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JULY 2003

CQ

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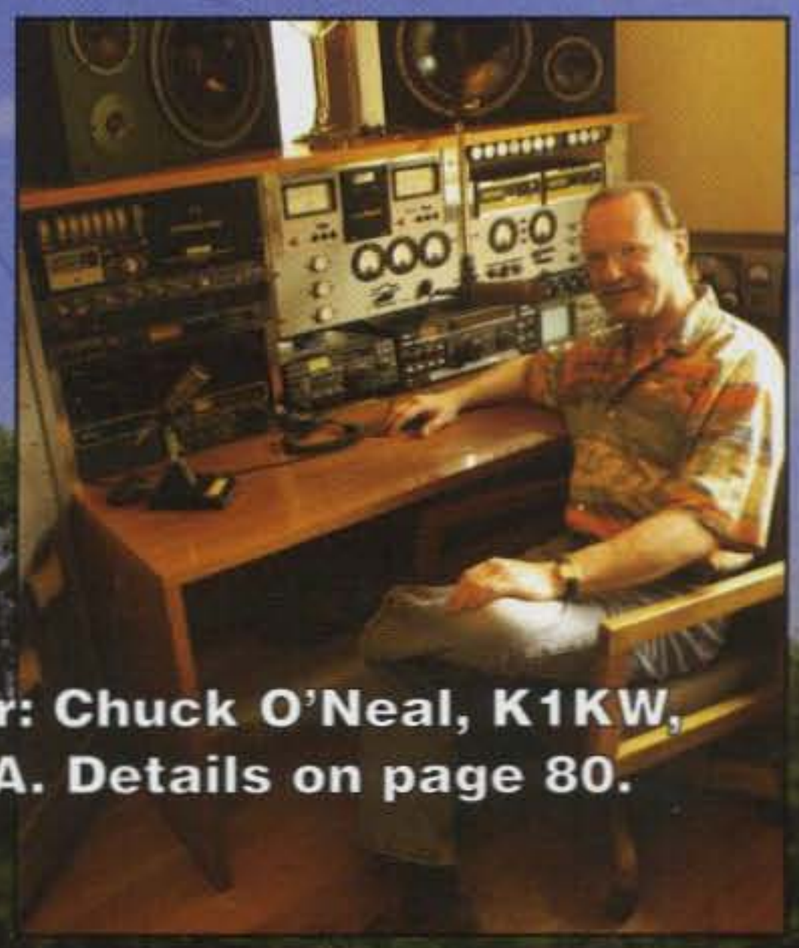

the Cover: Chuck O'Neal, K1KW, Bolton, MA. Details on page 80.

THE RADIO AMATEUR'S JOURNAL

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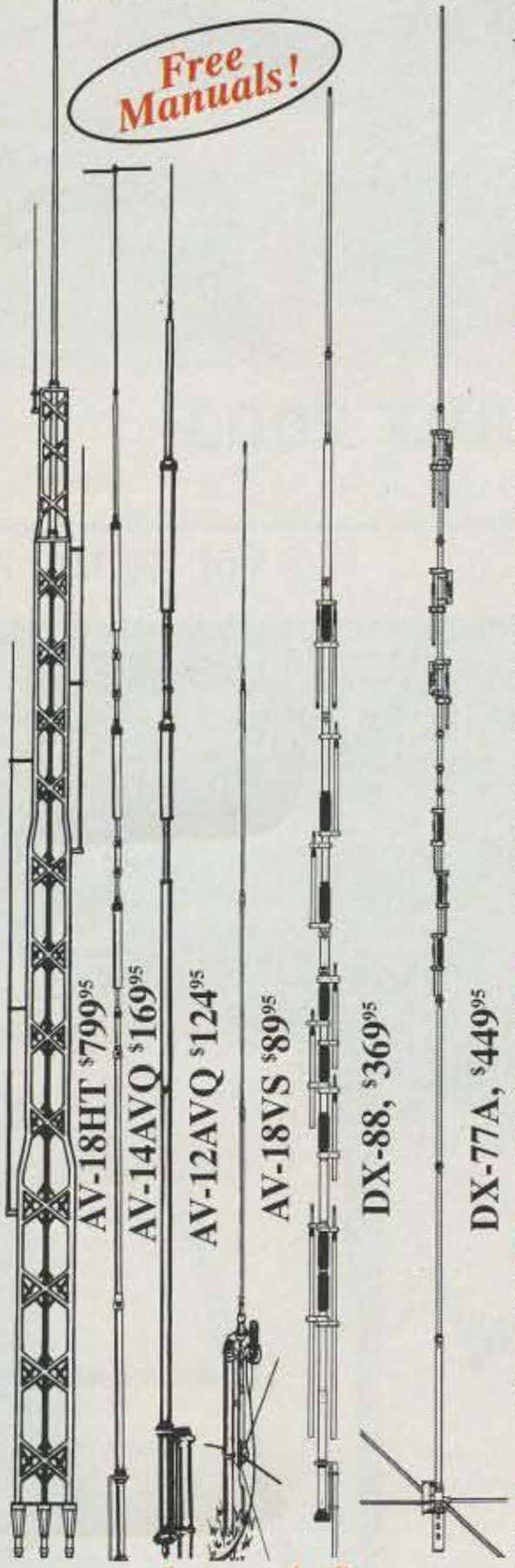

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Standing 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so 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.

DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs. *No ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$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 no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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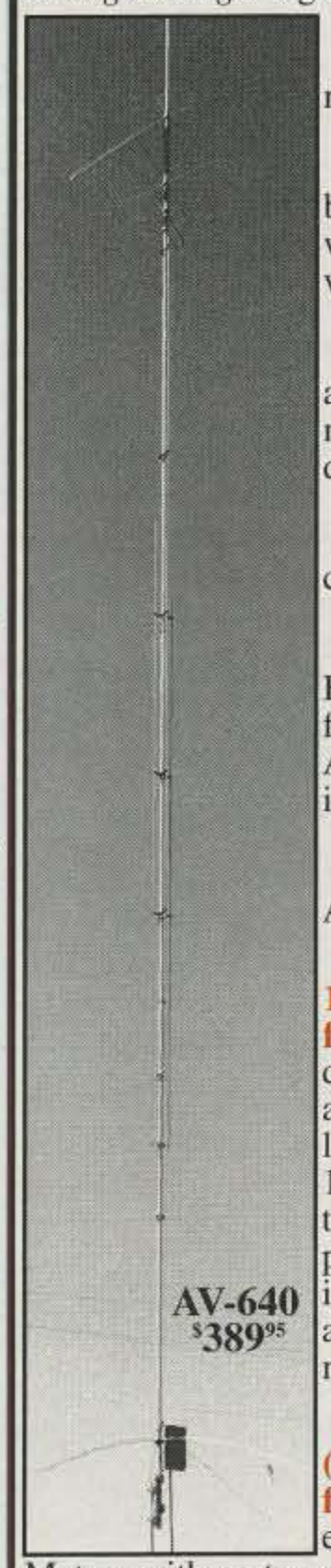

No ground or radials needed

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.

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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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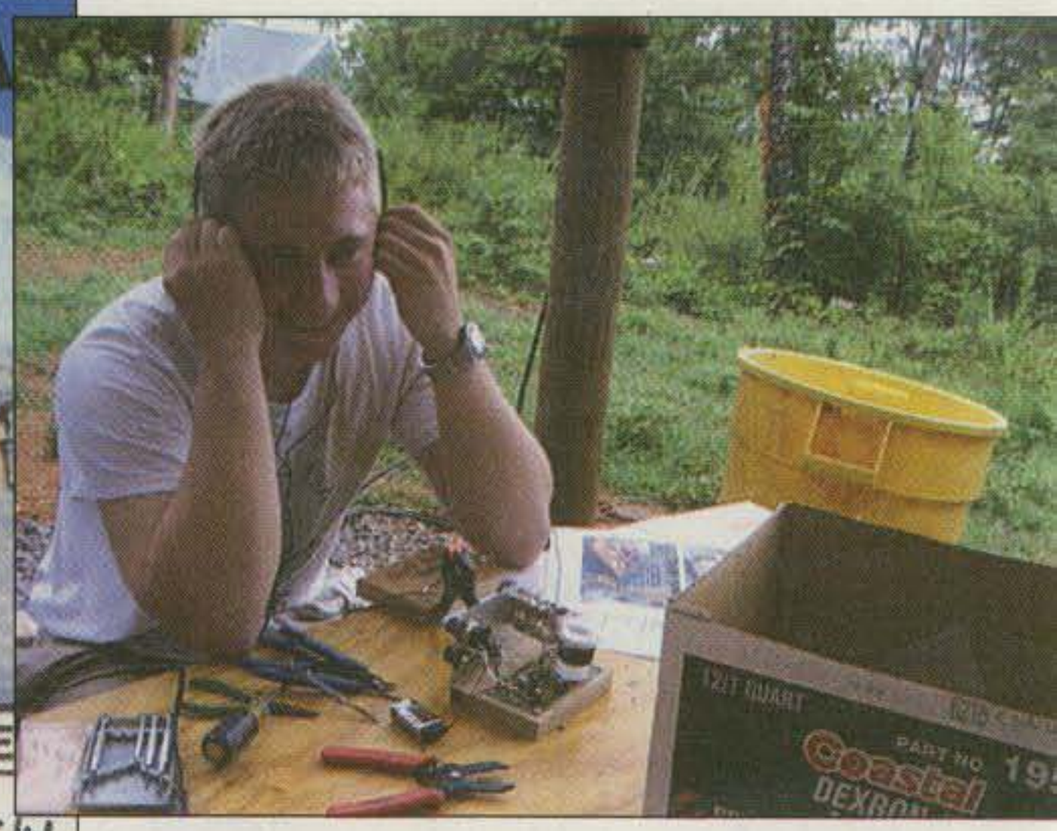
DATE	UTC	FREQ.	SIG	MODE	WORKE
3·4·91	1243	20METR	5×5	2×SSB	W2OSW



JULY 2003

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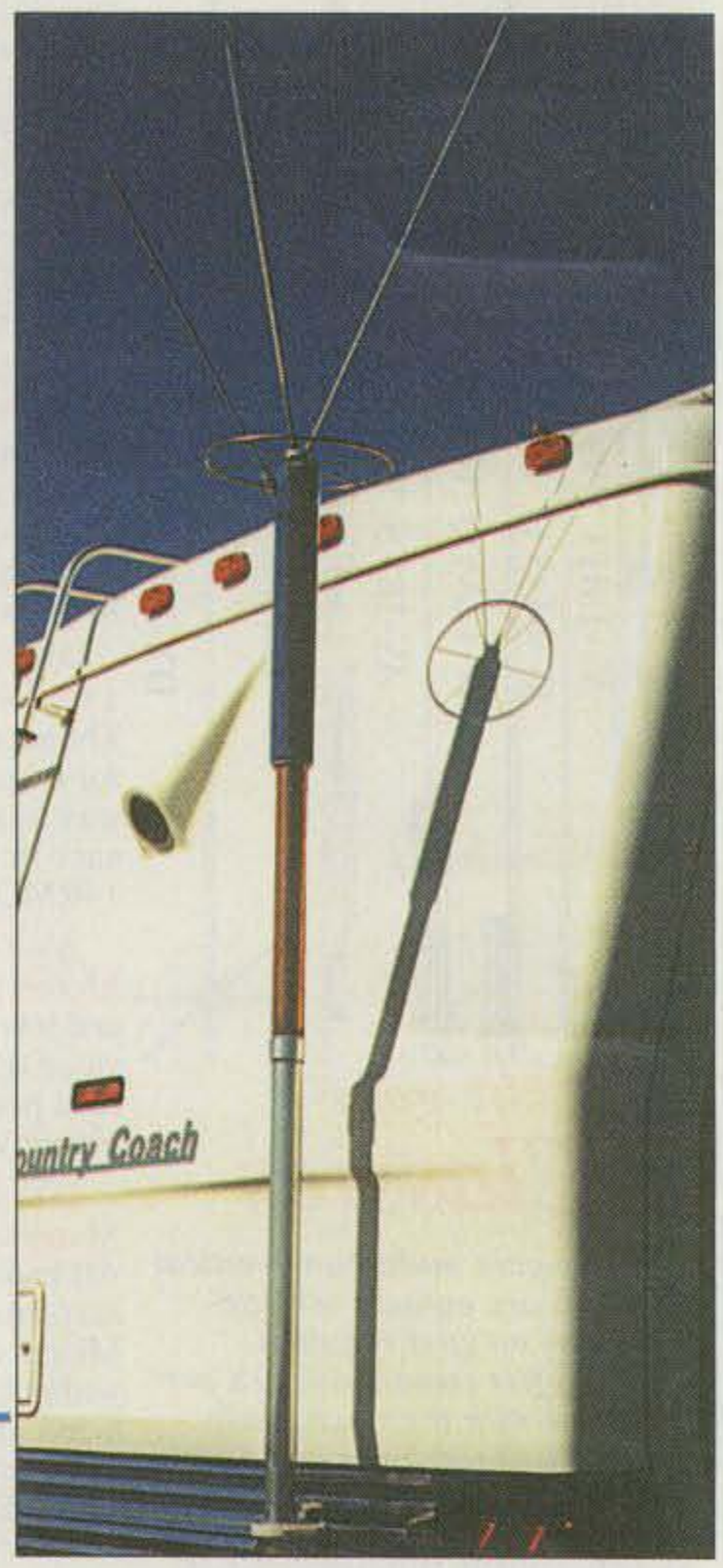
features

Antenna Special!



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The TM-G707A mobile offers the highest quality also, with a one piece die-cast heat-sink, the world's smallest detachable front panel for difficult mounting situations and the largest, easy to read character display available anywhere. Of course each of these models offer built-in CTCSS en-code/de-code, 200 total memory frequencies on the 144/440 MHz bands, FREE PC programming software and complete operators manual over the internet . Oh, and let's not forget the best customer support in the industry to help both new and old Hams alike.

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FCC Rules on New Ham Bands

The FCC has made its decision on the new allocations requested by the ARRL, and it didn't give hams very much. The Commission decided against even the limited, 2-kHz-wide "sliver band" it had proposed on LF, at 135 kHz, bowing to concerns from power companies about possible interference to communications used to control the electrical distribution system.

At 5 MHz, faced with objections from the National Telecommunications and Information Administration (NTIA), which coordinates federal government frequency allocations, the FCC granted hams five specific frequencies, 5332, 5348, 5368, 5373 and 5405 kHz, USB only, with power limited to 50 watts ERP (effective radiated power).

The only "win" for hams was FCC approval of giving amateur radio primary status at 2400–2402 MHz, matching the allocations at 2390–2400 and 2402–2417 MHz. However, a request for a primary allocation to the Amateur Satellite Service on the same frequencies was denied, with the FCC saying the satellite service actually had no current allocation there, but rather was authorized to operate by a footnote to the allocation table on a non-interference basis, essentially on par with unlicensed Part 15 devices.

The decision was announced just before the Dayton Hamvention®. Additional details will be found in this month's "Zero Bias" editorial and *next* month's "Washington Readout" column.

NTIA Urges Caution on Power Line Broadband

The head of the National Telecommunications and Information Administration (NTIA) praised the FCC for taking the first steps in authorizing Broadband over Power Lines, or BPL (the subject of this month's "Washington Readout" and "Zero Bias" columns). However, the *ARRL Letter* says NTIA Administrator Nancy Victory also urged caution and told FCC commissioners in a letter that any rules permitting BPL must "prevent harmful radio frequency (RF) interference to other communications mediums (sic)."

BPL systems are envisioned as operating across virtually the entire HF spectrum and possibly even part of the VHF spectrum, and there are significant fears among HF and VHF users at the potential for massive interference. Along these lines, Victory offered NTIA's help in measuring and testing BPL emissions.

FCC Requests Ham Help on 10 Meters

The FCC has asked the ARRL's Amateur Auxiliary for help in identifying unlicensed operation in the 10 meter band, including truckers and others. In a memo to the ARRL, the FCC's Riley Hollingsworth, K4ZDH, asked for auxiliary members to provide, where possible, the names and locations of illegal operators, and license plate numbers of vehicles. The Amateur Auxiliary program is an offshoot of the ARRL's Official Observer program.

Hearing Promised for Spectrum Protection Bill

The chairman of the House subcommittee to which the Amateur Radio Spectrum Protection Act bill has been referred has promised to hold hearings on it in late spring. According to the *ARRL Letter,* Telecommunications and Internet subcommittee Chairman Rep. Fred Upton promised the bill's sponsor, Florida Republican Michael Bilirakis, that the bill, HR-713, would be included in a hearing called to address public safety spectrum needs, and that a member of the amateur radio community will be able to testify. Bilirakis commented on the bill and on amateur radio during a meeting of the full House Energy and Commerce Committee.

"Echo" Satellite Could Launch This Year

AMSAT's newest satellite, dubbed "Echo," could be launched sometime later this year, according to AMSAT-NA President Robin Haighton, VE3FRH. Haighton wrote in his monthly letter to members that construction of the satellite is well under way and that he hopes pre-launch testing can begin by late spring or early summer. The satellite will combine analog and digital capabilities, will have about 7 watts of output power, and will be able to simultaneously transmit FM and data. For complete details see: <http://www.amsat.org/amsat/sats/echo/article-02-11.html>.

New License Spurs UK Ham Growth

The President of the Radio Society of Great Britain (RSGB) says the United Kingdom's new Foundation license has reversed an alarming drop in the number of new hams being licensed there and is bringing many young people into the hobby. The *ARRL Letter* reports that Bob Whelan, G3PJT, speaking during a visit to ARRL Headquarters, said the ranks of UK amateurs has risen by some 4000 since the new license was introduced at the beginning of 2002, and that nearly a quarter of the new amateurs are under age 21. This represents an increase of about 8% in just over one year. License requirements include a "Morse assessment," which has no set speed requirement, and a short written exam. The Foundation license grants privileges on all bands from 136 kHz to 440 MHz, except 10 meters, with a maximum power output of 10 watts.

Hams Invited to Participate In "Logbook of the World" Test

The ARRL's electronic log project, "Logbook of the World," is now in beta testing and hams are invited to participate, according to a posting on the ARRL website. Users will have to be certified, after which their contacts made on or after January 1, 1998 may be uploaded to the test site. When the program is fully functional, contacts which appear in those certified logs will be accepted as valid for ARRL awards (by the people contacted, not by the person posting the log), whether or not QSL cards have been exchanged.

New Address for W8 QSL Bureau

The 8th district QSL Bureau has a new manager—Jay Slough, K4ZLE—and a new address: W8 QSL Bureau, P.O. Box 307, W. Chester, OH 45071-0307. This should be used only by U.S. hams with an 8 in their calls to send envelopes or credits, and by DX hams to send cards for U.S. hams with an 8 in their calls. No domestic cards are accepted by any U.S. incoming QSL bureaus.

Wildlife Monitors Needed

Volunteer hams and scanner listeners are needed this summer for three wildlife projects in the south-central and southeastern states, according to *CQ* National Foxhunting Weekend Coordinator Joe Moell, KØOV. One project involves tracking the travels of young Florida Burrowing Owls; another will follow the movements of Mexican Long-nosed Bats in and around Big Bend National Park in Texas; and the third involves orphaned Great Horned Owls that have been raised in captivity and are being released this summer in Texas. For details or to volunteer, visit KØOV's website, <http://www.homingin.com>.

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.

our readers say

The @ Symbol in CW

Editor, *CQ:*

The February issue of *QST* carried a letter from John Ceccherelli, N2XE, expressing the need for a CW @ used in internet addresses. I know it was in *QST,* but the question is relevant to *CQ* readers as well.

We can use the French *à*, which means "at." An accented *a* is .– – .– or AK. Its meaning would be obvious to most by its context. Should enough CW operators start using this, explaining when asked, it would soon become an accepted convention.

We know what @ means and how to use it, but I can't find out the symbol's actual name. If you know, please let me know at <ac7fz@yahoo.com>.

Richard Mathers, AC7FZ

The following two letters were written in response to the article "The Use of Pringles™ containers to Enhance Network Security," by Prof. Emil Heisseluft, April 2003 CQ*).*

An Intellectual Giant

Editor, *CQ:*

Once again, the Professor has demonstrated his superior grasp of the day's most timely topics. I recall his seminal work on ultra wideband communications techniques in 1979, which, 20 years later, has become a commercial reality. Then there was his work on fluidic computers in 1984. And who can forget the moment in 1981 when the Professor gave the world its first glimpse of a stealth aircraft?

Today the Professor has harnessed cavity resonators to protect network security throughout the homeland. I am in awe. Just as Johnson had his Boswell, may I suggest that you seriously consider that someone undertake to write the definitive biography of this intellectual giant of our times. I shall reserve a place on my shelves for it, next to the biographies of Edison, Tesla, and Fred Link.

Ray Kowalski

A SPAM Rig?

Editor, *CQ:*

I was delighted to read about Emil's role in in the Pringles™ cavity resonator ("The Use of Pringles™ containers to Enhance Network Security," by Prof. Emil Heisseluft, April 2003 *CQ*). Actually, the use of food containers for esoteric subversive purposes started much earlier in the OSS during WW II.

SPAM, and old favorite meat (?) with a wonderfully useful container, peel strip, and key, saw extensive use during WW II not only as a source of nourishment, but as a sophisticated spy shortwave transceiver. The details have been classified for over 60 years, but I can divulge that the gelatinous material surrounding the meat can undergo a biochemical metamorphosis under certain conditions, resulting in the production of a tunable superheterodyne receiver and CW transmitter. The use of the key and peel strip is self-explanatory. This was truly the first edible radio set.

By the way, "SPAM" doesn't stand for what the food manufacturer would like you to believe. A hint: "Spy . . . American Military."

The Brits had a similar edible radio program underway involving haggis . . . but that's another story.

Ron Davidson, W4IA

zero bias

BY RICH MOSESON, W2VU

Ham Radio, Power Companies, and the FCCs

No, that's not a typo in this month's title. When it comes to matters involving hams and power companies, it seems that there are two FCCs, and that neither one talks to the other. On the one hand, power companies seem to need regular reminders from the FCC Enforcement Bureau that as operators of "unintentional radiators" of RF energy (power lines), they are responsible not only for preventing interference with licensed spectrum users but also for promptly resolving any problems that develop. While some power companies are very responsive when approached by hams about power line interference problems, it seems that nearly every month, my packet of enforcement letters from Riley Hollingsworth at the FCC includes at least one letter to a power company, effectively saying, "Hello... you've been ignoring this ham with interference problems and the law says you have to straighten it out." Riley generally suggests that the power company contact the ARRL Lab for help in resolving the problem, and the folks there say they typically get involved in several new cases every *week*, most of which have *not* yet gone to the FCC. So the problems that reach Riley's desk are only the tip of the iceberg. But whatever the number, it's a persistent problem, and Riley and the ARRL lab are persistent in trying to resolve the ones that reach them. Clearly, it's a problem that is well-known to the FCC.

Then there's the *other* FCC, the one that's fallen head-over-heels in love with something called *Broadband over Power Lines*, or BPL. It's one form of PLC, or Power Line Communications (don't you just love all these abbreviations?), whose interests seem to be intersecting with amateur radio at more than one location, and generally at 90-degree angles. BPL, also known as PLC Access, will basically have the ability to bring high-speed internet connections to anyone with electric service, which, in developed countries, is just about everybody. More than being an alternative to broadband service via phone or cable TV line, BPL opens the promise of "smart appliances" that can monitor their own health, detect problems, and report them via the internet, with no special wiring needed. One scenario lets your refrigerator send you a page or an e-mail message at work if the power goes out or if a part fails. Cool possibilities, but there's a tradeoff, especially for hams.

The BPL systems envisioned by their promoters would operate in the HF radio spectrum, although in the theoretically "closed" environment of a power line. Considering the fact that power lines are notorious for "leaking" noise (with many power companies being equally notorious for not helping plug those leaks; see above), and go down virtually every street in America, the interference potential on HF is enormous. But the "other" FCC doesn't seem to know that.

The ARRL estimates that on 80 meters, a leaky BPL signal 30 meters (90 feet) away would result in an increased system noise floor of some 73 dB, or a noise level of S9 +30dB! Tests conducted by hams in Japan showed that a nearby PLC signal blocked out all but the very strongest HF amateur signals, and the Japan Amateur Radio League (JARL) reports that the country's Ministry of Public Management, Home Affairs, Posts and Telecommunications has declined, for now, to authorize BPL between 2 and 30 MHz, "due to hazardous effects on HF users."

The FCC that is unaware of these "hazardous effects on HF users" and of the generally poor track record of power companies in resolving interference complaints without a kick from the other FCC, has issued a notice of inquiry (NOI) about the possibility of permitting BPL at HF frequencies. "Washington Readout" Editor Fred Maia, W5YI, has background and full details of the BPL/PLC inquiry in his column this month, starting on page 89. Check the FCC's website for the comment deadline, which should be somewhere in the neighborhood of July 1. Look for ET Docket 03-104.

FCC Acts on New Band Requests

Now, this may come as a surprise, but the power companies are squarely in the middle of—and opposed to amateur radio on—the FCC's May 14th decision on the ARRL's requests for new amateur allocations on 135 kHz and 5 MHz. In this action, the power companies won one and lost one ... and the hams lost one and sort-of-almost won one. The FCC had proposed a "sliver band" for hams at 135.7–137.8 kHz; a slightly more substantial band at 5250–5400 kHz, and raising the status of the amateur allocation on 2400–2402 MHz from secondary to primary while adding a primary allocation in the same place for the Amateur Satellite Service. While W5YI will have additional details on this decision next month, I wanted to bring you the basics this month, and discuss some parts of it—especially the tie-in with the power companies.

One of the things that power companies already send down their lines (besides electricity) is Control PLC, or signaling for the power grid itself. This operates in the LF segment of the spectrum, including the 135 kHz region (and the 160–190 kHz range, which the FCC declined to propose for a ham band due to PLC concerns; keep this in mind a little later). The PLC folks objected strongly to amateur operation at 135–137 kHz, raising the specter of high-powered amateur signals interfering with PLC control signals and making the electrical supply system vulnerable to disruption. Forget the fact (as they did) that several years worth of operation under a Special Temporary Authority (STA) had shown no actual interference, and the fact that there doesn't seem to be a problem with control PLC in Canada or Great Britain, where hams are authorized to operate on both 135 and 160 kHz. Keep in mind that PLC is an unlicensed Part 15 operation which has no legal protection against interference from licensed services. But the FCC said, "We will not jeopardize the reliability of electrical service to the general public," and decided against any amateur LF allocation "at this time." The Commission did point out, though, that amateurs may operate on 160–190 kHz under Part 15 ... even though the original request for a ham allocation there was denied because of greater interference potential than at 135 kHz. Just pretend it makes sense. Believe it long enough and it will.

5 MHz

This was considered a shoo-in until the National Telecommunications and Information Administration (NTIA), the FCC's "mirror" on the government side of frequency allocations, objected on the basis of continued need for these frequencies by the federal government. However, NTIA said it had identified five specific frequencies on which low-power amateur SSB operation would most likely be compatible with government uses. The FCC adopted the NTIA's proposal *in toto*, granting amateurs a secondary allocation on 5332, 5348, 5368, 5373, and 5405 kHz, USB only, with power limited to 50 watts

ERP (effective radiated power). The FCC notes that this equates to 50 watts PEP into a dipole, and if gain antennas are used, hams must multiply their power output by the gain in decibels of the antenna over a dipole (dBd) to determine ERP; and must keep in their station records either measured gain or manufacturer's gain data on the antenna in use. Frankly, we can probably live with this. There aren't that many hams who have both the space and the money to put up big antennas on 60 meters (remember, antennas will be 50% larger than those for 40 meters), and 50 watts should be more than enough power to get where you want to go ... especially if no one else is running higher power. Our main concern here will be the potential for congestion and thus, interference, on the five "channels." A station in, say, North Carolina may have trouble contacting a station in the Caribbean due to interference from a station in New York who may not hear the Caribbean station. On all other bands, they could shift up or down a few kHz and have their QSO. On 60 meters, they'll have only four other choices, each of which may already be busy with QSOs that one station or the other cannot hear, but which may cause unintentional QRM. (Trivia note: This is the first-ever amateur allocation on which CW is not permitted. The reason, curiously enough, is identical to why code proficiency was required in the first place, nearly a century ago: so that hams may easily be told to stop transmitting in the event that a primary government user needs the frequency.)

So what do power companies have to do with 5 MHz? Go back to part one of this editorial—broadband over power lines. The umbrella groups of power line people objected to any amateur allocation here on the basis that they *might* use 5 MHz in the future for BPL, and that any Commission action should be deferred until "the potential impact on future Part 15 broadband Power Line Carrier systems" is "fully assessed." The FCC denied that request, saying that "(b)ecause these new PLC systems are still in development we expect that they can be designed to be compatible with the other operations in this band..." Clearly, competition and conflict with PLC systems will not be going away.

2400 MHz

Now we come to Part 3 of the FCC's ruling—a petition for upgrading amateur radio from secondary to primary, and establishing a new primary amateur satellite allocation, at 2400–2402 MHz. OSCAR-40's only working downlink is at 2401 MHz. The Amateur Service is already primary at 2390–2400 and 2402–2417, so it makes sense to link them, and the FCC agreed. However, the Commission said no to the Amateur Satellite allocation, pointing out a bit of arcane FCC trivia — that the Amateur Satellite Service actually has no allocation at all on 2400 MHz; rather it is authorized by a footnote to the allocation tables to operate on a non-interference basis, on a par with unlicensed Part 15 users.

The Commission said that current sharing the band was working pretty well, and as long as it continues to, it will make no other changes. Still, the FCC noted (partially in response to *CQ* comments) that while Part 15 users of the band, such as wireless computer networks, have no legal protection status, they must be considered by the Commission as it weighs the effects of its actions on *all* users, licensed or not.

We need to take this to heart and keep it in mind: Well-designed, well-engineered amateur systems can and do coexist peacefully with Part 15 systems. We should be careful to design our systems in shared bands to meet our needs—taking into consideration the needs of other band users—and not just run as much power as we can simply because we can. Interference hurts everyone, and if it comes down to a problem between a few thousand hams using high-powered networks on 2.4 gigs and a few million WiFi wireless network users, guess who's going to win?

Common sense and "good amateur practice" will go nearly as far in protecting our allocations as legislation in Congress and rulemaking petitions before the FCC ... especially when we're not sure which FCC is listening. 73, Rich, W2VU

announcements

• The following Special Event stations are scheduled for July:

Museum Ships Radio Event, July 19–20, 43 museum ships from around the world, sponsored by the USS Cassin Young, Boston, MA, Harbor. For certificate submit log of eight or more contacts to K1RMC. For further information, see: <http://www.qsl.net/ww2dd/event.html>.

N1S, from submarine *USS Nautilus,* Museum Ships On The Air, Groton, CT; CT RI Contest Group; 0001Z July 19 to 2359Z July 20 on 7.260, 14.260, 21.360, 28.360 MHz ±QRM. QSL via KB1LN, P.O. Box 995, Charlestown, RI 02813. Enclose #10 SASE with QSL for two-page history of the *USS Nautilus* and QSL.

W2GLQ, from New Jersey Camp for the Blind, Marcella, NJ; Nutley ARS; 1500–2200Z July 26, General class frequencies. For certificate/QSL send SASE to Nutley ARS, American Red Cross Bldg., 169 Chestnut St., Nutley, NJ 07110.

KA4OIL, from Ashland, KY Summer Motion Festival; River Cities ARA; 8:30 to 4:30 EST July 5 in middle of General bands. For certificate send QSL and SASE to RCARA, P.O. Box 612, Ashland, KY 41105; <http://www.summermotion.com/>.

KC4GUG, from Smithville Fiddlers Jamboree & Crafts Festival, Smithville, TN; DeKalb County ARC; 1500–2200Z July 5 on 7.275, 14.280, 21.335, 28.425 MHz. QSL with SASE to Wm. Freddy Curtis, KC4GUG, DeKalb County ARC, 288 Dogwood Circle, Smithville, TN 37166-2712; <http://www.geocities.com/kg4bto1/darc_warc.html>.

W4E, from *USCG Tall Ship Eagle,* Wilmington Nautical Festival, Wilmington, NC; members of US Power Squadrons Amateur Radio Net; 1300–2200Z July 25–28 on 28.367, 21.367, 14.267, 7.267 MHz. For certificate send QSL and 9 × 12 SASE to Donald Stark, N3HOW, 65 Stark Spur, Eighty Four, PA 15330.

W9C, from Great Circus Parade Showgrounds, Milwaukee, WI; West Allis RAC; 1800–0200Z July 9–12 on 7.240, 14.240, 145.170 MHz. For certificate send QSL and 9×12 SASE to W9C, c/o Dick Wood, S.46 W.22328 Tansdale Rd., Waukesha, WI 53189.

WØNOZ, from Little House on the Prairie Pageant, Huron, SD; DeSmet, SD ARC; 1600Z July 19 to 2200Z July 20 on 28.465, 21.365, 14.265, 7.265 MHz. For certificate send QSL and SASE to Huron ARC, P.O. Box 205, Huron, SD 57350.

VC3MCC, from celebration of 100 years of Canadian Military Communications; July 27 to July 1. Certificate available via on-the-air instructions, or for more information see <www.storm.ca/~scalver>.

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

July 6, **KARSFEST 2003**, Will County Fairgrounds, Peotone, IL. Contact Chip Moore, K9IOC, 815-933-1323; e-mail: <karsfest@yahoo.com>; <www.w9az.com>. (Talk-in 146.94)

July 11–13, **Utah Hamfest & ARRL Utah State Convention**, Ruby's Inn, Bryce, UT. See <www.utahhamfest.org>. (Exams)

July 12, **Tidelands ARS Hamfest 2003**, Chuck Doyle Convention Center, Texas City, TX. Contact Joe Wileman, AA5OP, 1010 24th Ave. North, Texas City, TX 77590 (409-945-6794; e-mail: <aa5op@arrl.net>); <http://www.tidelands.org>.

July 12, **Straits Area ARC Swap & Shop**, 4H Building, Emmet County Fairgrounds, Petosky, MI. Contact Cliff Rosebohn, 231-526-5645, e-mail: <peewee2@GLCComputers.com>. (Talk-in 146.68 PL 110.9; exams 1 PM at American Red Cross)

July 12, **South Milwaukee ARC Swapfest**, American Legion Post #434, Oak Creek, WI. Contact South Milwaukee ARC, P.O. Box 102, South Milwaukee, WI 53172-0102. (Talk-in 146.52)

July 13, **Valley Forge Hamfest & Computer Fair**, Kimberton, PA Fire Company Fairgrounds. Contact Mid-Atlantic ARC, P.O. Box 2154, Southeastern, PA 19399-2154; e-mail: <Hamfest-info@marc-radio.org>; <http://www.marc-radio.org>. (Talk-in 146.835–, 443.800+, PL 131.8)

July 18–19, **Ham Holiday 2003**, Oklahoma State Fair Park, NE of I-40 & I-44 intersection, Oklahoma. Contact Central Oklahoma Radio Amateurs Ham Holiday 2003, P.O. Box 265, Ft. Supply, OK 73841-0265; <www.qsl.net/ coranews>. (Talk-in 146.82; exams)

July 18–20, **Pacific Northwest DX Convention DX2003**, Hilton Vancouver Metrotown, Burnaby, BC, Canada. Contact Earl Dery, VE7IN, 1-604-536-3281; <www.bcdxc.org>. (Talk-in 147.30 +600)

July 19, **Pioneer ARC Fleamarket**, St. Charles Parish Center, North Bend, NE. Contact Rich Mehaffey, KBØARZ, 1525 County Road 5, North Bend, NE 68649 (402-652-3410; e-mail: <mehaffey@dtnspeed.net>). (Talk-in 146.67)

July 19, **Northern Colorado ARC Superfest**, Larimer County Fairgrounds, Loveland, CO. Contact Willis Whatley, WA5VRL, 970-407-6599. (Talk-in 145.115 [– offset], 100 Hz])

July 19, **NOARSFEST 2003**, Lorain County Fairgrounds, Wellington, OH. Contact Tom Porter, W8KYZ, 440-930-9115; <http://www.apk.net/noars/>. Also look for Special Event station W8COD or K8KRG aboard the *USS Cod*. (Talk-in 146.10/70; exams)

July 20, **Fox River Radio League Hamfest**, Waubonsee Community College, Sugar Grove, IL. 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, 103.5/107.2; exams 10 AM)

July 20, **Zero Beaters Hamfest**, Bernie Hillerman Park, Washington, MO. Contact Zero Beaters ARC, P.O. Box 1305, Washington, MO 63090; or call Keith, KØZH, 636-629-7368 (days). (Talk-in 147.24+; exams 9 AM)

July 20, **MIT Radio Society Hamfest**, MIT, Albany & Main Sts., Cambridge, MA. Contact Nick, KA1MQX, 617-253-3776 (9–5 M–F); <http://web.mit.edu/w1mx/www/swapfest.html>. (Talk-in 146.52, 449.725/444.725 –PL 114.8)

July 26, **Fall River (MA) ARC Clam-Boil & Fleamarket**, American Legion Post 303, Swansea, MA. Contact George, KB1CNA, <kb1cna@msn.com>.

July 27, **Maryland Hamfest & Computer Fair**, Timonium Fairgrounds, Timonium, MD. Contact BRATS, P.O. Box 5915, Baltimore, MD 21282 (410-461-0086; e-mail: <brats@bratsatv.org>; <http://www.bratsatv.org>. (Exams 9 AM, preregistration required: call 301-572-5124 (6–9 PM), e-mail: <creewb3gxw@aol.com>)

Mississippi Valley DX and Contest Club – If you are interested in DXing and contesting and live in the St. Louis metro area, this club—which has a newsletter, meetings, and social events—is looking for new members. For details visit <www.MVDXCC.org> or contact Allen Schulman, WØDRT, 417 Monticello Dr., Ballwin, MO 63011 (e-mail: <alleninvest@earthlink.net>.

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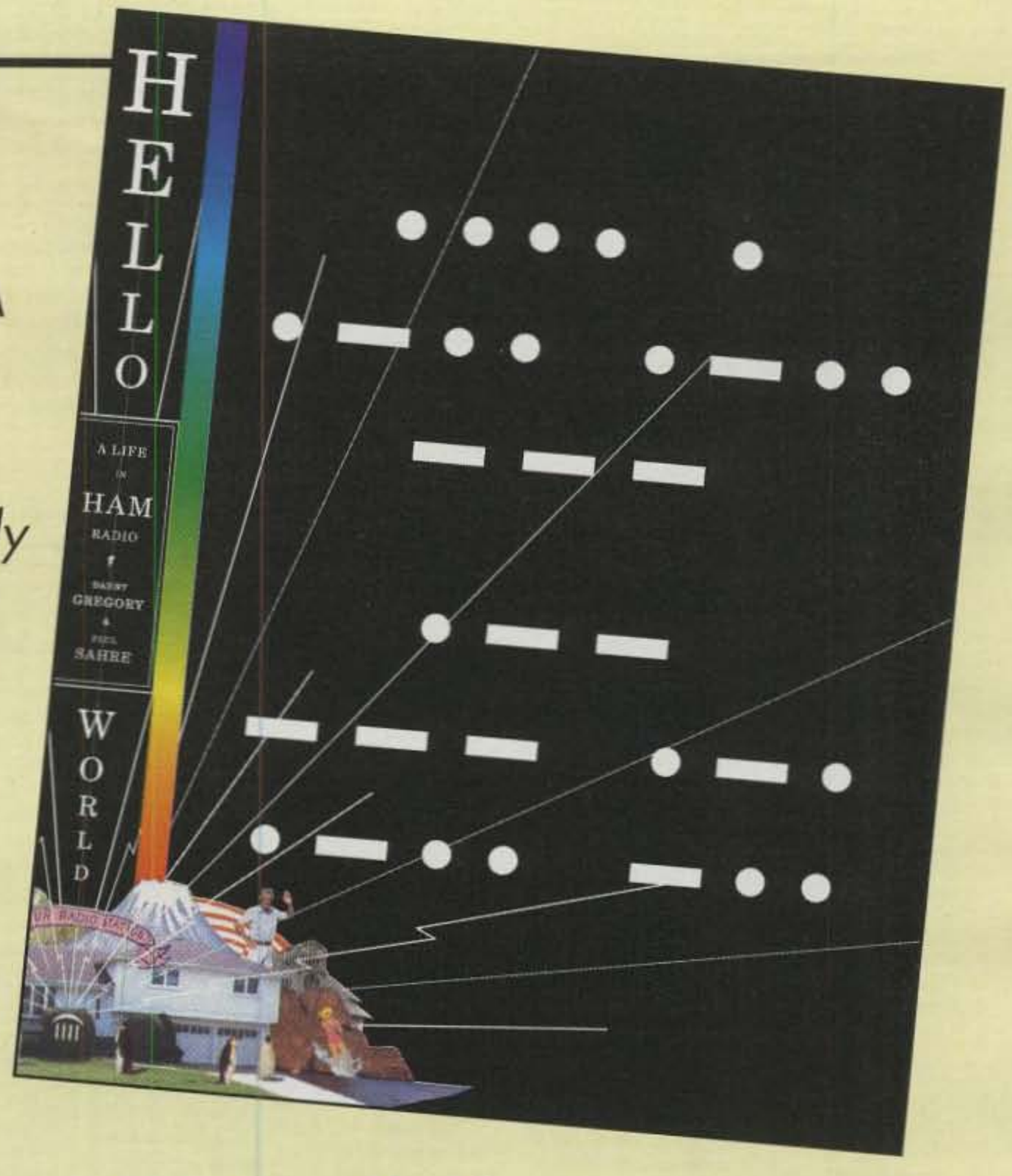
The new book, "Hello, World: A Life in Ham Radio," about a collection of QSL cards and the stories they tell, is quickly becoming one of the most heavily promoted ham radio books ever among the general public. CQ author Bob Hopkins, WB2UDC, helped the authors get to understand ham radio. Here's Bob's "story behind the story."



Hello World
A Story Behind A Story

BY BOB HOPKINS,* WB2UDC

I admit it: Most people who get to know me quickly discover my involvement in ham radio. Thus, it was not surprising that after a business meeting about a year ago, a colleague approached me and asked if I would meet with his two friends. They were working on a book about ham radio postcards. Sure I was interested!

Danny Gregory and Paul Sahre met with me, and we began a dialog that continues today. Danny is a writer and collector, and Paul is involved in education and design. Danny, the collector, had purchased this box of "ham radio cards" at a flea market in Lower Manhattan. The QSL collection was from the shack of Jerry Powell, W2OJW, now a Silent Key. It consists of over three-hundred pieces, covering the time from July 28, 1928, when Jerry, then licensed as W9DOG, worked 5GF in Shawnee, Oklahoma (see photo A), to October 18, 1995, when Jerry worked 9U/F5FHI in Burundi on 15 meters.

As Danny and Paul soon discovered, the collection chronicles "a life in ham radio." In our many meetings and conversations I tried to translate the "ham lingo" of the cards into language they might understand. Early on in our friendship I even managed to share the QSO experience with them, when from my office in Manhattan we worked Bob, N4UPX/5, mobile on the banks of the Mississippi. Perhaps this experience convinced them that the QSLs indeed had a story. They proceeded to research the story, and they presented it brilliantly in their book, with words by Danny and graphic design by Paul.

There are many ham books out there, and in the research phase of the book Danny and Paul seem to have collected most of them. However, while most books on amateur radio address how to get your license, how to fix or build equipment, or how to string antennas, *Hello World* is that rare piece that dwells on the human aspect of the hobby. The book has a time line at the bottom of each page. Above the time line are reproductions of the cards issued in that era. Many of the cards are accompanied by short commentaries about the hams who issued them, or perhaps by a bit of history about the QTH of the station. The time line also notes historical events for reference: It seems Jerry often sought out contacts in areas where big events were happening.

Part of the fun of this book is the fact that you do not have to start at the beginning and read to the end; rather, you can navigate through in different ways using the aids provided by the authors. The inside back cover folds open to dis-

*e-mail: <bob@cooper.edu>

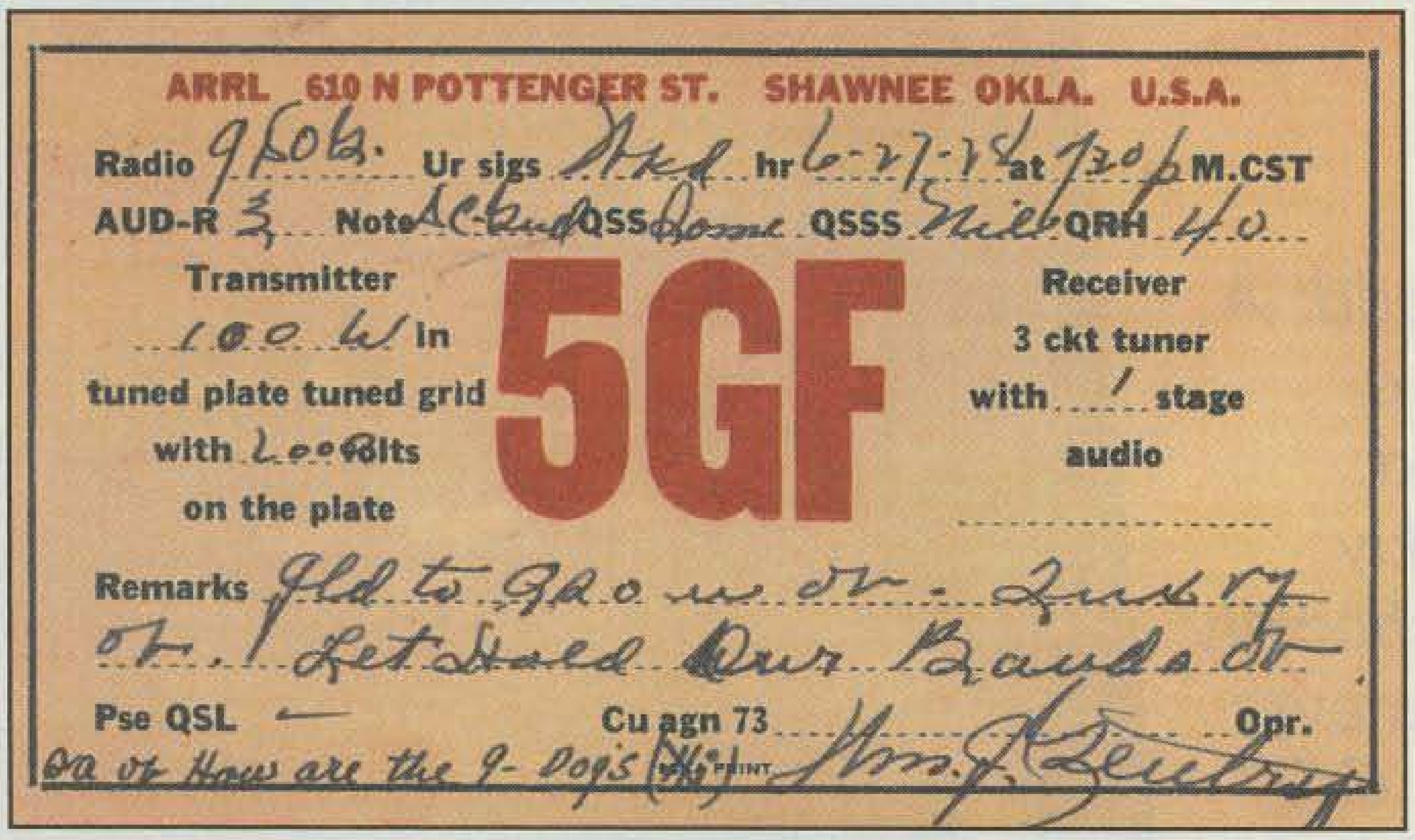


Photo A– The first QSL in the book, dated 1928, is from 5GF in Oklahoma to 9DOG, Jerry Powell's original call. (Photos from the book, via WB2UDC)

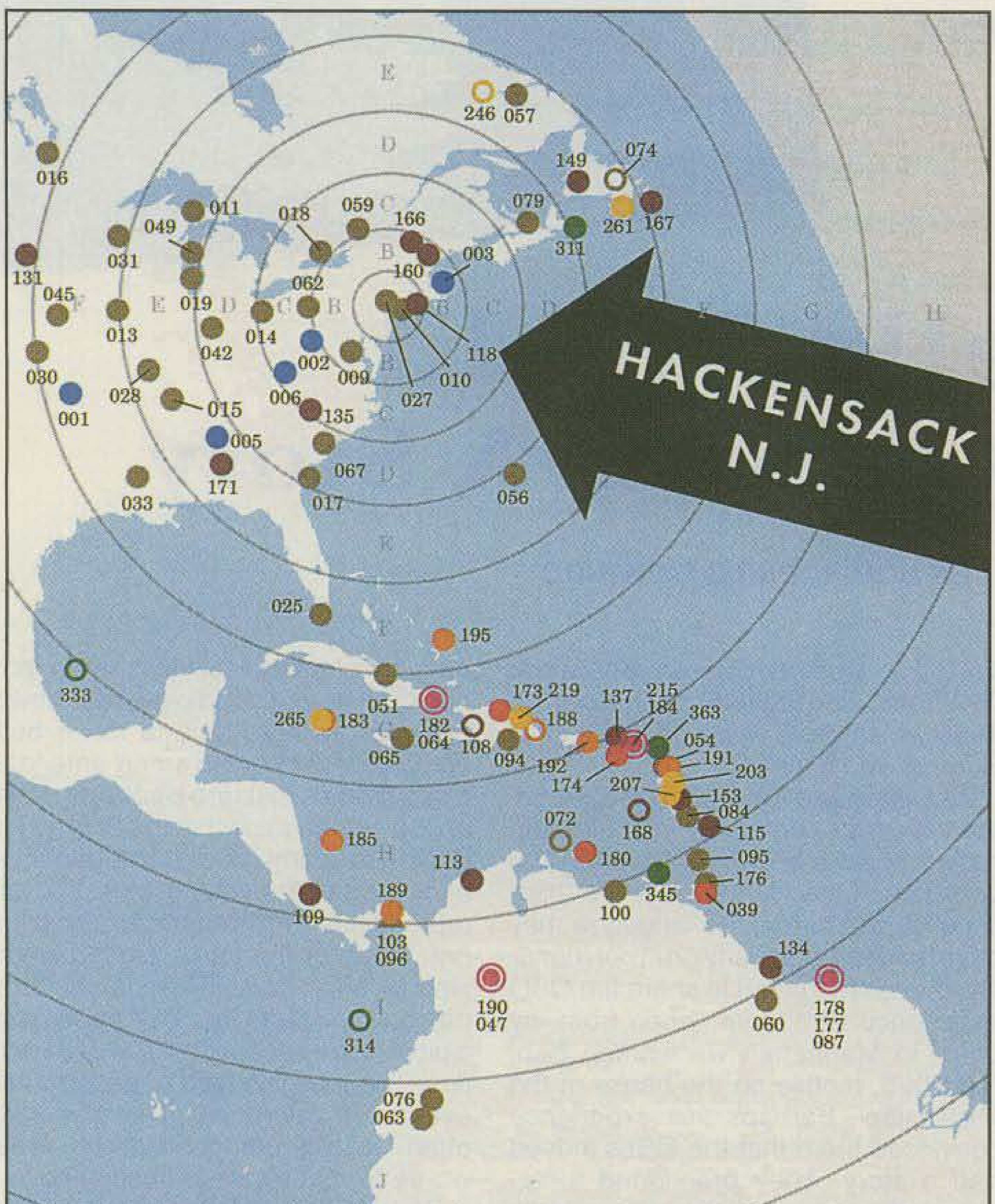


Photo B– A world map showing locations of contacts by image number helps readers navigate to specific stories in the book.

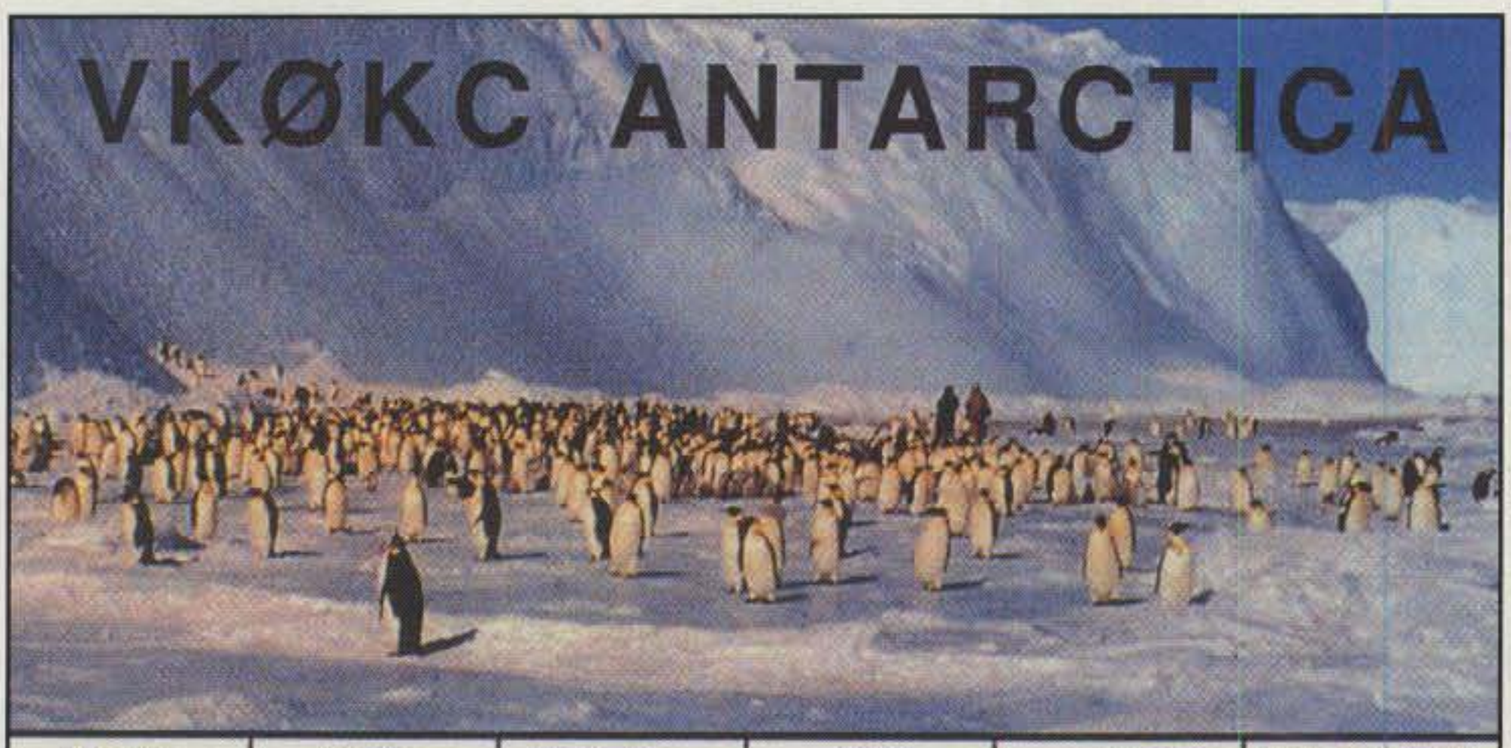
play an index of all the cards. This index gives a cross reference of the three-digit card number, the call, the date of the QSO, the name of the location, the operator's name, and where the QTH falls on the "Radio Activity" map (photo B) that folds out from the middle of the book. This world map marks each QTH corresponding to the three-digit numbered QSL. The authors used this numbering scheme to cross reference the whole shooting match. One can look at a part of the world and find the corresponding card. The map further indicates the decade of the contact.

In looking at the earlier cards, it becomes clear that Jerry was originally pretty much a CW op (who wasn't in those early days?), but after 1940 or so most of his contacts were on voice. Several contacts occurred on 11 meters before that band was designated to the Citizen's Radio Service. Most early QSLs listed the transmitter by stating the vacuum-tube type of the driver and PA stages. (And I always thought 807s meant bottles of beer!) Jerry worked a number of GIs on duty in the Pacific and elsewhere.

This book is not just for hams. On a recent commute from New York City to Metuchen, New Jersey, I showed the book to my friend Sue McCoy. She immediately noticed the graphical presentation of Morse Code on the front cover and proceeded to decode "hello world" from the dots and dashes. It turns out that her grandmother is WA1JYO, and she taught Sue the code as a child. Therefore, Sue, although not completely new to hamdom, found the book quite appealing. We looked at the map and Sue picked #335, a contact location marked on the continent of Antarctica. We flipped through the book to find that QSL #335 is on page 227 and belongs to VKØKC, worked by Jerry on March 4, 1991 at 1243 UTC on 20 meters. VKØKC's QSL (photo C) is beautiful. It shows a flat plain of snow with penguins everywhere. Amongst the crowd of penguins stand two humans, and behind them is a mountain of snow! I can just imagine it now, sitting at the rig, tuning around 20 meters, and hearing the rare DX station. I recall saying, "No, Sue, I've never worked Antarctica. It's not all that easy, but I'd love to"—especially after turning the page and reading the following commentary:

335 – VKØKC

Antarctica doesn't belong to anyone, but about a dozen countries have territorial claims and have established about 40 bases



DATE	UTC	FREQ.	SIG	MODE	WORKED
3·4·91	1243	20MTR	5×5	2×SSB	W2OJW

Photo C– VKØKC's QSL card from Antarctica proved to be a QSO starter (off the air) for WB2UDC as much as it must have been for W2OJW.

on the continent. There is complete collaboration between the different scientific research stations. The distinguishing factor is that each station adheres to the time zone of its home country, so visitors to other bases can go through abrupt jet lag.

Life in an Antarctica station is tough and lonely. Studies show that after a year staff show similar symptoms to returning POWs. The annals of the frozen continent are replete with stories of people going stir crazy, getting blitzed on home-brew, and attacking each other with various implements. On an Argentine expedition, a doctor, anxious to be shipped home, burnt down his own base. A chess game led one Soviet scientist to axe another. When people freak out, they have to be sequestered in padded cells for months until they can be evacuated after the thaw.

Not all of the nuttiness is pathological. Members of the 300 Club have to jump naked out of a 200-degree (Fahrenheit) sauna and run outside and around the marker for the South Pole, where it's generally 100 degrees below. Members of the Varda Swimming club have broken through the ice of Lake Varda and plunged in, stark naked. (228)

Sue was hooked. She has already hit Amazon.com for the book to give to her grandmother. The book is full of stories just like the one behind QSL #335.

I remain hooked. The fact that the two authors had only a modest knowledge of ham radio when they embarked on this project really fascinated me. I would get a couple of calls a week from them, asking for some sort of interpretation or just to chat about another of their discoveries about our hobby. The Q signals, the phonetic alphabet, and the overall cheerfulness conveyed via the QSLs must have been some of the compelling aspects to the authors. I also know that when the authors contacted other hams, they almost always got a welcoming and positive response.

Also included in this book are little bits of ham lore, such as the often-debated "theological question," "Why is a ham called a ham?" or "Has the internet replaced the need for ham radio?" Discussion of these and other pressing issues can be found in this rich text. It touches upon the scientific aspects of radio as well as on the service part. The work done by the heroic hams of September 11th and beyond is presented quite well.

I know that Jerry Powell had made many friends over his 70-plus years as a ham—many more than even the QSLs represent. It is also apparent as you navigate the book that Jerry valued the public-service aspect of our hobby, especially with his involvement in the local QCWA chapter and other clubs in his area. On page 102 there is an image of a newspaper clipping from the *Town News* dated December 29, 1982 and entitled "Elmer of the Year award is Presented." Jerry Powell was honored by the QCWA as the Elmer of the Year. We all know what an Elmer is, and the value of mentoring in all aspects of life. Although W2OJW's key is now silent, he seems to continue his "elmering" ways, for Danny is now KC2KGT and Paul is KC2KHN. They can be found on the New York repeaters. There also seems to be some competition as to who passes their General Class first. They both are anxious to build their own personal QSL collections.

I enjoyed having a small part in this work as well as being the "on-site Elmer." After reading the final result, I feel that this book presents the hobby in a very attractive and positive light. This is a story about W2OJW and two authors' journeys of discovery into our dynamic hobby. Give the book a look. The artwork is beautiful and the stories are fun. If, by chance, someone asks you what ham radio is about, this book will surely open the door. It did for KC2KGT and KC2KHN. ■

A Personal Connection

One more story that's not in the book: When Bob first told me about this book and his involvement with it, I experienced yet another "Ham Radio Moment" (see my Dec. 2002 editorial). I *knew* W2OJW ... talked to him on 2 meters on morning walks when I was accompanied by my HT instead of my wife. He was quite on in years and a bit forgetful by the time we met, but he always recognized "W-2-VOLume-Units in Bloomfield" when I got on the air. I never met Jerry in person, but he kept me company on many a walk, and I was saddened when I heard he'd become a Silent Key. I'm very pleased that, through this book, and with the help of Danny Gregory, Paul Sahre and a box full of QSL cards, Jerry lives on. — *W2VU*

The passing of a local ham inspired east Tennessee amateurs to build a ham radio shelter and mobile ham shack to teach Boy Scouts about amateur radio and Scout Merit Badges. Here's the story of the Jack Goforth Memorial Station.

Ham Radio Goes to Scout Camp

BY DICK WOLF,* WI8X

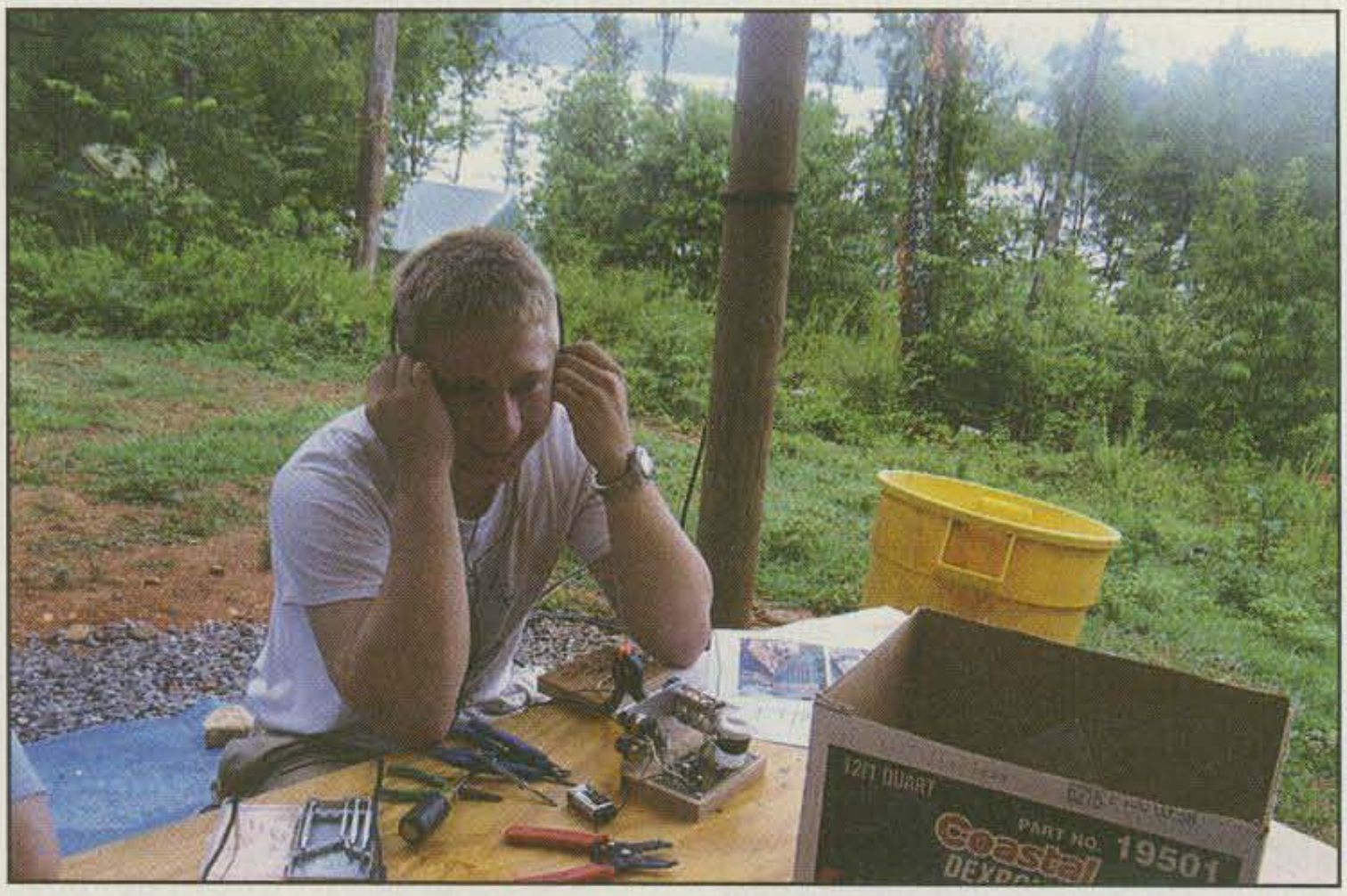
"Brady" McBride of Troop 154, Powell, Tennessee, plugs headphones into the shortwave receiver he'd finished building minutes earlier. At first nothing. Then a big ear-to-ear smile: "Hey! I hear music!" Carter Ambrister in Troop 30, Knoxville, exclaims, "I hear guys talking in Spanish!"

