this Station which shows the W. E. Loud Speaker on top of a cabinet which has additional B. Batteries 100-V, same as shown under Receiver.

The hole to drop pennies in for new tubes, had to be made larger for dollars. In the center you will see the Transmitter, which is a combination fone and C. W. Transmitter. The coupled Hartley circuit with Heising modulation system being used.

At the right is the Grebe C. R. 6 receiver. Above is a C. R. 7 long wave receiver which works in connection with the lower two stage amplifier.

You will note a taped lever between the horn and transmitter. This is the main control lever. On and off everything. Note the key on the end of the receiver, and which is placed on side, this being a much more comfortable position for long continuous relay work.

View No.4 shows a 5 horse power air

John Dilks, K2TQN ♦ 125 Wharf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

cooled Gas Engine made by the New Way Corp. which furnishes splendid steady reliable power for this Transmitting work. Of course you know in the country we hams have to make our juice, and this is one way to do it. And no doubt that is the reason the country A. R. R. L. stations are scarce, the equipment required for the non-profitable amusement runs up in considerable sums, while the average ham cannot afford to expend $3.000.00 for Radio.

This engine runs continuously while transmitting. The generator being stopped and started with a, clutch arrangement connected with the lever shown in View No.3. The generator belted direct over the fly wheel, is a 125-V. D. C. and is shown in view No.4. This engine runs on Natural Gas for fuel, which is a very convenient fuel.

View No.5 shows the storage batteries which furnish the juice for the filament of the Transmitting tubes, also the receiving sets for both the residence, and the station. The total average current drawn with all receiving sets, and horns in operation is in the neighborhood of 9 amps. The batteries are arranged in groups or rows in parallel.

The transmitting batteries are arranged in seven rows of six cells to the row, while the Receiving batteries have three rows, but divided in groups of three cells making a total of eighteen cells for receiving only. This furnishes ample capacity for continuous usage.

Heavy copper cables of No.4 or larger being used for the low voltage mains. The transmitter draws 7 1/2 amps. alone, and at 12 volts, the life of one charge being three weeks operation.

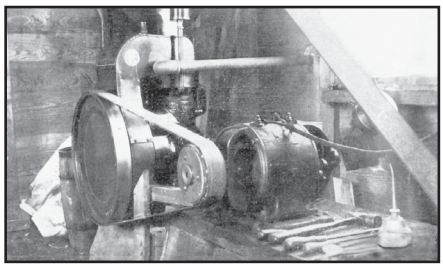
Above the batteries you will note a mess of switches, these being used to series the batteries for charging, and parallel for use. A separate group switch being to the right for separate charge means.

View No.6 shows the High Voltage source of my Station. Shown herewith is a E. S. Co. D. C. Generator, belt driven. This generator is a 2000 V. 1500 Watt. capacity, so you see I have juice to lend.

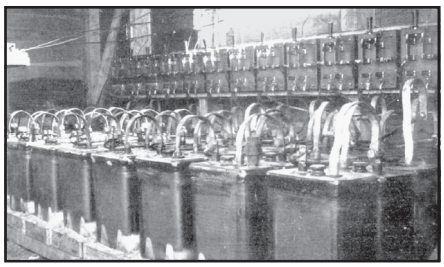
This generator is belted up to a countershaft above the Gas Engine which is started and stopped with a clutch.

For receiving everything is idle but the engine, thus doing away with all mechanical and electrical disturbances with exception to the Gas Engine ignition which is a Bosch H. T. Mag and which was reported by a friend as being heard a distance of 2 miles away. To put the kibosh on this noise I took a tomato can and turned it upside down over the sparkplug, which almost silenced the H. F. discharge entirely.

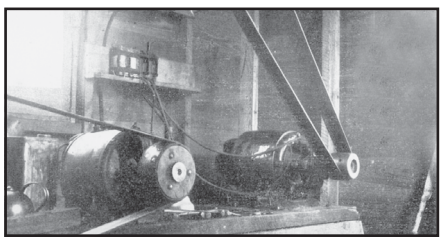
A brief summary of the Station is as follows: Located at a fairly central location for all A. R. R. L. relay work. Am eager to do all I can toward this entertaining and instructive amusement, while on the other hand I am very busy with my Manufacturing business and can only spare a portion of my time for this purpose. What I wish all you good spirited hams would do is co-operate with me and we can make this a bully good success. I have spent nearly two thousand dollars solely for the purpose of erecting this new Amateur Station in order to help put this A. R. R. L. traffic across. Now what I need is the help from you fellows who are willing to help me by arranging schedules and maintain a route in this direction for your traffic. I am going to try to dope



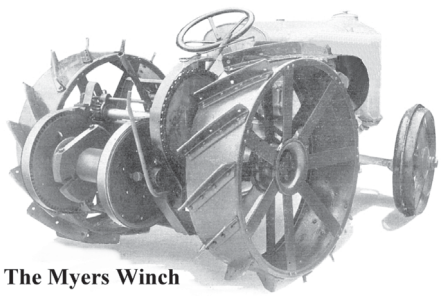
View No. 4



View No. 5



View No. 6



The Myers Winch

View No. 7

out a working time and ask you fellows who will, to write and we will try to get lined up for this summer, and for next winter. We have here all Uncle Sam will permit us Amateurs to use, although not a fraction has been used to date.

Any of you Brother Bugs who will come to visit me, I am sure will be welcome, and I would be delighted to get personally acquainted.

In view No.2 you will note the power house on the left which houses Engine, Batteries and Generators. All main leads and H. V. Lines leading from the power house to the upper story of the Office building located under the Antenna are placed in conduit buried three feet under the ground to avoid induction as far as possible

The top story of the Office building is Radio, and nothing else but radio. It has a complete work bench with all necessary tools and equipment for experimental work, provided with good light both day and night, and also a bunk for the weary operator to rest, and to sleep while the W. E. Horn gives concerts from various Broadcasting Stations from 7 to 10:30 E. S. T. It seems like a long time to wait when the Traffic hook is full. Anyway you won't hear a peep out of 8-BRC during that period.

And like all other stations the wall paper is composed of nearly a thousand different call cards from Brother Hams. And oh, by the way, before you forget about it will you please sit down and mail me a card with your call on it, and I will have a wonderful display to show you when you come to visit me. I have spent considerable money just to get this little sheet printed, not saying anything about postage to the round of Amateur Stations. If I have omitted you on my mailing list, please drop me a card and request one of these sheets.

Now, In order to defray expenses of this get-up, I am going to add a little line of my Product as presented in this picture. We build a hoisting drum or what is commonly known as a Myers Winch to attach to the Fordson Tractor, and with this combination the Oil Producer, Contractor and a hundred like users can make very good use of this winch for any and most all hoisting work which is normally required of a portable hoist.

The outfit is self contained and is very easily moved about without changing anything. Some day you may grow up and be a user for some equipment like this, and ask you kindly to remember about old 8-BRC and write to me should you need some machine like I make. If you have a friend who could possibly use something like this, I will thank you a thousand times if you would tell him about this outfit. We sell these all over the world thru the Ford Dealers. We also have other literature which we would be glad to mail out to other prospective customers. Now, Boys, let's all get our spirit up for A. R. R. L. and get a message ready to shoot over to 8-BRC for QSR. Thanking you for the time it took to read this dope, and hoping to C. U. on the air before long. Best 73s to all of you.

Harry S. Myers,
Van, Pennsylvania.
Near Oil City, Pa., Venango County.

Information is Sparse

In searching the Internet for information on Harry Myers, I found only one item, which I extracted from Dick Moon's Stories, by Sam Pees, from the Oil Industry Web page: "Another gent, long gone, built a winch, the Myers winch, had it patented. About every Fordson tractor had a Myers winch on the back for pulling wells. Someone else copied his winch so Myers went to Chicago with his lawyer. The other side had several lawyers, and Myers lost because the other man's winch had one more (or less) tooth on the main gear."

As always, if you have any additional information about Harry Myers, please let me know.—*K2TQN*

Is the Frequency in Use?

Here in the US one of the first things we learned when preparing to become an Amateur Radio operator is that no one owns a frequency. The FCC's Part 97.101 General standards states—*(b) Each station licensee and each control operator must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station.* Basically what that means is that no owns a frequency, and the first person who gets there may use the frequency.

Traditionally the DX calling frequencies on HF have been 14.025, 21.025 and 28.025 MHz on CW and 3795, 14.195, 21.295 and 28.495 MHz on SSB. Although not set in concrete these frequencies have been recognized throughout the years, somewhat like some of the net frequencies. For example, 14.336 is the County Hunters Net and 14.313 is the Maritime Mobile Net. Having said that, both DXers and non-DXers alike should try to avoid these well established DX calling frequencies if at all possible.

Non-DXers should take these DX calling frequencies into consideration when operating. It would be best to stay away from them if at all possible. I'm not saying never use them or get close to them. What I am saying is to be aware that these DX calling frequencies are typically where the rarer DX (DXpeditions) stations will be hanging out.

DX stations (DXpeditions, rare DX, etc) should always ask if the frequency is in use. They should also check to see if their listening frequency range is clear, using the minimum amount of spectrum necessary. If you just say "up" and are not specific then you are causing unwanted grief as your listeners could call up 10, 15 or even 20 kHz higher than needed, thus causing unnecessary QRM to others. As the DX station you want to keep your listening range as small as possible. If you start listening to your pileup on top of another QSO you run the possibility of ticking off the person who is having the QSO.

Traditionally when this happens the person who is getting their QSO trashed will then come down to the DX stations transmit frequency and jam it or cause more unnecessary QRM. I'm not saying this is the correct response, but it does happen! Listen up a minimum on 3 kHz on SSB so that those calling you do not QRM your transmit frequency. Anything less than 3 is asking for problems. Remember you as the DX station are directly responsible for the pileup! You make the rules. If you say "who is the Victor Papa station" you'd better only come back to that station and not to someone else. Otherwise, you will upset the apple cart!

DXers (those who are chasing the DX station) who are trying to call the DX station should also make sure the range of frequencies they are using to transmit (call) on are clear of any QSOs. If the DX station is on 14.195 and some other QSO is taking place on 14.193 or even closer don't yell at them. Be polite. It's okay to break in and ask them politely if they would mind moving up or down to avoid QRMing the DX station. They may not move. If they refuse to move, let it go. Don't cause a scene. Give your call and don't be demanding. If you're polite and give your call often they will move quickly and without hassle. If you start yelling at them and don't give your call they probably couldn't care less. Remember: DXers are ambassadors and world diplomats.

No One Owns a Frequency

I am sure those of you who operate 20-meter SSB have heard the recent fiascos on 14.195 and 14.200. For those who haven't heard, I'll just say take a listen and you will quickly see the problem. There have been a couple of stations that basically set up camp and refuse to move. To be honest the so-called DXers who confront these guys without giving their call signs are as much to blame for the situation that results. The operators who are monopolizing the frequency seem determined to continue, and it appears that it will take a great effort to remove them from these frequencies. In fact, though, the most effective response from DXers would be to leave them alone. I know that can be hard. But if everyone and I mean everyone (even those who don't read this column) were to avoid them and not respond in any way, they would most likely go QRT from boredom.

This predicament is not just a problem for DXers and DXpeditioners. It is everyone's problem, or at least everyone who operates 20 meter SSB. Why? Because it upsets the whole band. Now DXpeditions are going to be leery about operating on the traditional DXpedition frequency (14.195), as they may not be heard there. So, instead of calling on 14.195 they will pick a new frequency, thus listen in a new place on the band. When operating split DXpeditions and DX operators should occasionally check their transmit frequency to make sure it is clear. It may also be a good idea to ask every so often if your transmit frequency is clear to avoid those who think they own 14.195 or 14.200 MHz.

In Summary

The bottom line is no one owns a frequency. At the same time, everyone should use some common sense and avoid certain frequencies that have a specific purpose. Educate those who don't know better. That does not mean yell at them "Hey, dummy, this frequency is for DX only" or "Get off the frequency"—especially without giving your call sign.

Most of the offenders fit one of two categories: They either don't know or don't care. I like to call the first group the "clueless." Those are the ones who don't know and typically will be glad to do what you ask if you are polite and give instruction. Then there are the "hardheads"—those who don't care and just aren't going to move. Be polite with them also and don't get them fired up. It's just not worth it. And finally for the frequency monopolizers the best answer is to completely ignore them. You'll notice I did not specifically identify them. There is a good reason I am not giving their calls. They just don't deserve the attention. Only the subject matter needs to be discussed so that everyone is aware of what is going on. Those frequency monopolizers will eventually give up or get into a snag with their local authorities!

DX NEWS FROM AROUND THE GLOBE

3Y—PETER I ISLAND

Ralph, KØIR, and Bob, K4UEE, released more information on the multi-national operator DXpedition to Peter I Island, which will take place in early 2005. Their itinerary will be to meet in Punta Arenas, Chile on January 12, 2005. All equipment will be loaded onto the Antarctic Dream (**www.antarctic.cl/**) on the following day. On January 14 they will

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

ship out directly to Peter I Island and expect to arrive on January 20 or 21.

Weather permitting the team will be air lifted on to the frozen island via helicopter. The ship will remain offshore for the entire operation, which is expected to take place between January 21 and February 4. Once on the island and after setting up the team will be QRV with four to six high power stations for about two weeks. Plans are for activity on 10 through 160 meters on CW, SSB, RTTY and PSK31.

As of this moment the expedition has sponsorships from the following equipment manufacturers: ICOM America, Alpha Power, Force 12 and SteppIR. The 3YØX team will depart Peter I Island on February 5 and expect to arrive back in Punta Arenas on the 10th.

At the moment the international team is made up of KØIR, K3NA, K4SV, K4UEE, F2JD, HB9AHL, HB9BHW, LA6VM, NP4IW/6, N2WB, N4GRN, N6OX, UA3AB and WØRUN. Several other invitations have been made, so there maybe a few additional operators to complete the team. A backup list is also in place for potential team members who might want to go, in the event of a cancellation. If interested, please contact K4UEE at **mallphin@aol.com**. Fundraising is beginning with the addition of several area fundraisers: W3WL (NA/SA), F2JD (EU/AF), JA1ELY (Asia) and ZL2AL (Pacific). Please consider a generous donation to this very expensive project. Check out the Peter I Island Web site at **www.peterone.com** for more details on how you can help out.

4U1UN—UNITED NATIONS

There have been several other operations from 4U1UN since your editor was there earlier this year. Since then HB9BOU has been set up as the QSL manager. Currently HB9BOU can confirm all QSOs after March 12, 2004. In the near future HB9BOU will have all electronic logs. Photocopies of hand logs are now being made and will also soon be in the possession of the new QSL manager. Watch the DX bulletins for more updates on the QSLing of this station. Also, Mohamed, KA2RTD, says that any future operations will be announced via the DX bulletins.

5B—CYPRUS

P3B will be on from Cyprus in the CQ/RJ RTTY contest with Skobelkin, RA3AMG, operating. QSL to his home call sign.

FH—MAYOTTE

Andre, FH/ZS6WPX, will be on the air from Mayotte, October 1-13, on 6-160 meters on SSB, digital, and some CW. QSL direct only, via ZS6WPX, no bureau QSLing.

FK/C—CHESTERFIELDS

Chris, DL5NAM, and group plan an operation to TX/C, the Chesterfields, in October. They plan to be on 6-160 meters on CW, SSB and RTTY. Air flight tickets and vessel are booked and the call sign is in hand, they say. Other operators are Jan, DJ8NK; Hans, DK9KX; Dieter, DJ9ON; Dieter, DL3KDV, and Heye, DJ9RR. They are looking for one more operator. The budget for the operation is 45,000-50,000 USD, so they are looking for funds. You can contact Chris at **dl5nam@arrl.net** or Chris Sauvageot, Guttenburg 19, D-91322 Graefenberg, Germany, or ++44 9192 998968 fax and ++44 9192 998967 telephone. This group was awarded DXpedition of the year honors by several groups for their last operation, STØRY.

Mohamed, KA2RTD, is the 4U1UN station manager. He puts in many hours at the United Nations as a translator.

GD—ISLE OF MAN

Members of the Wrexham and District Amateur Radio Society will be operating from the Isle of Man, (EU-116) during the period September 1-8, 2004. The site that will be used is Scarlett Point, a disused Coast Guard lookout tower, approximately 1.5 miles south of Castletown, Isle of Man (QRA: IO74, WAB SC26). Operation will be on all HF bands, 50 MHz, 70 MHz, 144 MHz and 432 MHz on CW, SSB, RTTY, PSK and some SSTV. The team plans a high level of activity on the lower HF bands, with particular attention being paid to 160 and 80 meters. They will use GB4IOM and GB4SPT. QSL via the bureau or direct to M1LCR. The team will consist of at least 10 operators including Ronnie, MD3ABZ; Steve, MW1STE; Mark, MW1MDH; John, MW1VCD; Adrian, M1LCR; James, M3JRP, and three others yet to be named. They will have a Web site at **www.gb4iom.co.uk**, which is expected to go live on April 16. A number of awards are planned for working the station, either multiband/multimode or a combination, and QSLs are requested from SWLs.

HBØ—LIECHTENSTEIN

Two Belgians will be in Liechtenstein September 12-19. Look for Roger, ON7TQ, and Marcel, ON6UQ, to be active on 10 through 160 meters on CW and SSB. QSL to home call signs.

OHØ—ALAND ISLANDS

OHØI will be on the air in the CQ/RJ RTTY Contest September 25-26 with five operators: OH3BHL, OH6JHU, OH6XX, OH8GCW and OH9MM. They will have two transmitters on the air. QSL via OH3BHL.

OJØ—MARKET REEF

A group from the World Wide Young Contesters (WWYC) plan to put on a DXpedition from Market Reef (OJØ) September 23-26. The team is made up of students and they are accepting support either with donations or sponsors. If you can help, please contact Pat via e-mail to **oj0yc@hotmail.com** or call/SMS him on +358503557789. Their main emphasis will be the SAC (Scandinavian Activity Contest) SSB Contest on the weekend of September 25-26. They will also be operating RTTY during the SAC. Team members will include OZ1AA, Thomas; OH6GDX, Pat; SM3WMV, Mike, and KU5B, Colin. Mike plans to do 6 meters while Pat expects to be on 2 meters (FSK441a, CW, SSB and FM) and possibly 70 cm. For equipment, the guys will take a TS-850SAT/AT, IC-706 and IC-735. They will have kW amp for HF and a Mirage amp for VHF. Antennas to be used will include A4S, 5 el 6 m, 2 m monoband 15-el beam, Butternut, 2 el 12/18 MHz, R7, GP 7 MHz and 160/80 m dipoles. Suggested frequencies (MHz) will be: *CW*—1.822, 3.522, 7.022, 10.106, 14.022, 18.072, 21.022, 24.892, 28.022, 50.120 and 144.050; *SSB*—1.842, 3.722, 7.062, 14.222, 18.122, 21.322, 24.922, 28.522, 50.120 and 144.325; *RTTY*—1.812, 3.585, 7.043, 10.142, 14.085, 18.102, 21.085, 24.922, 28.085 and 50.620; *PSK*—3.573, 7.037, 10.142, 14.073, 18.102, 21.073, 24.922 and 28.073.

They will also be doing digital modes on 2 and 6 meters on 50.220 and 144.355 MHz. The team has a Web page at **oj0yc.m3php.net/**. This includes complete information on the upcoming DXpedition along with on-line logs and propagation forecasts. QSL via QSL via OH6GDX, Patrik Willfor, Langviksgatan 24 B13, FI—65100 Vasa, Finland.

S7—SEYCHELLES

S79OA, Seychelles, will be Igor, RN3OS, from Mahe (AF-024) August 16-31. He will try to get to Alphonse Island (AF-033), another one in the Seychelles.

VP5—TURKS & CAICOS ISLANDS

VP5/AH6HY will be on 10-20 meters from Salt Cay (NA-003) in the Turks Islands from September 23 to October 2. QSL to his home call.

W—UNITED STATES

Members of the Tennessee Valley DX Association (TVDXA) will activate Dauphin Island using the call sign W4D. This island is part of the Alabama State group, which has an IOTA NA-213 assigned to it. W4D plans on being QRV about 1900Z on Friday September 24, 2004 and will go QRT sometime on Monday, September 27, 2004. The group will use 100 W transceivers with various antennas and plans to be active on 10-80 meters SSB. Possible operators include Barbara, WA4RMC; Kathy, W4KRY; Lynn, KØMAI; Tom, K4VCM; Greg, WA4NFO; Kenny, AB4GG; Tommie, K4KWK, and Paul, WA4AA. QSL via WA4AA direct (SASE) or via the bureau. A W4D Web site will be available to view contact logs. Please direct inquiries to **wa4aa@arrl.net**.

WRAP-UP

Well, that is all for this month. Thanks to KE3Q and *The Daily DX* for input this month. Don't forget to keep your DX editor in the loop with your DX news, photos and club newsletters. Send your info to **w3ur@arrl.org** or to Bernie McClenny, W3UR, 3025 Hobbs Rd, Glenwood, MD 21738. I've been hearing rumors that BS7H may be on this fall. Watch your favorite DX bulletin for details. Until next month, see you in the pileups! —*Bernie, W3UR*

Microwave Meetings and Publications

I am often asked where to go to learn more about Amateur Radio microwave operation, equipment and techniques. The best advice is to find a local group where you can share and learn from other amateurs who either already have the experience or will learn along with you. A local group offers the possibility of trying out new rigs or improvements frequently, and will help establish personal relationships with other microwavers.

Two more sources of information are publications and conferences. Newsletters from various clubs and *DUBUS*, a European publication, keep us informed of new developments. At conferences, amateurs gather on an annual basis to focus on VHF and above topics.

Newsletters and Periodicals

Some of the more active clubs publish a monthly newsletter. By joining the club you can also receive their newsletter and keep up on the latest information, including activities for members, topics at club meetings, construction projects and items for sale.

The San Bernardino Microwave society publishes a club newsletter. To learn more, set your browser to **www.hamradio.com/sbms/**. Send your requests to the Corresponding Secretary, as listed on the site.

North Texas Microwave Society newsletter is called *Feed Point*. NTMS has a Web site at **www.ntms.org/**. For a subscription, click on "Membership" and follow directions.

The North East Weak Signal Group publishes a newsletter called "NEWSLetter". Subscriptions can be obtained by setting your browser to **www.newsvhf.com/**. Click on the membership application form link.

Mt Airy VHF Radio Club has a newsletter called *Cheesebits*. For subscription information, go to **www.ij.net/packrats/** and follow the links to subscribe.

Subscription information for the European *DUBUS* magazine, perhaps one of the best technical amateur microwave periodicals, is available by setting your browser to **www.dubus.org/** and sending e-mail to the address for your country. Most articles are published in both German and English, and the magazine is typically published once every two months.

Conferences

Meetings, band sessions, talks, equipment clinics, LNA noise figure measurements, antenna measurements, banquets, vendors specializing in our needs, and lots of enjoyable discussions are in store for you at conferences held annually around the country (see Figures 1 through 5).

The Southeastern VHF Society

The Southeastern States VHF conference, held annually in April has met in. Tennessee, Georgia and Alabama. The 2005 meeting is scheduled for April 29-30 in Charlotte, North Carolina. Set your browser to **www.svhf.org/** for information.

The Central States VHF Society

Usually held in the summer months and in some central location, the Central States VHF Society holds its annual meeting, drawing a large crowd from all over the Americas, and some beyond. Not restricted to just VHF, there are often topics about microwaves, equipment clinics

COURTESY WZ1V

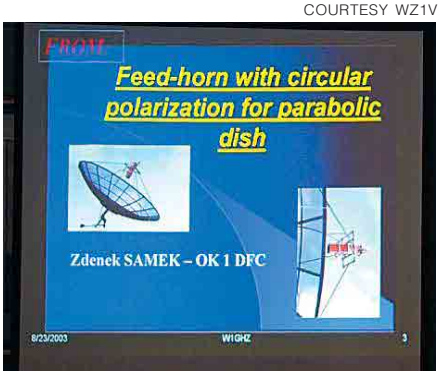


Figure 1—Technical talks are usually very well explained and full of practical information.

COURTESY WZ1V

Figure 4—Sandra of Down East Microwave is ready to help you with the latest kits and systems.

COURTESY WZ1V

Figure 2—Various high quality test equipment is often set up to help tune up your latest project.

COURTESY WZ1V

Figure 3—A banquet at a recent conference was a great time to share friendship and a good meal.

Tom Williams, WA1MBA ♦ wa1mba@arrl.org

COURTESY WZ1V

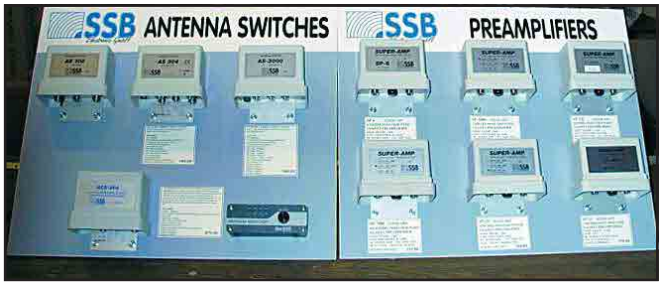


Figure 5—SSB Electronic is showing off some tower mounted solutions.

COURTESY G3PHO

Figure 7—At the end of a Microwave Update talk the presenter takes questions from the audience

and antenna measuring. Visit **www.csvhfs.org/** for more information.

Eastern VHF

Held in New England, historically in either the summer or the spring, this meeting draws attendance from all over the northeast, and occasionally from beyond. Topics of interest span from 50 MHz through light. Usually there are parallel sessions, with technical talks in one room and band sessions in another, followed by a flea market and antenna measuring the second day (see Figure 6).

COURTESY WZ1V

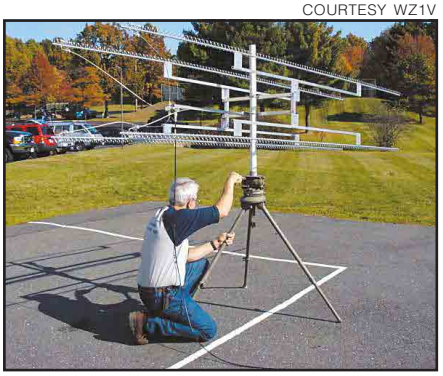


Figure 6—Antenna measuring is provided at some conferences.

Microwave Update

Possibly the largest and most prestigious annual meeting of radio amateurs focused on microwaves is the Microwave Update conference. With attendance usually well over 100, and moving to different cities around the country, this meeting has been bringing together an international crowd for nearly 20 years. The 2004 meeting is slated for the Dallas/Fort Worth area October 15 and 16 with some additional activities on the 14th. Two full days of presentations cover a wide range of topics (see Figure 7) from high-level descriptions to very detailed practical advice. Examples of previous meeting topics include power amplifier design, TWT amplifier tuning, low noise amplifiers, phase noise, antenna design, digital techniques, microwave EME, roving, frequency stability and rain scatter. One day is traditionally added to the beginning of the conference for those who want to participate in special activities such as visits to exciting installations and tours of surplus vendors (see Figure 8). A flea market is usually held Friday evening. If you are interested in microwaves, this is the one conference to attend.

The latest Microwave Update information can be found at **www.microwaveupdate.org/** and the upcoming update details are at **ntms.org/Update.htm**.

Clubs

Your local club might sponsor other types of events. Some have regularly scheduled equipment tune-up evenings, others have activity days and some have fun competitions to get equipment ready for the contesting season. The NEWS group combines its annual picnic with a 10 and 24 GHz MDS (minimum discernable signal) test. This way, most club members learn if their portable rig is as sensitive as the others (see Figure 9).

The various links mentioned here and others can be found at **www.wa1mba.org/interest.htm/**. Please visit this site for listings of other clubs and overseas resources.

Next Month

Next issue we will take a look at RF connectors suitable for microwave work. Some connectors that work just fine on VHF and UHF begin to have problems at the higher frequencies.

COURTESY G3PHO

Figure 8—Surplus vendor tours can be most rewarding if you can just remember that model number…

COURTESY WZ1V

Figure 9—Portable stations being prepared at the NEWS picnic for MDS testing.

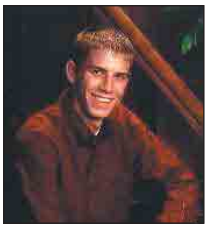
2004 Scholarship Recipients

Each year the ARRL Foundation reviews hundreds of scholarship applications from radio amateurs seeking to pursue advanced education. The 2004 awards to 39 qualified students represent more than $39,000 in scholarships that will help young hams studying electronics, engineering, communications, computer technology and related subjects. These young radio amateurs represent 20 states where they excel in academics, contribute to their communities and are active in Amateur Radio. We offer heartiest congratulations and wish each of them the best of luck!

Information and applications for 2005 academic year scholarships, including four new scholarship awards for 2005, downloadable applications and instructions, are on the ARRLWeb at **www.arrl.org/arrlf**.

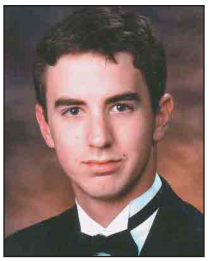
The application period for 2005 academic year awards begins October 1, 2004. The deadline to submit applications *with transcripts and SAT/ACT scores affixed* is February 1, 2005.

