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Amateur Radio

COMMUNICATIONS & TECHNOLOGY

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CQ

JULY 2004

Our 60th Year 1945 2004

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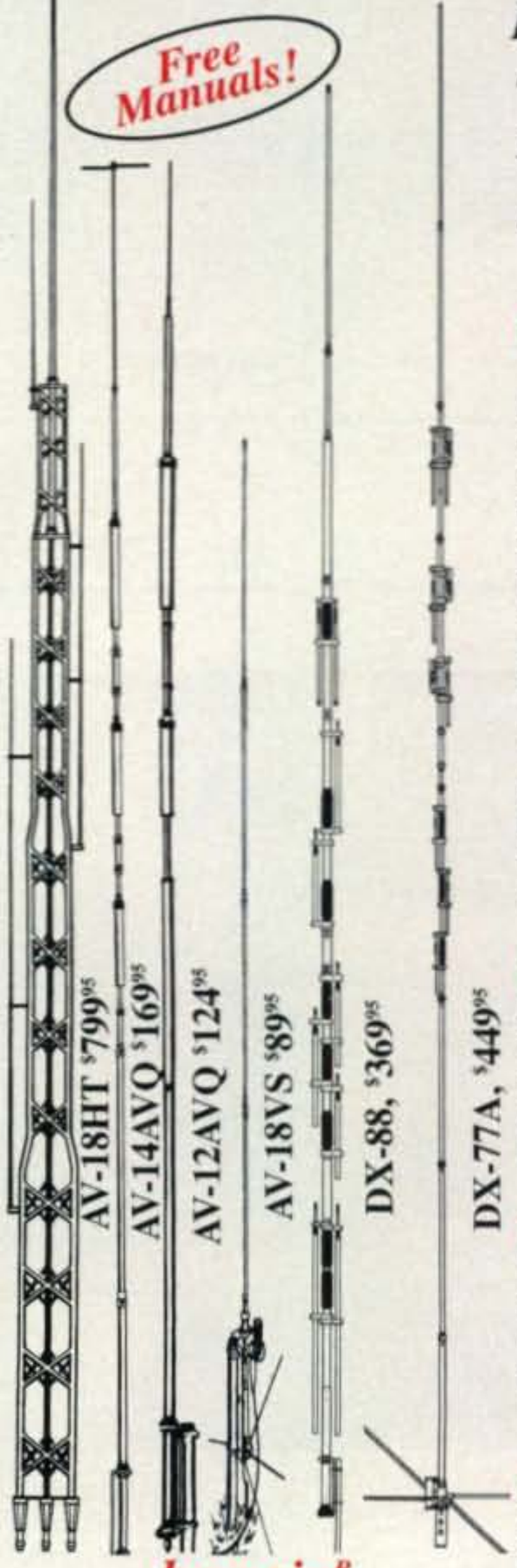

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All hy-gain multi-band vertical antennas are entirely self supporting -- no guys required.

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

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

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

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

DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs. All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $189.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

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Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$799.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph w/o guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph w/o guy**	**1.5-1.625"**

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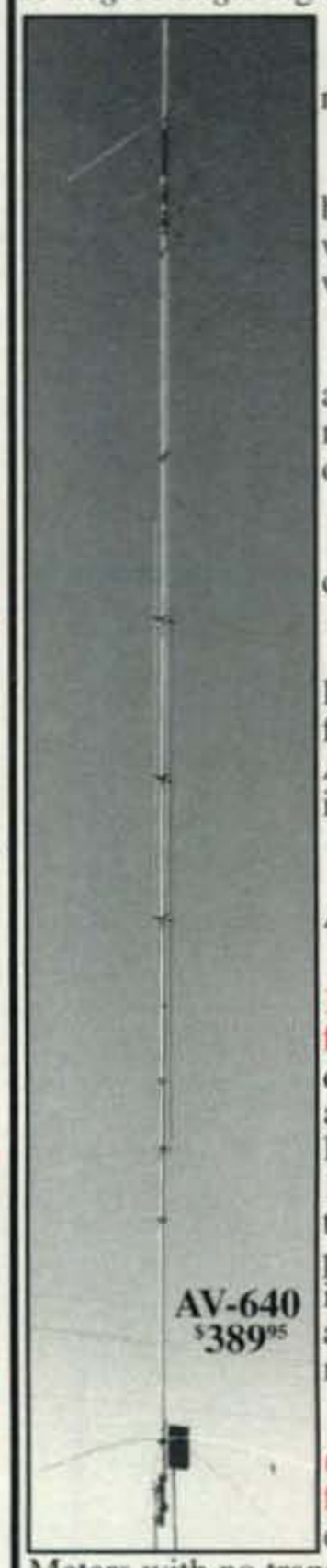
Hy-Gain's new **PATRIOT** HF verticals are the best built, best performing and best priced multiband verticals available today. For exciting DX make full use of your sunspot cycle with the **PATRIOT's** *low 17 degree angle* signal.



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

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

Sleek and low-profile

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

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

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

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Two year limited warranty. All replacement parts in stock.

AV-640, $359.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $289.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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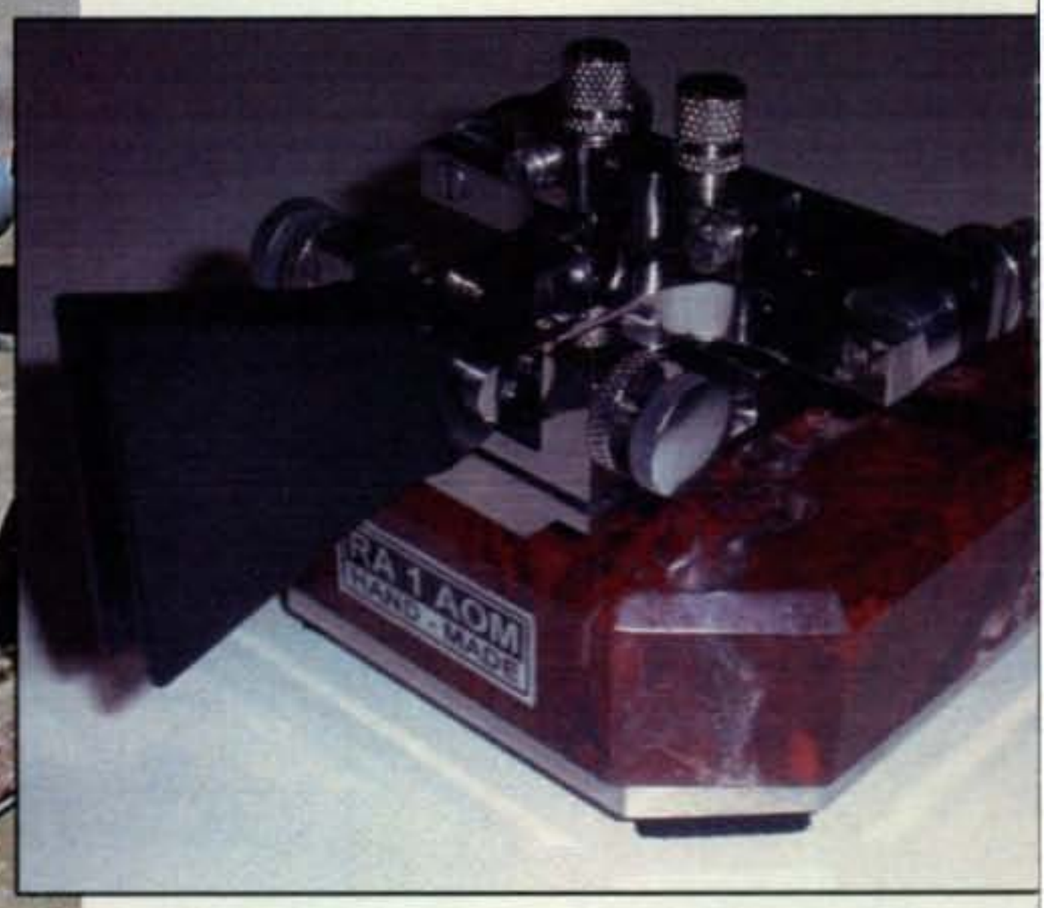

features

Vol. 60 No. 7

departments

All-Terrain Performance

On or off the road, Kenwood's new TM-271A delivers powerful mobile performance with 60W maximum output and other welcome features such as multiple scan functions and memory names. Yet this tough, MIL-STD compliant transceiver goes easy on you, providing high-quality audio, illuminated keys and a large LCD with adjustable green backlighting for simple operation, day or night.

144MHz FM TRANSCEIVER

TM-271A

▮ 200 memory channels (100 when used with memory names) ▮ Frequency stability better than ±2.5ppm (-20~+60°C) ▮ Wide/Narrow deviation with switchable receive filters ▮ DTMF microphone supplied ▮ NOAA Weather Band reception with warning alert tone ▮ CTCSS (42 subtone frequencies), DCS (104 codes) ▮ 1750Hz tone burst ▮ VFO scan, MHz scan, Program scan, Memory scan, Group scan, Call scan, Priority scan, Tone scan, CTCSS scan, DCS scan ▮ Memory channel lockout ▮ Scan resume (time-operated, carrier-operated, seek scan) ▮ Automatic repeater offset ▮ Automatic simplex checker ▮ Power-on message ▮ Key lock & key beep ▮ Automatic power off ▮ Compliant with MIL-STD 810 C/D/E/F standards for resistance to vibration and shock ▮ Memory Control Program (available free for downloading from the Kenwood Website: ***www.kenwood.net***)

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ham radio news

ARRL Officials Meet With Bush Aide on BPL

Three representatives of the ARRL met with a top White House technology official in late May and got some assurances of caution in the Bush administration's support for Broadband over Power Lines, or BPL. ARRL President Jim Haynie, W5JBP, General Counsel Chris Imlay, W3KD, and Chief Technology Officer Paul Rinaldo, W4RI, met with Richard Russell, Associate Director for Technology in the White House Office of Science and Technology Policy. According to a report on the ARRL website, the League representatives pointed out the interference issues identified in the National Telecommunications and Information Administration's (NTIA's) preliminary report on BPL, and urged the administration to back away from its support of BPL in favor of "less troublesome broadband technologies."

Russell reportedly told the ARRL officials that the administration is committed to finding ways to make BPL work, but does not want a flawed technology to result from the current BPL proceeding. Based on the NITA report, Russell said, the interference issues would be addressed, but would not commit to asking the FCC to delay a decision on its rulemaking proposal until after Part 2 of the NTIA report is released later this year. ARRL President Haynie said he left the meeting with "a better feeling" that interference problems would not be ignored, but that he remains "absolutely" convinced that a political agenda is driving the BPL proceeding.

NTIA Finds Significant BPL Interference

Interference from Broadband over Power Lines extends more than a quarter-mile on the ground and up to 25 miles in the air up to 20,000 feet, according to a long-awaited report from the National Telecommunications and Information Administration (NTIA). The report, issued just before the May 3 deadline for comments on the FCC's BPL rulemaking proposal, also concluded that the methods currently used for measuring BPL noise levels are inadequate and that more study is needed on areas such as ionospheric propagation of BPL signals. Acting NTIA Administrator Michael Gallagher called the NTIA recommendations "the technical foundation for the responsible deployment of broadband over power lines."

Here is our summary of the report's major findings:

1) the methods currently used to measure noise levels and interference potential are inadequate;

2) noise levels must be measured from BPL-energized power lines as well as the "device" coupling the signal to the power lines;

3) interference to weak-to-medium strength signals is likely out to 460 meters (1500 feet; more than 1/4 mile) from a BPL noise source at ground level and out to a 40-kilometer (25 mile) radius from the signal source for an airplane at an altitude of up to 6 kilometers (approximately 20,000 feet);

4) results of BPL tests and implementations in other countries have been mixed and some countries have banned BPL; and

5) more study is needed in several important areas, including skywave propagation of BPL signals.

NTIA said it would conduct further studies and issue a report later this year. The full report may be downloaded, either in full or chapter by chapter, from the NTIA website at: <http://www.ntia.doc.gov/new.html>.

LoTW Now Open for DXCC Credits

The ARRL reports that its computerized contact database, Logbook of the World (LoTW), may now be used for credits toward the DX Century Club (DXCC) award. As of May 5, registered users are able to apply "matches" in the 41 million-plus QSO database to their DXCC records. Details are available on the LoTW web page at <http://www.arrl.org/lotw/>. The LoTW database is not yet available for other ARRL awards or non-ARRL awards.

CQ Files BPL Comments

CQ Communications Inc., publishers of *CQ Amateur Radio,* joined about 5000 others in filing comments on the FCC's proposed rules for Broadband Over Power Lines, or BPL. Our comments voiced concern not only for amateur interests, but for the impact on all current users of the HF and low VHF portions of the spectrum; cited the likelihood of skywave propagation of BPL signals and of harmonics well up into the VHF and UHF ranges due to corroded connectors and other well-known sources of power line interference. We strongly urged the Commission to move slowly and carefully and to give strong consideration to authorizing BPL only in the microwave regions where wireless computer networks already operate. The full text of CQ's comments are on our BPL Info Center page at <http://www.cq-vhf.com/BPL.html>.

Wisconsin Ham Gets Bush's Ear on BPL

A ham in Wisconsin attending a campaign event for President Bush managed to get in a few-second plug for ham radio concerns over BPL. According to the *ARRL Letter,* Rich Kelly, KB9RNO, of Prairie du Chien, was among people shaking the President's hand as he left the "town hall meeting" campaign stop.

"I held his hand extra long and said 'Mr. President, please support the amateur radio operators of America,'" Kelly told the ARRL, noting that the President responded, "I do, I do." Kelly says he added, "Broadband internet over power lines is a real concern for us," and that Mr. Bush replied, "I know, I know about it." The ARRL, CQ, and many individual hams have written to the President in recent months after he announced support for BPL, urging him to keep in mind the likelihood of significant interference to current radio users.

First Amateur Rocket, Carrying Ham Radio, Reaches Space

Amateur radio played a major role in the flight and recovery of the first amateur rocket successfully launched into space. The ARRL reports via its website that the 21-foot, 10-inch diameter "GoFast" rocket launched by CSXT, the Civilian Space Xploration Team, flew to an altitude of 77 miles on May 17, considerably beyond the generally recognized boundary between Earth's atmosphere and space, which is 100 kilometers, or about 62 miles. Amateur radio equipment on board the rocket included a 33-centimeter telemetry downlink, a 2.4-GHz amateur television transmitter and a 224-MHz tracking system which allowed team members to locate and recover the rocket and avionics package in rugged terrain about 25 miles away from the launch site. The CSXT avionics team includes eight licensed hams.

Ham-Congressmen Push ARRL Restructuring Plan

The two members of Congress who are also hams have written to FCC Chairman Michael Powell, urging the Commission to adopt the ARRL's proposal for restructuring amateur licensing. The League's petition is one of 18 files since the International Telecommunications Union decided last summer to drop the worldwide requirement for Morse code proficiency as a condition of getting HF amateur privileges. In an April 23 letter to Powell, the *ARRL Letter* says Representatives Greg Walden, W7EQI (R-OR) and Mike Ross, WD5DVR (D-AR) called on the FCC "to support the ARRL's restructuring plan and to implement it rapidly."

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

hy-gain ROTATORS

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

HAM-IV

HAM-IV
$559.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum readability. *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	
WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	26
Effective Moment (in tower)	**2800 ft/lbs.**

TAILTWISTER SERIES II

T-2X
$649.95

T-2XD
$1029.95
with DCU-1

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.

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
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 (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
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 (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
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 (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
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
$69.95

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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CQ editorial

BY RICH MOSESON,* W2VU

zero bias – a CQ editorial

Inspiration at Dayton

The Dayton Hamvention® always seems to come just before the deadline for this issue of *CQ*, and I always wait until after I get home to write my editorial, since there's always something that happens there that inspires me to scrap whatever I've written B.D. (before Dayton) and start from scratch. Usually, I'll find my inspiration while wandering through the five rooms of indoor exhibits and the vastness of the flea market. I didn't get a chance to do much of that this year because, other than my annual "what's new" circuit and one forum I was on, things were too busy at our booth for me to leave. But that's some pretty good inspiration right there!

I came home from Dayton, as I always do, even more optimistic about our future than when I headed out there. First of all—since the rumors are already floating around about next year—announcements were made several times during the course of the show that there *will* be a Hamvention next year, it *will* be in Dayton, and it *will* be at Hara Arena. The only change is that it will be the *third* weekend in May next year instead of the second—May 20, 21, and 22. Mark your calendars, and if your club is in the habit of having a hamfest in mid-May, be sure to keep the Dayton date change in mind as you plan for 2005.

There were several things that were encouraging to me at Dayton this year, despite attendance appearing to be down somewhat from last year (which was down somewhat from the year before). Hamvention officials claimed the numbers had gone up slightly, but most of us there had the opposite impression. Nonetheless, considering the world situation, the slowness of the economic recovery, and the price of gasoline, I was pleasantly surprised that the show was as crowded and as busy as it was. In addition, it seemed to follow a pattern I've been seeing lately at every hamfest I attend—overall attendance may be down, but the people who are there have come to buy stuff, so sales stay even or increase over the previous year. This is good for the ham radio economy.

Other encouraging news: The ham radio manufacturers continue to be very optimistic about the top end of the ham market, continuing a trend that began last year when ICOM introduced the $10,000+ IC-7800, which was finally available this year (and sold well, from what we're hearing). Now, Yaesu has upped the ante with its introduction at this year's Hamvention of the FTDX-9000, a monster radio with a tentative price tag of $13,500! The biggest question seemed to be "when will it be available?" This is good even for those of us who can't plunk down 10 grand or more for a radio, since the technology that starts out only in top-of-the-line rigs fairly quickly works its way down into mid-range models as well. If the top end of the market is as strong as these manufacturers believe it is, then it's good news for the ham radio market as a whole. (I'll have a roundup of all the new stuff I saw at Dayton next month.)

Wait! There's more! Efforts to get more young people involved in ham radio (*involved*, as opposed to just licensed) are also beginning to pay off, and to be recognized. This year's Dayton "Amateur of the Year" is David Kopacz, KY1V, who was honored for starting a program to take one young ham each year on a contest DXpedition (all expenses paid). I had the opportunity not only to meet David, but also 14-year-old Daniel Bradke, W2AU, who, as the first DXpedition winner, joined KY1V's multi-multi group at VP5X for last year's CQ World-Wide DX CW Contest (yes, CW). ICOM's Ray Novak, N9JA, has made a major commitment to helping kids get more active in amateur radio and that was obvious at the ICOM booth, where 17-year-old Trevor Conroy, W7TDC, and 14-year-old Sara Saeger, K3OOO (both with Extra Class licenses), were helping out all weekend, and where I ran across four other kids while I was standing there (I'll have a separate story on all of them next month as well).

All in all, I came home encouraged that our hobby is moving not only toward greater economic vitality but toward greater involvement by young people as well.

BPL, Continued

I'm also somewhat more optimistic about the whole issue of Broadband over Power Lines, or BPL. As you're aware if you've been reading *CQ* or visiting our website over the past few months, we've been trying to educate our readers (and ourselves) about this issue, and we've filed our own comments with the FCC on its rulemaking proposal.

We are encouraged that—finally—concern about the potential impact of BPL on HF and VHF communications is being shown by users beyond the world of amateur radio. First of all, the long-awaited study by the National Telecommunications and Information Administration (NTIA) pointed up significant interference problems caused by BPL, called current techniques for measuring interference inadequate and said it needs more time to study the effects of BPL signal propagation and "aggregation" (the combined effect of multiple simultaneous signals). The National Academy of Sciences weighed in with serious concerns about effects on radioastronomy, as did the Pisgah Astronomical Research Institute. Aeronautical Radio, Inc., and Boeing both warned of potentially disastrous interference to HF aeronautical communications. ShipCom, an operator of maritime coast stations, warned that BPL not only would affect its ability to provide reliable communications for American ships at sea, but also for "foreign vessels and aircraft through international treaties administered by the Commission." The National Association of Shortwave Broadcasters expressed fears that foreign broadcasters would view BPL interference as jamming of their signals and would retaliate by jamming signals from U.S. shortwave broadcasters. NASB also noted that the burden would be on the listener to recognize harmful interference and to know how and where to file a complaint. Two public safety communications groups—APCO and NPSTC—as well as the Missouri Highway Patrol, warned that BPL interference could compromise emergency and disaster response, and noted that the proposed interference mitigation measures are "reactive, not proactive." The International Municipal Signal Association registered its fears that emergency radio callboxes, which operate on 72 and 75 MHz and often sit directly beneath power lines, would not be able to get their signals through because of interference from BPL signals. A similar warning came from the Central Station Alarm Association regarding radio alarm systems. And the Academy of Model Aeronautics warned that BPL signals could cause radio-controlled model airplanes to crash by blocking out control signals. Each group asked that, at minimum, the frequencies it uses be notched out. Adding all these, plus the amateur bands, would effectively notch out the entire HF spectrum, which, of course, would make BPL at HF useless. Even the National Rural Electric Cooperative Association had considerable concerns about the economic viability of BPL as well as a host of other issues not even touched on by the FCC's rulemaking proposal.

With all of these disparate voices calling for, at minimum, a slow and very cautious approach to BPL, we believe the FCC must listen or it will put itself at great risk of being held responsible for a future disaster as a result of rushing headlong into promoting widespread BPL deployment. As I write this, the 9/11 Commission is holding hearings in New York, focusing on the communications failures of that day … just imagine how much worse it might have been with BPL added into the mix.

73, W2VU

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announcements

• **YCCC Introduces DXpedition Award Program** – The Yankee Clipper Contest Club is offering $1500 to either a young ham (age 14–21) or a new ham (licensed less than one year) in the northeast with a General Class or higher license for the purpose of joining a YCCC-authorized contest DXpedition to anywhere in the world for either the ARRL DX Contest or the CQ World-Wide DX Contest. Applications are due by July 15, and the winner will be announced at the Boxboro Hamfest in Massachusetts in August. For specific rules and/or an application, contact Jim McCobb, W1LLU, at <W1LLU@verizon.net>.

• **The following special events are scheduled for July:**

W1B, from the 14th annual National Baby Food Festival, Fremont, Michigan; hams of Newayco County; July 20–24 in the General portion of 80, 40, 20, 15, and 10 meters. For certificate send QSL and 9×12 SASE to Leo Woodard, WD8DCA, 304 N. Stone Rd., Fremont, MI 49412.

W2GLQ, from Historic Morris Canal Special Event, Ledgewood, New Jersey; Nutley ARS; 0900–1700Z July 10–11 (no frequencies given). Special events from points along the canal will run through 2005. QSL for each location and certificate upon completion with SASE to: Nutley AES, c/o American Red Cross Building, 169 Chestnut St., Nutley, NJ 07110. (Details: <http://hometown.aol.com/kc2aup>)

KC4GUG, from 33rd annual Smithville Fiddlers Jamboree & Crafts Festival, Smithville, Tennessee; DeKalb County ARC; 1400–2200Z July 3 on 7.275, 14.280, 21.325, 28.425 MHz. For QSL send QSL and SASE to Wm. Freddy Curtis, KC4GUG, DeKalb Co. ARC, 288 Dogwood Circle, Smithville, TN 37166-2712. (http://www.geocities.com/kg4bto1/dekalb_club.html)

K5WHD, from 100th anniversary of the founding of Kingsville, Texas; Wild Horse Desert Hams ARC; 0000Z July 3 to 0000Z July 4 on 7.250, 14.250, 21.350, 28.350 MHz. For QSL send QSL and SASE to KD5TXD, 295 E FM 1118, Kingsville, TX 78363.

WØMTL, from National Tom Sawyer Days, Hannibal, Missouri, Hannibal ARC; 1400–2300Z July 3 on 7.250, 14.250, 21.350 MHz. For certificate or QSL, QSL to Robert Mitchell, AB9DU, 816 Long Dr., Quincy, IL 62305.

• **The following hamfests, etc., are slated for July:**

July 11, **Fox River Radio League Hamfest**, Aurora Central Catholic High School, Aurora, Illinois. Contact Maurice Schietecatte, W9CEO, c/o FRRL, P.O. Box 673, Batavia, IL 60510 (815-786-2860; e-mail: <scat42@msn.com>; <http://www.frrl.org>). (Talk-in 147.210 [+600], PL 103.5; exams 10 AM)

July 11, **Valley Forge Hamfest & Computer Fair**, Kimberton (Pennsylvania) Fire Company Fairgrounds. Contact MARAC, P.O. Box 2154, Southeastern, PA 19399-2154 (e-mail: <mailto:reservations@marc-radio.org>; <htt://www.marac-radio.org>). (Talk-in 145.1300/–, 147.0600/+ [PL 131.8 Hz])

July 16–17, **Ham Holiday 2004**, Oklahoma State Fair Park, Oklahoma City, Oklahoma. Contact CORA Ham Holiday 2004, P.O. Box 265, Ft. Supply, OK 73841-0265 (e-mail: <kc5qcv@cox.net>; <www.qsl.net/coranews>). (Talk-in 146.82, exams)

July 16–18, **Pacific Northwest DX Convention**, South Everett Quality Inn, Everett, Washington. Information e-mail Joe Gregory, W7QN, <w7qn@msn.net>; reservations 425-337-2900.

July 17, **Northern Colorado ARC Superfest**, Budweiser Events Center, Laimer County Fairgrounds, Loveland, Colorado. Contact Willis Whatley, WA5VRL, 970-407-6599. (Talk-in 145.115 [–offest, 100 Hz])

July 17, **Pioneer ARC Fleamarket**, St. Charles Parish Center, North Bend, Nebraska. Contact Rich Mehaffey, KBØARZ, 402-652-3410; e-mail: <mehaffey@dtnspeed.net>; <http://home.alltel.net/~jlhoffman/index.htm>. (Talk-in 146.76)

July 18, **Zero Beaters ARC Hamfest**, Bernie E. Hillerman Park, Washington, Missouri. Contact Jim, WØFF, 636-584-8888; e-mail: <JimFoxFox@aol.com>; web: <http://www.wa0fya.org>. (Talk-in 147.240+; exams)

July 25, **Maryland Hamfest & Computer Fair**, Timonium Fairgrounds, Timonium, Maryland. Contact BRATS, P.O. Box 5915, baltimore, MD 21282 (410-461-0086; e-mail: <brats@bratsatv.org>; <http://www.bratsatv.org>). (Talk-in 147.03+, 224.96–; exams 9 AM, preregistration required, contact John Creel, WB3GXW, 301-572-5124 [after 6 PM], or e-mail: <creewb3gxw@aol.com>)

July 31, **Bristol County RA Geek Fest, Clam Boil & Fleamarket**, American Legion Hall, Swansea, Massachusetts. Contact Roland, N1JOY, 508-678-6331, or George, KB1CNA, 508-965-1866.

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In the great tradition of amateur radio, K8JWR shows us how to "recycle" a junked TV or VCR into a low-power (QRP) CW transceiver. The project requires minimal tools and test equipment.

The Phoenix QRP Transceiver

Rising from the Ashes of a Junked TV

Part II

BY DAN METZGER,* K8JWR

In Part I of this article (June 2004 issue), we discussed how to salvage parts from junked TV sets and VCRs to build something new—the Phoenix QRP transceiver (photo E). Now it's time to build and test the rig. Figs. 5 and 6 show how I built the case. Photo F shows the interior parts layout. The schematic is in Part I, or if you've misplaced that issue, on the *CQ* website.[1]

Ground-plane construction, also called "ugly" or "Manhattan" style, is the only way to go with a project such as this, because there is no telling about the sizes of the salvaged components, and you will want to be free to make improvements to the circuit once you get the basic configuration working. Ground-plane construction uses a single-sided, copper-clad circuit board, copper-side up, with 3/16-inch squares of circuit-board material super-glued to the copper surface to form the pads where component leads are soldered. A parts-placement diagram showing the layout I used is in fig. 7. The dark circles are solder connections to the copper ground plane. Use this as a guide; your parts sizes may be different from mine.

Photo E– The completed Phoenix transceiver. Note that the crystal is in one of four positions in the octal tube socket. Each provides a slight variation in frequency. See text and fig. 10 for details. (Photos by Michael Croke)

Divide and Conquer

The cardinal rule in a project such as this is "divide and conquer." *Don't* build the whole thing at once, and then turn it on expecting to make a QSO. It will smoke, or at best it won't work, and you will have no idea where to start troubleshooting. Follow the wiring diagram of the schematic (fig. 1 in Part I),[1] but take it one step at a time. Start with the transmitter oscillator section, Q1. Wire up just that much. Apply 9-volt reduced supply voltage and close the key contacts. Listen for the 40-meter signal on your station receiver.

When you get the oscillator working, go on to the amplifier, Q2–Q3. Cement down the pads as you need them, not all at once, so you can adjust component spacing as you go. Place a No. 47 pilot lamp (6.3-volt, 150 mA) in series with a 50-ohm, 2-watt resistor from the antenna output to ground. If you don't have the 2-watt resistor, use five 10-ohm 1/2-watt units in series, or four 220-ohms in parallel. Fire up the rig with a 9-volt supply. If the lamp glows, but is a bit dim, up the supply to 13.5 volts. The lamp should be *very* bright. If the lamp doesn't light, don't leave the key down for more than a half second at a time. Begin troubleshooting. The boxed numbers on the schematic give the approximate voltages at selected test points with the key down and a 72-ohm dummy load connected. The number before the slash is DC voltage, measured with a DVM. The number after the slash is peak AC voltage, measured with the RF probe, which you can build from the diagram in fig. 8. The RF voltages may vary quite a bit with different crystals and

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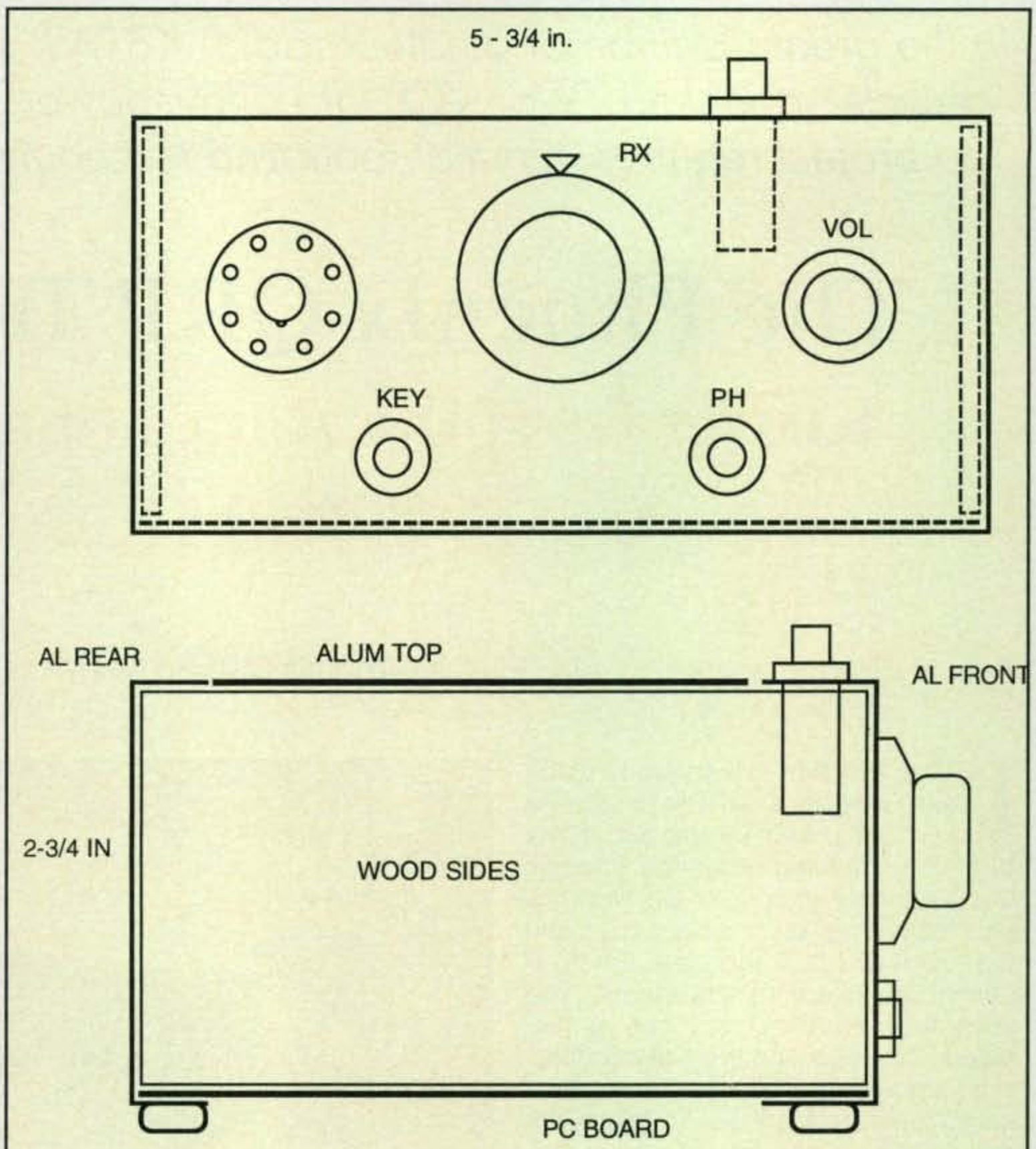

Fig. 5– The Phoenix transceiver uses aluminum for the front, top, and rear, and craft wood for the sides. The octal tube socket on the front is for a crystal, offering four different positions for slightly different frequencies. See text for details.

transistors. If the DC voltages at the emitters of Q2 and Q3 differ from one another by more than 20%, the transistors are not well matched, and one of them may overheat.

Once you have the transmitter working, reward yourself by hooking up a properly tuned antenna and making a few QSOs.

Building the Receiver Sections

Now it's time to start building the receiver. Testing is easier if you build the audio stage first and work backward towards the RF stage. After wiring up the LM-386 IC, touch the input (pin 3, or the tap of the pot) with your finger. Noise pickup from the 60-Hz power wires should cause a hum in the speaker or headphones. Next, wire up the BFO oscillator and listen for its signal on your station receiver at 3.579 MHz. Then wire the local oscillator. This stage determines the stability of your receiver, so tightly wind coil L3 and glue it to the PC board once you are sure you have the right number of turns. Again, listen for the signal on your receiver, and check the voltages with your RF probe. If you have trouble adjusting the BFO frequency to 3.579 MHz, try adding a 33-pF capacitor from the base of Q6 to ground.

Now you can wire the detector, IF amplifier, and diode mixer stages—you're getting close! Adjust C18 to bump the local oscillator up to 3.578 MHz. You should hear an incredibly loud howl as the local oscillator beats with the BFO. If at any point your tests are unsuccessful, stop. Check your

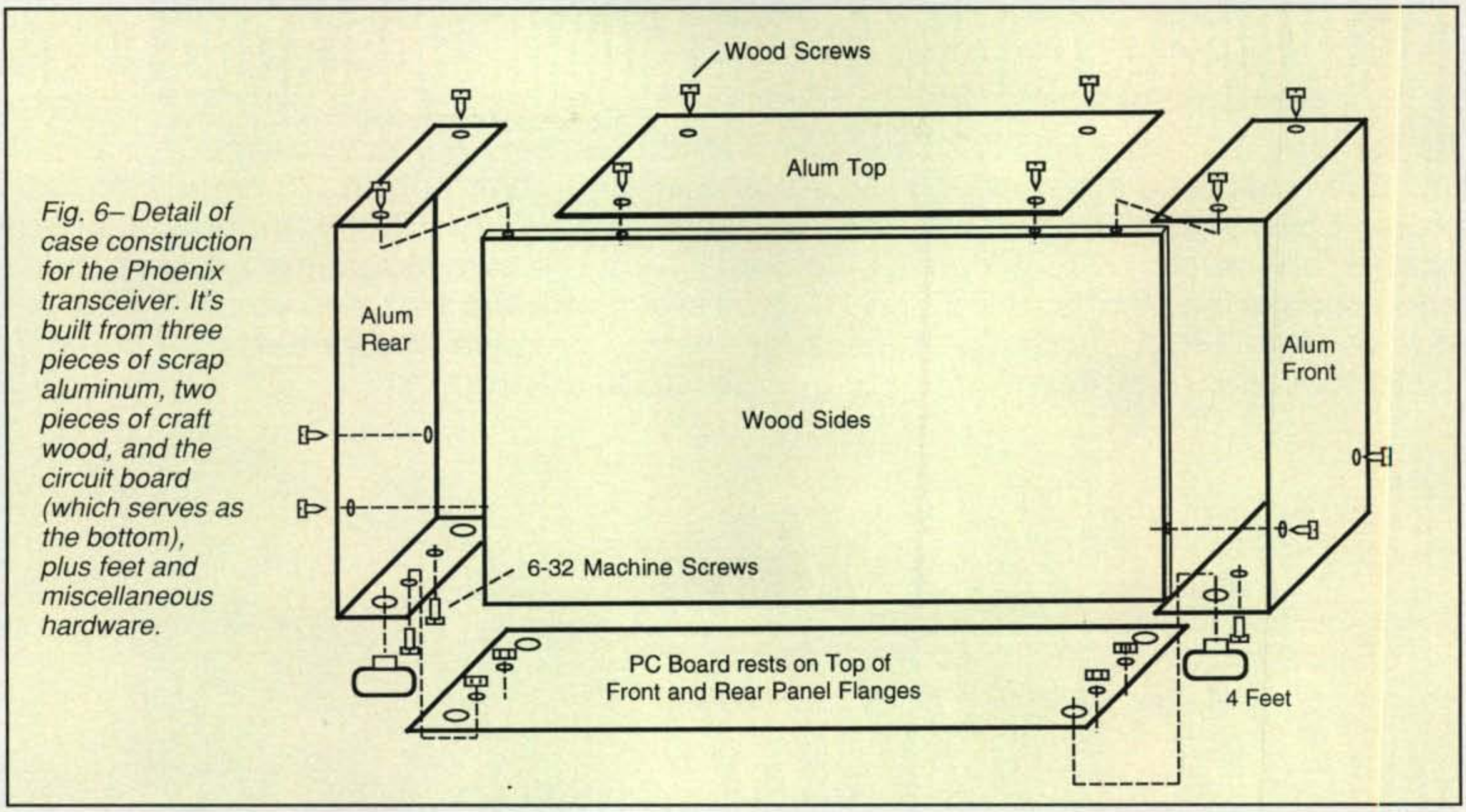

Fig. 6– Detail of case construction for the Phoenix transceiver. It's built from three pieces of scrap aluminum, two pieces of craft wood, and the circuit board (which serves as the bottom), plus feet and miscellaneous hardware.

wiring. Check the DC and RF voltages. Try a different transistor. If all else fails, build a second version of the troublesome circuit on another PC board, alone and out in the open where you can experiment on it. Once you have it working, you can transfer the components to the transceiver circuit board.

Finally, wire the RF amplifier. Q4 is an emitter follower, so its voltage gain is a little less than one. Its job is to present a high-impedance load to tuned circuit T2–C10 while driving the diode mixer, which has a low impedance of about 40 ohms. It is true that FETs make better RF amps than emitter followers, and better mixers than single diodes, but FETs are not likely to be obtained from salvaged TVs, so the Phoenix design doesn't use them. T2 does increase the antenna voltage (typically 5–50 microvolts) several times. The DC voltages listed for Q4 and Q7 will vary considerably, depending on the betas of your transistors, but this will not cause a problem, as the signal levels are quite low.

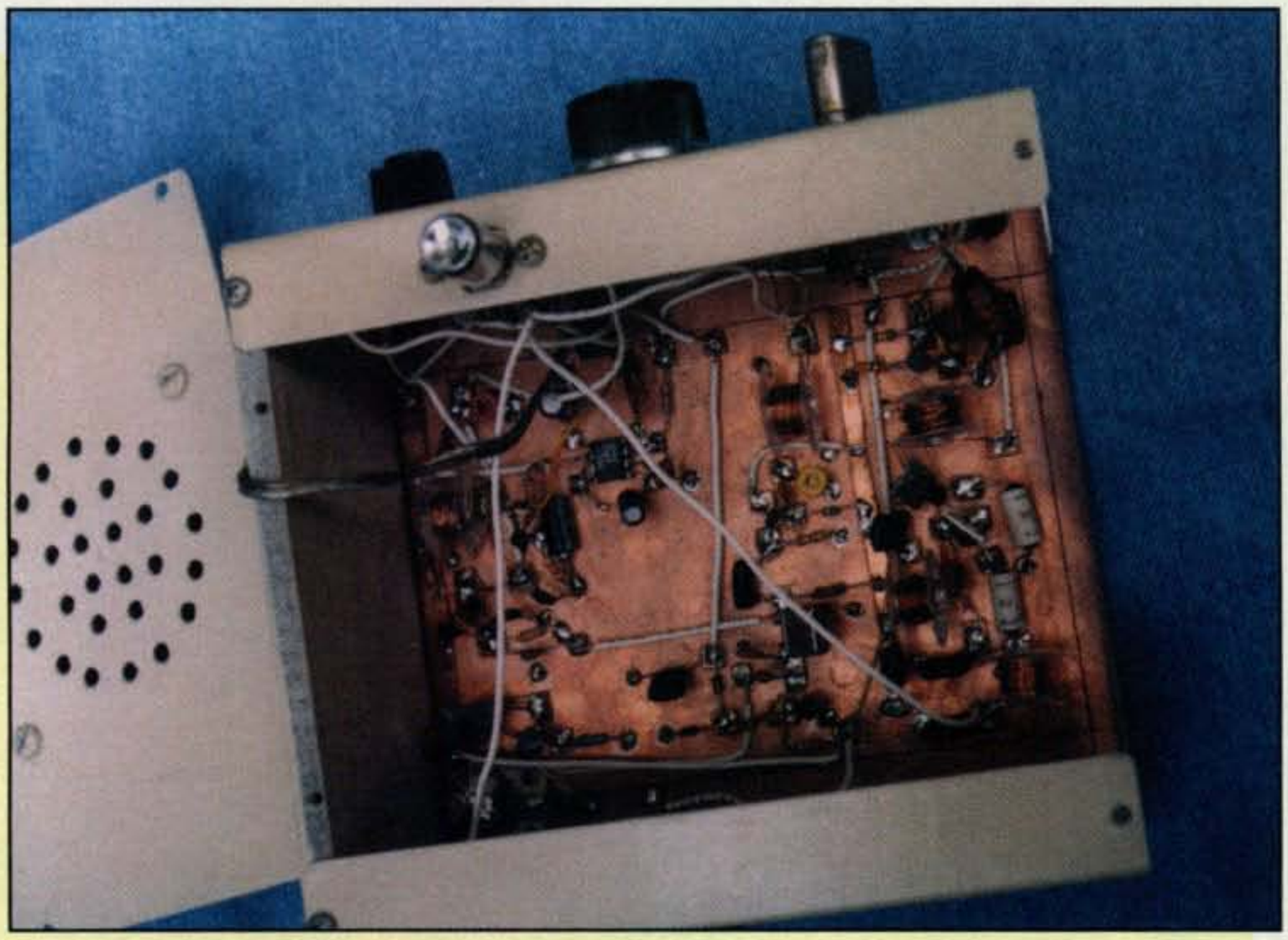

Photo F– Interior parts layout of the Phoenix transceiver. See fig. 6 and text for additional details.

Final Adjustments

Connect a resonant antenna and adjust C10 for loudest signals (if a proper antenna is not connected, Q4 may oscillate and cause an overpowering screech). Adjust C18 so that tuning capacitor C17 covers the desired segment of the 40-meter band. The tuning range will be 30 to 50 kHz wide, depending on the size of the C17 plates. Adjust C24 so the signal is the loudest at the CW pitch you prefer—typically 900 Hz. You should notice that the signal on the other side of zero beat has quite a bit less volume. If the selectivity is so sharp that you have trouble adjusting the tuning to keep it on peak, you can widen the response by lowering the value of C23. Using smaller plates on C17, or installing a vernier drive, will also make tuning less critical.

Troubleshooting

In the evenings, strong broadcast stations around 9 MHz can come crashing through. Close adjustment of C10 will minimize interference. Experimenting with the value of C14 may also help optimize sensitivity and interference rejection. C14 can be a "gimmick" capacitor,

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DSP

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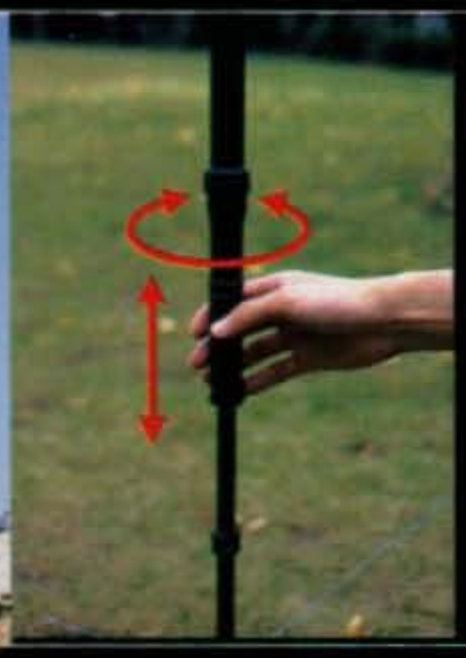
ALL MODE PORTABLE TRANSCEIVER

FT-817ND

60 m Band

HF/50/144/430 MHz 5 W



ATAS-25 Manually-Tuned Portable Antenna

The ATAS-25 is a manually-adjusted portable antenna ideal for field use with the FT-817. Designed for mounting on a standard camera tripod (1/4" stud), the ATAS-25 is tuned by sliding the shorting ring of the loading coil up or down and selecting the appropriate number of top sections. Counterpoise wires are supplied.

The ATAS-25 is constructed of high-grade materials for maximum efficiency, and it's the perfect traveling companion for your FT-817!

Freq. Range: Amateur Bands 7-450 MHz.
Max. Power: HF/50 MHz: 100 W SSB/CW
(50% Duty, 1 min. TX/RX)
AM/FM: 50 W
144/430 MHz: 50 W
Size: Max. Length 7'3" (2.2 m)
Min. Length for Carrying: 2' (0.6 m)
Weight: 2.1 lb. (930 g)

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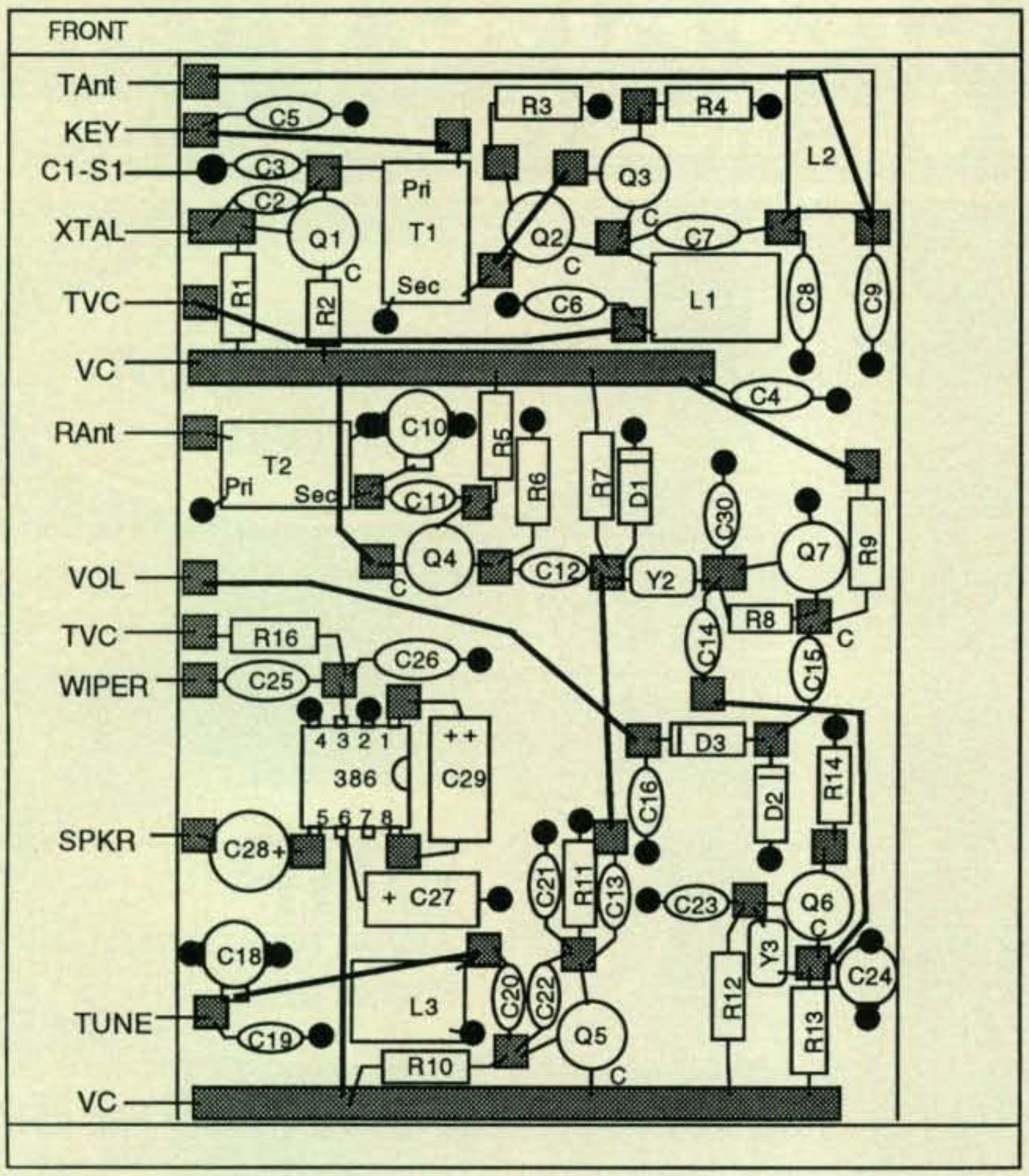


Fig. 7– Parts layout for the Phoenix transceiver. Use this as a guide only, since the parts you salvage may be of sizes different from those the author salvaged. It is strongly suggested that you build and test one section at a time, both to keep from getting overwhelmed and to make sure each section works before moving on to the next one.

made from two wires twisted together for an inch or two. If audio oscillations occur when the volume is turned up, be sure that the ground connections of D2, C16, R15, and pins 2 and 4 of the IC are kept close together. A 500-µF capacitor across the supply lines may help, especially when using a battery supply.

Homebrew Improvements

The best part of building a ground-plane homebrew is that the fun doesn't end once you get it working. Now you can make it better! Just promise that you won't attempt to implement these improvements until you have the basic unit working. Okay? Then here are some ideas:

1. Keying the transmitter for even a second with a badly mismatched or disconnected antenna is likely to destroy the output transistors. To minimize this danger you should tune up on a 9-volt supply before graduating to the full 13.5-volt supply. A better solution is to solder a 35- to 40-volt zener diode from the Q2–Q3 collectors (cathode end) to ground (anode end). This will protect the transistors from the 60-volt spikes generated by L1 when the transistors are operated without a load. Use 1/2-watt zeners; the higher-power units have so much internal capacitance that they will upset the amplifier tuning. I used two 21-volt, 1/2-watt zeners in series.

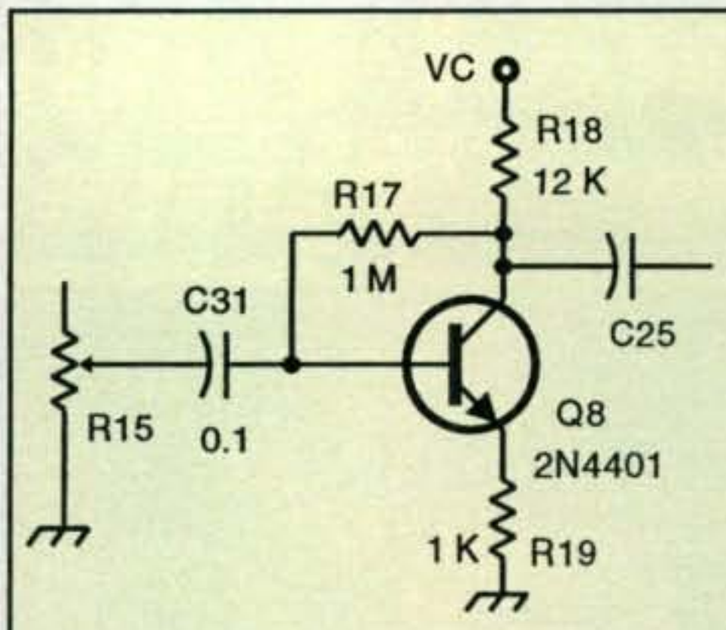


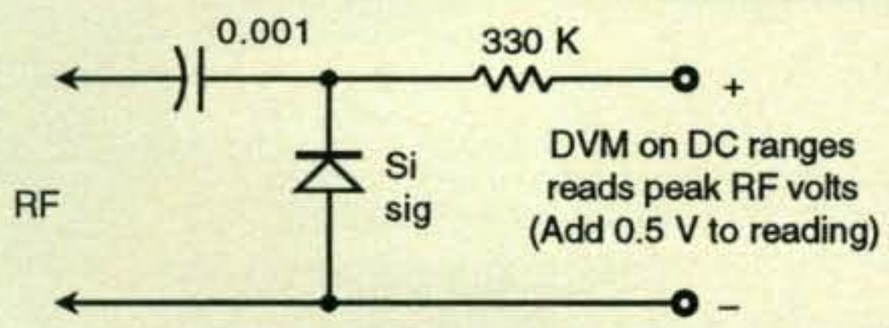
Fig. 9– Audio amplifier circuit to boost output to speaker. See text for details.

2. The receiver has adequate gain when using headphones, but it takes an S-9 signal to give comfortable speaker volume. Fig. 9 shows a simple audio amplifier that you can add to make the speaker boom! It would go between C25 and R15 on the main schematic.

3. The schematic shows how the transmitter crystal can be plugged into either of two sockets to allow two operating frequencies (1 or 2 kHz apart, depending on crystal characteristics). In fact, an octal socket permits four different arrangements, as shown in fig. 10(A). The 30-pF position raises the crystal frequency 1–2 kHz, while the inductors lower it by as much as 6 kHz with some crystals. Wind the coils of No. 30 wire using 10 K, 2-watt resistors as coil forms. You will have to experiment with the number of turns to give four nearly equally spaced frequencies for each crystal. **Warning:** Coil values above 20 µH may put the oscillator in a free-run mode, generating unstable signals far outside the ham band. Of course, a switch may be used to select the four frequencies, as shown in fig. 10(B). If you have a variable capacitor of 100 pF or so, you can achieve continuously variable transmitter frequency with the VXO circuit of fig. 10(C). This is very convenient, but since the Phoenix objective was to use only parts salvaged from a TV, we didn't make it part of the basic design.

4. Spotting—that is, zero-beating the receiver frequency to the transmitter frequency—requires keying the transmitter oscillator with the receiver on, but the volume must be turned *way* down if

Fig. 8– A simple circuit to let you use a digital voltmeter (DVM) as an RF probe.



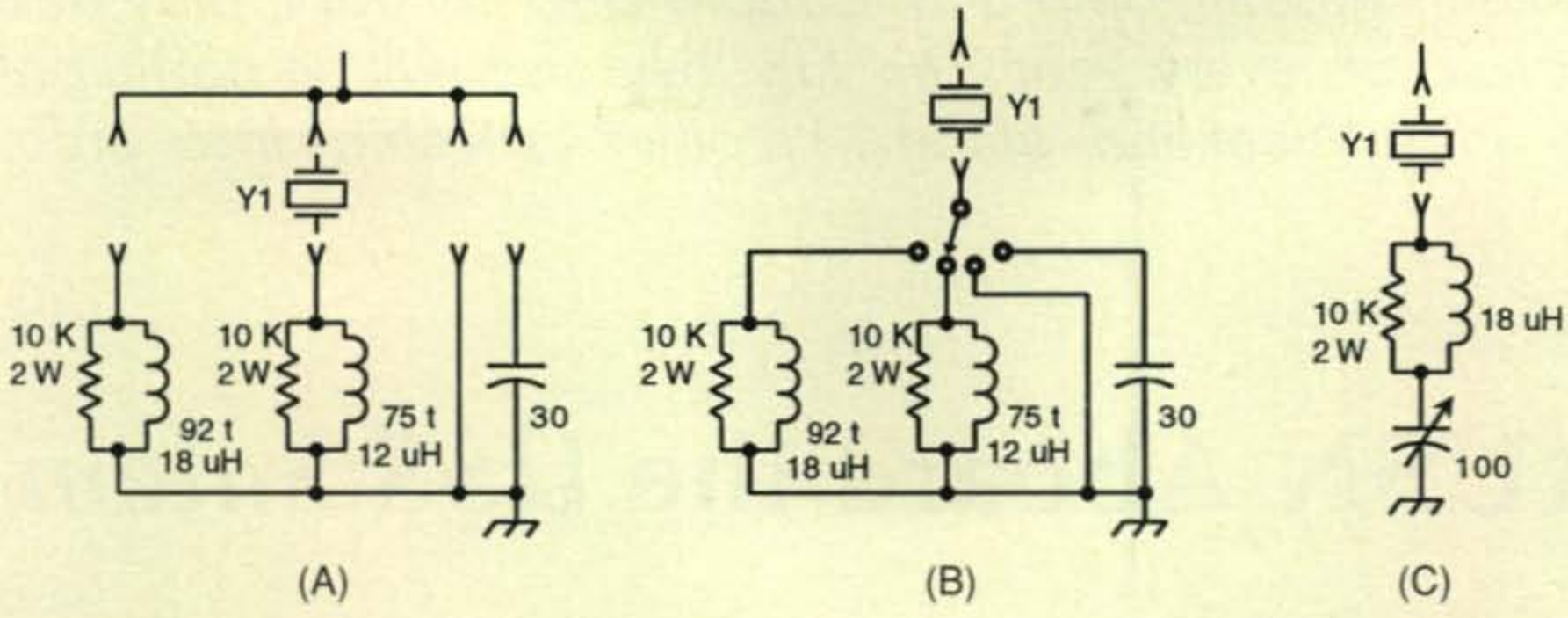


Fig. 10– The basic schematic provides for two crystal positions which vary output frequency by 1 to 3 kHz, depending on the crystal used. These additional circuits (explained in the text) offer two options for having a choice of four frequencies—(A) and (B)—and one (C) for a VXO to give you a range of operating frequencies.

you want to avoid an unpleasantly *loud* blast. I put a 330-ohm resistor between the bottom of R15 and ground, so turning the pot all the way back gives just the right spotting volume.

5. The 1-kHz bandwidth can be narrowed by adding some audio selectivity. You can replace C29 with a 900-Hz tuned circuit consisting of a surplus 88-mH toroid in series with 0.35 µF of capacitance. Note that a high-Q toroid is required; ordinary inductors will not work well. A similar parallel-tuned circuit can be tried in the R18 position of the extra audio amplifier, or an active filter using two op-amps might be employed to achieve the same effect.

6. What else? Well, you might go for true VFO transmitter control using an oscillator similar to Q5 to drive Q1. You could try electronic T-R switching, eliminating the need for S1 and permitting break-in operation. An FET RF amplifier between the antenna tuned circuit and Q4 might improve sensitivity and interference rejection. Perhaps you could build an 80-meter or a 30-meter version. The sky's the limit; experiment!

On the Air

How does the Phoenix perform on the air? Most people's first comment is, "It doesn't sound like a junk-box radio." The receiver produces a mellow, stable CW note, and QRM rejection compares favorably with entry-level commercial receivers. The 3-watt transmitter output is only $2^1/_2$ S-units (15 dB) below the level of a 100-watt rig, so solid QSOs with 589 or 599 reports are common. Crystal control of the transmitter ensures a stable, chirp-free signal on the air, even with less-than-professional construction techniques.

It's always exciting to hurl a radio wave at the ionosphere and make contact with another ham, with nothing between the two of you but empty space. However, to do it with a radio you've built from scratch using salvaged components is a thrill that can't be beat!

Note

1. The schematic diagram for this project may be found as fig. 1 in Part I of this article, in the June 2004 issue of *CQ*, or as a PDF file on the *CQ* website at <http://www.cq-amateur-radio.com>. Click on the link for July issue highlights and look for the link to the Phoenix schematic. ■

Resources

Low-cost 7040-kHz crystals: Contact Doug Hendricks, KI6DS, 862 Frank Avenue, Dos Palos, CA 93620.

Crystals at 7030, 7035, 7040, 7045, 7110, and 7125 are available for $9.65 plus shipping from Ocean State Electronics, 6 Industrial Drive, P.O. Box 1458, Westerly, RI 02891; phone 1-800-866-6626; <www.oselectronics.com>. Other frequencies are available from International Crystal at <http://www.icmfg.com/>; specify HC-49/U case, 20-pF loading, and 0.01% frequency tolerance.

The USS Salem Museum Ship and its radio club, K1USN, play host to groups of Scouts every year. This July they also will be participating in Museum Ships Weekend, along with other such ships from around the world.

K1USN Aboard the *USS Salem*

BY BOB "WHITEY" DOHERTY,* K1VV

"Hello, Mike, KE6ZYK. How is the weather there today?"

"Well it's –10° Fahrenheit, and the wind is blowing 40 miles per hour. Wind chill is –43° Fahrenheit, so not a day to be outside."

"KE6ZYK, this is K1USN. Thanks, Mike. We always heard it could be cold at the South Pole! This is George, W1YR, at the mic, and we have several Scouts here waiting to talk to you."

It's another Scouting Day on the *USS Salem* in Quincy, Massachusetts using 2 meters and IRLP to talk to KC4USV, the McMurdo Sound Station at the South Pole. Scouting and ham radio with club station K1USN on the *USS Salem* are a big part of the onboard radio activities.

The USS Salem, home of club station K1USN.

USS Salem Radio Club

Back in July 1997, a chance drive past the *USS Salem* by Bob Callahan, W1QWT, led to forming the *USS Salem* Radio Club. Bob and Harold Pugh, K1RV, known as "Pi," visited the ship and inquired about operating an amateur station from one of the radio rooms. The ship's custodians said they would welcome a radio club on board and made Radio 5 available to set up a ham station. The club was formed, and the call K1USN was secured through the FCC Vanity Call Sign system. The aim of the club, stated in its charter, is to promote awareness of museum ships and recognition of their crews.

The club grew, and several hams made generous donations of cash, equipment, and antennas. Some of the older equipment was sold to buy newer amateur gear. The equipment for HF in Radio 5 now consists of Yaesu FT-920 and Kenwood TS-690S transceivers and R-7000 and Gap Titan vertical antennas. Accessories include a Rigblaster, Bencher keyers, and computers for logging and printing the K1USN QSL cards. The packet station consists of an ADI AR-147 and a Kantronics TNC. The VHF/UHF the station is an ICOM IC-2800H, which is used for IRLP and EchoLink. This station is used for IRLP communication with McMurdo Sound.

Some History

"CQ CQ this is K1USN on the US Navy Heavy Cruiser *USS Salem* ... QRX"

"K1USN ... where are you located? The Atlantic, the Mediterranean?"

"No, the *USS Salem* is a Museum Ship located at the United States Naval Shipbuilding Museum in Quincy, Massachusetts."