During the summer of 2002 some 38 Boy Scouts built regenerative shortwave radio kits at Camp Buck Toms BSA (Knoxville, Tennessee) as part of a hands-on approach to Scout Merit Badges. This is a story about creating amateur radio excitement in Scout-age boys, and one group's approach to it. It is also the story of how Knoxville hams are helping honor the memory of a Silent Key, Jack Goforth, K4IBP.

Jack was highly regarded in both the amateur radio and Boy Scout communities in Knoxville.I became acquainted with him in April 2001 at a DX club meeting. The very next night he suffered a fatal heart attack. Hundreds paid their respects and attended his funeral. Many people wanted to do something to commemorate K4IBP, but what?

Enter Tom Moak, WW5H, a Scoutmaster in the Great Smoky Mountain Council, BSA. In May 2001 Tom proposed a memorial at Camp Buck Toms, operated by the Scout Council. Don Riley, N4CZL, spoke up at the May 2001 Radio Amateur Club of Knoxville (RACK) meeting and moved the idea along. He proposed teaching amateur radio and related Merit Badges to Boy Scouts at summer camp.

Don hosted the first Jack Goforth Memorial meeting. What emerged were plans for a shelter and a mobile ham shack. They chose a name: Jack Goforth Memorial Ham Shack at Camp Buck Toms. Nothing against long names, but I called it The Goforth Group, or GG for short.



Patrick "Brady" McBride of Troop 154, Powell, TN hears a shortwave radio station. (Photos by Don Riley, N4CZL)

A Boy Scout Project

I was invited to the second meeting in December 2001. L. D. Strader, K4LDS, presented plans for a 30' × 40' covered pole barn shelter with open sides, and Merle Growden, KD6FBT, presented equipment needs and a layout for the ham shack. The question: What kind of ham shack? The answer: a trailer. It would offer mobility and opportunities to display amateur radio at public events in addition to six weeks' use at Camp Buck Toms. We also decided to raise funds for the project. On a sunny, chilly day later in December members of the GG visited Camp Buck Toms to get the lay of the land and staked out a shelter site.

Proving that no job is too difficult to delegate, N4CZL asked me to work up an electronics camp project. Don's prior contact with the ARRL had put him in touch with Vic Mukai, WB2STR. Mukai teaches Scouts to build a shortwave receiver from a bag of parts in a single day. He e-mailed Don a reprint of N1TEV's September 2000 *QST* article about a beginner's receiver, along with encouragement for our project. Fast-forward to early January 2002. I recommended the N1TEV receiver as a good teaching tool. L. D. Strader,

*4440 Royal View Road, Knoxville, TN 37921

The 30' × 40' Goforth Ham Shack shelter during construction.

The ambitious plan: Build a shelter, outfit a trailer, assemble radio kits, and line up instructors, all before the start of camp on June 10, 2002. Some, when shown the aggressive plans and timetable, stroked their chins and remarked, "Maybe in a year to 18 months."

With only three months remaining until June 10, I showed the N1TEV prototype radio at the East Tennessee DX Association (ETDXA) March meeting. Rose Goforth, K4IBP's widow, donated $1000 to start the project, beginning her outstanding fund-raising.

Shelter Construction

Big things happened at Camp Buck Toms. Nathan Mathis, P. E., bulldozed and leveled the site. Don Riley picked up the main supports for the shelter, fourteen 8" × 18' poles, and delivered them to camp.

Three 65 foot poles, for antenna supports, were set in holes about 70 feet apart. While this was fine, and part of the plan, there was one tiny problem. Tom Moak, WW5H, had scheduled a Thursday to install eyebolt hardware before the poles went up, but the crane got there the day before! Thus, there stood the poles with no hardware on top to hoist antennas. We just stared at the naked pole tops some 55 feet in the air. It was one of those "Oh, horsefeathers!" moments. (We're planning to resolve the problem for this summer.)

Wolf Tree Experts owner Tom Wolf (no relation to the author) topped, cut, and notched all ten shelter poles and

A Team Effort

Projects like this don't happen by themselves, nor can just one or two people make everything happen. Our project involved not only hams from around Knoxville, but also local companies and some not-so-local companies. In addition to those mentioned in the main article, a big thanks to these amateur radio operators and companies who contributed to the Goforth Group:

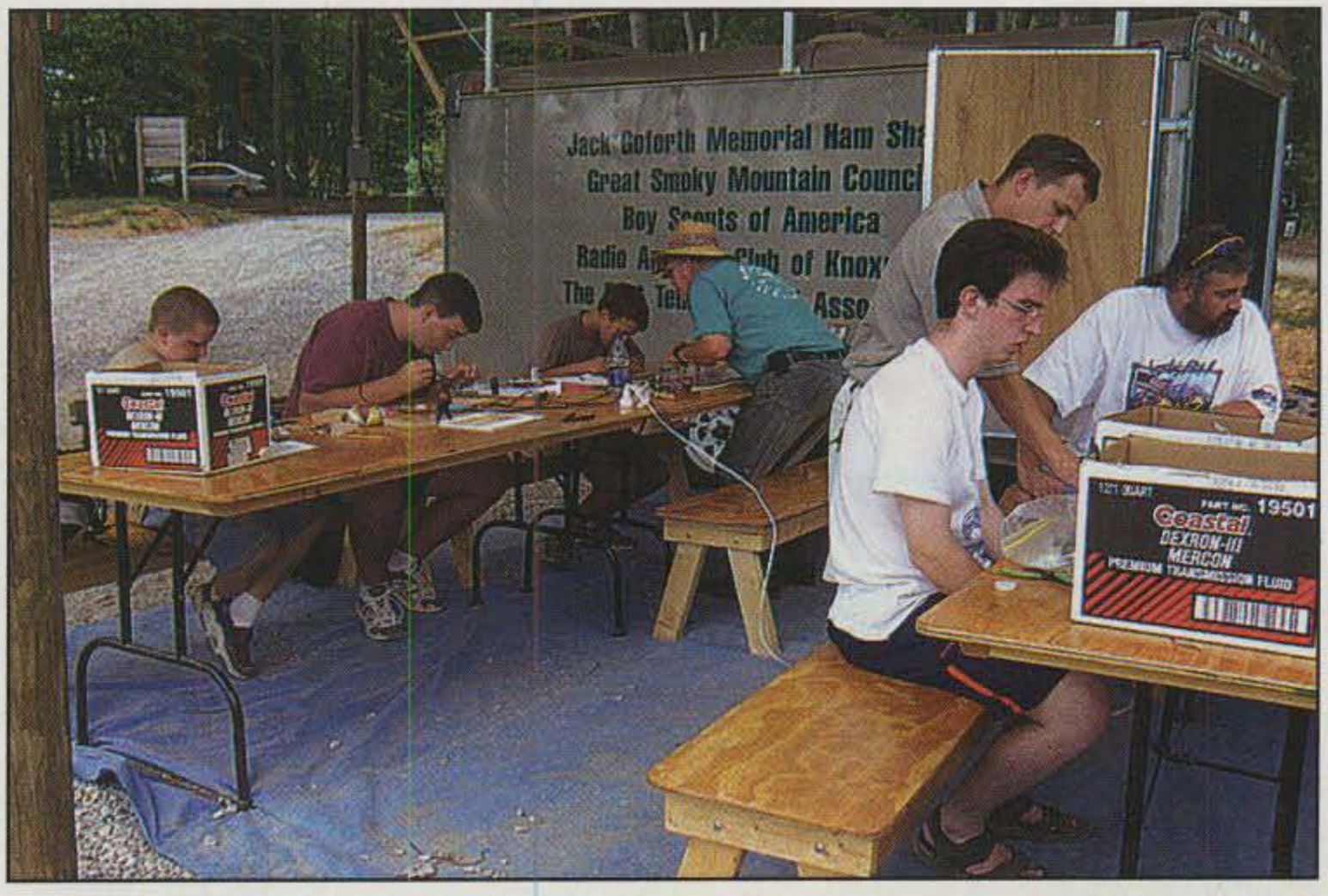
The instructors: Frank Ambrister, N4OQJ; Jeff Baker, WU4O; Terrill Clift (no call); Wayne Gardner, N4FLM; Jean Giesler, W4TYU; Merle Growden, KD6FBT; Greg Jones, KD4VVM; Tom Moak, WW5H; Jerry Moore, AF1P; Chet Morris, W4GEK; Walt Ohnesorge, KØBUH; Don Prater, W4TO; Don Riley, N4CZL; Larry Rockfield, W6UB; Jay Stadler, KD4AYU; Brice Umstead, KØCSJ; and Dick Wolf, WI8X. It was a logistical challenge, since Camp Buck Toms is 30 miles from Knoxville.

The companies: Ten-Tec, a Jupiter HF rig and power supply; Fred Reimers, KF9GX (FAR Circuits); BC Micro (Texas); Mouser Electronics (Texas); Ocean Side Electronics (Rhode Island); Shields Electronics (Knoxville), all help with extra discounts; Signs Etc., trailer graphics; Steve Burris (Langdale Forest Products Co.), shelter poles; Allstate Trailer Sales and Schubert Lumber (Knoxville).

Donations: Chet Morris, W4GEK, ICOM IC-746; David Bower, K4PZT, power supply; Dave Wallace, camp ranger, additional labor. Also, the East Tennessee DX Association (ETDXA), Oak Ridge Amateur Radio Club (ORARC), Radio Amateur Club of Knoxville (RACK), and many Goforth relatives contributed significant funds to the project.

K4LDS, donated $40 to buy parts. Now we had a project.

However, while we were enthused about the project, the Great Smoky Mountain Council, BSA, only had an inkling of our plans. Don Riley and I visited Steve Buery, Council Program Director, in January at Scout Council headquarters. Buery listened as we proposed building the receiver in a 4 to 5 hour session in one day, as Vic Mukai did. Oops! QRM: Buery said that the camp divvied up the day into hour-long segments. Could the Scouts build the receivers in four one-hour sessions over four days? We didn't know. We would have to find out.



The first week's Boy Scouts with amateur radio instructors.

Goforth Ham Shack dedication. Left to right: Bill Riding, Karen Crutchfield, Kathy Grizzell, Kendahl Knox, Rose Goforth, Kima Riding, and Tony Crutchfield.

set the roof trusses and panels. Now it looked like a real shelter.

Proofing the Radio Kit and Gathering Instructors

In April four hams built two radio kits in four consecutive one-hour sessions. While the group proved kits could be built in four hours, we didn't figure in Boy Scouts' soldering skills, or more precisely, lack of soldering skills. This would prove nettlesome during the summer.

Fanning out to area amateur radio clubs, we recruited hams as instructors, and the Smoky Mountain Boy Scout Council recruited Boy Scouts as instructees. We decided to limit classes to six Scouts for each of the six weeks of camp. Soon we heard that all six weeks of camp were fully subscribed!

Later in April, Merle Growden, KD6FBT, bought a 7' × 14' trailer, put in a finished floor, installed sound-conditioning carpet on the walls, and designed and built operating positions. The trailer continues as a work in progress.

Countdown to Camp

Early May, 2002. One month until camp. A trip to the Dayton Hamvention flea market netted soldering irons, tools, and other equipment. Instructor volunteers assembled at the author's home to review kit building. Hams built tables and benches. A dipole antenna went up at camp.

We displayed the trailer to favorable comment at the RACK Hamfest in Knoxville on June 8. The next day WW5H towed the trailer to Camp Buck Toms and maneuvered it into position under the shelter for the June 10 start of camp. Now would the entire project work? How would the Scouts respond?

Monday, June 10, 2002. First day at Camp Buck Toms. At about 3:45 PM Scouts responded. They came running—running!—to start their 4:00 PM kit building! Was it a success? Yes, but soldering practice took much longer than expected. However, Scouts learned to solder well enough to begin soldering components to the PC board the first day.

By Thursday, Scout Cody Watson completed a working radio. The other five Scouts came very close. On June 12 we held a dedication ceremony at Camp Buck Toms with Rose Goforth and members of her family, amateur radio instructors, and Great Smoky Mountain Council BSA executives in attendance. Rose Goforth reported that donations topped $10,000!

The other five weeks? More success. During the last three weeks every Scout completed a working radio. After class hams operated the rigs in the trailer so that Scouts could talk third-party to other hams. Quite exciting for the Scouts! Instructors also noticed that Scouts filtered back at night with their radios and connected them to the dipole on their own to listen. They were enthusiastic!

What Did We Learn? And What About the Future?

The Scouts built the kits in four days, although classes lasted closer to 90 minutes than an hour. Many Scouts also earned a Radio Merit Badge, an Electronics Merit Badge, or both. Scouts who didn't complete their kits attended a make-up day in August and took home working radios.

At this writing, the Goforth Group plans to offer a Ten-Tec Model 1054 shortwave receiver for 2003, which offers five-band performance and first-rate appearance. Also, the Scout Council agreed, on the basis of our experience, to start each Camp Buck Toms building session an hour earlier, and an older, licensed Scout will teach Radio and Electronics Merit Badges at camp.

And oh, yes. Remember the knowing comments that the project would take, "Maybe one year to 18 months?" The Goforth Group did it in six months. Another benefit: At least 15 Boy Scouts signed up for amateur radio license classes to inject new blood into our hobby. Overall, this adventure helped turn a family tragedy into a community triumph, an amateur radio triumph, and a new adventure for 38 Boy Scouts. ■

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Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
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In the best amateur tradition, W5GI has designed a multiband wire antenna that confounds the antenna modeling software, but passes the most important test of all: It works ... well.

The W5GI Multiband Mystery Antenna

BY JOHN P. BASILOTTO,* W5GI

This article describes an antenna that covers 80 to 6 meters with low feed-point impedance and that will work with most radios, with or without an antenna tuner. It is approximately 100 feet long, can handle the legal limit, and is easy and inexpensive to build. It's similar to a G5RV but a much better performer, especially on 20 meters. During the last two-plus years the antenna described herein was built, installed, and used by amateurs at various heights and configurations in over 300 locations. Feedback from users indicates that the antenna met or exceeded all performance criteria. The "mystery" part of the antenna comes from the fact that it is difficult, if not impossible, to model and explain why the antenna works as well as it does.

*808 Mariner, Austin, TX 78734
e-mail: <w5gi@aol.com>

Over two years ago I moved to a new QTH. Like many other amateurs, I succumbed to my wife's demands, which also meant living in a community that prohibits towers and most antennas. Fortunately, the lot we purchased has two large oak trees about 130 ft. apart, which allowed installation of wire antennas at about 25 ft. above ground. I initially installed a G5RV because I work mostly 17, 20, and 40 meters and had good luck with it on these bands at other locations. Although the G5RV worked well, it did not provide the performance I had hoped for.

Over a period of several months I tried a variety of popular antennas—full-size loops for 80 and 40 meters, a commercial multiband dipole, resonant dipoles, a multiband vertical, half square, extended Zepp, and a 130 ft. dipole fed with open-wire line. Each antenna worked reasonably well, but I still wasn't satisfied. In my quest to find a better antenna, I came across an article by James E. Taylor, W2OZH, in which he described a low-profile collinear coaxial array.[1] It was Taylor's article that inspired my design.

The W5GI Multiband Mystery Antenna is fundamentally a collinear antenna comprising three half waves *in-phase* on 20 meters with a half-wave 20 meter line transformer. It may sound like and look like a G5RV, but it is a substantially different antenna on 20 meters. Louis Varney's antenna, although three half waves long, is an *out-of-phase* aerial. Mr. Varney (G5RV) had very specific reasons for selecting a three-half-wave arrangement on 20: He wanted a four-lobe radiation pattern, at least unity gain, and a low feed-point impedance.[2] On the other hand, I wanted a six-lobe pattern on 20 meters, gain broadside to the antenna, and also low feed-point impedance to simplify matching the antenna to the rig. In addi-

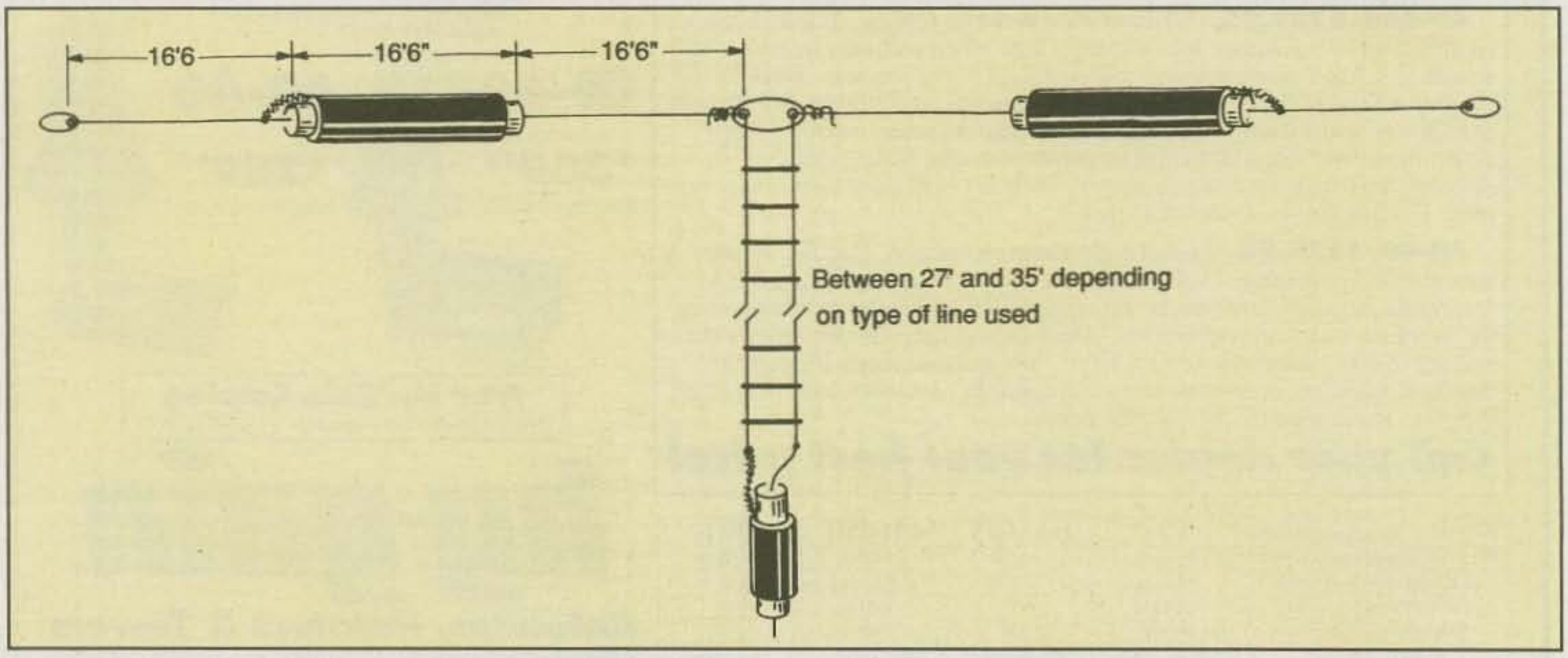

Fig. 1– Schematic drawing of the W5GI Multiband Mystery Antenna. See text for details on connection of coax sections in center of antenna legs and on length of twinlead stub.

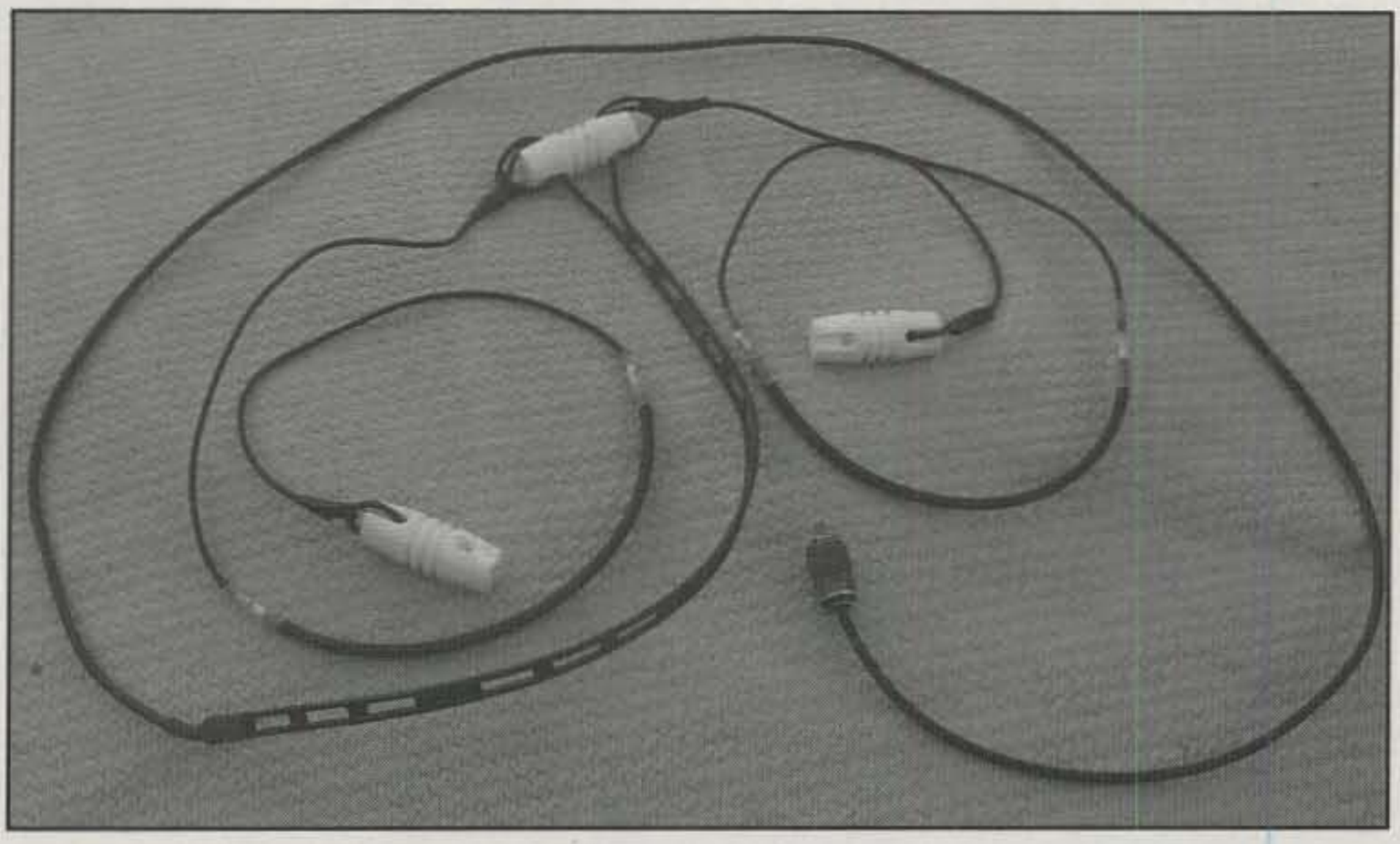

Photo A– Full view of the W5GI Multiband Mystery Antenna, with all sections shortened considerably for illustration.

Photo B– Connection of inner end of coax section (closer to center). Note that only the center conductor is connected to the wire.

Installation data

wire:	14 AWG
coax:	Mini 8X
Ladder-line:	Cut to half wave length at 20 meters using appropriate velocity factor

Performance (measurements taken with MFJ 259 Analyzer)

Freq.	SWR	R	X
3550	1.5	42	34
3650	2.5	98	61
3850	3.5	48	61
3950	4	22	36
7000	1.9	95	12
7200	3	22	25
10.1	5.2	22	50
14	1.7	37	19
14.2	1.5	42	18
14.3	1.6	43	22
18.15	1.9	93	13
21.3	2.9	120	46
24.9	1.9	35	23
27.8	2.1	26	16
28.35	1.8	33	20
29.5	2.6	53	55
50.11	2.3	51	37
52.5	1.2	57	7

Table I– Measured performance of the W5GI Multiband Mystery Antenna at various frequencies. Columns list frequency, SWR (all as a ratio to 1), Resistance (R) in ohms, and Reactance (X) in ohms.

tion, the antenna had to be usable as a G5RV and work at least as well on the other HF bands. The answer to my needs was a skywire that incorporated the advantages of a 3-element collinear and the G5RV antenna.

In its standard configuration, a collinear antenna uses phase reversing stubs added at the ends of a center-fed dipole. These stubs put the instantaneous RF current in the end elements in phase with that in the center element. You can make these phase-reversing stubs from open-wire line or coaxial cable. Normally, a shorted quarter-wave stub is used, but an open-ended half-wave stub would also work. The problem is that the dangling stubs are unwieldy and/or unsightly.

In his article Taylor described a low-profile collinear coaxial array. According to Taylor, when you apply an RF voltage to the center conductor at the open end, the stub causes a voltage phase lag of 180 degrees at the adjacent coax shield. This happens because the RF is delayed by one quarter-cycle as it passes from left to right, inside the coax to the shorted (opposite) end. There's another quarter-cycle delay as the wave passes back from right to left inside the coax and emerges on the shield at the open end. Add up the delays and you get a total time delay of one-half cycle, or 180 degrees. In essence, the coax section serves two purposes: It provides the necessary delay and provides part of the radiating element in a collinear array.

My initial version of the antenna used the Taylor formulas, cutting the wires to a quarter wave length using 234/f(MHz) and cutting the coax sections using the same formula, but adjusting the lengths to compensate for the velocity factor of the specific cable used. The first version of my antenna worked well on 20 meters but failed as a multi-band antenna.

I built a second antenna, but this time I cut the coax to the same length as the wire. My reasoning was that perhaps the coax didn't behave like coax and therefore the velocity factor wasn't applicable. To my amazement, the new antenna performed exceptionally well on 20 meters, had low SWR, and performed just as well as my G5RV reference antenna on the other HF bands and 6 meters.

Step-by-Step Construction

The *W5GI Multi-band Mystery Antenna* looks like a plain dipole (fig. 1 and photo A) and is very simple to build. You will need three wish-bone insulators, about 70 ft. of wire (14-gauge household electrical wire works well), enough twin lead or open wire to make a half-wave section on 20 meters (I found that window-type, 18-gauge, 300 ohm ribbon works best[3]), 34 ft. of RG-8X mini-coax, an electrical connector[4] to connect the twin lead and coax, and shrink tubing to cover the exposed coax joints. The antenna can be built in less than an hour when you have the above materials.

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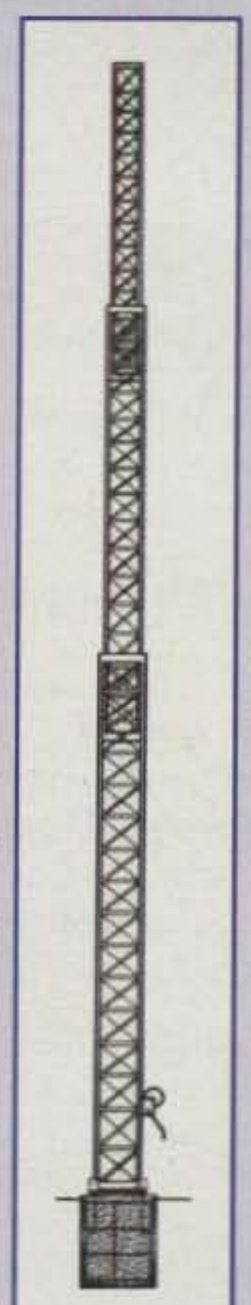

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TX-472	72'	22'8"	1040	$3,147	$2,459
TX-472MDPL	72'	22'8"	1210	$5,064	$3,999
TX-489	89'	23'4"	1590	$5,475	$4,579
TX-489MDPL	89'	23'4"	1800	$8,212	$6,429

HDX SERIES CRANK-UP TOWERS

• Heavy duty, handles 44.7 square feet of antenna load at 50 MPH, 35 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

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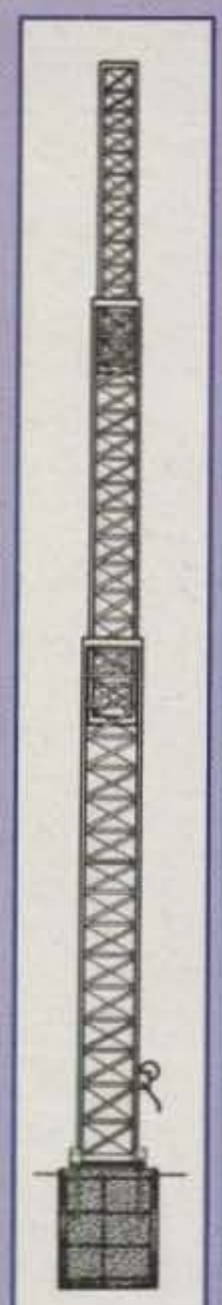

HDX SERIES HEAVY DUTY CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
HDX-538	38'	21'6"	600	$1,642	$1,269
HDX-555	55'	22'	870	$2,874	$2,269
HDX-572MDPL	72'	22'8"	1600	$7,528	$5,899
HDX-589MDPL	89'	23'8"	2440	$9,855	$7,699
HDX-689MDPL	89'	23'8"	3450	$19,039	$14,999
HDX-5106MDPL	106'	24'8"	3700	$20,719	$15,999

MA SERIES CRANK-UP MASTS

• Handles up to 22 square feet of antenna load. (See chart below)

• MDP & MDPL models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

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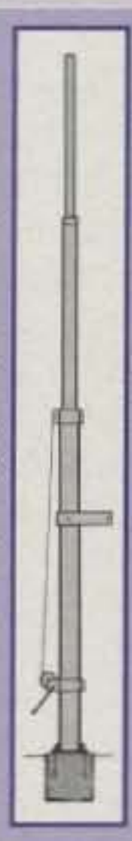

MA SERIES CRANK-UP MASTS							
MAST MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,007	$849
MA-550	55'	22'1"	435	22	9	$1,704	$1,399
MA-550MDP	55'	22'1"	620	22	9	$3,258	$2,729
MA-770	71'	22'10"	645	15.5	5.5	$2,810	$2,359
MA-770MDPL	71'	22'10"	830	15.5	5.5	$4,445	$3,729
MA-850MDPL	85'	23'6"	1128	15.3	6.3	$5,991	$5,029

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.

• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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TMM SERIES COMPACT CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TMM-433SS	33'	11'4"	315	$1,355	$1,139
TMM-433HD	33'	11'4"	400	$1,624	$1,379
TMM-541SS	41'	12'	430	$1,779	$1,499

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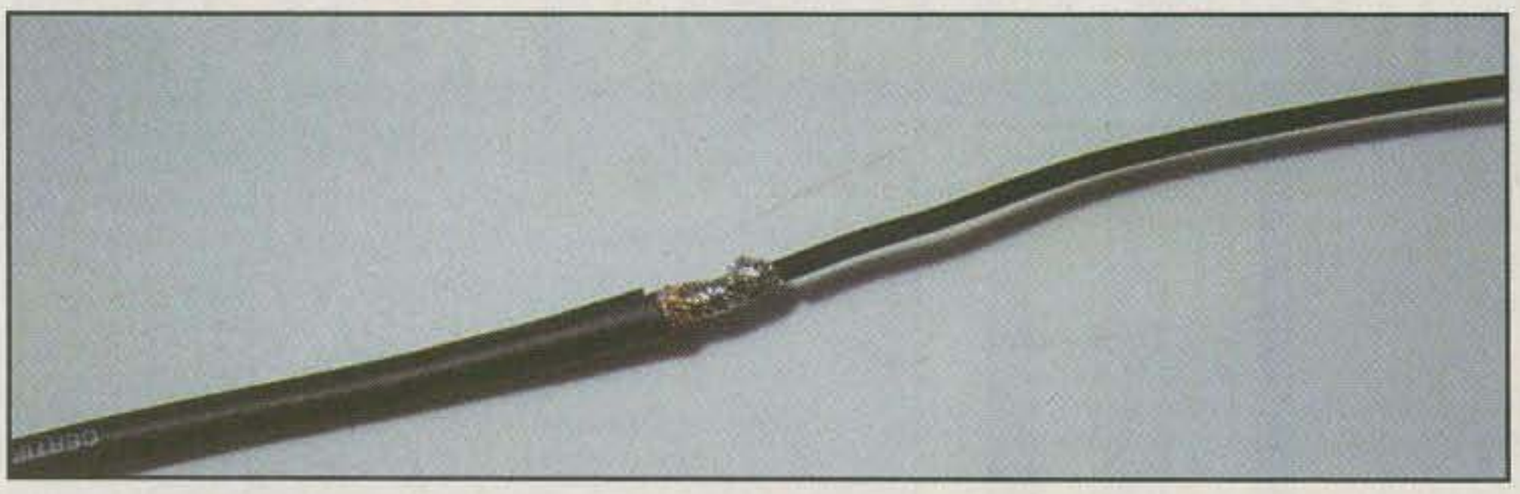

Photo C– Connection of outer end of coax section (farther from center). Note that both center conductor and shield are connected to the wire.

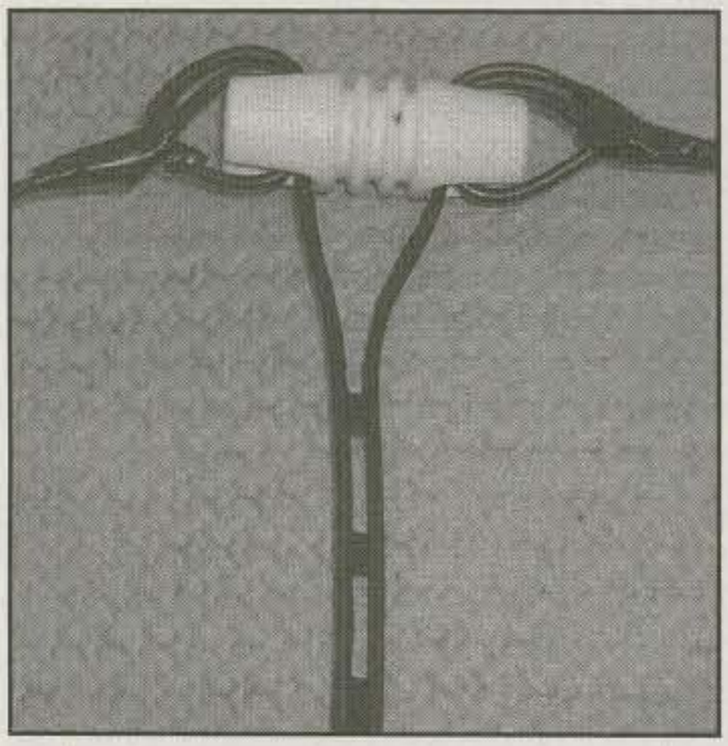

Photo D. Connection of twinlead to inner antenna wires at center of antenna.

When you're ready to proceed, do the following:

• Cut the electrical wire into four equal lengths of 17 ft.

• Cut the two lengths of coax to 16 ft. 6 in. each.

• Cut a 20 meter half-wave section of twin lead. This piece needs to be adjusted by its velocity factor. I used 300 ohm window-type line with a VF of .91, for a total length of 30 ft. 450 ohm, solid 300 ohm, or homemade open-wire line can be used provided the electrical length is one-half wave at 20 meters. Actual length obviously will vary, typically between 27 and 35 ft., depending on type and velocity factor.

• Trim 2 in. of braid from one end of both lengths of coax (item A).

• Trim 1 in. of braid *and* center insulator from the opposite end of both coax sections (item B).

• Build a 20 meter dipole without end insulators.

The next two steps of the construction process involve connecting only the "inner" end section of the coax section to one end of the dipole; the shield is not connected to anything here. At the other end of the coax section both the coax shield and second wire section are connected to the coax center conductor.

• Connect one end of the dipole to the center conductor of the coax (item A) and cover with shrink tubing (photo B).

• Connect the opposite end of the coax (item B) to braid *and* quarter-wave wire section, cover with shrink tubing, and connect to end insulator (photo C).

• Install the twin lead through the holes of the center insulator (you may have to enlarge the holes) and solder to antenna wire (photo D).

• Connect the opposite side of the twin lead to the coax (photo E). Almost any type of connection will work, provided the connection is stable and sealed properly. The coax length in the photo is for illustration only. It should be long enough to reach your radio!

• Install the antenna with the center conductor at least 25 ft. high. Mine is installed in a horizontal plane; however, others have installed the 'GI antenna as an inverted-Vee and are getting excellent results. Table I shows the typical SWR results for this antenna.

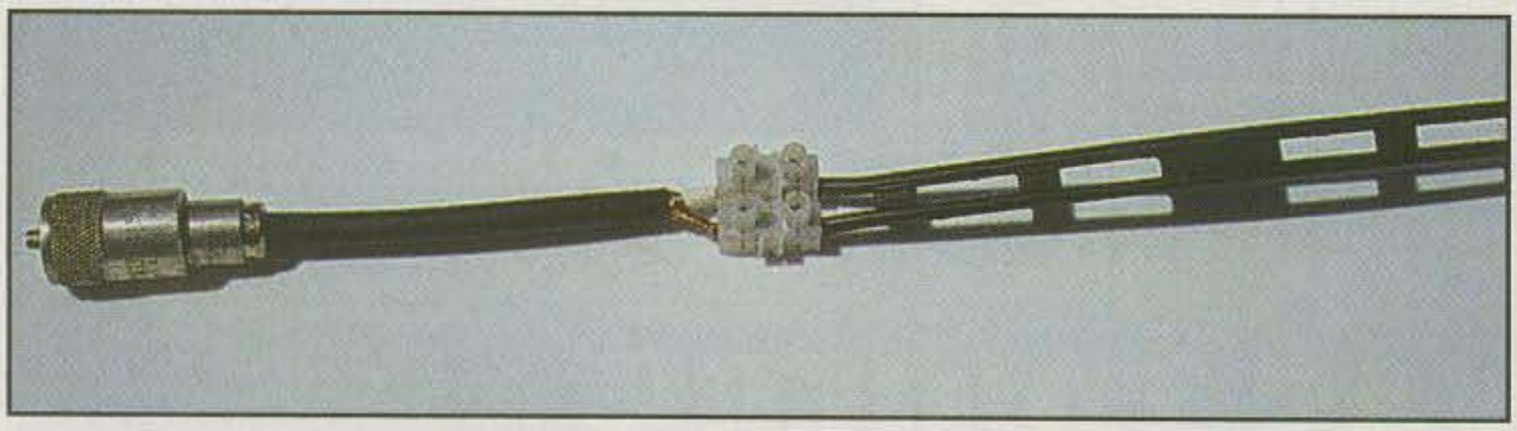

Photo E– Connection of twinlead to coax. Short length of coax section is for illustration only. All connections should be weatherproofed with shrink-tubing, CoaxSeal®, or similar.

On-The-Air Performance

On 20 meters you should expect 3–6 dB gain over a dipole and a six-lobe radiation pattern with an elongated figure-8 pattern perpendicular to the plane of the antenna. This is typical of a 3-element collinear array.[5] On all other bands the antenna performs like a G5RV, which is really a random-length dipole on all but 20 meters. M. Walter Maxwell, in *Reflections II, Transmission Lines and Antennas,* aptly describes this phenomenon. Several users report it is possible to use the antenna on 160 meters, but you will need to connect the twin lead together at the point where it connects to the coax. On 160 the antenna performs like a Marconi. Those who have used the antenna on 160 say the "GI Mystery Antenna" is a quieter receiving antenna compared to other 160 meter antennas.

As for the theory of operation, it remains a mystery. At least three "experts" tried computer modeling the antenna. All three rendered completely different findings. I hope to have more sophisticated findings at a later date. In the meantime, enjoy what for many has been a fun project and an excellent performer.

In conclusion, I would like to thank the many amateurs who have built and used this antenna during the last couple of months, especially Dean, N9ZLS, who personally built over a dozen GI Mystery Antennas and whose feedback has been invaluable; Rod, WA9GQT, who uses the antenna in QRP operation with impressive results, for his feedback regarding 160 meters; and last, but not least, my wife, who provided the opportunity and encouragement to build the *W5GI Multi-band Mystery Antenna.*

Notes

1. James E. Taylor, "COCOA-A Collinear Coaxial Array," *73 Amateur Radio,* August 1989: 24.

2. M. Walter Maxwell, *Reflections II Transmission Lines and Antennas,* Worldradio Books 2001: 20-10.

3. Available from the Wireman and other sources.

4. Available from most electrical parts outlets.

5. For a simple explanation of collinear arrays, read *Troubleshooting Antennas and Feedlines* by Ralph Tyrrell, W1TF. ■

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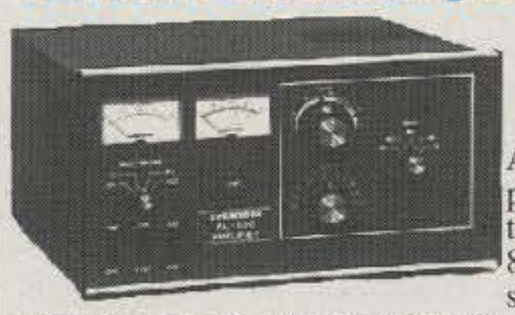

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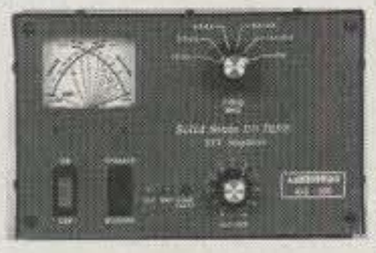

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How much impact does the location on your vehicle of an HF mobile antenna affect your signal? WB6NOA reports on some test results.

Boost Your HF Mobile Range By Boosting Your Antenna

BY GORDON WEST,* WB6NOA

Forty meters is a great band on which to experiment with mobile HF antennas. Every day you can get on in the morning and work a cluster of mobile stations about 700 miles away via a skywave hop. This is what I do every morning from southern California to the San Francisco Bay area. My antenna is a Cushcraft A4S with a 40 meter add-on kit, and each mobile station has its own type of antenna system.

The strongest signals come from the mobile operators using big-coil, major-mount whips that just fit under the California height limit of 13 ft., 5 in. Signal strengths are always well above S9. Very nice signals also come in from some mobile operators using inexpensive $20 center-loaded, fiberglass, and stainless-steel whip antennas as well as the tried-and-proven Hustler mobile whips. You can count on them every morning right at S9. We also have some mobiles who check in with lightweight HF ham whips and their signals are fair, but nowhere near S9 . . . and light years away from the well over S9 signals that we always get from N6FM and W7AEG running big-coil whips and possibly the added capacity hats.

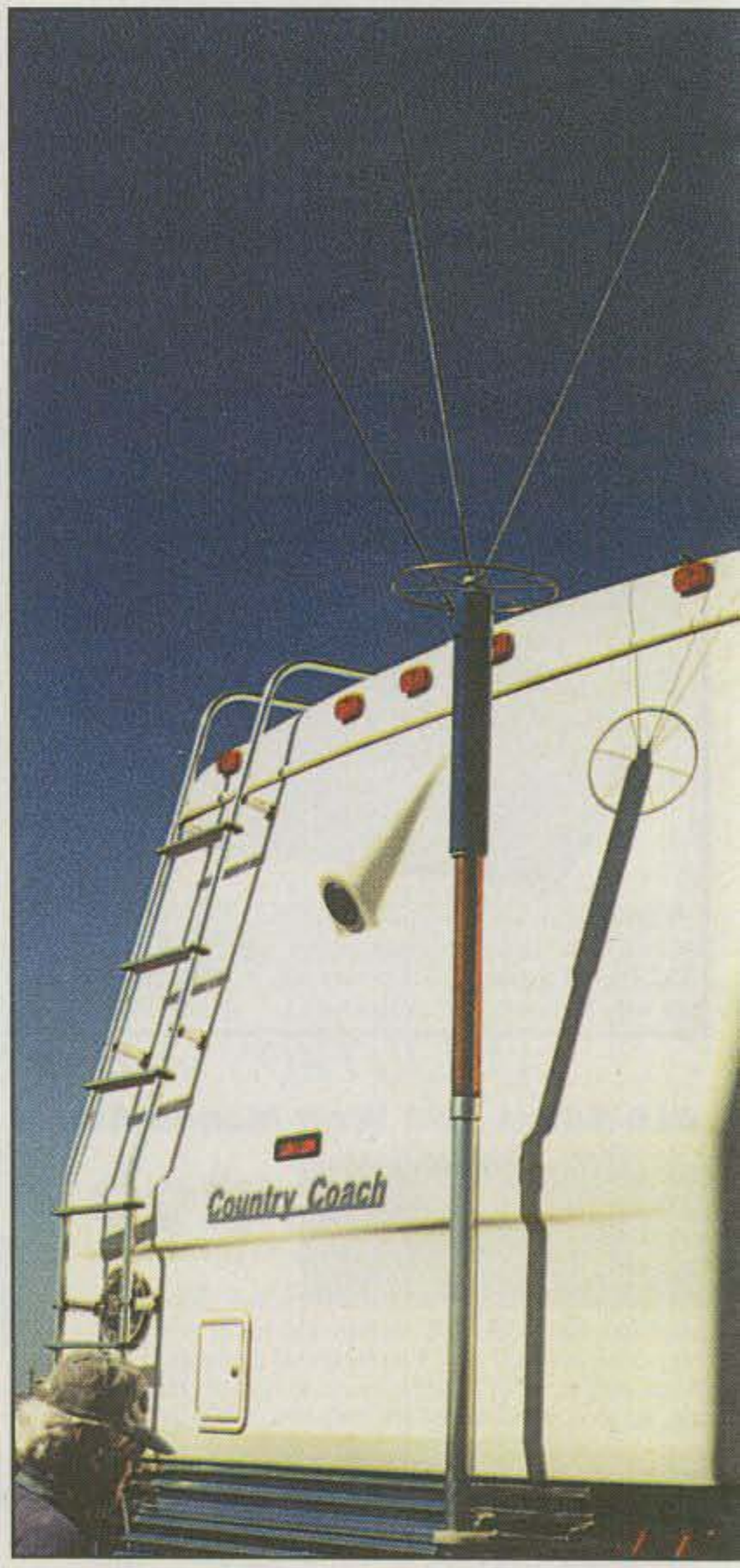
The difference in signal strength between monster whips and the little $20, slender, fiberglass-shaft, single-band ham whips is understandable, but why are similar whips not working as well on some mobile stations as on others in the same general vicinity? Everyone is running 100 watts, but with big variations in consistent signal strengths.

We found that lower-than-normal HF signal strengths on 40 meters came from those mobile stations with their whip antennas mounted relatively low off the rear bumper. If we had looked at the vehicle from the side, only about one third of the stainless-steel whip tip extended above the roof line. Also, when we looked at the HF mobile antenna on a portable MFJ SWR analyzer, the SWR was acceptable, but nowhere near the deep dip that we would normally like to see on a mobile HF antenna at resonance. Yet this same type of antenna on another vehicle had an absolutely flat SWR at resonance.

No mystery here: Many manufacturers of lightweight mobile HF whips include a bag full of high-voltage disk capacitors to help improve feedpoint impedance to approach 50 ohms. Without some sort of impedance matching at the base of the antenna, the low-mounted mobile HF whips could exhibit elevated reflected power.

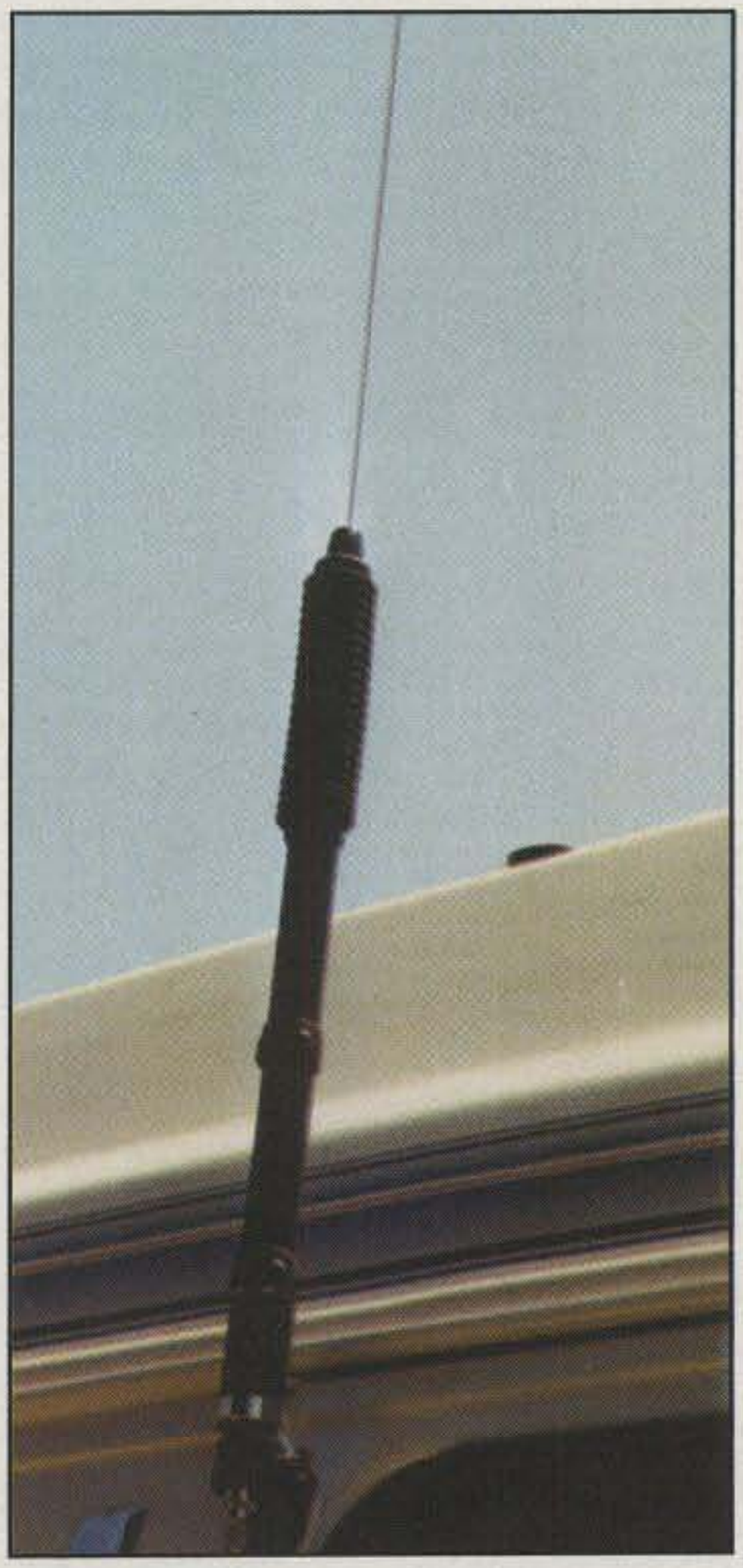
There was also something else happening with the low-mounted, lightweight HF whips that further decreased their skywave performance. Since the SWR was not absolutely flat, the protection circuitry on the transmitter would begin to pull back power output. You wouldn't think much about SWR of 1.8 to 1 as being absolutely awful, but a quick check of power output on four leading-brand HF radios showed a power output pull-back of almost 50 percent. Instead of getting those 100 watt peaks on a peak-reading wattmeter, the moderately elevated SWR caused the transmitters to throttle back to less than 50 watts PEP out. How much difference can that make? Well, cutting output power in half results in a 3 dB loss, plus there's additional loss from having three quarters of the whip next to the metal body of the vehicle, so the resulting HF signals were noticeably weaker than those of other mobile operators driving around with the same whip in the general vicinity, but mounted higher up.

We then tried an experiment, asking Bill Albert, WA6CAX, to relocate his single-band HF whip from his bumper mount up to a temporary three-magnet mount on the roof. Bill ran some aircraft-grade silver-tinned grounding braid from the base of the magnetic mount over to a solid metal ground on the roof



W7AEG's homebrew, motor-driven HF mobile antenna with a whip, capacity hat, and three stingers gets most of the radiating portion of the antenna above the roofline of his RV for maximum signal output.

**CQ Contributing Editor, 2414 College Dr., Costa Mesa, CA 92626*
e-mail: <wb6noa@cq-amateur-radio.com>



Lightweight HF mobile antennas such as this Yaesu ATAS-100 work best when mounted high enough to clear the top of your vehicle.

in order to minimize a capacitive ground on the roof. He reported a slight change in whip tuning, and an amazing change in the VSWR readings!

"On the temporary roof-mounted, triple-mag mount," Bill reported, "reflected power went to zero, my radio's transmit power output went to full tilt, and Gordo via skywave 500 miles away told me something major good had happened to my mobile signal." Indeed, Bill's signal went up to S9+, not quite as strong as the monster antennas, but certainly a big improvement over the S6 to S8 he would normally put in with the whip mounted down low.

Our next test was to see whether triple- and quad-magnetic antenna mounts on a roof for HF whips need to have a connection to roof metal. Without the braid, the SWR began to creep up as we moved the coax cable around within the vehicle. However, once we added the ground strap, the coax cable appeared to be "stone cold." When we asked several experts on HF antennas, we received split decisions on whether

Full-size motorized HF mobile antennas, such as this Hi-Q model, have to be mounted down low, but getting the main radiating sections above the roofline makes a big difference in your signal strength.

the magnetic base absolutely had to be DC grounded at the roof line. However, they all generally agreed that a small ground strap or ground foil from the base of the mag mount to anything metal at the roof line would certainly help stabilize any erratic operation of the equipment. This applies to more than radio equipment.

"I kept getting bit by the metal back of the mic until I grounded my quad-mag mount," commented Julian Frost, N3JF, adding, "Grounding the base of the mag mount also stopped the erratic operation of my windshield wipers on transmit."

Back to the Mush

Then one morning Bill's signal was back in the mush, and he confirmed that he had moved his antenna back down to the bumper mount. We had him install a 64 picofarad disc capacitor at the feedpoint, and performance was a little better, probably because the transceiver was seeing a slightly lower SWR. However, adding disk capacitors of different values each time you change mobile whips for different bands of operation doesn't seem very practical to me! You never want to leave a feedpoint open, as water quickly gets in, eats up the braid of the coax, and ultimately kills the connections, and without an open feedpoint, you can't add the caps!

Two in-line coax impedance matchers are available from MFJ—Model 910 and Model 914—as well as from other sources. These should be mounted as close as possible to the antenna, but in the real world of radio, most of us usually mount them right by the transceiver so we can see the results as we click-in pre-set amounts of capacitance. This type of device has been around for years. At least one non-amateur manufacturer insists that all of its solid-state HF radios run mobile be tied into one of these impedance-matching devices. They work well, but they still don't make up for the lack of mobile whip height.

The Ideal Location

Mounting a lightweight HF whip up high almost always presents an acceptable feedpoint impedance and allows your transmitter to run full power out without the need for external impedance-matching networks or the selectable impedance-matching box. The roof line of most vehicles is about eye-level or slightly higher. This is where you want to mount your lightweight HF whip, and still get under the 13 ft. 5 in. maximum clearance. Most lightweight whips are less than 6 ft. tall.

Certainly the triple- or quad-magnetic mount is a quick way to get on the air temporarily. For a more permanent roof mount, though, Comet, Diamond, Maldol, and MFJ all offer trunk-lip mounts with $^3/_8$" × 24 receivers. However, instead of radiating everybody in the back seat, gain an extra foot or two and install these mounts higher up on a door lip. I have yet to see a back door that doesn't offer a solid ground to the chassis of the vehicle when it is closed. Therefore, don't worry

Even when you have a tuner attached directly to the antenna base, as is the case with this SGC system, "the higher the better" is still the rule.

about needing extra braid to ground out the door to the vehicle chassis. If you want to do it, fine.

These mounts may come with a small section of very thin coax that allows you to easily close the door on the cable without causing damage. The coax then routes down to your transceiver, and you are ready to roll with a lip-mount up high and in the clear. Install the mount on the left side of your vehicle to minimize tangles with trees. The worst trouble you're likely to have is forgetting to remove the antenna before driving into the garage. We all have done it, and the fiberglass rod that supports the coil windings will give long before your door gets yanked off! This same mount may also hold slightly heavier antennas, such as the Outbacker and the small motorized HF antennas that terminate to a 3/8" × 24 mount receiver.

If you have a luggage rack, that's another option, with mounts available to get your whip up at roof level. And if you promise to mount nothing more than a lightweight $22 HF whip on it, I could even suggest the stainless steel mirror bracket with 3/8" × 24 receiver on the top, and SO-239 coax cable receiver on the bottom. *However,* this mount is intended only for lightweight antenna applications. If you screw a heavy antenna onto this mount, the 3/8" × 24 stud will pull out from the mount, and your heavy HF antenna will fly off, endangering other drivers and costing you one antenna.

RVs and Vans

If you're thinking of a heavier antenna for your RV or van, construct a mount out of heavy-aluminum angle material, drill a 1/2 in. hole for a 3/8" × 24 aircraft bolt to go through, held in place with a non-conductive insulating material to keep the stud from grounding out. You can buy pre-made insulators with a 1/2 in. lip on them for your own homebrew mount, or complete L-bracket heavy-duty mounts, from most of the antenna manufacturers. On vans and other utility vehicles, the mount may be affixed to the flat door-hinge assembly on the side or rear. Just make sure the door does not open so far as to cause the mount to dig into the side of a vehicle (yours or someone else's)!

Seal That Cable!

It is vitally important on any mount that requires you to split apart coax cable to seal the coax-cable connection with flexible sealant. When I see split coax cable without protection on vehicles at hamfests, the braid is usually dirty brown and wet to the touch, or the braid

has already broken off from the ground post. When the braid breaks off from any HF antenna feedpoint, SWR goes whacko, and you'll never get a great signal on the air. On receive, you wouldn't know that anything was wrong when the braid breaks off other than a slightly higher than normal noise level.

If you are absolutely going to go for the monster motorized antenna and mount the feedpoint down low, do all you can to get a tall whip to approach the overall height of 13 ft. Next, figure out a way to capacitively top-load the whip at least 1 ft. up from the top of the coil. When you add a single capacity hat well above the center-loading coil, you will find that you will now need 8 to 15 fewer turns of coil to achieve resonance. Less coil in the circuit, improved performance.

A simple way to add a capacity hat to some of the big monster, tunable, HF mobile whips is to buy a stainless-steel or aluminum extension rod, tap it for 3/8" × 24 threads, add a female receiver to the top of the new extension mast, and put the capacity hat at the top of the short extension. You will now need to cut off one foot from the stainless steel or fiberglass whip tip to ensure you meet bridge clearance rules.

The capacity hat will only work with tunable coil antennas because of the need to dramatically reduce the number of coil turns for resonance. I suppose you could add a little tiny capacity hat to one of those inexpensive, fixed-tuned, lightweight whips, and this would result in a shorter stainless-steel whip. However, on those inexpensive HF single-band whips, keep in mind that you *must* hacksaw off the stainless-steel lower section of the whip as you decrease the length for resonance. If you simply loosen the Allen nut and begin pushing the whip inside the fixed coil, the bottom of the whip will detune the coil, and the whip will no longer be resonant anywhere near where it is supposed to operate. Also, *anytime you chop off any sections of a stainless-steel whip, be sure to wear safety glasses.*

Here is one final thought on the importance of mounting the base of your HF mobile whip up high: We tested several portable-type, tunable, 4-ft.-long HF whips at roof level against twice-the-length HF whips mounted down low on a bumper, and the dramatically shorter little whips up high did just as well as the big longer whip with the feedpoint down low.

Of course, for those big, heavyweight, tunable, HF mobile antenna systems that no way terminate to the tiny 3/8" × 24 threads, your *only* mounting is down at hitch level, and many times an extra support brace may be necessary. If you have one of these installations, good for you, but imagine the added signal you might achieve by adding a capacity hat a foot above the loading coil, and then watching how many turns you can get rid of as you retune for resonance. Even though your overall height has been readjusted to about the same level, the capacity hat will really make a difference on the air.

No Metal in Your Body?

Where should the whip go on a fiberglass- or composite-body car? What special considerations are needed for mounting an antenna on a vehicle with little or no metal in its body?

Let's start with large motorhomes and van conversions, and work down.

On large motorhomes, staying below the 13 1/2 ft. bridge limit height is not practical with a whip mounted near the top of the roof. I have seen some lightweight whips mounted halfway down the rear ladder, but having the metal ladder parallel to the whips causes detuning, and the whip usually has a relatively high SWR.

On motorhomes, hitch mounts may be the answer, and the powerful High Sierra antenna system, among others, has many models specifically for "low down" hitch mounting on motorhomes. Because the motorhome's side is probably fiberglass, the motorized antenna can usually be tuned for minimum SWR. A fixed-base mounting coil will elevate feedpoint impedance, too.

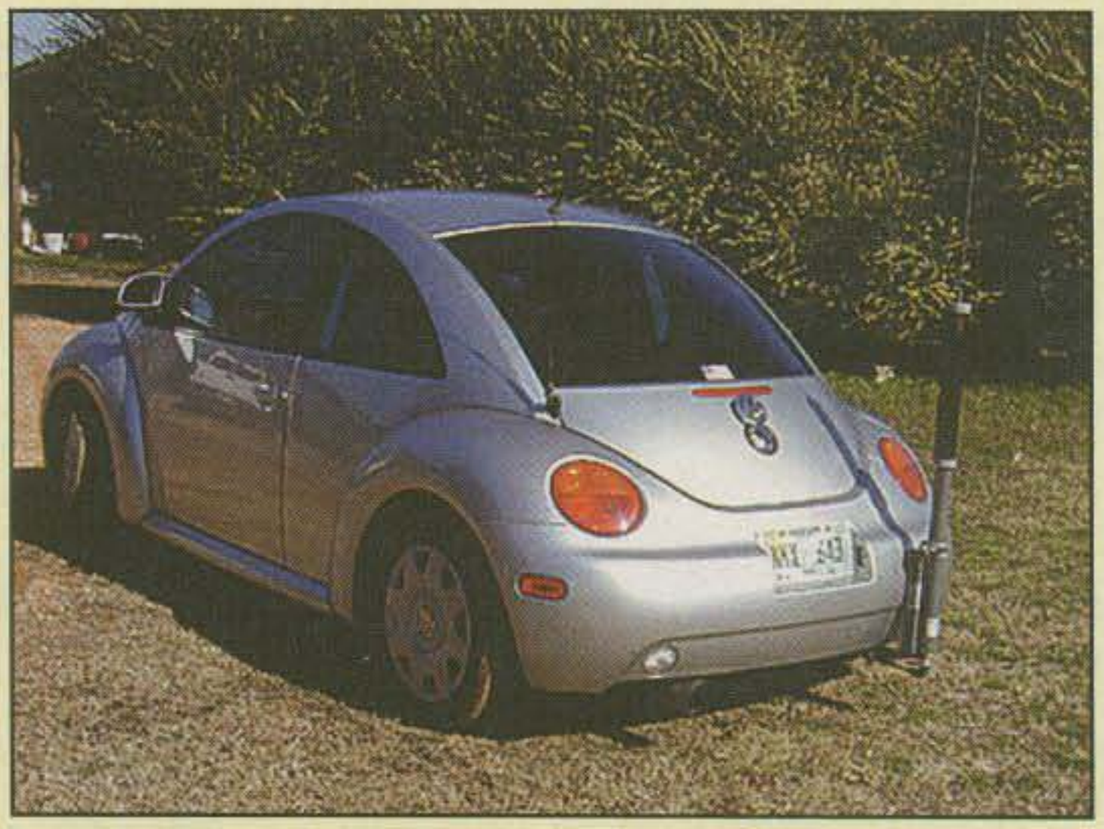
The only down side to a whip mounted relatively low in a fiberglass motorhome is being sure not to transmit when anyone is sleeping or seated in the back. Also, RF will tend to get into everything with wires, and there is little that can be done to prevent this other than not transmit when driving down the road or when stopped and playing the stereo!

On van conversions, the sides and rear of the van are usually metal, but the top is made of fiberglass or another type of composite material. Here, mount your whip up as high as possible, such as off the left door hinge. However, like fiberglass motorhomes, expect that some of the RF is going to get into the vehicle wiring, as it easily passes through the fiberglass top.

