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COMMUNICATIONS & TECHNOLOGY

JULY 2002

CQ

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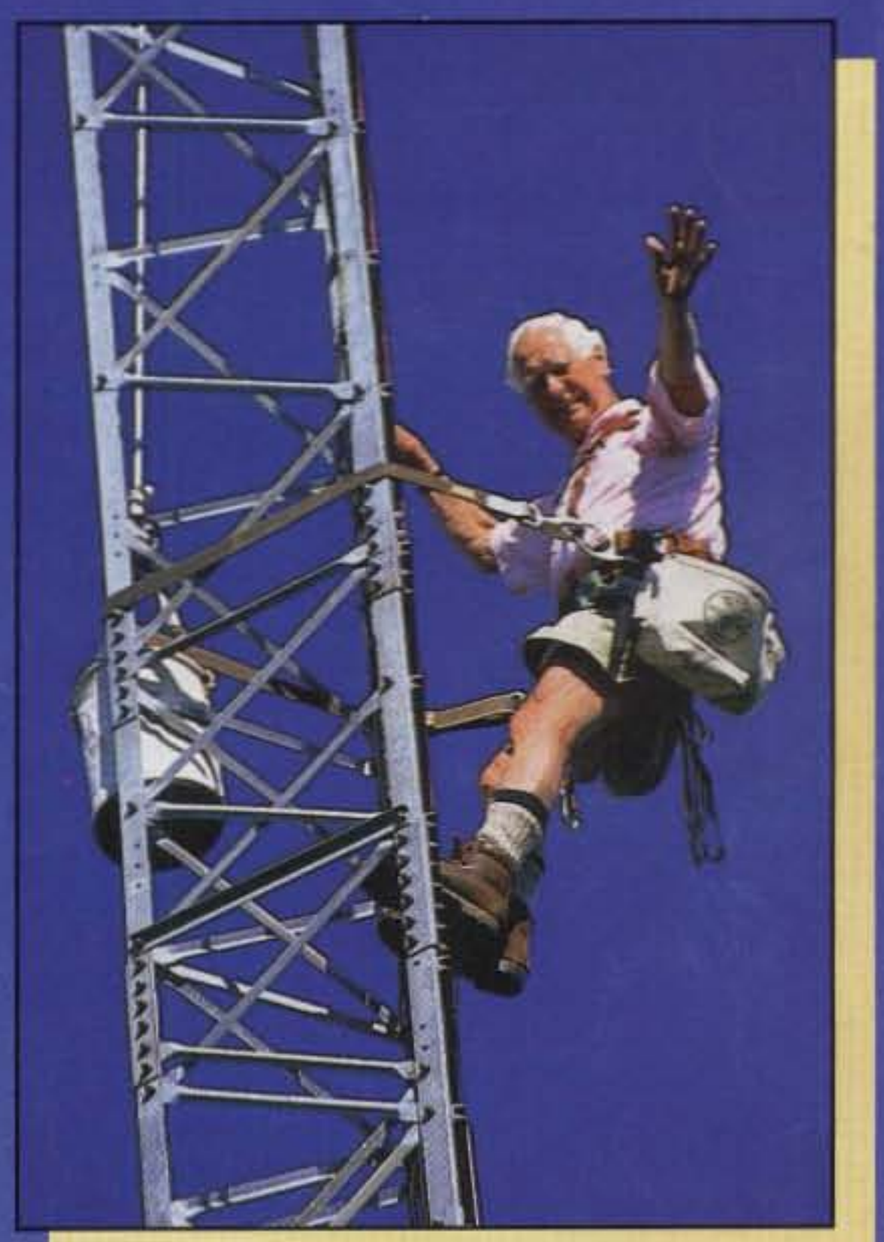

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ooley, W7HUY, of Brush Prairie,
on his tower. Details on page 108.

MATEUR'S JOURNAL

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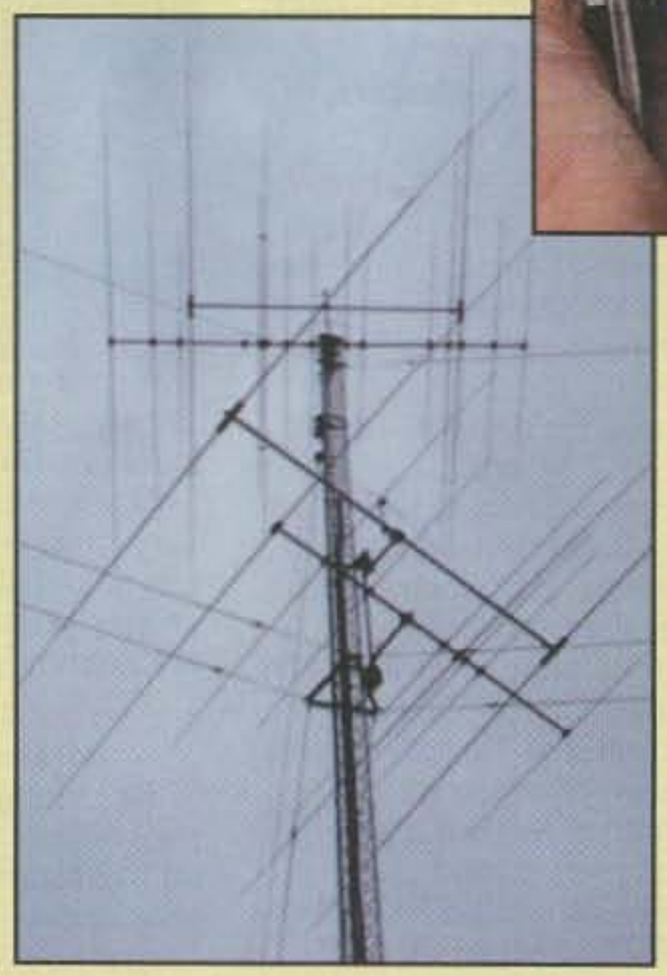

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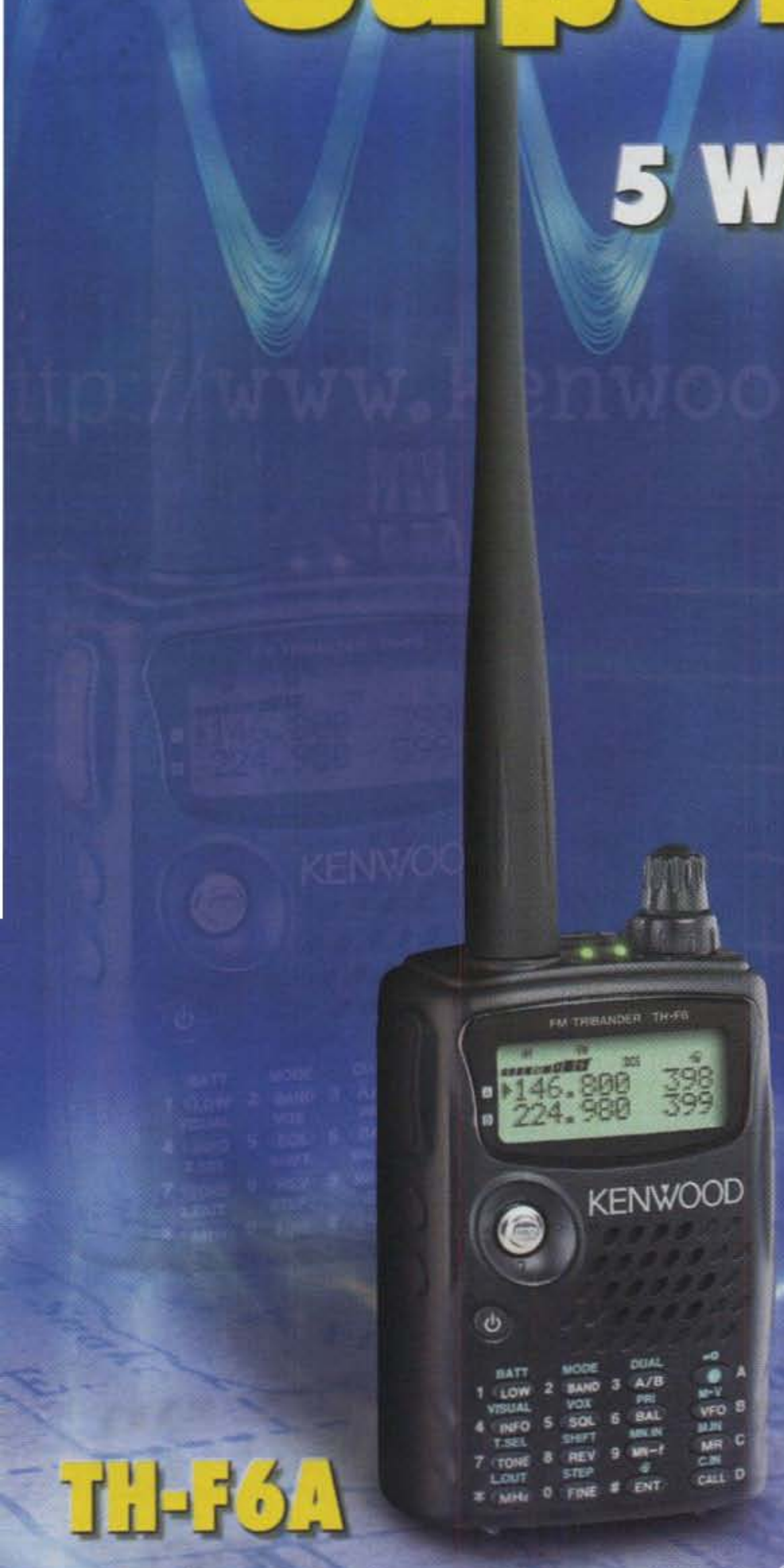
DEPARTMENTS

Airwave Superiority

5 Watts / All Bands



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

"Specifications subject to change without notice."

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Ham Radio News

From The CQ Newsroom

Ham Antenna Bill Introduced in Congress

A New York Congressman has introduced a bill—H.R. 4720—intended to offer residents of condominiums and others affected by private land use regulations the same right of "reasonable accommodation" of amateur antennas currently afforded to hams without such restrictions.

According to the ARRL, Rep. Steve Israel (D-NY), whose father is a ham, introduced the "Amateur Radio Emergency Communications Consistency Act" on May 14. Initial co-sponsors are Rep. Greg Walden, WB7OCE (R-OR), currently the only licensed amateur in Congress, and Rep. Pete Sessions (R-TX). The bill consists of a single sentence:

"For purposes of the Federal Communications Commission's regulation relating to station antenna structures in the Amateur Radio Service (47 CFR 97.15), any private land use rules applicable to such structures shall be treated as a state or local regulation and shall be subject to the same requirements and limitations as a state or local regulation."

This means that if the bill passes, the limitations of PRB-1, the FCC's prohibition on outright bans on amateur antennas and a requirement to "accommodate reasonably" amateur operation through "the minimum practicable regulation," would also apply to private land use regulations.

The ARRL had asked the FCC several times to impose this requirement administratively, but the Commission refused. At the same time, it virtually invited the League to seek a legislative remedy, saying that if Congress told it that PRB-1 rules must apply to private land use rules as well as state and local zoning laws, it would comply promptly. See this month's "Zero Bias" editorial for more on H.R. 4720.

In a related story, ARRL Hudson Division Director Frank Fallon, N2FF, reports that New York Governor George Pataki, a former ham himself, has informally promised to sign a state version of PRB-1 if the bill is passed by the state legislature.

FCC Proposes New LF and HF Ham Bands

The FCC is proposing two new amateur allocations in the low-frequency (LF) and high-frequency (HF) portions of the spectrum, along with added protection for amateurs at 2.4 GHz. All three proposals are in response to ARRL requests.

Working up from DC toward light, the Commission is proposing a secondary amateur allocation in a 2.1 kHz wide "sliver band" between 135.7 and 137.8 kHz. The spectrum around 136 kHz is one of two LF areas on which considerable amateur experimentation has been taking place around the world in recent years. According to the FCC, its goal in proposing this new band is to enhance amateurs' ability to conduct propagation and antenna design experiments in the LF portion of the spectrum.

The proposal that would probably affect the greatest number of hams is for a secondary amateur allocation between 5250 and 5400 kHz. The Commission says this new band should help amateurs better match their choice of operating frequencies to propagation conditions, especially in maintaining contact with the Caribbean during hurricane season (No Caribbean countries have yet authorized amateur operation on these frequencies.).

The FCC also proposed upgrading the amateur allocation at 2400–2402 MHz from secondary to primary, closing a gap between existing primary amateur allocations at 2390–2400 and 2402–2417 MHz. It would also add a primary amateur-satellite service allocation at 2400–2402. The FCC says its purpose for this part of the proposal is to protect current amateur operations in the band, most notably the OSCAR-40 downlinks. (Meanwhile, however, the FCC has identified 2390–2400 MHz as possible "replacement spectrum" for public-safety users relocated from the 800 MHz region due to interference problems. The ARRL has filed comments in opposition to any reallocation.)

The Notice calls for a 45-day comment period and a 15-day reply comment period. At press time, the NPRM (ET Docket 02-98) had not yet been published in the Federal Register, so specific comment and reply deadlines had not been set. Updates should be available on the EDOCS area of the FCC website, <http://www.fcc.gov>.

FCC Promotes High-Speed Wireless In Shared Amateur Bands

The FCC has decided to permit the use of new digital transmission technologies by unlicensed (Part 15) digital radios operating in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands, all of which are shared at least in part by amateurs. The Commission decided to permit new digital modulation technologies that have spectrum characteristics similar to direct-sequence spread spectrum (DSSS) to operate in these bands along with DSSS and frequency-hopping spread-spectrum (FHSS) systems. In addition, the FCC decided to permit the use of as few as 15 hopping channels for FHSS in the 2400 MHz band, with signals occupying up to 5 MHz of bandwidth but operating at a maximum power of 125 milliwatts if fewer than 75 hopping channels are used. The Commission said it was confident that the new rules would not result in increased interference to licensed users of these bands.

In a separate action, the FCC has decided to license telemetry services on a secondary basis in the 216–220 MHz band using "a frequency coordinated site-by-site approach." There is a secondary amateur allocation at 218–219 MHz for high-speed digital networking, but the primary occupants of that band have not agreed to permit a single amateur station operate there.

40 Meter Update and Clarification

European plans for a possible realignment of the 40 meter band at next year's World Radiocommunication Conference are far from decided, according to ARRL Executive Vice President Dave Sumner, K1ZZ. Sumner, who is an active participant in the discussions leading up to WRC-03, told *CQ* that the plan we reported on in May's "Washington Readout" column was very preliminary and in fact was outdated by the time the magazine appeared in print. As of mid-May, according to Sumner, the working groups considering ways to realign 40 meters to reduce interference between amateurs and broadcasters were looking at several possibilities, but any possible movement of the amateur band below 7 MHz had been taken off the table due to strong objections by current users of that spectrum (fixed and land mobile services). Possible sharing of band segments between hams and fixed/land mobile users (rather than between hams and broadcasters) was still being considered. Stay tuned...

AMSAT: Finances are Fine, New Satellite Under Construction

The President of AMSAT-North America says the organization is not facing a fiscal crisis and that plans for building new satellites are continuing on schedule.

In an open letter to members in April, AMSAT-NA President Robin Haighton, VE3FRH, had noted that donations for future projects dropped off after September 11 and had not yet recovered. He said a special meeting of the AMSAT Board of Directors was being convened "to review the situation and to decide on a proper course of action." After the meeting, Haighton told *CQ* that the board was not dealing with a financial crisis and that the group's reserves are in "excellent shape."

"We do, like every other organization, have to spend our money wisely and at the right time," said Haighton, adding "that was the subject of a part of the BoD meeting."

One announcement that did come out of the meeting was that construction has begun on a new low-earth-orbit amateur satellite. At the Dayton Hamvention®, AMSAT announced that the craft, dubbed "AMSAT OSCAR-Echo," will be the size of the microsats launched in the early 1990s but more advanced technically. It will feature multichannel operation in both voice and digital modes. Officials hope to get a launch date in 2004.

AMSAT also provided some details on the "Eagle" satellite project at Dayton. It is being

planned for a high Earth orbit with a hoped-for launch date in 2006.

IRLP Hosts Kids' Net

The Internet Radio Linking Project (IRLP) is hosting a worldwide net for young hams, called the IRLP4KIDS Net. According to *Newsline*, the net meets every Saturday at 0100 UTC (Friday night in the U.S.) on IRLP Reflector #2. You must first join the group by going to <http://www.groups.yahoo.com/group/irlp4kids> on the internet. Young hams interested in serving as net control stations are urged to contact Jason Nochlin by e-mail at <K0IIN@arrl.net>.

Newsline also reports that IRLP has now signed up more than 400 repeaters around the world as nodes on its network. Users of these repeaters may use IRLP to connect to any of the other repeaters. Detailed information on IRLP may be found in the Spring 2002 issue of *CQ VHF* or on the internet at <http://www.irlp.net>.

FCC Says RFI Problem Resolved

FCC Amateur enforcement chief Riley Hollingsworth, K4ZDH, reports the successful resolution of RFI problems connected with WLW radio in Cincinnati, Ohio. Responding to an FCC letter of last December, station owner Cinergy Corp. reported that it had worked with the amateurs involved to resolve the problems to everyone's satisfaction. Hollingsworth notes that ARRL staffers Ed Hare and John Phillips played key roles, along with Paul Jellison of WLW and amateur Bob Reiff, WA8ULW.

In a separate matter, a marketer of high-power cordless telephones has been fined $17,000 by the FCC for "repeated and willful violations" of Commission rules. The fine was levied against CTI of Miami, Inc., of Miami, Florida. High-power cordless telephones manufactured overseas often operate in the 2 meter and 70 centimeter amateur bands, causing significant interference when sold and used illegally in this country.

Special Canadian Prefixes

Amateurs in Canada have been authorized to use special prefixes between May 18 and July 18, 2002 in honor of the Golden Jubilee of Queen Elizabeth II. According to the *ARRL Letter*, Canadian hams may substitute XL for VA prefixes, XM for VE, XN for VO, and XO for VY.

Former ARRL Staffer Laird Campbell, W1HQ, SK

Former ARRL staffer Laird Campbell, W1HQ (formerly WN5TQD, W5TQD, and W1CUT), died on April 26 at age 70 in Amarillo, Texas. A memorial service was held there on May 4, according to an obituary on the ARRL website.

In his 35-year career at ARRL headquarters Campbell served in a variety of positions, including Managing Editor of *QST* and Assistant General Manager. As a Technical Assistant at the League in 1955, according to the ARRL, Campbell is believed to have made the first amateur contacts using transistorized transmitters on 160, 40, and 20 meters. He retired in 1989.

The ARRL obituary says Campbell succumbed to the effects of multiple sclerosis. The family has asked that memorial contributions be made to the Maine Chapter, National Multiple Sclerosis Society, P.O. Box 8730, Portland, ME 04104.

Hams in Panama Regain Lost Bands

Two years ago the government of Panama issued a revised frequency allocation plan which removed 30 meters and several UHF/microwave bands from the amateur service there. The *ARRL Letter* reports that after "lengthy discussions, debates, and public hearings," an effort to reverse the changes spearheaded by the Radio Club of Panama has been mostly successful. The Panamanian government reportedly has now agreed to restore all previous amateur allocations except for the 902–928 MHz band.

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.

Zero Bias

BY RICH MOSESON, W2VU

An Editorial

New Bands, New Friends, Old Friends (Bookends?) . . .

Well, another Dayton is history—and this one goes into the books as being exceedingly wet on Friday (nothing new about that!) and exceedingly cold on Saturday and Sunday (as in frost on the windshields!). In other words, a typical Dayton weekend! I'm going to have to put off my annual Dayton ruminations until next month, though, because I want to talk about the most exciting news to come out of Washington in a good long time.

First, the FCC has issued a Notice of Proposed Rule Making to create two new amateur allocations and help protect another. Second, a bill has been introduced in Congress to extend the protections of "PRB-1" to hams living with deed restrictions and other forms of private land use regulations. The major details are in our "Ham Radio News" column, so I won't repeat them here. Rather, I want to take a "behind the headlines" look at these issues. First and foremost, both the FCC's NPRM and the bill in Congress are the direct results of a tremendous amount of work by the ARRL. Keep this in mind the next time you ask, "What has the League done for me lately?" (Our friends in Newington are far from perfect, but this time they've hit two home runs and deserve lots of credit.)

New Bands—2200 Meters

On May 15, the FCC released ET Docket 02-98, which originated in the Office of Engineering and Technology. It contains three separate proposals. First is for a "sliver band" at 2200 meters, a 2.1 kHz wide segment between 135.7 and 137.8 kHz in the LF, or low frequency, portion of the spectrum. An ARRL request for an additional LF allocation at 160–190 kHz was turned down due to concerns about possible interference to power line carrier (PLC) systems, which use LF transmissions *on power lines* to assure the reliability and security of the nation's electric transmission network. There's been a good deal of experimentation in the 135 kHz area, especially among hams in the UK and Canada, which have permitted LF amateur operation for a few years, and they've succeeded at least once in making a transatlantic contact.

The FCC is proposing to allow CW, RTTY and data on this band—it's too narrow for even one standard SSB voice signal—and I'd expect to see some work develop on digital modes that will be more efficient than the currently used CW, which has to be sent so slowly that it takes something like a day and a half to exchange callsigns and signal reports (great news for the slow-speed guys!). The FCC is proposing a power limit of 100 watts PEP and effective radiated power (EIRP) of 1 watt for the band with a maximum signal bandwidth of 100 Hz. Noting the tiny size of the "band," the NPRM says the Commission expects that "amateur radio operations may be limited to propagation experiments, telegraphy and low speed data applications." Of course, it's our tradition to exceed expectations, so you never know what we'll come up with!

The proposal is also very significant for old-old-timers in that, *finally*, for the first time since 1912, hams might be given access to those prized frequencies above 200 meters! So dust off those spark gaps! (*No, no! Don't! I'm only kidding!*)

60 Meters

Part two of the FCC's proposal, and the one which will benefit the greatest number of hams, is to establish a new amateur band at 60 meters, between 5250 and 5400 kHz. The ARRL has coordinated a group of 15 stations over the past three years in FCC-approved experiments to compare communications reliability on 80, 60, and 40 meters. These tests showed that there are times, especially during the summer, when signals will not get through on 80 or 40 meters, but will on 60. According to the League, this could make the band very important for maintaining contact between the US and the Caribbean during hurricane season. Since there's no international amateur allocation at 60 meters, this would start out being a US-only allocation. Hopefully, those countries in the Caribbean with which we'd want to communicate during a hurricane would follow suit and authorize amateur operation on 5 MHz as well. The NPRM also notes the difficulty that hams have on 40 meters at night, competing with broadcasters in other parts of the world, and hopes the new 60-meter band would help reduce the crowding and frustration on 40.

The FCC is asking the amateur community for its input on whether there ought to be power and/or mode restrictions on 60 meters, and whether separate mode subbands would be needed. This band, like 137 kHz, would be allocated to amateurs on a secondary basis, meaning that hams may not cause interference to the band's primary users. This is also the case with 30 meters and most UHF bands, and the sharing has worked out quite well.

13 Centimeters

The 2400–2402 MHz band segment is already a ham band, part of the much broader 13 centimeter band, which has one small chunk at 2300–2310 MHz, then a larger piece at 2390–2450 MHz. There are two segments on which hams have a primary allocation—2390–2400 and 2402–2417, and a secondary status elsewhere. The FCC's proposal would close that gap by creating a single primary amateur allocation from 2390–2417 MHz, offering a higher level of protection to amateur operations there, particularly satellites. At least four current amateur satellites have receivers, transmitters or both between 2400 and 2402 MHz. Considering the time and expense involved in building amateur satellites, and the difficulty of getting to them to change frequency, the Commission is trying to provide this subband with its highest level of protection against being reallocated. In fact, the NPRM separately proposes a primary allocation here to the Amateur Satellite Service.

Overall, this NPRM demonstrates the breadth of ongoing amateur experimentation and recognizes the technical research that hams are conducting across the radio spectrum, from low frequency to shortwave to microwave. Comments on the proposals are due 45 days after the NPRM's publication in the Federal Register, and should be made if possible online via the FCC's Electronic Comment Filing System, or ECFS. Reply comments are due 15 days after the initial comment deadline, and it would probably be several months to a year after that before a final ruling is issued, and a similar period before the bands are opened for amateur use. At press time the NPRM had not yet appeared in the Federal Register, so exact dates were not available. Watch our website and e-mail newsletter for updates.

New Friends

Amateur radio has not had a strong champion on Capitol Hill since the retirements from the Senate of the late Barry Goldwater, K7UGA, and former astronaut John Glenn. Goldwater was more up-front, being an active ham himself (and often referred to as "the Senator from Amateur Radio"), while Senator Glenn and his staff

worked very hard behind the scenes to protect and promote amateur radio.

Now, three new friends have emerged in the House of Representatives, all with ties to our hobby, as co-sponsors of H.R. 4720, the "Amateur Radio Emergency Communications Consistency Act of 2002." This one-sentence bill would bring deed restrictions, CC&Rs (Covenants, Conditions & Restrictions), homeowner association rules, etc., under the umbrella of limited protection offered to amateurs for their antennas by section 97.15 of the FCC rules, commonly known as PRB-1. In order to assure the availability of amateurs to respond to emergencies anywhere in the country, the bill states simply that "For purposes of the Federal Communications Commission's regulation relating to station antenna structures in the amateur radio services (47 CFR 97.15), any private land use rules applicable to such structures shall be treated as a State or local regulation and shall be subject to the same requirements and limitations as a State or local regulation." This means that, if the bill becomes law, condos, private developments, etc., would no longer be able to ban amateur antennas altogether, as many now do. Instead, their regulations would have to "accommodate reasonably" amateur communications and would have to represent the "minimum practicable regulation" to achieve their legitimate goals.

PRB-1 has been less than perfect for amateurs dealing with state and local governments, but it has meant that those governments cannot make it impossible or impossibly expensive to put up an effective amateur antenna. It means they have to work with us to come up with a compromise acceptable to all sides. This bill—effectively requested by the FCC in its refusal to impose such a regulation on its own—would apply those same requirements to private land use regulators.

The three Congressmen who introduced the bill are Rep. Steve Israel, a New York Democrat whose father is a ham (K2JCC); Rep. Greg Walden, a Republican from Oregon who is also the only ham in Congress (WB7OCE); and Rep. Pete Sessions, a Texas Republican whose Chief of Staff, Jeff Koch, is NU5Z. Rep. Sessions worked closely two years ago with ARRL President Jim Haynie, W5JBP, on arranging to bring then 13-year-old Willem van Tuijl to the United States for medical care after the boy had been shot by pirates attacking his parents' boat off the coast of Central America. Amateur radio was central to the boy's rescue (see June 2000 *CQ* for details). We thank Representatives Israel, Walden and Sessions for their strong support of amateur radio and the ability of hams to provide emergency communications regardless of where they live.

Getting a bill introduced and getting it passed are two different things, though. If you feel it is important for hams living in condos and other privately-regulated areas to have the same ability to negotiate for antennas as do hams in other locations, please contact your representative in Congress and urge him/her to co-sponsor or at least support H.R. 4720. The House of Representative website (http://www.house.gov) offers a "Write Your Representative Service" for e-mailing your Congressperson. If you don't want to send a full letter explaining the situation, you can simply mail him/her a QSL card, asking your representative to "Please support or co-sponsor H.R. 4720 to make sure ham radio operators can help in future emergencies" or something similar. The ARRL asks that you send copies of any correspondence about the bill (positive or negative) to "CC&R Bill, c/o ARRL, 225 Main St., Newington, CT 06111"; or via e-mail to <ccr-bill@arrl.org>.

Old Friends

I'm running out of space for this month, so I'll simply say it was great—as always—to see and talk with so many of you at Dayton. It's always fun to hook up with old friends each May. Next month, I'll try to spend a little time talking about the Hamvention's theme of emergency preparedness. Meanwhile, be sure to read WA3PZO's column on that topic this month, and enjoy our Antenna Special.

73, Rich, W2VU

Announcements

• **VHF/UHF Conference Call for Papers.** The Western States VHF/UHF & Microwave Conference will be held October 11–13, 2002 in Cerritos, California. The sponsors are soliciting papers and technical sessions with the theme "to provide VHF/UHF enthusiasts the knowledge and tools to work DX and contests on 6 meters and up." An abstract for consideration may be submitted to: Western States Weak Signal Society, 2002 Conference Committee, c/o Malcolm Levy, KO6SY, 25422 Trabuco Road, Lake Forest, CA 92630 (e-mail: <ko6sy@ soara.org>).

•**ARRL & TAPR Digital Communications Conference Call for Papers.** Technical papers are being solicited for presentation at this conference to be held September 13–15, 2002 in Denver, Colorado, and for publication in the Cenference Proceedings. Submissions are due by August 5 and should be submitted to Maty Weinberg, ARRL, 225 Main St., Newington, CT 06111, or via e-mail: <maty@arrl.org>. Information on paper submission guidelines may be found at <http://www.tapr.org/dcc/>.

•**Kentucky QSO Party.** After many years this QSO party will be back on the air on July 6. Rules and information may be found at: <http://www.qsl.net/ky4ky/kyqsopartyrules.html>.

•**The following Special Event stations are scheduled for July:**

W1B, from the National Baby Food Festival, Fremont, Michigan; July 16–20 *(no times given)* in the General portions of 10, 15, 20, 40, 75 meters. For certificate send QSL and SASE to Shawn Gibson, KC8LGD, 3377 West 80th St., Newaygo, MI 49337.

W3LRC, from 100th anniversary of the Laurel Fire Dept., 50th anniversary of the Laurel Volunteer Rescue Squad, and 25th anniversary of the city's July 4th celebration, Laurel, Maryland; Laurel ARC; 1200–2400Z July 7th in the low end of the General subbands on 75–15, 28.450, and 147.54. QSL to P.O. Box 1259, Laurel, MD 20723 for certificate.

KC4GUG, from Smithville Fiddlers Jamboree, Smithville, Tennessee; DeKalb County ARC; 1500–2200Z July 6 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. Website: <http://www.geocities.com/kg4bto1/darc_warc.html>.