The Mary Lou Brown Scholarship—$2500: A. J. Barse, KD7OGZ, Silverdale, Washington



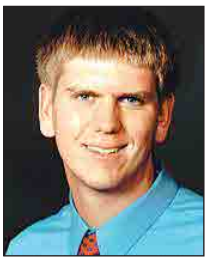
The PHD-ARA Scholarship—$1000: Adam Brockmiller, KCØQMS, Union, Missouri

The New England Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA) Scholarships—$600: Chad E. Bulkley, N1UDN, Westport, Connecticut

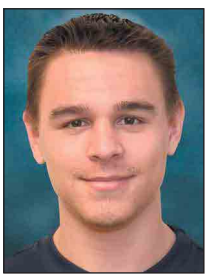


The L. Phil and Alice J. Wicker Scholarship—$1000: Ryan Comes, KF4YKD, Alexandria, Virginia

The IRARC, Joseph P. Rubino WA4MMD Scholarship—$750: James Cooper, KG4UFF, Oviedo, Florida



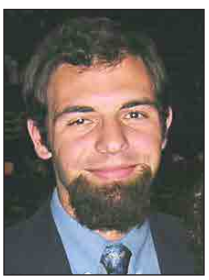
The Irving W. Cook, WAØCGS Scholarship—$1000: Reid Crowe, KCØIDI, Lawrence, Kansas



The New England Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA) Scholarships—$600: Kristopher D. Cui, K5CUI, Barrington, New Hampshire

The Albuquerque ARC/ Toby Cross Memorial Scholarship—$500: Patrick Dixon, KD5CXF, San Rafael, New Mexico

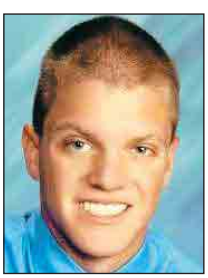
The Donald Riebhoff Memorial Scholarship—$1000: Daniel Friedrichs, KØIPG, Le Mars, Iowa



The Charles Clarke Cordle Memorial Scholarship—$1000: Ian Fritzsche, KF4AON, Thomasville, Georgia

The Tom and Judith Comstock Scholarship—$1000: Francis Gradijan, KD5HTB, Carrolton, Texas

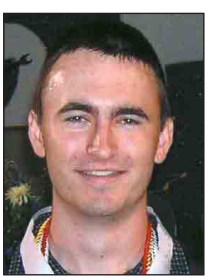
The Charles N. Fisher Memorial Scholarship—$1000: Brandin Grams, KG6RWV, Costa Mesa, California



The Six Meter Club of Chicago Scholarship—$500: Scott Grams, W9AFB, Elk Grove Village, Illinois

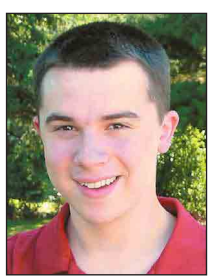
The Norman E. Strohmeier, W2VRS, Memorial Scholarship—$500: Clinton Hansen, KC2KYK, Durhamville, New York

The Mississippi Scholarship—$500: Wesley Holland, KD5NHI, Brandon, Mississippi



The Central Arizona DX Association Scholarship—$500: Brian Kearns, AC7VQ, Cave Creek, Arizona

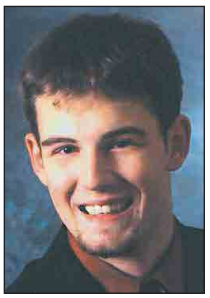
The William R. Goldfarb Memorial Scholarship—Jonathan Krenzel, KCØAMG, Leoti, Kansas



The Henry Broughton K2AE Memorial Scholarship—$1000: Andrew Maroney, W2AJM, New Windsor, New York

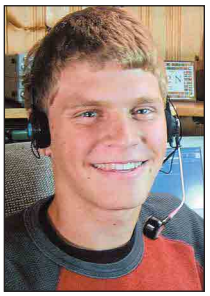
Mary M. Hobart, K1MMH ♦ Secretary, ARRL Foundation Inc ♦ mhobart@arrl.org

The Earl I. Anderson Scholarship—$1250: Patricia Martin, KF6YWJ, Miami, Florida



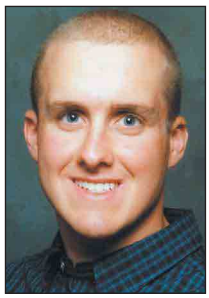
The Earl I. Anderson Scholarship—$1250: Charles McClish, KB9RGF, Kokomo, Indiana

You've Got a Friend in Pennsylvania—$1000: Randall McPherson, KF3DR, Greenville, Pennsylvania



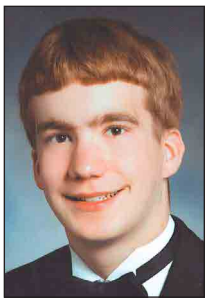
The ARRL Scholarship to Honor Barry Goldwater—$5000: Nathaniel T. Oster, KCØIEI, Ames, Iowa

The New England Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA) Scholarships—$600: Kendra M. Sandford, KA1QLV, Dublin, New Hampshire



The Dr James L. Lawson Memorial Scholarship—$500: Andrew Schaefer, KB2ZWZ, Binghamton, New York

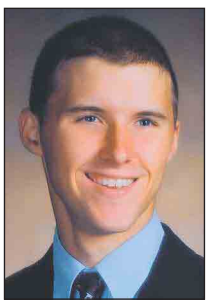
The New England Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA) Scholarship—$600: Andrew B. Schiller, AB1BA, Newington, Connecticut



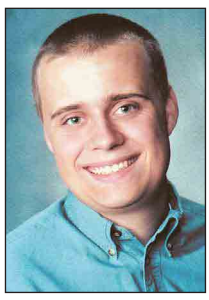
The Henry Broughton K2AE Memorial Scholarship—$1000: Daniel R. Schwarting, KB2ZVM, Ballston Lake, New York

The Paul and Helen L. Grauer Scholarship—$1000: David Shane, KC8UKW, Kirksville, Missouri

The Fred R. McDaniel Memorial Scholarship—$500: Timothy Skoch, N3XNF, Elkins, Arkansas



The Perry F. Hadlock Memorial Scholarship—$2000: John Stratton, AA3SL, Glen Mills, Pennsylvania



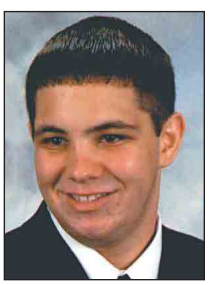
The Francis Walton Memorial Scholarship—$500: Steven Swedberg, N9SG, DeKalb, Illinois

The Earl I. Anderson Scholarship—$1250: Phillip Thomas, KB9ZRF, East Peoria, Illinois

The Chicago FM Club Scholarship—$500: Pamela Toman, KB9SCM, Westmont, Illinois

The General Fund Scholarship—$1000: Brian Tomko, KC8FJV, Munroe Falls, Ohio

The Eugene "Gene" Sallee, W4YFR, Memorial Scholarship—$500: Anna Tyler, KG4ATH, Alpharetta, Georgia



The General Fund Scholarship—$1000: Shawn Vause, AA3YX, Greensburg, Pennsylvania

The General Fund Scholarship—$1000: Adam Waickman, KC2FDJ, Ray Brook, New York

The New England Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA) Scholarships—$600: Elizabeth A. Watt, N1UNX, Stratford, Connecticut

No photos available:

The K2TEO Martin J. Green Sr Memorial Scholarship—$1000: Andrew Lilly, KG4VUH, Lakeland, Florida

The Edmond A. Metzger Scholarship—$500: Nicholas Luther, K9NL, Oshkosh, Wisconsin

$1000: Matthew Rozea, KC2IGE, Massapequa Park, New York

STRAYS

I would like to get in touch with...

◊ anyone who has ever been a member of the West Allis (Wisconsin) Radio Amateur Club. WARAC will celebrate its 50th Anniversary September 26, and all former members are invited.—*Tom Macon, K9BTQ, 3547 S 95 St, Milwaukee, WI 53228;* **tmacon@wi.rr.com** *or John Zach, K9IAC, 5140 S 124 St, Hales Corners, WI 53130;* **cjiac1@juno.com**

COMING CONVENTIONS

ARRL/TAPR DIGITAL COMMUNICATIONS CONFERENCE

September 10-12, Des Moines, IA

The 23rd Annual ARRL/TAPR Digital Communications Conference will be held at the Holiday Inn Des Moines-Airport and Conference Center, 6111 Fleur Dr. For reservations contact the Holiday Inn at 800-248-4013 or on the Web at **www.ichotelsgroup.com/h/d/hi/1/en/hd/dsmap?irs=null** or e-mail **info@holidaydsm.com.** Features include software defined radio (SDR), digital voice, digital satellite communications, Global Position System (GPS), precision timing, Automatic Position Reporting System (APRS), short messaging (a mode of APRS), Digital Signal Processing (DSP), HF digital modes, Internet interoperability with Amateur Radio networks, spread spectrum, IEEE 802.11 and other Part 15 license-exempt systems adaptable for Amateur Radio, using TCP/IP networking over Amateur Radio, mesh and peer to peer wireless networking, emergency and Homeland Defense backup digital communications, using Linux in Amateur Radio, updates on AX.25 and other wireless networking protocols. Two-day registration is $80; Friday or Saturday only registration is $50. Conference registration includes conference proceedings, sessions, meetings. Saturday evening banquet with guest speaker and awards ceremony is $30; Sunday seminar is $25. Contact the TAPR office at 972-671-8277; fax 972-671-8716; **tapr@tapr.org**; **www.tapr.org/dcc/**.

ALASKA STATE CONVENTION

September 11-12, Anchorage

The Alaska State Convention, sponsored by the Anchorage ARC, will be held at the Northway Mall, 3101 Penland Parkway; corner of Glenn Highway and Airport Heights Way. Doors are open Saturday and Sunday 10 AM to 4 PM. Features include technical presentations, speakers, VE sessions. Talk-in on 147.27 (103.5 Hz). Admission is free. Tables are $10. Contact John Lynn, KL7CY, 7013 Trafford Ave, Anchorage, AK 99504; 907-337-1091; **kl7cy@arrl.net**; **www.kl7aa.org/**.

MARYLAND/DC SECTION CONVENTION

September 11-12, Gaithersburg

The Maryland/DC Section Convention, sponsored by the Foundation for Amateur Radio, will be held at the Montgomery County Agricultural Center, 16 Chestnut St; I-270 to Exit 10 (MD 117), take MD 117 E to Meem Ave, go left onto Meem Ave to Chestnut St, go right onto Chestnut St to immediate left after crossing railroad tracks. Doors are open Saturday 8 AM to 4 PM, Sunday 8 AM to 3 PM (buildings); gates open at 6 AM. Features include tailgating ($20 per space, good for both days), indoor vendors, ARRL meetings and forums, demonstrations, VE sessions. Talk-in on 145.45 (156.7 Hz). Admission is $5 per day in advance, $6 per day at the door. Tables are $35 (8-ft; first-come, first-served basis; Bill Dobson, N3WD, 410-526-2154). Contact Dan Blasberg, KA8YPY, c/o FAR, Box 1013, College Park, MD 20741; 301-345-7381; **ka8ypy@arrl.net**; **www.amateurradio-far.org**.

WESTERN PENNSYLVANIA SECTION CONVENTION

September 12, Butler

The Western Pennsylvania Section Convention, sponsored by the Butler County ARA, will be held at the Butler Farm Showgrounds/Roe Airport, Rte 68; 5 miles W of the city of Butler. Doors are open 8 AM to 3 PM. Features include 27th Annual Hamfest/Computer Show, huge flea market, new radio vendors, ample free parking. Talk-in on 147.36, 146.52. Admission is $5. Tables are $15 (with power, indoor); outside space $5. Contact Dave Zibrat, W3VXT, 724-282-9077; **w3vxt@arrl.net**; or Kevin Berry, KF4RMA, 724-586-1182; **kf4rma@arrl.net**; **www.qsl.net/w3udx/**.

August 20-21
New Mexico State, Albuquerque*

August 21
Missouri State, Columbia*

August 21-22
Alabama State, Huntsville*

August 27-29
Southwestern Division, Phoenix, AZ*

August 28-29
West Virginia State, Weston*

September 10-11
Kentucky State, Louisville*

October 15-17
Pacific Division, San Ramon, CA

October 23
South Carolina State, Sumter

November 5-6
Michigan State, Holland

November 6-7
Georgia State, Lawrenceville

***See August *QST* for details.**

W9DXCC CONVENTION

September 17-18, Elk Grove Village, IL

The W9DXCC Convention (52nd W9DXCC DX Convention and Banquet), sponsored by the Northern Illinois DX Assn, will be held at the Holiday Inn, 1000 Busse Rd (Rte 83); NW of Chicago. Doors are open Friday 7:30 PM for "Welcome Reception," Saturday registration at 8 AM, convention begins at 9 AM. Features include forums and presentations, ARRL News and Views, DXCC QSL card checking, CW Pileup Contest, hospitality suites (Friday and Saturday), banquet (Saturday, 7 PM; special speaker John Devoldere, ON4UN). Talk-in on 147.36. Admission is $50 in advance (before Sep 11), $55 at the door (convention and banquet); $28 in advance (before Sep 11), $30 at the door (convention only). Contact Bill Smith, W9VA, 1345 Linden Ave, Deerfield, IL 60015; 847-945-1564; **w9va@aol.com**; **www.w9dxcc.com**.

ILLINOIS STATE CONVENTION

September 17-19, Peoria

The Illinois State Convention (Peoria Superfest 2004), sponsored by the Peoria Area ARC, will be held at the Exposition Gardens, 1601 W Northmoor Rd; from E or W on I-74 exit at University St to the N, go 9 stop lights to Northmoor Rd, turn W, go 2 blocks N to Superfest. Doors are open Friday 3 PM to dusk, Saturday and Sunday 6 AM to 4 PM (commercial buildings open at 8 AM). Features include Amateur Radio Hamfest and Computer Show, giant outdoor flea market ($5 per space, covers both days), new and used amateur radio equipment and accessories, commercial dealers, manufacturer reps, computers and software, electronic parts and components, technical forums, VE sessions (Sunday, 11:30 AM to 1 PM; Larry Leary, AB9DJ, **AB9DJ@Insightbb.com**), acres of free parking, refreshments. Talk-in on 147.075, 146.76. Admission is $5 in advance (2 stubs), $7 at the door (1 stub). Tables are $10-$20. Contact John Coker, N9FAM, c/o Peoria Superfest, Box 3508, Peoria, IL 61612-3508; 309-369-7428 or 309-692-3378 (info line); **n9fam@arrl.net** or **w9uvi@arrl.net**; **www.peoriasuperfest.com**.

ARKANSAS STATE CONVENTION

September 18, Jacksonville

The Arkansas State Convention ("All-Arkansas Hamfest"), sponsored by the Central Arkansas Radio Emergency Net (CAREN), will be held at the Jacksonville Community Center, 5 Municipal Dr, just off the Main St Exit on US 67/167. Doors are open 8 AM to 3 PM. Features include flea market, tailgating, dealer booths, vendors, ARRL forum, VE sessions, refreshments. Talk-in on 146.94. Admission is $5, under 12 free with paying adult. Tables are $20 in advance, $30 at the door. Contact Mark Barnhard, KD5AIV, Box 2893, Little Rock, AR 72203; 501-221-3909; **mbarnhard@aristotle.net** or **kd5aiv@arrl.net**; **www.carenclub.com**.

ROANOKE DIVISION CONVENTION

September 18-19, Virginia Beach, VA

The Roanoke Division Convention, sponsored by Tidewater Radio Conventions, will be held at Virginia Wesleyan College, 1584 Wesleyan Dr; I-64 W to Exit 282, exit 282 at Rte 13 (Northampton Blvd N), go to first stop light, turn right on Wesleyan Dr, go 3/4 mile, turn right into College; guard will direct you to hamfest location. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 3 PM. Features include hamfest and electronics flea market, dealers and manufacturers, division and section forums, VE sessions. Talk-in on 146.97. Admission is $5. Tables are $20. Contact Lynn Lilla, W9DJQ, 848 Stacey Pl, Virginia Beach, VA 23464; 757-479-1597; **hamfest@exis.net**; **www.vahamfest.com**.

NEBRASKA STATE CONVENTION

September 24-25, Norfolk

The Nebraska State Convention, sponsored by the Elkhorn Valley ARC, will be held at the Northeast Community College Lifelong Learning Center, 801 E Benjamin Ave; from the intersection of US Hwys 81 and 275 go N on Hwy 81 (13th St) to Benjamin Ave, turn right (E), proceed E for approximately 1.7 miles to entrance of NECC (on N side). Doors are open for set-up Friday 8-11 AM; public noon-6 PM; Saturday 8 AM to 3:30 PM. Features include flea market, dealers, seminars, ARRL forum, VE sessions (Saturday; registration 7 AM, testing 7:30 AM), APRS demo, banquet (Friday, 7 PM, come as you are; $12 each or $20 per couple). Talk-in on 146.73 (131.8 Hz). Admission is $6 in advance, $7 at the door. Tables are $15 (first-come, first-served basis; power available). Contact Dave Thege, NØXBN, 207 S 9th St, Norfolk, NE 68701; 402-371-3550; **n0xbn@arrl.net**; **www.qsl.net/evarc/**.

EASTERN WASHINGTON SECTION CONVENTION

September 25, Spokane

The Eastern Washington Section Convention, cosponsored by the Kamiak Butte Amateur Repeater Assn, Spokane Radio Amateurs, NW Tri-State ARO, Palouse Hills ARC, Inland Empire VHF Club and the Spokane DX Assn, will be held at University High School, 12420 E 32nd Ave; take the Pines Rd Exit off I-90 (Exit 289), go S on Pines Rd, continue straight to 32nd Ave, school is on corner of Pines Rd and 32nd Ave. Doors are open for setup Friday 7-9 PM, Saturday 8 AM; public Saturday 9 AM to 5 PM. Features include vendors; many seminars and workshops; Open-Cry Auction (11 AM); VE sessions (2 PM); from ARRL HQ Dennis Motschenbacher, K7BV; ARES/RACES forum; ARRL forum; DXCC QSL card checking; radio test gear table; BBQ lunch. Talk-in on 147.24, 146.52. Admission is $5, 18 and under free. Swap

Gail Iannone ♦ Convention Program Manager ♦ giannone@arrl.org

tables are $5 before Sep 10, $7.50 after Sep 10; commercial tables are $12 before Sep 10, $15 after Sep 10. Contact Betsy Ashleman, N7WRQ, 3903 E 48th Ave, Spokane, WA 99223; 509-448-5821; **n7wrq@aol.com**; **www.kbara.org**.

PACIFIC NORTHWEST VHF CONFERENCE

October 1-2, Moses Lake, WA

The Pacific Northwest VHF Conference, sponsored by the Pacific Northwest VHF Society, will be held at the Best Western Hallmark Inn, 3000 Marina Dr; from Seattle, traveling E on I-90, take Exit 176 in Moses Lake, turn left onto Broadway, then next left to Hallmark Inn. Features include Friday evening no-host get-together, full schedule of technical programs on Saturday, catered buffet lunch, tailgate swapmeet, informal Saturday evening no-host dinner. Talk-in on 146.58. Admission is $25 in advance, $30 at the door. Contact Jim Aguirre, W7DHC, Box 527, Preston, WA 98050; 425-222-6149; **secretary@pnwvhfs.org**; **www.pnwvhfs.org/events.htm**.

NORTHERN NEW YORK SECTION CONVENTION

October 9, Lake Placid

The Northern New York Section Convention, sponsored by the Northern New York ARA, will be held at the Lake Placid Horse Showgrounds on Rte 73; from the S go N on Rte 87 (Adirondack Northway), take Exit 30 on Northway, stay on Rte 73, Showgrounds are across from Ski Jumps and adjacent to the Lake Placid Airport. Doors are open for setup Friday at 1 PM, Saturday at 6 AM; public Saturday 7 AM to 3 PM. Features include vendors, tailgating, demonstrations, Special Event Station, guest speakers and forums, VE sessions, barbeque (Friday eve), self-contained RV spaces, refreshments. Talk-in on 145.11 (123.0 Hz), 146.52. Admission is $5. Tables are $10 (includes 1 admission); additional tables are $2.50 each. Contact Tom Valosin, WB2KLD, 117 Warrior Way, Middleburgh, NY 12122; 518-827-4800 (eves until 9 PM) or 518-827-4852 (days); **valosin@midtel.net**; **www.nnyara.org**.

AR LIGHTHOUSE SOCIETY OPERATING SPECIALTY CONVENTION

October 8-9, Kill Devil Hills, NC

The Amateur Radio Lighthouse Operating Specialty Convention, sponsored by the Amateur Radio Lighthouse Society, will be held at the Clarion Hotel On The Ocean, 1601 S Virginia Dare Trail; US 64 from NC mainland to Manteo, then NC 12 to Kill Devil Hills. Doors are open Friday 2-9 PM, Saturday 8 AM to 9 PM. Features include lighthouse activations, presentations by lighthouse experts, slide show and demonstrations, business meeting, guest speakers, lunch and dinner. Talk-in on 146.835. Registration fee of $45 includes Friday night and Saturday noon buffets. Contact James Buffington, K5JIM, 402 S Matubba St, Aberdeen, MS 39730; 662-369-4985; **k5jim@arrl.net**; **www.arlhsconvention.jimbuffington.com/**.

CONNECTICUT STATE CONVENTION

October 10, Wallingford

The Connecticut State Convention, sponsored by the Nutmeg Hamfest Alliance, will be held at Mountainside, High Hill Rd; I-91, Exit 15, E on Rte 68, left on Research Pkwy, right on Carpenter Ave, left on High Hill Rd to Mountainside. Doors are open for setup and tailgating at 6 AM; VIPs 8:30 AM, general public 9 AM to 3 PM. Features include huge flea market; tailgating; major vendors; new and used equipment; seminars; ARRL forum; all-day demonstrations from American Red Cross, ARES, and APRS; VE sessions (10 AM; Joel Curneal, N1JEO, 203-235-6932; **vetest@nutmeghamfest.com**); refreshments. Talk-in on 147.36. Admission is $7, under 12 free (children must be with an adult at all times). Tables are $25 until Sep 12, $30 thereafter; outside space $20. Contact Andrew Purchia, N1XXU, 116 Kensington Ave, Meriden, CT 06451; 203-235-8440; **n1xxu@arrl.net** or **nutmeghamfest@qsl.net**; **www.nutmeghamfest.com**.

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

HAMFEST CALENDAR

Attention: 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. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

Alaska (Anchorage)—Sep 11-12, Alaska State Convention. See "Coming Conventions."

†Alaska (Fairbanks)—Sep 4, noon to 5 PM. *Spr:* Arctic ARC. Alaska Centennial Center for the Arts, (formerly known as Alaskaland Civic Center), corner of Airport and Peger Rds; eastbound from the airport on Airport Rd, turn N onto Peger Rd, go 300 feet and turn right into parking lot. Swap 'n Sell, equipment vendors, Arctic ARC Annual Meeting (1:15 PM), Potluck Picnic (2 PM), ARRL forum (3 PM), Bunny Hunt (4 PM), VE sessions. *TI:* 146.28/146.88 (103.5 Hz). *Adm:* Free. Tables: $10. Jim Movius, KL7JM, Box 83992, Fairbanks, AK 99708-3992; 907-452-6347; **ajmovius@gci.net**; **www.mosquitonet.com/~fbrown/04hamfest.html**.

†Arizona (Kingman)—Sep 18; set up 6 AM; public 7 AM. *Spr:* Hualapai ARC. Mohave Community College parking lot, 1971 Jagerson Ave; I-40 to Exit 51 (Stockton Hill Rd), N to Jagerson Ave, go E on Jagerson to College. Hamfest/Electronics Flea Market, dealers, tailgating (free), VE sessions, ARCA meeting, refreshments. *TI:* 146.76 (131.8 Hz). *Adm:* Free. Tables: Free. Bill Beaman, KAØIYS, 2652 E Mary Ave, Bullhead City, AZ 86426; 928-758-6780 or 602-999-6004 (cell).

†ARRL Hamfest

†Arkansas (Bentonville)—Sep 24-25. *Spr:* Benton County Radio Operators. Thomas Jefferson School Lunch Room, 810 Bella Vista Rd; from 71B go E on Tigar Blvd to Bella Vista Rd, go S to second school on left. VE sessions. *TI:* 145.29. *Adm:* $3. Tables: $5. Buster Morrow, AD5AM, 815 N 30th, Rogers, AR 72756; 501-631-9231; **ad5am@arrl.net**.

Arkansas (Jacksonville)—Sep 18, Arkansas State Convention. See "Coming Conventions."

†Arkansas (Mena)—Sep 10-11; Friday 9 AM to 3 PM, Saturday 6 AM to 4 PM. *Spr:* Queen Wilhelmina Hamfest Assn. Queen Wilhelmina State Park, 3877 Hwy 88 W; 14 miles W of downtown Mena. VE sessions. *TI:* 146.79 (100 Hz). *Adm:* Free. Charlotte Lee, KC5DOR, 415 Crosstrails Rd, De Queen, AR 71832; 870-642-7656; **clee1948@yahoo.com**; **www.qwha.org**.

†Colorado (Longmont)—Sep 26; set up 6 AM; public 8 AM. *Spr:* Boulder ARC. Boulder County Fairgrounds, 9595 Nelson Rd; from Hwy 287 in Longmont, drive W on Ken Pratt Parkway to Hover or Nelson Rd; from Boulder, drive NE on Diagonal Hwy to Hover or Nelson Rd, turn N on either Hover or Nelson, Fairgrounds are located where Hover and Nelson Rds cross. 51st Annual Swapmeet, vendors, forums, VE sessions. *TI:* 146.7. *Adm:* $5, under 13 free with paying adult. Tables: advance $10, door $15 (plus admission). Mike Derr, W3DIF, c/o BARC, Box 17362, Boulder, CO 80308; 303-404-2161; **BARC70@arrl.net**; **www.qsl.net/w0dk**.

†Connecticut (Newtown)—Sep 12; set up 7 AM; public 8:30 AM to 12:30 PM. *Spr:* Candlewood ARA. Edmond Town Hall, 45 Main St, Rte 6; Exit 10 off I-84, follow signs. Flea market, new equipment dealers, computers, electronics, tailgating ($8, includes 1 admission), ample parking, refreshments. *TI:* 147.3 (100 Hz). *Adm:* $5, under 12 free. Tables: $12.50 (includes 1 admission); under 12 free. Bill Schaefer, N1PJG, 63A Taylor Ave, Bethel, CT 06801; 203-798-2831 or 203-438-6782; **bs7000@hotmail.com**; **www.danbury.org/cara/**.

Connecticut (Wallingford)—Oct 10, Connecticut State Convention. See "Coming Conventions."

†Delaware (Felton)—Sep 12, 7 AM to 2 PM. *Spr:* Kent County ARC. Diamond State Drive-In Theater; 8 miles S of Dover on Rte 13. Large tailgate area. *TI:* 146.97. *Adm:* $5. Ken Steele, N3QJJ, 316 W Commerce St, Smyrna, DE 19977; 302-653-2144; **n3qjj@hotmail.com**; **www.kcarc.net**.

†Florida (Jacksonville)—Oct 2, 6:30 AM to 2 PM. *Sprs:* North Florida ARS and Florida Radio Electronics Enthusiasts. Jax Raceways, I-95 and Pecan Park Rd; I-95 to Pecan Park Rd Exit, go E ¼ mile to Jax Raceways; site is 10 miles N of the I-10/I-95 junction and 20 miles S of the Georgia/Florida state line. Free tailgating, auction, demos. *TI:* 146.7 (127.3 Hz). *Adm:* Free. Tables: Free spaces; bring your own tables. Billy Williams, N4UF, c/o Jacksonville Hamfest Assn, Box 9673, Jacksonville, FL 32208-0673; 904-765-3230; **n4uf@nofars.org**; **www.nofars.org/hamfest.html**.

†Florida (Melbourne)—Sep 11-12. *Spr:* Platinum Coast ARS. Melbourne Municipal Auditorium, 625 Hibiscus Blvd; from the intersection of US 1 and US 192 go N to first stop light, turn left (W) on Hibiscus, go 3 blocks, Auditorium on left. Large outdoor tailgating area ($10 per spot), VE sessions. *TI:* 146.85. *Adm:* $5. Tables: $20. Jeff Hildreth, KG4IPO, Box 1004, Melbourne, FL 32902-1004; 321-258-4943; **kg4ipo@arrl.net**; **www.pcars.org**.

†Florida (New Port Richey)—Sep 25, 8:30 AM to 2 PM. *Spr:* Suncoast ARC. First Lutheran Church, 6416 Delaware Ave, at corner of Polk St and Delaware Ave; US Hwy 19 to Main St in New Port Richey, go E on Main through 5 traffic lights, take right onto Congress St, then go 3 streets and take right onto Delaware Ave, parking on left. Tailgating ($3 per space plus admission), plenty of free parking, refreshments. *TI:* 145.35. *Adm:*

Gail Iannone ♦ Convention Program Manager ♦ giannone@arrl.org

$5. Tables: $15 (indoors, limited). Ron Wright, N9EE, Box 1992, New Port Richey, FL 34656; 727-376-6575; **mccrpt@earthlink.net**; **www.qsl.net/sarc/**.

†Florida (Orlando)—Sep 25; set up 7 AM; public 8 AM to 2 PM. *Spr:* AR Unit of Bahia Shrine Center. Bahia Shrine Center, 2300 Pembrook Dr; from I-4, take Maitland Blvd W (Exit 90), go W on Maitland Blvd (Hwy 414), turn left at first stoplight onto Keller Rd, take immediate right onto Pembrook Dr. Ham fellowship, dealers, tailgating. *TI:* 147.39 (103.5 Hz). *Adm:* $3. Tables: $5. Warren Hill, W4WHH, 177 Hanging Moss Dr, Oviedo, FL 32765; 407-365-6682; **w4whh@arrl.net**; **www.bahiashrine.org/users/radio/**.

†Florida (Plantation)—Oct 9, 7 AM. *Sprs:* Motorola and Broward ARCs. Motorola, 8000 W Sunrise Blvd; just E of University Dr on S side of Sunrise Blvd. Refreshments. Cy Harris W4MAQ Memorial Free Flea. *TI:* 146.79. *Adm:* Free. Richard Block, KG4CHW, 5080 SW 64th Ave, Apt 201, Davie, FL 33314-5214; 954-275-0652; **kg4chw@arrl.net**; **www.geocities.com/bcepn/freeflea.html**.

†Hawaii (Waimea/Kamuela)—Oct 9, 9 AM to 3 PM. *Sprs:* Big Island ARC and Kona ARS. Waimea Elementary School Cafeteria. Swapmeet, VE sessions. *TI:* 147.16. *Adm:* Donation. Tables: 10% Donation. John Buck, KH7T, 808-885-9718; **kh7t@arrl.net**.

Illinois (Elk Grove Village)—Sep 17-18, W9DXCC Convention. See "Coming Conventions."

†Illinois (Grayslake)—Sep 18-19; Saturday 8 AM to 4 PM, Sunday 8 AM to 3 PM. *Spr:* Chicago FM Club. Lake County Fairgrounds, Rtes 45 and 120; I-294 N to Rte 120, W to Rte 45. Huge outdoor flea market (open both days at 6 AM), indoor commercial vendors, major manufacturers and leading distributors, computers and electronics, VE sessions (both days, walk-ins), free parking, outdoor electrical hookups available. *TI:* 146.76 (107.2 Hz). *Adm:* advance $8, door $10 (good both days); under 10 free. Tables: 8-ft $25 (good both days). Send SASE to CFMC, c/o Jerry Spearman, W9EG, 348 W Natoma Ave, Addison, IL 60101-3422; 630-628-1501; **w9eg@peoplepc.com**; **www.chicagofmclub.org**.

Illinois (Peoria)—Sep 17-19, Illinois State Convention. See "Coming Conventions."

†Indiana (Bedford)—Oct 3; set up Saturday noon; public Sunday 6 AM. *Spr:* Hoosier Hills Ham Club. Lawrence County 4-H Fairgrounds, US 50 W; from Bedford take SR 37 S to US 50 W, turn W (left) onto US 50, 2 miles to entrance on right. Vendors, VE sessions, free chili supper (Saturday, 6 PM), International Foxhunt (Sunday, 10 AM). *TI:* 146.73 (107.2 Hz). *Adm:* $8. Michael Wright, KF9NP, Box 891, Bedford, IN 47421; 812-849-4230; **kf9np@juno.com**; **www.hoosierhillshamfest.org**.

†Indiana (Spencer)—Sep 11, 7 AM. *Sprs:* Owen County ARA and Bloomington ARC. Owen County Fairgrounds; State Rte 46 (Morgan St) to East 5th St, turn S to Fairgrounds. Forums, VE sessions. *TI:* 146.985. *Adm:* $3. Tables: $5 (covered space). John Maassen, K9FK, 2400 Burberry Ln, Bloomington, IN 47401; 812-336-2311; **k9fk@arrl.net**; **www.bloomingtonradio.org/hamfest**.

Iowa (Des Moines)—Sep 10-12, ARRL/TAPR Digital Communications Conference. See "Coming Conventions."

†Iowa (West Liberty)—Oct 3, 7 AM to 1 PM. *Sprs:* Muscatine and Iowa City ARCs. Muscatine County Fairgrounds, W 1st St and S Calhoun; from I-80 take Exit 259 S to intersection of US Hwy 6 and IA Hwy 70, go S 3 blocks, turn right at W 1st St, proceed straight ahead to gate. Saturday evening pre-hamfest Wiener Roast (6 PM), VE sessions. *TI:* 146.85, 146.91, 146.52. *Adm:* $5. Tables: $1 per foot. Rich Bingham, WWØQ, Box 4, Iowa City, IA 52244; 319-335-5982; **ww0q@arrl.net**; **www.qsl.net/kc0aqs**.

Kansas (Chanute)—Oct 9. Keith Rather, KBØZAI, 620-431-0930.