So it goes with many QSOs. The *USS Salem* is a retired heavy cruiser. She was launched in March 1947 and commissioned in May 1949. The ship is 716 ft. 6 in. long, which is longer than the *Battleship USS Massachusetts* at 680 ft. 10 in. The *USS Salem* had a ten-year US Naval career, serving as the flagship of the 6th Fleet in the Mediterranean and the 2nd Fleet in the Atlantic. She was mothballed at the Philadelphia Navy Yard for 25 years and brought to the former Bethlehem Steel Shipyard, where she was originally built, in October 1994.

**P.O. Box 1193, Lakeville, MA 02347-1193*
e-mail contact for the USS Salem*: <k1rv@ arrl.net>*

QUALITY begins with PEOPLE

Front (L-R): Lee Jones, WB4JTR, Chief Technical Officer; Gary Barbour, AC4DL, VP/Engineering Director; Jeff Parton, Enclosure Product Manager.
Rear (L-R): Staff engineers Boyd Lichlyter, KE4MCF; Eric Guinn, AC4LS; Bill Curb, WA4CDM; Mike Webber, KE4VSQ.

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The members of USS Salem Radio Club K1USN.

The *USS Salem* became a part of the United States Naval Shipbuilding Museum in 1997. The ship is open to the public from 10 AM to 4 PM on weekends. Much of the original ship's radio equipment is still in operating condition thanks to the efforts of Mark "Brown" Beezer, W1NZR. Brown's expertise in restoring, maintaining, and operating vintage WW II military radio gear is legendary. The original equipment is often put on the ham bands by Brown or Bob, W1QWT, using CW or AM phone. Bob is a former US Navy Radio Operator.

These ship radios come from long before the widespread use of solid-state transceivers and SSB. The following radio designations may be familiar to former US Navy Radio Operators: the TCS-12, RBA, RBB, and RBC receivers, and the TCK-4, TCZ-25, TAJ-19, TBM-11, and TCS-12 transmitters. There is also an AN/URR35A UHF receiver used for communications with aircraft on 225–400 MHz. The equipment in Radio 2 has been activated on 3885 and 7290 kHz AM by Bob, W1QWT, using the TCK-4, 2–18 MHz AM transmitter with 100 watts and the RBB and RBC receivers. Bob has also used CW on 80 meters a number of times, but the stability of the CW signal leaves a bit to be desired. What can one expect from gear that is nearly 50 years old?

Scouting and the *USS Salem*

During the overnight Scouting program in 2003 about 6000 Scouts passed through the *USS Salem,* an average of 250 to 300 each weekend.

The Scouts arrive at about noon, sleep on the ship on Saturday night, and leave at noon on Sunday. Most of them come from the northeastern United States, although one group came from the United Kingdom. They are exposed to a code class in the Chief Petty Officers' mess area and learn to send their name in code. After successfully sending their name, they become "Official" *USS Salem* Radio Operators and receive a certification card with their name, a list of the code characters, and a list of radio-related URLs to investigate. The Scouts, boys and girls, all show an intense interest in the code, and many only have to be shown how to use the Bencher keyer a few times before they are able to send their name. This amazes the club members who can recall their own difficulties in mastering the code!

The Scouts also get to speak with other amateurs via HF, VHF, or by IRLP. They all receive a *USS Salem* Radioman card, a K1USN QSL card, ARRL literature, a list of repeaters in their home area, and a DX QSL card.

Museum Ships Weekend

One of the most significant operating events of the year for the *USS Salem* Radio Club K1USN membership is the

This is Bob, W1QWT, on 3885 kHz, 100 watts AM, with original ship equipment, a TCK-4 transmitter.

George, W1YR, with a Scout on IRLP in contact with Antarctica.

The two-man German WW II submarine, which has the club call WW2MAN.

Museum Ships Weekend Event held each year on the third weekend in July. This year it is on July 17th and 18th (see the K1USN web page: <http://www.qsl.net/k1usn/event.html>.

K1USN started this event in 1997, when six other museum ships took part. It has grown to the point where 83 museum ships took part in the event in 2003. A greeting from the United States Secretary of the Navy, Harold T. Johnson, was received for the event and addressed to all of the participants.

There are over 200 museum ships worldwide, and over a hundred have clubs or amateur radio callsigns assigned to them. For a full list go to: <http://www.marinefunker.de/eng/show.php3?pos=21>. If you like to collect rare, distinctive QSL cards, the Museum Ships Weekend Event is for you. Many of these ships and submarines are only activated for this event.

The *USS Salem* has close company at dockside, the WW II *Seehund U-5075*, a two-man German submarine. A number of K1USN club members formed another club and secured WW2MAN as the call for the mini-sub. WW2MAN will be activated from the deck of the *USS Salem* for the Museum Ships Weekend, as there is little room inside the mini-sub for a ham station. For more information on these small submarines go to: <http://uboat.net/types/seehund.htm>.

K1USN takes part in many events and national holidays such as FISTS, Military Appreciation Day, International Museum Ships Weekend, Veterans Day, Pearl Harbor Day, and others. See you on the bands!

"CQ CQ CQ this is K1USN on the *USS Salem*"

For additional information, see the following websites:

http://www.qsl.net/k1usn/
http://www.milradio.org/
http://www.rnars.org.uk/
http://www.marinefunker.de/
http://www.fleetairarmarchive.net/Ships/Survivingships/shipsA-Z_2000.htm

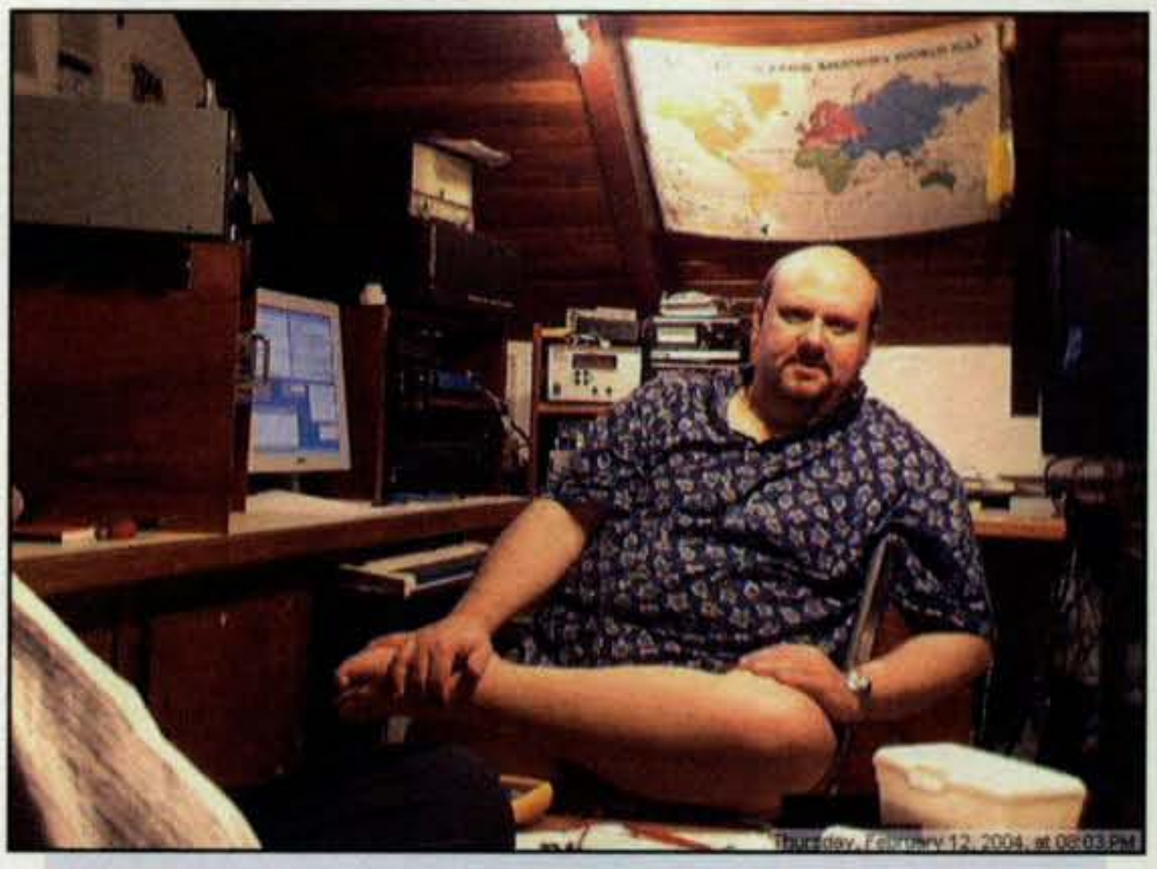
Results of the 2004 CQ WPX RTTY Contest

BY GLENN VINSON,* W6OTC, AND JOE WITTMER,† K9SZ

The tenth annual CQ WPX RTTY Contest was held February 14–15, 2004. Again this year a record number of logs was submitted, virtually all via e-mail, and new record scores were set in many regions and categories. To fully appreciate the growth of WPX RTTY, just look at the number of logs submitted for the past three years: 2002—635 logs, 2003—853 logs, 2004—1083 logs. This increased participation, plus good operators and good contest stations, keeps pushing scores upward.

The highest score in the contest (and a new world record) was achieved in the Single Operator High Power category rather than in any of the multi-operator classes. However, the multis filled out the next nine of the top ten overall scores. Among the big multi scores were NA and USA records in Multi-Multi, Multi-Two, and Multi-Operator Single Transmitter classes, as well as Multi-Op Single Transmitter records in Oceania, Japan, and North America. New Single-Band World Records were also set at both ends of the HF spectrum, on 10 and 80 meters.

Geomagnetic conditions were good worldwide throughout the contest, with no solar storms and solar flux averaging around the 100 level. Judging by the scores submitted, the slowly declining solar-flux level continues to be more than overcome by the yearly increase in RTTY contesting activity.



Single Op High Power World champion Paolo, P40G (I2UIY) relaxing before the contest at P43P.

Single Operator

Single Operator, Low Power (SOL). In SOL, 503 participants submitted logs, almost one-half of the contest total. As the results demonstrate, only a few points separate many entrants. Wanderley, ZX2B (op: PY2MNL), the 2002 winner, moved back into first place this year with a score of 2,978,858 points (1625 Qs, 5263 Q-pts, 566 mults), a new record for Brazil. The Africa SOL record fell for the second year in a row, this time to Mohamed, CN8KD, who scored 2,120,580 points (1219 Qs, 4620 Q-pts, 459 mults), moving up from World fifth place last year to World second this year. In North America the competition was stiff, but the 2-point location of Dean, 8P2K (op: 8P6SH), was too much for Don, AA5AU, to overcome, although Don had more QSOs and multipliers. Dean won from Barbados with 1,600,030 points (1317 Qs, 3721 Q-pts, 430 mults), while Don, former five-time (now six-time) USA winner, made 1,497,476 points (1619 Qs, 3313 Q-pts, 452 mults). Only 2000 points behind Don was ON4ADZ with 1,495,354 points.

Single Operator, High Power (SOH). This year 195 competitors entered SOH class, with top scores moving higher. The SOH record is challenged virtually every year, and this year was no exception. In the end, the record was decisively returned to P4, a tough place to beat because of its relative proximity to Europe with its 6-point premium contacts on 40 and 80 meters, particularly when a champion operator such as Paolo, I2UIY, works from a well-established contest station such as the one maintained by Jacobo, P43P. There, as P40G, Paolo, who is also the current 15 meter RTTY WPX World Record holder from 5U8B, not only set a new World Record for SOH, but achieved the highest score for any station in 2004 RTTY WPX—6,190,514 points (2585 Qs, 9889 Q-pts, 626 mults). His 727 contacts and 199 mults on 80 and 40 meters greatly enhanced Paolo's score. Farther north in the Caribbean, another veteran contester, ZF2NT (op: Bruce, aka N6NT), was World second, with 2,752,964 points (1852 Qs, 5284 Q-pts, 521 mults), by far the highest score ever from the Caribbean. Very close behind and repeating as World third—but from a much more distant 3-point location—was KH7X (op: Mike, KH6ND, operating from KH6YY), who was within 1000 points of his current Oceania Record, with a score of 2,697,475 points (1744 Qs, 6347 Q-pts, 425 mults).

Single Operator, Single Band 28 MHz (28). As noted in past years, RTTY operators do not seem to operate frequently on 10 meters except during solar-flux peaks and during contests. Then the band magically opens with lots of activity, particularly on the north-south paths. This year Argentina dominated in top scores, with a new World Record set by John, LU1HF, who scored 1,928,274 points (1215 Qs, 3611 Q-pts, 534 mults). This was a great result for this band. LU9EV (op: LW9DMM) was World second with 484,380 points, while LT1D (op: LU4DJC) was World third with 368,820 points.

Single Operator, Single Band 21 MHz (21). Last year the top 15 meter scoring stations were all from central or eastern Europe. This year, as with the results on 10 meters, Argentina stations controlled the top spots on 15 meters. The winner was LPØH (op: Rene, LU7HN), with 1,552,384 points (1024 Qs, 3032 Q-pts, 512 mults). In second place was LU1NDC, scoring 1,227,413 points. AY8A (op: LU8ADX) won third place with 1,033,461 points.

Single Operator, Single Band 14 MHz (14). The competition on 20 meters was very tight, but as on 10 and 15 meters, Argentina prevailed. LV5V (op: Jorge, LU5VV) set a new South America 20 meter record, scoring 954,030 points (782 Qs, 2310 Q-pts, 413 mults). Just behind Jorge was 20 meters World Record holder 9A7R, who scored 910,000 points (816 Qs, 2000 Q-pts, 455 mults). Close, in third place, was UA1AKC, with 756,704 points (795 Qs, 1819 Q-pts, 416 mults).

Single Operator, Single Band 7 MHz (7). As predicted here last year, the 40 meter competition was hot in 2004. In 2003, Robert, 9A5E, almost set a new World Record. This year Robert again fell just short of a new World Record with a score of 1,500,096 points (740 Qs, 3606 Q-pts, 416 mults)—only 47,000 points less than the 1999 record set by ED8WPX (op: EA8PP). In second place was HG1W (op: HA1WD), who scored 1,083,320 points (654 Qs, 2920 Q-pts, 371 mults). IK2FIL moved up from World fourth place to World third at 892,680 points (570 Qs, 2580 Q-pts, 346 mults). We should

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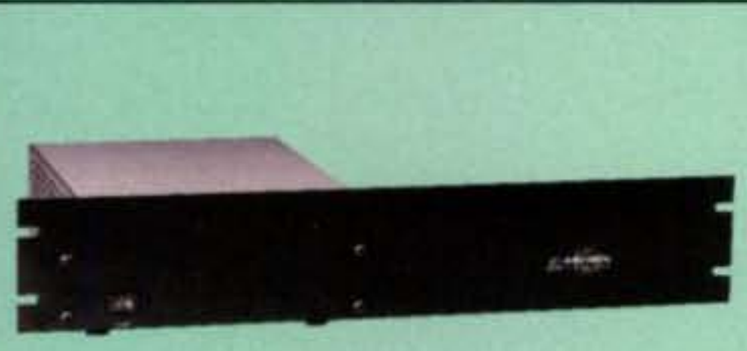
SS-12	10	12	1⅝ x 6 x 9	3.4
SS-18	15	18	1⅝ x 6 x 9	3.6
SS-25	20	25	2¼ x 7 x 9¾	4.2
SS-30	25	30	3¼ x 7 x 9¾	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2¼ x 7 x 9¾	4.2
SS-30M*	25	30	3¼ x 7 x 9¾	5.0



MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9¾	6.5
SRM-30	25	30	3½ x 19 x 9¾	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9¾	6.5
SRM-30M	25	30	3½ x 19 x 9¾	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9¾	10.5
SRM-30-2	25	30	3½ x 19 x 9¾	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9¾	10.5
SRM-30M-2	25	30	3½ x 19 x 9¾	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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EF JOHNSON AVENGER GX-MC41
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EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
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SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

not be surprised to see a new 40 meter World Record set in 2005.

Single Operator, Single Band 3.5 MHz (3.5). If anything, the 80 meter competition was even more intense than that on 40 meters. Three-time winner and World Record holder Tone, S54E, was pushed to second place this year, as 9A5Y (op: 9A3NM) moved into first place with his own new World Record of 1,141,820 points (695 Qs, 3086 Q-pts, 370 mults). Only 110,000 points behind, S54E also broke his own 2003 World Record but could not overcome the QSO advantage of the winner. Tone's score: 1,031,466 points (657 Qs, 2922 Q-pts, 353 mults). World third was EO6F (op: UXØFF) at 737,968 points (576 Qs, 2396 Q-pts, 308 mults). Incredibly, LY2IJ was only 4000 behind with 733,838 points. These excellent scores suggest that the 2005 contest on 80 meters may be particularly competitive.

Multi-Operator

Multi-Operator Multi-Transmitter (MOM). The MOM class had good participation in what is the toughest class to operate successfully. Here, the top participants tend to be seasoned operators from well-established stations where the problems of operating with high power simultaneously on several bands with an adequate number of operators have been diagnosed and solved. As usual, the RKØAXX mega-team (RAØAM, RUØAM, RUØAB, RVØAR, RAØALM, RAØAHC, RXØAE, RUØAE, RUØAKB, RUØAKA, RUØAIG, RVØAU, RVØAEV, RUØAT, RWØAR, RUØAAB, UAØANW) was deep into the hunt and this year won the championship, scoring 4,912,355 points (2284 Qs, 8455 Q-pts, 581 mults). In second place, beating its own NA Record, was the Woodbridge Wireless group at KA4RRU (KA4RRU, K5OF, N4DXS, W4MGM, K3UI, W4DAV, W4DC, K4RSU, WB4ZNH, KE4BUS, KG4HTL, WA4TK, Lianna, Tessa), scoring 3,517,632 points (2359 Qs, 5,952 Q-pts, 591 mults). Likewise, JA6ZPR (JH6JSR, JR6CKX, JR6CKY) almost doubled its own Japan M/M record with a score of 1,596,991 points (1171 Qs, 3541 Q-pts, 451 mults).

Multi-Operator Single Transmitter (MOS). This class attracts more entrants than all the other multi-operator classes combined despite the fact that unlike CQWW it allows only one transmitter to be used by all operators and there are no power classes. This year the crown moved back from Central America to Europe, with IY4W (IK4MHB, I4LEC, I4JED, IK4NPD, IZ4AFW, IK4ZGO) narrowly emerging as the winner at 3,545,339 points (1760 Qs, 6209 Q-pts, 571 mults). Very close behind and repeating as World second was HG1S (HA1TJ, HA1DAC, HA1DAI, HA3UU, HA3LN, HA1AR, HA1AV, HA1AH, HA1DAE), scoring 3,345,346 points (1704 Qs, 5942 Q-pts, 563 mults). Similarly, RW9C (RW9CF, UA9CGA) repeated as World third, with 3,262,376 points (1,734 Qs, 6,422 Q-pts, 508 mults).

Multi-Operator Two Transmitter (M2). Activity in M2 class increased this year, with a new NA record being established by KM4M (W3BP, K4GMH, K4JA, AJ3M, NW4V) with 5,620,752 points (2912 Qs, 8674 Q-pts, 648 mults), almost twice the previous NA and USA record. Z37M (Z31GX, Z31MM, Z32PT, Z32XA, Z32ID, Z33F, Z36W), most of whose operators won the World as Z30M in 2002, beat their previous score by a million points but were still World second this year, scoring 4,577,092 points (2300 Qs, 7654 Q-pts, 598 mults). In World third was another European station, DAØBCC (DM5TI, DL9NDS, DL2RMC, DJ3NG), with a score of 3,792,555 points (1953 Qs, 6483 Q-pts, 585 mults).

Rookie of the Year

Fourteen operators entered as Rookies this year. The winner was KB1JZU, who entered in SOL and scored 302,258 points. Please see the detailed listings at the end of this article for the complete results.

SWL

The SWL winner this year was YU1RS500 who logged 255 QSOs and 121,506 points.

Summary

CQ WPX RTTY has now joined CQ WW RTTY as the only RTTY contests with more than 1000 entrants. As participation has grown annually, new World Records are set regularly. Interestingly, in both WW and WPX RTTY the master call files created for each contest are split about one-third U.S. calls and two-thirds non-U.S. calls. Strong International participation is clearly a significant factor in increasing scores. For those of you who do not have a big contesting station or a good contesting QTH but would like to challenge the P40G or ZF2NT Single-Op records, take a look at the contest stations offered for rent by well-known contesters such as Jody at <www.VP5JM.com> or Keko at <www.qsl.net/TI5KD>, and others advertised from time to time in *CQ, National Contest Journal,* and *QST*.

To check all-time CQ WPX RTTY Records, go to <www.rttycontesting.com/ records/cqw-pxrtty.html> hosted by Don, AA5AU, and maintained by Joe, K9SZ. For comments from participants, see the Soapbox below.

We continue to progress with the electronic submission of logs, with *approximately 99% of all logs (and 100% of competitive logs) submitted via e-mail* to **<wpxrtty@kkn.net>**. Thanks to all of you who reviewed your logs carefully before submitting them. We received a large number of checklogs which were very helpful for log-checking. Thanks to all who submitted them.

2005 CQ WPX RTTY Contest

The 11th Annual CQ WPX RTTY Contest will be run on February 12–13, 2005 (the second full weekend of February). Please

2004 PLAQUE SPONSORS AND WINNERS

Single Operator High Power

World: Sponsored by John Orton, WA6BOB. Winner: **P40G (op: Paolo Cortese, I2UIY)**
N.A.: Sponsored by Charles Anderson, KK5OQ. Winner: **ZF2NT (op: Bruce Sawyer, N6NT)**
USA: Sponsored by Mike Sims, K4GMH. Winner: **Dave Anderson, K4SV**
Oceania: Sponsored by Doug Faunt, N6TQS. Winner: **KH7X (op: Michael Gibson, KH6ND)**
Asia: Sponsored by Dean Wood, N6DE. Winner: **A61AR (op: Alexander Lunev, RV6LNA)**
Japan: Sponsored by The NN6NN RTTY Team. Winner: **Masaki Okano, JH4UYB**

Single Operator Low Power

World: Sponsored by Bryan Preas, AC6JT. Winner: **ZX2B (op: Wanderley Ferreira Gomes, PY2MNL)**
N.A.: Sponsored by Don Hill, AA5AU. Winner: **8P2K (op: Dean St. Hill, 8P6SH)**
USA: Sponsored by Ray Lindquist, KG7YQ. Winner: **Don Hill, AA5AU**
Asia: Sponsored by Ron Lodewyck, N6EE. Winner: **Dimitriy Borzenko, 4Z5CP**
Japan: Sponsored by Chet Jensen, W6XK. Winner: **Taisuke Kishi, JA1OVD**
Africa: Sponsored by Joe Wittmer, K9SZ. Winner: **Mohamed Kharbouche, CN8KD**

Multi-Op Single Transmitter

World: Sponsored by Doug Faunt, N6TQS. Winner: **IY4W (ops: IK4MHB, I4LEC, I4JED, IK4NPD, IZ4AFW, IK4ZGO)**

Multi-Op Multi-Transmitter

World: Sponsored by Steve (Sid) Caesar, NH7C. Winner: **RKØAXX (ops: RAØAM, RUØAM, RUØAB, RVØAR, RAØALM, RAØAHC, RXØAE, RUØAE, RUvAKB, RUØAKA, RUØAIG, RVØAU, RVØAEV, RUØAT, RWØAR, RUØAAB, UAØANW)**
N.A.: Sponsored by Glenn Vinson, W6OTC. Winner: **KA4RRU (KA4RRU, K5OF, N4DXS, W4MGM, K3UI, W4DAV, W4DC, K4RSU, WB4ZNH, KE4BUS, KG4HTL, WA4TK, Lianna, Tessa)**

Multi-Op Two-Transmitter

World: Sponsored by The HC8N RTTY Team. Winner: **KM4M (ops: W3BP, K4GMH, K4JA, AJ3M, NW4V)**
Europe: Sponsored by *CQ* Magazine. Winner: **Z37M (ops: Z31GX, Z31MM, Z32PT, Z32XA, Z32ID, Z33F, Z36W)**

Single Band

World, 28 MHz: Sponsored by Trey Garlough, N5KO. Winner: **John Morandi, LU1HF**
World, 7 MHz: Sponsored by Frank McGonical, W6DSQ. Winner: **Robert Orehoci, 9A5E**
World, 3.5 MHz: Sponsored by Steve Merchant, K6AW. Winner: **9A5Y (op: R. C. Jan Hus, 9A3NM)**

note that *Cabrillo*-format logs are *highly* encouraged for *all* entrants with *e-logs required* from *all* potential *high-scoring* entrants in any category. Also, any computer-generated log with *more than 100 contacts must* be submitted via *e-mail* or on a *3.5-inch diskette* via snail mail. For those who submit diskettes, please remember to send the diskettes in a protective envelope. E-mail is clearly the most reliable and easiest mode for log submissions, but we welcome all logs, including (subject to the restrictions described above) paper logs, no matter how they may be sent. Finally, the **deadline** for log submissions is **March 11, 2005**. The full text of the 2005 rules will be published in the January 2005 issue of *CQ* and on the *CQ* website at <www.cq-amateur-radio.com>. *Please read the rules carefully prior to the contest,* and please note that *all* logs submitted via e-mail go to **<wpxrtty@kkn.net>.**

Soapbox

Thanks to the warm hospitality of Jacobo (P43P) and his great family and to his superb radio station. I set a new World Record in spite of the fact I had never operated as SO2R before ... ***P40G (I2UIY).*** Thanks to VE3GSI, K4SV, AI6T, and KD6NA for clean QSOs on all bands and to all the great prefixes. This was a great contest ... ***8P2K (8P6SH).*** Congrats to Dean (8P2K/8P6SH) for his excellent effort as 8P2K. Despite having more than QSOs and mults, I could not offset his higher average points/QSO. It was great to see Dean do so well. Highlight of the contest was having CN8KD call me on 80 meters. Thanks Mohamed! ... ***AA5AU.*** What a fun contest! Thanks everyone for the QSOs. And Arigato! To all our friends in Japan who made this weekend extra special ... ***NN6NN.*** Bad condx on 10 and 15 meters so I spent lots of time on 40. Result—more points on 40 than the total for 10, 15, and 20. Tnx good contest! ... ***YL7A.*** This is the 5th anniversary of my first RTTY QSO (and my first RTTY contest). Best QSO was RKØAXX on 40 meters Sunday afternoon—can't believe he heard my low power! ... ***AD1C.***

This was undoubtedly the most fun RTTY contest I've done yet ... ***ZF2NT.*** First ever serious RTTY contest. We sure had fun this weekend especially on the low bands ... ***KM4M.*** Another great weekend for this semi-serious effort ... ***XE2AC.*** No good USA openings; lost too many NA mults ... ***UA9MA.*** Excellent fun and did better than I anticipated with a break for Valentine's Day! Nice to see so much activity too ... ***GUØSUP.*** My first RTTY contest ever ... ***9A3RE.*** Great contest. Made this time from my personal QTH, instead in the south of the island in the capital city, Funchal ... ***CT3EE.*** I lost power to the Quartz Hill contest site at 1500Z on the last day. The low bands went well and my total was looking good—next year! ... ***ZL2AMI.*** Almost no polar propagation at all, with only 37 European stations in the log ... ***KH7X (KH6ND).*** We had some problems during the beginning of the contest, but anyway it was very funny ... ***IQ9RG.*** Very strong signals from KM4M, P40G, RKØAXX. Thanks to P40G for new RTTY DXCC on 80! ... ***LZ9R.***

This was my first SO2R RTTY contest. I had so much fun that I ran over the 30-hour time limit by a couple of hours, so I'm entering as multi-multi ... ***AB5K.*** Overall was a great contest. Hopefully next year there won't be holidays, I'll have both FT-1000's back and I won't have any power failures ... ***KI5XP.*** All the crew will remember this contest for a long, long time because of the extremely cold WX during the contest time. Temp. was around –10 to –20° C. Murphy was with us again. One of the shacks had a problem with electricity and we lost 16 hours of operation. Conditions on low bands were excellent. Congratulations to KM4M for the good score ... ***Z37M.*** We had a great time during this contest. We had a total of 12 ops this year...all but one had done RTTY contesting at least once from here...looks like it is starting to make a difference ... ***KA4RRU.*** I QSO'd 5-bands: KYØW, NN6NN, JM1LPN ... ***JA1BWA.*** This contest was in good condition, so we could enjoy the wonder contest ... ***JA6ZPR.*** After some time without contesting a good one to start again. Nice test and good condx but much noise. Hope to be again in the test ... ***LV5V.*** Very few JA landers hear here which hurt the mult count. EU openings made up a little for that though. Lots of new calls heard which is great ... ***VE1OP.*** Great activity! ... ***JH4UYB.***

(Continued on page 109)

Important On-Line Resources

To prepare for the 2005 contest, please refer to the following on-line resources:

Contest rules: <www.cq-amateur-radio.com>
Contest records: <www.rttyjournal.com/records/wpx.html>
Cabrillo specifications: <www.kkn.net/~trey/cabrillo/spec.html>
Cabrillo template for this contest: <www.kkn.net/~trey/cabrillo/wpx-rtty.txt>
Log Submissions: <wpxrtty@kkn.net>

Announcing:

The 2004 Inductees

CQ Amateur Radio and Contest Halls of Fame

CQ is proud to regularly honor the most accomplished members of the amateur radio community through three "Halls of Fame"—the CQ Amateur Radio Hall of Fame, the CQ Contest Hall of Fame, and the CQ DX Hall of Fame. We are pleased to introduce you to this year's inductees (please note, there were no nominees this year for the CQ DX Hall of Fame).

CQ Amateur Radio Hall of Fame

Our fourth annual "class" of inductees to the CQ Amateur Radio Hall of Fame includes 15 individuals in one of the following two categories: (1) Those individuals, whether licensed hams or not, who have made significant contributions to amateur radio; and (2) Those amateurs who have made significant contributions either to amateur radio, to their professional careers, or to some other aspect of life on our planet. This year, once again, all are or were licensed hams. Please note that callsigns were as issued to these individuals when they were alive/active, and may have been reissued under the vanity callsign program.

We welcome the following members (listed alphabetically) of the 2004 "class" of the CQ Amateur Radio Hall of Fame:

Burchfield, Jack, K4JU. Co-founder of Ten-Tec, along with Al Kahn, K4FW (inducted 2002).

Carman, Ned, WØZSW. Co-founder of Handi-Hams, program to encourage people with disabilities to become radio amateurs and to help them get licensed and on the air.

Clarricoats, John, G6CL. Radio Society of Great Britain General Secretary, 1932–63; RSGB magazine editor, 1937–63.

Heil, Bob, K9EID. Revolutionized audio in rock music live performances, amateur radio; tireless promoter of amateur radio.

Kneitel, Tom, K2AES. Prolific writer/editor on various radio topics; columnist for *Popular Electronics* and *Electronics Illustrated*; editor of *CB Radio* and *S9* magazines; founding editor of *Popular Communications*; author of numerous radio books.

Milosevic, Hrane, YT1AD. Noted DXer and DXpeditioner; President, Radio Amateur Union of Serbia and Montenegro.

Nurse, David, W8GCD. President, Heath Co., 1965– 1980; led the company through the heyday of the "Heathkit" era in amateur radio

O'Laughlin, Sister Alverna, WAØSGJ. Co-founder of Handi-Hams, program to encourage people with disabilities to become radio amateurs and to help them get licensed and on the air.

Oms, Atilano de, PY5EG. Leader in amateur radio in South America, noted DXer and contester, organized several major contest DXpedition stations.

Pasternak, Bill, WA6ITF. Producer, "Amateur Radio Newsline" for over 25 years; founder and sponsor of the "Newsline Young Ham of the Year" Awardprogram.

Pluvinet Grau, Miguel, EA3DUJ. Longtime editor, *CQ Radio Amateur* (Spanish *CQ*); established credibility and reputation of magazine, which is a mix of original material and translations from the English-language version.

Rohde, Ulrich, KA2WEU. Prolific technical author, engineer, businessman.

Sevick, Jerry, W2FMI. Author, authority on transmission line transformers

Shrader, Bob, W6BNB. Author, electronics expert; literally "wrote the book" on *Electronic Communications.*

Villard, Jr., Oswald Garrison "Mike", W6QYT. SSB pioneer, meteor-scatter pioneer, invented over-the-horizon radar, developed "stealth" technology.

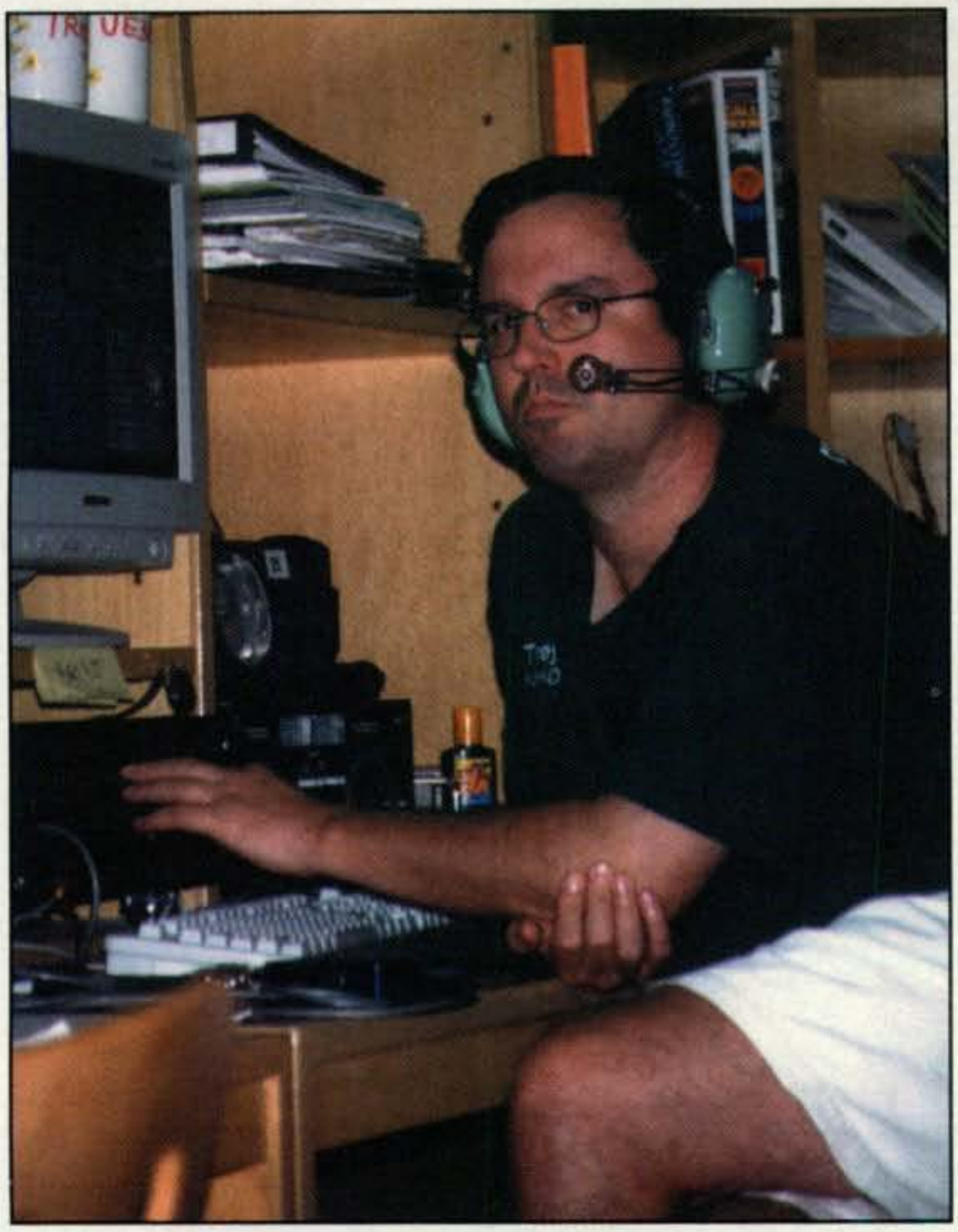
Congratulations to all of our new inductees on your outstanding accomplishments!

CQ Contest Hall of Fame

Steve Bolia, N8BJQ

Steve was Director of the CQ World-Wide WPX Contests for 20 years, from 1983 to 2003, and pioneered computer log-checking. Under Steve's leadership the WPX grew into the world's second largest amateur radio contest (only the CQ WW DX Contest has more logs submitted). As CQ WW Contest Director Bob Cox, K3EST, wrote in his "thank you note" to Steve when he stepped down last year, "...the dedicated and professional work of Steve Bolia, N8BJQ, has helped shape the (WPX Contest) today. ... Throughout his long leadership, Steve has maintained the 'fun' aspect of the

Steve Bolia, N8BJQ, 2004 CQ Contest Hall of Fame inductee.



2004 CQ Contest Hall of Fame inductee Trey Garlough, N5KO.

contest while pulling the WPX up to meet today's standards of contesting excellence. ... From the contest community, we thank you, Steve, N8BJQ, for your thousands of hours of dedication so that we could enjoy the CQ WW WPX Contest."

Steve is also a top-flight contester himself, regularly operating either from his home station or from contest DXpedition stations in the Caribbean. The high regard with which Steve is held by contesters around the world is reflected in the fact that he was nominated by the Slovenia Contest Club.

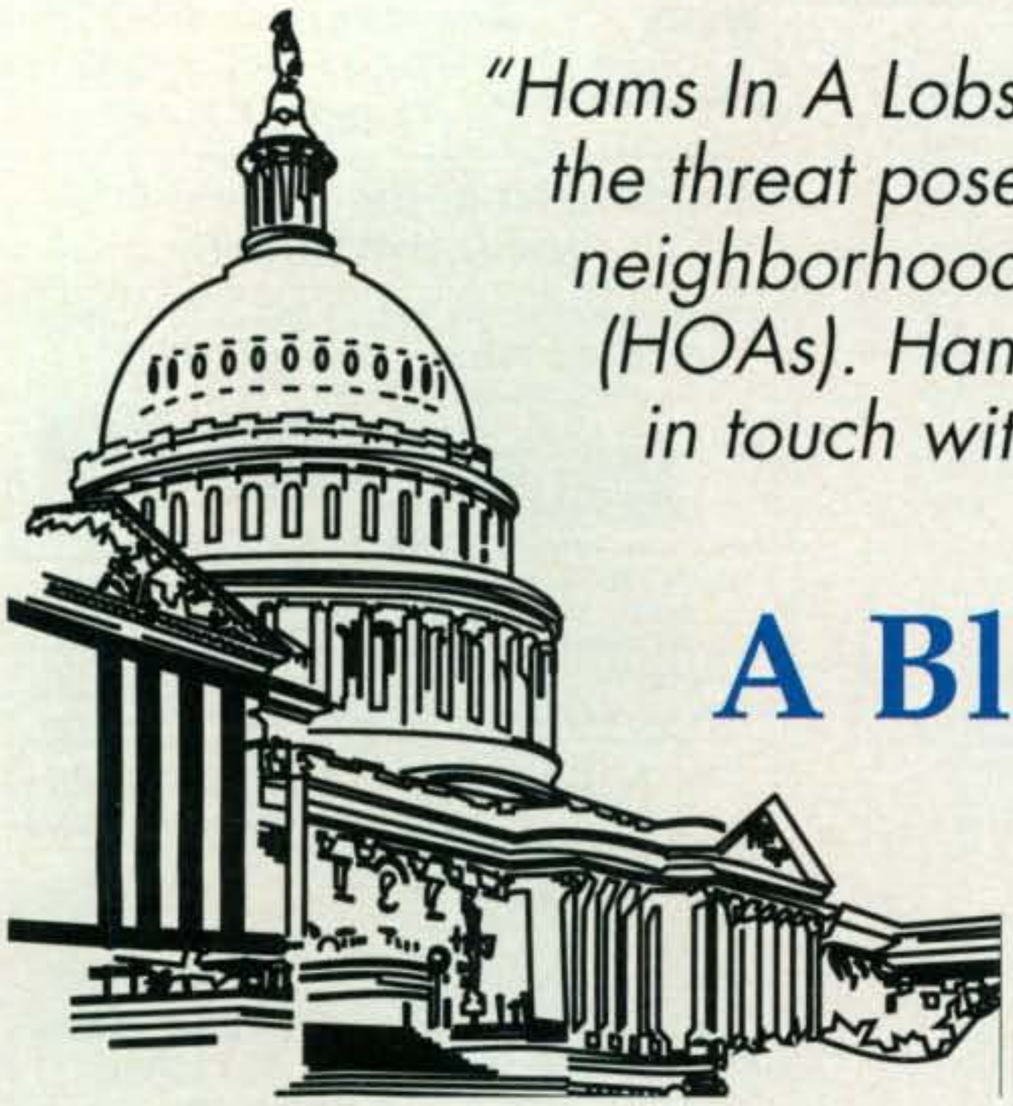
Trey Garlough, N5KO

Trey Garlough, N5KO/HC8N, is not only a world-class contester, he is someone who has gone "above and beyond," in the true spirit of the CQ Contest Hall of Fame. In addition to his on-the-air accomplishments from his home station and from his station in the Galapagos, Trey created the CQ-Contest@contesting.com and 3830@contesting.com internet mailing lists, and was a co-founder of both the contesting.com and eHam.net websites. He is also a former editor of the *National Contest Journal* and participated twice in the World Radiosport Team Championship competition, in 1996 and 2002. He holds nine world records in the CQ World-Wide DX Contest and eight world records in the CQ WPX Contest, and was the first single-op to make 7000 contacts during a single 48-hour CW contest.

Trey was nominated by two Latin American radio clubs, the Brazil-based Araucária DX Group and the Radio Club Quilmes in Argentina. His nominators noted that "Trey is not an American coming south looking only for QSOs. He is a man who learned how to speak our language because of radio, an amicable competitor, a colleague always willing to share, a patient 'Elmer,' and above all, a good friend."

Do You Have a Nomination?

The nominating period for membership in the CQ Halls of Fame will reopen on January 1, 2005. Criteria and procedures are different for nominations for the CQ Amateur Radio Hall of Fame, the CQ Contest Hall of Fame, and the CQ DX Hall of Fame. Details on all three are on the CQ website at <http://www.cq-amateur-radio.com/hof.html>.



"Hams In A Lobster Pot." That's how the author describes the threat posed by growing antenna restrictions in neighborhoods controlled by homeowners' associations (HOAs). Hams, he says, need to get out of the pot and in touch with Congress.

A Blueprint For Victory on HOA/Covenant Antenna Reform

BY DON SCHELLHARDT*

Slowly, inexorably, neighborhood by neighborhood by neighborhood, without the drama of Broadband Over Powerlines (BPL) technology or a "spectrum grab" by commercial interests, a paralyzing force has been silencing amateur radio operators across the United States. This paralyzing force is the spread of compulsory membership in Homeowners' Associations (HOAs), and/or involuntary servitude to restrictive covenants (CC&Rs), which in most cases act with impunity to ban all external ham antennas in affected areas.

By now, backed in some cases by the directives of local governments, HOA/covenant antenna bans have spread to encompass entire towns, entire counties, and even entire states. For example, it is now legally necessary to establish an HOA when building a new housing development anywhere in Fairfax County, Virginia—a suburb of Washington, DC, with more than 1,000,000 residents—or virtually anywhere in the State of Colorado. Most of these HOAs ban external ham antennas.

In other areas, HOAs are mandated by the banks, not the law. Financing of new housing developments is denied to any builder who will not establish an HOA. Because these indirect mandates have been in effect in some places for decades, the "bottom line" result has been akin to a legal edict: total permeation of new housing by antenna bans, across towns, counties—and even regions as large as southern California.

Overall, roughly four in ten Americans now live in HOA-controlled neighborhoods—nearly all of which ban external ham antennas.The Amateur Radio Service has been subject to an attack as gradual as the boiling of a lobster. Instead of a sudden change of temperature, sufficient to alert the lobster and prompt attempts to escape, the temperature in the lobster pot is raised gradually—slowly, inexorably, degree by degree by degree—until the lobster slips quietly into paralysis, and then death.

Hams living outside of the largest metropolitan areas, in older homes within the largest metropolitan areas, or in "pockets" of comparative freedom (such as New England) may not realize the full extent to which HOA/covenant antenna bans are now spanning entire regions, and in the process almost precluding the recruitment of future hams. They also may not realize that HOAs are now beginning to spread to smaller towns and cities, places where they were once unknown.

BPL, as bad as it can be when it is interfering at its worst, varies in the intensity of its impact and is unlikely to spread everywhere. By contrast, HOAs have a 100% "kill rate"—*a 100% "kill rate"*—and could, in time, become almost universal in the United States.

Further, it may be possible, at least in theory, for hams to escape BPL interference, or mitigate it, by shifting to different frequencies. HOAs cannot be escaped in this way, because they ban access to *all* frequencies.

Unfortunately, our nation's political and business leaders appear to be even less aware of the current contagion than are many hams. These leaders may not discover the full implications of HOA/covenant antenna bans until the day when they face a disaster like a hurricane or tornado—or even a *mega*disaster, such as an 8.5 earthquake on the New Madrid fault line, a Mount Saint Helens-type eruption by Mount Rainier, or a thermonuclear terrorist attack—and suddenly realize that the hams who are usually there to help have been put out of business by their local HOAs.

Hope In The House

Early in 2003, with strong encouragement from the American Radio Relay League (ARRL), Representative Steven Israel, D-NY, introduced H.R. 1478: the ":Amateur Radio Emergency Communications Consistency Act." His bill would direct the FCC to require that HOAs and restrictive covenants make "reasonable accommodations" that permit external ham antennas.

Technically, the mechanism for the bill's directive would be to expand the scope of Section 97.15 (b) of the FCC's rules (the codification of the decision known as PRB-1) to require the FCC to pre-empt HOA and covenant restrictions, in addition to the regulations of state and local governments, that "preclude amateur service communica-

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tions."[1] HOAs and covenants could still regulate ham antennas, but could not regulate them "unreasonably"—as in regulating them out of existence.

The FCC has already acted to protect satellite TV antennas from over-regulation by HOAs and/or restrictive covenants. *The FCC has the legal authority to offer exactly the same kind of protection to ham antennas, but has consistently refused to extend it.* The FCC has clearly stated that it will not extend PRB-1 protections to CC&Rs and HOA regulations unless and until Congress orders it to act. H.R. 1478, if enacted, would order the FCC to act.

The Road Ahead

So far, H.R. 1478 has attracted 34 co-sponsors (out of 435 possible voting Representatives) in the House. This is a

Possible Opponents of H.R. 1478

As of this writing, at the end of April, 2004, no associations or other institutions are officially opposed to H.R. 1478. However, once HOA/covenant antenna reform legislation begins to gain momentum—which the initiation of Congressional Hearings on H.R. 1478, and/or on a Senate "companion bill" might signal—we can be expect that the proposal will be taken more seriously by possible opponents.

In attempting to determine which potential opponents might turn into actual opponents, we need to ask: "Who benefits, especially in terms of money and power, from the status quo?"

Beneficiaries of HOAs and restrictive covenants include:

- Some, though not necessarily all, individual leaders of HOAs
- State and national groups composed of HOAs
- Lawyers who represent HOAs and collect fees and penalties, which are sometimes huge, assessed against "non-complying" individuals
- Developers who are compelled to impose HOAs on homeowners in order to obtain financing for their developments and/or in order to comply with governmental mandates
- Realtors who believe, rightly or wrongly, that HOA regulations increase property values
- Banks and other sources of financing who believe, rightly or wrongly, that HOA regulations increase property values in developments they finance
- Some, though far from all, state and local governments—which see HOA-controlled developments as: (1) a way to expand the property tax base, while simultaneously (2) sticking HOA-controlled homeowners with the tab for services that would otherwise have to be paid for by local governments

Whether any or all of these groups decide to oppose HOA/covenant antenna reform legislation will turn in most cases on their respective assessments of what they will gain from keeping current antenna bans in place *minus* what it will cost them—in time, money *and* reputation—to fight for them.

If the established "special interests" conclude that they can bend on ham antennas, as they have already done on satellite TV dishes, *without* creating a precedent for losing their entire "empire," they are more likely to conclude that the prize isn't worth the battle. The more they see reasonable regulation as the first step toward more comprehensive HOA reform, the harder the special interests are likely to fight.

This observation argues, of course, for limiting hams' "wish list" on HOA reform *solely* to the enactment of H.R. 1478 or comparable legislation—in the hope that possible opponents will not feel threatened enough to wage a major battle over ham antennas alone.

If, however, the established special interests see *any* accommodation of HOA reform—including the very modest reforms embodied in H.R. 1478—as a potential threat, *then* hams will quickly develop an incentive to support *sweeping* HOA reform legislation, so that they will have far more allies in a battle that has become inevitable.

In short:

- If H.R. 1478 begins to advance, *and then* attracts major hostile fire, hams should be prepared to shift toward pursuit of HOA reform on a large number of fronts—in order to facilitate *a coalition* of millions of discontented homeowners.
- On the other hand, if H.R. 1478 begins to move, *and then* attracts only token opposition, hams may be able to remain focused on ham antennas alone.
- A possible mid-range strategy might be a call for *an expanded version of the H.R. 1478* proposal that protects shortwave antennas as well as amateur radio antennas. However, since any expansion of the H.R. 1478 legislation would make serious opposition to the proposal more likely, *shortwave-oriented groups would have to agree in advance to join the fight* if the bill were expanded.

Should a full-scale battle develop in Congress over HOA/covenant antenna reform legislation, hams and their possible allies should *not* allow themselves to be discouraged or intimidated by the financial resources that would be available to banks, developers, trial lawyers, and other possible adversaries.

For one thing, in Congress *votes count,* along with dollars. To date, only a minute percentage of American hams have "weighed in" with their Congressional representatives about HOA/covenant antenna reform legislation. This situation could change, however, whenever American hams decide that it should.

Potentially, in rising order of numerical strength, supporters of H.R. 1478 or comparable legislation could bring to bear:

50,000 subscribers to *CQ Amateur Radio* magazine
168,000 Members of ARRL
300,000 active American hams (estimated)
680,000 licensed American hams
At least 3,000,000 American hams *and* shortwave listeners

These are a lot more voters than H.R. 1478 opponents can muster from among their corporate Boards of Directors.

We must also remember that *voters can generate dollars, too.* It may take 1000 everyday voters to offset the donation of a single CEO, but our ranks could easily swell to include thousands of groups of 1000 everyday voters.

Using the numbers set forth above, this is the average contribution that would be needed in order to generate a lobbying fund of $1,000,000 to press for enactment of HOA/covenant antenna reform.

From every subscriber to *CQ*: $20.00
From every Member of the ARRL: $5.95
From every active American ham: $3.33
From every licensed American ham: $1.47
From every licensed American ham *plus* every American shortwave listener: $.33 (or less)

Should it instead become desirable for hams to crystallize a broadly based coalition, that will lobby for *broadly based HOA reform legislation,* the potential constituency could run into tens of millions of voters. At least 40 percent of the American population currently resides in an HOA-controlled neighborhood. That's 120 million people, at least a third of whom are seriously unhappy with HOA living, according to various polls. This translates into 40 million unhappy people, or more, all across the U.S.A. Even if only half of them are adults, that's still a pool of 20 million allies in a possible future battle for major HOA reform.

Collect an average of $5.00 from each of them—and you have a lobbying fund of $100,000,000 for broadly based HOA reform. (Let me have $10,000,000 of that and I'll run for the Senate!)

Finally, let's not forget that hams have *the merits of the argument* solidly on their side. They have weapons in the debate which cannot be translated into either votes *or* dollars and cents:

- The lives that can be saved by hams in a disaster, whether natural or man-made—a community service that's impossible without antennas
- The value of preserving ham radio's traditional role as a pathway to careers in science, engineering, and broadcasting
- The value of maintaining ham radio's traditional role as a source of important technological innovation

respectable number, though not a spectacular one. Unfortunately, as of this writing (in April of 2004), the bill appears to need, *at an absolute minimum,* at least two more boosts in order to move any farther along toward enactment:

(A) Introduction of an identical (or very similar) "companion bill" in the Senate. Members of the House, fearing that their time and energy may be wasted, are unlikely to invest much effort in a bill that has no Senate sponsor—to keep the bill alive when and if it reaches "the other body".

(B) Committee or subcommittee hearings on H.R. 1478 within the House Energy & Commerce Committee. Under the procedures of each house of Congress, it is extremely difficult for a bill to move out of committee for a floor vote on passage unless a committee hearing has been held first.

It is certainly possible that H.R. 1478, and/or a Senate "companion bill," might pass both houses of Congress, and be signed into law by the President, during the remainder of 2004. As a practical matter, however, there is probably not enough time left for HOA/covenant antenna reform legislation to travel that far in what is left of this session of Congress. Each House of Congress has set a "target" adjournment date of October 1, and with this being an election year, members up for re-election will want to get home to campaign.

Thus, even with active lobbying by rank-and-file hams, introduction of a Senate "companion bill," and the holding of House hearings—plus, *possibly,* Senate hearings as well—may be the best we can do in 2004.

Achievement of these goals in 2004 is still well worth the effort. For one thing, much or all of the ground gained in this session of Congress could become the starting point for Congressional action in 2005. Procedurally, everything starts at "zero" in a new session of Congress. Politically and intellectually, however, "carryover" legislators and staff are likely to remember in 2005 what they learned about HOAs in 2004.

As another consideration, remember that *the FCC already has the legal authority to do, on its own initiative, everything that H.R. 1478 would order it to do.* It is therefore possible, though far from guaranteed, that enough visible momentum for H.R. 1478 could persuade the FCC that an implicit reprimand by Congress may be imminent. In that case, the FCC might prefer to adopt H.R. 1478 policies on its own, in its own regulations.

Requests to Make in 2004

To reiterate, as the 2004 portion of a longer term "Blueprint For Victory," hams should make two basic requests—one to their U.S. Representatives and the other to each of their two U.S. Senators.

Ask your U.S. Senators: To introduce a Senate version of H.R. 1478 (and then Press for committee hearings on it).

Ask your U.S. Representative: To press for committee hearings on H.R. 1478 (Also, though less urgent, it wouldn't hurt to ask your U.S. Representative to co-sponsor H.R. 1478).

Information on how to contact your U.S. Representative can be found by visiting his or her webSite, which is reachable through <http://www.house.gov>, and information on contacting your two U.S. Senators can be found by looking up their websites at <http://www.senate.gov>. In addition, there is a link on the *CQ* website <www.cq-amateur-radio.com> entitled "Contact Your Elected Officials." This link will help you get in touch with your representatives, even if you don't know who they are.

If you are not a Net surfer, you may call the nearest local offices of your three Congressional representatives. Their phone numbers should be available in your local phone book, and/or from your local phone Information Assistance, and/or from your local Registrar of Voters.

Caution: Beware Of Sending "Snail Mail" To Washington. *Please do not make the mistake of sending a letter to Capitol Hill by regular U.S. Postal Service mail.* Since 9/11, and the anthrax attacks on Congress, security screenings on Capitol Hill and at federal agencies have delayed incoming "snail mail" letters by several weeks (when they are delivered at all).

Therefore, if you wish to contact the Washington office of your Representative or Senators, please choose one of the following options:

1. Fax;
2. E-Mail;
3. Regular USPS mail, addressed *c/o* your legislator's *local* office (which will add two or four days to the normal delivery time); or
4. USPS Priority Mail to Capitol Hill (with two to three day delivery for around $4.00 per envelope).

"Some Hams are More Equal Than Others"

To paraphrase George Orwell's famous dictum in his novel *Animal Farm,* when it comes to *lobbying Congress:* "All hams are equal, but some are more equal than others."

You have special clout—and, with it, special responsibility —*if* you live in an area that is represented by a Member of the Senate Commerce, Science & Transportation Committee (and, especially, of that committee's Subcommittee on Communications), *and/or* by a Member of the House Committee on Energy & Commerce (and, especially, of that committee's Subcommittee on Telecommunications & the Internet).

Favorable action on HOA/covenant antenna reform legislation by these committees and subcommittees does not guarantee that enactment, or even passage in a floor vote by the full House or Senate, will occur. However, *the absence* of favorable action virtually guarantees that floor votes and eventual enactment will *not* occur.

The memberships of these bodies, along with the names of key leaders of the House and the Senate as a whole,

are listed on the National Antenna Consortium's website at <http://www.antenna-consortium.org>. If one of the people on these lists represents *you*, recruiting that person as a supporter of H.R. 1478 will have *at least four or five times the impact* of recruiting a "rank-and-file" Congressional legislator.

Nevertheless, even legislators who are not on the jurisdictional committees, and/or in the highest leadership ranks of the House and/or the Senate, can still be helpful in influencing the legislators who are. If, for example, Senate Commerce Committee Chairman John McCain (R-AZ), hears from five or ten Republican senators off his committee that action on a Senate version of H.R. 1478 will improve their prospects for re-election, he is likely to pay attention. By the same token, Representative John Dingell (D-MI), the Ranking Minority Member of the House Energy & Commerce Committee, is likely to listen sympathetically to requests for action from 10 or 20 House Democrats—even if they do not serve on his committee.

At the moment, enlisting a typical House or Senate Republican to support H.R. 1478 (or a companion Senate bill) will generally carry more weight than enlisting a typical House Democrat. This is because Republicans currently hold a majority of the seats in both the House and the Senate. *However*, bear in mind that the Republicans' margin of control in both Houses of Congress is narrow, and that the 2004 election is likely to be closely contested. Therefore, this year's minority party *could* be next year's majority party—and the Congressional Democrats who now serve as Ranking Minority Members could be committee chairs.

In short: *Every* vote in Congress is worth going after, and *your vote* in November is something every member of Congress needs. Now is the best time to share your concerns with your representatives ; they'll be listening to your message because they want you to listen to theirs in the fall.

Note

1. §97.15(b) of the FCC rules states: "(b) Except as otherwise provided herein, a station antenna structure may be erected at heights and dimensions sufficient to accommodate amateur service communications. [State and local regulation of a station antenna structure must not preclude amateur service communications. Rather, it must reasonably accommodate such communications and must constitute the minimum practicable regulation to accomplish the state or local authority's legitimate purpose. See PRB-1, 101 FCC 2d 952 (1985) for details.]"

Announcing:

The 2004 CQ WW RTTY DX Contest

September 25–26, 2004
Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday
Logs are due no later than October 29, 2004
Send logs to: <rtty@cqww.com>

I. Period of Operation: All stations may operate the entire 48-hour contest period.

II. Objective: The object of the contest is for amateurs around the world using RTTY to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 3.5, 7, 14, 21, and 28 MHz bands may be used. No 1.8 MHz or WARC bands.

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. Only the entrant's callsign may be used to aid the entrant's score. No self-spotting on any form of DX spotting nets is permitted for any category. Self-spotting includes, but is not limited to, generating packet spots for your contest callsign by (a) using your own callsign; (b) using another callsign; or (c) other stations as a result of prearranged solicitation by you

V. Categories:

1. Single Operator (Single Band and All Band)

(a) Single Operator stations are those at which one person performs all of the operating, logging, and, for the Assisted category only, spotting functions. Only one transmitted signal is allowed at any time.

(b) Low Power: Same as V.1.(a) except that (i) output power is 150 watts or less and (ii) only All Band entrants may enter the Low Power category. Stations in this category compete only with other low power stations.

(c) Assisted (all band operation only): Same as V.1.a. except the passive use of DX spotting nets is allowed (see IV above). No power subcategories.

(d) Single Band: All contacts are made on one band, regardless of power level. However, entrants may make contacts on other bands for the benefit of other contestants if they submit logs in Cabrillo format and clearly mark in the log header which band is to be counted as the single-band entry (see Rule XII below). No power subcategories.

2. Multi-Operator (All band operation only)

(a) Single-Transmitter: Only one transmitted signal at any time. Limited to six band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the six-band-change rule will result in reclassification to the Multi-Multi category. Two power categories: Low Power (150W or less) and High Power (greater than 150W).

Exception: One and only one other band may be used during the same time period if and only if the station worked is a new multiplier. Violation of the six-band-change rule by either transmitter will result in reclassification of the entry to the Multi-Multi category.

(b) Two-Transmitter: A maximum of two transmitted signals are allowed as long as each signal is transmitted on a different band. Entrants in this category are allowed a total of six band-changes per transmitter in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the six-band-change rule may result in reclassification of the entry to the Multi-Multi category. No power subcategories.

(c) Multi-Transmitter: No limit to the number of transmitters, but only one signal and "running station" allowed per band. No power subcategories.

VI. Modes: Baudot only. No unattended operation or contacts through gateways or digipeaters permitted.

VII. Exchange: Stations operating within the 48 continental United States and the 14 Canadian areas transmit RS(T) report plus State or Area (Canada only) plus CQ Zone. All other stations transmit RS(T) and CQ Zone.

Valid Contacts: A given station may be contacted only once per band. Additional contacts are allowed with the same station on each of the other bands used in the contest.

VIII. Identification of Transmitters: Multi-Single and Multi-Two log entries must identify which transmitter made each QSO in the log (column 81 of Cabrillo QSO template for *CQ* contests). Multi-Multi entries which submit logs in other than Cabrillo format must provide a separate log for each transmitter.

IX. QSO Points: One QSO point for contacts within your own country. Two QSO points for contacts outside your own country but within your own continent. Three QSO points for contacts outside your own continent

X. Multipliers: One multiplier point for each U.S. state (48) and each Canadian area (14) on each band. Please use only official U.S. Postal Service abbreviations to identify states (e.g., Michigan = MI; Massachusetts = MA, Ohio = OH). One multiplier point for each DX country in the ARRL and/or WAE country lists on each band. *Note:* KL7 and KH6 are counted as country multipliers only and not as state multipliers. One multiplier point for each CQ zone worked on each band. Maximum of 40 Zones per band.

Canadian areas (14 total) are as follows: NB (VE1, 9), NS (VE1), QC (VE2), ON (VE3), MB (VE4), SK (VE5), AB (VE6), BC (VE7), NWT (VE8), NF (VO1), LB (VO2), NU (VYØ), YT (VY1), PEI (VY2).

XI. Scoring: Final score = total QSO points × the total multipliers (US states + VE areas + ARRL/WAE countries + CQ zones).

XII. Awards: First-place certificates will be awarded in each category listed under Section V in every participating country and in each call area of the United States, Canada, Australia,

and Japan. All scores will be published. To be eligible for an award a Single Operator station must operate at least 12 hours. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. (Single band entrants who also operate on other bands are encouraged to submit their logs to aid in the log-checking process. *Note:* Logs containing more than one band will be judged as all-band entries unless they are submitted in Cabrillo format and the single band entry is specified in the Cabrillo header.) All certificates and plaques will be issued to the licensee of the station used. To the extent sponsors or winners purchase plaques through the Contest Director, plaques will be awarded in the following geographical areas for each of the categories listed in Rule V: World, North America, USA, Canada, South America, Africa, Europe, Asia, and Oceania.

XIII. Instructions for Preparation of Logs: All logs should be submitted in Cabrillo format via e-mail to <rtty@cqww.com>.

1. Logs must be submitted no later than **October 29, 2004.**

2. Electronic Submissions.

(a) In the "Subject:" line of your e-mail message please include your callsign and the category you entered—e.g., SOABL, M2, MS, etc. Logs should be sent as an e-mail attachment, not in the text of the e-mail, and the **filename** for the log should be ***yourcall.log.***

(b) Entries from **Multi-Single, Multi-Two,** and **Multi-Multi** stations must be merged into a single chronological log that **clearly** indicates which transmitter made each QSO (column 81 of Cabrillo QSO template for *CQ* contests).