K7H, from ARRL Rocky Mountain Convention & Hamfest, Bryce Canyon, Utah; 1800Z July 12 to 0000Z July 14 on 7.260, 14.260, 21.260, 28.460 MHz. Send QSL and SASE for QSL to Dan Farwell, W8EQA, 95 N. 2300 E., St. George, UT 84790-2437.

W7H, from World Hang Gliding Championship, shores of Lake Chelan, Washington; Lake Chelan RC K7SMX; 0000Z July 13 to 2359Z July 14 on 3.875, 7.250, 14.275, 21.325, 28.450 MHz. For QSL send SASE, or $4.00 for $8^1/2 \times 11$ certificate, to Lake Chelan Radio Club, P.O. Box 1445, Lake Chelan, WA 98816-1445. <www.lakechelanradioclub.com/index.html>.

W8D, from All-American Soap Box Derby, Akron, Ohio; Cuyahoga Falls ARC; 2000–2400Z July 22–26, and 1200–2100Z July 27 on 7.275, 14.250, 21.275, 28.340 MHz. For certificate contact Cuyahoga Falls ARC, P.O. Box 614, Cuyahoga Falls, OH 44222.

W8KPJ, from celebration of 50 years as a ham, Marv Kontak, N5MK (ex-KI5TL), Arlington, Texas; Kontak Family RC; 1500–2300Z July 6 on 7.250, 14.250, 21.350, 28.450 MHz. QSL to Marv Kontak, N5MK, 2820 Yorkshire St., Irving, TX 75061-6468.

W8LBZ, from toth anniversary of the Sandusky Radio Experimental League, Sandusky, Ohio; 8 PM EDST July 19 to 8 PM EDST July 20 on 28.350, 21.330, or 14.340. For certificate send QSL and SASE to SREL, 2909 W. Perkins Avenue, Sandusky, OH 44870.

W8P, from Packard Auto Museum annual celebration, Warren, Ohio; Warren ARA; 1200–2000Z July 27 and 28 on 10, 15, 20, 40 meters. For certificate send SASE and QSL to WARA, P.O. Box 809, Warren, OH 44482.

W8TCM, from National Cherry Festival, Traverse City, Michigan; Cherryland ARC; 2000–0000Z July 6 and 7 on 7.260 and 14.260 MHz ±QRM. QSL route: Dave Erlewein, N8CN, 2738 Ra-Wa-Si, Traverse City, MI 49684, e-mail: <n8cn@arrl.net>.

W9C, from Great Circus Parade Showgrounds, Milwaukee, Wisconsin; West Allis RAC; 1800–0200Z July 10–13 on 7.240, 14.240, 28.400, 145.170 MHz. For certificate send QSL to W9C, S.46 W.22328 Transdale Rd., Waukesha, WI 53189.

WØMTL, from National Tom Sawyer Days, Hannibal, Missouri; Hannibal ARC and Western Illinois ARC; 1300–2300Z July 4 on 7.250, 14.250, 21.325, 28.450 MHz ±25 kHz. For certificate send QSL and 9 × 12 SASE to AB9DU, c/o Robert Mitchell, 816 Long Drive, Quincy, IL 62305.

WØWTN, from Little House on the Prairie Pageant, DeSmet, South Dakota; Lake Area Radio Klub and Huron ARC; 1600Z July 6 to 2200Z July 7 on 7.265, 14.265, 21.365, 28.465. For certificate send QSL and SASE to LARK, P.O. Box 642, Watertown, SD 57201.

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

July 6, **Straits Area ARC Swap & Shop**, 4H Building, Emmet County Fairgrounds, Petoskey, Michigan. Contact Cliff Rosebohn, 231-526-5645. (Talk-in on 146.68; exams 1 PM at American Red Cross, contact Floyd Davis, 231-526-5503)

July 6, **South Milwaukee ARC Swapfest**, American Legion Post 434 grounds, Oak Creek, Michigan. Call 414-762-3235; e-mail: <ryatex@aol.com>; or South Milwaukee ARC, P.O. Box 102, South Milwaukee, WI 53172-0102. (Talk-in 146.52)

July 7, **Petoskey Swap & Shop**, Central Elementary School, Petoskey, Michigan. Contact Tom, W8IZS, 231-539-8459, or Cliff, KC8NVI, 231-526-5645, e-mail: <peewee@freeway.net>. (Talk-in 146.68; exams 1 PM at American Red Cross, contact Floyd, KC8CS, 231-526-5503)

July 14, **North Hills ARC Hamfest**, Northland Public Library, Pittsburgh, Pennsylvania. Contact Joe Springer, 2601 Clare St., Glenshaw, PA 15116 (412-486-1681); <www.nharc.pgh.pa.us>. (Talk-in 149.09)

July 14, **Valley Forge Hamfest & Computer Fair**, Kimberton Fire Company Fairgrounds, Kimberton, Pennsylvania. For table info contact Rick Miskinis, N3AGS, 610-825-9590, e-mail: <reservations@marc-radio.org>. For hamfest info contact MARC, 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 19–20, **Ham Holiday 2002**, Oklahoma State Fair Park, northeast of I-40 & I-44 intersection. Contact CORA Ham Holiday 2002, P.O. Box 265, Ft. Supply, OK 73841-0265; <www.geocities.com/heartland/7332>. (Talk-in 146.82; exams)

July 20, **Northern Colorado Superfest 2002**, Larimer County Fairgrounds, Loveland, Colorado. Table reservations contact: Rod Cerkoney, NØRC, 970-225-0117, e-mail: <n0rc@arrl.net>. More info: <http://www.radioactivehams.com/superfest>. (Talk-in 145.115, 146.52; exams)

July 20, **Batavia Hamfest**, Alexander, New York. Contact Harold Hay, WA2ABQ, <wa2abq@localnet.com>. (Talk-in 147.285 + repeater)

July 21, **Zero Beaters ARC Hamfest**, Bernie E. Hillerman Park, Washington, Missouri. Contact Zero Beaters ARC, P.O. Box 1305, Washington, MO 63090; or Keith Wilson, KØZH, 636-629-7368 (days). (Talk-in 147.24+; exams 9 AM, more info send SASE to ZBARC VE Exam, P.O. Box 1305, Washington, MO 63090)

July 21, **Fox River Radio League Hamfest**, Waubonsee Community College, Sugar Grove, Illinois. Contact Maurice Schietecatte, W9CEO, c/o FRRL, P.O. Box 673, Batavia, IL 60510; call 815-786-2860; e-mail: <w9ceo@arrl.net>; <http://www.frrl.org/hamfest.html>. (Talk-in 147.210 [+600] PL 103.5/107.2; exams 10 AM)

July 26–28, **Fort Tuthill Hamfest**, 3 miles south of Flagstaff at Hwy 17 exit 337. Contact KW7V, 602-881-2722; or Amateur Radio Council of Arizona, 16845 N 29 Ave., Phoenix, AZ 85053-3041, <www.arca-az.org>. (Talk-in 146.98/162.2; exams)

July 28, **BRATS Maryland Hamfest & Computer Fest**, Timonium Fairgrounds, Timonium, Maryland. Call 410-461-0086; e-mail: <hamfest@bratsatv.org>; <http://www.bratsatv.org>. (Talk-in 147.03+, 224.96–; exams 9 AM, preregistration required, contact John Creel, WB3GXW, phone 301-572-5124 after 6 PM, e-mail: <creewb3gxw@aol.com>)

To place a item in the "Announcements" column, send the specifics about your special event or hamfest to CQ Announcements, 25 Newbridge Road, Hicksville, NY 11801; fax 516-681-2926; or e-mail: <hamfests@cq-amateur-radio.com>. Deadline is the first of the month that is two months prior to the event date (i.e., May 1st for a July event).

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Our Readers Say

160 Meter Possibilities

Note: While this letter refers to a 1999 article, it was received in mid-2002 and brings up a perspective interesting enough that it seems worthwhile to publish it, even three years later.

Editor, *CQ:*

The articles by R. R. Brown, NM7M, and Carl Leutzelschwab, K9LA, on 160 m radio propagation raised my great interest in this phenomenon. Sorry, but I have no experience with this band still. I have some experience with the former 7.6 m as well with 10 m and 20 m bands and with ionospheric research in the Arctic circle. I would like to make some comments on propagation models and conditions in the article by C. Leutzelschwab, *CQ,* August 1999 issue, pp. 11 to 18.

I noted the shortly mentioned model by J. Devoldere, ON4UN, that the 160 m signal follows a smooth curved path around the outer edge of the auroral oval. Leutzelschwab presented a more detailed model for 160 m signal path from W4ZV, N.C., to SM4CAN, south Sweden (02:27 UT, March 10, 1999) at a great polar substorm activity, when the K index exceeded 5. This path extended from late evening to early morning side along or around the edge of the auroral oval. The model tells us that the signal headed more southward from the great circle, N.C.–south Sweden, and is going through some gaps in auroral ionization and meets rather a district skewing region—a very steep auroral E-ionization horizontal southward gradient that makes the path turn almost 90 degrees onto the new great circle path to south Sweden. The district skewing (reflecting) region as shown in fig. 1 and fig. 3 is in midnight region at latitudes less than or equal to 50 degrees north.

Leutzelschwab hypothesizes that the path turn is made not by refraction but by a "metallic-type" reflection from the ionization irregularity on the order of a wavelength or so in the N–S extent. In my summary this model seems likely, but also not simple, because the conditions are rather intricate. It is well known that in the auroral oval at complex polar substorm activity the structure of auroral displays and auroral E-ionization are very irregular (unhomogeneous) in extent and in time. There may be auroral arcs, bands, and rays with extents as small as about 1 to 0.5 km and various patches. The vertical sounding ionosondes show various sporadic propagation conditions due to the refraction and/ or strong scattering or various types of sporadic E/E_S. One of the interesting types of E_S is the so called "slant" E_S/E_{SS}, whose model involves refraction by a sporadic layer and strong scattering from magnetic field aligned ionization irregularities (southward of the ionosonde).

So, the problem is how to take a real-time or any typical auroral ionization distribution and adequate wave propagation theory or program, also taking into account auroral absorption and probable scattering losses. One can wonder about the fact of a 160 m path along the auroral oval and may look for any duct or path over or below the absorptive layers. If I imagine the constant electron plasma frequency lines in the meridional plane, crossing the main ionospheric trough (MIT), I will see a hole or cave (MITH), whose southward wall is formed by the mid-latitude ionosphere, but northward wall—by auroral ionization and ceiling—by MIT. The plasma frequency in the MITH may be well below 1.8 MHz (see fig. 2). So it seems that a 160 m signal can propagate there in some waveguide mode. The entry, the propagation in the MITH, and the leakage, perhaps, make the skewed 160 m signal path. Besides, at strong magnetic activity, when K exceeds 5, there is some probability of auroral ionization in the E-region at latitudes 56 to 50 degrees, somewhat separate from the auroral oval (S. I. Isaev, G. Lange-Hesse).

I hope to find new, interesting, and useful articles by R. R. Brown and Carl Leutzelschwab on DX propagation. Excuse my English and many thanks for your attention!

Harald Cirs, YL3BZ (ex-UA1ZJ)
Aglona, Latvia

Author Carl Leutzelschwab, K9LA, responds:

Harald,

Thank you for your e-mail. Rich, W2VU, forwarded it to Bob, NM7M, and me.

Since the main point of your e-mail was about my article in the August 1999 issue of *CQ,* I am the one replying. However, if you have any questions about Bob's articles, do not hesitate to correspond with him. He is a retired professor of physics, with his specialty being ionospheric physics.

As for your comment in relation to my article, I did consider a waveguide mode due to the mid-latitude trough as you suggested. But from satellite data that I have seen, it appears to me that the mid-latitude trough is very dynamic in nature, especially when the K index is greatly elevated, as it was on March 10, 1999. Since a waveguide mode for such a great distance would appear to require a very stable mechanism, I figured that my reflection hypothesis from one area was more plausible.

Your idea is certainly possible. If you have any data about this, I would love to see it. My mailing address is good in the Callbook and at qrz.com. I'm not sure we'll ever know what really happened. I enjoy investigating these unusual propagation modes, especially on 160 meters, and love to hear from others about their ideas.

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No, this isn't about using a six-shooter to defend your tower against angry neighbors and the local Zoning Board! On the other hand, this IS about a potentially fatal flaw in some towers that could lead to their collapse in even a moderate wind. If you have a tower with side arms, this article is required reading!

Tower Considerations When Using Side Arms

BY DICK WEBER,* PE, K5IU

Over the years I've helped a large number of hams in Texas get tower-building permits. As part of these efforts, I analyzed the proposed installations to verify that they were structurally sound with adequate strength margins and that the hams' local building-code requirements were met. Most of the proposed installations I worked on were reasonably configured to begin with, and for the most part, no significant structural issues came up. Occasionally a weak spot would show up, but usually these were cleared up easily. There is, though, one relatively recent case that had a very significant structural problem—so much so that I've written this article about the problem, its cause, and how we took care of it.

In late 1999 I was helping Larry Alkoff, N2LA, with the design of his tower installation at his new home in Austin. In addition to mast-mounted Yagis at the top of his 120 foot Rohn 55G tower, Larry planned to mount two HF Yagis on a side arm. My first look at his tower turned up a real showstopper. I found that if the side arm was fully open and a moderately high wind was present, *the tower probably would collapse*. The potential failure was due to the high level of torque put into the tower by the side-arm-mounted antennas. To address this problem, a special side arm was fabricated and installed which prevented the side-arm torque from overstressing the tower. This eliminated the problem and resulted in an overall tower installation that was structurally sound. You can see Larry's completed installation with the specially constructed side arm in photo A.

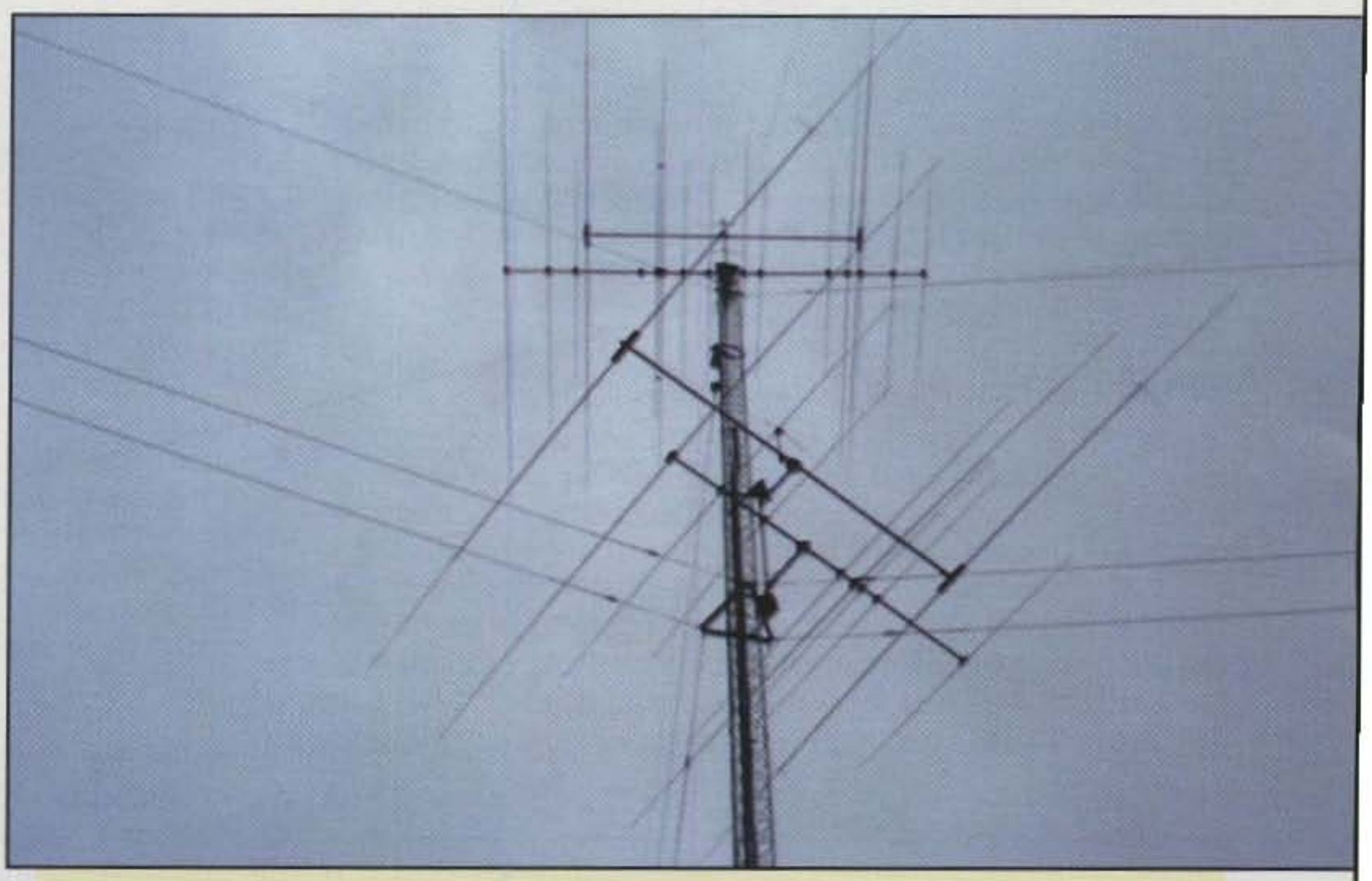

Photo A– The N2LA tower with side arm. (All photos by Paul Nyland, K7PN)

From what I learned working on Larry's installation, I've concluded there are a number of amateur radio towers with side arms that are potentially at risk. This is especially true with the more recent trend of putting up side arms with larger antennas and bigger rotators. My goal in this article is to cover the basics of the problem and show a way to design a side arm that minimizes the stressing of the tower due to the torque it produces. I purposely have not included any detailed structural calculations or listed any "acceptable" levels of torque for tower types commonly used by hams. The issues are very complex, and there are other factors involved that work in combination with one another and prevent the use of simple guidelines. However, there is one design guide I offer willingly:

I found that if the side arm was fully open and a moderately high wind was present, the tower probably would collapse.

If you have a side-arm installation that has a large Yagi or a couple of medium-size Yagis similar to that shown in photo A, you definitely have a situation

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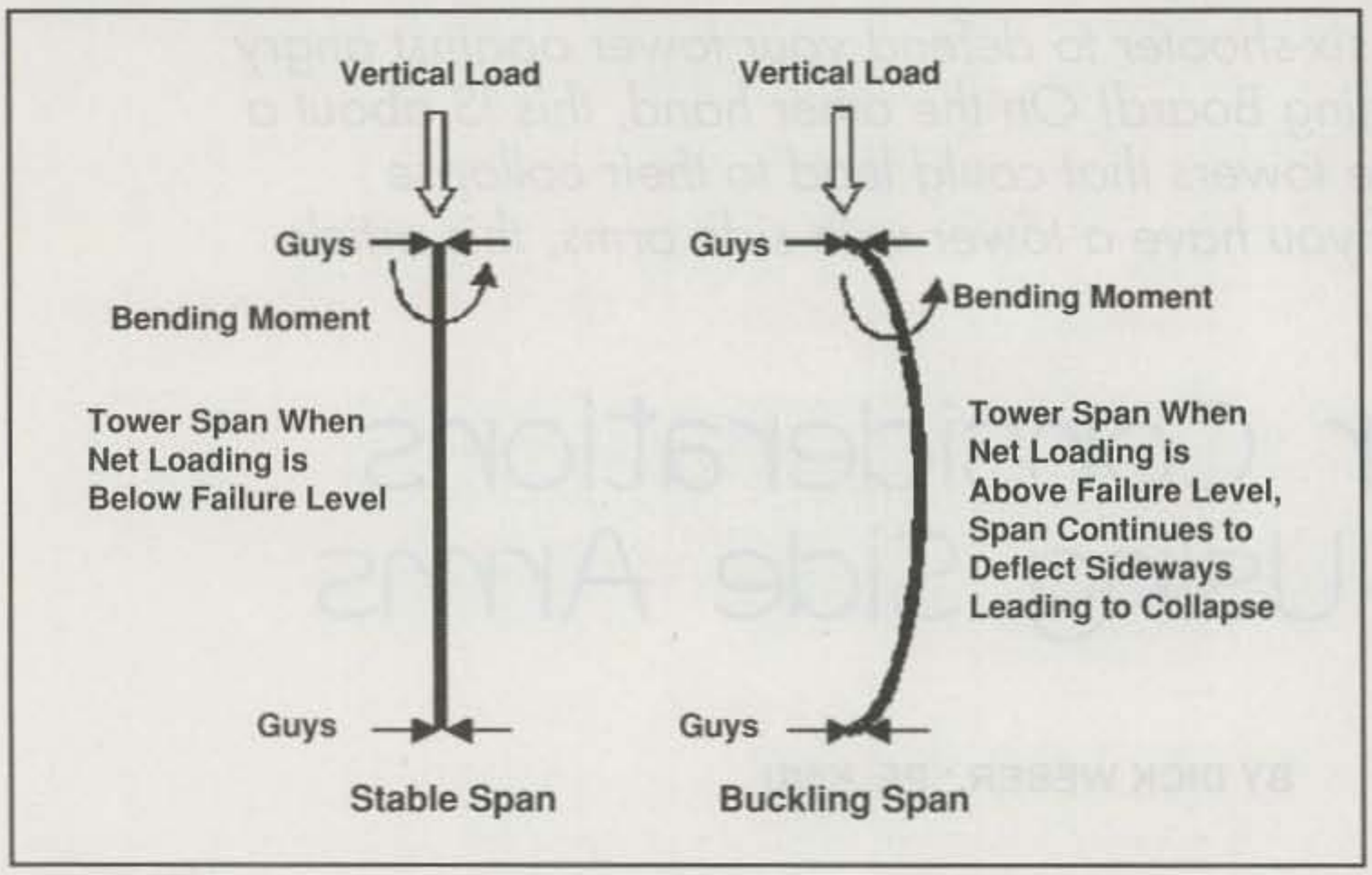

Fig. 1– Tower spans should not buckle.

that could lead to the collapse of your tower. It is only a matter of time until the particular conditions will be present. Do all side-arm installations have this problem? It is a matter of degree. If you are following the more recent trend of using larger antennas and a more capable rotator with a side arm, you are definitely putting yourself at risk.

Structural Issues and the Problem

There are a number of ways a tower can have a structural failure. A tower structural member, such as a leg or cross brace, can fail when in tension because the stress in the member is too high. It will begin to stretch or elongate to the point where it will not return to its original length when the tension is removed. The member could deform so much that the structure can no longer do its intended job, or the member could continue to elongate under load until it breaks. Welds are another opportunity for a failure. All welds have to be strong enough to take the loads put into them. If a weld breaks, a tower section may lose all, or a large portion, of its strength. When this happens, there may be a catastrophic failure.

Probably the most common failure mode for a tower, other than a guy-system failure, is for a tower structural member to have a buckling failure. A buckling failure is a quite different form of failure. When a structural member is subjected to a compressive load, it essentially shows no deflection or movement until a certain level is reached. At that point, the member will deflect sideways. Any further increase of the member's loading will easily cause further deflection, leading to collapse. This type of failure has to be addressed for tower members that are put into compression. It also has to be addressed for the more complicated case where a compressive load, a bending moment, and a torque are present simultaneously in a structural member.

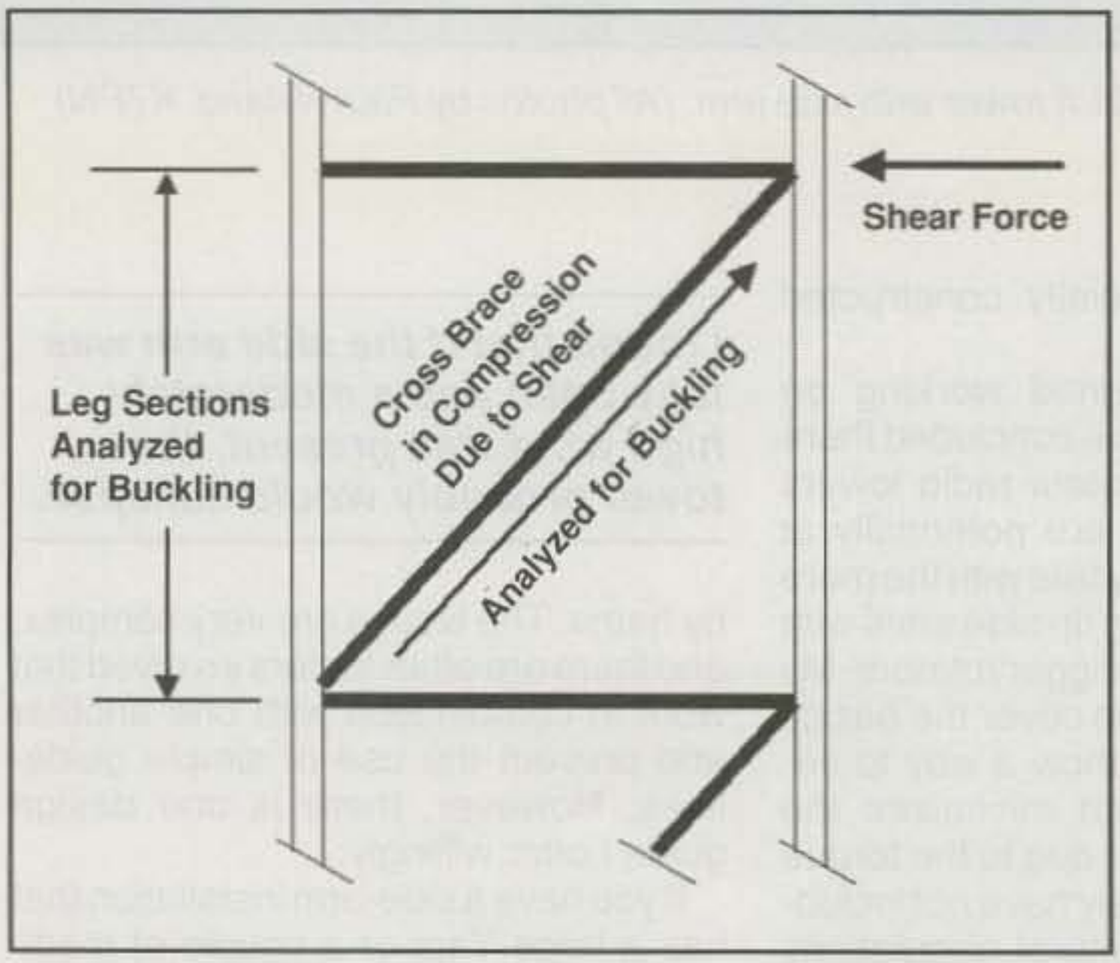

Fig. 2– Tower members are analyzed for buckling.

When a tower is analyzed to determine if it is structurally sound, a number of forces and bending moments are calculated. These are created by the wind hitting the antennas and accessories mounted on the tower and the impact of the wind on the tower itself. In addition to these loads, there are the forces due to the weight of the tower sections, antennas, rotator, cables, and ice, and the horizontal and vertical components of the tension in each guy. With this information, bending moments, vertical loads, and shear loads are found along the entire height of the tower. Knowing these loads, the ability of the tower spans between guy points to handle the combined effects of the vertical loads and bending moments is addressed. This is done to see if each tower span has sufficient margin to prevent a buckling failure. In this case, each span is treated as an individual structural member as illustrated in fig. 1.

Work is then done to look at the loads in the individual members that make up the tower. The portions of the tower legs between the cross braces are analyzed to see if they can take the combined compressive loads due to the vertical forces and the forces that result from the bending moments. This checks for buckling of these members. In addition, shear forces in the tower sections are used to find the tensile and compressive loads in the cross braces as illustrated in fig. 2. In almost all cases the cross braces are not as strong when loaded in compression as they are when in tension, because different failure modes are involved. The cross-brace failure mode that takes the lesser force to initiate occurs when it is in compression and its column strength is exceeded. When this happens, the brace becomes unstable and collapses as the brace displaces sideways. A cross-brace buckling failure is essentially the same as the buckling failure shown in fig. 1 except the bending moment is absent.

When a side arm is used, there are two loads put into the tower. These loads are due to the antenna wind force and the torque that results from the antenna wind force being applied at the end of the side arm. This is illustrated in fig. 3 with the resulting loading shown on the right. As the tower resists the torque put into it, forces result in the bracing as also illustrated in fig. 3. These forces put the cross braces into either compression or tension depending on the direction the wind relative to the orientation of the cross bracing.

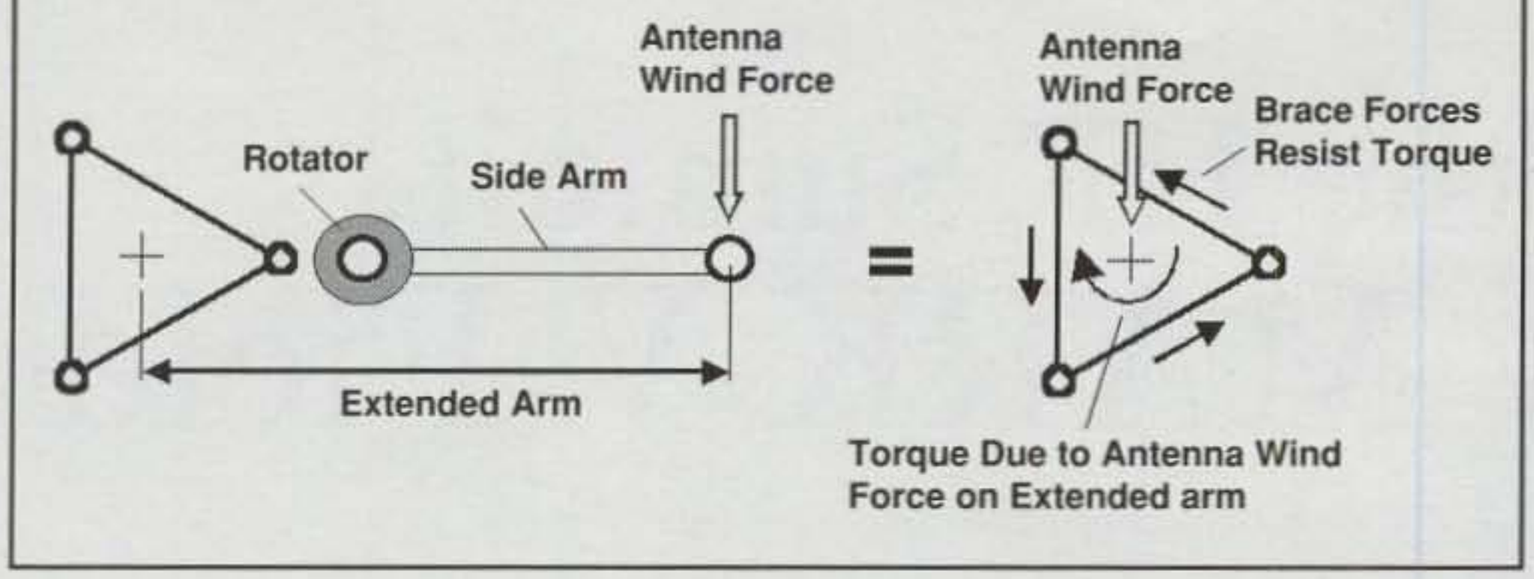

Fig. 3– Side arm and resulting loads.