†Louisiana (Lake Charles)—Sep 11, 8 AM to 3 PM. *Spr:* Southwest Louisiana Amateur Repeater Club. Habibi Temple, 2928 Pack Rd; I-10 (E or W) take Exit 33 (Hwy 171N), proceed N through 4 stoplights (approximately 1.1 miles), take right-hand fork at light, Hwy 171 veers off to left and road to Habibi veers off to right, follow signs to Habibi Temple arch entrance, swapfest will be in smaller building with entrance on right. Forums on several subjects, VE sessions (10 AM), camping (on right along fence; $15 per night). *TI:* 146.73. *Adm:* Free. Tables: $15. Doug Phelps, WB5OZA, c/o SWLARC, Box 7244, Lake Charles, LA 70606; 337-477-4909; **cajungeese@yahoo.com**; **www.qsl.net/w5bii/**.

†Maine (Alexander)—Sep 18, 9 AM to 5 PM. *Spr:* Saint Croix Valley ARC. Alexander Elementary School, Rte 9; the Irving "Big Stop" midway between Calais and Baileyville marks the beginning of Rte 9 (the "Airline"); Alexander School is approximately 7 miles E of this point on the left. VE sessions. *TI:* 147.33 (118.8 Hz). *Adm:* $5. Skip Colson, KB1HXC, 40 King St, Calais, ME 04619; 207-454-2156; **kb1hxc@arrl.net**; **www.saintcroixvalley.org**.

Maryland (Gaithersburg)—Sep 11-12, Maryland/DC Section Convention. See "Coming Conventions."

Massachusetts (Cambridge)—Sep 19. Nick Altenbernd, KA1MQX, 617-253-3776.

†Massachusetts (Orange)—Oct 9. *Spr:* Mohawk ARC. Athol-Orange Elks Hall, 92 New Athol Rd; Rte 2 (E or W) to Exit 16, go N on Rte 202 to junction of Rte 2A at McDonald's, go left on Rte 2A towards Orange, Hall is 1 mile on left. *TI:* 145.37 (136.5 Hz). *Adm:* $2. Tables: $5. John Dould, AE1B, 41 Gauthier Rd, Barre, MA 01005; 978-355-0019; **ae1b@trysb.net**.

Massachusetts (South Dartmouth)—Sep 12. Tim Smith, N1TI, 508-758-3680.

†Michigan (Adrian)—Sep 19, 8 AM. *Spr:* Adrian ARC. Lenawee County Fairgrounds, Dean and Addison Streets; M-52 S to Siena Hts Dr, turn left, follow signs. VE sessions. *TI:* 145.37 (85.4 Hz). *Adm:* $5. Tables: $10. Eric Smith, K8JVW, 5398 Hunt Rd, Adrian, MI 49221; 517-263-5407; **k8jvw@arrl.net**; **www.w8tqe.com**.

†Michigan (Grand Rapids)—Sep 11; set up 6 AM; public 8 AM to 1 PM. *Sprs:* Grand Rapids ARA, Lowell ARC, and Michigan AR Alliance. Forest Hills Northern Middle School, 3775 Leonard NE; I-96 to Exit 38; Hwy M-44, N 1 mile to Leonard St, turn right (E), 0.8 mile to school, turn left. Electronics/Computer/Ham Radio Equipment Swapmeet, flea market, trunk sales (no extra charge, admission required), VE sessions (10 AM, all walk-ins), forums, overnight self-contained camping (Friday, no hookups). *TI:* 147.26 (94.8 Hz), 146.52. *Adm:* $6 (not required of K-12 students). Tables: $10 (8-ft, reserved by Sep 3), $5 (5-ft round, non-reserved). Jack Amelar, NY8D, c/o GRARA, Box 3282, Grand Rapids, MI 49501-3282; 616-897-6885; **grahamfest04@w8dc.org**; **www.w8dc.org/swap.htm**.

†Michigan (Kalamazoo)—Oct 10, 8 AM to 2 PM. *Sprs:* Kalamazoo ARC and SW Michigan AR Team. Hazel Grey Bldg at Kalamazoo County Fairgrounds, 2900 Lake St; from I-94 E (Battle Creek) take Business Loop to 3rd light, turn right (N) onto Olmstead Rd which passes the Fairgrounds on left; from I-94 W (Paw Paw) take Exit 80 N to Sprinkle Rd, follow it N to the I-94 Business Loop intersection, turn left (W) at light, make next right (N) onto Olmstead Rd to Fairgrounds. DXCC card checking. *TI:* 147.04. *Adm:* advance $4, door $5. Tables: $12 (8-ft). Donald Eikhoff, WD8IDJ, Box 555, Galesburg, MI 49053; 269-665-6421; **Information@KalamazooHamfest.com**; **www.kalamazoohamfest.com/khf**.

†Minnesota (Rush City)—Sep 11, 9 AM to noon. *Spr:* East Central Minnesota ARC. Rush City High School, 51001 Fairfield Ave; I-35, Rush City Exit 159, go 1 block E, then 1 block N to High School; Rush City is approximately 45 miles N of Minneapolis and St Paul on I-35. Bratwurst Brunch. *TI:* 145.33. *Adm:* $3. Tables: $5. Larry Jilek, KAØMEN, 51835 Belle Isle Dr, Rush City, MN 55069; 320-358-4205; **lj@ecenet.com**; **www.ecmarc.org**.

Nebraska (Norfolk)—Sep 24-25, Nebraska State Convention. See "Coming Conventions."

†Nebraska (Springfield)—Sep 11, 8 AM to 1 PM. *Spr:* Ak-Sar-Ben ARC. Sarpy County Fairgrounds 4-H Building, 5 miles S of I-80 on Nebraska Hwy 50; or 5 miles S of Sapp Bros Truckstop. Breakfast and Lunch. *TI:* 146.94. *Adm:* $2. Tables: $8. Pat Joseph, KØCTU, 1821 Robertson Dr, Omaha, NE 68114; 402-492-9156; **k0ctu@arrl.net**; **www.aksarbenarc.org**.

†New Hampshire (Hopkinton)—Oct 1-2; Friday 9 AM to Saturday 5 PM. *Spr:* Hosstraders. New Hampshire State Fairgrounds; I-89 to Exit 7, go E 100 yards, take Warner Rd, go about 1.5 miles to "G" gate, Fairgrounds are on left. Old-fashioned tailgating and social event, VE sessions. *TI:* 146.895 (100 Hz). *Adm:* $10 (at 9 AM), $5 (after 3 PM on Friday). Tables: $10. Joe Demaso, K1RQG, 79 Orcutt Mountain Rd, Bucksport, ME 04416; 207-469-3492; **k1rqg@aol.com**; **www.qsl.net/k1rqg**.

†New Jersey (Washington Township)—Oct 9, 8 AM to 1 PM. *Spr:* Bergen ARA. Westwood Regional Jr/Sr High School, 701 Ridgewood Rd; from Rte 17 N or S to Linwood Ave, go E to Pascack Rd, left (N) on Pascack, go 1/4 mile to Ridgewood Rd, right (E) on Ridgewood to High School. Vendors, tailgating ($15 per space), VE sessions, DXCC card checking, refreshments. *TI:* 146.79 (141.3 Hz). *Adm:* $5. Tables: $15 (inside). Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Washington Township, NJ 07676; 201-664-6725; **k2zo@arrl.net**; **www.bara.org**.

†New Mexico (Deming)—Sep 25, 8 AM to noon. *Spr:* Deming ARC. Learning Center, 2300 East Pine; I-10, Exit 85 (Motel Dr), also Pine St, stay on Pine to Learning Center. Tailgate only, free coffee and donuts. *TI:* 146.82. *Adm:* Free. Charlie Brown, N9RU, 713 W Spruce St, No. 161, Deming, NM 88030; 505-544-4766; **n9ru@arrl.net**; **www.zianet.com/darc**.

†New York (Ballston Spa)—Sep 11; set up Friday 6-8:30 PM; public Saturday 7 AM to 3 PM. *Spr:* Saratoga County RACES. Saratoga County Fairgrounds, Prospect Ave; I-87 to Exit 12, W on Rte 67 to Ballston Spa, follow hamfest signs. New and used equipment, tailgating ($5 per space, includes admission), foxhunt, VE sessions, free parking, refreshments. *TI:* 147.0, 147.24. *Adm:* $5. Tables: $5 (reservations and pre-payment welcomed and encouraged; first-come, first-served basis). Darlene Lake, N2XQG, 314 Louden Rd, No. 84, Saratoga Springs, NY 12866; 518-587-2385; **dar@saratogaspringsny.us**; **www.wa2umx.net**.

†New York (Bethpage)—Sep 12; set up 7:30 AM; public 9 AM to 2 PM. *Spr:* Long Island Mobile ARC. Briarcliff College, 1055 Stewart Ave. Long Island Expressway to Exit 44S to Exit 9 (Broadway), turn right onto Broadway, bear right onto Cherry Ave, turn right onto Stewart Ave. Hamfair and Electronics Show, flea market, vendors, dealers, tailgating, equipment, computers, VE sessions, ARRL info, tune-up clinic, free parking, refreshments. *TI:* 146.85 (136.5 Hz). *Adm:* $6. Tables: $15. Diane Ortiz, K2DO, Box 296, Bellport, NY 11701; 631-286-7562; **k2do@limarc.org**; **www.limarc.org**.

†New York (Horseheads)—Sep 25. *Spr:* ARA of the Southern Tier. Chemung County Fairgrounds, Fairview Rd; from Rtes 17/86 W/E turn onto Grand Central Ave S, hamfest entrance is ½ mile on left. Free flea market, VE sessions. *TI:* 147.36. *Adm:* advance $5, door $6. Tables: $15. Randy Viele, N2SYT, 1198 Maple Ave, B9, Elmira, NY 14904-2862; 607-732-2822; **n2syt@arast.org**; **www.arast.org**.

New York (Lake Placid)—Oct 9, Northern New York Section Convention. See "Coming Conventions."

†New York (Queens)—Oct 10, 9 AM to 2 PM. *Spr:* Hall of Science ARC. NY Hall of Science Museum Parking Lot (Flushing Meadow Corona Park), 47-01 111th St. Electronics and computer equipment, tailgating, tune-up clinic, VE sessions (10 AM; Lenny Menna, W2LJM, 718-835-1548; **w2ljm@verizon.net**), Museum Exhibit Station WB2JSM, free parking, refreshments. *TI:* 444.2 (136.5 Hz), 146.52. *Adm:* buyers $5, sellers $10 (per space). Stephen Greenbaum, WB2KDG, 85-10 34th Ave, Apt 323, Jackson Heights, NY 11372; 718-898-5599; **wb2kdg@arrl.net**; **www.qsl.net/hosarc**.

†New York (Syracuse)—Sep 18, 8 AM to 2 PM.

Spr: Radio Amateurs of Greater Syracuse. Pompey Hills Fire Department, Henneberry Rd; take I-81, Exit 15 onto Rte 20 E, go 6 miles to Henneberry Rd, on left. Indoor/outdoor flea market, vendors, dealers, exhibitors, displays, ham radio and computer equipment, ARRL forum, NTS, awards, VE sessions (noon, walk-ins), breakfast and lunch served, refreshments. *TI:* 147.3. *Adm:* $5, under 17 free. Tables: $12 (or bring your own, 8-ft space $5). RAGS, Box 88, Liverpool, NY 13088; 315-698-4558; **ragsonline@hotmail.com**; **www.ragsinreview.com**.

North Carolina (Kill Devil Hills)—Oct 8-9, AR Lighthouse Society Operating Specialty Convention. See "Coming Conventions."

†North Carolina (Maysville)—Oct 10, 8 AM to 2 PM. *Spr:* Maysville Hamfest Assn. Maysville Community Bldg, 201 8th St; 1 block W of intersection of NC Rte 58 and US Rte 17. Free tailgating, Amateur Radio equipment, refreshments. *TI:* 146.685 (88.5 Hz). *Adm:* Free. Byron Highland, K4BMH, 3753 Thorne Dr, Farmville, NC 27828; 252-753-2895; **bhighland@greenvillenc.gov**.

†Ohio (Cincinnati)—Sep 19, 8 AM to 4 PM. *Spr:* Greater Cincinnati ARA. Scarlet Oaks Career Center, 3254 E Kemper Rd; I-275, go E to Mosteller Rd, go S (left) onto Mosteller Rd to E Kemper, go E (left) on Kemper to access road, go N (left) to site. Flea market, commercial dealers, VE sessions, refreshments. *TI:* 145.37. *Adm:* $6. Tables: $35. Stan Cohen, W8QDQ, 2301 Royal Oak Ct, Cincinnati, OH 45237; 513-531-1011; **stanco49@aol.com**; **www.themikeandkey.com**.

†Ohio (Cleveland)—Sep 26, 8 AM to 2 PM. *Spr:* Hamfest Assn of Cleveland. Cuyahoga County Fairgrounds, 164 Eastland Rd, Berea; 1.2 miles W of I-71 and Bagley Rd Interchange Exit 235, go ½ mile S on Eastland Rd to gate. ARRL forum, VE sessions, refreshments. *TI:* 146.73 (110.9 Hz). *Adm:* $6. Tables: $20. William Beckman, N8LXY, 4360 Metropolitan Dr, Cleveland, OH 44135; 800-CLE-FEST or 216-999-7388; **info@hac.org**; **www.hac.org**.

†Ohio (Findlay)—Sep 12, 8 AM to 3 PM. *Spr:* Findlay Radio Club. Hancock County Fairgrounds, 1017 E Sandusky St; S side of Sandusky St (State Rte 568), 3/4 mile E of Main St. Flea market, commercial vendors, forums. *TI:* 147.15, 444.15. *Adm:* $5. Tables: $14. Bill Kelsey, N8ET, 3521 Spring Lake Dr, Findlay, OH 45840; 419-423-5643; **kanga@bright.net**; **www.findlayradioclub.org**.

†Ohio (Medina)—Oct 10, 8 AM to 2 PM. *Spr:* Medina Two Meter Group. Medina County Career Center, 1101 W Liberty St; from I-71 and SR 18, take SR 18 for 4 miles W to downtown Medina, continue through Medina on SR 18 for 2.5 miles W, hamfest is on right (N) side of SR 18. VE sessions. *TI:* 147.03 (141.3 Hz). *Adm:* advance $4, door $5. Tables: $9. Ed Eyerdom, K8NVR, 3312 State Rd, Medina, OH 44256; 330-239-1686; **k8nvr@arrl.net**; **www.qsl.net/m2m**.

Ontario (Ottawa/Carp)—Sep 4. Greg Danylchenko, VE3YTZ, 613-236-9291.

†Pennsylvania (Bartonsville)—Sep 11, 8 AM to 2 PM. *Sprs:* Eastern PA ARA and Pocono ARK. Monroe Career and Technical Institute, Vo-Tech Rd; Rte 611 N, right onto Bartonsville Ave, proceed until "Y" in road, stay right at "Y" onto Laurel Lake Rd, turn right onto Vo-Tech Rd. Inside vendors, VE sessions. *TI:* 147.045 (131.8 Hz). *Adm:* $5, children and spouses free. Tables: $15. Bill Connelly, W3MJ, RD 3, Box 3165, E Stroudsburg, PA 18301; 570-424-0845; **w3mj@ptd.net**; **www.qsl.net/n3is/hamfest.htm**.

†Pennsylvania (Brownstown)—Oct 2. *Spr:* Red Rose Repeater Assn. West Earl Twp Park; from Lancaster take 222 N to Brownstown, go E on 772, Park is on left just past bridge. *TI:* 147.015 (118.8 Hz). *Adm:* $1. Tables: $5. David Phillips, W3CWE, 344 N George St, Millersville, PA 17551; 717-872-6578; **w3cwe@comcast.net**; **www.qsl.net/rrra**.

Pennsylvania (Butler)—Sep 12, Western Pennsylvania Section Convention. See "Coming Conventions."

†Pennsylvania (Schnecksville)—Sep 18, 7 AM to 1 PM. *Spr:* Delaware Lehigh ARC. Schnecksville Fire Department, Rte 309; Rte 22 to PA Rte 309 N, go 4.3 miles to Schnecksville Fire Dept on left. *TI:* 51.76, 146.7, 444.9 (all 151.4 Hz). *Adm:* $5. Tables: $4. Charles Lazarchak, W3DEA, c/o DLARC, Greystone Building, Gracedale Complex, RD 8, Nazareth, PA 18064-9278; 610-954-5285; **w3dea@snycomp.com**; **www.dlarc.org**.

†Pennsylvania (Somerset)—Sep 19, 8 AM to 2 PM. *Spr:* Somerset County ARC. The Factory Shops at Georgian Place, Georgian Place Dr; from PA Turnpike take Exit 10 (110), take left at second light onto Rte 601 N (aka N Center Ave), take right at second light (3/4 mile) just before Sheetz. Tailgating, VE sessions. *TI:* 147.195. *Adm:* $2. Tables: $10. Bill Smith, KB3GUN, 434 W Patriot St Rear, Somerset, PA 15501; 814-443-2774; **kb3gun@arrl.net**; **www.k3smt.org/hamfest**.

†Pennsylvania (Washington)—Oct 3, 8 AM to 1 PM. *Spr:* Washington Amateur Communications. Washington County Fairgrounds, 2151 N Main St; I-79 to Exit 41 (Racetrack Rd); if coming from I-79 N take left off exit, if coming from I-79 S, take right onto Race Track Rd, follow to stop light, go left onto Pike St, at next light go right onto Country Club Rd, follow to stop sign, go right onto N Main St, Fairgrounds on right just across railroad tracks. VE sessions, breakfast and lunch, free coffee all day. *TI:* 145.49. *Adm:* $5. Tables: $10. Ed Oelschlager, N3ZNI, 60 Carl Ave, B-2, Eighty Four, PA 15330; 724-746-9235; **n3zni@arrl.net**; **www.wacomarc.org**.

†Pennsylvania (Wrightstown)—Oct 10; sellers 6 AM, buyers 7 AM. *Spr:* Mt Airy VHF Club (PACKRATS). Middletown Grange Fairgrounds, Penns Park Rd; between PA Rtes 232 and 413. Flea market ($10 per car space), refreshments. *TI:* 146.52. *Adm:* $6, nonham spouses and under 13 free. Tables: $10 per 10-ft space (indoors); bring your own table. Ed Finn, WA3DRC, **packrats_w3ccx@yahoo.com**; **members.ij.net/packrats/latest.htm**.

†Pennsylvania (York)—Sep 18; set up Friday 5-9 PM, Saturday 6 AM; public 8 AM to 3 PM. *Spr:* York Hamfest Foundation. 4-H Club Center, 771 Stoverstown Rd; 5 miles W of York on US Rte 30, turn S at PA Rte 116, go 1.3 miles on State Rte 116 to Stoverstown Rd. Tailgating ($5 per space, plus admission), VE sessions (promptly at 1 PM, pre-registration recommended), breakfast and lunch served. *TI:* 147.33 (146.2 Hz). *Adm:* $5, spouse and under 16 free. Tables: $15 (before Sep 10), $20 (at the hamfest). Jim Shultz, W3MYK, 1267 Wiltshire Dr, York, PA 17403; 717-812-0037; **jimpat31@suscom.net**; **www.yorkhamfest.org**.

Rhode Island (Forestdale/N Smithfield)—Sep 18. Rick Fairweather, K1KYI, 401-725-7507 (7-8 PM only).

†South Carolina (Rock Hill)—Oct 2, 6 AM. *Spr:* York County ARS. Rock Hill American Legion Post 34, 199 S Cherry Rd; take 77 S to Exit 82B, proceed 3.8 miles on Cherry Rd to American Legion on left, beside Fairgrounds. Tailgating (no extra cost, except admission ticket), inside vendors, ARRL and technical forums, VE sessions, famous barbeque lunch. *TI:* 147.03. *Adm:* $7. Tables: $10. Bob Bacharach, WA2EMF, 1627 Bridal Trail, Rock Hill, SC 29732; 803-327-2634; **wa2emf@arrl.net**; **www.ycars.org**.

†Tennessee (Kingsport)—Sep 18, 7 AM to 2 PM. *Sprs:* Kingsport and Bays Mountain ARCs. Eastman's Toy F. Reid Employee Center, S Wilcox Dr and Industry Dr; go S on I-81 from Bristol to Knoxville, merge onto I-181 N/US-23 N via Exit 57B towards Kingsport, take TN 93 Exit (Exit 51), merge onto TN-126 E/S Wilcox Dr. VE sessions (9 AM). *TI:* 146.97 (77 Hz). *Adm:* Free. Tables: Free. Paul Marcum, AC4QZ, 999 Bell Ridge Rd, Kingsport, TN 37660; 423-230-0532; **marcump@preferred.com**; **w4trc.tripod.com/**.

†Tennessee (Madisonville)—Sep 11, 7 AM. *Spr:* Monroe ARS. Monroe Farmer's Market, New Hwy 68; from I-75 take Exit 60 in Sweetwater, go E onto New Hwy 68 S, go through 2 traffic lights, continue straight for 5.5 miles (1.5 miles past Lost Sea), watch for signs. Swapmeet. *TI:* 146.82 (141.3 Hz), 442.1 (141.3 Hz). *Adm:* $5. Horace Taylor, WA4HT, Box 144, Sweetwater, TN 37874; 423-337-9561; **wa4ht@charter.net**; **www.qsl.net/kg4yti**.

†Tennessee (Sevierville)—Sep 24-25; Friday 3-8 PM, Saturday 9 AM to 3 PM. *Spr:* Ten-Tec. Ten-Tec Factory, 1185 Dolly Parton Pkwy, 2 miles E of downtown Sevierville on Hwy 411 N; directly across from Sevier County High School. Flea market, equipment sales, forums, VE sessions. *Adm:* Free. Stan Brock, WDØBGS, 1185 Dolly Parton Pkwy, Sevierville, TN 37862; 865-453-7172; **sales@tentec.com**; **www.tentec.com**.

†Tennessee (Smyrna)—Oct 9; set up Friday noon to 11 PM, Saturday 5-7 AM; public 8 AM to 5 PM. *Spr:* Nashville ARC. Tennessee Expo and Banquet Center, 1412 Hazelwood Dr; I-24 S from Nashville to Exit 66B, go N on Sam Ridley Blvd, turn right, go 1.6 miles on Old Nashville Pike, go 2.4 miles to traffic light, turn right into Expo parking. Dealers, vendors, contests (high speed CW, left foot CW), on-site moving transmitter hunt, free paved parking, refreshments. *TI:* 146.64. *Adm:* $6, under 12 free. Tables: $20 (includes free electricity and 2 chairs). Murray Jones, K4ANH, 1044 Forest Harbor Dr, Hendersonville, TN 37075; 615-824-7216; **mj80917@aol.com**; **www.kf4oal.com**.

†Texas (Katy)—Sep 11. Katy ARS. Katy VFW Hall, W George Bush Dr; from E take Exit 742 off I-10, go W 1.4 miles on US-90 to Ave D, go N to George Bush Dr, go W to Hall; from W take Exit 740 off I-10, go N on 1463 to US-90, go E to Ave D, go N to George Bush Dr, go W to Hall. Swapfest/Tailgate. *TI:* 147.2. *Adm:* $1. Tables: $10. Bernie White, AD5KB, 5327 Marian St, Katy, TX 77493; 281-391-2857; **bernie17018@msn.com**; **www.qsl.net/katyars**.

Texas (Lake Murvaul)—Sep 17-18. Betty Moreland, W5PUP, 903-685-2365.

Virginia (Virginia Beach)—Sep 18-19, Roanoke Division Convention. See "Coming Conventions."

†Washington (Bremerton)—Oct 9, 9 AM to 3 PM. *Spr:* North Kitsap ARC. Kitsap County Fairgrounds President's Hall, 1201 NW Fairgrounds Rd, NW corner of Fairgrounds Rd at Nels Nelson Rd; from Bremerton follow Warren Ave N on SR 303 for 3.6 miles, turn left onto Fairgrounds Rd, continue for 1½ miles, follow signs to hamfest on right. Hamfest and Electronics Swapmeet, digital communications demos, commercial radio dealers, tour Kitsap County Communications Vehicle, new and used equipment, computers and software, electronics parts and goodies, ARRL table and info, live antique radio station, VE sessions (10 AM, pre-registration encouraged; Susan, AB7MD, 360-697-9379). *TI:* 146.62 (103.5 Hz), 146.52. *Adm:* $5, under 13 free. Tables: $15 (includes 1 admission, until Sep 30), $20 (after Sep 30); helpers for renters of personal tables (2 max) $4 each; commercial spaces $30; electrical power $2 per table. Jeff Hasz, KS7H, Box 2268, Silverdale, WA 98383-2268; 360-638-0775; **ks7h@jhasz.com**; **nkarc.home.donobi.net/**.

Washington (Moses Lake)—Oct 1-2, Pacific Northwest VHF Conference. See "Coming Conventions."

Washington (Spokane)—Sep 25, Eastern Washington Section Convention. See "Coming Conventions."

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

W1ALL, George H. Hughes, Southwick, MA
N1BUR, Danny E. Goulette, Alamogordo, NM
K1DFQ, Wilfred L. French, Henniker, NH
WB1DJL, Mariana W. Armstrong, Hartford, CT
*W1GJ, F. Norman, Davis, Old Orchard Beach, ME
W1IKI, John E. O'Neill, North Weymouth, MA
KQ1J, Norman L. Johnson Jr, Brandon, VT
KZ1M, James P. Dalterio, Manchaug, MA
N1WC, Weston D. Clement, Harpswell, ME
*WB2AFS, John H. Gold, Binghamton, NY
N2AUV, Warren O. Ulrich, Rochester, NY
K2DVC, G. Kenneth Miner, Stafford, NY
K2EHR, Francesco E. Filice, Old Tappan, NJ
WA2GIJ, John R. Skinner, Rochester, NY
KC2IOF, Thomas J. Sweeney, Dansville, NY
WA2NNY, Frank J. Cimbrik Jr, Ridgewood, NJ
W2RSS, Ralph W. Baxendale, Williamson, NY
W2SRP, Angelo J. De Fazio, Batavia, NY
WB2WBZ, Ben C. Michener, Tulsa, OK
W2XJ, William A. O'Donnell, Nunda, NY
N2YBF, Newton H. Whispell, Kingston, NY
K2ZCD, David W. Stewart, Rochester, NY
N3AN, Milton Soss, Tenafly, NJ
K3CYE, Harry H. Filling, Baltimore, MD
N3FMD, Peter J. Pangan, Darlington, PA
N3FRR, Francis Vernitsky, Pine Forge, PA
W3QCM, William A. Huston, Etters, PA
N3SBT, Johnny J. Wilson, Waldorf, MD
KA3SCR, Philip B. Neff, Mechanicsburg, PA
W3SSS, Maximilian A. Kraft Jr, Ambler, PA
W3WGY, Howard W. Smith, Portage, PA
W4DAP, Marvin J. Hand, High Springs, FL
W4DBH, Dewey F. Hembree, Enoree, SC
WD4EIX, Henry Valentino, North Charleston, SC
W4EQE, Orton L. Duggan Jr, Cocoa, FL
W4FLK, Thomas R. Griffin, Greensboro, NC
KA4FMD, Dennis R. Retherford, Covington, KY
KA4GSS, Sewell D. Givens, Rockwood, TN
K4HJM, D. R. Allen, Anniston, AL
AC4HR, Richard D. Townsend, Livonia, MI
KC4HU, George Stone, Clearwater, FL
KE4IQI, John C. Steffen, Inverness, FL
KD4JF, Kenneth F. Daugherty, Russellville, KY
KE4KDG, Betty A. Codones, Saint Peters, MO
WD4MRD, Joseph V. Henderson, Raleigh, NC
KD4OEK, Alfred Mac Farland Jr, Castalian Springs, TN
N4PCD, James R. Summers, Beech Bluff, TN
K4SGQ, Gilbert F. Comstock, King George, VA
W4SYR, Richard E. Parkins, Eutaw, AL
KF4TFH, Huey F. Coleman, Mary Esther, FL
K4UFD, George McGinley, Loudon, TN
WA4WYR, John O'Bryan, Calvert City, KY
KC4ZBN, Leonard M. Cowherd III, Culpeper, VA
W5BQU, Byrl "Tex" Burdick, El Paso, TX
WB5DWP, Richard J. Sanderson, Hot Springs National Park, AR
W5ILJ, Joseph W. Butler, Lubbock, TX
WA5IQH, Charles B. Blakley, Wanette, OK
N5NNI, James E. Hall, Newhebron, MS
ex-N5NYC, Willis G. Kilgore, Georgetown, TX
KB5TDX, Paul Sartain, Fort Worth, TX
KD5TOJ, Wayne E. Thompson, Meridian, MS
K5YAQ, Clarence W. Sittel, Oklahoma City, OK
KB6ACJ, Clement G. Patocka, Downey, CA
K6CSZ, Thomas Woo, Oakland, CA
W6GYN, Maxon B. Sayre, Waterford, CA
KA6HME, Robert L. Hansen, Reedley, CA
W6JQX, James C. Shaw, Orange, CA
ex-W6LQ, Loyd C. Sigmon, Sherman Oaks, CA
K6RSX, Desmond G. Boyle, El Paso, TX
W6SWZ, A. A. Wicks, Lynden, WA
K6UI, William R. Adey, Redlands, CA
W6UOL, John Gill, Salinas, CA
K7ALX, John F. Campbell, Gold Beach, OR
NC7A, Robert F. Morris, Sandy, UT
K7CLO, Michael E. Gilmore, Layton, UT
N7DKP, Jennifer L. Dye, Anaconda, MT
W7GUN, Thomas Ichikawa, Owego, NY
AF7I, Roger L. Perry, Lake Havasu City, AZ
AA7KJ, Chris Bichsel, Creswell, OR
W7KPK, Delbert L. Shampine, Troutdale, OR
KD7LPR, Wayne D. Burklund, Coos Bay, OR
KB7RQV, Joseph C. Christensen, Fruit Heights, UT
KJ7UJ, Wilfred W. Nickel, Everett, WA
KC8BAN, Gregory J. Revord, Munising, MI
AJ8F, Joseph J. Nagy, Northwood, OH
KC8HRW, Greg G. Childs, Cambridge, OH
W8LDS, Samuel E. Smith, Johannesburg, MI
KC8NOK, Ivan J. Soper, Huber Heights, OH
KD8SP, Delores J. Rizer, East Palestine, OH
W8VWY, Marion J. Stoner, Frankfort, MI
WA9CZA, Daniel E. Graczyk, Calumet City, IL
WA9EKG, Russell F. Webber, Sun Prairie, WI
K9ELT, Karen O. Walker, Alto, NM
W9FCY, John S. Purcell, Beloit, WI
W9IEM, Harold W. Ferguson, Pine River, WI
WA9IMC, David J. Staudenraus, Oshkosh, WI
WB9JDO, Wilbur C. Jackson, Omaha, NE
W9MVB, Ben H. Logan, Sun City West, AZ
W9NFN, David L. Porter, Gladewater, TX
KB9UWO, Calvin C. Burke, Carmel, IN
KIØAH, James R. Walker, Canon City, CO
KØDHI, George Boller, Winona, MN
KØFW, Fred Wuenschel, Clermont, FL
WØLY, Daniel J. Weisser, San Diego, CA
WØPIK, Carl E. Zitzman, Lonedell, MO
WØRSX, Stanley I. Richardson, Raytown, MO
WOØX, Frank Richards, Mebane, NC
VE5OJ, Donald Olson, Fort Qu'appelle, SK, Canada
VE6ABD, Paul E. Christiansen, Ponoka, AB, Canada

*Life Member, ARRL
**Charter Life Member, ARRL
‡Call sign has been re-issued through the vanity call sign program.