On composite-panel cars and light trucks, the base of the whip is usually mounted down low, with a common hitch mount most popular. Again, High Sierra and other manufacturers of motorized HF antenna systems offer multiple types of hitch mounts and extensions for their antennas.

If you try to mount a lightweight whip anywhere else, there will not be any metal at the base to serve as a good counterpoise, and no feedpoint matching system will be able to make up for no apparent ground. Even a heavy wire off the base of the antenna mounted on fiberglass still won't convey a decent ground plane for the HF mobile whip. The HF mobile whip wants to see a large amount of metal directly at the base mounting system. Therefore, for most composite vehicles whose side panels are not conductive, the base of the whip goes down low in line with the metal chassis. Yes, you will have RF getting into all of your vehicle wiring, so plan to have plenty of RF chokes to keep your windshield wipers from activating, your horn from honking, and who knows what else from happening when you transmit, because there is no shielding between the whip and your wiring. (I have not heard of any air-bag activation from RF, but this certainly is an important consideration when checking out a new installation. On any new installation, I start the vehicle, switch to the back seat, and then key the mic and say a few words to see what is going to happen. This way, in case of a catastrophic air-bag deployment, I don't end up with the microphone halfway down my throat.)

So don't let a non-metallic panel vehicle keep you from coming up on HF. You just have to plan your antenna installation carefully.



"Down low" is the only place to mount an antenna, such as this High Sierra 1800, on a composite-body vehicle like the VW Beetle. There's no problem with a metal body blocking signals, but beware of possible RF interference to the vehicle's electrical system. (Photo courtesy High Sierra Antenna website)

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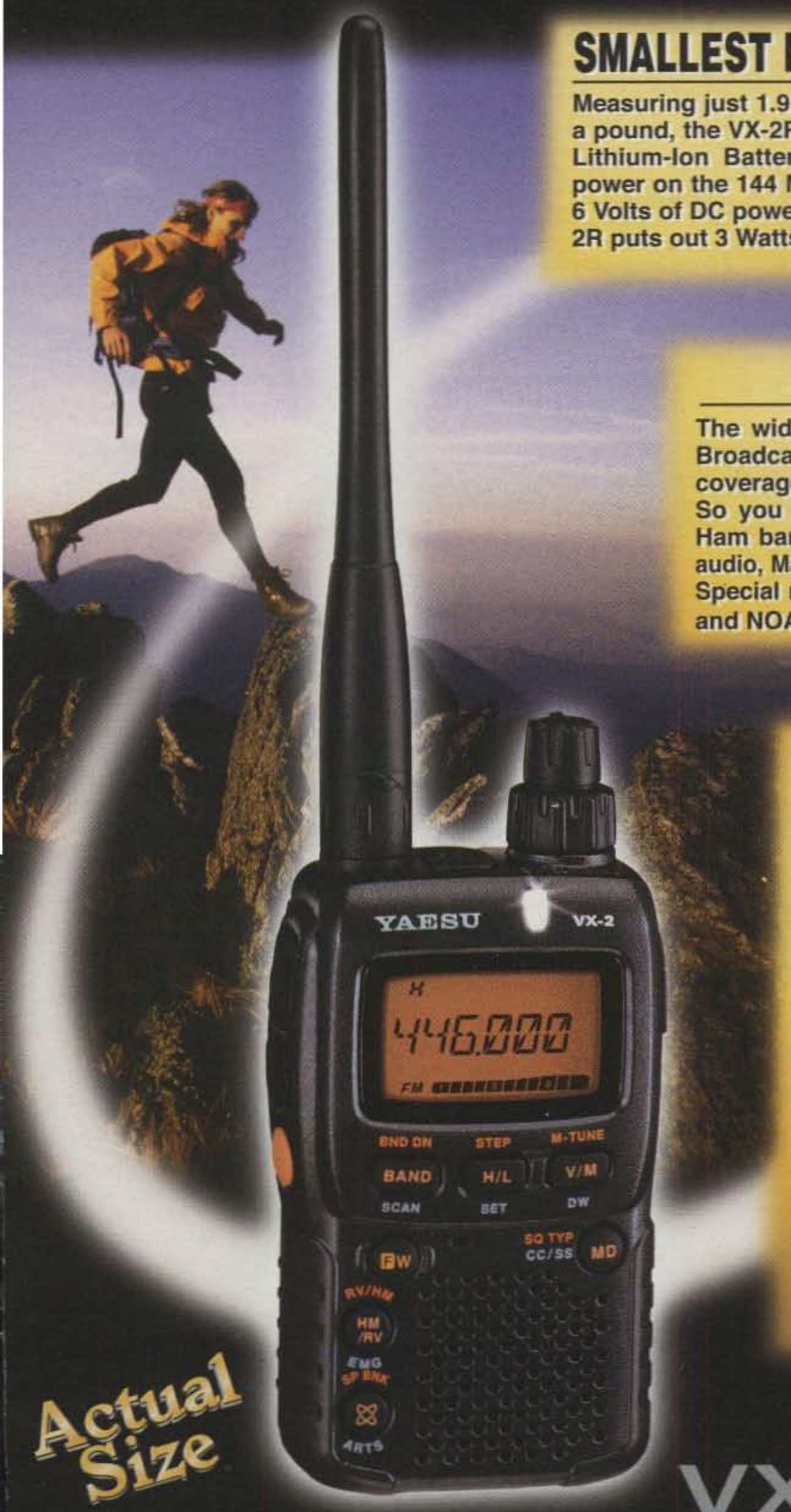
*1.5 W/144 MHz, 1 W/430 MHz



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The Array Solutions StackMatch is not particularly new. However, it's one of those useful products that sometimes slips beneath the "review radar." Now that we're past the initial upsurge in HF activity due to restructuring, many hams for the first time are considering a "serious antenna system." The StackMatch might be part of your "array solution."

CQ Reviews:

The Array Solutions StackMatch

BY PAUL BLUMHARDT,* K5RT

Stacking antennas (or any method of phasing multiple antennas) has long been an accepted means of increasing the gain of an antenna system. Typically, about 2.5 dB of gain improvement is realized when two antennas are stacked and fed in phase. The actual gain is determined by loss of the combining device, stacking distance between antennas, and the height of the antennas above ground.

In addition to added gain, vertically stacking antennas can provide a means of filling in the nulls that occur in the vertical pattern of an antenna. Depending on boom length, number of elements, and height above ground, there may be many nulls in the vertical pattern, which can be as deep as 35 dB. What this means to the station is that as a band opening changes, the incoming signal's angle of arrival changes and your signal strength can be many dB below where it was only minutes before. Adding a second (or even a third) antenna at the proper height can fill in those nulls and make your signal consistently strong, even as the band changes.

The Array Solutions StackMatch by WXØB is an antenna-combining device that has gained quite a bit of favor among contesters and DXers. The device allows you to feed up to three antennas from a single feedline. It is a broadband device employing a 2.25:1 Un-Un[1] for impedance matching of multiple antennas. The StackMatch works with mono-band or multi-band antennas from 1.8 to 30 MHz.

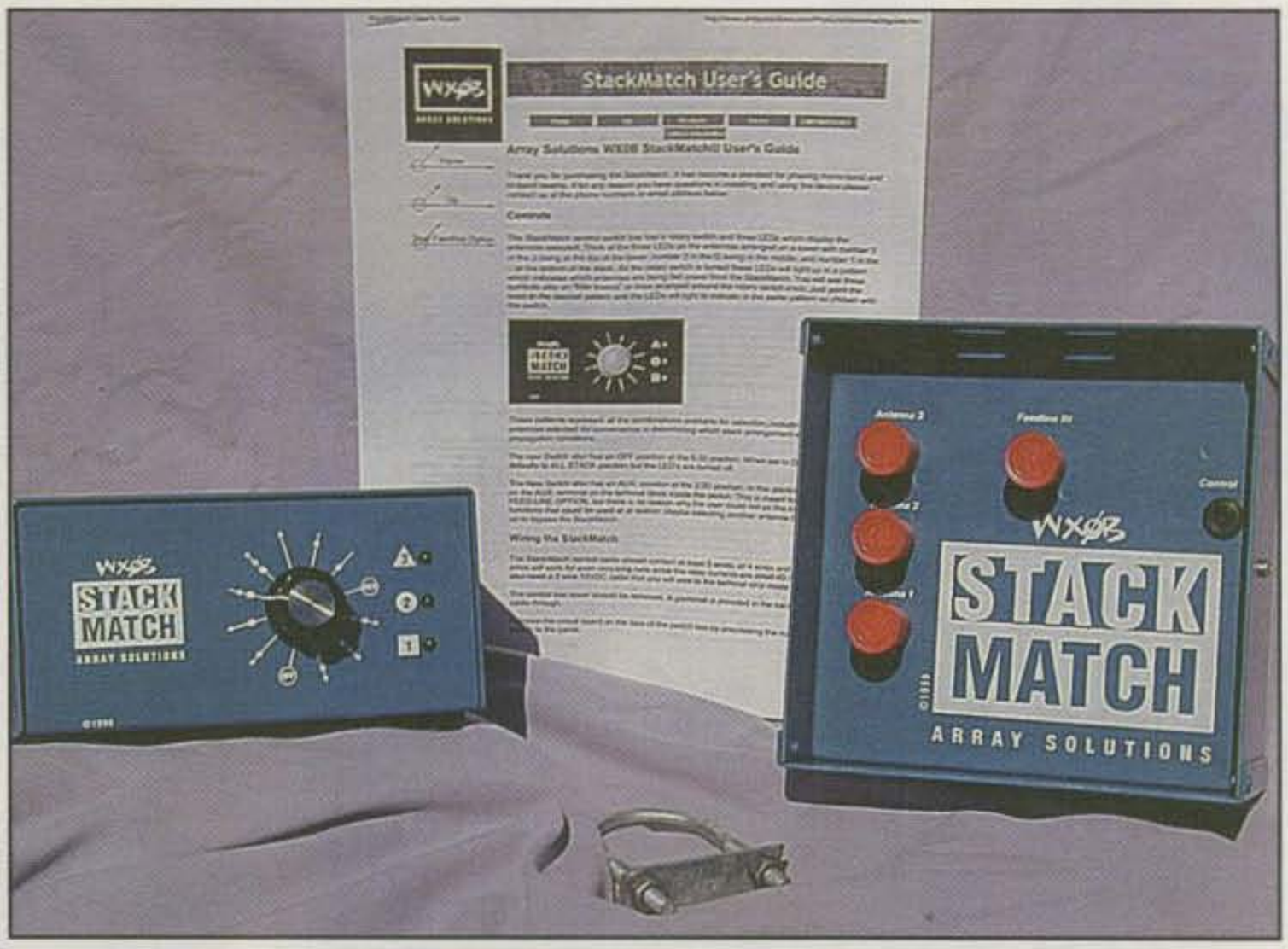


Photo A– The Array Solutions StackMatch includes a control box for inside your shack (left), an excellent manual, and the actual switchbox (right) that is mounted on the tower.

An additional reason for using the StackMatch is that it provides increased antenna-system flexibility. In the case of a three-antenna stack, you can select any one antenna, the top pair, the bottom pair, the top and bottom antennas, or all three. That's a lot of antennas to choose from! If you are using mono-band antennas, WXØB also has a way to connect antennas in a BIP-BOP (Both In Phase, Both Out of Phase) configuration.

One last benefit of using a StackMatch is that it will allow you to squirt a signal in multiple directions. This is accomplished by feeding multiple antennas pointed in different directions. Since I live in Texas, this is an important feature for me in the ARRL

**2805 Toler Road, Rowlett, TX 75089*
e-mail: <k5rt@cq-amateur-radio.com>

Photo B– An interior view of the StackMatch switchbox (outside box) shows the terminal strip to which the control cable connects. See text for note on connecting the control cable.

November Sweepstakes when the bands are open from coast to coast. By using the StackMatch and pointing the top antenna west and the lower antenna fixed northeast, a signal can be directed at both coasts without having to switch antennas or wait for an antenna to turn. It's a real rate-booster!

Assembly and Installation

Array Solutions includes a very good instruction manual with the StackMatch to guide you through the installation. As photo A illustrates, the StackMatch comes in two parts, the indoor controller and the outdoor switch box. The two boxes are connected via a 6-conductor cable. The StackMatch draws only about 40 ma, so wire size isn't terribly critical. Most commonly available rotator cable should work just fine. An external 12 volt power supply is required.

Wiring of the two boxes is straightforward, but there are a few things to be careful of. The controller comes disassembled, because the connections are made *inside* the controller via a terminal strip. See photo B for an inside view of both boxes. The rear apron of the control box is drilled with two holes. The smaller hole has a rubber grommet (provided) and

100 Watts Input	Reflected Power (watts) Frequency (MHz)		
Antenna	28.5	21.2	14.15
1,2,3	2	1	2
1,2	2	0	0
1,3	1	0	0
2,3	1	0	0
1	0	0	0
2	0	0	0
3	0	0	0

Table I– A comparison of reflected power readings from different combinations of antennas switched through the Array Solutions StackMatch.

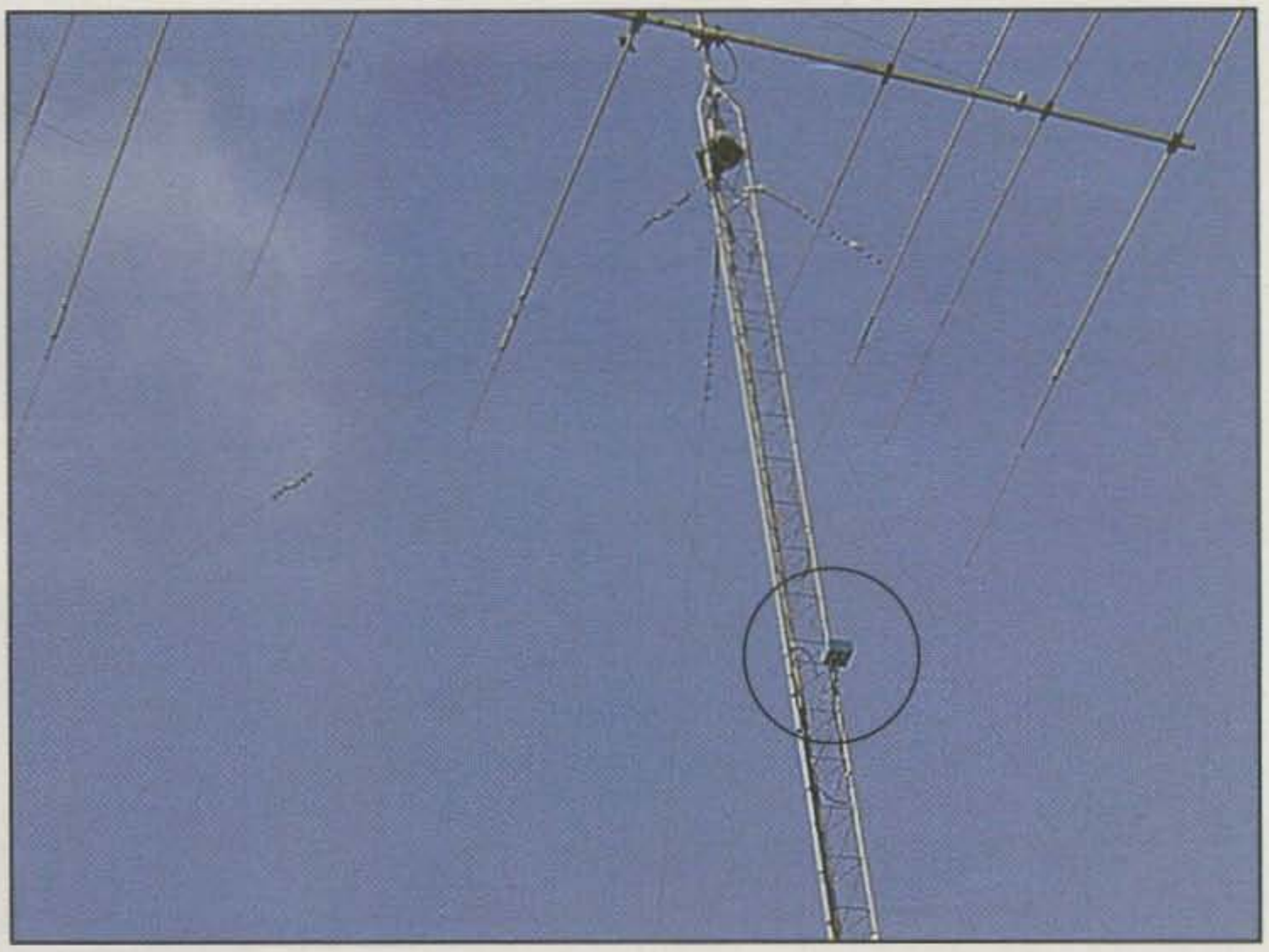


Photo C– The StackMatch outside box was mounted at 80 feet on a tower leg using the U-bolt provided.

is intended for the 12 volt leads. The larger hole is for the control cable. Array Solutions provides two small Tye-Wraps for use as a strain relief on each lead. Once the power and control connections are made at the terminal strip, the circuit board and knob can be installed, followed by the cover.

The connection method at the outdoor box is essentially the same. However, connecting the outdoor box while up on the tower can be a bit dicey. The cover of the box is secured by four 6-32 screws. It's easy to drop these screws when removing or installing them, so be careful. A terminal strip similar to the one on the indoor control is used for connecting the control cable. You must be aware that the numbering of this strip is reversed from the indoor control box. Follow the numbers. The outdoor box is secured to the tower leg by a single galvanized U-bolt. Care must be taken when the installing the cover to make sure the U-bolt will not interfere with easily getting the PL-259 connectors onto their receptacles.

The StackMatch installed at K5RT was bench tested prior to installation on the tower to check power split and VSWR on the 20, 15, and 10 meter bands. The results of the SWR measurement are in Table I. The power split was found to be perfect when using two or three outputs.

As can be seen in photo C, the antennas at K5RT are a pair of well-worn Hy-Gain TH6DXX tri-band Yagis installed at 100 feet (rotary) and 60 feet (fixed northeast). The StackMatch outside box was mounted at 80 feet on a tower leg using the U-bolt provided. The feedlines connecting the two Yagis to the outdoor box are constructed of RG-213 coax and are each 30 feet long to allow for rotation of the top antenna plus cable dress. No resonant coax lengths or 75 ohm matching sections are required. Just cut the 50 ohm coax to equal lengths, install the PL-259 connectors, and go!

The only critical elements of the installation are to make sure that the feedlines are the same length and type of cable, and that the connections to the feedpoints of the Yagis are identical. If the connections at the antenna feedpoints are reversed, the antennas will be out of phase. When using a transformer-type balun, care must be taken to determine the "sense" of the balun. Cal-Av baluns have been in use at K5RT for nearly ten years. These baluns are a ferrite "choke" design, so maintaining correct feedpoint alignment was simple. Installation of the StackMatch at K5RT required only a couple of hours on the tower. (Special thanks to Ken Brown, WB9AJJ, for his support on the ground while I was on the tower completing the installation.)

When using multi-band antennas, antenna spacing will be a compromise. Much has been written about stacking

distance vs. boom length vs. height above ground. In my case, the spacing worked out to .57 wavelength on 20 meters, .86 wavelength on 15 meters, and 1.15 wavelengths on 10 meters. This spacing may be a bit close on 20 and a bit wide for 10 meters, but given the 24 foot boom length of the TH6DXX, it's probably about optimal. Clearly, by using mono-band antennas an optimal stacked antenna system can be built around the StackMatch.

Now that we've covered the installation of the StackMatch and how it worked on the bench, how did it work on the air?

On-the-Air Performance

In a nutshell, the StackMatch performs very well. I discovered that there were times when either the top antenna or the bottom antenna was slightly stronger than the stack. However, the majority of the time the stack was stronger than any single antenna. During the ARRL 10 Meter Contest the system was given a good workout towards Europe. QSO rates seemed better and more sustained when using the antenna stack as opposed to either one of the antennas separately. While no "rate vs. antenna" measurements were made to confirm this (I felt that such measurements would not be accurate), the station did feel "louder" on the stack.

I did find one facet of the indoor control box to be inconvenient. The antenna selector switch is arranged in such a way that you have to switch past three positions in order to select a single antenna from the selection for the pair of antennas. The StackMatch controller is designed to support a *three*-antenna system. While it does support a two-antenna stack just fine, the design of the control box leaves something to be desired in this application. It would be easy for a tired operator to make a mistake and make a selection that drives an unused antenna port on the system. A better solution would be a control box tailored to a two-antenna stack, as an alternative to the three-antenna stack version presently offered.

A concern that does arise when using an Un-Un arrangement such as the StackMatch is that due to the impedance differences involved, your SWR may be slightly *higher* when driving the stack of antennas than when feeding a single Yagi. In my case, I found this to be true on 20 meters. In all fairness, the lower TH6DXX at K5RT does exhibit a somewhat different SWR curve than the antenna at 100 feet. Still, I didn't find the SWR of the combined antennas to be a problem (which would have caused the TS-850's SWR protection circuit to roll back transmitter power), and the worst SWR of the pair was 2.0:1 at 14.175 MHz.

I am quite pleased with the performance of the WXØB StackMatch. It's a simple, reliable, and affordable way of increasing the flexibility and performance of your station. Array Solutions offers an optional push-button controller for the StackMatch as well as an external relay permitting a single antenna "by-pass" mode. This will require the installation of a second feedline up the tower, but is a real benefit to the single tower, SO2R (Single Operator, 2 Radio) contest station using tribanders.

List price for the StackMatch is $270. A 6 meter version (covering 7–54 MHz) is also available ($285). Contact Array Solutions, 350 Gloria Road, Sunnyvale, TX 75182 (phone: 972-203-2008; fax: 972-203-8811; on the web: <http://www.arraysolutions.com>.

Note

1. An Un-Un is a matching transformer used with Unbalanced feedline on each side, unlike a Balun, which is used to match balanced and unbalanced feedline sections. ■

Part I of KA3JIJ's article showed us that hams using high-speed wireless "Wi-Fi" networking in shared amateur spectrum may sometimes benefit from higher power levels allowed by Part 97, but may be better off at other times sticking with the looser content standards of Part 15. In his conclusion, Ron shows us how to build these networks for either type of use.

Wi-Fi For Hams

Part II: Building a Wi-Fi Network

BY RON OLEXA,* KA3JIJ

In part one of this article we discussed the basics of high-speed wireless networking (Wi-Fi) on bands shared by both hams and unlicensed Part 15 users. We also discussed the pros and cons of using one of these networks under Part 97 (as ham stations) vs. Part 15. Here in part two (of the article, not the FCC rules) we'll look at building a Wi-Fi network and the different considerations of how that network would be built for a Part 15 setup vs. Part 97. The first thing we need to do is understand the nature of propagation on 2.4 GHz.

2.4 GHz Propagation Characteristics

Radio-signal propagation can be divided into free space, reflection, diffraction, and scattering mechanisms. For point-to-point link analysis, a free-space propagation model can be used as long as the first fresnel zone is free of obstacles. Fresnel zone is the area around the visual line-of-sight into which radio waves spread out after they leave the antenna. If this area is not clear, reflections and multi-path will occur, leading to a reduction in signal strength at the receiver. If there are fresnel-zone obstructions, a line-of-sight propagation model should be used.

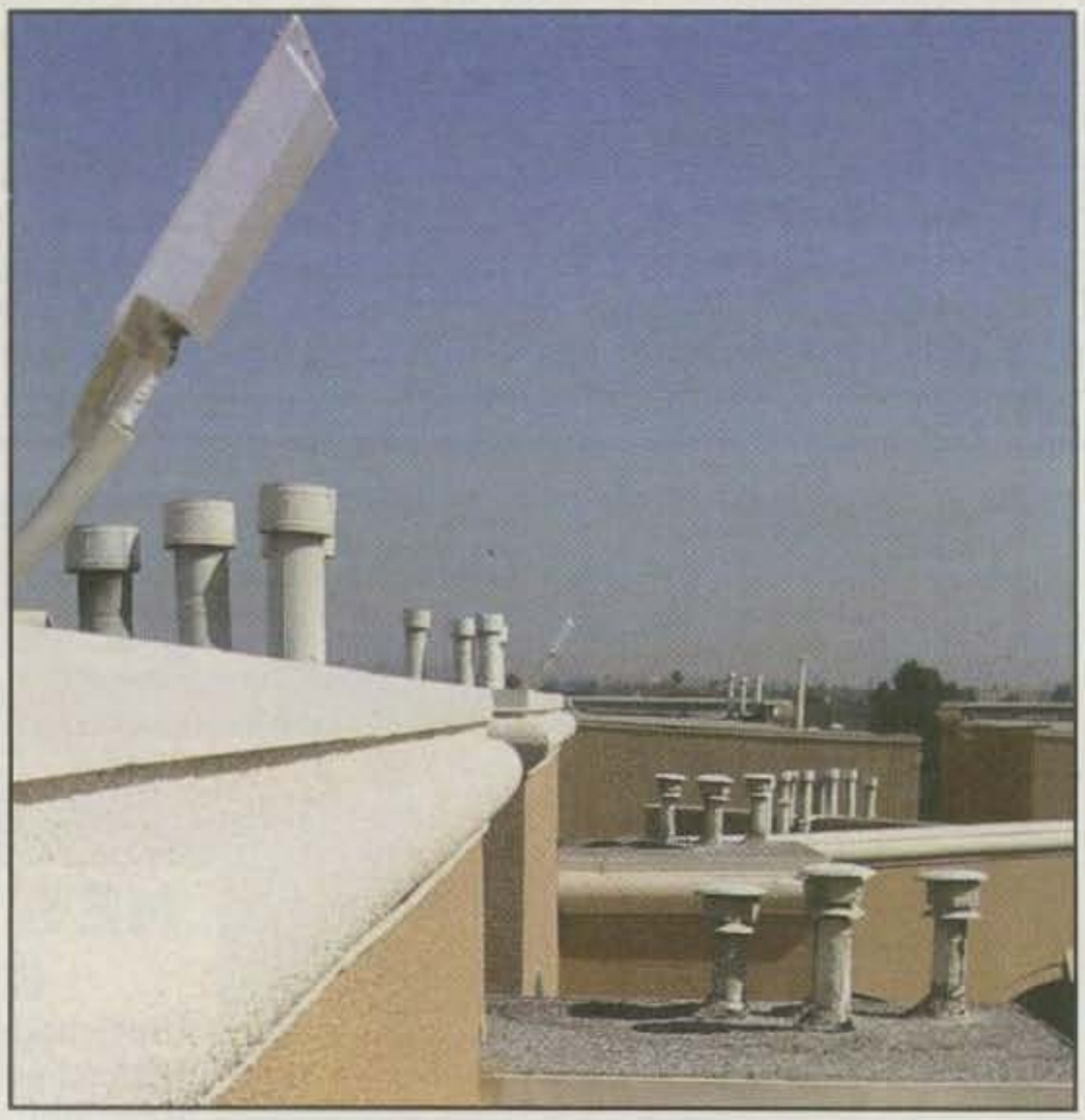
To accurately predict the propagation of a 2.4 GHz signal you need to know the gain and loss of each part of the link system. While equipment specifications are easy enough to find, the path loss can be tricky. There are programs that can be used to accurately predict path loss, but my advice is to estimate the loss using the graph in fig. 1 and the equation below, then put together a good system and see what happens. The link budget formula (which is actually simpler than it looks) is as follows:

$$L\,[dB] = Ptx\,[dBm] + Gtx\,[dBi] - Prx\,[dBm] + Grx\,[dBi] - M\,[dB]$$

where *L* is the link budget in dB, *Ptx* is transmit power, *Prx* is receiver sensitivity, *Gtx* and *Grx* are antenna gains on the transmit side and receive side respectively, and *M* is fading margin. All values are expressed in dB for ease of calculations. Using conservative power levels and antenna gains to design a simple point-to-point link yields the following:

$$L = 17\ dBm + 15\ dBi - (-84\ dBm) + 15\ dBi - 10\ dB = 121\ dB$$

This link could easily be assembled and operated under Part 15 rules, providing you use compliant external antennas and equipment. Looking at the free-space line of fig. 1, we



A directional antenna installation. Note the horizontal mounting angle, known as "down tilt." Down tilt is used to center the main lobe of the antenna on the area to be served, rather than on the horizon. It is used to improve signal strength in the desired service area and reduce interference to other areas, an important consideration, since over 15 different access points serve this community. (Photos by the author)

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Capacitive coupling to ground is a *time-proven* principle. It needs no tuning and antenna radiates well and gives good SWR on all bands. Performance is similar to mobile stations when using a mobile antenna but is far better with longer antennas.

The base can support a lightweight multiband vertical antenna -- like the all band Hy-Gain 18AVS and the bandswitching MFJ-1795 -- and provide a semi or permanent installation.

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Two handles make carrying and removing the base fast and easy. You can also attach radials for improved performance.

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Bugcatcher design uses large highly-efficient *air-wound* inductor -- far out performs other compact HF antennas. *Exclusive* built-in inductive matching network keeps SWR low. 5½ foot whip collapses to 2½ feet for easy storage and low garages. Base loaded for minimum wind load and light duty mounts. Change band by moving *wander lead*. 3/8x24 in. mount.

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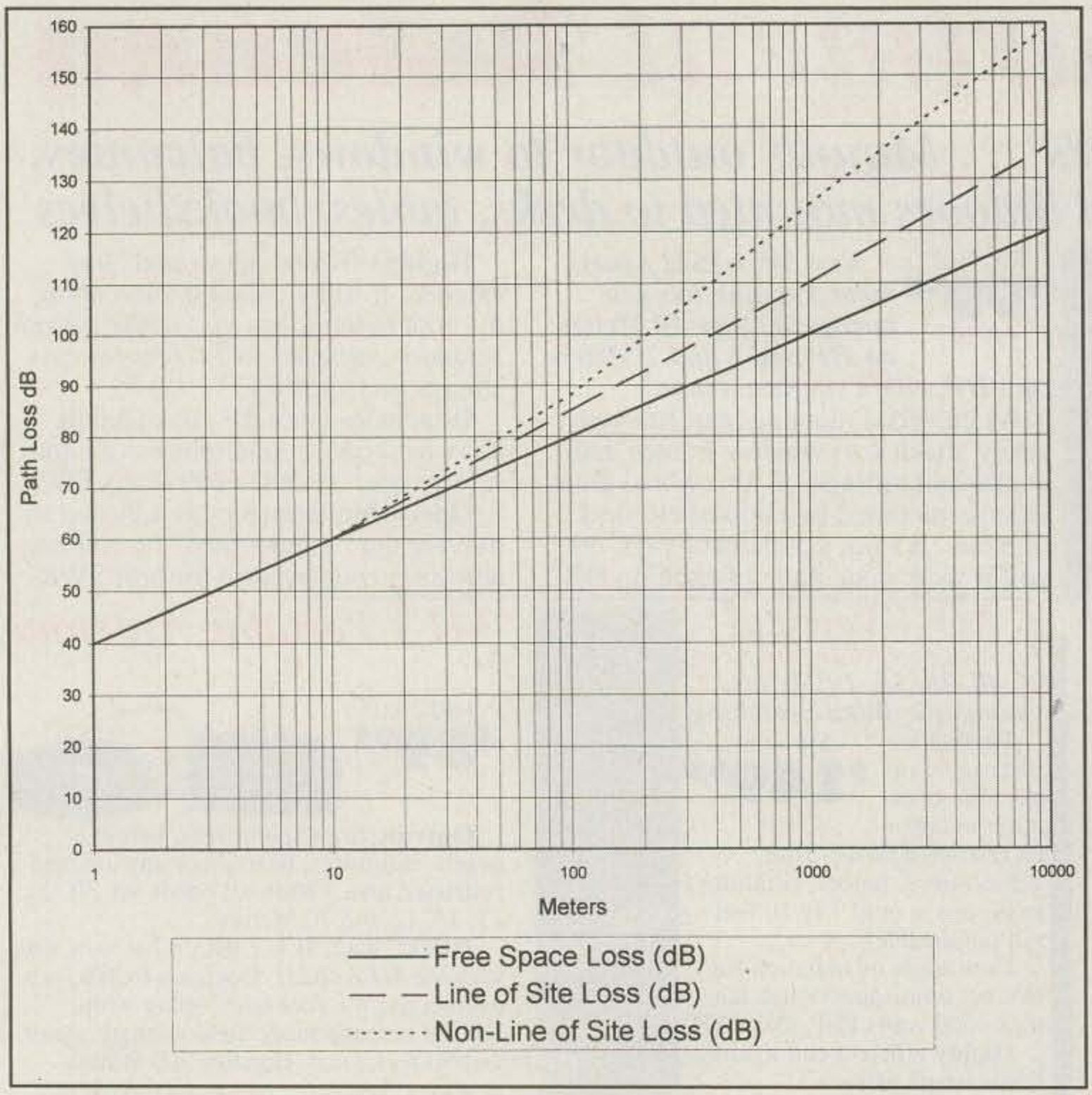
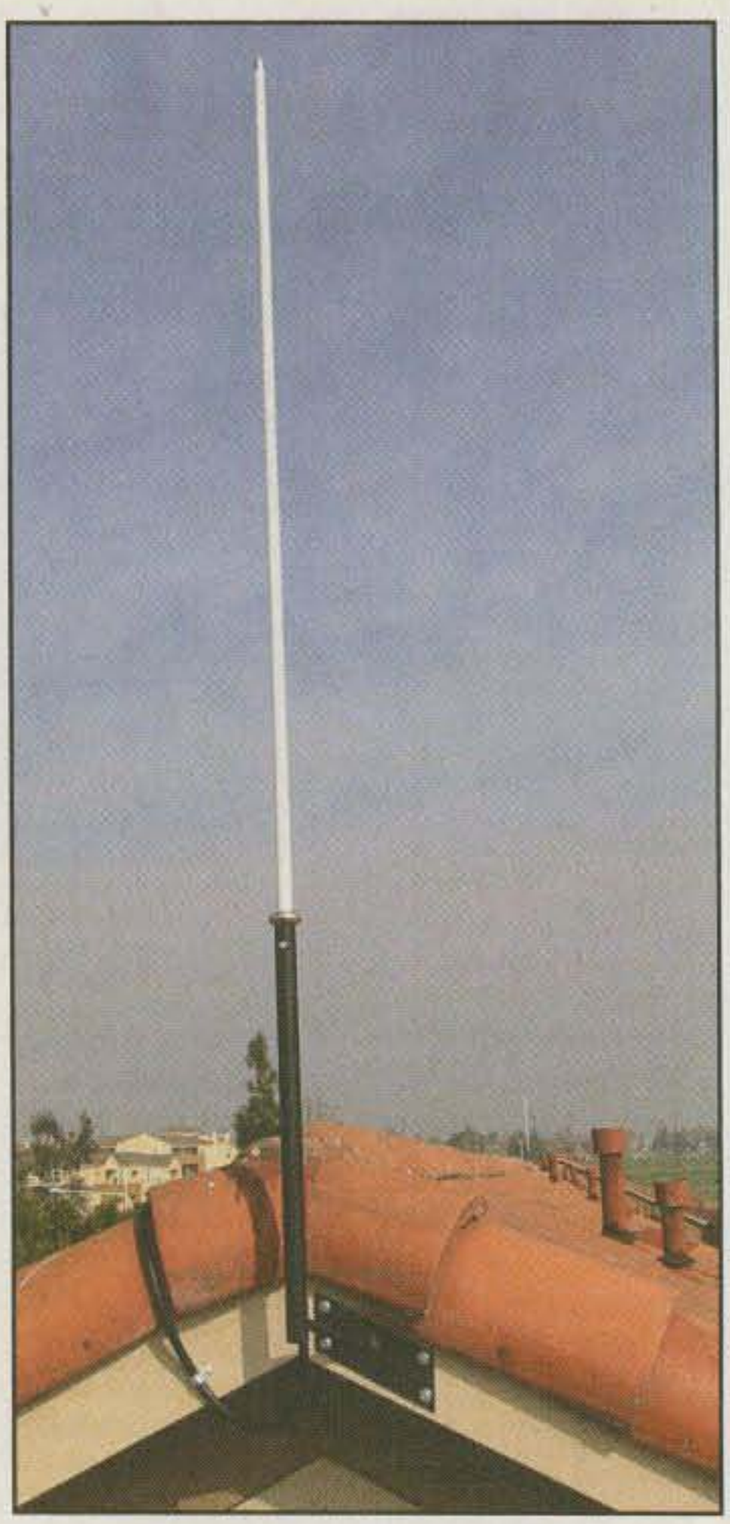


Fig. 1– Estimated link distances for a given path loss. The free-space line is an acceptable estimate for a link where both antennas are visible to each other and there are no nearby obstructions. The line-of-sight (LOS) curve is used where there is optical LOS, but there is an object in the fresnel zone. NLOS assumes that there are buildings and trees within 50 feet of the transmitter and that the receiver is at street level within this clutter.



An omnidirectional antenna installation. This omni antenna has 15.1 dBi of gain and is designed with a main lobe down tilt of 3 degrees. The antennas in the photos, as well as many others, can be purchased at <http://www.natcommgroup.com/index.php>.

can see that 121 dB allows for a link of over 10 kilometers! You can see from the graph that free space offers a huge advantage in terms of link distance, but the reality is that most of us live in an urban or suburban environment where free-space links are impossible to achieve. Thus, a more realistic result for the real world would be to use the curves shown for line of sight (LOS) or non-LOS. The line-of-sight curve assumes optical line of sight with obstructions in the fresnel zone. The covered distance of the 121 dB path drops to about 2.5 km under these conditions. The non-line-of-sight curve assumes no major obstructions (such as hills or other dense obstacles), only some trees and buildings, but even that adds 25 dB or more attenuation to the line-of-sight path loss.

While our 121 dB link budget would result in a non-line-of-sight link distance of only about 500 meters, remember that we can use much better antennas than in our conservative assumptions. The same point-to-point link, with 30 dBi antennas at each end, could easily span a few miles, all while remaining within Part 15 rules!

To assist in evaluating your system coverage I suggest getting a copy of Netstumbler from <http://www.netstumbler.com>. Netstumbler is a freeware program that turns your 802.11-enabled computer into a tool for measuring signal strength and interference and identifying any 802.11 signals in an area. It can even be used in conjunction with a GPS unit to generate coverage maps!

Speaking of knowing all the losses in the system, one which should not be forgotten is feedline loss, which can be significant at these frequencies. Even really good cable such as LMR-400 coax exhibits 6.8 dB of loss per hundred feet here, and an improperly assembled connector could exhibit over 3 dB of loss. Keep the feedline run as short as possible. In fact, the best bet is to put the 802.11 equipment in a weatherproof box and mount it as close to the antenna as possible. If you are using an access point or bridge, all you need to provide it is DC power and an Ethernet cable, both of which can be run 300 feet without a problem.

Project Concept: A Wide-Area Data Network

Using the point-to-multipoint capabilities of 802.11 allows for the construction of an IP-based network with the capability of connecting users over a wide area.

When designing a wireless data network, the **4 C**s must be considered: Coverage, Capacity, Carrier to Interference Ratio (C/I), and Cost. Let's take a look at how these factors interact. In

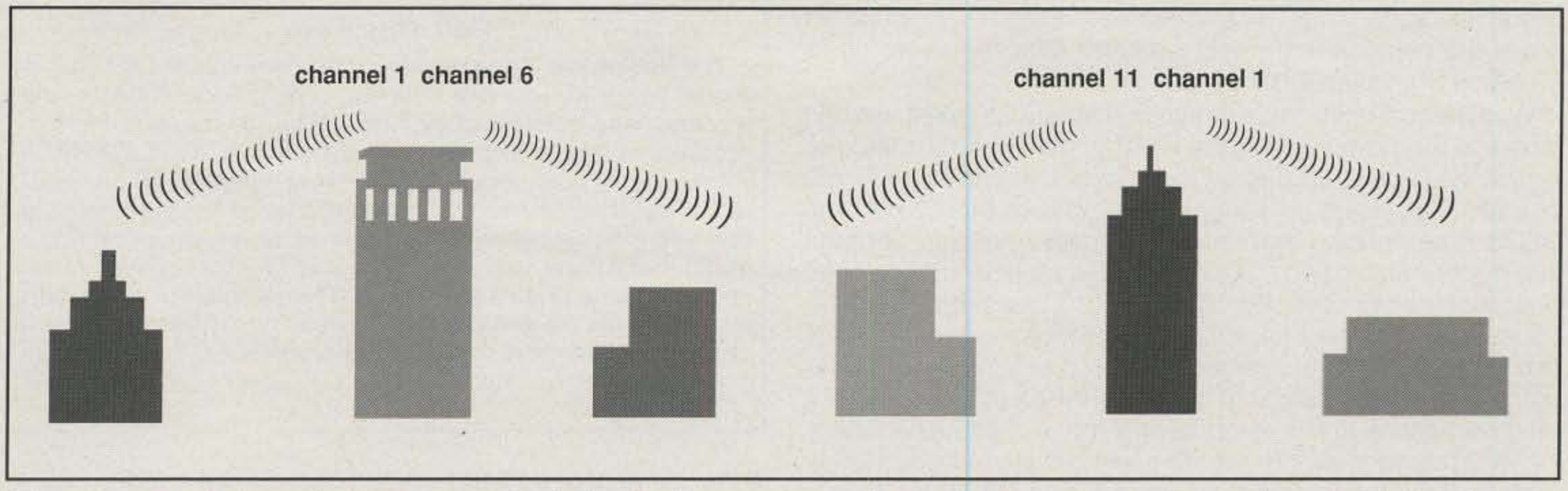


Fig. 2–Reuse of channels in a system. Both physical separation and antenna aperture can be used to provide interference protection. In this case Channel 1 can be reused at both sites because of both physical separation and the directional antennas. The covered area can be increased many times over by continuing to reuse the channels at additional sites with separation intervals sufficient to avoid co-channel interference.

this example I'll use a college campus that is 1.5 km long and 1/2 km wide, with a mix of two-story to eight-story buildings. The users will operate standard client cards without external antennas. Thus, we will assume 0 dBi gain for these antennas.

The first design will be Part 15 compliant using omni antennas. The access point selected has a power output of 100 milliwatts (20 dBm) and a receive sensitivity of –84 dBm. The access points will be mounted as close to the antennas as possible to minimize feedline loss to 1 dB. This configuration is compliant with Part 15 rules as long as it does not generate more than 1 watt EIRP, meaning we can use an 11 dBi gain omni antenna. Using the link budget calculation yields an acceptable path loss of 104 dBm. Applying this figure to the NLOS graph in fig. 1 shows that each access point can cover about a 300 meter radius; thus, two access points could cover most of the campus, while three would assure coverage over the entire area. Since there are three non-overlapping channels (1, 6, and 11), each site can be assigned a unique channel to avoid inter-site interference. As I mentioned earlier, there is a possibility of Channel 1 interfering with AO-40 operation, so it would be best to deploy this network on channels 2, 6, and 11 or 2, 7, and 11. This clears AO-40 interference at the expense of adding some adjacent channel interference in the network, but the interference most likely will be inconsequential.

From a cost standpoint, each of the access-point locations would cost about $300, assuming $100 for the access point itself, $150 for the antenna and cable, and $50 for a weather-

proof enclosure. Thus, for this example a $900 system would cover the campus extremely well and offer the users up to 33 Mbps of available bandwidth.

What happens if we use directional antennas? Well, we can increase the power to 4 watts EIRP under Part 15 rules. For simplicity, I'll use 180-degree directional antennas with 17 dBi of gain. This yields an acceptable path loss of 110 dB. The NLOS graph shows that you can expect coverage of about 400 meters. Using two sites, each 400 meters inside the campus, allows us to cover the area with only two sites. However, because of the directionality of the antennas each site needs two access points and antenna systems. With four access points there are insufficient channels for each one to have a unique channel. In this case channel reuse must be deployed. Channel reuse is simply coordinating the use of limited spectrum to allow the intended signal (the *C* in C/I) in an area to be greater than the unwanted signal (the *I* in C/I) by a certain margin. This is the concept behind modern telecommunications systems such as cellular and PCS. The operators of those systems repeatedly reuse limited channels using physical separation and antenna patterns to provide C/I levels sufficient to allow near-interference-free operation over large service areas. Think of it as repeater coordination on a much smaller scale. Since directional antennas are used, you can take advantage of both antenna pattern and physical site separation in planning the reuse of channels. A possible reuse plan for this example is shown in fig. 2.

The cost and capacity of this network is higher since four access points and antennas are needed. While the cost increases to $1200, the available bandwidth also rises to 44 Mbps.

Either of these designs will work and both are Part 15 compliant, meaning anyone could legally use the system, and it could be connected to the internet. The selection of one over the other has more to do with real-world availability of suitable antenna locations, access to an internet connection, and the usage characteristics of the users, which will dictate the amount of capacity you need to build.

But what can be done under Part 97 rules? Basically, we lose all the power limitations, so coverage can be dramatically increased. The campus could be covered with a single site located mid-campus. This would require the system to cover a radius of 750 meters. The NLOS path loss will be about 120 dB. This can easily be covered using a 17 dBi gain omni antenna and a 1 watt bi-directional amplifier. One and 2 watt amplifiers are commercially available for about $500 each. Because this design limits the transmit power to 1 watt, it can be legally operated under Part 97 without implementing automatic power control.

The downsides of this configuration are capacity, interference, access control, and loss of internet connectivity. With only a single access point, the campus wireless network only has an 11 Mbps capacity, while the costs are nearly identical to our 33 Mbps design. Moreover, this system may be accessed only by licensed amateurs, so appropriate access control mechanisms must be implemented at additional expense. Another issue to be considered is channelization. Only one non-overlapping channel is available, so no localized reuse is possible. The next site will need to have enough physical separation to assure interference-free operation of both; thus there will be gaps in coverage. In addition, high-power operation could become a source of interference to Part 15 users in the service area. (*Legally speaking, Part 15 users must put up with all interference from licensed users. But the reality is that there are a lot more of them than there are of us, so if for no reason other than good community relations, it's best to do what we can to minimize interference to other users.—ed.*) Worst of all, while the Part 15 designs could provide internet access, this Part 97 design would be precluded from doing so unless all internet commercial content could be filtered out before it got to this network.

Roll Your Own

The author has provided an Excel® spreadsheet file that is posted on our website (link from our July highlights page) to help readers make the necessary calculations for setting up individual systems. It is an Excel® representation of a COST 231 HATA propagation model, which is routinely used for NLOS propagation analysis in commercial RF planning tools. The big difference between Ron's model and the commercial version is that Ron's assumes flat earth, while the commercial products use actual terrain data to calculate a path profile. Please note that this is only a spreadsheet file and you must already have Microsoft Excel® or other spreadsheet software that reads Excel® files on your computer. *—W2VU*

Conclusion

As you have seen in the previous exercise, 802.11 is extremely flexible, provides many options for designing coverage and capacity into an area, and has the ability to provide considerable area coverage under both Part 15 and Part 97 rules. The determination of how to implement a network will ultimately be driven by the environment to be covered, the availability of suitable transmitter sites, and the needs of the users. There are already many individuals and companies who have used 802.11 to provide internet access in everything from coffee houses and apartment complexes to entire communities, and they have done so using the equipment under Part 15 rules.

Also, almost every week brings a press release about a new 802.11 product. Many of these products seem to focus on combining RF components and antenna technology in ever more creative ways. This results in many new products with the ability to extend 802.11 over greater and greater distances, while still remaining compliant with Part 15 rules. In the weeks that I've been writing this article a start-up company named Vivato has announced an 802.11 product with a smart antenna. The smart antenna allows a single antenna array to form multiple individual antenna beams, each treated as a point-to-point link. These beams are steered in real time to each user as necessary. Obviously, with the higher EIRP power limits associated with point-to-point links, this technology should be able to serve users over significant distances. Of course, with complexity comes cost: The product carries a price tag of over $10,000. However, to cover an entire community from a single site that price may be a bargain.

The proliferation of 802.11b equipment, combined with the public and commercial interest in 802.11b, makes this technology ripe for adoption by the amateur community. There are many interesting uses for this technology under both the Part 15 and Part 97 rules, and the limitations are not as severe as generally imagined. While propagation at 2.4 GHz is closer to a light beam than a radio wave, antennas can pack huge amounts of gain into a very small space. Equipment is extremely inexpensive and readily available for nearly every computer. Link design is simple enough, using easy calculations and a graph, but don't let an unfavorable number stop you. Try the link and see what happens. You might be surprised!

I encourage every amateur to experiment with this readily available and inexpensive consumer commodity. I would enjoy hearing from you with questions or comments, or just to share your stories. ■

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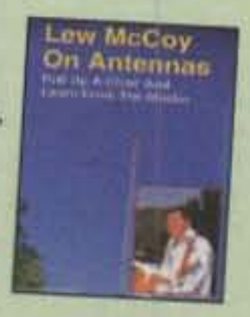

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What You've Told Us...

Our May survey asked about your mobile operating habits, and your responses confirm that ham radio is not often left behind in our mobile society. Nearly all of you (91%) report some operation from a non-fixed location, but very few of you do most of your operating away from home. A clear majority (59%) report that operating away from a fixed location accounts for 25% or less of their operating time, while 26% say they operate away from home 26–50% of the time, 10% operate mobile 51–75% of the time, and only 5% do 75% or more of their operating from a non-fixed location.

In a testament to the ever-shrinking size of HF transceivers and mobile antennas, 51% of you say you operate both HF and VHF/UHF while mobile, along with 40% who have only a VHF/UHF rig in their vehicles and 9% who operate only HF while mobile. FM voice is still the most popular mode of mobile operating, at 88%. A surprisingly high 59% of you also operate SSB while mobile, and 22% work CW while away from home. Only 9% operate other modes, such as digital or ATV, while mobile.

The overwhelming majority (89%) operates from a car or other passenger vehicle, 31% while walking on roads or streets, 17% while hiking on trails, 16% from a truck or other commercial vehicle, 9% from a boat or ship, 7% from a bicycle, 3% from a motorcycle, 2% from a bus or train, 2% from an airplane, and only 1% from a horse or other "live transportation."

Finally, 99% of you operate mobile from a motor vehicle, with 60% having a permanently installed radio. In addition, 50% use a handheld for away-from-home operating, 7% have a backpack-carried station, 4% have temporary installations on their bicycles, and 10% responded "other." That matches up pretty well with the boat/ship contingent from the previous question, so we'll assume that's where most of the "other" stations are installed. If you've got your mobile station someplace *really* different, we'd like to hear about it!

This month's free subscription winner is N. C. Mosley, W4YVY, of Tarboro, North Carolina.

Reader Survey July 2003

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*.

Since one point of focus in this month's issue is wireless networking, we'd like to ask a few questions in that area.

Please indicate... — **Circle Survey Card #**

1. ... whether you have one or more computers in your home:
   - Yes 32
   - No 33

Please answer the remaining questions only if you answered "yes" to Question 1.

2. ... the number of computers in your home:
   - 1 34
   - 2 35
   - 3 36
   - 4 37
   - 5 or more 38

3. ... if you have more than one computer, whether they are networked:
   - Yes, wire network 39
   - Yes, wireless network 40
   - No 41

4. ... if you are using a wireless network, whether it is:
   - 802.11a 42
   - 802.11b 43
   - 802.11g 44
   - Other 45
   - Don't know 46
   - No wireless network 47

5. ... your main motivation for networking home computers (even if you do not currently have networked computers at home):
   - Sharing files and printers 48
   - Sharing high-speed internet access in home 49
   - Sharing internet access with neighbors 50
   - Communication with area hams 51
   - Other 52
   - No network/no motivation 53

6. ... whether you would consider a multi-user wireless network at this time:
   - Yes, under unlicensed Part 15 use 54
   - Yes, under Part 97 amateur use 55
   - No 56
   - Don't know/no opinion 57

7. ... whether you believe wireless computer networking is a valid amateur radio activity:
   - Yes 58
   - No 59
   - Don't know/no opinion 60

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

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The 2003 Inductees

CQ Amateur Radio, Contest, and DX Halls of Fame

CQ is proud to regularly honor some of 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:

CQ Amateur Radio Hall of Fame

Our third 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 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 2003 "class" of the CQ Amateur Radio Hall of Fame:

Baldwin, Dick, W1RU. As General Manager of the ARRL from 1975–1982, led the ARRL delegation to the 1979 World Administrative Radio Conference (WARC-79), which resulted in the creation of new amateur bands at 10, 18, and 24 MHz. Responsible for much of the behind-the-scenes building of international support for the new bands. President of International Amateur Radio Union (IARU) from 1982–1999.

Bartlett, Forrest, W6OWP. For over 50 years beginning in 1948, as a volunteer, programmed and transmitted ARRL CW "West Coast Qualifying Run" for those unable to copy W1AW to help promote code proficiency among his fellow hams.

Cronkite, Walter, KB2GSD. Retired anchor and Managing Editor of the CBS Evening News, a position in which he became "the most trusted man in America."

Denniston, Bob, VP2VI/WØDX. Leader of the first modern DXpedition ("Gon-Wacky") in 1948; pioneer in 160 meter DXing; ARRL President, 1966–1972; IARU President, 1966–1974.

Eaton, Noel, VE3CJ. First non-U.S. president of IARU; led IARU delegation to WARC-79, helped build international support for new ham bands at 10, 18, and 24 MHz. Active DXpeditioner from the Caribbean long before such operations became commonplace.

Elias, Antonio, KA1LLM. Executive Vice President and General Manager for Advanced Sciences, Orbital Sciences Corp. Led technical team that designed and built the air-launched Pegasus booster as well as the X-34 hypersonic research vehicle. Elected to the National Academy of Engineering in 2002 in recognition of his "conception and execution of a new generation of Earth-orbit transportation systems."

Hara, Shozo, JA1AN. President of Japan Amateur Radio League (JARL) for over 30 years. Helped guide development of amateur radio in Japan, which has more licensed amateurs than any other country.

Hasegawa, Sako, JA1MP. Founder of Yaesu Musen Co. (now Vertex Standard); pioneered technology leading to the modern SSB transceiver; introduced first AC/DC HF SSB transceiver, FT-101; first 2 meter mobile rig with memory and first synthesized, scanning, 2 meter handheld.

Hawker, J.P. (Pat), G3VA. Editor of "Technical Topics" column in Radio Society of Great Britain's magazine, *RadCom* since 1958; contributor to several editions of the RSGB's *Handbook* and *A Guide to Amateur Radio,* of which he has also been Editor since 1958; prolific writer on radio and electronics for various magazines.

Johnson, Glenn, WØGJ. Orthopedic surgeon active as volunteer in Orthopedics Overseas, training physicians in medically underserved areas such as Bhutan in orthopedic surgery techniques. Also very active DXer from various locations around the world. Helped with re-establishment of amateur radio in Bhutan.

Neal, Roy, K6DUE. As science correspondent for NBC News, was instrumental in persuading officials at NASA to allow amateur radio operation from space; key organizer of SAREX, Shuttle Amateur Radio EXperiment (now Space Amateur Radio EXperiment) coordinating group; active in production of various amateur radio promotional videos.

Rouleau, Bob, VE2PY. First to modify commercial digital communications protocol for amateur use, leading to development of amateur packet radio. Part of group of five hams who developed the Montreal Protocol in 1978, which was the first attempt at an amateur packet protocol. Founder, President, and CEO of Dataradio, Inc., which provides mobile data systems to the public-safety community and even has equipment on Mars, transmitting data from lander to Sojourner on Pathfinder mission.

Smith, Ethel, K4LMB. Co-founder and first President of YLRL, Young Ladies Radio League. Creation of organization was spurred by a letter from Ethel published in *QST* in 1939.

van de Nadort, Lou, PAØLOU. Chairman of IARU Region 1 (Europe and Africa) from 1975–2002; oversaw regional initiative to expand amateur radio in Africa; guided region through tumultuous times after fall of communism and breakup of Soviet Union in late 1980s/early 1990s.

West, Gordon, WB6NOA. Personally responsible for licensing thousands of new amateurs through his classes; inspired thousands more through his license manuals, club talks, and articles for various amateur magazines.

More to Come in 2004

The nominating period for membership in the CQ Halls of Fame will reopen on January 1, 2004. 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>.

CQ Contest Hall of Fame

Ken Keeler, N6RO

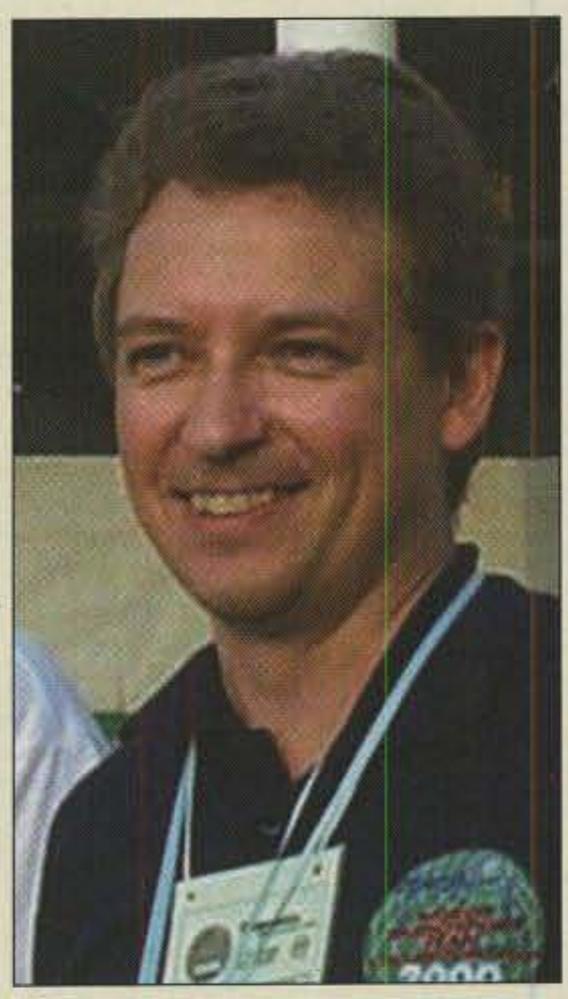
Ken Keeler, N6RO, 2003 CQ Contest Hall of Fame inductee.

Ken is a founding member of the Northern California Contest Club, which nominated him, and has served multiple terms as President and Vice President of the group. A dedicated contester since the early 1950s, he finally had the chance in the late '70s to build his dream station in Oakley, California, with, as his nomination states, "five tall towers festooned with big stacks of Yagis, wire 80 meter quads, and four-square arrays for 160, 80, and 40 meters."

You'll hear N6RO on the air in most major and many smaller contests, often with guest ops behind the mic, key, or keyboard. One of the qualities that sets Ken apart is his willingness to share not only his station, but also his contesting knowledge, with other hams. "Ken is always willing to show rookies the contesting ropes," explains his nomination, noting that Ken has been responsible for mentoring "a small herd" of northern California hams who have become prominent contesters themselves. "He keeps nothing secret about his own outstanding contesting abilities and techniques. Ken will share logs, detailed propagation knowledge, antenna designs, station layout tips—you name it and he'll work with you..."

Dan Street, K1TO

Dan Street, K1TO, is beginning to claim ownership of the top spot in the World Radiosport Team Championship (WRTC), along with teammate Jeff Steinman, N5TJ. He and Jeff have won the event three times in a row. On his own, Dan holds many records in both domestic and DX contests, including being the first single-op/all-band CW entry to work all 40 zones on 20 meters in the CQ World-Wide DX Contest. He began contesting as a teenager in Connecticut and worked during school vacations at the ARRL's contest branch, where he gained the nickname "Samurai Dan" for his skill at dupe-checking logs *(remember dupe-checking?—ed.)*. He honed his operating skills at major multi-op stations in the northeast and various DX locations, then started building his own contest station after moving to Florida. He's also president of the Florida Contest Group, which has grown to over a hundred members under his leadership and which nominated him; he eagerly mentors new contesters, and is "the backbone and log checker" for the Florida QSO Party.



2003 CQ Contest Hall of Fame inductee Dan Street, K1TO. (Photo courtesy ARRL)

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

CQ DX Hall of Fame

James Brooks, 9V1YC

James Brooks, 9V1YC, CQ DX Hall of Fame inductee 2003.

James has made his mark in the DX world off the air as well as on the air. In addition to keeping a strong signal on the air from Singapore, helping DXers worldwide to work the country, James has been part of several major DXpeditions. However, he is perhaps best known for producing professional-quality videos about those operating extravaganzas. His videos include the VKØIR, ZL9CI, FOØAAA, A52A, and VP8THU/VP8GEO DXpeditions.

In the words of one nominator, James "has captured and preserved the thrills and excitement that the DXers (on DXpeditions) experience first hand, and shared it with those who are on the other end of the radio circuits ... (H)e has been able to display and preserve the reality and emotions that expeditioners experience and relay it to the DX enthusiasts who were not on the actual expedition." The 9V1YC videos are notable in that they always go beyond the ham radio aspect of the operation, including a tremendous amount of information about the people, history, and geography of the expedition locations. James was nominated by the Magnolia DX Association and the Southeastern DX Club.

Results of the 2003 CQ/RJ WPX RTTY Contest

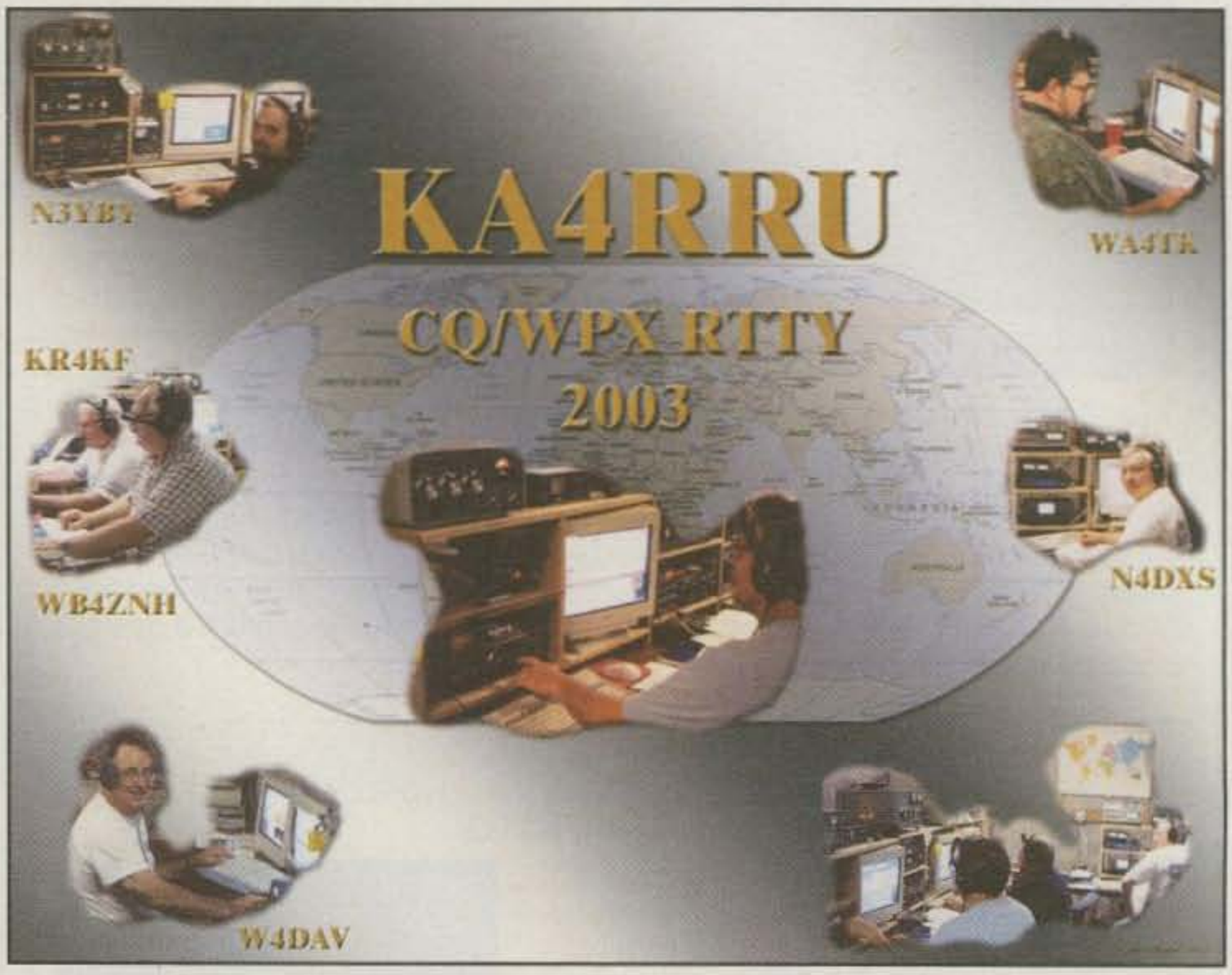
BY GLENN VINSON,* W6OTC, AND JOE WITTMER,† K9SZ

The ninth annual CQ/RJ WPX RTTY Contest, sponsored by *CQ* and *The New RTTY Journal*, was held February 8–9, 2003. The results: incredible participation, a record number of logs submitted, and new record scores set in many regions and categories, including seven new world records. For the first time, logs submitted in the WPX RTTY Contest almost equaled the number of logs submitted in the WW RTTY Contest: 853 logs in the 2003 WPX RTTY Contest (an increase of some 250 logs over 2002) as compared to 925 logs in the 2002 WW RTTY Contest.