In Larry's case, I found that the torque produced by his side arm was high enough for the cross braces to buckle when in compression. This would result in a catastrophic tower failure. Herein lies the heart of the problem. To make matters worse, the cross-brace loads can be higher. This happens because the cross braces have to resist the shear forces in the tower sections, too. When both the shear loads and the side-arm-induced torque result in cross-brace compressive loads, the combined effect is a net compressive force level that can be significantly larger than the braces are able to handle.

Eliminating the Problem

Torque bars and torque arm stabilizers are commonly used on towers to limit the amount a tower will twist due to torque loads. These essentially stiffen the tower in torsion as a way to limit the amount of twist. This is especially important when highly directional antennas such as microwave dishes are on a tower. In most installations, torque bars and torque arm stabilizers are incorporated as part of the guying system. They may or may not be near the antennas.

When torque bars or torque arm stabilizers are used, the tower will twist less, but there still can be high levels of torque in the tower sections. For example, let's consider the case where the rotator mounting plate of a side arm is mounted several feet above a guy point that uses a torque arm stabilizer. With this installation, the full level of torque is first put into the tower and then transferred to the guy assembly. Because the span of tower is relatively small between the rotator mounting plate and guy point, there is no apparent twisting of the tower. The side arm is "stabilized," but the torque can still produce very high compressive loads in the tower's cross

Photo B– The side arm incorporates a torque arm stabilizer.

braces and failure can occur. What we need is a way for the side-arm torque to be transferred directly to the guys without the torque stressing the cross braces. This is exactly what we did to solve Larry's problem.

Paul Nyland, K7PN, of Custom Metalworks (P.O. Box 371, Welches, OR 97067; telephone 503-622-4403;

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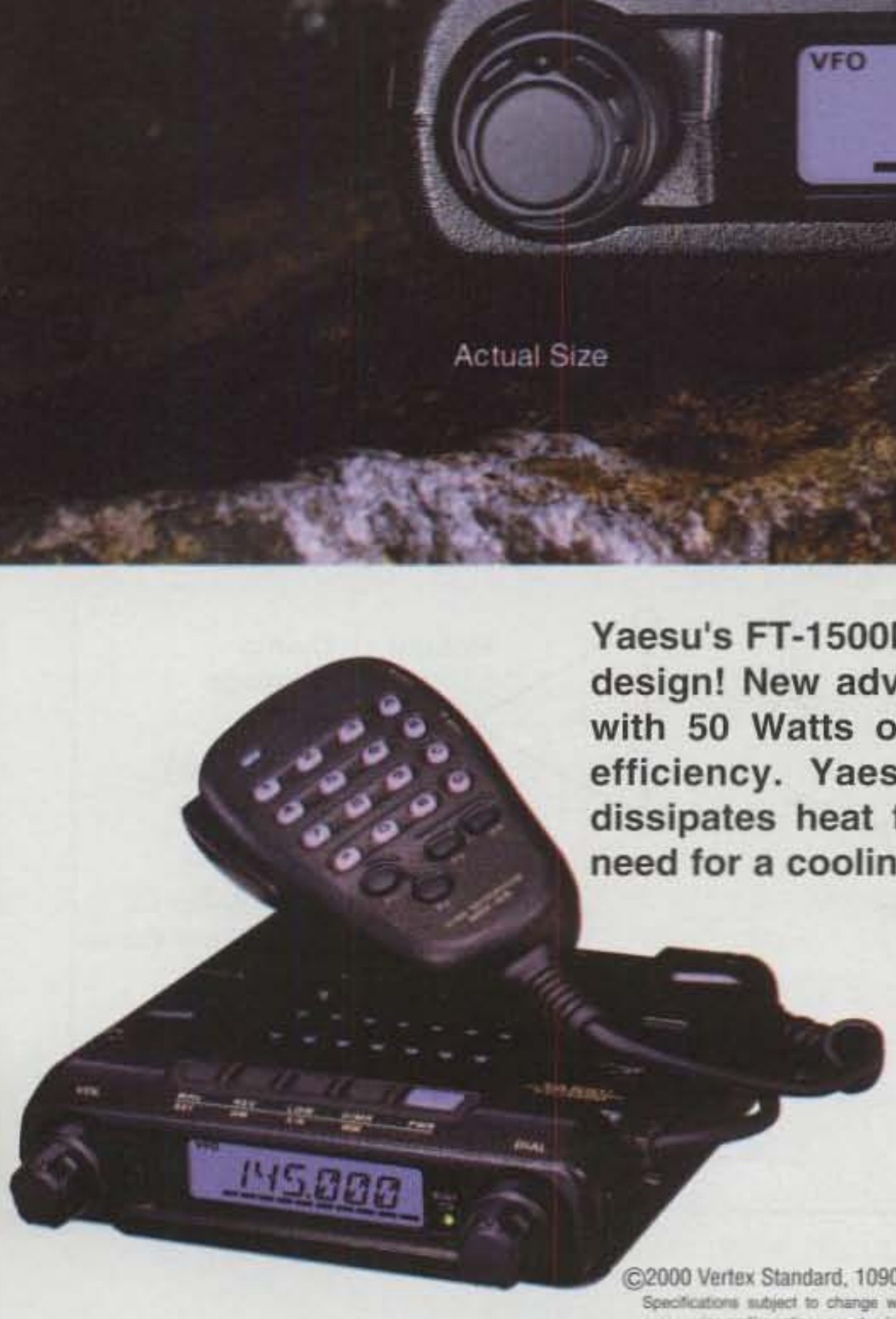

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Photo C– Rotator mounting detail.

Photo D– Side-arm torque goes into guys.

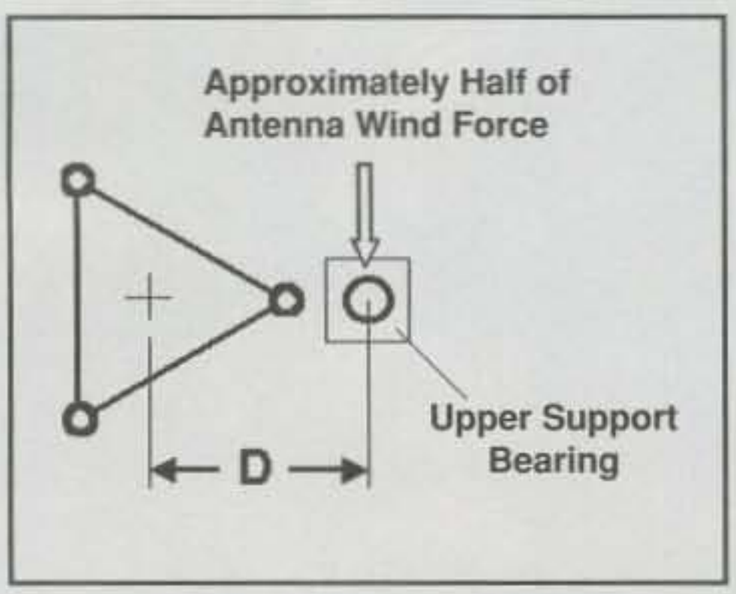

Fig. 4– Residual torque is generated at upper support arm.

fax 503-622-4884; on the web: <www.custommetalworks.com>; e-mail: <paul@custommetalworks.com>), built and installed a side arm that incorporated a Rohn TA55 torque arm stabilizer. The unique feature of this design is that the side-arm rotator mounting plate is mounted directly on the TA55 torque arm stabilizer. With this design, the torque from the side arm that is put into the rotator never goes into the tower, but is resisted by the guys that are hooked to the TA55. As an additional benefit, about half of the wind load due to the antennas mounted on the side arm is put into the TA55 and then into the guys without going into the tower. Photo B shows Larry's side-arm assembly on his tower before the antennas were mounted. Photos C and D show details of how the rotator mounting plate was integrated with the TA55 torque arm stabilizer.

Using a side-arm design such as the one on Larry's tower greatly reduces the overall torque put into the tower, but it doesn't eliminate it totally nor can any design that has a support arm used to secure the top end of the side arm. So where does this residual torque come from? I mentioned above that an additional advantage of Larry's side-arm design is that about half of the antenna wind load goes into the TA55 and then into the guys. Well, it is the "other half" that causes the residual torque. This is illustrated in fig. 4. This figure shows that the "other half" of the antenna wind

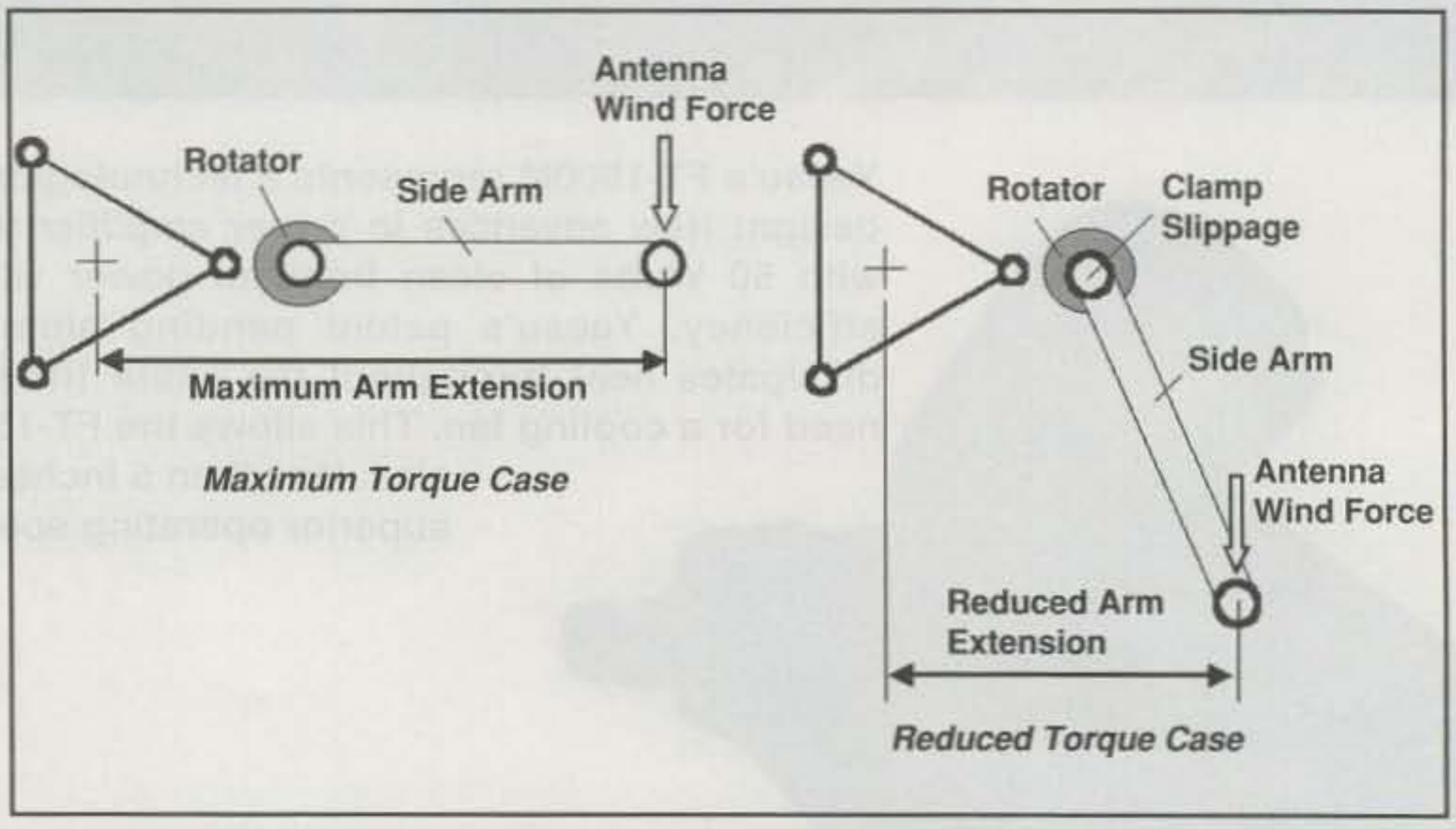

Fig. 5– Less torque is produced when the mast slips in the rotator clamp.

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T-2X, $619.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $14^{1}/_{16}$Hx$9^{3}/_{16}$D in.

CD-45II, $369.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty lower mast support, Rotator size is $17^{3}/_{8}$Hx8 D inches.

AR-40, $269.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty mast support. Rotator size is $17^{3}/_{8}$Hx8D inches.

Call your dealer for your best price!

Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
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
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

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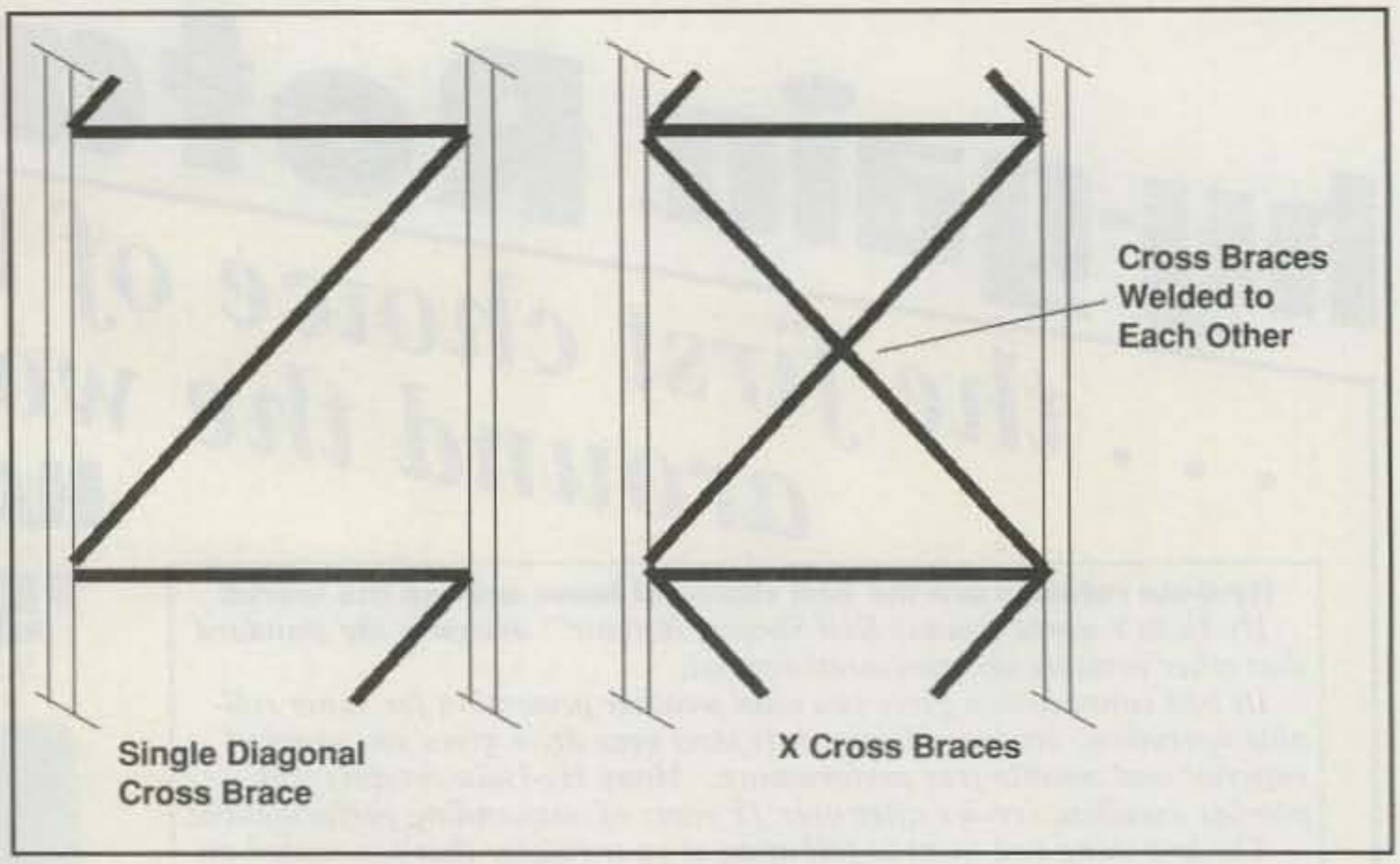


Fig. 6– Single diagonal and X cross bracing.

force is put into the upper support arm where the mast portion of the side arm goes through the support arm bearing. (The support arm bearing ensures that no torque from the movable arm is transferred to the support arm.) It is the portion of the antenna wind force illustrated in fig. 4 working at the distance "D" that creates the residual torque. In Larry's case, the residual torque is about 12% of the total torque. This means about 88% of the torque due to the side-arm assembly is not put into the tower.

With the side-arm rotator mounting plate integrated with a TA55 torque arm stabilizer, Larry has a structurally sound way of accommodating the potentially high levels of torque that can be produced by his side-arm assembly. A significantly large portion of the torque doesn't get put into his tower, thus preserving the strength of the cross braces to handle the tower's shear loads. Larry can rest assured that he will not have a catastrophic tower failure caused by his side-arm-mounted antennas.

Comments

Are all towers with a side arm at risk? Yes and no. Most installations have an inadvertently designed-in safety feature that probably has helped prevent a number of tower failures. It is quite common for the mast part of the side arm to slip in the rotator clamps during high winds. This is actually a good thing, because the slipping clamp limits the torque level put into the tower. In this case, the side arm rotates in the clamp, yielding a shorter effective distance through which the antenna wind force can act, as illustrated in fig. 5. This results in a lower torque level being put into the tower. Some people use a bolt to pin the side-arm mast to the rotator clamp to prevent slippage. If you've done this, I suggest that you remove the bolt and live with the inconvenience. I also know of cases where the rotator brakes failed under high winds. Failed brakes and slipped rotator mast clamps have been blessings in disguise.

One of the trends over the past 15 years is that bigger antennas, taller towers, and more aggressive antenna systems, including stacked Yagis, are being put up. This has resulted in companies providing larger antennas, distributors selling heavier-duty tower sections, and people putting up rotating towers and using side arms. In addition, we now have available more powerful antenna rotators that are more affordable than in the past. The newer rotators not only produce more torque, but they have significantly stronger brakes and mast clamps. As side arms with bigger antennas and higher capacity rotators are put up, there will be an increase in the incidence of tower structural problems due to higher torque levels being put into towers as these mounting arrangements come into wider use.

Probably the majority of ham radio installations that have guyed towers use either Rohn 25G, 45G, or 55G tower sections. One structural aspect of these designs is that there is one diagonal cross brace on each tower face between horizontal cross braces as shown in fig. 6. There are other tower designs that have cross bracing in both diagonal directions as also illustrated in fig.

6. This design generally can take higher shear and torque loads because one of the two cross braces will be loaded in tension. In addition, the two cross braces do indeed act together to a large degree until the one in compression begins to have a buckling failure. There are enhancements to this type of design where the two cross braces are welded to each other at the point where they cross. This stiffens the cross braces, which increases the load they can take before buckling. The net effect is that X cross-braced towers can support higher shear and torque loads, and offer the same strength in either direction of loading. Because there is more material and labor required to produce this type of tower, they cost more. In addition, ham radio distributors generally don't handle this type of tower.

It may seem as though the ideal tower on which to mount a side arm is one which has X type cross bracing. I am not suggesting this, because there are other factors that come into play and limit the structural integrity of a tower. I mentioned earlier that I found the cross braces on Larry's tower would fail due to the torque put into the tower. Any tower that has this magnitude of torque put into it most likely will have other problems due to this level of torque. Fig. 1 illustrates that the structural integrity of a tower span between guy points is related to the combined effects of the bending moments and vertical loads in that span. This is true in most cases because generally there are not significantly high torque levels in a tower. This situation changes with side arms, especially when they potentially are able to generate torque levels high enough to cause a local buckling failure. Torque levels of this magnitude will have a significant effect on the buckling safety margin for the tower spans between guyed levels when they are taken in combination with the vertical loading and bending moments. Using a different type of tower may prevent a local buckling failure, but may not prevent a more global one. Regardless of the type of tower you have, you should consider using a side arm similar to the one at N2LA.

With the current trend toward larger antennas and the recent availability of affordable, high-capacity rotators, we will begin to see tower structural problems with increased frequency. This especially will be true for those who use a side arm of conventional design. If you are planning to use a side arm, I urge you to use a design that does not put potentially catastrophic levels of torque into your tower. ■

You're tooling down the road chatting on your mobile HF rig when you hear a snap and a crash and you notice that your mobile HF antenna is no longer there...

HF Mobile-Mount Warning

BY GORDON WEST,* WB6NOA

A popular mounting method to secure high-frequency whips onto an L-bracket may become a safety hazard to drivers behind you if the whip unexpectedly breaks loose. The failure of the mounting system is not the whip or the L-bracket, but rather the lightweight adapter assembly.

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

A very popular stainless-steel mount sold at flea markets and ham radio stores throughout the country features an adapter that takes a PL-259 coaxial cable connector on the bottom side and a $^3/_8 \times 24$ stud with an insulated washer and $^3/_8 \times 24$ receiver on the top. The mount is a favorite for truck-style mirrors, luggage racks, maritime-mobile stainless-steel rails, and L-bracket mounts on the flat side of anything vertical on a vehicle.

The typical, popular "L" mount with SO-239 stud adapter.

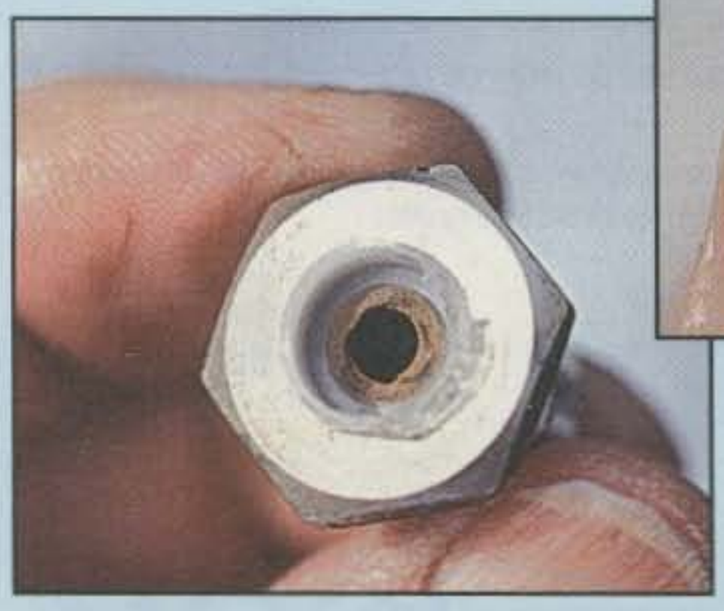
At driving speeds, the whipping action of HF antennas can cause the shaft of the $^3/_8 \times 24$ stud to break loose from its plastic compression fitting which meets the center-pin contact of the SO-239. The whip then pulls the stud out of the mounting assembly, and your antenna flies off. Not only do you lose your whip, but the flying whip poses a danger to anyone behind you.

Close inspection of the failing fitting shows only a plastic compression connection not strong enough to support popular, helically-loaded, high-frequency fiberglass whips. After a few weeks of roadway vibration, the compression fitting works loose and the whip flies off.

The solution is a termination to lugs on the coaxial-cable pigtail, making sure to protect the coax-cable braid from moisture. A stainless-steel $^3/_8 \times 24$ bolt will compress the center conductor below the mount, and the same plastic or nylon insulator will keep the bolt from contacting the metal L-bracket. This is

← Close-up of the popular "coax to stud" adapter with pressed-in brass stud.

The stud failure point with tall whips at highway speeds.



The stud pulls out and the whip flies off the bracket.

A better way of mounting a big HF whip.

the mounting that Hi-Q Antennas supplies with all of its HF 3/8 × 24 threaded, motorized, and manual whips.

"Our mounting method ensures the whip will stay put on the mount," comments Charlie, VE7BOC, of Hi-Q Antennas. "We supply aircraft-quality 3/8 × 24 bolts, and I custom manufacture the mount insulators to ensure our antennas won't come off."

Other manufacturers, such as High Sierra, provide a different mounting system that does not have this problem.

If your present HF antenna system is mounted with an L-bracket and a SO-239 to 3/8 × 24 stud, I strongly recommend you rework your antenna mount so that your whip won't fly off when you least expect it. ■

Coax Seal™ protects the coax "Y" connection.

Results of the 2002 CQ/RJ WPX RTTY Contest

BY GLENN VINSON,* W6OTC, AND EDDIE SCHNEIDER,† GØAZT

The Eighth Annual CQ/RJ WPX RTTY Contest, sponsored by *CQ* and the *New RTTY Journal*, was held February 9–10, 2002 with solar flux hovering around 217, well above levels of the past two years during this contest. RTTY contesters submitted 635 logs, keeping this contest the second most popular annual RTTY contest, led only by its older sibling, the CQ WW RTTY Contest, which is run the last full weekend in September (see elsewhere in this issue for the rules for the 2002 CQ WW RTTY contest to be held September 28–29).

This year's WPX RTTY competition was particularly fierce in the Multi-Operator categories, and a new world record was achieved by RW9C in world Multi-Single, surpassing last year's great performance by HG1S.

In addition, several single-band and regional records were exceeded. As in the 2001 contest, 15 meters was the most prolific band this year, with a new world record set by Paolo, I2UIY, at 5U8B, who also achieved the highest single-band score ever for this contest. New records were set on 10 meters as well. Scores on 80, 40, and 20 meters changed little from those in 2001, although they should improve in the next few years with the overall decline in solar flux.

Single Operator

Single Operator, Low Power (SOL). The competition for the SOL crown is always fierce. With 303 logs submitted in this class alone, there were many excellent scores. This year the world crown was won by ZX2B (PY2MNL op.), last year's world SOL second-place finisher. Coming within 32,000 points of eclipsing AA5AU's 2001 world record, Wanderly scored 1.843 million points (1230 QSOs, 3695 Q-pts, 499 mults), setting a new South American record for the third consecutive year and winning his first world championship in this event. As might be expected, three-time SOL champion Don, AA5AU, was close behind, scoring 1.7 million points (1473 QSOs, 3500 Q-pts, 486 mults). Third (as in 2001) was veteran RTTY contester Jody, VP5JM, with approximately 1.5 million points (1242 QSOs, 3475 Q-pts, 439 mults). Wayne, N2WK, was fourth in the world and the U.S. winner with 1.4 million points, while RU3QW won Europe with 1.2 million points.

Single Operator, High Power (SOH). For the first time in several years no new world record was set in SOH, with all top-five entrants coming from North America. Again showing that the low-band WPX point premium for 80 and 40 meters can work for U.S. operators as well as for Europeans, the title this year was returned to the U.S., with Mike, K4GMH, making a score of 2,091,660 points (1476 QSOs, 4260 Q-pts, 491 mults), just 498 points behind the current U.S. record holder, KF3P (K3MM op.). Second, and less than 10,000 points behind Mike, was another North American entrant, ZF2QS (Doug, N6TQS op.) at 1,998,654 points (1460 QSOs, 4138 Q-pts, 483 mults). Third was W1ZT with 1.87 million points (1445 QSOs, 3822 Q-pts, 488 mults).

Single Operator, Single Band 28 MHz (28). With solar flux above 200 this year, scores were higher than in 2001, producing several new records for Europe and the U.S. Despite these fine conditions, 10 meters—just as in the 2001 contest—did not gross as many contacts as 15 meters. Nevertheless, the winner by a large margin, RN6BN, scored an excellent 979,278 points (882 QSOs, 2157 Q-points, 454 mults). In second place, also from Europe, was S50C (Goran, S55OO op.) with 781,705 points (772 QSOs, 1979 Q-points, 395 mults). Setting a new North American (and U.S.) record was world third Charles, KK5OQ, with 742,995 points (732 QSOs, 1881 Q-pts, 395 mults), exceeding by almost 50% the 2001 U.S. record set by WS7I.