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

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator ♦ n1gzo@arrl.org

STRAYS

LIGHTHOUSE/LIGHTSHIP WEEKEND AUGUST 21-22

◊ This year's International Lighthouse/Lightship Weekend will be held from 0001 UTC Saturday, August 21 until 2359 UTC Sunday, August 22.

The event is *not* a contest. It is a special event weekend when amateur radio stations are established at lighthouses or lightships (not necessarily adjacent to salt water), and each group decides how it will operate the station with regard to modes and bands. Participants are not committed to being on the air during the entire period—operate as much as you can. There are no restrictions on antennas or power up to the legal limit. We are hoping that operators will enjoy themselves while making contact with as many stations as possible, giving priority to other lighthouse/lightship stations. Please take some time to work the slow operator, the newly licensed and QRP stations.

For more information, see **www.lighthouse.fsnet.co.uk/events/intlighthouseday.html**. *—Mike Dalrymple, GM4SUC*

ARTICLE RECOUNTS HAM RESPONSE TO 1953 NETHERLANDS FLOOD

◊ An article by Dick Rollema, PAØSE, in the April 2004 *Proceedings of the IEEE* tells the story of how Amateur Radio saved a great many lives during a devastating 1953 flood in The Netherlands. "The disaster," Rollema wrote, "illustrates a memorable example of the importance of communications technology and how it can be rapidly utilized by knowledgeable radio amateurs with much innovation, primarily on an *adhoc* basis, in order to help save human life."*—tnx Dave Robb, WØYRN*

I would like to get in touch with...

◊ other radio operators who used quenched spark in the 1930s. I used a Simon 1/4 kW quenched spark transmitter aboard a ship on the Great Lakes in 1932.*—Larry Briggs, W3MSN, 2832 Ridge Rd, Waldorf, MD 20603-6146*

◊ amateurs who were stationed at Field Station Berlin (ASA).*—H. A. (Harry) Arsenault, K1PLR;* **haa_1947@hotmail.com**

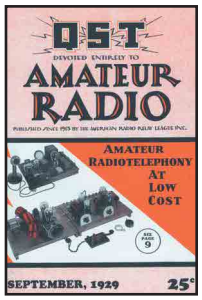
◊ anyone with information on Navy Bomber Squadron VB-109, PB4Y-1 aircraft, its radio equipment or Warren Hindenlang USNR, who may have held an Amateur Radio license before WW II.*—Warren Harding, K1BOX,* **k1box@arrl.net**

◊ anyone who has an old FCC Extra Class certificate that came with a serial number. *—Ken Copeland, K5KD, 9400 Moon Dr, Mabelvale, AR 72103-4940;* **k5kd@arrl.net**

◊ survivors of the Field Engineering Force of the Western Electric Co during WW II. The FEF provided information and training in the operation and maintenance of radar and fire control equipment for all branches of the US military.*—W. A. Bernath, K4UAS, 158 Buckingham Rd, Winston-Salem, NC 27104-4118;* **wbernath@bellsouth.net**

75, 50 AND 25 YEARS AGO

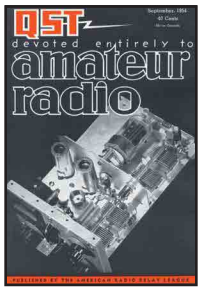
September 1929



♦ The cover photo shows a small breadboard transmitter—"Amateur Radiotelephony at Low Cost." The editorial points out, with pride, the advantages of the League's form of self-government, and urges members to cast their ballots when elections are held for their division directors.

Jim Lamb, W1CEI, and Beverly Dudley, W1AL, describe "An Effective Low-Cost 'Phone and C.W. Transmitter of Modern Design," the cover article. L. G. Windom, W8GZ/W8ZG, presents "Notes on Ethereal Adornments," with practical design data for the single-wire-fed Hertz antenna. "XYL," by Eulalia Thomas, "(Mrs.) W8CNO," was written in response to *QST*'s request for an article about "impressions of ham radio by an XYL operator, especially those concerning the idiosyncrasies of the male of the species." L. W. Hatry discusses "Improving the All-Purpose Super-Heterodyne." "W9CJC" is the fifth entry in the Station Description Contest. In "Strays," W6NW passes along a suggestion that he got from F. L. Dewey of the Mackay Radio Company: To keep your bug from sliding around the tabletop as you key, "Just moisten the feet on the bottom of the bug and press the bug down firmly on the table."

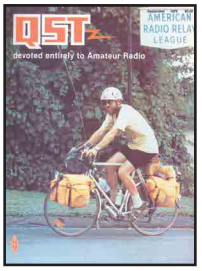
September 1954



♦ The cover photo shows the latest rig by Vern Chambers, W1JEQ, to be described in next month's issue. The editorial further discusses the new ham exams by mail, with ARRL-affiliated clubs stepping up to administer the exams in a uniform manner.

Dick Turrin, W1IMU, tells about "The 'Tur-Key' in Miniature," a new and smaller version of his popular electronic keyer circuit. Ed Tilton, W1HDQ, asks "Have You Tried V.H.F. Mobile?" H. F. Priebe, W2TGP, tells the reader how to "Build Your Own Panoramic Adapter." Bob Letter, W2YFM, uses "A Broad-Band Bandswitching Converter/Preselector" to improve the performance and extend the tuning range of military surplus receivers. To help the new Novices avoid TVI problems, Lew McCoy, W1ICP, tells them how to build "The Tin Can Low-Pass Filter." The "Recent Equipment" column tells us about the new Johnson Viking Ranger. Changes in FCC rules have made most medical diathermy machines obsolete (the machines use R.F. for deep heating of human tissue). A. W. Anthony, W1CTE, bought one for $10 and converted it to a high-power rig he calls "A Low-Cost Gallon." The article warms the heart of a true ham.

September 1979



♦ The cover photo shows Dave Howerton, WA7ABI, near the end of his cross-country bicycle ride, using 2 meters along the way. The editorial reports that the League Board of Directors is of the opinion that there might be too many hamfests nowadays.

Helge Granberg, K7ES/OH2ZE, discusses "Printed Line Techniques Applied to VHF Amplifier Design" on 2 meters. Doug DeMaw, W1FB, tells about "The Low-Bander's Special," an SB-200 amplifier that was modified to work on only 160, 80 and 40 meters. "Ionospheric Ducting at HF," by Vit. Kanevsky, UL7GW (translated by Ned Raub, W1RAN), suggests that magnetic fields around the Earth's tectonic plates may promote "pipeline" propagation. "The Great Ionospheric-Hole Experiment," by P. A. Bernhardt and amateurs W1BZT, W6QYT, W6JTH, W6ISQ and W1JR, asks that hams watch for propagation vagaries following a planned rocket launch that might deplete the ionosphere over the West Indies. Ray Brandt, N9KV, helps the visually handicapped community, with "An Audio Tone-Shift Power/SWR Meter." A "Strays" item tells about Fr Marshall Moran, 9N1MM, of Nepal, and shows photos of Fr Moran with Mac Maurer, W1QMS, during Mac's tour of Nepal. QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW Schedule

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	TELEPRINTER BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	TELEPRINTER BULLETIN				
6:45 PM	7:45 PM	8:45 PM	9:45 PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**
Frequencies are 1.8175, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 2001 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. See "Contest Corral" in this issue. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. The fee structure is $10 for a certificate, and $7.50 for endorsements.

♦ **Teleprinter transmissions:**
Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz. Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.
On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**
Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**
On Fridays, UTC, a DX bulletin replaces the regular bulletins.
W1AW is open to visitors 10 AM to noon and 1 PM to 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy. In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, Presidents' Day (Feb 16), Good Friday (Apr 9), Memorial Day (May 31), Independence Day (Jul 5), Labor Day (Sep 6), Thanksgiving and the following Friday (Nov 25-26), and Christmas Day (Dec 24). QST

SPECIAL EVENTS

Pikes Peak, CO: Colorado 14er Event Task Force, Various calls. 1500Z-1800Z **Aug 15**. Colorado 14er Event. 147.42 21.330 14.260 14.060. QSL. Bob Witte, 21060 Capella Dr, Monument, CO 80132. **www.14er.org**. Contact 10+ summits for award.

Tuckerton, NJ: Old Barney Amateur Radio Club, W2T. 1300Z **Aug 21**-2200Z **Aug 22**. ARLHS Lighthouse #USA-911 and 4th Annual Classic Boat Festival. 14.280 7.280 146.835. QSL. Bob Schenck N2OO, PO Box 345, Tuckerton, NJ 08087.

Various, England: Royal Signals Amateur Radio Society, GB6LOP. 0700Z **Aug 28**-2359Z **Sep 22**. 60th Anniversary of the Liberation of Paris 1944. 21.070 21.056 14.070 14.056. QSL. Mike Humphrey, GØSWY/KF4OFR, 4 Bluebell Rd, Bassett Southhampton, Hampshire, England SO16 3LQ. **www.rsars.org.uk**.

Canfield, OH: 20 Over 9 and MVARA Radio Clubs, W8F. 1400-0200Z daily **Sep 1**-**Sep 6**. 158th Canfield Fair. 28.360 21.360 14.260 7.260. Certificate. Allan Avnet, AB8AA, 2050 East South Range Rd, New Springfield, OH 44443. **www.qsl.net/20over9/w8fair.htm**.

Tacoma, WA: Radio Club of Tacoma, W7J. 2200Z **Sep 3**-1900Z **Sep 6**. First BSA Washington State Jamboree "WashJam." 147.28 14.260 7.260 3.910. QSL. Radio Club of Tacoma W7DK, PO Box 11188, Tacoma, WA 98411.

Argonia, KS: Boeing Employees Amateur Radio Society of Wichita, KS, KCØAHN. 1400Z **Sep 3**-2000Z **Sep 6**. Airfest (sponsored by Klodubusters). 28.365 21.365 14/265 7.265. Certificate. Boeing Employees Amateur Radio Society, Randy Wind, NØLD, 13038 SW 186th St, Rose Hill, KS 67133-8559. **www.ourtownusa.com/~bears/**.

Piqua, OH: Piqua Amateur Radio Club, W8SWS. 1400Z-2200Z **Sep 4**. Piqua Heritage Festival—celebrating Piqua's rich history. 14.240 7.240. Certificate. Susan Popp, 1411 Nicklin Ave, Piqua, OH 45356.

Stroudsburg, PA: Pocono Amateur Radio Klub and Eastern Pennsylvania Amateur Radio Association, W3PRK/N3IS. 1400Z-2000Z **Sep 4**. Pocono Garlic Festival. 7.250. Certificate. Dave Haney, W3SJ, RD 1 Box 1250, Stroudsburg, PA 18360. **www.qsl.net/w3prk**.

Heston, IN: NorthWest Indiana Skywarn, K9NWI. 1000Z **Sep 4**-0500Z **Sep 5**. Labor Day Steam Show. 28.500 21.350 18.150 14.250. QSL. Bernie Gawronski, 951 North 100 West, Chesterton, IN 46304.

Laguna Woods, CA: Leisure World Amateur Radio Club, W6LY. 1700Z **Sep 4**-2100Z **Sep 5**. Celebrating the 40th Birthday of Leisure World, Laguna Woods. 28.380 14.250 7.250 14.070 PSK. Certificate. Ernie Senser, 3031 Calle Sonora Unit B, Laguna Woods, CA 92637.

Newark, DE: NERDS, NY3C. 0000Z **Sep 4**-2300Z **Sep 6**. Only Revolutionary War battle fought in Delaware at Cooch's Bridge. 21.270 14.270 7.270 3.870. Certificate. Gene McDowell, NY3C, 1705 Godwin Dr, Newark, DE 19702.

Paradise, AZ: Cochise Amateur Radio Association, K7RDG. 1800Z **Sep 4**-1600Z **Sep 6**. 25th anniversary Trek to Ghost Town of Paradise, AZ. 21.307 18.115 14.305 7.230. Certificate. Cochise ARA, PO Box 1855, Sierra Vista, AZ 85636-1855.

Schaumburg, IL: Schaumburg Amateur Radio Club, N9RJV. 1300Z **Sep 4**-0300Z **Sep 7**. Septemberfest. 21.340 14.250 14.035 7.250. QSL. Schaumburg Amateur Radio Club, PO Box 68251, Schaumburg, IL 60168-0251. **www.n9rjv.org**.

San Bernardino, CA: Citrus Belt Amateur Radio Club, W6A-W6O. 0000Z **Sep 4**-2400Z **Sep 12**. 5th annual Route 66 On The Air. 28.466 21.266 14.166 7.266. Certificate. Citrus Belt Amateur Radio Club, PO Box 3788, San Bernardino, CA 92413. **www.qsl.net/w6jbt**.

New Philadelphia, OH: Tusco Amateur Radio Club, W8ZX. 1300Z-1800Z **Sep 5**. Harry Clever Field Aviation Fly-in and the Wright Flyer. 14.300 7.250 3.950. Certificate. Tim Ashcraft, 502 Oakdale Dr, Dover, OH 44622. **www.noard.com/tuscoarc.htm**.

Parsons, WV: Mountain State Transmitters Amateur Radio Club, W8T. 1400Z-2000Z **Sep 5**. The Tucker County Hick Festival. 14.235 14.050 7.235 7.050. Certificate. Mountain State Transmitters Inc, PO Box 1492, Elkins, WV 26241.

Paterson, NJ: Robert D. Grant United Labor Amateur Radio Association, N2UL. 1200Z-2200Z **Sep 9**. CQ Labor Day from Great Falls. 28.460 14.260. Certificate. RDGULARA, c/o WA2VJA, 112 Prospect St, Nutley, NJ 07110-0716.

Hebron, CT: NARL, W1H. 1600Z **Sep 9**-0200Z **Sep 12**. Amateur Radio promotion for the general public. 28.385 21.350 14.260 7.235. Certificate. Ronald F. Cady, 110 Four Mile Rd, West Hartford, CT 06107. **www.narl.net**.

Rochester, MN: Rochester Amateur Radio Club, WØU. 0000Z **Sep 9**-0000Z **Sep 20**. Rochester MN Sesquicentennial. 28.380 21.380 14.280 7.280. QSL. WØU Rochester 150, c/o Chuck Gysi, N2DUP, PO Box 142, Rochester, MN 55903-0142. **www.RARChams.org**.

Findlay, OH: Findlay Radio Club, W8F. 2200Z **Sep 10**-1900Z **Sep 12**. 65th Annual Findlay Hamfest. 147.15/75 14.300 7.250. QSL. Bill Gaines, 624 S Main St, Bluffton, OH 45817.

West Alexander, PA: Washington Amateur Communications, WA3COM. 2200-0300Z daily **Sep 10**-**Sep 12**. West Alexander Fair. 21.300 14.250 7.275 3.975. QSL. Ed Oelschlager, N3ZNI, 60 Carl Ave B-2, Eighty Four, PA 15330.

Boulder, CO: Boulder Amateur Radio Club Kids Auxiliary, K1D. 1600Z-2200Z **Sep 11**. BARC/JR has been getting young hams on the air for 11 years! 21.310 14.310 7.310. Certificate. Richard Weingarten, 1133 Northridge Dr, Erie, CO 80516.

Hermitage, MO: Old Hickory ARC, KØA. 1300Z-2100Z **Sep 11**. Hermitage Fall Festival. 18.115 3.963 147.180 147.060. Certificate. Richard E. Hut KCØFDF, PO Box 96, Wheatland, MO 65779.

North Judson, IN: Starke County Amateur Radio Club, W9JOZ. 1300Z-2100Z **Sep 11**. Hoosier Valley Railroad Museum Open House. 14.240 7.240. QSL. Starke County ARC, 405 W Jackson St, Knox, IN 46534.

Roanoke, VA: Roanoke Valley Amateur Radio Club, W4CA. 1400Z-2100Z **Sep 11**. Commemorating N & W Steam Locomotives. 14.260 7.260. QSL. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175.

Decatur, IL: Macon County ARES, K9MCA. 0900Z **Sep 11**-1600Z **Sep 12**. Special Olympics Weekend. 21.350 14.280 7.275. Certificate. Don Wright, 134 N Westdale Pl, Decatur, IL 62522.

Henri-Chapelle, Belgium: GDV Group (Club Station ON4GDV), ON60USA. 0800Z **Sep 11**-1800Z **Sep 12**. From the WWII American Military Cemetery, honoring the memory of all men who gave their lives in WWII. 21.250 14.205 14.044 7.044. QSL. Groupement Radio-Amateur de Verviers, Rue des Prairies, 8, Verviers, Belgium B-4800. **www.qsl.net/on4usa**.

New York City, NY: New York City Transit Amateur Radio Club, K2IRT. 1000-2200Z daily **Sep 11** and **Sep 12**. Centennial Celebration of the New York City Subway 1904-2004. 28.325 21.340 14.250 7.240. Certificate. Robert Lobenstein, NYCT-ARC, 333 W 53rd St, New York, NY 10019. **roloben@nyct.com**.

Brooklyn, NY: Kings County Repeater Association, KC2RA. 1300Z-1900Z **Sep 12**. September 11th Memorial Station from Owls Head Park. 28.340 21.340 14.250. QSL. KCRA, PO Box 285, Brooklyn, NY 11228. Rain date is September 19, 2004. **kc2ra.org/special.htm**.

Big Rock, IL: DeKalb County Amateur Radio Operators, W9P. 1300Z **Sep 15**-2100Z **Sep 20**. 110th Annual Big Rock Plowing Match. 28.390 7.245 14.275 7.115 CW. Certificate. Bob Yurs, W9ICU, PO Box 341, Sycamore, IL 60178. **www.w9icu.com**.

Mena, AR: Ouachita Amateur Radio Association, W5HUM. 1300-2000Z daily **Sep 17** and **Sep 18**. Lum'n Abner radio program and 100th anniversary of museum building. 21.300 14.250 7.235 3.895. QSL. OARA, 268 Polk 36, Hatfield, AR 71945.

Freedom Township, OH: Portage Amateur Radio Club, KB8UUZ. 2100Z **Sep 17**-0200Z **Sep 20**. National POW/MIA Awareness Day. 28.375 21.375 14.235 7.245. Certificate. Tom Parkinson, 9992 State Route 700, Mantua, OH 44255.

Bennington, VT: Southern Vermont Amateur Radio Club, N1B. 1300Z **Sep 18**-1700Z **Sep 19**. Bennington Antique Car and Motorcycle Show. 14.285. Certificate. Ken Lanoue, KB1GSZ, 30 East St, Bennington, VT 05201. **www.classypages.com/sovarc/**.

Sardinia, OH: USS *Jurassic* Star Trek and Amateur Radio Club, W8J. 1400Z-2100Z **Sep 18**. Tenth Anniversary of the USS *Jurassic* club. 14.280 gen portion 40/20/15m. Certificate. Carolyn Donner, PO Box 158, Hamersville, OH 45130. **www.qsl.net/k8ssj**.

Slidell, LA: Ozone Amateur Radio Club, W5SLA. 1300Z-1000Z **Sep 18**. 40th Birthday of the Ozone Amateur Radio Club. 14.250 14.035 7.240. QSL. Ozone Amateur Radio Club, PO Box 553, Slidell, LA 70459.

Luray, VA: Richmond Amateur Radio Club, K4R. 1000Z **Sep 18**-1600Z **Sep 19**. Richmond Amateur Radio Club Fall Expedition Event. 14.245 7.245 3.845 144.190 50.190. QSL. Richmond Amateur Radio Club Fall Expedition Event, PO Box 35279, Richmond, VA 23235. **www.rarclub.net**.

Waterloo, AL: Muscle Shoals Amateur Radio Club, W4JNB. 1400Z **Sep 18**-0200Z **Sep 19**. Commemorating the 1838 Indian "Trail of Tears" in SE USA. 21.360 14.260 7.260 3.860. Certificate. MSARC, PO Box 3782, Muscle Shoals, AL 35662.

Eldon, MO: Lake of the Ozarks Amateur Radio Club, WØW. 1600Z-2200Z **Sep 25**. Early Days Power and Tractor Show. 28.400 21.340 14.240 7.240. Certificate. John Baremore, KCØCRO, 182 Bear Paw Cr, Camdenton, MO 65020.

Otsego, MI: Allegan County Amateur Radio Club, KC8ITU. 1200Z-1700Z **Sep 25**. 17th Annual Art Festival. 21.335 14.235 7.235. Certificate. ACARC, David Catalano, N8KQS, 3324 Pine Tree Dr, Allegan, MI 49010.

Springfield, IL: Sangamon Valley Radio Club, W9DUA. 1600Z **Sep 25**-2000Z **Sep 26**. 3rd Annual International Route 66 Mother Road Festival. 14.280 14.250. QSL. Sangamon Valley Radio Club, 1025 S Sixth Street, Springfield, IL 62703. **www.w9dua.com**.

Tulsa, OK: Tulsa Amateur Radio Club, W5IAS. **Sep 25**. From Chandler Park, celebrating 80 years of service to the Tulsa area Amateur Radio community. 10 15 20m. Certificate. Tulsa ARC, 3701 Stevens Ave, Sand Springs, OK 74063. **www.w5ias.com**.

Milton, ON, Canada: Mississauga Amateur Radio Club, VC3HCR. 1400-2000Z daily **Sep 25** and **Sep 26**. 50th Anniversary of Halton County Radial Railway Museum. 28.480 21.315 14.240 7.227. Certificate. MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Cres, Mississauga, ON L5N 1X6 Canada. **www.marc.on.ca**. Non-Canadians, send 2 IRCs or Green Stamps to cover postage.

Springfield, MO: Southwest Missouri Amateur Radio Club, WØEBE. 1500Z-2300Z **Sep 25**. Vote for your favorite grilled picnic meat! 14.300. Certificate. Erik Weaver, NØEW, 4857 E Farm Rd 136, Springfield, MO 65809. **www.smarc.org/k0g/**. QST

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

CONTEST CORRAL

W1AW Qualifying Runs are 10 PM EDT Friday, September 3 (0200Z September 4), and 7 PM EDT Wednesday, September 15 (2300Z). The K6YR West Coast Qualifying Run will be 9 PM PDT Wednesday, September 22 (0400Z September 23). Check the W1AW schedule elsewhere in this issue for details.

Feedback

In the 2004 ARRL January VHF Sweepstakes article in the August 2004 issue of *QST*, the call sign of **K2DRH** was inadvertently listed as K9DRH in one place. Also, in the Affiliated Club Competition Box, the Northern Lights Radio Society should be listed in the Unlimited instead of Medium category.

Abbreviations

SO—Single-Op; M2—Multiop—2 Transmitters; MO—Multi-Op; MS—Multi-Op, Single Transmitter; MM—Multi-Op, Multiple Transmitters; AB—All Band; SB—Single Band; S/P/C—State/Province/DXCC Entity; HP—High Power; LP—Low Power; Entity—DXCC Entity

No contest activity on 30, 17 or 12 meters. Refer to the contest Web sites for information about awards. Unless stated otherwise, regional contests only count QSOs with stations in the region. Publication deadline for Contest Corral listings is the first of the second month prior to publication.

Sep-Oct

VHF Fall Sprints—CW/Phone/Digital—sponsored by the Southeastern VHF Society as follows: 144 MHz—7-11 PM local Sep 20; 222 MHz—7-11 PM Sep 28; 432 MHz—7-11 PM Oct 6; Microwave—902 MHz and higher—6 AM-1 PM Oct 16; 50 MHz—2300Z Oct 23-0300Z Oct 24. Fixed and Rover categories. Exchange: Grid Square. QSO Points: 1 pt/QSO. Score is QSO Points × Grid Squares; score each sprint separately. Rovers all grids worked from each grid. For more information: **svhfs.org fall_sprint_rules.htm**. Logs must be e-mailed or postmarked within four weeks of the contest. 144 MHz logs to **ottf@wbia.net**, or to Ottmar Fiebel, W4WSR, PO Box 957, Hayesville, NC 28904. 222 MHz logs to **k4sz@arrl.net** or Bob Lear, K4SZ, PO Box 1269, Dahlonega, GA 30533. 432 MHz logs to **w4kxy@arrl.net** or Jim Worsham, W4KXY, 1915 Oak Wind Ln, Buford, GA 30519-6766. Microwave logs to **rover@wireco.net**, or to Greg Robinson, KB4NVD, 208 Dogwood Acres Rd, Hampton, TN 37658-3348. 50 MHz logs to **wa4njp@bellsouth.net** or via postal mail to Ray Rector, WA4NJP, 3493 Holly Springs Rd, Gillsville, GA 30534.

Sep 4-7

All-Asian DX Contest—Phone, 0000Z Sep 4-2400Z Sep 5 (see June *QST*, p 98 or **www.jarl.or.jp/English/4_Library/A-4-3_Contests/2004AA_Rule.htm**).

IARU Region 1 Field Day—SSB—sponsored by IARU Societies, 1300Z Sep 4-1300Z Sep 5 (see June *QST*, p 98). Frequencies: 160-10 meters. Categories: SOAB (LP, QRP), MS (HP, LP). Exchange: RST and serial number. QSO Points: non-EU to EU—3 pts, with portable EU stations 4 pts. Score: QSO points × DXCC and WAE entities counted once/band. For more information: **www.iaru.org** or IARU Region 1 society Web sites. Send logs to the appropriate national societies (NA hams to RAC or ARRL).

DARC 10-Meter Digital Contest—Digital Modes—sponsored by the Deutsche Amateur Radio Committee, 1100Z-1700Z Sep 5. Frequencies (MHz): 28.050-28.150 on RTTY, Pactor, PSK31, Amtor, Clover. Categories: SO, SWL. Stations may be worked on each mode, but count for multipliers only once. Exchange: RST + serial number. QSO Points: 1 pt/QSO. Score: QSO Points × WAE countries + DXCC entities + W/VE/JA districts. For more information: **www.darc.de/referate/hf/contest/dl9gs.** Logs due 4 weeks after the contest to **dl9gs@darc.de** or to Alfred Schlendermann, DL9GS, POB 10 22 01, D-44722 Bochum, Germany.

MI QRP Labor Day CW Sprint, 2300Z Sep 6-0300Z Sep 7 (see Jan *QST*, p 98 or **www.qsl.net/miqrpclub/**).

Sep 8-13

North American Sprint—CW, 0000Z-0400Z Sep 12 (see Feb *QST*, p 103 or **www.ncjweb.com**).

YLRL Howdy Days—CW/SSB—sponsored by the YL Radio League, 1400Z Sep 8-0200Z Sep 10, work 24 out of the 36 hour period. Exchange: YLRL Member or not. QSO Points: non-YLRL member—1 pt, YLRL members—2 pts. Score is total points. For more information: **www.ylrl.org**. Logs due 30 days after the contest to Mary Moore, WX4MM, 216 Lee Road 343, Salem, AL 36874.

WAE DX Contest—SSB, 0000Z Sep 11-2359Z Sep 12 (see Aug *QST*, p 94 or **www.darc.de/referate/dx**).

ARRL September VHF QSO Party, 1800Z Sep 11-0300Z Sep 13 (see Aug *QST*, p 107 or **www.arrl.org/contests**).

Russian RTTY WW Contest, sponsored by *Radio*, from 0000Z-2400Z Sep 4. Frequencies: 80-10 meters. Categories: SOAB, SOSB, MS, SWL. Exchange: RST + WAZ zone or Russian Oblast. QSO Points: own continent—5 pts, different cont—10 pts. Score: QSO points × DXCC entities + Russian oblasts, each counted once per band. Logs due Oct 4 to **contest@radio.ru** or Radio Magazine, Seliverstov per 10, 107045 Moscow, Russia.

Second-Class Operators Club (SOC) Marathon Sprint—CW, from 1800Z to 2400Z Sep 11. (Most sprints run four hours, but since we're Second Class Ops, we need more time!) Frequencies: 160-10 meters. Categories: SOAB. Exchange: RST + S/P/C + SOC number or power output. QSO Points: SOC member—5 pts, non-member same continent—2 pts, diff cont—4 pts. Score: QSO points × S/P/C counted once per band × Power Multiplier (<250 mW ×15, <1 W ×10, <5 W ×7, >5 W ×1). Multiply by 1.5 if using a homebrew paddle. Logs due 30 days after the contest to **n4bp@arrl.net** or via postal mail to Bob Patten, N4BP, 2841 NW 112 Terr, Plantation, FL 33323.

Tennessee QSO Party—CW/Phone—sponsored by the Tennessee Contest Group, 1800Z Sep 12-0100Z Sep 13. Frequencies (MHz): CW—1.815, 3.540, 7.040, 14.040, 21.040, 28.040; SSB—1.855, 3.900, 7.240, 14.280, 21.390, 28.390; Novice/Tech—3.700, 7.130, 21.140, 28.140, 28.390; VHF/UHF—50.195, 144.195, 146.55, 223.5, 446.0. Exchange: RS(T) and TN county or S/P/C. QSO Points: HF Phone—2 pts, HF CW—3 pts, VHF Phone—4 pts, VHF CW—6 pts. Score: QSO points × TN counties (TN stations add S/P/C) counted only once. TN stations claim one additional multiplier for every 5 QSOs with the same TN county. Bonus points: 100 points for each QSO with K4TCG and TN mobiles add 500 points for each TN county activated. For more information: **www.k4ro.net/tcg/tqp/tqp04_rules.html**. Logs due Oct 12 to **w9wi@w9wi.com** or to TN QSO Party c/o Doug Smith, W9WI, 1389 Old Clarksville Pike, Pleasant View, TN 37146-8098.

Sep 18-19

ARRL 10 GHz Cumulative Contest, 0600 local-2400 local Sep 18-19 (see Aug *QST*, p 107 or **www.arrl.org/contests**).

North American Sprint—SSB, 0000Z-0400Z Sep 19 (See Feb *QST*, p 103 or **www.ncjweb.com**).

Scandinavian Activity Contest—CW—sponsored by Sveriges Sändareamatörer (SSA), 1200Z Sep 18-1200Z Sep 19 (Phone, 1200Z Sep 25-1200Z Sep 26). Frequencies: 80-10 meters. Categories: SOAB (QRP <5 W, LP <100 W, HP), MS, SWL. Exchange: RS(T) + serial number. QSO Points: EU stations—1 pt, Non-EU—1 pt on 20—10, 3 pts on 80-40. Finals score is QSO pts × Scandinavian call areas counted once per band. For more information: **www.sk3bg.se/contest/text/sacnsc.txt**. Logs due Oct 31 to **sac@ssa.se** or to SACCW or via postal mail to SACSSB, Jan-Eric Rehn, SM3CER, Lisatåret 18, SE-863 32 Sundsbruk, Sweden.

Washington State Salmon Run—CW/SSB—sponsored by the Western Washington DX Club, 1600Z Sep 18-0700Z Sep 19 and 1600Z-2400Z Sep 19. Frequencies: 160-6 meters. Categories: SO (CW, SSB or Mixed Mode, QRP <5 W, LP <200 W, HP), MS, Washington Club Station, Mobile, Washington County DXpedition, SWL. Exchange: RS(T) and S/P/C or county (for WA stations). QSO Points: SSB—2 pts, CW—4 pts. Work Portables and Mobiles from each county, log county line QSOs as 2 separate QSOs. Score: QSO points × WA counties (WA stations use S/P/C + WA counties) counted once only. QSOs with W7DX add 500 bonus points for each mode—total 1000 points. For more information: **www.wwdxc.org**. Logs due Oct 31 to **salmonrun@wwdxc.org** or to Western Washington DX Club, PO Box 395, Mercer Island, WA 98040.