In single operator activity new world records were set in Single Op, High Power (from HP) and Single Op, Low Power (from P4), as well as on the single bands of 10 meters (from D4), 20 meters (from 9A), and 80 meters (from S5). While an SOH Asia win from the Middle East might not be unique in WPX SSB and CW, a RTTY SOH Asia win from JY (rather than from JA or UA9/UAØ or UN) is a first in RTTY WPX. At the same time, the Africa SOL record proved to be easy pickings from 9G.

The multi-operator categories continue to attract intense activity, with Multi-Op Multi-Transmitter LY5A and Multi-Op Single Transmitter TI5N both obliterating the old world records in their respective class.

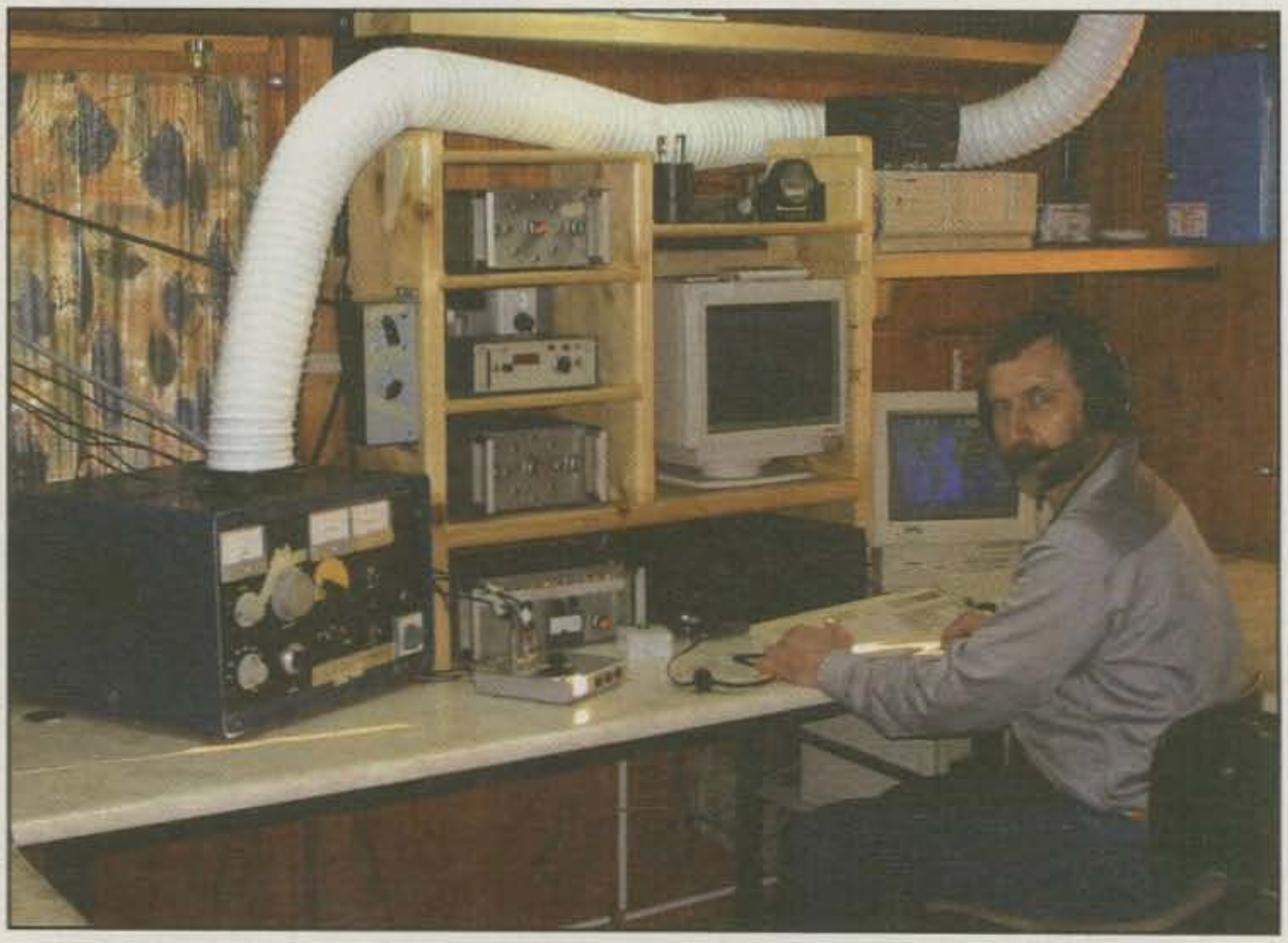
Geomagnetic conditions were good worldwide throughout the contest, with solar flux averaging around the 135 level. Judging from the scores submitted, the slowly declining solar flux level has been more than overcome by the yearly increase in RTTY contesting activity.



The Multi-Op Multi-Transmitter North America winning team at KA4RRU.

Single Operator

Single Operator, Low Power (SOL). In SOL 422 participants submitted logs, fully one third more than in 2002. As the results demonstrate, only a few points separate many entrants. Three entrants surpassed the existing world record of 1,875,678 points. However, the winner was not in doubt: Jacobo, P43P, virtually doubled AA5AU's 2001 SOL world record with a score of 3,506,198 points (1888 Qs, 6469 Q-pts, 542 mults). Winning scores have remained virtually unchanged for the past three years as the title passed from UP5P (Op. UN5PR) to AA5AU to ZX2B (Op. PY2MNL), but Jacobo's win dramatically raises the bar for anyone



Tone, S54E, setting a new 80 meter world record.

*e-mail: <w6otc@garlic.com>
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hoping to make SOL history in 2004. World second this year was last year's winner, ZX2B. Wanderley scored 2,480,090 points (1553 Qs, 4715 Q-pts, 526 mults), a great result from Brazil. Also impressive was world third, 9G5GA (Op. DL3GA), who scored 1,980,090 points (1338 Qs, 4041 Q-pts, 490 mults), setting a new RTTY WPX Africa record by a very large margin.

Single Operator, High Power (SOH). In WPX, some see Aruba's relative proximity to Europe as an advantage, particularly because of the point premium for 80 and 40 meter contacts. However, Wilfried, DJ7AA, prefers Panama, about 1100 km farther west, and he demonstrated its potency this year by setting a new world record as HP1/DJ7AA. Operating from the great HP1XVH contest station on Contadora Island in the Gulf of Panama, Wilfried scored 3,937,066 points (2195 Qs, 6859 Q-pts, 574 mults), a 20% increase over P43P's 2001 record score in this class. World second and new Asia record holder was JY9NX (Op. JM1CAX). As noted above, this win from the Middle East was a first for RTTY WPX, where we normally expect to find Asia point leaders located in east Asia or Kazakhstan. Koji amassed 2,985,797 points (1676 Qs, 6131 Q-pts, 487 mults). World third, KH7X (Op. KH6ND), more than doubled his own Oceania record set only last year. Operating from the KH7R contest station on Maui, Mike scored 2,698,395 points (1607 Qs, 5803 Q-pts, 465 mults).

Single Operator, Single Band 28 MHz (28). In the days preceding the contest 10 meters appeared to be dead. There were no RTTY signals to be heard. However, as competitors started their warm-ups during the day or so before 0000Z on February 8th, the band came alive with activity for those still in daylight and remained so during daylight hours throughout the contest, again proving that 10 meters is often far more open than generally assumed, particularly on north-south paths. As a result, both D44AC and EA9CD exceeded the old world record set by LV5V in 2000 when the solar flux was significantly higher. The winner was D44AC (Op. UA3TT), who scored 1,725,560 points (1196 Qs, 3580 Q-pts, 482 mults). Somewhat farther north, EA9CD was world second, making 1,075,200 points (858 Qs, 2560 Q-pts, 420 mults), while in the far south LW7EIC was third with 782,340 points (678 Qs, 2006 Q-pts, 390 mults).

Single Operator, Single Band 21 MHz (21). Unlike the last two years, 15 meters did not prove to be the biggest producer in this contest, and the 5U8B (Paolo, I2UIY) 2002 world record remained intact. The top scorers were all from central or eastern Europe. Winning this year was Nikola, 9A5W, who scored 1,550,430 points (1139 Qs, 2898 Q-pts, 535 mults). World second was 9A5Y (Op. 9A3NM), scoring 1,316,282 points (1002 Qs, 2546 Q-pts, 517 mults). Third was UA1AKC, who scored 1,130,124 points (948 Qs, 2297 Q-pts, 492 mults).

Single Operator, Single Band 14 MHz (14). Twenty meter activity continued as a solid resource for the multi-band contester and also produced a new world record. Last year's 20 meter winner, 9A7R, repeated his championship win on this band, squeezing past DJ7AA's 2001 world record of 1,031,940 points to established his own new world record of 1,047,880 points (944 Qs, 2,278 Q-pts, 460 mults). M4K (Op. MØBEW) was second with 601,125 points (731 Qs, 1,603 Q-pts, 375 mults). Third was UW5Q (Op. UR3QCW), scoring 570,495 points (701 Qs, 1,563 Q-pts, 365 mults).

Single Operator, Single Band 7 MHz (7). Robert, 9A5E, came close to the 1999 ED8WPX (Op. EA8PP) world record of 1,547,280 points, but fell just short at 1,497,852 points (774 Qs, 3,726 Q-pts, 402 mults). The 40 meter single band record is sure to be even more hotly pursued in the 2004 contest as conditions on 7 MHz continue to improve. World second this year was RA1ACJ, with an excellent 1,430,900 points (743 Qs, 3,490 Q-pts, 410 mults). Third was UW2N (Op. UT9NA), who scored 629,724 points (488 Qs, 2164 Q-pts, 291 mults).

Single Operator, Single Band 3.5 MHz (3.5). Two-time winner Tone, S54E, became a three-time winner, smashing his own 80 meter World Record of 469,224 points set in 2001 with a big jump to 756,912 points (553 Qs, 2426 Q-pts, 312 mults). Both second- and third-place winners also broke Tone's old record but could not catch the champion. S51DX was second with 529,620 points (462 Qs, 1940 Q-pts, 273 mults), and HA3LI was third with 520,246 points (471 Qs, 1934 Q-pts, 269 mults). These excellent scores suggest that 80 meters in the 2004 contest may be particularly competitive.

PLAQUE SPONSORS AND WINNERS

Single Operator High Power

World: Sponsored by *The New RTTY Journal*. Winner: **Wilfried Gottschald, HP1/DJ7AA.**
N.A.: Sponsored by John Orton, WA6BOB. Winner: **Mike Sims, K4GMH.**
USA: Sponsored by Mike Sims, K4GMH. Winner: **Don Hill, AA5AU.**
Oceania: Sponsored by Mark Schreiber, K6OWL. Winner: **Michael Gibson, KH7X (KH6ND).**
Europe: Sponsored by Charles Anderson, KK5OQ. Winner: **Thomas Platz, DL4MCF.**
Asia: Sponsored by Ray Lindquist, KG7YQ. Winner: **JY9NX (Op: Koji Tahara, JM1CAX).**

Single Operator Low Power

World: Sponsored by Bryan Preas, AC6JT. Winner: **Jacobo Oduber, P43P.**
N.A.: Sponsored by Ron Hall, KP2N. Winner: **Wayne King, N2WK.**
USA: Sponsored by HAL Communications Corp. Winner: **Tom Moore, WX4TM.**
Europe: Sponsored by Don Hill, AA5AU. Winner: **Igor Fomin, UY8IF.**
Africa: Sponsored by RCKRtty by DL4RCK. Winner: **9G5GA (Op: Andreas Gille, DL3GA).**

Multi-Op Single Transmitter

World: Sponsored by Doug Faunt, N6TQS. Winner: **TI5N (Ops: N5KO, W6OTC).**
N.A.: Sponsored by Bob Wruble, WW7OR. Winner: **AF4Z (Ops: KE4MMI, WO4D, WB4EQS, K4PX, K4QD, KC4HW, WT4I, AF4Z).**
USA: Sponsored by Shelby Summerville, K4WW. Winner: **NN6NN (Ops: N6EE, W6XK, N6LK, W5NH, NR6N).**

Multi-Op Multi-Transmitter

World: Sponsored by *CQ* Magazine. Winner: **LY5A (Ops: LY2PAJ, LY2TA, LY2BIG, LY1BA, LY2KW, LY3MM, LY2IJ)**
Asia: Sponsored by Steve (Sid) Caesar, NH7C. Winner: **RKØAXX (Ops: RAØAM, RAØAHC, RAØALM, RVØAX, RVØAEV, RVØAR, RUØAAB, RUØAB, RUØAIG, RUØAM, RUØAT, RWØAR, RXØAE, UAØAGI, UAØANW)**

Multi-Op Two Transmitter

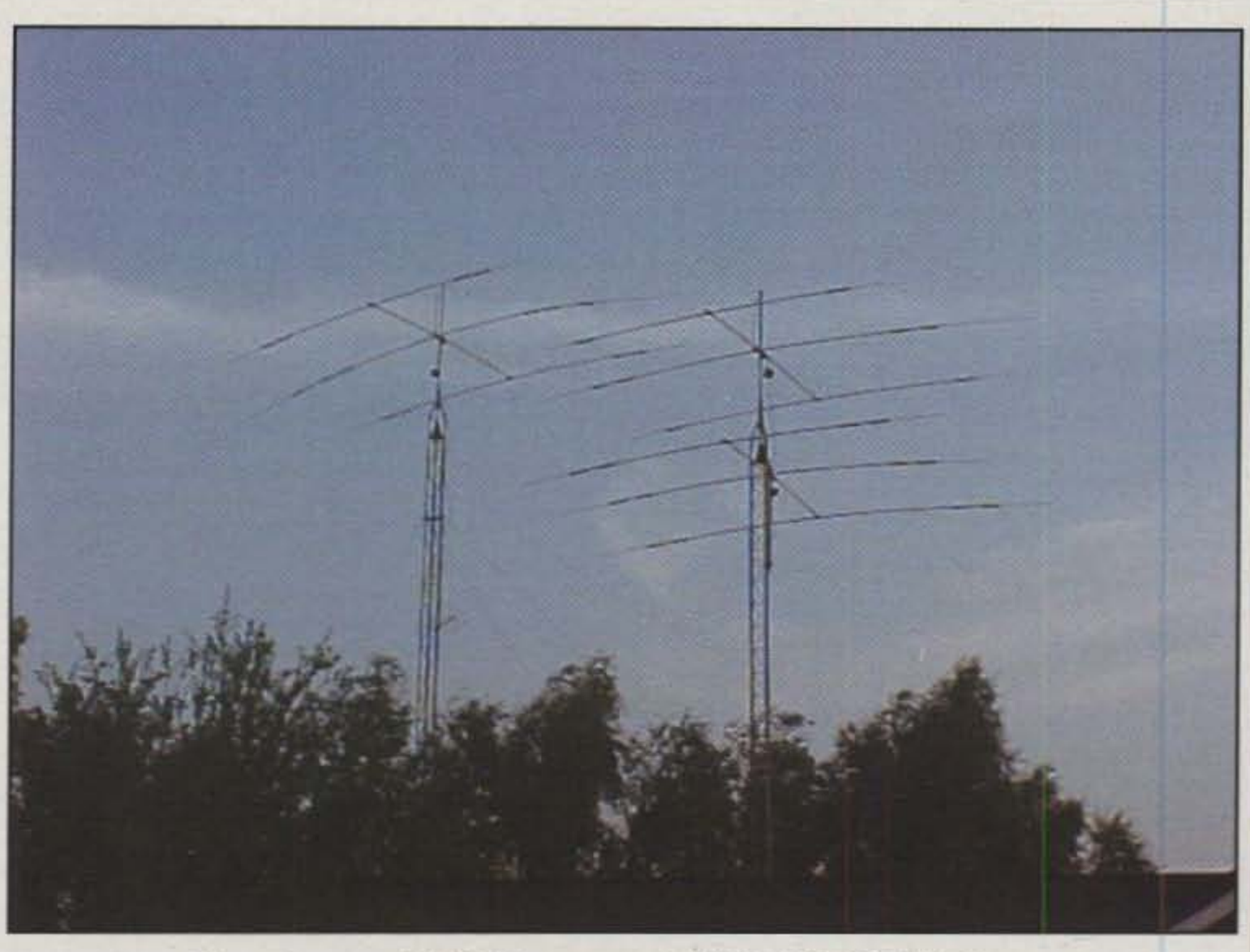
World: Sponsored by The HC8N RTTY Team. Winner: **SN7OM (Ops: SP7GIQ, SP7PS, SP5UAF, SP5HNK, SQ5BPM, SQ5EBJ, SQ5IRO)**

Single Band

World, 28 MHz: Sponsored by Glenn Vinson, W6OTC. Winner: **D44AC (Op: Oleg Lagurashvili, UA3TT).**
World, 14 MHz: Sponsored by Trey Garlough, N5KO. Winner: **9A7R (Op: Ivica Soric Braco).**
World, 3.5 MHz: Sponsored by Steve Merchant, K6AW. Winner: **Tone Crv, S54E.**

Multi-Operator

Multi-Operator Multi-Transmitter (MOM). The MOM class saw good competition and an increase in the number of entrants. Both the first- and second-place winners exceeded the old world record, but LY5A, already the 2002 WW RTTY champion in MOM class, won by a substantial margin. Setting a new world record of 8,036,403 points (3647 Qs, 11,497 Q-pts, 699 mults), the LY5A crew (LY2PAJ, LY2TA, LY2BIG, LY1BA, LY2KW, LY3MM, and LY2IJ) demolished the 2001 RKØAXX world record of 6,142,250 points. The LY5A score is the third highest WPX RTTY score ever in any class (behind only M2 entrants from HC8 and P4). RKØAXX (RAØAM, RAØAHC, RAØALM, RVØAX, RVØAEV, RVØAR, RUØAAB, RUØAB, RUØAIG, RUØAM, RUØAT, RWØAR, RXØAE, UAØAGI, UAØANW) also exceeded their old record by scoring 6,920,838 points, a new Asia record. Third was EMØU (UR5UDX, UT1UA, UT2UZ, UT3UA, UT5UGR, UT7UW, UU4JMG, UY2UA), scoring 4,161,600 points (2415 Qs, 7225 Q-pts, 576 mults). KA4RRU (K5OF, KA4RRU, KE4BUS, N3YBY, N4DXS, N8CIA, W4DAV, W4MGM, WA4TK, WB4ZNH, WN4FVU) exceeded its



The antennas of AA5AU, a perennial U.S. WPX RTTY winner.

own 2002 North America record with a score of 3,109,152 points (2207 Qs, 5592 Q-pts, 556 mults).

Multi-Operator Single Transmitter (MOS). This class attracts more entrants than all the other multi-operator classes combined despite the fact that it allows only one transmitter to be used by all operators. Accordingly, the competition is generally vigorous as is evident from looking at the first 20 entries in the MOS results. This year the MOS crown moved to Central America, with TI5N (Ops. N5KO and W6OTC) setting a new world record of 5,936,870 points (2890 Qs, 8861 Q-pts, 670 mults), the first RTTY contest effort from this nice contest station owned by Keko, TI5KD. World second this year was HG1S (HA1TJ, HA1DAE, HA1DAC, HA1DAI, HA1AG, HA3UU, HA3LN, HA3MY, HA1AH, HA1SN). Their score of 3,824,322 points (2005 Qs, 6571 Q-pts, 582 mults) also beat RW9C's 2002 world record score of 3,481,400 points. Almost equaling its own world record was the RW9C team (UA9CGA, RW9CF, RA9DK), achieving a score this year of 3,461,120 points (1853 Qs, 6760 Q-pts, 512 mults).

Multi-Operator Two Transmitter (M2). Although the two highest scores in WPX RTTY history have been made in M2 (P40K with 8,395,929 points in 2000 and HC8N with 8,411,106 points in 2001), activity in M2 has been relatively sparse the past two years. The winner this year was SN7OM (SP7GIQ, SP7PS, SP5UAF, SP5HNK, SQ5BPM, SQ5EBJ, SQ5IRO), scoring 5,004,435 points (2515 Qs 7881 Q-pts, 635 mults). World second was JA6ZPR (JH6JSR, JR6CKX, JR6CKY), who scored 1,593,680 points (1199Qs, 3622 Q-pts, 440 mults). W8NI (KA8CVE, WD8OWA, W8IBT, WB8SKP) repeated as world third with a score of 221,439 points (542 Qs, 993 Q-pts, 223 mults).

Rookie of the Year

Mattiello, IV3ZXQ, made by far the largest score in the Rookie class, achieving 962,082 points (607 Qs, 2838 pts, 339 mults), and is the Rookie of the Year for 2003.

SWL

Eight listeners submitted SWL logs for the 2003 contest: DE1EDD, ONL2309, DEØWAF, F11NPC/80, NL-455/r06, OH3-911, OK1-23233, and ONL5923, who won with a final score of 422,425 points.

Summary

The CQ/RJ WPX RTTY Contest continues to become more popular each year, now vying with the WW RTTY Contest for the title of "most popular," as measured by number of logs submitted. To check all-time CQ/RJ WPX RTTY Records, go to <www.rttyjournal.com/records/wpx.html>, originally compiled by Eddie, W6/GØAZT, and now maintained by Joe, K9SZ.

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

The 2004 CQ/RJ RTTY WPX Contest

The tenth annual CQ/RJ WPX RTTY Contest will be held on February 14–15, 2004. *Please note that Cabrillo-format logs*

The antennas used by S54E at the contest station owned by S54E, S50U, and S57NMQ.

TOP SCORES

Single Op High Power

HP1/DJ7AA	3,937,066	JH4UYB	2,415,415
JY9NX (Op: JM1CAX)	2,985,797	K4GMH	2,274,562
KH7X (Op: KH6ND)	2,698,395		

Single Op Low Power

P43P	3,506,198	UP5P (Op: UN6P)	1,760,760
ZX2B (Op: PY2MNL)	2,480,090	CN8KD	1,401,660
9G5GA (Op: DL3GA)	1,980,090		

Multi-Op Single Transmitter

TI5N	5,936,870	RL3A	3,270,545
HG1S	3,824,322	Z37M	2,887,365
RW9C	3,461,120		

Multi-Op Two Transmitter

SN7OM	5,004,435	W8NI	221,439
JA6ZPR	1,593,680		

Multi-Op Multi-Transmitter

LY5A	8,036,403	RO4M	4,017,100
RKØAXX	6,920,838	KA4RRU	3,109,152
EMØU	4,161,600		

Single Op
3.5 MHz

S54E	756,912	DL4RCK	433,324
S51DX	529,620	SP6EKS	356,110
HA3LI	520,246		

7.0 MHz

9A5E	1,497,852	IK2FIL	604,588
RA1ACJ	1,430,900	EO1I (Op: UT1IA)	551,600
UW2N (Op: UT9NA)	629,724		

14 MHz

9A7R	1,047,880	G5X (Op: G4RQI)	471,240
M4K (Op: MØBEW)	601,125	EU1SA	450,780
UW5Q (Op: UR3QCW)	570,495		

21 MHz

9A5W	1,550,430	S51FB	992,796
9A5Y (Op: 9A3NM)	1,316,282	S50R	774,360
UA1AKC	1,130,124		

28 MHz

D44AC (Op: UA3TT)	1,725,560	F5IJT	567,987
EA9CD	1,075,200	LT1A (Op: LU3CT)	503,041
LW9EIC	782,340		

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 them 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 12, 2004*. The full text of the 2004 rules will be published in the January 2004 issue of *CQ*, on the CQ website at <www.cq-amateur-radio.com> and at *The New RTTY Journal* website, <www.rttyjournal.com/rules/wpx.html>. *Please read the rules carefully prior to the contest,* and note that *all* logs submitted via e-mail go to **<wpxrtty@kkn.net>.**

73, Glenn, W6OTC, and Joe, K9SZ

Soapbox

Thanks to Gunter, HP1XVH, for letting me use his fine station. To get the right strategy to find the optimum rest times is the major key [for single operators] in this contest… ***HP1/DJ7AA.*** Had A51A answer my CQ Test!…***KØJPL***. I didn't do as well as last year but always enjoy WPX RTTY!…***N2WK***. Thanks to Keko and Sophia for the use of their station and for the fine meals during the contest. Look at <www.qsl.net/ti5kd> for a description…***N5KO***. Bands were good for stateside and Europe but little from VK/ZL land. We did see and work ZL2AMI with a good signal on several bands…***AF4Z.*** Great contest and activity. We managed to beat our last year's score. Special thanks go to Chris, SP7GIQ, for wonderful hosting at his great station…***SN7OM.*** We had a lot of fun…***LX5A.***

My first ever RTTY contest!…***S51J.*** Very pleased to better my last year's score using my new K2 and a home made 2-element beam…***GI4KSH.*** Hope the mult on 15 meters helped…***8P6SH.*** This contest was in good condition so that I could enjoy the wonderful contest…***JR5MND.*** My first RTTY contest; bit slow on the Sunday with few stations worked from North America…***G5X.*** Excellent contest. Really good fun and lots of activity…***M2Z.*** Suffering of a flu, the choice between the club station and my warm home QTH was quite easy … ***DL9NEV/qrp.*** Last year was better cuz VX prefix. Next year will try new prefix. Enjoyed very much the contest…***VE2XQ.*** First time with SO2R. I've got a lot of learning to do! …***KI5XP.*** As always a real blast!… ***WØETC.*** My 3-element SteppIR worked great at 40 feet…***AI9T.*** Highlight of the contest was being called by S21YV on 20 meters …***GM4FDM.*** I like digital. See U other contest…***TA1BM.*** Biggest thrill having D44AC answer my CQ on 10 meters!…***AD6KA.***

What a good contest year after year… ***KØBX.*** Just playing around and handing out a few mults to people; fun and thanks for the contest…***VK5GN.*** Hard work this year due to lousy propagation…***VK6GOM.*** One of my most-used macros: "No, I am not at Guantanamo Bay"…***KG4FPA.*** Hope the 8P prefix helped…***8P2K.*** What with shoveling snow and feeding the wood stove to keep warm my radio activity was limited… ***VA6MM.*** This contest was in good condition so that I could enjoy the wonderful contest…***JR3NDM.*** Could never get into this one. I think operating at HC8N spoiled me for RTTY contesting…***AD1C.*** Pictures from shack can be found at our website at <www.rk3awl.ru>…***RL3A.*** Our best effort ever in WPX RTTY. Good conditions for most of contest. Forty meter vertical and Delta loop worked very well. Need to work on 80 meter antenna. Look for us next year…***KP2D.*** Nice mini DXpedition to Epirus. QSL via SV1CIB…***SX6A.*** First multi-multi RTTY contest. Tough on equipment. We were able to get some valuable seat time for five new RTTY operators! . . . ***AE6B.***

Number groups after call letters denote the following: QSOs, QSO points, Mults, Final Score.

RESULTS 2003 CQ/RJ WPX RTTY CONTEST

SINGLE OPERATOR, ALL BAND, HIGH POWER

HP1/DJ7AA	**2195**	**6859**	**574**	**3,937,066**
JY9NX	**1676**	**6131**	**487**	**2,985,797**
KH7X	**1607**	**5803**	**465**	**2,698,395**
JH4UYB	**1451**	**4783**	**505**	**2,415,415**
K4GMH	**1503**	**4531**	**502**	**2,274,562**
AA5AU	**1818**	**4290**	**523**	**2,243,670**
ZW5B	**1400**	**4252**	**514**	**2,185,528**
DL4MCF	**1390**	**4223**	**505**	**2,132,615**
PJ7/W1CX	**1507**	**4193**	**506**	**2,121,658**
VE1OP	**1389**	**4007**	**465**	**1,863,255**
UXØFF	**1416**	**3806**	**478**	**1,819,268**
EU1MM	**1327**	**3926**	**453**	**1,778,478**
HA8JV	**1208**	**3737**	**461**	**1,722,757**
UA9CDV	**1181**	**4171**	**401**	**1,672,571**
YL2KF	**1222**	**3686**	**449**	**1,655,014**
DKØEE	**1170**	**3631**	**453**	**1,644,843**
HG4I	1141	3604	434	1,564,136
OH2BP	**1202**	**3642**	**429**	**1,562,418**
RD4M	**1277**	**3437**	**450**	**1,546,650**
YLØA	1131	3321	446	1,481,166
EA3NY	**1111**	**3104**	**445**	**1,381,280**
YL7A	1125	3200	430	1,376,000
WW7OR	**1383**	**3046**	**450**	**1,370,700**
VE2HQ	**1071**	**3383**	**394**	**1,332,902**
YO9HP	**1123**	**3186**	**416**	**1,325,376**
WA2ETU	**1159**	**2935**	**433**	**1,270,855**
K4SV	**1125**	**2939**	**429**	**1,260,831**
KU1CW	**1292**	**2954**	**426**	**1,258,404**
HA5BSW	1034	3134	398	1,247,332
HF7ØN	**1020**	**3092**	**395**	**1,221,340**
NO2T	1083	2950	394	1,162,300
LZ5ZI	**1007**	**3144**	**365**	**1,147,560**
DL6JZ	956	2967	384	1,139,328
KI5XP	**1160**	**2801**	**406**	**1,137,206**
W3FV	**1001**	**2954**	**379**	**1,119,566**
I1COB	**870**	**2761**	**375**	**1,035,375**
ZL2AMI	**802**	**2802**	**369**	**1,033,938**
WØETC	1125	2400	412	988,800
AI9T	**1003**	**2285**	**408**	**932,280**
W6IHG	922	2377	391	929,407
AM1AKS	813	2518	366	921,588
K4MA	875	2372	386	915,592
N8BJQ	**898**	**2249**	**395**	**888,355**
9A4RX	**862**	**2336**	**377**	**880,672**
OK2BXW	**799**	**2296**	**372**	**854,112**
W4OX	907	2167	387	838,629
JA1BWA	728	2291	350	801,850
RV9BB	670	2420	322	779,240
N5JR	852	2047	379	775,813
W4GKM	987	2181	344	750,264
GM4FDM	**802**	**1977**	**365**	**721,605**
SM5FUG	**742**	**2049**	**348**	**713,052**
W4UK	1023	2067	326	673,842
I2OKW	664	1954	344	672,176
TA1BM	**678**	**2122**	**307**	**651,454**
W1RY	**757**	**1959**	**326**	**638634**
EA5BY	646	1978	321	634,938
IZ5CCS	706	1992	318	633,456
OK2PEF	701	2000	314	628,000
VE6YR	**760**	**1977**	**312**	**616,824**
DL5NAM	636	1741	348	605,868
K9MUG	697	1955	302	590,410
OR3Z	**613**	**1884**	**312**	**587,808**
WØLSD	871	1823	318	579,714
RV3FF	700	1897	305	578,585
NE3H	649	1817	316	574,172
MW2I	**607**	**1780**	**309**	**550,020**
DJ3IW	520	1673	326	545,398
LW8EXF	**580**	**1694**	**313**	**530,222**
EA3QA	616	1697	305	517,585
SM7BHM	559	1688	296	499,648
LN5M	**617**	**1656**	**295**	**488,520**
JA7IC	505	1477	291	429,807
EW1CQ	522	1503	278	417,834
HL3GOB	**482**	**1445**	**274**	**395,930**
JA2FSM	490	1500	259	388,500
KY5I	680	1254	301	377,454
OK2PCL	504	1282	289	370,498
W9OL	604	1273	279	355,167
G3XTT	**440**	**1198**	**266**	**318,668**
VE5CPU	**547**	**1393**	**218**	**303,674**
OK1OX	401	1183	249	294,567
AN2AOI	404	1272	228	290,016
AD6KA	679	1212	238	288,456
AI9U	532	1173	236	276,828
IKØYVV	425	1036	260	269,360
NA2M	501	1148	231	265,188
RX9TX	410	1186	218	258,548
KØBX	444	965	244	235,460
WA6BOB	**502**	**1113**	**199**	**221,487**
WB4MSG	416	988	222	219,336
JN1BMX	350	1018	211	214,798
YO2BEH	364	980	213	208,740
HAØHW	357	895	228	204,060
OK2ZW	352	906	222	201,132
DL4MFP	334	951	211	200,661
UAØCW	307	912	209	190,608
K3WW	343	867	219	189,873
VK5GN	**295**	**883**	**202**	**178,366**
NØKE	346	940	189	177,660
VR2BG	**310**	**991**	**173**	**171,443**
N6EU	552	857	198	169,686
EA5FID	300	788	212	167,056
MMØBQI	311	833	198	164,934
WØTY	401	769	212	163,028
KØJPL	327	195	833	162,435
WB2JEP	376	804	198	159,192
RZ3TZA	312	804	189	151,956
KZ5AM	415	771	197	151,887
VK6GOM	**261**	**873**	**170**	**148,410**
HF7ØE	261	788	188	148,144
DK7ZT	260	872	169	147,368
DK6CQ	280	782	188	147,016
VY1JA	**353**	**892**	**161**	**143,612**
ES4RD	**283**	**869**	**157**	**136,433**
K5ZD	260	751	172	129,172
NA4M	312	681	183	124,623
DL5YM	236	703	174	122,322
IC8POF	221	783	156	122,148
WN1OTV	292	637	176	112,112
SP8NFF	232	687	160	109,920
OK2BTJ	199	615	171	105,165
AB1HZ	348	597	173	103,281
N8KM	258	679	152	103,208
AD4EB	322	603	171	103,113
KFØOH	327	632	163	103,016
W4RM	223	605	166	100,430
N4VV	279	594	167	99,198
RA3TT	250	542	183	99,186
JA1SJV	204	585	167	97,695
N3NZ	293	560	171	95,760
TF3AO	**242**	**577**	**162**	**93,474**
SV1QN	**216**	**590**	**149**	**87,910**
GW4KHQ	205	583	147	85,701
W7TI	253	623	131	81,613
W5BEN	232	494	162	80,028
SP2BBD	164	575	131	75,325
AA9NF	275	493	151	74,443
DL1THB	195	521	137	71,377
W7DPW	240	526	133	69,958
W6JOX	264	484	143	69,212
KB9YOZ	208	494	126	62,244
W6IWO	233	468	126	58,968
SP9VRY	144	482	118	56,876
VE9FX	**167**	**424**	**134**	**56,816**
VE6RRD	**211**	**465**	**122**	**56,730**
K1US	183	399	126	50,274
KM4H	144	371	128	47,488
KCØW	202	376	111	41,736
N8IW	164	341	122	41,602
OA4AHW	**129**	**373**	**108**	**40,284**
HB9CVE	**132**	**388**	**100**	**38,800**
WØDET	183	329	110	36,190
K2NV	130	326	102	33,252
OZ1AA	**122**	**311**	**102**	**31,722**
OH2GI	115	336	94	31,584
YBØZZ	**107**	**307**	**90**	**27,630**
DH6YMC	111	308	84	25,872
K6RIM	153	243	104	25,272
K5PI	99	296	85	25,160
W3DAD	111	273	90	24,570
N6VH	124	213	86	18,318
N4CW	100	184	87	16,008
KJ6RA	83	194	71	13,774
KØFJ	59	104	51	5,304
G4OBK	36	90	36	3,240
IZ7EUB	33	95	30	2,850
LA1K	2	12	2	24

OPS: **HP1/DJ7AA** (DJ7AA), **JY9NX** (JM1CAX), **KH7X** (KH6ND), **ZW5B** (PY5EG), **PJ7/W1CX** (W1CX), **DKØEE** (DL4MDO), **RD4M** (UA4LU), **YLØA** (YL2KA), **YL7A** (YL2GM), **WW7OR** (W7GG), **HF7ØN** (SP7IIT), **AM1AKS** (EA1AKS), **MW2I** (GW5NF), **LN5M** (LA7CL), **AN2AOI** (EA2AOI), **AI9U** (K9JS), **KZ5AM** (K5AM), **HF7ØE** (SP9MAX), **AB1HZ** (K7JJ), **YBØZZ** (OK1JR), **LA1K** (LA5LKA)

SINGLE OPERATOR, ALL BAND, LOW POWER

P43P	**1888**	**6469**	**542**	**3,506,198**
ZX2B	**1553**	**4715**	**526**	**2,480,090**
9G5GA	**1338**	**4041**	**490**	**1,980,090**
UP6P	**1208**	**4020**	**438**	**1,760,760**
CN8KD	**901**	**3594**	**390**	**1,401,660**
UY8IF	**1201**	**3440**	**404**	**1,389,760**
N2WK	**1220**	**3054**	**428**	**1,307,112**
WX4TM	**1272**	**3069**	**424**	**1,301,256**
LZ2BE	**1130**	**3119**	**406**	**1,266,314**
ON4ADZ	**990**	**2988**	**418**	**1,248,984**
YU7AM	**1005**	**3030**	**403**	**1,221,090**
LZ1ZM	1002	2977	366	1,089,582
9A7P	**880**	**2777**	**367**	**1,019,159**
RU3QW	**979**	**2544**	**393**	**999,792**
YO6BHN	**873**	**2644**	**369**	**975,636**
YO3APJ	882	2587	375	970,125
IK1TZO	**829**	**2523**	**376**	**948,648**
GØMTN	**952**	**2471**	**373**	**921,683**
N4IG	**935**	**2231**	**404**	**901,324**
YV5AAX	**778**	**2618**	**343**	**897,974**
LZ2PI	821	2532	353	893,796
F6IRF	**825**	**2574**	**345**	**888,030**
UAØCA	**839**	**2480**	**358**	**887,840**
RX9SR	774	2685	327	877,995
F6AUS	811	2178	389	847,242
UZ5U	**793**	**2318**	**358**	**829,844**
OH4BB	**824**	**2328**	**353**	**821,784**

OK2VWB	**780**	**2360**	**344**	**811,840**	NØAJ	489	1095	233	255,135	M3TMU	188	798	129	102,942	PY7IQ	114	331	86	28,466
HL2FDW	**815**	**2411**	**336**	**810,096**	OK2FB	402	1047	243	254,421	**KH6GMP**	**260**	**828**	**124**	**102,672**	W3FQE	122	287	99	28,413
OZ9GA	**842**	**2408**	**334**	**804,272**	YO8FZ	403	1080	232	250,560	W4TIJ	312	573	179	102,567	RU3XB	105	319	87	27,753
EA8/DJ1OJ	**753**	**2341**	**343**	**802,963**	RZ1AZ	380	1075	225	241,875	JA1OVD	200	660	155	102,300	HP1AC	109	292	95	27,740
OK1DDO	722	2160	371	801,360	SP4CQU	337	1098	218	239,364	SP6CZ	184	661	153	101,133	SP7DQR	100	305	90	27,450
LU1NDC	**762**	**2270**	**352**	**799,040**	**W7LD**	**561**	**1029**	**231**	**237,699**	W3DSX	227	571	175	99,925	RW4CG	107	284	95	26,980
UA3SAQ	826	2188	350	765,800	YU1LM/QRP	400	1150	205	235,750	OZ5MJ	213	624	160	99,840	EA4BPJ	121	287	92	26,404
ON5MF	775	2214	340	752,760	F5RD	356	1067	219	233,673	YO6CFB	193	657	151	99,207	N4WD	135	287	88	25,256
W4UEF	**814**	**2325**	**314**	**730,050**	AK6DV	500	1039	221	229,619	DL1KUR	214	606	162	98,172	N5PU	138	250	100	25,000
OK2RU	703	2148	335	719,580	F2AR	350	1058	214	226,412	N4GXP	299	566	173	97,918	**EW6BI**	**101**	**289**	**83**	**23,987**
KG4FPS	730	2089	342	714,438	HB9DHG	401	1065	212	225,780	ON4CIN	200	674	145	97,730	7L3IUE	104	280	85	23,800
DJ3NG	**714**	**2228**	**320**	**712,960**	KK6T	539	986	227	223,822	RK6CM	244	615	156	95,940	KC5LK	124	249	94	23,406
AH6OZ	**773**	**2567**	**273**	**700,791**	K6HGF	610	1020	218	222,360	DJ9XB	224	580	165	95,700	WN3C	105	279	83	23,157
UR4MZA	797	2219	315	698,985	RX1AX	351	1000	222	222,000	W7GTO	324	622	151	93,922	AD6G	136	243	93	22,599
VE3GSI	**745**	**2162**	**323**	**698,326**	**HA1ZH**	**315**	**1033**	**213**	**220,029**	OK2SPD	210	624	149	92,976	W4BCG	111	277	77	21,329
SP9BBH	**698**	**2093**	**329**	**688,597**	G3YJQ	412	1062	204	216,648	EA3EGC	225	568	163	92,584	DL9SEV	101	243	83	20,169
UA4FCO	758	2054	334	686,036	DJ3JD	357	981	218	213,858	N7GVV	249	574	159	91,266	IZ1DBY	102	257	73	18,761
WA1EHK	**770**	**1962**	**345**	**676,890**	UT5DL	303	1023	209	213,807	UA4CC	228	618	147	90,846	EA2AVM	81	264	71	18,744
M4W	675	2060	324	667,440	W5TZN	582	1076	196	210,896	OH2JLN	253	599	151	90,449	WA4FXX	113	230	81	18,630
W9HLY	**806**	**1942**	**339**	**658,338**	USØKW	332	1082	194	209,908	**ER3ZZ**	**197**	**598**	**149**	**89,102**	JA1IZZ	73	277	61	16,897
4X2Z	**627**	**2383**	**272**	**648,176**	**VA6MM**	**437**	**1022**	**204**	**208,488**	**VK3DBQ**	**194**	**596**	**149**	**88,804**	AE4EC	104	206	80	16,480
DL7VOG	651	1967	314	617,638	IK2PYU	349	962	214	205,868	M3OKU	225	642	138	88,596	KA9VHG	121	188	81	15,228
8P2K	**609**	**1958**	**308**	**603,064**	MØBEX	379	1026	198	203,148	AN3EFQ	203	590	150	88,500	K3FH	98	191	77	14,707
RA9XF	642	2116	281	594,596	JA1BHK	338	978	206	201,468	OK2TCW	209	542	161	87,262	DL8HCO	83	207	71	14,697
F8BNN	626	1845	316	583,020	ON5KL	327	888	225	199,800	**FO5PS**	**224**	**661**	**132**	**87,252**	PAØEHF	75	208	70	14,560
HB9CZF	**603**	**1721**	**338**	**581,698**	HB9DBK	346	979	202	197,758	G3LHJ	233	559	154	86,086	F6DZD	83	199	70	13,930
KE4KWE	770	1851	314	581,214	**BD8SN**	**368**	**914**	**215**	**196,510**	SM6CRM	219	569	151	85,919	N5DD	78	207	67	13,869
DJ5IR	626	1924	298	573,352	**PA3FGJ**	**328**	**948**	**207**	**196,236**	VE3XD/W4	223	544	157	85,408	DJ2IA	70	211	64	13,504
UN6G	**648**	**2032**	**278**	**564,896**	**EY8MM**	**341**	**992**	**196**	**194,432**	KE7NT	365	596	142	84,632	EA4AWM	80	194	69	13,386
S52RA	**607**	**1823**	**305**	**556,015**	IK2WXV	335	971	199	193,229	SP4Z	184	608	139	84,512	**JG3NKP/1**	**72**	**197**	**66**	**13,002**
KI6DY/Ø	**881**	**1768**	**300**	**530,400**	SP4CJA	361	890	216	192,240	WØSM	300	481	173	83,213	JA1XPU	82	208	62	12,896
S56A	528	1697	305	517,585	YO2BZV	302	895	213	190,635	DL8DUL	214	507	162	82,134	N4GJ	85	165	71	11,715
N6OJ	**900**	**1668**	**308**	**513,744**	UA9FFV	313	894	205	183,270	K6BIR	307	534	151	80,634	IK4JSI	71	205	56	11,480
DF7ZS	605	1603	320	512,960	SP6AXW	309	883	202	178,366	JA1BUI	205	548	147	80,556	WA2HFI	93	178	64	11,392
OH5CX	651	1796	284	510,064	K7WM	382	752	232	174,464	PP2KR	198	555	145	80,475	K7OX	97	145	77	11,165
Z31GX	**641**	**1780**	**286**	**509,080**	DL8SDC	325	799	218	174,182	ON4CAS	200	561	143	80,223	JA2QVP	63	211	52	10,972
SQ4NR	563	1764	288	508,032	RU3WR	312	926	188	174,088	MUØFBO	180	567	134	75,978	DL6ABB	61	190	55	10,450
N2DBI	665	1654	307	507,778	**W8WEJ**	**357**	**867**	**200**	**173,400**	UT5UKY	189	550	137	75,350	WBØULX	82	137	75	10,275
UA9MA	545	1819	278	505,682	F8AAN	344	872	198	172,656	SP6RGC	192	539	139	74,921	W6OAT	83	155	61	9,455
ISØHQJ	**645**	**1817**	**277**	**503,309**	SP6BEN	270	856	193	165,208	PS7KC	189	554	135	74,790	W8RU	68	147	63	9,261
UA4FX	704	1636	302	494,072	EA7CWA	320	819	201	164,619	ISØUDF	221	512	142	72,704	WB9BSH	71	127	71	9,017
WW3S	**618**	**1586**	**307**	**486,902**	W5RW	401	866	190	164,540	**JA2BQX**	**209**	**518**	**140**	**72,520**	KB9S	105	124	69	8,556
WD4GBW	600	1603	295	472,885	YO9BPX	307	863	190	163,970	NU8Z	204	496	146	72,416	EA2AZ	59	151	55	8,305
F8CDM	601	1572	295	463,740	KØHW	416	857	191	163,687	**JA9LX**	**195**	**555**	**130**	**72,150**	IK2REA	49	177	46	8,142
AKØA	655	1534	301	461,734	K9BJM	375	789	207	163,323	N2LK	223	521	137	71,377	WB7OND/4	70	137	59	8,083
UN5J	518	1672	275	459,800	F5POJ	302	827	197	162,919	CT3BD	153	620	114	70,680	KJ7NO	82	128	60	7,680
T93Y	**616**	**1426**	**321**	**457,746**	EA4EJP	316	824	197	162,328	UAØLMO	204	585	120	70,200	ABØMV	67	147	50	7,350
YO8FR	515	1713	266	455,658	JA1XUY	308	879	183	160,857	DK3WJ	159	486	144	69,984	K6MI	72	127	57	7,239
W3MEL	638	1543	289	445,927	ON6LY	320	804	199	159,996	G4EMT	202	513	136	69,768	K9SG	65	142	50	7,100
YU1KT	501	1585	277	439,045	NI5F	332	998	159	158,682	JA2BY	176	521	133	69,293	PY7ZY	47	141	42	5,922
KC1YF	626	1398	314	438,972	UT4ZX	342	829	191	158,339	UA4WLI	200	510	133	67,830	**HSØZDZ**	**45**	**142**	**41**	**5,822**
VE7FO	**617**	**1582**	**277**	**438,214**	JA1BNW	301	874	181	158,194	K8OSF	223	512	131	67,072	IK3ASM	45	135	41	5,535
AM2RY	**660**	**1524**	**287**	**437,388**	DL1DTC	310	806	196	157,976	W2QQ	189	522	128	66,816	JH1TUX	49	132	39	5,148
UA3PW	637	1546	279	431,334	SP6DNZ	290	813	194	157,722	G4KXG	168	526	122	64,172	XE2AUB	45	113	41	4,633
XE1YYD	**670**	**1620**	**263**	**426,060**	N6PC	475	832	189	157,248	UA1AFZ	176	512	124	63,488	IKØOTJ	41	124	37	4,588
AM3AYP	618	1474	289	425,986	N5VYS	467	776	201	155,976	HB9HQX	155	468	130	60,840	DH1OK	45	105	41	4,305
UU2JZ	553	1648	254	418,592	EA2BNU	367	738	210	154,980	K4WES	237	484	125	60,500	G3URA	47	102	42	4,284
VE2AXO	**512**	**1497**	**276**	**413,172**	MU3EFB	315	767	199	152,633	**AL7CM**	**208**	**496**	**121**	**60,016**	KE4OAR	56	91	45	4,095
K1PY	610	1435	280	401,800	SP2MKZ	299	807	189	152,523	RW6AH	157	511	116	59,276	N3JIX	43	104	37	3,848
UA9AX	464	1676	239	400,564	OK2ZJ	242	824	181	149,144	W1HY	197	430	136	58,480	K9SZ	48	86	43	3,698
DL2YCA	532	1512	260	393,120	US7IB	284	899	165	148,335	RA3XI	171	428	136	58,208	VK2CZ	34	107	32	3,424
JA8JCR	**538**	**1485**	**263**	**390,555**	IK2WYI	300	779	190	148,010	JF2SKV	174	530	107	56,710	KG4MTN	45	95	35	3,325
OM7PY	**499**	**1402**	**277**	**388,354**	VE7ASK	344	988	149	147,212	PAØLSK	170	442	126	55,692	K3MZ	35	108	30	3,240
SM5UFB	**529**	**1473**	**263**	**387399**	KF2XF	325	711	203	144,333	W4JH	177	425	131	55,675	VE2FFE	45	95	34	3,230
IZ4DZD	522	1536	251	385,536	SP1NQV	261	742	188	139,496	**ZS1JY**	**156**	**460**	**121**	**55,660**	7S3A	31	112	28	3,136
VA3PC	503	1432	268	383,776	SP6NVK	276	757	184	139,288	N9KO	232	409	136	55,624	UA9OSV	34	99	31	3,069
KS5V	**733**	**1321**	**290**	**383,090**	KA5EYH	439	739	188	138,932	M3GOJ	167	466	118	54,988	7N2DAB	24	98	23	2,254
OK1BNS	500	1442	263	379,246	**YBØDPO**	**265**	**784**	**177**	**138,768**	AG4TJ	200	465	116	53,940	JI1RXQ	30	75	30	2,250
CT3FN	**462**	**1505**	**251**	**377,755**	WA2LXE	370	763	181	138,103	AAØCY	200	398	135	53,730	7L3TDU	32	86	26	2,236
4K6DI	**454**	**1631**	**230**	**375,130**	NZ8O	404	705	195	137,475	KE5OG	232	377	142	53,534	JA1AZS	28	82	26	2,132
UA9KG/1	453	1675	222	371,850	9A3CY	252	758	179	135,682	NØIBT	233	417	128	53,376	WG7Y	41	57	37	2,109
OK2PMG	467	1513	245	370,685	PA3CDN	265	807	168	135,576	WB6BWZ	229	458	116	53,128	JQ1AHZ/2	24	63	19	1,197
GUØSUP	**464**	**1179**	**313**	**369,027**	EA5EM	305	730	185	135,050	IZ1DAT	139	491	108	53,028	XE1ZVO	22	48	21	1,008
LZ1QV	516	1546	234	361,764	WD9GMK	358	737	182	134,134	**KP4JRS**	**183**	**438**	**121**	**52,998**	JM1KNI	19	53	17	901
UAØSMF	552	1391	260	361,660	SP3GXH	253	779	170	132,430	IT9ORA	140	515	102	52,530	XE1RCQ	14	60	14	840
YO8RFS	472	1428	251	358,428	RN4SS	300	762	172	131,064	KC2DTJ	195	384	136	52,224	IK2EBP	14	52	14	728
KD6NA/1	580	1293	276	356,868	OH2LO	300	736	175	128,800	AD1C	150	420	124	52,080	EA1AK/7	16	48	15	720
GW4MVA	**500**	**1312**	**269**	**352,928**	OK1AOV	250	720	176	126,720	PA3EBP	154	406	126	51,156	OH3TY	11	31	11	341
I1BAY	490	1387	252	349,524	**7M4CLF/6**	**289**	**740**	**171**	**126,540**	IK2NCF	150	430	118	50,740	IK2MLS	12	28	12	336
AN7AJR	571	1266	276	349,416	XE1YJS	302	767	164	125,788	RX3PN	157	430	112	48,160	UA9OJG	3	9	1	9
IT9LGW	**511**	**1302**	**265**	**345,030**	**JA7DNO**	**260**	**739**	**170**	**125,630**	N4PSE	193	351	135	47,385					
SM6NET	500	1281	269	344,589	**PS7AA**	**257**	**744**	**168**	**124,992**	XE2XX	175	434	109	47,306					
N1NB	500	1271	267	339,357	DK3VN	245	705	177	124,785	K6OWL	207	424	108	45,792					
VE4COZ	**551**	**1396**	**241**	**336,436**	KSØM	320	676	183	123,708	EA4ZB	156	391	112	43,792					
SQ5RK	460	1245	267	332,415	OE1KTS	266	673	183	123,159	KC5YKX	186	361	121	43,681					
RA3BB	513	1345	241	324,145	EA5EG	277	665	185	123,025	RAØAN	125	471	92	43,332					
W1TO	486	1259	254	319,786	SM7BJW	261	712	172	122,464	YO4CVV	136	421	101	42,521					
JA1XRH	**459**	**1327**	**240**	**318,480**	**JR3NDM**	**241**	**766**	**159**	**121,794**	WA2EYA	177	358	118	42,244					
N2FF	505	1198	260	311,480	UA1WBV	258	731	166	121,346	W3BUI	172	341	118	40,238					
N3SL	515	1086	286	310,596	VA3XRZ	271	755	158	119,290	SP7AWG	128	361	111	40,071					
SP9SOU	445	1241	250	310,250	OK2PHI	228	688	173	119,024	EA7OK	216	392	95	39,984					
RW4HM	486	1233	248	305,784	OK1FHI	254	698	170	118,660	WA3AAN	159	402	98	39,396					
SP6FBD	425	1188	256	304,128	**TF3VS**	**265**	**634**	**185**	**117,290**	HA3OU	133	366	106	38,796					
OE2GEN	**442**	**1152**	**262**	**301,824**	UN7ED	226	814	141	114,774	KB8LNP	143	325	118	38,350					
RV6FG	502	1237	240	296,880	**S21YY**	**247**	**749**	**152**	**113,848**	WG8Y	150	307	121	37,147					
UYØIX	449	1285	231	296,835	W2WB	315	684	166	113,544	N1MGO	177	299	124	37,076					
SP2JHJ	444	1179	234	275,886	DL1DTL	248	634	179	113,486	AH6HH	119	398	90	35,820					
DL2AL	413	1181	233	275,173	IK3CST	250	615	181	111,315	JF2IGP	126	375	95	35,625					
UA9CR	377	1327	207	274,689	N9CK	267	655	167	109,385	IK2WFN	132	338	105	35,490					
W6FFH	577	1078	253	272,734	N8LRG	305	624	172	107,328	AE4Y	159	310	108	33,480					
OK1YM	377	1185	228	270,180	OK1AZK	216	680	157	106,760	AEØQ	187	323	102	32,946					
AN5YJ	432	1050	254	266,700	NØEA	312	662	160	105,920	IZ2DVI	108	304	102	31,008					
IZ8DVD	400	1102	242	266,684	DK3GI	210	653	162	105,786	JA3MIB	127	349	87	30,363					
TA1DX	**414**	**1260**	**210**	**264,600**	W5BBR	303	599	176	105,424	JA8AGI/1	135	328	90	29,520					
JQ1COB	396	1174	224	262,976	UT5UML	235	652	161	104,972	RZ9IB	119	329	89	29,281					
OH3HTU	450	1143	230	262,890	K5HDU	338	629	166	104,414	OH1MM	114	318	92	29,256					
SM3ETC	470	1131	231	261,261	OH2LZI	253	680	152	103,360	UAØSR	119	349	83	28,967					

OPS: ZX2B (PY2MNL), **9G5GA** (DL3GA), **UP6P** (UN6P), **9A7P** (9A5AEI), **KG4FPS** (WØYR), **UR4MZA** (UX3MR), **M4W** (G3YBY), **8P2K** (8P6SH), **AM2RY** (EA2RY), **KD6NA/1** (KD6NA), **AN5YJ** (EA5YJ), **NZ8O** (K8SIA), **PS7AA** (PS7ZZ), **S21YY** (JF1EQA), **VE3XD/W4** (VE3BUC), **7S3A** (SM3CER), **JQ1AHZ/2** (JQ1AHZ),

ROOKIE

IV3ZXQ	**607**	**2838**	**339**	**962,082**
AD6WL	**607**	**1316**	**266**	**350,056**
OK2CLW	**443**	**1080**	**297**	**320,760**
KB3IEO	**499**	**1120**	**239**	**267,680**
AB8NI	**354**	**709**	**196**	**138,964**
KD1F	**284**	**674**	**185**	**124,690**
M3OKT	**266**	**740**	**155**	**114,700**
UZ7HO	**190**	**587**	**139**	**81,593**
RK2FXG	**126**	**336**	**100**	**33,600**
SM4XIH	**113**	**299**	**95**	**28,405**
SQ8GHY	**95**	**251**	**74**	**18,574**
W4XDX	**123**	**174**	**95**	**16,530**
UR5FLC	**52**	**121**	**41**	**4,961**

OP: W4XDX (W1KCD)

SINGLE OPERATOR

10 METERS

D44AC	1196	3580	482	1,725,560
EA9CD	858	2560	420	1,075,200
LW7EIC	678	2006	390	782,340
F5IJT	618	1591	357	567,987
LT1A	517	1529	329	503,041
N4BP	615	1562	319	498,278
ED7FTR	622	1451	333	483,183
N9AG	560	1449	308	446,292
LT1D	452	1342	268	359,656
YU7AE	433	1122	296	332,112
KY4KY	456	1195	264	315,480
K3GP	452	1153	273	314,769
UA9LAU	403	1105	246	271,830
WZ7ZR	391	771	212	163,452
LA5TFA	351	709	173	122,657
T94DO	250	629	178	111,962
ES7AAZ	244	598	172	102,856
UR5ZMK	250	613	164	100,532
SM3LBP	214	530	175	92,750
LT5F	196	574	160	91,840
OK2PMS	204	547	159	86,973
K6EID	198	548	152	83,296
HA3VAM	187	500	153	76,500
I7PXV	199	503	151	75,953
LW1HDJ	166	488	142	69,296
DJ6TK	167	423	141	59,643
RUØBB	159	443	128	56,704
7N2UQC	154	393	121	47,553
VE1AOE	150	370	106	39,220
S51J	134	342	106	36,252
OK1DCP	125	335	104	34,840
JH6WHN	114	322	98	31,556
SP4DC	106	271	90	24,390
PU7EEL	99	281	86	24,166
F5JY	104	265	87	23,055
OH7JJT	96	211	78	16,458
EA1CYU	86	203	80	16,240
UA6LP	85	210	76	15,960
RV3APM	71	164	69	11,316
K5WW	79	138	64	8,832
JE2SOY	50	142	47	6,674
DL4SDT	47	117	45	5,265
PY4PW	35	90	33	2,970
OK1SI	24	56	21	1,176
UR5FCM	21	50	18	900

OPS: D44AC (UA3TT), **LT1A** (LU3CT), **ED7FTR** (EA7FTR), **LT1D** (LU4DJC), **KY4KY** (K4WW), **WZ7ZR** (W7ZR), **LT5F** (LU4FPZ)

15 METERS

9A5W	1139	2898	535	1,550,430
9A5Y	1002	2546	517	1,316,282
UA1AKC	948	2297	492	1,130,124
S51FB	870	2226	446	992,796
S5ØR	727	1912	405	774,360
HA1WD	691	1768	380	671,840
SP4TXI	645	1629	391	636,939
5B4AHA	642	1861	341	634,601
LW1DTZ	595	1755	336	589,680
CX4AAJ	527	1554	323	501,942
AY8A	528	1557	320	498,240
RXØAT	575	1556	298	463,688
YO3JF	554	1320	319	421,080
CX7BY	468	1386	301	417,186
KV7G	620	1212	306	370,872
OH2LU	471	1109	319	353,771
OH7MN	516	1168	284	331,712
GI4KSH	452	1069	299	319,631
WB3D	499	1039	303	314,817
JE1GMM	375	996	265	263,940
OK2WH	409	956	265	253,340
UR5UDX	402	912	252	229,824
SX1R	429	924	242	223,608
LZ2JA	357	809	234	189,306
GW4SKA	349	802	232	186,064
MWØCRI	345	772	228	176,016
JR3RIY	298	781	224	174,944
UWØF	333	755	221	166,855
HA3JB	311	742	220	163,240
W4LC	275	653	207	135,171
YV4GLD	280	829	161	133,469
IK2UCK	253	625	190	118,750
SM7JUR	246	571	187	106,777
J42A	246	541	167	90,347
OK2PTC	190	440	155	68,200
UTØH	184	419	142	59,498
JE1RRK	150	427	134	57,218
F6FTB	165	398	138	54,924
JH2BTM	135	371	115	42,665
UA6ACK	150	318	121	38,478
SP7FBQ	126	289	107	30,923
SM7PAF	103	233	91	21,203
JA1EMQ	85	239	79	18,881
EC1AMC	100	216	86	18,576
8P6SH	84	207	73	15,111
LU/VE2DWA	75	212	59	12,508
YC2DGR	71	212	57	12,084
DL6EDD	65	138	58	8,004
JR5NMD	54	140	50	7,000
HC1JQ	50	140	47	6,580
RW4LQ	40	99	40	3,960
AI3Q	19	51	19	969
CT2HZU	12	25	12	300

OPS: 9A5Y (9A3NM), **AY8A** (LU8ADX), **KV7G** (W7WW), **SX1R** (SV1XV), **J42A** (SV2AEL)

20 METERS

9A7R	944	2278	460	1,047,880
M4K	731	1603	375	601,125
UW5Q	701	1563	365	570,495
G5X	621	1386	340	471,240
EU1SA	599	1366	330	450,780
ZC4DW	499	1434	303	434,502
HK4QHD	459	1372	282	386,904
RA9DA	429	1184	286	338,624
UN7GCE	415	1123	258	289,734
F6FJE	448	995	285	283,575
RN2FB	488	1052	264	277,728
UT7FP	484	1025	268	274,700
PT2BW	383	1125	243	273,375
HF7ØI	431	943	278	262,154
RU3DNN	430	896	272	243,712
UT2AU	413	891	254	226,314
UR5NX	401	847	238	201,586
UN7JX	300	824	221	182,104
UR5FGW	360	767	223	171,041
SP3BJK	361	762	221	168,402
EU1BP	332	714	211	150,654
VE2SB	338	725	191	138,475
UA3DCW	299	617	202	124,634
RW4WZ	285	611	194	118,534
KE9S	298	450	175	78,750
RA9AU	191	544	139	75,616
SP4DM	212	464	157	72,848
M2Z	218	452	155	70,060
US3QW	206	443	153	67,779
SP9CQ	173	377	142	53,534
7K4QOK	149	400	130	52,000
N7DB	176	334	147	49,098
DH5WB	163	342	134	45,828
OZ1DAE	161	336	125	42,000
UA3RW	162	333	126	41,958
RA3DRA	150	317	116	36,772
UA9FGJ	113	307	101	31,007
Z33F	131	272	107	29,104
PR7AR	105	292	96	28,032
RW3DIA	125	253	109	27,577
DL9NEI/QRP	123	252	101	25,452
UV7M	99	215	81	17,415
RV3LQ	96	195	82	15,990
WG1Z	82	136	72	9,792
I4DOO	66	143	61	8,723
DL5JWL	66	136	59	8,024
RA4LK	63	135	59	7,965
JM4ORU	41	101	36	3,636
HP1DCP	34	76	32	2,432
RN3AQ	21	44	21	924

OPS: M4K (MØBEW), **UW5Q** (UR3QCW), **G5X** (G4RQI), **HF7ØI** (SP6IHE), **M2Z** (M5RIC), **7K4QOK** (JR2BNF), **UV7M** (US5MTJ),

40 METERS

9A5E	774	3726	402	1,497,852
RA1ACJ	743	3490	410	1,430,900
UW2N	488	2164	291	629,724
IK2FIL	470	2092	289	604,588
EO1I	461	1970	280	551,600
IK3SSJ	427	1850	268	495,800
RK6BZ	384	1624	262	425,488
UR5FFC	317	1310	211	276,410
UW2F	305	1266	211	267,126
YU1ZZ	267	1110	183	203,130
SP2EXE	247	1028	184	189,152
UA3LID	236	992	185	183,520
OH3MFP	230	956	170	162,520
UA3RF	195	820	156	127,920
W9SE	238	720	153	110,160
VE6JY	185	812	130	105,560
EA4WC	175	742	139	103,138
SP5OXJ	178	726	138	100,188
W6DSQ	202	536	128	68,608
2EØAVF	138	574	110	63,140
SO9W	127	516	106	54,696
JH1APZ	105	524	98	51,352
UR5QU	111	526	91	47,866
VK2KM	74	442	70	30,940
EA3FAJ	65	270	59	15,930
LA7CL	25	104	23	2,392
JJ1BDX/3	18	86	18	1,548

OPS: UW2N (UT9NA), **EO1I** (UT1IA), **UW2F** (UTØFT), **2EØAVF** (M5RIC), **SO9W** (SP9W)

80 METERS

S54E	553	2426	312	756,912
S51DX	462	1940	273	529,620
HA3LI	471	1934	269	520,246
DL4RCK	446	1706	254	433,324
SP6EKS	376	1490	239	356,110
UR8QR	379	1524	225	342,900
RN6AL	352	1382	222	306,804
LY2SA	315	1302	196	255,192
UX6F	316	1248	200	249,600
HA8LLS	271	1090	175	190,750
UT5NM	263	1038	182	188,916
UA3LEO	246	954	178	169,812
UT5EPP	180	706	141	99,546
RA2FB	103	418	82	34,276
DL2RTJ	25	92	25	2,300

OP: UX6F (US-F-027 [SWL])

MULTI-OPERATOR, TWO TRANSMITTER

SN7ØM	2515	7881	635	5,004,435
JA6ZPR	1199	3622	440	1,593,680
W8NI	542	993	223	221,439

OPS: SN7ØM (SP7GIQ, SP7PS, SP5UAF, SP5HNK, SQ5BPM, SQ5EBJ, SQ5IRO), **JA6ZPR** (JH6JSR, JR6CKX, JR6CKY), **W8NI** (KA8CVE, WD8OWA, W8IBT, WB8SKP)

MULTI-OPERATOR, SINGLE TRANSMITTER

TI5N	2890	8861	670	5,936,870
HG1S	2005	6571	582	3,824,322
RW9C	1853	6760	512	3,461,120
RL3A	2015	6001	545	3,270,545
Z37M	1784	5695	507	2,887,365
T77CD	1590	4964	525	2,606,100
LX5A	1587	5072	513	2,601,936
AF4Z	1749	4524	515	2,329,860
KP2D	1608	4720	485	2,289,200
OL5Q	1408	4509	459	2,069,631
SX6A	1558	4195	476	1,996,820
OK6A	1287	4187	456	1,909,272
S53M	1170	4126	447	1,844,322
YZ7EM	1147	3472	420	1,458,240
UZ4E	1172	3353	427	1,431,731
LU7FJ	1074	3201	435	1,392,435
NN6NN	1317	3132	394	1,234,008
KJ7TH	1356	2973	376	1,117,848
DF3GY	805	2776	369	1,024,344
VE3FJB	832	2371	373	884,383
UZ5N	619	1984	278	551,552
V31GW	776	1914	269	514,866
IY4W	627	1634	293	478,762
YU7AJM	403	1198	227	271,946
F8KFN/P	395	1104	201	221,904
OM3RJB	301	771	193	148,803
WF4DD	340	644	176	113,344
N3XLS	142	298	106	31,588
RK3RWL	20	44	19	836

OPS: TI5N (N5KO, W6OTC), **HG1S** (HA1TJ, HA1DAE, HA1DAC, HA1DAI, HA1AG, HA3UU, HA3LN, HA3MY, HA1AH, HA1SN), **RW9C** (UA9CGA, RW9CF, RA9DK), **RL3A** (UA3ASZ, RX3DCX, RV3BA, Peter), **Z37M** (Z32PT, Z32ID, Z36W), **T77CD** (T77CD, IK4GNI, IK4DDI, IK4UQA), **LX5A** (LX1RQ, LX1JH, LX1TI), **AF4Z** KE4MMI, WO4D, WB4EQS, K4PX, K4QD, KC4HW, WT4I, AF4Z), **KP2D** (KP2N, KP2VI, NP2M, NP2W, NP2DJ, NP2DZ), **OL5Q** (OK1HRA, OK1INC, OK1VSL, OK1FFU), **SX6A** (SV1DPI, SV1CIB, SV1DPP), **OK6A** (OK2CMW, OK2INW, OK2ACM, OK2PSE), **S53M** (S51DM, S51ZO, S53ZO), **YZ7EM** (YZ7EM, YU7AL), **UZ4E** (UR4EN, UR7EU, Sergej), **LU7FJ** (LU3FLV, LU4FXI, LU5FF, LU5FII, LU7FNI), **NN6NN** (N6EE, W6XK, N6LK, W5NH, NR6N), **KJ7TH** (KJ7TH, KW7N), **DF3GY** (DF3GY, DL2GAG), **VE3FJB** (VE3FJB, VA3DG, VE3IJM, VA3NX, VE3VSM, VA3CW), **UZ5N** (UR5NCX, UR5NGX, UR5NNF, US-N-701, US-N704, UT8NA), **V31GW** (V31GW, V31FG, V31YN), **IY4W** (IK4MHB, I4JED, I4LEC), **YU7AJM** (4N7TA, YU7YZ, YU7HC, YT7XT, 4N7NN, Ivan, Peter, Andrej, Jaro, Stano), **F8KFN/P** (F5TEF, F5TEU, F8CHR), **OM3RJB** (OM5CW, OM5MB), **WF4DD** (KG4CZU, W2DZO), **N3XLS** (N3XLS, N3KAE), **RK3RWL** (RN3RC, RU3RQ)

MULTI-OPERATOR MULTI-TRANSMITTER

LY5A	3647	11497	699	8,036,403
RKØAXX	3113	10534	657	6,920,838
EMØU	2415	7225	576	4,161,600
RO4M	2555	6950	578	4,017,100
KA4RRU	2207	5592	556	3,109,152
WX5S	2345	5184	497	2,576,448
AE9B	1896	4175	508	2,120,900
OH2K	424	1143	245	280,035

OPS: LY5A (LY2PAJ, LY2TA, LY2BIG, LY1BA, LY2KW, LY3MM, LY2IJ), **RKØAXX** (RAØAM, RAØAHC, RAØALM, RVØAX, RVØAEV, RVØAR, RUØAAB, RUØAB, RUØAIG, RUØAM, RUØAT, RWØAR, RXØAE, UAØAGI, UAØANW), **EMØU** (UR5UDX, UT1UA, UT2UZ, UT3UA, UT5UGR, UT7UW, UU4JMG, UY2UA), **RO4M** (RA4LW, RA4HCN, RA4LZ, RW4LE, RU4HP, RU4LM, RV4HL, RN4LP, UA4LY, UA4LDP), **KA4RRU** (K5OF, KA4RRU, KE4BUS, N3YBY, N4DXS, N8CIA, W4DAV, W4MGM, WA4TK, WB4ZNH, WN4FVU), **WX5S** (AC6JT, W6ZZZ, W1SRD, KØBEE, NI6T, WX5S, K6UFO, W7SW, W6LD, AE6KU, K6ENT, N6DE, W6YX), **AE9B** (AE9B, NWØL, WØZAP, KØLW, KI7WO, NØTT, KGØUA, KØVBU, NØAG, KCØCOP), **OH2K** (OH2GFY, OH2JRR, OH2KHX, OH2LRE)

CHECKLOGS

7L4IOU, DL2OE, DL7BW, DL8UFO, G3NXT, GSØTOW, JU1T, KØIDT, K4WW, K6KYJ, KB9Q, KCØDEB, PBØANX, RF4R, SM6BSK, SN7N, SP4CGJ, SP7FDV, T95DVD, UAØFDX, UT3UA, UXØUN, W1LZ, YO4DFT.