(c) If the Cabrillo format is unavailable, contact the log checker, Joe Wittmer, K9SZ, at <k9sz@wittmer.us>.

Other questions pertaining to the CQ WW RTTY Contest may be sent to the Contest Director, Glenn Vinson, W6OTC, 488 Locust St. – #401, San Francisco, CA 94118 USA, e-mail: <w6otc@garlic.com>.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the CQ WW RTTY Contest Committee to contain a large number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he will be ineligible for any *CQ* contest awards for three years.

XV. Deadline: All entries must be e-mailed NO LATER than **October 29, 2004.** Logs received after the deadline may be listed in the results but will be ineligible for any award.

Rising fuel prices are making a natural power source for Field Day attractive for more than just the bonus points. If your Field Day site has a fairly constant wind blowing through it, you might want to consider a windmill as a power source.

Windmill Power For Portable Operating

An Interview with Roy Rakobitsch,* KB2UHF

BY KEN NEUBECK,† WB2AMU

Not too long ago, there was a major push toward using natural sources, such as the sun and the wind, for generating electric power. A number of hams have been a major part of this push through the use of natural sources in powering Field Day operations or similar portable operations. With oil prices skyrocketing again, we may see renewed interest in power from natural sources.

I am a member of the Peconic Amateur Radio Club on eastern Long Island, New York. Every Field Day effort with the club's call, W2AMC, seems to bring out something off the beaten path. One year it was ATV; in 2002 there was a satellite setup. For Field Day 2003 we had a portable windmill generator at the site that was constructed by a young ham, Roy Rakobitsch, KB2UHF.

The windmill was a collection of different types of parts, both metal and wood, and it was used to power a number of the stations for a period of time by using the winds that ride along the north shore of Long Island.

The idea of alternate power sources for our equipment is an area of the hobby where some work has been done in the past, but we all need a reminder of the effectiveness of wind power as a means of generating power, especially with rising fuel prices for traditional generators, and the limitations of battery backups at cell-phone sites during lengthy power failures. The following is an interview that was conducted with Roy, KB2UHF, to provide a general overview of the use of wind power to the readers of *CQ:*

Photo A– Roy and helpers at the Peconic ARC Field Day site at Horton's Point Lighthouse on eastern Long Island, New York, preparing the windmill for assembly. The blades of the propeller are off and the rotor assembly can be seen. (Photo by Ken Neubeck, WB2AMU)

CQ: What got you interested in building your own windmills?

KB2UHF: Well, not too long after I became interested in electronics as a whole, I became interested in radio. I always had thought the mobile operations aspect of amateur radio was really interesting, and that stemmed from the thought of someone (me) being able to operate portable using alternative sources of power. I happened to grow

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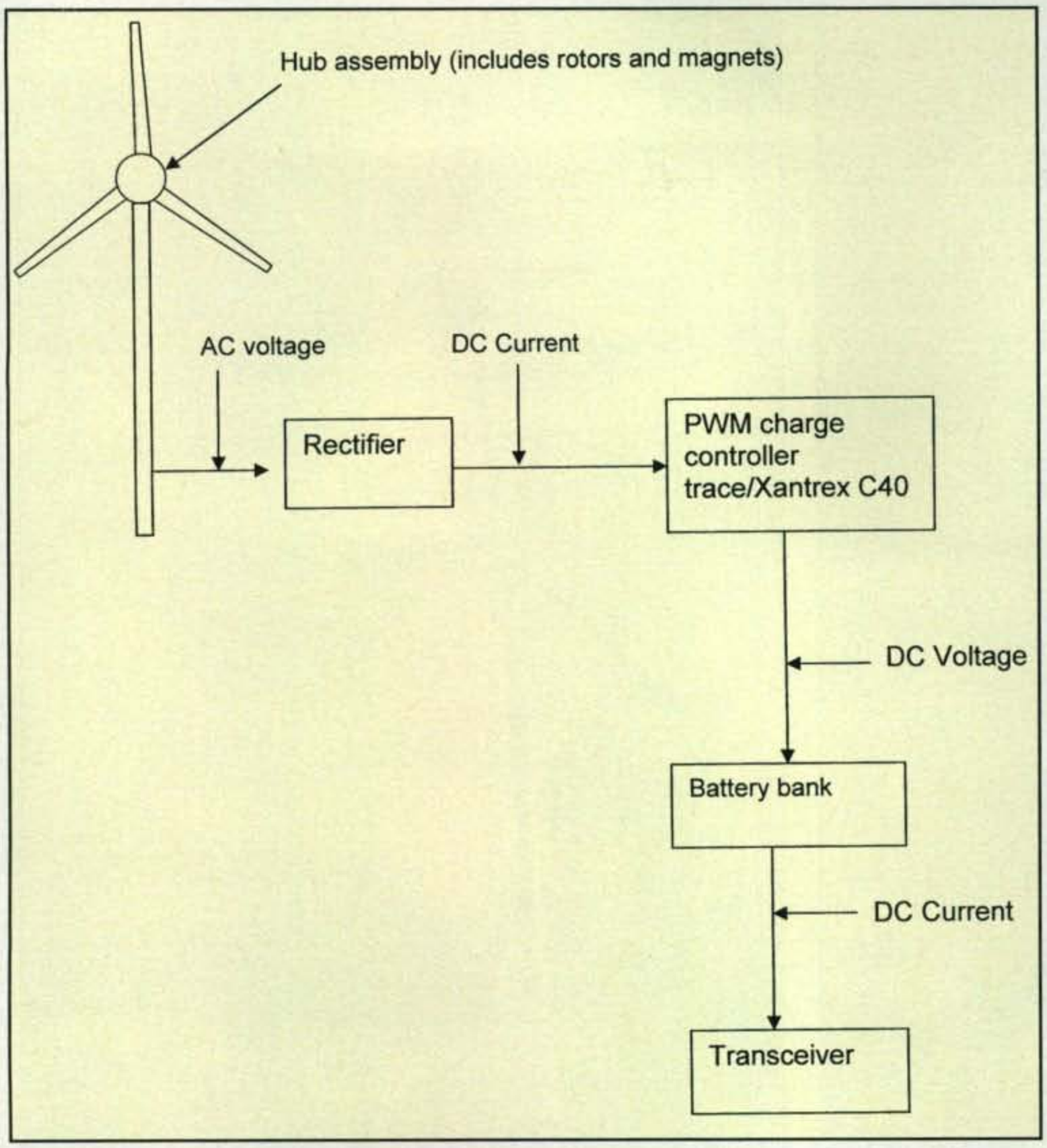

Fig. 1– Block diagram of the windmill-power system.

up on the east end of Long Island, where storms are quite commonplace and we lost power quite often. It was fun for me to design and build small power systems separate from the power grid to make this type of operating possible and dependable.

I started out by building smaller wind turbines based on simple DC motors that were not too powerful, but accomplished the job of charging small batteries for an array of uses, including lighting with small LED cluster lamps and powering of handheld radios. Pretty basic stuff, just use a diode to block reverse current here and there, and make sure the turbine can produce the right voltage for the job. These were small machines capable of only a couple of watts and having a prop that spanned only 12 to 24 inches in length. They also only produced DC voltage and were not very efficient.

It was only recently that I decided to go with the idea of building units that produce AC voltage. The production of AC voltage allowed me to mount the machine in a remote location on my property, where it would be exposed to a more sustained wind. Also, I would lose less power on the long cable run using AC than if I were to use DC (recall that this was the same reason why Nikola Tesla promoted AC power over Edison's DC power 100 years ago). I would lose even less power if I used a higher voltage system, but that's another article in itself.

My latest turbine is a Three-Phase AC PMG (Permanent Magnet Generator) with a 9-ft. diameter wooden propeller. It is a dual-rotor design that is incredible at saving power that would normally be lost due to eddy currents and heat buildup in a design that uses steel laminations to pull magnetic flux through the stator coils. A block diagram of this design appears in fig. 1.

CQ: Where does one go to find plans to build a windmill, small or large?

KB2UHF: Well, I was kind of on my own until I found a really great group of

Photo B– This side view shows the wooden vane and the three blades of the windmill structure. The propeller has a 9-ft. diameter. (Photo by WB2AMU)

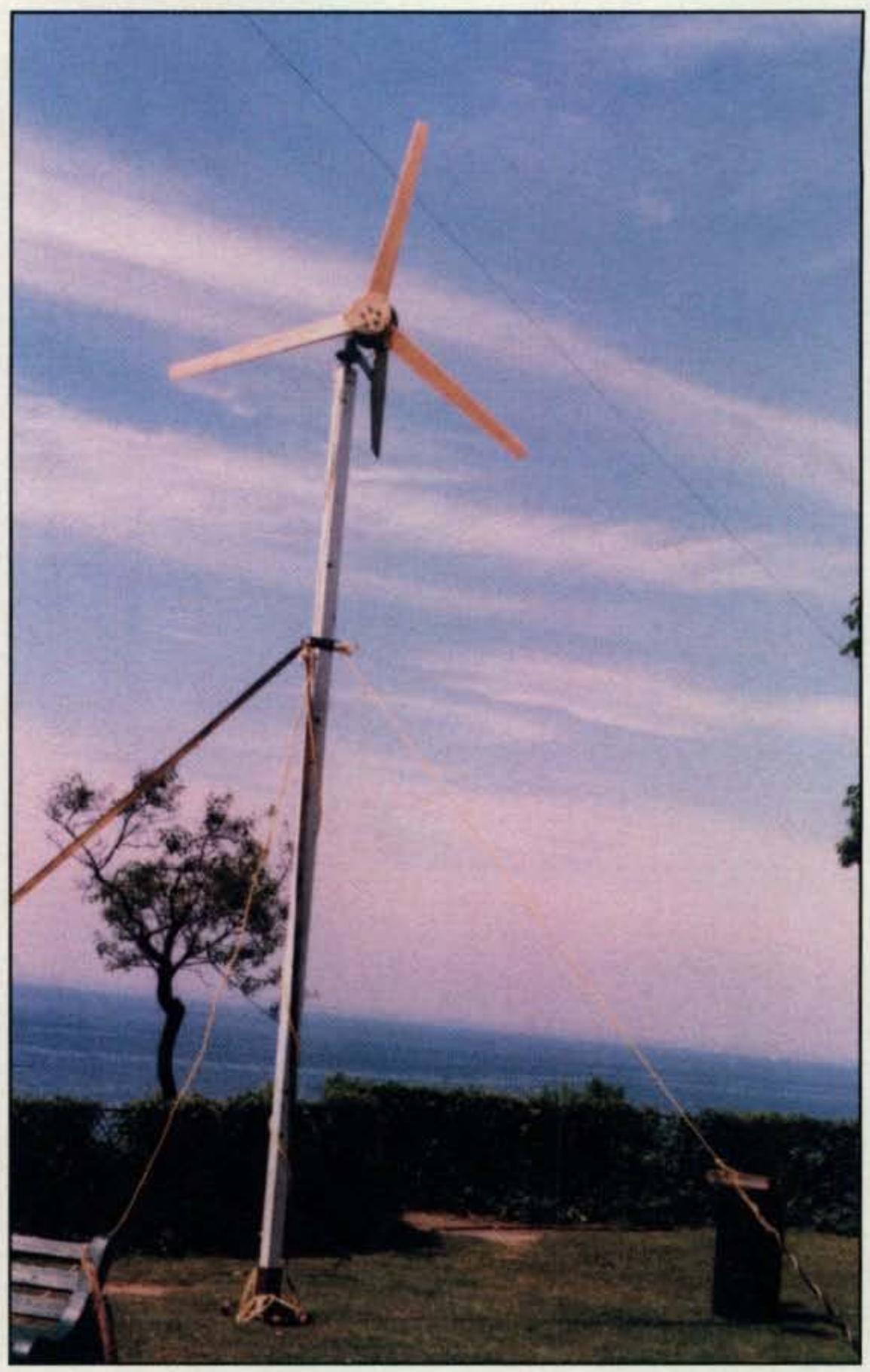

Photo C– The final installation of Roy's windmill at the Peconic ARC Field Day site, with Long Island Sound in the background. At times the wind speed was quite high. (Photo by Ken, WB2AMU)

guys at <www.otherpower.com>. They have a great message board, and I'm sure if you have any questions about how to go about building similar machines, you can either go there or e-mail me. I frequent the board a lot, and we all try to help out one another when we can. There is a lot to be learned about this sort of stuff. If you are not a mad scientist like me, and you don't feel like spending every dime and free moment on experimentation, plans are also available from either Hugh Piggott at <www.scoraigwind.co.uk> or Dan B. and the guys at <www.otherpower.com>.

CQ: Did you have a club or group of experts that was able to provide help?

KB2UHF: There is no club I'm aware of. I just basically like to build crazy contraptions. I have a machine shop at my disposal and a lot of experience with experimentation in both electronics and mechanical design. I really would like to thank all my friends at Otherpower for all the help and good topics. It's never boring at that site.

CQ: In addition to Field Day, have you used wind power for other aspects of ham radio?

KB2UHF: I have used smaller machines in the past on a much smaller scale to power small VHF radios, on the order of only a couple of watts of power.

CQ: What is the process that you use to construct the wooden blades on the windmill you have made? How much time does it take to build a complete propeller?

KB2UHF: I use a process that is quite accepted by everyone who builds these sorts of things. It takes me approximately a day to complete a 9-ft. diameter propeller without painting or treating the wood somehow. I basically start with Douglas Fir 2" × 6". I try to find a piece that is clean (knot free), but since that is nearly impossible (I get lucky sometimes) I usually buy long 12-ft. lengths from which I can usually find a clean part of approximately 5 ft. I then cut out the "good stuff" and use three pieces to make up the blades. You would use three pieces if you're making a three-blade prop. There are many ways to make props. This is just the way I prefer.

I then decide which side of the wood will be the face and which edge will be leading and trailing. I draw a line on the trailing edge of the blade from the bottom of the root to the tip of the blade. This line is at an angle that will determine

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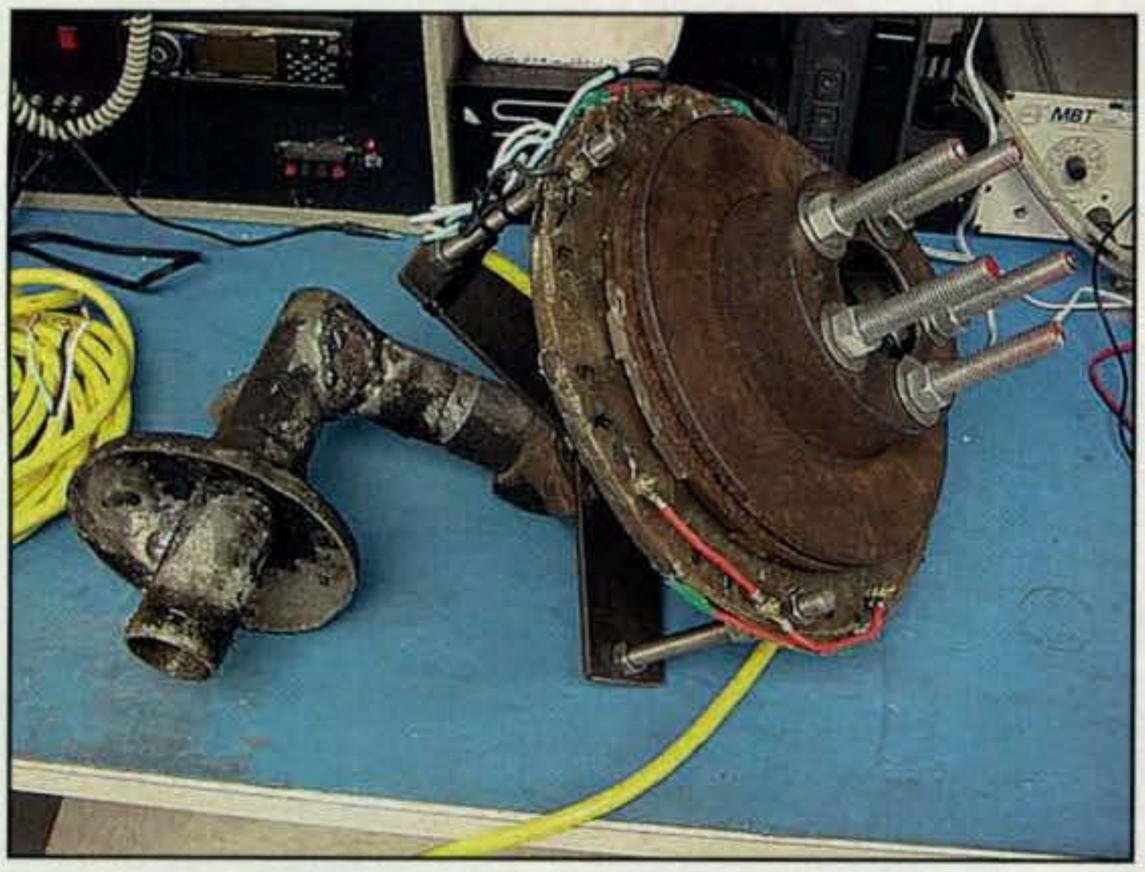

Photo D– A rotor assembly from a Volvo is used for the hub of the windmill, along with other parts of the front strut assembly. (Photo by Roy Rakobitsch, KB2UHF)

the pitch of the blade. I like making the blades so that they have somewhat of a twist to them, because they are more efficient at higher speeds. I usually like to make the pitch at the tip approximately 4 degrees, and I allow the pitch at the root to be as much as the thickness of the wood will allow. After the line is drawn and the pitch is known, a cross-cut saw is used to make vertical cuts every inch or so from the leading edge to the line on the trailing edge. Then a chisel is used to remove all the wood between the cuts, and what you're left with is a rough blade face that has a visible pitch increase all the way down to the root. It is then finished with a power planer and sanded.

The three finished blades are sandwiched between two plywood discs and screwed together. Then the "lug" pattern is drilled out, which allows the prop to be mounted on the alternator. Overall, the props I make seem to work pretty well. This is just a basic way to do it, and I'm sure if you put more time into it, yours may come out looking better—maybe even work better.

I also forgot to mention that what you are looking at in photo D is the front strut assembly that was taken from a rear-wheel-drive car. I find the brake rotors work really well for holding the magnets, and they are pretty durable. Also, the spindle and the tapered roller bearings seem to work really well as thrust bearings, and they are so well built that they will stand up to the abuse of heavy winds and probably will never break down.

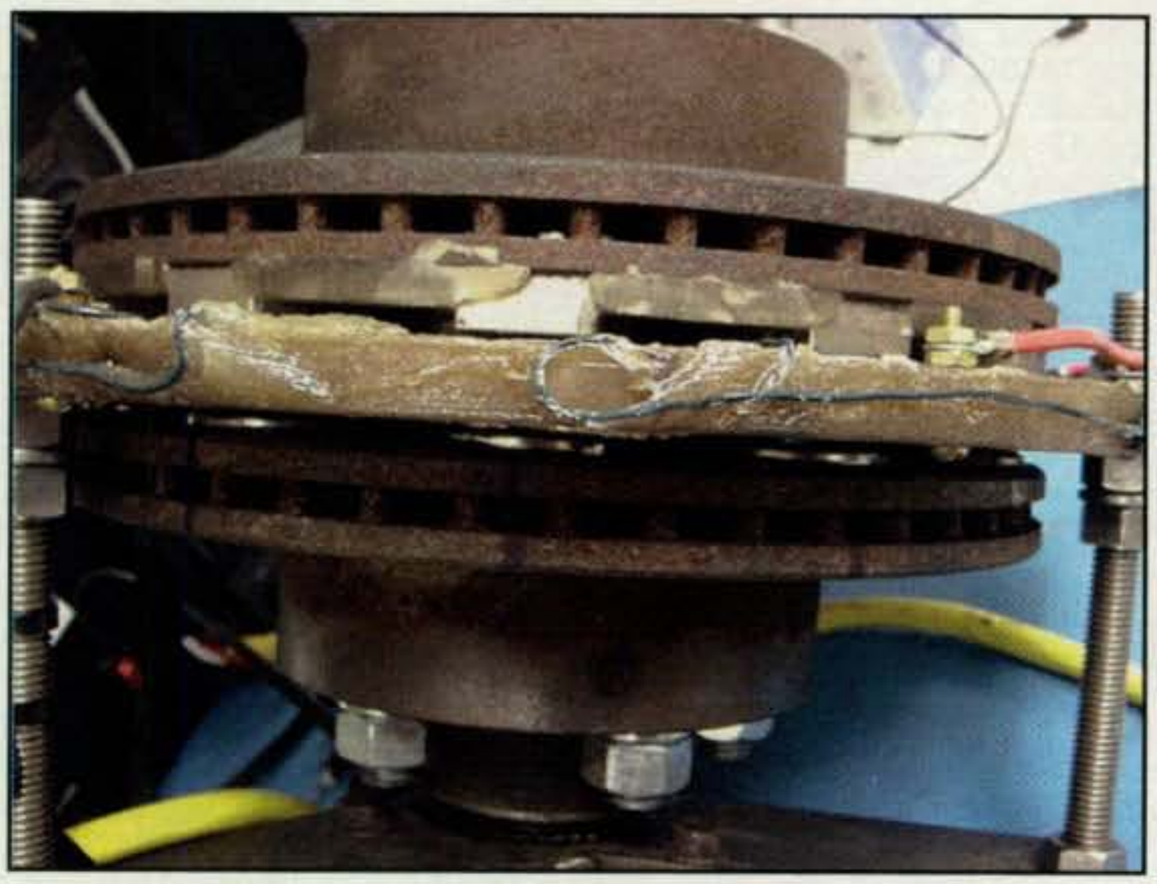

Photo E– Side view of the two rotors that are used in the hub of the windmill, along with the magnets glued into place. There are twelve magnets that are mounted on each rotor, and since this is a three-phase machine, there are nine coils. This works out to three coils per four magnets. (Photo by Roy, KB2UHF)

CQ: What is the smallest windmill that you have constructed and what kind of power output was able to be obtained?

KB2UHF: I've built machines out of stepper motors from old daisy-wheel printers and they made AC. They worked pretty well. They were used to light up small LEDs so I could find things in the dark.

CQ: What are the basics of how a windmill generates electrical power?

KB2UHF: The turbines I build are of the conventional upwind type, which uses a tail to position the turbine into the wind. This unit is direct drive (gearing not used), and in this particular unit the tail is made to furl automatically at high wind speeds and make the turbine turn to some extent out of the wind for over-speed protection while still providing power. Electricity is generated by moving a magnetic field past a coil, or in this case, nine coils. This produces an AC waveform, and if you were to move 24 magnets (12 on each rotor) past nine coils, you would end up with what you see in photo E. This is a dual-rotor machine, so there are actually 12 magnets per rotor, and the rotors are positioned so that each magnet on rotor 1 lines up with an opposing magnet on rotor 2. This completes the flux circuit and allows the flux path to be stronger and more direct. These rotors turn simultaneously while the coils (stators) remain stationary between the discs. I spaced three coils for every four poles or four magnets. This gave me a total of nine coils, which are 120 degrees out of phase with one another. Each coil is 80 turns of 16AWG magnet wire. I then wired three coils in series, so I was left with three groups of coils. These will either be wired in star (wye) or delta to produce three-phase AC output. The AC then goes down the cable from the generator and into the rectifier to be converted to DC. In this case, we're using a three-phase rectifier made up of bridge rectifiers. The DC then goes to a charge controller. I am using a Trace C40. The charge controller allows Pulse Width Modulated charging of the batteries. It also allows you to see the voltage present so you don't discharge them too low. These are deep-cycle lead-acid batteries (refer to the block diagram, fig. 1).

CQ: Describe the importance of checking out the weather forecasts for using windmills for portable operations such as Field Day. What do you look for in the forecast?

KB2UHF: The weather is very important, as you can imagine. If you pick a site that does not have much average wind, you probably would not expect to get much power out of the turbine. I pay close attention to wind charts and the coastal marine forecast, being that I live on the east end of Long Island. WEFAX also puts out a wind chart, and I'm working on listening to the rebroadcasts on HF and decoding them with a laptop in the car. This sort of thing is interesting and fun for me.

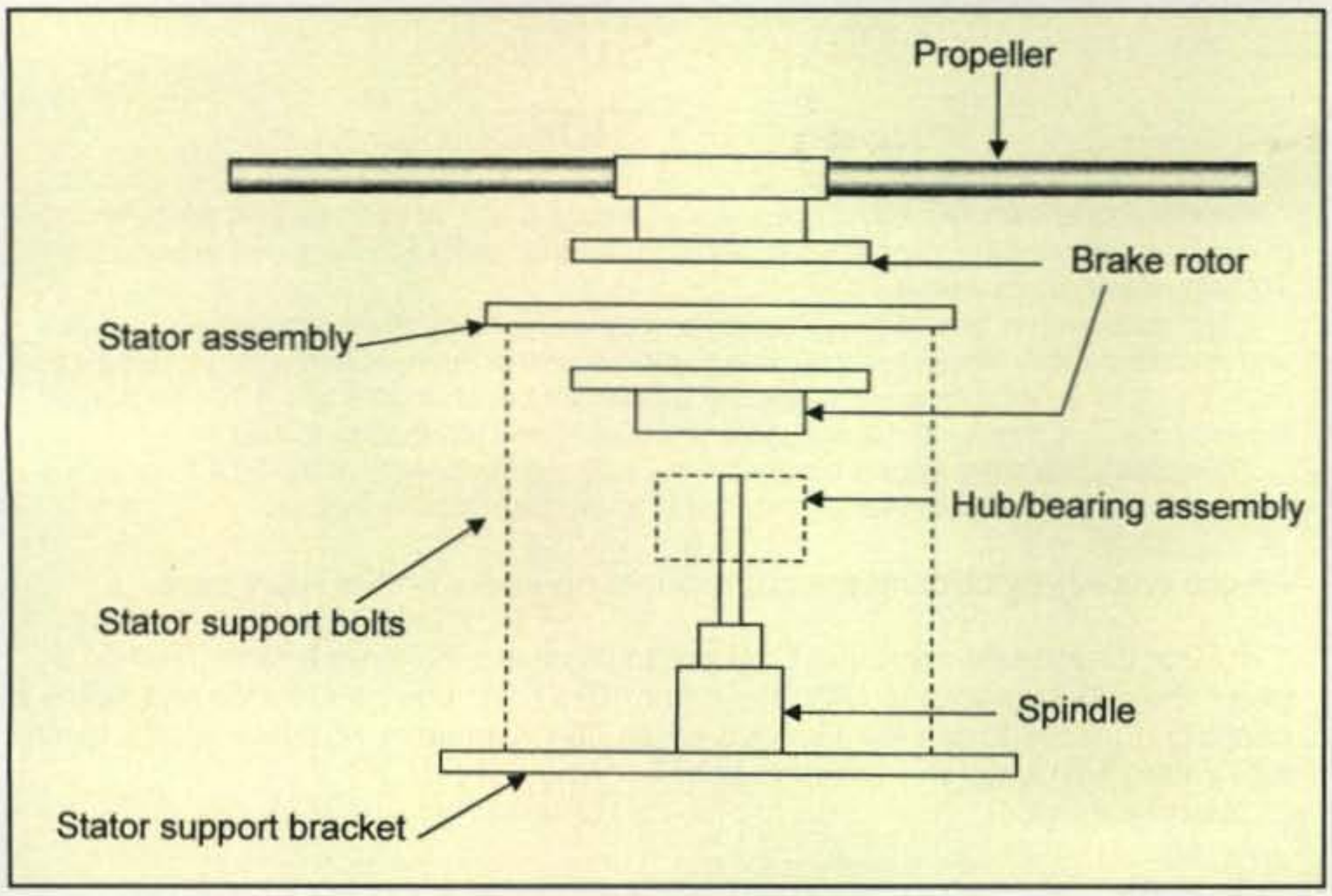

Fig. 2– Hub assembly detail.

CQ: What was the average speed required to maintain the charge on the batteries of the windmill used by the Peconic ARC during Field Day?

KB2UHF: I'm still in the process of doing tests, collecting data, and making fine adjustments but I would say that for its size, it's a pretty powerful machine. With a 10 MPH wind, I was seeing 10A @12V, and at 15 MPH I saw close to 20A @ 12V. The output climbs steeply after 15 MPH, and at 35 MPH I've seen over 100A @ 12V. That's approximately 1.2 KW output, and that's with the machine wired in star. I think there is more power to be had if it is wired in delta and the prop is designed to be a little more efficient. I really built this machine to take over in low winds, because my other 1-KW single-phase machine needs at least 12 MPH to start charging my batteries and that doesn't really cut it in the summer, the least windy time of the year here. *(By the way, Roy has a special bracket built onto his jeep for accommodating small prototype windmill structures for running test data!—WB2AMU)*

CQ: What is the next windmill project you have on the drawing board?

KB2UHF: I think I'm going to build a smaller wind turbine that is more portable and easier to set up. The blades quite possibly will fold up, and it might be used for QRP (low power) work on HF. I also might try to build a small machine that could be carried in the truck and set up in under 10 minutes for emergency use. It probably will be mounted to a mast on the truck and tied directly to the vehicle's electrical system. ■

What You've Told Us...

Our May survey was the first of a two-part series of questions on hamfests and you. Hamfest attendance may be down overall, but not among *CQ* readers – 73% of the survey respondents report attending a hamfest within the past 12 months; 10% have been to a hamfest within the past one-to-two years, and only 16% haven't been to a hamfest in three years or longer, or have never been to a hamfest (although one respondent noted, "Keep in mind I've been licensed less than a year.").

Within the past three years, 63% of you have attended a local hamfest, 49% have attended a large regional hamfest (with major manufacturers present), 42% have been to a small regional hamfest, and 25% of you have been to the Dayton Hamvention®. Looking forward, 59% plan to attend a local hamfest within the next year, 47% anticipate going to a large regional hamfest, 41% plan to go to a small regional hamfest, and the same 25% plan to go to Dayton.

Your **main** reasons for attending hamfests are many and varied, but 31% of you say you go mainly to browse; 19% go mostly to buy used equipment at a flea market; 17% to socialize with other hams; 10% to learn about new equipment from dealers and manufacturers; and 8% each go mostly to buy new equipment from dealers and to attend forums. In addition, 5% go mostly to staff a booth or exhibit, or work as hamfest staff; and 3% to sell used equipment at the flea market.

Our last question addressed your involvement in staffing hamfests, and an impressive 35% of you have pitched in as volunteer helpers, while 17% have been hamfest organizers or leaders, 14% have worked as Volunteer Examiners, 12% have been vendors or exhibitors, and 4% have been forum speakers. Finally, 46% have helped in that most important role of hamfest attendees/buyers.

This month's free subscription winner is Paul Begin, KB2NPT, of Riverhead, New York.

Reader Survey July 2004

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This month, we'd like your thoughts on the major components of the FCC's omnibus rulemaking proposal described in this month's and last month's issues.

Please answer by circling the appropriate numbers on the reply card.

1. How do you feel about the proposal to eliminate the Novice (and Technician plus code) CW subbands on 80, 40, 15 and 10 meters, and give Novice and Tech+ operators access to the full General Class CW segments of those bands (with RTTY/data privileges on 10 meters only)?

Strongly agree 31
Agree 32
Disagree 33
Strongly disagree 34
Uncertain 35
No opinion 36

2. How do you feel about the proposal to reallocate some of the 80, 40, and 15 meter Novice bands to expand the voice segments on those bands?

Strongly agree 37
Agree 38
Disagree 39
Strongly disagree 40
Uncertain 41
No opinion 42

3. How do you feel about the proposal to reduce the size of some of the current *exclusive* Advanced and Extra voice subbands as part of an overall expansion of voice frequencies available to General, Advanced and Extra Class hams?

Strongly agree 43
Agree 44
Disagree 45
Strongly disagree 46
Uncertain 47
No opinion 48

4. How do you feel about the proposal to permit auxiliary operation on 2 meters, such as for transmitting audio from an HF rig in one location to a VHF mobile or handheld rig in another?

Strongly agree 49
Agree 50
Disagree 51
Strongly disagree 52
Uncertain 53
No opinion 54

5. How do you feel about the proposal to once again permit the commercial manufacture and sale of external RF amplifiers that operate between 24 and 35 MHz?

Strongly agree 55
Agree 56
Disagree 57
Strongly disagree 58
Uncertain 59
No opinion 60

Thank you for your replies. We'll be back with more questions next month.

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Sizzling single bands

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If you're not yet on 222 MHz, you're not using all your privileges. From voice contacts to remote control of repeaters and more, now you can get on 222 MHz at a reasonable price. Enjoy 100 memories, alphanumeric channel labels, ignition key on/off operation, large illuminated mic, autodial memories, CTCSS encode+decode, DCS, wide/narrow FM operation, optional internal TNC and a host of features.

DR-435T MkII UHF

FM Mobile/Base Transceiver

There are many reasons you might want a monoband 440 MHz transceiver and the DR-435 is ready for whatever job you have in mind. From working repeaters, UHF satellites, remote command and control, data or simplex voice, and more; you'll find the 100 memories, large alphanumeric display, mic with illuminated keys all well designed to suit your purposes. Packed with features like CTCSS encode+decode, DCS, tone bursts, theft alarm, alphanumeric display, autodial memories, high stability TCXO and more.

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BY FREDERICK O. MAIA,* W5YI

FCC "Cleans House" on Petition Backlog

Proposals, if adopted, will have a major impact on amateur radio

Over the past three years the amateur radio community—ham operators and their organizations—has requested many changes to the rules. A couple of months ago a stack of nearly 40 Petitions for Rulemaking were gathering dust at the Federal Communications Commission awaiting some form of agency action. Receipt was acknowledged—that is, the petitions were assigned an RM (rulemaking) number. Then they went into somebody's "In" basket. Some have been sitting there for years.

The Administrative Procedures Act and the Communications Act of 1934 (as amended) specify that the public must have an opportunity to comment on regulations that may affect them. In our view, two or three years is an excessive amount of time to wait for the government to begin the "Notice and Comment" consideration process of a petition. However, that is what it frequently takes.

Realistically, the Amateur Radio Service and its issues are not top priority at the Commission. The FCC is understandably more concerned with regulatory matters that impact the national economy. In any event, as of April 15th, the number of petitions awaiting action is now down to 18.

What the FCC did was to divide the petitions into two piles. The old miscellaneous requests were lumped together, and the more recent ones generated as a result of the new international amateur radio rules enacted last summer at the 2003 World Radio Conference were put in a separate category for future handling. Hopefully, it won't take as long to get to them.

Notice of Proposed Rulemaking . . . Report and Order

Responding to the miscellaneous petitions, the FCC proposed in a massive 71-page document (dubbed WT Docket No. 04-140) several amateur radio rule changes. A few rule amendments—mostly mundane editorial changes —went directly to the "Order" stage without public comment.

The Notice of Proposed Rulemaking (NPRM) section, which made up the bulk of the document, carried a 60-day comment period (cut-off June 15th) with reply comments due two weeks later.

The NPRM made a number of proposals to revise ham operating privileges as well as to eliminate obsolete and duplicate rules. Four petitions addressed on-the-air operating privileges, six related to the types of communications an amateur station may transmit, three concerned the "Vanity" and special event callsign systems, and two focused on the Amateur Service operator licensing system.

*Chairman, NCVEC Rules Committee
Member, Question Pool Committee
1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

The major FCC proposed rule changes:

- Revise the operating privileges of amateur radio operators in four high-frequency (HF) bands (80, 40, 15, and 10 meters);
- Permit auxiliary stations to transmit on the 2 meter amateur service band;
- Permit amateur stations to transmit spread-spectrum communications on the 1.25 meter band plus the 2 and 6 meter bands;
- Permit amateur stations to re-transmit communications from the International Space Station;
- Allow Amateur Service licensees to designate the amateur radio club to receive their callsign after they die, "in memoriam";
- Prohibit an applicant from filing more than one application for a specific "Vanity" callsign;
- Eliminate unnecessary restrictions imposed on certain equipment manufacturers;
- Allow amateur radio stations in or near Alaska more flexibility in providing emergency communications; and
- Eliminate unnecessary rules in the amateur radio operator license examination system.

The FCC said it believed that "...these proposals will: (1) promote the development of the Amateur Radio Service by providing licensees greater flexibility in the utilization of Amateur Service frequencies; (2) eliminate unduly burdensome or duplicate requirements that may discourage individuals from becoming Amateur Radio Service licensees; and (3) promote efficient use of spectrum allocated to the Amateur Radio Service."

Frequency Privileges

High Frequency

The most significant proposal concerns the American Radio Relay League's 2002 petition asking that the Novice and Technician Plus CW (telegraphy) frequencies be eliminated. The League made this request to provide additional phone spectrum for other license classes by reusing segments of the 80, 40, and 15 meter (HF) bands.

The League argued that a "...a 'refarming' plan based on eliminating the Novice and Technician Plus Class subbands is critical because the segments presently authorized for phone and digital communications are severely overcrowded."

Specifically, the ARRL asked that:

1. *Novice and Technician Plus Class* licensees be authorized to operate in any portion of the 80, 40, and 15 meter Amateur Service bands that provide for telegraphy operation by General Class licensees. The ARRL also requested that these operators be allowed to operate CW, RTTY, and data emissions in the (10 meter) 28000–28300 kHz frequency segment;

2. *General Class* licensees be authorized to operate "voice" (phone emission) in the 3800–4000 kHz

(a gain of 50 kHz of phone spectrum), 7175–7300 kHz (a gain of 50 kHz), and 21275–21450 kHz frequency segments (a gain of 25 kHz);

3. *Advanced Class* licensees gain "voice" access to the 3750–4000 kHz (a gain of 25 kHz) and 7125–7300 kHz (a gain of 25 kHz) frequency segments; and

4. *Amateur Extra Class* licensees be authorized to operate "voice" communications in the 3725–4000 kHz (a gain of 25 kHz) and 7125–7300 kHz (a gain of 25 kHz) frequency segments.

The Commission complimented the efforts of the ARRL in developing emission subband options. "Because the ARRL Petition addresses the operating privileges of all classes of licensees on these Amateur Service bands, we believe that the ARRL Petition provides a basis for a comprehensive restructuring of operating privileges," the FCC added.

It further noted that "...no licensees would lose any spectrum privileges and that General, Advanced, and Amateur Extra Class licensees would gain spectrum for phone emissions, one of the most popular operating modes on the HF bands."

The FCC proposed amending the Part 97 Rules just as the ARRL had requested and asked the amateur community for comment on the proposal.

Medium Frequency

The 160 meter band has been a point of contention for some time. This ham band is the only Medium Frequency (MF) band allocated to the Amateur Service and the lowest frequency band the Amateur Service is authorized. Because the 160 meter ham band experiences very high ionospheric absorption during daylight hours and high levels of atmospheric noise during the summer, the distance communications can be transmitted and received on this band is limited, absent very sophisticated receiving systems. Conversely, at night and during sunset and sunrise time periods, because the ionospheric absorption is significantly less, and during the winter, because atmospheric noise is less, longer distance two-way communications on this band are more likely to result.

The FCC authorizes General, Advanced, and Amateur Extra Class amateur stations to transmit either Morse code telegraphy (CW) or voice emissions anywhere in the 1800–2000 kHz (160 meter) band. In order to accommodate specific operating activities, the amateur community has developed a voluntary band plan for the 160 meter ham band. The goal of this voluntary band plan is to minimize interference between stations simultaneously engaging in different operating activities.

Voluntary band planning also allows the amateur community to reallocate spec-

trum to accommodate changes in operating interests and technologies. Prior to July 2001, the generally recognized 160 meter voluntary band plan recommended use of the 1800–1840 kHz frequency segment for CW, RTTY, and other narrowband modes, and use of the 1840–2000 kHz frequency segment for phone, image, and other wideband modes.

In response to increased use of the 160 meter band and concerns about whether the voluntary band plan was meeting the needs of low-band users, the ARRL established a committee to review the 160 meter band plan and provide recommendations. The committee members included Jeffery T. Briggs, K1ZM, and William R. Tippett II, W4ZV. After consideration of the committee's proposed revisions to the voluntary band plan, the ARRL recommended a voluntary division of the band into two segments: (a) the 1800–1843 kHz segment for narrowband, data, and CW emissions; and (b) the 1843–2000 kHz segment for telephony, image, and other wideband emissions.

Disagreeing with the League's position, on September 10, 2001 Briggs and Tippett filed a petition requesting that the FCC make the voluntary 160 meter band plan mandatory. They felt that the band's unique propagation characteristics require the division of the band into mandated wideband and narrowband frequency segments and that such a division would greatly ease the interference that occurs between stations transmitting CW and voice emissions, particularly in the frequency segment 1800–1843 kHz during contests, and when stations are using CW to attempt long-distance international communications during the nighttime, at sunrise, and at sunset.

The FCC said that it had previously addressed the issue of a mandatory versus a voluntary band plan in 1999. In that Order, the FCC denied a request that it declare that any amateur radio operator who selects a transmitting frequency not in harmony with those voluntary band plans is in violation of the Commission's rules. It noted that such a result would be inconsistent with the fundamental principle of shared frequencies in the Amateur Service.

In addition, the FCC stated that granting the request would effectively transform voluntary band plans into de facto required mandates. Rather, the Commission found that because all amateur frequencies are shared, the Part 97 rules do not assign a particular operating activity (such as using CW to attempt long-distance international communications) to a specific frequency segment.

The FCC declined to mandate specific subbands in the 160 meter band "...because the petitioner has not presented any unique or changed circumstances to warrant a mandatory band plan, we find no basis to disturb this fundamental principle. ...We note that the voluntary nature of the band plan allows Amateur Service licensees the flexibility to make any changes if and when they are needed to reallocate the spectrum among operating interests as new operating interests and technologies emerge or certain operating interests and technologies fall into disfavor."

Very High Frequency

We are not going into detail here about the petitions and FCC proposals impacting VHF and higher frequency spectrum, since Joe Lynch, N6CL, covered this in his "VHF-Plus" column last month. The proposals include: Permitting auxiliary operation in the 2 meter band (effectively legalizing Kenwood's "Sky Command" system for remotely controlling HF transceivers); permitting spread-spectrum operations on 1.25, 2, and 6 meters; permitting retransmission of International Space Station communications (current rules specify only space shuttle communications); changing satellite launch notification requirements; and certain other minor changes. The Commission declined a proposal to permit foreign visitors without amateur licenses to use European Family Radio Service style transceivers on 446.0–446.1 MHz (in Europe, the 70 cm ham band ends at 440 MHz), and clarified that current rules already permit repeaters to identify using MCW (modulated CW), in addition to voice and standard CW.

Transmissions

Broadcast and Music

Amateur stations are prohibited from transmitting music—or any form of broadcasting—to ensure that Amateur Service frequencies are not used as a substitute for other communication services. Robert H. Birdsley, WI4J, from Palm Beach, Florida, asked the FCC two years ago to allow an amateur station to broadcast music. Birdsley's contention is that the prohibition violates the First Amendment because they allow amateur stations to make one-way transmissions, or broadcasts, of information that is determined to be of interest to other amateur radio operators, but not the general public, and to transmit tones, as long as the tones cannot form music.

The FCC defines "broadcasting" as "transmissions intended for reception by the general public, either direct or relayed." Birdsley claims this position results in the Federal government regulating noncommercial individual expression. The FCC disagreed with Birdsley and denied his request. "The Rules allow amateur stations to transmit one-way communications only for specified purposes and that these purposes are related to the operation of, or to communications between, amateur stations. Amateur stations are prohibited from broadcasting and transmitting music so that the Amateur Service and Amateur Service frequencies are not used as an alternative to broadcast services and the frequencies these other services are authorized. To allow amateur stations to transmit music or broadcast, as the term is defined in our rules, would be inconsistent with the definition and purpose of the amateur service," FCC ruled.

Information Bulletins

The Rules authorize stations to transmit one-way communications (such as code practice) and to distribute information bulletins. The transmission of information bulletins on the ham bands has long been a controversial issue and has generated many petitions from disgruntled amateurs who want the current policy changed. Most petitioners feel that bulletin transmission has provided a loop-hole enabling ham stations to may make long-winded broadcasts on congested bands.

One such amateur, Connecticut ham John J. Elengo, W1DQ, asked the FCC to impose three conditions on the transmission of information bulletins: (a) limit these stations to a single transmission that does not exceed 15 minutes; (b) require a time period between successive transmissions of not less than two hours; and (c) limit such transmissions in any given ham band to four per 24-hour period.

Jonathan S. Gunn, W9WHE (Champaign, IL), wanted the definition of information bulletins changed to "one-way voice broadcasts ...which are not reasonably designed to establish immediate two-way communications with the station emitting the broadcast." In addition, Gunn wants to impose four limitations on amateur stations that transmit one-way voice broadcasts, including information bulletins: (a) limit a single transmission from a station to not more than 30 minutes; (b) limit multiple transmissions from any amateur station to 60 minutes per day; (c) require a time period of not less than eight hours between successive transmissions on the same Amateur Service band; and (d) require that the control operator of a station take reasonable steps to assure that these transmissions will not cause interference to ongoing communications. He argued that "... lengthy transmissions of one-way voice broadcasts are inconsistent with [the] shared use of Amateur Service frequencies...."

Bob Sherin, W4ASK (Miami, FL), asked the FCC to allow only two types of information bulletins: (a) spontaneous bulletins such as weather alerts and (b) repeated bulletins, the content, number, length, and frequencies of which would be regulated by the government.

Finally, Phillip E. Galasso, K2PG (Wilkes-Barre,PA), asked the FCC to

totally prohibit amateur stations from transmitting information bulletins on the HF bands between 1.8 MHz and 30 MHz and to clearly define them as a prohibited broadcast transmission.

According to Section §97.3(a)(26), the definition of an information bulletin is a one-way transmission consisting solely of subject matter directly related to the Amateur Service. The definition of what content is amateur related is pretty much left up to the transmitting or relaying station.

In 1988, the FCC denied a request to limit these transmissions to ten minutes per day, as it was the Commission's belief that the congestion caused "...was not sufficiently serious to warrant an enforced time limit on bulletins and that there was no showing that such bulletins were of lesser importance than other types of permitted transmissions."

In denying the latest batch of petitions, the FCC reiterated that it historically relies on the judgment of the station operator in determining the content, length, frequency, and emission type of information bulletins. "We do not believe that it would serve the interest of the Amateur Service community to impose rules limiting the flexibility of licensees regarding these transmissions," FCC added.

Furthermore, limiting such bulletins "...would prohibit or severely restrict the ability of an amateur station to provide near real-time information other amateur stations and the public desire, including information concerning severe weather, disasters, and operating information."

Authorized Transmissions

On its own motion, the FCC is proposing to add a new paragraph to Section 97.111 (Authorized transmissions) that would stipulate that "Transmission[s] necessary to meet essential communication needs and to facilitate relief actions," is an authorized two-way transmission.

The Rules authorize RACES stations and amateur stations participating in RACES to transmit on certain specified frequency segments during periods of wartime emergency. The FCC believes this is unnecessary. The Commission is proposing to delete the frequency bands and segments listed in Section 97.407(b) to clarify that during certain emergencies the frequency segments available to RACES stations and amateur stations participating in RACES would be authorized by the Director of the Office of Science and Technology Policy. OSTP serves as the central authority over the nation's telecommunications facilities, systems, and services during wartime emergencies.

Callsigns

Memorial Vanity Calls

The trustee of a ham club station already may request that the callsign of a

deceased club member be immediately assigned to the club with the written consent of a relative. The current Vanity callsign rules, however, do not permit a living radio amateur to designate the recipient club of his or her callsign.

On October 26, 2001, the Quarter Century Wireless Association, Inc. asked that the rules be changed to permit currently licensed amateur radio operators to designate a specific amateur radio club to acquire their callsign "in memoriam." QCWA states that this additional option would allow its chapters to fulfill the expressed desire of a member.

Most commenters agreed with the QCWA suggestion and the FCC has invited comment on the proposal.

Multiple Vanity Callsign Applications

Under the current rules, an applicant may file multiple applications requesting a specific Vanity callsign, along with the attendant filing fee for each application. When multiple applicants request the same vanity callsign as their first choice, the FCC uses a lottery to select the first application to be processed.

Applicants who file multiple applications requesting the same Vanity callsign as their first choice have a greater chance that the FCC will select one of their applications in the lottery than applicants who file a single application. Applicants who file an application that is not selected in the lottery are eligible to request a refund of the filing fee.

Responding to a September 10, 2002 petition, the FCC said that the current scarcity of W or K 1×2 or 2×1 format callsigns "...persuades us to consider revising the rules to promote our goals of equity and fairness. ...We request comment on this proposal."

Special Event Callsign System

The special event callsign system allows an amateur operator, when transmitting in conjunction with an event of special significance, to select a callsign from a list of 750 "1×1" callsigns. A one-by-one callsign contains one prefix letter (either K, N, or W), a numeral (Ø through 9) and a single suffix letter (A to Z, except X). The licensee (or operators of a club station) uses the 1×1 special event callsign instead of the FCC-issued primary callsign while the station is transmitting during the special event.

The ARRL wanted the special event callsign system to contain certain callsign blocks that designate territories and possessions that have no specified mailing addresses. These territories and possessions include, among others, Kingman Reef, Baker and Howland Islands, Wake Island in the Pacific Ocean, and the islands of Navassa and Desecheo in the Caribbean Sea. In support of its request, the ARRL states that amateur station operation from uninhabited United States territories and possessions for avocational interest, in support of a scientific expedition, and radiosporting is an event of special significance to the ham radio community, and therefore, a special event within the meaning of the special event callsign program.

The League also states that while a 1×1 callsign indicates the station is participating in a special event, these callsigns do not denote that the location of the station is in one of these United States territories or possessions, or denote the location of certain types of special events.

The FCC said it did not believe the requested rule amendment is necessary, because there is no requirement in the rules that a station transmit its location or denote that it is transmitting from a territory or possession when it does so. As a convenience to the ham radio community, however, the Rules already provide various options amateur radio operators

may use to indicate that the station is transmitting from a particular U.S. territory or possession. "Specifically, Section 97.119 (c)) permits the control operator of a station to include one or more indicators before, after, or both before and after, the call-sign." The Commission denied ARRL's request.

Field Repair Requirements for Equipment

On February 11, 2002, Nick Leggett, N3NL (Reston, VA), asked that the FCC require manufacturers of commercially built amateur radio equipment to make that equipment field-repairable. In support of his request, Leggett states that most commercially built amateur radio systems are difficult to repair in the field due to a very densely packaged structural design that is optimized for machine assembly, thereby making it extremely difficult to access, diagnose, and replace parts in the field.

Dozens of comments were filed and nearly all opposed the requirement. In denying the petition, the FCC said, "Because we are particularly concerned that the requested rule is vague and would impose an apparently unnecessary requirement on manufacturers, we believe that this request, if adopted, would reduce the availability and reliability of commercially produced amateur radio equipment."

Licensing

Technician Class and the VEC Program

Because there are no more unexpired Technician Class licenses with documents granted before February 14, 1991, the Commission is proposing to revise Section 97.505(a)(9) to refer to only expired Technician Class license documents granted before February 14, 1991.

In addition, because of a quirk in the regulations, it is now possible for a former Technician Class licensee who was licensed prior to February 14, 1991 and who received credit for passing the code test to carry forward that credit to a future examination, while an expired Technician Class licensee who was licensed after February 14, 1991 cannot receive the same such credit.

The FCC said they believe "an examinee who holds an expired Technician Class license and who has passed the telegraphy examination element should receive examination credit for this element regardless of when their Technician Class license was first granted." The FCC proposed amending the rules to grant Morse code examination credit to those examinees.

Color-Coded Amateur Radio Licenses

The FCC denied a December 2002 petition from Dale Reich, K8AD (Seville, OH), that would have required it to issue color-coded radio license documents. K8AD wanted the FCC to print Advanced and Amateur Extra Class operator licenses on blue paper stock, General Class operator licenses on Federal Gold paper stock, and Technician Class operator licenses on red paper stock.

In declining the request, the FCC noted that holding an amateur radio license is determined only by entries in the Commission's Universal Licensing System database. "Possession of a license document is not necessary for an individual to be an Amateur Service licensee or determinative of an individual's class of operator license. For this reason, we believe the color-coding of license documents is unnecessary. We also do not believe this change is necessary or serves any significant purpose."

Instant Licensing

When an individual initially qualifies for an amateur radio license, the volunteer examiners (VEs) submit the examinee's application to the coordinating volunteer examiner coordinator

(VEC) who then electronically transmits the applications to the FCC. The Amateur Service database is then changed accordingly. An examinee may begin operating when an entry appears in the database.

In December 2002, Dale E. Reich, K8AD, filed a second petition requesting that the FCC allow VEs to issue an "instant temporary license" to examinees who qualify for a first ham operator license. "This would allow these individuals an option to gain rapid access to amateur radio upon passing the examinations," Reich argued.

The FCC stated that it had already considered "instant licensing" of amateur radio operators when it established the VEC system in the early 1980s and that the FCC does not permit private organizations to issue temporary or permanent licenses.

The FCC denied the petition noting that "...technological changes have resulted in the VECs filing applications electronically with the Commission, thereby allowing individuals who have qualified for their first Amateur Service license, the only individuals who could benefit from instant licensing, to be on the air within a few days of passing their examination. We do not believe that this minimal wait is unreasonable...."

Examination Credit Based on Merit and Service

When a person takes an examination for an amateur radio operator license, the Rules require that the VE must give that person examination credit for certain examination elements if that person can show having held certain amateur radio licenses, other Commission licenses, or certain other documents (such as a Certificate of Successful Completion of Examination [CSCE]). No credit is granted based on length of time an amateur has been licensed, operating or participation activities, or any other service activities a licensee may have performed.

On November 14, 2002, Dale E. Reich, K8AD, asked that the FCC grant examination credit to Novice and Advanced Class licensees based on the length of time licensed and merit. He wanted the VEs to be able to upgrade Novice and Advanced Class radio amateurs one license class if the applicant had been licensed 20 or more years and had operated without a serious FCC rule violation.

The FCC said most commenters opposed upgrades based on licensing time and a violation-free record, adding that the proposal would impose unreasonable administrative and record-keeping burdens on VEs and VECs. The Commission denied the request adding "...we are particularly concerned that length of licensure in and of itself does not show that a licensee possesses the operational and technical qualifications of a higher class operator license.

Qualifying Examination System

The FCC is also proposing to amend certain amateur radio test administration rules to conform to current practices. The Commission wants to eliminate the rule that requires a public announcement of test locations and times, because test locations and times are given adequate coverage on club and VEC websites, in newsletters, and in other media.

The Commission is also proposing to eliminate the mandated ten-day time frame during which VEs and VECs must submit or forward applications. This limitation is not required by statute, but rather the Commission adopted it in 1984 to ensure the timely filing of examinees' paper applications with the Commission. "Technological changes that have occurred since 1984, however, have allowed the VECs to file applications electronically with the Commission and the rules specifically require that they do so. Therefore, we believe that a rule mandating a ten-day submission time is unnecessary in light of the current rules and actual practices in the VEC system."

The FCC also invited the VE/VEC community to comment regarding whether there are other unnecessary rules applicable to the Amateur Service qualifying examination system that should be eliminated, and whether there are other rules that should be changed to conform with actual practices in the examination system.

Order

The FCC also made a number of minor non-substantive editorial amendments to various Part 97 Rule sections, such as deleting reference to a license document rather than a license grant, replacing the term FCC Engineer-in-Charge with District Director, conforming the spurious emission standards for amplifiers with the International Radio Regulations, and so forth.

Comments are Pouring In

By the time you read this, the 60-day comment period on WT Docket No. 04-140 will be over. Hundreds of comments from interested radio amateurs are already posted to the FCC's Electronic Comment Filing System (ECFS). You can read them by going to: <http://www.fcc.gov/cgb/ecfs/> and clicking on the "Search for filed comments" hyperlink on the right-hand side of the web page. Enter the NPRM number in the "Proceeding" field as "04-140" ... without the quotation marks but include the hyphen. We will cover how the amateur community feels about the FCC proposal in a future column.

73, Fred, W5YI

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.

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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.

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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.

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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 **$189.95**

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 **$169.95** New!

MFJ-974, $169.95. 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.

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Choose super versatile 5-way binding posts AND/OR Anderson PowerPole(R) connectors

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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*.

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math's notes

BY IRWIN MATH,* WA2NDM

Summer Circuit Tips

This month we thought we'd present some simple circuits that might help you enjoy the lazy, hot summer days without too much effort and possibly solve some problems as well.

First, how many times do you forget to turn off that battery-powered project only to find out that the batteries are dead the next morning? Well, fig. 1 is a simple circuit that will automatically disconnect a load after up to 10 or even 15 minutes without drawing any significant off-state current itself. As you can see from the schematic, when S1 is pushed low current relay K1 pulls in and is held in by Q1, which is now conducting due to the positive voltage at its base. At the same time, C1 begins to charge through R1. When the voltage reaches the point where Q2 conducts, it momentarily shorts the base of Q1 and the relay drops out. When this happens, C1 is shorted by the relay contacts, discharging it and allowing a full timing cycle to repeat the next time the button is pushed. The values of R1 and C1 determine the timing interval, and we have had good luck with capacitor values of up to 1000 µF and resistor values of 1 megohm. For K1, use a low-current DPDT (double pole, double throw) relay rated for the voltage your battery supply delivers, such as the Omron G6K series (Mouser Electronics). The lower the coil current, the less on-state current the turn-off circuit will consume.

For long-life incandescent-lamp applications such as an overhead porch light, an out-of-the-way basement light, or an inaccessible lighting fixture, consider the trick of installing a simple silicon rectifier diode in series with the lamp. This can easily be done within the fixture itself or in the wall switch controlling the fixture. The diode will clip one-half cycle of the AC supply to the lamp, reducing the lamp's light output by about 20–30%, but extending its life by a factor of 10 or more. If you need more light, just use the next higher wattage lamp. A schematic for this "circuit" is shown in fig. 2. When using such a circuit, just be certain that the diode has a reverse breakdown voltage that is greater than the peak value of the AC applied and a current rating that is adequate. A 1N4004, for example, will operate 115-volt AC lamps up to and including 100 watts.

*c/o CQ magazine

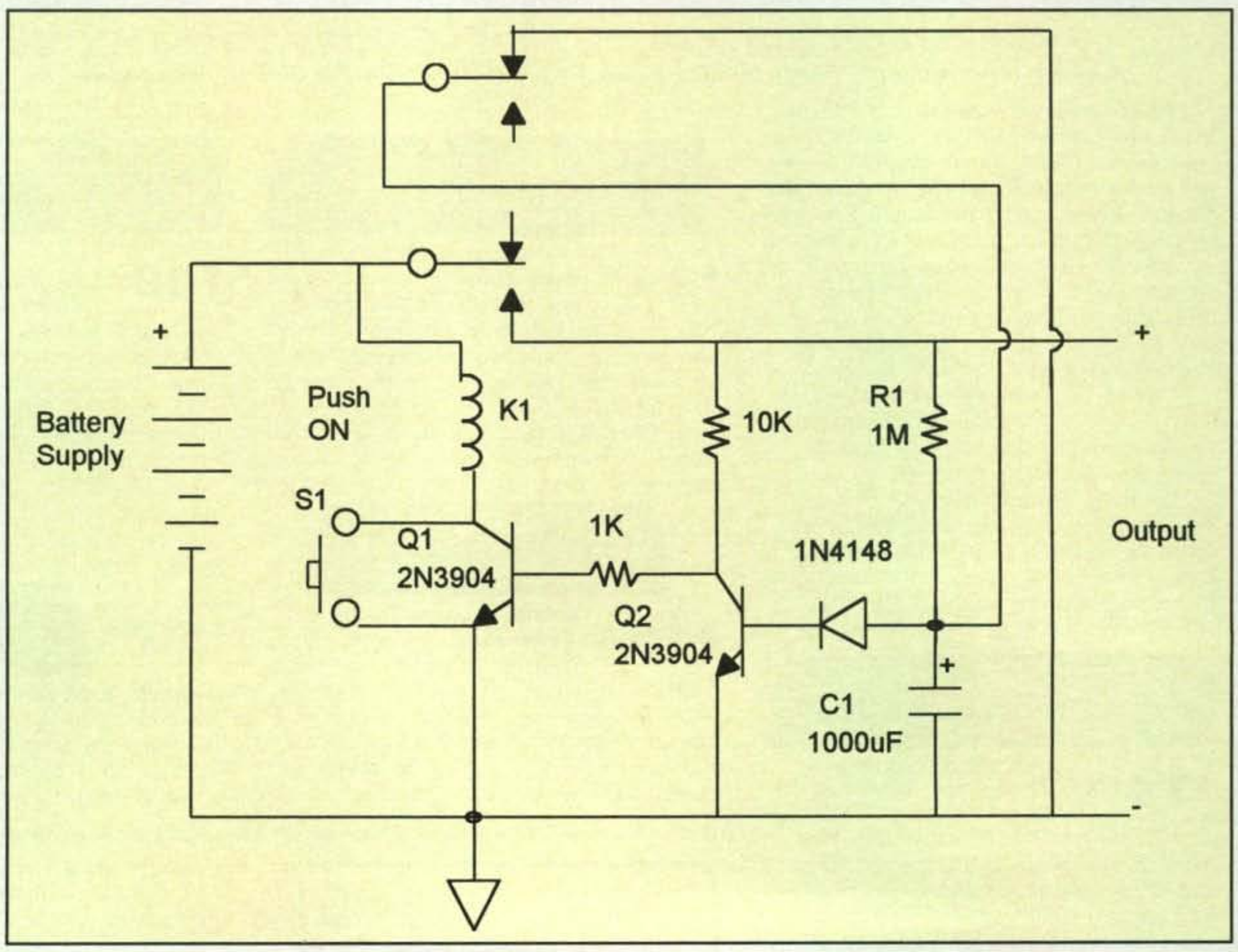

Fig. 1– Automatic power saver.

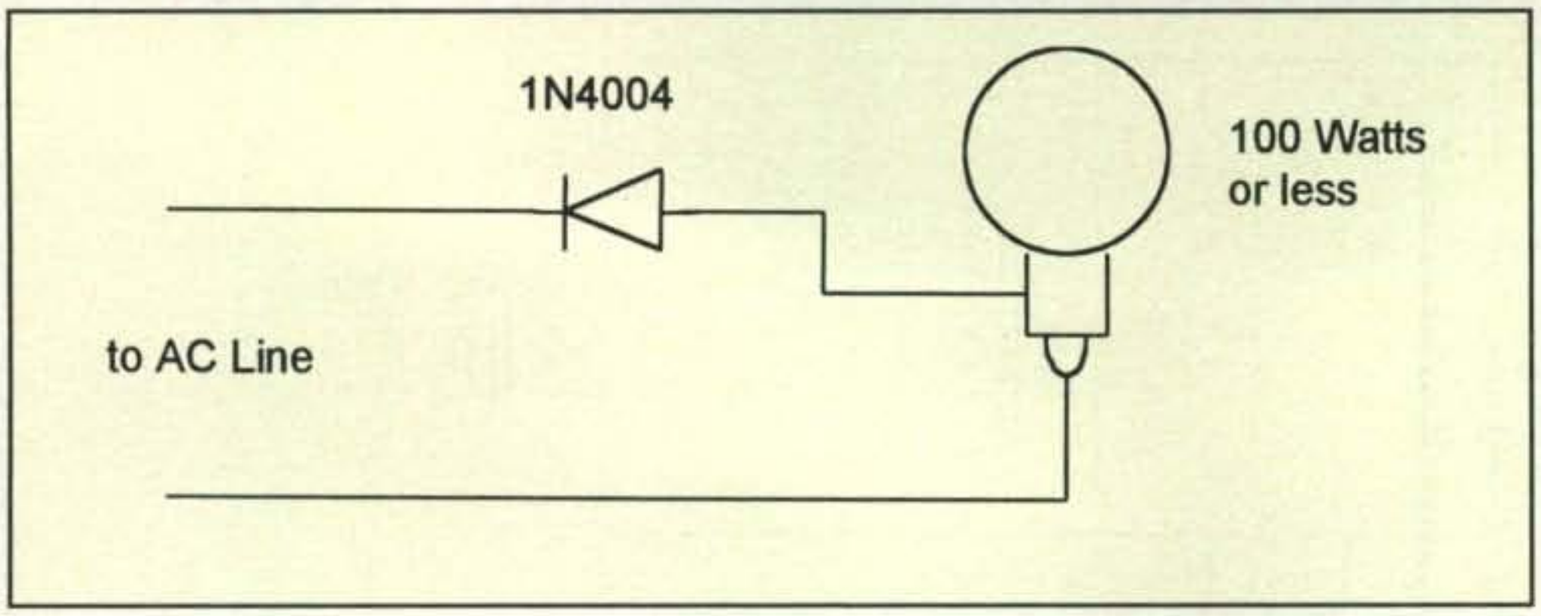

Fig. 2– Lamp-life extender.