South Carolina QSO Party—Phone/CW/Digital—sponsored by the Sumter Amateur Radio Association (SARA), 1300Z Sep 18-2100Z Sep 19, 2004. Frequencies (MHz): CW—1.805 and 50 kHz from band edge, Phone—1.845, 3.860, 7.260, 14.270, 21.370, 28.370, 50.125, 144.200, 146.58, 223.50, 446.00. No repeater or cross-band QSOs, work stations again from each county. Categories: SOAB, SC Mobile. Exchange: Serial Number and SC county or S/P/C. QSO Points: Phone—1 pt, CW—2 pts, Digital—3 pts. Score: Total QSO points × power multiplier (<5 W ×5, <150 W ×2, >150 W ×1) × SC counties (counted only once) × SC counties activated (SC Mobile only). 300 bonus points for QSO with N2ZZ or W4GL. For more information: **www.geocities.com/CapeCanaveral/2695/SCQSOWeb.htm**. Logs due Oct 18 to SAR SC QSO Party Entry, PO Box 193, Sumter, SC 29151-0193.

Mediterranean Islands Contest—CW/SSB—sponsored by the Mediterranean DX Club, from 1200Z Sep 18-1200Z Sep 19. Frequencies: 80-10 meters. Categories: SO Island Resident, SO and MM Island Dispatch (Expedition), and SO Non-Island; CW, SSB, and Mixed (all categories except MM, Mixed only). Exchange: RST + MIA island number or serial number. QSO Points: Island stations—5 pts, otherwise 1 pt. Score: QSO points × MIA islands counted once per band/mode. For more information: **www.mdxc.org/contestmia/rules.htm**. Logs due 30 days after the contest to **ik8vrn@mdxc.org** or via postal mail to Mr. Gianfranco Lai, Corso Umberto I°, 285/G, 80034 Marigliano, Naples, Italy or Gianfranco, PO Box 5, 80034 Marigliano, Naples, Italy.

QCWA Fall QSO Party—Phone/CW/Digital—sponsored by the Quarter Century Wireless Association from 1800Z Sep 18-1800Z Sep 19. Frequencies (MHz): CW—1.810, 3.540, 7.035, 14.040, 21.050, 28.050; Phone—1.910, 3.890, 7.244, 14.262, 21.365, 28.325 plus all VHF/UHF bands, no crossband or repeater QSOs. Categories: Mixed, Phone, CW/Digital. 15 QSOs with each station maximum and only one QSO with stations in home QCWA chapter. Exchange: Last two digits of year licensed and QCWA chapter or S/P/C. QSO Points: Phone—1 pt, CW/Digital—2 pts. Score: QSO Points × QCWA chapters + S/P/C counted once per band. W2MM counts as a 3-point multiplier on each band. For more information: **qcwa.org/2004-qso-party-rules.htm**. Send logs to **W2od@aol.com** or via postal mail to Robert Buus, W2OD, 8 Donner St, Holmdel, NJ 07733-2004.

Fall QRP Homebrewer Sprint—CW/PSK31—sponsored by New Jersey QRP Club, 0000Z-0400Z Sep 27. Frequencies: QRP CW and PSK31 frequencies on 80-10 meters. CW and PSK31 are considered separate bands. Exchange: RST + S/P/C + output power. QSO Points: commercial equipment—2 pts,

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homebrew xmtr or rcvr—3 pts, homebrew xmtr and rcvr or xcvr—4 pts. Kits okay as homebrew. Power Multiplier: 0>250 mW = ×15, 250 mW>1 W = ×10, 1-5 W = ×7, >5 W = ×1. Score: QSO Points × S/P/C (counted once per band) × power multiplier. For more information: **www.njqrp.org/data/qrphomebrewersprint.html**. Logs due 30 days from the contest to **n2cq@arrl.net** (text format) or to Ken Newman, N2CQ, 81 Holly Dr, Woodbury, NJ 08096.

QRP Afield—CW/Phone/Digital—sponsored by the New England QRP Club, 1500Z Sep 18-0300Z Sep 19, submit a log for the best 6 hr period of the contest. Frequencies: 160-10 meter QRP calling frequencies, work stations once per band and mode. Categories: SO and MS. Exchange: RS(T), S/P/C, and NE-QRP number or power. QSO Points: HP (>5 W) fixed station—1 pt, HP mobile or portable—2 pts, QRP fixed—5 pts, QRP mobile or portable—10 pts. QSOs with WQ1RP score triple points. Score: QSO points × SPC (counted once only). For more information: **www.qsl.net/wq1rp/main.htm**. Logs due Oct 15 to **k1cl@arrl.net** or to Chuck Ludinsky, K1CL, 6 Prancing Rd, Chelmsford, MA 01824-1922.

Collegiate QSO Party—CW/SSB/Digital, sponsored by the Collegiate Amateur Radio Association (CARA), 1200Z Sep 18-0400Z Sep 19. Frequencies: 160-10 meters. Categories: SO, MS, MM, packet spotting is allowed for all categories, no self-spotting. Exchange: Serial number and name of institution (for clubs) or operator (SO). QSO Points: 5 pts/QSO, see Web site for bonuses. Score: QSO points × clubs worked, counted once per band and mode. For more information: **www.qth.com/collegiate/qsopartyrules.htm.** Logs due Oct 20 to **qsoparty@collegiatehams.com** or to CARA, PO Box 150232, Alexandria, VA 22315-0232.

Sep 25-27

CQ Worldwide RTTY DX Contest—sponsored by *CQ Magazine* from 0000Z Sep 25-2400Z Sep 26. Frequencies: 80-10 meters. Categories: SOAB (LP, HP>150 W), SOSB, Assisted (AB only), MS (LP, HP), M2, MM. Exchange: RST + CQ Zone (W/VE stations also send state/province). QSO Points: own country—1 pt, different country, same continent—2 pts, diff cont—3 pts. Score: QSO points × S/P/C (incl WAE countries) + CQ Zones counted once per band. For more information: **www.cq-amateur-radio.com.** Logs due Oct 29 in Cabrillo format to **rtty@cqww.com**.

Scandinavian Activity Contest—SSB—1200Z Sep 25-1200Z Sep 26 (see Sep 18-19).

Arkansas QSO Party—CW/SSB/PSK31—sponsored by K1ARK, from 1400Z Sep 25-0600Z Sep 26 and 1800Z Sep 26-0200Z Sep 27. Frequencies (MHz): CW—3.550, 7.050, 14.050, 21.050, 28.050; Phone—3.980, 7.260, 14.260, 21.360, 28.360, 145-147; PSK—3.580, 7.070, 14.070, 21.080, 28.120. Categories: SO, MS, Mobile, HP, LP, QRP, PSK. Exchange: RST, state or province or AR county, DX stations send "DX." QSO Points: PSK—3 pts, CW—2 pts, SSB—1 pt. Mobile stations may be worked each time the station changes counties. Score: QSO points × AR counties (AR station also count states and provinces) + bonuses for QSOs with W5YM (25 pts per band/mode) and AR ARRL-affiliated club stations (10 pts counted only once). For more information: **www.arkan.us**. Logs due 30 days after the contest to **k1ark@arrl.net** or to Bill Smith, K1ARK, 3032 Strawberry Dr, Fayetteville, AR 72703.

Texas QSO Party—CW/Phone/Digital—sponsored by Northwest Amateur Radio Society (NARS), 1400Z Sep 25-0200Z Sep 26 and 1400Z-2000Z Sep 26. Frequencies (MHz): CW—40 to 60 kHz above bottom of band, Phone—25 kHz above edge of General segments and 28.300-28.500, VHF—50.2, 144.2. Categories: Fixed Stns—SO-Mixed (HP and QRP <5 W CW, <10 W Phone), SO-CW, MO; Mobile (Texas Only)—SO-Mixed, SO-CW, MO. Exchange: RST + TX County or S/P/C or MM region. QSO Points: Phone—2 pts, CW/Digital—3 pts. Score: QSO points × TX counties (TX stations add S/P/C). Multipliers counted only once. Add 500 points for every 5 counties from which a specific TX Mobile is worked. Texas mobiles add one thousand (1000) points to final score for every county activated with five or more QSOs. For more information: **www.txqp.org**. Logs due Oct 31 to **k5cx@arrl.net** or via postal mail to Texas QSO Party Committee, 16880 East Maglitto Cir, Tomball, TX 77377-8414.

Alabama QSO Party—CW/Phone—sponsored by the Central Alabama HF/VHF Contesting Club, 1800Z-2400Z Sep 27. Frequencies: 160-70 cm, SSB, CW, and FM contacts count separately. Categories: SO, MS, Rover, QRP (<5 W), LP (< 200 W), HP. Exchange: RST and S/P/C. Work Rover stations in each county. QSO Points: 1 pt/QSO. Scoring: AL stations—QSOs × states + AL counties + DXCC entities counted once per band. Non-AL stations—QSOs × AL counties counted once per band. For more information: **web.dbtech.net/~dxcc/page0004.htm**. Logs due 30 days after the contest to **dxcc@dbtech.net** or via postal mail to Alabama QSO Party, 4525 Eastern Hills Ln, Cottondale, AL 35453.

Classic Exchange (CX), 1300Z Sep 26-0700Z Sep 27, concurrent with AM International AM Discovery Weekend whose QSOs count for CX score. Frequencies (Mc): CW: 1.810, 3.545, 7.045, 14.045, 21.135, 28.180, AM: 1.890, 3.880, 7.290, 14.286, 21.420, 29.000, SSB: 3.870, 7.280, 14.270, 21.370, 28.490. Exchange RST, QTH, RX, TX, AMI number if available (AM only). QSO Points: 1 pt/QSO. Total Score: QSOs × (number of TX and RX worked + S/P/C counted once per band) × CX multiplier (age of all RX TX and XCVR used for at least 3 QSOs). For more information: **qsl.asti.com/CX**. Send logs to **wq8u@arrl.net** or to J. D. "Mac" Mac Aulay, WQ8U, 6235 Wooden Shoe Ln, Centerville, OH 45459.

2004 ARRL International EME Competition Announcement

October 9-10
(first 50-1296 MHz weekend)

October 30-31
(2304 and Up weekend)

December 4-5
(second 50-1296 MHz weekend)

0000 UTC Saturday-2359 UTC Sunday each weekend

How to participate: Any amateur station on any band 50 MHz and up may be worked utilizing the earth-moon-earth path. Both single operator and multioperator stations may participate as either multi-band or single band entries. CW, phone and digital QSOs are permissible, but only one contact per band regardless of mode.

What to say: All stations give both call signs and a signal report in a mutually understood format, plus a complete acknowledgment of the calls and report.

Special interest: You may work a station once per band for credit regardless of mode. Single band entries may make contacts on additional bands, and should report them in their entry.

Quirks: Stations must be worked over the earth-moon-earth path, regardless of how strong or weak a nearby station's terrestrial signal may be. Multioperator stations may work from different sites, provided the sites are no less than 50 km (30 miles) apart. Unless prohibited by your nation's rules, if operating from separate sites, a multioperator station uses the same call sign. In the US, if your call sign number does not properly indicate the call area from which you are operating, you must append the correct call area to your call (example: N1ND operating in Indiana should sign as N1ND/9).

Rule changes this year: **There are four significant rules changes for this year. First, the EME contest will be held over three separate weekends. The first and third weekends (October 9-10 and December 4-5) are for contacts only on the 50-1296 MHz bands. The second weekend is for contacts only on bands 2304 MHz and above.**

Multipliers within the US and Canada are now US states and Canadian provinces and territories instead of call areas. The third change is the addition of limited multiband categories for both Single and Multioperator entries.

In addition, US stations no longer must give a portable designator if operating away from their home QTH.

Best reason to participate: Whether an old-timer or newcomer, there is great pride in hanging the certificate for completing your first EME contact on the wall of your shack.

Relative challenge: To many, EME represents the height of technological challenge and achievement in Amateur Radio. Modern technology has made it somewhat easier to pull weak signal from the noise threshold, but the watchword for EME enthusiasts is still "Patience!"

Scoring: Score 100 QSO points for each completed EME contact. **You receive a multiplier for each US state and Canadian province/territory worked, plus each non-W/VE DXCC entity worked via EME on each band.** Final score is the total QSO points × the total multipliers.

How to report your score: Your entry must be postmarked or e-mailed by **January 5, 2005**. Cabrillo formatted logs are not required for the EME Competition but may be used provided a completed summary sheet also accompanies the entry. E-mail electronic submissions to **EMEcontest@arrl.org** or send paper logs and complete summary sheet to EME Contest, ARRL, 225 Main St, Newington, CT 06111.

Complete rules: The complete rules may be found at **www.arrl.org/contests/forms**. You will also find links to the General Rules for all ARRL Contests, General Rules for ARRL Contests on bands above 50 MHz (VHF) and other forms and operating aids, log sheets for submitting your entry. If you don't have Web access, you can obtain the complete rules and forms by sending a self-addressed, stamped envelope with 2 units of postage to EME Contest Rules, ARRL, 225 Main St, Newington CT 06111.

For more information: e-mail **contests@arrl.org** or phone 860-594-0232.

By **Scott Robbins, W4PA**
w4pa@yahoo.com

2004 ARRL International DX CW Contest Results

A 'tween year.

What's a "tween"? The most common definition is a kid who is past early childhood but hasn't made it to being a teenager. A "tween" would be an 11 year old, for example. In ham radio, the "tweens" are also related to an 11 year old, but in our case it refers to the 11-year peak and dip of the sunspot cycle. The ham radio "tweens" are those years between the cycle peak and cycle lull that can allow for some spectacular contest band conditions.

The cycle peaks usually see very high scores posted in contests for no other reason than open bands provide more opportunity for a large number of QSOs. Multiplier counts can be good, but generally suffer on the low bands at cycle peaks from lack of adequate low band conditions. The cycle dips are not good for high scoring because the low bands do not produce the sheer number of contacts needed, despite relative ease of finding and working low band multipliers.

The "tween" years provide an excellent opportunity—on the right weekend—for very high scores to be posted for ARRL DX CW and for records to be broken. The right weekend requires both quiet low band conditions for multiplier chasing and solid DX openings on 10 and 15 meters to occur.

Records fell like leaves as the bands showed a fabulous combination of solid high band DX openings and quiet low band conditions. From the W/VE side, new category records were set for domestic operators in the Single Operator High Power, Multioperator Single Transmitter, 40 meter single band and 80 meter single band categories. From the DX side, new high marks for Single Operator Low Power, Single Operator QRP, Single Operator Assisted, 80 meter single band and 160 meter single band were achieved.

Though no new record was set in the category, the most competitive race of 2004 was DX Multioperator Two Transmitter that saw 4 Caribbean DXpeditions battling it out in a very tight squeeze for the #1 spot. In the end, it came down to the log checking process to sort it out and the winner was determined by a margin of only 7 contacts out of 7700+ made by each of two teams.

Here's the K4JA Multi-Two crew. From the left: Mike, AJ9C; Pete, N4ZR; Chad, WE9V; Bruce, W3BP; Paul, K4JA; Larry, K7SV, and Jerry, KE9I.

W/VE QRP

Second place finisher in 2003 and perennial QRP entrant Tom Russell, N4KG (AL), pushed it up a notch to take the #1 spot with a line score of 927 contacts, 344 multipliers and a point total of 956,664. Congratulations, Tom!

Second place, and the new W3 call area record for the QRP category, went to Robert Schreibmaier, K3PH (EPA). K3PH's 1035 contacts were the most recorded of any 2004 QRP entrant, but N4KG's extra 48 multipliers were enough to make up the difference for the victory.

Third place went to Thomas Magera, N1TM (CT), at 649,728.

High QRP score from west of the Mississippi was recorded by 1999 ARRL DX CW QRP winner Gary Hembree, N7IR (AZ), with 552 QSOs for a score of 394,128. This was also Gary's 7th consecutive appearance in the QRP top 10.

W/VE Low Power

This year's W/VE low power winner, taking home the Dauberville DX Association plaque is Yankee Clipper Contest Club's Jim Bowman, KS1J (RI). His line score of 2186/368 for 2,413,344 points was a solid margin of victory over Potomac Valley Radio Club member Maury Peiperl, W3EF (MDC). Maury's score of 1887/404 and 2,287,044 was good enough to set the new W3 call area Low Power record.

Florida was represented at #3 with Palm City's Paul Tibbetts, K1PT (SFL) finishing third with 1775/404 for 2,151,300 points.

High finisher from west of the Mississippi was Marv Bloomquist, N5AW (STX). Running a SteppIR 4 el Yagi at 135 feet from his ranch in the Texas hill country, Marv's score of 1459/411 for

Expanded Reports Available

For expanded results, participant soapbox and the complete scores in a user-searchable database, please visit **www.arrl.org/contests/results**. ARRL Members without Internet access may obtain a printout of the complete line scores by sending a self-addressed, stamped envelope to ARRL Contest Results, 225 Main St, Newington CT 06111. Please be sure to include the contest name and year.

Top Ten—US CW

Single Operator HIGH POWER

K5ZD (W4PA, op)	6,588,960
N2NT	6,343,305
K3CR (LZ4AX, op)	5,060,160
KT1V	4,946,856
K3ZO	4,640,286
W1WEF	4,569,642
N2LT	4,361,880
WC1M	4,170,264
KQ2M	4,155,624
K1RM	4,120,200

Single Operator LOW POWER

KS1J	2,413,344
W3EF	2,287,044
K1PT	2,151,300
KK9A	2,051,112
N1UR	2,050,875
KFØR (KC2LLM, op)	1,845,090
N5AW	1,798,947
VO1MP	1,631,550
K2YWE	1,606,374
W1TE	1,481,376

Single Operator QRP

N4KG	956,664
K3PH	919,080
N1TM	649,728
W9WI	488,796
N7IR	394,128
KG5U	344,874
W6JTI	319,716
WA3NKO	305,040
K2JT	283,185
KA1IS	281,865

10

K4WI	201,996
K9ES (K1XX, op)	142,830
K5RX	126,618
N4GM	36,984
K4RDU	22,275
KG6ERO	14,508
KD1IA	10,575
K3SWZ	9,918
K8OWL	8,307
AE5B	6,732

15

N2MF	516,483
N4WW	500,976
K2BA	440,496
N2IC	427,572
K4WX	413,280
K4EA	398,970
K4OAQ	377,136
NY3A	350,703
K4FJ	333,270
WB4TDH	220,584

20

WE2F	517,023
VY2TT(K6LA, op)	470,586
W7WA	407,442
KØIR	378,945
N9TK	371,412
VE6BF (@VE6JY)	360,984
KT9T	256,035
W4NZ	245,964
W7UT	191,400
W5FO	181,764

40

N4PN	486,360
VE1JF	403,245
N6IG	380,820
W5TM (W5AO, op)	310,368
WX4G	285,498
N8OO	235,980
N5TW (KE5C,op)	191,478
K4XS	179,010
WF2W	156,606
VE6WQ (VE6JY, op)	149,940

80

VY2LZ (K1LZ, op)	356,034
K1PX	117,900
K4DLJ	108,054
NU8Z	89,280
VO1TA	61,560
W4SVO	61,560
K3JGJ	41,004
K6OY	31,110
K8MD	28,080
VE7CC	25,479

160

VY2ZM (K1ZM, op)	106,704
W8LRL	50,616
W8UVZ	33,252
WB9Z	31,758
K4TEA	29,835
N4XD	24,768
K3JJG	21,411
W4VQ	18,762
W3GH	17,331
K8AQM	17,160

Single Operator Assisted

K3WW	6,038,010
K2NG	5,200,281
W2RE	4,432,560
AA3B	4,316,235
KF3B	4,249,785
KI1G	3,670,308
KQ3F	3,382,236
W2WB	3,313,692
W3FV	3,109,392
N3BB	3,038,958

Multioperator Single Transmitter

K1IR	7,374,294
W3BGN	6,879,210
K8CC	4,995,876
K2UA	4,239,690
N2RM	3,959,604
K5NZ	3,784,830
K9SD	2,812,407
WN9O	2,368,176
NE3F	2,226,609
W6YX	1,886,976

Multioperator Two Transmitters

K4JA	12,587,652
K1KI	11,539,725
N3RS	10,668,060
K8AZ	8,969,607
N4RV	7,425,450
W4RM	6,672,930
KØTV	6,657,591
NØNI	5,359,338
W2XL	5,299,911
VE3RM	4,789,092

Multioperator Unlimited Transmitters

W3LPL	15,999,444
K3LR	15,130,926
K1XM	13,626,378
NY4A	12,926,088
K1RX	11,604,540
K9NS	11,349,027
W2FU	11,284,989
NQ4I	10,970,256
KB1H	10,592,640
K1TTT	10,187,964

Top Ten—DX CW

Single Operator HIGH POWER

D4B (4L5A, op)	6,245,262
V31DJ (WØCP, op)	5,497,902
P4ØY (AE6Y, op)	5,314,680
HC8L (W6NL, op)	5,226,000
FM5BH	5,222,088
ZF2NT	5,197,863
VP5M (K7BV, op)	5,139,966
ZD8Z (N6TJ, op)	4,883,418
KP2CW (K6VVA, op)	4,462,533
8R1K (OHØXX, op)	4,312,872

DXCW Single Operator LOW POWER

WP3R (K9PG, op)	5,436,576
P4ØW (W2GD, op)	4,773,798
N7OU/HI9	3,969,600
VP9/W6PH	3,544,230
XE2/W5WMU	2,444,388
J88DR	2,393,370
CS6T (CT1ILT, op)	2,379,456
EA7RM	2,069,325
VP9/K9CC	1,879,248
PY1NX	1,705,401

DXCW Single Operator QRP

FY5KE (F5MZN,op)	2,603,598
LU5FZ	360,036
OM7DX	238,788
HB9BMY	183,924
EA7AAW	150,750
GØDCK	145,314
LZ2RS	138,528
GW4ALG	123,201
G3YMC	121,776
YU7CB	107,016

DXCW 10

LT1F (LU2FM,op)	284,316
LT5F (LU4FPZ, op)	249,039
LT1A (LU3CT, op)	199,926
P43JB	149,364
C6APG	97,944
IR2Y	67,410
9A3TR	63,480
9A3VM	51,528
HG1W (HA1WD, op)	41,625
CT1AOZ	39,483

DXCW 15

ZF1A (W5ASP, op)	380,373
P4ØG (I2UIY, op)	360,726
CX7BY	232,731
LU5FC	231,534
F5IN	194,184
PI4TUE (PC5A, op)	166,212
XE3WAO	164,835
IR7A (I7ALE, op)	155,376
YZ1AU	138,750
YT1NT	128,700

DXCW 20

EA8/OH4NL (OH2BYS, op)	311,343
M5X (G4TSH, op)	263,730
TI3M (TI3TLS, op)	253,692
OH4XX	234,552
OH4A (OH6QU, op)	234,204
TM1W (F6FVY, op)	230,028
OH8L (OH8LQ, op)	220,365
LU1FZR	195,408
4M4C (YV4GLD, op)	193,992
S5ØR	188,859

DXCW 40

IR4T (IK4UPB, op)	260,478
T96Q	245,676
SN7Q (SP7GIQ, op)	236,151
CO2JD	220,284
HA5A (HA5IW, op)	217,848
T99W	207,648
HA3MQ	187,416
TM4Q (F6FYA,op)	184,800
EA5YU	172,590
S52ZW	172,197

DXCW 80

C6AKQ (N4BP, op)	255,765
FG5BG (F6IRF, op)	221,604
GØIVZ	161,784
SP3GEM (SP3RBR, op)	105,111
HB9FAP	103,200
HA8FM	94,800
DJØMDR	88,950
EA5FID	82,620
GM4YXI	76,194
S52EZ	76,140

DXCW 160

C6ALK (K7RE, op)	142,128
V31YN (DJ4KW, op)	71,298
CO8LY	69,801
YV1DIG	67,392
T98T	40,635
SO2R (SP2FAX, op)	34,428
YU1EXY	32,079
S57M	31,080
OK1AEZ	27,750
OM8A (OM3RM, op)	26,784

DXCW Single Operator Assisted

KH7X (KH6ND, op)	4,987,263
V26G (N2ED, op)	4,419,576
DL5AWI	1,996,893
DK3GI	1,881,684
HG3M (HA3MY, op)	1,867,536
YT7A (YU7GMN, op)	1,662,507
PY2YP	1,364,880
YU1ZZ	1,302,480
SN8F (SP8FHK, op)	1,211,364
PS2E (PY2EX, op)	816,144

DXCW Multioperator Single Transmitter

8P9JA	5,953,320
VP5K	5,900,688
V26DX	4,668,327
T48K	3,209,394
EA8ZS	2,561,418
OM7M	2,518,776
IR4M	2,389,410
EI7M	2,320,302
HG1S	2,303,847
IR4X	2,250,168

DXCW Multioperator Two Transmitters

PJ2T	8,091,693
FS5UQ	8,084,736
J7OJ	7,924,350
PJ4R	7,612,425
DL1MGB	3,333,876
HG6N	2,726,346
OMØM	2,624,760
DAØBCC	2,549,337
RU1A	2,251,890
ES5Q	2,047,407

DXCW Multioperator Unlimited Transmitters

CS6V	7,202,835
J6DX	6,768,798
TI5N	6,723,834
9A1A	4,938,129
LZ9W	2,322,594
JA3YBK	2,295,915
JE1ZWT	1,505,580
LY7A	1,382,700
OH2K	203,205

1,798,947 was both the high score west of the Mississippi and a 7th place finish in the Low Power category for the second consecutive year.

W/VE High Power

Coming at #1 for the second time in three years in the Single Operator High Power category to take the Frankford Radio Club plaque was Tennessee Contest Group president Scott Robbins, W4PA, who operated from the western Massachusetts station of K5ZD. Scott's line score of 4240/518 for 6,588,960 is the new overall W/VE scoring record in the High Power category.

Finishing a solid second was WRTC competitor Andy Blank, N2NT (NNJ), with 4187 contacts, 505 multipliers and a total score of 6,343,305 points. Andy's 6.3 million point score is the third highest score ever posted in the ARRL DX CW Single Operator High Power category and is the new W2 call area record.

Third was Alexander Avramov, LZ4AX, who operated using the Penn State University club call sign K3CR (WPA) from the contest superstation of WA3FET to finish third at 3514/480 for 5,060,160 points.

Excellent scores were posted in the High Power category from outside the northeastern United States. Finishing #14 overall with the high score from west of the Mississippi was WRTC competitor Dan Craig, N6MJ (ORG), who operated from W6KP's station for a score of 3,101,928.

W/VE Single Op Assisted

"Willie Willie" is #1 again! Charles Fulp, K3WW (EPA), operated his suburban Philadelphia station to a decisive victory in the W/VE Single Op Assisted

category. Charles' line score of 3762/535 for 6,038,010 points represents his 5th Single Op Assisted win in ARRL DX CW. Congratulations!

With his Bonaire QTH occupied by the KU8E-led team at PJ4R, Noah Gottfried, K2NG (NNJ), took on the challenge of the Assisted category to finish second with a score of 5,200,281.

A close race for the rest of the top 5 ensued, with Ray Higgins, W2RE (ENY), at 4,432,560 topping Bud Trench, AA3B (EPA), at 4,316,235 and Alan Snyder, KF3B (EPA), 4,249,785 for third, fourth and fifth positions, respectively.

Top score from west of the Mississippi (and outside the northeastern USA) was south Texas' Jim George, N3BB, who won the West Gulf Division title enroute to a #10 overall placing with a line score of 2106/481 for 3,038,958 points. Jim's score also is the new W5 call area record.

W/VE Single Band

160 and 80 meters both featured wins from the same Prince Edward Island QTH and a new W/VE score record for 80 meters. After enduring a harrowing journey to reach the VY2ZM station in a raging snowstorm, Jeff Briggs, K1ZM/VY2ZM, and Krassy Petkov, K1LZ/VY2LZ, operated side-by-side at the VY2ZM QTH to win the W/VE single band category for both bands. The VY2LZ score on 80 meters of 356,034 is the new W/VE scoring record and ends the 10 year win streak on 80 meters of Robye Lahlum, W1MK. Jeff's score from VY2ZM on 160 meters of 106,704 was his second consecutive W/VE win on top band.

There was another score record set in the W/VE single band categories, and it belongs to Paul Newberry, N4PN, on 40 meters. Paul took advantage of a great salt water QTH on the Gulf Coast at St George Island, Florida to rack up 1351 QSOs and an amazing 120 multipliers for a score of 486,360. This breaks the 1991 40 meter single band record of K1ZM, which had been the oldest single band ARRL DX CW record on the books previous to this point.

20 meters featured a win by John Naberezny, WE2F (ENY), with a line score of 1473/117 for 517,023. Prince Edward Island was again represented in a single band category by K6LA, who operated VY2TT to a second place single band 20 meter finish at 470,586 points.

Moving up a band to 15 meters was Brian Edward, N2MF (WNY), who won the 20 meter single band category in 2003, and also was victorious on 15 meters in 2001 and 2002. Brian's score of 1551/111 for 516,483 points narrowly edged out Austin Regal, N4WW (NFL), at 1491/112 for 500,976 for the 15 meter title.

10 meters featured another single band win from a southern QTH with Cort Judd, K4WI, of Alabama scoring 201,996 points on 724 contacts. Charles Carroll, K1XX, operated K9ES from South Florida to a second place 10 meter finish with a score total of 142,830.

Steve, AKØM, unfortunately had to "rough it" as C6ASB during the contest. I am sure many would gladly "suffer" with him.

W/VE Multioperator Categories

The man with one of the biggest smiles at Dayton this year had to be Jim Idelson, K1IR. His team of himself, K1NU, K1OA, K1VR, KE1J and W1VE operated the K1IR station in eastern Massachusetts to a solid victory and the Northern Illinois DX Association plaque in the W/VE Multioperator, Single Transmitter category. The K1IR line score of 4437/554 for 7,374,294 points is both the new category scoring record, breaking the 2001 record of W4AN, and the first time 7 million points has been topped by a M/S entry.

Coming in second in the Multioperator, Single Transmitter category was the two-man team of Steve Sussman, W3BGN, and Tom Wall, K2TW. Operating as W3BGN (EPA), the two of them racked up a score of 6,879,210 to also top the previous W4AN record and set a new high mark for the W3 call area.

Mad River Radio Club operators K8CC, KK8I and W8MJ operated K8CC to a third place finish with a line score of 3148/529 for 4,995,876 points.

In Multioperator, Two Transmitter, the Society of Midwest Contesters plaque was taken for the second consecutive year by the seasoned team led by Paul Hellenberg, K4JA (VA). Consisting of himself, W3BP, N4ZR, AJ9C, KE9I, K7SV and WE9V, their line score 6692/627 for 12,587,652 points was enough to beat back a competitive effort from the #2 team led by Tom Frenaye, K1KI. K1KI with K1CC, KM1P, W1RM and K2SX operated Tom's Connecticut station to 6275 QSOs for a score of 11,539,725 points.

Tenth place Multi-2 finisher VE3RM (VE3RM, VE2NI, VE2WU, VE3FU, VE3IAY, VE3JM, ops) set a new Canadian record in the category with 4,789,092 points.

CQ Contest Hall of Fame member Frank Donovan, W3LPL (MDC), is not one to revel in past glory, and continued his long tradition of battling it out in the competitive Multioperator Multitransmitter category by leading his team of W3LPL, K1HTV, W2GG, AI3M, K3MM, N3OC, K3RA, K3RV, KD4D, K4ZA, K4ZW to a 2004 victory with a total score of 15,999,444 points.

Another long time M/M category entrant is Tim Duffy, K3LR (WPA), and Tim led his 2004 crew of himself, N2NC, W2RQ, K3UA, N3GJ, N3RA, K8CX, N9RV, W9ZRX, VE3DX, VE3EJ and VE7ZO to second place category finish with a total score of 15,130,926 points.