Announcing:

The 2003 CQ WW RTTY DX Contest

September 27–28, 2003
Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday
Logs are due no later than October 31, 2003

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 so 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 that 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 (i.e., Michigan = MI; Massachusetts = MA, Ohio = OH). One multiplier point for each DX country in the ARRL and/or WAE country list 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), NT (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, 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 31, 2003.**

2. Electronic Submissions.

(a) In the "Subject:" line of your e-mail message please include your callsign and the category you entered—i.e., 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 Street #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 31, 2003.** Logs received after the deadline may be listed in the results but will be ineligible for any awards.

math's notes

BY IRWIN MATH,* WA2NDM

Super Capacitors

When we started out in electronics, which sometimes seems like the dark ages, a 100 microfarad capacitor (at 450 volts) was quite a large device. Values in the tens of microfarads were more common and considerably less expensive. Even when I went to college, my electrical engineering labs used what were then thought of as ancient capacitors (all oil filled) with values of 1 to 10 microfarads.

Imagine my surprise when I became aware of the so-called "super capacitor" with its value of 1 farad or higher! This value was only *mathematically* possible when I went to school—not a real device. Why, it would take ten-thousand 100 microfarad capacitors to equal 1 farad! Well, these devices exist today, and if you look at the latest Mouser catalog you will see that they are commonly available in values of up to 50 farads—incredible! Some manufacturers even offer devices into the thousands of farads! What does all of this mean? Does it mean that we no longer need batteries? Does it mean that we can build 555 timers with delays of days, months, or even years? We decided to investigate.

Super capacitors are called that because of their extremely high capacitance. However, they are still basically capacitors. Most are manufactured from carbon, not aluminum foil, as used by their lower value cousins. This means that their equivalent series resistance (ESR) is high at low frequencies (and DC), which can limit their usefulness in some applications. Another limitation is their operating voltage, currently in the area of only 2.5 volts or so. Operating at higher voltages requires that you configure various series/parallel combinations. To make a long story short, how can you use these devices?

The first application is as a filter for a power supply, albeit a low-voltage one. By connecting a super capacitor across the output, high-current pulses can be drawn from the battery without significantly straining it or causing self-heating. The capacitor will charge in the normal manner, but when a current pulse is needed from the circuit, most of the energy will come from the capacitor, not from the battery. If higher voltages are needed, you will

*c/o CQ magazine

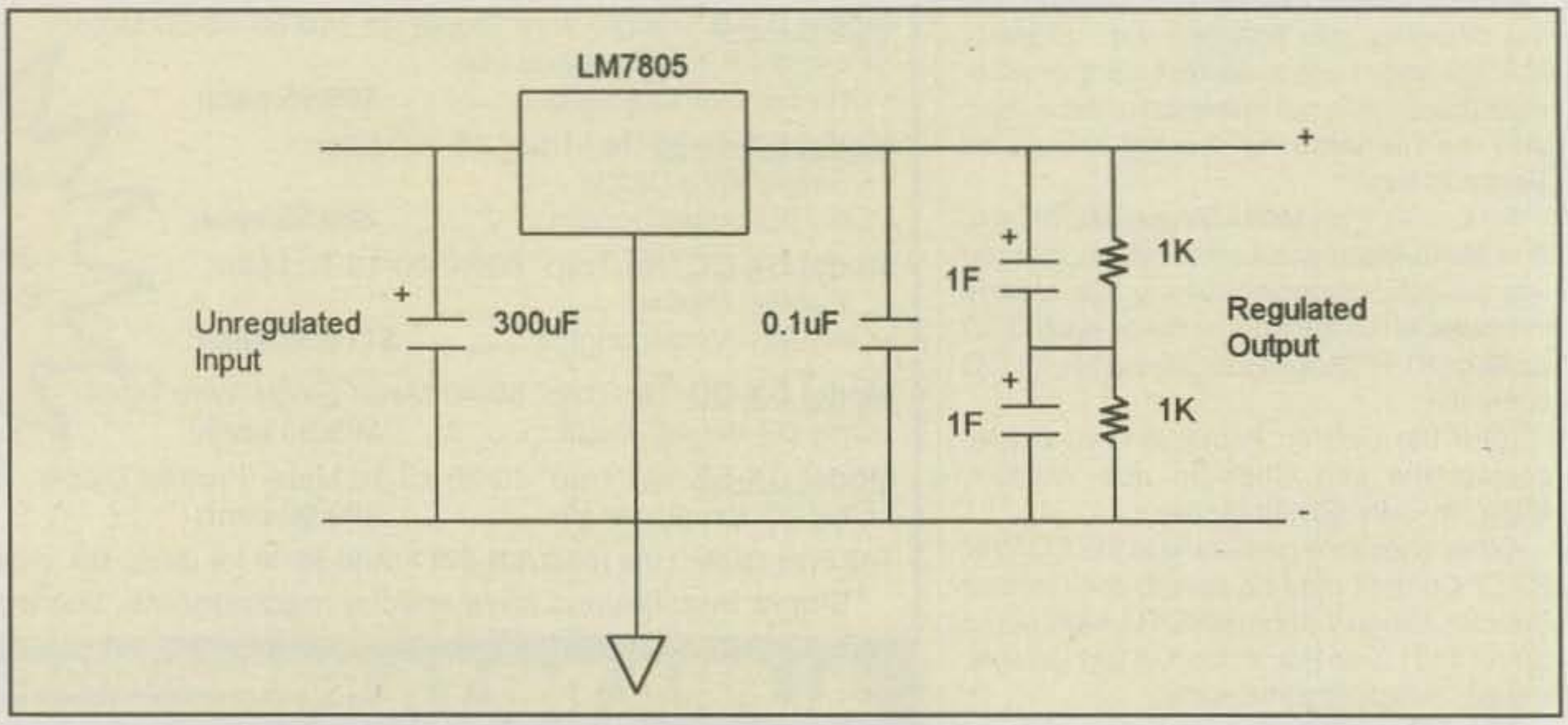


Fig. 1– The use of two 1 farad super capacitors in a 5 volt power supply.

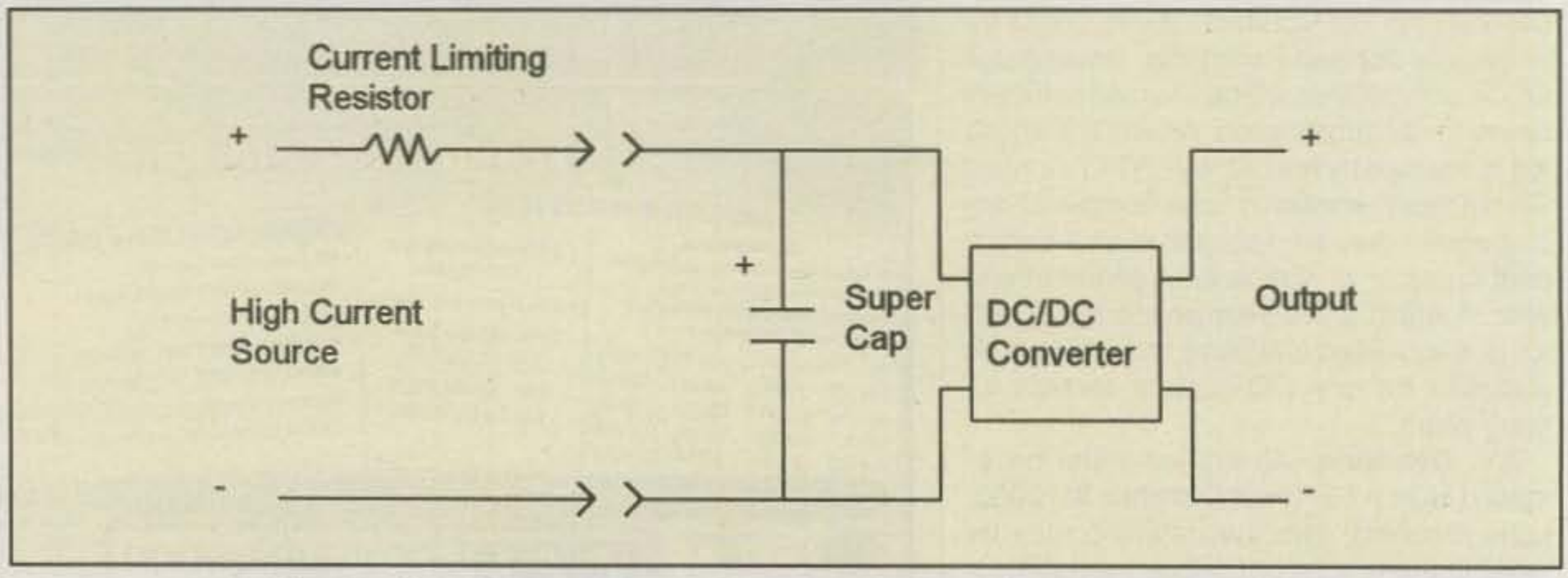


Fig. 2– Use of a super capacitor as a "quick charge" power source.

have to stack units. However, as with most capacitors, connecting them in series halves the capacitance. Fig. 1 is a schematic of a 5 volt power supply using two 1 farad super capacitors (with an equivalent final capacitance of 1/2 farad, or 500,000 µF). Note the two 1K resistors connected across each super capacitor. These are required to equalize the voltage across the two capacitors to be sure that neither operates at more than its rated value. Such a supply will not only provide a regulated 5 volt output, it will be able to handle narrow current spikes, well into the amp range, without the need for a higher powered regulator or source. Needless to say, ripple will be quite low!

The circuit of fig. 1 will also continue to provide voltage for a short time after the loss of power. Just how long will be a function of the current drawn, but will still be many times that of conventional capacitors. This feature may be useful for circuits that need to be powered down slowly, or to continue to operate during periods of power-line glitches or momentary interruptions.

As far as timing circuitry is concerned, one manufacturer of super capacitors indicated that a typical unit, when charged, will self-discharge to 50% of its initial voltage in 30 days. This means that simple timers in the range of weeks and months are probably not practical, but intervals of hours or even days may well be so. Here is an interesting area in which to experiment.

A final application of a super capacitor is as a power source that needs to be charged quickly, such as for low-power radios or even toys. Since the super capacitor is just that, a capacitor, it can be charged quickly by a high-current pulse. If the drain across the capacitor is then small, the device will function as a "poor man's battery," especially for the higher capacitance units. Fig. 2 shows a simple way to implement this, and if the capacitor value is very high and the drain is very low, a significant operating time will result. Remember, you can always parallel these devices for almost any capacitance you need.

As the super capacitor is a fairly new device, we suggest that you visit the websites of several of the manufacturers of these devices for more applications information and full data. They are Cooper Electronic Technologies at <www.cooperET.com>, Maxwell Technologies at <www.maxwell.com>, and NessCap at <www.nesscap.com>.

Also, please let us know of your experiences with these super capacitors.

73, Irwin, WA2NDM

public service

BY BOB JOSUWEIT,* WA3PZO

Hams Respond as May Sets New Tornado Record

NOAA Honors Helping Hams

This past May marked the 50th anniversary of the third deadliest year for tornadoes in the United States, and the month began by setting new tornado-related records. It started on Sunday, May 4, when cold, dry air moving from the Rockies collided with warm, moist air from the Gulf of Mexico, resulting in giant, supercell storms and deadly tornadoes in up to eight states. Residents of eastern Kansas; northwest, southwest and northern Missouri; and parts of Arkansas, Nebraska, Tennessee, South Dakota, Oklahoma, and Mississippi were sent scrambling for shelter from tornadoes, high winds, and large hail. As always, amateur radio operators across the region were activated by the National Weather Service Skywarn program.

This month we'll look at the amateur radio response to multiple tornadoes that resulted in at least 42 deaths and thousands of properties being damaged or destroyed. According to the National Weather Service in Norman, Oklahoma, the beginning of May will qualify as the most tornado-active period in modern recorded history. In just seven days over 360 tornadoes were reported to the weather service nationwide. The most recent comparison was 159 reported in 1999. The number of reported tornadoes will continue to rise with new technologies and an ever-growing number of weather spotters.

*c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>

The Week Starts

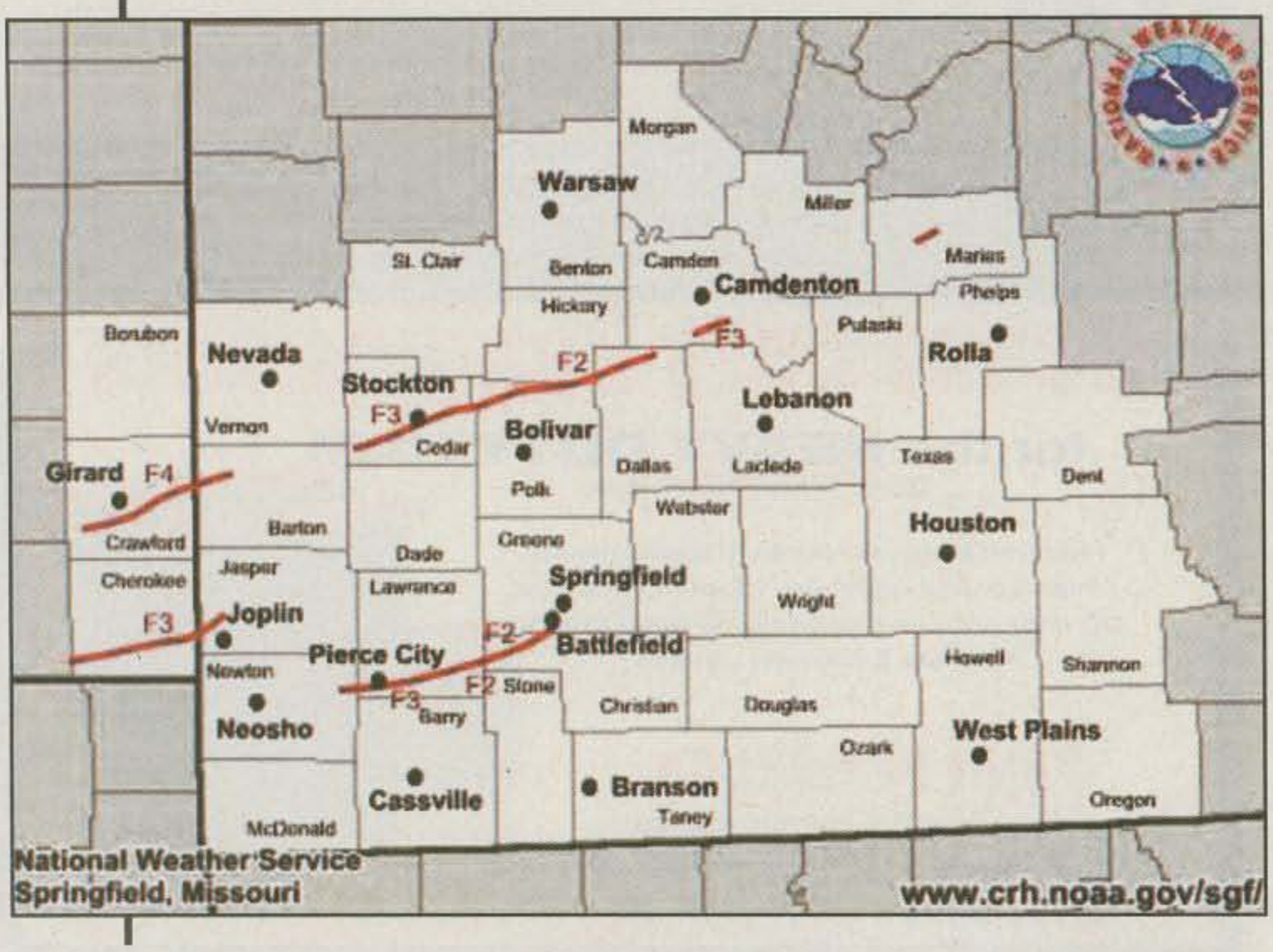
Moniteau County, Missouri Amateur Radio Emergency Service members were asked to be on standby as severe weather began to approach the area. Bryan Nehl, KØEMT, Moniteau County Emergency Coordinator, said he was able to monitor the local UHF repeater and the area Skywarn net from the county emergency operations center. Other ARES members were deployed in the field as storm spotters. The group was able to maintain contact with the National Weather Service in St. Louis via the WØSMI linked UHF repeater system.

As the storm passed their location, they knew their work was not done. They monitored a request for communications and medical assistance in Camdenton, which had just been hit by a tornado. "As our area appeared to be in the clear," Nehl said "a contingent of three of our operators made a rapid response to Camdenton. Of the three responding, two were firefighter/EMT trained and the other a chaplain." As they were responding, critical information was passed between the two counties, including a new tornado warning for Camden County. Once on the scene, the chaplain was assigned to the shelter and the EMTs became primary first responders for a wide coverage area. Once operations shut down for the night at 3:35 AM, the ARES members were released and they returned home.

Nehl described their drive to get to their destination: "Little pictures on a computer screen or TV do not do the devastation justice. What you are seeing is like looking through a knothole in a fence. The destruction went for several city blocks in every direction. The stuff we were seeing on the way in would normally be considered 'bad' and it was getting lower priority response. That was the first indicator that 'really bad' stuff was ahead. There were a number of times we saw trees totally stripped of their leaves."

Hams Help Across State Lines

A major storm went through several counties in southeastern Kansas and southwestern Missouri, causing 21



National Weather Service map shows the path of destruction by tornadoes in early May.

HEIL SOUND

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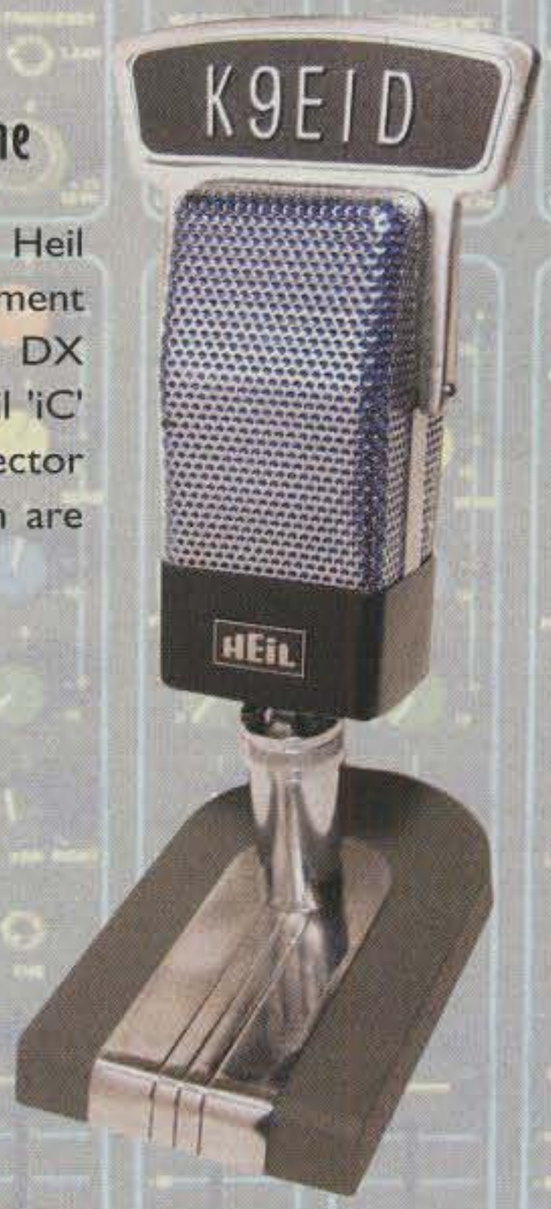

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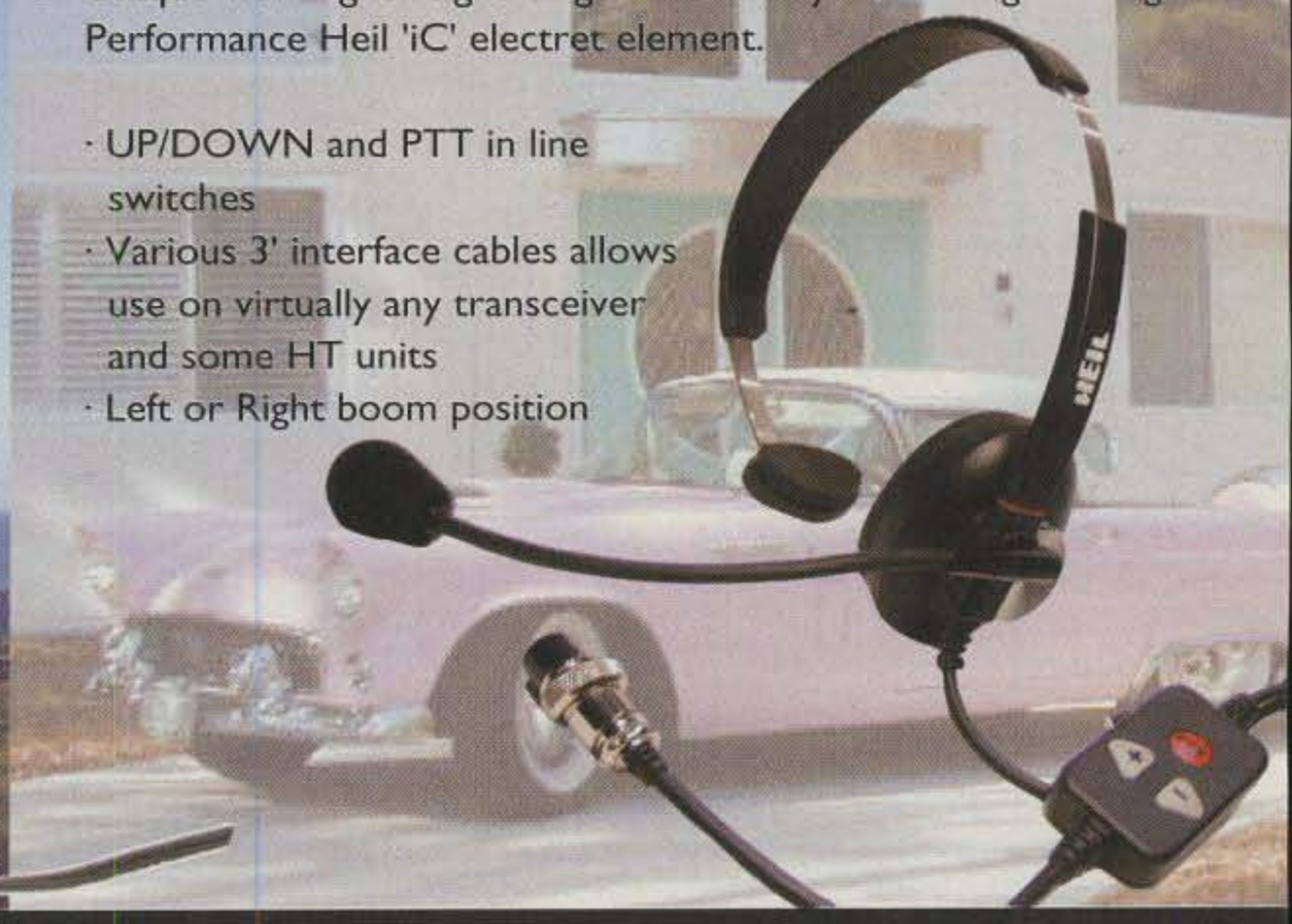

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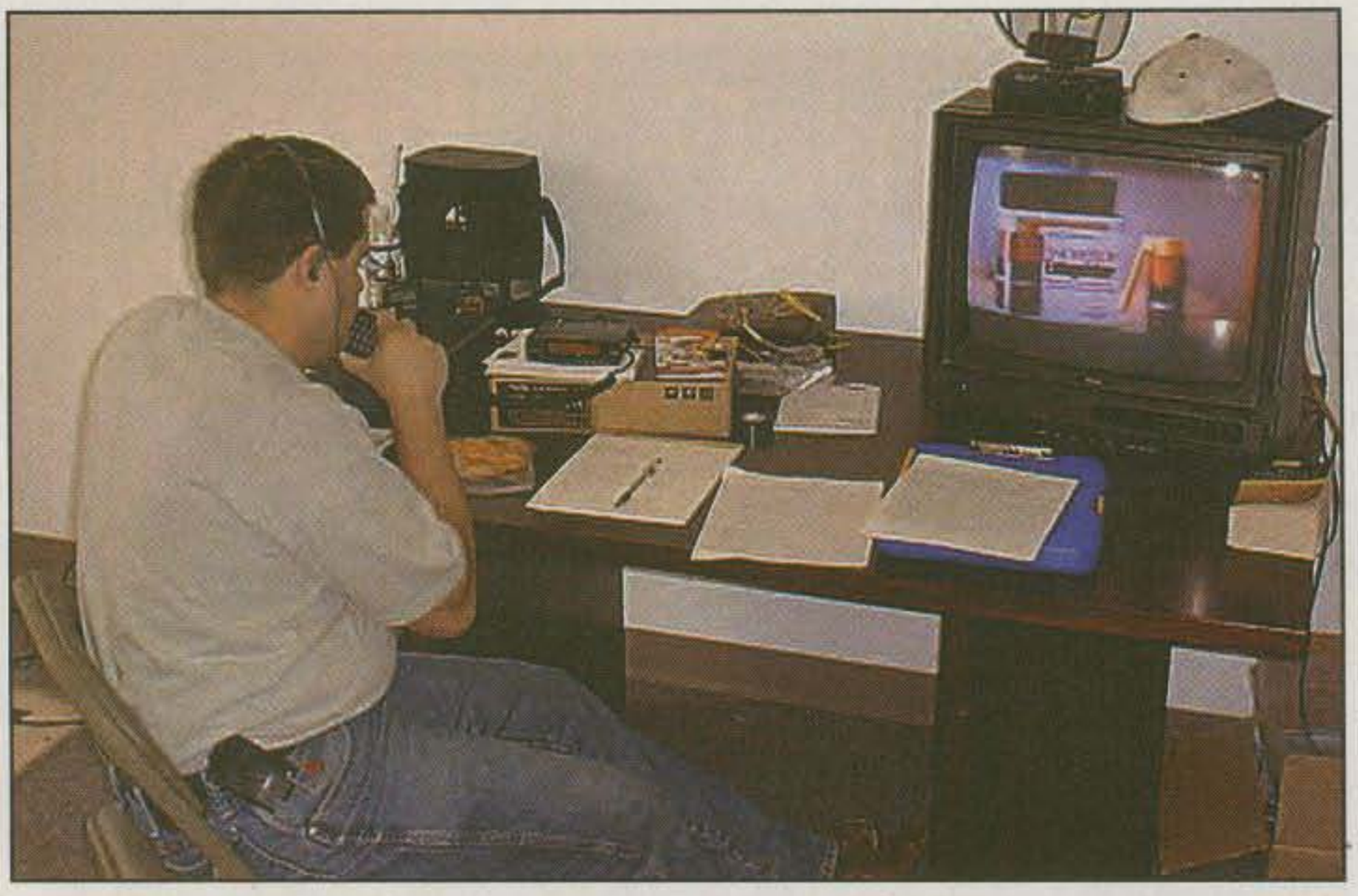


KBØHNR provides communications from Salvation Army Command Post. (Photo courtesy KØEMT)

deaths and widespread destruction. An HF net was established between all Missouri counties in the affected area. Contact was also established with an ARES group in Kansas. Missouri District F ARES Emergency Coordinator Dale Huffington, AEØS, said his group responded to a request for help in Kansas. The next day the group reported to the Salvation Army Center in Pittsburg, KS, where the command post was established. Radio links were set up on 2 meters, 70 centimeters, and 40 meters by the ARES group and members of the Salvation Army's SATERN team. Their main responsibility was to handle messages about donations, supplies, and volunteer accommodations. The Salvation Army had several canteen sites set up throughout the disaster area. Weather information about tornado watches and warnings continued to be passed to the volunteers in the field.

Team Go-Kit

The team was well prepared. Members were able to provide equipment which included dual-band VHF/UHF mobile units, dual-band hand-held units, transceivers, wire and vertical antennas for 80 and 40 meters, push-up poles for VHF and HF antennas, batteries, inverters, coax, spare VHF/UHF antennas, and repair equipment, including antenna analyzers.

While the Missouri ARES team was busy helping in Kansas, word came that tornadoes had touched down in their home communities. Since team members KBØHNR and KØEMT are both emergency management leaders at home, they maintained close contact with local amateurs who were providing information from the National Weather Service. By mid afternoon the group was able to return home while driving through areas under tornado warnings.

Requests continued to come in for amateur radio support. The Red Cross needed communication links with those of its teams that were doing damage assessment. The Salvation Army needed more help as it set up more food canteens in the disaster area. "This is another opportunity to be of service," said Larry Staples, WØAIB, of Shawnee Mission, KS, "to those *much* less fortunate, the people who lost their homes in yesterday's storms." One situation update by the Salvation Army said the work of the SATERN team members has been "invaluable." Operations continued for several days as new tornadoes hit the ground—13hours here, 10 hours there, 8 hours in another town. Each deployment established canteen and initial need supplies. For many, the only question was when they would be deployed again. Over 1300 man hours were logged in a short period of time. The number of volunteer hours would still increase.

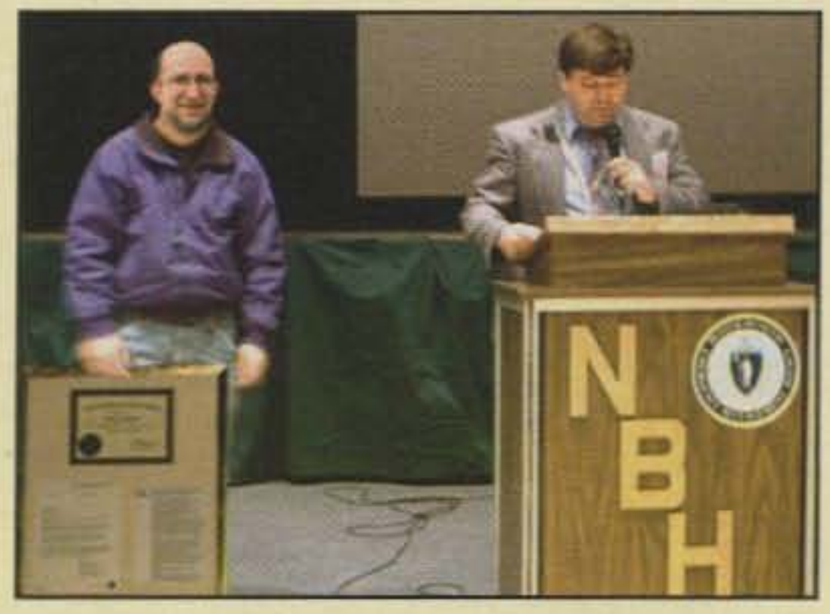
Oklahoma Hams Respond

Later in the week a severe tornado ripped through the Oklahoma City area. John Thomason, WB5SYT, ARRL Oklahoma Section Manager, said at least 50 hams were active supporting emergency operations during the first 24 hours following the May 8 tornado. According to Thomason, "Unusual VHF propagation conditions are resulting in same or similar frequency repeaters in Oklahoma and other states being heard on repeater frequencies being used in the recovery effort." He said the other repeater operators were cooperative and shut down their repeaters while the conditions existed. Ironically, many of the hams now assisting had just returned from an extensive two-day Salvation Army Disaster Conference. Thomason said, "The Salvation Army is providing a superb opportunity for ama-

Amateurs provide communications from many Canteen locations throughout the disaster area. (Photo courtesy KØEMT)

Brian Peters, WD4EPR (left), Warning Coordination Meteorologist with the National Weather Service in Birmingham, Alabama, presents the Environmental Heroes Award to ALERT President Chuck Arthur, KF4SSX. (Photo by Chuck Biddinger)

Bob Macedo, KD1CY, one of this year's NOAA award winners. (Photo courtesy Mike Neilsen, W1MPN)



teur radio to shine brightly." He added that amateur radio was "doing so." Less than two days later, amateurs were again activated by the National Weather Service. "Hams were very busy last night after midnight tracking a very dangerous storm," said Steve Miller, Jr., KC5TRR, of Tulsa, OK.

The severe weather required long-term coverage at critical locations throughout the disaster area. Each day required staffing between 7 and 12 canteens as well as other critical positions for approximately 18 hours. These canteens provided food and water to those in need as well as to relief workers. Three six-hour shifts were established. Many hams had been working their normal jobs and then working an additional 12 hours in the disaster area. Typical radio requirements included a mobile unit or a 5 watt HT with a portable antenna. Clay Mayrose, WA6LBU, who helped coordinate operations, pointed out that "rubber ducks are not portable antennas." Anther issue that relief workers had to keep in mind was that the canteens are made of aluminum. Magnetic-mount antennas were not effective while a vehicle was moving. There was a need to be able to move the mobile rig into another vehicle. According to Mayrose, "In some areas your personal vehicle will be able to follow the canteen but not in all areas." Finally staffing issues were made easier when a club "adopted" a canteen. The Choctaw Amateur Radio Club agreed to staff one canteen for the duration of the event. There was a request for more clubs to come forward.

Tornadoes are Nothing New

In mid-April a tornado cut across Washington County, OK, north of Bartlesville. This time 56 homes along a 12 mile path were either damaged or destroyed by the F2 tornado. As with the deadly May tornadoes, amateur radio operators were responsible for many of the initial reports prior to touchdown as well as tracking the storm and reporting on the debris path. In some cases amateur radio operators were the first on the scene in some of the most devastated damage areas and provided search-and-rescue services based on additional training they had received. The hams were not just communicators; they provided resource coordination, damage assessment, logistical support, and documentation. Any time the National Weather Service calls out hams, it knows they can make a difference. The hams are the eyes and ears of the National Weather Service. Forecasters can look at the radar and tell there is bad weather, but they are not able to tell if a tornado has formed or if it has touched the ground. This is where Skywarn members shine. They pick up where the fancy equipment leaves off.

NOAA Honors Skywarn Volunteers as Environmental Heroes

The National Oceanic and Atmospheric Administration (NOAA), parent agency of the National Weather Service, selected the Alabama Emergency Response Team (ALERT) and two individual ham radio operators as recipients of this year's NOAA Environmental Hero Awards. The award honors NOAA volunteers for their "tireless efforts to preserve and protect our nation's environment."

"NOAA and the nation are fortunate to have such dedicated people volunteer so much of their time," said retired Navy Vice Adm. Conrad C. Lautenbacher, Ph.D., Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator. "They set a perfect example for others to follow in their communities. America needs more environmental heroes like them." In all, 35 individuals and one organization were honored this year.

"On behalf of the 12,500 men and women working for the National Oceanic and Atmospheric Administration, I am pleased to present you with this 2003 Environmental Hero Award," Lautenbacher wrote in a letter to the recipients. "Your dedicated efforts and outstanding accomplishments greatly benefit the environment and make our nation a better place for all Americans."

The Alabama Emergency Response Team (ALERT), volunteers in Calera, AL, have put in hundreds of hours of time in support of severe weather operations in central Alabama over the past eight years. ALERT is a voluntary organization of mainly amateur radio operators who staff the radio equipment in the NWS Birmingham office to maintain direct contact with storm spotters and Emergency Management Agency officials in the field. On November 10, 2002 eleven tornadoes, including two long-track F3 tornadoes, killed twelve people across central Alabama during the worst outbreak of severe weather for the entire year. The volunteers with ALERT staffed the amateur radio equipment at the Birmingham NWS office and relayed severe-weather reports to the warning meteorologists. They also relayed the warnings as they were issued, keeping numerous emergency-management offices up to date. These reports were crucial to the issuance of

How Do I Get Involved?

Severe weather is not something you take lightly. In the case of severe thunderstorms and tornadoes, there is a need to understand how a storm develops, the signs that more trouble may lie ahead, and when it's time to get out of harm's way. There is also the need to understand that your role may change in a matter of minutes from reporting on severe weather to providing assistance with search and rescue or damage assessment.

The organization of spotters varies across the country, but is typically done at the county level. If there is a Skywarn group already active in your area, join in. If you are not sure if there is a Skywarn program in your area, check with your local club, ARRL Emergency Coordinator, or Section Emergency Coordinator. They will be able to point you in the right direction.

Once you get involved with the organization take the time for training. This would include learning how Skywarn fits into the overall emergency operations plan, how to identify severe weather formations, and how to properly report what you see to the National Weather Service office.

Spotters may be able to participate just by looking out the windows of their homes, or they may be asked to drive out to developing storms and follow them toward the area being watched. As the week of deadly tornadoes in May showed, a lot of manpower is required to provide service to the community.

new warnings and to impress upon the public the need for protective action. The dedication and hard work of the ALERT volunteers during the tornado outbreak clearly saved lives.

Under the leadership of ALERT President Chuck Arthur, KF4SSX, team members have spent hundreds of hours coordinating storm reports in support of severe-weather operations throughout the Birmingham office's warning area. Over the years they have proven invaluable during major events such as the historic tornado outbreak of November 24, 2001; the F4 tornado that struck Tuscaloosa County on December 16, 2000; and the April 8, 1998 F5 tornado that ripped through Jefferson County.

In a letter to ALERT members, Arthur expressed, "My most humble appreciation to *all* of the 'heroes' who made this recognition of ALERT a reality. Without the individual commitment you all have to serve the community, the NWS, and the State of Alabama in times of severe weather and crisis, our ongoing mission of saving lives would never have been possible. I look forward to continuing this effort and to strengthening our collaborative spirit across the state by enhancing our level of service and effectiveness in the months and years to come."

Moving from Alabama to Massachusetts, NOAA also recognized Robert Macedo, KD1CY, who has been the Skywarn Coordinator for the NWS-Taunton office since 1994. He has helped the program grow from 800 weather spotters in southern New England to 3500. He drafts and distributes his own e-mail newsletter to more than 700 key spotters and emergency managers, organizes NWS training sessions, and uses his personal time to promote the NWS mission. Because of Macedo's efforts, the NWS receives more real-time reports than ever before, thus having a direct, immediate, and positive impact on NWS warning operations. He has also assisted NOAA in surveying storm damage and the implementation and testing of a new high-frequency tower/antenna now in place at the weather service office.

Don McFarland, W5WD, of the Alamo Area Council of Governments in San Antonio, Texas, contributed to the improvement of public safety for south central Texas over the past decade by obtaining funds for a NOAA Weather Radio, expanding Amateur Radio Skywarn Spotter capabilities, and acting in numerous life-threatening situations as a Skywarn spotter and net control. McFarland also improved delivery of warnings in severe weather by linking the Emergency Managers Weather Information Network (EMWIN) to pagers of local officials. As a Skywarn Amateur Radio Operator he helped expand the program, serving both as a spotter and a network controller. His reports at several ungauged locations during the November 2001 and July 2002 flood events were critical in saving lives.

Congratulations to all of the winners and all who volunteer to serve in the public interest!

With Thanks . . .

Each month we work on sharing some of the most interesting stories in amateur radio public service. Telling that story would not be possible without reports from those who are on the scene. This month I would like to thank KØEMT, WB5SYT, N7XYO, KF4SSX, KB4KCH, N1IV, and N1VUX. Until next month . . . 73, Bob, WA3PZO

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SS-18	15	18	1⅜ x 6 x 9	3.6
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SS-30	25	30	3¾ x 7 x 9⅝	5.0

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SS-25M*	20	25	2⅞ x 7 x 9⅜	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

MODEL SRM-30

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SRM-25	20	25	3½ x 19 x 9⅜	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅜	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	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 9⅜	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅜	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

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MODEL SS-10EFJ-98

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KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
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SS-12MC
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
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SS-12RA
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SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

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BY DAVE INGRAM,* K4TWJ

Microphone Mania! Part II

If last month's photos and discussions of microphones from our memorable past caught your attention, check out the heartwarming beauties and collectible delights here in Part II. Once again Bob Heil, K9EID, and I have put together a captivating mix of mic views new and old, plus voice-operating notes guaranteed to please all.

As you may know or recall, Bob is the bright light behind those great-sounding Heil microphones you hear folks using on the air in ever-increasing numbers. He also has a killer collection of mics dating back to the early days of broadcasting, and they really inspire you to hunt down some golden oldies to spice up your shack—or rework and use today. We have you covered there, too! As a special treat this month, we describe how to assemble your own "retro mic" with a flea-market-obtained case, a cardboard back baffle, and a super-sounding Heil element. Having fun with classic microphones is a pursuit everyone can enjoy regardless of finances or technical expertise. Go for it!

Mics El Grande!

Would you like to add a special touch of class and flash to your home, portable, or mobile station? Put together your own retro mic either from scratch or by modifying a microphone from yesteryear. It's fun, and it is also easy to do. In fact, the most challenging part will be finding and cleaning up that special mic of your dreams. Some folks like the big chrome-head beauties, some prefer the D-104 "Lollipop" or the JT-30 "Green Bullet" look, and some like the "Candlestick" or Roaring '20s telephone look. Oh, such pleasant choices!

Automobile cutting compound works well for cleaning both chrome and painted finishes on old microphones. Steel wool works even better on heavily weathered chrome, but rub gently to avoid adding scratches or creating the necessity for rechroming. Polish the cleaned mic case with several coats of a good paste wax, and then replace the mic's passé grill cloth with a piece of red, green, or blue silk for pizzazz. If the mic was designed for PA use with an on/off switch, replace or rewire it for PTT operation. Check to see if either one of your rig's two mic wires is connected to ground (an *unbalanced* configuration) or isolated from ground (a *balanced* configuration), and follow suit in your element hook-up. Then remember to add a small (low voltage) 1 or 2 µF non-polarized or (if non-polarized is not available) a pair of 1 µF tantalum capacitors wired negative-to-negative as shown in fig. 1 in one mic line. The capacitor(s) will pass audio from the element, but block rig-supplied DC and prevent short-circuit damage to the element or rig. The vintage microphone's output cable will proba-

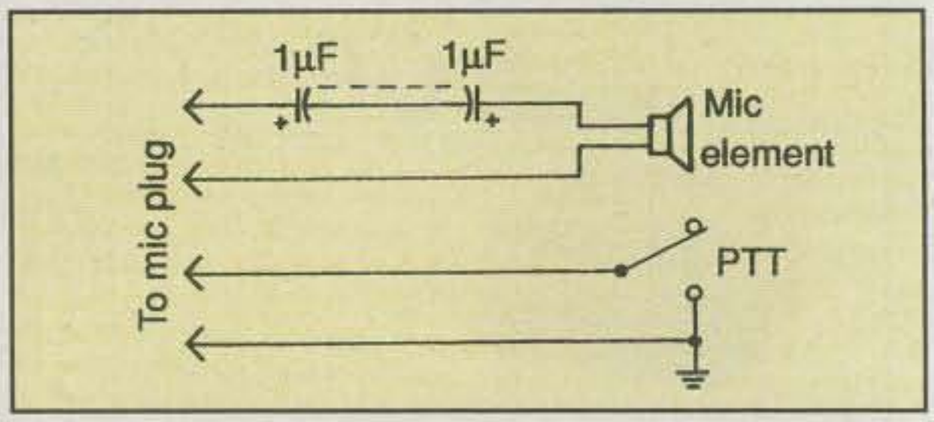

Fig. 1– Outline of how to install blocking capacitors in series with one-element wire when making a retro mic as discussed in the text. Notice in this example both element wires are isolated from ground and/or the PTT line. This is called a "balanced" configuration. Do not change it and ground one mic wire (and likewise do not change a grounded mic wire to "unbalanced"), or hum may result. (Discussion in text.)

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

Photo A– Timeless beauty and a smooth sound like no other mic appropriately describe the legendary RCA-77D. This famous "Capsule mic" saw extensive use in top-line broadcast and recording studios from the 1930s to the 1960s, and reconditioned '77Ds still grace some studios today. Watch the TV "Late Show," and you will see a desk-prop RCA-77D on David Letterman's desk. (Mic owned and photographed by Bob Heil, K9EID)

Photo B– Electro Voice introduced the EV-1A as a less-expensive alternative to RCA's "Capsule mic," and it too gained favor in broadcast and recording studios nationwide. The microphone also prompted evolutions in design between RCA's 77D Capsule and 74B Diamond mics. Note the petite tripod base mount. A most impressive mic! (Photo courtesy Bob, K9EID)

RSGB Books now available from CQ

Antenna Topics

byPat Hawker, G3VA

RSGB. 2002 Ed. 384 pages.
This book is a chronological collection of selections of G3VA's words over the years. Hundreds of areas and subjects are covered and many a good idea is included.

Order No. RSAT $29.00

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RSGB, 1st Ed., 1992. 233 pages.
A collection of outstanding articles and short pieces which were published in Radio Communication magazine during the period 1968-89. Includes ingenious designs for single element, beam and miniature antennas, as well as providing comprehensive information about feeders, tuners, baluns, testing, modeling, and how to erect your antenna safely.

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Edited by Roger Balister, G3KMA.
RSGB, 2002 Ed., 128 pages
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By Joe Carr, K4IPV
RSGB & Newnes, 2002 Ed.
256 pages.A definitive design guide for sending and receiving radio signals. Together with the powerful suite of CD software included with this book, the reader will have a complete solution for constructing or using an antenna; everything but the actual hardware!

Order: RSANTKIT2 $40.00

Practical Projects

Edited by Dr. George Brown, M5ACN
RSGB 2002 Ed, 224 pages
Packed with around 50 "weekend projects," Practical Projects is a book of simple construction projects for the radio amateur and others interested in electronics. Features a wide variety of radio ideas plus other simple electronic designs and a handy "now that I've built it, what do I do with it?" section. Excellent for newcomers or anyone just looking for interesting projects to build.

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Low Power Scrapbook

RSGB. © 2001, 320 pages.
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RSGB. ©2001. 288 pages. **$34.95.**
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50 HF antennas, 14 VHF/UHF/SHF antennas, 3 receiving antennas, 6 articles on masts and supports, 9 articles on tuning and measuring, 4 on antenna construction, 5 on design and theory, and 9 Peter Hart antenna reviews. Every band from 73kHz to 2.3GHz!

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The Antenna Experimenter's Guide

RSGB. 2nd Ed, 1996. 160 pages.
Takes the guesswork out of adjusting any antenna, home-made or commercial, and makes sure that it's working with maximum efficiency. Describes RF measuring equipment and its use, constructing your own antenna test range, computer modeling antennas. An invaluable companion for all those who wish to get the best results from antennas!

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HF Amateur Radio

RSGB, 2002 Ed.
The HF or short wave bands are one of the most interesting areas of amateur radio. This book takes the reader through setting up an efficient amateur radio station, which equipment to choose, installation, and the best antenna for your location and MUCH more.

Order: RSHFAR $21.00

Radio Communication Handbook

Edited by Dick Biddulph, G8DPS and Chris Lorek, G4HCL.
RSGB, 7th Ed., 2000, 820 pages.
This book is an invaluable reference for radio amateurs everywhere. It also provides a comprehensive guide to practical radio, from LF to the GHz bands, for professionals and students.

Order: RSRCH $50.00

Amateur Radio Mobile Handbook

RSGB. 2002 Ed., 128 pages.
The Amateur Radio Mobile Handbook covers all aspects of this popular part of the hobby. It includes operating techniques, installing equipment in a vehicle and antennas, as well as maritime and even bicycle mobile. This is essential reading if you want to get the most out of your mobile station.

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Backyard Antennas

RSGB, 1st Ed., 2000, 208 pages.
Whether you have a house, bungalow or apartment, Backyard Antennas will help you find the solution to radiating a good signal on your favorite band.

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By Fred Handscombe, G4BWP.
RSGB. 6th Ed., 2003. 48 pages.
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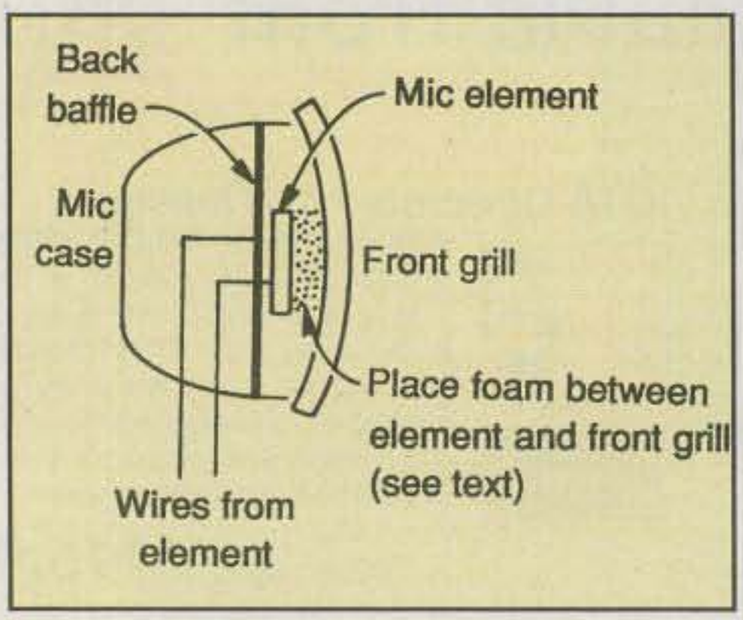


Fig. 2– Suggested layout for quickly assembling your own retro microphone. Element mounts to back baffle ,which is cut to fit snugly just inside the mic case, then the front of the element is covered with grill cloth. (See text.)

Photo C– RCA recaptured its authoritative position in the radio broadcasting and recording industries with the ever-popular 74B Diamond mic. Indeed, this smaller and less-expensive version of the 77D stands as a perfect balance in cost, looks, and performance. Just look at that grill . . . those lines. Now, friends, that's a real radio mic! (Photo courtesy K9EID)

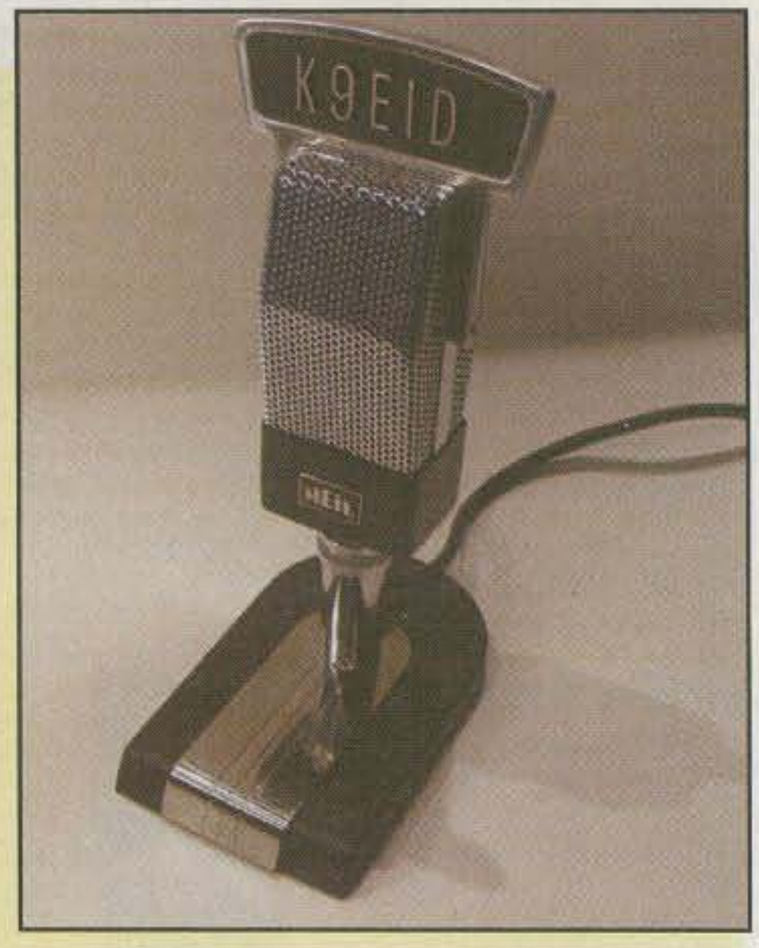


Photo D– Externally, Heil Sound's new Classic model desk mic is an exact replica of RCA's famous 74B Diamond mic. Internally, it is fitted with Bob's new wide-range and studio-grade element which makes modern transceivers sound marvelous. The microphone also includes a switch-selectable Heil HC-5 or HC-4 "DX" element (chosen during purchase) plus a rear PTT switch and ID flag with your call letters. Optional cables let the mic plug into 8-pin Kenwood/Yaesu/ICOM transceivers. (Details at <www.heilsound.com>)

bly be old and brittle, so replace it too (try Heil's new Heilwire cable; it's terrific) and then solder on a plug to match your rig.

I invited Bob to share some pointers on retrofitting microphone heads with Heil elements, and he passed along the following suggestions:

First, be sure you mount the element to a back baffle and support board. Otherwise, your voice will travel on past the element, hit the mic's back wall, reflect back to the element out of phase, and sound quite hollow. I cut a piece of cardboard from the top of a shoe box into a circle, rectangle, or however the mic's head is shaped, and then use double-sided tape or a hot-glue gun to hold the (HC-4 or HC-5) element to the cardboard. Then I route the element wires (poked through previously punched holes in the cardboard) to a connection/solder point for the output cable. I place a piece of mic foam (like that packed in the box with an HC element) over the element's front, and then I place the cardboard baffle with foam-covered element barely inside the mic case so the front closes right on it. That's all—and it works great.

Some folks make the fatal mistake of stuffing the back of a microphone's head with cotton or foam rather than using a back baffle. That doesn't work. Use a baffle.

Finish by checking your completed mic on the air, and set your transceiver's audio equalizer or carrier injection point to fit your voice. For more guidance, check out microphone retrofits at <www.heilsound.com>.

Thanks for the words of wisdom, Bob!

Beyond the Mic

Good audio and a clean signal go a long way toward establishing a good on-the-air image, but they cannot compensate for slurred speech, mumbled words, or unnecessarily lax operating techniques. This is when the pride of being a federally licensed and highly proficient radio amateur is most significant. Have you ever tuned across a frequency only to hear, "Okay, thanks. I can't believe I am working you. My QSL for sure. Bye-bye." Then silence, no calls—just silence. Or "Wahhh-Dooo—mush gush this is slurrer next detoo—dahh—go ahead" followed by an adjacent frequency announcement of "QRZ special event operation"—and again a blank pause. Then a curious (mystified?) station calls and the still unidentified station responds with "Yeah, you're finun—over." Say what? Who's working whom? Do folks realize how they sound to others? Even the best mic and rig are not miracle workers. We all must visualize how we sound and continuously strive to improve our on-the-air proficiency in both speech and operating savvy.

Be proud of your call. Say it with pride—and often—like at the beginning and end of transmissions. Signals traveling through the air are always susceptible to dropouts or fades. Experience

Photo E– You can almost see Winston Churchill talking into this classic Turner U9S microphone. It was super-popular among newscasters of the 1930s (sometimes five or six were lined up for special interviews), and the U9S was also used in many amateur radio setups of the same era. It is a genuine piece of radio history for sure. (Photo courtesy owner K9EID)

Photo F– Take a look at this impromptu hamfest table setting and check out this heartthrob from the Alabama Radio Historical Society. It is a rare 1930-style "Candlestick" microphone styled just like a 1930 telephone—the type gangsters called "blowers." You held the mic in one hand and the tubular earpiece (which hung on a side bracket) in the other hand during use. Oh, to find and retrofit one with a Heil element today! (Photo courtesy K4TWJ and W4AXL)

has proven call letters "get through" (and alert the other operator to begin transmitting) when words and conversations are lost amidst noise or QRM.

Stay aware of your "invisible audience"—those folks quietly listening as they work in their shack or mobile along lonely back roads. Don't leave them guessing who or where you are. Realize, too, that long-lost ham friends and semi-rare DX stations may tune on frequency and pause to give you a call. Talk up, talk clear ,and let your ham pride be heard around the world! The rewards will be returned tenfold!