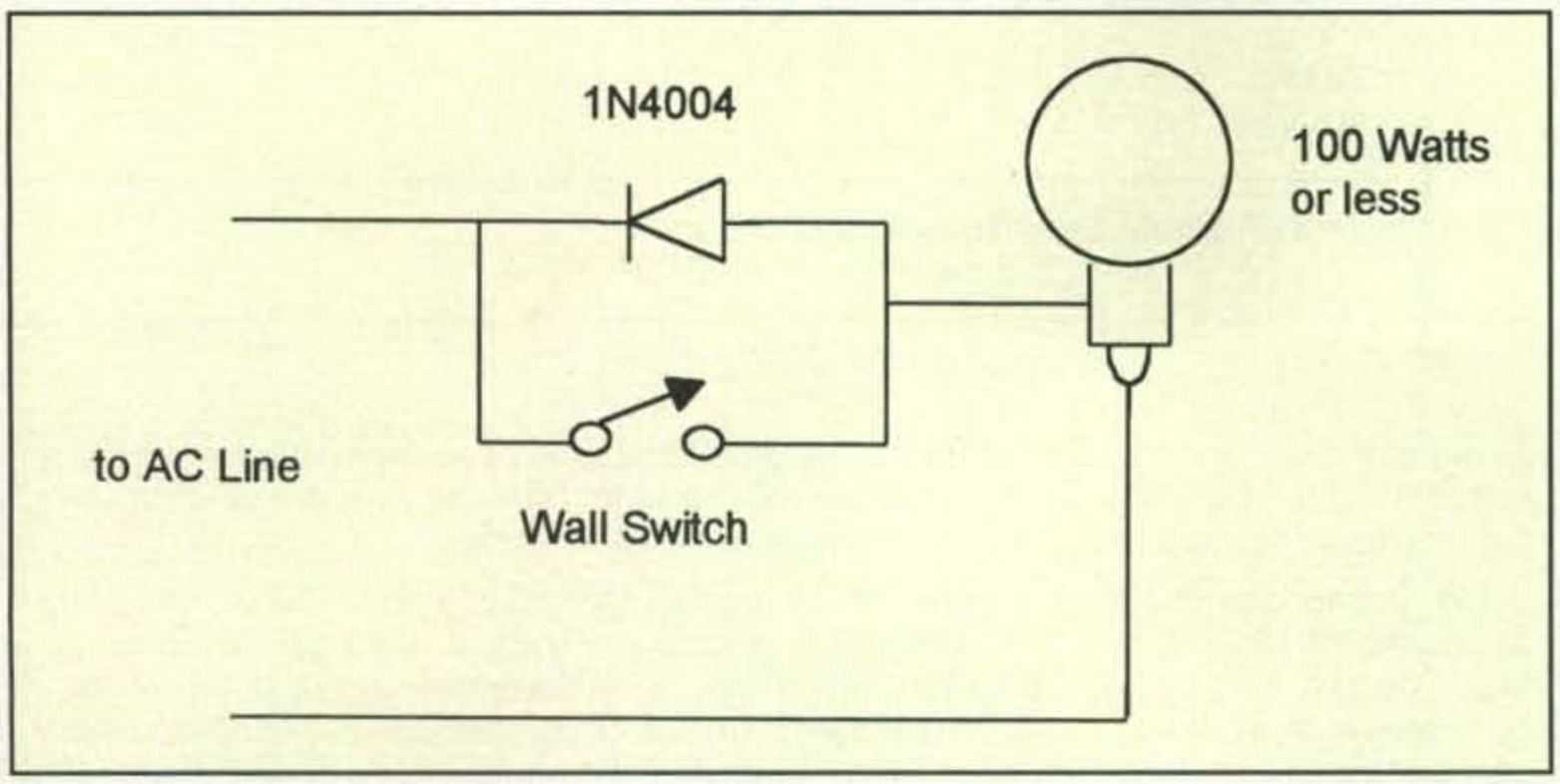

Fig. 3– Mildew eliminator?

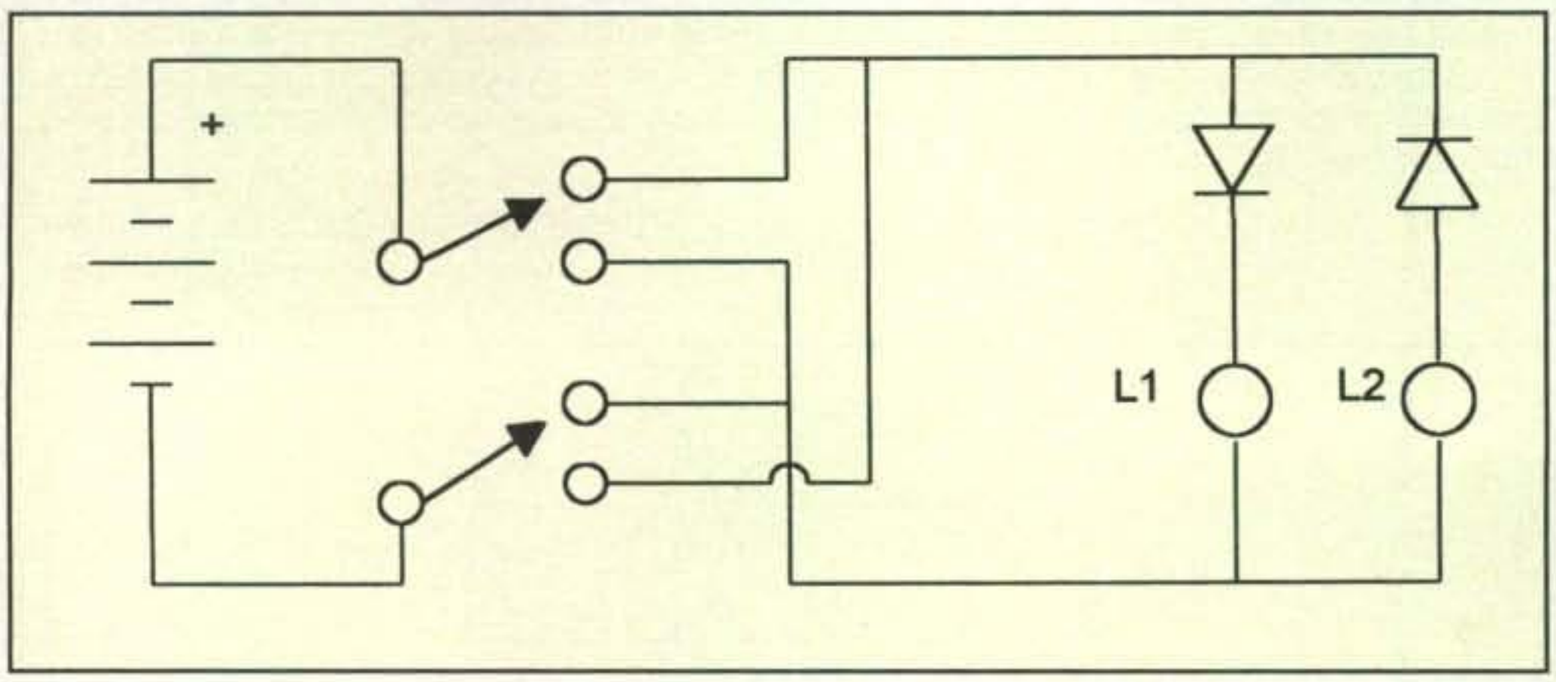

Fig. 4– Simple two-channel control system.

As a corollary to this scheme, we have installed a diode across a light switch (fig. 3) in a closet that was plagued with mildew. When the switch is turned off, the lamp in the closet produces reduced light as a result of only half cycles of AC current passing through it. When the switch is turned on, thereby shorting the diode, the lamp lights to full brightness. I am happy to report that apparently the spores do not like any amount of light, since the mildew problem no longer exists and the light bulb has not had to be changed for more than three years at this time!

Fig. 4 is a way to control two signals or lamps over a single pair of wires. As you can see, the polarity of the applied DC will determine which diode is forward biased and consequently which lamp lights. If you replace the lamps with relay coils, you now have a two-channel control system.

Expanding this concept further, consider fig. 5. Here we use DC to control the conduction of one of two diodes. However, by impressing an audio signal in series with the DC, we can route

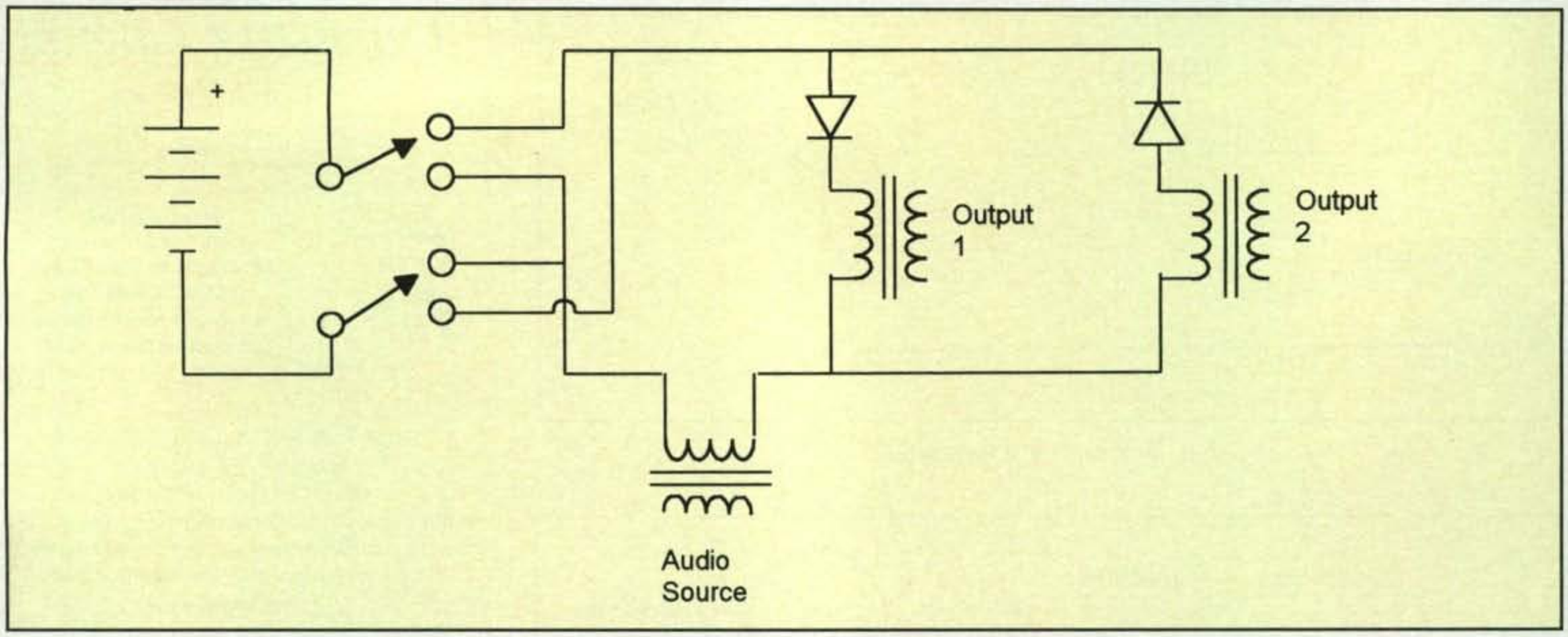

Fig. 5– Simple two-channel audio routing system.

audio to one of two destinations. The only requirement in a system like this is that the peak-to-peak audio voltage must not exceed the magnitude of the DC control voltage.

While the above circuits are simple, they should be ideal for whiling away the hours of a hot summer day when the beach becomes boring.

73, Irwin, WA2NDM

Correction to Diode-like Circuits

Unfortunately, an error occurred in my explanation of the precision diode circuit in the last part of the May 2004 column, and I would like to rectify it (no pun intended) by presenting the paragraph in question as it should have been written:

Fig. 5 is the non-diode equivalent. Although not strictly diode-less, the circuit neatly eliminates the forward drop of the diode. The op-amp in the circuit has a gain of 1 (R feedback/R input). The positive half-cycle of the input sine wave is inverted at the output, becoming a negative half-cycle. This negative voltage causes the diode to conduct, passing all of the output back to the input and resulting in an output voltage of zero volts. The negative half-cycle of the input is also inverted by the op-amp, becoming a positive half-cycle output. The positive voltage reverse biases the diode, which now does not conduct, thereby allowing the op-amp to amplify (at a gain of 1) and produce a positive half-cycle output as shown in the diagram but without the forward voltage drop of the diode. The frequency response, as well as the maximum current-carrying capacity of the circuit, is determined by the op-amp and diode chosen. Good operation can be achieved into the tens of MHz if desired.

I hope this clarifies the operation of the circuit and I thank the many readers who caught the error.

—73, WA2NDM

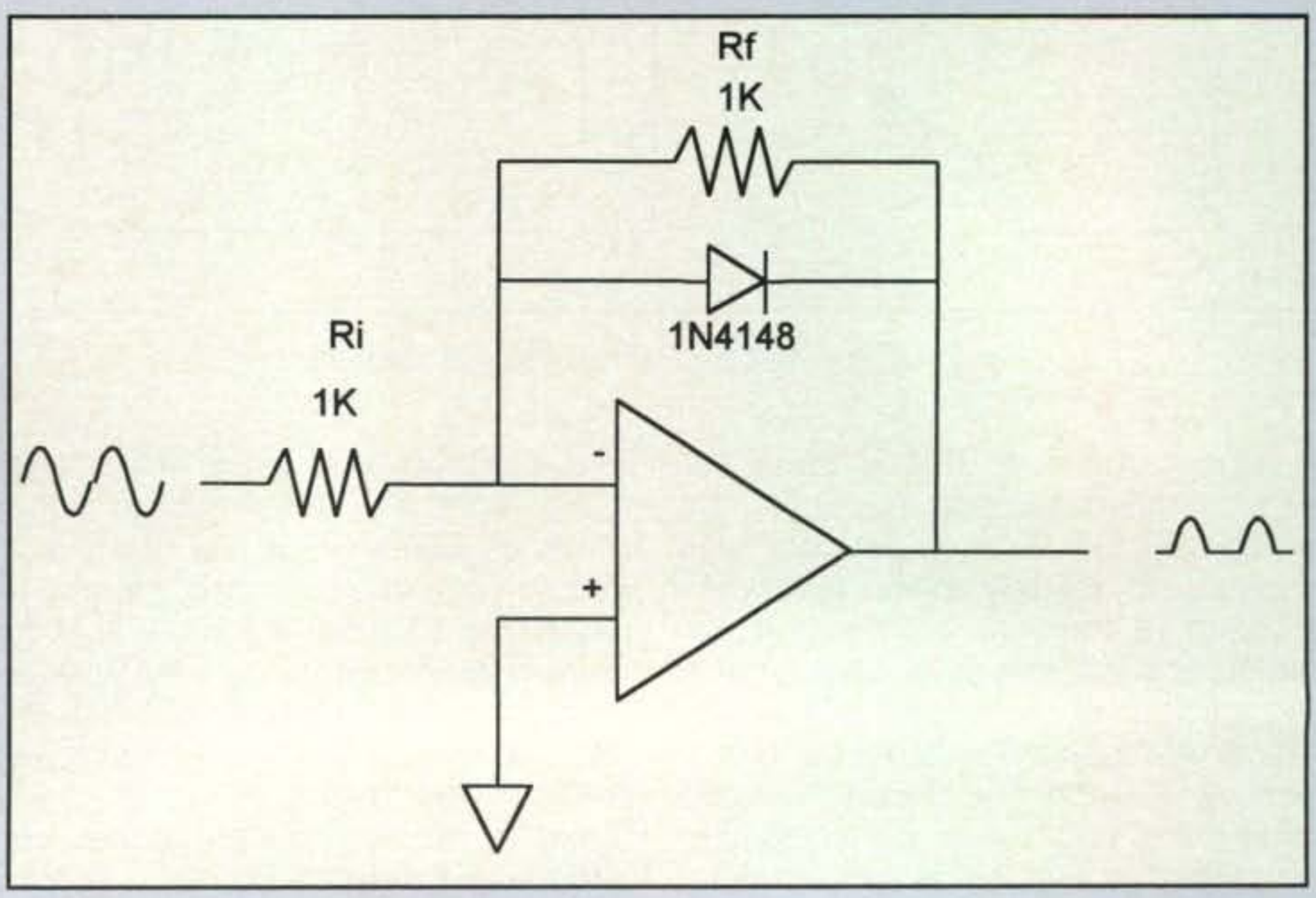

Fig. 5–A non-diode precision rectifier.

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BY BOB JOSUWEIT,* WA3PZO

Severe Weather Puts Preparedness to the Test

From flash flooding in Texas and Arkansas, to the deadly tornado that hit Illinois in mid-April, severe spring weather serves as a reminder for Americans to be prepared for unanticipated disasters. "The weather presents a very real danger in every season, but especially during this time of year conditions are ripe for powerful, damaging storms," said Larry Rockwell with American Red Cross Disaster Response. "People need to get prepared."

This month we'll take a look at the amateur radio response to deadly tornadoes.

Local hams worked closely with the National Weather Service, American Red Cross, and the Salvation Army. Pictured left to right: Steven Michalski, Jr., KB9UPS; Loyd Sherman, KB9APW; Jesse Risley, KB9TMA; Jim Morris, N9PLM; and Gerald Hagemann, N9ZJK (Photo provided by KB9UPS)

Time for a Workout...

Jesse Risley, KB9TMA, had just finished reading the Chicago, Illinois and Quad Cities National Weather Service (NWS) Forecast Office discussions and Hazardous Weather Outlook products for the afternoon of Tuesday, April 20, 2004. "It was 3:30 PM and all of my students had been dismissed for the day, and the best news was just being passed along by the NWS," said Jesse. There was a very low probability of severe WX for the afternoon with the "primary threat being marginally severe hail likely with any isolated severe cells in West Central Illinois. Believing that no chasing would be necessary, "I headed down to the MHS fitness center for a hard-core circuit workout," he continued.

Eerie Feeling

Risley has had an interest in severe weather for the past 12 years. He became a trained spotter in 1999. "During any given spring, north central Illinois usually hosts five to ten large-scale severe weather outbreaks," said Risley. These could include minor tornadoes, large hail, or destructive winds of at least 55 mph. La Salle County usually has a couple of F0 tornadoes reported each year and at least one widespread event that produces numerous damaging-wind reports. According to Risley, the "violent tornadoes are very rare and have not visited the county in many years."

"I arrived home at around 5:40 PM and checked the NWS Chicago web page, just because I had an eerie feeling after having been exposed to the primal atmosphere when heading home." He said the air was warm and humid, the sun was shining, and strong southerly winds were entering the area. It was quite indicative that some form of severe weather would likely occur at some point during the evening.

Steven Michalski, Jr., KB9UPS, president of the Starved Rock Radio Club, said, "In the past several years a new weather pattern has surfaced. This pattern consists of weather forecasts stating 'no severe weather expected.' Then with a fast-moving storm formation, the area goes directly to "WARNING" without a watch being issued. This pattern proves to give little to no local warning to the citizens. That is why when a watch or warning is issued to any county southeast or west of LaSalle, I set up my amateur station and prepare to move out to the edge of town."

Risley's worst fears were confirmed. A large tornado was reported on the ground 7 miles north of Henry, Illinois and headed northeast!

"Within minutes," said Risley, "the NWS forecast offices in the Quad Cities and Romeoville were spewing out warnings faster than I could ever imagine. '. . . large, destructive multiple-vortex tornadoes on the ground. . . . ' Granville, Cedar Point, La Salle, Peru, Oglesby, Ottawa, and Utica were but a few of the towns mentioned in the path. As I followed the unfolding calamity, utilizing weather radar and IWIN online, I realized this wasn't the average run-of-the-mill supercell outbreak for the region. One of my greatest fears had been realized, and the Illinois Valley had been greeted by a destructive reminder of Mother Nature's wrath." IWIN (Interactive Weather Information Network) is an online NOAA (National Oceanic and Atmospheric Administration) internet information network (http://iwin.nws.noaa.gov/iwin/main.html). It

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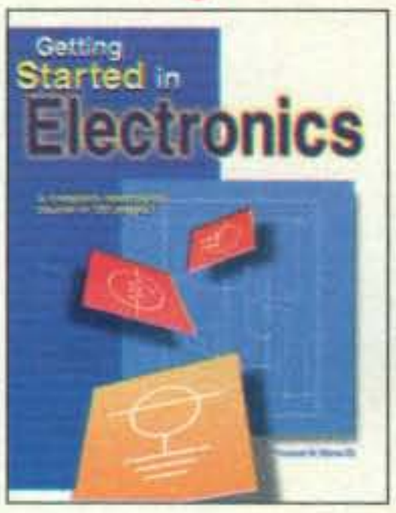

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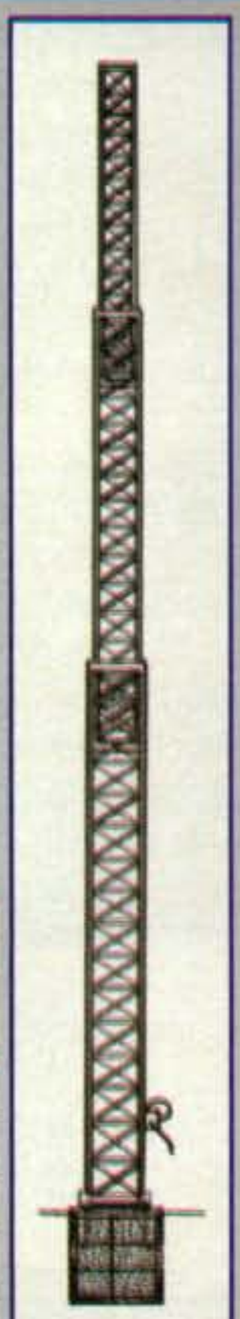

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• MDPL models include motor drive

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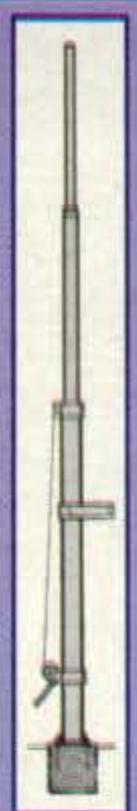

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provides timely NWS forecast products, including watches and warnings, for each of the 50 states in the U.S. When specific tornadoes were identified, the National Weather Service for the Chicago region issued 33 separate warnings for particular areas immediately vulnerable to the funnel winds.

Warnings

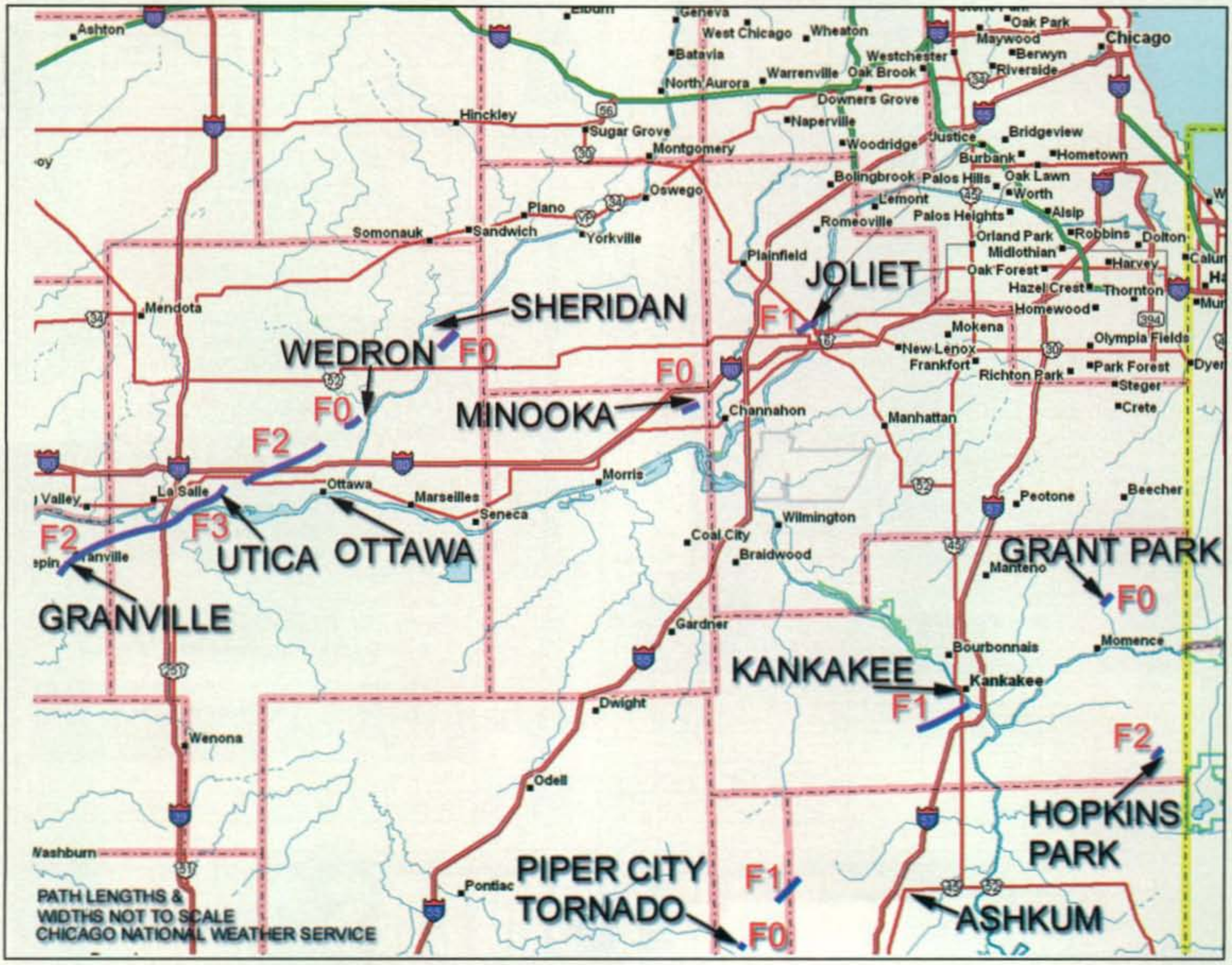
Each town had alarms in place to alert the residents that a tornado was approaching. In the city of Monmouth, the alarm sounded eight times intermittently. In Henderson County the siren blast was heard for two minutes, next a 15-second pause, and then repeated four times. The town of Utica had about a 30-minute warning before the tornado hit the town shortly after 6 PM. Residents took shelter in the basements of buildings, as they are suppose to do. Unfortunately, the old building was no match for the two city-block-wide F3 tornadoes that had winds from 158– 206 mph. Eight people lost their lives.

Eyes and a Radio

When there is the possibility of severe weather, most hams just observe the skies and report severe thunderstorms to the net control, who subsequently maintains close contact with the weather service. In La Salle County there is no EOC active during severe weather. There are a few hams who actually "chase" the storms and report their progress over long distances.

The National Weather Service said 14 tornadoes occurred across northern Illinois that evening. According to the Weather Service, six tornadoes developed from one storm. The first was a minimal F1 50-yard-wide tornado which traveled 1.8 miles across eastern Stark County. The third and most damaging tornado developed about 2 miles west-southwest of Granville. It had a 15.5-mile path through Granville into Utica. Approximately 80 percent of the downtown area was badly damaged. It finally dissipated about one-half mile northeast of the town. Illinois Gov. Rod Blagojevich declared four counties disaster areas.

"After spotting the storm coming in from Marshall County, and knowing that a tornado had been reported within the cell," Michalski stayed with the storm, reporting to the net control information to be relayed to other spotters positioned near the storm's path. "When I handed off the storm to other spotters, I then returned to the southern end of the county, as other cells where forming and threatening the area," said Michalski. "With the threat of storms entering the area decreasing, I returned home and started working as a relay



Numerous tornadoes were spotted on that fateful "Black Tuesday." (Courtesy National Weather Service)

This F3 tornado ripped a path of destruction through Illinois, eventually killing several people in Utica. (Photo courtesy of Don Naumann, W9DON)

station to assist other ground stations responding to the affected areas. Using the internet, I kept track of the storms, watching Doppler radar information and passing updates to ground crews."

Before, During, and After

Members of the Starved Rock Radio Club were the primary spotters as the storms developed. Once the storms passed, club members continued to provide communications, material, and personnel support for the American Red Cross and the Salvation Army. Michalski also managed the damage-assessment teams for the Red Cross. Amateurs from the Grundy County Radio Club, the Sterling Rock Falls Club, and the Tri-County Amateur Radio Society provided much-needed communications.

According to the ARRL, Jim Stefkovich, KD5HLE, the meteorologist in charge at the NWS Chicago Forecast Office, expressed gratitude for amateur radio's assistance in providing storm information. "This was a true team effort, and I truly appreciate everything that was done by everyone in the amateur radio community," he said. "I could not be more proud of everyone's efforts." The local weather service office issued a "sincere *thank you* for the numerous reports provided during the event by the broadcast media, state and local law enforcement, local emergency management agencies, local ham radio communities, spotters, and chasers. Their information greatly benefited the warning process."

Black Tuesday Clean-up

Risley headed back to McDonough County five days after the Black Tuesday tornado outbreak. He told *CQ* that he had logged many hours since Black Tuesday by working with some of his closest friends in the amateur radio community. "Each of us attempted to help the rescue and relief efforts at Utica and Granville in any way possible," he

Local amateur radio operators assisted the Red Cross with damage-assessment reports after the tornadoes. (Photo courtesy of W9DON)

said. On Wednesday, I teamed up with a group of local amateurs to complete damage assessment forms on Utica residences for the American Red Cross.

The American Red Cross disaster assessment form is designed to rate the extent of damage to residential units from a natural disaster. The form can be used for either floods or all other non-flood natural disasters. The form requires a visual assessment of homes affected by a natural disaster, and collects information about the property, such as the address, type of dwelling (single or multi-family), extent of damage (affected, minor, major, destroyed), name of homeowner or occupant, and any specific comments that can be offered on the condition of the home. Risley says most of the information he reported was of minor damage to homes. A few homes in Utica were destroyed and unable to be inhabited. He said, "These were often the more emotional cases."

Work Continued

Risley picks up the story: "We worked from 7 AM to approximately 5 PM that day. On Friday the American Red Cross again requested amateur radio operators to assist with damage assessment in the rural areas along the path of the tornadoes in Putnam and La Salle Counties. I assisted with this damage assessment detail as well. On Saturday and Sunday, I assisted both the American Red Cross and the Salvation Army with disaster relief and recovery efforts for a majority of both days. Disaster relief and recovery efforts involved providing amateur radio communications to allow members of the Red Cross and the Salvation Army to communicate between their headquarters and ground crews. I, along with a team of local hams, also transported both American Red Cross and Salvation Army personnel, food, and supplies between each of the respective agencies' headquarters and the corner canteens and/or survey teams that were operating at 'ground zero' in Utica."

"The most important lesson I have learned from this disaster is that life is too short and it should be cherished in every fashion possible. I learned this lesson the hard way. It was brought about only by seeing and hearing the many faces and voices of fear, agony, and despair worn by the residents of Utica on Wednesday as they began to clean up their lives and reflect on what they had been through the previous 24 hours. The damage-assessment survey I performed for the American Red Cross brought me in direct contact with how powerful and deadly tornadoes can really be, especially from a social and psychological standpoint."

Providing the Glue

Risley began to value the role amateur radio plays in helping to hold the pieces together in a very rigid, very disarrayed puzzle such as the one present in the minds and hearts of a small community ravaged by a deadly tornado. He said, "Yes, amateur radio operators were on the scene, giving unselfishly of themselves to help the recovery and relief efforts for all citizens impacted by this deadly storm. Many, many amateurs donated both their time and dedication to helping those in need after this dis-

aster, and they performed this service on the basis of compassion and commitment. This is the type of compassion and commitment unique to the Amateur Radio Service, as it is a type of public service unmatched in anything I have ever witnessed before."

Lessons Learned

Risley said he learned that it takes teamwork, commitment, and persistence to perform the role amateur radio operators played in the Illinois Valley. "I've also learned that we, as amateurs, have a duty to use this experience to improve our communications and disaster training skills to further serve the purpose of our hobby. We also have a duty to continue to educate the public about the necessity of severe-weather safety (especially NOAA WX radio) and the SKYWARN severe-weather spotters program. Furthermore, it is time that we improve our spotter communications network and begin moving forward on an area-wide radio-coverage system that will allow all spotters to access and relay severe weather reports to the NWS from any point in or near the county."

He continued, "If anything positive does come out of this disaster, I hope county and city public safety agencies utilize this experience as a motivating factor in improving the existing severe-weather warning infrastructure, with the possible implementation of a county-wide warning system with real-time warnings provided to even the smallest rural communities without access to modern warning technology (EMWIN, siren systems, DVN/satellite WX)."

Bottom Line:

Be prepared . . . have a plan . . . stay informed! I had long predicted that a major tornado of this magnitude would visit the area, and historical records indicated that we were long overdue for a destructive tornado. Both Risley and Michalski prepared for Tuesday by attending numerous spotter training sessions and American Red Cross disaster-response meetings. The Starved Rock Radio Club has also hosted several training sessions and meetings on this topic over the past several years. It was clear that Risley and Michalski, and other hams in the area, became prepared by attending training sessions, participating in nets, and knowing how to use various internet resources.

Near Chicago, Will County ARES Emergency Coordinator Rob Sobkoviak, K9NYO, told the ARRL that the "Plainfield EMA Lt. Dennis Hamilton, KC9DVI's spotter report of a tornado heading toward the City of Joliet directly resulted in the saving of lives in that community of 106,000."

"It was not a matter of *if,* but *when,*" said Risley. "The Starved Rock Radio Club knew this, and local hams were prepared and I feel they responded accordingly!"

It's More Than Radio

Amateur radio may very well have saved lives on that Black Tuesday in April. Once the storms had passed the local hams worked to further improve the lives of Illinois Valley residents as they tried to get their lives back together. There are probably many unsung heroes of this and other disasters. Sometimes it the little things that go unnoticed, but that make everyone else's job that much easier.

With Thanks....

Each month we report on another part of amateur radio serving in the public interest. This month we want to acknowledge input from Jesse Risley, KB9TMA, Steven Michalski, Jr., KB9UPS, and the ARRL.

Do you have a story to tell? Drop us a note as to how your group is providing a service in the public interest.

73, Bob, WA3PZO

how it works

BY DAVE INGRAM,* K4TWJ

More Notes on Radiating HF Signals

As you will recall, our previous "How It Works" column in the May issue introduced the open-ended subject of HF signal propagation and considered several noteworthy aspects relative to antennas of all types. We considered the difference between vertical and horizontal antenna polarities, signal take-off angles, and several more factors, but only a limited amount of information could be squeezed into available space.

Since this is a very popular area of study, more "helping Elmer" notes on antennas and signal propagation are the focus of this month's column. Think of it like an after-forum hamfest discussion where folks share various tidbits of useful information. Let's begin with some notes on standing waves, and then take a closer look at how seemingly similar antennas differ and also include some additional views on signal propagation along the way.

Photo A– Every radio amateur dreams of owning a big beam antenna on a tall tower. However, due to financial or neighborhood limitations, many of us use dipoles and verticals. Properly installed, either type of basic antenna will "work out" surprisingly well.

Traveling vs. Standing Waves

As we learned when studying for our ham licenses, a transmitter or transceiver generates radio waves that travel through a transmission line to an antenna, where they are radiated into free space. Assuming the transmitter is matched to the transmission line and the transmission line is also matched to the antenna, all of the generated power is accepted and radiated by the antenna (isn't pure theory nice?). In reality, however, the antenna's impedance is not exactly 50 ohms at all frequencies in a band, and a small amount of power is reflected back through the transmission line to the transmitter as a reverse traveling wave (fig. 1). The level, or amplitude, of forward traveling waves, incidentally, depends on the transmitter's output power, and the level, or amplitude, of the reverse traveling wave depends on the amount of impedance mismatch between the transmission line and the antenna.

Forward and reflected traveling waves meet or clash at specific points along a transmission line and produce a resultant wave that does not travel to or fro, but just stands in one spot—a standing wave. What are the detrimental effects of reflected power and standing waves? Reflected power can cause overheating of a transmitter's output stage and damage components. However, built-in self-protection circuitry usually cuts back output power to (hopefully) avoid such damage. If the measured SWR is less than roughly 1.6:1, the level of reflected power is usually low enough to be considered acceptable. If the level is higher but less than 3:1, an antenna tuner can be adjusted so the transmitter/transceiver "sees" a near-ideal match and calmly directs its full output into the transmission line without overheating. If the SWR is greater than 3:1, the antenna or transmission line usually warrants checking for problems or broken connections.

Standing waves cause a transmission line to radiate and receive signals like an antenna rather than simply conveying signals to and from the antenna. This is undesirable, as transmission lines typically are routed near a building, beside metal gutters, and/or even laid on the ground, so radiated signals accomplish little more than warming the ground. If the radiating transmission line is used with a beam antenna, the beam's directivity pattern or front-to-back ratio and forward gain will be altered. Once

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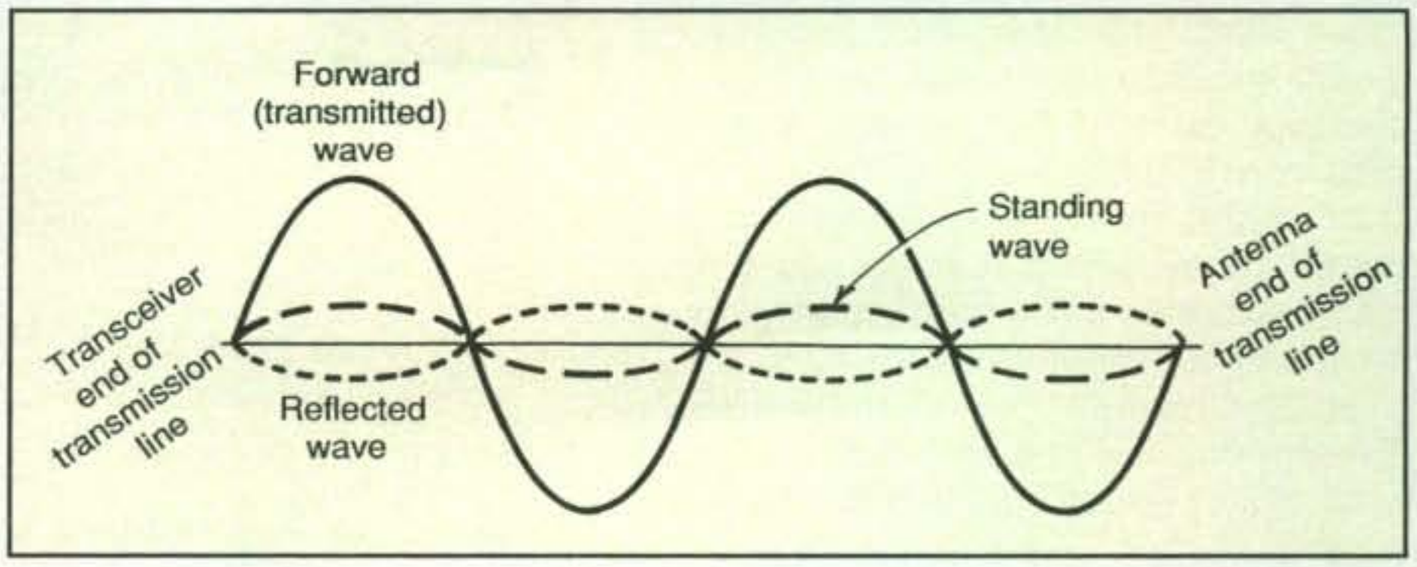


Fig. 1– Simplified comparison of transmitted, reflected, and resultant standing waves along a length of transmission line. Without reflected power or a reflected wave to clash with the forward wave, there will be no standing wave. (Discussion in text.)

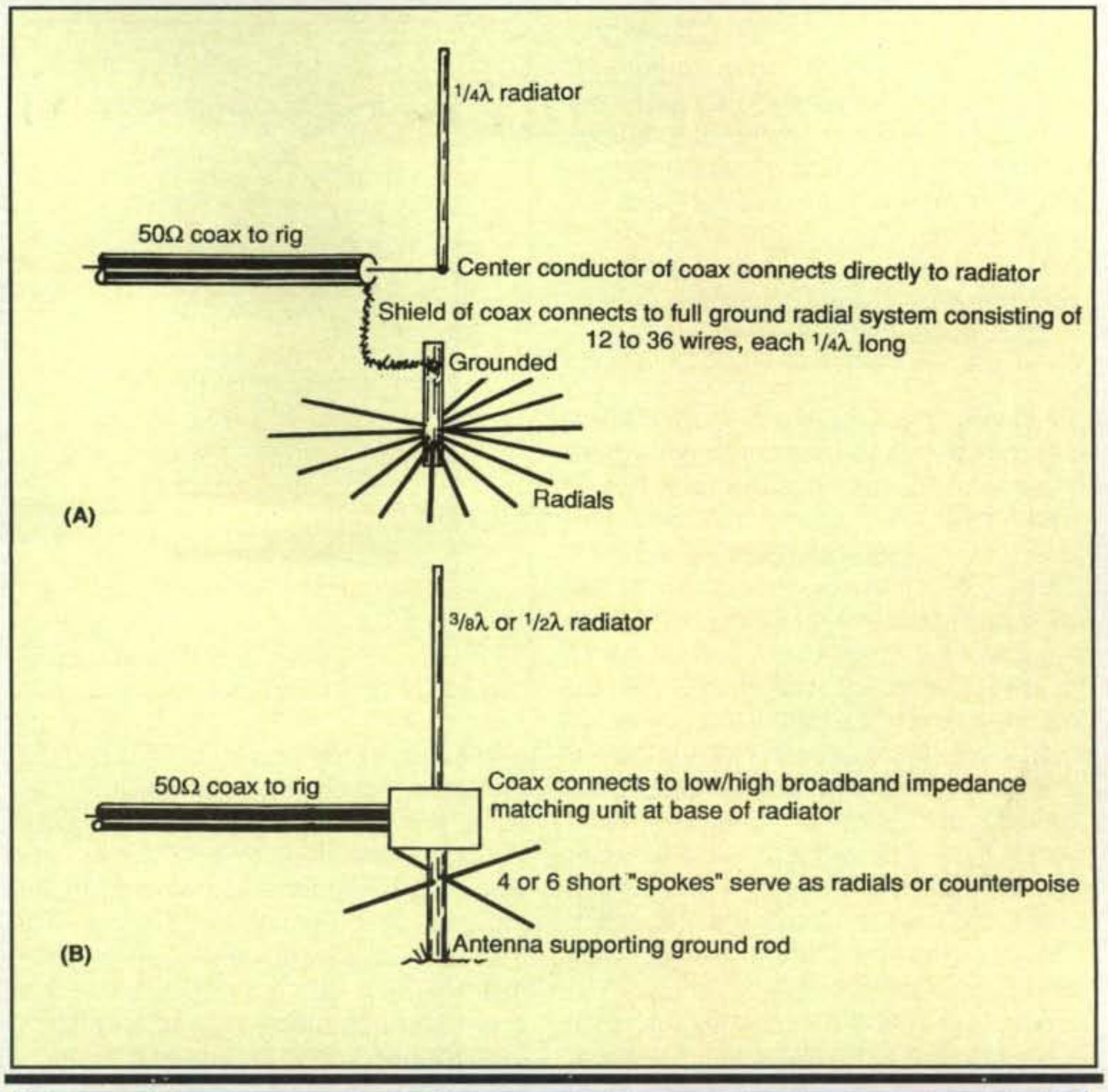


Fig. 2– A standard 1/4-wavelength vertical is usually mounted close to the ground and "worked against." (A) Full ground radial system of several 1/4-wave-long wires to synthesize the antenna's excluded quarter-wave section. Conversely, a 3/8- or 1/2-wave vertical (B) has more area to radiate a better signal and requires only a few short "spokes" for its ground system. This type of antenna may be ground or roof mounted, as desired. ⟶

again, matching the antenna and the transmission line minimizes the problem and ensures best front-to-back ratio and/or forward gain.

Radiating vs. Dissipating Signals

The more we learn about various factors that influence an antenna's signal-radiating capabilities, the better we are able to select and properly install an antenna matching our particular needs. The logic here is quite simple. We want all of our rig's output power to be radiating (by the antenna) rather than being dissipated into buildings, foliage, and/or ground losses. Dipoles, G5RVs, multiband doublets, and other horizontal wire antennas installed amidst a thick stand of trees or below a house roof line obviously suffer noticeable losses compared to the same antennas installed in higher and more clear areas. Low antennas positioned near or over indoor station gear also promote RF feedback and distorted SSB signals. Elevating horizontal antennas enough to send a good signal skyward but not enough to attract every stray bolt of lightning in the area has multiple benefits.

Verticals are trim, easy to install in tight spaces, and even easier to misunderstand in operation, so many folks consider them poor radiators of RF energy. That viewpoint may indeed hold true for a regular 1/4-wave vertical installed near a house, at ground level, and without a good ground system. In that case, the vertical is little more than a short aluminum rod at the end of a coax cable. Using a shower-curtain rod for an antenna would probably be just as effective. Quarter-wave verticals must have (or "be worked against") a good ground system of 12 to 36 quarter-wave radials (fig. 2A). It's that simple.

Recently, 3/8- and 1/2-wave or "no ground system required" verticals have become quite popular—and with good reason. First, their elements are physically taller or electrically longer, so they can radiate and receive signals more

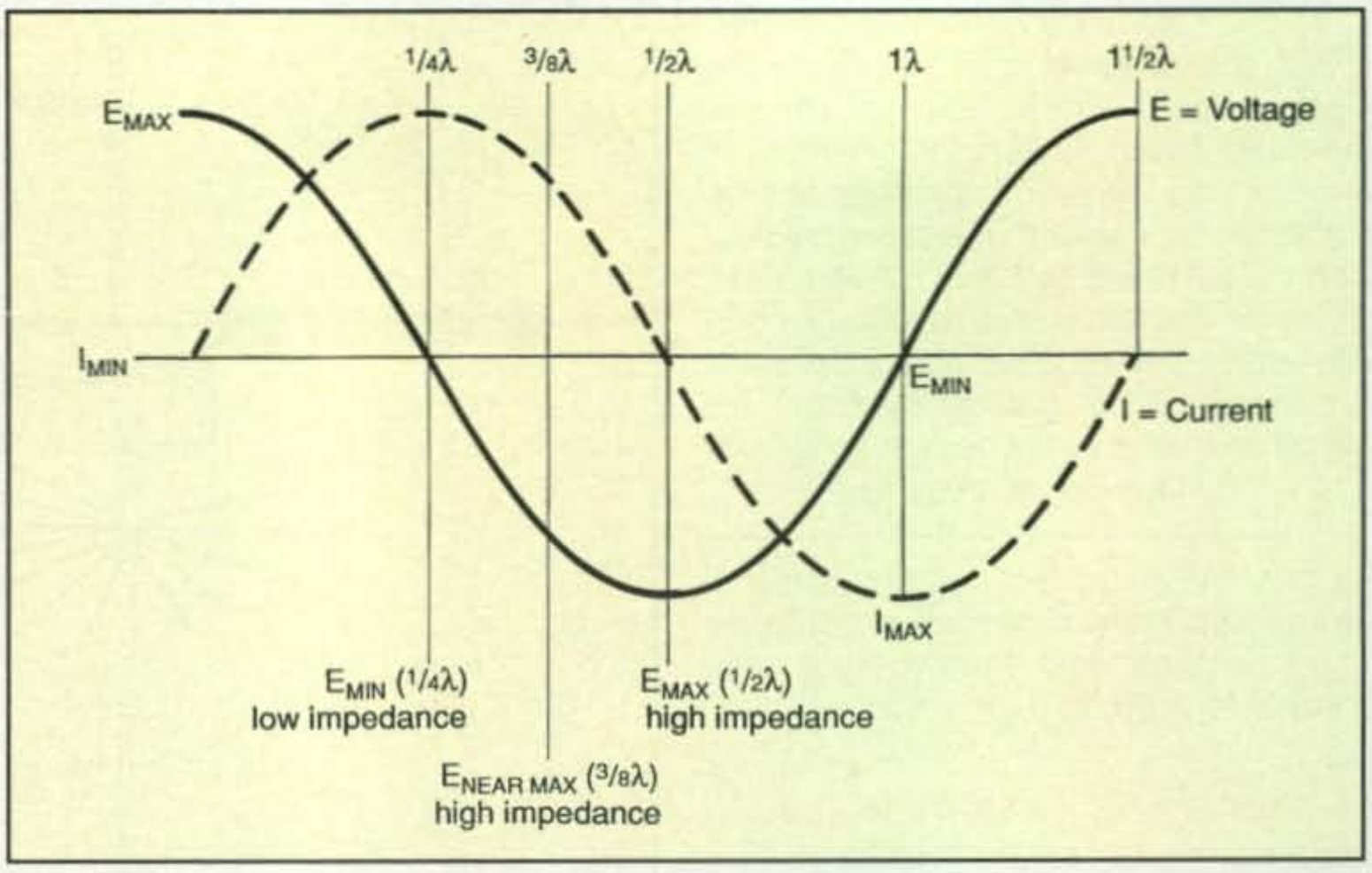


Fig. 3– The distribution of voltage and current (maximum and minimum points) along a wire or an antenna causes impedance to vary accordingly—from a low value at quarter-wave points to higher values at 3/8- and 1/2-wave points. As a result, 3/8- and 1/2-wave verticals must employ a broadband high-to-low impedance matching transformer at their feed point. →

effectively than regular 1/4-wave verticals. Some even exhibit mild signal gain, however, so many arguments have arisen over gain figures that manufacturers no longer list them in antenna specs. You must now scrutinize various antennas to determine if they are 1/4, 3/8, or 1/2 wave in height/length, if elements on lower bands are shortened with loading coils, and if the signal loss in use of such coils is offset by extra element length. Second, and regardless of the "gain debate," a 3/8- or 1/2-wave vertical works very well without an elaborate ground system: four or six 4-foot-long base "spokes" are sufficient (fig. 2B). The "why and how" behind that fact warrants further discussion.

When an antenna's radiating element is RF-fed at a 1/4-wave point, the feed-point impedance is close enough to 50 ohms that it matches 50-ohm cable (fig. 3). When the radiating element is RF-fed at a 3/8-wave point, the feed-point impedance is close to 1800 ohms, and when it is RF-fed at a 1/2-wave point, the impedance is around 2200 ohms. The impedances are obviously an extreme mismatch for 50-ohm cable, so a high-power, broadband impedance-matching transformer is used to convert the impedance to 50 ohms. The transformer is usually mounted in a small box or case at the antenna's base where the ground spokes or radials are located.

Could an indoor antenna tuner be used in lieu of a base or feed-point matching transformer? Not really. The impedance mismatch is between the antenna and feedline, and the mismatch must be corrected at that point. A tuner located at the rig only changes mismatches between the feedline and

the rig. Reread those last sentences several times. Remember them. They apply to all types of antennas—home, portable, and mobile. Could a remotely activated automatic antenna tuner be substituted for a base matching transformer? Possibly, but it would need expensive high-power components and would have to be capable of retuning every 50 kHz to maintain a low SWR. Otherwise, standing waves on the transmission line probably would be dissipated as heat and ground losses rather than radiated into free space by the antenna. As we mentioned earlier, the main purpose of any antenna is radiating all of its applied power in the most effective manner possible.

Maintaining Healthy Feedlines

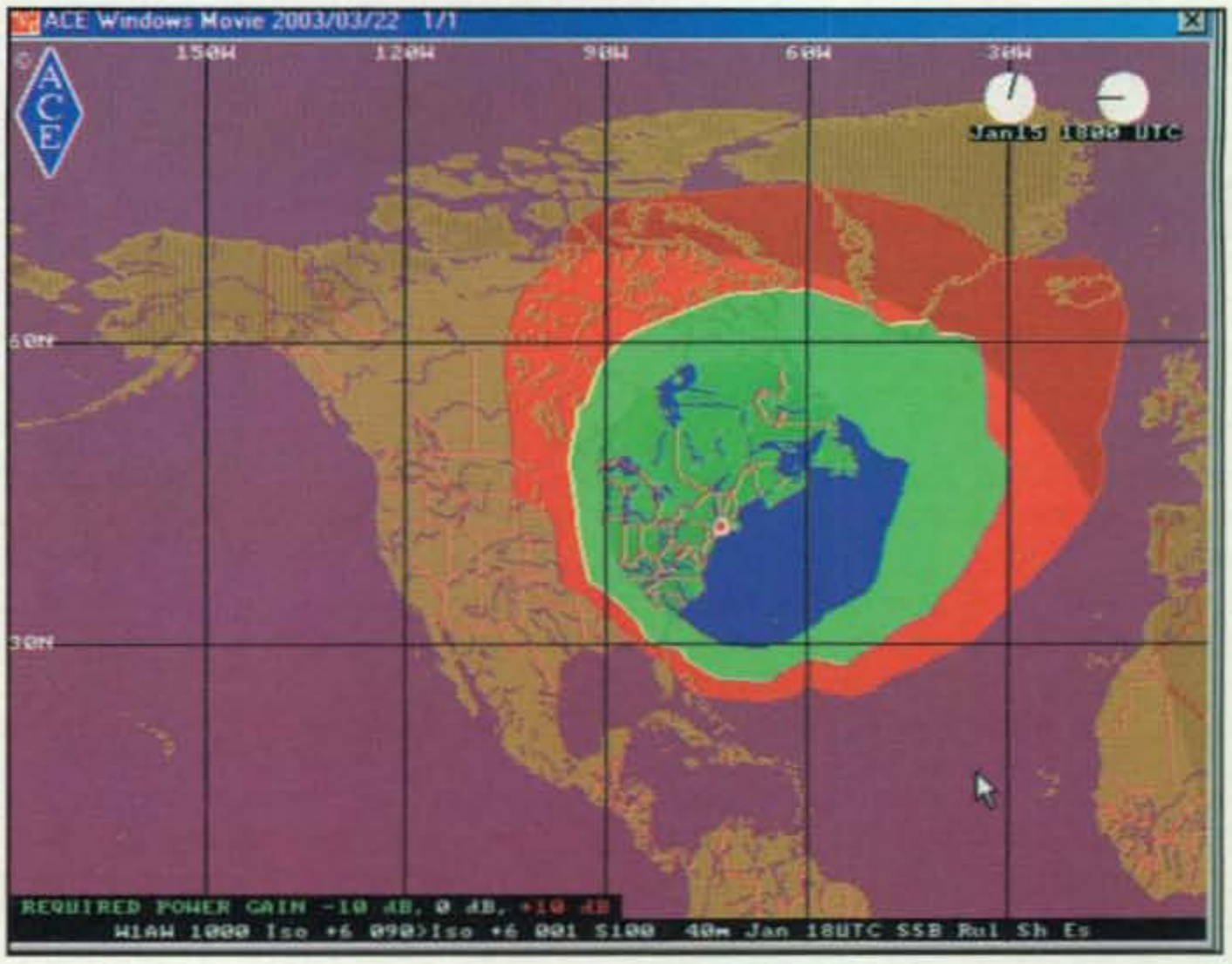
Whether your station's antenna is large or small, vertically or horizontally polarized, always connect it to your indoor gear via the highest grade of low-loss cable feasible. How can you differentiate between high-grade and low-grade cable? Comparing their price-per-foot usually works, but check more carefully before jumping at the most expensive cable. It may be super-stiff, have two shields, and prove challenging to work with. Look for medium-priced cable with a good outer jacket, a high amount of inner conductor shielding, and a low-loss foam inner dielectric. If you are unsure, purchase some short sample pieces of various types, slit their outer jacket with a carpet knife, and study their construction. The jacket should be tough, thick, and difficult to separate from the inner shield. The shield, in turn, should be tightly woven so you cannot see the inner dielectric through it. Finally, the inner dielectric should be white foam-type material rather than clear plastic. Good, cost-effective choices of cable are RG-213 *for high* power (2000 watts) and RG-8X marine cable for lower power (up to 800 watts).

Remember that coax cable is your

Photo B– Knowing which HF bands are "open" into what DX areas during various hours of the day and/or night is a snap with a new computer software program called ACE-HF version 2. Its "Path Group Chart," shown here, predicts quality of openings by colors: blue or green is good, yellow is fair, and red indicates a "closed" band.

Remember that coax cable is your

Photo C– ACE-HF's Area Coverage Map also displays your approximate communications range, with various colors indicating estimated signal levels as shown here. ⟶



radio's lifeline. Protect it from squeezing, crushing, or nicks (routing it through PVC pipe helps). Rain or water will seep into any cut, capillary action will draw it on through the cable, and it will become useless in a short period. Also, do splice sections of coax and avoid routing it in sharp bends. Coax deteriorates with age, so replacing it with new cable every seven to eight years is always a good plan.

HF'n Assistance

We have discussed several aspects important to both antennas and transmission lines this time, but as we pointed out last time, the Earth's ionosphere ultimately determines how well HF signals "skip" around the world. There is no way of getting around Mother Nature, friends; you simply must "go with the flow" of ionospheric propagation. There are, however, some neat computer programs available for predicting which HF band or bands are open into various world areas during each hour of the day. One program I find quite impressive is called ACE HF version 2, and it is available from Dick Buckner, 2715 Nimbus Drive, Estes Park, CO 80517 (telephone 1-800-697-9761).

In one of its triple modes, or screens, a "path ground chart" displays predicted signal conditions between your QTH and up to 18 distant areas on a band-versus-time basis (photo B). The chart is color coded according to expected signal levels, making it easy to visualize which band is the best choice for use at a given time. Another mode or screen overlays your area, country, continent,

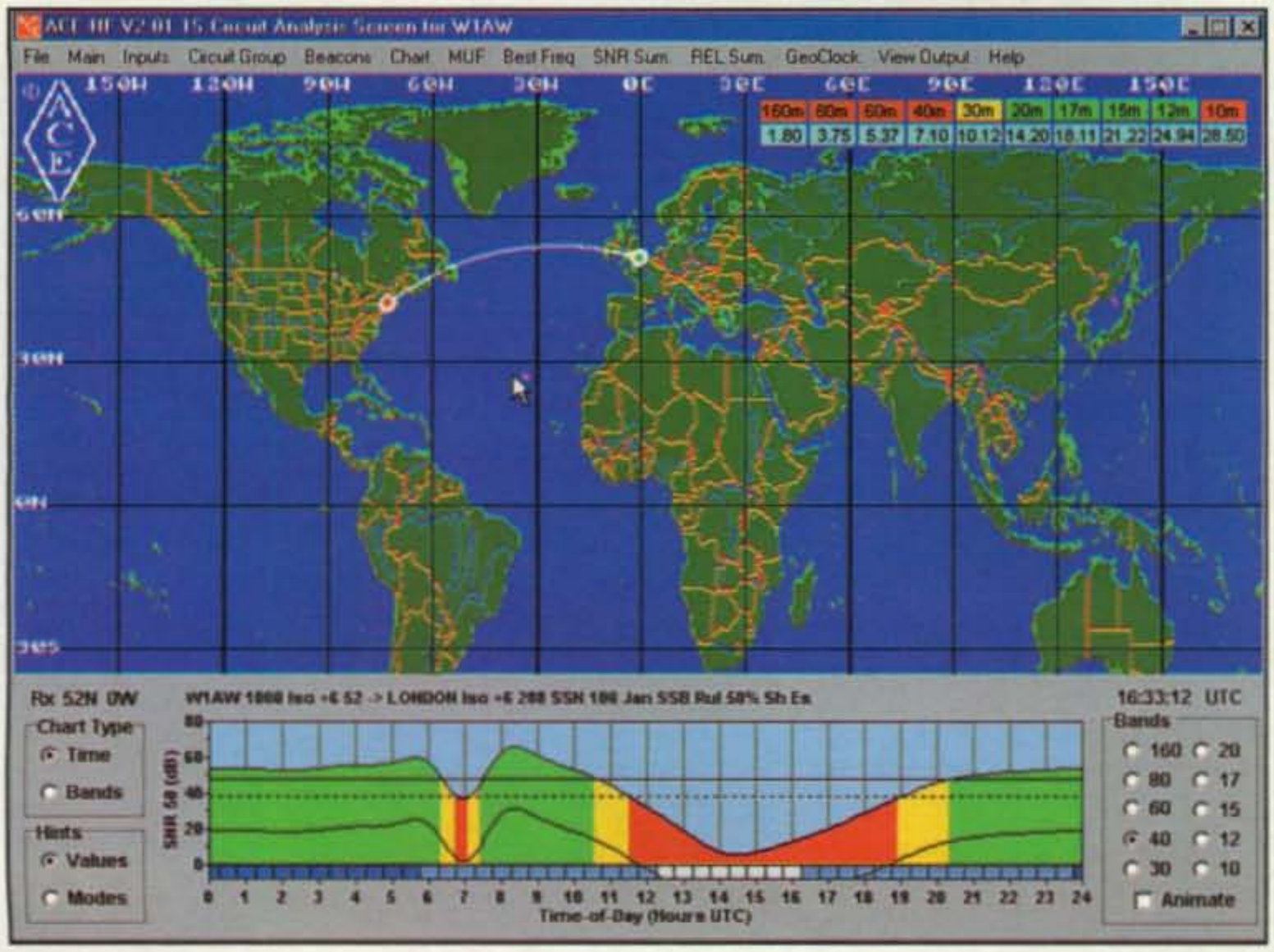


Photo D– In its third mode or screen, ACE-HF displays the world with a fixed mark at your QTH. You move a screen icon to a desired DX area, and the software displays a best frequency for communication or MUF (maximum usable frequency) chart color coded according to reliability. The program requires occasional internet updating on solar flux, etc. ←

or a world area with a coverage map with colors indicating estimated signal levels for the time (photo C). A third mode/screen displays a world map marked with your QTH and a pointer you move to a desired area of interest. The program then predicts conditions between your QTH and the distant area and graphs the results on a band(s) versus time of day chart (photo D). ACE HF bases its calculations on the smoothed monthly sunspot count, which it automatically acquires through an occasional telephone internal connection. It is quite elaborate, and more details are available at <www.acehf.com>. Check it out!