Single Operator, Single Band 21 MHz (21). As indicated above, 15 meters was again the *big* band for this contest. The top four entrants all exceeded the world 15 meter record set in 2001 by 9A5W. The apparent preference of RTTY WPX contestants for this band was enhanced this year by the presence of 5U8B, manned by the very experienced DXer and RTTY op. Paolo, I2UIY. With 5U high on the most-wanted RTTY DX lists, Paolo had a steady flow of contacts and racked up the highest-ever single-band score in this contest, 1,908,468 points (1297 QSOs, 3879 Q-points, 492

2002 RTTY WPX PLAQUE WINNERS AND SPONSORS

Single Operator High Power

World: Sponsored by *The New RTTY Journal.* Winner: **Mike Sims, K4GMH.**
N.A.: Sponsored by John Orton, WA2BOB. Winner: **ZF2QS (Op.: Doug Faunt, N6TQS).**
USA: Sponsored by Mike Sims, K4GMH. Winner: **George Johnson, W1ZT.**
Europe: Sponsored by Charles Anderson, KK5OQ. Winner: **UF3CWR (Op.: Alex Gimanov, RZ3AZ).**

Single Operator Low Power

World: Sponsored by Bryan Preas, AC6JT. Winner: **ZX2B (Op.: Wanderly Gomes, PY2MNL).**
N.A.: Sponsored by Ron Hall, KP2N. Winner: **Don Hill, AA5AU.**
USA: Sponsored by HAL Communications Corp. Winner: **Wayne King, N2WK.**
Europe: Sponsored by Don Hill, AA5AU. Winner: **Yuri Rogachov, RU3QW.**

Multi-Op Single Transmitter

World: Sponsored by Doug Faunt, N6TQS. Winner: **RW9C (Ops.: UA9CGA, RW9CF, RU9CK, RA9DK).**
N.A.: Sponsored by Bob Wruble, WW7OR. Winner: **NN6NN (Ops.: W6XK, N6DE, N6EE, N6LK, W6ADJ).**
USA: Sponsored by Shelby Summerville, K4WW. Winner: **AF4Z (Ops.: KC4HW, KE4MMI, K4PX, KT4FY, NR4E, WB4EQS, AB4ET, KD4HHF, W3QO, K4QD, AF4Z).**

Multi-Op Multi-Transmitter

World: Sponsored by *CQ* Magazine. Winner: **3ZØWPX (Ops.: SP7GIQ, SP7PS, SQ5BPM, SP5UAF, SP5-25-0717).**
North America: Sponsored by Trey Garlough, N5KO. Winner: **KA4RRU (Ops.: KA4RRU, W4MGM, W4DAV, WA4TK, N4DXS).**

Multi-Op Two Transmitter

World: Sponsored by The HC8N RTTY Team. Winner: **Z30M (Ops: Z31GX, Z31MM, Z32PT, Z33F, Z36W).**

Single Band

World, 28 MHz: Sponsored by Glenn Vinson, W6OTC. Winner: **Sam Dubovtsev, RN6BN.**
World, 21 MHz: Sponsored by Steve Merchant, K6AW. Winner: **5U8B (Op.: Paolo Cortese, I2UIY).**

*e-mail: <w6otc@garlic.com>
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mults). The 15 meter winner for the past two years (and previous world record holder), 9A5W, was second this year, establishing yet another new Europe SO 21 record with a score of 1,249,980 points (975 QSOs, 2510 Q-points, 498 mults). World third was RA1ACJ, with 1,036,917 points (929 QSOs, 2289 Q-points, 453 mults).

Single Operator, Single Band 14 MHz (14). Twenty meter activity was generally on a par with last year—solid but no new world records. 9A7R had the highest score with 763,156 points. Second, from Argentina, was LV5V with 641,754 points, while world third was YL7A, scoring 552,279 points.

Single Operator, Single Band 7 MHz (7). As we have noted for several years, 40 meters is a difficult band for RTTY because the RTTY sub-bands vary dramatically around the world, ranging from a legal low of 7.025 MHz in Japan to an operational high of 7.1 MHz in the U.S., with lots of conflicting uses throughout. In addition, the normal noise levels on this band in most locations often make RTTY copy difficult. Europeans continue to dominate the 40 meter competition, but scores have not yet returned to the 1998–1999 levels. First in the world in 2002 for the second consecutive year was 9A6A, scoring 772,524 points, just short of his winning 2001 total. World second was RK6BZ with 560,560 points, while UX1IL was third with 350,034 points—both scores significantly higher than those achieved in 2001.

Single Operator, Single Band 3.5 MHz (3.5). Like 40 meters, 80 meters continues to be a tough band for single op. S54E repeated as world champion, scoring 418,200 points this year. S51DX moved up from third last year to second this year, scoring 254,394 points. World third was S59CAB with 198,176 points. These results will certainly improve in the next few years as solar activity declines.

Multi-Operator

Multi-Operator Two Transmitter (M2). This year an entirely new group of stations entered the Multi-2 category. Z30M (ops.: Z31GX, Z31MM, Z32PT, Z33F, Z36W) was the high-scoring group with 3,546,900 points (2158 QSOs, 6300 Q-points, 563 mults). Next, more than quadrupling the existing JA record, was JE4VVM (ops.: JE4VVM, JG4CLV, JN4FEU) with 2,158,320 points (1505 QSOs, 4232 Q-points, 510 mults), a very fine result indeed. World third was W8NI (ops.: WB8SKP, WB8OOH, W8IBT, WD8OWA, KC8GKK, KC8QZG, KC8QZL), scoring 220,430 points.

Multi-Operator Multi-Transmitter (MOM). As in M2, the MOM category saw a new group of top entrants in 2002. This year the world winner was 3Z0WPX (ops.: SP7GIQ, SP7PS, SQ5BPM, SP5UAF, SP5-25-0717), operating from SP7GIQ's big station and scoring an excellent 4,497,984 points (2451 QSOs, 7398 Q-points, 608 mults). World second, also from Europe, was RI4M (ops.: RA4LBE, RA4LW, RN4LP, RW4LE, RW4LR, RZ4LA) with 3,083,986 points (2073 QSOs, 5638 Q-points, 547 mults). World third, setting a new U.S. record, was KA4RRU (ops.: KA4RRU, W4MGM, W4DAV, WA4TK, N4DXS), achieving 2,767,820 points (1920 QSOs, 5060 Q-points, 547 mults).

Multi-Operator Single Transmitter (MOS). With 32 entrants, 8 of whom exceeded 2 million points, MOS continues to be the most competitive multi-operator class in this contest. Setting a new world record was the fine Russian team at RW9C (ops.: UA9CGA, RW9CF, RU9CK, RA9DK), who scored a big 3,481,400 points (1903 QSOs, 6695 Q-points, 520 mults), the first-ever MOS score exceeding 3 million points. World second was OM5M (ops.: OM2RA, OM3BH, OM3RG), scoring 2,820,375 points (1731 QSOs, 5175 Q-points, 545 mults). Last year's winner, HG1S (ops.: HA1TJ, HA1DAE, HA1DAC, HA1AG, HA1DAI), was third this year with 2,755,716 points (1702 QSOs, 5259 Q-points, 524 mults).

Rookie

The Rookie of the Year for 2002 was Serge, UA9QFF, an 11-year old contester who made 43,660 points, an excellent score that we hope will continue to increase annually now that Serge is a veteran!

SWL

Eight listeners submitted SWL logs: I5-1990, OE500786, OK1-23233, OK2-9329, UR5FCM, USF-007, and YU1RS500, who won with a big claimed score of 1,381,856.

2002 WPX RTTY TOP SCORES

Single Op High Power

K4GMH	2,091,660	WW7OR (Op. W7GG)	1,853,340
ZF2QS (Op. N6TQS)	1,998,654	VX2XQ	1,836,510
W1ZT	1,865,136		

Single Op Low Power

ZX2B (Op: PY2MNL)	1,843,805	N2WK	1,415,050
AA5AU	1,701,000	RU3QW	1,216,285
VP5JM	1,525,525		

Multi-Op Single Transmitter

RW9C	3,481,400	UP5P	2,417,684
OM5M	2,820,375	OL5Q	2,369,566
HG1S	2,755,716		

Multi-Op Two Transmitter

Z30M	3,546,900	W8NI	220,430
JE4VVM	2,158,320		

Multi-Op Multi-Transmitter

3Z0WPX	4,497,984	CT3BX	2,534,616
RI4M	3,083,986	KX7LDS	2,091,294
KA4RRU	2,767,820		

Single Op 3.5 MHz

S54E	418,200	OK2CLW	191,868
S51DX	254,394	EU1AZ	149,760
S59CAB (Op. S53CC)	198,176		

Single Op 7.0 MHz

9A6A	772,524	UR5FFC	263,340
RK6BZ	560,560	UW2F (Op. UT0FT)	227,752
UX1IL	350,034		

Single Op 14 MHz

9A7R	763,156	SN4G (Op. SP4MPG)	449,085
LV5V (Op. LU5VV)	641,754	UX0DL	402,128
YL7A	552,279		

Single Op 21 MHz

5U8B (Op. I2UIY)	1,908,468	S57IIO	1,028,960
9A5W	1,249,980	SP5GRM	872,066
RA1ACJ	1,036,917		

Single Op 28 MHz

RN6BN	979,278	UA1AKC	708,210
S50C (Op. S55OO)	781,705	EO1I (Op. UT1IA)	707,517
KK5OQ	742,995		

Summary

This was another great and highly competitive contest. Solar cycle 23 has peaked, but propagation for the contest remained very good. To check all-time CQ/RJ WPX RTTY Records, go to <www.rttyjournal.com/records/wpx.html> maintained by G0AZT.

Approximately 98% of all logs (and 100% of competitive logs) were submitted via e-mail. All e-logs and those few snail-mail logs with diskettes enclosed were converted to Cabrillo format. They were then checked against a master call file built by the log checkers from the submitted logs for the 2002 contest. As in prior years, snail-mail logs without diskettes were checked manually. We also received a significant number of check logs, which are always welcomed and are used extensively for log checking. Thanks to all of you who submitted logs.

While most logs were generally accurate, some neglected to copy QSO information carefully, particularly "unusual" callsigns (After all, this is the WPX contest!) and serial numbers. In addition, as we noted here last year, log checking now cross-checks for serial numbers as well as callsigns. Accordingly, when in doubt, you should request a re-send of the exchange information.

Eddie, W6/G0AZT, was the principal checker of computer logs (whether submitted by e-mail or snail-mail). Glenn, W6OTC, checked the paper logs and assembled the results for publication. Given the preponderance of Cabrillo-format logs submitted and the

relatively few other logs submitted, we will be looking in the 2003 contest to coming closer to eliminating paper log submissions altogether.

Plaques. All plaques sponsored as of April 30, 2002 are shown in the 2002 Plaque Winners and Sponsors box in this article. However, any winner of any class may order a plaque from W6OTC for a cost of $55 each, as long as the order is placed by August 31, 2002.

Rules Changes for 2003 CQ/RJ WPX RTTY Contest. The Ninth Annual CQ/RJ WPX RTTY Contest will run on February 8–9, 2003 and will have only a few significant rules changes. Based on our experiences in the past two years, Cabrillo-format logs will be even more highly encouraged than before 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" diskette* via snail mail. For those who submit diskettes, please remember to send the diskettes in a protective envelope. E-mail is clearly the most reliable and easiest mode for log submissions, but we welcome all logs, including (subject to the restrictions described above) paper logs, no matter how they may be sent.

Finally, the deadline for log submissions will be March 10, 2003. The full and final text of the 2003 rules will be published in the December 2002 issue of *CQ* and on the *CQ* website at <www.cq-amateur-radio.com>. **Please read the rules carefully prior to the contest**, and please note that **all** logs submitted via e-mail continue to go to **<wpxrtty@kkn.net>**.

73, Glenn, W6OTC, and Eddie, GØAZT

Soapbox

GW4KHQ . . . My best score ever, so I guess conditions must have been good. **KY4AA (K4WW)** . . . More of an experiment than a serious effort. I was curious if I could hold a frequency below 21100 kHz using low power . . . I could not hold any frequency below 21100 until after 2000Z. **K4GMH** . . . The large number of stations with QSO counts above 1000 with several hours to go was great to see. **DJ3IW** . . . Highlight [on 80 meters]: being called by 4Z4DX and 4X6UU. Low light: the many stations giving their call and serial number only *once*, often even without leading/trailing CR, necessitating *many* requests for repeats. **W4UK** . . . This is the most QSOs [1,000] I have ever had in a single contest. **W7TI** . . . 20 [meters] is the magic band. Friday night, in less than a half hour I worked all continents except Antarctica. **W1ZT** . . . Thanks to all for the contacts and to 5U8B for making that new one available to so many of us in the contest. **W9HLY** . . . Upper bands best on Sunday.

AA5AU . . . The most amazing part of the contest was having only 11 dupes. It was another great contest and I was glad to be a part of it. Thanks to *RJ & CQ* for sponsoring it. Where the heck was that WQ6/GØAZT this year? **VE7CF** . . . Lots of real DX, like 5U8B, A45WD, and CN8KD. **7S5ARA (SM5FUG)** . . . I borrowed this anniversary call for the weekend to make me more attractive. It will never be used again in a RTTY contest. **VE6RAJ** . . . One of the best things I like about this contest is the number of mults, and the fact that you are getting new mults right up until the end of the contest. **LX5A (from DF4OR)** . . . All in all we had a fantastic weekend, and are very pleased with the results. **WX4TM** . . . Many, many thanks . . . to the "casual" participants who seemed to be there when I needed them most on Sunday afternoon. Without you, there'd be no contest!

K3GP . . . It was a pleasure to run into a high percentage of skilled RTTY ops, along with plenty of eager newcomers. **VE6YR** . . . Bands were crowded and other operators moved in very, very close. **J41YM** . . . It was my last RTTY WPX from Greece. I hope to see you next year from OK with a vertical or LW and 100W, hi. **KB6SIZ** . . . Wow, what fun! **N1NB** . . . First time for me in this one—every other QSO a mult! **3ZØWPX (SP5UAF)** . . . The biggest thrill: Our station was called three times by V73UG himself. **ZL2AMI** . . . Highlight: working AN1AKS on 80 meters; missed them on 10 meters for an all-band sweep. **NA2H** . . . Great contest. Appears to be a lot more interest in RTTY contesting in light of the many new callsigns worked.

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

RESULTS 2002 CQ/RJ WPX RTTY CONTEST

SINGLE OP, ALL BAND, HIGH POWER

K4GMH	**1476**	**4260**	**491**	**2,091,660**
ZF2QS	**1460**	**4138**	**483**	**1,998,654**
W1ZT	**1445**	**3822**	**488**	**1,865,136**
WW7OR	**1496**	**3634**	**510**	**1,853,340**
VX2HQ	**1389**	**4155**	**442**	**1,836,510**
UA9CDV	**1178**	**4007**	**446**	**1,787,122**
UF3CWR	**1403**	**3859**	**463**	**1,786,717**
JH4UYB	**1181**	**3713**	**469**	**1,741,397**
J41YM	**1226**	**3562**	**458**	**1,631,396**
RQ4L	**1267**	**3334**	**487**	**1,623,658**
VA7XX	**1151**	**3155**	**449**	**1,416,595**
AN1AKS	**1199**	**3288**	**428**	**1,407,264**
WA2ETU	**1166**	**2934**	**463**	**1,358,442**
7S5ARA	**1053**	**3042**	**446**	**1,356,732**
DKØEE	**1052**	**3050**	**430**	**1,311,500**
WØETC	**1227**	**2891**	**451**	**1,303,841**
K8YU/KH2	**1153**	**2955**	**432**	**1,276,560**
YU7YG	1053	3021	419	1,265,799
WX4TM	**1106**	**2791**	**440**	**1,228,040**
UZ7U	**990**	**2763**	**416**	**1,149,408**
W2YC	976	2560	418	1,070,080
LZ2PL	**960**	**2729**	**390**	**1,064,310**
I1COB	**888**	**2739**	**378**	**1,035,342**
KY5I	**1023**	**2372**	**433**	**1,027,076**
K9DJ	**1030**	**2482**	**413**	**1,025,066**
K3GP	**948**	**2458**	**412**	**1,012,696**
RDØC	882	2494	396	987,624
NO2T	**922**	**2442**	**395**	**964,590**
IK2HKT	832	2543	371	943,453
AN1BD	867	2444	384	938,496
GW4KHQ	**926**	**2706**	**341**	**922,746**
VX2RA	**759**	**2459**	**353**	**868,027**
IKØYVV	825	2215	387	857,205
YU7AE	**788**	**2435**	**352**	**857,120**
W4UK	975	2164	395	854,780
S56A	**755**	**2226**	**368**	**819,168**
DJ3NG	802	2332	351	818,532
DAØBVG	721	2104	388	816,352
KW4DA	798	2161	375	810,375
RX9SR	707	2142	339	726,138
OK2BXW	**704**	**2099**	**338**	**709,462**
ZL2AMI	**621**	**2039**	**339**	**691,221**
RV9BB	588	2089	321	670,569
UAØAGI	646	2098	315	660,870
W2WB	680	1860	329	611,940
KB3TS	686	1894	317	600,398
DL4RCK	688	1853	318	589,254
K3WW	682	1892	311	588,412
VE7CF	**671**	**1783**	**326**	**581,258**
VE5CPU	**751**	**1843**	**291**	**536,313**
RA3AA	620	1641	321	526,761
4Z8BB	**589**	**1814**	**284**	**515,176**
EA5DFV	586	1612	315	507,780
SN5N	**592**	**1660**	**301**	**499,660**
I1WBW	606	1736	286	496,496
VA6MM	**606**	**1584**	**308**	**487,872**
TF3AO	**682**	**1593**	**295**	**469,935**
VK4UC	**488**	**1540**	**297**	**457,380**
YO4CIS	**586**	**1469**	**311**	**456,859**
RSØF	530	1432	291	416,712
MW2I	**464**	**1541**	**263**	**405,283**
UW5Q	548	1448	261	377,928
RUØAT	533	1431	255	364,905
WØLSD	576	1261	289	364,429
CE8SFG	**456**	**1346**	**269**	**362,074**
NA2M	522	1221	283	345,543
IZ5CCS	449	1279	260	332,540
NW6S	**434**	**1203**	**261**	**313,983**
LX1JH	**455**	**1147**	**240**	**275,280**
W6IHG	423	1019	253	257,807
VE3GLA	**392**	**1097**	**231**	**253,407**
N5JR	400	945	262	247,590
WA8RPK	**466**	**1012**	**242**	**244,904**
UT8EL	412	1143	207	236,601
EA5RM	390	941	237	223,017
WØTY	422	901	240	216,240
W5BEN	374	910	232	211,120
VX9FX	**355**	**900**	**215**	**193,500**
K9JY	308	808	238	192,304
T88XF	**332**	**994**	**186**	**184,884**
N4CW	345	824	214	176,336
JN4FNZ	**294**	**826**	**203**	**167,678**
DK7ZT	283	835	190	158,650
N2FF	297	743	205	152,315
W6JOX	363	741	204	151,164
N8BJQ	276	754	187	140,998
K3SV	267	739	174	128,586
DL3JPN	240	666	185	123,210
XE2AC	**279**	**693**	**176**	**121,968**
G3UFY	**213**	**694**	**161**	**111,734**
EA7CWA	259	605	184	111,320
W7DPW	293	636	175	111,300
N4VV	254	609	175	106,575
WA3AAN	264	589	165	97,185
N8KM	242	578	162	93,636
RX9TX	226	606	154	93,324
YO2BZV	222	543	171	92,853
JA1BWA	**194**	**612**	**134**	**82,008**
KB9JD	215	492	160	78,720
G4EMT	204	514	143	73,502
IZ5BSA	198	459	152	69,768
IZ3BUR	196	479	139	66,581
WO6M	203	424	143	60,632
I2SVA	158	460	129	59,340
K4RO	189	397	133	52,801
F6IFY	**159**	**391**	**119**	**46,529**
KØCOP	145	360	120	43,200
N7VGO	153	360	119	42,840
KØJPL	143	378	101	38,178
XE1YYD	157	378	100	37,800
WA9ALS	160	343	101	34,643
UA6JY	115	336	102	34,272
AJ3M	149	304	102	31,008
KZ5AM	180	266	110	29,260
DM5JBN	111	260	105	27,300
N3NZ	118	260	89	23,140
K6SEM/2	94	229	84	19,236
VE6YP	89	217	70	15,190
WD5GSL	108	171	80	13,680

OPS: **ZF2QS** (N6TQS), **WW7OR** (W7GG), **UF3CWR** (RZ3AZ), **RQ4L** (UA4LCQ), **J41YM** (OK1YM), **7S5ARA** (SM5FUG), **UZ7U** (UT3UA), **DKØEE** (DL4MDO), **RDØC** (UAØCA), **DAØBVG** (DJ5JK), **RSØF** (UAØFZ), **UW5Q** (UR3QCW), **T88XF** (JH5OXF).

SINGLE OP, ALL BAND, LOW POWER

ZX2B	**1230**	**3695**	**499**	**1,843,805**
AA5AU	**1473**	**3500**	**486**	**1,701,000**
VP5JM	**1242**	**3475**	**439**	**1,525,525**
N2WK	**1199**	**3110**	**455**	**1,415,050**
RU3QW	**1135**	**2945**	**413**	**1,216,285**
RA3WA	1011	2855	411	1,173,405
OPØGS	**971**	**2708**	**417**	**1,129,236**
YU7AM	**943**	**2792**	**399**	**1,114,008**
VE4COZ	**1014**	**2600**	**413**	**1,073,800**
HA5BSW	**922**	**2701**	**396**	**1,069,596**
K9MOT	**1030**	**2475**	**431**	**1,066,725**
UY8IF	**1051**	**2693**	**391**	**1,052,963**
YL4U	**931**	**2520**	**411**	**1,035,720**
YO3APJ	**860**	**2730**	**378**	**1,031,940**
TM6A	905	2456	403	989,768
ON4ADZ	891	2543	387	984,141
IK4JSI	**867**	**2492**	**394**	**981,848**
DK3VN	**865**	**2550**	**380**	**969,000**
WA1EHK	**847**	**2210**	**400**	**884,000**
RG9O	**861**	**2579**	**342**	**882,018**
LZ2PI	**849**	**2491**	**342**	**851,922**
4Z5CP	**735**	**2632**	**320**	**842,240**
GØURR	**803**	**2070**	**403**	**834,210**
UW5U	843	2314	356	823,784
VE6YR	**832**	**2153**	**370**	**796,610**
DL7VOG	770	2142	366	783,972
YU8/S57AW	804	2341	334	781,894
N9CK	865	2022	382	772,404
W9HLY	817	2056	372	764,832
EA8/DJ1OJ	**656**	**2282**	**326**	**743,932**
UT2UZ	781	1890	385	727,650
ES1QV	**806**	**2085**	**343**	**715,155**
KI6DY/Ø	**923**	**1985**	**353**	**700,705**
JM1LPN	**696**	**1914**	**361**	**690,954**
HA9OA	685	2023	334	675,682
OH4BB	**740**	**1973**	**336**	**662,928**
SM5UFB	**739**	**1982**	**334**	**661,988**
W4UEF	**727**	**1957**	**328**	**641,896**
RA9DA	654	2077	308	639,716
N6OJ	**838**	**1771**	**357**	**632,247**
VE3WQ	**685**	**1982**	**318**	**630,276**
AM4CI	**784**	**1863**	**338**	**629,694**
JS1OYN	655	1822	335	610,370
G4WFQ	691	1872	323	604,656
KE4KWE	748	1721	350	602,350
ON4CHT	618	1771	340	602,140
RA9XF	620	1892	315	595,980
VE6RAJ	696	1870	318	594,660
RX9JM	602	1925	298	573,650
UA4FCO	694	1813	315	571,095
N9SDL	706	1660	340	564,400
RW3LB	648	1861	302	562,022
RA4CTR	721	1805	307	554,135
AKØA	**741**	**1613**	**331**	**533,903**
W3MEL	**700**	**1689**	**313**	**528,657**
JL6HKJ	**591**	**1597**	**321**	**512,637**
EI4DW	**589**	**1566**	**326**	**510,516**
WD4GBW	616	1657	301	498,757
PA3EMN	**593**	**1570**	**311**	**488,270**
N1NB	562	1550	297	460,350
EA2AOI	550	1561	294	458,934
UT4EO	575	1578	284	448,152
NK5A	663	1435	309	443,415
KE5OG	723	1416	312	441,792
K8RS	**574**	**1472**	**300**	**441,600**
ES2NA	598	1521	289	439,569
RA9FRD	492	1673	260	434,980
JA8JCR	**534**	**1427**	**304**	**433,808**
W8UL	556	1454	298	433,292
DK3GI	513	1462	294	429,828
AD1C	525	1355	317	429,535
7L4IOU	496	1480	283	418,840
4K6DI	**494**	**1532**	**272**	**416,704**
KE7NT	**696**	**1355**	**305**	**413,275**
SM6BSK	480	1431	287	410,697
KL7AC	**649**	**1491**	**274**	**408,534**
KØIDT	661	1413	286	404,118
EA7GTF	530	1405	286	401,830
YL/RZ3BY	463	1465	266	389,690
YO8RFS	530	1523	254	386,842
K8VT	604	1394	277	386,138
UA3SAQ	498	1195	313	374,035
GUØSUP	**419**	**1095**	**339**	**371,205**
4X6UO	474	1394	266	370,804
VE3IAY	505	1445	250	361,250
VK4DZ	**444**	**1318**	**266**	**350,588**
JA1XRH	**463**	**1287**	**272**	**350,064**
9A3CY	**430**	**1340**	**261**	**349,740**
AC6JT	671	1332	260	346,320
KA2D	469	1198	283	339,034
OK2PEF	**504**	**1334**	**253**	**337,502**
ACØM	485	1150	290	333,500
4X6UU	417	1504	221	332,384
CT3KN	**394**	**1363**	**243**	**331,209**
ES1BH	465	1284	245	314,580
VA3PC	454	1219	253	308,407
UZ7HO	510	1326	231	306,306
W1TO	463	1212	251	304,212
I1BAY	447	1290	234	301,860
UA4FX	495	1182	254	300,228
SP6IHE	**397**	**1211**	**247**	**299,117**
LY2SA	403	1173	253	296,769
DM5GI	440	1267	230	291,410
UT9NA	407	1188	229	272,052
LZ9R	441	1026	264	270,864
SP8FHJ	384	1185	225	266,625
LA7CL	**406**	**1067**	**247**	**263,549**
OK1OX	395	1085	239	259,315
YL2NN	299	1274	200	254,800
DL2AL	395	1097	232	254,504
4X1RF	355	1122	226	253,572
ND6E	495	1012	250	253,000
DL4MFP	368	1125	223	250,875
K8SIA	442	1007	249	250,743
SP9CQ	372	1072	233	249,776
N1MGO	449	990	250	247,500
WA2EYA	461	1011	244	246,684
GØMTN	418	1042	232	241,744
WC9C	397	1012	236	238,832
RWØBG	352	1054	225	237,150
SV1BSX	**395**	**1088**	**217**	**236,096**
SQ6FHP	368	1077	214	230,478
ON4KGL	367	966	235	227,010
SM7BJW	361	971	229	222,359
JA2BY	**335**	**953**	**223**	**212,519**
MMØBQI	**319**	**941**	**222**	**208,902**
SP3BLT	319	985	206	202,910
RU3XB	363	962	210	202,020
AAØYX	451	833	241	200,753
I4HRH	322	888	225	199,800
IK3QAR	353	851	231	196,581
K1US	350	828	235	194,580
K6TA	344	861	220	189,420
YL3FW	337	996	190	189,240
IZ4DZD	324	951	198	188,298
W4AUI	410	864	216	186,624
NØAC	406	829	224	185,696
UT5UML	335	884	209	184,756
OK1DCP	328	877	207	181,539
OM7PY	**315**	**810**	**217**	**175,770**
W6ISO	363	781	222	173,382
RA9AU	289	988	173	170,924
VA3PL	332	883	190	167,770
IZ8DVD	326	819	204	167,076
OM7JG	308	887	187	165,869
DL8SDC	300	840	196	164,640
SP3NYS	250	780	209	163,020
HB9DHG	**347**	**831**	**195**	**162,045**
G6UQ/P	303	844	191	161,204
UT1UA	283	798	201	160,398
YO3III	292	916	174	159,384
OH2GI	272	828	189	156,492
DF5SI	283	812	192	155,904
EA3AYP	304	731	212	154,972
RW9QA	284	910	170	154,700
TF3VS	**300**	**745**	**204**	**151,980**
WT6P	322	735	205	150,675
A45WD	**252**	**855**	**173**	**147,915**
VE9DX	**250**	**840**	**176**	**147,840**
OM3TA	264	770	188	144,760
KC4SAW	321	751	191	143,441
SP1NQV	290	750	188	141,000
YU1ZZ	270	799	176	140,624
LX2RH	**270**	**761**	**184**	**140,024**
TA1DX	**238**	**791**	**176**	**139,216**
WN1OTV	317	728	190	138,320
KØBJ	306	690	199	137,310
JR1NHD	273	746	184	137,264
SP4CJA	296	697	189	131,733
EA3FAJ	280	712	184	131,008
SP4CQU	233	748	171	127,908
UA9AX	231	766	165	126,390
VE6TN	278	679	180	122,220
VA6RA	291	686	176	120,736
UA9OSV	264	745	159	118,455
N5ZM	258	677	173	117,121
EA3EGC	253	689	169	116,441
JA3MIB/1	260	664	174	115,536
YO8FZ	250	733	157	115,081
WD9GMK	287	638	179	114,202
SP3OL	236	636	177	112,572
JO3JYE	**240**	**649**	**172**	**111,628**
JA1BHK	242	652	169	110,188
JA1XUY	242	668	164	109,552
JM1GHT	222	661	163	107,743
W4TIJ	289	580	184	106,720
RW3PN	254	624	171	106,704
YLØA	211	689	154	106,106
IK4ZHH	230	607	171	103,797
SP6RGC	246	638	162	103,356
ON4IG	197	680	150	102,000
ZS1JY	**219**	**648**	**154**	**99,792**
KN6OZ	280	578	170	98,260
VE3OXX	220	636	152	96,672
W6OAT	267	558	171	95,418
JF2IGP	215	593	158	93,694
NØIBT	252	535	172	92,020
W8DN	225	559	164	91,676
OE1KTS	**215**	**566**	**159**	**89,994**
NX8C	227	529	168	88,872
K3OK	257	566	157	88,862
JF2SKV	233	608	146	88,768
K9BJM	223	529	167	88,343
NN6XX	238	488	176	85,888
RW4CG	214	559	153	85,527
K6BIR	284	538	154	82,852
NN5T	238	551	149	82,099
JA5ATN	**195**	**562**	**143**	**80,366**
EA4BT	218	508	156	79,248
KSØM	227	491	161	79,051
UAØBHC	193	527	149	78,523
HL3AHQ	**192**	**544**	**141**	**76,704**
WA6BOB	266	560	133	74,480
MU3EFB	182	513	142	72,846
JK6ISK	181	456	159	72,504
OE5JKL	170	507	140	70,980
SP9ODY	178	567	122	69,174
WE9V	202	474	145	68,730
AD6G	280	478	143	68,354
XE2AUB	**200**	**487**	**139**	**67,693**

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Real innovation in a multi-mode VHF transceiver was long overdue. Introducing the Ten-Tec model 526 "6N2" VHF transceiver. Amateur radios' first IF-DSP multi-mode VHF rig. For a long time, there have been no affordable choices for either 6 or 2 meters in a single band VHF multi-mode transceiver. Active hams planted the idea with us - why not offer a single rig that has BOTH 6 and 2 meters, without sacrificing performance? Multi-mode HF/VHF rigs have been around for years, at over a thousand dollars and with compromised performance on the VHF bands at best. The "6N2" provides serious multi-mode VHF performance in a small, take-anywhere package at a significantly lower price than HF/VHF multi-mode transceivers. Why buy another HF rig to get VHF coverage, when you already own one?