Show Us Your Microphones

Do you have a special mic (or two!) you enjoy using on the air or showing to visiting amateurs—a golden oldie or a funky item you homebrewed for fun? Send us a photo of the little gem along with a short note on its background, and let's feature it in a future "Microphone Mania" column while directing some well-deserved recognition your way. One or two photos taken outdoors in smooth shade (like a under roof overhang) with a sheet of light-blue or light-tan poster paper as a background usually works fine. Try it! Actual 35 mm prints are ideal, but digital photos of 360 to 640 dpi in .jpeg or .tif format—the kind that do not require a special reader or a long time to open—are acceptable. Send your pictures and details directly to me, K4TWJ, at the address at the beginning of the column and let's keep this series going! 73, Dave, K4TWJ

Photo G– Roaring back from extensive missions on tanks, ships, airplanes, and in police cars of yesteryear is the famous handheld version of the "Candlestick" microphone—the military T17 with unmistakable PTT switch. This captivating gem was popular during the days of AM mobiling with big-tube transmitters, Gonset receive converters, and whirring dynamotors. Totally and unquestionably awesome! (Photo via K9EID)

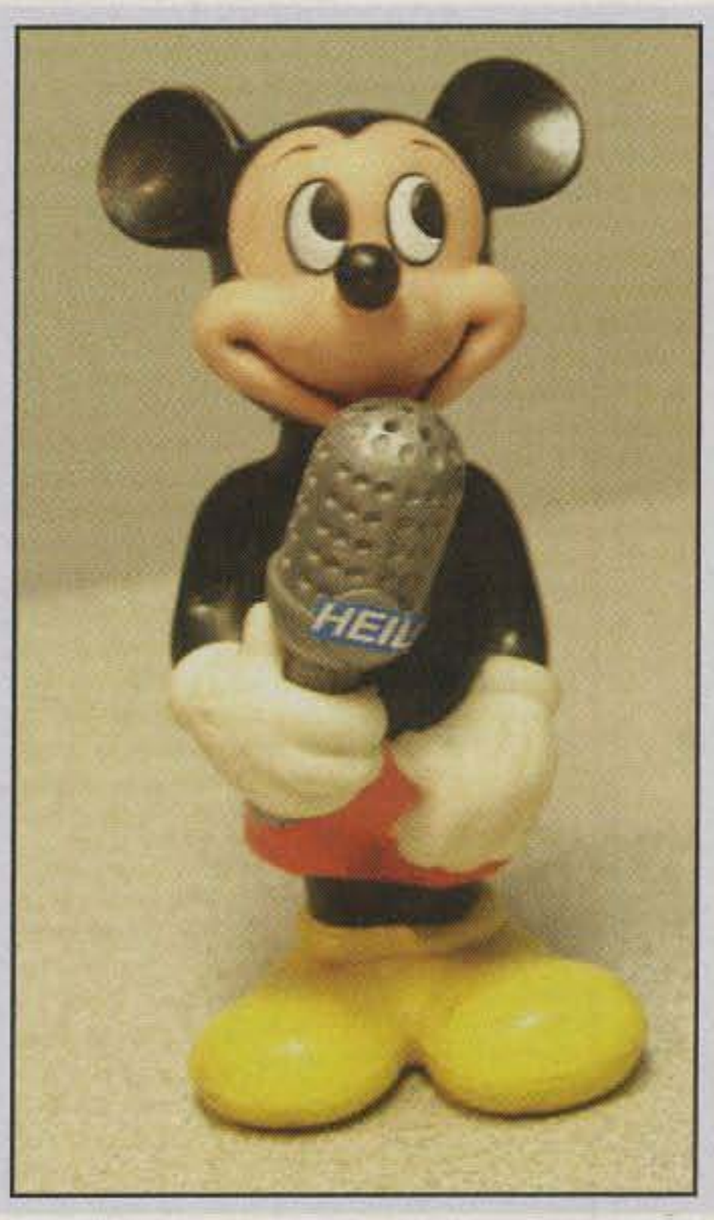


Photo H– Whether keys, cars, or microphones, every enthusiastic collector has at least one conversation piece of special interest. In the case of Bob Heil, it is this figurine of Mickey Mouse. Naturally Bob added a Heil logo to Mickey's mic. Now Mickey is really talking! →

magic in the sky

BY JEFF REINHARDT,* AA6JR

It's A Big Planet!

Few things broaden knowledge and understanding as effectively as travel. Whether it be to a neighboring village or to a country on the other side of the planet, it is quickly apparent to the visitor that "things are different here."

What with the uncertainties of world politics, a soft global economy, and the aftermath of September 11, 2001, there are some tremendous airfare bargains available. This may be your opportunity to broaden your horizons and maybe even have your own DXpedition without laying out a lot of money to get there.

I just returned from a trip to Japan. In many ways I feel as if I have returned "back from the future." Despite that country's ancient history, Japan has created marvels of modern engineering, not only in electronics, but in transportation as well. Japan's developments in rail travel, from their Shinkansen "bullet trains" that whisk you along at 165 mph, to commuter trains that criss-cross cities with "to the second" schedules, and their rural feeder rail lines, the system runs, well, like a quartz watch.

Many cars in Japan now sport driver-assistance video systems. Some are factory equipment, but many aftermarket systems are available. GPS-assisted mapping is a part of it, but there's more. Real-time data on road construction, blockages, accidents, and emergencies is also fed to the display from broadcast stations that pass the data, apart from their audible programming (see photo). Congested areas are identified so the driver can choose alternatives. In this country, transportation planners consider this element part of what they refer to as "Intelligent Traffic Systems," or ITS. It may not be so important if you live in Mayberry, but if you traverse the streets of Atlanta, Houston, Chicago, New, York, Boston, Los Angeles, Dallas, or other congested cities, ITS could be an incredibly effective system. Let's hope we see such a system in the U.S. soon; it certainly puts the "magic" of radio to a more effective use than just the latest offerings of pop music.

Japan's electronics markets offer an amazing array of equipment choices. There are still some old-fashioned "junk shops" sprinkled among the flashy modern stores, and happily a number of places that still sell components, including vacuum tubes.

In Osaka there's also the amazing Yodobashi Camera Store which offers seven floors of choices and plenty of helpful employees. The only drawback is the blaring of their store's jingle all day, everyday, with an energetic female vocalist singing about their price war to the tune of "The Battle Hymn of the Republic." (Okay, it's cute the first 399 times you hear it.) The Yodobashi Tokyo location I visited was somewhat smaller but featured the same jingle. Nevertheless, I did make some purchases at these well-stocked outlets.

Sadly, I could not engage in ham radio operations while in Japan. Their licensing system is a bureaucrat's nightmare for visitors, which is to say (in the words of a Japanese ham), "Don't even bother trying." It's a shame, because Japan has many licensed hams and some of the best HF operators I have heard on the bands.

Become DX!

If you are planning to travel abroad this summer, check out the possibility of operating in countries you may visit with a stop at the ARRL website: <http://www.arrl.org/FandES/field/regulations/io/

*5904 Lake Lindero Drive, Agoura Hills, CA 91301
e-mail: <aa6jr@cq-amateur-radio.com>

Actual display of driver information system in Tokyo, Japan. Note landmarks and red areas showing traffic congestion. (Photos by AA6JR)

National Institute of Standards and Technology radio station WWVH on Kauai, Hawaii. This outpost serves the Pacific and beyond with a wide array of information. Transmitters and site are monitored by a small but attentive staff.

#us>. There you will find guidance as to what is needed to operate while outside the U.S. Fortunately, Canada and the U.S. do not require paperwork to be filed for cross-border visits of their respective resident hams, but Mexico is another "problem" country. You'll be pleased to know that most European countries will let you operate with your U.S. license and a copy of the CEPT (available at the above-referenced website). In the Americas, the IARP is similar to a CEPT. I have deliberately not disclosed what those "alphabet soup" abbreviations mean, because you need to become familiar with those terms at the website, where there is much more detailed information. Taking your HT or a "field" HF radio along on a vacation abroad can add to your travel enjoyment, but be sure to do your homework first (and don't forget to document your radio, to avoid problems with customs).

Visiting Using "Magic"

For those who cannot physically travel for whatever reason, we hams are blessed with the ability to "visit" faraway places using our radios. I once brought dead silence to a conference room during pre-meeting conversation. I was asked by a co-worker, "What did you do last night?" I responded, "I visited New Zealand." Then came the response, "Huh??"

It turns out that I had made a contact with a New Zealand ham. He was calling CQ for some time and I was his only response. We had a delightful conversation! He taught me more about New Zealand than you can imagine, so much so that NZ is now very high on my "places I want to visit" list. Fast forward about a year and I am on a flight from Los Angeles to Washington, D.C., and I found myself sitting next to a New Zealander, or "Kiwi." As we winged across the U.S. we engaged in interesting conversation largely based on what I had gained from my conversation with the ham a few months earlier.

The Lost Art of the QSO

Which brings us to the next point. In my humble opinion, too many DX conversations I hear on the bands consist of "AA6JR, you're 59, QRZ." While I admit I have had more than a few of those exchanges, I have also enjoyed a good long chat (please spare me from the term *rag chew*) with many DX hams who

have educated me on their localities, broadened my horizons, and shared some darned good stories. I once had a QSO with a South Pacific ham interrupted by another "ham," this one a wild pig that had wandered uninvited into the radio shack.

Unfortunately, many a DX QSO is also interrupted these days by other bipod hams seeking to get that quick report to chalk up another country. To those operators I say, "Patience my friend." Conversation is fast becoming a lost art, and this busy planet can wait a few minutes for hams on either end to enjoy one another's company.

How can you initiate an entertaining QSO? Get beyond the signal reports, weather conditions, and what gear you're running. If you're talking with the other party, trust me, your gear is working okay. Be a good "reporter" and ask engaging questions such as "Give me a sense of what life is like at your location." What is the main source of income for the locals? How do people move about? What are the locally observed holidays? In other words, ask questions that require thought and expression, rather than yes or no responses.

Here's another tip: Speak more slowly, particularly for hams located where English is not the primary language. Many foreign hams enjoy English-language QSOs as an opportunity to sharpen their language skills, but rapid-fire English can sound like 65 wpm CW to the DX ear.

If you have internet access in the shack, bring up info on that ham's country during your QSO. Such data can help you formulate intelligent questions that also impress on your contact that you're an interesting contact, too!

Tempting though it may be, avoid getting into religion and politics. In some countries political statements could be hazardous to one's health. The same holds true for religion. The "no religion, no politics" rule used to be the "gentlemen's agreement" in all of ham radio. That tacit understanding seems to have gone away in the U.S., but it should remain intact for DX QSOs. Like you, I have political and religious views, but there are times when they are best kept to yourself.

Another Type of "DXpedition"

Don Quixote had his windmills. I have radio towers. Like Cervante's wind machines, those towers are more than just functional; to me, towers are symbols of the magic we share . . . like the monuments of Easter Island, evidence of intelligent life on the planet.

One interesting vacation visit I made was to WWVH on Kauai. Surprisingly, they get a mild stream of visitors, and the folks who tend to the facility were gracious hosts, providing a tour and thorough explanations as to how the National Institute of Standards and Technology station works, giving time tones and important data to ships at sea. They also provided some documents, and I learned there's a lot more to WWV and WWVH than just a quick time check from their respective male and female robot voices. (Those stations—at 2.5, 5, 10, and 15 MHz—are also quick and easy ways to ascertain if there's decent propagation on certain bands!) There may be better locations (from a scenery standpoint) at which to work than WWVH, but I'm hard pressed to think of where they may be! (See <http://www.boulder.nist.gov/timefreq/stations/wwvh.htm>)

Treasures abound at summertime hamfests. You can find everything from classics to contemporary. Bring cash and join the bargaining fun!

Ahhhh, Summer

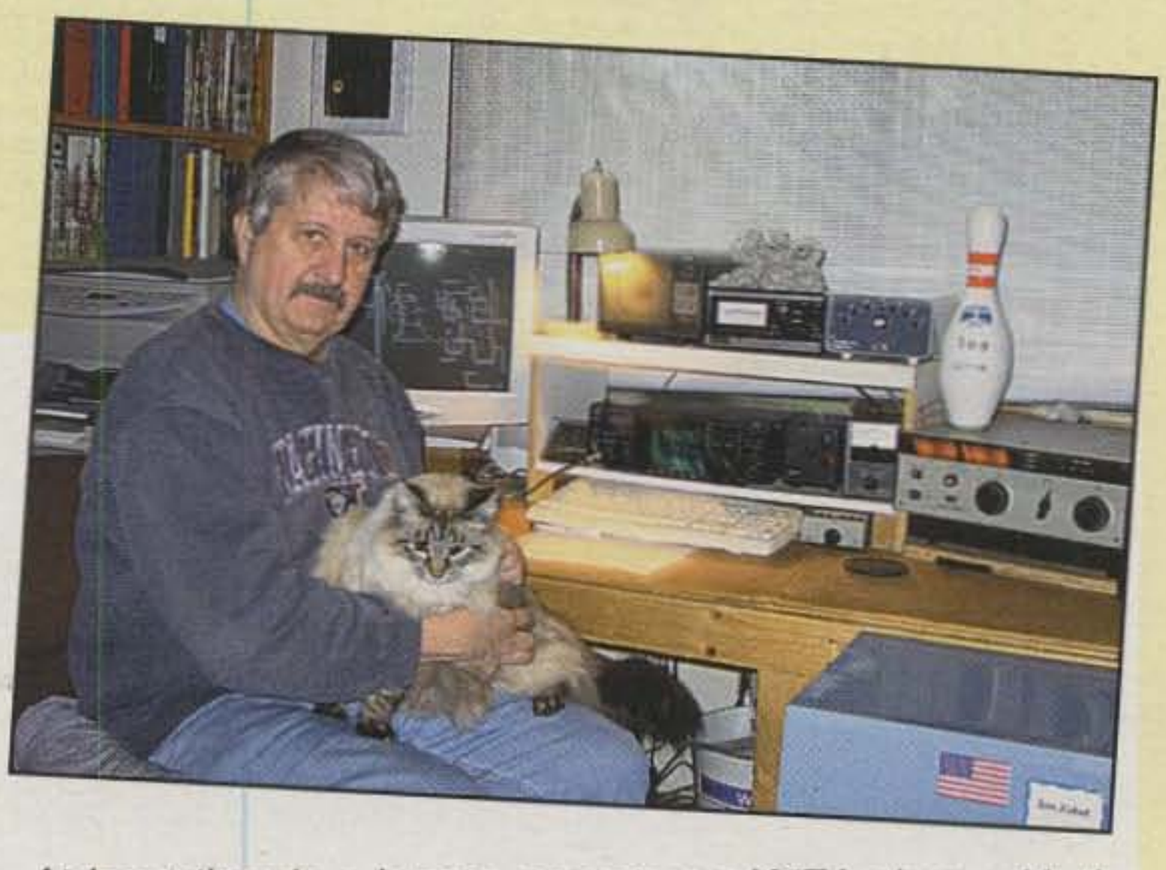
Summer is here! Time for Field Day, hamfests (see photos), and many other activities, including trips to the park or the beach. Take along that radio and monitor 146.52, but also put out a call now and then. You'd be amazed how many hams monitor a seemingly "dead" band. Someone has to make the first move! Enjoy these summer days and the summer conditions that favor remote operations, 6 and 2 meter DX, and who knows what else. It's all part of the fun we can enjoy as we play with the "Magic In The Sky." 73, Jeff, AA6JR

Millennium Profiles

We continue our profiles of CQ Millennium Award "4-Star Winners"—the two dozen hams who qualified for all four award categories in 2001—with stories from Jon Zabel, K7ZA, and Kermit Gay, K4XI. Both appear to have cats in charge of their stations. . . . perhaps there's a connection.

Jon Zabel, K7ZA

What triggered my interest in the CQ Millennium Award were the words "nearly impossible." Since I'm a contest fan, working 100 countries and 40 zones seemed no problem (except for Zones 23 and 34, but they didn't turn out to be problems at all. I worked SU9ZZ in Zone 34 on January 19, and JT1BH in Zone 23 on February 12.). The prefixes would come naturally with all the contest QSOs. That left the 500 counties, the hardest part of the four-part award. There again I fell back on contest activity, namely the state QSO parties. I hadn't worked the state parties for a number of years and forgot how much fun they could be! I've been a ham since 1954 and am always up to a challenge! *(Jon completed all four award segments in October.—ed.)*



At least there's a human operator at K7ZA along with the cat. Jon says they really had to claw their way through the 500-county portion of the CQ Millennium Award.

Kermit Gay, K4XI

It was winter in Florida. That means I have to mow the grass *every other* week, so with all that free time I was looking for some indoor ham activity. The CQ Millennium Award seemed to be just the excuse I needed to work a bunch of stations on various bands. It also seemed to be something that could be accomplished in a few months.

I guess I never thought of working for just one or two of the award categories. I completed the CQ WAZ (Worked All Zones) award in 1972 and need only three more on 80 meters to complete the 5BWAZ award. I received 5BDXCC in 1976, and completed the CQ WPX Award of Excellence in 1991 and USA-CA in 1998. I have all 335 countries confirmed and need only North Korea to have them all on CW.

I was licensed in 1952 and enjoyed construction and antenna building until the advent of the current "commercial" approach to ham radio. Since then I have chased DX as a prime aspect of the hobby, with county hunting as a "fill-in."

Here are some observations, as I look back at my log:

CQ DX: I completed the award on February 17, thanks to the ARRL CW DX Contest, which gave me 45 of the 100. Overall, 70% of my countries were on CW.

WAZ: Zone 30, VK4FW, was the last one worked for this award, on February 14. In the process, I worked JT1CO (Zone 23) for my last band country on 40 meters for the 5BWAZ Award.

USA-CA: When there is no new DX to work, I chase counties! It is a lot of fun. I worked 60% of the counties in January and 40% in February. Most were worked on the County Hunter CW Net frequency of 14056.5 kHz. Some were on the SSB county-hunting frequency of 14,336 kHz. A big hitter was KBØGZR, a "big rig" ham. I worked him in 38 different counties and 15 different states as he drove his truck across the country. WØGXQ was worked 34 times, and WB4FFV, another "big rig" ham, was worked in 28 counties. I worked six counties in Texas and missed only eight states! I also worked about 50 counties while mobile.

WPX: This one was easy. It was really a fallout of the other contacts. The major effort was listing them in a file and then eliminating the duplications. I finished up everything on March 3.

According to "Second Op" Kermit, the Chief Op at K4XI is "Kitty," who really knows how to pounce on DX stations!

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

That Brand-New Rig

What is the first thing you do when you get that brand-new radio home? If you are like me, you take out your tools and open the cabinet to see inside, right? And don't you just love the smell of a new piece of electronic equipment; the artistry of the printed-circuit-board foil patterns and the wonderful colors in the wiring harnesses; the way the wires are dressed along the cabinet panels and how the solder joints are all nice and shiny; how amazingly small a lot of the parts are? Modern ham radio rigs and accessories are amazing examples of state-of-the-art electronics.

Okay, here's what I suggest after you have fun appreciating what's inside: Make sure everything that is supposed to be there really is in the box, including small items such as cables and mounting screws. Although you may not need them right now, you may need them later, and if you don't have them, you must buy them later. You don't want to pay for something twice, right?

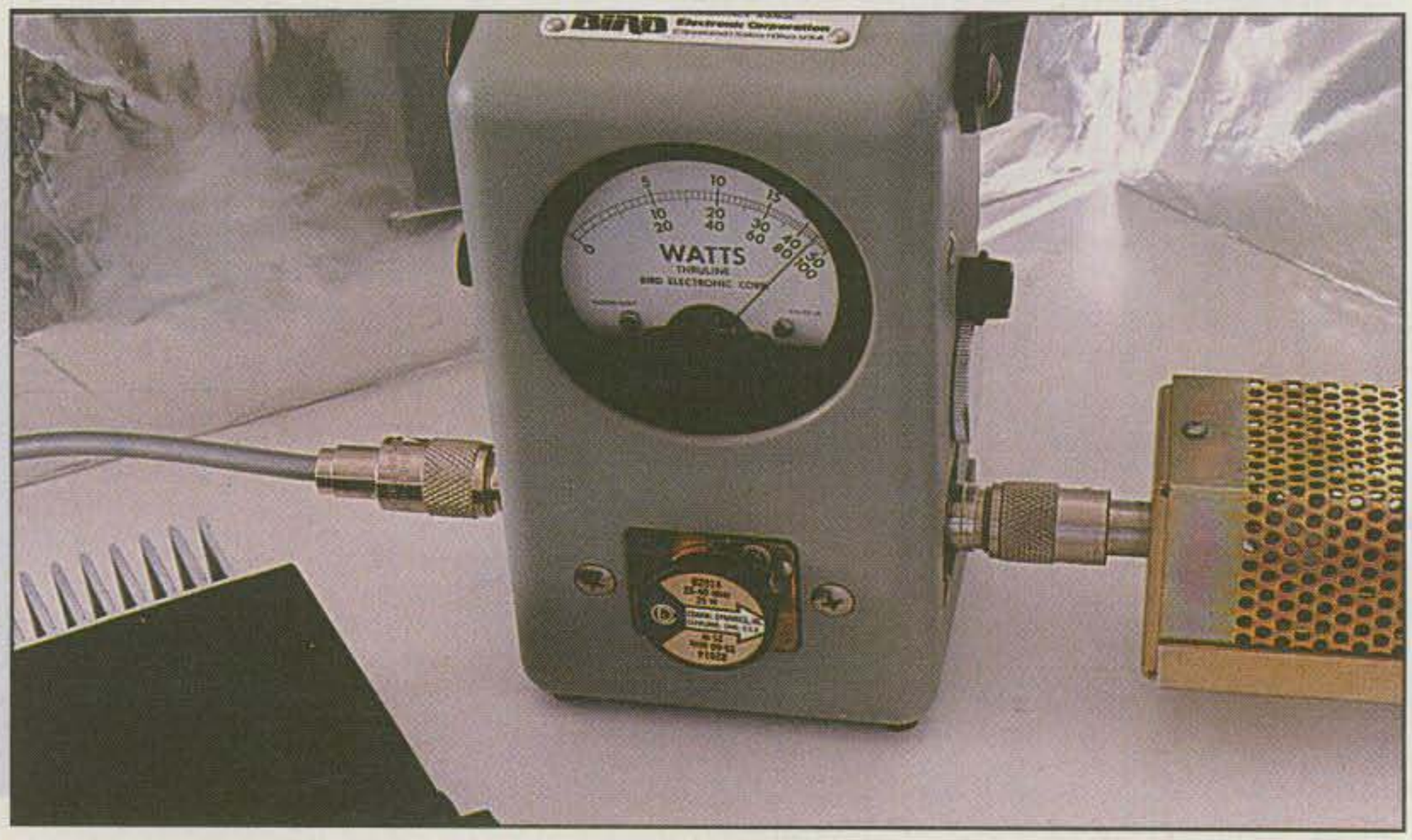
Paperwork and Documentation

When you get that new radio home and open the box, you might want to leave the warranty card intact and not filled-out, since there is a chance that the radio you have may be not quite right in some way. If you fill in the warranty card, you will not be able to return the unit, since it is no longer "new." It must be considered "used," because not all of the original contents are there. Does a warranty card make the manufacturer's warranty valid? The answer in almost all cases is no. The best proof of purchase is the sales receipt. The decision to fill in the card is ultimately up to you.

At one time I was a very big fan of filling in those little survey cards for manufacturers. Since I was in sales and marketing, I figured I'd help the companies improve their products. I even completed those cards when there was no postage applied to them and I had to use my own stamp. However, after a while, and especially since e-mail (or should I say "spam"?), I now refuse to fill out "junk-mail generators" unless I *really* need additional information on certain products. Most manufacturers input the information into some computer system so they can classify and profile what and who their buyers are, including you. Of course, that's also done to generate revenue by selling your name and address and other information to marketing and database houses.

Okay, now what about that instruction manual? I think one of the ultimate tests of a rig's "user-friendliness" is to try to operate a new rig without looking at the instructions. I've rejected the purchase of a new radio based on this test, but at the same time, I've also overlooked this shortcoming based on other factors such as scanning capability and ergonomics. Here is some advice, though: *Do not, under any circumstances, lose that instruction manual.* In fact, I always make at least three copies of the instruction manual—one to use, one to lose, and one to keep in a safe place along with the receipt and original manual. Have you ever looked for an operating manual for an older piece of equipment? A quick search on eBay or the ham radio classified ads will tell you that old manuals are very precious , especially since they were included free with every unit when purchased new. In fact, I consider making copies of

*16428 Camino Canada Lane, Huntington Beach, CA 92649
e-mail: <kh6wz@cq-amateur-radio.com>



This is a simple setup for measuring RF power output. The key is having a good wattmeter and dummy load.

the operating manual an investment that will increase with time, since some other poor chap will probably lose his operating manual and will be looking for one. That "poor chap" will not be you, however. You'll be the one to come to his rescue, because you made some extra copies.

Speaking of the original manual, here's a tip that will enhance its lifetime: Get some clear, self-adhesive shelf paper and use it to "laminate" the operating manual cover. I learned that trick somewhere a long time ago when I was just getting into photography. I did this to my first new 35 mm camera manual in the 1970s (a Canon AT-1). The manual still looks pristine even today. But remember to do this after the warranty period expires, just to be safe. Remember, too, that once you stick that stuff on, there's no turning back, so do it carefully.

Also along the lines of "documentation" I highly recommend that you purchase the service manual for your gear as well. Some manufacturers call this the *technical manual*. Service manuals are a good source of information explaining how your radio works, and they are always interesting reading. Also, as you grow in your technical expertise, you may want to modify your unit to either customize its operation or enhance its performance. I am saying this very carefully, since modifying radios is not an easy task for a beginner. Although you may never need to fix that unit yourself, over time the service manual will become a very valuable investment, just like the operating manual.

The Fun Part: Turning it On

Now it's time to make sure the new unit works like it is supposed to. Let's call this idea similar to the break-in period of a new car. You should exercise the new rig as much as possible to wring out all the bugs and gremlins before the warranty expires. Besides, these tests will help you learn how to operate your new rig. There's nothing better than actually learning by doing. I call this hands-on stuff "active learning," since you will be reading the operating manual, touching the radio, and watching for expected results. I know this "final quality check" sounds a little funny in this day and age of ISO-9001-certified procedures, Zero Defect programs and other quality control processes, but this is based on a recent experience with one of my newer rigs. By the way, this "break-in period" can and should also be done with used units you may purchase or otherwise acquire.

One of my newer HTs went "bad" one day. I wasn't able to capture the local RACES repeater from my living room like before, even with high power—5 watts. I took my back-up HT, which is of an older vintage, and put that HT on high power (2 watts) and was able to get into the repeater with full quieting.

The newer HT, well out of the warranty period, seemed to be putting out less power than my old back-up unit. Hmmm. It had seemed to work fine all along, although every now and then someone on the net would make a comparison between his radio and my radio and couldn't understand why my signals weren't as strong as his. I attributed it to the location or the antenna, factors that make a difference in signal strength.

A few days after that "net experience" I sent the unit in for factory service. The estimated repair cost was almost as much as the cost of the (now generously discounted and soon-to-be-discontinued) unit. Several circuits in the antenna and final amplifier were bad for some

reason. To this day I still wonder whether or not that problem might have been repairable under warranty. However, I will never know, because I never checked the power output of the unit when it was new. I was making a fatal assumption that the unit was putting out a lot of power (well, "full power") when the bar-graph display went "way to the right" when I clicked the PTT button.

On most new-fangled FM radios the power indicator on the LCD readout is a "fake" display; the power bar-graph indicator is not measuring anything coming out of the radio. This means that if you click the PTT button and the bar graph goes all the way to the right, it is very possible that nothing at all is going to the antenna and out into the air.

It's a good idea to at least measure a new unit's power output using a dummy load and wattmeter. If you don't have such equipment, you may be able to take your radio to the shack of a friend who does.

Attach a good dummy load to the antenna connector on the radio with a short length of coax. If your radio has more than one antenna connector, tests can be done on one band at a time. Just be sure that you will not accidentally transmit without an antenna or dummy load connected to that empty connector.

If you are using a battery-powered radio—an HT or mobile rig, for example—make sure the battery is fully charged or use an AC-operated power supply. Make sure the voltage and current are enough to power the radio on transmit as well as receive. Be careful when you hook up the radio to the power supply, since applying the wrong polarity to the radio will surely break something, and that sort of damage is never covered under warranty. Double check the connections before you turn stuff on.

Next operate the rig on all transmit modes. Remember, if you are in the CW mode, you may have to insert a key in the key jack in order to transmit. Remember also that most rigs have lower transmit power output in certain modes, such as AM. Check the operating manual to see what you should expect. See the photo for a typical power-measuring test setup.

When you are checking the transmit power output, you may want to check the frequency accuracy at the same time. This can easily be done with a frequency counter, or just use (or borrow) another radio and see if you can talk to yourself. Remember, you are doing all these transmitting tests using a dummy load, right?

On an HF rig with a built-in antenna tuner (I like to call them "SWR flatteners"), change bands and see how the tuner reacts. Although you are transmitting into a "perfect" 50 ohm load, the frequency changes should make the tuner whir and grind (rotary parts such as variable capacitors) or click and clunk (switched parts such as relays), especially if you go from one extreme frequency band to the next. For example, going from 160 meters to 10 meters should make the tuner tune. If you watch the power meter, you usually will see less than full power output during the tuning process, and then full power when the tuning is complete.

The receiver performance will be a little more difficult to assess without test equipment. However, a non-scientific test can be done without any test equipment. This is a simple comparison between your radio and the same or similar radio of a friend. The comparison checks may be interesting to both of you. After all, aren't you influenced by a friend's buying decision? (Well, in some cases it may be a decision *not* to buy something.)

With the radios side by side, listen to various frequencies and watch the S-

References

There are several online references that cover warranty cards. Here are a few good consumer-beware stories to take a look at:

<http://www.komotv.com/buyerbeware/story.asp?id=15866>
<http://www.wral.com/money/948375/detail.html>

Consumer Reports has good advice on computer buying and warranty claims, which can be very similar to a ham radio buying experience. Go to:

<http://www.consumerreports.org/main/detail.jsp?CONTENT%3C%3Ecnt_id=84767&FOLDER%3C%3Efolder_id=84747&bmUID=999787681017)>

Also, the *Consumer Reports* website has some good information on warranty cards and personal information gathering. Go to the magazine's home page: <http://www.consumerreports.org> and use their search function. Although some articles are only for subscribers, there are plenty of good articles you can view for free.

meter indications. If your rig does not have an S-meter, listen to the audio coming from the speaker or a set of headphones. If you have a multi-mode radio, do this check in all operating modes. Listen carefully to the receiver audio for any distortion or inconsistencies.

That Neat Box

What about that nice, fancy box, and inside, those plastic Styrofoam™ buffers? I've always been amazed by the packaging of electronic equipment. Things are precisely shaped to suspend the expensive piece of merchandise within a cardboard carton, designed to withstand tossing and turning and throwing and vibration activity of a package in transit. Does one keep all that engineering, or does it just get tossed out and into the landfill? In my case, I live in a very small townhouse with very little storage space. I do retain the packing boxes for small mobile and HT-type units, but larger cartons get dumped into the recycling bin. However, you really should save all packing materials so that if the new rig is not working correctly, you can return it for repair or exchange, in accordance with the warranty policy.

I know at least one manufacturer that actually sells the individual buffers and boxes for most of its rigs via its parts department. In fact, each individual piece of foam and plastic and cardboard has a part number. You might (or might not) be able to buy some of that stuff later on. If you've dumped the box and packing material, you have another option, and that is to go to a packaging place such as MailBoxes, Etc. However, you will get charged for the service, and the unit will still be considered "used." Therefore, my advice on the box situation is to save all packing materials at least until after the warranty expires. By that time you probably will have forgotten that you have all that stuff stashed someplace, or it will be out of your way in some storage area and you may as well leave it where it is.

Summary

Getting a new rig, whether new and fresh out of the box or a classic used unit, is a really neat and exciting experience. After you spend some time admiring the inside workings, put that new rig through its paces and see if you can chase the gremlins and bugs out of there before the warranty period expires. You'll get practice learning how to operate your radio proficiently, and you will confirm your buying decision in the process. 73, Wayne, KH6WZ

how it works

BY DAVE INGRAM,* K4TWJ

Amplifier Circuits A "Ground Floor" Study

As you may recall, our May "How It Works" column featured a keep-it-simple discussion of tubes, transistors, ICs, and microprocessors. It also mentioned a subsequent column would continue with a similar plain-language explanation of basic circuit configurations using those tubes and transistors, plus consider how they process signals and function as amplifiers. Well, friends, that's the focus of this month's column, and we trust newer and/or non-technical-minded readers will find it helpful for visualizing what is happening inside the cabinet of that favorite transceiver or linear amplifier. We have some very interesting ground to cover, so let's begin with a brief overview of the most popular circuit configurations and the concepts behind their operation.

The Big Three

Generally speaking, three types of amplifying devices (vacuum tubes, transistors, and FETs [field-effect transistors]) and three types of circuit configurations are popular today. The three circuits are the common cathode or common emitter, the grounded grid or grounded base, and the cathode follower or emitter follower. Since modern communications gear utilizes these circuits as "building blocks" in single-ended, double-ended, push-pull, and parallel arrangements, initially looking at a rig's main circuit diagram may seem frightfully intimidating (Egad . . . whatta mess!). Ah, but if we learn how to recognize the basic circuits and mentally separate them from "added on" and support sections such as switching, metering, and ALC, understanding how rigs and amplifiers work becomes much easier. Just remember to take it one step at a time (or one stage at a time) and trace signal paths from input to output without getting sidetracked. If you become confused, try using different-color pens to isolate signal-, control-, and bias-related sections on a unit's block diagram. Then transfer your notes and path tracings to the rig's circuit diagram. This procedure helps. Really. Try it and build your confidence!

In an effort to minimize unnecessary repetitiveness in the following discussion, I may refer to a tube's grid and plate in one place or spot and a transistor's base and collector in another place or spot. Using this approach rather than continuously listing various active devices such as tubes, transistors, FETs, and MOSFETs (metal-oxide-silicon field-effect transistors) plus elements within each also keeps your thinking flexible for understanding all circuits—today and tomorrow. Why include vacuum tubes? Simple. They are still the most economical way to achieve high power levels.

One other introductory note warrants mention: Electronics study is roughly 50 percent circuit analysis and 50 percent mathematical calculations. In my observations while teaching college electronics, students initially are intimidated by "heavy math," but actually enjoy it after some inside guidance. Thus, I say "relax." We will take

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

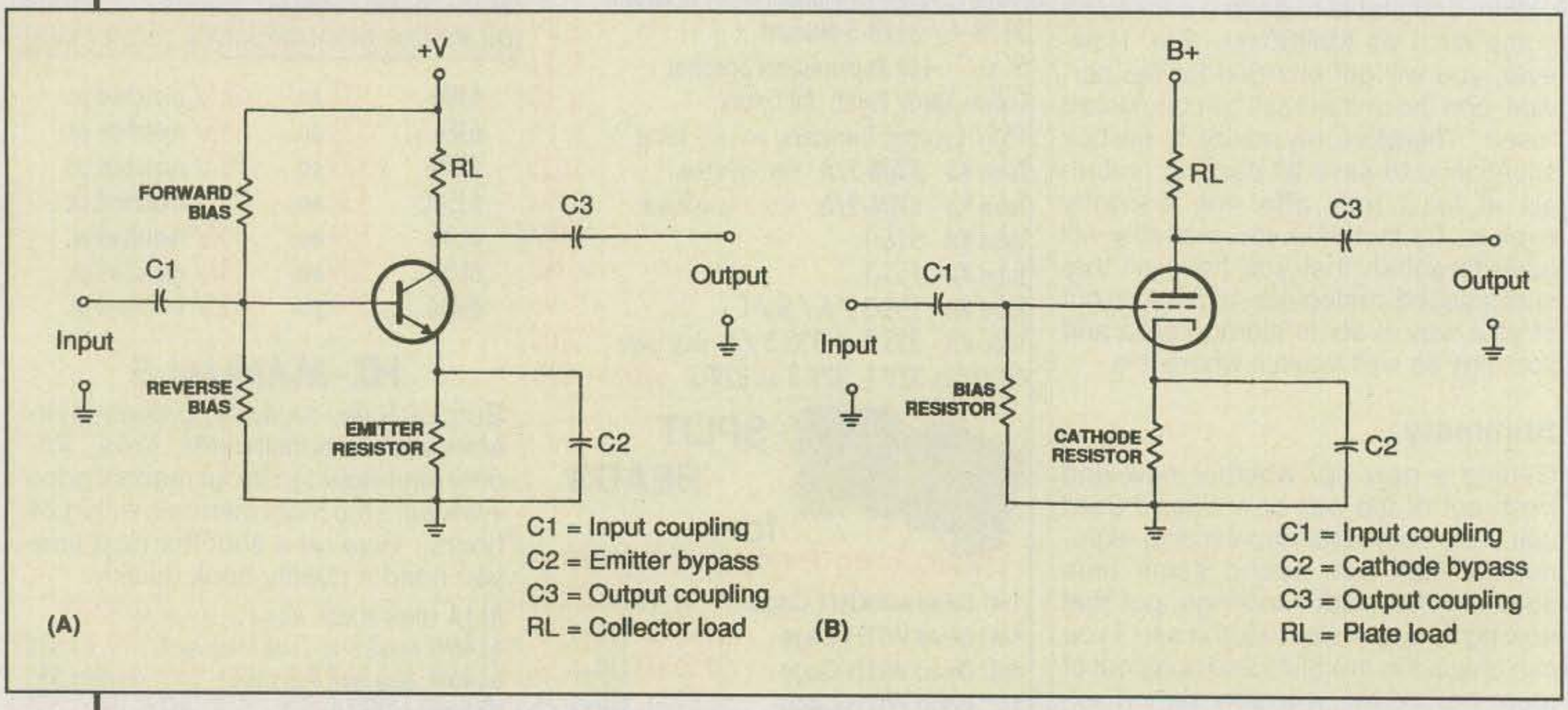


Fig. 1– General outline of common-emitter (A) or common-cathode (B) circuit configuration. Input signal is applied between base/grid and ground. It varies the transistor/tube's conduction, which varies voltage drop across R_L. Output signal (fluctuations across R_L) passes through coupling capacitor C3. (Details in text.)

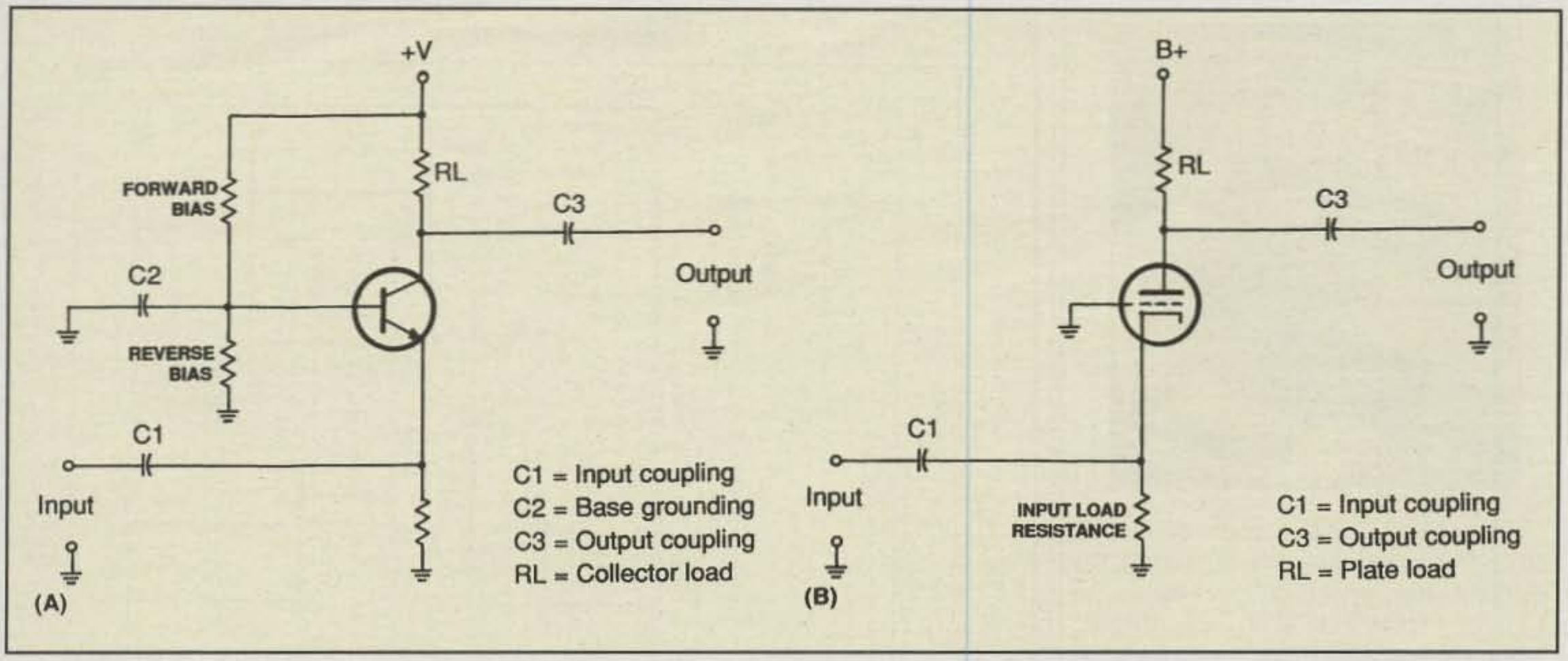


Fig. 2– Basic outline of the popular grounded-grid (A) or grounded-base (B) circuit. Here input signal is applied between cathode or emitter and ground, and output signal appears between plate or collector and ground. (Discussion in text.)

the easy way in by focusing on circuits first and bringing in some "sugar-coated math" later. Hold on to those scientific-notation-equipped pocket calculators; they will come in handy! Now let's take a closer look at our previously mentioned "Big Three" circuits.

The Common Emitter

Whether employing a transistor, vacuum tube, or FET, the most often used and most easily recognized circuit configuration is the common emitter or common cathode as illustrated in fig. 1. The term *common* as included in that description relates to ground, so the circuit may also be called *grounded* emitter or *grounded* cathode. Do I sense some readers saying, "But the emitter is not grounded. It is connected to a resistor and capacitor." Ah, but we consider circuits from their AC/signal-processing standpoint, and a capacitor's purpose is passing AC while blocking DC. Assuming the capacitor's value is large enough to pass the applied signal's frequency without significant AC resistance (which we call *reactance*), it effectively connects the emitter to ground. That's why it's called *grounded emitter.*

Here, and as we discussed with regard to biasing last month, an input signal is applied between a transistor's base or a tube's grid and ground. As the tube or transistor's internal conduction varies in accordance with the incoming signal's amplitude, a larger replica of the signal develops across the plate or collector load resistance or reactance. The amount of signal developed depends on the circuit's or stage's gain, class of operation, and the value of its components (this is where those mathematical calculations we mentioned come into play).

Now let's take a closer look at this common-emitter circuit (and highlight some facts applicable to other circuits as well). First, the circuit's plate or collector load will be resistive (a resistor) if it is an audio amplifier, or an impedance (a tuned circuit) if it is an RF or IF amplifier. Remember the previously discussed emitter/cathode bypass capacitor? If the circuit is processing audio signals, this capacitor (plus the input and output coupling capacitors) should be slightly large in value (in the *low µF range*) to present minimum opposition or impedance to audio tones. If the circuit is processing RF signals,

Photo A– A creditable number of modern linear amplifiers utilize grounded-grid circuit configurations for both simplicity and smooth operation. Ameritron's popular AL-82 is a good example. It uses a pair of zero-biased 3-500Z tubes to give a "barefoot" HF transceiver a band-commanding boost in signal strength. (Photo courtesy Richard Stubbs, KC5NSZ, of MFJ Enterprises)

these capacitors should be smaller value (in the *pF range*) to pass RF with minimum impedance. Second, if the value of an input or output coupling capacitor is too small, the stage's low-frequency response will be reduced or lost (large capacitors are required to pass low frequencies). If the emitter/cathode capacitor's value is too small, negative feedback or degeneration will occur. What is that, you ask? Negative feedback is the opposite of regeneration. It decreases gain, whereas regeneration increases gain—to the point of oscillation, in fact. Negative feedback is usually considered as a reduction in stage gain, but actually it is a trade-off. In an audio amplifier the compensation for reduced gain is improved sound quality. That is because any signal developed across the emitter/cathode resistor opposes the signal developed across the collector/plate resistor. The more signal developed across this emitter resistor, the more degeneration, the better the sound quality, and the lower the output level. Have you heard of old-time regenerative receivers?

On the Cover

The antenna system featured on our cover this month is a pair of stacked 18-element log periodics* belonging to Chuck O'Neal, K1KW, of Bolton, Massachusetts. One of the largest log periodic arrays (LPA) of its kind in the world, each of these homebuilt antennas is on a 62-foot boom and covers 13-30 MHz continuously. The tower is one of three at his station, supporting, among other things, a pair of stacked 2-element 40-meter beams, a pair of phased dipoles on 75 meters, an inverted Vee on 160, 13 elements on 6 meters, and two 2-meter arrays, one with 60 elements horizontally polarized for SSB, the other with 30 vertical elements for FM.

Chuck is active on all bands from 160 to 2 meters, and has built all of his antennas and much of his equipment. Inside his shack, Chuck has a rack full of homebrew amplifiers to cover every band he's on; a home-built audio equipment rack and control console for speech processing, automatic switching and sequencing to move smoothly from band to band, and a bunch of Bird wattmeters to keep watch on everything. Chuck uses two big speakers rather than headphones for listening, and in between them is an old 1920s-30s era broadcast mic (for display). His primary rig is a Yaesu FT-1000D, although he also collects and uses vintage rigs, particularly on 75, 40, and 10 meter AM. Chuck says his favorite activity is casual DXing on HF SSB, switching over to 6 and 2 meters when they're open.

As is the case with many of us, Chuck got started in radio at age 12 ... but he did it in a somewhat unusual way: by starting his own pirate station! He eventually went straight and has been transmitting legally since 1963! (Cover photo by Larry Mulvehill, WB2ZPI)

* Chuck's antennas were misidentified in the 2003-04 CQ Amateur Radio Calendar, where he was featured as "Mr. March." While Chuck is active on 6 meters, the antennas are 13-30 MHz log periodics, not 6-meter long johns. The very top antenna is a 13 element 6 meter beam We apologize for the error.

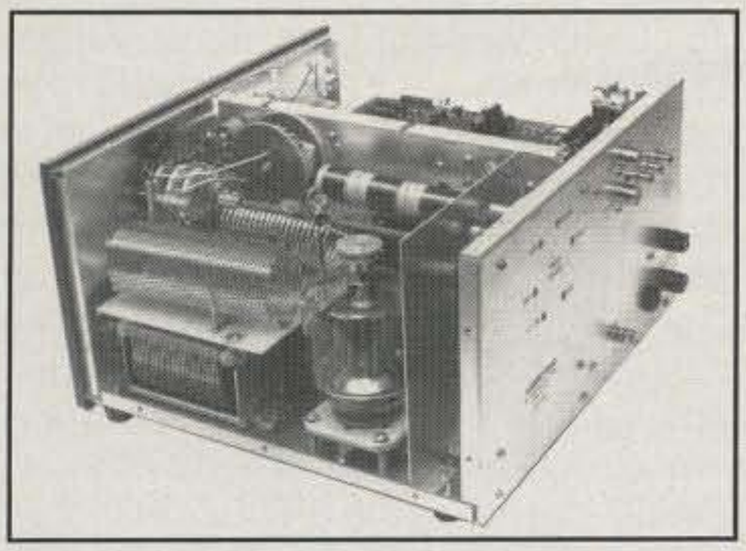


Photo B– Whether a transceiver or a linear amplifier such as this world-famous Ameritron AL-80, a unit's circuit configuration is not very apparent from an inside view (but you can see plenty of expensive components!). You must study the unit's circuit diagram and manual's "theory of operation" section to see the "full picture." (Photo courtesy Richard Stubbs, KC5NSZ)

They detected signals by increasing gain until they oscillated—and produced a beat note for copying CW in the process. The audio quality was not terrific, but the gain/sensitivity was quite good.

The Grounded-Base/ Grounded-Grid Circuit

Another popular circuit configuration (and one especially favored in high-power linear amplifiers) is the grounded-base or grounded-grid arrangement as shown in fig. 2. Here the input signal is applied between the cathode or emitter and ground, and the grid or base is connected directly to ground. Again, the tube's or transistor's conduction varies according to the incoming signal's waveform, and an amplified replica of that input signal is developed across the plate's or collector's load impedance or output circuit. This circuit configuration requires a higher drive level than a common-cathode circuit, but it is easier to build and use and exhibits very good gain and efficiency.

While everything from multi-grid sweep tubes to classic 811s have been used in grounded-grid circuits, zero-bias triodes such as the well-known 3-500Z are all-time favorites (naturally, as they do not require an extra bias supply). A prime example of a 3-500Z amp-

Fig. 3– Outline of RF section (only) in a popular Ameritron AL-82 linear amplifier. Discussion of this grounded grid circuit and function of components in text. (Circuit diagram courtesy MFJ Enterprises)

lifier is the 2000 watt Ameritron AL-82 highlighted in photo A. This legal-limit linear amplifier utilizes a pair of 3-500Zs, and a streamlined copy of its circuit diagram(that is, only the main RF section, less power supply, metering, and control circuitry) is shown in fig. 3 for our study.

Here an "RF in" driving signal from a transceiver is directed to a selected band's input circuit at S1A. These tuned circuits present a 50 ohm match to the transceiver, so it "sees" a low SWR. The incoming signal then goes through C7 and C8 to the filaments of the 3-500Zs. We realize this amplifier has two tubes connected in parallel, even though only one tube marked "V1, V2" is shown in the circuit diagram (reading schematics sometimes requires technical thinking; this is one example). These are direct-heated tubes (they do not have a cathode). That's why RF is applied to their filaments. RFC1 prevents RF from reaching the filament power supply. Likewise, our previously mentioned capacitors C7 and C8 block or prevent filament voltage from affecting input circuits at S1A or the driving transceiver. How is that possible? The filament voltage is AC, and AC goes right through capacitors. Remember our discussions about capacitive reactance (Xc) in previous columns? Capacitors C7 and C8 are .01 µFd, which will pass a high frequency (incoming RF) with very little reactance or opposition, but present a very high reactance or opposition to the low power-line frequency of 60 Hz. In other words, they act like a high AC resistance to low frequencies, but act like a low AC resistance to high frequencies—signal cops, so to speak.

The amplifier RF output (a real band-blasting signal!) then goes from the tube's plates, through Parasitic Suppressors 1 and 2 (one for each tube; only one shown), through C14 and C15, the pi-net output circuit (C19, L2, L3, C20), and on to the "RF Out" socket. No bias, no fumbles; just smooth operation.

Yes, I sense your next question. If the AL-82's circuit (or its popular single 3-500Z mate, the world-famous AL-80) is so simple, why are the units so expensive? Actually, they're a bargain. That's because each and every component in a high-power amplifier is husky and expensive. The transformer, for example, is a 32 pound hypersil-core Peter Dahl item—and it's not cheap! The associated filter capacitors are computer-grade electrolytics, which again are costly, and there are six of them. Finally, there are the 3-500Zs with their deluxe air-flow sockets, Pyrex® chimneys, and a German-made squirrel-cage blower, plus silver-plated plate coil (L3) and extra-large tuning capacitors (C19 and C20) with vernier drives. Those items are not just expensive, they are *expensive!* If you purchased all the parts (including transformers, meters, cabinet, etc.) and homebrewed an AL-80 or AL-82, it would cost more than buying one ready to use. The company makes money by buying parts, plant-fabricating cabinetry, and building in quantity, so overall cost is less. That way everyone wins! Next topic.

The Cathode/Emitter Follower

Our third circuit configuration is the cathode follower or emitter follower as shown in fig. 4. This arrangement is noticeably different and unusual, because the tube's plate or transistor's collector is connected directly to its voltage source rather than a load resistor or inductor (which, in turn, connects to the voltage source). How can it amplify a signal without a load resistor or inductor for the amplified signal to develop across? It can't. It can only pass a slightly lower level replica of its input signal. What good is that? A cathode or emitter follower is used as a buffer to isolate stages so the input of one does not load down the output of the other. One example of use is including a cathode/emitter follower between a rig's frequency-controlling VFO and driver stage (which, in turn, connects to the transmitter's output stage). This way the VFO does not electrically "feel" the output stage's changing load between key down and key up, and this maintains a stable output signal.

In a cathode follower or emitter follower the input signal is applied between grid/base and ground, while the output signal is sampled from across the cathode/emitter resistor—which is not bypassed as usual with a capacitor. Why not? A bypass capacitor's purpose is to provide AC (our desired signal) a path around the cathode/emitter resistor. That's fine when the output signal is taken from the plate/collector, but

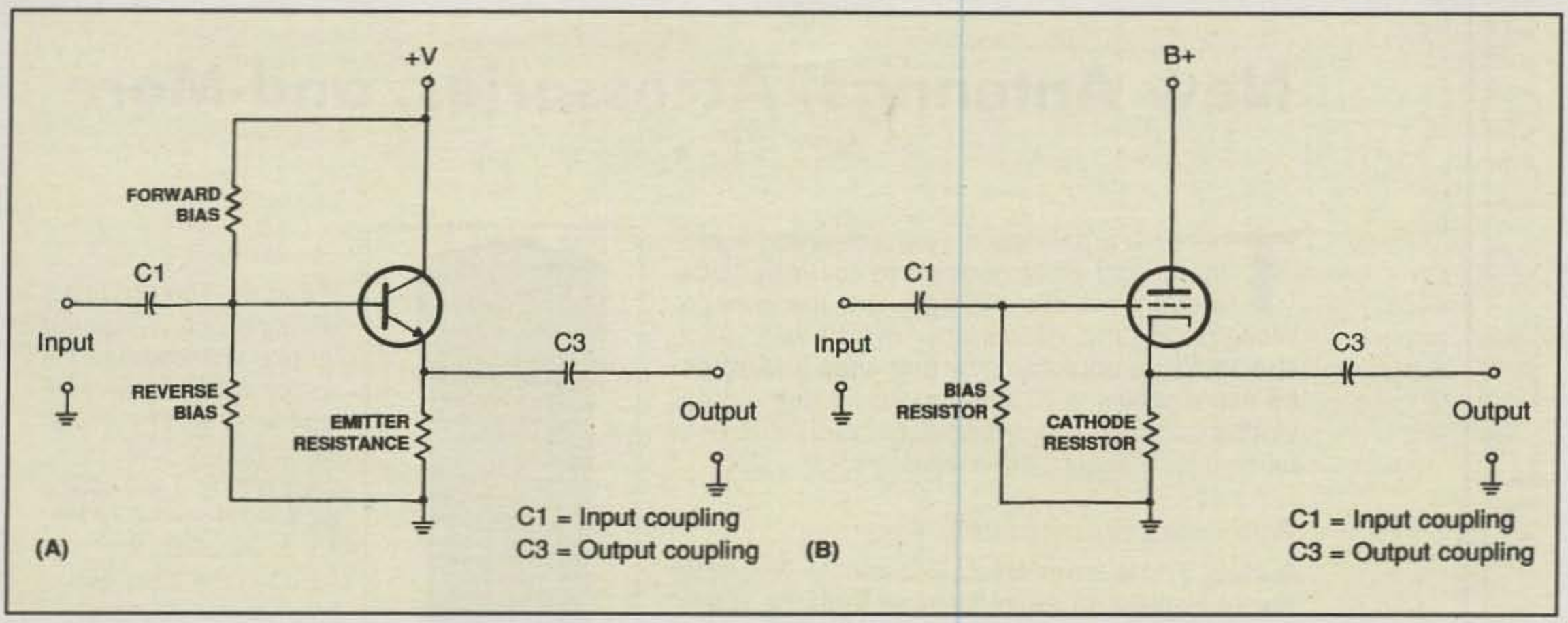


Fig. 4– Circuit diagram of an emitter follower (A) or cathode follower (B). Input signal is applied between base/grid and ground, and output appears between emitter/cathode and ground. (Discussion in text.)

there is no plate/collector load resistor or coil in a cathode follower. The cathode/emitter resistor is the load. If it is bypassed, there is no place left for the output signal to develop. It's that simple. A most interesting circuit, eh?

Conclusion

That is all the space we have for this month, gang, but stay tuned next time when we will combine tubes and transistors with our three basic circuit configurations to explain how they are employed in single-ended, double-ended, push-pull, and parallel arrangements. Then we will delve into amplifier classes and operating parameters, plus return to more discussions of basic components. Yes, your notes and e-mails have been received and will be honored. There is just a "lag time" between them and the time a column appears in print. Stay with us!

73, Dave, K4TWJ

what's new

BY KARL T. THURBER, JR.,* W8FX

New Antennas, Accessories, and More

There's a great deal of new antennas, equipment, and other goodies to cover this time around, so let's dig right into the column. While during this midsummer month we'll place special focus on some new antennas and antenna accessories, we'll save space for some noteworthy software, radio resources, and more useful stuff just for you, the reader.

Antennas and Accessories

A New Triple from MFJ. This month we would like to feature an antenna triple from the undisputed "accessory kings" at MFJ Enterprises of Starkville, Mississippi.

For the fixed-station amateur, MFJ has introduced the MFJ G5RV Junior 40–10 Meter Antenna (photo A). The MFJ1778M is a multiband, center-fed dipole capable of handling 1500 watts. It consists of 52 ft. of flattop, fed with 17 ft. of 450 ohm matching section, terminated in a coax connector. While you can feed the antenna with coax, you should use a balun such as the MFJ-915 RF Isolator (described below) with the antenna to eliminate or reduce undesirable parallel feedline currents. You may also need to use an antenna tuner at the shack end of the system. The G5RV Junior is $34.95.

You'll find the MFJ-915 RF Isolator (photo B) to be a "natural" for use with the G5RV Junior described above. The RF Isolator is a 1:1 current balun designed to be placed in line with coax, suitable for use over the range 1.8 to 30 MHz. The MFJ-915 will reduce or eliminate stray RF often found on coax; failure to use such a balun may result in RFI, RF feedback, or other undesirable symptoms of RF in the shack.

The RF Isolator is made up of 50 ferrite core beads placed onto a 13 inch piece of RG-303 coax. The coax and SO-239 connectors have a Teflon® coating for maximum insulation and extended life. The RF Isolator is enclosed in schedule 40 PVC pipe for maximum strength and precision. It's priced at $29.95.

The new MFJ-336S/T Goliath™ Tri-Magnet Mount (photo C) is for the diehard mobileer. This impressive, black-finish mount has three super-strong, 5 inch magnets that are bolted to a solid 1/4 inch triangular mount. The unit comes complete with 17 ft. of tough coaxial line terminated

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

Photo A– MFJ has introduced the MFJ G5RV Junior 40–10 Meter Antenna. The new MFJ-1778M is a multiband, center-fed dipole capable of handling 1500 watts. Details are in this month's text. (Photo courtesy MFJ Enterprises)

Photo B– The MFJ-915 RF Isolator is a "natural" for use with the G5RV Junior antenna. The RF Isolator is a 1:1 current balun designed to be placed in line with coax, working over the range 1.8 to 30 MHz. It reduces the stray RF often found on coax. (Photo courtesy MFJ Enterprises.

Photo C– The new MFJ-336S/T Goliath™ Tri-Magnet Mount is for the diehard mobileer. This black-finish mount has three super-strong, 5 inch magnets that are bolted to a solid 1/4 inch triangular mount. It's available in two versions; see text for details. (Photo courtesy MFJ Enterprises)

with a PL-259 connector. The $29.95 mount is so strong that MFJ is compelled to caution that once it's on your vehicle, it's a bit difficult to get it back off! Order the MFJ-336S for SO-239 type fittings, or the MFJ-336T for use with the MFJ Hamtenna™ whip antennas and other HF antenna brands.

For more info, contact MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; on the web: <http://www.mfjenterprises.com>).

Photo D– Are you plagued with RF interference? Since 1963, Amidon Associates has been supplying the amateur radio community with ferromagnetic products. The firm offers over 30 different materials from which to choose to find the right solution for you (Photo from the Amidon website)

Amidon Inc.: Not All Ferrites are the Same. If you're plagued with RF interference to your (or even you neighbor's) computers, stereos, TVs, VCRs, and other electronic gear, the odds are you can get rid of the interference with proven Amidon RF suppression ferrites. However, Amidon points out that not all ferrites are the same. Different ferrite materials are used to kill different types of RF interference, and also to help prevent RF interference from robbing performance from your equipment. The firm offers over 30 different materials from which to choose (see photo D) to find the right RFI/EMI solution for you.

Since 1963, when the firm was founded by William Amidon and his wife, the company has been furnishing the amateur radio community with ferromagnetic products. The business has grown steadily over the 40 years it has been in operation through supplying amateurs and various companies that are involved in the research and development of electronic products.

Amidon long has offered a broad selection of iron-powder and ferrite cores, ferrite beads, bobbins, magnet wire, baluns, toroids, coil forms, and related components. Their 24-page, foldout flyer is particularly useful in that it contains many, often quite detailed application notes that describe the products Amidon offers and also show typical radio shack uses for them. As Amidon's *CQ* ad says, "Wrap the ferrites on your cables and see the RF Interference disappear."

For a free tech data flyer, contact Amidon Inc., 240 Briggs Avenue, Cosa Mesa, CA 92626 (1-800-898-1883; e-mail: <sales@amidon-inductive.com>; web: <http://www.amidon-inductive.com>). You can go to Amidon directly for your RFI/EMI needs, or go through any of its authorized dealers.

Tri-Magnet Base from Antenna World. Antenna World offers a large commercial line of antennas, and recently has focused on antennas and accessories for the amateur radio community. The firm began operations in 1982 as an importer of European-made car radio antennas, and later added Asian-made products. Today, the company makes its VHF, UHF, and 800/900 MHz antennas in-house.

Antenna World covers the two-way commercial and amateur, cellular, 800 and 900 MHz commercial, and wireless low-power bands. Most of Antenna World's antennas are available for portable cellular phones, as well as automotive, marine, and base-station use. Cables, connectors, and antenna accessories for a variety of applications are available.

Recently, Antenna World announced the Model BAS-04X3 TriMagnet Base, specially designed for heavy-duty amateur HF mobile applications. The new, top-of-the-line model features 5 inch plastic-covered magnets in a triangular configuration on a powder-coated, 12 inch diameter, 3/16 inch thick aluminum platform. A detachable, 15 ft. coaxial cable is included with the mount, which is retail-priced at $59. For more details and availability, check out the firm's website.

Retail orders may be placed with the Retail Division, 888ANTENAS, Inc. (1-888-ANTENAS or 1-888-268-3627; e-mail: <sales@antennaworld.com>; on the web: <http://www.antennaworld.com>). The firm offers an online store, and dealer inquiries also are solicited.

New from The RF Connection. It recently came to our attention that The RF Connection has been a specialist supplying a wide variety of RF connectors and coax for some 22 years from its Gaithersburg, Maryland facility. Its catchy motto is "connecting you through the millennium."

The firm offers many different types of connectors, grounding materials, tooling, cable and cable ties, Zip Cord and DC power distribution cable, and more. The RF Connection's website shows many newly stocked types of connectors, including various TNC and SMA series; audio; FME, reverse polarity, and reverse thread connectors. The firm also has a research and development capability, and can even custom build your cable assemblies for you.

For more information, contact The RF Connection, 213 N. Frederick Ave., Suite 11-W, Gaithersburg, MD 20877 (1-800-7832666; e-mail: <rfc@therfc.com>; web: <http://www.therfc.com>).

Software and Computers

MultiNEC 2.0 de AC6LA. Dan Maguire, AC6LA, recently told us of his development of MultiNEC 2.0 (see fig. 1). It's a rather unique program that combines antenna modeling with propagation predictions.

MultiNEC 2.0 gives both beginners and experts the ability to combine antenna modeling with propagation predictions. You can build your model from scratch just like any other modeling program, or you can have MultiNEC import existing EZNEC, NEC, Antenna Model (Teri Software), ELNEC, MMANA, AO, or Nec/Wires format models. MultiNEC will translate models from one format to another as necessary.

MultiNEC can then show you not only traditional modeling results such as source impedance and radiation patterns, but also the expected propagation performance of your antenna. Propagation predictions are made via a simplified interface to the VOACAP engine and may be presented on both area coverage maps and point-to-point plots.

MultiNEC animates these maps and plots so you can easily see how the propagation results might change given varying conditions such as different sunspot numbers. MultiNEC can be used by itself or it can be used to extend the capabilities of several other antenna-modeling programs with which it interfaces.