Conclusion

That wraps up our views for this time, friends, and we hope they further kindled your interest in HF communications. Our famous "low bands" of 160 through 10 meters are the real heartbeat of amateur radio, and we want you to join the fun! Need more guidance? Check out my book *Your Guide to HF Fun.* It is loaded with good hand-holding advice and copies are $16 plus postage ($2.50 book rate, or $3.85 priority mail). I will soon move my QTH, so e-mail me via <k4twj@cq-amateur-radio.com> for more details. Good luck on HF!

73, Dave, K4TWJ

antennas

BY KENT BRITAIN,* WA5VJB

"Cheap Yagis" for 2 Meters

This month we're going to talk about the 2-meter version of a family of easy-to-build Yagis. These are great for rovers, Field Day, satellite operation, or packet. Since "Cheap Yagis" were first published in 1993, over 70 versions from 50 to 5800 MHz have been developed. Before we get into building one, let's discuss the theory of how they work

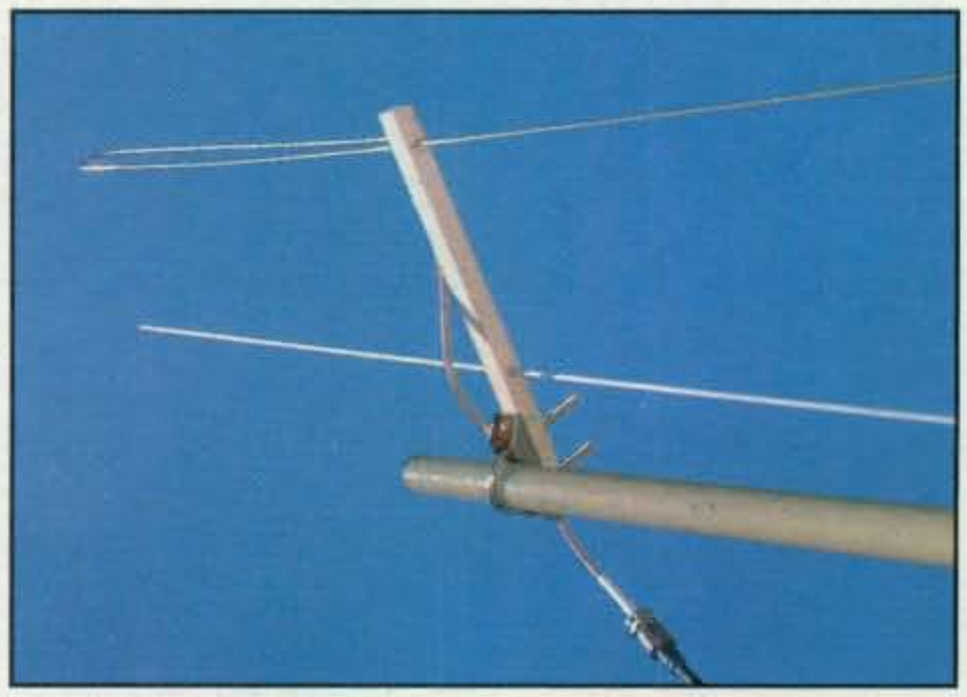


Photo A– Two-element 2-meter "Cheap Yagi."

Theory

You don't see any gamma matches, shorting bars, or any other adjustments on the driven element of a Cheap Yagi (see photos A and B). We are using *the structure of the Yagi itself* for impedance matching. How do we do that? Let's take a simple dipole antenna; its impedance is roughly 72 watts in free space. As I bring in another element, the second element loads down the impedance of the dipole. If I put this second element at just the right distance from the first, I can load the 72-watt dipole down to 50 watts.

For those of you who like to play with your own Yagi designs, to use just a straight dipole as your driven element, design for a 38-watt driven-element impedance. It works, and is simple enough, but you will not be able to couple much current into the Yagi structure, so there will be quite a compromise between gain and SWR. If you like to use a 300-watt folded dipole for the driven element, design for an 8- to 9-watt driven-element impedance when using 50-watt coax, or if you prefer to use 72-watt coax, then design the Yagi for a 12-watt driven-element impedance. You get more gain with a folded-dipole driven element than a straight dipole, but the elements are very close to the driven element and the dimensions are very critical—kind of hard to build with hand tools.

My designs use a third option, a J element, as a driven element. You can also think of it as three quarters of a folded dipole. Its free-space impedance is about 150 watts, so we can load it down by a factor of two for a 72-watt model, or by a factor of three for a 50-watt version. (For a while, I had thought I just might have invented a new type of driven element, but Zack Lau, W1VT, at the ARRL send me a construction project from a 1950 edition of *Understanding Amateur Radio* with a 2-meter Yagi using a J driven element. Oh well, the story of my life. However, I do have US Patent 6307524-B4 on a highly specialized version of the "Cheap Yagi.")

These antennas have been optimized more on the side of bandwidth than of gain. That's why the dimensions are to a quarter inch instead of 1/10,000 of an inch. (I recently saw a 20-meter beam with dimensions published in 1/10,000's of an inch. Someone needs to take that calculator away from the lad! (Gee . . . Get real!) Optimizing on the side of bandwidth costs about 1/2 dB of gain, but the design tolerates somewhat sloppy construction and the substitution of different materi-

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e-mail: <wa5vjb@cq-amateur-radio.com>

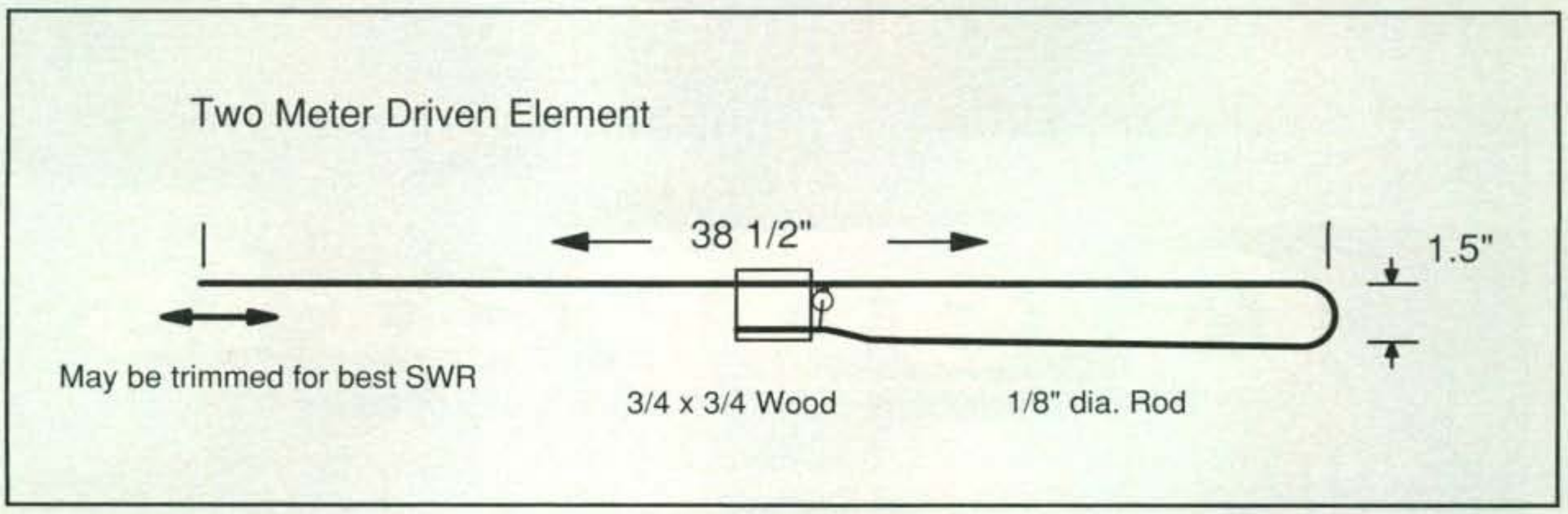

Fig. 1– Dimensions for the driven element used on all versions of the 2-meter Cheap Yagi.

Photo B– Four-element 2-meter Cheap Yagi.

Simulating a Cheap Yagi

Okay, for you chaps who like to keep your NEC4 Kernels up to date, the family of Cheap Yagis was designed with a Larson-based program, not NEC. Larson programs actually pre-date NEC by about 10 years, and assume that the current in a Yagi element is sinusoidal. This is more accurate than NEC (unless you're doing 100+ segments). Of course the current must really *be* sinusoidal. With NEC you can see what your 20-meter beam looks like on 6 meters, while a Larson-based program goes flaky if you depart from the design frequency by more than 10%. If you really want to have fun with a Larson-based program, just try calculating the pattern for your 144-MHz antenna on 288 MHz. Be sure to save your other work, because it's going to give you a bunch of divide by zero errors as the system locks up!

As mentioned in the main text, the J driven element doesn't simulate well, either in Larson or NEC. NEC doesn't like 90-degree bends. You'll need to bust up the 180-degree bend into several small segments for a good model, or substitute a straight dipole for the driven element and look for a 17–18 watt impedance. However, the best way is to just build the thing and talk on it!

Most of my Cheap Yagis start as computer models. Then I build a prototype and test it on the antenna range, where I determine the best length for the driven element. Thus, the driven element is experimentally determined, and the antenna range dimensions are the ones published. Virtually all of my published antenna designs were tested on the antenna range before I published the design.

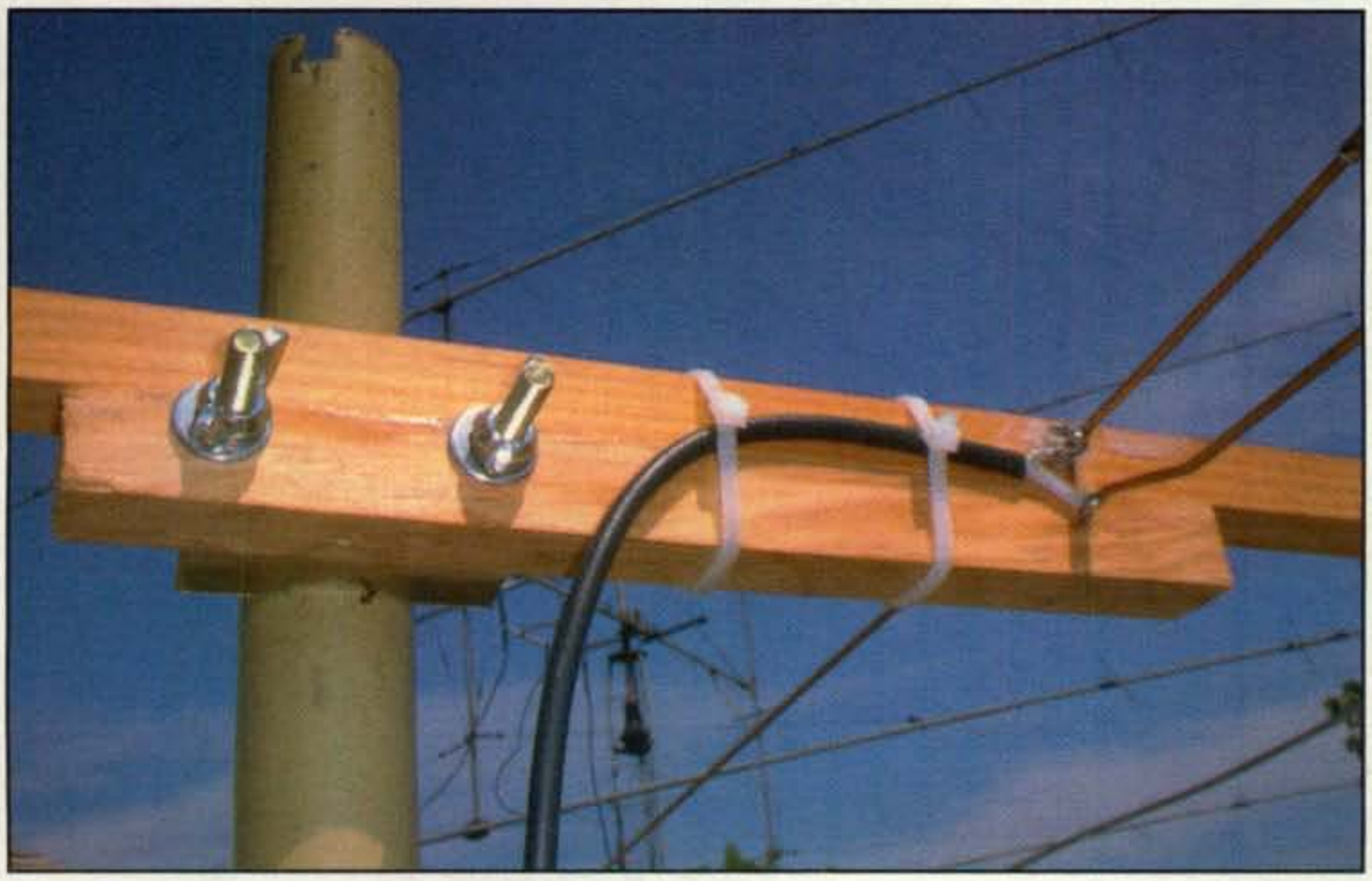

Photo C– The driven element and U-bolt on the 4-element Cheap Yagi.

Dimensions for the FM optimized "Cheap Yagi"

No. of Elements		Reflector	Driven Element	D1	D2	D3	D4
2	Length	41.0	*	—	—	—	—
	Spacing	0	—	7.0	—	—	—
3	Length	40.5	*	36.5	—	—	—
	Spacing	0	8.5	19.75	—	—	—
4	Length	40.5	*	37.0	32.5	—	—
	Spacing	0	8.5	19.0	40.0	—	—
6	Length	40.5	*	37.0	36.0	36.	32.25
	Spacing	0	7.5	16.25	33.5	51.0	69.0

Table I– Element dimensions and spacing for the 2-meter "Cheap Yagi." All dimensions are in inches. Spacings are all from zero starting at the reflector. Reflector and directors are made from 3/16-inch diameter material. If you can't find 3/16-inch diameter material and want to use 1/8-inch material for the elements, you need to make the 1/8-inch diameter element 1/4 inch longer to compensate for the smaller element material.

als. Heck, you can build these antennas for about $5. When it comes to dBs per dollar, you'll find these designs hard to beat. See Table I for element dimensions and spacing.

Construction

For the boom, I like to use 3/4-inch or 1-inch square wood. Fir, oak, or ash is great, but I usually just end up using a piece of pine. I like to put a brace where the driven element and U-bolt holes have weakened the wood, but that's a personal choice. Yes, PVC will work, but I've personally had bad luck with PVC pipe.

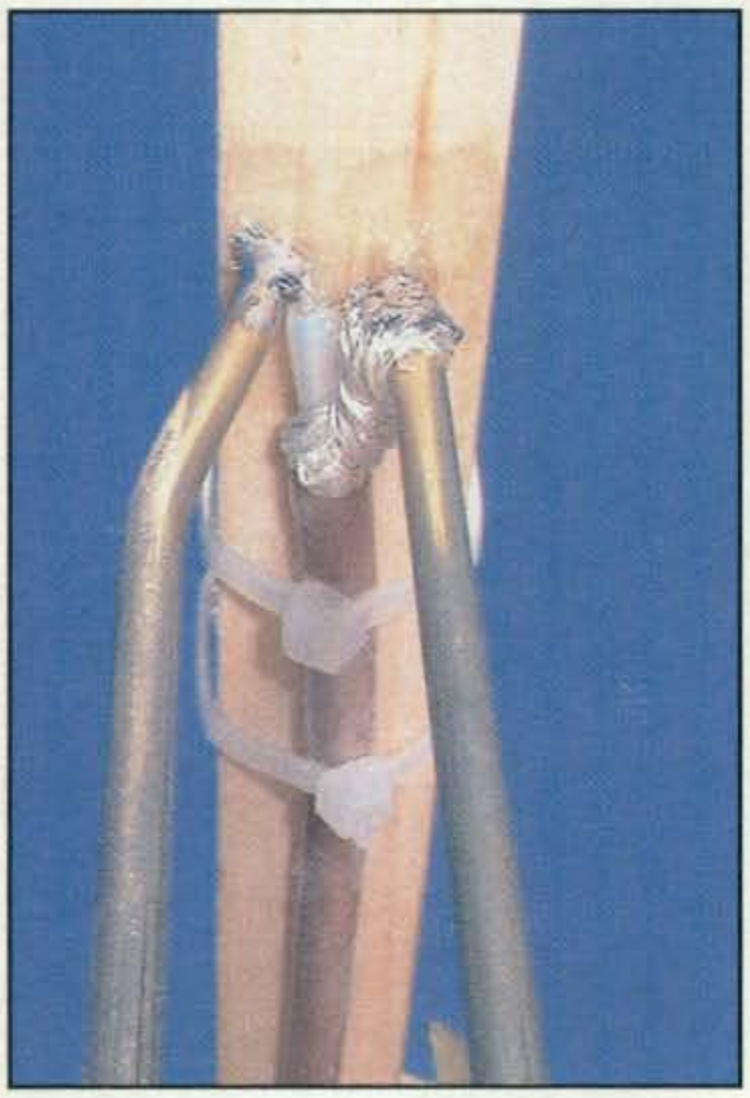

Photo D– Coax attachment on the 2-element Cheap Yagi.

For waterproofing, spar varnish, one of the Water Seal products, or just latex house paint work well, and the antenna should last as long as your house.

Aluminum rod, hobby tubing, #10 and #12 solid copper wire, and solid ground wire all have been used as elements. A drop of "Super Glue" epoxy, RTV, or my favorite—Liquid Nails™—can be used to hold each element in place. On the U-bolt, I've replaced the usual hex nuts with wing nuts. Those wing nuts are worth the few extra pennies when you're putting up an antenna for Field Day or at a contest rover site. ("Roving" is a popular activity in VHF contesting in which operators drive to and operate from more than one multiplier area during the course of a contest.)

For the 2- and 3-element versions, which are easily end mounted, I drill two sets of holes for the U-Bolt. This way the antennas can be mounted vertically or horizontally.

The Driven Element

A good hard-drawn copper wire or piece of hobby brass tubing can be used to build the driven element (see fig. 1 for dimensions). On the ones you see here, I used silicon bronze welding rod (see photo C). The welding rod is cheap, stiff, and easy to solder. If you look closely, you'll see where I used a few inches of 1/8-inch hobby tubing to splice two shorter pieces of welding rod. The shield of the feedline is attached near the center of the driven element. The coax center conductor is soldered to the free tip (see fig. 2 and photo D). Some hams have built these with an aluminum-rod driven element and attached the coax with various

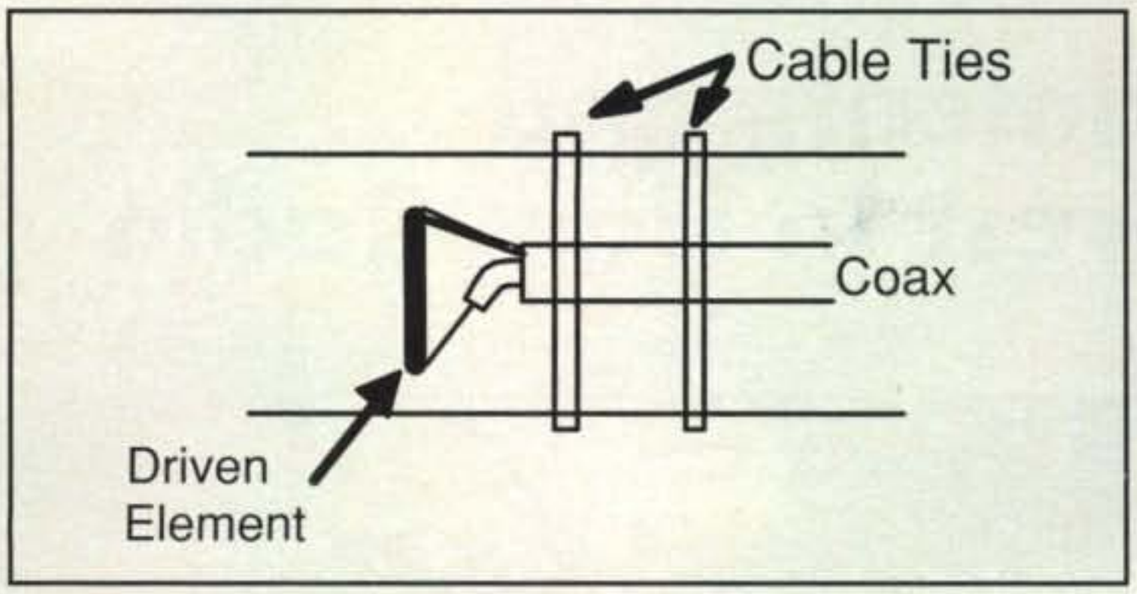

Fig. 2– Detail of how to attach coax to the driven element.

clips. However, if you can solder the coax directly to a brass or copper element, you'll be better off in the long run. The loop in the driven element is about an inch and a half wide, but this width is not critical. Computer programs just can't model this driven element well, so the best dimensions are determined on the antenna range. (See the sidebar, "Simulating the Cheap Yagi," for more on computer modeling of these antennas.)

Using Your Cheap Yagi

(Build it, Hook up the Radio, and Start Talking!)

Build it pretty close to the dimensions, and the SWR should be less than 2:1, and 1.5:1 is more typical of what you'll measure. That low an SWR is safe to use on the air without having to constantly check it. You're welcome to tweak it for lower SWR. I use a small section of copper or brass hobby tubing slipped over the end of the driven element (see photo E). Slide it in and out, and then solder it at the best point. The hobby tubing is also a quick fix if you trim the end a few too many times.

Just to see how low I could go, I played with it on my network analyzer. Got it right down to and below the uncertainty (margin of error) in my directional coupler, about 47 dB return loss. We will be talking more about return loss in subsequent columns. Return loss doesn't equate very well to SWR, but 47 dB RL would be an SWR of less than 1.009:1.

By the way, you don't have to mount these outside. I have a half dozen mounted in my attic space. If you just need a simple antenna for a local repeater, packet node, or ATV system, these antennas are something you can build in less than an hour for a few bucks.

Mini Book Review

We don't normally cover new books in this column, but this book by L. B. Cebik, published by MFJ, is particularly good. *Antennas From the Ground Up Vol. 2* (photo F) is a collection of 20 papers by W4RNL on HF antennas and related topics. Any one of these papers would made a good antenna column—uhh . . . they do say plagiarism is the most sincere form of flattery!

Again, an excellent book, *Antennas From the Ground Up Vol. 2,* by L. B. Cebik, MFJ-3307.

Letters, Letters...

From Tom, we had a comment about using room-temperature superconductors to build antennas. Yes, Tom, room-temperature superconductors are not yet available (and I'm not holding my breath until they are), but there is nothing in current superconductor theory that says they never can be. Several alloys will go superconducting in liquid nitrogen, which is far more practical than the older niobium ones that needed liquid helium.

Several years ago I visited Super Conducting Technologies in Golden, Colorado. They build several different RF filters out of superconductors for use in severe RF environments. The response of those filters was absolutely amazing, nearly vertical –80 dB skirts. Due to surface roughness and other losses, the loss in a superconducting filter or antenna would not be zero, but still very, very low. Thus, the 4-foot vertical on 160 meters that gets out like a quarter-wave with 120 radials isn't currently available … but it's fun to dream.

Coming up...

In September we'll go over more of your letters and the 440-MHz versions of Cheap Yagis, but use the weeks in between to get more copper and aluminum in the air!

73, Kent, WA5VJB

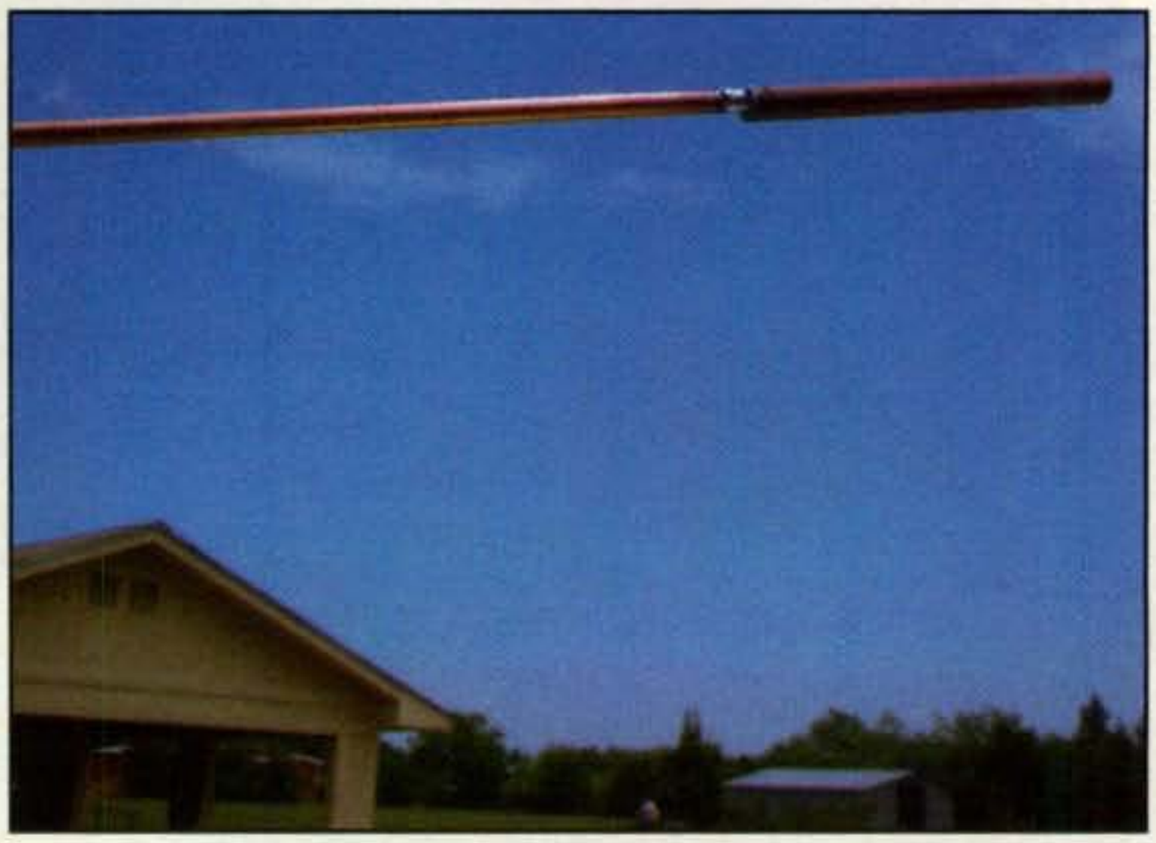

Photo E– Sliding tube on the driven element used in testing.

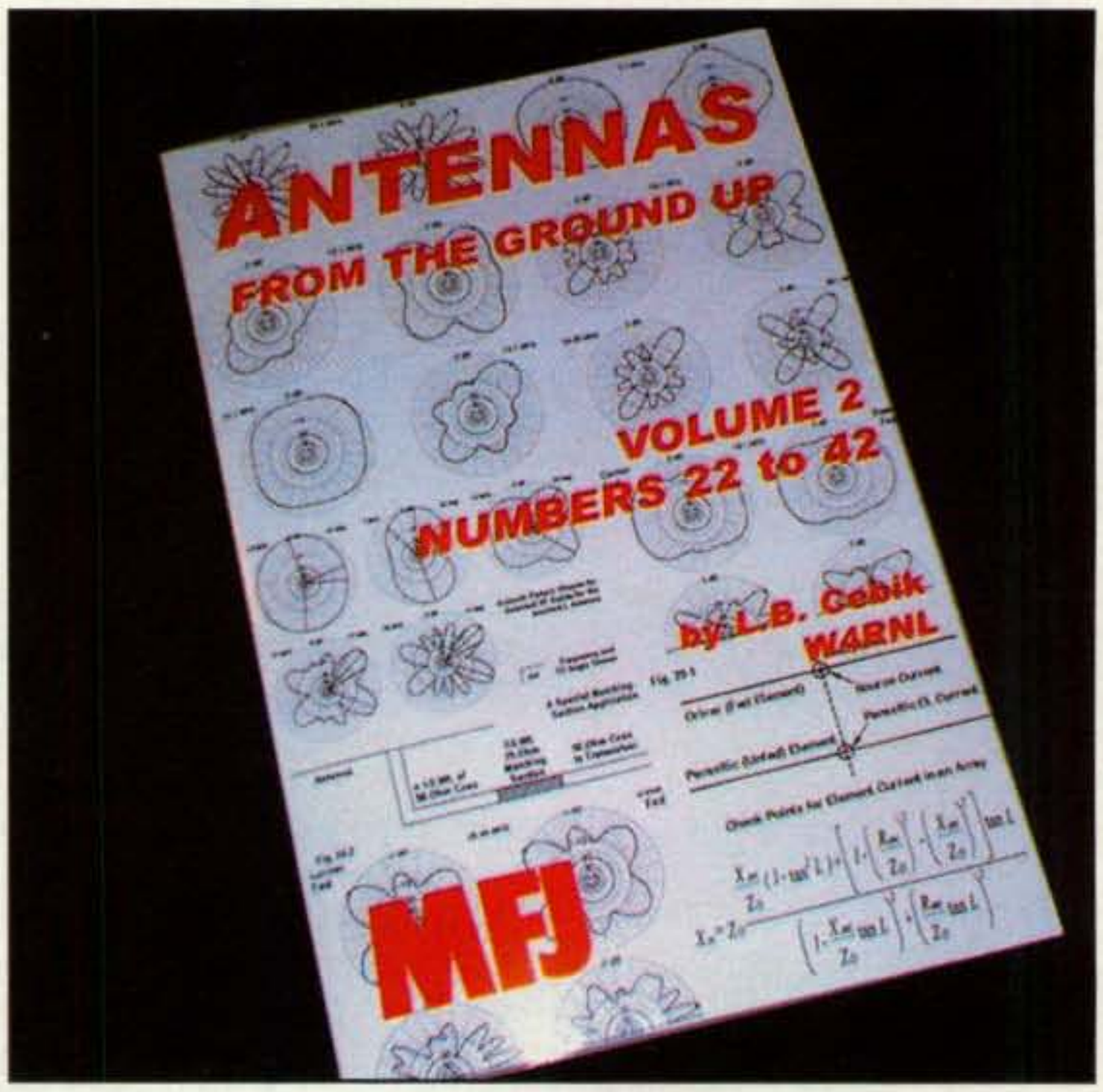

Photo F– W4RNL's new book, Antennas From the Ground Up. Vol. 2, *published by MFJ.*

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Science Experiments and Sparking Interest in Ham Radio

One night after one of the microwave club meetings, a bunch of us gathered at a nearby restaurant to have pie and coffee. One of my microwave radio friends, Dennis Kidder, WA6NIA, handed me an envelope. I opened it to find some long, dark, thick strands of hair. Dennis said, "Horse hair. You wanted some horse hair, right?"

This all started several months ago at another after-meeting gathering at the local restaurant. Dennis and I—along with Dave Glawson, WA6CGR, Pat Coker, N6RMJ, Chip Angle, N6CA, and others—were talking about high-voltage experiments and other shenanigans we did when we were kids. I mentioned that ever since I was a kid, I had always wanted to build a big Wimshurst machine. However, where does a "city kid" get a tuft of horse hair for a static generator? I read or heard that some chairs were stuffed with horse hair, so I decided to check that out. I found out the hard way that all of our living-room furniture was filled with foam and not hair of any kind . . . and no, my parents didn't understand what I was trying to do.

When I was little, my parents tell me, I spent more time in *back* of the television set than in *front* of it. I do recall that I spent a lot of time peeking through the ventilation holes on the rear panel looking at the glowing glass bulbs inside, and listening to the weird noises the TV set made (probably 60-cycle hum or buzz from the transformer and the horizontal or vertical oscillator or something).

When the TV was "on the blink," the "TV man" would come over to our house and fix it, or take the chassis away to his shop to fix it. These "house calls" were always fascinating to me, and I got a real kick out of watching the TV man work. He had a huge tool kit and a portable case that unfolded to reveal a big array of new tubes in colorful little boxes. I was impressed that someone could come over, open up the TV, do "stuff" to the insides, and make it work again. Just like magic.

Now remember that to a kid, the TV is one of the most important things in your life. It's way up there, along with your bicycle, the baseball-card collection, and ice cream from the truck on a hot summer day. Thus, when the TV set breaks and you can't watch anything and the TV man can fix it . . . boy, he was one of my heroes.

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e-mail: <kh6wz@cq-amateur-radio.com>

This simple and small Tesla coil was made from an inexpensive kit. Although very tiny, it can still produce a small Jacob's Ladder and it will deliver sparks and arcs if you get something close to the output terminal—including your fingers—so be careful. (Photos by the author)

I loved our TV man. In addition to the TV set, he also worked on the washing machine (we didn't have a dryer; mom hung clothes on some wire lines in the back yard), the stove, and other appliances around the house.

He gave me all kinds of neat parts to play with, such as magnets out of dead speakers, spools of leftover wire (and the empty spools), old parts, and even some dead tubes. I still remember when he showed me that the dirt in the front yard could be picked up with the magnet. He dragged the magnet on the ground and showed me that dirt is filled with all kinds of magic dust that a magnet likes to stick to. He told me about science experiments I could do with magnets—how I could build a crane with my Gilbert Erector set, and how I could use an electro-magnet connected to a doorbell button and my dry cell to pick things up, move them around, and let them go.

Later, I discovered an excellent book by Alfred P. Morgan, called *The Boys' First Book of Radio and Electronics*. I read all four volumes in the series. I enjoyed them so much I bought the *Fourth Book,* and I still have it in my bookcase. I think I read just about everything Morgan wrote; his books replaced everything else I read. I learned about electro-magnets, motors, coils, and crystal detectors. I dreamed about making Wimshurst (static electricity) machines, Leyden jars (early capacitors), Tesla coils, and Jacob's Ladders (as

The little Tesla coil can still make a fluorescent tube glow without wires. This "squiggly" fluorescent tube was designed for backlighting some sort of display panel. I found it at a surplus store for five dollars. It has an interesting green color.

Websites to Visit

Here are some interesting, and even scary, websites for some fun ideas:

Barlow Research Laboratory: <http://www.barlow-research-laboratory.i8.com>

Information Unlimited: Kits and plans for science experiments, as well as high-voltage items, <http://www.amazing1.com/tesla.htm>

Joe Tedesco's National Electrical Code and Electrical Inspection Information: Joe has an amazing gallery of electrical code violations. Fascinating! <http://www.joetedesco.com/nec/index.php>

Lone Oceans Ignition Coil Experiments: Contains several nice images of high-voltage things that spark and glow. <http://loneoceans.com/lo_main/projects/ignitioncoil>

Mike's Electro-Stuff: Mike has a great collection of antique electrical items, including Geissler tubes, Nixie® tubes, and Tesla coils. He also has lasers and other interesting items. <http://www.electricstuff.co.uk>

Science Hobbyist: Check the Unwise Microwave Oven Experiments and other fascinating things from Bill Beaty. <http://amasci.com>

Snock's World of High Voltage: Circuit diagrams for high-voltage drivers and other items. <http://www.geocities.com/CapeCanaveral/Lab/5322/index.html>

Leyden Jars: <http://www.alaska.net/~natnkell/leyden.htm>

The Electronics Area: Many interesting projects with high voltage and electricity. <http://zap.to/electronicsarea>

Caution: As mentioned in many of these web pages, high-voltage experiments are dangerous. Always understand what you are doing and observe safety precautions.

This is not an endorsement for these companies or the validity of their information.

As always, try typing a few key words into your favorite search engine for more resources.

seen in most Frankenstein movies), and owning Geissler tubes. I did experiments with electrolysis, separating oxygen and hydrogen from water. I made crystal sets using a safety pin as a cat's whisker and a single-edge razor blade instead of a chunk of galena. Sadly, Morgan's books have been out of print for several years.

I don't know what happened to our TV man, because we moved away. We got a new color TV set, washing machine, and even a dryer for our clothes.

After a short time, the stuff that broke around the house was just replaced by new ones. What? The TV is broken? Let's go get another one. Uh-oh . . . the washing machine isn't working right? We'd better get a new one. The ice-maker in the refrigerator is not making ice? Let's go get another fridge. And so it went.

I forgot all about the TV man, and then sometime in high school electric shop, I ran into some other students who dedicated their time to making trouble rather than making projects in the lab. Of course, those guys seemed to have much more fun building "things" that would spark and blow up and smoke. It's amazing we didn't get hurt. We did, however, wear the appropriate safety gear. Of course, we tried to do these experiments while Mr. Stratton wasn't looking....

Let's see if we can spark some interest in ham radio by going back, way back, to some of the earlier times when everything was fun. We could call this "science," and just like the *Mr. Wizard* television show on Public Television, we can make learning about electricity fun. Let's show kids the scary Tesla coil and mention that a long time ago, before FM and TV and cell phones, there was *spark*. Let's get some kids interested in electronics and radio and technology—and we just might "grow" the next crop of hams.

73, Wayne, KH6WZ

magic in the sky

BY JEFF REINHARDT,* AA6JR

It's Time for the "Sweeps"

As you read this, across town, across America, around the world, radio signals are being transmitted, making their way through transmission lines to towers and radiating into the ether, from steel structures perhaps hundreds of feet high. Many of those structures are adorned with beacon lights that serve to reinforce their presence (and keep airplanes away) during the hours of darkness. Continuous signals of all descriptions have been present on this planet for the better part of a century.

As amateur radio operators, we have much in common with our commercial broadcasting "cousins" in terms of technical execution, but we're different in terms of our *raison d'etre*. The biggest difference is that the commercial station is out to make a make a buck, and our licenses have nothing to do with that aspect. In fact, we're specifically prohibited from engaging the profit motive as a reason to get on the air. However, we can learn a lot from commercial broadcasters. Anyone who has worked in commercial radio has, at one time or another, loved, hated, feared, and come to grips with estimates of audience listenership otherwise known as *the ratings*. Shortly after broadcast radio was invented, someone else figured out how to estimate audience size, which largely determines how much a commercial broadcaster can charge for commercials played by the outlet. Quite simply, more listeners equals more revenue.

As audience measurement evolved, more sophistication worked its way into audience estimates. Selected listeners are asked to keep diaries of their listening habits, from which a great deal of information is extrapolated. It is now possible for a radio station to know its relative strengths and weaknesses in amazing detail, including the average length of time spent listening, gender, age bracket, and subsets (everyone says they cater to the 18 to 49 demographic, but as most of us know, 19 year-olds have very little in common with 47 year-olds).

One of the disasters that can befall a commercial station is to be off the air for any period during the time which audience estimates are being taken by the rating firm(s).

So How are Your "Ratings"?

Of course there are no "ratings" for amateur radio . . . or are there? Here are some ways of measuring your "performance" as a radio licensee.

• Have you been on the air lately? It's hard to get noticed if the PTT or key has not been activated!

• Have you received any QSL cards recently? That's a real indicator of activity! You get extra "points" if you've received a card from an SWL; that sometimes means you were fun to listen to. For many years a QSL was referred to as "the final courtesy" of a QSO. As nice as e-mail and e-QSLs may be, there's nothing like opening an envelope and getting a "real" QSL. I have a great collection and it grows almost every month. The real secret to receiving them is sending them.

• How engaging are your conversations? Would you listen in on a contact you were having if you just happened to tune in? Forget the "rig here is..." and "our weather is...." I'd like to know what makes you the interesting person I know you are! More and more commercial stations are emulating amateur radio in that they seek participation from their listeners. This is most often found on call-in shows in talk-radio formats. Have you ever noticed how a good host can "draw a listener out" by asking a few good questions?

• Has there been an effort on your part to reach the important 8 to 18 age bracket? Many youngsters are just looking for a mentor.

• How does your "diary" (or logbook) look? Does it have many recent entries?

• How does your station sound? Are you using a good mic and transmitting nice, clean audio? It's a pleasure to hear a good-sounding station. Conversely, it's tedious to listen to a station running too much compression or distorted audio. The same holds true for CW. Give a listen to your transmitted signals to be sure the output is crisp and clean.

Commercial stations often take pride in rendering public service. This is an area we have in common. When is the last time you operated your station in support of a community event or emergency drill?

Of course, there are no "real" rating services for amateur radio, but you can be the best judge of the extent of the enjoyment you derive from the hobby. A better "yardstick," though, might be the amount of pleasure your efforts bring to others.

A Summer of Adventure

This is being written on the eve of my annual trek to the Dayton Hamvention®, where every year something new and different happens. I think the part I like most about Dayton is that it's unpredictable. Certainly, there are basic elements you can count on *(such as bad weather!—ed.)*, but I'm referring to people, events, and impulses that seem to permeate the event. In our next column I'll try to identify what made Dayton 2004 unique.

One example is the time when some practical jokers in the flea market were displaying a replica (I hope) World War II vintage floating mine. I don't know if they ever sold it, but I can imagine what it may look like strapped to the roof of someone's car. Can you begin to visualize such an item making an appearance in these days of enhanced security awareness?

Then there was the year a Japanese engineer expressed a desire to drive my (unique to him) left-hand steering, V-8, rear-wheel-drive, full-size luxury car. What he didn't tell me was that it was also

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The Dayton Hamvention®, says, AA6JR, is predictably unpredictable . . . and that's one of the things he likes best about it! Attending Dayton or any other hamfest should certainly help boost your "ham radio ratings"!

his first experience with both power steering and power brakes, along with trying to stay on the right-hand side of the road. We laughed until it hurt, and fortunately he, the car, and I all survived without physical mishaps. Thank goodness the University of Dayton had a large, empty parking lot. However, I am having trouble recalling the Japanese word for "wheel spin." I don't know if there's a Japanese word for the term "donut" in the context of motoring, but I could have made use of it. Thank goodness his English was better than my Japanese.

I've made several "impulse" purchases at Dayton, and I'm happy to say that most of them have worked out very well. As to the occasional gadget or gimmick that didn't, I can usually justify the purchase for the entertainment value. (Okay, the sparkling "blinky" badge was a bit lame, but it looked good at the time.)

Don't let me mislead you, however, with the impression that Dayton is silly. I have come away with a lot of good information from the forums, renewed some long-lost acquaintances, added to my technical and operating skills, had "eyeball" contacts with folks I only knew from the radio, and met some fascinating people.

This time of year also marks the beginning of the season for local hamfests, preparations for Field Day, special-event stations, outdoor antenna system improvements, and more. It's hard to not get caught up in some element of it. If you're not having fun, you need to re-think your methodology!

Sometimes All You Have To Do is Ask!

Looking for a good program for your next club meeting? Sometimes all you have to do is ask. Just a few weeks ago, I asked L.A. area ham Dave Bell, W6AQ, to speak at our club meeting about some of his recent DXpedition experiences. It was a fun program presented by Dave and Don Lisle, K6IPV, a couple of first-class guys. You might remember Dave as an Emmy Award winning producer/film-maker or as the driving force behind the stirring "Amateur Radio Today" video featuring Walter Cronkite. At our meeting, though, he was just "Dave," and

along with Don, he shared a lot of tips for heading out on DX adventures without spending a lot of money.

Look around! There are probably talented speakers in your community, maybe even members of other clubs who can make your next club meeting a night to remember. Break the mold and ask them to join you.

By sharing our collective talents, we can only add to the Magic In The Sky.

73, Jeff, AA6JR

Keys and CW Hot in 2004! Part I

BY DAVE INGRAM,* K4TWJ

Goodness gracious, friends, your interest in and enthusiasm for Morse code, keys and CW is insatiable! Yes, and the recently proposed licensing changes downplaying Morse proficiency seem only to have made keys and CW more popular than ever before—if that is possible. We also have noticed a fair number of prospective new amateurs clamoring to acquire a highly esteemed "know code" license while it is still available. Amazing! If this trend continues, CW may soon match both SSB and PSK in popularity. Farfetched? I don't think so.

Sending and receiving Morse code is a special skill and a proud tradition, keys are fun to use, and CW is also ideal for basic survival communications during these uncertain times. It is also the most effective means of communicating over long distances with low power. It is our first and original form of data communications, and its use during times of abnormal situations is endless (remember the famous SOS message). Only a few years ago, for example, in this column we discussed how severely paralyzed people conversed by using Morse code eye blinks, and how the final words from a Russian submarine that sank in the Barents Sea were sent via Morse code taps on the ship's hull. Morse is more than fun; it can also be a survival aid.

In light of these facts and supporting your continuing appreciation of keys (every one is a mechanical work of art), we proudly present another "Keys Special" column. Enjoy the views and discussions!

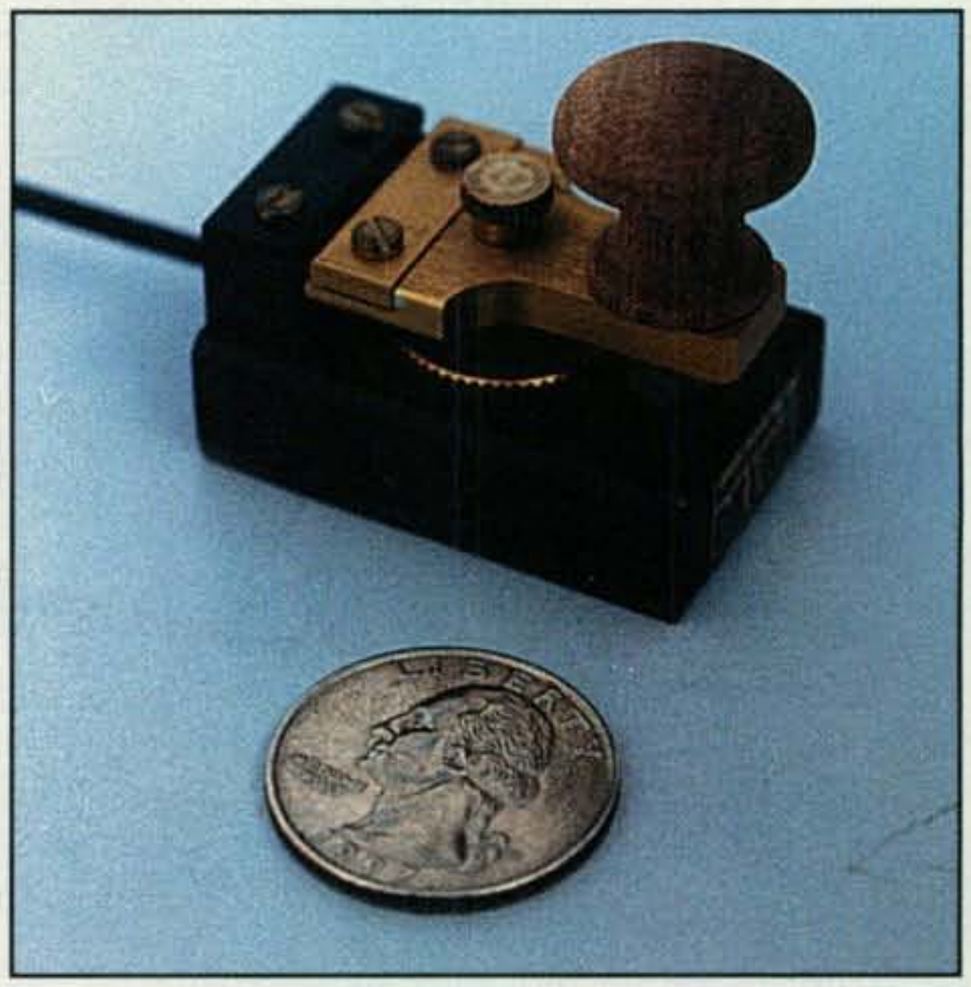

Photo A– This little Morse marvel is called Micky. It measures only 1.5"H × 1.0"W × 1.5"D, is solidly built, and handles great. The knurled disc below the arm sets the tension, the nut atop the arm adjusts gap, and the contacts are directly beneath the arm's knob. Micky is made in limited quantity by Englmar Wenk, DK1WE, in Germany and is available in the U.S. from your author, K4TWJ (details in the text). (Photo by K4TWJ)

New Keys and Paddles

Leading the views this time are the attention-grabbing miniature Morse items made by Englmar Wenk, DK1WE, in Germany and shown in photos A and B. Both items sport rear pivoting brass arms, an aluminum frame, a 2-foot cable with miniplug, and exquisite German craftsmanship. They also have spring-type bearings that do not wear out or wobble and silver contacts set in Teflon® insulators. Micky (photo A) is a real little traveling companion. It is rugged enough to stuff in a shirt pocket yet has the feel and stability of a full-size key. It has precise adjustments for gap and tension, a beautifully contoured wood knob, and contacts located directly below the knob. This is the smoothest handling miniature hand key I have seen to date. In fact, I have become so impressed with Englmar's "Wenkys" (I could not resist adding that one!) that I agreed to act as his exclusive North American agent, or liaison, and yes, you are welcome to e-mail me with questions.

The other DK1WE-produced item is Squeeky, the .75"H × 1.0"W × 1.75"D squeeze key, or iambic

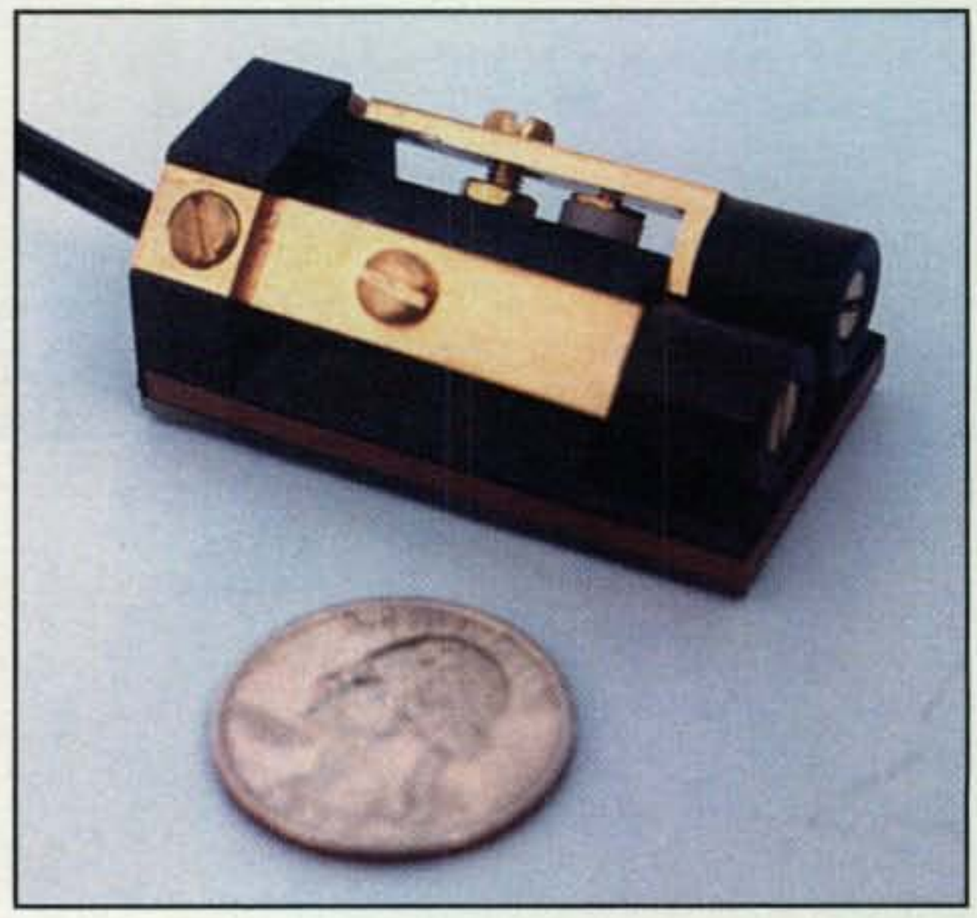

Photo B– Meet Squeeky, a miniature iambic paddle with its arms mounted at a 45-degree angle so it mates perfectly with the unusual wrist and key positions typical of portable operations. Combine this agile-handling .75" × 1.0" × 1.75" marvel with a little battery-powered rig and take CW everywhere you go. Squeeky is also made by Englmar, DK1WE and is available in U.S. from K4TWJ. (Photo by K4TWJ)

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

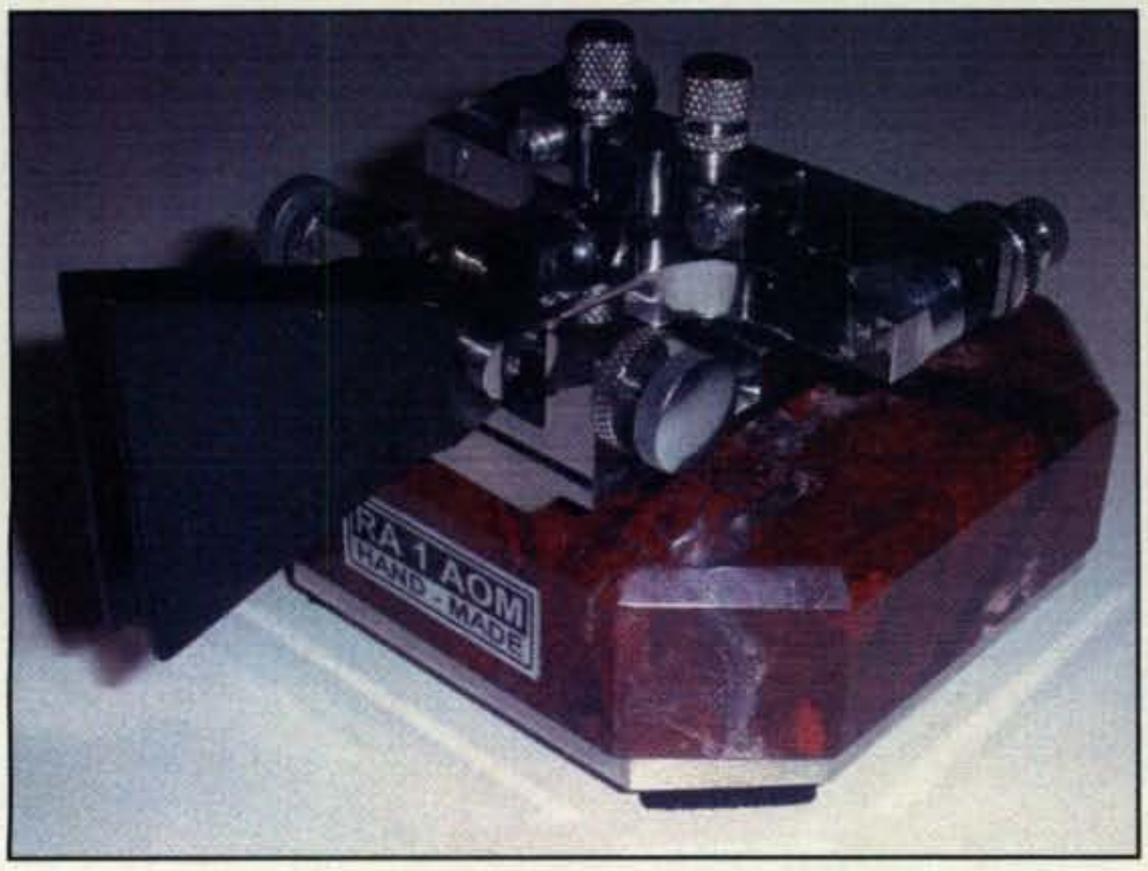

Photo C– The new magnetically tensioned Maestro twin-lever paddle is being made by Valery Pavlov, RA1AOM, in Russia. The paddle's levers move within a chrome frame, with magnets on adjustable screws at the rear. Gap adjustments are outside of the frame near the finger pieces, and the ground contact block with pads is between the levers. (Photo courtesy RA1AOM)

paddle, shown in photo B. This little gem looks unusual, but it works in a really cool manner that must be experienced first-hand (no pun intended!) to be fully appreciated. Notice the paddle's levers are set at 45-degree angles and fitted with round finger pieces. This arrangement lets you operate the paddle from various horizontal or vertical angles or positions rather than requiring exact side-to-side movements like a regular paddle. Each lever has its own gap adjustment, and Squeeky works so well that I even use it mobile. In fact, I turn it backwards, attach it to the console with double-sided tape, and transmit with my left hand while XYL, Sandy, WB4OEE, grins and drives. It's keys such as these that make CW a breeze!

Englmar's keys are fine telegraphic instruments in miniature that anyone would be proud to own, and they are affordably priced. However, like those neat little Mini Cooper autos, the demand occasionally exceeds supply and there may be a short waiting list. As I mentioned earlier, check with me for the latest details. I am not sure if my new website and e-mail address will be up and running when this column appears in print, and I am also preparing to move my QTH in the near future (warmer climates and sandy beaches call). Please contact me via my *CQ* e-mail address (k4twj@cq-amateur-radio.com) during this transition period, and I'll keep you posted in my column.

Another new and impressive-looking item we are sure you would enjoy is the captivating Maestro iambic paddle being made by Valery Pavlov, RA1AOM, in Russia (photo C). The paddle sports a fine chrome-plated mechanism mounted on a Jasper stone base with a non-skid pad on the bottom for stay-put operation. Look closely and you will see each lever is tensioned by a magnet that is adjustable at the rear, while the lever gap or travel is set by screws with knurled locknuts on the "outer side" of each lever. A ground-contact block with flexible pads for a soft feel can also be seen between the levers and near the paddle's center. I have used an earlier spring-tension version of this paddle, and it handles quite well, so it seems Val has another winner in his Maestro. If you would like more details or want to have Val make one for you, contact

Photo D– Like to join the fun and DX action on CW, but have difficulty copying or sending code? Need help reading fast-sent Morse code? Check out the new MFJ-464 combination Morse code reader and programmable memory keyer from MFJ Enterprises. It connects to the key and earphone sockets of your rig and makes CW a cinch. (Photo courtesy MFJ Enterprises)

Photo E– If copying medium- or high-speed Morse code is your only handicap, try this MFJ-461 reader. Just place it near your rig's speaker and it displays received Morse on its LCD readout. Use it for a couple of months, and your code sending will also improve. (Photo courtesy MFJ Enterprises)

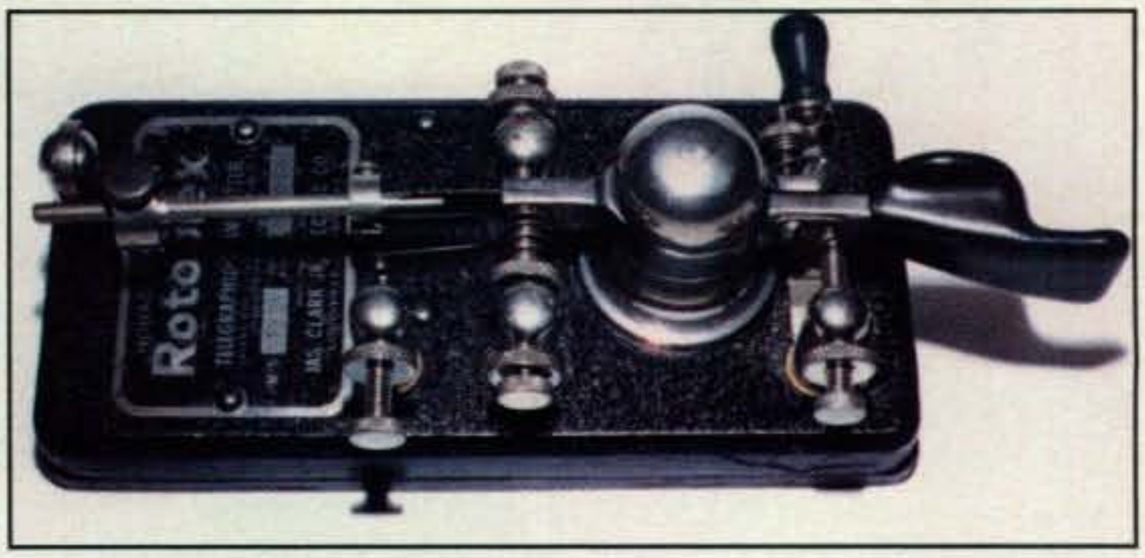

Photo F– Vintage keys exhibit an incredible amount of real radio glamour, and this unique Rotoplex is a shining example of that fact. Horace G. Martin designed it after he left Vibroplex, and it was made by the Jas. Clark Electric Co. of Louisville, Kentucky. The little beauty sports a rotating center post rather than a mainframe, Speed-X type damper, and molded finger piece. (Photo courtesy master collector Gil Schlehman, K9WDY)

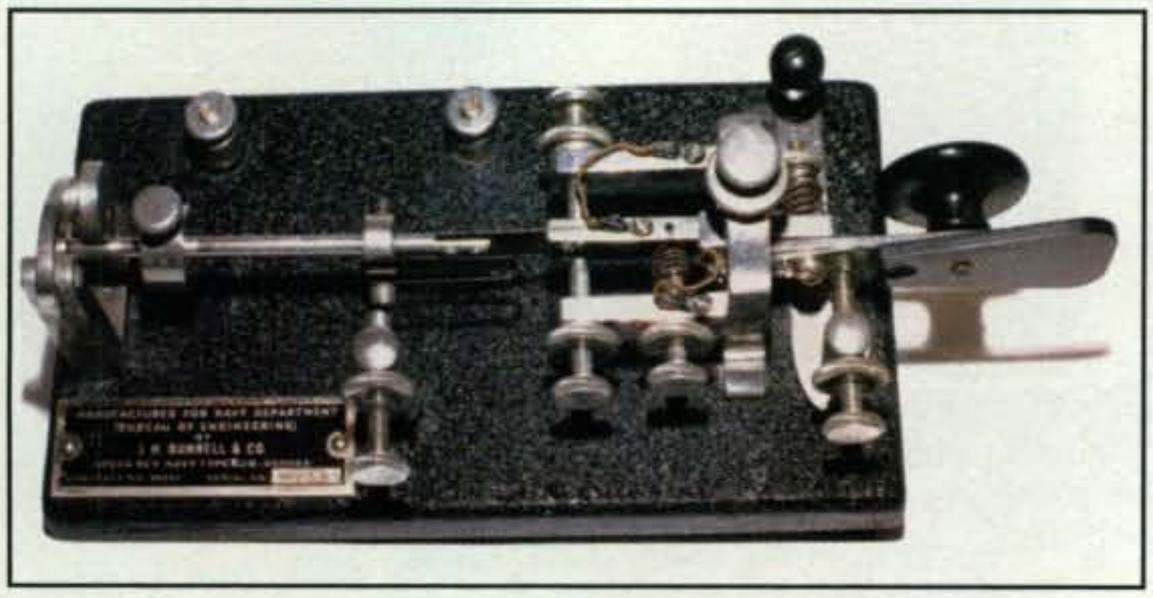

Photo G– Like many historically significant keys, the nameplate on this rare Bunnell Speed Key tells an interesting story. It was made under special contract with the Navy for wartime use, and it is also an exact copy of the Flash Key bugs H. G. Martin and J. H. Bunnell produced after Martin left Vibroplex. (Photo courtesy K9WDY)

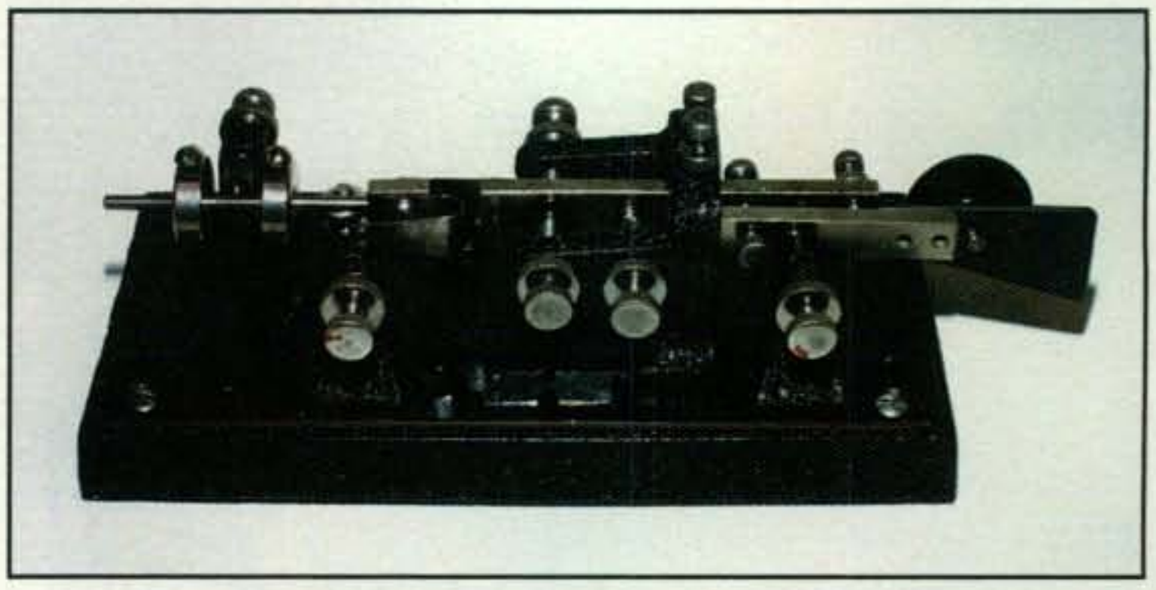

Photo I– This unique gem is a Kenmore bug. It has a speckled, or simulated wrinkle, finish base and mainframe, and sports several mechanism designs similar to the famous Cedar Rapids Special kit bug. Whether it is related to Kenmore products sold by Sears and Roebuck is unknown. (Photo courtesy K9WDY)

him (Valery Pavlon, RA1AOM) at P.O. Box 98, St. Petersburg, 197022 Russia, or check out <www.qsl.net/DL4FO>.