Ten-Tec's years of experience designing DSP radio equipment for amateur, commercial, and military applications comes together to deliver a VHF multi-mode transceiver to meet performance demands of weaker signal VHF operators. Let's take a look:

- SSB, CW, and FM transceive operation on both 6 and 2 meters. Extended receive range from 136 - 174 MHz on 2 meters.
- 35 IF-DSP bandwidth filters are built in. No extra filtering to buy! Instantly select the best one for band conditions with the twist of a knob.
- Can be used as your main 2-meter FM rig. 100 memories, repeater splits, CTCSS tone encode are all built in. Memories will retain mode, tone, and split information. You can even program (and scan!) memories for different modes. Memory lockout function allows skipping constantly busy channels while scanning.
- Two SO-239 antenna connectors, one per band, allow you to leave antennas for both 6 and 2 meters connected. Separate amp keying lines allow connection of separate linear amplifiers for each band.
- 20 watts output power, front panel knob adjustable. Front panel meter does double duty as S-meter on receive and power output meter on transmit.
- Separate low level drive connection from 144 MHz for UHF and microwave transverters.
- All-mode squelch useful for FM repeaters or for quiet monitoring of SSB calling frequencies. Never miss a band opening again!
- Portable operation is a snap. The "6N2" is small and light enough to be carried anywhere. Only 4 1/2 pounds! Current drain is minimal - only 400 mA @ 13.8 VDC on receive.

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Repair Dept.: (865) 428-0364 (8 - 4 EST)

S&H cost in 48 states is $16. With Power Supply, $21.

ICOM continues to refine and improve a rig that set new standards from the beginning. K1BQT looks at the newest version of the top-of-the-line IC-756, the IC-756PROII.

CQ Reviews:

The ICOM IC-756PROII Transceiver

BY RICK LITTLEFIELD,* K1BQT

New radios come and go, but occasionally one rises above the pack to become a classic (the 75A4, Viking Ranger, KWM-2, and TS-930 are four of many that come to mind). As digital signal processing (DSP) technology matures, ICOM's 756-PRO undoubtedly will join this rarified group as one of ham radio's more popular offerings. You don't need to be a contest fanatic to like this radio. Despite its $3000 price tag, many "average hams" already own one, and more will likely take the plunge as soon as their ship comes in.

In my view, there are at least four stand-up reasons why this radio is popular. First, with its eye-catching TFT (thin film transistor) color display, the PRO is one of the classier looking radios on the market. Second, most PROs sound exceptionally good on the air. Third, the DSP circuitry does a nice job of cutting down on noise and QRM without mutilating the signals you're trying to copy. Finally, despite a frightening potential for complexity, the basic controls are user friendly and easy to master.

The newer IC-756PROII is a near carbon copy of the original IC-756PRO, with some significant tweaks and refinements added to make it better. Because the PRO has been reviewed extensively, this report will focus mainly on how the PROII is different.

ICOM's third-generation IC-756PROII keeps all the good features of the two earlier models (the IC-756 and IC-756PRO) while tweaking a few of its predecessors' problems and adding new enhancements. (Photo courtesy ICOM America)

Lower Distortion

One of the refinements claimed by ICOM is reduced receiver distortion. You might think that an expensive and complex radio would be immune to such things, but nothing could be further from the truth. The more times a signal is amplified, switched, mixed, filtered, and processed, the more opportunity there is for distortion and noise to creep in and degrade signal quality. Indeed, minimalist QRP rigs often sound cleaner than more complex radios precisely because there are fewer components to muddy the waters between the antenna jack and the speaker. The real engineering challenge is to design a complex receiver with enough transparency to pass signals over a long signal path without depositing a lot of unwanted detritus along the way. Herein lies one of the primary differences claimed for the PROII: Several stages along the analog pipeline have been either redesigned or optimized for lower noise and higher signal-handling capacity. Because of these improvements, signals are able to pass through with less coloration and lower noise contribution. Even though the PROII receiver has a lot of overall gain, its noise floor is very low, making for a pleasantly "quiet" radio.

Better Overload Performance

The issue of signal-handling capability is the subject of endless debate among designers and manufacturers. In the end, probably few of us care whether our rig's 20 meter IP3 (third-order intercept point) measures +12 dBm or +20 dBm as long as the recovered signals emanating from the speaker sound good. However, up to a point, we probably should care! As a case in point, a few years back I diligently scraped together enough pennies to buy a brand-new, state-of-the-art transceiver. This acquisition was my first fresh-out-of-the-box radio ever. It looked great and it had DDS (direct digital synthesis), speech processing, QSK (break-in), built-in keyer, dual-IF shift, multiple filters, the works!

The weekend I brought it home coincided with Sweepstakes, so I hooked

*109A McDaniel Shore Drive, Barrington, NH 03825
e-mail: <k1bqt@aol.com>

up the paddles and slid down to the low end of 20 to sniff out some weak ones. Imagine my horror when I was greeted with a cacophony of chirps, bleeps, phantom SSB bursts, jumping signal levels, and a bouncing noise floor. After confirming that the noise blanker was off, I killed the preamp and kicked in attenuation until the intermod cleared up—only to hear my DX station drop below the deck. Even today, faint traces of teardrops stain my operating desk in a grim memorial to that event!

Receivers have come a long way since the 1980s, and lab tests conducted on the new PROII suggest that it keeps pace with other top performers.[1] Indeed, looking at the schematic, there's plenty of evidence to suggest the PROII is anything but wimpy. I was especially impressed by the assemblage of low-noise FETs (field-effect transistors), high-signal-capacity DBMs (double-balanced mixers), quality PIN-switching components, plus the use of push-pull and parallel stages to increase power handling—stuff usually reserved for high-performance military equipment. Of course, the intermodulation distortion (IMD) tests we read about are tidy laboratory-controlled events with only two conflicting signals to worry about, so IP3 numbers alone may not paint the complete picture of a receiver's immunity to overload. Connecting a spectrum analyzer to the antenna and viewing the horrific mass of out-of-band signals the receiver must handle reveals the rest of the story. ICOM engineers apparently took this issue into account and redesigned the receiver bandpass filters for greater out-of-band signal rejection. By reducing the amount of out-of-band energy getting into the radio's mixer and amplifier stages, it follows that more power-handling reserve is available for cleanly processing the in-band signals we care about.

Ironically, the PROII test radio arrived on the eve of a big contest weekend, presenting me with a golden opportunity to test it under the same cut-throat conditions that folded up my "dream radio" a few years earlier. Would history repeat itself? Not this time! Even with both levels of preamplification switched in, I didn't observe any misbehavior amid the clamoring and shoving. Times have definitely changed for the better.

Filters: Soft or Hard?

If there's one central thing that bugs me about DSP-filtered radios, it's the psychological thing that happens at cut-off frequency where the passband noise stops abruptly and silence begins. This fringing effect tricks the human ear into perceiving a rushing sound with a near-coherent pitch—almost like what you get by holding your ear up to a seashell. ICOM (bless them) addressed this annoyance in the PROII by adding a soft-filter option to the custom filter setup menu. In *soft-filter* mode you can round the margins of the passband to your liking and literally take the edge off listening to a noisy band. It's a fantastic feature—one of those "BMW-luxury" amenities that make long-duration operating jaunts more enjoyable.

Quieter Ride

Virtually all DSP radios feature automatic noise-reduction circuits, and some work better than others. Although I didn't have an older PRO available for an A/B comparison, I'm told the variable noise-reduction algorithm in the new PROII is significantly better in that it causes less signal degradation. I found

[1]QST, *February 2002 issue.*

the variable reduction control quite effective, although like most NR circuits, it tended to re-equalize audio toward the bassy end of the spectrum when not applied judiciously. Still, with summer T-storm season fully upon us, I was very impressed with its ability to suppress the roar.

Speaking of noise, you may recall reviews of the original PRO identifying a kind of rumble on signals when the band was especially crowded. There were also reports of audible jitter or roughness in CW mode. Although nobody seemed to know the exact cause at the time, ICOM apparently has identified the culprit and banished it from the inner sanctums of the PROII. Finally, there were many reports decrying the ineffectiveness of the original PRO's noise blanker. Once again, ICOM apparently took those early observations seriously and introduced a multi-level blanker that portends to get the job done more effectively. I live out in the burley wilds of New Hampshire where pulse noise is limited to an occasional motorboat, so I can't confirm how truly effective the new blanker really is.

Murky Monitor

While the PROII does a great job of rendering other people's signals clearly, its *Monitor* function didn't do a very accurate job of telling me how my own signal sounded. Specifically, I initially set up the transmit audio for best quality using the monitor, then checked in with a group of old friends on 75 meters. Audio reports ranged from "flat as a pancake," to "thin," to "no fullness or punch." I then set up the radio a second time using a scope and a second receiver to monitor speech quality. Afterward, my voice sounded grainy and boomy through the PROII monitor, but fantastic on the air. Bottom line: If you're a Don Imus or Rush Limbaugh wannabe with a thirst to hear your own dulcet tones ringing in the headphones, you'll probably wish ICOM had lavished a little more care on this relatively low-tech aspect of the radio. It's always the simple things that slip between the cracks.

Cosmetic Surgery

Along with the RF-related changes, ICOM engineers performed some minor cosmetic surgery to enhance the PROII's already impressive appearance. For openers, there are more choices of font, color, and background available for the big screen, plus some font recomposition to improve character definition. Also, the tiny blue keypad numbers on the old PRO have morphed into big red ones on the PROII—and the S-meter is brighter and easier to read. Add a more sensitive (or higher leaping) band-scope display, and you have quite a brilliant color and light show sitting on the operating table!

The Competitive Edge

I like to work DX, but I'm not rabid about it. Consequently, rather than fake this portion of the review, I loaned the PROII to a colleague who owns a well-used set of paddles and a big antenna. In addition to creating some nifty DX photo-calendars over the years, John David, KB1T, is a veteran when it comes to stalking the bands in search of exotic QSLs.

Up front, John noted that the PROII possesses all the features needed to make it a top choice for DX and contest operators. Being a seasoned CW op, he especially liked the manual notch filter, noting, "It is extremely sharp and deep. A few times while sneaking up on an offending signal—maybe someone tuning up—it seemed they had suddenly stopped transmitting. Nope, they were in the notch!" He added, "This notch filter is sharp enough to take out a strong signal only 200 Hz away without seriously affecting the desired signal. It's fun to use." John was also impressed with the sidetone tracking feature on the *Pitch* control, and liked the flexibility of twin passband tuning for getting rid of encroaching QRM. None of these features are unique to the PROII, but he felt they were well implemented.

John also appreciated the dual receive function, saying, "This is a capability of surpassing value for both CW and SSB, with split DX operation." He continued, "With the PROII's amazing multicolored Spectrum Display and its independent markers for Main and Sub VFO, we have the virtual equivalent of two high-end receivers, plus a panadapter-like view of the band. This is getting really good!"

John observed that while keeping track of the TX function on dual receive was easier on the PROII, it could still be confusing. He especially liked being able to zero-beat the station currently working the DX contact while being able to monitor the DX station's own transmit frequency at the same time. On the down side, while complementing the memory keyer's flexibility, John found it a bit slow and laborious to load. He was also disappointed that accessing stored messages meant losing the spectrum scan display. Finally, John pointed out a soft audio hiss he thought might become tiring after awhile (I used a speaker for my testing and didn't notice it.).

Overall, John reported that he liked using the PROII a lot—and confessed that he was growing rather attached to it. Knowing that ICOM would eventually come looking for its radio, I figured I'd better ask him to return it before it was too late!

Summary

When all is said and done, I found the third-generation IC-756 PROII to be a very nicely refined product. Some have complained because the PROII frequency coverage doesn't extend far enough into VHF (it covers HF plus 6 meters), but that really didn't bother me. Diversity too often breeds compromise, and compromise isn't what this particular radio is about! I personally hope ICOM will keep the PROII in its lineup for a long time to come, continuing to pick away at the small stuff until there's nothing much left to dislike. It's that BMW-luxury thing! If it looks good and handles well; if it's quiet, comfortable and plush; and—most important of all—if people want to own one, why mess with a good thing? ■

Resources

For more information, contact your favorite ICOM dealer or visit the ICOM America website at <http://www.icomamerica.com>. List price for the IC-756PROII is $3600; "street price" is in the neighborhood of $3000.

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

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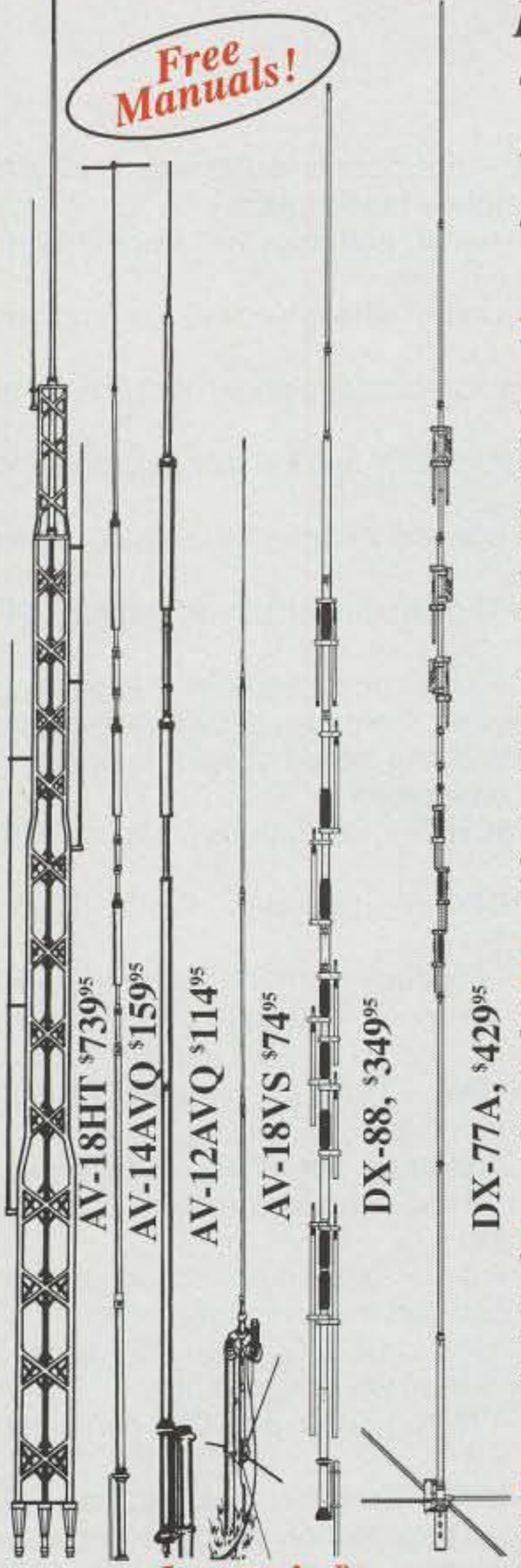

hy-gain[R] Classics

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

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

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

Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators. Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage. Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low. Two year limited warranty.

AV-18HT, $739.95. (10, 12, 15, 20, 40, 80 Meters, 160 Meters optional). 53 ft., 114 lbs.

Standing 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands.

Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. With the addition of a base loading coil (LC-160Q, $99.95), it also provides exceptional 160 Meter performance.

The 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 and lowering.

AV-14AVQ, $159.95. (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, $79.95.

AV-12AVQ, $114.95. (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, $79.95.

AV-18VS, $74.95. (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, $79.95.

DX-88, $349.95. (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, $179.95. Ground Radial System, GRK-88, $81.95. Roof Radial System, RRK-88, $89.95.

DX-77A, $429.95. (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	$739.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$159.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$114.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$74.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$349.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$429.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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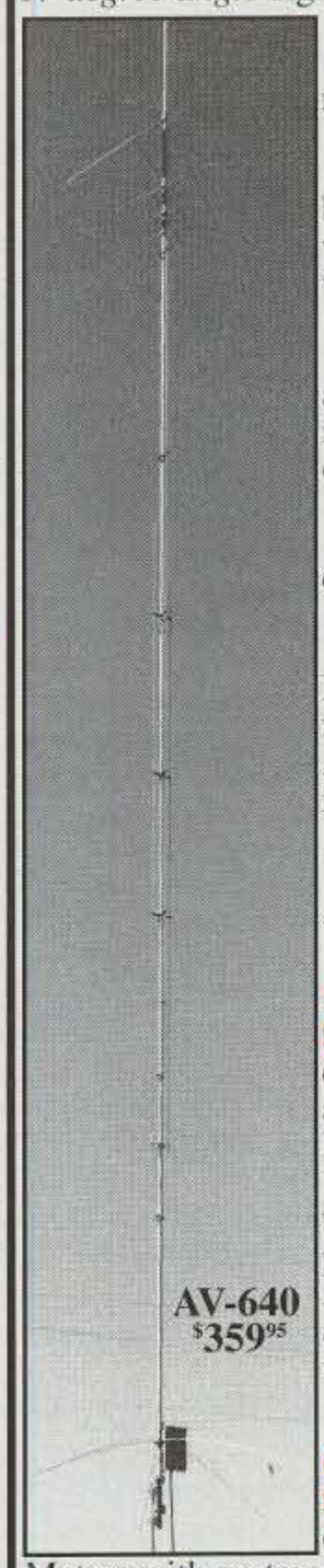
Hy-Gain's new **PATRIOT** HF verticals are the best built, best performing and best priced multiband verticals available today. For exciting DX make full use of your sunspot cycle with the **PATRIOT's** *low 17 degree angle* signal.



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

AV-620, $269.95. (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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Announcing:

2002 Inductees
CQ Amateur Radio, Contest, and DX Halls of Fame

CQ is proud to regularly honor the most accomplished members of the amateur radio community through three "Halls of Fame": the CQ Amateur Radio Hall of Fame, the CQ Contest Hall of Fame, and the CQ DX Hall of Fame. We are pleased to introduce you to this year's inductees:

CQ Amateur Radio Hall of Fame

Our second annual "class" of inductees to the CQ Amateur Radio Hall of Fame includes 44 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 but one 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 2002 "class" of the CQ Amateur Radio Hall of Fame:

1. Baran, Paul, W3KAS – Invented packet switching, basis of internet, and other modern communication networks; developed first telemetry equipment for NASA

2. Beverage, Harold, W2BML – Inventor, Beverage antenna

3. Black, Gene, W2LL – Former Editor, *CQ*

4. Brier, Herb, W9EGQ/W9AD – Amateur radio writer, educator, mentor

5. Browning, Gus, W4BPD – Noted DXer/DXpeditioner

6. Bruninga, Bob, WB4APR – Developer of APRS (Automatic Position Reporting System)

7. Campbell, Laird, W1HQ/W1CUT – ARRL Asst. General Manager and *QST* Managing Editor; first amateur to use transistorized transmitters on 160, 40, and 20 meters

8. Clark, Vic, W4KFC – Noted DXer, contester, ARRL President

9. Clegg, Ed, W3LOY/W2LOY/W8LOY – VHF radio designer; Founder, Clegg Communications

10. Colvin, Iris, W6QL – Noted DXer, DXpeditioner, with husband, Lloyd, W6KG

11. Colvin, Lloyd, W6KG – Noted DXer, DXpeditioner, with wife, Iris, W6QL

12. Dannals, Harry, W2HD – Former president, ARRL, QCWA

13. DeMaw, Doug, W1FB – Amateur radio writer

14. Drake, Robert L., W8CYE – Founder, R.L. Drake Co.

15. Eitel, William, W6UF – Co-founder, Eimac, with Jack McCullough, W6CHE

16. Ercolino, Mike, W2BDS – Inventor, double-V TV antenna; founder, Telrex Antennas

17. Goodman, Byron, W1DX – ARRL Technical Director; author, *Antenna Handbook*

18. Grammer, George, W1DF – Editor, ARRL *Handbook*

19. Halligan, Bill, W9AC – Founder, Hallicrafters

20. Handy, F.E. (Francis Edward), W1BDI – Communications Manager, ARRL; originated ARRL Field Day and Sweepstakes events, A-1 Operator Club

21. Harris, Sam, W1FZJ – VHF pioneer, *QST* columnist; made first EME contact, engineered Arecibo radiotelescope

22. Hull, Ross, 3JU (Australian call) – *QST* Associate Editor, VHF pioneer

23. Inoue, Tokuzo, JA3FA – Founder and President, ICOM; brought many innovations to amateur marketplace

24. Jones, Frank, W6AJF – writer, author of first *Radio Handbook* in 1930s

25. Kahn, Al, K4FW – Founder, ElectroVoice; co-founder, Ten-Tec

26. Klein, Perry W3PK – Amateur satellite pioneer; first President of AMSAT

27. Kretzman, Byron, W2JTP – RTTY and FM pioneer, longtime *CQ* RTTY Editor and author

28. Lawson, Jim, W2PV – Legendary contester, amateur radio writer

29. Martinez, Peter, G3PLX – Digital pioneer, developed AMTOR and PSK-31

30. Maxwell, James Clerk – Developed equations explaining relationship between electricity and magnetism; determined that electromagnetic fields propagate at the speed of light, suggesting that light is an electromagnetic phenomenon

31. McCullough, Jack, W6CHE – Co-founder, Eimac, with William Eitel, W6UF

32. Meyerson, Leo, WØGFQ – Founder, World Radio Laboratories

33. Millen, James, W1HRX – Product engineer, National Radio – developed HRO receiver and designed its unique dial; Founder, James Millen Co.

34. Moran, Fr. Marshall, 9N1MM – Jesuit priest, educator, and for years the only active amateur in Nepal

35. Murgas, Fr. Josef – Radio pioneer, some say Marconi used his methods for effective overland radio communication; holds 17 patents, including rotary spark gap

36. Newell, Dick, AK1A – Invented Packet Cluster; changed face of DXing, wide application in public-service communication

37. Newkirk, Rod, W9BRD –*QST* DX Editor, 1948–78; credited with first use of term "Elmer" for a ham who helps others

38. Nose, Katashi, KH6IJ – Noted DXer and CW contester; antenna expert

39. Reinartz, John, 1QP/1XAM – Invented first practical CW tuner and other circuits; introduced propagation science to amateur radio; participant in 1923 transatlantic tests, radio operator for 1925 MacMillan Arctic Expedition

40. Tenney, Skip, W1NLB – Founding publisher, *ham radio* magazine

41. Tilton, Ed, W1HDQ – VHF pioneer, *QST* columnist

42. Towns, Chuck, K6LFH – Amateur satellite pioneer; OSCARs I & II built in his garage

43. Vidmar, Matjaz, S53MV – Designer/builder of high-speed (11 MB/s) amateur digital network, several AO-40 satellite components, VHF/UHF/microwave radios

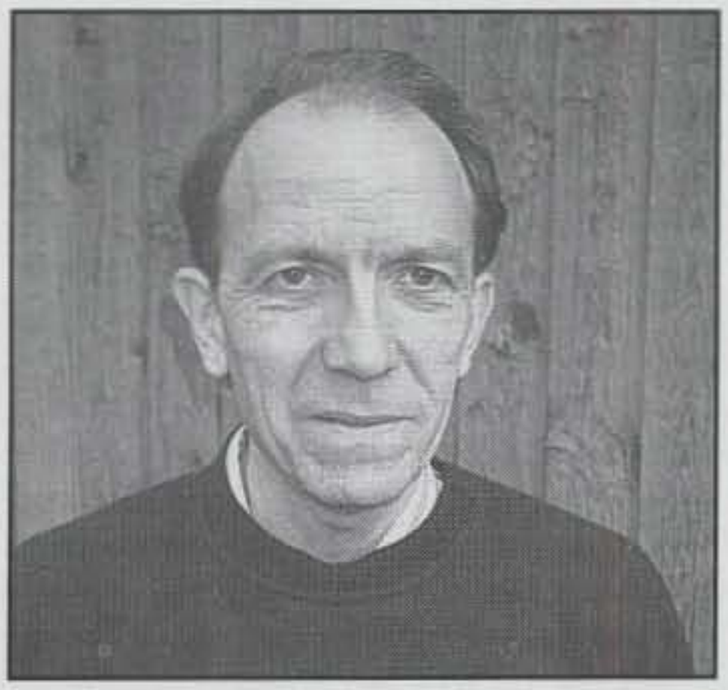
44. Windom, Gen. Loren, W8GZ – Inventor, Windom antenna

We will be inducting another "class" to our Amateur Radio Hall of Fame next year. If there is someone you believe should be among these members who isn't on this list (and wasn't on last year's list), nominations for the 2003 class will open on January 1, 2003, and will be accepted by mail c/o the *CQ* offices or by e-mail to <hall-of-fame@cq-amateur-radio.com>.

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>.

CQ Contest Hall of Fame

This year Leif Ottosen, OZ1LO, has been added to the list of distinguished members of the CQ Contest Hall of Fame. He is the 39th inductee to be so honored.



Leif Ottosen, OZ1LO, the 39th member of the CQ Contest Hall of Fame, inducted May 2002.

Nominated by the Danish DX Group, Leif's achievements in CW contesting as well as his knowledge of propagation and DX have made him well known and respected around the world. First licensed in 1961, Leif won the Danish Christmas Contest in 1963 on CW, and this gave him the incentive to participate in international contests from then on. He has operated in the major phone and CW contests from 1965 to date with top-scoring results, using his own call and also participating in major contest DXpeditions both single operator and as part of multi-op single transmitter teams.

Besides being a devoted contester, Leif is an avid DXer, having achieved 5 Band DXCC in July 1970. He is also a member of the DXCC Honor Roll CW, Phone, and Mixed, and has qualified for endorsements on five additional bands. In addition, he is a member of the First Class CW Operators Club (FOC).

Leif has been secretary of the Danish DX Group since it was founded in 1972 and takes part in the Danish national society, the EDR, as a member of the HF committee and representative of the EDR at IARU Region 1 meetings. He was the editor of the DX section of *OZ* magazine from 1974–76 and has written numerous articles on contesting and DXing which are an inspiration to Danish radio amateurs. He was also contest manager of the EDR from 1976–88.

In addition to being very active on the HF bands, Leif also is often found on 6 and 2 meters.

CQ welcomes Leif Ottosen, OZ1LO, as the newest member of the CQ Contest Hall of Fame.

CQ DX Hall of Fame

Lee Bergren, WØAR, is the 41st DXer to be inducted into the CQ DX Hall of Fame. He was nominated for this honor by the Kansas City DX Club, of which he was a founding father. In addition to being a top DXer, Lee is a noted author, electronic designer, businessman, and advisor, and Elmer to a generation of hams in the Midwest. Over the years Lee's contributions to the hobby have been many.

Lee Bergren, WØAR, CQ DX Hall of Fame inductee, May 2002.

Lee traveled and casually operated on the ham bands even before the term *DXpedition* came into existence. He was among those who were the first to activate XF4 Soccoro for DXCC credit in 1956. Lee then went on to operate from 5Z4 Kenya and VQ9 the Seychelles, extremely rare countries in the 1960s. He teamed up with Robby, 5Z4ERR, to take along the young Gus Browning, W4BPD, on his very first DXpedition. Lee's operating and world travels gained him a spot at the top of the DXCC Honor Roll in the 1960s, a position he resigned due to a controversial issue at the time.

Lee was the principal founder and president of Radio Industries, Inc. In the early '60s he and other engineers at the company developed a grounded-grid linear circuit around the then-new Eimac 4CX-1000A tetrode. The resultant, popular linear amplifier was dubbed "Der Loudenboomer"; the rights later were bought by Bill Halligan, the founder of Hallicrafters, who produced it as the HT-45 amplifier. Lee is also noted for the development of a highly effective multi-element quad antenna at a time when little work had been done in this area. The antenna was documented in the May 1963 issue of *QST*, and his article is still considered a useful reference after almost 30 years.

At age 85 Lee is still active, and *CQ* is pleased to welcome WØAR to the CQ DX Hall of Fame as its 2002 inductee.

Log periodic antennas have long been popular for commercial and government users who need to communicate on a variety of frequencies. Here's a ham radio version of a versatile HF beam that gives you 13 to 30 MHz coverage on a single boom!

CQ Reviews:

The KMA-1330 HF Log Periodic Antenna

BY PETER J. BERTINI,* K1ZJH

The KMA-1330 Log Periodic antenna mounted at 65 feet on the author's Rohn 25 tower. Farther up on the mast are two other KMA log antennas: the KMA Rover (vertically polarized for 90 to 1300 MHz coverage) and a KMA-4030 horizontally polarized for 41 to 1300 MHz coverage.

When it was time to downsize my antenna farm—then comprised of numerous antennas on three aged and rusted towers—I opted to replace them with a single refurbished 65 foot Rohn 25G fold-over tower. The fold-over tower would be ideal, since I could tend to my future antenna needs while keeping both feet firmly on the ground. I (and most of my friends) was getting too old to climb, and besides, the liability aspects worried me!

Choosing a replacement antenna was more of a challenge: A fold-over tower places some limitations on antenna size, mast length, and their combined weight. I decided that the KMA-1330 Log Periodic would be a good replacement for the HF monobanders I had used previously. I chose KMA Antennas because of the good experiences I had had with their VHF/UHF log periodic antennas.

Why a Log Periodic Antenna?

Monobanders and trapped beam antennas share some unique and common problems. Both have limited bandwidth and are usually tuned when assembled for best performance for either the CW or SSB portions of the bands. Operate too far off frequency and their SWR, front-to-back ratio, and gain suffer. Trapped antennas have the same limitations, and a few more. Traps have inherent losses, narrow bandwidths, and in time traps often develop problems if moisture or insects get inside. A log periodic avoids these problems. All of the power is radiated, not wasted heating traps. Also, there is *no tuning required* during the KMA-1330 assembly, nor is *fine tuning* needed once it's up on the tower! Build it and it works as-is.