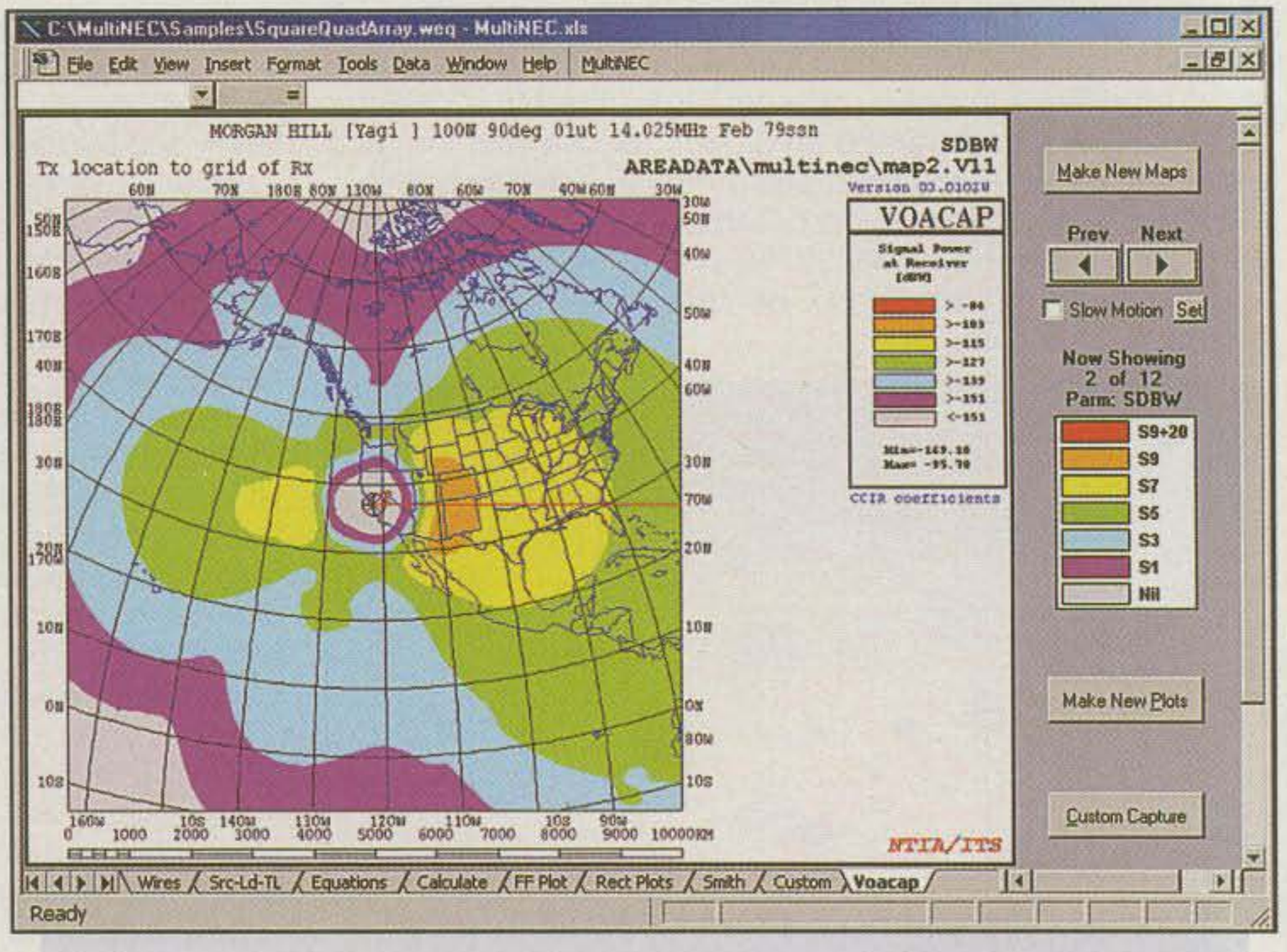


Fig. 1– MultiNEC 2.0 from AC6LA gives both beginners and experts the ability to combine antenna modeling with propagation predictions. Thus, MultiNEC can show you not only traditional modeling results such as source impedance and radiation patterns, but also the expected propagation performance of your antenna. (Photo courtesy Dan Maguire, AC6LA)

MultiNEC lets you get more out of your existing modeling program than just propagation predictions. For example, EZNEC users can apply the "modeling by equation" concept to EZNEC and use variables to control things such as the height or length of one or more wires, the rotation of wires, or even the placement of a source along a wire. Then you can use MultiNEC to run a "variable sweep" of the model, which is like a frequency sweep except that MultiNEC automatically changes some aspect of the model other than frequency.

The program's price is $39. For more information and a website demo download, contact Dan Maguire, AC6LA, 2150 Louis Holstrom Dr., Morgan Hill, CA 95037 (408-779-2492; e-mail: <ac6la@arrl.net>; web: <www.qsl.net/ac6la>). Note that MultiNEC requires Microsoft Excel 97 or later version.

Radio Resources

Radio Manufacturer's Service Information. We all know how difficult it can be to repair and maintain electronic equipment without service manuals and schematic diagrams. This is especially true of antique and vintage radio gear, where many of the manufacturers of older equipment now are defunct, and/or the manuals themselves are out of print. Nevertheless, documentation probably still exists somewhere for almost any radio gear you're likely to encounter. The trick is to find it.

One of the several specialized sources of documentation, especially for antique and vintage radios, is Gary Micanek, one of my old college classmates. Gary can supply a wide variety of documentation, some of which is much more detailed than that contained in standard sources such as Riders and Sams manuals.

Gary has photocopies of original, old-time manufacturers' radio service data from a large number of companies; almost all of the familiar (and many not-so-familiar) names are represented. Gary has a large library of electronic and radio component catalogs (transformers, coils, early radio volume controls, and especially tubes—notably RCA, Raytheon, and Sylvania). He also has reference data from early radio and electronics textbooks, as well as radio equipment catalogs (including Allied Radio, Sears Silvertone, and Western Electric).

Gary's other hobby is early and collector automobiles. He has a large reference library on almost everything from 1900 on—service, parts, and man-

ufacturers' catalogs. He's heavy on the technical data and not so much on sales catalogs.

For more information, call or write to Gary Micanek, 226 Henry Avenue, Manchester, MO 63011 (636-227-7046; e-mail: <micanek@aol.com>). Gary prefers phone calls from 7–9 AM Monday through Friday. If you send a letter or request, you must know the make and specific model number, and approximate year. If you're looking for general information, it's best to phone.

More Genuinely Useful Stuff

QSL Index Dividers from Radio Warehouse. Are you a collector of QSL cards, or are you an award chaser? Radio Warehouse's systems of QSL index dividers organize all of your cards, making storage and retrieval of cards a pleasure. QFile™, an organized index filing system, can put a professional touch on your sought-after QSL collection.

The original QFile DXCC System (photo E) consists of 340, 5" × 8", heavy-duty Mylar®-reinforced, tabbed index-card dividers with labels for all of the current DXCC entries, sorted by prefix. The tabs follow the latest version of the ARRL DXCC list, and five blank dividers are included so that you can sort deleted entries separately. Each divider comes preprinted with a handy record-keeping chart so you can instantly know whether you still need that certain elusive DX station on, for example, 40 meter CW! The QFile DXCC System is $49.95; all you need add are the QSL cards and a box (shoeboxes reportedly work great for the purpose).

Now Radio Warehouse's president, Rush Johnson, W4QA, tells us that he recently introduced a new QFile WAS edition (photo F), which is produced in the same familiar format as the original DXCC edition. The new product includes Mylar®-reinforced tabs for all 50 states, complete with a recordkeeping grid on each card. As with the DXCC edition, the heavy-duty dividers are sized to fit in any standard 5" × 8" index box, available at office-supply stores. QFile WAS is $19.95.

For more information, contact Rush Johnson at Radio Warehouse, P.O. Box 77001, Charlotte, NC 28271-7000 (phone 704-321-2300; e-mail: <radio@carolina.rr.com>; on the web: <http://www.radiowarehouse.com>). Product details are on the website.

We Get Letters

Before wrapping up things this month, we would like to acknowledge some of

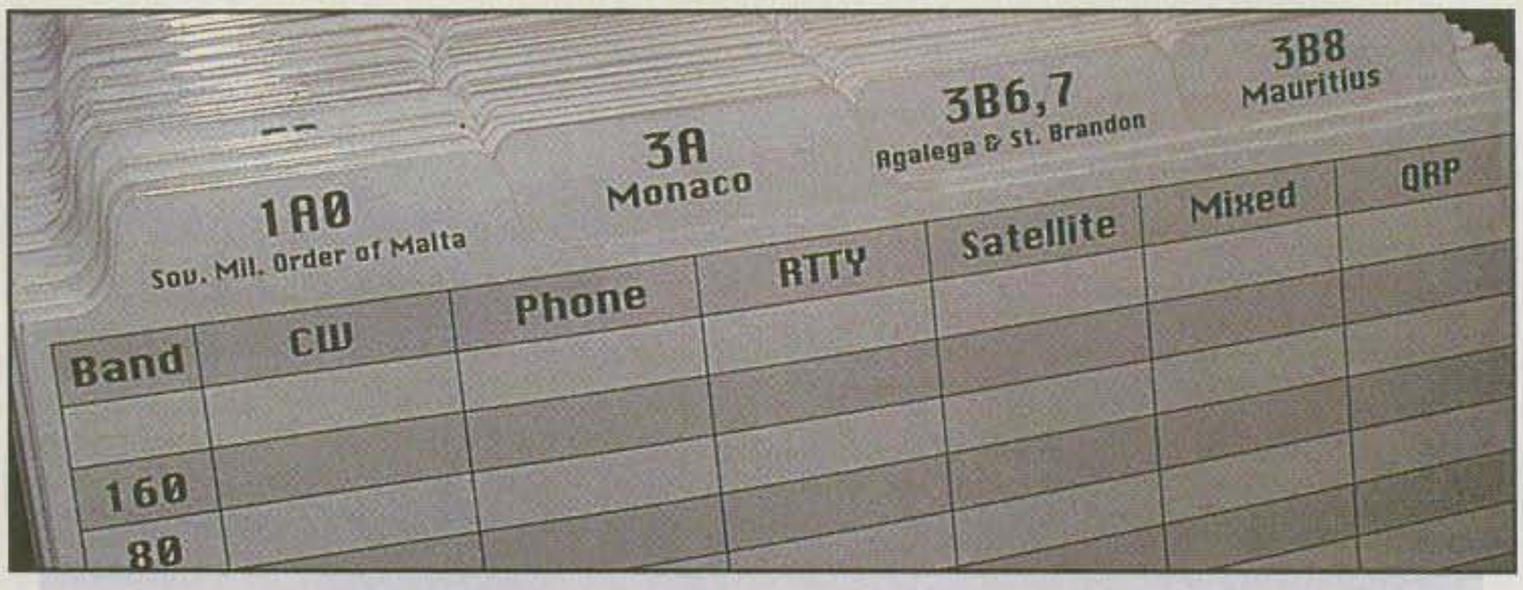


Photo E– Radio Warehouse's systems of QSL index dividers organize all of your cards, making storage and retrieval of cards a pleasure. The QFile™ System, an organized index filing system, can put a professional touch on your sought-after QSL collection. Shown here is a view of the QFile DXCC edition. (Photo courtesy Radio Warehouse)

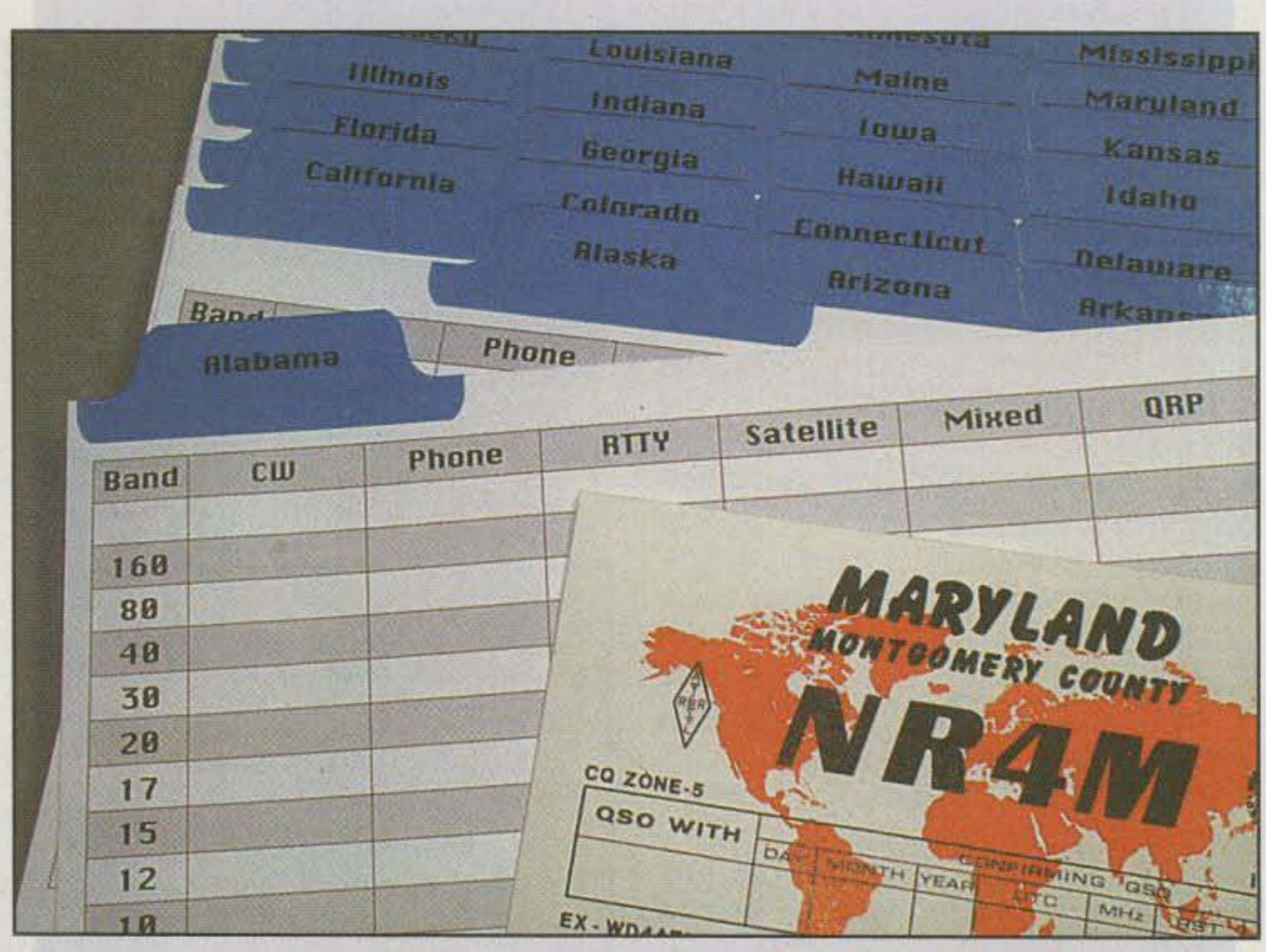


Photo F– Here's the newly available QFile WAS edition, one of two QSL index divider systems offered by Rush Johnson, W4QA, of Radio Warehouse. The new product has Mylar®-reinforced tabs for all 50 states. (Photo courtesy Radio Warehouse)

the good folks who took the time and trouble to correspond with us in recent months.

A tip of the ol' W8FX hat goes to Chris Drummond, W6HFP; David Autry, WD8IOU; Scott Davis, N3FJP; Dan Young; Dan Maguire, AC6LA; Gary Micanek; Jack Stone; Rush Johnson, W4QA; Dan Simmonds, KK3AN; Glen Rollins, N3IYR; and all the rest.

A special note: If you e-mail us, please include your full name and callsign, if any. It would be nice to know we're corresponding with a real person, and not just an e-mail address!

Wrap-Up

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

Overheard: We all probably know this, but bear in mind that all of us have to go through some really bad times to appreciate how truly wonderful our "good times" actually are.

73, Karl, W8FX

FCC Begins Inquiry into Broadband Over Power Lines

BY FREDERICK O. MAIA,* W5YI

Plug your computer into any wall socket and you're hooked into a high-speed internet connection. No it's not science fiction, it's BPL over Power Lines. And it's right around the corner.. BPL service can go places where cable and DSL can't, especially the rural areas. However, what are the interference consequences?

On April 28, 2003 the FCC released a 21-page formal Notice of Inquiry (ET Docket No. 03-104) seeking public comment on "BPL," an acronym few people have heard of. If the advance publicity is any indication, though, it could become as well known as high-speed DSL and cable-modem internet access. BPL stands for Broadband over Power Lines, the ability to use existing electrical power lines to carry internet and broadband services to homes and offices.

The technology promises to provide consumers with the freedom to access broadband services from any room in the house without adding or paying for additional connections simply by plugging a BPL device into an existing electrical outlet. Furthermore, BPL will enable access to communications services in rural and remote areas of the country.

Background of Broadband Over Power Lines

BPL systems are new types of carrier current systems that operate on an unlicensed basis under Part 15 of the Commission's rules. BPL systems use existing electrical power lines as a transmission medium to provide high-speed communications capabilities by coupling RF energy onto the power line.

BPL systems may operate either inside a building ("In-House BPL") or over utility poles and medium-voltage electric power lines ("Access BPL"). As In-House BPL systems can use the electrical outlets available in every room of a building to transfer information between computers and between other home electronic devices, they eliminate the need to install new wires between these devices. Using this technology, consumers can readily implement communications local-area networking and similar technology.

Access BPL systems can be used to provide high-speed internet access and other broadband services to homes, as well as provide electric utility companies with a means to more effectively manage their electric-power distribution operations. Given that Access BPL can be made available in conjunction with the delivery of electric power, it may provide an effective means for "last-mile" delivery of broadband services and may offer a competitive alternative to digital-subscriber- line (DSL) and cable-modem services and other high-speed internet technologies.

An advantage of BPL is the cost of the hardware. The equipment needed to push an internet signal to the end of an electric wire is cheaper than the equipment needed to send a DSL signal to the end of a telephone network, said FCC engineer Bruce Franca, chief of the FCC's Office of Engineering and Technology.

The idea of using the alternating current (AC) power lines to carry information to a variety of devices is not new. A number of devices or systems already use carrier-current techniques to couple radio-frequency (RF) energy to the AC electrical wiring for purposes of communication. For example, AM radio systems on some school campuses employ carrier-current technology; many devices intended for the home, such as intercom systems and remote controls for electrical appliances and lamps, also utilize carrier-current technology; and for many years electric utilities have been using carrier-current technology to monitor and control the electrical power grid.

More recently, these systems have been used to convey information in digital form, providing communications at relatively slow transmission speeds on carrier frequencies below 2 MHz. All such devices are subject to the FCC's existing Part 15 rules for low-power, unlicensed equipment operating on a non-interference basis.

The Part 15 rules limit the amount of conducted RF energy that may be injected into a building's wiring by an RF device that receives power from the commercial power source, including carrier-current systems that couple RF energy onto the AC wiring for communication purposes.

This conducted energy can cause harmful interference to radio communications via two possible paths. First, the RF energy may be carried through the electrical wiring to other devices also connected to the electrical wiring. Second, at frequencies below 30 MHz, where wavelengths exceed 10 meters, long stretches of electrical wiring can act as an antenna, permitting the RF energy to be radiated over the airwaves. Due to the low propagation loss at these frequencies, such radiated energy can cause interference to other services (such as amateur radio) at considerable distances.

The existing Part 15 rules cover two types of power-line equipment—carrier-current systems and power-line carrier systems. A carrier-current system is defined as a system, or part of a system, that transmits radio-frequency energy by con-

*National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101
(telephone 817-461-6443)
e-mail: <w5yi@cq-amateur-radio.com>

duction over the electric power line to a receiver also connected to the same power line.

A carrier-current system can be designed so that the signals are received by conduction directly from connection to the electric power line (unintentional radiator), or the signals are received over the air, due to radiation of the radio-frequency signals from the power line (intentional radiator).

Until recently, carrier-current devices have operated generally on frequencies below 2 MHz with limited communications capabilities over the electric power wiring. The power line is a noisy communications medium, characterized by several unpredictable and strong forms of interference generated by devices such as dimmer switches, motorized electrical appliances, and computers.

Because of these inherent non-linear characteristics, reliable high-speed communications over power lines have been difficult to achieve. However, the availability of faster chip sets and the development of sophisticated modulation schemes have produced new designs that can overcome these earlier technical obstacles—i.e., extreme vulnerability to power-line noise, which causes drop-off in transmission speeds and disruptions due to random home power usage of other appliances.

New BPL devices operate on multiple carriers that are spread over a wide spectrum (i.e., from 4.5 MHz to 21 MHz), with adaptive algorithms to counter the noise in the line. Data transmission speeds rated at 14 Mbps and higher have been claimed for in-house communications.

BPL devices intended to carry high-speed broadband services to neighborhoods over a utility's power lines have claimed speeds comparable to DSL and cable in actual BPL experimental installations. This new generation of high-speed BPL devices that use wide spectrum was not contemplated under the existing Part 15 rules when they were formulated.

The FCC said that manufacturers of BPL equipment are free to continue to deploy their networks in conformance with existing Part 15 rules. Looking toward the future, however, the FCC wants to know if some rule changes might be necessary to further advance BPL deployment. Some of the information the Commission requests in the inquiry concerns:

• The current state of high-speed BPL technology;

• The potential interference effects, if any, on authorized spectrum users;

• Test results from experimental BPL sites;

• The appropriate measurement procedure for testing emission characteristics for all types of carrier-current systems; and any

• Changes that may be needed in the Part 15 technical rules and the equipment approval process to foster the development of BPL and to ensure that interference is not caused to other services.

FCC Chairman Visits BPL Site

According to comScore Networks, broadband use grew 6 percent over the last six months to 28 percent of all online households, a figure that will jump to 40 percent by 2005, according to Jupiter Research.

FCC chairman Michael Powell is particularly positive about the potential of Broadband over Power Line systems. He said it "...had the potential to provide consumers with an ever present third broadband pipe to the home."

He recently witnessed first hand the potential of BPL at a local Maryland site. "Broadband over power lines can offer consumers freedom to access broadband services from any room in their home without the need to pay for additional wiring, by simply plugging an adapter into an existing electrical outlet," Powell said. "There have been a couple of questions about whether the interference protections are appropriate and whether they are inhibitors to the growth of the technology and whether there are concerns that we have yet to identify." He added, however, that the interference issues did not need to be cleared up before a technology provider could provide commercial service. "I have an attitude that if the government doesn't say no, you keep going, and I hope these guys keep going."

"Power-line technology also provides for useful redundancy and diversity in communications networks that are key aspects of secure homeland communications," Powell said.

He said that the Notice of Inquiry "...explores ways to update our rules to ensure that regulatory uncertainty does not in any way hinder the deployment of these new services. Ultimately it will be for the marketplace to decide how broadband over power lines fits into tomorrow's competitive telecommunications landscape, but we welcome them to the frontier of the digital migration."

Not only is FCC Chairman Powell impressed by the potential of BPL technology, Commissioner Jonathan Adelstein issued a separate statement in which he characterized the potential of BPL as "enormous." He said one of his top priorities is to speed up the deployment of broadband. "While we must be mindful of harmful interference, we can-

not let unsupported claims stand in the way of an innovation such as BPL systems. Provided that the engineering bears out, I believe that we need to push the boundaries to accommodate new technologies."

Commissioner Copps agreed, saying he supported the Inquiry "to gather information critical to assisting the Commission to play a constructive role in making this a reality without causing problems, such as unacceptable interference, to existing radio devices."

Dollars and Sense of BPL

Electronics makers are pairing with power companies around the country to test equipment that allows electric lines and old-fashioned power outlets to deliver high-speed internet services. If the tests end as well as company executives expect, cable and telephone companies may start facing competition by the end of the year from an industry that reaches into nearly every home and office in the country.

A dozen power companies nationwide are experimenting with the technology. Alan Shark, president of the Powerline Communications Association, which represents utility interests in high-speed internet service, says power-line broadband could have up to 3 million U.S. subscribers by the end of 2004.

Power companies and their partners expect to beat their rivals on price, said Brett Kilbourne, a spokesman for the United Powering Council, a nonprofit advocacy group organized by utilities and technology companies.

Cable and telephone companies typically charge $45 to $55 a month for high-speed service. Comcast Cable has 3.6 million high-speed internet customers today and is wired to deliver the service to up to 30 million homes in the United States.

Several utilities claim they can provide the service for as little as $30 per month. Utilities will be able to charge that amount because it costs them less to provide the service, Kilbourne said.

ARRL "Skeptical" About Interference-Free BPL

A couple of days after the FCC adopted the Notice of Inquiry, the American Radio Relay League said in a published release that BPL would cause an interference threat to HF amateur radio communications "...since BPL would apply high-frequency RF to parts of the power grid."

"Entire communities will be affected, so every amateur in that community could have part of the radiating system 'next door' on the power wiring on his or her street," cautioned ARRL Lab Supervisor Ed Hare, W1RFI, who chairs an IEEE PLC Work Group on electromagnetic compatibility

ARRL CEO David Sumner, K1ZZ, mentioned in the October 2002 issue of *QST* that he also doubted power-line communications would be interference-free. "What may be a fine transmission line at 60 Hz looks more like an antenna at HF," he said. " And that's a matter of physics, not economics. Radio smog results from putting RF where it doesn't belong."

Hare says BPL would be a significant source of interference "...because overhead electrical wiring is a much better antenna than the electrical wiring within a building." Even though manufacturers included 30 dB notches for the ham bands at the ARRL's request, Hare believes this to be insufficient protection for the amateur radio bands.

His own analysis using computer models of simple power wiring and estimates of the levels of PLC signals suggests "...a significant increase in noise levels" from deployed BPL/PLC systems.

Tests of BPL are under way in several states, and ARRL Lab personnel will be visiting some of the test cities to take field measurements of the potential for interference to amateur radio operations. The League also mentioned BPL technology already deployed in other countries had resulted in interference complaints from ham operators.

The League has prepared an excellent BPL web page at <www.arrl.org/tis/info/HTML/plc/> that contains all the ARRL's BPL information and links to a number of sites and studies that show the technology poses a significant interference potential to amateur radio. 73, Fred, W5YI

dx

BY CARL SMITH,* N4AA

The QSL Managers Society

The annual Dayton Hamvention is fast approaching as I write this column. I'll bring you some of the highlights from that event next month. I suspect many readers will be in Dayton May 16–18, and I'll have the chance to see you then. Dayton is always fun, interesting, and informative, and I am looking forward to being there. Hopefully, we will have a weekend free of the severe weather and tornado activity that has wreaked havoc on the Midwest and southeast in early May.

On the Bands from YI

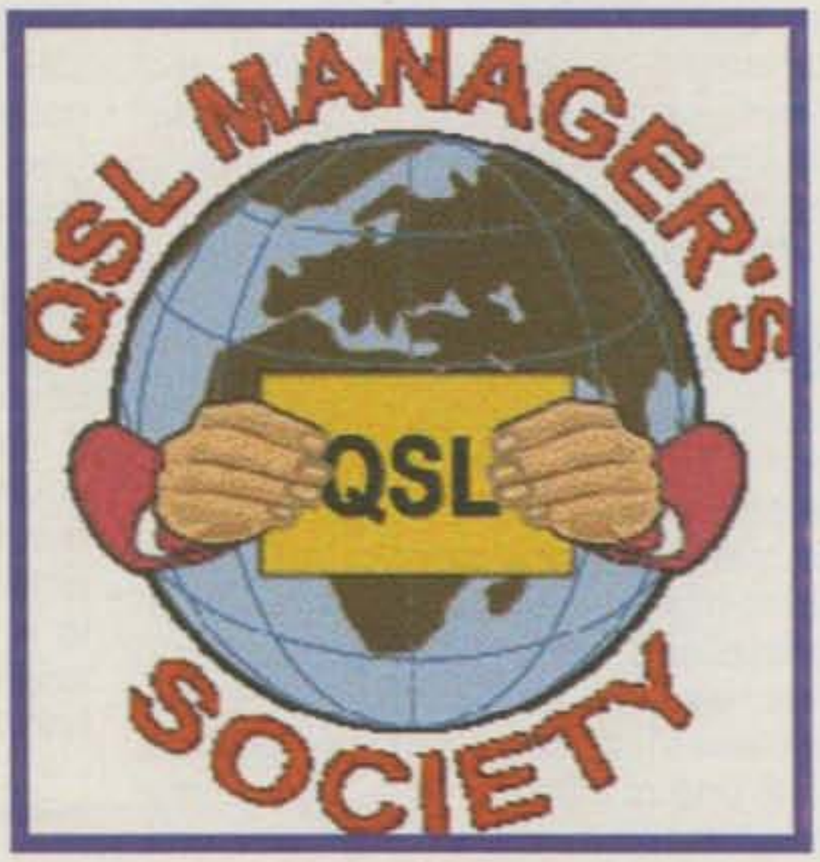
Following the action in Iraq, a number of U.S. military personnel appeared on the bands signing YI/home call. They will have to have written permission from the military commanders for any of those contacts to be "counters" for DXCC. They drew lots of interest, and most of them were using very low power and makeshift antennas. I suspect the interest in working them was more out of curiosity and the desire just to say hello rather than interest in getting QSL cards. Wayne Carroll, W4MPY, "The QSL Man," generously offered to provide QSL cards free of charge to those military personnel operating from Kuwait and Iraq, provided the quantities were reasonable and they could be sent to a U.S. address. As Wayne put it, "I feel they have sacrificed a lot for all of us and this is the least I can do to say *thank you*."

QSL Managers Society

Speaking of QSL cards, I'll bet most of you are not aware of the QSL Managers Society. Bob Schenck, N2OO, and a few others formed this group. From their website I quote: "The QSL Manager's Society has been organized in order to have a single point of contact for quality QSL managers on the 'internet' . . . and to promote fair and uniform guidelines for quality QSL managers."

I invite all of you to check out <http://www.qsl.net/qslmanagers> and see for yourselves what they have done. As I understand the background on this project, it came about as a result of a number of stations making the statement: "I will close the logs for XYZ operation as of (some date)." Bob and his friends put together a network of stations that would accept those "closed" logs and continue to provide QSL cards indefinitely. That's quite a project, but certainly a worthy one.

Many of you will recognize the call W4FRU. John Parrot served as QSL Manager for dozens of stations for many, many years. Following his death, Bob Young, K4JDJ, took over the task. I'd like to share the following story with you to show the dedication of the QSL Managers Society. It was provided by Bob, N2OO.



QSL Managers Society Logo.

In March of 2003, the QSL Manager's Society was approached by Bob Young, K4JDJ, about taking over the logs that he was handling. He had some family health issues to deal with and needed to off-load his QSL managing duties. Many of the logs that he was holding were from John Parrot, W4FRU, who became a SK awhile back. It is worth noting that Bob often assisted John over the years.

On April 5th, Bob Schenck N2OO, and Skip Maze, N1IBM, drove down to Virginia to pick up the logs. The 18 hour round trip took them across the Delaware Bay on the Cape May/Lewes Ferry, and then across the Chesapeake Bay/Bridge Tunnel to Suffolk, Virginia, where K4JDJ lives. Upon arrival, Bob had us back our pickup truck up to his garden shed, where all the logs and cards had already been nicely sorted and packed. The load completely filled N2OO's pickup truck bed to a depth of about 2 feet!

Upon return to New Jersey and over the next three weeks, N2OO dug into the logs and blank cards and began to sort out everything. Everything was found quite orderly! K4JDJ had done a great job of keeping everything in order. There turned out to be 60 logs involved, some going back to 1973. There were also somewhere around 100,000 blank QSL cards.

Thirteen new QSL managers were solicited among the members of the QSL Managers Society to take over these logs. The logs and appropriate blank cards were packaged in preparation for mailing to the new managers. A check was done with the DXCC Desk to verify that all logs (except a couple of maritime mobile operations, of course) counted for DXCC. All were found to be OK. On April 23rd all logs were shipped to their new homes.

Many thanks to the volunteer managers who have dedicated themselves to the preservation of some DX history . . . and who will continue to provide QSL cards for these special calls from the past.

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The WPX Program

CW

3110 .....PP6CW 3111 .....W2CDO

SSB

2863 .....KC5KJE

Mixed

1917 .....DL4ZN

CW: 600 G4PWA. 650 PP6CW. 4800 WA2HZR.

SSB: 450 K2PH. 500 JK7QJK. 550 JK7QJK. 600 G4PWA. 1300 WM4R. 1700 KWØU. 1950 W8JDX. 2600 KF7RU.

MIXED: 450 DL4ZN. 950 WBØWAO. 1000 G4PWA. 5200 W2FXA.

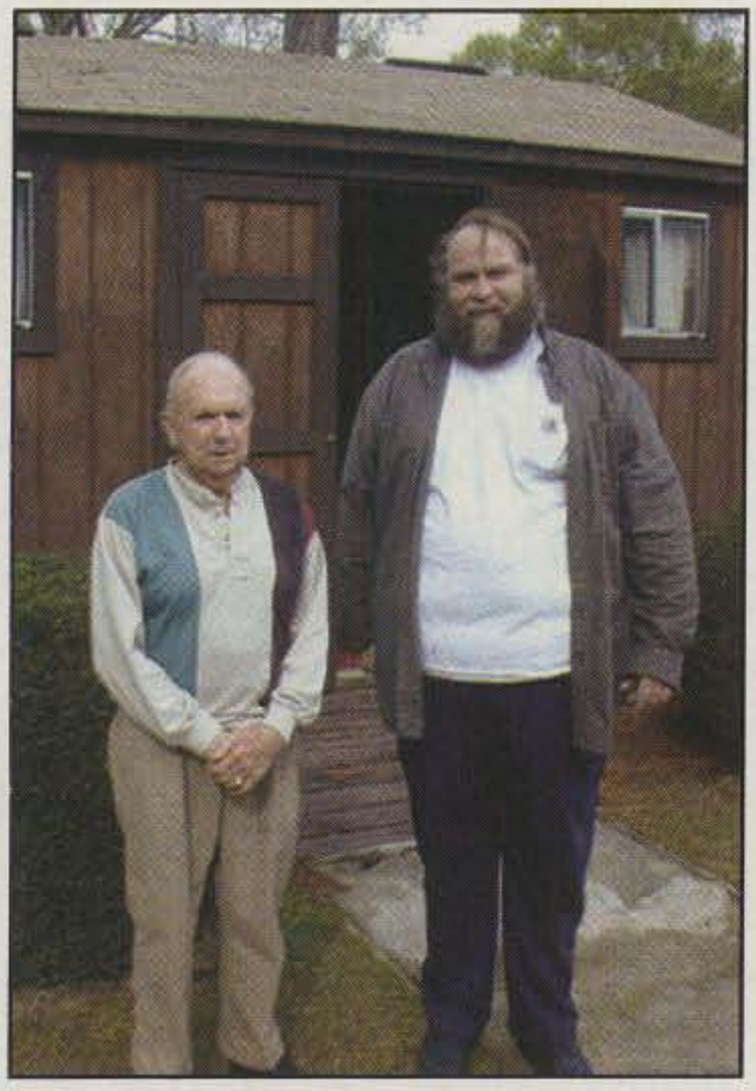
10 Meters: K2PH, G4PWA
15 Meters: G4PWA
40 Meters: G4PWA
80 Meters: G4PWA
160 Meters: G4PWA

Africa: G4PWA
S. America: WBØWAO

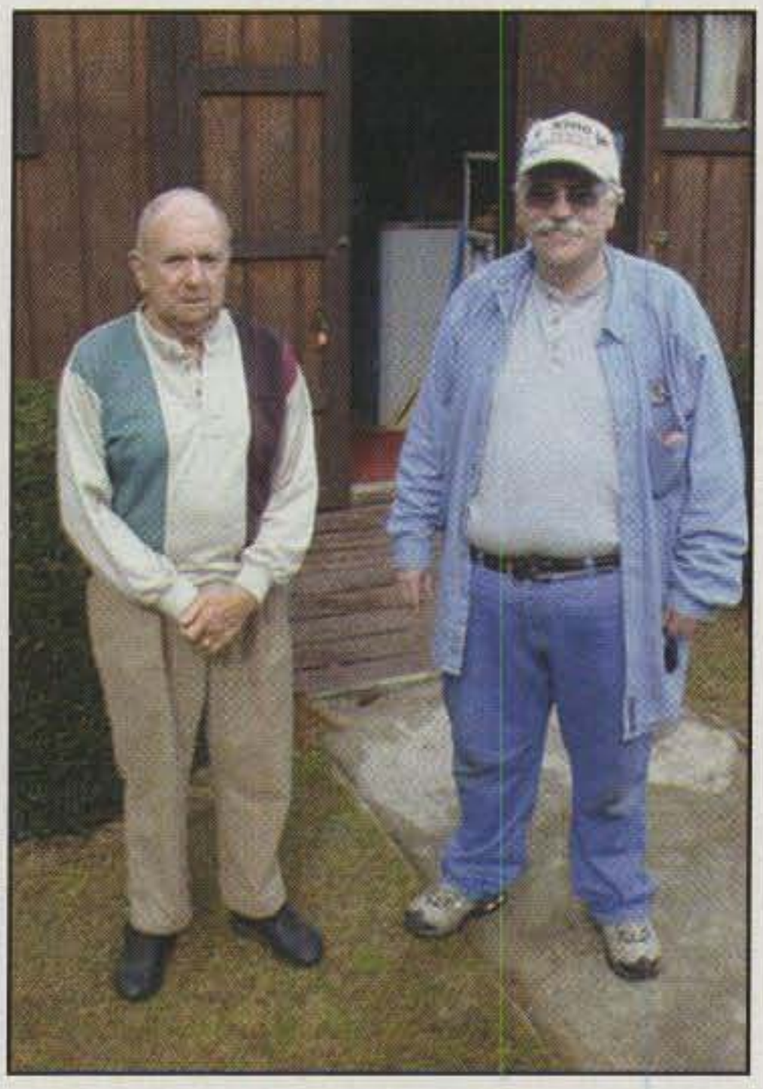
Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4GP, K4LQ, KØKG, DL6ATM, VE9FX.

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, SMØDJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM.

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.*



Bob Young, K4JDJ (left), and Skip Maze, N1IBM, a member of the QSL Managers Society.



Bob, K4JDJ (left), and Bob Schenck, N2OO, also a member of the QSL Managers Society.

This month I am including the list of QSL Managers for cards formerly handled by W4FRU and/or K4JDJ. You will note the dates on many of these calls go back into the 1970s. I offer my personal thanks to Bob and his friends for taking on this task for the benefit of DXers worldwide.

KH7K QSL Cards

As long as I'm on the subject of QSLing this month, let me add this note on

KH7K QSL cards, provided by Ken Brown, N6KB:

I am the trustee of club call NH7O. This was formerly KH7K. KH7K was revoked by the FCC shortly after our club used the call in the 2001 CQ 160 CW Contest. Apparently, even 2×1 K suffix KH7 calls are reserved for Kure Island. WH7K and AH7K were also revoked on the same day. . . . Anyway, what I am writing about is the fact that I receive QSLs for KH7K almost weekly. These QSLs are all for QSOs that could never have happened. Most are for bands that KH7K never operated on, and many are for dates after the FCC revoked the callsign. A lot of DXers would save a lot of trouble and postage expense if KH7K were listed in a DX column QSL route table as a pirate.

Andaman & Nicobar and Lakshadweep

These very sought-after islands won't be active any time soon according to a report from a reputable source in India, who says, "It doesn't look as though there will be any DXpedition in the near future. The authorities are just not issuing any licenses for these islands, as they are 'sensitive' locations from their point of view." Many have tried to gain permission to operate from the islands in recent years, but it appears it just won't happen until the political situation changes in that area of the world.

Kutty, VU2PKK, shows up in a lot of logs in NA around 14203 kHz at around 1100Z. Kutty is an old timer who remembers building regenerative receivers many years ago. He likes 15 and 20 meters SSB. His son is VU2KVG, who is a medical doctor. His daughter-in-law is VU2GVP. (Photo courtesy KDØJL)

July DXpeditions

7P – Lesotho will see *two* operations in July. The first will run from July 7 to 11 and is dubbed "The African Double Jump." It will feature Fabrizio, IN3ZNR; Mauro, IN3QBR; and Joe, AA4NN. This is a ham-vacation and a DXpedition, as they are also planning tours, safaris, sightseeing, and night life. For more details on this trip go to: <http:www.qsl.net/xu7aay/Africa/index.html>.

The second Lesotho operation will run from July 18 to 25. The DXpedition, organized by Frosty, K5LBU, now includes Igor, WØIZ; Dave, K4SV/7P8DA; Frosty, K5LBU/7P8CF; Madison, W5MJ/7P8MJ; Neil, VA7DX/7P8NK; and Tom, WW5L/7P8TA. An added feature will be Dave, K4SV, and Neil, VA7DX, who will go to 3DA – Swaziland following the Lesotho operation.

CY9 – St. Paul Island. The team of Robert, NØRN; Vance, N5VL; Igor, WØIZ; Joe, AA4NN; Andrea, K5AAH; Alan, K5AB; and Dale, VE7SV, will be on St. Paul Island July 24 to August 2.

FP – St. Pierre & Miquelon. Paul, K9OT, and Peg, KB9LIE, will be going to Miquelon for the third time, operating low power July 27 to August 5.

VP2M – Montserrat. Bill, W4WX; William, N2WB; and Bob, K9MDO (members of the Florida DXpedition Group), will be doing a "warmup" operation from Montserrat July 22 to 29.

5 Band WAZ

As of May 15, 2003, 621 stations have attained the 200 zone level and 1327 stations have attained the 150 zone level.

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

DK1RV N4AH EY8MM

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
KL7Y, 199 (34)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
KC7V, 199 (34)
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)
KY7M, 199 (34)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
UA4PO, 198 (1, 2)
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)
OE2BZL, 198 (1, 27)
N4PQX, 198 (24, 26)
RU3DX, 198 (1, 6)
UT5JAJ, 198 (12, 30)
N8PR, 198 (18, 24)
N6HR/7, 198 (34, 37)
N4MM, 198 (24, 26)

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

LU2BA (190 zones)
N6OU (169 zones)
AI6Z (185 zones)

Endorsements:

N4MM (198 zones)
KØSR (200 zones)
W6XK (190 zones)
DJ9RR (196 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, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. 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 Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

The WAZ Program

10 Meter SSB

552 ..... WAØQII

15 Meter SSB

595 ..... JE7JIS
596 ..... 7L1XXM
597 ..... AI6Z

20 Meter SSB

1111 ..... KU4BP

10 Meter CW

181 ..... AI6Z

20 Meter CW

534 ..... JA3CWL

40 Meter CW

233 ..... K4QL

20 Meter RTTY

52 ..... K4QL

6 Meters

002 ..... N4MM (endorsement, 29 zones)

All Band WAZ SSB

4859 ..... 7L1XXM
4860 ..... N1IZP
4861 ..... DS5TGK
4862 ..... AA2ZS
4863 ..... KE4HRF
4864 ..... W8KA
4865 ..... K4QL

Mixed

8223 ..... K4QL
8224 ..... DL2KQ
8225 ..... HL1TXQ
8226 ..... JA4BS
8227 ..... W6NDR
8228 ..... N6NG
8229 ..... JK1NMJ
8230 ..... KIØDE
8231 ..... WB6IYM
8232 ..... K4JJW
8233 ..... DL2AYK

All CW

359 ..... W8KA
360 ..... VA3UU
361 ..... RA3WDK
362 ..... W6MWY
363 ..... DL3NSM
364 ..... HB9DOT
365 ..... PT2CJ
366 ..... K4QL

RTTY

139 ..... K4QL

Satellite

019 ..... DL2AYK (35 zones)

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, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. 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 Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

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	K4CN 333	K2JF 331	K7JS 328	W4LI 325	K6CU 321	K9OW 313	W9IL 300
K2FL 334	EA2IA 334	W4MPY 333	K3JGJ 331	K9OW 328	OK1MP 325	HA5DA 321	N1HN 313	KØHQW 299
K9BWQ 334	PA5PQ 334	PY2YP 333	W2VJN 331	W4UW 328	WA8DXA 325	IKØTUG 321	PY4WS 313	WG7A 295
K9MM 334	K3UA 334	K6GJ 332	N4CH 331	K8PV 327	I5XIM 325	VE7DX 320	K9DDO 312	KE3A 295
W7OM 334	K2ENT 333	KA7T 332	W2UE 330	W4QB 327	K5UO 325	IKØADY 320	W3II 312	K4IE 291
K2JLA 334	WB5MTV 333	W8XD 332	I4LCK 330	I1JQJ 327	IK2ILH 325	WG5G/QRPp 320	W6YQ 311	KD8IW 288
N7FU 334	W7CNL 333	WØJLC 332	VE7CNE 330	YU1TR 327	N5FW 325	HA5NK 319	YT1AT 310	EA3BHK 282
K2OWE 334	YU1HA 333	K8LJG 332	4N7ZZ 330	I4EAT 327	9A2AA 325	F6HMJ 319	KF8UN 308	YC2OK 282
N4MM 334	DL3DXX 333	YU1AB 332	W6DN 330	DL8CM 327	N4OT 325	N7WO 318	IKØADY 307	DJ1YH 281
F3TH 334	IT9QDS 333	K5RT 332	K7LAY 330	SM6CST 327	LA7JO 324	G3KMQ 317	YU7FW 306	UA9SG 279
F3AT 334	G4BWP 333	NØFW 332	WB4UBD 330	N4KG 327	SM5HV/HK7 324	OZ5UR 317	LU3DSI 302	XE1MD 278
DJ2PJ 334	K4CEB 333	N4AH 332	K9IW 329	K4JLD 327	9A2AJ 323	F5OIU 317	F5OIU 302	EA2CIN 278
WA4IUM 334	K4IQJ 333	PT2TF 331	G3KMQ 329	IT9TQH 326	W6SR 323	K8JJC 315	N1KC 302	I3ZSX 276
W4OEL 334	WØHZ 333	K6LEB 331	KZ4V 329	I2EOW 326	K1FK 323	HB9DDZ 314	KH6CF 301	G3DPX 275
W2FXA 334	N5FG 333	VE3XN 331	N5HB 329	NC9T 326	KUØS 322	CT1YH 313	VE7KDU 300	WA4DOU 275
N4JF 334	N7RO 333	W1WAI 331	K1HDO 328	W7IIT 326	KE5PO 322			

SSB

K6YRA 335	VE3XN 335	K4JLD 334	EA3BMT 332	W2FGY 329	KW7J 327	WA4ZZ 322	VE3CKP 311	WA1ECF 295
K2TQC 335	4Z4DX 335	N5ZM 334	W2FKF 332	CT1EEN 329	KE5K 327	WN9NBT 322	CT1YH 311	N5WYR 293
W6EUF 335	N7RO 335	PY2YP 334	DL9OH 331	KE4VU 328	I1JQJ 327	LU5DV 322	YV5NWG 311	K7ZM 292
K2JLA 335	IØZV 335	K2ENT 333	N2VW 331	K1HDO 328	CP2DL 327	WW1N 322	LU3HBO 310	OA4EI 292
K4MQG 335	EA2IA 335	4N7ZZ 333	YZ7AA 331	K5UO 328	W6SR 326	N3RX 321	SV3AQR 310	KØOZ 291
IK1GPG 335	IN3DEI 335	KE5PO 333	YV1JV 331	KF8UN 328	N4KG 326	XE1CI 321	HA6NF 310	I3ZSX 290
K5OVC 335	EA4DO 335	VE1YX 333	WA4WTG 331	EA3EQT 328	K7TCL 326	CT1ESO 321	HB9DDZ 310	W4PGC 290
NØFW 335	PA5PQ 335	I4LCK 333	W8KS 331	WØULU 328	W9HRQ 326	YT1AT 321	WA5MLT 310	YV5NWG 287
K9MM 335	K9OW 335	W2JZK 333	YV5IVB 331	K1EY 328	W4QB 326	EA8TE 321	XE2LV 310	VE7HAM 285
W6BCQ 335	W6DPD 335	K8LJG 333	KX5V 331	KZ4V 328	K8PV 326	W6MFC 321	EA3BHK 307	KKØDX 285
XE1AE 335	XE1VIC 335	VE4ACY 333	I8LEL 331	XE1D 328	DL6KG 326	K3LC 320	RW9SG 307	F5RRS 284
W7OM 335	WDØBNC 334	KØKG 333	K3JGJ 331	KD8IW 328	W4LI 326	N4CSF 320	XE1MDX 305	CT1CFH 284
KZ2P 335	DU9RG 334	W4WX 333	N5ORT 331	ZL1BOQ 328	WR5Y 326	N4HK 320	EA5OL 305	WØIKD 283
IK8CNT 335	K2FL 334	VE2WY 333	PT2TF 331	KE3A 328	W5LLU 326	DL3DXX 320	WB2AQC 305	EA3CYM 283
VK4LC 335	WØYDB 334	WB3DNA 333	CT1AHU 331	W9IL 328	N1ALR 326	KØFP 320	KC4FW 304	W9ACE 283
OE7SEL 335	W4UW 334	K6GJ 333	EA3JL 331	KE3A 328	IKØIOL 325	EA7TV 320	K3BYV 303	KBØRNC 282
VE3MR 335	K9BWQ 334	W9SS 333	W6DN 330	I1EEW 327	K9IW 325	SV1RK 320	YC2OK 303	K4IE 282
VE3MRS 335	W4NKI 334	K9PP 333	K8CSG 330	SV1ADG 327	WA4JTI 325	N1KC 320	WB2NQT 303	WN6J 281
K4MZU 335	WB4UBD 334	W2CC 333	YV1CLM 330	DL8CM 327	NI5D 325	WA4DAN 319	VK3IR 303	IK8TMI 281
OZ5EV 335	W4UNP 334	VE7WJ 333	LA7JO 330	F9RM 327	KC4MJ 325	CE1YI 318	VE7KDU 302	F5JSK 281
N7BK 335	W8AXI 334	W3AZD 333	AB4IQ 330	XE1MD 327	PY2DBU 325	W5OXA 317	W2GZI 302	KK5UY 280
K7LAY 335	VE2GHZ 334	VE2PJ 332	AE5DX 330	I4EAT 327	K7HG 324	YV4VN 317	N5QDE 302	YU1TR 280
ZL3NS 335	OE2EGL 334	YV1KZ 332	KB2MY 330	W3GG 327	AC7DX 324	EA5GMB 317	KD4YT 302	KA5OER 280
N4MM 335	WA4IUM 334	YV1AJ 332	K3PT 330	AA6BB 327	KØHQW 324	KD5ZD 317	KK4TR 301	F5INJ 279
OZ3SK 335	K5RT 334	KSØZ 332	WS9V 329	SM6CST 327	EA3BKI 323	K6RO 316	N8SHZ 301	EA3CWT 278
K7JS 335	W2FXA 334	I8KCI 332	K2JF 329	WD8MGQ 327	W6WI 323	N5HSF 316	SV2CWY 300	VE2DRN 277
XE1L 335	N4JF 334	LU4DXU 332	ZL1AGO 329	CX4HS 327	K4JDJ 323	KE4SCY 315	4X6DK 300	9A9R 277
YU1AB 335	W6SHY 334	VE4ROY 332	N5FG 329	IØSGF 327	EA3BMT 323	WZ3E 314	YT7TY 300	W6UPI 276
OE3WWB 335	W5RUK 334	W7FP 332	W9OKL 329	IT9TQH 327	F6BFI 322	IZ6CST 314	XE2NLD 300	Z31JA 275
K5TVC 335	K4CN 334	K9HQM 332	DU1KT 329	IT9TGO 327	K6CF 322	K9YY 313	K6GFJ 299	G4URW 275
N5FG 335	EA3KB 334	CT1EEB 332	I2EOW 329	DK5WQ 327	LU7HJM 322	NØMI 313	VE7SMP 297	VE2AJT 275
DJ9ZB 335	N4CH 334	W8ZET 332	VE7DX 329	UY5XE 327	K5NP 322	W5GZI 311	AC6WO 296	4Z5FL/M 275
PY4OY 335	K3UA 334	K1UO 332						

RTTY

K2ENT 331	NI4H 325	K3UA 320	G4BWP 312	N5FG 305	KE5PO 297	I1JQJ 289	W4QB 280	YC2OK 280
WB4UBD 329	EA5FKI 320	W2JGR 316	PA5PQ 311	W4EEU 299	I2EOW 291			

N2OO's pickup truck was full of logs and cards from the QTH of former QSL Manager K4JDJ.

Bert, F6DZU, is familiar to many on the bands, especially North American DXers. He enjoys operating from this station on most bands. (Photo courtesy KDØJL)

The QSL card designed by Charlotte, KQ1F, for Paul, K1XM, and their operation from Belize. She creates the neatest color cards from photos they take on the trip. (Photo courtesy Charlotte, KQ1F)

They plan an operation from San Andres in October.

In addition to the DXpeditions above, we have the IARU HF World Championship July 12–12, NA QSO Party on RTTY July 19–20, and annual IOTA Contest July 26–27. It looks as if July is shaping up to be a very active month, no matter what your specialty or interest might be.

Until next time, here's hoping you escaped any severe weather and its potential damage to you, your family, and/or property.

73, Carl, N4AA

CQ DX Awards Program

SSB

2403.....IZ6CST
2404.....PY2QA
2405.....PY2YP

CW

1043.....PY2QA
1044.....VE2BWJ
1045.....PY2DBU
1046.....PY2YP

SSB Endorsements

320.....N5ZM/334
320.....PY2YP/334
320.....W2FKF/332
320.....CP2DL/327
310.....KD5ZD/317
310.....IZ6CST/314
300.....N8SHZ/301
275.....AC6WO/296
200.....PY2QA/200
150.....CT2FUH/152
28 MHz.....PY2QA
28 MHz.....PY2DBU

CW Endorsements

320.....PY2YP/333
320.....N4AH/332
320.....NØFW/332
320.....W4UW/328
320.....W7IIT/326

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, 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. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, 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.

QSL Information

(Provided by Bob, N2OO, and the QSL Managers Society)

New QSL manager routes for cards formerly handled by W4FRU and/or K4JDJ:

9MØS via N2OO, 26 May – 2 June 1993
FB8WJ via N2OO
1SØXV via N2OO, April – May 1990
1S1RR via N2OO, 11 & 12 May 1990
VKØIR via N2OO, 14–27 Jan. 1997
E3ØGA via N2OO, 4–17 Nov. 1998
TOØR via N2OO, 26 Dec. 1996 – 2 Jan. 1997
TOØR/mm via N2OO, Jan. – Feb. 1997
VP8SGP via N2OO, 6–15 Jan. 1995
VP8CRB via N2OO, Dec. 1994
VP8CRC via N2OO, Dec. 1994
VP8CBC via N2OO, Dec. 1994
KX6PO via W9OL, 10 Jun. 1983 – 14 Dec. 1983 only
YB1AQC via W9OL, 16 Feb. 1988 – 11 Oct. 1988 only
ZD8XX via W9OL, 5 Aug. 1989 – 24 Aug. 1989 & 30 May 1991 – 10 Jun. 1991 only
TYA11 via W9OL ,19 Jun. – 21 Jun. 1981 only
9X5AA via W9OL,15 Nov. 1987 – 19 Dec. 1989 only
A4XYS via W9OL, Sept. 1983 – Mar. 1984 only
KB4ATV/4S7 via W9OL, Apr. 1984 only
V29A via W9OL, Nov. 1988 – May 1991 only
ZD7HH via N1IBM, 14 Sept. 1979 – 4 Jan. 1981 & 26 May 2000 – 12 Oct. 2000
ZD8HH via N1IBM, 25 Mar. 1987 – 5 May 1990 only
FR7BE via N1IBM, Jun. 1978 – Mar. 1979 only
ZD7XY via N1IBM, 20 Oct. 1995 – 7 Jun. 1996 only
TA1A via N1IBM, 1 Mar. 1988 – 2 Jan. 1989 only
ZD7BJ via N1IBM, Dec. 1986 – Sept. 1996 only
ZD9BV via WB2YQH, 1 Mar. 1981 – 17 Oct. 2000 only
FM5WE via WF1N, Oct. 1985 – Dec. 2001 only
ZD9CK via WF1N, Mar. 1986 – Oct. 1987 only
ZD9YL via WF1N, May 1982 – Sept. 1983 only
ZD9CO via WF1N, Aug. 1990 – Dec. 1991 & Jan. 1993 – Nov. 1993 only
ZS1EDR via K1BV, May 1990 – Mar. 1992 only
ZD9CN via K1BV, Jun. 1990 – Jul. 1990 only
5T5ZZ via K1BV, Jun. 1981 – Dec. 1981 only
5N4ROF via K1BV, 21 Sept. 1980 – 13 Apr. 1981 only
S21ZG via AA1M, 7 Dec. 1992 – 27 Jul. 1994 only
J28EM via W1TE, Jul. 1985 – Jul. 1987 only
S21A via N2VW, Jul. 1992 – Oct. 1995 only
W3IVP/5N1 via K2PF, Mar. & Apr. 1981 only
5NØRMJ via K2PF, Jun. 1980 – Mar. 1981 only
5N2ØRMJ via K2PF, Oct. 1981 only
S21B via K2PF, Nov. 1992 – Apr. 2000 only
3X1Z via K2PF, Aug. 1981 – Nov. 1982 only
3WØA via K2PF, Jan. 1989 – Feb. 1989 only
3W7A via K2PF, Mar. 1990 only
XVØSU via K2PF, Apr. 1990 only
XVØSU/mm via K2PF, Apr. 1980 only
XV1ØØHCM via K2PF, May 90
3W1ØØHCM via K2PF, May 90
5Z4BI via NZ9Z, 2 Sept. 1989 – 4 Jul. 1993 only
8R1ZG via NZ9Z, 12 Feb. 1996 – 21 Jun. 1997 only
5NØDOG via NZ9Z, 11 May 1979 – 17 Mar. 1981 only
5N2ØDOG via NZ9Z, Oct. 1980 only
ET3USE via W2GR, 8 Dec. 1973 – 3 Feb. 1975 only
WZ6C/ST4 via W2GR, 29 Nov. 1989 – 22 Oct. 1990 only
S21NQ via W2GR, 5 Jun. 1991 – 30 Sept. 1991 only
WZ6C/MM/S21 via W2GR
WZ6C/S21 via W2GR, 18 Jan. 1992 – 31 May 1992 only
VK4NIC/3X via W2GR, 7 Nov. 80 – 20 Apr. 1981 only
BS7H via KU9C, 1995 &1997 only

All of the above managers have correct mailing addresses on QRZ.COM

A Tribute to Ed Bissell, W3AU, SK

July's Contest Tip

When I tune the bands during a contest, like you, I find that there are many stations with over-processed, distorted audio, and it's not always limited to the smaller stations trying to squeeze that last watt of RF out of their station. A good piece of advice is for you to ask for several opinions on your own transmit audio quality before each contest. You may even want to consider checking it on several bands in the event that you have new RFI problems that didn't exist before on a particular frequency. Bad audio is usually just the result of overly aggressive transmitter settings, but it can be a sign of something more serious, something broken in your shack. Remember, if they can't clearly understand you, they aren't going to work you!

Calendar of Events

June 21	Kid's Day
June 21-22	All Asian CW Contest
June 21-22	SMIRK 6M Contest
June 28-29	ARRL Field Day
June 28-29	Marconi Memorial HF Contest
July 1	RAC Canada Day Contest
July 5-6	Venezuela Independence Day SSB Contest
July 5-6	DL DX RTTY Contest
July 12-13	IARU HF World Championship
July 19-20	**CQ WW VHF Contest**
July 19-20	North American RTTY QSO Party
July 26-27	Venezuela Independence Day CW Contest
Aug. 2	European HF Championship
Aug. 2-3	North American CW QSO Party
Aug. 9-10	Worked All Europe CW Contest
Aug. 9-10	Maryland QSO Party
Aug. 16	SARTG WW RTTY Contest
Aug. 16-17	North American SSB QSO Party
Aug. 16-17	New Jersey QSO Party
Aug. 30-31	YO DX HF Contest

Many of you knew, or at the very least have heard of, Ed Bissell, W3AU. For those of you who have not, Ed was one of contesting's statesmen, a leader in the early days of multi-multi contesting. More important, Ed was an elmer and friend to many of today's contesters, including the likes of Bob, K3EST; Tim, K3LR; Stu, KC1F; myself, K1AR; and many, many others.

During the 1970s I lived in the Maryland/DC area with my parents during college breaks, so it was natural for me to get involved with the Potomac Valley Radio Club. I counted Bob, K3EST, and Fred, K3ZO, among my best ham friends at the time and quickly added the friendship of Ed, W3AU, to my list.

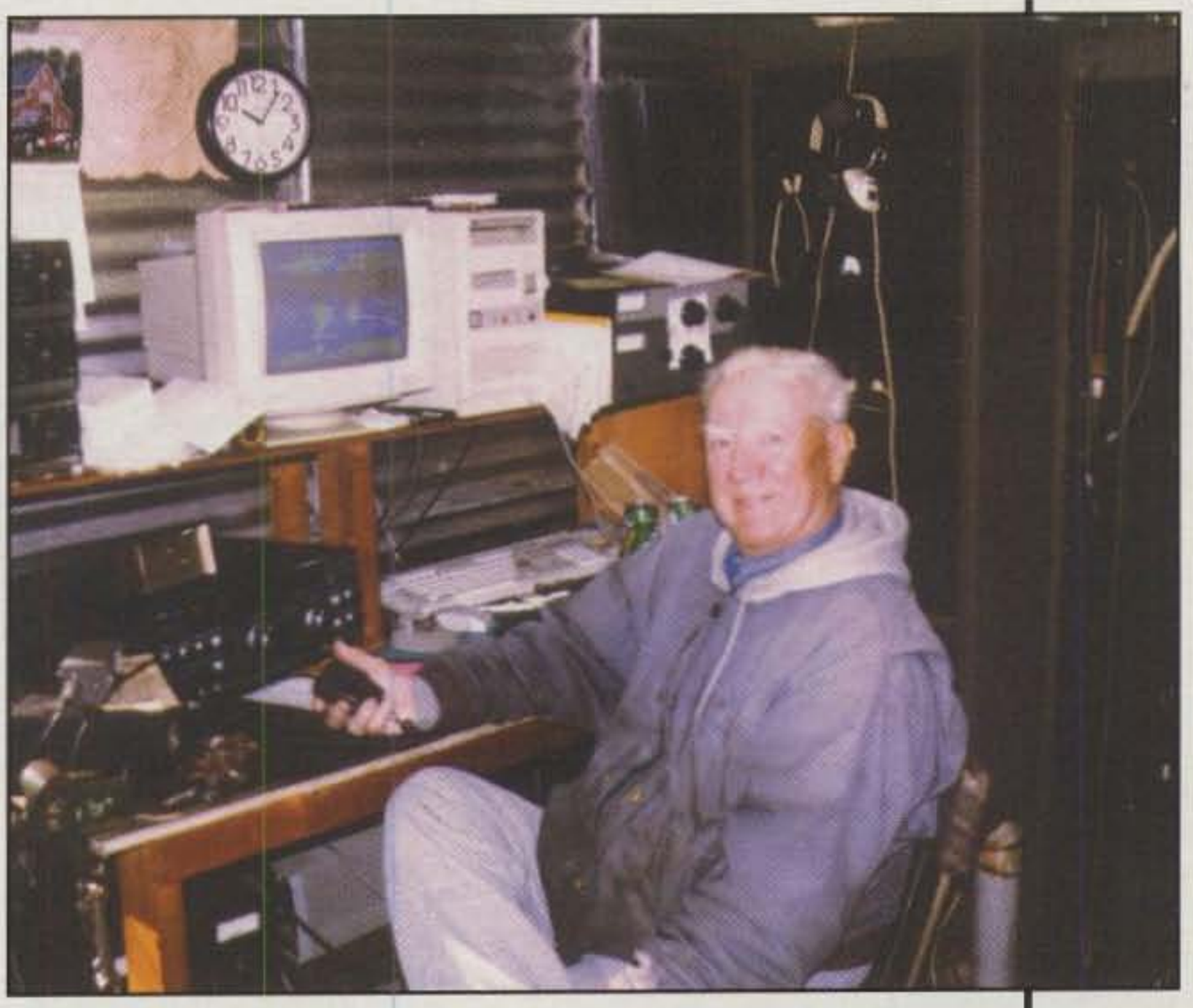
I remember the very first time I visited Ed's station. W3AU was a boisterous, friendly man who did not make an enemy in his 83 years of life. He loved ham radio and his fellow man and never met a ham he didn't immediately embrace. I was fortunate to be part of that group.

During one CQ WW DX CW Contest in the early 1970s, I got my first taste of operating at W3AU. It was a dream contest station, with Collins gear everywhere and an enormous antenna field outside. Within minutes, I was sitting next to K3EST on 40 meters, running the main station and frankly wondering how this 19-year-old kid deserved the opportunity I was experiencing at the time. It was extremely intimidating and a huge honor for me at the same time. Ed was there to cheer me on, and I'll never forget how his enthusiasm ultimately translated into the passion I have for contesting right to this day.

The loss of Ed Bissell is more than ham radio losing another of its own. We've lost a founding father. Ed was everything that is good about ham radio and contesting. For that reason I will miss him more that you can imagine. It's my hope that we'll stop and reflect, read many of the tributes that have been written about Ed (many on the internet), and consider how we can benefit from his accomplishments and unbridled enthusiasm for our sport. I'll miss you, Ed. You gave me more than you ever knew. Thank you, old friend!

In addition to my thoughts this month, I wanted to pass along, with his gracious permission, the perspective of Fred Laun, K3ZO, who was a close friend of Ed's and knew him about as well as anyone. What follows is Fred's tribute, and it truly stands on its own:

I am sure that the news that Ed Bissell, W3AU (ex-W3MSK), died on May 10 at the age of 83 made a lot of



Ed Bissell, W3AU, a warm and caring contester that gave back to our hobby so much more than he took. RIP, OM!