Automated Morse?

A fair number of amateur radio friends have told us they are sincerely interested in operating CW but have difficulty copying or sending Morse code above 5 or 6 wpm. They asked if I have any suggestions. Sure!

The most convenient and effective way I have seen for those not proficient in Morse code is to send and receive is with the MFJ-464 combination code reader and memory keyer (photo D). This compact device connects to the earphone and key sockets of a transceiver and prints out both incoming and outgoing Morse messages on its front LCD readout. Just watch, read, and enjoy! The 464 automatically locks on and reads code from 5 to 99 words per minute and includes a built-in speaker with volume control so you can listen while reading code in real time on the display. It is the perfect gizmo for improving your Morse proficiency—effortlessly and while operating CW to boot. The MFJ-464's CW keyer accepts input from a paddle or a computer keyboard and has four message memories of 256 characters each plus a large type-ahead buffer. For CQing, contesting, or general QSO exchanges (such as RST, name, QTH, and rig), you can load the memories with slow and accurate information, and then speed up the output to sound like a pro with perfectly timed and spaced Morse code. The keyer even includes auto serial-number incrementing for "pushbutton contesting"!

Does this code-reader/keyer technique actually work? It can't copy poorly sent or sloppy code—even top CW operators have problems trying to copy a wild fist haphazardly banging on a key—but the overall level of success can be surprising. Did you know, for example, that a top-scoring European station in a rather recent (and major) worldwide

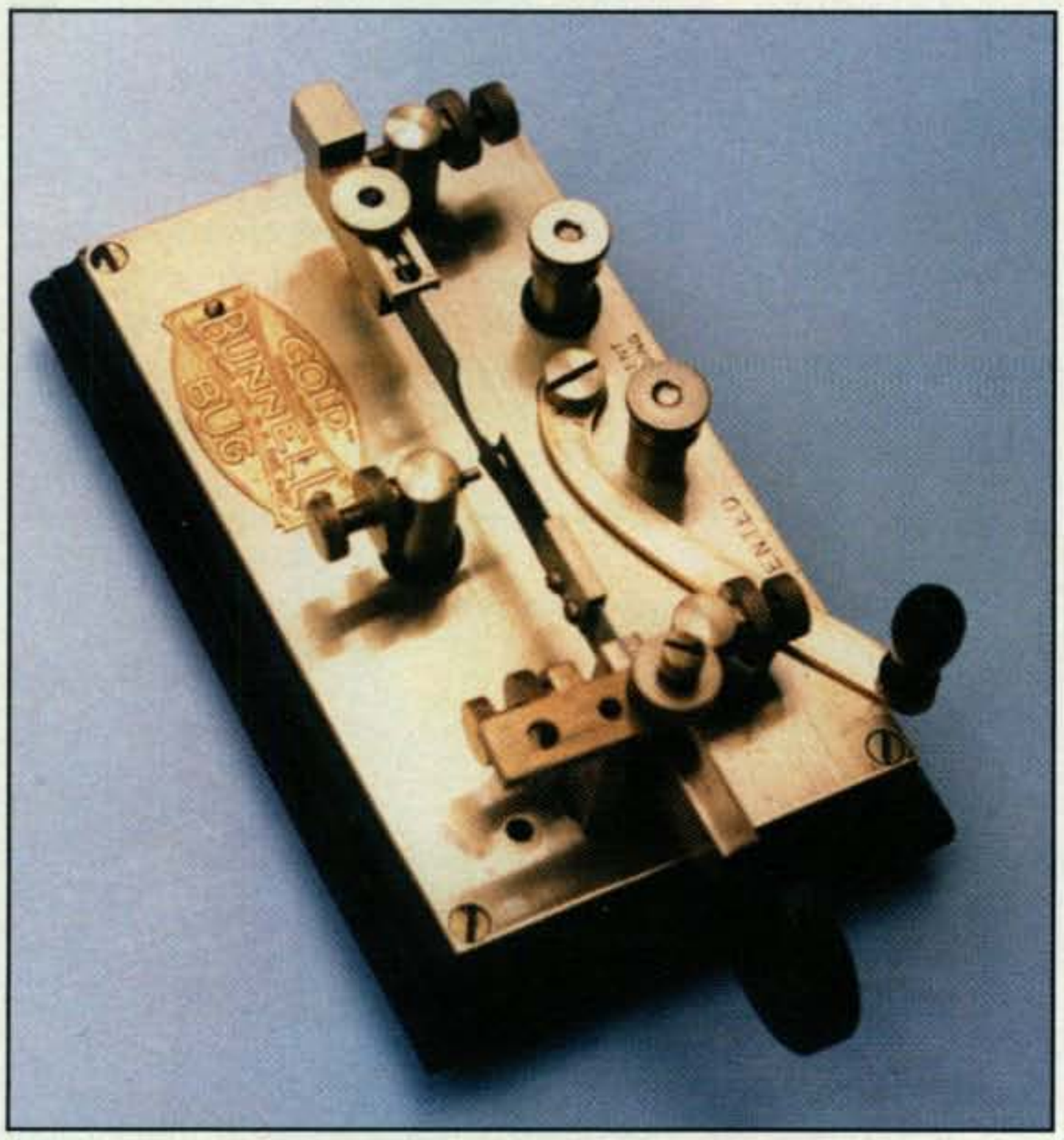

Photo H– Another special item is this unique Bunnell Gold Bug, which is actually polished brass rather than gold. It has a flat, floppy feel and was produced as a trophy-type achievement award rather than a daily-use bug. It is a highly sought-after collectible. (Photo by K4TWJ)

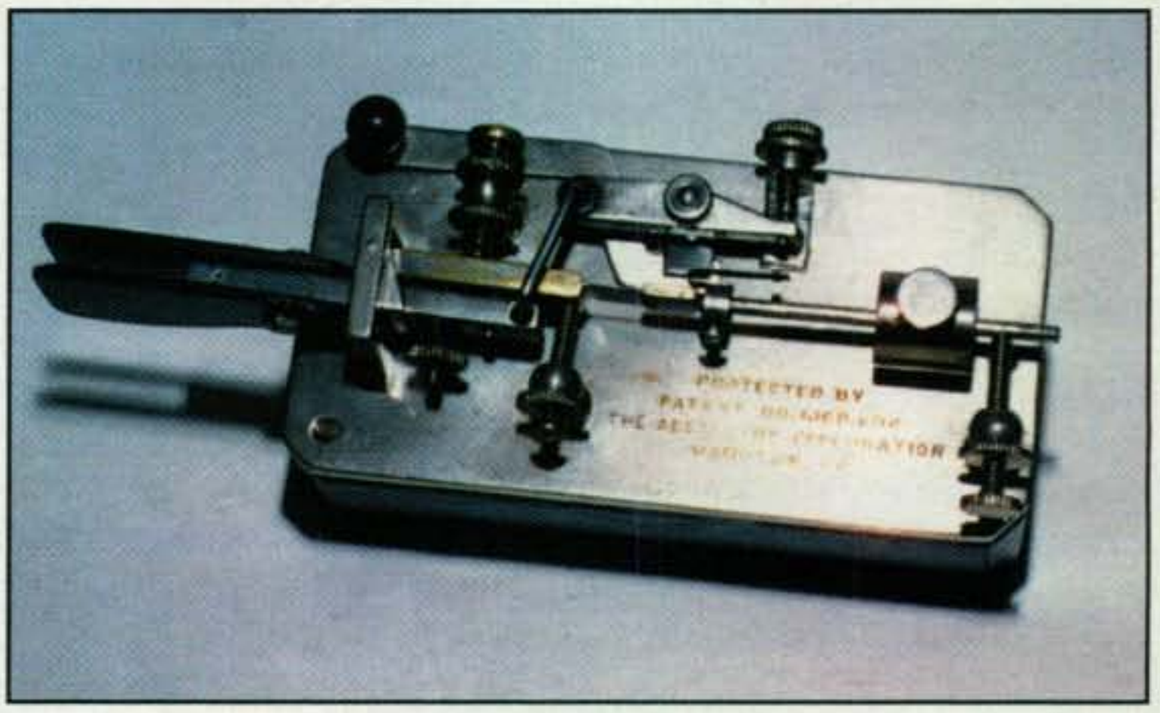

Photo J– Check out the unusual mechanism on this 1916-era bug made by the Abernathy Corporation of Hampton, Virginia. The single contact for both dots and dashes is mounted on the left side. A swinging pawl linked to the main arm produces dashes, while a spring-attached contact on the pendulum produces dots. (Photo courtesy K9WDY)

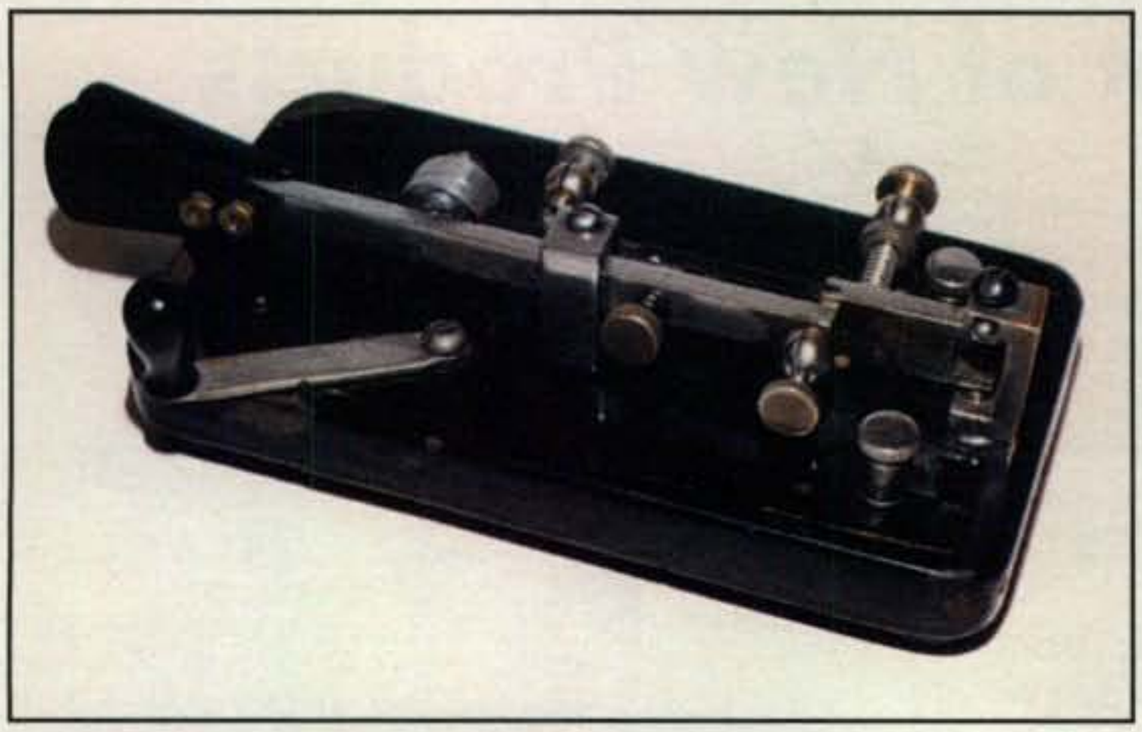

Photo K– Almost as wild and unusual as the Abernathy bug is this 1909-era bug made by the Tinsley Transmitting Machine Co. of Kansas City, Missouri. The low-slung arm moves on a short C bracket, and the dash contact is on the right, near the rear binding post. (Photo courtesy K9WDY)

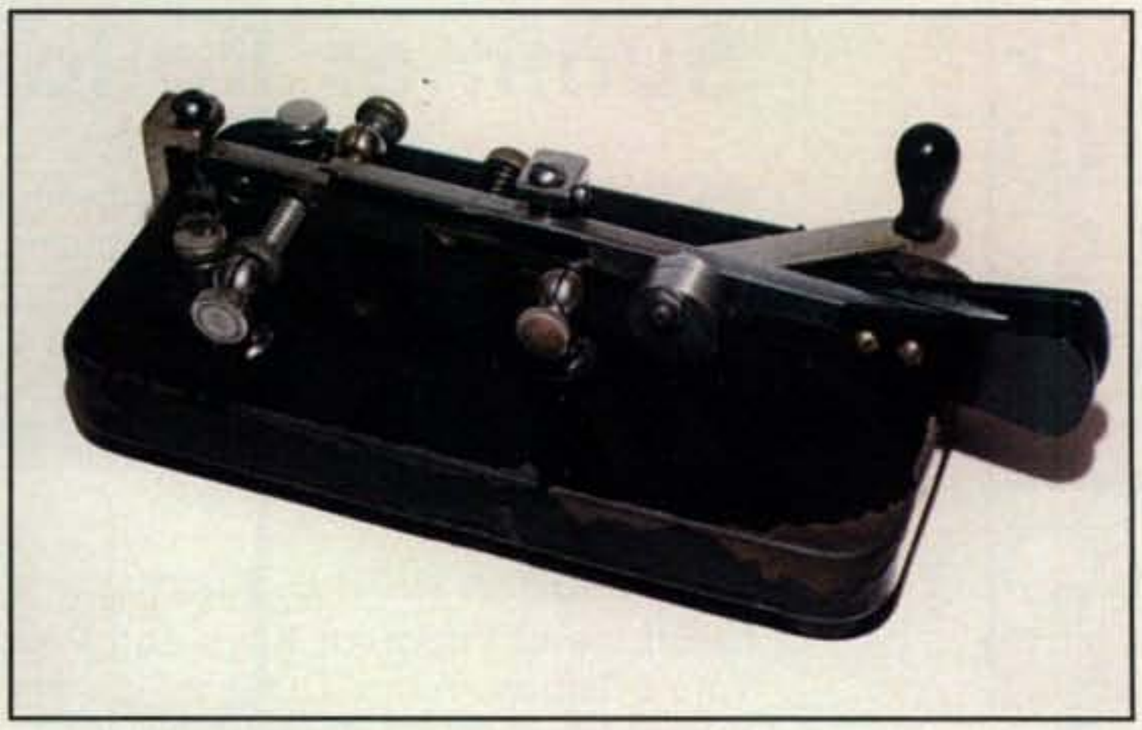

Photo L– Reverse-angle view of the Tinsley bug reveals an extra-long dot contact spring attached to the main arm. The spring's contact mates with a horizontally positioned screw near the left-rear binding post to make dots. (Photo courtesy K9WDY)

CW contest could barely copy code at 4 or 5 wpm? He used a reader and programmable keyer—and won—and improved his Morse code proficiency in the process.

Do you already have a nice keyer with memory and only need a Morse reader, possibly for backup assistance when working those fast ops? Check out the palm-size MFJ-461 reader shown in photo E. You just place it by your rig's speaker, and it reads out incoming Morse code on its 32-character display. The reader uses an internal 9-volt battery for power, and you can use it anywhere—even when mobiling (as a rider, not the driver).

MFJ code readers and keyers are available from amateur radio dealers nationwide. Try one and see how it fits your needs or check out <www.mfjenterprises.com> for more details.

Super Semis

In looking over the wide variety of telegraphic instruments made during the last decade, semi-automatic keys or bugs always rate tops in real radio glitz, glamour, and flash. Why? Their designs are fascinating to study, they are fun to use, each one has its own "personality," and many have historically related backgrounds. Several examples are presented in this month's column.

The Rotoplex (photo F) and the Bunnell Speed Key (photo G), for example, were designed by Horace G. Martin after he left Vibroplex Company and were specially produced to fill wartime needs. Only a limited number of each were made and few survived the war, so they are now prized collectibles. The Bunnell Gold Bug (photo H) was not a war item, but a sort of "working model trophy" companies awarded to their top-of-the-line telegraphers. Interestingly, the bug lacks arm tensioning springs and flops around like a half-dead fish. Like most J. H. Bunnell items, however, it is a highly sought after and rather pricey collectible.

Precious little information is available on the Kenmore, Abernathy, and Tinsley bugs (photos I through L), but we are sure you will enjoy studying their designs. In particular, the Abernathy Bug is a treat. Notice its fingerpiece-linked arm moves the pendulum and its dot spring to make dots, and a rod linked to the arm moves a pawl against the same left-side contact screw to make dashes.

Keys are oh so captivating, but embarking on this tour has also brought us right to the limit on column space. We thus will bow out rather quickly while urging you to share views of your special keys with *CQ* readers. We also invite you to join us for Part II of this 2004 keys tour next month.

73, Dave, K4TWJ

what's new

BY KARL T. THURBER, JR.,* W8FX

Summer Rollout of New Products

This month in your "What's New" column we'll present some noteworthy hamshack accessories, antennas and antenna accessories, software, books, and other fascinating items rolled out over the past few months—plus some news from ICOM. We think these will be of real interest to you, so let's dig right in.

Accessories for the Shack

New Line of Imported Keys and Paddles from Tom's Tubes. Tom's Tubes is now the exclusive U.S. distributor of CT Ham Radio Devices (CT HRD) brass, chrome, and hardwood CW keys and paddles from the Ukraine (see photos A and B). The manufacturer, CT HRD, has put skilled machinist-craftsmen to work in creating these stylish, handcrafted keys. Because of the turmoil in the region's economy, CT HRD produces these beautiful, functional works of art at prices that would not be possible elsewhere. Apart from being beautifully machined, the keys are designed for ease of use and high reliability, with separate machined contacts, needle bearing trunnions, and easily adjustable contact spacing and spring tension.

The brass parts are machined from high-quality stock and are finished to mirror perfection. The wood bases and knobs are of oak, finished and lacquered (or painted) for durability. The chrome-plated keys are fashioned from "GOST" (Russian National Standard) black steel and plated with a brilliant, nickel-chromium alloy.

Each key has a unique serial number engraved in the side of the CT1 base, the lever of the CT4, and on a brass plaque on the other keys and paddles. The wood-base keys have the wiring recessed in the base, with a felt pad on the bottom.

For more information, contact Tom's Tubes, 190 East Hwy., Boaz, AL 35957-6430 (256-593-0077; e-mail: <w4th@tomstubes.com>; on the web: <http://www.tomstubes.com>).

Postscript: A visit to the Tom's Tubes website shows that Tom specializes in the sale of Russian power amplifier tubes; the website is billed as "Your Russian Tube Connection." Tom stocks many Svetlana tubes that aren't listed on the site. He also is now the worldwide distributor for G3SEK's line of triode and tetrode boards and kits that can help make building a triode or tetrode amp an easy and enjoyable project.

Most Expensive Telegraph Key from Morse Express. Over the years we have announced several keys and other products from Milestone Technologies. Proprietor Marshall Emm, N1FN, has introduced a high-quality stream of keys, paddles, bugs, and other accessories to the amateur community. Many are imported, and more than a few are very unusual. This time open your wallet wide for a real gem of a super-high-quality key.

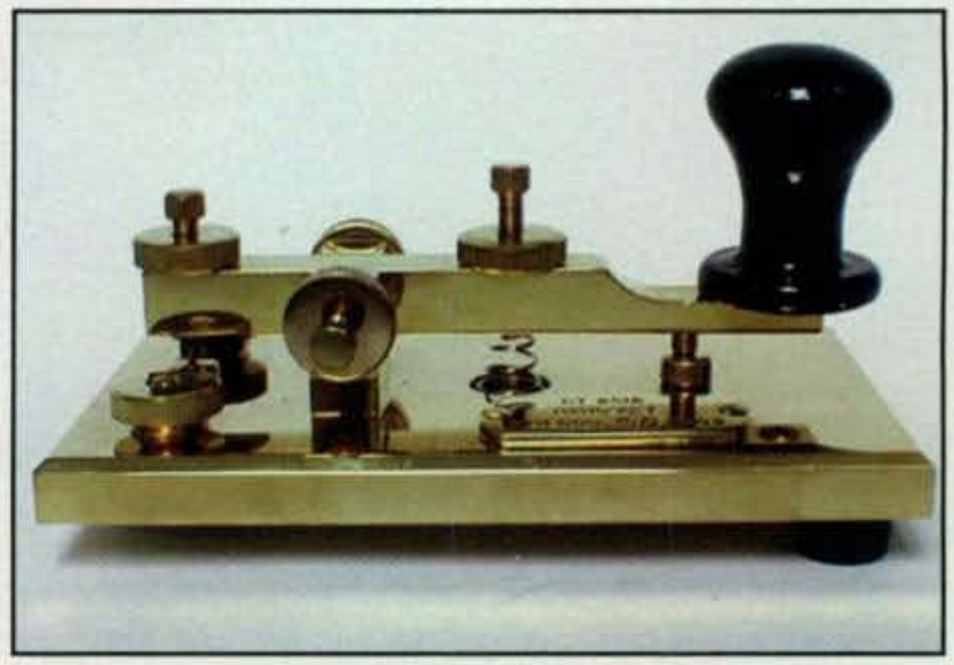

Photo A– Tom's Tubes is now the exclusive U.S. distributor of Ukraine-based CT Ham Radio Devices' beautiful brass, chrome, and hardwood CW keys. Depicted here is the polished-finish CT HRD Model CTASIABR Asia Hand Key, priced at $119.95. (Photo courtesy Tom's Tubes)

According to Marshall, Hi-Mound's HK-8 Serpentine Key (photo C) is probably the most expensive key in current production anywhere in the world. The Japanese import also could be the most beautiful key anywhere, with its hand-polished serpentine base and knob. Serpentine is an attractive green mineral that takes a nice polish and is suitable for carving. It has been used as a substitute for jade and is sometimes difficult to distinguish from jade, a testament to the beauty of the serpentine material.

The HK-8 is a visually striking key, and it also represents the epitome of the keymaker's art. The trunnion is mounted in high-precision, sealed and permanently lubricated ball bearings. The contacts are of vanadium, and the mechanical parts have a mirror-perfect chrome finish.

In use, the HK-8 is said to be as good as it gets. The result of its weight of more than five pounds,

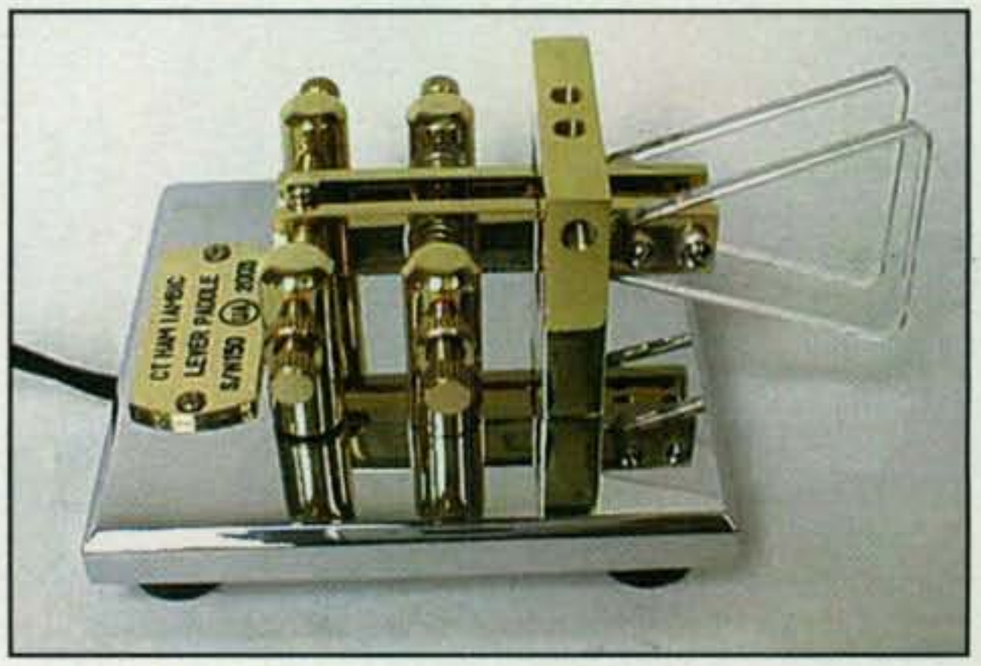

Photo B– The CT HRD keys, made in Ukraine and distributed by Tom's Tubes, are high-quality, handcrafted telegraph keys. This photo shows the "Exclusive Edition" CT HRD Model CT9BC Ham Iambic Lever Paddle, at $124.95. (Photo courtesy Tom's Tubes)

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

and the precision mechanical components, is a key that is extremely stable. Operation is effortless, and the serpentine knob is an extremely comfortable fit to the hand. The key is $715 from Morse Express.

Are you intrigued? If so, contact Morse Express, 10691 E. Bethany Dr., Suite 800, Aurora, CO 80014; (1-800-238-8205; e-mail: <nifn@MorseX.com>; on the web: <http://www.MorseX.com>).

Antennas and Accessories

Buddipole Deluxe Package from W3FF Antennas. The good-performance, portable Buddipole™ HF/VHF antennas (photo D), offered by W3FF Antennas, are no strangers to most *CQ* readers. The precision-crafted, inductively loaded, limited-space rotatable dipoles grew out of W3FF Antennas' vision of providing amateurs with a modular antenna system where you can mix and match parts and change configurations to optimize performance. The antennas also had to be lightweight and compact for portable operation, yet not compromise on performance. The result: the popular Buddipole that covers 40 through 2 meters.

The Buddipole Deluxe Package is now available. The all-in-one package includes the Buddipole itself, plus everything you need for setting up an efficient portable antenna solution anywhere in the world in just a few minutes. There are a number of custom components, all of which fit into the padded cordura nylon custom-carrying "antenna system bag" with shoulder strap. These components include the Buddipole antenna (covering nine bands, 40 through 2 meters); the tripod, with extendible legs and locking base; a portable mast, which extends to 8 ft. in height; a rotating arm kit, to change configurations; an extra stainless-steel telescopic whip and three extra coil clips; an antenna operating manual; and a free, new ten-page modeling report.

The package is said to be perfect for all types of situations, including Field Day, DXpeditions, emergency services, and the like. You can easily put it in your suitcase when you go on vacation, keep it in your RV or car, or have it ready for anytime you want to have a versatile and efficient portable antenna system up and running in minutes.

The Buddipole system is not cheap, but that's true of most well-made, quality things. All items in the package are available separately for $421, but are just $385 in the package. For more information, contact W3FF Antennas, 2390 Templeton Drive, Redding, CA 960002 (phone 530-226-8446; e-mail: <sales@buddipole.com>; on the web: <http://www.buddipole.com>).

Z-100 Low Cost Autotuner from LDG Electronics. Over the past few years we have noted many impressive products from Dwayne Kincaid, WD8OYG, of LDG Electronics. Not long ago, Dwayne started a new line of tuners that tune from memory. For the moment, we'll just take note of one of LDG's latest new-breed tuners. The $149 Z-100 Low Cost Autotuner (photo E) effectively offers QRO performance at a QRP price; in fact, it's been said to be the definitive low-cost automatic antenna tuner, aiming to outperform any other tuner in its price class.

The Z-100 will tune with 0.1 to 125 watts (50 watts on 6 meters), making it an excellent choice for almost any radio or operating style. Backpackers and QRP operators will appreciate the latching relays. Also, power can be removed from the tuner once you have tuned. In addition, when the tuner is not tuning, it draws nearly zero amps. Finally, the Z-100 features 200 fast memories which decrease tuning time up to 95%.

The tuner interfaces to many radios for added convenience. An optional interfaces integrates the tuner with the radio so you

Photo C– Hi-Mound's HK-8 Serpentine Key from Morse Express is probably the most expensive key in current production anywhere. The HK-8 is a visually striking key, representing the epitome of the keymaker's art. In use, the HK-8 Serpentine is said to be as good as it gets. (Photo courtesy Morse Express)

can take advantage of radio faceplate "tune buttons" (if so equipped) or tuner-signaled tuning. Interfaces are available for certain ICOM, Alinco, Yaesu, and Kenwood radios. Tuner operating range is 1.8 to 54 MHz, and it will tune a 10:1 SWR (3:1 on 6 meters) down to 1.5:1 or less. Without going into details, we'll just say that "simple operation" is the key to the Z-100.

Contact LDG Electronics, 1445 Parran Road, St. Leonard, MD 20685 (telephone 1-877-890-3003; e-mail: <ldg@ldgelectronics.com>; <http://www.ldgelectronics.com>).

Postscript: LDG Electronics endorses the Z-100 Ultra Autotuner from W4RT Electronics (go to <http://www.w4rt.com>). The Z-100 Ultra includes an internal battery pack

Photo D– The portable Buddipole™ HF/VHF antennas offered by W3FF Antennas, one of which is shown here, are familiar to most readers. Now the Buddipole Deluxe Package is available. The new, all-in-one package's details are in this month's column. (Photo from the W3FF Antennas website)

Photo E– The new LDG Electronics Z-100 Low Cost Autotuner effectively offers QRO performance at a QRP price. In fact, the Z-100 has been said to be the definitive low-cost automatic antenna tuner, aiming to outperform any other tuner in its price class. (Photo from the LDG Electronics website)

(with batteries) and circuit modifications that allow you to operate the Z-100 Ultra without needing to connect an external power source (although you still can). Nominally, you get over 10,000 full-tunes and many times more memory tunes before needing to change the long-life batteries. The Z-100 Ultra is said to be outstanding for portable operations where power, weight, and space are issues, so check it out!

Software and Computers

MicroLog Ham Radio Logging Program from WAØH. Jerry Gentry, WAØH, let us know about his ambitious MicroLog shareware program for ham radio logging by PC. As shareware, his program can be freely downloaded, copied, and given to others.

MicroLog runs under Windows® 98 or later. Important, too, the U.S. and Canadian callbooks are built into the program. However, due to the size of the U.S. and Canadian callbooks (150 MB), they are not included as part of the downloaded program. To get a new version of MicroLog (which has a recent copy of the callbooks built in), send $10 to WAØH at the address shown below.

Once a callsign is entered, MicroLog can display additional information that it extracts from the built-in callbooks or that can be entered manually. Also, for several different types of awards, MicroLog can display a summary of the stations worked and confirmed. Also, MicroLog can display several types of lists, such as a list of islands or a customized list of stations worked. The program allows you to specify which fields to display, and it can display a map that shows the location of the callsign you entered. MicroLog also can display a list of which types of licensees are allowed to work which frequencies, as well as present several types of maps, such as a U.S. grid map.

Contact Jerry Gentry, WAØH, Box 4485, Springfield, MO 65807 (417-887-6333; e-mail: <wa0h@arrl.net>; on the web: <http://www.wa0h.com>). When you buy MicroLog directly from WAØH, you become a registered user and are entitled to technical support. You will also be notified of new program versions.

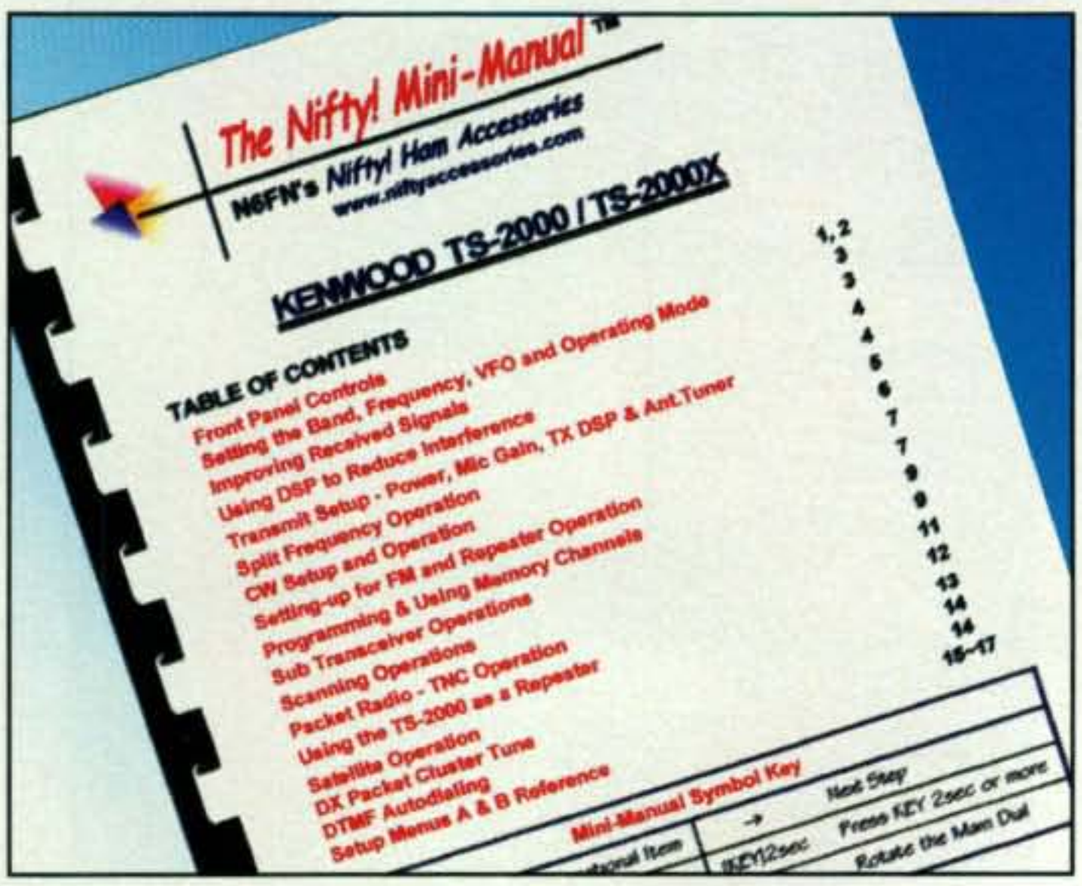

Photo F– Nifty! Ham Accessories has added the TS-2000 Quick Reference Mini-Manual *to its series of quick reference guides. The new mini-manual provides complete coverage for Kenwood TS-2000 and TS-2000X models. (Photo courtesy Nifty! Ham Accessories)*

From the Bookshelf

TS-2000 Quick Reference Mini-Manual™ and Nifty! HT Stand. Bernie Lafreniere, N6FN, let us know of yet another new addition to his growing series of Quick Reference Guide products for various ICOM, Kenwood, and Yaesu radios. Bernie added the *TS-2000 Quick Reference Mini-Manual* (photo F) to his series of reference guides, providing complete coverage for Kenwood TS-2000 and TS-2000X models. Organized for quick and easy access, all controls and menus are fully explained. Condensed, step-by-step instructions and operating hints are interspersed throughout the guide.

Printed in color and fully laminated for durability, the compact, 18-page, 4.5" × 8" mini-manual is designed to be kept with the radio, so it's there when you need it. Price is $18.85 plus shipping.

Recently, Bernie branched out to offer another, but quite different, portable radio product. It's the Nifty! HT Stand (photo G). With an adjustable shelf, it's designed to hold just about any HT equipped with a belt clip. With it, you can get double-duty out of your HT, using it for base station as well as portable operations. The stand is said to be perfect for holding your radio upright and steady at a convenient angle.

Made of steel with soft rubber feet, the stand is very substantial, and it resists a remotely connected microphone from "dragging" your HT around the desk. The radio clips to the support plate using your HT's belt clip and is supported with an adjustable shelf. The stand is $30 plus s/h.

For more details on both types of products, contact Nifty! Ham Accessories, 1601 Donalor Drive, Escondido, CA 92027; (760-781-5522; e-mail: <berniel@niftyaccessories.com>; web: <http://www.niftyaccessories.com>).

Short Bursts

News from ICOM: EchoLink Over D-STAR and Team Subaru. "Exciting" is a good term for ICOM's announcement that their "EchoLink® over D-STAR" system allows practical VoIP (Voice Over IP) amateur radio communications. Last winter, the first EchoLink over D-STAR contact was made between Bellevue, Washington and several cities in Ohio. The initial contact was made using EchoLink, with high-speed internet access provided by ICOM's D-STAR system (fig. 1).

D-STAR is a new mode of amateur radio operation that utilizes digital voice and high-speed data. The D-STAR system is an off-the-shelf, open protocol system that provides 128K high-speed data over the air on the 1.2-GHz amateur band. The system lets amateurs talk on repeaters located in every state, as well as repeaters located in foreign countries and HF base stations.

D-STAR offers extremely narrow bandwidth for voice communications, and the system can help eliminate overcrowding

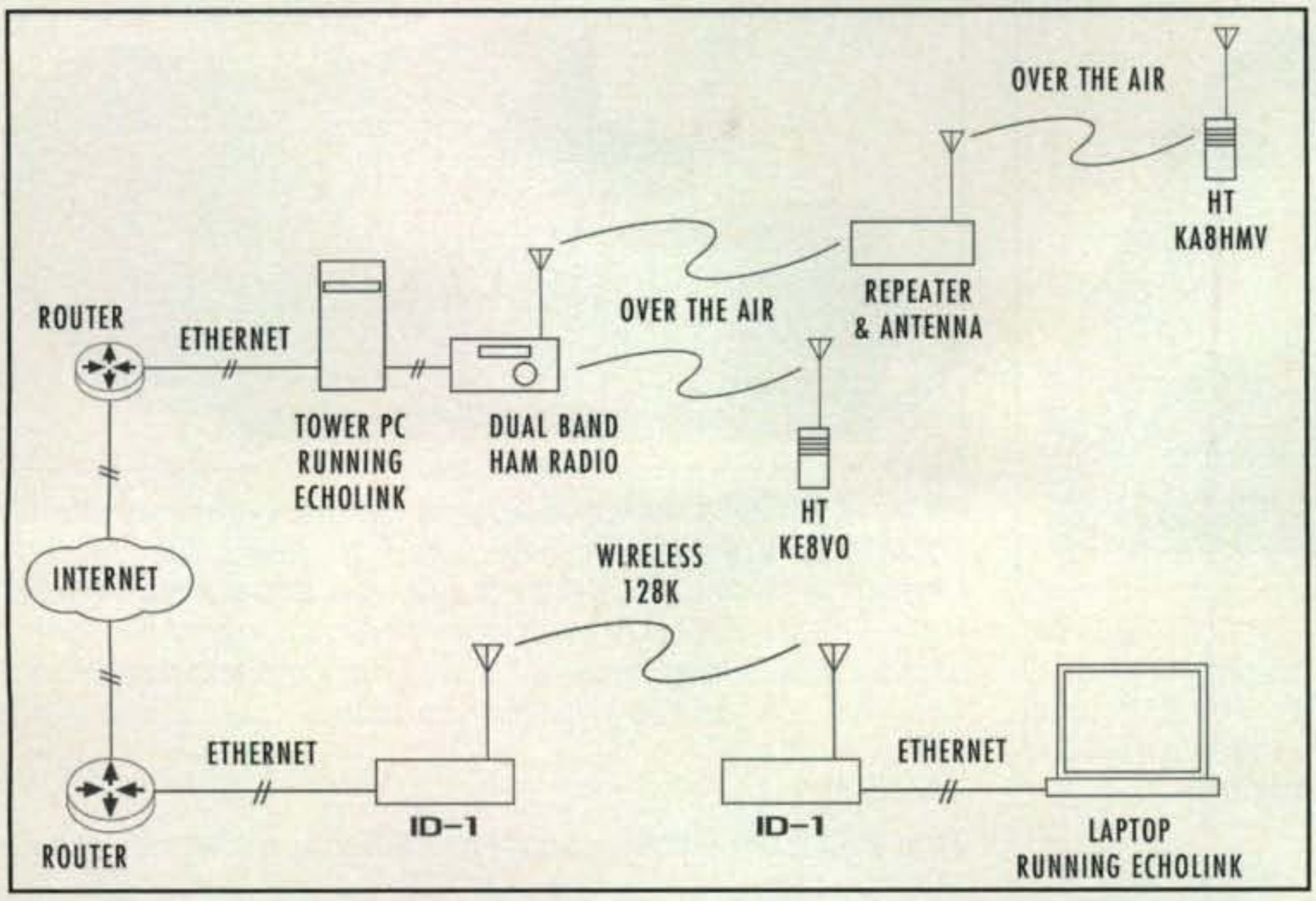

Fig. 1– Here's a simple representation of the EchoLink® over D-STAR system as used by ICOM to allow VoIP amateur radio—said to be an amateur radio first. Initial contact was made by EchoLink, with high-speed internet access provided by ICOM's D-STAR system. (Graphic courtesy ICOM America)

of the amateur bands. The significance of being able to work with amateur-based VoIP applications is great, with real implications for the future of digital communications, including communications in mobile and remote locations. Some new amateur radio gear already supports D-STAR, and many amateurs expect fast growth of this mode as it becomes more available (photo H).

EchoLink uses VoIP technology to transmit voice signals digitally from one PC to another, and includes all of the software required to connect amateur equipment (typically FM transceivers) to a PC. The only additional equipment required is any of several commonly available sound-card-to-rig interfaces. Each EchoLink station allows amateurs in its local area to communicate with those in distant locations, using low-power VHF/UHF mobile gear.

EchoLink is conceptually similar to several other VoIP systems. However, EchoLink offers extra flexibility. It also has built-in support for conferencing; good performance over dial-up internet connections; compatibility with generic hardware; remote-control capability; and a sophisticated, centralized security system.

In a separate announcement, ICOM radios were used to keep the "Subaru Challenge Team," sponsored by ICOM during the 2004 Alcan Winter Rally, in touch with one another, with rally officials, and with the outside amateur radio world via HF APRS® mode communi-

Photo G– With an adjustable shelf, the Nifty! HT Stand from Nifty! Ham Accessories is designed to hold just about any HT equipped with a belt clip. The little stand is said to be perfect for holding your radio upright and steady at a convenient angle. (Photo courtesy Nifty! Ham Accessories)

cation (photo I). Held every four years, The Alcan Winter Rally runs along and around the famous frozen Alaska-Canada highway. Every event follows a different course. This year the nine-day February rally began in Kirkland, Washington and ended approximately 5000 miles later in Anchorage, Alaska. This year also marks the 20th anniversary of the world-renowned rally.

Radio equipment selection for Arctic conditions is critical, as winter in Alaska

Photo H– Depicted here is ICOM's ID-1 Digital Transceiver, the "wireless" link in its groundbreaking EchoLink over D-STAR system described in the column text. The ID-1 transceiver is an important component of a complete D-STAR system. (Photo courtesy ICOM America)

and the Yukon Territory is very severe. All electronic devices must be removed from the vehicles each night, and some teams even keep their cars running all night. Isolation in extreme temperatures, especially when the route deviates far from the main highway, is a danger and is the reason why amateur radio is so popular with road rallyists.

For more information on D-STAR, contact ICOM America, Inc., 2380 116th Ave. N.E., Bellevue, WA 98004 (425-454-8155; on the web: <http://www.icomamerica.com>). For more information on the Subaru Challenge Team, visit <http://www.challengedriving.com>. More Alcan Rally details are at <http://www.alcan5000.com>.

Photo I– ICOM amateur radio gear, primarily the rugged IC-706MKIIG transceiver, was used to keep the Subaru Challenge Team in contact during the 2004 Alcan Winter Rally. The IC-706MKIIG was considered to be a perfect compact rig for working under difficult climatic conditions. (Photo courtesy ICOM America)

Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

Overheard: Sadly, I've always found that the road to "Easy Street" is always under construction, or it's at least rutted with lots of potholes.

73, Karl, W8FX

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

On The Cover

Mark Pride, K1RX, can take great pride in his "multi-multi" (multi-operator, multi-transmitter) contest station in Kensington, New Hampshire. He has provisions for five separate operating positions, all linked by networked computers, and enjoys hosting contesters—especially new contesters—during major operating events. In our cover photo, you can see two of Mark's several towers behind him. The front tower holds stacked Yagis on 20 and 15 meters, while the rear one is home to two 40-meter beams plus stacked Yagi arrays for 10 meters. Not visible are his 80-meter 4-square and inverted vee, plus a shunt-fed tower for 160 meters.

Mark has also done some contesting from a few portable locations—including 4U1ITU (ITU headquarters in Geneva, Switzerland), Taiwan, Sardinia, Japan, Vatican City, and several islands in the Caribbean.

Former ARRL General Manager Dick Baldwin, W1RU (then W1IKE), lived in the town where Mark grew up and was his ham radio mentor. That relationship led to Mark's first job after college, working in the ARRL Technical Department under the legendary Doug DeMaw, W1CER. That job led to his next one, as Chief Antenna Engineer for Cushcraft (succeeding company founder Les Cushman in the position), followed by a short stint in the advertising department at *ham radio* magazine. Currently, Mark is a Wireless Solutions Executive with IBM.

Mark's favorite band is 40 meters CW, where he says he enjoys working Asia via longpath on winter afternoons. But contesting is his true love, as it has been for the past 30 years. "I strongly believe," says K1RX, "that contesting is the one aspect of ham radio that pulls together all of the most fascinating elements of the hobby under one roof."

(Cover photo by Larry Mulvehill, WB2ZPI)

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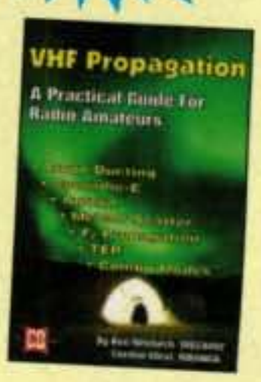

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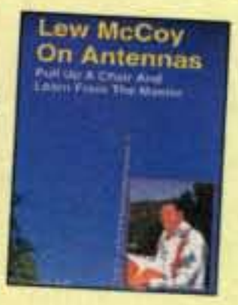

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BY JOE LYNCH,* N6CL

Much More on BPL

Once again this column contains information on a current pressing issue affecting amateur radio—access Broadband over Power Lines (BPL) proposed regulations. There is a lot of news to cover, so let's begin.

FCC Wireless Broadband Access Task Force Announced

On the heels of the FCC's Notice of Proposed Rulemaking (NPRM) on the access BPL plan comes word that FCC Chairman Michael K. Powell has announced the formation of a Wireless Broadband Access Task Force to identify potential changes in wireless broadband policies that will further facilitate the deployment of wireless broadband services.

According to a May 5, 2004 FCC press release, Chairman Powell commented, "We are strongly committed to facilitating broadband investment and deployment, particularly through technological choices. This Commission has put a high priority on making sure Americans have access to broadband services through multiple facilities-based platforms. I believe that we can do even more. I have asked this Task Force to study existing wireless broadband polices and make recommendations for possible improvements to promote the growth of both licensed and unlicensed wireless broadband services. The overarching goal of this initiative is to take a hard look at what we can do to extend the reach of broadband services to underserved areas and to provide increased competition in areas that already have access to broadband. The creation of this Task Force is a positive step for progress in implementing our broadband vision." More information on this task force may be found at: <http://www.fcc.gov/wbatf/>.

While it is unwise to read too much into this announcement, it is probably safe to say that the FCC chairman is keeping an open mind in exploring all options pertaining to broadband internet access, particularly in light of the release of the first phase of a long-awaited BPL study by the National Telecommunications and Information Administration (NTIA). A summary of this report follows:

NTIA Study Documents Access BPL Generated RFI

The NTIA has issued an extensive report (NTIA Report 04-413) that documents access BPL generated RFI. The first phase of NTIA's study of RFI from BPL was released on April 27, 2004. The entire document can be downloaded from the NTIA URL at: <http://www.ntia.doc.gov/ntiahome/fccfilings/2004/bpl/index.html>.

In a cover letter to FCC Chairman Michael K. Powell, Acting NTIA Assistant Secretary for Communications and Information Michael D. Gallagher assured him that the NTIA would "work with the Commission to establish a firm technical foundation for responsible deployment of BPL to protect critical federal communications systems." Even so, regarding harmful interference, Gallagher further wrote the following caveat: "The value of the commercial opportunity presented by BPL systems may be very high, but the technical rules governing their deployment must address potential harmful interference to critical systems."

It is the second half of that sentence that is perhaps the most important news that we amateurs have to date to believe that the FCC may delay implementing any changes in its regulations to accommodate access BPL. In the same cover letter Gallagher states that there is more work ahead for the NTIA, commenting, "NTIA's Phase 2 study will assess the interference risks due to aggregation and ionospheric propagation of interfering signals from BPL systems, refine and apply BPL deployment models, and evaluate the effectiveness of proposed Part 15 measurement techniques."

While Gallagher writes that part of the NTIA's goal is "to protect 41 frequencies for the most sensitive and likely most severely affected federal systems," information generated in this and future reports by the NTIA will be most useful for amateur radio operators in their position that access BPL will cause harmful interference to a wide spectrum of operations, including both amateur radio and commercial broadcasting operations.

Particularly noteworthy to mobile and rover operations is the following *ARRL Letter* summary of the NTIA report: "Interference calculations by the NTIA engineers indicated that a BPL transmitter operat-

*e-mail: <n6cl@fuller.edu>

VHF Plus Calendar

July 1, 2004 – June 30, 2005	States Above 50 MHz Contest (See text for details.)
July 1	Moon Perigee
July 2	Full Moon
July 4	Moderate EME conditions
July 9	Last Quarter Moon; *Pegasids* meteor shower predicted peak
July 11	Poor EME conditions
July 13	*Phoenicids* meteor shower predicted peak
July 14	Moon Apogee
July 16–18	Mid Summer Six Club Contest (See text for details.)
July 17	New Moon.
July 17–18	CQ WW VHF Contest (See text for details.)
July 18	Moderate EME conditions.
July 23–25	Central States VHF Society Conference (See text for details.)
July 25	First Quarter Moon; Moderate EME conditions
July 30	Moon Perigee
July 31	Full Moon

—EME conditions courtesy W5LUU

ing within Part 15 limits would significantly increase the noise floor for land-mobile receivers on frequencies below 30 MHz. The agency said it could be inferred from its calculations that 'a vehicle-mounted HF receiver' operating in a residential neighborhood next to a BPL-energized line 'may experience harmful interference' depending on the frequency, distance along the line from the BPL transmitter, the BPL transmitter's duty cycle, and the number of BPL devices on the power line." (Source: <http://www.arrl.org/ news/stories/2004/04/29/1/?nc=1>.)

By contrast, according to an *ARRL Letter* story dated April 22, 2004 (see: <http://www.arrl.org/news/stories/2004/04/22/2/?nc=1>), Progress Electric Company (PEG) attorney for regulatory affairs Len Anthony told James Burtle, chief of the FCC's Experimental License Branch, "It is PEC's position and interpretation of the FCC's rules with regard to 'harmful interference' that any interference that may still exist is not 'harmful' as that term is defined by the FCC's rules. This level of interference does not seriously degrade ham radio operation or transmissions or cause repeated interruptions."

Particularly of interest to rover operations, the *Letter* states: "Anthony noted that since PEC can modify its Amperion BPL system to totally eliminate interference to fixed stations, 'the only impact of any kind upon ham operations is upon mobile operators.' PEC concluded that since BPL interference to mobiles would be 'very short lived,' the company is not causing harmful interference and is in 'full compliance' with FCC Part 15 rules."

A legitimate question to ask is: What does the NTIA see in mobile operations that the PEG does not see? This is your columnist's answer: While it is important to us in the weak-signal community to ward off harmful interference for our rover operations, more important is protecting the use of mobile operations for emergency communications.

My case in point is my use of my 1982 Ford conversion van as a base of operations for providing emergency communications for the Salvation Army in the aftermath of the Oklahoma City Murrah building bombing on April 19, 1995. For nearly a week my wife and I operated from our van providing communications for the adjacent Salvation Army canteen. While our operations took place on 2 meters, outside of the spectrum with which access BPL is concerned, it does demonstrate the use of amateur radio mobile operations at the scene of a disaster. Even though we never operated on HF, my van was equipped to do so with an appropriate HF radio and antenna.

For Mr. Anthony to arrogantly assume that because BPL interference to mobiles would be "very short lived" the company is not causing harmful interference and is in "full compliance" with FCC Part 15 rules demonstrates his ignorance of what is fully defined as mobile operation. Speaking of the Oklahoma City bombing, parked across the street from my van at the bombing site was a mobile FCC monitoring station. Its task was to see to it that all of the radios in operation within the perimeter were in FCC compliance. As it turned out, according to a friend of mine on the Oklahoma City police force, one of their new radios was shut down by the FCC when it was determined that radio was interfering with the Secret Service by way of a spurious emission. In retrospect, if access BPL had been in existence then and was lighting up the power lines with its RFI, I wonder if the FCC inspector would have ordered the interfering access BPL to shut down.

The BPL test site in question is the same one addressed by *CQ VHF* magazine "FM" columnist Gary Pearce, KN4AQ, in his column in the Spring 2004 issue of the magazine. The following is from the *ARRL Letter:*

ARRL North Carolina Public Information Officer Gary Pearce, KN4AQ, suggested this week that PEC has a bit more work to do. He is among local amateurs closely monitoring BPL deployment in the test zones and cooperating with PEC and Amperion to work out any interference issues. Pearce says interference remains on the top end of 20 meters in an overhead-line field trial neighborhood where PEC recently had tweaked its system, but it has not been mitigated at all in neighborhoods with underground power lines. When he visited the neighborhood in the wake of Anthony's e-mail, Pearce said he at least expected to find that PEC had eliminated the 20-meter interference.

"Nothing had changed," he told the ARRL. "They were still covering up the top end of the 20-meter band." Interference to 17 and 12 meters had been notched out, but beyond that, BPL interference persisted from 14.290 to nearly 17 MHz, he said, and "fringe" carriers still encroached some 100 kHz into the bottom of 15 meters.

"The signals on the underground lines have not changed at all," Pearce continued. "They were still full-strength across virtually every ham band if you look across the whole neighborhood."

Progress Energy has been operating its "Phase II" trial in three neighborhoods south of Raleigh since early January. The area,

in Wake County, is largely rural or lightly settled.

"No hams live in the underground-wired neighborhood, so none complained," Pearce said. Early on, no hams in the vicinity of the BPL trial areas filed formal complaints "because they didn't know what the signals were," Pearce said. The handful of BPL interference complaints eventually lodged with the FCC came from Amateur Radio licensees living closer to the overhead-wired neighborhood, and some came from mobile operators.

Pearce said PEC's stance regarding mobile stations "sets a new bar" in interpreting harmful interference. "If you're driving by a power line, you can hear the signal for a mile or so," he added. "It is hardly something that is just going to be transitory."

"Hams have never been asked to accept that level of interference before," he said.

The ARRL's BPL strategy, okayed at a March 13, 2004 Executive Committee meeting, calls for the League to seek a radiated emission limit sufficient to protect the estimated 70,000 amateur radio mobile stations in the U.S. The FCC's BPL Notice of Proposed Rulemaking in ET Docket 04-37 is silent with respect to mobile operation, which typically occurs in close proximity to medium-voltage power lines. ARRL field observations using typical amateur equipment have documented BPL interference to mobile stations located hundreds of meters from a BPL interference source.

"To date," Pearce says, PEC has not demonstrated the ability "to completely eliminate any interference with fixed ham operators," as it claims it can do. Amateurs in his area remain concerned about the so-called "fringe" carriers at the edge of the BPL spectrum blocks that still fall inside amateur bands at reduced amplitude, he said. They are also troubled by incomplete BPL signal notching in 17 and 12 meters, where, he says, weak BPL carriers remain audible. . . .

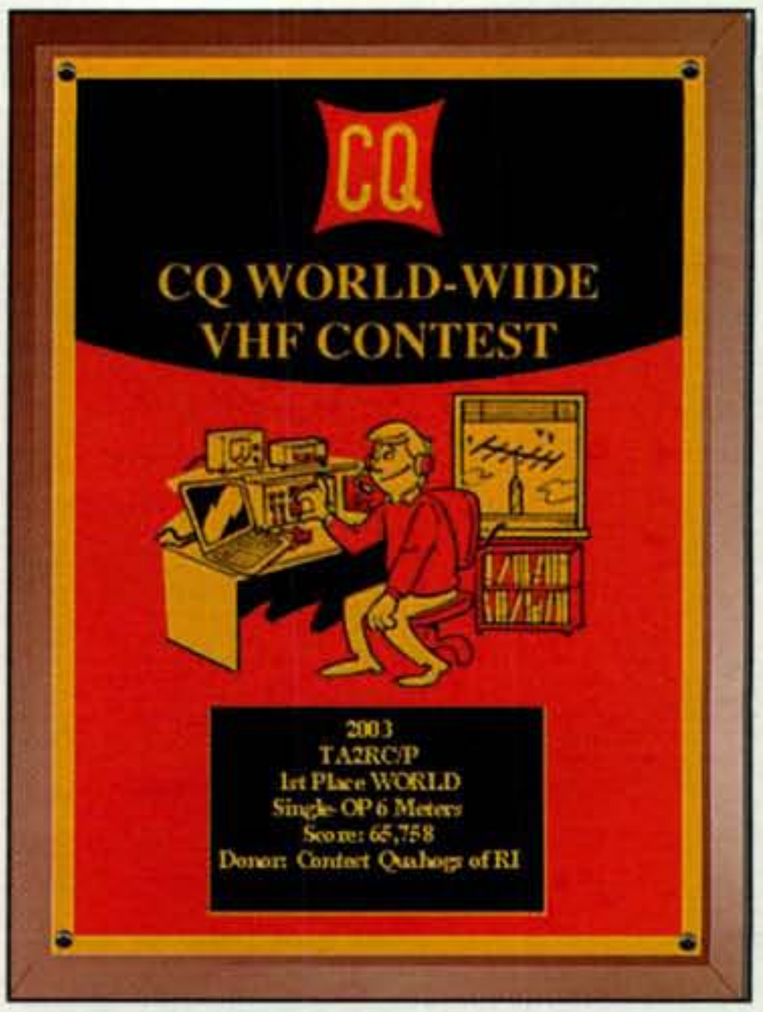
President Bush Supports Access BPL

In an April 26 speech at the Minneapolis convention of the American Association of Community Colleges, U.S. President George W. Bush advocated changing technical standards to encourage BPL deployment in the U.S. According to the *ARRL Letter,* in his speech, he told the community colleges gathered that there need to be technical standards to enable new broadband technologies such as high-speed communication over power lines. From *the ARRL Letter* (<http://www.arrl.org/news/stories/2004/04/27/1/?nc=1>), President Bush said:

"Power lines were for electricity; power lines can be used for broadband technology," Bush declared. "So the technical standards need to be changed to encourage that [use of the power lines]." In response to President Bush's address, ARRL President Jim Haynie, W5JBP, has written Mr. Bush urging him to reconsider his support of access BPL, stating that "while the League supports universal and affordable broadband access, BPL is the wrong direction to take."

"Power lines were designed to transmit energy," Haynie said in a fax to the White House. "They were not designed to transmit broadband signals, which are, in fact, radio frequency signals. The broadband signals radiate from power lines and cause severe interference to radio reception."

Unfortunately, Mr. Bush's speech reflects the current White House agenda concerning access BPL. As part of an ambitious statement on the White House website concerning broadband internet access (see <http://www.whitehouse.gov/infocus/technology/economic_policy200404/chap4.html>), the following was written concerning access BPL: "The Department of Commerce [via its NTIA branch] is developing the technical specifications necessary to enable the widespread and responsible deployment of Broadband over Power Lines (BPL). Having conducted 10 million measurements of BPL systems, the Department of Commerce will be able to chart the clear technical path forward for BPL to coexist with other critical uses of spectrum. Once deployed, BPL has the potential to turn every electrical outlet into a broadband pipeline." Unfortunately, this statement totally ignores the caveats documented in the above-cited NTIA report.



The CQ World-Wide VHF Contest will now be offering this sponsored, sharp-looking, 9" × 12" walnut plaque to the top scorers in the various categories. See the rules for the July 17–18, 2004 contest on page 91 of the June issue of CQ. Individuals, clubs, and ham radio profit centers who may want to sponsor one of these neat plaques please e-mail John Lindholm, W1XX, at <w1xx@cqww.com> for more information.

FCC Adopts RFID Tag Regulations

In a Report and Order contained in ET 10-278 the FCC has approved a request by SAVI International Technology to adopt changes pertaining to the Commission's Part 15 regulations that would accommodate the use of RF identification tags in the vicinity of 433 MHz. Such devices, according to the new regulations, will be allowed to transmit for durations of up to one minute at power levels higher than what had been permitted under the old regulations (but lower than that permitted by garage-door openers also permitted in the 70-cm ham band).

According the April 23, 2004 *ARRL Letter,* the regulations limit "the operating band for such RFID tags to 433.5 to 434.5 MHz, instead of the 425 to 435 MHz SAVI originally wanted. It further would prohibit operation of RFID tag systems within 40 km (about 25 miles) of five government radar sites. Manu-

facturers of 433 MHz RFID systems would have to register the locations of their system base stations to assist in resolving interference complaints."

Echo Satellite Due to be Launched Soon

AMSAT's latest satellite, Echo, is due to be launched no earlier than June 29. Previously, the launch had been scheduled for late February, but it was postponed due to a delay in the delivery of the primary payload to the launch site. While this is the earliest current launch date, typically this date slides, depending on a number of factors, one of which is paying for the launch.

Unfortunately, AMSAT is still far short of its goal of raising $110,000 for this first launch. As of May 5, 2004 only slightly more than $62,000 has been raised. If you would like to make a donation, please send it to AMSAT-NA Headquarters at 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703. AMSAT-NA is a 501(c)(3) organization, so your donation should be tax deductible in the U.S.

For an extensive technical article concerning Echo, please see the Spring 2004 issue of *CQ VHF* magazine. This article also can be downloaded from AMSAT's website at: <http://www.amsat.org/amsat/sats/echo/OSCAR-E_Status_Report_F03.pdf>. Additional articles can be found in Summer 2002 and Summer 2003 issues of *CQ VHF*.