Now let's talk cost advantages. After you figure in the price of three monobanders for 20, 15, and 10 meters, add in the coax, baluns, and tower/rotor/mast requirements, a single log periodic antenna solution becomes even more attractive! And you still have nothing for 17 or 12 meters.

The KMA-1330 completely covers 13 to 30 MHz, spanning the 20, 17, 15, 12, and 10 meter amateur bands. I've never seen the SWR go over 2:1, with readings of 1.8:1 to 1.5:1 being more typical. This is all achieved on an 18 foot boom using eight elements, with the longest element being 38 feet. Most of the important antenna specs are given in Table I.

Frequency Coverage: 13 MHz through 30 MHz, continuous
Number of Elements: 8 tapered, T6061- grade aluminum tubing
Longest Element: 38 feet
Boom Length: 18 feet
Turning Radius: 21 feet
Weight: 38 pounds (UPS shippable)
Wing Area: 8 square feet
Antenna Gain: 8 dBi (free space)
FB Ratio: 15–25 dB—increases with frequency
SWR: 1.8:1.0
Materials: T6061 aluminum, stainless-steel hardware
Connection: direct
Balun: optional, ferrite-bead choke balun
Price Class: $575.00, factory direct

Table I– The KMA-1330 Log Periodic antenna specifications.

**20 Patsun Rd., Somers, CT 06071-1810*
e-mail: <radioconnection@juno.com>

Note that the weight, boom length, and turning ratios are about the same as an average 3-element tribander. Here is the best part: It offers similar performance on the 12 and 17 meter WARC bands! If you are a serious DXer or HF operator, you'll find that having a good antenna for these two bands will give you a serious edge over those who don't! The broad frequency coverage is another plus if you enjoy shortwave listening or monitoring utility stations.

What about gain? Well, the manufacturer "specs" the antenna for 8 dBi gain in free space, a figure based on W7EL's popular EZNEC[1] antenna software. Rather than try and compare apples to oranges, remember that a monobander designed expressly for maximum gain will only work over a narrow portion of a band, while a log periodic antenna's gain is consistent across its full frequency range! Since I use both CW and SSB, this was something I needed in an antenna.

Assembly

The KMA-1330 antenna is UPS shippable. This is nice, but what it really means is that there are a lot of short aluminum tubes and rods crammed into that 8 foot shipping box! Assembly requires that you first read—and understand—the instructions before doing anything. I began by building the boom assembly, which is comprised of two parallel booms, in the back yard. I then sorted the elements by size and marked them with various colors of electrical tape to keep them that way. This was a big time saver when it came time to start putting the elements together. Two fold-up metal sawhorses supported the antenna during assembly. Everything goes together using common hand tools; nutdrivers, screwdrivers, and a small wrench will do the job.

The machining is tight, particularly for some of the boom-to-element mounting and for some of the boom splices. The elements are tapered to minimize wind-loading and weight, while improving mechanical strength. I used aluminum electrical paste where the element tubes overlapped and joined to reduce corrosion or seizing and to improve conductivity. The electrical paste will also help lubricate and ease those tight fits. All of the hardware, including the boom U-bolts, is stainless steel. The stainless sheet-metal screws (used for the element and boom joints) are brittle, and some care is needed lest the heads break off if forced. Replacement stainless hardware is available at hardware stores, should you happen to break or lose a screw or nut. The boom separators are machined from PVC blocks, and the boom-to-mast insulator is also a large block of PVC. This is a very rugged antenna, and the only fault I found is that I feel that the mast U-bolts should have been a bit larger. I had one break as I over-tightened it, and I eventually used a heavier set when the antenna was installed on the tower mast.

[1]*EZNEC software is distributed by Roy Lewallen, W7EL, <W7EL@eznec.com>.*

Balun Needed

KMA Antennas recommends a balun at the feedpoint to decouple the RF from the feedline. This can be done using a *Collins*-style balun comprised of a coil of coax at the feedpoint—rather unwieldy in my opinion. A far better solution is to use a ferrite-bead choke balun. An assembled balun may be ordered from The Wireman, or a kit of cores and shrink tubing may be ordered from Palomar Engineers. The ferrite-choke balun is far less obtrusive. The coax terminates at the boom end with the shortest elements, and you will need to fully seal the coax from moisture where the braid and center conductor emerge from the jacket. Ed Griffin, W4KMA, owner of KMA Antennas, suggests using liquid plastic intended for coating tool handles, and painting it over the exposed braid and terminals. This is sold at hardware or electrical supply stores.

How Well Does It Work?

I used this antenna for several months before penning this review. It's all too easy to put up a new antenna and quickly form anecdotal opinions on how great it works based on a few contacts. Ideally, antenna comparisons should be done by directly comparing one antenna against the other in A/B fashion. When the bands are open, even a wet string for an antenna will produce contacts!

However, after several months of chasing DXpeditions, I am confident that the KMA-1330 delivers what it promises. Over a reasonable period of time you can tell if an antenna is living up to expectations. I live on the east coast, and I use a modest Heath SB-220 linear amplifier—not a powerhouse, but typical of what the average weekend DXer would be using. The VP6DI Ducie Island DXpedition in March was for a new country, a *must work* for all DXers! This translated into *huge* pile-ups. During the first several hours I was able to log three band-mode contacts, including one of the first 400 15 meter SSB contacts as reported on the VP6DI online weblog internet site! Ditto for 3D2CI/3D2CY Conway Reef in October 2001, VP8GEO South Georgia in January, and again for XRØX San Felix contacts in March 2002. All easily worked on multiple band-modes, thanks to the KMA-1330. I should note that I am impatient... If I don't work a station within one hour, I search for better band conditions or wait for better propagation on that band.

The front-to-back ratio increases with frequency, going from 15 dB on 20 meters to about 25 dB on 10 meters. More F/B ratio on 20 meters would have been a big plus in eliminating off-the-back interference, but this is a typical trade-off inherent in log periodic designs. I also like the sleek, elegant design of the KMA-1330. Perched on my tower, as shown in the photo, I think it is one handsome-looking piece of hardware. Even my wife and neighbors agree! ■

KMA Antennas
Contact Information

KMA Antennas, P.O. Box 451, New London, NC 28127; telephone 704-463-5820; e-mail: <W4KMA@qsl.net>; website: <www.kmaantennas.com>.

Here's a plan to help rid your neighborhood of abandoned CB antennas while getting yourself one or more VHF J-poles in the process.

Cleaning Up The Neighborhood (Another J-Pole Story)

BY DENNIS W. MURPHY,* KB6LZW

A couple of years ago I was looking around for a lightweight, easy-to-use antenna for hilltopping on 6 meters. What I ended up with was a homebrew J-pole that is now used at home. The best part I found was that cleaning up the neighborhood is a good way of getting the parts to make 6 and even 2 meter antennas for next to no money! It will generally cost you just a little labor and some fun.

In neighborhoods all across America there are a ton of the 11 meter CB ground-plane antennas that were erected, most of which are no longer being used. As a carpenter, I run across these eyesores from time to time while on the job. You can just look and tell that some of these haven't been on the air in years. The sight of coax ends dangling in the air is a dead giveaway that *there* is a pile of parts available for the cost of taking the whole mess down off the roof. Often this will include the push-up mast. One of these push-up masts with even just two good sections left still makes a fine VHF Field Day mast (I keep a couple stashed away at our cabin.). (*Remember, use all standard safety precautions and don't sue the homeowner if you get hurt taking down their antenna!*)

By the way, if you want some good temporary stakes to tie off your mast, try 18 inch pieces of 1/2 inch concrete rebar stock. Their ribbing will keep your lines from slipping up or down and they're dirt cheap. Just throw a truckers' hitch knot on them for easy adjustment and you're in business!

"Reformatting" the Antenna

Now that you know what to get and where to find it, let's move on to turning a CB ground plane into a 6 meter J-pole.

Based on numerous articles already published, the J-pole antenna is quite popular. Essentially, a J-pole is a vertical antenna consisting of a 3/4-wave main radiating element plus a 1/4-wave tuning stub. While most of these articles describe 2 meter monobanders or 2 meter plus 70 cm combinations utilizing new materials, we're going to show you how to construct a 6 meter J-pole, or even a 6-plus-2 combo, using mostly recycled materials.

First, refer to fig. 1. These are the two main configurations of CB ground-plane antennas. The only real difference between the two is the number of ground-plane (radial) elements, either three or four. As our first step (after taking down the antenna from its previous home), we need to gently remove these radials. If they do not want to be removed easily, don't worry. Just break out your trusty hacksaw and cut them off flush at the mounting plate. Do not put that hacksaw away. It, plus a screwdriver and a drill, will be your main tools for this project.

Once the 11 meter antenna has been pruned of its ground-plane elements, leaving the "driven" element, refer to fig. 2. Measure up 14 1/2 feet from the ground-plane-element mounting plate and cut off the main element at that point. Now take some 1 inch aluminum strap material and form a bracket to mount one of the ground-plane elements alongside the 14 1/2 foot driven element. The strap should not be very thick, as forming the bracket with a hammer to go around the driven-element part requires the material to bend easily without breaking or cracking in the

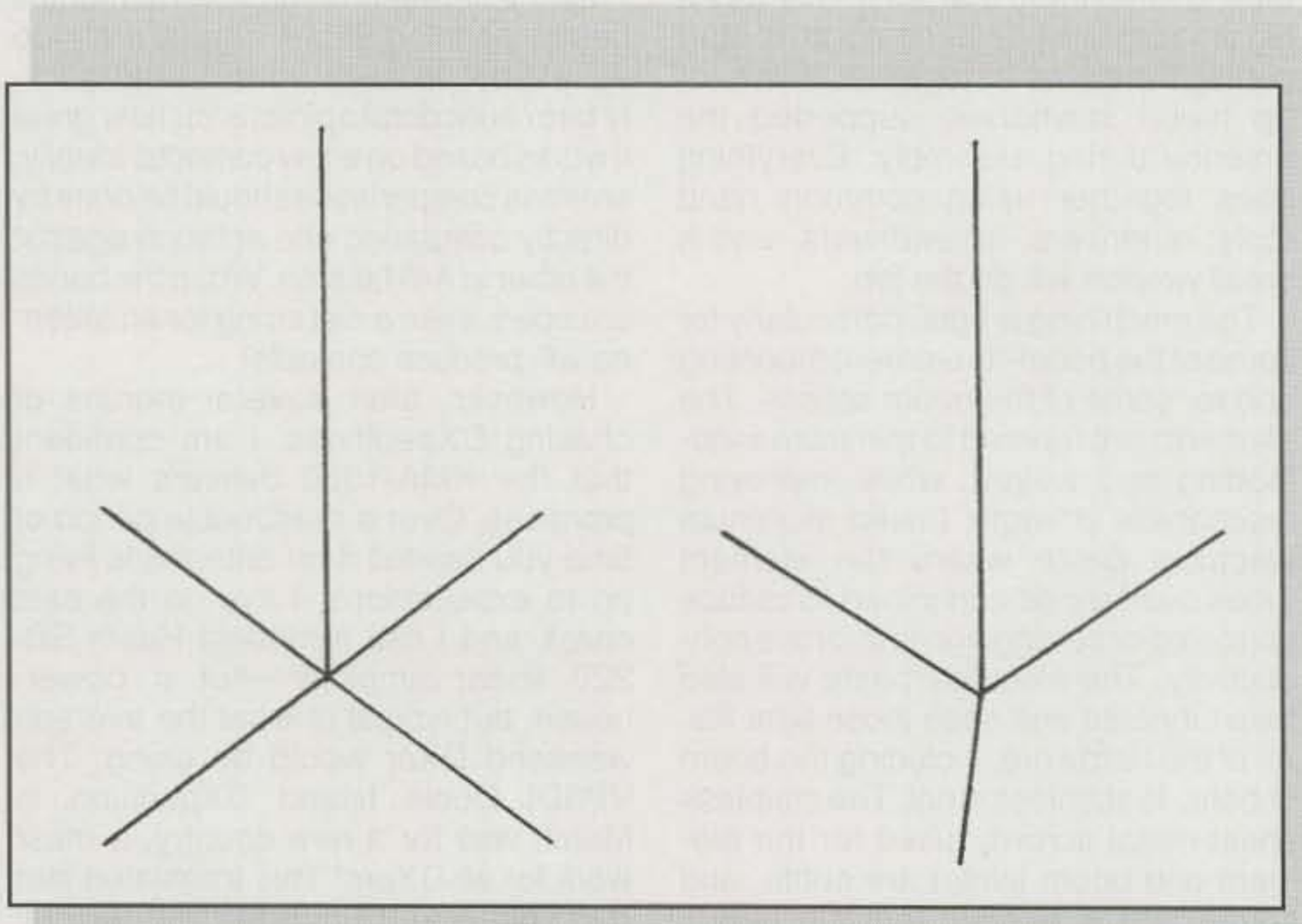


Fig. 1– The two most common configuration of CB (11 meter) ground-plane antennas. One has four radial sections; the other has three.

*17750 Freitas Lane, Ft. Bragg, CA 95437

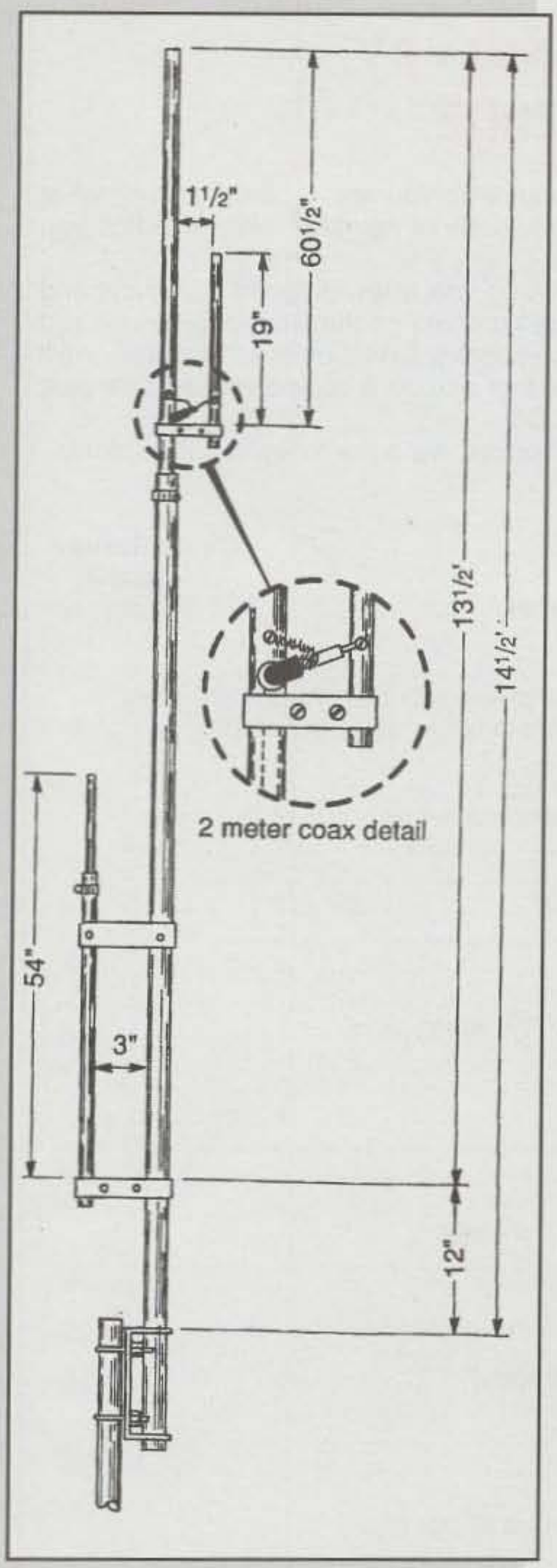


Fig. 2– Construction details of the dual-band 6 meter and 2 meter J-pole, using parts from scrap CB antennas.

process. Once the bracket has been formed, measure upward 12 inches from the old ground-plane mounting plate and mark. This is where the 6 meter stub will be mounted and the *top* of the bracket should be fastened at the 12 inch mark above the old mounting plate, leaving 13 1/2 feet of the driven element.

Once the stub bracket has been mounted, grab one of those ground-plane elements you removed, place it alongside the driven element, and fasten. After mounting the stub, measure up 56 inches from the top of the stub bracket and cut off the remainder at that point. Be sure to leave a joint in the stub element (see fig. 2). This will allow a little room for adjustment if you need it. After final adjustments, mine measured out at around 54 inches from the top of the bracket. Use a small stainless-steel hose clamp to fasten the stub length securely at the joint. Next screw a piece of Plexiglas® from mast to stub just below the joint to keep it from whipping around in the wind. You don't have to be too fancy (I used a piece of 3/4 inch wood and some black electrician's tape and bound it all together.); just use the insulating materials to keep the stub from doing the hula in the wind.

2 Meters, Too

Now to the 2 meter section, if that is your desire. Otherwise skip ahead to the tuning section and tune the 6 meter monobander at this point.

For 2 meters, measure *down* 60 1/2 inches from the top of the antenna. This is where the *top* of the 2 meter stub bracket goes. Using material left over from the 6 meter stub, cut the 2 meter stub to be 19 inches long above the mounting bracket. I placed mine 1 1/2 inches away from the main antenna and it worked fine. Use stainless screws wherever screws are needed.

Tuning the Antenna

Now the antenna is ready for coax and tuning. Attach the coax *shield* to the *main* portion of the antenna and the coax *center conductor* to the *stub*. Tune the 2 meter section first, adjusting the stub length for lowest SWR. After locating the best spot, mark it. I was concerned with the coax whipping around in the wind, so I drilled a hole in the main antenna portion just below the setting mark so the coax could be fed down through the inside. This gives a nice clean look to the project and minimizes any interaction between the 2 meter coax and the 6 meter portion of the antenna.

Running the coax down inside the antenna will require you to remove the SO-239 connector from the bottom of the 11 meter antenna so the coax will fit through and out. Once the coax has been run, screw the coax ends to the setting marks on the 2 meter portion and put a glob of silicone sealant at the hole for good measure. ***Do not seal*** the bottom where the SO-239 was removed. You certainly don't want a quart of water bottled up inside your antenna. Also leave the top uncapped so that a little air flow will dry out the inside after a rain or snow storm.

A little note here about weather-proofing: Remember to seal the coax at the point where you split the ends apart to run the shield one way and the center conductor the other way. I recommend a good coating of marine spar varnish, and don't be stingy—especially where the two ends part ways. Make sure that plenty has soaked in at that point. After it is dry (in about 24 hours), a healthy coat of liquid rubber seal will finish the job properly. After two years of coastal weather, I have just re-separated the ends and checked the weather proofing. The braid is still shiny and fresh, so it does work.

6 Meter Tune-up

After you are finished with the 2 meter section, tune the 6 meter section. It is not necessary to run the coax inside the antenna for this section because you're nearly at the bottom already. Plus, another hole here could weaken the overall structure. You'll find that one of the benefits of using a CB ground-plane antenna for this project is that it generally comes with its own mast mounting bracket for the push-up mast or whatever it is you plan to stick it on. No worries about how you will attach it. It is already part of the antenna! And see, the neighborhood has been cleansed of one more idle 11 meter antenna! ■

A Bonus

If you have collected several of these antennas, you will have enough ground-plane elements to make a 6 meter Yagi! Refer to a handbook to find the plans for a 3-, 4-, or 5-element Yagi. I made mine 4 elements long.

A good source of boom material that I found was professional pool sweep handles. The ones I ran across were 1 1/4 inch diameter stock in 10 foot sections. Whether you decide to use a gamma match or coaxial phasing, many of the antenna parts can be salvaged from the good old 11 meter ground planes. Just follow the construction specs carefully and you shouldn't have much trouble. As with all antenna projects, I strongly advocate using stainless-steel hardware wherever possible. Here on the coast, it means the difference between being able to remove something or watching a big, rusty glob form on your antenna. Beautify the neighborhood and have some VHF fun at the same time!

What You've Told Us...

Our May survey asked for your opinions on the ethics of your fellow hams. We defined ethics as "the rules or standards governing the conduct of members of a particular group, in this case, members of the amateur radio fraternity." Overall, 78% of you felt that "most hams are highly ethical people, with just a few exceptions," while 20% said "many hams are highly ethical but just as many are not." Only 2% said most hams would behave unethically if they thought they could get away with it.

Compared to society as a whole, 56% of you think hams' ethics are about the same as everybody else's, while 42% of you say hams tend to be more ethical than the rest of society, and only 1% thought hams are less ethical.

The picture shifted, though, when we asked about the ethics of contesters and DXers. By the way, 31% of you identified yourselves as contesters and 55% say you're a DXer. The numbers for both groups are almost identical, so we'll lump 'em together to save space. A little more than half of you (56%) feel the ethics of DXers and contesters are the same as or higher than those of hams in general, but 30% feel DXers and contesters have lower ethics than hams overall. There was also a large "don't know/no opinion" group here (14% on the contesters question, 11% on the DXers question). On the other hand, 71% of you say most hams are highly ethical when it comes to QSL cards for awards, etc., while 18% say enough hams would cheat that strict rules are needed, and only 2% said most hams would cheat if they thought they could get away with it (7% had no opinion).

Hams at flea markets are perceived as being less ethical than the general ham population. Only 27% feel most hams are "honest and will deal truthfully with you," while 58% say "most are honest but you've got to watch out for those who aren't," 7% say there's a 50/50 chance of being cheated, and 1% feel most hams will cheat you if they can.

Finally, we asked you to assess your own ethics compared with those of your fellow hams, and 36% of you believe you're more ethical than most other hams, while 62% of you say your ethics are on the same level as most other hams. Only 1% admitted to being less ethical than most hams.

As always, thank you for taking part in our survey. This month's winner of a free one-year subscription is Scott Castonguay, KC7UOC, of Des Moines, Washington.

Reader Survey
July 2002

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 Reader Service Card and returning it to us (we've already paid the postage). 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 this month's issue is an Antenna Special, we'd like to know a little more about the antennas at your station.

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

1. ... whether you have a station/antenna on the air
- Yes 1
- No* 2

*(*If you do not have a station/antenna on the air, please skip directly to the questions printed on the survey card. You will still be eligible to win a free subscription.)*

If you have a station/antenna on the air, please indicate...

2. ... the frequencies for which you have an antenna/antennas (circle all that apply)
- MF/HF 3
- VHF/UHF 4
- Microwave 5
- Satellite 6
- Other 7

3. ... whether you have antenna(s) for (circle all that apply)
- Home/fixed station use 8
- Mobile (car, van, or truck) use 9
- Mobile (bike, boat, or plane) use 10
- Handheld/portable use 11
- Other 12

4. ... if your antenna is/antennas are (circle all that apply)
- Homemade from own design 13
- Homemade from published design 14
- Commercially built 15

5. ... if your antenna(s) was/were (circle all that apply)
- Installed by you, working alone 16
- Installed by you, with help 17
- Professionally installed 18

6. ... if your **home station antenna(s)** is/are (circle all that apply)
- Indoors 19
- Outdoors 20

7. ... what type of **home station antenna(s)** you have (circle all that apply)
- Yagi 21
- Quad 22
- Vertical 23
- Dipole 24
- Other 25
- No home station antenna 26

8. ... if your **home station antenna(s)** is/are supported by (circle all that apply)
- A tower 27
- A roof/wall mount 28
- A balcony/deck mount 29
- Trees 30
- Other 31
- No home station antenna 32

Thank you for your responses. We'll have more questions for you in our next reader survey.

Meet Our New Family of Mobile/Base Transceivers

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Additional features include:

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- AM Airband RX (118 ~ 136 MHz)
- Extended Receive 136 ~ 174 MHz (FM)
- MARS capability
- 50/10/5 watt power output settings
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- Extended receive 216 ~ 280 MHz (FM)
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- 25/10/5 watt power output settings
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DR-435T/TG 440 MHz FM Transceiver

NEW!

Additional features include:

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- Extended receive 350 ~ 511 MHz (FM)
- All memories capable of odd splits
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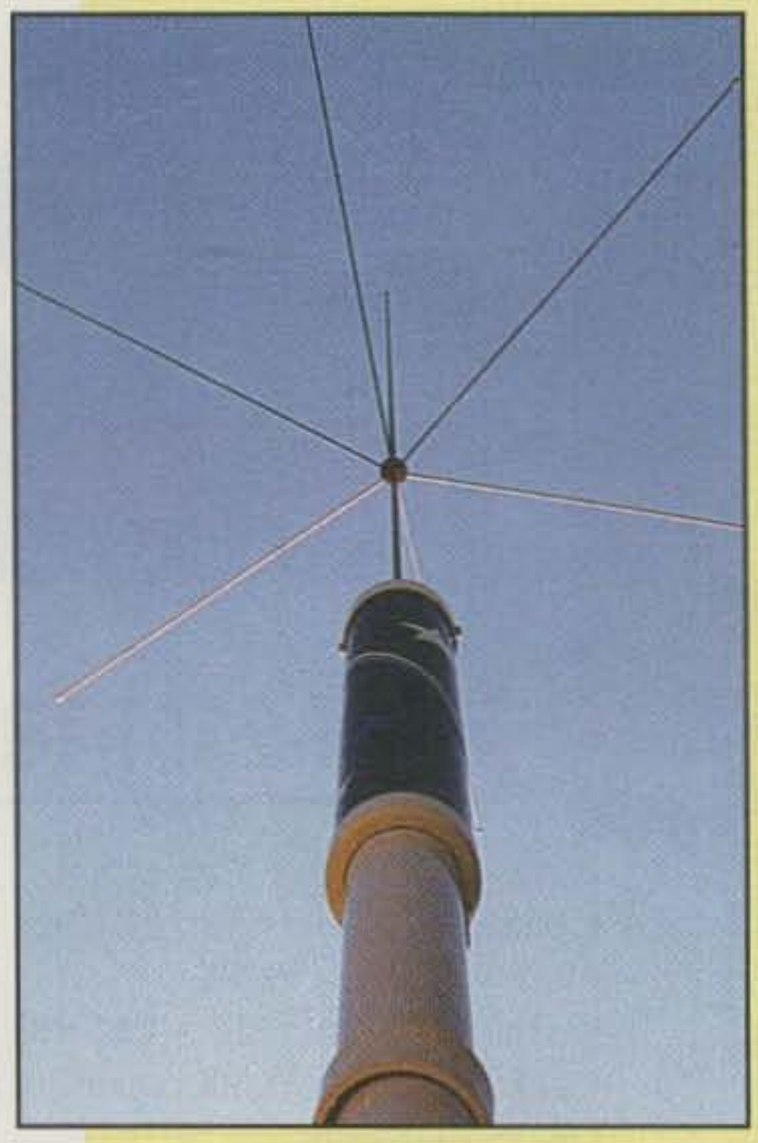
Whether you're looking for a big signal from your mobile HF station or a way to get on the air from a home with antenna restrictions, the High Sierra HS-1500 MkII is certainly worth a close look.

CQ Reviews:

The High Sierra HS-1500 MkII Antenna

BY GORDON WEST,* WB6NOA



Thinking of graduating from an adequate HF mobile signal to a *big* signal that almost sounds as if you are transmitting from home? While inexpensive center-loaded and helical ham whips may do the job, *bigger* is definitely *better*—especially on 40 and 75/80 meters!

Jim Heath, KB6SX, at High Sierra said he had just the antenna and mount for our communications van, and that might require all of a half hour to get it up and running. Now wait a minute. The big High Sierra antenna *must* have a good, secure base mounting, along with an absolute zero-ohm base ground connection to our van chassis. When Jim reminded me of our already-installed regular trailer-hitch receiver, it became clear the High Sierra could mount on almost any vehicle with a similar receiver in just minutes.

The High Sierra HS-1500 MkII is a motorized, continuous-coverage, high-frequency, variable center-loaded quarter-wave antenna that may tune from 3 to 50 MHz. A motor inside the lower section drives the coil up or down the shaft to achieve resonance. The coil is rated to handle up to 600 watts, and the more you can add to the 72 inch whip atop the coil, the fewer turns are necessary to achieve resonance. Jim uses a cat-whisker capacity hat to top load the antenna and decrease the number of coil turns. His version of the capacity hat with its six little stingers pointing up at a 45-degree angle keeps everything in place with a now and then encounter with tree foliage. You can move the capacity hat "grip point" up and down the stainless steel whip, but almost everyone agrees that about 12 inches up from the top of the coil is the best place to tighten down the little upward stingers.

Down at the base, the High Sierra uses an exposed shunt coil we measured at approximately 1.5 micro-Henrys. The coil is exposed so that you can spread it out slightly, or push the windings closer together to optimize your feedpoint impedance on either 40 or 75 meters. The well-illustrated, 20-page instruction manual has many photos and diagrams that show you how to achieve a low-reactance ground, plus there are tips on where to mount the antenna on different types of vehicles. The photos will give you a good idea of where and how you can mount the High Sierra for the best signal.

We were supplied with a 3 foot tube as an extension mast for trailer-hitch mounting. High Sierra calls it the "RV Mast," and you remove eight screws in the bottom of the brass base, add the extension two-conductor motor cable with professional plugs already attached, screw on the extension, and then insert the coupling into the bottom of the antenna and reinstall the eight screws. The High Sierra "universal mount" will provide the support needed for the big antenna, and it has the exclusive High Sierra "easy off" tapered brass stud on which the antenna rests and picks up the center conductor of the SO-239 coax connector. An upper stainless-steel hose clamp securely holds the antenna in place with an insulating collar to keep the outside "hot" tube from shorting out to the grounded mount. To safely store the antenna, simply loosen the hose clamp and pull the antenna up and out. All you will need to do is unplug the red and black motor wires with their waterproof plug connection.