DX High Power

Winning the DX High Power category generally requires building or renting a station in a far-off locale and traveling there in an attempt to beat out all the other like-minded operators who have done the same thing in pursuit of victory. This year was no exception with D4B operator Alexander Teimurazov, 4L5A, making an 18 hour multi-stop plane trip from Moscow to his contest station in the Cape Verde Islands off the west coast of Africa to operate ARRL DX CW. Finishing third in 2003, Alex was determined that 2004 was going to be his year and he operated D4B to a score of 6,245,262 points for his first ARRL DX CW contest win and a new African continent record. Congrats, OM!

After D4B, a battle for the #2 through #7 spots ensued with only about 6 percent of score total separating the next 6 positions. It was Walt Stinson, WØCP, who was next through the log checking process to operate V31DJ from Belize to a second place finish with a line score of 5406/339 for 5,497,902 points. Right on Walt's tail was Andy Faber, AE6Y, operating P4ØY from Aruba to a third place finish at 5180/342 for 5,314,680.

Best High Power score from Europe was GIØKOW (Andrew, GIØNWG, op) who finished 12th overall with a score of 3,410,184 points. The top Asian High Power scorer was A61AJ, operated by Robert, S53R. Top score from Oceania was Stan at Indonesia's YBØAJR.

DX Low Power

Paul Gentry, K9PG, was our 2003 High Power winner from WP3R and he returned to Puerto Rico again for 2004, this time leaving the amplifier in the standby position. Operating in the Low Power category, Paul's WP3R line score of 5268/344 for 5,436,576 points would have been a #3 finish in the High Power category and is the new DX Low Power scoring record. Paul's Low Power win is his second, the first coming from FS5PL in 1996.

CQ Contest Hall of Famer and WRTC competitor John Crovelli, W2GD, operated P4ØW from Aruba to a second place Low Power finish with a score of 4,773,798 points, also topping the old 6V6U record.

Continental Leaders

Single Operator QRP

Asia	JR4DAH	62,694
Europe	OM7DX	238,788
North America	HP1/NV7X	9,963
Oceania	N7ET/DU7	21,573
South America	FY5KE (F5MZN,op)	2,603,598

Single Operator Low

Africa	EA8/ON5UM	742,896
Asia	TA2ZF	723,819
Europe	CS6T (CT1ILT, op)	2,379,456
North America	WP3R (K9PG, op)	5,436,576
Oceania	ZL2BR	432,765
South America	P40W (W2GD, op)	4,773,798

Single Operator High

Africa	D4B (4L5A, op)	6,245,262
Asia	A61AJ (S53R, op)	1,018,350
Europe	GI0KOW (GI0NWG, op)	3,410,184
North America	V31DJ (W0CP, op)	5,497,902
Oceania	YB0AJR	11,583
South America	P40Y (AE6Y, op)	5,314,680

Single Operator Single Band 160

Asia	JA8NFV	990
Europe	T98T	40,635
North America	V31YN	71,298
Oceania	KH6/N6KB	5,394
South America	YV1DIG	67,392

Single Operator Single Band 80

Asia	JH1AEP	13,362
Europe	G0IVZ	161,784
North America	FG5BG (F6IRF, op)	221,604
Oceania	9M6NA (JE1JKL, op)	13,050
South America	PR7AR	90

Single Operator Single Band 40

Asia	A61AR (RV6LNA, op)	83,430
Europe	IR4T (IK4UPB, op)	260,478
North America	CO2JD	220,284
Oceania	VK4UC	56,259
South America	YV7QP	10,476

Single Operator Single Band 20

Africa	EA8/OH4NL (OH2BYS, op)	311,343
Asia	JT1FDD (UA3QJC, op)	49,500
Europe	M5X (G4TSH, op)	263,730
North America	TI3M (TI3TLS, op)	253,692
Oceania	ZL/W3SE	15,048
South America	LU1FZR	195,408

Single Operator Single Band 15

Africa	EA8/DL3KVR	73,008
Asia	JH3AIU	118,272
Europe	F5IN	194,184
North America	ZF1A (W5ASP, op)	380,373
Oceania	T88LZ	32,103
South America	P40G	360,726

Single Operator Single Band 10

Asia	JG2TKH	9,828
Europe	IR2Y	67,410
Oceania	VK2CZ	264
South America	LT1F (LU2FM, op)	284,316

Single Operator Assisted

Asia	JY9QJ	243,945
Europe	DL5AWI	1,996,893
North America	V26G (N2ED, op)	4,419,576
Oceania	KH7X (KH6ND, op)	4,987,263
South America	PY2YP	1,364,880

Multioperator Single Transmitter

Africa	EA8ZS	2,561,418
Asia	JA2ZJW	806,490
Europe	OM7M	2,518,776
North America	8P9JA	5,953,320
South America	LQ7D	1,826,220

Multioperator Two Transmitter

Asia	JA1ZLO	424,872
Europe	DL1MGB	3,333,876
North America	FS5UQ	8,084,736
South America	PJ2T	8,091,693

Multioperator Unlimited Transmitter

Asia	JA3YBK	2,295,915
Europe	CS6V	7,202,835
North America	J6DX	6,768,798

Plaque Winners

Winner	*Plaque Category*	*Plaque Sponsor*
K5ZD (W4PA, op)	W/VE Single Operator High Power CW	Frankford Radio Club
KS1J	W/VE Single Operator Low Power CW	Dauberville DX Association
N4KG	W/VE Single Operator QRP CW	Tod Olson, K0TO
K3WW	W/VE Single Operator Assisted CW	Harold Ritchey, W3WPG Memorial
K1IR	W/VE Multioperator Single Transmitter CW	Northern Illinois DX Association
K4JA	W/VE Multioperator Two Transmitter CW	Society of Midwest Contesters
W3LPL	W/VE Multoperator Unlimited Transmitter CW	DX Publishing, N4AA
VY2LZ (K1LZ, op)	W/VE 3.5 MHz CW	SM3DMP
N4PN	W/VE 7 MHz CW	Northern Arizona DX Association
WE2F	W/VE 14 MHz CW	The QSL MAN—W4MPY
N2MF	W/VE 21 MHz CW	Carl Luetzelschwab, K9LA
K4WI	W/VE 28 MHz CW	Green River Valley, IL ARS, K9WM
D4B (4L5A, op)	World Single Operator High Power CW	North Jersey DX Association
WP3R (K9PG, op)	World Single Operator Low Power CW	Jim Stevens, K4MA
FY5KE (F5MZN,op)	World Single Operator QRP CW	Jerry Griffin, K6MD/YI9MD
8P9JA	World Multioperator Single Transmitter CW	DX Publishing, N4AA
PJ2T	World Multioperator Two Transmitter CW	Frankford Radio Club
CS6V	World Multioperator Unlimited CW	H. Stephen Miller, N0SM
C6ALK	World 1.8 MHz CW	Fred Race, W8FR, In Memory of DL1FF
EA8/OH4NL (OH2BYS, op)	World 14 MHz CW	Tom Frenaye, K1KI
ZF1A (W5ASP, op)	World 21 MHz CW	Caribbean Contesting Consortium -PJ2T
LT1F (LU2FM, op)	World 28 MHz CW	Ft. Wayne DX Association
K9NW	Central Division Single Operator High Power CW	Society of Midwest Contesters
KK9A	Central Division Single Operator Low Power CW	Society of Midwest Contesters
WN9O	Central Division Multioperator Single Transmitter CW	Society of Midwest Contesters
K0SR	Dakota Division Single Operator High Power CW	In Memory of SPC Jon Fettig, KC0HSQ, ND ARNG, OIF, by MSG Hall, K9GY
N6ZZ	Rocky Mountain Division Single Operator Low Power CW	Grand Mesa Contesters of Colorado
VO1MP	Canada Single Operator Low Power CW	Contest Club Ontario
EA8ZS	Africa Multioperator Single Transmitter CW	Tom Frenaye, K1KI
A61AJ (S53R, op)	Asia Single Operator High Power CW	Alamo DX Amigos
JA2ZJW	Asia Multioperator Single Transmitter CW	Yankee Clipper Contest Club
JA1ZLO	Asia Multioperator Two Transmitter CW	AH9B, D. Craig Boyer
GI0KOW (GI0NWG, op)	Europe Single Operator High Power CW	Jerry Griffin, K6MD/YI9MD
DL1MGB	Europe Multioperator Two Transmitter CW	Jim George, N3BB
CS6V	Europe Multioperator Unlimited CW	Texas DX Society
V31DJ (W0CP, op)	North American Single Operator High Power CW	Potomac Valley Radio Club
8P9JA	Caribbean Multioperator Single Transmitter CW	The YASME Foundation
JI2KVW	Japan Single Operator Low Power CW	Western Washington DX Club

Other Low Power continental leaders were CS6T (CT1ILT, op) for Europe, who scored 2,379,456 for a 7th place overall finish, EA8/ON5UM for Africa, TA2ZF for Asia, and ZL2BR for Oceania.

DX QRP

Olivier Le Cam, F5MZN, operating FY5KE from French Guiana is our 2004 winner in the DX QRP category. His line score of 2962/293 for 2,603,598 beats the previous DX QRP category record he set in the 2003 running. In 2003 Olivier had more than 1000 contacts on 10 meters to cruise to the win; 2004 featured a 1000+ contact run on 15 meters for a runaway category win.

Ed, LU5FZ, made 822 contacts from Argentina for a total score of 360,036 and a second place finish. After the first two positions, the rest of the top 10 consisted of European operators with Stefan Melcer, OM7DX #1 Europe and third overall with 603 QSOs and a score of 238,788. Peter Egger, HB9BMY, and Emilio Arenas, EA7AAW, rounded out the top 5.

Leading DX QRP scores from North America was HP1/NV7X, from Oceania N7ET/DU7 and from Asia JR4DAH.

DX Single Band

The Bahama Islands were the scene of a pair of DX single band victories and two new single band records set by two American contest operators.

On top band, it was Brian Kassel, K7RE, who operated C6ALK to 142,128 points, breaking the 1997 DX 160 meter single band record held by V26CW (NM9H, op). Finishing second was Gerd Sapper, DJ4KW, who operated V31YN from Belize with a score of 71,298.

On 80 meters, Bob Patten, N4BP, operated C6AKQ to a score of 255,765 points, topping the 1997 record of HH2AW (9A3A, op) and pulling in for his second consecutive DX 80 meter single band victory. Second place went to Patrick Destrem, F6IRF, who operated FG5BG to a score of 221,604.

40 meters was won from the mammoth IR4T contest station, this time operated by Gabriele Macchi, IK4UPB. Gabriele's line score of 1497/58 for 260,478 points was just enough to squeak by strong performances from Matkic Ivica, T96Q, at 245,676 in second place and Krzysztof Sobon, SP7GIQ, operating as SN7Q at 236,151, third.

20 meters was won handily from the Canary Islands by EA8/OH4NL operated by Mauri Leppala, OH2BYS. Mauri's line score of 1759/59 for 311,343 provided a solid margin of victory over second place finisher M5X, operated by Justin Snow, G4TSH, to a score of 263,730 points.

W/VE Single Operator 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)			Southeast Region (Delta, Roanoke and Southeastern Divisions)			Central Region (Central and Great Lakes Divisions; Ontario Section)			Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)			West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT Sections)		
K5ZD (W4PA, op)	6,588,960	C	K4RO	2,746,590	C	VE3AT	3,986,700	C	WXØB (AD5Q, op)	2,714,289	C	N6MJ (@W6KP)	3,101,928	C
N2NT	6,343,305	C	N4CW	2,524,050	C	K9NW	3,437,280	C	K5NA	2,627,130	C	N6BV	2,162,226	C
K3CR (LZ4AX, op)	5,060,160	C	WF3J	1,729,350	C	N4GN	2,774,724	C	KØSR	2,034,396	C	KC7V	1,747,980	C
KS1J	2,413,344	B	K1PT	2,151,300	B	KK9A	2,051,112	B	N5AW	1,798,947	B	K8IA	1,044,900	B
W3EF	2,287,044	B	K4GKD	1,353,732	B	VE3XB	1,340,820	B	WØUO	1,160,136	B	W7ZMD	501,720	B
N1UR	2,050,875	B	WO4O	1,288,854	B	VE3KP	1,108,548	B	WØVX	725,220	B	N6NF	407,973	B
K3PH	919,080	A	N4KG	956,664	A	N8IE	251,301	A	KG5U	344,874	A	N7IR	394,128	A
N1TM	649,728	A	W9WI	488,796	A	VA3DF	236,292	A	NØUR	242,112	A	W6JTI	319,716	A
K2JT	283,185	A	WA3NKO	305,040	A	KT8K	141,252	A	WA8ZBT	192,096	A	W6QU (W8QZA, op)	171,756	A

15 meters featured a close finish with Joe Staples, W5ASP, operating ZF1A to victory with 2149 QSOs for a total score of 380,373 points. Right behind Joe was Paolo Cortese, I2UIY, who operated P4ØG from Aruba to 2038 QSOs for 360,726 points.

10 meters was the battle of the Argentineans with LT1F (LU2FM, op) coming in #1 at 284,316; LT5F (LU4FPZ, op) #2 with 249,039, and LT1A (LU3CT, op) #3 at 199,926.

DX Single Op, Assisted

In the DX Single Op, Assisted category we saw 2002 DX High Power winner Mike Gibson, KH6ND, operate KH7X to victory and a new category record with a line score of 4933/337 for 4,987,263 points. Mike's win is the first in the DX SO/A category from the Pacific since KH6RS took #1 in 1997.

Coming in second was previous record holder and 2002 and 2003 DXSO/Assisted winner Ed Wlodarski, N2ED, operating from Antigua as V26G to a score of 4,419,576.

The next four positions in the top 10 were taken by European operators, with DL5AWI and DK3GI finishing a close (to each other) third and fourth with 1,996,893 and 1,881,684, respectively. Not far behind in the #5 slot was HG3M (HA3MY, op) at 1,867,536.

High South American score was posted by #7 finisher PY2YP at 1,364,880. High score posted from Asia was Jordan's JY9QJ.

DX Multioperator Categories

A close race ensued for the top spot in the DX Multioperator Single Transmitter class, with two two-man operating teams finishing within 1% of each other and both just short of the all-time category scoring record.

It was the effort of Will Roberts, AA4NC and Jim Stevens, K4MA, operating 8P9JA from Barbados to victory in the DX M/S category. This is the fourth win in the M/S category for 'NC and 'MA from 8P9JA, with previous wins in 1999, 2000 and 2002. The 8P9JA line score of 5752/345 for 5,953,320 was just enough to top second place finisher VP5K on Turks and Caicos. The VP5K team of Mark Obermann, AG9A, and Ray Sokola, K9RS, had 5652/348 for 5,900,688 points but the three extra multipliers were not enough to make up the 100 QSO lead of the 8P team.

High African score was #5 finisher EA8ZS at 2,561,418. The high European M/S score was #6 overall finisher OM7M at 2,518,776. High South America M/S finisher was LQ7D. High M/S Asian score was posted by JA2ZJW.

Razor thin. That's the margin of victory accurately described when a 7700+ QSO effort by two teams is won or lost by a score margin equivalent to 7 contacts. It was a total of 4 Caribbean DXpeditions that battled it out this time for the top score in the ultra-competitive Multioperator Two Transmitter category. All four of them were in a statistical tie for the top spot going into the log checking process—within the general operator logging error margin, any of the 4 teams in the top 4 could have ended up at #1.

Coming in with their first ARRL DX CW multioperator category-win was the Caribbean Contesting Consortium team led by Geoff Howard, WØCG, and operating from Signal Point in Curacao as PJ2T.

But it was *close*. The CCC group of WØCG, N1ZZ, W8AV, W8TK and WØNB were closely followed by an expedition to French St Martin that consisted of K3LP, N3KS, W3ARS, K4EU, N7DD and N8II operating as FS5UQ. PJ2T's line score of 7773/347 for 8,091,693 was barely enough to top FS5UQ at 7744/348 for 8,084,736. Given the +1 multiplier count for FS5UQ, that's a margin of 7 contacts for PJ2T that made the difference for the win.

Jim White, K4OJ, loved contesting and his sudden passing at age 48 led his friends in the Florida Contest Group to arrange a last minute change in Dominica to use J7OJ rather than J7A as their ARRL DX CW call sign. The K5KG-led group was able to get permission to use J7OJ only 24 hours before the beginning of the contest—kudos to the Domincian licensing authority for arranging it so quickly for them. The J7OJ group of K5KG, K3TEJ and W4IX finished a very strong third at 7,924,350 points, just 2.1% off the PJ2T lead.

High European M/2 finisher was DL1MGB at 5th overall with 3,333,876 points. High Asian score was posted by JA1ZLO.

In the multioperator, multitransmitter category it was Portugal's CS6V operated by German amateurs DL3OI, DL4LQM, DL4WG, DL5AXX, DL5LYM and DL8WAA finishing first with 7,202,835 points. Second place went to an American DXpedition to St Lucia where J6DX was operated by WA1T, KI6T, N6JRL, W8QID, K9JE, N9AG and NØFW to a total score of 6,768,798 points. Close behind the J6DX group was the Costa Rican expedition TI5N operated by K7AR, KI7Y, TI2WGO, W7YAQ and WJ7R at 6,723,834. High Asian M/M score was #6 finisher JA3YBK at 2,295,915.

Coda

Nothing lasts—what is here today is gone tomorrow, including us as individuals. This is an indisputable fact of life. Another consideration, therefore, is to reflect on those who have died, their lives taken from them sometimes suddenly. In addition to his many other contest accomplishments, Bill Fisher, W4AN, led his station to a 2001 victory in the W/VE Multiop-erator, Single Transmitter category—setting the scoring record that was broken this year—and was the 1991 W/VE Low Power winner as KM9P. His untimely death on April 4 of this year was a reminder of how impermanent we and our achievements are. Bill's ashes were scattered at the base of the big 40 meter tower at his beloved world-class Dahlonega, Georgia contest station shortly after his death. Many of us in the contest community considered him friend and mentor, and he will be missed. Bill—73, OM. QST

By Mark Spencer, WA8SME

Jamboree on the Air 2004

JOTA, Jamboree on the Air, is a 47 year old tradition that provides an opportunity for all of us to expose youth to Amateur Radio. So instead of talking about it, how about doing it! If you haven't participated in this annual October event you're missing a great weekend. Offer a Boy Scout or Girl Scout leader (Cubs and Brownies included) the opportunity for their troop to participate in this worldwide scouting tradition. If you need a little help or more information, please visit **www.arrl.org/FandES/ead/#scout**.

In 2000, Les Mitchell, G3BHK, the JOTA founder, said, "Little did I think when I drew up the plans and rules for the first event in 1958 that its popularity would increase and spread around the world. Even more astonishing is the fact that after all this time it still holds its popularity and now has a participation of some half a million Scouts and Guides in over 100 countries involving some 10,000 Amateur Radio stations. In fact it has become the largest international Scout event ever."

Each year the ARRL HQ receives questions pertaining to third party regulations, frequencies, control operators and how non-hams can make contacts during this event. Putting kids on the radio is no different than allowing your neighbor to make a contact. All the FCC rules must still be observed.

Who can talk to whom? A licensed amateur can make contact with any other amateur provided that the US amateur is operating on a frequency permitted by his or her license. There are no "banned countries" for US amateurs.

Make sure you review Third Party rules, the countries list and station identification requirements. If you're unclear, check **www.arrl.org/FandES/field/regulations/io/recip.html**.

Where will Scouts be operating? The published frequencies are a starting point. During JOTA you will find Scout contacts all over the band. It is important that you listen to the frequency before you begin calling CQ or sending a signal. Remember that a single group or mode cannot own a particular ham radio frequency. The Worldwide Scout frequencies listed are not specific to the USA. Consequently, a mode that we would expect to find on a particular frequency may not use the same frequency in another country.

You can register your JOTA event at **www.arrl.org/FandES/ead/youthskeds/**. Some Scout troops are very small or may want to check out JOTA before setting up one of their own. Registering will help them locate the closest JOTA event.

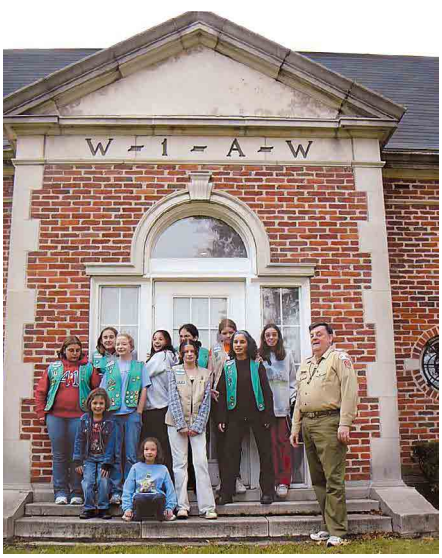
Whether this is your first JOTA or your 10th, please complete the simple survey at **www.arrl.org/FandES/ead/jotalog/** after JOTA. Completing this form will help ARRL see the growth and the needs of this activity. Last year 123 surveys detailed the activities of over 8575 Scouts who participated in JOTA along with 3000 adults and visitors.

For some clubs, October 16-17, 2004 will mean big plans, lots of Scouts, radios, antennas, modes, contacts and teaching a merit badge during JOTA. For others, it means getting a few Scouts together to just talk on the radio. The Valencia County Amateur Radio Association has produced some exceptional materials that will help you organize a Radio Merit Badge seminar that leads to achieving the badge. Check it out at **www.qsl.net/kc5our/**.

Photos by the author.

Mark Spencer, WA8SME, is ARRL Educational and Technology Program Coordinator. He can be reached at **mspencer@arrl.org**.

Steve Ewald, WV1X, with local Girl Scouts operating at W1AW.



JOTA is a big deal here at ARRL HQ.

Ham radio? Two thumbs-up, of course!

When and Where

JOTA 2004 begins Saturday, October 16, at 0001 local time and ends Sunday, October 17, at 2359 local time.

Suggested World Wide Scout Frequencies

Band (meters)	*Phone (MHz)*	*CW (MHz)*
80	3.740 & 3.940	3.590
40	7.270	7.030
20	14.290	14.070*
17	18.140	18.080
15	21.360	21.140
12	24.960	24.910
10	28.390	28.190

Go to **www.arrl.org/FandES/ead/#scout** for more information.

*14.070 is generally in use for PSK31. Consider operating CW *below* this frequency.

By Steve Ewald, WV1X

2004 Simulated Emergency Test

Test your communication skills October 2-3.

The ARRL's Simulated Emergency Test (SET) is October 2 and 3, 2004. This nationwide exercise is designed to test your emergency-operating skills and the readiness of your Amateur Radio communications equipment and accessories in an emergency-like deployment. All radio amateurs are invited to learn more. If you have taken the ARRL's Amateur Radio Emergency Communications Course (see **www.arrl.org/cce**), this event is one to practice what you have learned. How can you get involved?

Get Ready!

The ARRL Field Organization Leaders at the section and local levels and many other volunteers who are active in public service and emergency communications are working on potential emergency-like scenarios. The Amateur Radio Emergency Service (ARES), the National Traffic System (NTS), the Radio Amateur Civil Emergency Service (RACES), and many others will be called upon to act out these scenarios. Members of the ARRL Field Organization such as Net Managers (NMs), Emergency Coordinators (ECs) and District Emergency Coordinators (DECs), Section Emergency Coordinators and Section Managers will provide guidance and leadership. All Field Organization appointees have an important role.

To find out what you can do to get ready and how to participate, contact one of these local or section-level ARRL leaders. More information may be obtained by logging onto your ARRL Section's Web page at **www.arrl.org/sections**. This will lead you to a listing of your Section Leaders and pertinent news and links. Page 16 of *QST* also has a listing of all ARRL Section Managers.

Teamwork is Paramount

The ARRL Simulated Emergency Test is an ideal opportunity to showcase the capabilities of Amateur Radio and to improve them when necessary. It's an opportunity to work and practice with community and public service agency officials to learn what their communication needs may be before an emergency occurs.

The ARRL has established national relationships with several organizations including the American National Red Cross, Salvation Army, the National Weather Service, National Communications System and Association of Public Safety Officers—International.

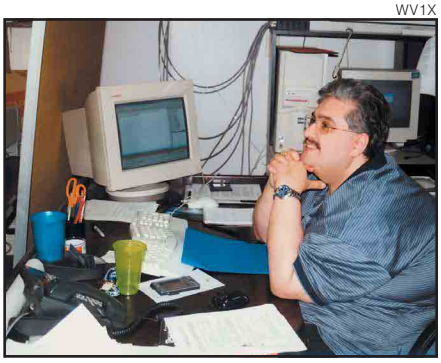
ARRL is also an affiliate program of Citizen Corps, an initiative within the Department of Homeland Security to enhance public preparedness and safety. Your local or section-wide SET might involve the local office or chapter of any of these national agencies or, perhaps, the local emergency management and Citizen Emergency Response Team (CERT).

In consideration of local schedules with these agencies and others, ARRL Field Organization Leaders have the option of conducting their local or section-wide SET on another weekend in the Fall season. Specific SET guidelines and reporting forms for these ARRL Field Leaders are forthcoming and are also posted on the ARRLWeb at **www.arrl.org/FandES/field/forms/**.

WV1X

Connecticut ARES used this site in East Hartford as a marshalling area to gather resources and assign operators to served agencies during the Greater Hartford Emergency Drill. Left to right: Official Relay Station Rick McClure, N1VXP; Emergency Coordinator Walt Styslo, KA1DFH, operates with his portable ARES station; former Connecticut Section Emergency Coordinator Allen Pitts, W1AGP, and District Emergency Coordinator Harry Abery, AB1ER.

WV1X



Hugo Costa Jr, Assistant Director of the North Central Connecticut Emergency Medical Services Council, participated in the drill in which ARES members provided back-up communications for this ambulance dispatch center in Hartford.

GREATER HARTFORD DRILL INVOLVES CONNECTICUT ARES

On May 15, Connecticut ARES members and its leaders demonstrated their capabilities to public service and state agencies to provide emergency communications for a multifaceted emergency disaster exercise in and around Hartford, Connecticut. The Capitol Region Emergency Planning Committee sponsored the drill involving nearly a thousand people and dozens of agencies and emergency response groups.

Drill participants were faced with several emergency scenarios: a large power outage during a heat wave; a potential biomedical emergency is discovered when employees of several downtown companies suffered similar sickness; a tour bus wrecks on a major highway inside the city limits; and a gasoline transport truck crashes into a government building and explodes.

Connecticut ARES responded rapidly to a marshalling area where ARES leaders implemented procedures for registration and operator accountability before assigning operators to various served agencies and locations including local Red Cross chapters, and the Area 3 Emergency Operations Center. Amateur Radio operators maintained liaison.

The statewide linked repeater system in Connecticut was tested on this day, and ARES made use of this system to handle directed net operations. Several other repeaters or simplex frequencies were used, and emergency 2 meter packet radio stations were also set up and tested from their field locations.

By **Lew Malchick, N2RQ**

School Club Roundup 2004

The 2004 School Club Roundup was a great success in spite of declining HF propagation conditions. Total entries increased slightly from 54 to 55 although total QSOs were down from nearly 7800 to less than 6500. Total hours increased from 659 to 707 and reported operators from 566 to 721. Entries came from 26 states and 2 DXCC countries, up from 20 and 1 in 2003.

W3NCS returned and regained the lead Elementary School score with more than four times their N. Clarion School 2003 score. W4KBR made an excellent showing in second place. KB3BRT slipped to third although they doubled the number of operators and increased the number of school contacts.

K5OMS, Olle Middle School Radio Club moved up from 10 of 11 to 1 of 12 by improving their score by 37 times. K7BZN slipped to 3rd, while AD8B moved up to 2nd. Total QSOs were down from 2003 but school contacts were nearly constant among the leaders.

The top High School score and number of entries slipped slightly from last year. KC7KFF, Carl Hayden HS, a frequent overall leader was in 3rd place even though they reported a relatively new and inexperienced group of student operators. W6PRB, Paso Robles HS ARC, returned even stronger than 2003. Once again they worked all 50 states and increased from 50 to 56 school QSOs. A first place finish with 340,173 showed great consistency. (Paso Robles was the site of a significant earthquake in the fall of 2003). K3NHC, North Hills HS, also improved their score from 2003, but did not catch the leader. KCØCXB, Palisade HS, nearly doubled their score, but remained in 3rd place.

The big news in the College/University category was not that W7ASU, Arizona State University, repeated with the top score or that K7UAZ, University of Arizona placed second. It was that the number of entries nearly doubled from 6 to 11. The highest participation in this category of the SCR. Even the DX entries doubled with ON4HTI from Ostend Polytechnic University returning with an increased score and a first time entry from VE7UBC, University of British Columbia ARS.

Among the non-school clubs, K3FBI continued as an active participant, which is often mentioned as a highlight contact by other operators.

Figure 1—ON4HTI from Ostend Polytechnic University in Belgium returned with a higher score than last year.

COURTESY KAREN MCDOUGAL, KC4AVF

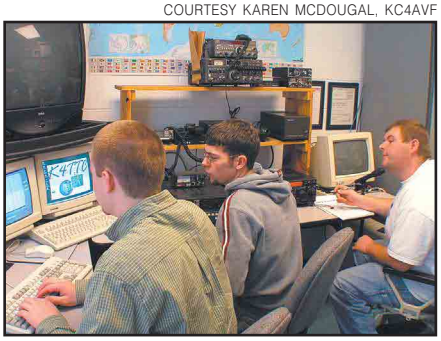


Figure 2—Three Electronics Technology students at the Tennessee Technology Center: Charles Cryer is logging, Brian Weaver, AG4UX, is operating, and Jay Inman, KI4BCI, is logging manually.

COURTESY RICH HIBBARD, KR2H

Figure 3—An enthusiastic group of fourth and fifth graders at the Intervale School, Parsippany, New Jersey, updated this hallway bulletin board daily as they made contacts with other schools around the country.