Current Conference

Central States VHF Society Conference: It is neither geographically in the central part of the U.S. nor is it within a U.S. state. Nevertheless, the Delta Meadowvale Resort and Conference Centre in Mississauga, Ontario, Canada is this year's site for the annual Central States VHF Society conference to be held July 23–25. The venue is located only 15 minutes west of Toronto's Pearson Airport.

It was two years ago at the Milwaukee, Wisconsin conference that the Canadians proposed the Toronto area for this year. In the aftermath of 9/11 concerns were voiced among the leadership and membership of CSVHFS pertaining to international travel. However, due to the longstanding warm relationship between the two countries, these concerns were not given much consideration.

Even so, travel to Canada by the majority of members and interested attendees on the U.S. side is not without its potential problems. To alleviate these concerns the leadership of this year's conference has gone out of its way to "cover all the bases," as the U.S. saying goes. On the CSVHFS website (<http://www.csvhfs.org>) are extensive write-ups concerning the dos and don'ts of traveling between the U.S. and Canada, in particular traveling back into the U.S. after the conference. There are also complete listings of what there will be to do before and during the conference. Should you have questions not answered by the website, please e-mail conference president Peter Shilton, VE3AX, at <ve3ax@csvhfs.org>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings,* or both. For more information, questions about format, media, hardcopy, email, etc., please contact the person listed with the announcement. To date this year the following organizations or conference organizers have announced calls for papers for their forthcoming conferences:

TAPR/ARRL Digital Communications Conference: The 2004 TAPR/ARRL Digital Communications Conference will be held September 10–12 at the Airport Holiday Inn in Des Moines, Iowa. You'll find more conference information on the web at <http://www.tapr.org/dcc/>. Send your submission by August 10, 2004 to: Maty Weinberg, ARRL, 225 Main Street, Newington, CT 06111, or via the internet to: <maty@arrl.org>.

Microwave Update: The Microwave Update conference dates are October 14–16, and it is to be held in the Dallas-Ft. Worth area of Texas. The contact person is Kent Britain, WA5VJB, at <wa5vjb@cq-vhf.com> no later than

August 16. For more information, see the North Texas Microwave Society's website: <http://www.ntms.org>.

AMSAT-NA Space Symposium and Annual Meeting: The 2004 AMSAT Space Symposium and Annual Meeting will be held October 8–10 in Arlington, Virginia. This symposium will be in conjunction with the ARISS International Meeting that is planned for October 10–13. Camera-ready copy of submissions on paper or in electronic form will be due by August 1 for inclusion in the printed symposium proceedings. Papers should be sent to: Daniel Schultz, N8FGV, 14612 Dowling Drive, Burtonsville, MD 20866, or by e-mail to: <n8fgv @amsat.org>. For more information, please see the AMSAT URL pertaining to the symposium at: <http://www. amsat. org/amsat/news/ ans.html#03>.

Current Contests

States Above 50 MHz Award: Started nine years ago by the Central States VHF Society, this year-long contest is really going strong with heavy competition for the top awards. The last three years the contest was won by Mike King, KMØT, but by the barest of margins. In the past, to be eligible for a certificate one had to have worked 30 states on bands above 50 MHz. Any combination of bands may be worked just so the total is 30 or more states. For more information and rules, check the CSVHFS website at: <http://www. csvhfs.org/ CSTEST0.html>.

CQ WW VHF Contest: The annual CQ WW VHF Contest will be held between 1800 UTC July 17 and 2100 UTC July 18. Exchange is callsign and Maidenhead grid locator. The bands of operation are only 6 and 2 meters. The categories are: Single Op, Single Band; Single Op, Multiband; Multi Op; and Rover. Scoring is 1 point per QSO on 6 meters and 2 points per QSO on 2 meters. Mail your logs to CQ VHF Contest, 25 Newbridge Rd., Hicksville, NY 11801; or e-mail to <cqvhf@cqww. com>. For the complete rules see the June issue of *CQ*, the Spring 2004 issue of *CQ VHF* magazine, or the CQ website: <www.cq-amateur-radio.com>.

Mid Summer Six Club Contest: The Mid Summer Six Club Contest will be held between 2300 UTC, July 16 and 0300 UTC, July 18. All logs are due 30 days from ending date of the contest and they go to <w4wrl@aol.com>. For further information go to: <http://6mt. com/contest.htm>.

Current Meteor Showers

The *Pegasids* peaks on July 9 with an unknown time and a low ZHR (zenith hourly rate). The *July Phoenicids* is a Southern Hemisphere shower that peaks on July 13 with at unknown time and with a low ZHR. The International Meteor Organization reports that this shower is a better radio shower than visual shower. Toward the latter part of this month you should start to see increased meteor-scatter activity associated with the *Perseids* meteor shower, which peaks on August 12–13. Next month's column and the summer issue of CQ VHF will contain more extensive coverage of this shower.

And Finally . . .

It is unfortunate that the President of the United States has taken an early position regarding access BPL that does not consider the technological problems associated with it. I say that it is unfortunate because in doing so he has politicized the issue. It has been our policy as amateur radio operators to be apolitical when it comes to the unofficial rules governing our hobby. However, with the President's position comes the necessity to oppose him on this issue; hence, the politicalization of the issue. Hopefully, reasonable minds will assemble together in the coming months and begin to determine that access BPL is a bad idea and other technology should be developed in its stead.

This optimistic idea will not happen on its own, however. This is why in a previous column I urged everyone to write your senator and congressman. Now, I also urge you to write to our President. You can send your letter to President George W. Bush, The White House, 1600 Pennsylvania Avenue NW, Washington, DC 20500, or send an e-mail to: <president@whitehouse.gov>.

In your letter to President Bush, please be civil. Point out to him how important amateur radio is as a backup communications source when all else fails in a disaster. Remind him of his support of our hobby, in particular his January 2002 visit to a Daytona Beach fire station in which he spoke via an amateur radio station to other hams concerning his appreciation of volunteers who "help make sure that Florida is prepared for any kind of emergency." (Source the *ARRL Letter* URL: <http:// www.arrl.org/pio/press_releases/bush.html>.) Finally, point out to him the absolute need for further study on the part of the NTIA to determine just how problematic access BPL is to all forms of HF and VHF communications, and how normal use of radio transmitters is also problematic to access BPL operations.

Once again our plate is full of BPL issues. Perhaps in a future column we will be able to devote less space to the topic. Until it is properly dealt with, however, it will continue to be topic number one for this columnist.

Until next month… 73, Joe, N6CL

BY JOHN DORR,* K1AR

Is Line Noise Hurting Your Contest Scores?

July's Contest Tip

Occasionally in a contest you will work a special prefix or other vague designator (e.g., SVØ) that prevents you from identifying the station's country. Don't wait until the end of the contest to resolve your confusion; ask the operator right on the spot. By knowing his QTH, you may be more inclined to want to wait around if you hear him on a different band or try to pass him right away if circumstances warrant that move. In this case, knowledge is an advantage.

Calendar of Events

June 26–27	ARRL Field Day
June 26–27	King of Spain SSB Contest
July 1	RAC Canada Day Contest
July 3–4	Venezuela Independence Day Contest
July 10–11	IARU HF World Championship
July 10–11	UK RTTY DX Contest
July 17–18	**CQ WW VHF Contest**
July 17–18	North American RTTY QSO Party
July 24–25	Russian RTTY WW Contest
July 24–25	RSGB IOTA Contest
Aug. 1	SARL HF Phone Contest
Aug. 7	European HF Championship Contest
Aug. 7–8	North American CW QSO Party
Aug. 7–8	ARRL UHF Contest
Aug. 14–15	Maryland-DC QSO Party
Aug. 21–22	North American SSB QSO Party
Aug. 21–22	New Jersey QSO Party
Sept. 25–26	**CQ WW RTTY DX Contest**

Line noise has always been the bane of existence for hams, and contesters in particular. It seems that contest operators and DXers alike spend much of their operating time digging weak signals out of the noise. Having said that, nothing is more satisfying during a long run of weak Europeans or JAs than the occasional S9 signal that calls in and rocks you out of your chair.

Fortunately, I have never had serious problems with line noise. Of course there has been the occasional noisy morning after a long dry spell, but I guess I'm one of the lucky ones. However, suddenly on a bright sunny morning a few years ago, while living in New York, the noise hit and hit big! Having turned on my rig for its usual morning ritual, I was shocked to hear S9+ line noise on 10, 15, and 20 meters. Perhaps you have encountered a scenario like this as well. After settling down from my initial frustration, my first thought was, "Is this a long-term problem or just something that will go away when I get home from work?" When I got home that night, the noise was still there. In fact, after two weeks of noise it became clear that this was not an intermittent problem.

In my case, it was relatively easy to isolate the problem. By turning my antennas, I could determine with reasonable accuracy the location of the noise source. I then proceeded to walk down the street bordering my property with a battery-driven AM radio tuned to the bottom of the band (530 kHz). It's amazing how much man-made noise you discover when using this detection method.

As I walked down the street, there was no apparent increase in the ambient noise level. This, of course, made me think that locating my problem was going to be more difficult that I had anticipated. It was at that precise point when the noise level dramatically increased in the receiver. I was in between two utility poles and quickly discovered that the noise built to a horrendous level as I stood underneath the very next pole. As I walked away, the noise gradually dissipated. Good fortune had come my way again.

Years ago, Fred Lass, K2TR, had a rather drastic method for dealing with his noise problem once the offending pole had been identified. While operating at W2PV, he proceeded to identify the offending pole in a manner similar to my approach. He then took a sledgehammer and banged away at the pole until the noise stopped—being guided by input from "home base." I still wonder what the neighbors must have thought about this 6-foot man attempting to knock over a telephone pole in their front yard!

Now that I had the location of my noise identified, it was time to deal with the local utility company. Much to my surprise, they were both cooperative and had developed an efficient process (complete with forms) for dealing with consumer-based line-noise problems. Not only did I receive the complaint forms in the next day's mail, but I also received a call from the utility company the same week to inform me that a work crew had been scheduled for the following week. The person I spoke with was not only friendly and willing to help, he was technically competent and able to ease my concerns.

A little over three weeks after my initial discovery of the noise, I arrived home from work to discover a noise-free band once again. Magically that day the work crew had discovered some cracked insulators on the pole I had identified (as well as a few others) plus some other corroded parts, replacing everything on the spot.

At least in my case, the summary is simple: (1) Not all line noise is difficult to chase down, and (2) Not all utility companies are bureaucratic and unwilling to help. Perhaps someone should conduct a study to see if cooperation is inversely related to utility rates!

Another Experience

Not everyone has had the same experience or results as mine. Several years ago, Steve Fraasch, KØSF, shared with me a much more significant noise challenge that he had on his hands:

> Last winter, I asked my local utility for help in fixing what I suspected to be a high-tension power-line noise problem. Over the course of the investigation it turned out that my problem was originating from the mid-voltage distribution point in a local sub-station. The true offending source was, in fact, not on the 100+ kV lines 4 miles away, but on the intermediate lines running out of a sub-station 2.5 miles closer to my QTH. Lesson number one was simple: Don't assume you are an expert and know the solution when you haven't even begun to identify the problem!
>
> After four months of casual hunting, I finally discovered the noise source. As it turned out, there were three sets of

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Lapp Co. "bell" insulators that were arcing across through the ceramic glue that holds the tie stud together. Not to anyone's surprise, these were old insulators made in 1954 and 1960, respectively. The crew replaced the bell-insulator type with a one-piece design that did not use the series bell pin and clevis attachment—the bell being the true offender in this case.

I've had a lot of experience working with the utilities fixing power-line noise. Taking the aggregate of the good and bad, I've attempted to provide an after-action report of lessons learned over the years.

The actual mechanism responsible for the generation of power-line noise is a commutating, or rectifying, junction such as a loose connection, or insulation arc that generates a square wave at ultrasonic frequencies (500 Hz to 100 kHz). Because the square-wave slopes are very steep, the frequency spectrum of power-line noise is rich in harmonic energy, extending well into UHF, if not SHF. In fact, I had recorded a noise source on my 100-MHz oscilloscope, and numerically Fast-Fourier Transformed one pulse on my computer. The energy spectrum, at least to 50 MHz, was nearly flat! The lower frequency components couple very well into the distribution line, which propagate for miles as a traveling wave (similar to the Beverage principle), making low-frequency detection impossible.

Despite K1AR's success, don't be fooled by an HF beam heading. You could very well be listening to the main beam or side lobe of a power-line Beverage "antenna." On the other hand, the VHF/UHF spectrum decays quickly (evanescent mode) near the source, because this energy does not couple into the distribution system. Therefore, VHF/UHF detection is nearly true line of sight (i.e., the radiator "is" the source).

Given that the VHF components are stronger, initially you may want to use a 10-, 6-, or 2-meter AM rig for your search. Once you're in the noise-source vicinity, you will find that a 440-MHz AM rig will find not only the pole, but also possibly the offending piece(s) of hardware. I have found that the most directional, linear-polarized antenna available to you is the best (e.g., a Yagi). Polarization can be used to determine the plane of the electric field, which will be the noise current's vector orientation—hardware orientation—as well.

For example, a noise current traveling through a horizontal arcing bell insulator will tend to create a horizontally polarized electric field. By rotating the plane of your antenna, you will notice the noise strength varies sharply. I have used a modified Heath HW-202 and a homebrew 6-element W2PV Yagi design. I can hear weak sources from up to 3 miles away, yet the setup is still useful in identifying the pole, if not the actual hardware.

My experience says that you will save immeasurable time by hunting for the noise source yourself. The power utilities have limited training, time, and resources. I have found that they try hard to find noise, but many times the source they find is not the one you're hearing. Start from your QTH and work out omni-directionally from ground zero. Do not discount your own or your neighbors' homes (my experience is that 10% of all noise is from neighbor's noisy appliances).

If there is heavy salt build-up on power lines following a snowmelt, you may have to wait until more snow or rain washes it off. Match the noise source with the interference you hear. Check over time, and correlate that the source is indeed the one you're hearing (most sources stop momentarily after rainfall or a large change in temperature). Correlation is easy if the arc is seen or heard (large amplitude), but inaudible, invisible arcs generally are much lower in amplitude. If the pole is in a distribution network around your QTH, it could very well be the one, but be absolutely sure before you "cry wolf." If you are more than 2 miles from a low-amplitude source, be sure to check carefully for another source that is closer to your QTH. When you are confident that you've identified the noise location, give your local utility company a call. Be prepared to provide the exact location and pole number if available. There should be no need to get the FCC or others involved.

Fixing power-line noise can be compared to something between re-stocking the employee soda-pop machine and removing "lost dog" signs from power poles. You must be patient, but persistent. Although I reported my problem in late April, the problem was not fixed until early August. I was fortunate to have a service technician who followed up on the problem every three weeks or so. He told me up front that fixing the problem would take some time. After all, the ground had been extremely wet in Minnesota, and he did not want to get his truck stuck in the mud! If nothing happens after three months and numerous calls, then you may need to write letters (to utility management, the FCC, and the state utility commission). I've never had to write and involve others, but another ham in my local area did have to resort to this method to have some *really big* lines fixed.

It is very helpful to be aware of the utilities' work schedule for your job. Check the day of their arrival to make sure noise is present. If the noise is intermittent and it rained a day before, the noise could be gone, and your credibility is severely compromised. If it's possible, *be at the site* with your *detector in hand!*

I have found that the most successful repairs happen when troubleshooting occurs in the following order: insulators, disconnects, lighting arresters, and line components. Insulators often arc through and can be either continuous or intermittent. Lightning arresters usually arc internally and are continuous noisemakers by nature. The repair technician will most likely have a 300-MHz "super snoop" noise detector whose 3-element Yagi is too broad to locate a specific piece of hardware. They will then use a portable "snoop" device or ultrasonic detector from inside the bucket crane and check all of the hardware close-up. You may want to offer to use your 6-element fixture to help. When I showed the crew my setup, they put their equipment away and used my HW-202 because it had an S-meter.

Finally, a letter of thanks to the crew's boss after successful completion goes a long way. Can you think of a more thankless job? Things are now quiet again. It's fun to hear summer Europeans from the "black hole" of the central U.S. on 75 meters as well as weak VK sideband ers who continue to be oblivious to DX on the bands.

Some Concluding Thoughts

There is nothing black and white about detecting line noise. In yet another situation at my QTH, I discovered offending noise being generated from two sources right inside my own house. The first was a laptop power pack and the other a set of over-the-counter halogen lights in the kitchen. By simply using the process of elimination and turning them both off, the noise went away.

There are an amazing number of hams who suffer from the effects of bad noise. Sadly, it can often be resolved, but for whatever reason many chose simply to put up with it. Hopefully, you'll be encouraged to do something about the problem after reading this month's column.

Final Comments

Can you believe we're already in the midst of summer (or winter for our Southern Hemisphere friends)? In just a few short weeks we'll all be saying, "Where did the time go this summer?" Enjoy the warm weather and use the opportunity to work on that antenna project you've been dreaming about. Until next month...

73, John, K1AR

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BY CARL SMITH,* N4AA

LoTW Fully Operational

I suspect most of you know by now that the ARRL's Logbook of The World became fully operational on May 5th. As of that date one could claim DXCC credit for any "matching" entries in that massive database of over 40-million entries. In the *ARRL Letter* for April 30th, Wayne Mills, N7NG, at ARRL headquarters reported there were more than 2.5-million QSO matches in the system. The use of the LoTW will most certainly change the way things are done in the future. No more sending those prized cards off to the ARRL by Registered Mail or FedEx and anxiously waiting for them to be returned, along with the paperwork with your new confirmed totals.

The cost of using the LoTW is certainly within the budget of anyone—as little as 15 cents per credit, which is far less than all those IRCs and green stamps. Many of us will still send off for the "hard copy" QSLs for our walls, or books, or however we store/display our prizes. However, if the station or DXpedition chooses to upload their logs to LoTW, we won't have to wait for those cards to claim credit. If I understand it, there will no longer be that huge backlog for the September 30th deadline every year. I suppose there will be some cutoff date for the publishing of the DXCC yearbook, but I'm sure that will not be a major issue.

Wayne, N7NG, was quoted as saying, "DXCC is the first and only award for which LoTW users will be able to apply their credits." He added, "Plans already are in the works to make the system available to apply LoTW credits to other ARRL and possibly some non-ARRL awards."

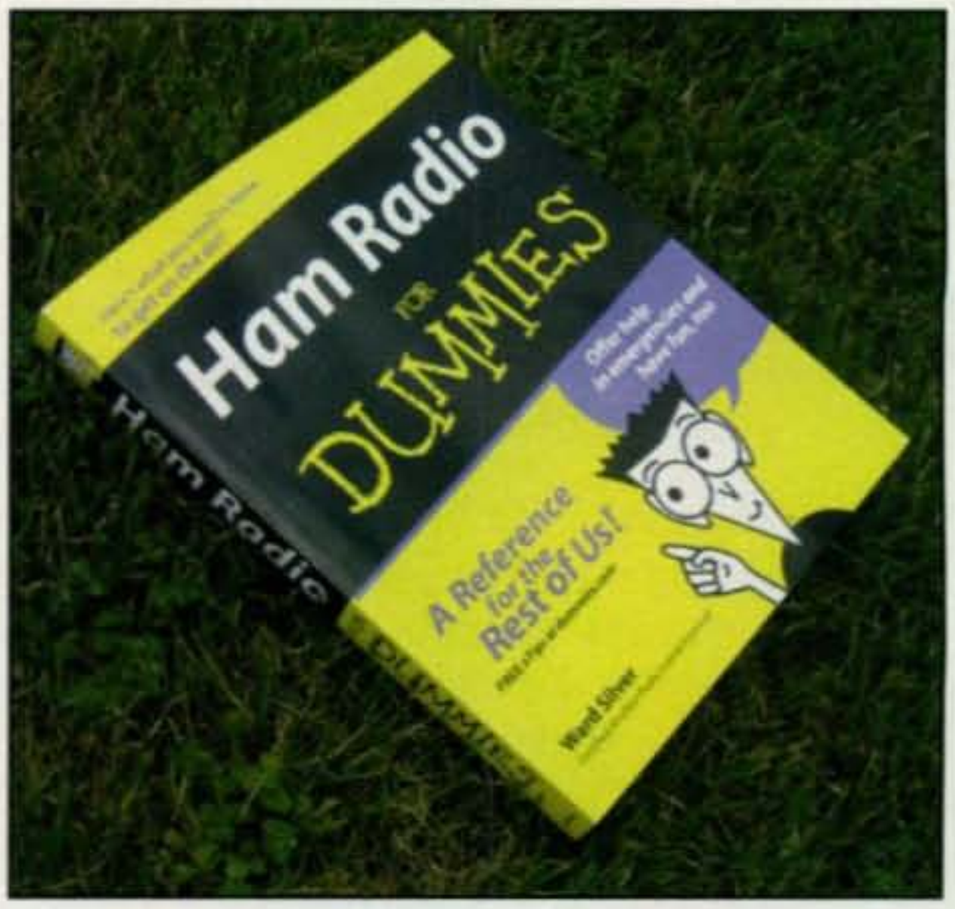
Ham Radio for Dummies

Last month I mentioned another new book, *Ham Radio for Dummies.* A good friend of mine (Uncle DX) has reviewed the book, and I present his comments here:

Ham Radio for Dummies
By Ward Silver, NØAX
A review by Uncle DX

I like to read books with reviews in mind. Why? I read them with a vision and understanding of how they would resonate on others, not just me. In other words, how the message would be conveyed to its targets versus just entertainment or a learning experience for me. *Ham Radio for Dummies,* by Ward Silver, NØAX, made this concept as easy as it can be. This book clearly will become a staple in our shacks. Remember the old, well-worn ARRL license manuals of yesterday? Well, this one may be beside the *Now You're Talking* by the ARRL 50 years from now!

Yes, a person with 50 years of active experience can not only learn from Ward's book, but also "relive" some of the things he points out. It's rejuvenating. For those who don't have a notion about the hobby, it's a road map. For those who have just been exposed to ham radio, it may put you on the super highway to a wonderful lifetime experience. *HR for Ds* is a good book for all of us—DC to light!



Ham Radio for Dummies *is a new book by Ward Silver, NØAX. Everyone should have a copy.*

The first thing I found outstanding was the "Contents at a Glance." Backing up, I deplore any book, particular a technical or reference book, where I can't find something quickly. The "Contents at a Glance" section makes this an easy task, and it truly will serve as a useful book for quickly looking up what we need. It surely looks to me as if Ward did his homework before writing the book inasmuch as the outline was well thought out and the planning done.

For some of us old duffers, it's hard at times to explain our hobby in terms understood by someone who hasn't been exposed at all. Ward does this, and well. One thing it taught me, which I should have known, is *exactly* how to register with the FCC online. It couldn't be simpler with his cook-book point-by-point instructions. There are other examples from which I personally benefited. I'm giving a talk to a radio club on DX soon. I've been DXing most of my life, yet this book is helping me prepare for

Damage caused by one of the turtles on Europa Island during the TO4E DXpedition. This was not one of those "easy" DXpeditions. (Photo courtesy of Dany, F5CW)

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e-mail: <n4aa@cq-amateur-radio.com>

The team of RI1CA activating Russian IOTA islands last year. Left to right: Mike, RL3AA; Leo, RN3AZ; Pavel, RA3AUM; and Nick, UA3DX. (Photo courtesy of Pavel, RA3AUM)

it. It's crammed full of anecdotes, history, and tips for the ham once "ticketed."

As a result, it's a book for those who are in the "what is a ham?" phase to those of us who "think" we know it all, with a good table of contents, wonderful index, and all the meat in between. It has it all, and here is what Uncle DX is going to do with it.

We *all* know some young folks (and old folks) who would be helpful to our beloved hobby, period. Many of us—shucks, most of us—try to figure out ways to introduce, entice, or talk others into becoming involved in the hobby. I'm going to buy at least a dozen copies and place them in libraries, present them to clubs, and give them as presents. I suggest radio clubs give out a few each year to do the same thing. How about it, club officers? This is one darn good way to help, and help in the right way in order to get the very best word about our hobby out there. If *we all* do just this one thing alone, it will help.

Ward covers the all the various parts of ham radio. This book is about the best that I've read to tell it like it is in terms that are direct, enjoyable, and complete. He has contributed, and now it's our turn to take it and run with it. It doesn't do any good if it sits on some shelf; it must be put in the right hands—the hands of our future to keep ham radio "charged" for the next hundred years.

Thanks, Ward.

Obviously, this book is not strictly for DXers, but there is enough good information in it to justify having one on hand. Also, Uncle DX's thoughts on providing the book to newcomers sounds like a great idea. I'll take several and donate them to the local radio club to use for prizes at regular meetings. How about you?

DX Action

As I write this in early May, the higher frequency bands (10 and 12 meters) are not showing much activity. However, 15 and 17 meters are holding up very well and there is a lot of action, especially on 17. Twenty meters continues to be the mainstay for DXing as we continue the slide down the solar curve. A lot of DXers must have erected those low-

The WPX Program

CW

3137 .....KQ3F

SSB

2901 .....JS3OSI
2902 .....KP4FKN
2903 .....IT9RDG
2904 .....7M2PSC
2905 .....KQ3F

Mixed

1938 .....JA7MN
1939 .....EI8HA
1940 .....N8IKX
1941 .....OX3KV
1942 .....KQ3F

CW: 450 JS3OSI. 700 IK3UVD. 1000 K1NU. 1300 KQ3F.
SSB: 400 IT9RDG. 1100 KQ3F. 1200 K1NU. 1250 K1NU. 1300 K1NU. 2650 KF7RU.
MIXED: 500 OX3KV. 1550 IV3ARJ. 1700 K1NU, KQ3F. 1750 K1NU. 1800 WZ4P. 2350 WB3DNA.

10 Meters: IV3ARJ, KQ3F
15 Meters: IV3ARJ, 7N1NXF, KQ3F
20 Meters: IV3ARJ, KQ3F
40 Meters: IV3ARJ, JA6GWU, KQ3F
80 Meters: IV3ARJ, KQ3F
160 Meters: IV3ARJ, KQ3F

Asia: JS3OSI, IV3ARJ, KQ3F
Africa: IV3ARJ, KQ3F
No. America: IV3ARJ, KQ3F
So. America: IV3ARJ, OK1FED, KQ3F
Europe: JA7MN, IV3ARJ, KQ3F
Oceania: JA7MN, JS3OSI, IV3ARJ, OK1FED, KQ3F

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SM0AJU, N5TV, W6OUL, AB0P, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, ONL-4003, W5AWT, KB0G, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YB0TK, K9QFR, 9A2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, K0DEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UA0FZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RA0FU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4BP, K4LQ, K0KG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK3AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WB0DD, I0RIZ, I2MQP, F6HMJ, HB9DZZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA5CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, K0DEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RA0FU, UA0FZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM, W2OO, RU3DX.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

5 Band WAZ

As of May 1, 2004, 652 stations have attained the 200 zone level and 1391 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
WP4U RA2FBC

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W0PGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
N4PQX, 198 (24, 26)
RU3DX, 198 (1, 6)
UT5JAJ, 198 (12, 30)
N6HR/7, 198 (34, 37)
OE2LCM, 198 (1, 31)
EA7GF, 198 (1, 27)
W7SX, 198 (18, 23)
UT3UA, 198 (1, 6)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)

The following have qualified for the basic 5 Band WAZ Award:

W4PGC (158 zones)
AC0X (162 zones)

Endorsements:

WP4U (200 zones)
RA2FBC (200 zones)
UT3UA (200 zones)
WK3N (198 zones)
W7KSK (191 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WAZ Program

10 Meter SSB

563 .....JA1BDF 564 .....SP1DMD

15 Meter SSB

610 .....JA1BDF

17 Meter SSB

35 .....JA1BDF

20 Meter SSB

1128.....DL7YM 1129 .....K2MHE

80 Meter SSB

81 .....EA8LS

15 Meter CW

320 .....JG3UVN

80 Meter CW

60.....K4ZA 61 .....WØSF.

160 Meters

197 .....NX4D (30 zones) 198 ..RA2FBC (38 zones)

All Band WAZ SSB

49014.....KP4FKN 4916 .....(open)
4915.....K4ZA 4917 .....K3QDV

Mixed

8306.....JA5AUG 8308 .....JR9POO
8307.....RW4CY 8309 .....6K2BSW

All CW

416.....KK8I 419.....RA1AE
417.....DF1TJ 420 .....RA2FBC
418 .....NØTNJ

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

CQ DX Awards Program

SSB

2433.....W1PX/4 2434 .....EA6SB

CW

1059 .....KD5JWC/M

RTTY

35 .....NI5F

SSB Endorsements

320.....I8KCI/335 300 .....W4PGC/300
300.....VE7SMP/305

CW Endorsements

320 .....WA8DXA/331 200 .....W4PGC/220
320 .....F5OIU/320 150 .....KD5JWC/M/152

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

The operators of J7OJ in the ARRL DX CW contest this year in memory of the late Jim White, K4OJ. Left to right: George, K5KG; John, K3TEJ; and John, W4IX. (Photo courtesy of George, K5KG)

noise Beverages, flags, pennants, etc., to improve their receiving capabilities, as I am noticing a lot of activity on 160, 80, 40, and 30 meters.

I am not aware of any major DX-pedition plans for the remainder of the year, although one could be announced at any time. Just keep your eye on the DX news sources for any late-breaking activity. Otherwise, enjoy the summer and keep working on those antennas for whatever your favorite bands are and be ready when the DX shows up.

The IARU (International Amateur Radio Union) Contest is the second weekend of July, and then the IOTA (Islands On The Air) Contest is July 24–25. These two events should provide a lot of activity for your summer craving for DX.

Acronyms

What are all those acronyms in this column? You know, CQ WW, WPX, WAZ, etc. Well, WPX stands for Worked PrefiXes, WAZ is Worked All Zones (there are 40 of them); and CQ WW is short for CQ World Wide (typically used to indicate the contests sponsored by *CQ* magazine). CQ WW WPX CW is the short version of CQ World-Wide Prefix CW contest for working prefixes. For all of *CQ*'s awards and contests, check the website at <http://www.cq-amateur-

QSL Information

1AØKM via IKØFTA
2SØF via MØCMK
3A/F8ASY via 3A2MD
3A/IK2YSE via Bureau
3A50ARM via 3A50ARM
3A50LZ via W3HC
3B6RF via N3SL
3B8/DK7AO via DL3APO
3B8/DL3LBP via DL3LBP
3B8/ON4AME via ON4AME
3B8MM via DL6UAA
3B9MM via DL6UAA
3B9ZL via FR5ZL
3CØA via DJ9ZB
3CØF via DJ9ZB
3CØNNN via DJ9ZB
3CØR via DJ9ZB
3CØV via DJ9ZB
3C1/TU4EI via W3HC
3C5XA via G3XAQ
3D2AD via YT1AD
3D2AG via FO5RK
3D2AM via K1ER
3D2AY via YZ7AA
3D2BT via OM2SA
3D2DC via K5KV
3D2DD via VE6RJP
3D2DM via GM4FDM
3D2FM via F5CWU
3D2II via ZL2III
3D2IR via DJ2MX
3D2IZ via N6IZ
3D2JX via JN1HOW
3D2LB via GM3VLB
3D2MN via DF8AN
3D2MO via OM2SA
3D2NC via AC6DD
3D2OA via DL5OAB
3D2VB via UA4WHX
3D2VB/R via UA4WHX
3D2WP via PA3EWP
3D2YOO via W6YOO
3DAØAX via NOAH
3DAØCG via W4GMY
3DAØDM via WØDM
3DAØDX via ZS5WI
3DAØLJ via JM1LJS
3DAØMT via NA5U
3DAØSV via K4YL
3DAØWC via VA7DX
3G1E via CE1FA
3G1P via XQ1IDM
3G1X via XQ1IDM
3G2D via CA2WUI
3G4Y via CE4FXY
3G5Q via XQ5SM
3V/F5VHH via ON4CKY
3V8BB via YT1AD
3V8SM via DL1BDF
3V8SM via F8DVD
3W22S via XV9DT
3W2US via N2OO
3W2XK via W9XK
3W5KVR via EA5KB
3W6KM via ES1FB
3X7YC via DL7DF
3XDØ2 via F8DQZ
3XDØ2/P via F8DQZ
3XDQZ via F8DQZ
3XY1L via UY5XE
3XY2D via W3HNK
3XY8B via KA5BQM
3Z0CW via SP1EG
3Z0I via SP6ZDA
3Z0I/1 via SP6ZDA
3Z0IL via SP8ZBX
3Z0OL via SQ4NR
3Z2EFU via SP2EFU
3Z8Z via SP8AJC

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 334	K4MQG 334	N5FG 333	K6LEB 331	K9IW 330	K4JLD 327	W6SR 323	YT1AT 317	WG7A 295
K2FL 334	EA2IA 334	N7RO 333	VE3XN 331	G3KMQ 329	W6OUL 327	N5ZM 323	K8JJC 315	KE3A 295
K9BWQ 334	PA5PQ 334	K4CN 333	W1WAI 331	KZ4V 329	IT9TQH 326	KUØS 322	CT1YH 313	K4IE 291
K9MM 334	K3UA 334	W4MPY 333	K2JF 331	N5HB 329	I2EOW 326	KE5PO 322	PY4WS 313	KD8IW 288
W7OM 334	DL3DXX 334	PY2YP 333	K3JGJ 331	W4UW 329	W7IIT 326	K6CU 321	N1HN 313	EA3BHK 282
K2JLA 334	K2ENT 334	W8XD 333	PT2TF 331	W9IL 329	SM5HV/HK7 326	HA5DA 321	W6YQ 313	YC2OK 282
N7FU 334	OK1MP 334	W2VJN 333	N4CH 331	K1HDO 328	W4LI 325	IKØTUG 321	K9DDO 312	DJ1YH 281
K2OWE 334	NC9T 334	KA7T 332	WA8DXA 331	K7JS 328	I5XIM 325	VE7DX 320	W3II 312	XE1MD 278
N4MM 334	WB5MTV 333	WØJLC 332	W2UE 330	K9OW 328	K5UO 325	IKØADY 320	UA9SG 309	EA2CIN 278
F3TH 334	W7CNL 333	K8LJG 332	I4LCK 330	K8PV 327	IK2ILH 325	WG5G/QRPp 320	KF8UN 308	I3ZSX 276
F3AT 334	YU1HA 333	YU1AB 332	VE7CNE 330	W4QB 327	N5FW 325	N7WO 320	YU7FW 306	G3DPX 275
DJ2PJ 334	IT9QDS 333	K5RT 332	4N7ZZ 330	I1JQJ 327	9A2AA 325	F5OIU 320	LU3DSI 302	WA4DOU 275
WA4IUM 334	G4BWP 333	YU1AB 332	W6DN 330	I4EAT 327	N4OT 325	HA5NK 319	N1KC 302	
W4OEL 334	K4CEB 333	NØFW 332	K7LAY 330	DL8CM 327	LA7JO 324	F6HMJ 319	KH6CF 301	
W2FXA 334	K4IQJ 333	N4AH 332	WB4UBD 330	SM6CST 327	K1FK 324	OZ5UR 319	VE7KDU 300	
N4JF 334	WØHZ 333	HB9DDZ 332	YU1TR 330	N4KG 327	9A2AJ 323	G3KMQ 317	KØHQW 299	

SSB

K6YRA 335	4Z4DX 335	EA3KB 334	W7FP 332	I2EOW 329	IT9TQH 327	LU7HJM 322	VE3CKP 311	N5WYR 293
K2TQC 335	N7RO 335	N4CH 334	K9HQM 332	VE7DX 329	DK5WQ 327	K5NP 322	CT1YH 311	K7ZM 292
W6EUF 335	IØZV 335	K3UA 334	CT1EEB 332	W2FGY 329	UY5XE 327	WA4ZZ 322	YV5NWG 311	OA4EI 292
K2JLA 335	EA2IA 335	K4JLD 334	W2FKF 332	CT1EEN 329	KE5K 327	WN9NBT 322	LU3HBO 310	K7ZM 292
K4MQG 335	IN3DEI 335	N5ZM 334	CT3BM 332	CT1CFH 329	I1JQJ 327	WW1N 322	HA6NF 310	K1RB 292
IK1GPG 335	EA4DO 335	PY2YP 334	DL9OH 331	EA1JG 329	CP2DL 327	W6OUL 322	WA5MLT 310	KØOZ 291
K5OVC 335	PA5PQ 335	AA4S 334	N2VW 331	KE4VU 328	NI5D 327	N3RX 321	XE2LV 310	W9ACE 291
NØFW 335	K9OW 335	CT3DL 334	YV1JV 331	K1HDO 328	EA1JG 327	XE1CI 321	EA3BHK 307	I3ZSX 290
K9MM 335	W6DPD 335	NC9T 334	WA4WTG 331	K5UO 328	W6SR 326	CT1ESO 321	RW9SG 307	WØROB 287
W6BCQ 335	XE1VIC 335	W9SS 334	W8KS 331	KF8UN 328	N4KG 326	EA8TE 321	W9IL 306	KKØDX 285
XE1AE 335	K2ENT 335	VE7WJ 334	YV5IVB 331	EA3EQT 328	K7TCL 326	W6MFC 321	XE1MDX 305	VE7HAM 285
W7OM 335	OK1MP 335	VE2PJ 334	KX5V 331	WØULU 328	W9HRQ 326	KD5ZD 321	EA5OL 305	F5RRS 284
KZ2P 335	IZ6GPZ 335	W3AZD 334	I8LEL 331	K1EY 328	W4QB 326	N4CSF 320	WB2AQC 305	N8LIQ 284
IK8CNT 335	K1UO 335	YZ7AA 334	K3JGJ 331	KZ4V 328	K8PV 326	N4HK 320	VE7SMP 305	WØIKD 283
VK4LC 335	I8KCI 335	4N7ZZ 333	N5ORT 331	XE1D 328	DL6KG 326	KØFP 320	KC4FW 304	KBØRNC 282
OE7SEL 335	WDØBNC 334	KE5PO 333	PT2TF 331	KD8IW 328	W4LI 326	EA7TV 320	K3BYV 303	WN6J 281
VE3MR 335	DU9RG 334	VE1YX 333	CT1AHU 331	KE3A 328	WR5Y 326	SV1RK 320	YC2OK 303	IK8TMI 281
VE3MRS 335	K2FL 334	I4LCK 333	EA3JL 331	W9IL 328	W5LLU 326	N1KC 320	WB2NQT 303	F5JSK 281
K4MZU 335	WØYDB 334	W2JZK 333	W6DN 330	K3LC 328	N1ALR 326	W5GZI 320	VK3IR 303	KA5OER 280
OZ5EV 335	W4UW 334	K8LJG 333	K8CSG 330	K8DXA 328	HB9DDZ 326	SV3AQR 320	KK4TR 303	KK5UY 280
N7BK 335	K9BWQ 334	VE4ACY 333	YV1CLM 330	LU5DV 328	WA4JTI 325	WA4DAN 319	VE7KDU 302	F5INJ 279
K7LAY 335	W4NKI 334	KØKG 333	LA7JO 330	I1EEW 327	KC4MJ 325	CE1YI 318	W2GZI 302	K7SAM 279
ZL3NS 335	WB4UBD 334	W4WX 333	AB4IQ 330	SV1ADG 327	PY2DBU 325	W5OXA 317	N5QDE 302	EA3CWT 278
N4MM 335	W4UNP 334	VE2WY 333	AE5DX 330	DL8CM 327	IKØIOL 325	YV4VN 317	KD4YT 302	VE2DRN 277
OZ3SK 335	W8AXI 334	WB3DNA 333	KB2MY 330	F9RM 327	YT1AT 325	EA5GMB 317	SV2CWY 300	9A9R 277
K7JS 335	VE2GHZ 334	K9PP 333	K3PT 330	XE1MD 327	K7HG 324	KE4SCY 317	4X6DK 300	W6UPI 276
XE1L 335	OE2EGL 334	W2CC 333	ZL1BOQ 330	I4EAT 327	AC7DX 324	K6RO 316	YT7TY 300	Z31JA 275
YU1AB 335	WA4IUM 334	DL3DXX 333	K9IW 330	W3GG 327	KØHQW 324	N5HSF 316	XE2NLD 300	G4URW 275
OE3WWB 335	K5RT 334	EA3BMT 333	KW7J 330	AA6BB 327	EA3BKI 323	N8SHZ 316	K4IE 300	VE2AJT 275
K5TVC 335	W2FXA 334	YV1KZ 332	WS9V 329	SM6CST 327	K4JDJ 323	WZ3E 314	W4PGC 300	4Z5FL/M 275
N5FG 335	N4JF 334	YV1AJ 332	K2JF 329	WD8MGQ 327	W6WI 323	IZ6CST 314	K6GFJ 299	
DJ9ZB 335	W6SHY 334	KSØZ 332	ZL1AGO 329	CX4HS 327	EA3CYM 323	K9YY 313	AC6WO 297	
PY4OY 335	W5RUK 334	LU4DXU 332	W9OKL 329	IØSGF 327	F6BFI 322	NØMI 313	WA1ECF 295	
VE3XN 335	K4CN 334	VE4ROY 332	DU1KT 329	IT9TGO 327	K6CF 322	W7GAX 312	KW1DX 295	

RTTY

K2ENT	333	K3UA	327	EA5FKI	320	G4BWP	312	PA5PQ	311	KE5PO	297	I2EOW	291	W4QB	280	YC2OK	280
WB4UBD	330	NI4H	325	W2JGR	316	OK1MP	312	N5FG	305	W4EEU	297	I1JQJ	289				

radio.com> and then click on Awards or Contests.

In Closing . . .

Let me share a little story that a reader recently sent to me:

"I was tuning 20-meter SSB mid-morning last weekend and came across a little pile-up on a VU2. A strong south-east stateside station got through, and in the exchange the VU2 commented to the W4 that he was about 300 Hz off frequency. 'I don't think so,' replied the W4. 'Packet says you're supposed to be on 14210.4 and that's where I got my radio set.'"

It has been said many times before, but once again, "Don't believe everything you read."

73, Carl, N4AA

awards

BY TED MELINOSKY,* K1BV

DX Interest in USA-CA

During the past 12 months I've processed 72 new certificates and endorsements for the USA-CA Award. A surprising 18 (25%) of these were from foreign amateurs—five from Germany, four from Japan, two from France and one each from Australia, Canada, Czech Republic, Indonesia, Poland, Portugal, and Spain. Most DX applicants do not regularly work on 14.336 or 14.056.5 MHz. It's a hard grind, and their effort and determination has to be applauded.

USA-CA All CW

KØEVE's USA-CA #3077 is now recorded as "All CW." Jim submitted additional cards for CW contacts, replacing the ones for other modes in his August 2001 application. This option is available to any applicants who want to "upgrade" their award to their favorite mode. There is no charge for this except that you must provide an SASE. If I don't have your original application, you also will need to provide a complete list.

Left to right: Tim Eklin, W8JJ; Joe Novak, W8TVT; and Ed Eklin, K8ZZ. Ed gave Joe the last three counties he needed in Minnesota, and Tim traveled to Lawrence County, Pennsylvania to give Joe his last county for "the whole ball of wax" for USA-CA All Counties.

Joseph W. Novak, W8TVT
USA-CA All Counties #1091

This month we hear from Joseph Novak, W8TVT, who was awarded USA-CA All Counties #1091 on March 25, 2004.

I first heard about county hunting back in the 1960s when Bruce Smith, WB8ADT, of Northport, Michigan was active in this part of our hobby. He would hold court, telling the stories of his mobile runs to put out some of the Michigan counties. Bruce passed away before reaching his goal of working all the counties.

For the next few years I was busy working and helping to raise a family. However, I listened to the activities on 14.336 MHz. Occasionally I worked some of the mobiles if for no other reason than to make sure my rig was working properly. These contacts were dutifully recorded in my logbook and later verified through the mobile reply cards.

In 1993 my interest was renewed when Aaron, WA2AKB, telephoned me asking for assistance in making contacts in Leelanau and Benzie counties in Michigan. I didn't have mobile capabilities, but referred him to hams who lived in those counties. Aaron was able to work them and completed his first USA-CA, and has since worked all of the counties many times over.

In 1998 I really became serious about county hunting and started to become a regular on the county hunters net. I installed speakers from my radio to my wife's computer room, my basement workroom, and the garage. (The speaker in the computer room was equipped with an on/off switch to satisfy my wife's requirements.) I was ready to monitor the net frequency from all areas of the house while I worked on other projects! I made duplicate copies of the county lists so if I heard one being announced, I could check my needed list and then run down to the ham shack to attempt to work it.

In January 2000 my wife Janet and I started to remodel a farmhouse in Leelanau County that had been in her family since 1872. I installed a station and continued to work counties from this location. I placed a baby monitor next to my rig and carried the receiver portion with me when working on the various house-remodeling projects. My work was frequently interrupted by dashes to the rig to work a new county. It's a good thing that the remodeling has been a never-ending project, as it has given me plenty of time for county hunting.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Joseph W. Novak, W8TVT
USA-CA All Counties #1091
March 25, 2004

Van Hodgden, WC5D
USA-CA All Counties #1092
April 19, 2004

USA-CA Honor Roll

500
W8TVT 3295
YBØECT ...3296
DL4NBE....3297
EA5YJ.....3298
K6CA 3299
DK2OY 1658

1000
W8TVT 1656
YBØECT ...1657

1500
W8TVT 1385
KB8OMG ..1386
WC5D 1387

2000
W8TVT 1284
WC5D 1285

2500
W8TVT 1203
WC5D 1204

3000
W8TVT 1113
WC5D 1114

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

When I got close to completing my goal, it seemed that I would go for long periods before working a new county. To help keep my interest going, I started to work toward other awards, such as the "Big Rig" offered by the Mobile Amateur Radio Awards Club (www.marac.org). My wife and I attended the 2003 MARAC convention in South Bend, Indiana. It was interesting to attach names and faces to the calls and voices heard for many years and to learn some new tricks of the trade.

As I neared completion of my goal, KM9X and WB9MBI were very helpful in getting me my last counties in Indiana, Illinois, and Kentucky. Then I was down to needing only four. A local ham, Ed, K8ZZ, was planning a trip to Minnesota and mentioned he would get me my last three in that state. His son Tim, W8JJ, indicated his willingness to travel to Lawrence, Pennsylvania for my very last one. I worked K8ZZ for my next to last on a Thursday. During his eight-day trip "to visit his mother," Ed made 1092 contacts from 84 counties.

In the meantime, W8JJ was making plans to leave on Saturday to get me my last for "the whole ball of wax." Things were happening so fast! After an exchange of e-mails and phone calls, the stage was set. At the appointed time, Tim was in Lawrence County and checked in on the 20-meter county hunters net. Net control Jim, KZ2P, asked if I could hear Tim, but the propagation wasn't right. As planned, we then moved to 7.238 MHz. Tim gave me a call, and I heard the loudest, strongest signal I have ever heard on 40 meters. It was just great! What a way to end up working my 3077th county. Tim was away from his home for 13 hours, traveled 675 miles, and transmitted from 19 counties. When he got home, he sent me a digital photo of his car with the Lawrence County sign. He also sent the following note: "ICOM 706 and Outbacker antenna . . . $1,000. Toll fare for the Ohio Turnpike . . . $6.10. Helping a fellow county hunter with the whole ball of wax . . . priceless!"

There is a great group of people driving all over the country to put out counties for the rest of us. My thanks go out to all the mobile operators who have contacted me from the counties of our great country. Special thanks to KZ2P, the other net control operators, and the relay stations who helped me attain my goal. Everyone's assistance is greatly appreciated. I could not have done it without all of your help. Last, but not least, super thanks to my wife Janet for her understanding, support, and encouragement. —*73, W8TVT*

DX Awards

Belarussian Island Award. Summertime is a great time for going on a little expedition. With so many countries offering their own version of "Islands on the Air" awards, you'll easily be working on four or five different awards available from different countries at the same time all summer long. Belarus is a landlocked European country, so the islands involved are found on its rivers and lakes.

The award is available to amateurs and SWLs. For Europeans, contact stations on 25 different river and lake islands in the Republic of Belarus. Stations in all other continents need 15 QSOs. Small endorsement plates are available for 50, 75, 100, and 150 islands. Contacts after January 1, 1994 count for the award. All bands and modes; however, cross-band, repeater, satellite, and other relay methods are *not* permitted. Sending in QSLs is not necessary. Submit GCR list and fee of $US10 or 10 IRCs (endorsement $US2 or 2 IRCs). Send by *registered mail* to: Award Manager, Nikolay L. Sukhorukov, Frunze Str. 58 – 7, Vitebsk 210009, Republic of Belarus. For more information, go to <http://www.eu6tv.narod.ru/bia/rules.html>.

The Belarussian Island Award is available for contacting river and lake islands in the Republic of Belarus.

The Western Hainaut Award is sponsored by the Radio-Club of Lessines to promote this region in Belgium.

Western Hainaut Award. I like the award certificates that show a montage of small images, each representing one of the localities required to earn the award. It's almost a miniature tour of the area and gives a flavor that a single image could never capture. The Western Hainaut Award makes me want to visit the Belgian countryside!

The award is sponsored by the Radio-Club of Lessines to promote the Belgian region of Western Hainaut. It is available for contacting (SWL okay) stations in the region after January 1, 2000.

Basic Award: Belgian stations need 20 points on HF or 10 on VHF; others need 10 points on HF and 5 points on VHF.

Honor Award: Belgians need 40 points on HF and 20 points on VHF; others need 20 points on HF and 10 points on VHF.

Excellence Award: Belgians need 60 points on HF and 30 points on VHF.

Point values: station of the Radio-Club Lessines operating portable = 5 points; Radio-club Lessines = 3 points; individual stations in Western Hainaut = 1 point.

Each station may be contacted only once per band. Radio-Club stations may be contacted twice on each band, including once portable (/P). The award may be earned by *either* HF or VHF contacts, but not by a combination of HF and VHF. Modes permitted are AM, SSB, CW, RTTY, PSK-31, and SSTV. No use of repeaters. Portable or mobile stations operating in Western Hainaut are okay. Contest contacts are also okay.

An official list of cities/communes in Western Hainaut may be found on the club's website (<http://qsl.net/on7vz/>). Look for the notation "Valid for D.H.O. Award" on QSL cards. Postal codes 7320–7322, 7500–7866, and 7880– 7973 are in the province. Valid club stations include ON4JX, ON4LSN, ON4TOR, ON4RAM, and ON5RC.

Send GCR list and fee of 10 Euros and 2 IRCs for Belgian stations and 10 Euros ($US11) and 3 IRCs for all others. Send request to: Daniel Vandewalle, Mazenque 25, B-7866 Ollignies, Belgium. (See <http://qsl.net/on7vz/>.)

Pedro Alvares Cabral Award

Districts of Portugal

Angra do Heroismo	Faro	Porto
Aveiro	Funchal	Santarem
Beja	Guarda	Setubal
Braga	Horta	Viana do Castelo
Braganca	Leiria	Vila Real
Castelo Branco	Lisboa	Viseu
Coimbra	Ponta Delgada	
Evora	Portalegre	

States of Brazil

No.	Abbreviation	State Name	Capital City	Call Sign
1	—	Fernando de Noronha	—	PY0T
2	—	Trinidade	—	PY0T
3	—	St Peter and Paul	—	PY0S
4	AC	Acre	Rio Branco	PT8
5	AL	Alagoas	Maceio	PP7
6	AM	Amazonas	Manaus	PP8
7	AP	Amapa	—	PQ8
8	BA	Baia	Salvador	PY6
9	CE	Ceara	Fortaleza	PT7
10	ES	Espirito Santo	Vitoria	PP1
11	GO	Goias	Goiania	PP2
12	MG	Minas Gerais	Belo Horizonte	PY4
13	MA	Maranhao	Sao Luis	PR8
14	MS	Mato Grosso do Sul	—	PT9
15	MT	Mato Grosso	Cuiaba	PY9
16	PA	Para	Belem	PY8
17	PB	Paraiba	Joao Pessoa	PR7
18	PE	Pernambuco	Recife	PY7
19	PI	Piaui	Teresina	PS8
20	PR	Parana	Curitiba	PY5
21	RJ	Rio de Janerio	Niteroi	PY1
22	RN	Rio Grande do Norte	Natal	PS7
23	RO	Rondonia	—	PW8
24	RR	Roraima	—	PV8
25	RS	Rio Grande do Sul	Porto Alegre	PY3
26	SC	Santa Catarina	Florianopolis	PP5
27	SE	Sergipe	Aracaju	PP6
28	SP	Sao Paolo	Sao Paulo	PY2
29	TO	Tocantins	—	PQ2

The Pedro Alvares Cabral Award honors Portuguese discoveries during the 15th century and especially the discovery of Brazil in 1500 by navigator Pedro Alvares Cabral. The table at the left lists qualifying regions.

Portugal's Pedro Alvares Cabral Award. The 500th anniversary of the discovery of Brazil by Portugal was commemorated in the year 2000. Sponsored by REP (Rede dos Emissores Portugueses) to honor Portuguese discoveries during the 15th century and especially the discovery of Brazil in 1500 (by the Portuguese navigator Pedro Alvares Cabral), this permanent award was established as a part of the REP awards series. The certificate shows an old map of the coastline of Brazil with images of fauna and flora of that largely untouched land. Note that contacts going back to November 15, 1945 may be used, so it's possible that your QSL-card collection can contribute enough cards to qualify for the award.

Contact at least five districts of Portugal and five states of Brazil (see the accompanying table). Each Portuguese district—including Azores (CU) and Madeira (CT3)—and each Brazilian state—including the islands of St. Peter & Paul, Trinidade, and Fernando de Noronha—count for one point. For the Basic award, earn 10 points, including the five different districts of Portugal and five different states of Brazil, on SSB, CW, Mixed, or RTTY HF. SWL okay.

There are five different classes and endorsements as follows:

Class	Points	Endorsement
I	20	Golden Sextant
II	30	Golden Compass
III	35	Golden Anchor
IV	40	Golden Astrolabe
V	45	Golden Caravel

There is also an Honor Roll level for earning 50 points or more. Cost of award is 3 Euros for REP members; 10 Euros, $US8, or 12 IRCs for Europeans; and 12 Euros, $US10, or 15 IRCs for all others. Endorsements are free of charge, but an SASE, or SAE and 2 IRCs, must be sent along with the GCR list. Cost of the Honor Roll level is 35 Euros or $US30 for Europeans, and 48 Euros or $US40 for all others.

Apply to REP – Rede dos Emissories Portugueses, Award/Contest Manager, P.O. Box 2483, 1112 Lisboa Codex, Portugal.

Panama International Award. There's only one official award offered by the national amateur radio organization of Panama, Liga Panamena de Radio Aficionados. It can be a challenging one, since it requires a contact with each of the nine call areas of that country. The rules allow you to substitute up to three of the official club stations for missing call areas. That's a great idea, since some of the call areas just don't have much activity.

The Panama International Award is the only official award offered by the Liga Panamena de Radio Aficionados. It requires a contact with each of the nine call areas of Panama.

The Northern Ohio DX Association Award is earned by having made contacts with members of the group after January 1, 1945.

The award is available to any licensed amateur who has confirmed contact with each of the HP call areas 1 through 9 after January 1, 1978. Up to three of the required call areas may be substituted by any of the Panamanian official club stations—for example, HP1LR through HP9LR. Non-members of the Panamanian ARL must submit the cards, which will be returned. Provide a list of contacts, cards if required, and fee of $US3 or 6 IRCs to: LPRA-HP Bureau, P.O. Box 175, Panama 9A, Republic of Panama. (For more information, go to: <http://qsl.net/lpr>.)

NODXA Award

Several DX clubs offer awards for contacting their members. It's a great way to increase awareness of a club and provide an incentive to make contacts with members. Many clubs offer their members a distinctive QSL card for their use. Some have their club affiliation printed somewhere on the card. Still others, such as the Northern Ohio DX Association (NODXA), provide lists of members for an SASE or on their internet site.

Contacts with members of the Northern Ohio DX Association after January 1, 1945 on any band or mode count for the award. No use of repeaters. Mainland U.S. stations need ten contacts. All others, including Hawaii (KH) and Alaska (KL) need five. A member list is available from the sponsor for an SASE. Submit GCR list or logs signed by two amateur radio club members, your own QSL, and fee of $US4 or 10 IRCs to NODXA Awards Manager, Dwaine Modock, K8ME, 8113 Thornhurst Drive, North Royalton, OH 44133. (See <http://www.papays.com/award.html>.)

Internet Site of the Month

A colorful, striking page that provides links to Polish awards is run by SP7JKW. He has collected images of 54 awards and arranged them in rows as miniature clickable icons that take you to the page of the club or individual who offers the award. Unfortunately, the rules are mostly in Polish. It's worth a visit, however, if only to see the excellent award designs of Polish amateurs. Go to: <http://www.republika.pl/sp7jkw/dyplomy.html>.

I'm still looking for samples of your club's award for publication in the only dedicated amateur radio awards column—in *CQ* magazine, of course.

73, Ted, K1BV

BY TOMAS HOOD,* NW7US

Summertime Tropospheric Propagation and VHF DX

A Quick Look at Current Cycle 23 Conditions

(Data is rounded to nearest whole number)

Sunspots
Observed Monthly, April 2004: 39
Twelve-month smoothed, October 2003: 58

10.7 cm Flux
Observed Monthly, April 2004: 101
Twelve-month smoothed, October 2003: 124

***Ap* Index**
Observed Monthly, April 2004: 10
Twelve-month smoothed, October 2003: 21

Each summer in North America, weather systems develop that produce conditions favorable for VHF DX. Stalled high-pressure cells, with pressures reaching above 1025 millibars, are known to cause ducting of VHF radio signals. When ducts occur, VHF radio signals may propagate through them far beyond the normal line-of-sight distances.

In a normal atmosphere, as you move from ground level to higher altitudes, temperatures and humidity levels decrease. However, when temperature and humidity suddenly increase as you move higher, the change in air density causes radio waves to be refracted back to Earth. This creates a duct, or a wave-guide, through which VHF radio signals propagate with very little loss. These ducts typically are contained in the troposphere. Ducting via the troposphere can propagate signals great distances, such as from Hawaii to California, and ducting isn't limited to waves at radio frequencies. Amazing stories tell of oil rigs and cities over 75 miles away being seen during these hot summer periods. This is well beyond normal line-of-sight distances. What's more incredible is that these objects appear upside down! Light is being ducted far beyond the horizon, trapped between the boundaries of the stratified layers. If radio waves are small enough (the frequency is high enough), they too can be ducted far into the distance.

The Troposphere

The troposphere is the lowest layer of our atmosphere, bounded below by the Earth's surface and above by the tropopause, at a height of slightly over 7 miles. Just about all of our weather occurs in this region.

Under perfect conditions, the troposphere is characterized by a steady decrease in both temperature and pressure as height is increased. However, the many changes in weather phenomena cause variations in humidity and an uneven heating of the Earth's surface. As a result, the air in the troposphere is in constant motion, causing small turbulences to form.

These turbulences, or eddies, are most intense near the Earth's surface and gradually diminish with height. They have a refractive quality that permits the refracting or scattering of radio waves with short wavelengths. This is what provides enhanced "troposcatter" communications at VHF and higher frequencies, covering distances up to several hundred miles. This is different from tropospheric ducting discussed above and, in greater detail, below.

In the relationship between frequency and wavelength, wavelength decreases as frequency increases and vice versa. Radio waves of frequencies below 30 MHz have wavelengths longer than the size of normal weather eddies. HF radio waves therefore are affected very little by tropospheric turbulences. On the other hand, as the frequency increases into the VHF range, wavelength size decreases to the point where waves may become subject to tropospheric scattering. The most usable frequency range for tropospheric scattering is from about 100 MHz to 10 GHz.

Above the tropopause, changes in temperature and water content are very small indeed, resulting in very little alteration in radio refractive index. Therefore, there can be little scatter or refraction, and no real assistance to propagation until the *E*-layer and meteor trails are reached, above about 60 miles.

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2004

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 4-6. 10-13, 17-20 23-24, 27, 31	A	A	B	C
High Normal: 2-3, 7-9, 15-16, 21-22, 25-26, 29-30	A	B	C	C-D
Low Normal: 1, 14, 28	B	C-B	C-D	D-E
Below Normal: none	C	C-D	D-E	E
Disturbed: none	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair to good (C-B) on July 1st, good (B) on the 2nd and 3rd, excellent (A) on the 4th, 5th, and 6th, etc.

Recently, David Dunham, WA1CUH, has proposed that there might be refraction of VHF and higher frequencies in ionized ozone or the *D*-layer in the stratosphere. (See, "Ozone Layer Propagation: Pondering the Possibility," *CQ VHF,* January 1999, pp. 32–38). David has produced evidence that stability and low wind speeds in the troposphere and stratosphere could have resulted in very little scatter until the radio waves reached ionized ozone or the *D*-layer.

Tropospheric Ducting

The term *tropospheric ducting* refers to the stratification of the air within the troposphere. When layers form within this region of air, the refractive index between each layer causes a refraction of VHF and UHF radio waves. If the layers form in just the right way and at the right height, a natural wave-guide is created. A tropospheric duct develops.

As with most matters of propagation, it is not always possible to determine whether tropospheric propagation is ducting or non-ducting. Ducting usually has characteristics like sporadic-*E* propagation in that the distant station will be noticeably stronger than closer stations that are not accessible by the duct. Tropospheric ducting results in surprisingly strong signals for the distance. Ducting is typically very geographically selective. Normally, stations working a duct are quite close together in space, at both ends of the duct.

Ducting is most likely to occur over water during high-pressure, anticyclonic conditions when the air is relatively still. It is unusual at longer wavelengths, because the ducts have to be larger to be effective. You'll be very lucky to observe any tropospheric ducts on low VHF, such as on 6 meters.

Most tropospheric ducting in the Northern Hemisphere occurs in the summer. On a normal spring day, air pressure, temperature, and water vapor in the air decrease with height. The weather is relatively cool and breezy. Signals on VHF and above are from local sources and reception is "normal." However, late in the summer the weather is much hotter, with slow-moving high-pressure systems spanning several states and causing stagnant air masses. You can see a brown haze in a layer in the air above that contains smoke and smog that has become trapped in a stalled air mass. This is a good visual cue that stratification has occurred, and your chances of working tropospheric ducting are high.

Tropospheric ducts form each year between Hawaii and the U.S. West Coast, and from San Francisco to Los Angeles, Denver to Dallas, Texas to Florida, the Great Lakes to the eastern seaboard, the Great Lakes to Texas, Nova Scotia to Miami, and from the Midwest to the Southeast.

Advanced visual and infrared weather maps can be a real aid in detecting the undisturbed low clouds between the West Coast and Hawaii or farther during periods of intense subsidence-inversion band openings. This condition also occurs over the Atlantic, although hams have yet to be able to take advantage of it for transatlantic communications on 2 meters or above. There is a great resource on the internet that provides a look into current conditions. Bill Hepburn has created forecast maps and presents them at <http://www.iprimus.ca/~hepburnw/tropo_xxx.html>, which includes maps for the Pacific, the Atlantic, and other regions.

July Propagation

Many DX hunters view July as the least exciting month of the year on HF. With generally lower summertime Maximum Usable Frequencies (MUF), the higher of the amateur HF bands are mostly unusable for long-distance communications. Added to this seasonal change is the lower solar activity of the ever-declining cycle. Solar activity is half of what it was just a year ago. *F*-layer propagation on bands above 20 meters is sparse and weak.