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

people in the amateur radio contesting world take a few minutes to stop and think. Ed, CQ Contest Hall of Fame Member #10, touched the lives of quite a few of today's active contesters, giving a number of them their first chance to enter the world of big-time multi-multi contesting. This writer was one of them.

It has been my sad experience in recent years to see one after another of those on my personal list of heroes pass from the scene. I feel that it is appropriate on such occasions to pause for a bit to record for posterity's sake remembrances of these folks so that something about them will be available long after they and those who knew them pass from the scene. Time has blurred some of my memories, so I will not attempt to assign a time frame to them in all cases. No one person can do justice to the multi-faceted, colorful personality that was Ed Bissell.

I first met Ed not long after I moved to the Washington area from Wisconsin in 1963 as W9SZR to work for the U.S. Government. I joined Potomac Valley Radio Club almost immediately, and since all I had with me was an SR-150 in my car with a home-brew HF mobile whip—and given that I had done reasonably well in CW WW DX Contests as Single-Op High Power from the station of W9EWC—at one time or another I was invited to join the multi-multi teams at both W3MSK and W4BVV, the two biggest multi-multi teams the PVRC had at the time. W4KXV (Dick, now N4RP), was another multi-multi available to PVRCers as well.

Having joined the U. S. Foreign Service, I operated at Ed's or Tom's (W4BVV) off and on for several years during my brief stints back in Washington in between my overseas assignments at HI8XAL, HS3AL, HS5ABD, XV4AL, and LU5HFI, until I bought my own place in 1975 and proceeded to erect my own antenna farm. Much of the inspiration for having my own antenna farm built came from Tom and Ed, as well as Len Chertok, W3GRF. Sadly, all three have now left us.

I recall that we would all arrive at Ed's on Friday afternoon in order to sit around his dinner table while his XYL, Grace, served a sumptuous meal before the contest began. While we ate, Ed would chair a planning session during which we reviewed what conditions would probably be like and how we planned to cope with them. In those days we didn't have anything to go on but WWV, which would transmit a series of numbers in Morse code, which told us how good or bad things were predicted to be for the following several hours.

Then it was into the big shack to take up our assigned positions and get ready for 0000Z Saturday to arrive. Ed had homebrew amplifiers for each band which were lined up along one wall, and a fair collection of Collins and Central Electronics exciters and Collins receivers, augmented by the rigs of many of the operators who would bring their own equipment along with them. As I recall, most of the time Bob, K3EST, ran the operation, assigning the bands to the operators and forcing us to keep things moving as the contest went on. When I first operated W3MSK, Don McClennon, W3EIS, later W3IN and N4IN, had a lock on the 160 meter position; I don't recall who had 80; Jack Colson, W3TMZ, ran 40 meters; K3EST and Jack Reichert, W3ZKH, now N4RV, jointly manned 20; "Big Charlie" Weir, W3FYS, later W6UA, ran 15; and in phone contests Don Search, W3AZD, was the 10 meter man. Ed himself would fill in only when a position would otherwise remain unmanned; he preferred 160 or 10 meters.

Ed felt his job was to keep the hardware side of the operation running smoothly. If an antenna or rotor problem cropped up, Ed would climb a tower to fix it no matter what the weather, or no matter what the time of day or night. If there was an operator or two to spare, they would go out and help Ed from the ground. If not, Grace generally would fill that assignment herself. I can remember once going out in the dark to help move an 80 meter sloper around in an effort to get a CE1 who was not answering our calls, and the move was successful! Others who filled in where needed were Carl Kratzer, WA3HRV, now K3RV, who eventually became the main 40 meter operator; "Little Charlie" Weir, W6HOH/W3NPZ, now W6UM; Bob Morris, W4MYA; and Gene Zimmerman, K1ANV, now W3ZZ. I'm sure I have left out a few, as I was not in the area very much during my early years in the foreign service. On one occasion a fresh-faced 16-year-old whose call is now K3LR came down from the Pittsburgh area to see what big-time contesting was like at W3MSK. Another op who spent some time sitting in Ed's operating chairs was the legendary Don Riebhoff, K7CBZ/K7ZZ, of XU1DX, HS3DR, and CT4AT fame.

At one point a nasty line noise developed at the station and Ed, after some searching, located the offending pole. Each time the noise popped up again, Ed would hand a big sledgehammer to an operator who was not busy at the moment and instruct him to drive down and hit the pole until, listening on the car's radio, the noise stopped. It was just one of many memorable stories at W3AU.

A new arrival to operate at W3MSK would be overwhelmed by the tall towers sticking up through the trees on Ed's heavily wooded lot, which supported monster arrays such as a 5-el 40 meter Yagi, 7-el Yagis on 20 and 15, maybe 10-el on 10 (I don't recall), as well as a 2-el Yagi on 80 and wires for 160 and receiving snaking through the trees in all directions. Ed's QTH was very close to the Potomac River, and the towers and antennas could easily be seen from the other side of the river in Mount Vernon, VA, which was President George Washington's residence in days of yore. Ed's QTH was situated so that when we beamed "over the pole" into Asia, we beamed right up the Potomac River, which we felt gave us a big advantage over the competition in that direction, although we couldn't always beat the legendary W3CRA in pile-ups of Asians. At the end of the contest Ed would usually come to my operating position with a potent highball to celebrate the successful completion of yet another contest, and "bottoms up" it was.

The principal competition in those days for W3MSK was the big installation in Tuxedo Park, NY of Buzz Reeves, K2GL. At that time, hard as it is to believe now, all of the W1's thought we had a big propagation advantage over them because they thought they were too close to the North Pole during disturbed conditions. As I recall the story, a group of W1's surreptitiously drove down to observe Ed's operation to try to figure out what his secrets of success were. After being parked along the road next to Ed's lot for some time, they were accosted by a county cop who told them: "You can't park here—CIA!" They needn't have been so secretive about their visit, for Ed's door was always open to ham visitors and no appointment was necessary.

I recall that at the height of the 1968 riots following Martin Luther King, Jr.'s assassination, when much of downtown Washington was put to the torch, it fell to me to pick up Dick Klein, K9OPF, later K4GKD, an old pal from Wisconsin who at that very moment was arriving by train at Union Station in downtown Washington to go to work for the government. I was an apartment dweller in suburban Virginia at the time, and the direct route from my place to the train station forced me to thread my way through smoky streets where cars had been abandoned by their owners who had been caught in the traffic jam created by the riots, desperate to get out of town and to safety. After picking up Dick, the only place I could think of that might provide a safe haven for us without requiring me to drive back through the danger zone was Ed's, so Dick and I promptly headed there, and Ed gave Dick a warm welcome to Washington and assured him that the city was not normally in such turmoil.

In the effort to compete with K2GL, W4BVV and W3MSK decided it would be a good idea to join forces and pool information, and they converted some old command sets to 147.00 MHz, where DX spots were passed from one station to the other. This may very well have been the pioneer spotting net in the history of contesting. To this day, the frequency, which most PVRCers in the Washington area use when driving to and from work, is the repeater whose output frequency is 147.00, K3WX, the owner of which is Tony Faiola, is a long-time PVRC member.

Ed was one of a number of PVRC contesters who came to the Washington area to work at the U.S. Naval Research Lab (NRL), and it was no coincidence that many contest sites in those days were located just south of the District of Columbia in Maryland not far from the Potomac River, an easy com-

mute to the NRL HQ along the Potomac River in southeast DC. Before Ed moved to his QTH in Accokeek, he rolled up some big single-op scores from a hilltop in Forest Heights, MD. My QTH, by the way, is in the same general area.

When NASA was formed to run the U.S. space program, the new agency raided NRL for a lot of its initial scientists and engineers, and Ed was one of them, as was his boss at the time, Karl Medrow, W3MCG, later W3FA, who was also a PVRC member and later erected a multi-multi of his own. Ed eventually became NASA's liaison to the Indian space program and made many trips to the spaceport at Trivandrum, where he developed lasting personal friendships with Indian hams, including VU2JN and VU2PKK. In recent years, after retiring to Florida and assembling yet another super antenna farm with the assistance of Pete Raymond, N4KW, Ed had kept regular daily CW and SSB skeds with Jayram and Kutty and others out there, as well as weekly skeds with W6UM and other former ops. He was in reasonably good health and regularly active up until about three months before his death.

Since Ed traveled so much to India at that time, he was the principal driving force in the effort to establish a reciprocal operating agreement with India following the passage of the Goldwater bill, which made such agreements possible. He was the first American licensed under the agreement, holding the call VU2MSK for many years.

So, Ed, mentor to so many budding contesters, inventor of so many multi-multi procedures and techniques, we loved ya, man, and we'll miss ya. If you ever learn how to communicate back here from the fifth dimension, give us a call.

In fond remembrance . . . *Fred, K3ZO*

Final Comments

Well, friends, that's all I have time and space for this month. I should add that in addition to losing Ed, W3AU, we also lost Dave, W1WAI, to a very unfortunate biking accident during the same week. Please remember Dave and his family in your thoughts and prayers, too.

My wife and I just returned from a glorious 25th wedding anniversary trip to Europe, so things are a little rushed this month. In case you're wondering, I resisted the temptation to visit hams during our DXpedition!

Finally, as you know by now, we have two new and well-deserved additions to the CQ Contest Hall of Fame, Dan Street, K1TO, and Ken Keeler, N6RO. I'll have more information, including induction ceremony pictures next month. Congratulations to Dan and Ken!

73, John, K1AR

vhf plus

BY JOE LYNCH,* N6CL

CSVHFS Conference This Month

It began in Sioux Falls, South Dakota in 1965, when a group of like-minded VHF and above experimenters informally gathered to exchange ideas. They agreed to meet again the next year, this time in Sand Springs, a suburb of Tulsa, Oklahoma. Then someone got the idea that maybe they should formalize their meetings, so they elected Larry Nichols, W5UGO (SK), chairman and planned for the next year's event, which would be held at the Western Hills Lodge in Wagoner, about an hour's drive from Tulsa.

Central States VHF Society President Charlie Calhoun, Jr., K5TTT, invites last year's conference participants to Tulsa for this year's conference. (N6CL photo)

The following year the conference was held at the Lake of the Ozarks in central Missouri, with Larry continuing to serve as chairman. At this meeting the momentous decision was made to incorporate as the Central States VHF Society (CSVHFS). This required the election of a board of directors and a slate of officers. The first president was Don Hilliard, WØEYE, (now WØPW). The first vice president was Louis Breyfogle, III, WØMOX (SK) (that callsign now belongs to his son, Louis Breyfogle, IV). The first treasurer was Bill McCaa, KØRZJ (who later shortened his callsign to KØRZ under the old vanity callsign program). The first secretary was Ted Mathewson, W4FJ, who is now 98 years old!

Since that inauspicious beginning CSVHFS has held its annual conference throughout the central part of the U.S. and Canada. Although the conference was held regularly in the Tulsa area in those early years, it's been nine years since it was held in Oklahoma, when your editor hosted it in Oklahoma City, and 18 years since it was in the Tulsa area, when Charlie Calhoun, Sr., WØRRY, hosted it.

Two years ago, Charlie's son, Charlie, Jr., K5TTT, said that it had been too long since the conference was held in Tulsa. Stepping forward, he decided to follow in his father's footsteps and volunteered to host the conference in Tulsa. Those two years of planning have come to fruition this month, with the conference scheduled for the 24th through the 27th at the new Renaissance Hotel and Convention Center.

e-mail: <n6cl@fuller.edu>

VHF Plus Calendar

July 6	First quarter Moon. Good EME conditions.
July 9	*Pegasids* meteor shower predicted peak.
July 10	Moon perigee.
July 12	Lowest Moon declination.
July 13	*Phoenicids* meteor shower predicted peak. Full Moon. Very poor EME conditions.
July 19–20	CQ WW VHF Contest. See text for details.
July 20	Moderate EME conditions.
July 21	Last quarter Moon.
July 22	Moon apogee.
July 24–27	Central States VHF Society Conference, Tulsa, Oklahoma.
July 27	Highest Moon declination. Poor EME conditions.
July 29	New Moon.

The hotel is located on Tulsa's east side at 6808 South 107th East Avenue, about a 10-minute drive from Tulsa International airport. Shuttle service to and from the airport is available and is provided by the hotel. If you are driving into Tulsa, it is easily accessible from any direction. This is one of the areas in which Tulsa has experience fantastic growth. The hotel is very near a major shopping and entertainment area as well. There is a widely diversified selection of eating establishments available close to the hotel.

The hotel will provide an excellent area for antenna gain measurements on Friday morning. Noise-figure measurements and a flea market will follow Friday evening in the convention center. Vendors are invited to display their merchandise during the conference on Friday and Saturday.

Room rates are a very reasonable $89 per night. If you are planning to attend and have not made your reservations, you need to do so very soon. You can call them at 918-307-2600, or toll free at 800-264-1065. When you do so, please be sure to mention the Central States VHF Society's conference rate.

There will be other activities available to family members. As of this writing in mid-May, the planners hope to include trips to places such as the new Tulsa Aquarium, which hopefully will open this month. Tulsa has two very prestigious museums, the Tulsa Philbrook Museum of Art and the Gilcrease Art Museum. To cool off, there are Bell's Amusement Park and the Big Splash Water Park. Tulsa is also well known for its art deco architectural buildings and the Oral Roberts University. In an effort to make the conference a family affair, the planners state that they are going the extra mile to ensure that family members have plenty of fun things to do.

We in the Tulsa area are excited to be having the conference back here and are looking forward to seeing you and hosting you during your stay in our city. For the latest information on the conference, check the society's web page at <http://www.csvhfs.org>.

Imlay Addresses Southeast VHF Society on Frequency Defenses

In an address delivered to the Southeast VHF Society Conference April 26–27, ARRL General Counsel Chris Imlay, N3KD, urged attendees to increasingly

ARRL General Counsel Chris Imlay, W3KD (left), accepts a check to the ARRL Defense of Frequencies Fund from Southeastern VHF Society President Bert Rollen, K4AR. ARRL Southeastern Division Vice Director Sandy Donahue, W4RU, is on the right. The presentation came during the SVHFS Conference April 26 in Huntsville, Alabama. (Phoito courtesy ARRL and SVHFS)

occupy the VHF and above ham bands as their (our) way of defending amateur radio spectrum allocations. In particular, he encouraged them to develop new and innovative communication techniques—such as IEEE 802.11 high-speed wireless—to expand amateur radio's presence on its microwave allocations.

Imlay also outlined the various threats to the U.S. ham radio allocations, both HF and VHF and above. In particular, he stated that amateurs were being asked to share their VHF and UHF bands with more and higher powered unlicensed Part 15 devices, and he pledged the League's aggressive defense against these intruders.

Among the intruder threats he discussed was an FCC proposal to agree with a 2001 request from SAVI Technology that would allow operation of advanced RF identification (RFID) devices between 425 and 435 MHz. Imlay stated that the ARRL contends that the Part 15 RFID proposal—included as part of a larger Notice of Proposed Rule Making and Order—is contrary to the philosophy of Part 15 rules and could result in significant interference to amateur operations.

Other threats to the VHF and above spectrum that were outlined by Imlay include some items that are being considered at the World Radiocommunication Conference 2003 (WRC-03) that ends early this month. Outlined below are the current threats, including those discussed at WRC-03:

70 cm Synthetic Aperture Radars: Operation of Synthetic Aperture Radars (SARs) at frequencies around 400–500 MHz would permit collection of data through the dense upper canopy of tropical rain forests. WRC-03 agenda item 1.38 asks the conference to consider provision of up to 6 MHz of frequency spectrum to the Earth exploration-satellite service (active) in the frequency band 420–470 MHz.

Ultra-Wideband (UWB): Prior to the end of 2002, the FCC was expected to issue a Report and Order authorizing short-range devices using ultra-wideband UWB) technology. Potential applications could include ground-penetrating radar (GPR), through-the-wall radar, and lesser-well-defined communications systems. GPR systems typically operate below 1 GHz and are considered somewhat benign because the energy is pointed downward.

Even wall radars may not be a problem, because their duty cycle could be low. Use by construction firms and rescue squads could be typical applications. Communications uses could be a problem, depending on frequency spread, duty cycle, and how widespread their eventual deployment is. The airline industry is especially concerned about the possibility of UWB devices, such as electronic games, being inadvertently on and causing a safety-of-life hazard.

Depending on what the FCC decides, UWB devices could operate under Part 15 rules on a center frequency in the UHF band, possibly 1.5 GHz, and spread their energy over a band at least 25% of that center frequency. UWB devices produce extremely short pulses and are expected to use very low power.

Fixed Wireless Access and Radio Local Area Networks: *Fixed wireless Access* (FWA) is the term used for telephones at fixed locations connecting to the public switched telephone network by radio instead of the usual twisted pairs. You may also hear it called *Wireless Access Systems* (WAS) or *Wireless Local Loop* (WLL). FWA proponents predict that in a decade there will be more wireless than wired telephones.

Radio Local Area Networks (RLANs) are a related technology. The concept is that people and their computers need to move around inside buildings and within a campus.

The problem for us is that FWA and RLANs have a voracious appetite for frequencies, and some of our bands are in their sights. FWA and RLAN proponents have been pursuing the 3400–3700 MHz band through the ITU, specifically in Joint Rapporteurs' Group of Working Parties 8A and 9B (known as JRG 8A-9B). In addition, they have been studying numerous bands from about 25 MHz upward to find spectrum for their use. Bands of most interest to them at present are:

440–450 MHz: It is unlikely to affect the USA, as the domestic allocation of this band is Radiolocation (primary) and amateur (secondary). However, FWA could be used in countries with domestic fixed service allocations, such as Mexico and Peru.

3400–3800 MHz: The band has grown to 3800 MHz. Of this band, only 3400–3500 MHz is an amateur secondary allocation. We also have a secondary allocation at 3300–3400 MHz, which has not been targeted by FWA advocates. The band 3300–3400 MHz is allocated to Radiolocation on a primary basis and the amateur service on a secondary basis.

5650–5725 MHz: This is a band in which the amateur service has a secondary allocation. (The Radiolocation service is primary. WRC-03 agenda item 1.5 asks the conference to consider spectrum requirements for new and additional allocations to the mobile, fixed, Earth exploration-satellite, and space research services, and to review the status of the Radiolocation service in the frequency range 5150–5725 MHz.) RLAN proponents would like to see the band 5650–5725 MHz, among others, allocated to the mobile service for RLAN applications.

10.15–10.3 GHz: Channels 1.75 MHz wide are proposed for FWA.

Intelligent Transportation Systems: On October 22, 1999 the FCC released a Report and Order under ET Docket 98-95 allocating 75 MHz of spectrum at 5850– 5925 MHz to the mobile service for use by Dedicated Short Range Communications (DSRC) systems operating in the Intelligent Transportation System (ITS) radio service. In their R&O the FCC stated, "The record in this proceeding overwhelmingly supports the allocation of spectrum for DSRC-based ITS applications to increase traveler safety, reduce fuel consumption and pollution, and continue to advance the nation's economy." The FCC acted under the Transportation Equity Act for the 21st Century signed by the President calling for an allocation to be made no later than January 1, 2000.

Little LEOs: The low-Earth-orbit satellites operating at frequencies below 1 GHz are known as Little LEOs. There are fewer Little LEOs now because of insufficient markets for this type of service in these times of many other options. Nevertheless, proponents continue to seek additional service link spectrum in bands below 1 GHz and feeder link spectrum around 1.4 GHz. (Portions of this report courtesy the ARRL, the *ARRL Letter*, and the ARRL website, in particular the following URLs:

<http://www.arrl.org/news/stories/2003/05/01/1/?nc=1> and <http://www.arrl.org/news/bandthreat/>.)

In response to Imlay's address, the Southeast VHF Society voted to contribute $300 to the League's Defense of Frequencies Fund. The society also contributed $300 to AMSAT-NA for its ongoing work of developing amateur satellite communications.

The First EM Contact?

We in the weak-signal community commonly use the acronym EME to refer to Earth-Moon-Earth contacts that use the surface of the Moon as the reflector for our signals as a way of making distant contacts here on our planet. Now from former International Space Station (ISS) Science Officer Don Pettit, KD5MDT, one of the astronauts who returned to Earth last May, comes speculation about setting up a base camp on the Moon as a jumping off point for exploring Mars. Where NASA has gone, amateur radio is usually not far behind. If this is the case, is it a not too distant possibility of the first EM, or Earth-Moon, QSO?

Expedition 6 NASA ISS Science Officer Don Petit, KC5MDT, at work aboard the ISS. (NASA photo)

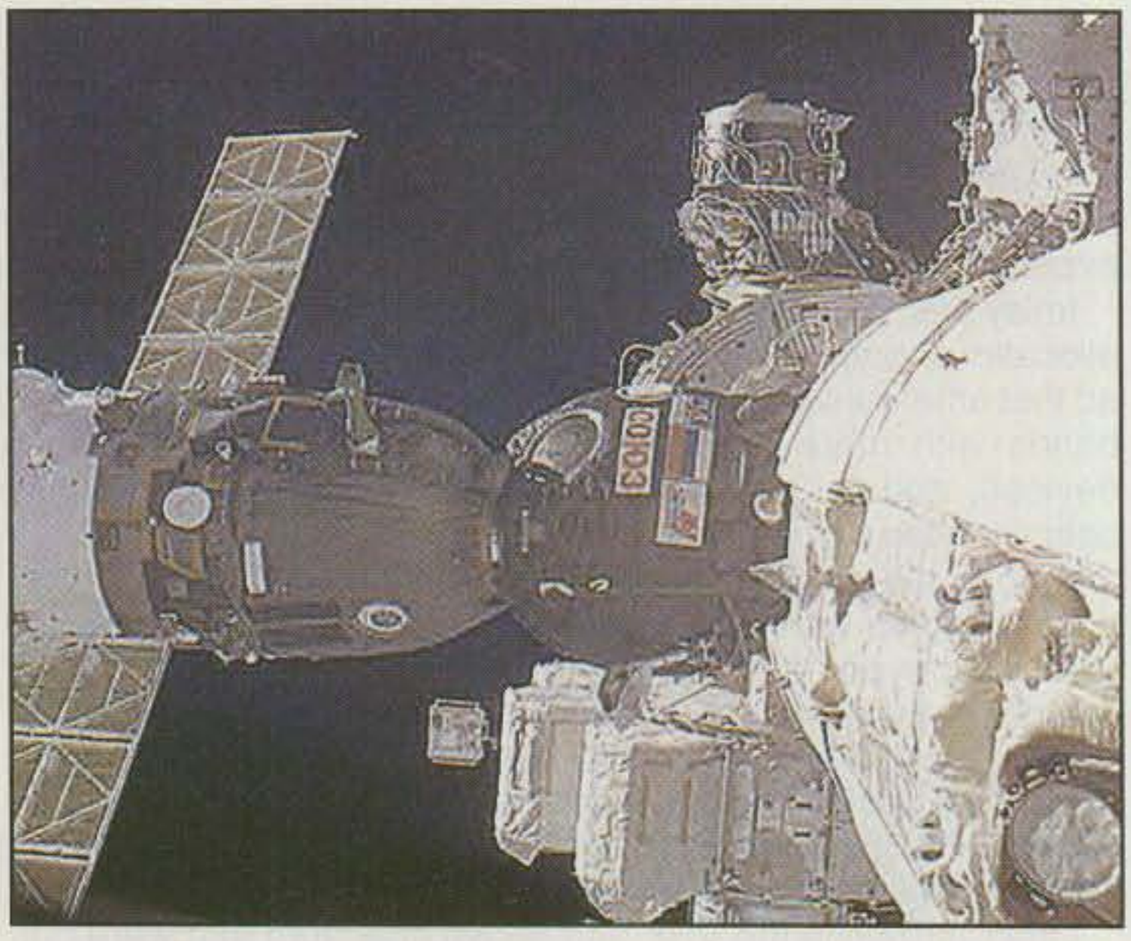
During one of those frequent school contacts with the ISS Pettit suggested that in the future NASA should consider setting up lunar bases as a stepping stone to expanding mankind's exploration of the universe. He made his speculative suggestion in a response to a student's question during an Amateur Radio on the International Space Station (ARISS) school group contact. Several students at Cowichan Secondary School in Duncan, British Columbia, Canada, had the opportunity to quiz Pettit about life in space via amateur radio on April 21. The QSO between VE7CVA and NA1SS was the last for members of the Expedition 6 crew of Pettit, Commander Ken Bowersox, KD5JBP, and Nikolai Budarin, RV3FB, who returned to Earth on May 4.

In response to the student's question, Pettit remarked, "I hope the next step for manned space exploration will be to go away from the planet Earth for a while instead of just going in circles around the planet." Pettit believes that a logical next step would be to set up bases on the Moon and learn how to operate at that distance from Earth. "When you have your technology down, then you can go off to Mars and try doing a little exploration there," he said. (Portions of this report courtesy ARRL and the *ARRL Letter*, May 2, 2003.)

ISS Crewmembers' Return Rough

After a two-month extended stay at the ISS due to the *Columbia* shuttle tragedy on February 1, U.S. Astronauts Ken Bowersox,

Preparing for their return flight, Expedition 6 crew members, attired in their Sokol spacesuits, pose in the Zvezda Service Module of the ISS. (left to right) Don Petit, KC5MDT, Nikolai Budarin, RV3FB, and Ken Bowersox, KC5JBP. (NASA photo)



The Soyuz TMA-2 spacecraft, which carried the Expedition 7 crew into space, is docked to the Zarya Functional Cargo Block (FGB) on the ISS. (NASA photo)

KD5JBP, and Don Pettit, KD5MDT, and Russian Cosmonaut Nikolai Budarin, RV3FB, returned to Earth on May 4 via a Russian *Soyuz* TMA-1 vehicle, which had been docked at the ISS as an emergency escape vehicle since September 2002. Their trip back was not without incident.

With the loss of the *Columbia* crew in the back of everyone's mind, there was concern for the safe return of this crew. The concern came to the forefront of their thinking when nothing was heard from the crew for 16 minutes before their scheduled touchdown. Ironically, communications was lost about the same time that communications was lost with the *Columbia* crew before its breakup.

Onboard the crew was experiencing a less than pleasant ride, to say the least. The *Soyuz* spacecraft took a steeper and faster than expected approach, which led to a more ballistic ride (up to eight G's) that put them landing around 300 miles off course. The wild ride home was so steep and with such force that the crew's tongues rolled back in their mouths and they could hard-

Expedition 7 Commander Yuri Malenchenko, RK3DUP (right), and NASA ISS Science Officer Ed Lu, KC5WKJ, pause on the Soyuz stand at Baikonur Cosmodrome in Kazakhstan prior to their launch. Now aboard the ISS, Malenchenko and Lu will spend some six months in space. (NASA photo by Bill Ingalls)

ly breathe. Upon landing, the spacecraft was dragged around 40 feet, coming to rest on its side and thereby crushing its antennas into the ground.

After 2 1/2 hours of searching, the crew of a recovery aircraft finally located the *Soyuz* crew. It took an additional two hours for the recovery helicopters to arrive at the scene. No one was hurt on the *Soyuz* trip back to Earth, but Pettit did experience some motion sickness. He was most appreciative of the delay in their recovery, since it gave him some time to lie on the grass and work off his wooziness.

At the time of this writing it is unknown why the *Soyuz* veered off course. A computer programming glitch is the suspected culprit.

In the aftermath of the *Columbia* tragedy, the *Soyuz* has become the only transportation to and from the ISS. Expedition 7 crewmembers Yuri Malenchenko, RK3DUP, and Ed Lu, KC5WKJ, rode up to the ISS on a *Soyuz*, arriving aboard the ISS on April 28. They are scheduled to return in November, hopefully aboard a U.S. space shuttle (see below). (Sources: *ARRL Letter*, AMSAT News Service, and Space.com *SpaceNews*.)

Columbia Tragedy Cause Being Determined

From nearly the beginning of the investigation of the loss of the shuttle *Columbia* attention has been focused on a piece of foam that had dislodged from the shuttle's fuel tank, striking and damaging the lower left wing reinforced carbon-carbon (RCC) panels during liftoff. On May 5 the Columbia Accident Investigation Board (CAIB) issued a press release which outlines a "working scenario" of what happened. Evidence indicates that the dislodged foam struck an area of the shuttle in the vicinity of the lower left wing RCC panels 5–9. The speculation is that this impact was sufficient enough to leave the RCC 8/9 area vulnerable to the effects of the extreme heat of re-entry.

Telemetry and forensic evidence indicate that at some point during re-entry hot gas flowed inside of the wing at this area, thereby destroying the interior of the wing, beginning with wire harnesses carrying data monitoring such items as Modular Auxiliary Data System (MADS), the left main gear tire pressure, and temperature measurements. As the re-entry continued, data from this area progressively were lost. Among the last were the gear and tire pressure and temperature measurements. Approximately nine seconds after the MADS data stream ended, witnesses on the ground began observing the breakup of the shuttle.

While many months of testing lay ahead for the investigation teams, they hope that a final report will be released later this summer. A lot will be riding on the report concerning when the resumption of shuttle flights will occur. The best guess seems to be no earlier than the fall of this year, with early 2004 the more likely timeframe, according to NASA's administrator, Sean O'Keefe. (Sources: *ARRL Letter*, the Columbia Accident Investigation Board, and Space.com *SpaceNews*.)

SARS Scares Unfounded, Says AMSAT-NA President

In the aftermath of the SARS (Sudden Acute Respiratory System) illness outbreak, Toronto, Canada has become the location of a significant pocket of infection, so much so that the World Health Organization briefly declared it to be an off-limits city. These concerns have led to speculation that this year's AMSAT Space Symposium and Annual Meeting, which is to be held in Toronto October 17–18, would be moved to another venue.

Not so, assured AMSAT-NA President Robin Haighton, VE3FRH. Haighton, who lives in Ontario, commented concerning the situation there, "The outbreak of SARS in Toronto has caused some worry by travelers to and from Toronto, but let me assure you that at present the SARS outbreak appears to be under control and is being limited to a few health care facilities." Haighton added that if the situation should change for the worse, AMSAT would relocate the Symposium. Even so, he anticipates no problem with Toronto at this point. Washington, DC and Orlando, Florida are two possible locations under consideration, should an alternative become necessary. (Sources: *ARRL Letter* and AMSAT News Service.)

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, e-mail, 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:

Microwave Update (September 25–28): Contact Jim Christiansen, K7ND, at <k7nd@att.net>. The deadline for submitting papers is July 1.

22nd Annual ARRL and TAPR Digital Communications Conference (September 19–21): Contact Maty Weinberg, at <maty@arrl.org>. The deadline for submitting papers is August 5.

AMSAT-NA Space Symposium and Annual Meeting: Copy-ready papers must be received no later than August 15. Electronic submittal is preferred in MS WORD format. Please e-mail your electronic submittals to Wayne Chandler, VE3WHC, via <ve3whc@amsat.org>.

Current Contests & Awards

States Above 50 MHz Award: Started eight years ago by the Central States VHF Society, this contest is really going strong, with heavy competition for the top awards. The last two years the contest has been 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 can be worked just so the total is 30 or more states. This year has an added feature, that of counting the Canadian provinces as multipliers so the minimum score may be more. As of press time there was no posting for the new rules, so you might want to check the society's website, <http://www.csvhfs.org/CSTEST0.HTML> for any late changes in the point totals or other rules.

CQ WW VHF Contest: The annual CQ WW VHF Contest will be begin at 1800 UTC July 19 and end at 2100 UTC July 20. 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 one point per QSO on 6 meters and 2 points per QSO on 2 meters. Mail your completed logs to CQ VHF Contest, 25 Newbridge Rd., Hicksville, NY 11801; e-mail to <cqvhf@cqww.com>. Complete rules for the contest may be found on the CQ website, <www.cq-amateur-radio.com>, and in the June issue of *CQ*.

Current Meteor Showers

The *Pegasids* peaks on July 9 at an unknown time and with a low ZHR. The *July Phoenicids* is a Southern Hemisphere shower that peaks on July 13 at an unknown time and with a low ZHR. The International Meteor Organization reports that this shower is a better radio than visual shower. Toward the latter part of this month you should start seeing 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 . . .

I want to tell you about my experience this past semester as a graduate student in an RF Engineering class at the University of Tulsa. While it has nothing to do with VHF (actually, it does, a little), it was important insofar as the future of ham radio is concerned.

A component of the course was that the students had to build a NORCAL 40 QRP CW transceiver. The only person in the class who was a ham was your editor. Since the students were being exposed to the hobby for the first time, the onus was on me to present it in as favorable a light as possible, which I did.

Keep in mind that these students are future engineers, the future employees of companies that in some cases are giving us fits over wanting our frequencies. I had this in mind every time I talked about the hobby. I knew that even if these students never became hams, they still could be defenders of the hobby because of their positive experience in one college class.

At the end of the semester we had to present our finished products to a group of advisors to the EE department. I worked with each of the teams to help them complete their projects, in the end selecting one team to represent the class to the advisors. It was quite a challenge to get everything working in time to make the presentation. We did not have access to the outside of the building to put up an antenna, so using ham radio ingenuity, I found a roll of transformer wire, rolled off 67 feet of it, and created the most awful indoor inverted-Vee antenna you would want to see.

Yet, it worked! I called my wife Carol, W6CL, from the classroom and asked her to listen for me. When she was on my frequency, I began to transmit and *I* heard my signal through the phone! Was I ever excited! My fellow student was amazed. It was as if we had crossed the Atlantic with a spark gap signal—well, not nearly as dramatic as that.

Then it came time to wow and dazzle the advisors. I identified myself as a non-traditional student so they would understand why this older guy was attending the class. Conveniently I had copies of our magazines to show off to give them a bit of reference as to my expertise. Then I spoke to them about the project my fellow students had built during the semester, describing the practical applications they learned along the way (solder skills, troubleshooting, transceiver design and construction, etc.).

Finally, I put in a plug for ham radio and its impact on career choices, relating that when I was a youth ham radio provided the impetus for many of us who entered the electronics field as a career. I explained that now there is a shortage of RF engineers and that the university must address this need by offering more classes for them.

The end result was that these advisors were impressed and my professor was pleased, as was the dean of the EE school. I made new friends for our hobby, and when I conduct a ham radio licensing class this fall semester two of the faculty will be in attendance. Finally, I passed the course with an A!

My point is that unless we are proactive in our approach toward recruiting new people into our hobby, we may not have the hobby in the not too distant future. In addition, unless we give a positive impression of ham radio, no one will want to hear our stories. Finally, unless we seek ways to convert people into ham radio operators, we will have no one to replace us when we are no longer here.

One final note: This past May my wife, Carol, W6CL, was the recipient of the Whitney Nugget Award from the officers of the 7290 Traffic Net organization. Carol's tireless activities as net control on Monday mornings and as an alternate on Saturdays, along with her dedication to the net and to the hobby in general, gained her the award. You can bet that her husband is very proud of her accomplishments.

That's enough bragging for now. It's time to see some of your stories in this column. Please let me hear from you about your accomplishments. I hope to see many of you at the Central States VHF Society Conference later this month.

Until next time…

73, Joe, N6CL

BY TED MELINOSKY,* K1BV

County Hunting Q&A

The following are some questions and answers on current county hunting topics. If you have any questions, please drop me a note at the snail-mail address or e-mail address at the bottom of this page.

Q: Does the name of the county have to show on the QSL card you receive?

A: No. You can refer to a map or other data source to determine the county based on the city/town and state of the QSO.

Q: How many persons have received USA-CA based on all 2 meter contacts?

A: I have several boxes of file cards with records going back into the 1960s, but no breakdown of band/mode endorsements. In the five years I have been USA-CA custodian there have been no VHF submissions, so I strongly suspect it hasn't happened yet. If anyone reading this column knows otherwise, please let me know.

Q: I am a poor college student *(I've been there, done that—ed.)* and use the university ham station for all county contacts, about 2200 so far. Based on your March 2003 column, does this mean that I can count all of these contacts for my own USA-CA? Second, would it be possible to request a second certificate/plaque using the club callsign for display in the club shack?

A: Yes to both questions. The rules permit the award to be issued in your name, since you made all the contacts, and a second certificate would help to promote activity at the club station.

Jay P. Jenkins, AA9KH
USA-CA All Counties #1061

This month we hear from Jay, AA9KH, who was awarded USA-CA All Counties #1061 on March 26, 2003. He achieved the award using all CW. Here's his story:

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

Jay Jenkins, AA9KH, USA-CA All Counties #1061, all CW, March 26, 2003.

USA-CA Special Honor Roll

Jay P. Jenkins, AA9KH
USA-CA All Counties #1061
March 26, 2003

Larry Pronier, KAØSHC
USA-CA All Counties #1062
March 28, 2003

Arnold K. Pederson, KK4VN
USA-CA All Counties #1063
March 31, 2003

Maurice Smith, KØEH
USA-CA All Counties #1064
April 8, 2003

S. C. "Ernie" Ernst, W7KQZ
USA-CA All Counties #1065
April 16, 2003

I recently completed the requirements for the USA-CA Award using Morse code for all QSOs with each of the 3077 counties (or Parishes, Judicial Districts, Independent Cities, depending on the state). First, I would be remiss if I did not offer a heartfelt (and *large*) THANK YOU to the fellow hams who (seemingly) tirelessly operate from their various mobile stations on the County Hunters Net, which primarily operates on 14056.5 kHz. Without your kind help and cooperation, as well as that of the net control stations, my dream would not—and could not—have become a reality.

Step right into the way-back machine and I will set the year at 1969.

My father, mother, brother, and I visited Disneyland in California that year, and on July 20th I was able to witness Neil Armstrong's first steps on the Earth's Moon on a video screen composed of 100-watt light bulbs. No wide-screen TVs that big in those days.

I achieved the rank of Second Class in the Boy Scouts also that year and was enjoying the October issue of *Boy's Life* magazine. A sidebar entitled "Jamboree on the Air" caught my eye. How neat! Boy Scouts from all over the world talking with each other via something called amateur radio over the course of a weekend. How do I sign up? *World Book Encyclopedia* (the printed version; remember, it's 1969) gave me a little generalized information about amateur radio and the American Radio Relay League.

Several trips to the (downtown) Chicago Public Library yielded more information, and I even came across the first *ARRL Handbook* I had ever seen there. All the books seemed to indicate that shortwave listening was a reasonable place to begin learning (firsthand) about hams and amateur radio.

Posted in the *Chicago Sun-Times* newspaper was a classified ad for a Hallicrafters SX-43 shortwave receiver—for $40! As I only had about $30 in the kitty, I consulted with the OM (my father) about how to go about making up the shortfall. The seller, Mr. Pappas, gratefully responded to my telephone call by saying he would bring the radio by that very evening for a demonstration, if I liked. IF I liked? How about 7 o'clock!

I set up the card table in the living room and (anxiously) awaited his arrival. Mr. Pappas threw the pick-up wire out the window (for the antenna) and I was hooked.

USA-CA Honor Roll

500

KAØSHC.....3236
KK4VN 3237
CU3AA 3238
KØEH.....3239
OE5CMN.....3240
W7KQZ 3241
F5DE 3242

1000

KAØSHC.....1626
KK4VN 1627
CU3AA 1628
KØEH.....1629
W7KQZ 1630

1500

KAØSHC.....1355
KK4VN 1356
CU3AA 1357
KØEH.....1358
W7KQZ 1359

2000

KAØSHC.....1254
KK4VN 1255
CU3AA 1256
KØEH.....1257
W7KQZ 1258

2500

AA9KH 1173
KAØSHC.....1174
KK4VN 1175
CU3AA 1176
KØEH.....1177
W7KQZ 1178

3000

AA9KH 1081
KAØSHC.....1082
KK4VN 1083
CU3AA 1084
KØEH.....1085
W7KQZ 1086
W4YDY 1087

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.

HCJB, Radio Australia, the BBC, VOA, Radio Sweden, and I quickly became good friends.

Then I discovered the time signal station from Colorado operated by the U.S. government—WWV. The time was announced once every five minutes, and the voice announcement was preceded by . . . Morse code: (translated) <WWV WWV WWV 1800> (or whatever time it was). I later discovered what those mysterious Morse code signals said, but it whetted my appetite to better my Morse code ability. I had previously learned it in the Boy Scouts so that my friends and I could communicate by flashlight at night.

With the Elmering of my older cousin Cliff (former WN9YHR), who was a Novice when 2 meter AM was *the* big thing, my Morse code speed quickly increased. I felt I was ready to try to enter ham radio.

An inquiring letter to the ARRL yielded a phone call from Phil Haller, W9HPG (SK), who, I would later discover, was the Central Division Director for the League. Phil asked if he could come by and chat with me a while. He and I spoke for a while outside on a bright, sunny afternoon for what seemed like hours and decided that I had a few more hurdles to cross, and since my family would soon be moving from the city to the suburbs, I should continue to study the license manual and contact him again when I felt ready. I was awestruck. . . . What a nice gesture from an adult I only knew as being a ham and a voice on the telephone. I was 14 and the year was 1970.

My family moved to Homewood, and my quest to become a ham took off in earnest. many happy hours were spent enjoying my SX-43, and the code practice sessions from W1AW, and I felt prepared.

Finally I earned the Novice callsign WN9JSN in October 1972. Now to build a transmitter. With the help of my Elmer, Cliff, I built the 6L6-final, crystal-controlled transmitter described in the *1972 ARRL Handbook*. I went to the local Ace Hardware store and bought 75 feet of #14 AWG solid house wire and 75 feet of RG-8 coaxial cable and assembled my first antenna, a half-wave dipole for 40 meters, secured between the basketball backstop and the peach tree, a whopping 15 feet off the ground. My first CQ was sent on 21110 kc (kHz) and answered by Taroh, JH1WIX (SK). I was in heaven.

I discovered a lot of my nearby fellow Novices were on 40 meters, and they convinced me to come to the local club meeting and see what that was like. I thoroughly enjoyed it and joined the Tri-Town Radio Amateur Club that same evening.

I attended several hamfests and convinced my father that it would be *great* if *I* could go to the *big* hamfest down in Peoria (IL). He agreed and off we went. I had a great time at my first large hamfest, but the real surprise came on Monday morning. "Is this Jay?" a female voice asked over the phone. "You just won the grand raffle prize from the Peoria Amateur Radio Club's hamfest . . . a brand-new Drake TR-4 transceiver, SP-4 speaker, and MS-4 power supply."

"Are you kidding?! C'mon, who is this really?" I asked.

She replied, "They should come to you via United Parcel Service in a few days."

I thanked her, somewhat still in a state of shock and disbelief. Talk about an impetus to upgrade!

I put on my best suit and went to the Dirksen-McKinley Federal Building in downtown Chicago for my General test, and WB9JSN was created. "Great," I thought. "Now I can work all that DX I've been hearing near the low end of the band (40) and even work 20 meters!"

A new antenna was *definitely* in order, but what kind? Several of my Novice friends who had already upgraded to General were already using the new Hustler 4BTV vertical and getting *very* impressive results with it. I bought one and ground mounted it.

Several of the club's old timers asked what I had for a shack and said things like, "You'll never get out of your backyard with that antenna." The gauntlet had been laid down. The year was 1974 and I headed off to Valparaiso Technical Institute in Indiana to pursue an A.S.E.E.T. degree.

Time passes, and I now fast forward to 1992, nearly 15 years since I had listened to shortwave and I bought a scanner for low and high VHF and UHF. That was when I discovered hams had something called "repeaters" now, and that a walkie-talkie (HT) could communicate with nearly the entire Chicago area. The (ham) bug had bitten again . . . *hard*.

I decided that this time I would go all the way to Extra and put all the tests behind me ASAP. I attended the Rockford (IL) hamfest in April 1993 and became a Novice. Six weeks later the callsign KB9IPX came in the mail, the day after Memorial Day. I went to my local Radio Shack and bought an HTX-202 two meter HT. I also bought a copper-tubing J-pole from one of the hams in my new club, S.T.A.R.S.

Two meters was fun, but my real interest in hamming was still HF—DXing, ragchewing, chasing awards, etc. I upgraded to Tech Plus in June of '93, and General in July. I bought a Yaesu FT-840 shortly after seeing one at the Dayton Hamvention. I purchased a new Hustler 6BTV and ground mounted it in the backyard next to the copper-tubing J-pole which I had mounted on some D-type handrail from Builders Square. No climbing towers for me, thank you.

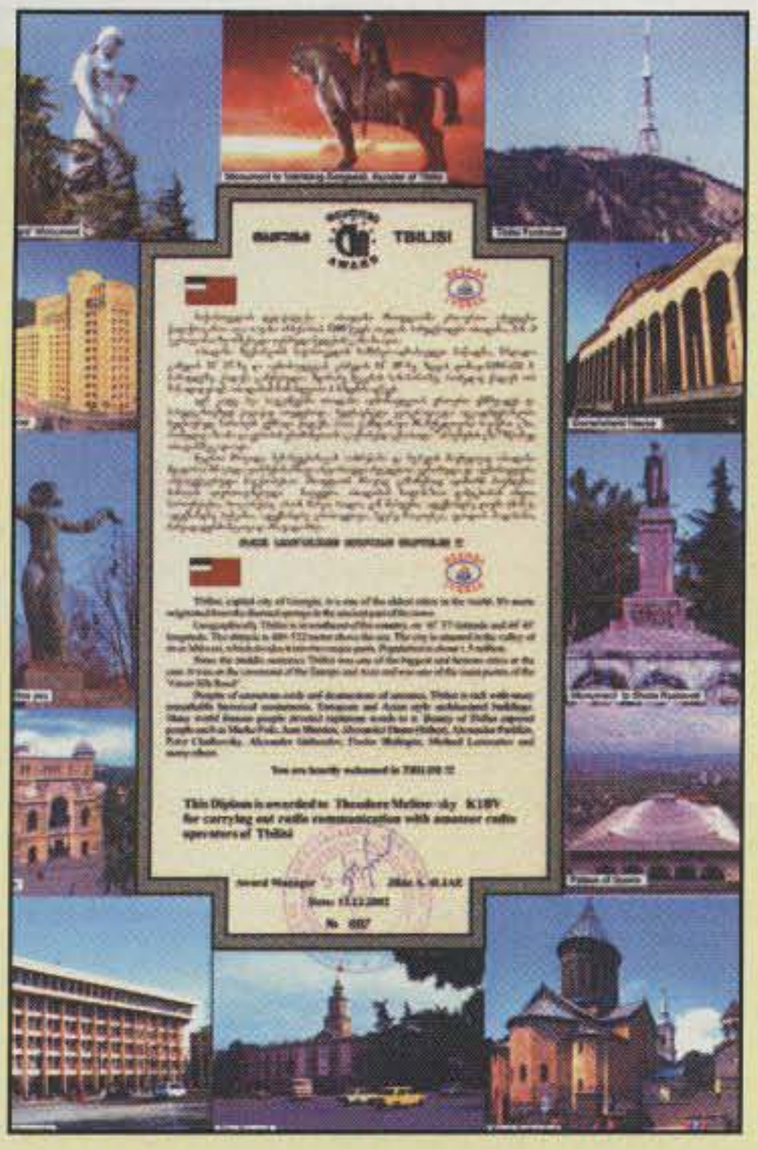
The Advanced Class exam caused me the most concern, so I attended a class sponsored by Hamfesters (radio club) at Carl Sandburg High School in Orland Park. Due to the weather I missed one class, and that was when I decided to take the plunge—and the test. That was in October. In November 1993 I took and passed the Extra Class exam. In February 1994 I received the Extra Class call AA9KH.

I became intrigued with the FISTS CW club, and finally joined at Dayton in 1996. I was listening to a QSO between two of my fellow FISTS members on 14058 kHz one afternoon, when down the band a little ways a commotion caught my attention. I tuned down to 14056.5 kHz and thought that maybe a ham had set up a station on the planet Mars, as it seemed that every CW ham on the air was calling this one station, trying for a QSO.

It turned out that the station in question was Andy, W3XE (SK), and that he was "putting out" a county somewhere from his mobile station. I heard him fine and treated it just like it was a DX pile-up, waiting for him to send QRZ and then joining the pile "chasing" him. We exchanged "5NN" (a CW RST of 599) signal reports, and I was hooked on this "county hunting" thing, which at that time I knew nothing about. I had already earned (40 meter) WAS and DXCC from the ARRL and was then chasing some of the awards issued by the FISTS club.

Earning an award for a contact with every county in America? Wow! If I could do that, I figured I could finally silence the nay-sayers who thought my vertical was a "ground-mounted dummy load."

Six years later, and thousands of contacts with (literally) hundreds of stations, many of whom were mobile and I had worked them on the County Hunters Net, brought me down to my final county. Many thanks to the efforts of both Mike, WU3H, and Sue, WB3AXC, for providing me with the contact for my 3077th unique U.S. county on December 21, 2002 in Adair, Kentucky. At Sue's suggestion, via e-mail in advance of their Christmas trip, WB3AXC/M provided



The Tbilisi Award is offered by the Georgian Independent Club Iveria for contacting Georgian stations on any bands on or after January 1, 2000.

The Iveria certificate is awarded to radio amateurs from around the world for two-way contacts on any frequency with Georgian amateur radio stations on or after January 1, 2000.

The Celtic Knot Award is sponsored by the GMDX Group for working stations in lands traditionally agreed upon as being associated with the Celtic people

me with the contact in my last needed county to earn the USA-CA All Counties award, and here I am.

I have already had the privilege (which I hope to repeat some day) of being DX, back in August 1996 as VP9/AA9KH from Saint David's Parish in Bermuda from the home of my old friend Jim, formerly VP9NNB, who at one time worked at the NASA tracking station there.

Labor Day of 2002 saw me install my first mobile station—a Yaesu FT-100 transceiver and an Atlas 100 mobile antenna. I am now enjoying being the mobile, as well as working other mobile stations on the net.

As for the future? I would like to transmit, at least once, from each of America's "counties"—using CW, of course. The Mobile Amateur Radio Awards Club (MARAC) also issues a whole slew of awards for many variations on a theme, but all relate to working all the counties—a *second* time. As the MARAC members are quick to point out, you can also earn awards for working them all a third, fourth, fifth . . . and even a ninth time. I believe that one of the nets' "regulars," Kenny, KC4UG, held the current record for nine times contacting all counties. Kenny recently became a Silent Key and will be sorely missed on the nets, both SSB and my favorite, CW.

Many, many thanks to all who have helped with my quest and with the realization of a dream. You are the best. Also, many thanks to those reading my story. I hope you enjoyed it and . . . C U DN THE LOG.

73, Jay, AA9KH

Awards from Georgia (4L)

Here is a pair of very handsome, colorful awards from the country of Georgia in Asia. The Tbilisi certificate is a montage of color photographs showing public buildings, monuments, and other scenic spots of the capital of Georgia. The Iveria certificate features a detailed map of the provinces of Georgia together with traditional native costumes.

The Tbilisi Award. This award is offered by the Iveria Club for contacting Georgian stations on any bands on or after January 1, 2000. Europeans need three QSOs, Asians two, and all others one. Send GCR list and fee of $US6 or 10 IRCs to Avtndil Djikia, Manager, Independent Radioclub Iveria, 34/38 Kaloubani St., Tbilisi, 380082 Georgia.

Iveria Award. The Georgian Independent Club Iveria certificate is awarded to radio amateurs from around the world for two-way contacts on any frequency with Georgian amateur radio stations on or after January 1, 2000. Europeans need ten QSOs, Asians seven, and all others five. SWL okay. Send GCR list, SASE and $US6 or 10 IRCs to Avtandil Djikia, at the address listed with the Tbilisi Award.

GMDX Group Awards

Scotland's Celtic Knot Award. The Celtic Knot Award is sponsored by the GMDX Group for working stations in lands traditionally agreed upon as being associated with the Celtic people—Scotland (GM), Northern Ireland (GI), Republic of Ireland (EI), Isle of Man (GD), Wales (GW), Cornwall (G), Brittany (F), Galicia and Asturias (EA1), and to celebrate its Scottish heritage, Nova Scotia (VE1). The award has an interesting background of an intricate Celtic design and features the flags of the modern countries and areas peopled by Celts. Contacts must have been made on or after January 1, 2000. If you've been active in DX contests since the beginning of 2000, you've probably earned at least the Basic level, and more likely the Bronze or Silver level.

Some specific areas that are also valid for the award include:

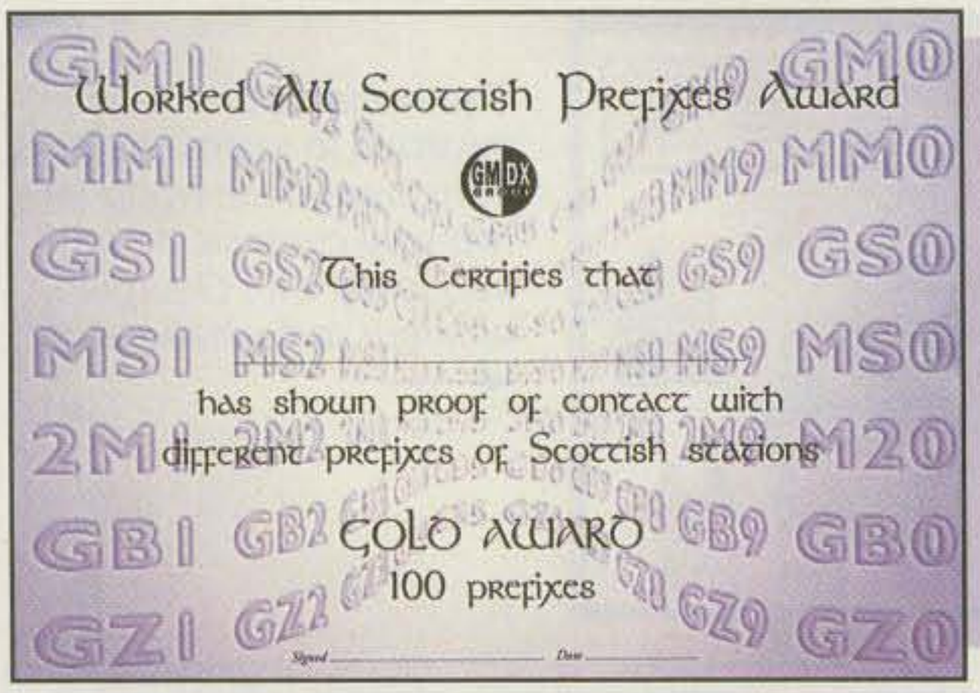
France, Province of Brittany—Cotes du Nord 22, Finistere 29, Ille et Vilaine 35, Morbihan 56.

Spain, Calicia Provinces (EA1)—La Coruna, Pontevedra, Lugo, Orense.

Spain, Asturias Province—Oviedo.

The award is available in four classes as follows:

Celtic Knot Bronze: 100 different contacts needed, minimum 5 per call area.



The Worked All Scottish Prefixes Award, also from the GMDX Group, is a new award issued for contacting as many Scottish prefixes as possible.

Celtic Knot Silver: 200 different contacts, minimum 10 per call area.

Celtic Knot Gold: 300 different contacts, minimum 15 per call area.

Celtic Knot Honor Roll: 400 different contacts, minimum 20 per call area.

All bands and modes okay. Cost of a certificate is £5GBP, 10 Euros, or US$10. Fee for special plaque for the 300 level is £35GBP, 70 Euros, or $70. Those achieving Honor Roll will be also be eligible for an engraved Quaich (Scottish Drinking Cup) which costs £35GBP, 70 Euros, or US$70. Make checks payable to "GMDX Group" (only checks made payable in £GBP are accepted). Those applying for awards should send the application form available on the GMDX website with the appropriate fee to: Celtic Knot Award, Colin Brown, GMØRLZ, 9 Newton Crescent, Rosyth Fife KY11 2QW Scotland, U.K. (website: <http://www.gmdx.org.uk>). An activity weekend called Celtic Connections is held on the third full weekend in April each year.

Worked All Scottish Prefixes Award. Also from the GMDX Group is a new award for contacting as many Scottish prefixes as possible. Each prefix may be worked on a total of three bands for points, so while there aren't 100 prefixes currently available in Scotland, the higher levels of the award are possible if you contact the same prefix on several bands. Note the custodian is not the same as for the Celtic Knot Award listed above.

Available to all radio amateurs and SWLs for contacts with stations located in Scotland on or after January 1, 2000, each prefix may be worked on CW, SSB, and digital modes on each band, giving a possible three per band. The award is available in four levels: Basic—25 prefixes, Bronze—50 prefixes, Silver—75 prefixes, and Gold—100 prefixes. Acceptable prefixes are GM, GS, MM, MS, 2M, GB for special event stations located in Scotland (QSL card required for proof of location), and GZ for contest operations from the Shetland Islands. Ambiguous callsigns such as GM/F5NED count as GMØ; MM/W5ZE/P counts as MMØ. Send GCR list and fee of £5GBP, 10 Euros, or US$10. Make checks payable to the GMDX Group (only £GBP checks are accepted). Apply to: Drew Givens, GM3YOR, 3 Murray Place, Gourock, PA19 1TS, Scotland, U.K.

Russia's Arktika Award

Vorkuta, Siberia lies in the extreme north of Asiatic Siberia. I have a UA9 QSL dating from the old days of the "Cold War" which shows a cartoon character pointing to a thermometer showing a reading of –45°C. Stalin established some of the worst political prisoner gulags in this area. Modern-day Vorkuta is still cold and remote, but a lot friendlier.

Contact Russian Arktika radio club members after September 24, 1989 to earn this award.

Contact Arktika Club members starting September 24, 1989. A special time for club activity is September 24–30 each year. Earn a total of 67 points. Each club member = 3 points; Vorkuta stations who are not members = 2 points; all other stations north of the Arctic Circle = 1 point. All bands, including WARC, and all modes accepted. SWL okay.

Send GCR list and fee of 10 Euros or the equivalent to: Heinrich Niehaus, DF1EW, Baldeney 34, D-45134 Essen, Germany.

URL of the Month

The German website <http://www.hamradio.de/awards/index.html> allows any station to post information about an award. There's an interesting collection of certificates already posted, and the site has grown over the years. It's worth a visit every once in a while just to see what has changed.

I'm still interested in promoting your awards programs. Please send complete rules and certificate samples to my e-mail or snail-mail address listed at the beginning of this column.

73, Ted, K1BV

Steady Summertime Conditions

BY TOMAS HOOD,* NW7US

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports an observed monthly mean sunspot number of 60 for April 2003, about the same as for March. The 12-month running smoothed sunspot number centered on October 2002 is 159. The sunspot minimum for April 2003 was 16 on April 16. The sunspot maximum of 109 occurred on April 29.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada reports a 10.7 cm observed monthly mean solar flux of 127 for April, down from March's 164. The 12-month smoothed 10.7 cm flux centered on October 2002 is 160.

The observed monthly mean planetary A-index (*Ap*) for April is 20, up a point from an *Ap* of 19 for March. The 12-month smoothed *Ap*-index centered on October 2002 is 16.

A smoothed sunspot level of 53 and a 10.7 cm solar flux of about 110 are predicted for July 2003. Geomagnetic storming will be much the same as we have had during June.

July Propagation

With longer hours of daylight and the sun high in the northern sky, HF propagation should be considerably more stable during July than it was during the radio-storm-ridden spring months. While propagation of the highest HF frequencies will be poor, radio signals near the Best Usable Frequency (BUF) will be stable over paths that should remain open for longer periods than during the spring season. As the solar activity is declining, the highest of the HF frequencies are mostly unusable for DX propagation. However, July is generally the month in which sporadic-*E* ionization is most intense. This should result in a considerable increase in short-skip openings on almost all of the HF amateur bands and on 6 and 2 meters as well.

Twenty meters should continue to be the best band for DX propagation during the month. When conditions are at least Low Normal the band is expected to remain open to one area of the world or another from sunrise through the early evening. Peak conditions are expected for a few hours after local sunrise and again during the late afternoon and early evening, when the band should open in almost all directions. When conditions are at least Low Normal, expect 20 meter openings toward South America, the South Pacific, and Oceania until as late as midnight. When conditions are High Normal or better, the band should also remain open to most other areas of the world until as late as midnight.

Considerably fewer DX openings are expected on 15 meters and very few, if any, on 10 meters during July. This is due to a combination of changing seasonal conditions and the current level of solar activity in the decline of this solar cycle. When conditions are at least Low Normal, 15 meters should occasionally open towards the south. Look for some short-skip openings into the Caribbean area and Central America as early as 10AM, with a peak expected to all areas of Latin America between 3 and 5PM local daylight time. When conditions are High Normal or better, the band may also open to Africa during the late afternoon from the eastern half of the country, and to Australasia and the South Pacific area during the late afternoon and early evening from the western half of the country. Seventeen meters will act somewhat the same as 15 meters, but openings will be tend to be longer, and signals perhaps stronger and more stable.

Don't expect much DX on 10 and 12 meters during July, but some short-skip openings should be possible from time to time towards the Caribbean and possibly Central America as a result of sporadic-*E* ionization. When conditions are High Normal or better, an occasional opening deeper into South America may be possible, especially during the afternoon hours.

Nighttime openings to many areas of the world are possible on 20, 30, and 40 meters. However, seasonally high static levels may often make DX reception difficult on 40 meters. 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. One-sixty meters is virtually shut down due to the high static levels of summer. The best bet for 40, 80, and 160 meter DX openings is an hour or two before midnight for openings toward

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2003

Propagation Index..... Expected Signal Quality	(4)	(3)	(2)	(1)
Above Normal: 24-25	A	A	B	C
High Normal: 5, 9-11, 14, 17-20, 23, 26	A	B	C	C-D
Low Normal: 2-3, 6, 8, 12-13, 15, 27, 29-30	B	C-B	C-D	D-E
Below Normal: 1, 7, 16, 21-22, 28	C	C-D	D-E	E
Disturbed: 4, 31	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 poor to fair (D-C) on July 1st, fair to good (C-B) on the 2nd and 3rd, poor (D) on the 4th, etc.

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

the north and east, and just before local sunrise for openings towards the south and west.

Peak Sporadic-*E* Propagation

Optimum short-skip propagation conditions are expected during July as a result of a seasonal peak in sporadic-*E* ionization. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters. During the daylight hours, considerable short-skip openings are forecast for 10 and 15 meters over distances ranging between approximately 400 and 1300 miles, with openings occasionally extending out to beyond 2000 miles. Around-the-clock short-skip openings should be possible on most days on 20 meters, with the skip often as short as 300 miles and as long as 2300 miles. Short-skip conditions on 20 meters should peak during the late afternoon and the early evening.

Good daytime openings on 40 and 30 meters should range between 100 and 750 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 one-hop limit of 2300 miles during the hours of darkness. However, these bands could be quite noisy.

While no short-skip openings are likely 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 static levels are low.

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 ranging between approximately 600 and 1300 miles should be possible on 6 meters.During periods of intense sporadic-*E* ionization, openings may also be possible on 2 meters with stations up to 1300 miles away. While sporadic-*E* short-skip openings can take place at just about any time of the day or night, statistics indicate that conditions should peak for a few hours before noon and again during the late afternoon and early evening. During July you can expect 6 meter sporadic-*E* on at least three out of every four days. Openings may last from a few minutes up to hours.

A number of minor meteor showers are expected during July, but none look promising for significant meteor-scatter propagation. The best chance for meteor-scatter openings will be during the last week of July, when the southern *delta-Aquarids* shower is expected to intensify. It should peak on July 28, but with only about 20 meteors per hour. For a detailed list of meteor showers, check out <http://www.imo.net/calendar/cal03.html>.

While little, if any, auroral activity is expected during July, it may pay to check the VHF bands during those days that are expected to be Below Normal or Disturbed. You may also find the up-to-the-minute auroral information at <http://prop.hfradio.org> useful.

Until next month, I wish you great DX. Write to me with questions or observations, and look for me on the bands!

73, Tomas, NW7US

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 2003
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 2003
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) 16-17 (3) 17-18 (2) 18-20 (1)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-20 (4) 20-22 (3) 22-05 (2) 05-06 (31)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)† 20-22 (2)† 22-02 (3)† 02-03 (2)† 03-04 (1)†

ALASKA
July & August 2003
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.

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Oops...

We know some of you enjoy searching through each issue, looking for errors. Well, we didn't want to make you work too hard last month . . . we accidentally repeated the May reader survey in the June issue! As Yogi Berra once said, "It's déjà vu all over again!" To get back on track, we're running the survey originally intended for June in this issue (we hope).

A diagram in last November's "How It Works" column suggested using "R68X or equivalent 500 Ω coax to rig" . . . Since that 500 Ω R68X is kind of hard to find, we'd suggest substituting "RG-8X or equivalent 50 Ω coax to rig." (Tnx ZL2DW)

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