SOAPBOX

Many thanks, as always, for the hours you folks put in so that this school club event can promote Amateur Radio among our students! This School Club Roundup event is a highlight of our year for the students in the club.—*Ken Kane, KG8DN, Gilmour Academy, ND8GA*

Whether shooting for the competitive edge or casually getting young people on the air for a short rag chew, the School Club Round Up is an awesome tool to motivate youth about Amateur Radio! Our fifth year in the SCR was another hit among our high school kids here at Paso Robles High School. We ended up with 17 student operators and several more just stopping in to see our progress throughout the week. The highlight for us this year occurred about mid week when I received an email from a Paso Robles elementary school teacher, who happens to be a ham, wanting to get her third grade class on the air with some of my students! Mary, W6ROX, did an excellent job acting as an ambassador for ham radio with her third graders. We passed the microphone around, answering all sorts of radio related questions asked by her students. It was great to watch the high school students interact on the air with those kids. It looks like we might just have another school on board for next year's SCR! I think one of the most positive attributes of this event is how it makes radio become contagious. Thanks to all the hams who make it a point to contact the many schools throughout the week. We look forward to seeing you all again next year.—*Rob Thoresen, AG6RT, Paso Robles High School ARC. W6PRB*

As always, thanks again for a great contest. My fourth and fifth graders had a great time meeting new friends. We updated a hallway bulletin board every day, and the whole school checked our progress during the week. Almost every one of our 31 fourth and fifth graders made at least one contact, and I was impressed with the way the students encouraged each other and celebrated each other's successes. Thanks to all the other schools and individuals, who were very helpful, and continue to insure the future of our great hobby. Let me know if I can ever be of assistance.—*Rich Hibbard, KR2H, 4th grade teacher/Club Advisor; Intervale School ARC, KB2VBU*

Once again the ham community proved to be very supportive of the students as they nervously called CQs or gave names, QTHs, and signal reports. It's always fun to have 6 year olds talking to 76 year olds. We say a big THANK YOU to all the Amateur Radio operators who seek out the schools during the SCR and offer words of encouragement to this great hobby at our school during the second week in February.—*Bruce D. Weaver, K3LTM, fifth grade teacher, advisor, CVSARC KB3BRT*

Thanks so much for doing the School Club Roundup. The kids loved it.—*Vic, KCØENB*

The contest was wonderful. We got a number of students and staff excited about ham radio and the contacts our students made during the contest were memorable. Thank you for organizing and managing this contest. It has really been helpful for what we are trying to do here in Roanoke to promote ham radio. I appreciate your efforts. I look forward to participating next year! —*Dr Richard A. Turner, KZ4VT, principal and trustee, William Byrd HS ARC, WB4HS*

We at Olle had a great time several students helped out. Thanks to all who gave us a contact it was great. Our 15 meter part of the Force 12

2004 School Club Roundup Scores

Call Sign	Score	Rank	QSOs	States	Can Prov	Countries	Clubs	Schools	Hours	Operators	Club Name	School
Elementary Schools												
W3NCS	53332	1	250	41	4	22	1	26	22	3	N Clarion School ARC	N Clarion Co ES
W4KBR	23976	2	148	37	4	6	0	23	15	14	St Aloysius RC	
KB3BRT	15908	3	97	24	4	15	3	23	23	52	Cowanesque Valley School ARC	Westfield Area Elem
KC0LZD	12008	4	79	26	2	2	1	24	9	21	Morgan County R-2 School Ham Club	
KD7CJV	9752	5	71	27	1	1	1	15	15	10	Mr Spooner's 5th grade	Mill Park Elementary
KB2VBU	6664	6	68	24	0	5	2	13	12	32	Intervale School ARC	
KB2RMS	2847	7	39	18	1	2	1	10	15	11	Chapin School Radio Group	
W4TIM	1491	8	21	12	0	0	2	11	10	1	AB Combs Elementary ARC	
KB3CGA	1479	9	17	12	0	0	0	15	8	6		Family Learning Academy
Junior High/Middle Schools												
K5OMS	48705	1	191	40	3	10	6	38	9	3	Olle Radio Club	Olle Middle School
AD8B	35112	2	152	42	3	4	6	34	22	40	Zion ARC	Zion Lutheran School
K7BZN	27880	3	164	40	4	7	2	23	14	6	Sacajawea Middle School HRC	
KB0SAL	14577	4	129	25	3	10	0	15	24	8	Waco Jr-Sr HS Amateur Radio Club	
KC5KBO	12110	5	70	29	2	1	3	27	17	14		Webster Intermediate School
N1IFP	4982	6	47	18	1	2	0	17	5	27		Messalonskee Middle School
AB0OA	3780	7	54	21	1	1	1	9	10	20		Winfield MS
W7ERY	3710	8	53	22	1	0	1	9	20	50		Maple Grove MS
KC2KJN	1875	9	25	14	1	5	0	11	6	6	Gowanda CSD ARC	Gowanda MS
K7SMX	560	10	28	8	0	0	1	2	9	14	Lake Chelan RC	Chelan Valley Independent School
KA1PTW	280	11	14	9	0	2	2	1	4	13	Rochester Middle School	
K2BAR	120	12	12	3	0	7	0	0	3	13	Lincoln Middle School	
High Schools												
W6PRB	340173	1	765	50	7	28	11	56	24	18	Paso Robles High School ARC	Paso Robles HS
K3NHC	112710	2	388	43	7	12	6	43	24	1	North Hills HS AR & Electronics Club (AREC)	
KC7KFF	70356	3	246	38	3	5	5	46	14	7	Carl Hayden Community HS ARC	
KC0CXB	60990	4	214	39	4	2	5	46	24	25	Palisade High School ARC	Palisade HS
WB4HS	34882	5	214	42	3	9	2	21	12	10	William Byrd High School ARC	William Byrd HS
ND8GA	22962	6	127	35	5	14	2	24	15	5	Gilmour Academy ARC	
W2CXN	18666	7	122	30	0	10	4	21	9	12	Brooklyn Technical High School ARC & Soc	
KC0ENB	14726	8	74	23	1	3	1	34	17	5	Russell HS Radio Club	
K1BBS	14384	9	124	21	1	13	3	15	14	34	Burr and Burton ARC, Burr And Burton Academy	
N4LZJ	13580	10	77	24	1	3	1	22	23	9	Colonial Forge HS Ham Radio Club	
KB3BKW	10620	11	90	30	2	7	2	15	8	7	Belle Vernon HS ARC	
W4S	7938	12	60	25	0	7	2	18	18	7	Commonwealth Governor's School	Spotsylvania Career & Technical Center
KL7WHS/AL9A	7878	13	101	30	4	4	5	6	9	6	Warrior AR Club	Wasilla HS
K7EFA	1776	14	24	14	0	0	0	12	6	170	Yellowstone Radio Club	Billings Christian School
W8SWD	1482	15	19	14	1	1	1	12	10	4	Milford High School Communications Club	
KC2AXX	1005	16	15	12	0	3	1	10	9	12	AMAR, SCT BOCES Tec Program	
Colleges/Universities												
W7ASU	177775	1	501	48	5	13	7	49	21	3	Amateur Radio Society at Arizona State University	
K7UAZ	143225	2	423	45	5	5	6	54	24	4	UA Amateur Radio Club	University of Arizona
K4TTC	42700	3	175	40	2	5	1	39	13	12	Amateur Radio Club	Tennessee Technology Center-Hohenwald
W9NIU	33264	4	144	40	1	7	4	35	22	4	NIU College of Engineering RC	Northern Illinois U
W6YRA	31668	5	203	45	2	0	2	21	6	4	UCLA ARC	UCLA
K3DUQ	21594	6	114	21	1	1	5	30	13	1	Duquesne University ARC	Duquesne Uninversity
W9YT	9555	7	65	24	1	2	0	24	24	2	Badger Amateur Radio Society	U of Wisconsin Madison
KC5ZHF	5368	8	61	27	1	1	2	11	4	1	Patriot Amateur Radio Club	University of Texas at Tyler
W8EDU	793	9	13	11	0	0	0	10	4	1	Case Western Reserve University	
W2AEE	774	10	18	11	0	0	1	6	6	1	CUARC	Columbia University
W6YX	45	11	4	3	0	1	0	1	2	2	Stanford University ARC	
DX Colleges/Universities												
ON4HTI	17664	1	170	5	0	40	21	1	22	5	STARCOM, Ostend Polytechnic University (KHBO)	
VE7UBC	2816	2	32	19	0	0	2	13	6	1	University of British Columbia ARS	
Clubs (Non-School)												
K3FBI	32980	1	170	35	3	16	0	28	8	2	Federal Bureau of Investigation ARA	
W0GQ	4686	2	33	19	1	2	0	24	5	1	Cedar Valley ARC	
Individuals												
KB3AGZ	3753	1	27	18	0	0	3	23	11	1		
KA2NRR	1005	2	15	9	0	1	1	11	5	1		
WO8L	828	3	12	11	0	1	1	11	12	1		

C3SS does not work so had to use the B&W folded dipole for 15 meters. The QRM on 20 was bad but we got through okay anyway. Never worked anyone on 40 or 10 this year. Of course could have worked some of the same stations on 15 as well as 20 but only can work stations once no matter what bands. Had lots of fun. Hope to do better next year. CU in the pileups. —*Frosty K5LBU, Olle Middle School K5OMS*

We really enjoyed chewing the rag with fellow hams. In addition, to our regular contacts, we also made an aeronautical mobile and a maritime mobile contact. Our first-time operators found it challenging to think of things to talk about, but they had a great time. We're looking forward to the 2005 SCR! —*Tom, KA3WSQ sponsor, KB3BKW*

Even though I had to set up and take down my antenna each day, I wouldn't miss the SCR. Twenty-six sixth graders made contacts during the week. It was their first experience on Amateur Radio. They can't wait to operate again. Thanks to everyone!—*Phil, N1IFP, Messalonskee MS*

The Wasilla High School Warrior Amateur Radio Club, KL7WHS, whose station equipment was obtained through a grant from the ARRL's Big Project, was QRV each day of the SCR contest period from 1900-2300 UTC. The WARC, which has seven newly licensed Technicians, operated as KL7WHS/AL9A throughout the contest period.

Despite the trying conditions we managed to log 101 QSOs on voice, 85 on 15 m, 2 on 20 m and 14 on 2 m for a total of 8282 points.

SCR E-Mail Reflector

The 2005 School Club Roundup will be February 14-18. Meanwhile, you can join our reflector at **SCR-L@yahoogroups.com** by sending a message to **SCR-L-subscribe@yahoogroups.com**, or on-line at **groups.yahoo.com/groups/SCR-L**.

We also bagged a few DX contacts including Belize, Hawaii, Japan, Solomon Is and Papua New Guinea. Everyone seemed to have an enjoyable time (of course, getting out of class may have had something to do with that!) and they were impressed with the capabilities of Amateur Radio.

All in all it was a fun time for everyone and should be something to look forward to again next year.—*73 de Len, KL7LB, and Gary, AL9A*

After 8 years of saying that I was going to do this, I finally did. And it was fun! My entire class of 13 Special Ed students from Rochester (New Hampshire) Middle School was able to participate.—*Bill Nelson, KA1PTW*

This was our first year participating in this contest, and the students had a blast.—*Karen McDougal, KC4AVF, secretary TTC-ARCH*

We ran over lunch hour each afternoon of the week. It was fun talking to some of the children operating stations. Thanks for making it all work!—*Alan, KI8JV/W8EDU*

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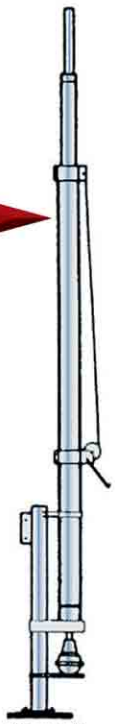

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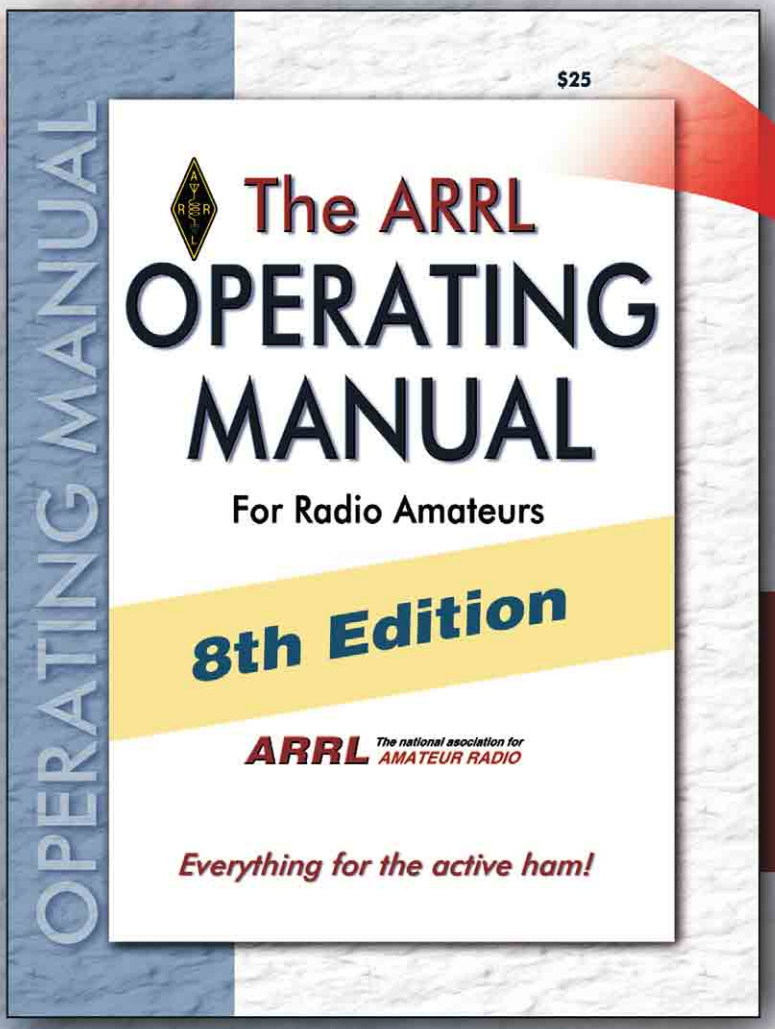

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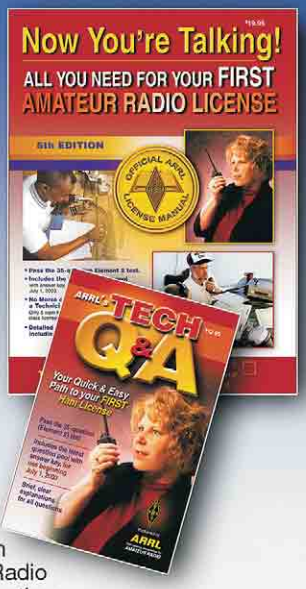

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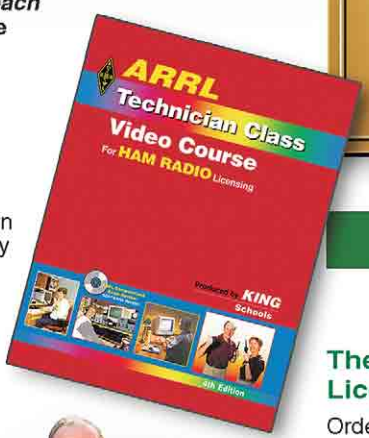

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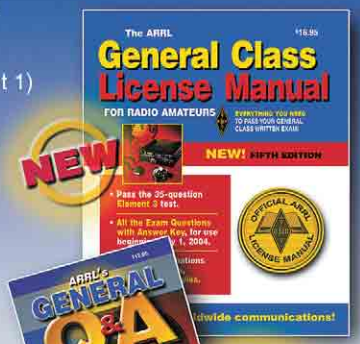

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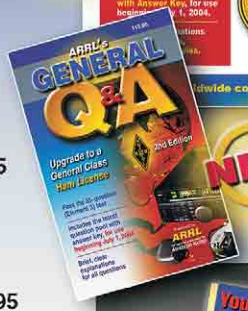

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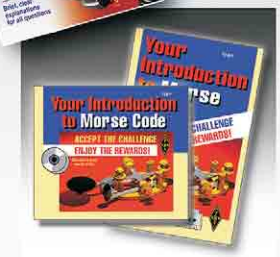

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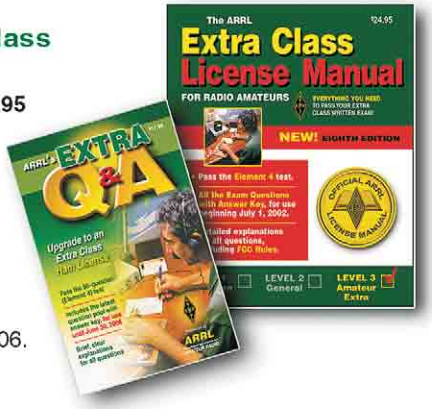

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TH-K2AT A triumph of advanced engineering and design. (middle) This 2M 5W HT is equipped with internal VOX, weather alert/RX, auto simplex checker, auto repeater offset and multiple scans. The K2AT also offers built-in CTCSS, DCS and 1750Hz tone burst. The K2AT meets MIL-STD-810 for resistance to rain, vibration, shock, humidity. 2.44"w x 4.38"h x 1.13"d, 12.5 oz...© **$139.99**

TH-G71A The brighter side of handy communications. (right) This FM, 144/440MHz boasts illuminated keypad and LCD, high-performance antenna, and ergonomic design. The 5W G71A also offers convenience with menu mode, PC compatible and 200 memories. 2.31"w x 4.44"h x 1.44"d, 11.6 oz...© **$209.99**

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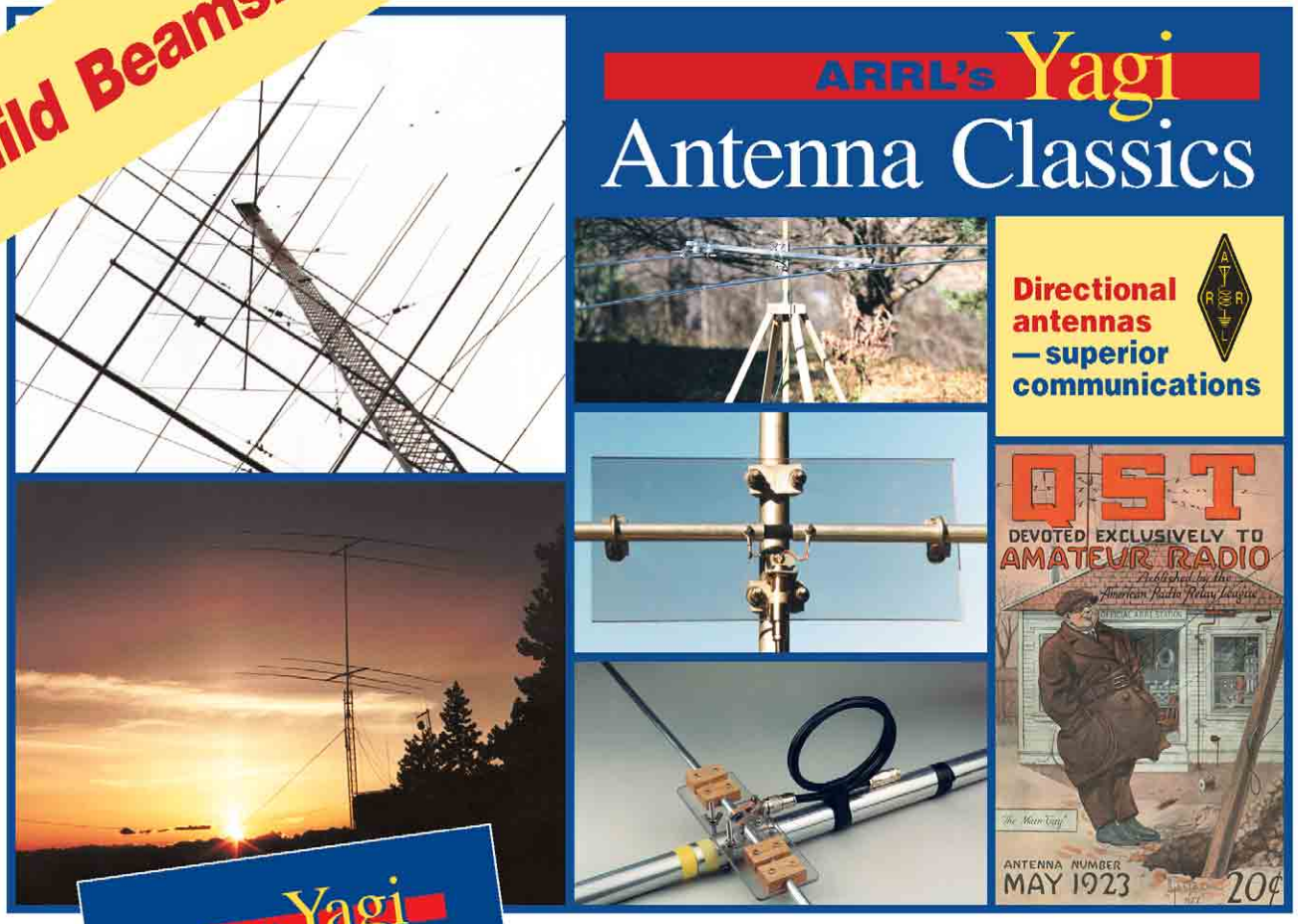

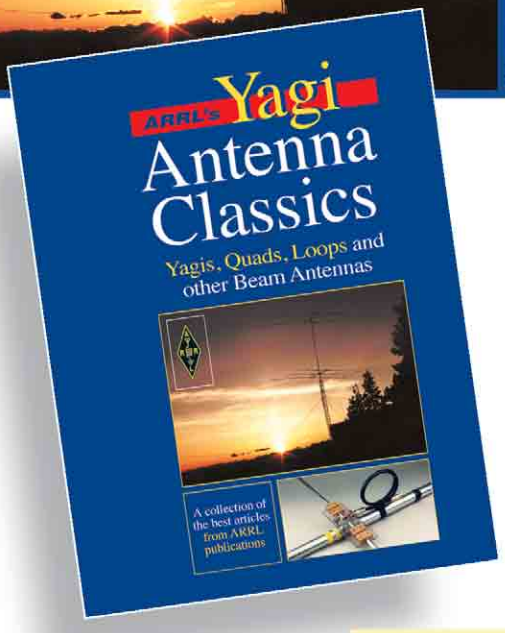

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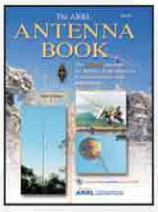

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MFJ-4035MV
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You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

MFJ-1117
$54.95
plus s&h

MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $49.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $34.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

MFJ-1117, $54.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

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http://www.mfjenterprises.com

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All are protected by MFJ's famous No Matter What™ one year limited warranty.

MIRAGE. . .160 Watts on 2 Meters!

Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer. . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

The MIRAGE B-5018-G gives you 160 Watts output for 50 Watts input on all modes -- FM, SSB, or CW!

Ideal for 25-50 Watt 2 Meter mobile or base. Weak signals pop out with its low noise *GaAsFET* preamp and its excellent 0.6 dB noise figure. Selectable 5, 8 or 14 dB preamp gain.

Exclusive MIRAGE *ActiveBias*™ circuit gives *crystal clear SSB* without splatter or distortion.

B-5018-G is legendary for its ruggedness and is fully protected -- high SWR or excessive input power automatically bypasses the B-5018-G to prevent damage.

Heavy-duty heatsink spans entire length of cabinet. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Has adjustable delay *RF sense* Transmit/Receive switch *and* remote external keying. 16-20 Amps at 13.8 VDC.12x3x5½ inches.

B-5018-G **$329**

B-1018-G, $409. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.25-10 Watt rigs.

B-2518-G, $329. Same as B-5018-G but for 10 to 25 Watt mobile or base. 160 Watts out for 25 Watts in.

RC-2, $45. Remote Control. On/Off, preamp On/Off, selects SSB/FM. With 25 foot cable.

Power Curve -- typical output power in Watts

B-1018-G	25	50	140	150	160	160	--	--	--	--
B-2518-G	5	7	40	60	80	100	125	160	160	160
B-5018-G	--	2	15	25	40	50	70	100	130	160
Watts In	.25	.5	3	5	8	10	15	25	35	50

35 Watts for 2 Meter HT

For handhelds up to 8 Watts. 35 Watts out for 3-8 Watts in (18 W out/1W in)! 18 dB *GaAsFET* preamp. All modes: FM, SSB, CW. RF sense T/R switch. Reverse polarity protection. Includes mobile bracket, 1 year warranty. 5¼Wx1¾Hx4¾D in.

B-34-G **$99.95**

35 Watts, $79.95, FM only

B-34, $79.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛Wx1¾Hx4¼D in

MIRAGE Dual Band 144/440 MHz Amp

Boost your *dual band* 144/440 MHz handheld to a powerful mobile/base -- 45 Watts on 2 Meters/ 35 Watts on 440 MHz! Works with all FM handhelds to 7 Watts. Includes *full duplex* operation -- lets you talk on one band, listen on other at same time. Auto band selection, RF sense T/R switch, single connector, reverse polarity protection, 5Wx1¾Hx5D in. Mobile bracket. One year warranty.

BD-35 **$159.95**

100 Watts for 2M HT

100 Watts out for 2-8 Watts in! Great for HTs up to 8W. FM, SSB, CW. 15 dB *GaAsFET* preamp, RF sense T/R, high-SWR protected. B-310-G **$199.95**

http://www.mirageamp.com

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Tech: 662-323-8287 **Fax:** 662-323-6551

MIRAGE

300 Industrial Park Rd
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MIRAGE . . . the world's most rugged VHF/UHF amplifiers!

the *finest* antenna tuner made!

. . . the VECTRONICS HFT-1500

- ***High Current Roller Inductor***
- ***SSB*Analyzer Bargraph***™
- ***Cross-Needle Meter***
- ***6 Position Antenna Switch***
- ***Built-in 4:1 Balun***
- ***Gear driven Turns Counter***

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a super durable paint that won't scratch or chip.

Attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the front panel. You won't leave a mark!

Arc-Free Operation

Two 4.5 kV transmitting variable capacitors and a massive roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you quickly fly from band to band. A precision 5-digit gear driven turns counter lets you accurately retune.

HFT-1500 **$459.95**

Large comfortable knobs and smooth vernier drives make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

You can tune your SWR down to the absolute minimum! **Why?** Because all network components -- roller inductor and variable capacitors are fully adjustable.

Tune any Antenna

You can tune any *real* antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, Yagis, quads, longwires, whips, G5RVs, and more.

*SSB*Analyzer Bargraph*™

Exclusive 21 segment bargraph lets you visually follow your instantaneous voice peaks. Has level and delay controls.

Accurate SWR/Power Meter

A shielded directional coupler and backlit Cross-Needle meter displays accurate SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

6 Pos. Ceramic Antenna Switch

Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

Built-in Balun

A heavy duty two ferrite core 4:1 balun feeds dual high voltage Delrin terminal posts for balanced lines. 5.5x12.5x12 inches. One year limited warranty.

Call toll-free, 1-800-363-2922

Order the HFT-1500 from Vectronics. Try it for 30 days. If you are not completely satisfied, return it for a full refund, less shipping and handling -- no hassles.

http://www.vectronics.com

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MFJ *Balanced Line* Antenna Tuner

Superb balance . . . Very wide matching range . . . Covers 1.8-54 MHz . . . Cross-Needle SWR Wattmeter . . . Handles 300 Watts . . . Compact size . . .

The MFJ-974H is a* fully balanced true *balanced line antenna tuner. It gives you superb current balance.

Johnson Matchbox

For decades, the Johnson Matchbox has been the standard of comparison for balanced line antenna tuners. But, it had a severely limited matching range and covered only 80, 40, 20, 15 and 10 Meters.

***The** MFJ-974H is its successor*. It meets today's needs and even surpasses the Johnson Matchbox outstanding performance.

Everything You Need

The MFJ-974H gives you excellent current balance, very wide matching range(12-2000 Ohms) and covers 1.8 through 54 MHz *continuously* including all WARC bands, 160 Meters, 6 Meters and the new 60 Meter band. Handles 300 Watts SSB PEP and 150 Watts CW.

Tuning is fast and easy - - just three tuning controls. You can adjust for highly efficient broadband low-Q operation or use higher Q when you encounter extreme loads.

A large three-inch lighted Cross-Needle SWR/Wattmeter lets you read SWR, peak or average forward and reflected power *all at a glance* on 300/60 or 30/6 Watt ranges.

A ground post is provided to ground one output terminal so you can also tune random wires and coax fed antennas.

Compact 7½Wx6Hx8D in. fits anywhere.

Tunes any Balanced Line

The MFJ-974H tunes any balanced lines including 600 Ohm open wire line, 450/300 Ohm ladder lines, 300/72 Ohm twin lead - - shielded or unshielded.

Superb current balance minimizes feedline radiation that can cause troublesome TVI /RFI, painful RF bites, mysterious RF feedback problems and radiation pattern distortion.

Excellent Balance, Excellent Design

The MFJ-974H is a *fully balanced* wide range T-Network. *Four* 1000 Volt air variable capacitors are gear driven. A high-Q air wound tapped inductor is used for 80-10 Meters with separate inductors for 6 and 160 Meters. The tuning components are mounted symmetrically to insure electrical balance.

A 1:1 *current* balun is placed on the low impedance 50 Ohm input side to convert the balanced T-Net-work to unbalanced operation. An efficient balun is made of 50 ferrite beads on RG-303 *Teflon*™ coax to give very high isolation. It stays cool even at max power.

MFJ-974H **$199.95**

Balanced Line = Extremely Low Loss

Balanced lines give extremely low loss.

Doublet, horizontal loop, vertical loop, quad, double extended Zepp, Lazy H, W8JK antennas all give efficient multi-band operation when fed with balanced lines.

6-80 Meter Balanced Line Tuner

MFJ-974 **$179.95**

MFJ-974, $179.95. Same as MFJ-974H but for 6-80 Meter operation (no 160 Meters).

160-6 Meters All Band Doublet Antenna

MFJ-1777, $49.95. 102 feet doublet antenna covers 160-6 Meters with balanced line tuner. Super strong custom fiberglass center insulator provides stress relief for 450 Ohm ladder line (100 feet included). Authentic *glazed ceramic* end insulators. Handles 1500 Watts.

MFJ *High Current* DC Multi-Outlet Strips

Choose super versatile 5-way binding posts AND/OR Anderson PowerPole® connectors

Anderson PowerPole® is a registered trademark of Anderson Power Products.

Provide multiple high current DC outlets for transceivers and accessories from your main 12 VDC power supply – keeps you neat, organized and safe. Prevents fire hazard. Keeps wires from tangling up and shorting. Outlets are fused and RF bypassed.

All MFJ DC power strips have *built-in* six foot, eight gauge, flexible color-coded cable with ring tongue terminals -- *no extra cost*. *RF-tight* aluminum cabinet has mounting ears and ground post with wing nut.

Choose MFJ's *super versatile* super heavy duty 5-way binding posts (spaced for standard dual banana plugs) and/or *Anderson PowerPole®* outlets.

Each *Anderson PowerPole®* is individually fused as needed. Standard color coded automobile fuses plug in externally. Extra *PowerPole®* connectors, contacts, fuses are included at *no extra cost*.

Versatile 5-Way Binding Posts

MFJ-1118 **$74.95** **Power** two HF and/or VHF rigs and six accessories from your main 12 VDC supply. *Built-in 0-25 VDC voltmeter*. Two pairs 35 amp 5-way binding posts, fused and RF bypassed for transceivers. Six pairs RF bypassed binding posts with master fuse, ON/OFF switch, and "ON" LED provide 15 Amps for accessories. 12½x2¾x2½ in.

All PowerPoles®

MFJ-1128 **$99.95** ***12 outlets, each fused, 40 Amps total.*** Three high-current outlets for transceivers. Nine *switched* outlets for accessories. Mix and match in-cluded fuses as needed (one-40A, one-25A, four-10A, four-5A, three-1A fuses installed). *Built-in 0-25 VDC Voltmeter*. Includes *extra* 12 pairs of *PowerPole®* contacts and *extra* 10 fuses (2 each: 1, 5, 10, 25, 40A) -- *no extra cost*. 12Wx1¼Hx2¾D in.

MFJ-1126 **$79.95** ***8 outlets. each fused, 40 Amps total.*** Factory installed fuses: two 1A, three 5A, two 10A, one 25A, one 40A. *Built-in 0-25 VDC Voltmeter*. Includes *extra* 6 pairs of *Anderson PowerPole®* contacts and *extra* 5 fuses (1, 5, 10, 25, 40A) -- *no extra cost*. 9Wx1¼Hx2¾ inches.

PowerPoles® AND 5-Way Binding Posts

MFJ-1129 **$109.95** *The best of both worlds!* ***10 outlets, each fused, 40 Amps total.*** Three high-current outlets for rigs -- 2 *PowerPoles®* and 1 versatile high-current 5-way binding post. Seven *switched* outlets for accessories (20A max) -- 5 *PowerPoles®* and 2 versatile binding posts. Mix and match included fuses as needed (1- 40A, 2-25A, 3-10A, 3-5A, 2-1A installed). *Built-in 0-25 VDC Voltmeter*. Includes *extra* 7 pairs of *PowerPole®* contacts, and 10 fuses (2 each,1,5,10, 25, 40A) -- *no extra cost*.12½Wx1¼Hx2¾D in.