On lower frequencies, with the long hours of daylight and the sun high in the northern sky, HF propagation conditions are more stable during July than during any other month.

Ten and 12 meters are in good shape in the Southern Hemisphere. Conditions to points south of the equator might occur, but with the low solar activity these openings will be short and rare. More likely will be short-distance contacts during July, as sporadic-*E* propagation will be most prevalent.

Fifteen meters offers good propagation, but reduced significantly from a year ago. Look for long-distance signals during local sunrise and sunset, even as the east/west Northern Hemisphere paths deteriorate. Seventeen and 15 meters may have strong openings into the Southern Hemisphere during the afternoon hours.

Twenty meters is the most reliable daytime and long-distance band during July. Expect this band to be weaker this year, but to still offer occasional openings around the clock to one area of the world or another, with peak conditions forecast for several hours after local sunrise and again during the late afternoon and early evening hours. Look for days with high 10.7-cm flux readings, along with High-Normal to Above-Normal conditions.

Nighttime openings to many areas of the world are possible on 40 meters. However, seasonally high static levels may often make DX reception difficult. High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast during the hours of darkness. 160 meters is virtually shut down due to the high static levels of summer.

Sporadic-*E* propagation peaks during the summer months. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters, with paths open between 50 and 2300 miles.

Look for frequent short-skip openings on 10, 12, 15, and 17 meters between distances of 500 and 1300 miles. During the afternoon hours skip may extend to beyond 2300 miles as a result of *F*-layer reflection. Short-skip openings should range between 250 and 2300 miles on 20 meters. Peak conditions are most likely to occur during the late morning and again during the late afternoon and early evening hours. Daytime openings on 40 and 30 meters should range between 100 and 600 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the maximum short-skip (one-hop *F*-layer reflection) of 2300 miles during the hours of darkness.

While no ionospheric openings will be possible on 160 meters during the daylight hours of July, expect some openings between sunset and sunrise for distances up to approximately 1300 miles, if the seasonally-high static levels permit.

VHF Conditions

Statistical studies show that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances as great as 1400 miles should be possible for about 10 percent of the time on 6 meters. Two-meter openings may also be possible during periods of intense sporadic-*E* ionization.

In addition, conditions for tropospheric ducting begin to form over wide

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
July & August 2004
Band Openings Given In Local Standard Time At Path Mid-Point (24-Hour Time System)

Band (Meters)		Distance From Transmitter (Miles)		
	50-250	*250-750*	*750-1300*	*1300-230*
10	Nil	08-10 (0-1)* 10-14 (0-2)* 14-18 (0-1)* 18-22 (0-2)* 22-00 (0-1)*	08-10 (1)* 10-14 (3)* 14-18 (1-2)* 18-22 (2-3)* 22-08 (1)*	08-10 (1-0)* 10-14 (3-1)* 14-18 (2-1)* 18-22 (3-1)* 22-08 (1-0)*
15	Nil	08-10 (0-2)* 10-14 (0-3)* 14-18 (0-2)* 18-20 (0-3)* 22-08 (0-1)*	08-10 (2)* 10-14 (3)* 14-18 (2)* 18-20 (3)* 20-22 (2)* 22-00 (1-2)* 00-08 (1)*	08-10 (2-1) 10-14 (3-2) 14-18 (2-3) 18-20 (3-4) 20-21 (2-3) 20-00 (2-1) 00-08 (1-0)
20	10-01 (0-1)*	07-10 (0-2)* 10-16 (1-4)* 16-21 (1-3)* 21-01 (1-2)* 01-07 (0-1)*	07-10 (2-3)* 10-17 (4)* 17-22 (3-4)* 22-01 (2-3)* 01-07 (1-2)*	07-10 (3-2) 10-16 (4-2) 16-17 (4-3) 17-22 (4) 22-00 (3) 00-01 (3-2) 01-07 (2-1)
40	08-12 (1-2)* 12-17 (2-4)* 17-21 (3-4) 21-23 (1-2) 23-08 (0-2)*	08-10 (2-4)* 10-12 (2) 12-17 (4-2) 17-18 (4-3) 18-21 (4) 21-23 (2-4) 23-05 (2-4) 05-08 (2-3)	08-10 (4-1) 10-17 (2-1) 17-18 (3-1) 18-21 (4-3) 21-05 (4) 05-06 (3-4) 06-08 (3)	08-18 (1-0) 18-21 (3-2) 21-06 (4) 06-08 (3-1)
80	07-12 (3-4) 12-16 (4-3) 16-22 (4) 22-05 (3-4) 05-07 (4)	08-10 (4-1) 10-12 (4-0) 12-16 (3-0) 16-18 (4-1) 18-20 (4-2) 20-22 (4-3) 22-07 (4) 07-08 (4-2)	08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (3-1) 22-05 (43) 05-07 (4-3) 07-08 (2-1)	08-18 (0) 18-28 (1-0) 20-22 (1) 22-04 (4-3) 04-05 (3-2) 05-06 (3-2) 06-07 (3-1) 07-08 (1)
160	18-19 (1-0) 19-20 (1) 20-22 (3-2) 22-00 (4-3) 00-06 (4) 06-08 (3-2) 08-09 (1) 09-10 (1-0)	19-20 (1-0) 20-21 (2-0) 21-22 (2-1) 22-00 (3-2) 00-04 (4-2) 04-06 (4-3) 06-08 (2-1) 08-09 (0-1)	21-22 (1) 22-01 (2-1) 01-04 (2) 04-06 (3-2) 06-07 (1) 07-08 (1-0)	21-23 (1-0) 23-01 (1) 01-06 (2-1) 06-07 (1-0)

**Predominantly sporadic-E openings.*

HAWAII
July & August 2004
Openings Given in GMT

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	14-16 (1)	06-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-02 (2) 02-04 (3) 04-06 (2) 06-09 (1)	18-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)†
Central USA	14-16 (1)	06-08 (1) 08-13 (2) 13-17 (3) 17-18 (2) 18-19 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-20 (4) 20-23 (3) 23-03 (2) 03-06 (3)	18-21 (1) 21-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)† 22-00 (2)† 00-02 (1)†
Western USA	11-14 (1) 14-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-16 (4)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3)
Western USA	16-17 (3) 17-18 (2) 18-20 (1)	15-20 (4) 20-22 (3) 22-05 (2) 05-06 (31)	04-05 (2) 05-06 (1) 19-20 (1)† 20-22 (2)† 22-02 (3)† 02-03 (2)† 03-04 (1)†	

ALASKA
July & August 2004
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	Nil	00-02 (1)	12-15 (1) 22-01 (1) 01-04 (2) 04-06 (1)	07-10 (1)
Central USA	Nil	21-00 (1) 00-03 (2) 03-04 (1)	13-15 (1) 22-00 (1) 00-03 (2) 03-05 (3) 05-06 (2) 06-08 (1)	08-12 (1)
Western USA	01-04 (1)	17-22 (1) 22-00 (2) 00-03 (3) 03-04 (2) 04-05 (1)	13-14 (1) 14-15 (2) 15-19 (3) 19-01 (2) 01-03 (3) 03-05 (4) 05-07 (3) 07-09 (2) 09-11 (1)	07-09 (1) 09-12 (2) 12-13 (1) 09-12 (1)†

†Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

Note: The Alaska and Hawaii propagation charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

Propagation charts prepared by George Jacobs, W3ASK.

areas of North America and over the Atlantic and Pacific Oceans. Watch for stalled high-pressure cells between your location and the DX.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for April 2004 is 39, down ten points from March's 49. The 12-month running smoothed sunspot number centered on October 2003 is 58, a couple of points less than September's 60. The lowest daily sunspot value during April 2004 was 13, recorded on April 10 and 11. The highest daily sunspot count for April was 63 on April 19. A smoothed sunspot count of 32 is expected for July 2004.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 101 for April 2004, down from 112 for March. The 12-month smoothed 10.7-cm flux centered on October 2003 is 124, down from September's 126. The predicted smoothed 10.7-cm solar flux for July 2004 is about 91, give or take about 17 points.

The observed monthly mean planetary *A*-index (*Ap*) for April 2004 is 10, down from March's 12. The 12-month smoothed *Ap*-index centered on October 2003 is 21, down a point from September. Expect overall geomagnetic activity to be quiet-to-disturbed during most days in July.

You may e-mail me, write me a letter, or catch me on the HF amateur bands. I also have an EchoLink node where you might catch me: Look for node number 152783, NW7US-L. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. I look forward to hearing from you. Happy DXing!

73, Tomas, NW7US/AAMØEWA

RTTY Results *(continued from page 25)*

Number groups after call letters denote the following: QSOs, QSO points, Mults, Final Score.

RESULTS 2004
CQ WPX RTTY CONTEST

SINGLE OPERATOR, ALL BAND, HIGH POWER

P40G	**2585**	**9889**	**626**	**6,190,514**
ZF2NT	**1852**	**5284**	**521**	**2,752,964**
KH7X	**1744**	**6347**	**425**	**2,697,475**
A61AR	**1324**	**5054**	**433**	**2,188,382**
AM1AKS	**1393**	**4276**	**504**	**2,155,104**
LTØH	**1233**	**3971**	**485**	**1,925,935**
YL7A	**1129**	**3862**	**468**	**1,807,416**
RA6CM	**1283**	**3744**	**467**	**1,748,448**
UA4RC	1272	3648	472	1,721,856
IK2RZP	**1093**	**3851**	**442**	**1,702,142**
K4SV	**1467**	**3528**	**467**	**1,647,576**
EU1MM	**1160**	**3669**	**427**	**1,566,663**
JH4UYB	**1023**	**3314**	**432**	**1,431,648**
KI5XP	**1515**	**3240**	**441**	**1,428,840**
RL9F	**956**	**3489**	**380**	**1,325,820**
SP6EKS	**909**	**3131**	**414**	**1,296,234**
DKØEE	**941**	**3114**	**408**	**1,270,512**
OH2BP	**977**	**3237**	**387**	**1,252,719**
JY9QJ	**999**	**3461**	**356**	**1,232,116**
HA8IE	**923**	**2827**	**429**	**1,212,783**
8S6E	**944**	**3157**	**377**	**1,190,189**
WW7OR	**1281**	**2731**	**433**	**1,182,523**
VE1OP	**997**	**2941**	**391**	**1,149,931**
N2XD	**1150**	**2914**	**394**	**1,148,116**
HA3LI	890	2978	384	1,143,552
I1COB	891	2895	392	1,134,840
W4GKM	1328	2858	393	1,123,194
WØYR	1031	2696	415	1,118,840
SP9LJD	860	2779	401	1,114,379
CT3FQ	**782**	**2674**	**389**	**1,040,186**
KYØW	**1152**	**2982**	**342**	**1,019,844**
RA3TT	976	2657	373	991,061
OK2BXW	**795**	**2648**	**372**	**985,056**
AM5KB	**908**	**2368**	**402**	**951,936**
S50C	**786**	**2622**	**362**	**949,164**
AI9T	**1108**	**2425**	**389**	**943,325**
OH7UE	813	2329	379	882,691
K7RL	1208	2404	364	875,056
UN6G	**820**	**2738**	**319**	**873,422**
K9MUG	993	2308	374	863,192
NO2T	**959**	**2306**	**372**	**857,832**
ND5S	**1022**	**2214**	**384**	**850,176**
EA3QA	741	2224	382	849,568
K4MA	830	2298	367	843,366
7S2E	740	2345	353	827,785
LY2OX	**739**	**2488**	**330**	**821,040**
JM1LPN	**842**	**2263**	**360**	**814,680**
ZL2AMI	**725**	**2560**	**314**	**803,840**
DL6JZ	721	2523	317	799,791
KR7AZ	1123	2325	337	783,525
W6IHG	860	2157	362	780,834
KZ7X	1254	2312	332	767,584
JA7IC	**717**	**2178**	**349**	**760,122**
YO9HP	**717**	**2281**	**333**	**759,573**
JM1XCW	697	2347	315	739,305
W9MU	845	1939	371	719,369
RZ3DX	735	2263	314	710,582
SV1CER	**734**	**2125**	**333**	**707,625**
W4UEF	746	2064	323	666,672
RX3DCN	716	1915	333	637,695
K4WW	832	1894	336	636,384
JA1BWA	667	2110	301	635,110
VE7CF	**872**	**2080**	**300**	**624,000**
W6WRT	1037	2041	300	612,300
W4UK	1009	1976	304	600,704
VK4UC	**558**	**2020**	**293**	**591,860**
UAØCA	739	2072	283	586,376
YL2CI	635	1984	295	585,280
SP3HUU	570	2020	289	583,780
IZ5BAM	623	1900	306	581,400
WT8C	777	1750	326	570,500
DL4RCK	604	1799	317	570,283
JR3NZC	**581**	**1878**	**300**	**563,400**
LZ5ZI	**680**	**1820**	**309**	**562,380**
SP3GXH	562	1909	291	555,519
K8AJS	786	1722	315	542,430
RU9CY	606	1791	298	533,718
W2YE	680	1663	318	528,834
K5HP	**954**	**1825**	**289**	**527,425**
XE2AC	**683**	**1868**	**277**	**517,436**
SV1DPP	649	1667	306	510,102
HB9AVK	**469**	**1793**	**267**	**478,731**
NK5A	627	1534	300	460,200
W4OX	579	1524	298	454,152
DL2OE	486	1573	269	423,137
WD4DDU	627	1501	281	421,781
UAØAZ	522	1554	268	416,472
K3GP	631	1366	300	409,800
YL2NN	498	1639	248	406,472
SP6CZ	455	1553	261	405,333
W3FV	**564**	**1481**	**271**	**401,351**
DAØPHV	467	1444	277	399,988
G3UHU	**483**	**1585**	**246**	**389,910**
AK1W	**475**	**1430**	**268**	**383,240**
RU6MM	532	1490	257	382,930
DL5BUT	440	1491	256	381,696
KØFX	**717**	**1450**	**261**	**378,450**
HB9CVE	439	1483	253	375,199
NA2M	670	1387	263	364,781
AD4EB	667	1200	296	355,200
K3WW	503	1307	268	350,276
N2BJ	658	1263	277	349,851
UAØSMF	556	1396	250	349,000
JS1OYN	490	1475	229	337,775
OK1MSP	403	1415	236	333,940
DF3IS	425	1201	260	312,260
IK8URC	435	1203	253	304,359
IK2UCK	415	1183	254	300,482
KE6RAD	594	1283	231	296,373
F5CQ	**407**	**1223**	**241**	**294,743**
JA1BNW	454	1268	224	284,032
N8KM	466	1174	235	275,890
OK2SG	357	1155	233	269,115
K6HGF	688	1074	250	268,500
AC1O	453	1067	249	265,683
SJ5AA	345	1196	219	261,924
VE9FX	419	1134	222	251,748
VE3HG	**419**	**1294**	**188**	**243,272**
VK6GOM	353	1148	210	241,080
RUØLL	420	1156	196	226,576
OK1BNS	323	1070	211	225,770
JA2FSM	**379**	**1110**	**202**	**224,220**
UT5EPP	**342**	**1202**	**183**	**219,966**
UAØAGI	386	1123	193	216,739
EN1U	332	1096	197	215,912
JA8TR	**360**	**1079**	**200**	**215,800**
4X1GA	**339**	**1085**	**197**	**213,745**
N4VV	425	979	213	208,527
RTØQ	426	1084	177	191,868
KFØOH	537	905	211	190,955
AB1HZ	514	935	204	190,740
DL5YM	302	955	190	181,450
HL3AHQ	**319**	**1082**	**165**	**178,530**
N4CW	342	843	201	169,443
KF8HR	409	802	211	169,222
JR1NHD	362	909	180	163,620
RX9TX	285	976	163	159,088
OH4RH	293	817	194	158,498
PS2E	**298**	**902**	**171**	**154,242**
KJ6RA	420	823	186	153,078
N7MQ	406	701	205	143,705
N5JR	298	641	207	132,687
WØHW	369	689	190	130,910
K5NZ	393	760	171	129,960
WA6BOB	290	799	151	120,649
W1TO	294	675	170	114,750
OH1MM	242	683	168	114,744
UA9DD	223	709	160	113,440
JI1CQA	261	693	161	111,573
JA2AXB	248	728	153	111,384
UN5J	222	698	155	108,190
IK2HKT	202	802	133	106,666
SV1BDO	224	765	139	106,335
RA3FD	239	701	145	101,645
DJ2YE	203	690	144	99,360
EI4DW	**214**	**591**	**157**	**92,787**
KZ5AM	341	574	158	90,692
WA8TNO	224	487	157	76,459
KL7IWC	**250**	**595**	**122**	**72,590**
MW2I	**194**	**568**	**127**	**72,136**
KØIR	292	460	150	69,000
W6IXP	270	448	144	64,512
WY4Y	244	472	131	61,832
W9WI	227	457	132	60,324
W6JOX	260	430	139	59,770
K8RT	247	442	135	59,670
KP4JRS	**217**	**486**	**114**	**55,404**
LA2IJ	**151**	**515**	**103**	**53,045**
NA4M	198	397	131	52,007
WA1Z	201	431	117	50,427
EY8MM	**132**	**526**	**94**	**49,444**
EA5EG	166	373	131	48,863
YL1A	140	432	110	47,520
G3LDI	123	428	108	46,224
W5JAY	262	346	132	45,672
W9SE	200	376	120	45,120
DK2PC	136	435	102	44,370
N3NZ	234	335	124	41,540
YBØAJR	**128**	**415**	**99**	**41,085**
LX1NO	**129**	**389**	**100**	**38,900**
N5PU	180	339	105	35,595
WØTY	173	293	117	34,281
NF6V	168	276	112	30,912
N7VGO	197	282	108	30,456
UA1OAM	121	340	89	30,260
W3FQE	144	254	112	28,448
KØCOP	128	268	100	26,800
N6NBB	167	274	97	26,578
K5ZG	142	242	94	22,748
RZ9HW	103	308	72	22,176
KD1J	118	252	87	21,924
KC7V	113	191	96	18,336
KS5V	115	185	89	16,465
KØAD	131	172	88	15,136
SM1TDE	59	161	53	8,533
VY2LI	72	160	53	8,480
PY5KD	44	131	34	4,454
JR1VAY	50	108	37	3,996
N6BXO	39	91	36	3,276
OE1TKW	27	98	26	2,548
EU7SA	17	47	17	799
AA3TL	24	32	20	640
UAØCW	4	10	4	40

OPS: P40G (I2UIY), **KH7X** (KH6ND), A61AR (RV6LNA), **LTØH** (LU3HY), **DKØEE** (DL4MDO), **8S6E** (SM6FUD), **WW7OR** (W7GG), **KYØW** (WØYK), **AM5KB** (EA5KB), **S50C** (S55OO), **7S2E** (SM2DMU), **KR7AZ** (K7WM), **N5KA** (K4HV), **SJ5AA** (SM5FUG), **EN1U** (UX1UA), **RTØQ** (RZ3BY/Ø), **AB1HZ** (K7JJ), **PS2E** (PY2EX), **MW2I** (GW5NF), **WY4Y** (N4EIL), **YL1A** (YL2PA)

SINGLE OPERATOR, ALL BAND, LOW POWER

ZX2B	**1625**	**5263**	**566**	**2,978,858**
CN8KD	**1219**	**4620**	**459**	**2,120,580**
8P2K	**1317**	**3721**	**430**	**1,600,030**
AA5AU	**1619**	**3313**	**452**	**1,497,476**
ON4ADZ	**1040**	**3502**	**427**	**1,495,354**
4Z5CP	**995**	**3847**	**370**	**1,423,390**
N2WK	**1154**	**2932**	**420**	**1,231,440**
UY8IF	**1050**	**2993**	**411**	**1,230,123**
PS7TKS	**834**	**3099**	**381**	**1,180,719**
UP6P	**959**	**2984**	**379**	**1,130,936**
AN5DF	**1006**	**2593**	**433**	**1,122,769**
WX4TM	**1216**	**2732**	**399**	**1,090,068**
AN2RY	1011	2843	382	1,086,026
9J2KC	**894**	**2701**	**391**	**1,056,091**
9A3ZI	**839**	**2832**	**358**	**1,013,856**
HI3TEJ	**937**	**2804**	**350**	**981,400**
UA4FCO	**932**	**2810**	**347**	**975,070**
CX4AAJ	**839**	**2582**	**371**	**957,922**
LZ9R	**910**	**2662**	**359**	**955,658**
OK6A	**780**	**2649**	**350**	**927,150**
USØKW	780	2585	346	894,410
IT9SGN	**870**	**2539**	**350**	**888,650**
YU7AM	**770**	**2592**	**341**	**883,872**
RX9SR	**775**	**2594**	**330**	**856,020**
F6AUS	**726**	**2275**	**365**	**830,375**
YV5AAX	**715**	**2445**	**327**	**799,515**
OK2ZC	707	2287	332	759,284
DK3VN	**723**	**2347**	**320**	**751,040**
OK2RU	687	2334	321	749,214
N9BX	**920**	**2048**	**348**	**712,704**
UA4HJ	788	2297	310	712,070
EW1CQ	**724**	**2408**	**291**	**700,728**
UN7MO	682	2293	303	694,779
WA1EHK	**746**	**1902**	**353**	**671,406**
EA8/DJ1OJ	**614**	**2150**	**305**	**655,750**
SQ5RK	**661**	**1912**	**336**	**642,432**
OZ9GA	**658**	**2186**	**287**	**627,382**
CT1ELC	**595**	**1965**	**316**	**620,940**
WW3S	**829**	**1830**	**331**	**605,730**
N9CK	**899**	**1833**	**323**	**592,059**
UA3SAQ	645	1958	294	575,652
W1ECT	664	1733	320	554,560
PV8DX	545	2013	274	551,562
OK2PEF	601	2003	273	546,819
IC8POF	**598**	**1771**	**307**	**543,697**
KI6DY/Ø	**1004**	**1837**	**294**	**540,078**
NØAT	1024	1796	300	538,800
UN4PG	596	1843	289	532,627
VE9DX	**645**	**1702**	**293**	**498,686**
VE3GSI	**655**	**1875**	**265**	**496,875**
SQ4NR	555	1803	263	474,189
SP9W	535	1700	270	459,000
CN8LI	**521**	**1629**	**279**	**454,491**
WA2ETU	705	1532	294	450,408
W3MEL	718	1514	295	446,630
LV7H	**562**	**1656**	**267**	**442,152**
EA1ZH	506	1424	301	428,624
GM4FDM	**529**	**1634**	**259**	**423,206**
N1MGO	694	1404	299	419,796
DG8LAV	512	1519	276	419,244
N6OJ	**867**	**1488**	**281**	**418,128**
HB9CAL	**491**	**1559**	**263**	**410,017**
WD4GBW	550	1379	295	406,805
K4UTE	563	1302	304	395,808
S57U	**453**	**1498**	**264**	**395,472**
GUØSUP	**462**	**1285**	**306**	**393,210**
W7LD	**850**	**1397**	**281**	**392,557**
RA4CTR	585	1506	260	391,560
YB5QZ	**473**	**1420**	**275**	**390,500**
VE7FO	**607**	**1502**	**256**	**384,512**
TA1BM	**469**	**1515**	**252**	**381,780**
YEØANA	464	1608	231	371,448
RA9DA	448	1484	250	371,000
W3OA	605	1366	267	364,722
SQ7B	476	1557	234	364,338
CT1ELF	469	1304	271	353,384
4X6UU	**406**	**1633**	**216**	**352,728**
W8UL	602	1327	265	351,655
UA9AX	429	1604	216	346,464
RW4WZ	478	1414	245	346,430
UT2UZ	489	1347	257	346,179
4K6DI	**388**	**1656**	**203**	**336,168**
SP8QED	444	1432	228	326,496
F2AR	425	1384	233	322,472
IZ4DZD	405	1311	241	315,951
SP3BJK	447	1363	230	313,490
W6OAT	579	1206	257	309,942
W6FFH	706	1194	257	306,858
YC3MM	406	1207	254	306,578
CT1XK	441	1226	247	302,822
DL1ZBO	401	1276	230	293,480
LA7CL	**410**	**1236**	**236**	**291,696**
DL7VOG	397	1166	244	284,504
DL2YCA	412	1233	228	281,124
KU5S	**565**	**1089**	**254**	**276,606**
YL2LY	**375**	**1224**	**224**	**274,176**
F5NOD	387	1094	246	269,124
OZØF	395	1311	205	268,755
AD1C	510	1100	242	266,200
YL3FP	400	1358	195	264,810
VE3ESH	**469**	**1275**	**207**	**263,925**
DL1DTL	379	1131	229	258,999
PY7ZY	396	1174	219	257,106
RU3WR	407	1302	197	256,494
PA3HCF	**366**	**1202**	**212**	**254,824**
ND2T	633	1066	238	253,708
SP2EXE	366	1173	215	252,195
WØEK	738	1184	213	252,192
MØAFZ	**315**	**1179**	**212**	**249,948**
XE1YYD	**497**	**1151**	**215**	**247,465**
KT1I	474	1054	234	246,636
N6PC	633	1060	229	242,740
CT3KN	**304**	**1223**	**198**	**242,154**
OK1JN	352	1241	194	240,754
SM7JUR	**372**	**1168**	**201**	**234,768**
OM3RM	**303**	**1080**	**215**	**232,200**
W2QQ	529	1078	215	231,770
RA9XF	373	1181	196	231,476
RW4FE	399	987	234	230,958
LZ2NP	328	1075	212	227,900
DK4IO	354	1033	217	224,161
RA3BB	372	1062	209	221,958
K6TA	495	1032	211	217,752
GW4MVA	**316**	**964**	**221**	**213,044**
F6FTB	329	996	213	212,148
SP4COU	304	1055	199	209,945
DJ3JD	336	1045	200	209,000
UA9TO	348	1066	195	207,870
DL2AL	313	1032	199	205,368
UA9FFV	350	959	214	205,226
UAØWL	358	953	212	202,036
VE4COZ	**434**	**1125**	**179**	**201,375**
SP9LKS	317	1050	191	200,550
LY2SA	**293**	**1049**	**190**	**199,310**
WM7A	551	950	208	197,600
UT5UKY	300	1055	187	197,285
WG7Y	615	929	212	196,948
N5IJE	482	896	219	196,224
UK/JI2MED	**347**	**978**	**200**	**195,600**
EA3AGZ	318	791	247	195,377
UX8ZA	316	985	197	194,045
OK2BTJ	313	943	204	192,372
RN4SS	336	937	203	190,211
NI5F	451	923	206	190,138
NP3D	**352**	**980**	**194**	**190,120**
N7UVH	516	835	227	189,545
ER3ZZ	**296**	**976**	**193**	**188,368**
SP6BEN	298	979	190	186,010
EF1DQN	334	791	233	184,303
W4BCG	500	874	208	181,792
OH3HTU	**314**	**992**	**183**	**181,536**
B3CE	**443**	**1204**	**150**	**180,600**
SP1NQV	314	951	189	179,739
RN9AA/9	286	1052	170	178,840
WB2RHM	416	879	202	177,558
VE3XD	341	902	191	172,282
HB9DWL	280	902	190	171,380
RA1AY	292	946	181	171,226
KE4DX	396	801	213	170,613
N4GVA	451	816	207	168,912
IK2PYU	277	877	192	168,384
VA3XRZ	354	1016	165	167,640
SM3LBP	279	892	186	165,912
CT3EE	287	858	192	164,736
WE9V	334	851	193	164,243
UA4LCQ/9	331	835	195	162,825
IK4QI8	273	830	195	161,850
JA1OVD	**324**	**901**	**177**	**159,477**
KC5NYO	464	778	203	157,934
KB5DO	420	768	205	157,440
EA3NO	290	802	195	156,390
WO4O	403	789	197	155,433
G4IXF	292	764	203	155,092
N2FF	360	835	184	153,640
XE2AUB	356	928	165	153,120
HL2FDW	**316**	**931**	**163**	**151,753**
OK1DOZ	269	876	173	151,548
JA5JWQ	**302**	**878**	**170**	**149,260**
WA1LWS	395	780	191	148,980
UX1HW	273	897	166	148,902
WY7LL	550	759	196	148,764
7XØAD	**260**	**879**	**168**	**147,672**
W5JE	407	732	201	147,132
VA3PL	288	807	182	146,874
KM5FY	427	757	193	146,101
W5RW	437	820	178	145,960
RU3XB	281	897	162	145,314
XE1XOE	323	929	156	144,924
K9WX	387	769	187	143,803
AH6HH	**304**	**984**	**146**	**143,664**
VE3XAT	274	893	156	139,308
OK2TCW	257	760	177	134,520
OH3PS	235	758	177	134,166
VE5CPU	**396**	**881**	**149**	**131,269**
OL3W	246	804	163	131,052

JA1XRH	296	855	150	128,250
K7GS	364	651	195	126,945
PY3OL	250	731	173	126,463
VE2FK	**262**	**836**	**151**	**126,236**
K4BX	396	713	177	126,201
JG1GGU	298	833	151	125,783
UA6JD	269	794	158	125,452
W9HLY	327	684	183	125,172
JA8JCR	**327**	**827**	**150**	**124,050**
PP7ZZ	198	821	151	123,971
OK2PAD	234	735	167	122,745
NP4BM	272	721	168	121,128
M5AEX	231	738	164	121,032
SM3ETC	270	751	161	120,911
F5RD	211	795	152	120,840
SP3DSC	229	708	168	118,944
JA1BHK	288	752	156	117,312
K5HDU	342	646	178	114,988
K9BJM	359	705	163	114,915
UR5KCC	235	771	149	114,879
LY3BY	242	728	157	114,296
DL4IB	239	708	161	113,988
PA3EBP	244	720	157	113,040
KØCF	358	702	160	112,320
SM7BJW	250	710	156	110,760
NR4X	307	628	176	110,528
KA5EYH	433	618	178	110,004
UT1UA	239	655	167	109,385
UT5UML	229	752	145	109,040
YZ7EM	220	700	155	108,500
RA9FTM	218	748	144	107,712
RZ1AZ	235	712	151	107,512
AE4Y	339	615	174	107,010
HA1YI	**228**	**673**	**159**	**107,007**
RV3UG	238	695	152	105,640
N3HSH	279	648	163	105,624
SM5UFB	236	634	165	104,610
FO5PS	**234**	**748**	**139**	**103,972**
RV3LQ	244	679	153	103,887
OM5MX	191	710	146	103,660
KJ7NO	382	656	156	102,336
W4TIJ	344	565	179	101,135
WA3AAN	324	628	161	101,108
DL7NFK	211	670	150	100,500
W1VET	322	576	174	100,224
SP7AWG	219	677	147	99,519
WØVD	354	532	186	98,952
N5UWY/9	347	621	159	98,739
SP4KEV	220	729	135	98,415
K6RIM	359	530	185	98,050
W1AMF	292	575	170	97,750
UA1AFZ	219	718	135	96,930
HB9HQX	211	725	133	96,425
ON7CFZ	**216**	**669**	**144**	**96,336**
PY2NB	221	665	144	95,760
DF8AA	188	651	147	95,697
JA7KM	**236**	**646**	**146**	**94,316**
OM7RC	209	683	138	94,254
NZ8O	320	594	158	93,852
SQ6F	224	627	148	92,796
EW7AW	193	672	138	92,736
UR5GAR	213	696	133	92,568
W1/SM6SRW	240	532	173	92,036
WB6BWZ	334	617	146	90,082
OK2PCL	154	682	132	90,024
IZ7AUH	180	605	147	88,935
N2LK	286	553	160	88,480
PAØWCH	189	606	146	88,476
SP9CQ	189	666	129	85,914
7N2UQC	**243**	**586**	**146**	**85,556**
DH2MA	207	586	146	85,556
JA8UON	232	657	130	85,410
HAØGK	198	606	140	84,840
KA3PVA	296	601	141	84,741
NT6K	345	551	153	84,303
N1NB	256	530	159	84,270
3Z8Z	188	579	145	83,955
US7IB	201	643	129	82,947
K5WW	331	530	150	79,500
AK6DV	295	504	152	76,608
N9KO	308	521	147	76,587
WD9GMK	298	478	157	75,046
EA2BNU	199	563	133	74,879
LY2FN	179	571	130	74,230
EA4CRP	170	556	131	72,836
RW3TA	212	526	138	72,588
G3XTT	167	550	129	70,950
3Z9U	158	620	114	70,680
UT7EJ	200	496	142	70,432
UA6XIS	204	514	137	70,418
VE7WU	171	465	151	70,215
AD6G	296	466	149	69,434
PAØLSK	175	526	132	69,432
EA/DH8WR	169	603	114	68,742
MWØ0GMB	196	528	130	68,640
WM5DX	284	446	152	67,792
DL7VBO	172	516	130	67,080
W8RAH	222	466	142	66,172
2E1OKT	195	462	143	66,066
ON6OM	173	530	121	64,130
VA7ST	218	572	112	64,064
JH1ECF	190	525	122	64,050
SP3DOF	175	530	119	63,070
DS5DNO	195	616	102	62,832
OH2LZI	178	501	124	62,124
VA3JNO	194	533	116	61,828
KE1F	248	426	145	61,770
UAØFBS	210	601	101	60,701
HB9AWS	162	566	107	60,562
JA8EIU	209	555	109	60,495
RU3VD	164	478	126	60,228
JA2KCY	183	504	118	59,472
YO6BHN	**180**	**457**	**130**	**59,410**
VE6RRD	**221**	**515**	**115**	**59,225**
SQ9AOR	160	471	125	58,875
W5BBR	249	418	138	57,684
VE7HBS	206	497	115	57,155
JA2QVP	171	509	112	57,008
IT9ORA	137	514	109	56,026
NFØN	229	411	131	53,841
UR4EI	159	468	114	53,352
DL6UAM	146	554	96	53,184
SV1EML	**146**	**515**	**103**	**53,045**
PA3CDN	157	460	114	52,440
G1WAB	153	479	109	52,211
YO3APJ	166	412	124	51,088
EA5ME	147	469	108	50,652
OK1MCA	128	456	111	50,616
NNØG	275	389	129	50,181
YL2TW	159	452	111	50,172
KØBX	188	373	134	49,982
WBØDUL	274	389	126	49,014
IK8SCR	146	418	117	48,906
DK3WJ	145	454	106	48,124
K3FH	214	422	114	48,108
N5ZM	210	395	121	47,795
KB9Q	232	406	116	47,096
JE1LFX	163	406	116	47,096
K4HAL	203	404	115	46,460
K6UM	205	397	117	46,449
OE1KTS	**154**	**437**	**106**	**46,322**
AA5BE	263	367	126	46,242
NF4L	184	381	121	46,101
RA6AAW	141	461	100	46,100
W2WB	178	383	119	45,577
F5PHW	136	432	104	44,928
UT2QQ	152	415	106	43,990
UA1OMS	142	439	100	43,900
SP3RBT	148	421	104	43,784
SN9A	131	413	105	43,365
DJ9ER	125	383	113	43,279
G7TMU	151	349	123	42,927
VE2AXO	137	434	97	42,098
RZ9IB	166	404	104	42,016
AM5TS	143	378	111	41,958
UA9XKB	140	394	106	41,764
DU7/G4DUM	**150**	**444**	**94**	**41,736**
OK1FHI	126	413	101	41,713
CE1V	**140**	**411**	**101**	**41,511**
UA9CR	119	443	93	41,199
LA1YE	131	386	103	39,758
GU8FBO	117	393	101	39,693
K6BIR	209	344	115	39,560
SP4CJA	140	357	110	39,270
LZ1MC	120	434	89	38,626
KB9DVC	188	341	113	38,533
DK3RA	118	428	90	38,520
KH6GMP	137	403	92	37,076
WA8RC	170	339	109	36,951
JA5ATN	**138**	**403**	**91**	**36,673**
HB9VID	128	363	100	36,300
K9OSH	176	328	110	36,080
NØKBD	220	298	121	36,058
W8JGU	160	316	114	36,024
SP3JIA	125	353	102	36,006
HS1PDY	**122**	**371**	**97**	**35,987**
F5OIU	126	346	104	35,984
JA1EMQ	126	339	103	34,917
PY2BRZ	117	353	98	34,594
SM4UOS	115	378	91	34,398
WA6AWD	191	299	115	34,385
JA1ALE	151	344	96	33,024
DL8HCO	122	339	97	32,883
WA4OSD	170	300	107	32,100
JL7IFR	119	334	96	32,064
OK2PHI	110	360	89	32,040
JM1GHT	111	383	80	30,640
RD4WA	108	354	85	30,090
KW9N	175	302	99	29,898
ZL2BR	**111**	**336**	**88**	**29,568**
SP6BSL	103	331	89	29,459
JR3NDM	125	344	85	29,240
NQ4/KP2N	174	253	115	29,095
SQ6LAK	107	310	93	28,830
YO7ARY	111	341	83	28,303
KC4SAW	144	268	104	27,872
WA4GLH	145	311	89	27,679
JA9LX	123	349	79	27,571
RA4LE	121	302	91	27,482
W5YM	149	300	90	27,000
SQ2BXI	99	327	82	26,814
PA3BFH	98	314	85	26,690
IK2WFN	107	312	85	26,520
G4EMT	117	268	98	26,264
DL6ABB	103	309	83	25,647
OM2AAA	107	292	83	24,236
EA4AWM	105	257	93	23,901
RAØCL	150	306	77	23,562
JF2IGP	102	299	75	22,425
SP3HC	96	269	81	21,789
SQ9ANS	94	285	75	21,375
N7GVV	137	238	89	21,182
SM6CRM	93	238	89	21,182
KC5YKX	117	242	87	21,054
JA3MIB	101	258	78	20,124
K6OWL	117	247	80	19,760
W4JH	107	219	89	19,491
WG1Z	120	215	89	19,135
DL1ARJ	84	273	70	19,110
KW2P	98	254	75	19,050
LZ1ZM	108	243	78	18,954
DF9DH	97	238	78	18,564
JA2BQX	95	255	72	18,360
VE1SKY	93	273	67	18,291
RD3DK	89	258	70	18,060
KF6PKG	123	197	91	17,927
PT2ND	84	248	72	17,856
AAØCY	122	205	86	17,630
KF2XF	128	185	93	17,205
JA1IZ	81	252	68	17,136
W4ZY	115	199	82	16,318
UA1WBV	80	242	65	15,730
DL5JWL	84	241	63	15,183
N6RCE	106	188	80	15,040
SP9OHP	75	223	66	14,718
UA4WLI	93	196	74	14,504
MØAEJ	87	187	76	14,212
W1LZ	100	179	79	14,141
W7DPW	98	188	74	13,912
N5NJ	119	178	78	13,884
AE4EC	99	173	80	13,840
RW6AH	82	214	64	13,696
PA5O	80	202	67	13,534
LY2KW	71	212	62	13,144
K2MK	97	169	77	13,013
WØRY	98	183	71	12,993
WA8SDA	104	173	75	12,975
EA3EYD	71	203	62	12,586
PAØFAW	78	196	64	12,544
JA3PYC	70	219	57	12,483
JA1XPU	82	198	63	12,474
KZ5AA	75	192	63	12,096
W3DSX	87	147	69	10,143
DK7FP	56	195	52	10,140
W6LSN	86	150	66	9,900
WA9NBU	95	131	74	9,694
RAØANO	68	172	56	9,632
W7VXS	94	123	74	9,102
W9ISC	99	125	72	9,000
NØIBT	98	129	69	8,901
OK2SWD	59	167	53	8,851
SQ9IDE	66	158	56	8,848
DL1DRD	49	180	47	8,460
HB9TOC	59	168	50	8,400
NL7AU/4	62	155	54	8,370
NØICV	79	131	58	7,598
KF6RY	82	124	61	7,564
KØRY/5	81	126	60	7,560
7L3IUE	59	154	49	7,546
RW4HM	54	165	44	7,260
4J9NM	47	157	44	6,908
KT4Q	61	146	47	6,862
ZL3DW	48	159	42	6,678
AB8ND	79	115	58	6,670
JA1AYO	46	177	37	6,549
JG5DHX/5	48	160	39	6,240
YO3III	46	138	44	6,072
K9QH	65	127	46	5,842
KX7YT	62	112	50	5,600
IK2WYI	47	128	42	5,376
ON6NL	41	141	37	5,217
DJ1AD	46	126	37	4,662
RW9QA	34	144	32	4,608
OH2LO	42	125	36	4,500
JA1IE	43	126	31	3,906
UA3QIX/QRP	45	111	35	3,885
W8RU	41	96	39	3,744
OK1KDO	35	112	33	3,696
DM6PAA	43	91	39	3,549
HB9DBK	37	102	34	3,468
EA4BNQ	37	97	35	3,395
I8BVW	35	93	35	3,255
DL9DWR	31	77	31	2,387
IKØMIB	33	75	28	2,100
KG4PKQ	42	56	37	2,072
NC6P	39	60	34	2,040
VE3MGY	33	74	27	1,998
K9EMG	33	66	30	1,980
NM1W	34	59	31	1,829
N3JIX	35	57	32	1,824
K6MI	30	64	27	1,728
YL2KF	20	86	19	1,634
SP4HXV	25	69	23	1,587
JQ1AHZ/2	24	63	22	1,386
DJ6TK	21	48	20	960
PA7PTT	19	48	18	864
OH2GI	13	48	12	576
W1ZRV	20	29	18	522
K8CPA	14	33	13	429
TF3MM	13	28	13	364
W3GQ	11	33	11	363
KB9YOZ	16	24	14	336

WB5EXI/VE6	16	21	15	315
GM8OEG	11	28	10	280
LA1PHA	8	32	8	256
KC2FJS	2	4	2	8
NU6T	1	1	1	1

OPS: ZX2B (PY2MNL), **8P2K** (8P6SH), **AN5DF** (EA5DF), **AN2RY** (EA2RY), **9J2KC** (JL1NKC), **LZ9R** (LZ3YY), **OK6A** (OK2CLW), **LV7H** (LU7HF), **NR4X** (K4SB), **SP4KEV** (SP4IRS), **NZ8O** (K8SIA), **G1WAB** (G6OKU), **KW9N** (K9MI), **W5YM** (KD5RTQ), **KZ5AA** (K4VU), **KF6RY** (W6ZL), **ON6NL** (ON6LEO), **OK1KDO** (OK1WN)

ROOKIE

KB1JZU	**598**	**1249**	**242**	**302,258**
ABØRX	**587**	**1121**	**230**	**257,830**
6K2CLF	**395**	**1277**	**180**	**229,860**
NQ4S	**420**	**812**	**212**	**172,144**
WA2AGE	**460**	**738**	**220**	**162,360**
DK1RF	249	713	163	116,219
OH5VG	**126**	**410**	**114**	**46,740**
K5PAX	**227**	**330**	**135**	**44,550**
RK2FXG	**165**	**367**	**120**	**44,040**
2EØMLR	98	222	75	16,650
SM5FAN	37	134	37	4,958
AA6VO	52	111	39	4,329
VA7CPC	42	116	37	4,292
KB1HDO	60	87	49	4,263
N2KIN	36	38	32	1,216

OP: ABØRX (WØMA)

SINGLE OPERATOR 10 METERS

LU1HF	**1215**	**3611**	**534**	**1,928,274**
LU9EV	**547**	**1620**	**299**	**484,380**
LT1D	**459**	**1366**	**270**	**368,820**
KR6E	**328**	**454**	**182**	**82,628**
NA4WI	**288**	**448**	**181**	**81,088**
LY1BA	**202**	**478**	**161**	**76,958**
WM9G	**206**	**412**	**153**	**63,036**
SV8CS	**188**	**467**	**130**	**60,710**
PY2EB	**153**	**443**	**109**	**48,287**
LU7DW	139	411	103	42,333
UA6ADC	**126**	**311**	**99**	**30,789**
SQ9IET	82	224	67	15,008
WØ0ETC	91	171	72	12,312
SV2AEL	70	176	58	10,208
SQ6ELV	55	149	48	7,152
EA4/EA1DDN	55	136	51	6,936
JA1BPA	54	134	48	6,432
OH3TY	34	94	34	3,196
KG4FSN	36	68	35	2,380
SP4DC	23	61	22	1,342
UA9FGJ	23	59	21	1,239
SP3PL	21	61	20	1,220
JE2SOY	18	38	17	646

OPS: LU9EV (LW9DMM), **LT1D** (LU4DJC), **NA4WI** (K4WI)

SINGLE OPERATOR 15 METERS

LPØH	**1024**	**3032**	**512**	**1,552,384**
LU1NDC	**894**	**2651**	**463**	**1,227,413**
AY8A	**817**	**2409**	**429**	**1,033,461**
9A5W	**804**	**2151**	**424**	**912,024**
CX7BY	**646**	**1912**	**360**	**688,320**
S51FB	**670**	**1764**	**378**	**666,792**
EO1I	**713**	**1682**	**377**	**634,114**
NJ4U	**695**	**1614**	**388**	**626,232**
RA1ACJ	**565**	**1387**	**347**	**481,289**
UX1IL	615	1468	327	480,036
W1US	**595**	**1390**	**328**	**455,920**
IV3HAX	**437**	**1178**	**266**	**313,348**
4Z8EE	**419**	**1247**	**235**	**293,045**
DL1YD	**399**	**1053**	**268**	**282,204**
OH7MJU	**405**	**965**	**287**	**276,955**
YO3JF	**408**	**1049**	**260**	**272,740**
DJ3IW	380	989	273	269,997
YC2ECG	**359**	**1067**	**227**	**242,209**
EA5FID	**370**	**921**	**262**	**241,302**
JE1GMM	**358**	**893**	**238**	**212,534**
EA7CWA	383	880	241	212,080
UN4PD	**328**	**892**	**229**	**204,268**
WG8Y	**346**	**744**	**240**	**178,560**
ED1BD	303	759	229	173,811
UU4JO	333	778	217	168,826
4X6UO	**289**	**862**	**181**	**156,022**
W6IWO	**430**	**697**	**223**	**155,431**
SX1R	**320**	**691**	**204**	**140,964**
HA1ZH	**283**	**722**	**195**	**140,790**
S51J	238	633	166	105,078
HA5LV	229	595	174	103,530
RU4SS	253	580	175	101,500
JR3RIY	**223**	**564**	**166**	**93,624**
SVØXAI/SV9	279	572	159	90,948
HG3IPA	193	497	144	71,568
OK2PMS	**173**	**451**	**141**	**63,591**
YO2RR	176	454	136	61,744
SP6DMI	164	428	132	56,496
ES4MM	**159**	**387**	**128**	**49,536**
JM1NKT	159	401	122	48,922
SM6BSK	**140**	**348**	**123**	**42,804**
8S7A	134	336	110	36,960

AH6OZ	**124**	**368**	**90**	**33,120**
JH2BTM	**117**	**295**	**93**	**27,435**
JH9BWC	**107**	**292**	**93**	**27,156**
7Z1SJ	**101**	**290**	**90**	**26,100**
EF1AKI	104	250	84	21,000
HC1JQ	93	269	72	19,368
OM7PY	93	250	77	19,250
OH7MN	99	211	75	15,825
T95MMX	86	199	74	14,726
ON4VV	82	215	67	14,405
KI9R	94	170	84	14,280
JH9VUU	77	205	65	13,325
RW4LQ	76	203	63	12,789
E21EIC	65	171	58	9,918
JE1RRK	62	167	51	8,517
SP4NKJ	57	144	52	7,488
HK3PJC	56	156	47	7,332
WA4FXX	65	104	59	6,136
YL2GUI	50	123	45	5,535
JH8KYU/1	30	82	30	2,460
RK6CM	31	66	27	1,782
JR1NKN	14	32	13	416
JH1TUX	11	32	11	352
PR7AR	10	21	10	210
EA2KP	2	6	1	6

OPS: LPØH (LU7HN), **AY8A** (LU8ADX), **EO1I** (UT1IA), **NJ4U** (K4EA), **W1US** (K6ND), **4Z8EE** (OK1EE), **SX1R** (SV1XV), **8S7A** (SM7CRW), **KI9R** (K9JS)

SINGLE OPERATOR 20 METERS

LV5V	**782**	**2310**	**413**	**954,030**
9A7R	**816**	**2000**	**455**	**910,000**
UA1AKC	**795**	**1819**	**416**	**756,704**
VE2RYY	**733**	**1841**	**401**	**738,241**
LU7FJ	**603**	**1780**	**352**	**626,560**
S51DX	**638**	**1536**	**378**	**580,608**
UW8M	**671**	**1458**	**347**	**505,926**
IV3TMV	**567**	**1376**	**354**	**487,104**
DL5NAM	**531**	**1332**	**346**	**460,872**
EA4EJP	**616**	**1394**	**328**	**457,232**
SX1A	**584**	**1267**	**321**	**406,707**
UQ1D	**472**	**1336**	**274**	**366,064**
RA9AU	**415**	**1184**	**248**	**293,632**
EU1DX	**448**	**1022**	**286**	**292,292**
OL1A	**404**	**958**	**259**	**248,122**
RN6AL	431	918	261	239,598
LZ2PL	**422**	**918**	**249**	**228,582**
RZ3AIR	413	874	250	218,500
F6FJE	**350**	**820**	**236**	**193,520**
UAØJQ	330	814	226	183,964
UR5WCQ	350	787	226	177,862
RX9FG	292	814	200	162,800
UR5ZMK	330	712	206	146,672
OE8YDQ	**313**	**700**	**202**	**141,400**
UT2AU	299	664	187	124,168
MWØCRI	**263**	**565**	**197**	**111,305**
W4LC	**342**	**523**	**210**	**109,830**
KE9S	**377**	**519**	**206**	**106,914**
OL1F	245	549	182	99,918
ES4RD	**265**	**572**	**174**	**99,528**
UX6F	282	594	164	97,416
PY2NY	**210**	**624**	**136**	**84,864**
W9ILY	**305**	**423**	**184**	**77,832**
DLØODX	190	466	151	70,366
UT4ZX	212	472	149	70,328
CT1AOZ	**196**	**432**	**154**	**66,528**
RW9SZ	181	494	134	66,196
UN8CC	**178**	**485**	**130**	**63,050**
VE2SB	**224**	**462**	**134**	**61,908**
PR7AB	151	442	125	55,250
RXØAT	166	403	125	50,375
DL8RCL	143	329	115	37,835
UN7JX	141	370	102	37,740
DL6EZ	141	316	116	36,656
DH5WB	143	320	114	36,480
OH7JJT	**137**	**307**	**114**	**34,998**
IT9BLB	**144**	**315**	**109**	**34,335**
DL3JXN	109	251	95	23,845
4Z5LZ	92	262	78	20,436
OM4TC	**105**	**228**	**85**	**19,380**
VE3RCN	**108**	**226**	**79**	**17,854**
IK2GWH	88	215	77	16,555
UT7GX	95	202	80	16,160
7K4QOK	77	202	66	13,332
US3QW	77	170	65	11,050
SP4ZJC/4	57	131	49	6,419
TF3GC	61	128	48	6,144
UY2ZA	52	115	48	5,520
ACØM	60	96	54	5,184
RN3AQ	45	97	40	3,880
DL9NEI	37	77	35	2,695
LW8EXF	26	74	25	1,850
RAØCM	31	61	22	1,342
USØYA	21	49	20	980
NA8W	23	33	20	660
KE4OAR	23	28	23	644
9A2U	10	29	9	261
DM5JBN	10	23	9	207

OPS: LV5V (LU5VV), **UW8M** (UR5MID), **SX1A** (SV1DPI), **UQ1D** (UN7DA), **OL1A** (OK1DF), **OL1F** (OK1VWK), **UX6F** (US-F-031), **DLØDX** (DL5JS), **SP4ZJC/4** (SP4NKJ), **9A2U** (9A3ZA)

SINGLE OPERATOR 40 METERS

9A5E	**740**	**3606**	**416**	**1,500,096**
HG1W	**654**	**2920**	**371**	**1,083,320**
IK2FIL	**570**	**2580**	**346**	**892,680**
YU7NW	**469**	**2182**	**297**	**648,054**
UV8M	**491**	**2116**	**295**	**624,220**
YV6BTF	**360**	**2152**	**240**	**516,480**
EU1AZ	**409**	**1762**	**271**	**477,502**
TA2LM	**357**	**2102**	**223**	**468,746**
OH2LU	**414**	**1746**	**254**	**443,484**
GX5RP	**396**	**1714**	**245**	**419,930**
EU1SA	380	1672	240	401,280
CT3IA	**302**	**1806**	**213**	**384,678**
RK6BZ	**314**	**1308**	**226**	**295,608**
AB8K	**360**	**1222**	**230**	**281,060**
IV3KAS	289	1184	205	242,720
SM7BHM	**266**	**1146**	**196**	**224,616**
SP9H	**261**	**1090**	**188**	**204,920**
UT8EL	266	1102	182	200,564
DF7EME	**242**	**1036**	**182**	**188,552**
OH3MFP	222	940	161	151,340
W1TY	**252**	**684**	**157**	**107,388**
EA4WC	**165**	**746**	**129**	**96,234**
UW2F	169	714	127	90,678
SP5OXJ	148	636	127	80,772
DL1SWB	143	582	111	64,602
ON4ZD	**133**	**564**	**108**	**60,912**
KØHW	**194**	**452**	**123**	**55,596**
UW6N	127	522	96	50,112
MMØBQI	63	254	53	13,462
SP2HXY	52	218	47	10,246
RU2FL	32	140	28	3,920
UA9LAU	21	104	19	1,976
SP6BBE	25	90	21	1,890
RV3UN	17	72	16	1,152

OPS: HG1W (HA1WD), **UV8M** (UX3MR), **GX5RP** (G3SEK), **UW2F** (UTØFT), **UW6N** (UR5NX)

SINGLE OPERATOR 80 METERS

9A5Y	**695**	**3086**	**370**	**1,141,820**
S54E	**657**	**2922**	**353**	**1,031,466**
EO6F	**576**	**2396**	**308**	**737,968**
LY2IJ	**584**	**2438**	**301**	**733,838**
S57NRO	**512**	**2122**	**293**	**621,745**
DL3LE	**516**	**2068**	**293**	**605,924**
OH7KUD	**431**	**1760**	**240**	**422,400**

UZ7HO	423	1692	235	397,620
UT2II	394	1596	237	378,252
UTØH	383	1540	224	344,960
SO6A	**351**	**1394**	**209**	**291,346**
OE8CIQ	**337**	**1392**	**208**	**289,536**
SP1DTG	350	1370	206	282,220
SQ9UM	310	1196	192	229,632
UT5ERP	263	1046	169	176,774
9A3RE	**225**	**908**	**155**	**140,740**
SQ6FHP	174	682	133	90,706
RA2FB	**135**	**560**	**103**	**57,680**
UA3PW	**121**	**490**	**105**	**51,450**
UZ7U	118	480	94	45,120
NQ4K	68	160	54	8,640
W8WEJ	51	122	46	5,612
HA8T	25	100	22	2,200

OPS: 9A5Y (9A3NM), **EO6F** (UXØFF), **SO6A** (SP6IHE), **UZ7U** (UT3UA)

MULTI-OPERATOR TWO-TRANSMITER

KM4M	**2912**	**8674**	**648**	**5,620,752**
Z37M	**2300**	**7654**	**598**	**4,577,092**
DAØBCC	**1953**	**6483**	**585**	**3,792,555**
RW4LYL	**1917**	**5949**	**510**	**3,033,990**
NM5O	**2082**	**4203**	**508**	**2,135,124**
RK9CZO	**1073**	**4232**	**387**	**1,637,784**
WX5S	**1636**	**3693**	**391**	**1,443,963**
AA5NT	**907**	**1897**	**353**	**669,641**
W8NI	**519**	**990**	**210**	**207,900**

OPS: KM4M (W3BP, K4GMH, K4JA, AJ3M, NW4V), **Z37M** (Z31GX, Z31MM, Z32PT, Z32XA, Z32ID, Z33F, Z36W), **DAØBCC** (DM5TI, DL9NDS, DL2RMC, DJ3NG), **RW4LYL** (RA4LW, RA4LZ, RN4LP, RU4HP, RU4LM, RW4LE, UA4LDP), **NM5O** (N5KR, N5YA, AD6WL, W5LL, N5UM), **RK9CZO** (RX9COD, RV9CTD, UA9CTT, RX9CGD, RX9CAZ), **WX5S** (WX5S, W6GEM, W6LD, NC6P, K6UFO, W6ZZZ, N7MH), **AA5NT** (AA5NT, N3BOU, N5NJ, N1CC, KB2VEA), **W8NI** (WB8SKP, WA8OOH, KC8UMB, KA8CVE, WD8OWA, N8YP, KI8CL)

MULTI-OPERATOR SINGLE TRANSMITTER

IY4W	**1760**	**6209**	**571**	**3,545,339**
HG1S	**1704**	**5942**	**563**	**3,345,346**
RW9C	**1734**	**6422**	**508**	**3,262,376**
IQ9RG	**1787**	**5325**	**526**	**2,800,950**
YZ9A	**1518**	**4929**	**538**	**2,651,802**
RL3A	**1572**	**5222**	**490**	**2,558,780**
SO7Z	**1440**	**4897**	**510**	**2,497,470**
LX5A	**1379**	**4742**	**513**	**2,432,646**
J43BSF	**1627**	**4860**	**483**	**2,347,380**
AF4Z	**1668**	**4270**	**487**	**2,079,490**
NN6NN	**1791**	**4272**	**437**	**1,866,864**
UZ4E	**1172**	**3670**	**415**	**1,523,050**
S53S	**973**	**3297**	**416**	**1,371,552**
OM3RJB	**956**	**3306**	**406**	**1,342,236**
IQ1RY	**913**	**3047**	**385**	**1,173,095**
WØLSD	**1400**	**3007**	**387**	**1,163,709**
4N1N	946	2944	377	1,109,888
KC5FU	**1345**	**2796**	**395**	**1,104,420**
SJ9WL	**938**	**2842**	**362**	**1,028,804**
KJ7TH	**1378**	**2702**	**376**	**1,015,952**
YT7TY	720	2255	346	780,230
IQ2TU	683	2160	356	768,960
UE3MFU	767	2277	313	712,701
DN1JC	**546**	**1666**	**277**	**461,482**
VE5RI	**736**	**1884**	**235**	**442,740**
RZ9SWR	464	1654	234	387,036
KP2D	**490**	**1291**	**218**	**281,438**
N3KAE	**583**	**1196**	**231**	**276,276**
V31GW	**457**	**1137**	**196**	**222,852**
KL7DX	**418**	**1092**	**175**	**191,100**
N4GN	**354**	**908**	**192**	**174,336**
NY4N	410	736	200	147,200
UR4PWC	216	861	139	119,679
WØKCF	448	689	166	114,374
WI8W	**330**	**635**	**160**	**101,600**
SP9ZHR	195	664	139	92,296
YU7AJM	238	625	146	91,250
TF3W	**246**	**543**	**136**	**73,848**
W3ZGD	269	478	147	70,266
JF2SKV	**189**	**568**	**115**	**65,320**
RK4CWA	113	298	90	26,820
F8FKN/P	**108**	**305**	**84**	**25,620**
LN1K	**122**	**247**	**101**	**24,947**

OPS: HG1S (HA1TJ, HA1DAC, HA1DAI, HA3UU, HA3LN, HA1AR, HA1AV, HA1AH, HA1DAE), **RW9C** (RW9CF, UA9CGA), **IQ9RG** (IT9EQO, IT9CHU, IT9LGV), **YZ9A** (YU1KT, YU1AU, YU1RH), **RL3A** (RZ3AJD, UA3ASZ), **SO7Z** (SP5UAF, SQ5BPM, SQ5IRO, SP7PS, SP7GIQ), **LX5A** (LX1RQ, LX1ER), **J43BSF** (SV1CIB, SV3BSF, SV3FUO), **AF4Z** (AF4Z, K4PX, KE4MMI, K4QD, W4ERM, AB4ET, WB4EQS, W2DTJ, K4AW), **NN6NN** (W6XK, N6EE, N6LK, W5NH, N6DE), **UZ4E** (UR7EU, US-E-601), **S53S** (S57NDT, S57LWE, S50M, S57VAH), **OM3RJB** (OM3RJB, OM5MB, OM5EA, OM5CW, OM5NA), **IQ1RY** (IK1HXN, IK1HSR), **WØLSD** (WØDC, WØLSD), **4N1N** (4N1JA, YT1BX, YU1BX, YZ1EA, 4N1LB, YZ1TRI, YZ1DO), **KC5FU** (N5ZT, W5WW), **SJ9WL** (SM4RGD, SM4RGD, SM4LLN, SM4XIG, SM4XIH, SM5YNP), **KJ7TH** (KJ7TH, KW7N), **IQ2TU** (I2DMI I2DJX IK2LOL), **UE3MFU** (UA3MSA, RA1QJM, UA3MRA), **DN1JC** (DN1JC, DL7VBJ), **VE5RI** (VE5FN, VE5WI, VE6EZ, VE6SF), **RZ9SWR** (RA9SD, RX9SN), **N3KAE** (N3KAE, N3XLS), **V31GW** (V31GW, V31YN), **KL7DX** (AL1G, KL7FH, KL1MX), **N4GN** (N4GN, K9GX), **NY4N** (NY4N, NN5A, KF4TJE, KG4ABM), **UR4PWC** (US-P-297, US-P-363, UT4PZ), **WØKCF** (WØKCF, WØDSF, NØTOH), **WI8W** (WI8W, N8PUG), **SP9ZHR** (SP9MRQ, SP9CTS), **YU7AJM** (4N7TA, YT7XT, YU7HC, YU7YZ), **TF3W** (TF3AO, TF3HP, TF3SNN), **W3ZGD** (AD3E, N3NRN, N3JDQ), **RK4CWA** (RW4CG, RK4CR), **F8FKN/P** (F5TEF, F8CHR), **LN1K** (LA5LKA), **IY4W** (IK4MHB, I4LEC, I4JED, IK4NPD, IZ4AFW, IK4ZGO)

MULTI-OPERATOR MULTI-TRANSMITTER

RKØAXX	**2284**	**8455**	**581**	**4,912,355**
KA4RRU	**2359**	**5952**	**591**	**3,517,632**
JA6ZPR	**1171**	**3541**	**451**	**1,596,991**
AB5K	**1609**	**2743**	**396**	**1,086,228**
OH2K	**399**	**1135**	**231**	**262,185**

OPS: RKØAXX (RAØAM, RUØAM, RUØAB, RVØAR, RAØALM, RAØAHC, RXØAE, RUØAE, RUØAKB, RUØAKA, RUØAIG, RVØAU, RVØAEV, RUØAT, RWØAR, RUØAAB, UAØANW), **KA4RRU** (KA4RRU, K5OF, N4DXS, W4MGM, K3UI, W4DAV, W4DC, K4RSU, WB4ZNH, KE4BUS, KG4HTL, WA4TK), **JA6ZPR** (JH6JSR, JR6CKX, JR6CKY), **OH2K** (OH2GFY, OH2KHX, OH2KNU, OH2LNH, OH2LRE, OH3GMM, OH5JOC)

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Looking Ahead in CQ

Here are some of the stories we're working on for upcoming issues of *CQ:*

"Results, 2003 CQ World Wide SSB DX Contest," by K3EST
"100th Anniversary of the 'Bug,' " by W4OA
"Hot Stuff at Hamvention," by W2VU
"Secrets of Top DXers," by W1HEO

Plus...

"Wireless Signaling Without Radiated Power," by W4LTU
"Still Chasing the Invisible Wave," by RV3IZ
"Breaking the Language Barrier," by KD5HTB

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We're always happy to hear from our readers. You can reach us by mail, phone, fax, or e-mail. Here's how:

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