The High Sierra motorized antenna is shipped with a remote-control panel which includes a two-way switch and an "end of travel"-warning, light-emitting-diode indicator. The motor pulls the tube

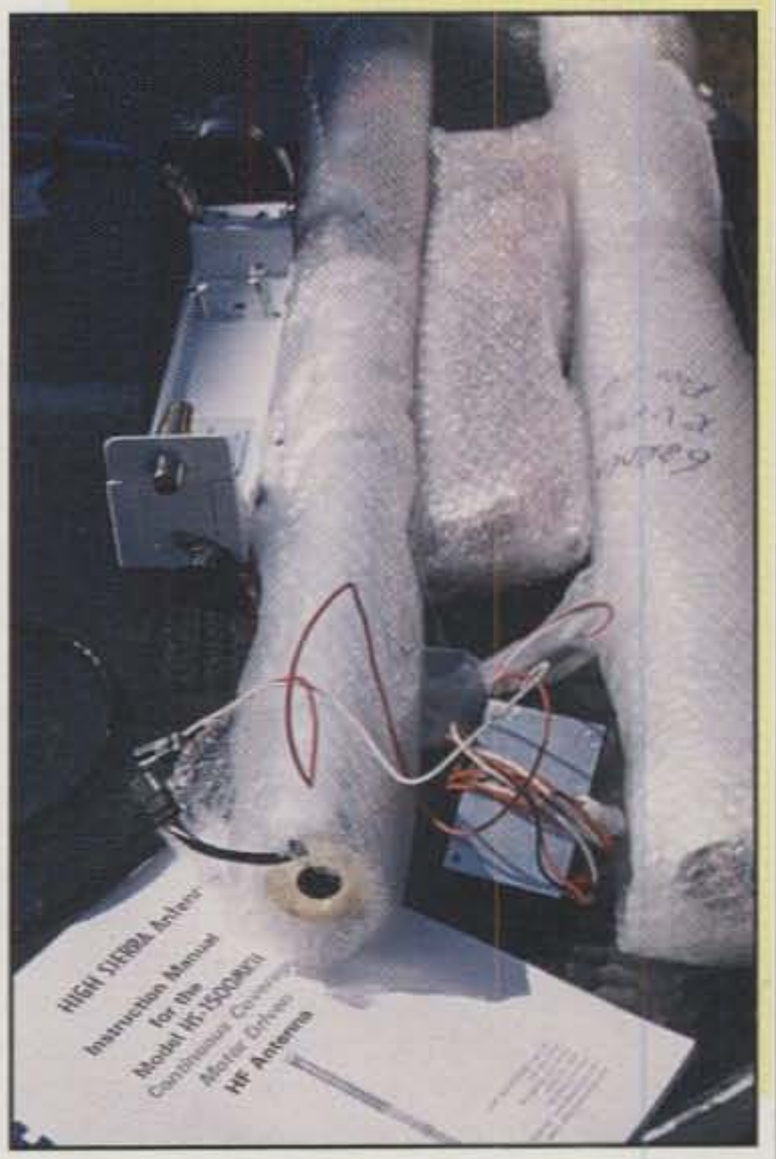
*CQ Contributing Editor, 2414 College Dr., Costa Mesa, CA 92626
e-mail: <wb6noa@cq-amateur-radio.com>

up and down over the loading coil, and you can watch the process through the clear window. We measured the time to go from no-coil to maximum-coil, and it took only 49 seconds. The momentarily up or down switch reminds you to keep an eye on the tuning process, and the little LED indeed begins to glow when the motor dogs down at the end of the excursion.

During the tuning tests we easily could hear the resonant "sweet spot" just by listening to background noise. Although we could hear some motor noise coming over the receiver, the sharp increase in background noise got us in close for a little touching up on transmit. Even down on 40 and 75 meters the feedpoint impedance was high enough to still give our equipment a good match without using the built-in automatic antenna tuner. This is due to the shunt coil and the good ground at the base.

If you want this all done automatically, the Am Com automatic tuner for the High Sierra has been working well for Ben Hathaway, N6FM, an HF radio guru in the Santa Cruz, California, mountains. Every morning we work HF mobile-to-mobile and mobile-to-base, and it gives us a good opportunity to try out different types of mobile HF antennas.

During the tests on the communications van, we found that the six-rod capacity hat along with the center whip tip capacitively loaded the antenna so that we didn't need *any* loading on 20 meters. It was a natural one-quarter



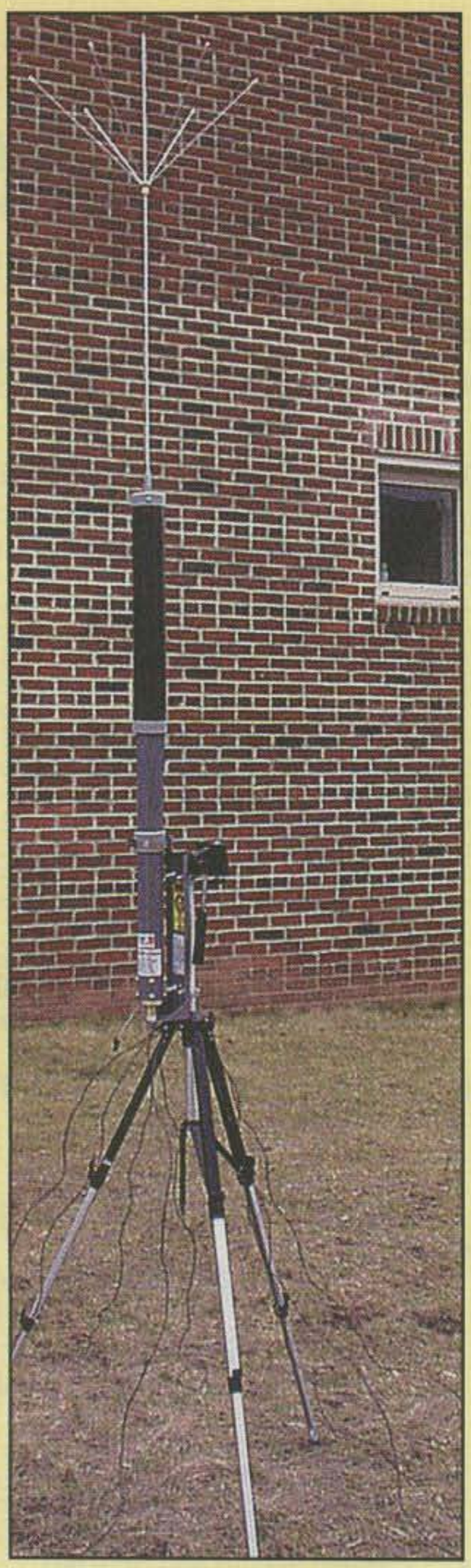
The HS-1500 comes with just about everything you'll need to get up and running quickly. Everything is well-engineered, well-built, and well-packaged.(WB6NOA photos, except as noted)

wavelength! Thus, to get 6, 10, or 15 meters, or any frequency in between, the capacity hat should come off, or you might even remove the entire whip assembly atop the coil. Now the antenna becomes top loaded and works well on the higher HF bands, including 6 meters.

The mobile antenna base includes an exposed shunt coil (on left side) that you can tweak for better tuning. The antenna itself slides onto the brass fitting for very quick and easy connect/disconnect.

The HS-1500 MkII/MVA For Fixed-Station Use

By Rich Moseson, W2VU



The fixed-station version of the HS-1500 MkII, the MVA, sets up quickly and easily on just about anything, including a camera tripod. (W2VU photo)

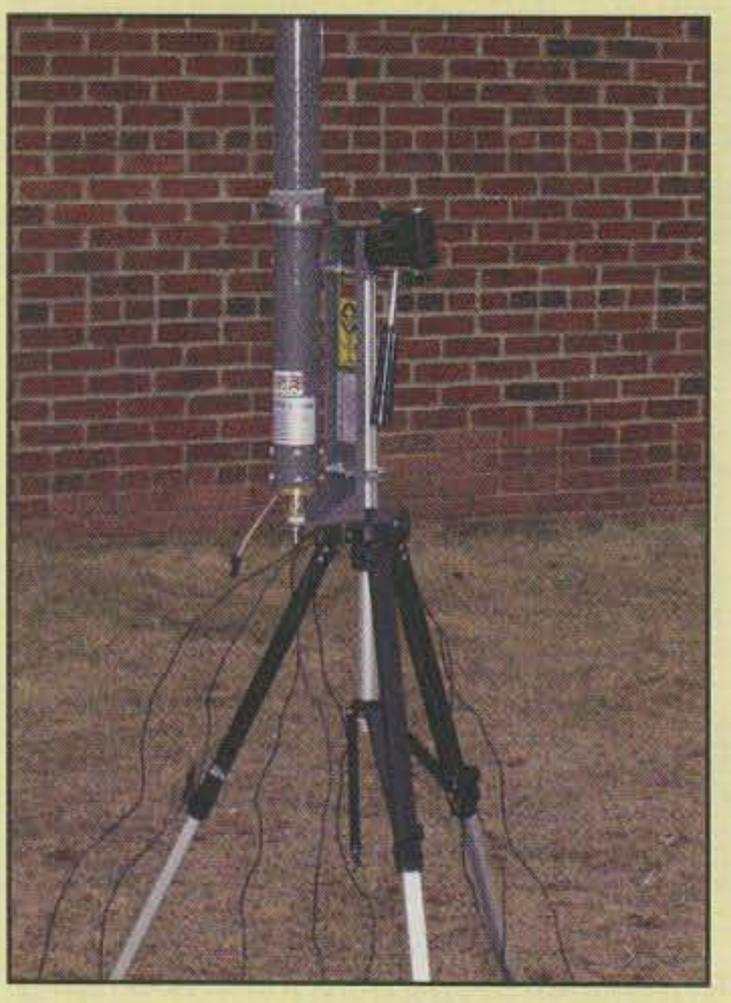
High Sierra has created a version of its HS-1500 MkII mobile antenna for use with fixed stations by hams who cannot put up larger or permanent antennas. The HS-1500 MVA (for Motorized Vertical Antenna) is a full kit containing just about everything you'd need for a fixed-station installation. The package includes the basic antenna with a 3 foot whip for a total height of between 6 and 7.5 feet (just right for decks and such, and it appears that the six stingers in the capacity hat are shorter than on the mobile model, a good idea since they're more likely to be within people range), a blend-in gray color so you don't stand out, a special base without the shunt coil but with a connector for the eight included 10 foot wire radials to be rolled out as a counterpoise, a 1000 watt power rating, and a 50 foot roll of cable that includes RG-58 coax and a 2-conductor DC power line for the antenna motor. Also included are the remote-control switch box and two coax connectors. The only extras I needed to supply were an inline fuse for the power line and a 12 volt DC power source.

Assembly is straightforward, but the manual assumes you already have some experience putting things together and will know that the red and black wires running next to the coax in the 50 foot cable are power leads for the motor. The control cables and power leads need to be soldered to certain points in the switchbox, and the coax connectors need to be attached to the ends of the feedline. The whole process took me about a half-hour. Nothing major or complex here, as long as you've done it before. A beginner might find it a bit confusing and would be well-advised to get some help from a more experienced ham.

Once the control cable is put together, assembly and disassembly of the antenna is incredibly quick and easy. I mounted the base on a camera tripod and set up the antenna in my back yard, dragged my rig up to the dining room (for easy access to the feedline), and hooked it all up. The whole thing took 10 minutes. I tuned up on 40 meters using the built-in SWR meter on my rig—very sharp tuning, as you might expect—and almost immediately made contact with a station in northern Virginia. He gave me an excellent signal report and we spent a few minutes discussing various portable antennas. Very pleasant QSO, about the distance I'd expect on 40 in the afternoon, and good signals both ways. In other words, *it works!*

My MVA arrived as I was getting ready for a four-week hobby radio mini-course at a local elementary school. I figured this would be the perfect test and it was. I set up there twice, the first time only to listen (it was for a segment on shortwave listening) and the second time to transmit. I used the tripod again on my first installation at the school. Again, the whole thing was up inside of 10 minutes, and it took about that long to get it taken down and put away when I was done. The antenna worked very well on receive and the kids loved watching it go up and down as I keyed the switch!

On my second setup at the school, it was too windy to use a tripod, so I hooked up the mount to a walkway railing (the $1^1/8$" U-bolt was just a little too small for a standard fencepost, which I guess is either $1^1/4$" or $1^1/2$"). The U-bolts held everything very securely in place and, again, everything was set up and ready for use in less than 10 minutes. Back inside, we got on 10 meters, quickly found a good match (tuning is broader on 10 than on 40), and worked stations in northern Minnesota and California.



Note the eight 10-foot radial wires attached to the antenna base. They serve as a counterpoise for fixed-station operation. When you're done, you can simply roll up the wires and leave them attached to the base. (W2VU photo) →

While the antenna is marketed for hams with antenna restrictions—and will be an excellent option for those amateurs—I found it was also an ideal antenna for demonstration stations and other temporary setups, including HF emergency communications. It's low-profile, easy to set up, and secure even in windy conditions. The motor runs on 12 VDC, so it's not reliant on 117 VAC mains being up, and it gets out just fine. I would highly recommend it not only to hams with antenna restrictions, but also to any hams or clubs that regularly do demonstrations or need the capability for temporary, quick set-up, HF operation—especially ARES/RACES groups.

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The fully assembled HS-1500 MkII on the back of WB6NOA's van. The bottom section is an optional extension rod for using the antenna on tall vehicles.

The antenna base mounts securely to the trailer-hitch receiver on the back of WB6NOA's van, which also provides an excellent point for a solid ground connection. A good ground to the vehicle chassis is essential for mobile use.

Jim indicates that some hams have found 10 and 15 meter resonant spots *with* the whip and capacity rods in place by tuning down the coil and looking for a secondary or tertiary "sweet spot," maybe hitting three-quarter wavelengths of the shorter wavelength bands. Jim's motto is, "The idea here is just have fun and configure the system that gives you best performance." However, he's also quick to add the importance of *major* grounding to the vehicle frame at the base for best performance. I would also recommend using Coax Seal™ to seal up the exposed coaxial cable connector I saw just hanging out bare in the breeze in many of his photos of High Sierra users.

How did the High Sierra antenna compare with other big-coil antennas we have used on the van? I will say that the High Sierra with its supplied (but optional dollars) trailer-hitch receiver mount made for a fast and secure installation without worry of losing the entire antenna system on an expressway. We also found the motor-drive system much faster than that of other motorized antennas we have tested. We noticed that the lower in frequency you plan to operate, the *higher* the whip tip goes up into the air. Keep in mind your local and state regulations on antenna height (not to mention overpass heights!), especially when operating down on 80 meters.

Performance on 40 and 75/80 meters showed a dramatic improvement over inexpensive, lightweight whips. On 40 and 75 meters the performance was what we have always found by s witching from small whips to big coil antenna systems. We have seen that capacitive top-hat loading, combined with a well-designed large coil and quality coil pick-up fingerstock, leads to a terrific signal on 40 and 75 meters that otherwise might be lost in the noise with just a short, low-cost quarter--wave whip. Actually, Jim says the High Sierra doesn't use fingerstock, which he says tends to fail over time, but rather a patented torus-shaped, stainless-steel spring, which (according to the manual) makes contact with the coil at 120 points. It looks good in motion, and Jim says the High Sierra antenna holds up well in heavy rain as well as snow and ice. Also, with that 45 second from top to bottom motor-drive system, you can be assured of getting from one band to the next in a matter of seconds, letting your ears do the initial resonating of the coil, and then a little bit of AM tune-up to drop that SWR to a nice low dip.

The base price for the HS-1500 MkII is $325, but High Sierra offers a variety of packages (platinum, gold, silver, and bronze) with different accessories at discounted package prices. For more information on the antenna, log on to <http://www.hsantennas.com> or give Jim a call at 530-273-3415. Here is yet one more big-coil, high-performance antenna system that has worked out well during our comm-van antenna trials. We had it out of the wrappers and hitched it up in less than 25 minutes!

In spite of the events of September 11th, last year five members of the Florida DXpedition Group traveled to Dominica and gave that country to "the deserving" in the CQ WW DX SSB Contest.

Team Dominica – J75J

BY CLARENCE J. KEROUS,* W9AAZ

In the spring of 2001 five members of the Florida DXpedition Group (FDXPG) started planning a Multi-Single effort for the CQ World-Wide DX SSB Contest in October. It was decided that the island of Dominica would be our target for the operation. Bill, W4WX/J75WX (the DXpedition leader), Clarence, W9AAZ/J79AA, Bob, KR4DA/ J79DA, William, N2WB/J79WB, and Larry, W1LR/J79LR, would be Team Dominica.

I had read an article in an old issue of *QST* about a DXpedition to Dominica as J75A back in 1995. It had taken place at Picards Beach Cottages just south of Portsmouth. Bill, W4WX, contacted the owner of the resort by e-mail, and we reserved two beach-front cottages for October 23–30. Bill assigned each of us tasks to be done before and during the trip. Bob, KR4DA, was assigned the job of obtaining our licenses. He contacted the PTT in Roseau, Dominica, and sent them a copy of our U.S. licenses along with the proper fee for each license ($68.00 East Caribbean dollars, or $25.50 USD). Bob also asked for a special callsign to be used during the CQ WW; we were assigned J75J for an additional $25.50 USD.

Picards Beach Cottages does not specifically cater to hams, so we planned to take three rigs, two amplifiers, and four antennas which we intended to set up as close to the beach as possible. Bill, W4WX, drew up a "short list" of gear for the trip to J7 land: two Kenwood TS-570's to be used for the run and multiplier stations and an Alinco DX70T to be used for casual operating before and after the contest; two amplifiers, an Alpha 91-B for the run station and a Heathkit HA-14 for the multiplier station; two vertical antennas, a Hy-Gain Patriot AV-640 for 40–6 meters and a Hustler 5 BTV for 80–10 meters, plus a Hy-Gain TH-2 MK-3 beam for 10/15/20 meters and a wire inverted-Vee for 160. (We had a hunch that the verticals would play pretty well right on the beach, and we were not disappointed!) We also added to the list a lot of miscellaneous gear such as watt meters, a Nye Viking 1 KW tuner, 500 feet of coax, etc. We planned for everything we would need to get us on the air on all bands. As you can imagine, all that gear plus three laptops, food, clothes, etc., would make a formidable amount to transport. We were now all set to go—or so we thought.

Then the unthinkable happened on September 11th. Along with the rest of the world, we were stunned. After a few days the reality set in, and we thought too of the trip ahead. The airlines were grounded, and it looked as if our journey to Dominica would be over before it started. As planes began flying again, though, we

J75J, Team Dominica for the CQ WW SSB 2001. Front row (l. to r.): William, J79WB; Larry, J79LR; Clarence, J79AA. Back row (l. to r.): Bill, J75WX, and Bob, J79DA.

Picards Beach Cottages. Our two cottages were on the far right. The two verticals and the beam were in the front of the last cottage on the right.

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decided that if at all possible we would make the trip.

We soon had a lot of concerns, as daily the airline regulations were changing—no carry-on bags, luggage limitations, security tightened. We all hoped for the best as our departure date drew closer. By the third week in October things had gotten back to some degree of normalcy on the airlines, so we decided to give it our all and attempt the trip.

At 1:00 AM on October 23, 2001 we loaded five operators and our mountain of luggage and gear into two pickup trucks and headed for Orlando International Airport with our collective fingers crossed. We would be flying from Orlando to San Juan, Puerto Rico, and then on to Dominica. There were no hitches at the Orlando airport except my carry-on was checked by security, as it contained the Kenwood TS-570 and an Alinco DX70T. The security people asked what they were, and what I was going to use them for, and I explained we were ham radio operators going to Dominica for a radio contest. This seemed to satisfy them, but they then wiped the radios with a special swab and placed them under an ultraviolet light to check for explosives residue. Finding nothing, I was allowed to secure the rigs and close the bag.

At 7:00 AM our flight took off for San Juan. We landed 2 1/2 hours later without incident. Then we boarded an ATR-72 turbo-prop for the flight to Dominica. Strangely enough, this time there were *no* security checks at all. After a smooth, uneventful flight we landed at Melville Hall International Airport in Dominica. We cleared immigration, where our passports were checked and stamped. We then went to claim our luggage, but it was nowhere to be found. We learned that there was so much luggage and mail for Dominica that it was coming on another plane. It arrived an hour later. We then proceeded to customs, where Bill, now J75WX, presented the customs officer with a typewritten list of all of our radio gear, including serial numbers. We were cleared through customs in a few minutes.

Outside we were met by Clement James, J73CI, who runs a bus and tour business on the island. We had arranged for him to transport us and our luggage to the cottages, which are on the opposite side of the island from the airport. The ride to where we would be staying for a week took about an hour to go 25 miles. Dominica is a very rugged and mountainous country. Slow going on the roads is the order of the day!

We finally arrived at our destination at about 5:00 PM and unloaded our luggage and settled into our two cottages, which were 25 feet from the ocean. It began to rain (Dominica has over 400 inches of rain a year) and it was dark, so we decided against trying to get any antennas up at that point and just settled in.

Bill, J75WX (left), works a howling RTTY pile-up, while Bob, J79DA, gives Dominica to the deserving on PSK-31.

The next morning we walked into Portsmouth to stock up on provisions. When we returned to the cottages, we took a few minutes to scout out where we would put up our antennas. At the same time we could not help but notice the beautiful view. We were right on the beach of Prince Rupert Bay on the northwest coast of Dominica, on the eastern shore of the Caribbean Sea.

We split into teams to erect the antennas. Larry, J79LR, and Bob, J79DA, assembled the Hy-Gain Patriot AV-640 and lashed it to a small picket fence no more than 20 feet from the edge of water. Bill, J75WX, and William, J79WB, and I (now J79AA) first assembled the TH-2 MK3 beam, and with the help of the entire team we got it up and secured. Again it started to pour, but we kept going and assembled the Hustler vertical and had it up in no time. We unrolled the wire radials and stretched them out, using rocks to hold them in place on the sandy beach. Happily, the AV-640 did not require the use of any radials at all. We then put up the 160 wire inverted-Vee in a convenient tree and secured the ends as high off the ground as we could. We ran the four runs of coax into the radio-shack cottage. We set up the two Kenwood TS-570's, plus the Alpha 91-B amplifier for the run station and the Heath HA-14 for the multiplier station. I then set up the Alinco DX70T on a small table in the corner.

Finally we could get down to the reasons we were there: DXing, pile-ups, and the CQ WW! William, J79WB, was the first one on and had an almost instantaneous pile-up on 20 meters. Bob, J79DA, set up his laptop computer and Rig Blaster, and had a gigantic pile-up on RTTY using MMTTY; he later had an unbelievable time on 20 meters on PSK-31 using Digipan. I used the little Alinco DX70T on 10 meters SSB and was rewarded with a huge pile-up. Needless to say, the two verticals next to the ocean salt water really smoked. We were getting reports of 30 to 40 over 9 from all over the world! Later Bill, J75WX (J79WX was not available), got on 20 meters and fired up his KAM-Plus and in a few minutes had an earth-shaking pile-up going on RTTY. It got so heavy he had to work split. Apparently, Dominica is quite rare on RTTY and PSK-31. With three stations up and running we could operate almost whenever we wished. In the evening using the Alinco DX70T I got on 20 and then 30 meters CW with my trusty old Speed-X straight key. The chaos was awesome!

The next morning I was up at first light, around 5:00 AM. Using the DX70T again I was on 30 CW and got a howling pile-up going, working mostly JA stations. This time I was using my 1958-vintage Vibroplex Lightening Bug key. Surprisingly, as soon as the sun actually came up, the JA's faded out very quickly. I then started to work lots of stateside stations, including Roger, K9RB, our pilot station back home in Florida. Whenever the DX70T was not being used, we left it on 6 meters and listened on 50.110 for an opening. Also I called "CQ 6 Meters" time and time again to no avail. During the entire week we only managed to work a couple of stations in Brazil. That was very disappointing indeed.

This was how we all whiled away the days before the CQ WW, working pile-

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The multiplier master, Larry, J79LR. He could find a new multiplier anywhere!

ups, sightseeing, and of course taking a few well-deserved siestas now and then. What a life!

The Contest

Friday soon rolled around and the CQ WW DX SSB Contest loomed ahead. A few hours before the test started we stopped all casual operating. We got the run and multiplier stations set up and ready to go. We linked two laptop computers using the popular CT V.9.65. Finally all was ready, as the last minutes before the contest ticked by. Bill, J75WX, had made up a schedule for the entire contest weekend. I would get the first shot on the run station to start the contest. William, J79WB, would get first crack on the multiplier station. As the last seconds before the start of the CQ WW ticked by, we were tense with excitement. The clock on CT rolled over to 0000Z and the CQ WW SSB 2001 had begun!

I hit the foot switch and called "QRZed contest from Japan 75 Japan J75J." As soon as I let up on the switch I had a monster pile-up going on 20 meters. I have a habit of talking very fast, and in the excitement of the contest the rate counter on CT was well over 300 QSOs per hour at times. Band conditions were fabulous. William was on 15 meters working new multipliers right and left.

Our first shift went by in what seemed like only a few minutes instead of the hours it was. Soon we were relieved by Bob, J79DA, and Bill, J75WX. It was a welcome relief, as working the pile-ups in the beginning of the CQ WW can drain you in a short time. I went for a little shut-eye, but all too soon it was again time to man the hot seat of the run station.

It was early morning, and I spent my time on 40 meters working split and then on 80 where the QRM was brutal. I next QSYed to the Top band, 160 meters. We had high hopes for 160, but they did not materialize. We had a hard time working a lot of stations even though we were running a full KW. We figured it was because the 160 antenna was under the trees, and also it rained every night, keeping the trees and leaves soaking wet. Nonetheless, we did the best we could on 160.

My next shift was on the multiplier station, and after it ended I had to cook breakfast for the boys. I then managed to get a few hours sleep before it was back to the old grind on the run station. By now it was Saturday afternoon and 10 meters was wide open to everywhere all at once. Ten meters proved to be our best band, with almost 2800 QSOs.

My next shift was the run station on Saturday night, and I stayed on 40 meters. I went down to around 7.060 MHz and started calling "CQ Contest from J75J, listening this frequency and 7224." I had twin pile-ups. I logged contacts as fast as I could type them into the computer. I never could get those two pile-ups worked down and turned the chaos over to my relief, William, J79WB. After a few hours of fitful sleep I was once again up and at it again on the multiplier station. At the end of this shift I rustled up a hot breakfast for everyone and then slept as best I could.

When I awoke it was Sunday afternoon with the finale of the CQ WW approaching. I had the honor of the final shift on the run station, and the few hours before the end of the contest were unbelievable. The pile-ups were immense. Near the end 15 meters opened up to Japan with what seemed like thousands of JA's calling. It was almost impossible to pick out a callsign. I did the best I could, and soon the clock once again rolled over to 0000Z. I transmitted "It's over. This is J75J QRT. Thanks to all who worked us." I took off the Heil Pro set and got up from the run station as Bill, J75WX, saved the logs and backed up everything to disk.

Post-Contest

You might wonder what one does after operating 48 hours full bore in the CQ WW? It's simple—get on the air some more!

Bob, J79DA, got on 15 meters and worked a lot of JA stations. William, J79WB, went to 20 meters and soon had a roaring pile-up going again. What did I do? I made some supper and went to bed for a good night's sleep, but once again I was up at 5:00 AM the next day. At first light William, J79WB, also was up, and you guessed it: We got back on the air. William went to 20 SSB and I got on 160 CW with the Alinco DX70T and my trusty, rusty, old Speed-X straight key. I worked a goodly amount of stations on 160, and then QSYed to 30 meters CW and worked a nice pile-up. We all spent Monday morning operating, sleeping, or doing whatever else we wanted to do. On Monday afternoon we took down the Hy-Gain Patriot AV-640, the TH-2 MK-3 Beam, as well as the 160 wire antenna. We packed those away in preparation for leaving on Tuesday afternoon.

We left up one antenna, the Hustler vertical, to use Monday evening and Tuesday morning. We all got on the air for a while, and when I went to bed on Monday night William was cranking out the QSOs on 20 meters SSB. I swear, he calls CQ in his

The author, Clarence, J79AA, at the multiplier station.

sleep! I guess I went to bed too early, as I was wide awake at 4:20 AM. I got up, fired up the TS-570, and put the Alpha 91-B on 20 SSB. I figured the band would be dead, but I was surprised to find a lot of stations calling me after a short CQ. They were in the States, Europe, and JA, as well as some VK's. I logged close to a hundred contacts, and then heard William stirring. He got up and I gave him the rig to work his own pile-up for a while. At 7:00 AM, Bill, J75WX, came by and had a great time in a pile-up of his own. Finally at around 9:00 AM the station fell silent as we secured it and took down the Hustler vertical and packed it for the trip home.

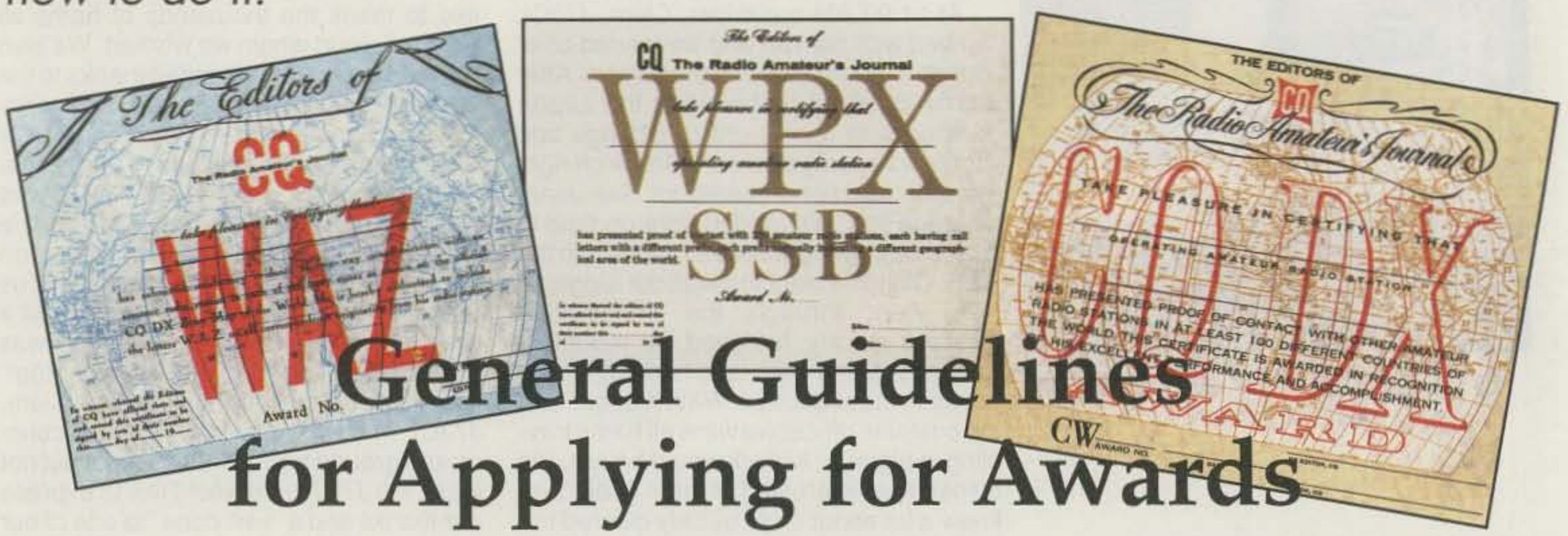
At 11:00 AM our driver, Clem, J73CI, arrived with his van and we loaded all of our gear and headed to the airport. After some logistical problems at the airport dealing with the weight of luggage and the new security checks, we took off right on time and set a course for San Juan, Puerto Rico. We landed right on time in San Juan, where we were herded into the U.S. Customs area to await our luggage. We went through the immigration process quickly, retrieved our mountain of luggage and gear, and headed for the customs area. Bill, now W4WX again, told the customs officer we were all hams traveling in a group. As luck would have it, the officer was interested in ham radio and knew a lot about it. He quickly cleared the five of us with no delays. We grabbed our carry-on bags and headed for our flight home. We touched down at Orlando International Airport, retrieved all our bags and piled them into the back of our two pickups, and headed home.