MFJ-1124 **$59.95**

6 outlets, each fused, 40 Amps total. Four *PowerPoles®* and two high-current 5-way binding posts, Installed fuses: 1-40A, 2-25A, 2-10A, 1-5A, 1-1A. Includes 4 pair *PowerPole®* contacts, and 5 fuses -- *no extra cost*.

•1 Year *No Matter What*™ warranty •30 day money back guarantee (less s/h) on orders direct from MFJ.

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MFJ . . . The World Leader in Ham Radio Accessories!

MFJ *IntelliTuner*™ Automatic Tuner

Automatically tunes any antenna balanced or unbalanced . . . Ultra fast . . . 2000 memories . . . Antenna Switch . . . Efficient L-network . . . Matches 6-1600 Ohms at 300 Watts . . . 1.8-30 MHz . . . 4:1 current balun . . . Cross-Needle and Digital SWR/Wattmeter . . . Aural SWR meter . . . Backlit LCD . . . Remote control port . . . Radio interface . . .

MFJ-993

$259.95 **New!**

The MFJ-993 *IntelliTuner*™ lets you tune any antenna *automatically* balanced or unbalanced -- *ultra fast*.

It's an automatic antenna tuning *console* complete with SWR/Wattmeter, antenna switch for two antennas and 4:1 current balun for balanced lines.

MFJs exclusive *IntelliTuner*™, *Adaptive Search*™ and *InstantRecall*™ algorithms give you *ultra fast* automatic tuning with over 2000 *non-volatile* revolving memories.

You get a highly efficient L-network, wide 6-1600 ohm matching at *full* 300 Watts SSB/150 Watts CW, 1.8-30 MHz coverage, Cross-Needle and *digital* meters, aural SWR meter, *backlit* LCD display, remote control port, radio interface, heavy-duty 16 amp/1000 volt relays and more.

It learns while you're having fun

As you're ragchewing, contesting or DXing, *your MFJ-993 is learning!*

When you transmit, the MFJ-993 automatically tunes for minimum SWR and remembers your frequency and tuner settings. The next time you operate on that frequency and antenna, these tuner settings are instantly restored and *you're ready to operate in milliseconds!*

Each of two antennas can learn and remember over a thousand frequencies and tuner settings. They are safely stored in *non-volatile* revolving memory.

Highly Intelligent ultra fast tuning

MFJ *InstantRecall*™ first checks its memory to see if you have operated this frequency before. If so, tuning is instantaneous and you're ready to operate.

If not, MFJ's *IntelliTuner*™ algorithm - - based on MFJ's famous SWR Analyzer technology - - kicks in. It *measures* the complex impedance of your antenna. Next, it *calculates* the components it needs and instantly *snaps* them in. Then, it fine tunes to minimize SWR -- you're ready to operate. It's all done in a *fraction* of a second.

When the impedance is within its measurement range, the MFJ-993 is the *fastest automatic antenna tuner in the world.*

If it can't accurately determine impedance, MFJ's *AdaptiveSearch*™ algorithm goes into action. Frequency is measured and relevant components values are determined. Only those values are searched for ultra-fast tuning.

For even faster searches, you can set the target SWR to 2 (settable 1.0 to 2.0).

You can manually tune when you can't transmit (for listening out of ham bands).

Cross Needle and Digital Meters

Lighted Cross-Needle and *digital* SWR/Wattmeters lets you accurately read SWR, forward and reflected power at a glance.

An *aural* SWR meter lets you *hear* the tuned SWR when you can't see or read the meters.

Turn on a highly visible, instant response SWR LCD bargraph when you need it.

Backlit LCD Display

An easy-to-read *backlit* LCD displays SWR, forward/reflected power, frequency, antenna 1 or 2, L and C tuner values, on/off indicators and other information.

Remote Control Port

Plug in the **MFJ-990RC, $39.95**, remote control and put your tuner at your antenna or elsewhere and control it remotely.

The MFJ-993 supports radio tuner interfaces such as the ICOM 706 series. *Interface cables are available.*

The MFJ-993 is a compact 10Wx2¾ Hx9D inches. Use 12-15 VDC/1 amp or 110 VAC with **MFJ-1316, $19.95**.

Tune any Antenna

You can tune any antenna -- dipoles, verticals, beams, phased arrays, inverted vees, quads, random wires, mobile antennas, limited space antennas -- any antenna.

A 4:1 true current balun lets you tune any *balanced* antenna -- horizontal loops, vertical loops, multi-band doublets, quads, folded dipoles, Zepps.

150 Watt Automatic Tuner

New!

MFJ-991, **$219.95**

MFJ-991, *150 Watt IntelliTuner*™ automatic antenna tuner. Similar to MFJ-993 but handles 150 Watts SSB/100 Watts CW, matches 6-3200 Ohms. Does not have digital SWR/Wattmeter/LCD display, aural SWR meter/audio feedback, antenna switch or 4:1 current balun for balanced lines.

600 Watt MFJ Automatic Tuner

MFJ-994, **$359.95** **New!**

MFJ-994, *600 Watt IntelliTuner*™ automatic antenna tuner. Similar to MFJ-993 but handles 600 Watts SSB/300 Watts CW, matches 12-800 Ohms. Does not have digital SWR/Wattmeter/LCD display, aural SWR meter/audio feedback, antenna switch or 4:1 current balun for balanced lines. Tuning must be done at low transceiver power with the amplifier bypassed.

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MFJ . . . the World Leader in Ham Radio Accessories!

MFJ tiny Travel Tuner

Tiny 4½x2¼x3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything!

MFJ brings you the *world's smallest* full power 150 Watt 80-10 Meter Antenna Tuner. Extra wide matching range lets you tune nearly any antenna.

It's no toy, its got guts! Built with real *air* variable capacitors (600 Volt, 322 pF) and *three* stacked powder iron toroids to handle real power -- not just QRP. Bypass switch lets you bypass tuner when you don't need it.

You can use nearly any transceiver at full power with nearly any coax fed or random wire antenna for portable, home or mobile operation.

It's perfect for compact rigs like Icom IC-706MKIIG, Yaesu FT-100D, Kenwood TS-50, QRP rigs and others with a built-in SWR meter.

Operate anywhere, anytime with a quick easy set-up! Tune out SWR on your mobile whip from inside your car. Operate in your apartment with a wall-to-wall antenna or from a motel room with a wire dropped from a window or from a mountain top with a wire over a tree limb. Great for DXpeditions or field day. Be prepared for emergencies.

MFJ-902 is so small and handy, you'll rely on it wherever you go! It's easy to pack away in your briefcase, suitcase, backpack, glove compartment or desk drawer. It's tiny enough to slide in your back hip pocket! 4½Wx2¼Hx3D in.

MFJ-902
$79.95 **New!**

Tiny Travel Tuner with 4:1 Balun

MFJ-902H
$99.95

MFJ-902H, same as MFJ-902 *Tiny Travel Tuner* but has *4:1 balun* for balanced lines and 5-way binding posts for balanced lines and random wire. 5¾Wx2¼Hx 2¾D inches.

Tiny Travel Tuner with Cross-Needle SWR/Wattmeter

MFJ-904
$109.95

MFJ-904, same as MFJ-902 *Tiny Travel Tuner* but has *Cross-Needle SWR/Wattmeter.* Read SWR, forward and re-flected power all at a glance in 300/60 and 30/6 Watt ranges. 7¼Hx2¼Hx2¾D in.

ALL-in-one *Tiny Travel Tuner* with 4:1 Balun *and* SWR/Wattmeter

MFJ-904H
$129.95

ALL-in-one! MFJ-904H, same as MFJ-902 *Tiny Travel Tuner* but has *4:1 balun for balanced lines* and Cross-Needle SWR Wattmeter. Read SWR, forward and reflected power all at a glance in 300/60 and 30/6 Watt ranges. Has 5-way binding posts for balanced lines and random wire. 7¼Hx2¼Hx2¾D inches.

Long 10/12 foot Telescoping Whips

MFJ-1954
$19.95
10 Feet

MFJ-1956
$29.95
12 Feet

10 foot extended, 19 inches collapsed, MFJ-1954, $19.95. 12 foot extended, 22.5 inches collapsed. MFJ-1956, $29.95. Standard 3/8 inch by 24 threaded stud for use with all standard mounts. Durable 1/2 inch diameter plated brass. Telescopes for full 1/4 wave operation 2 to 12/15 Meters. Cover 17, 20, 30, 40, 60, 80, 160 Meters with loading coil. Use two for multi-band dipoles. Replace screwdriver antenna whip for highly efficient *fixed* mobile operation.

MFJ RF Isolator

MFJ-915 *RF Isolator*

MFJ-915
$29.95

prevents unwanted RF from traveling on the outside of your coax shield into your transceiver. This unwanted stray RF can cause painful RF "bites" when you touch your microphone or volume control, cause your display or settings to go crazy, lock up your transceiver or turn off your power supply. In mobile installations, stray RF could cause your car to do funny things even blow your car computer. Clear up these problems, plug an MFJ-915 between your antenna and transceiver. *Don't operate without one!* 5x1½ inches. For 1.8 to 30 MHz.

Portable Collapsible Antenna Tri-Pod

MFJ-1918
$39.95

Holds 66 pounds of antenna steady. Black *steel* base forms strong braced equilateral triangle 40 inches on a side. Non-skid feet. One inch diameter steel mast extends height to six feet. Strong base and mast locks. Easily add antenna mount or mast extension for greater heights. Collapses to 38 inches by 4 inch diameter. 6¾ pounds.

1500 Watt Lightning Surge Protector

MFJ-272
$39.95

Protect your expensive transceiver from static electricity and lightning induced surges with an ultra-fast gas discharge tube. Plug between rig and antenna, attach ground. DC to 1000 MHz. SO-239s.

All-Band G5RV Antenna

MFJ-1778
$39.95

Cover all bands, 160-10M with tuner. 102 ft. long, 1.5kW. Custom fiberglass insulator stress relieves 450 Ohm ladder line. Use horizontally, as inverted vee or sloper. Marconi on 160M.

40-10M G5RV Junior
MFJ-1778M, $34.95.
Half-size 52 foot *G5RV Jr* 40-10 Meters, 1500 Watts.

Glazed Ceramic Antenna Insulator

MFJ-16C06
$3.95
Package of six. (69 cents each)

Authentic *glazed ceramic* antenna insulator. Extra-strong -- will not break with long antennas and will not arc over or melt even under full legal power. Molded ridges give extra-long high voltage path to prevent high-voltage breakdown. Smooth wire holes prevent wire damage. Use as center or end insulator for dipoles, doublets, G5RVs, guy wires and others.

Current Balun/Center Insulator

MFJ-918
$24.95

True *1:1 Current Balun/Center Insulator* forces equal currents into dipole halves to reduce coax feedline radiation and field pattern distortion. Reduces TVI, RFI and RF hot spots in your shack. 50 ferrite beads on *Teflon*® coax. 1.5kW, 1.8-30 MHz. Stainless steel hardware. *Direct* antenna connection. 5x1½ in.

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ARRL Membership Application

Name _____ Call Sign _____

Street _____

City _____ State _____ ZIP _____

Sign up my family members, residing at the same address, as ARRL members too! They'll each pay only $8 for a year's membership, have access to ARRL benefits and services (except QST) and also receive a membership card.

Family Member Name _____ Call Sign (if any) _____

Family Member Name _____ Call Sign (if any) _____

❑ Sign up _____ family members @ $8 each = $ _____ .

❑ Total amount enclosed, payable to ARRL $ _____ .

❑ Enclosed is $ _____ ($1.00 minimum) as a donation to the Legal Research and Resource Fund.

❑ Charge to: ❑ VISA ❑ MasterCard ❑ Amex ❑ Discover

Card Number _____ Expiration Date _____

Cardholder's Signature _____

❑ If you do not want your name and address made available for non-ARRL related mailings, please check here.

Please check the appropriate one-year[1] rate:

- ❑ **$39 in US.**
- ❑ **Age 65 or older rate, $36 in US.**
- ❑ **Age 21 or younger rate, $20 in US** (see note*).
- ❑ **Canada $49.**
- ❑ **Elsewhere $62.**

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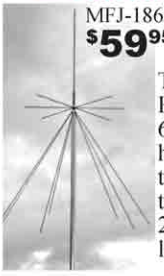

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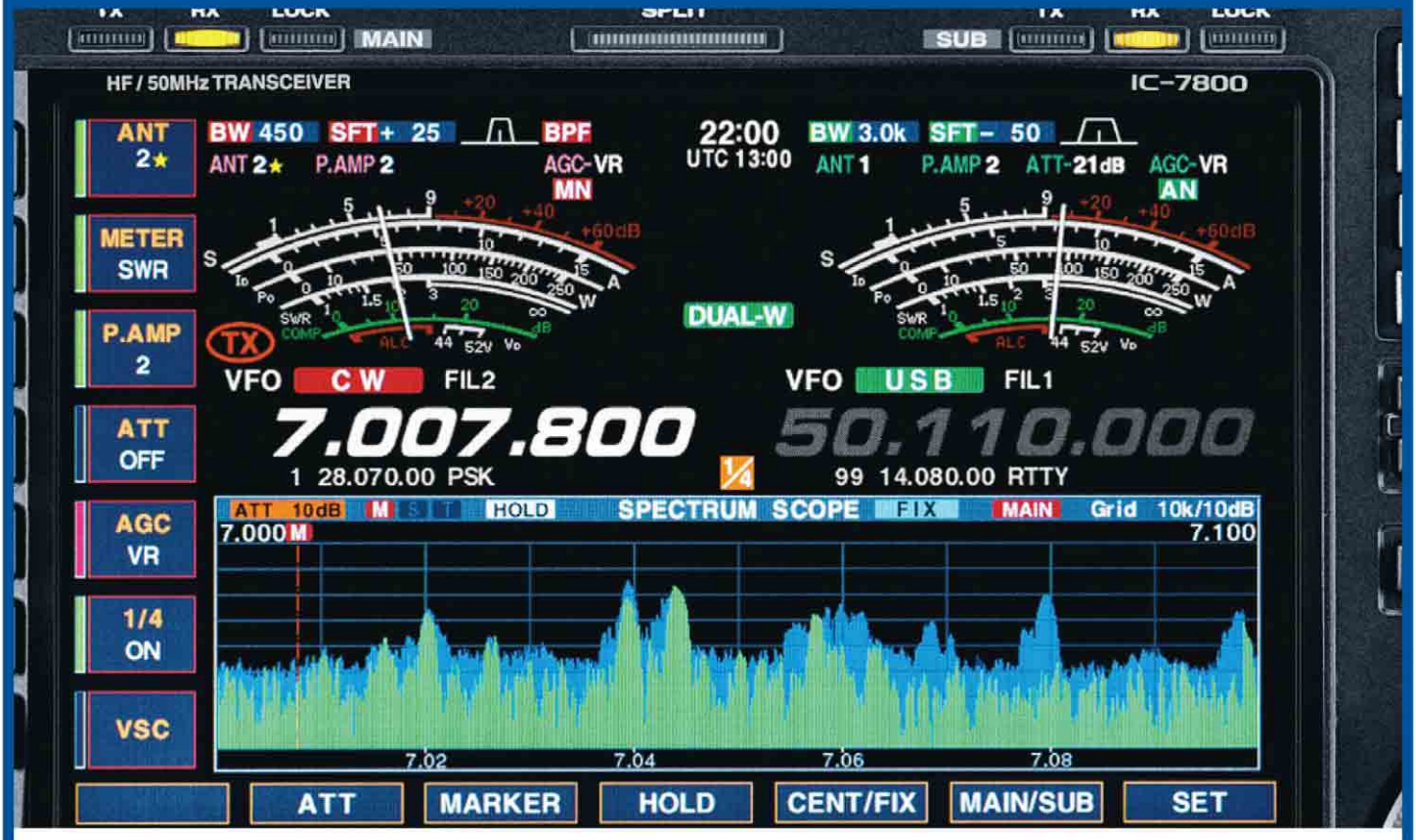

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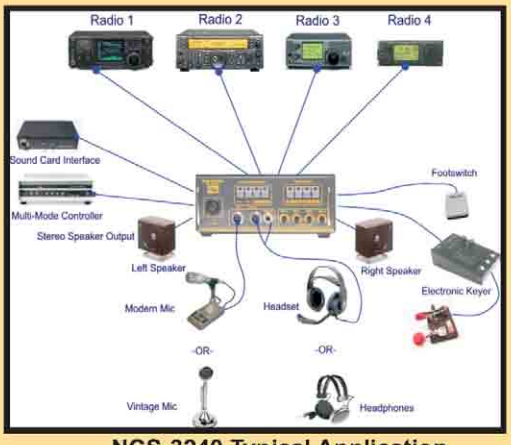

NCS-3240 Typical Application

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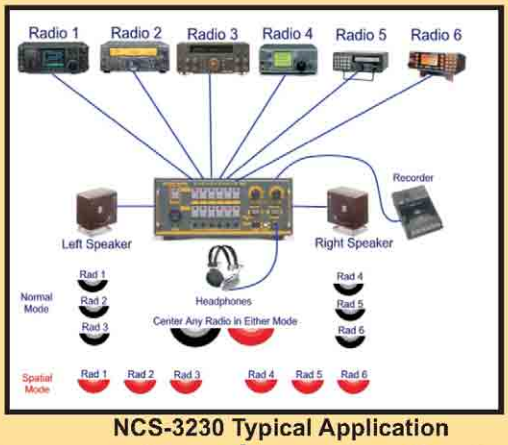

NCS-3230 Typical Application

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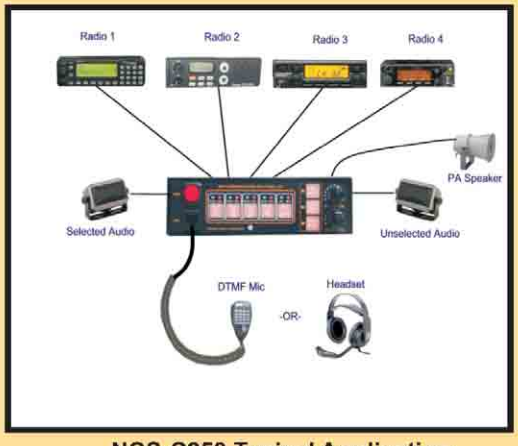

NCS-C250 Typical Application

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TECH TALK

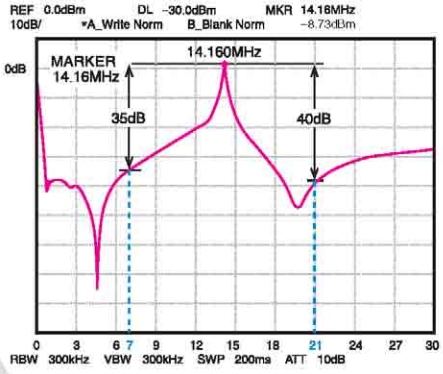
IC-7800 Digi-Sel: State-of-the-art preselector

Top-band enthusiasts and multi-multi contest station operators place incredible demands on their receivers. On 160 meters, amateurs who live in urban areas often have one or more local 50-kilowatt AM broadcast transmitters operating just below 1.8MHz. On any band, multi-multi contest stations may have as many as six full-legal-limit transmitters operating simultaneously, with antennas located very close to each other. If undesired out-of-band signals saturate the first mixer stage, the receiver will be useless for weak-signal DXing or contesting. Even a receiver with a +40dBm Third Order Intercept (TOI) can be overloaded under these extreme conditions!

External bandpass and band-reject filters are one way to battle strong out-of-band signals. Another device that's very useful for out-of-band signal rejection is a receiver preselector. Several popular radios of the 1970s had receiver preselectors that worked very well, but required manual adjustment whenever you changed frequency by more than a few dozen kHz. Although they improved receiver performance when adjusted correctly, they could seriously degrade receiver performance if you changed frequency and forgot to "tweak" the preselector control.

The ideal preselector adds selectivity to the receiver front end while automatically tracking the tuning control. Enter the IC-7800 Digi-Sel tracking preselector! The IC-7800's microcontroller tunes the Digi-Sel preselector automatically so that its response peak is always centered on your operating frequency. The following diagram shows the actual measured response of the Digi-Sel tracking preselector when the IC-7800 is receiving in the 20 meter SSB band (14.160MHz). Notice that the preselector suppresses signals on 40 meters (7MHz) by 35dB and signals on 15 meters (21MHz) by 40dB!

DIGI-SEL Characteristics in the 14MHz band



The IC-7800 tunes the Digi-Sel preselector by adding and subtracting inductance and capacitance from a tuned circuit. Icom's engineers designed the preselector for absolute maximum immunity from strong-signal overload and for absolute minimum distortion by using state-of-the-art ultra-miniature relays instead of switching diodes. A preselector that uses switching diodes can introduce in-band spurious signals in the presence of very strong out-of-band signals — a preselector that uses relays and passive components (inductors and capacitors) cannot.

How could we make Digi-Sel even more useful? By including one in each of the front ends of both receivers in the IC-7800! Imagine using dual-watch on the same or different bands with two identical, independent receivers, both of which have a tracking preselector in the front end!

Better yet, don't imagine it — try it for yourself! Test-drive the new IC-7800 at your favorite authorized ICOM dealer.

Get into HF!
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TECH TALK

IC-746PRO - How to tweak your DSP

Ready for new radio thrills and excitement? Gear up with Icom's new IC-746PRO and experience a totally new dimension in amateur radio enjoyment!

This new generation transceiver delivers unsurpassed DSP performance on all bands and modes, it is affordably priced, and it can also be tweaked to fit your particular operating needs or band conditions at the time. This Tech Talk overviews that concept.

Receive DSP Tweaks. First, you can select a built-in filter bandwidth that is fully adjustable from 3.0kHz to 50Hz for superb sounding SSB audio, copying weaker stations and dodging QRM or working CW in high style, as desired. Second, you can use the Twin PassBand Tuning controls to further tweak a selected filter's center frequency and width. By adjusting the concentric controls together, a received station's bass, mid range or treble tones can be emphasized. By adjusting them separately (one up, one down), a chosen filter's bandwidth can be sharpened to eliminate "side QRM" lower and/or higher in frequency. You can also menu-adjust the upper edges or shoulders of a filter's response curve and tweak the receiver's bass/treble equalization to mate with your hearing preference. Add in multiple AGC loops which, combined with the IC-746PRO's excellent DSP system, prevent strong adjacent frequency interference from reducing receiver sensitivity or causing "pumping" of receive audio, and you have new millennium performance supreme!

IC–746PRO
Supercharged Performance!

As Ray Novak, Icom's National Amateur Sales Manager, discovered during DXpedition operations from A52RN/Bhutan, copying a weak (S3) signal only 200Hz from a strong (S9+) signal is a cinch with the IC-756PROII... which uses the same DSP engine as the IC-746PRO. Now that is impressive!

SSB Transmit Tweaks. Three choices of transmit filter bandwidths, 2.8, 2.4 and 2.2 kHz plus adjustable microphone equalization let you custom-tailor the IC-746PRO's transmit audio to match your particular voice characteristics. By selecting a wide filter and boosting bass, mid range and/or high tones in that chosen bandwidth, your voice can sound extra-rich and full-bodied – even better on the air than "in person." By selecting a narrow filter and emphasizing upper range/treble tones, you can produce a remarkably strong signal with maximum "talk power" for DXing or communicating under adverse band conditions. Additionally, all filter and equalizer settings are easily changed so the IC-746PRO "has a different face to fit every need."

The Digital Difference. Some amateurs may understandably question how the IC-746PRO's performance is superior to other transceivers of similar power and bandwidth. The answer is using IF level DSP plus ultra-steep skirted filters. Combined, they ensure you hear good and sound great yet stop interference and "splatter" like a brick wall. That is the PRO's advantage and it is terrific! Test-tune an IC-746PRO at your favorite dealer and see for yourself!

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1/2"x12"EE / EJ Turnbuckle	$21/22
3/16" / 1/4" Big Grips	$5/6

PLEASE CALL FOR MORE HARDWARE.

HIGH CARBON STEEL MASTS

5 FT x .12" / 5 FT x .18"	$35/59
10 FT x .18" / 11 FT x .12"	$129/80
16 FT x .18" / 14 FT x .12"	$179/109
19 FT x .12" / 21 FT x .18"	$129/235
22 FT x .25" / 24 FT x .25"	$349/379

GAP ANTENNAS

Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45

PLEASE CALL FOR DELIVERY INFO.

LAKEVIEW HAMSTICKS

9106	6m	9115	15m	9130	30m
9110	10m	9117	17m	9140	40m
9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR .$24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/199
G6-270R, 2m/70cm Vertical	$169
G6-144B/G7-144B	$109/179

HUSTLER RESONATORS IN STOCK.

ANTENNA ROTATORS

M2 OR-2800P	$1249
Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

ROTATOR CABLE

R62 (#18)	$.32/ft.
R81/82	$.25/ft./.39/ft.
R84	$.85/ft

PHILLYSTRAN GUY CABLE

HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
PLP2758 Big Grip (11200)	$18.00

PLEASE CALL FOR HELP SELECTING THE PHILLYSTRAN SIZE FOR YOUR PROJECT.

WEEKDAY HOURS:
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HUGE ICOM DEALS ★ HUGE YAESU DEALS

IC-756PROII..... Icom Special!
The Icom IC-756PROII is an all mode HF and 6m transceiver featuring 32-bit digital signal processing, auto antenna tuner, 100 watts RF output, digital twin PBT, 5" multifunction color TFT LCD display with band scope function, built-in CW and SSB memory keyers, and more. Supplied with hand mic and DC power cord.

PW-1..... In Stock!
The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

IC-746PRO..... In Stock!
The Icom IC-746PRO is an all mode HF/6m/2m XCVR with 32-bit IF level DSP. The radio features a built-in auto tuner, built-in RTTY demodulator and decoder (reads out on the radio's LCD display), auto notch, digital twin PBT, and more. Supplied hand mic and DC power cord.

IC-910H..... In Stock!
All-mode 2m/70cm dual band transceiver, featuring dual data inputs, CTCSS encode/decode, CW keyer, satellite mode, scan, sweep display function, optional 23cm module, optional DSP, and more. Supplied with hand mic and DC power cord.

FT-1000MP-V..... Yaesu Special!
Competition class HF DSP transceiver with automatic antenna tuner, digital signal processing, 200 Watts RF output, and more! With external AC power supply.

FT-1000MP-V Field..... Special!
Lower power (100W) version of the FT-1000MP-V, with built-in power supply.

Quadra System..... In Stock!
Solid state, no tune linear amplifier, offers 1000 Watts RF output on 160-15m (easy user mod adds 10/12m operation) and 500 Watts RF output on 6m.

FT-897D..... In Stock!
"Backpack" all-mode HF/6m/2m/70cm XCVR offering 100 watts of output power! The radio can be run from optional internal batteries with reduced output of 20 watts, or an optional internal power supply can be installed instead. An optional bolt-on external auto tuner is also available. The FT-897 is a truly self-contained portable!

FT-847..... Yaesu Special!
Great all-mode XCVR covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features DSP, CTCSS tone encode/decode, and more. Supplied with microphone and DC power cord.

IC-703..... New, In Stock!
IC-703PLUS..... New, In Stock!
The Icom IC-703 is a compact HF XCVR, with built-in auto tuner, DSP, and more! The IC-703PLUS adds 6m coverage.

IC-706MK2G..... Icom Special!
The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode XCVR with DSP, CW keyer, built-in CTCSS encode/decode/scan, 107 memoriess and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718..... New Lower Price!

IC-2720H..... New!
Dual band 2m/70cm FM XCVR. Features remote control panel, CTCSS tone encode/decode/scan, cross band repeat, data jack, dual RX, extended RX, 212 memories, and more. Supplied with a DTMF hand mic, separation cable, mounting brackets, and a fused DC power cord.

IC-V8000..... In Stock!
Great 75W 2m mobile XCVR. Features CTCSS tone encode/decode/scan, 207 memories, front panel mounted speaker, and more. Supplied with a DTMF hand mic, mounting bracket, and DC cord.

FT-8900R..... In Stock!
Quad band mobile XCVR covers 10m/6m/2m/70cm, with cross-band repeat.

FT-8800R..... New, In Stock!
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-7800R..... New, Please Call!
New, 2m/70cm dual band mobile XCVR.

FT-2800M..... In Stock!
Rugged, 50W 2m mobile transceiver.

FT-857D..... Now In Stock!
Ultra-compact all mode XCVR for HF/6m/2m/70cm. Features CW memory keyer, CTCSS encode/decode, 200 memories, optional DSP, and more. Supplied with a hand microphone, a fused DC power cord and mounting bracket.

FT-817ND..... In Stock!
A truly tiny self-contained all mode HF/6m/2m/70cm QRP XCVR featuring tone encode/decode, 200 memory channels, VOX, and more! With hand microphone.

IC-T2H Sport.... Great Low Price!
IC-T7H..... Icom Special!
IC-V8..... Great Low Price!
IC-W32A..... Now In Stock!
IC-T90A..... New, In Stock!
IC-R20-06..... New, Please Call!

IC-208H..... Great Low Price!
A great 2m/70cm dual band mobile XCVR, featuring CTCSS tone encode/decode, 500 memories, removable control panel, and more. With a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-2100H..... Great Low Price!
Rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memories, and more.

IC-PCR1000..... In Stock!
IC-R8500/R75..... In Stock!
IC-R3/R5-06..... In Stock!

G-2800DXA..... $1089
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA..... $499
G-800SA/DXA..... $329/409
G-450A..... $249
G-5500..... $599
G-550..... $299

FT-60R..... New, Please Call!
VR-120D..... In Stock!
VR-500..... In Stock!
VX-2R..... Great Low Price!
VX-5R..... In Stock!
VX-7R..... In Stock!
VX-150..... Great Low Price!

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Actual Size

YAESU RUGGED HANDHELD SERIES

50/144/430 MHz FM TRIPLE BAND DUAL RECEIVE

5 W Ultra-Rugged Magnesium Case Submersible (3 feet for 30 minutes)

VX-7RB/VX-7R

50/144/430 MHz FM TRIPLE BAND

5 W Heavy Duty Aluminum Diecast Case

VX-5R/VX-5RS

144/430 MHz FM DUAL BAND

1.5 W Ultra Compact

VX-2R

144/430 MHz FM DUAL BAND HANDHELD

FT-60R

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TH-D7A(G) / TM-D700A

Throughout the years, Kenwood has engineered many significant feature and hardware advancements that earned us the nickname "Pacesetter in Amateur Radio". Kenwood continues to show this leadership in advanced design and technology with the TH-D7A(G) handheld and the TM-D700A mobile dual-banders. Not only do our radios perform all the functions of any other radio, but you can also explore the exciting digital world of APRS™, which has become the fastest growing and most dynamic part of the hobby. Most Disaster Communication organizations use APRS™. Identifying someone's location with APRS™ can save a life.

The TH-D7A(G) and the TM-D700A are the only radios ever produced that have both built-in TNC and APRS™ operating software, allowing you to send and receive exact GPS positions. You can even send text messages over 144.390 MHz, an international APRS™ frequency. Position reports and two-way messaging can also be achieved over the Internet, across the country or around the world. Street level mapping can also be employed using a PC, palm device or GPS. And yes, the TM-D700A is great for receiving satellite packet!

Venture into the future of Ham radio today and experience Kenwood's "Dynamic Digital Duo". They may just be the excitement and enjoyment you have been waiting for!

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