We were glad we had made the trip. We heard that a few other CQ WW operations had been cancelled because of the terrorists attacks on September 11th. We were resolute from the moment they happened that we would go if there was any way possible. Looking back, we faced few problems with travel compared to what they could have been. We were very lucky.

The members of the J75J team would like to thank the thousands of hams all over the world whom we worked. We also would like to extend heartfelt thanks to the staff at Picard's Beach Resort, and especially to Sandie, who was an angel. We extend our sincere gratitude to a very special person, Roger Borowski, K9RB, who was our pilot station during the trip. He was in almost constant contact with us on the air and also ran phone patches for us to our wives and families. It gave us all a great sense of security knowing he was there for us. From all of us, "Thanks, Rog!" Also, a very special thank you to Clem, J73CI, who was so helpful with our licenses and ground transportation. Last but not least, the J75J team would like to express our thanks and a "well done" to one of our team members, Larry, W1LR/J79LR, for manning the multiplier station for countless hours beyond his scheduled time. This allowed the rest of the team to get some much-needed rest. Larry also did a bang-up job of searching out and working new multipliers. Great job, Larry!

The world certainly has changed since September 11th, and so has the challenge of DXing. Will this deter us? I think not, as we are already planning for CQ WW 2002!

If you want to improve your chances of receiving an award in a timely manner, and also make the award manager's life a bit easier, here's how to do it.



General Guidelines for Applying for Awards

BY PAUL BLUMHARDT,* K5RT

Chasing awards in our hobby can be fun and rewarding. It's a test of your station and your dedication to the hunt. There are many different awards available to amateurs, but all have a few things in common that you must do in order to receive your piece of "wall paper."

Rules

Probably the single most overlooked item is the most obvious—the rules for the award. Rules for awards do change from time to time. You should do one of two things to make sure that you have the most current rules:

1. Search the internet for the rules for the award in which you are interested. Don't stop at the first source and assume that those rules are the most current. Check a few other websites to see if the rules posted there match the first set that you found. One regularly updated site, <http://www.dxawards.com/>, is run by *CQ* "Awards" column editor Ted Melinosky, K1BV. Six dollars will get you a year's access to the rules for over 3000 awards.

2. If you are not on the internet, contact the sponsor of the award via "snail mail" and request a copy of the rules and an application form. Be sure to include an SASE or an SAE with IRCs or green stamps to cover the postal expense.

Next, read and understand the rules. Don't try to read anything into the words. Sometimes people have a tendency to make the obvious harder than it needs to be. However, if something isn't clear, ask for clarification.

Card Checking

Many of the "smaller" awards don't require submission of QSL cards. These awards may require that you supply the QSO information (a log extract) that has been witnessed by one or two other amateurs. There are generic award application forms available on the internet or from DX clubs. All will have the same basic information required: your name, your callsign, and your mailing address, and will provide a place to fill in the QSO information and a place for you to sign that the information supplied is true and correct.

The major awards—such as DXCC, WAZ, WPX, VUCC, WAS, and CQ DX—all require that QSL cards be presented with your application for checking. Here are some suggestions about QSL cards and submitting them.

1. Check the card carefully. Don't submit a QSL that has been altered.

2. Make sure the date of the QSO is within the terms of the award for which you are applying. Some awards require that QSOs be made before or after a specific date in order for them to count.

3. Make sure your card clearly indicates the callsign of *both* stations, the date, time (in UTC), frequency (or band), signal report, and mode. Many awards do not allow crossband or cross-mode QSOs; be sure to check this on your card.

4. Arrange your QSLs for checking in the order that they appear on the application. There is nothing more burdensome for an award manager or card checker than to have to sort the cards into order before checking them. If you have multi-band QSLs be sure to indicate the bands that the cards are being used for on a separate sheet of paper.

The Application

Make sure that the application is filled out correctly and is legible. Make sure your handwriting is readable. Either type or write using block letters to complete the application. Print your name *exactly* as you want it to appear on your award.

Poor handwriting increases the chances of having your name spelled incorrectly on your certificate. If the award manager can't read your handwriting, he may be able to track your name down via one of the call books, but if he can't, your application may be set aside until you inquire about the status of your award. Either way, you've added time to the delivery of your certificate and made the award manager's job a little more difficult.

Application Fees and Return Postage

Some award sponsors have elaborate systems in place for tracking the funds that you have provided over time. However,

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

most of them do not. Don't assume that everyone keeps a "balance" for you. It's simpler to supply the correct fee and be as close to the suggested return postage as possible.

Be sure to check the rules for accepted methods of payment. Frequently, credit cards cannot be accepted nor can personal checks. A good rule of thumb to follow is to supply the currency used by the sponsor of the award (U.S. Dollars, Pound Sterling, Eurodollar, Yen, etc.). Don't send your local currency to award managers (unless they are in the same country as you). This will cause them additional work, since they will have to exchange the currency.

Personal checks can also be a problem. As an alternative, consider a Postal Money Order for international use or a bank teller's check for domestic use. Here again, the rules for the award will indicate the forms of payment that will be accepted by the sponsor.

Last, but not least, is the venerable IRC. Be sure to include the correct number per the award rules. Most awards state the IRC conversion rate that they use (such as 2 IRCs per U.S. Dollar).

Including an SASE is always appreciated for return of QSLs. Just make sure to use the postage of the country from which your cards will be coming back to you. Korean stamps on an envelope being mailed from the U.S. won't work.

Miscellaneous

When sending fees through the mail, it is a very good idea to use Registered Mail for security. In many countries theft of the mail is a problem. Don't put callsigns on your envelopes. Hold your envelope (with application and fee inside) up to a bright light and see if you can see the currency inside. If it's obvious to you, then it will be to a thief.

When you send your fee, put a brief note in with it explaining how it is to be used. Clearly indicate how much for return postage, how much for the award itself, how much for special handling, and anything else that the award manager might need to know.

Be patient. Don't pester the award manager with inquiries about the status of your award until at least 120 days have gone by.

Don't ask for "special favors." Doing lots of "favors" means lots more work for the award manager. If the rules say the cards must be mailed for checking by the award manager, then that's what needs to be done.

Most important, have *fun* chasing your award! ■

Eureka! A trap dipole for ANY two HF bands that can be shrunk to fit a small space[1]!

The ES2B
(Electrically Shortened Two-Band) Dipole

BY GEORGE MURPHY,* VE3ERP

This is more of an idea provoker than a construction article, because the ES2B dipole is an experimental antenna custom designed by *you* (no knowledge of, or experience in, antenna design required!) and therefore can only be proven by designing and building one.

Before getting all excited about the prospect of an ES2B dipole gaining you entry into Antenna Nirvana, be aware that the ES2B (like all shortened dipoles) may not be as efficient as a full-size half-wave dipole. However, be an optimist. Look at its performance on each band not as being X% *worse* than a full-size isotropic[2] dipole, but as being Y% *better* than one of those short noodles mounted on the roof or trunk lid of a plastic-body car, or installed in an attic or on an apartment balcony railing. Somewhere between the isotropic dipole and a noodle, an ES2B antenna in a restricted space can be a viable alternative to no antenna at all!

Jerry Hall, K1TD,[3] developed an elegant equation (fig. 1) for physically shortening a dipole while substantially maintaining its electrical properties by adding loading coils somewhere along each leg. This equation is the conceptual core of the ES2B dipole design. For those of us (including me) who are frightened by complex equations, fig. 2a is the K1TD equation translated into a simple BASIC computer program.

There is nothing mysterious about an ES2B dipole. It is simply a trap dipole with its lower frequency elements physically shortened to fit a small space, maintaining the electrical properties of its lower operating frequency by attaching an additional loading coil *L2* to trap coil *L1* (see fig. 3d). Together *L1* and *L2* function as an inductive-load *L3* to physically shorten the antenna.

*77 McKenzie Street, Orillia, ON, L3V 6A6, Canada
e-mail: <ve3erp@encode.com>

Evolution of the ES2B Antenna

Fig. 3a is a half-wave dipole with a physical length (in feet) of 468/(freq. in MHz). Add a couple of loading coils, *L2*, and you have an electrically shortened dipole (fig. 3b) somewhat shorter than 468/(freq. in MHz) feet.

A trap dipole (fig. 3c) has a capacitor *C1* in parallel with a coil *L1* on each leg, forming a wave trap tuned to the higher

$$L_{uH} = \frac{10^6}{68\Pi^2 f^2}\left(\frac{\left(\log_n \frac{24\left(\frac{234}{f}-B\right)}{D}-1\right)\left(\left(1-\frac{fB}{234}\right)^2-1\right)}{\frac{234}{f}-B} - \frac{\left(\log_n \frac{24\left(\frac{A}{2}-B\right)}{D}-1\right)\left(\left(\frac{\frac{fA}{2}-fB}{234}\right)^2-1\right)}{\frac{A}{2}-B}\right)$$

Where:

L_{uH} = inductance (uH) required for resonance

$\log_n$ = natural log

f = frequency (MHz)

A = overall antenna length (feet)

B = distance (feet) from center to each loading coil

D = diameter (inches) of radiator

Fig. 1–K1TD's equation for physically shortening a dipole while substantially maintaining its electrical properties by adding loading coils somewhere along each leg.

```
10 REM filename K1TD.BAS
20 CLS
30 PI=4*ATN(1)
40 INPUT " Frequency of operation (MHz)";F
50 INPUT " Wire diameter (inches)";D
60 PRINT " Length of a full size 1/2 wave dipole (feet)=";468/F
70 INPUT " Desired length of shortened dipole (feet)";A
80 PRINT " Length of each dipole leg (feet)=";A/2
90 INPUT " Distance B (feet) from feedpoint to each inductor";B
100 F1=10^6/(68*PI^2*F^2)
110 F2=LOG(24*(234/F-B)/D)-1
120 F3=(1-F*B/234)^2-1
130 F4=234/F-B
140 F5=LOG(24*(A/2-B)/D)-1
150 F6=((F*A/2-F*B)/234)^2-1
160 F7=A/2-B
170 L=F1*(F2*F3/F4-F5*F6/F7)
180 PRINT " Inductor L3 (uH)=";L
190 END
```

FIG. 2a
BASIC program to solve equation shown in Fig. 1

```
10 REM filename TRAP.BAS
20 CLS
30 PI=4*ATN(1)
40 INPUT " ENTER: Frequency in MHz";F
50 INPUT " ENTER: Reactance in ohms";X
60 C=10^6/(2*PI*F*X)
70 L=X/(2*PI*F)
80 PRINT " Inductance L =";L;"uH"
90 PRINT " Capacitance C =";C;"pF"
100 PRINT " ENTER: Standard capacitor value near C pF";C
110 X=10^6/(2*PI*F*C)
120 L=X/(2*PI*F)
130 PRINT "or"
140 PRINT " Reactance X =";X;"ohms"
150 PRINT " Inductance L =";L;"uH"
160 PRINT " Capacitance C =";C;"pF"
170 END
```

FIG. 2b
BASIC program to design trap

Fig. 2– BASIC programs: (a) The K1TD equation translated into a simple BASIC computer program; (b) BASIC program to design the trap.

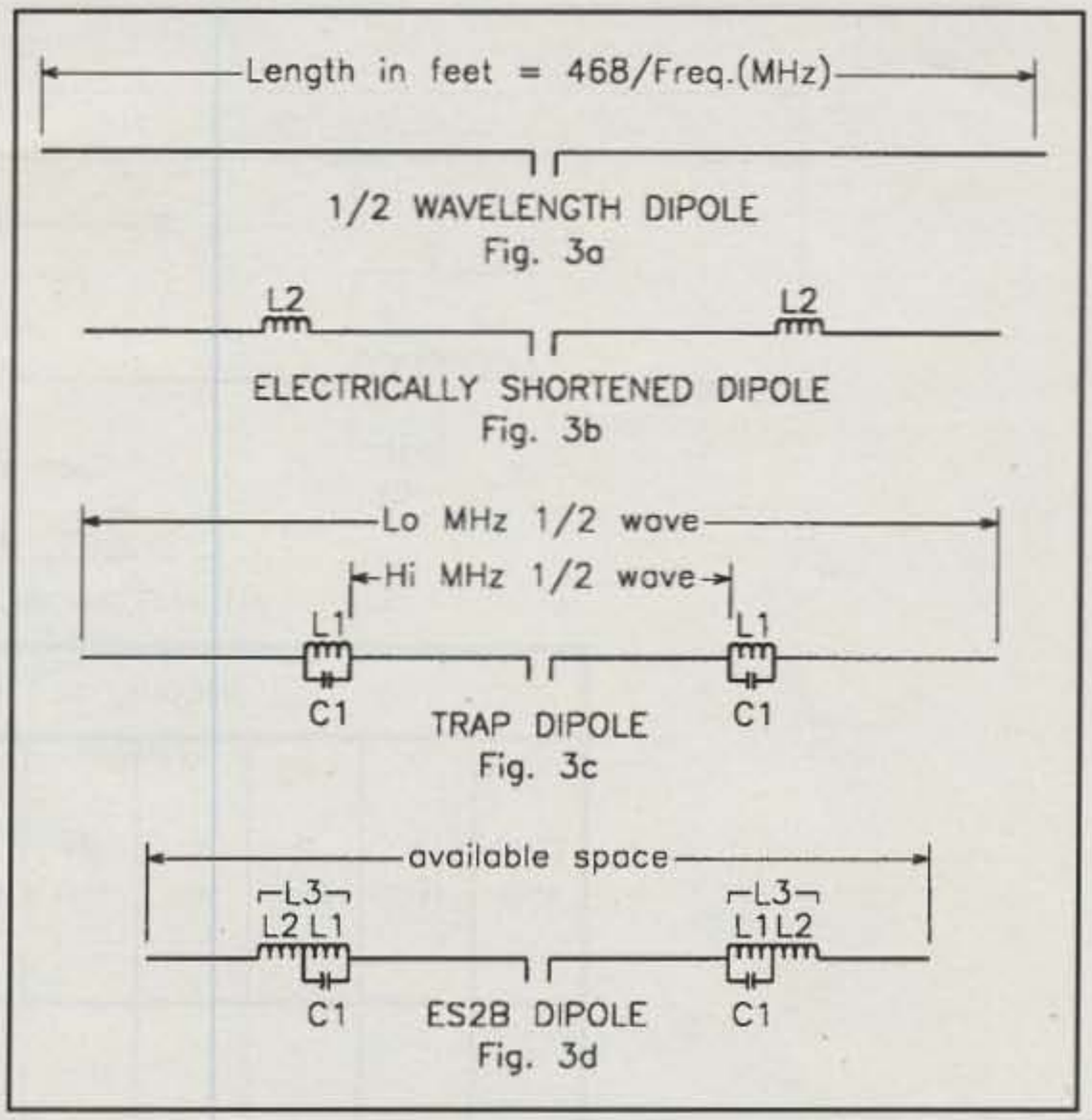


Fig. 3– Evolution of the ES2B antenna: (a) 1/2-wavelength dipole; (b) electrically shortened dipole; (c) trap dipole; (d) ES2B dipole.

of two design frequencies. The antenna's overall length is shorter than 468/(freq. in MHz) because of the loading effect of trap coil *L1* at the lower frequency. Although not generally mentioned in most handbooks, trap dipoles can be designed for *any* two bands, including the relatively recently added WARC bands (30, 17, and 12 meters).[4]

To further shorten a trap dipole (fig. 3d), coil *L2* is added to *L1* in each leg to form a total effective load inductance *L3*. Since the value of *L1* is determined by the trap design and cannot be changed, the degree of shortening is determined by the designer's selection of the value of *L2* (and thus *L3*).

ES2B Quirks

Fig. 4 is a table of typical data for only a few of the infinite number of possible frequency and wire-size combinations. Note that in each case *B1* is the familiar 468/(freq. in MHz), and the minimum overall length, *A*, is just a bit longer.

The *B1* antenna section is a 1/2-wavelength dipole, and as such is very efficient on the higher frequency. If you build an ES2B antenna with minimum overall length *A*, it probably will work, but its efficiency on the lower frequency may not be great. Moreover, if the two operating frequencies you want are relatively far apart, the *L2* coils can be quite large and unwieldy. Therefore, try to avail yourself of as much space as possible to provide a dimension *A* substantially above the minimum of approximately 520/f (see note 1).

To keep the physical sizes of the coils as small as possible, design them with the smallest wire size capable of carrying the currents involved. If you use PVC pipe for the forms, avoid the gray PVC, as it has crud[5] in it that makes it quite lossy when used as a coil form.

Design Stuff

Before tackling the equation in fig. 1, there are a few factors you need to determine:

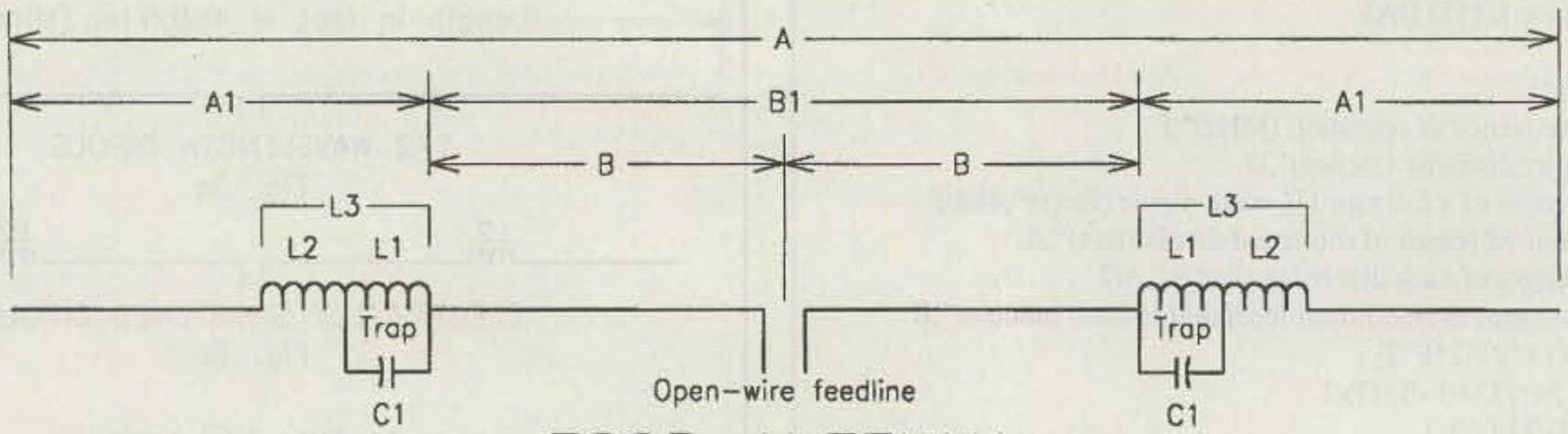
To see if the ES2B you have in mind will fit the space available, a rough estimate can be made using the equation Space in Feet = 520/f (see note 1). If you have the space, then:

A = your selection of overall length
B = 234/f
B1 = 468/f
f = frequency

where *A*, *B*, and *B1* are in feet and *f* is the operating frequency of the higher band in MHz. You also need to know the inductance *L1* of the trap coil you intend to use, or you can design the trap yourself using the BASIC program shown in fig. 2b. Whatever trap design you use, for acceptable Q and bandwidth, *L1* should have a reactance within the range of 300–400 ohms.

The Math—An Example

Let's suppose you want to design an ES2B trap dipole 80 feet long, with a trap reactance of about 350 ohms, for operation on 10.125 MHz in the 30 meter band and 1.900 MHz



ES2B ANTENNA

ALL ANTENNA AND COIL WIRE #12 AWG

RECOMMENDED MINIMUM LENGTHS A										
F(Hi) MHz	A feet	B feet	A1 feet	B1 feet	Trap X ohms	Trap C1 pF	Trap L1 uH	F(Lo) MHz	L2 uH	L3 uH
28.840	19.0	8.11	1.39	16.23	367.9	15	2.03	21.225	3.668	5.695
								14.175	20.17	22.20
								7.150	99.27	101.30
								3.750	377.38	379.41
								1.900	1488.2	1490.5
21.225	25.0	11.02	1.48	22.05	374.9	20	2.81	14.175	14.84	17.65
								7.150	91.55	94.36
								3.750	356.29	359.10
								1.900	1413.1	1415.9
14.175	37.0	16.51	1.99	33.02	374.3	30	4.20	7.150	64.12	68.33
								3.750	272.79	276.99
								1.900	1101.8	1106.0
7.150	73.0	32.73	3.77	65.45	397.5	56	8.85	3.750	137.31	146.16
								1.900	629.96	638.81
3.750	139.0	62.40	7.10	124.80	353.7	120	15.01	1.900	325.28	340.29

Fig. 4– Typical data for a few of the infinite number of possible frequency and wire-size combinations for the ES2B antenna.

in the 160 meter band using #18 AWG (.0403 inch diameter) wire. Then, referring to fig. 4:

1. Determine dimensions *B* and *B1* using the equations

B (in feet) = 234/f
(234/10.125 = 23.11 feet), and
B1 = 468/f
(468/10.125 = 46.22 feet)

2. Traps should be designed for the low edge of the trapped band, in this case 10.100 MHz. Using the equations in lines 40 and 50 of fig. 2a, calculate the values of the trap capacitor *C* and inductor *L*, where

C = 1,000,000/(2 × 3.141593 × 10.1 x 350)
= 45.022261 pF, and
L = 350/(2 × 3.141593 × 10.1) = 5.51527 µH)

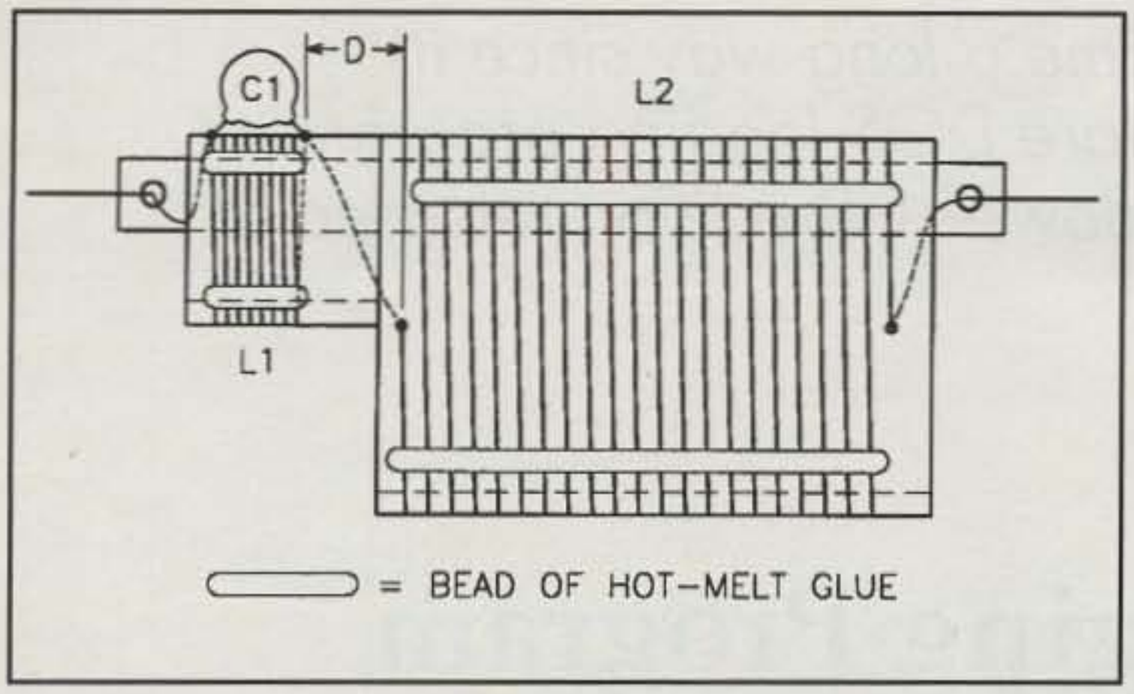


Fig. 5– A type of construction using PVC-pipe coil forms of varying sizes (see text).

3. Since the value of *C* invariably will be some oddball value, recalculate the trap reactance *X* and inductance *L* using the nearest standard capacitor, which in this case is 47 pF. Using the equations in lines 110 and 120 of fig. 2b, the new values are

X = 1,000,000/(2 × 3.141593 × 10.1 × 47)
= 335.2748 ohms, and
L = 335.2748/(2 × 3.141593 × 10.1)
= 5.283 µH

4. With factors f = 1.900 MHz, length *A* = 80.0 feet, *B* = 23.11 feet, and *D* = 0.0403 inches, use the equation in fig. 1 (or in lines 100–170 of fig. 2a) to calculate the value of inductance *L3,* which in this example is 182.98 µH. When referring to fig. 2a, note that in BASIC "LOG" means $\log_n$ (natural log).

5. Consequently,

L2 = L3 – L1 (182.98 – 5.28 = 177.70 µH)

Coils

L1 should be a high Q coil with center-to-center turn spacing being about twice the conductor diameter and a winding length near, but not much less than, one-half the coil diameter.[6] The Q of *L2* need not be as high as *L1,* so *L2* may be close-wound (using enameled wire) with a winding length/diameter ratio of 1:1 to 3:1 being typical. To meet these physical requirements, fig. 5 suggests a type of construction using PVC-pipe coil forms of varying sizes, where *L1* and *L2* are hung from, and glued to, a length of smaller PVC pipe. Depending on the inductances of each, the form for *L2* may be larger or smaller in diameter than the form for *L1,* or you may end up with both coils wound on the same form. In this case the smaller piece of pipe shown in fig. 4 is not required. In any event, leave a space *D* about equal to the winding length of *L1* between coils to minimize mutual coupling between *L1* and *L2.*

Parting Words

Since the feed-point impedance is unpredictable, feeding the ES2B with open-wire line and a transmatch (antenna tuner) at the rig is recommended. You can start with 300 ohm TV twinlead because it is cheap, and most moderately priced antenna tuners can handle it.

Bearing in mind the aforementioned design quirks, you can then design the coils using your favorite coil design method or mine, which is in the Hamcalc (version 56 or later) software suite.[7] The Hamcalc "Short ES2B Dipole" program designs everything, including the traps and all the coils. It also has a handy feature: As soon as you enter the two design frequencies, it lets you know the lengths of a standard 1/2-wave trap dipole and the minimum recommended length *A* of an ES2B dipole for those frequencies. If your available space is somewhere between these two lengths, you need an ES2B!

Conclusion

I normally would recommend doing a computer model to find out what might be expected in the way of performance, but unfortunately, after untold hours of intensive research, my consulting antenna modeling cohort, Dan Richardson, K6MHE,[8] came to the conclusion the ES2B is one of those antennas which just cannot be NEC modeled accurately.[9] In the true pioneering spirit of amateur radio, then, why not just go ahead and build one to see if it works?

Notes

1. The practical minimum space required (in feet) is about 520/f, where *f* = the higher of the two desired frequencies in MHz.

2. The isotropic antenna is apparently a perfect antenna mounted between two self-supporting, nonexistent, nonconductive towers spaced zero millimeters apart at the edge of outer space above the surface of an unnecessary ocean to provide an inessential perfect ground. It has no losses and is fed with a lossless imaginary transmission line. I have never seen it, bit it must be out there somewhere, because antenna manufacturers are forever comparing their latest inventions to it.

3. Jerry Hall, K1TD, "Off-Center-Loaded Dipole Antennas," *ARRL Antenna Anthology,* 1978, Publication No. 36, page 107. This is an excellent article treating the subject in considerable depth. The equation accompanying the article contains a typographical error which has been corrected (see fig. 1) in subsequent ARRL publications and in this article.

4. George Murphy, VE3ERP, "Trap Dipoles for Dummies," *CQ,* October 1998, pp. 32–34.

5. I have often wished that designers of gray PVC electrical conduit, black PVC drain pipe, toilet-paper rolls, mailing tubes, shotgun shells, plastic pill bottles, cereal boxes, etc., would pay more attention to the needs of radio amateurs, who use all of the above for coil forms.

6. George Murphy, VE3ERP, "The Q of Single-Layer Air-Core Coils: A Mathematical Analysis," *QEX* magazine, Sept./Oct. 2001, pp. 33–37.

7. Hamcalc 56 is free software on a CD available from the author for a modest materials and handling charge. For details contact me at <ve3erp@encode.com>.

8. Dan Richardson, K6MHE, "VHF Mobile Antenna Performance," *CQ,* October 2001, p. 28.

9. A conclusion shared by L. B. Cebik, W4RNL (author of many papers and books on the subject of NEC modeling and antennas in general), and Dean Straw, N6BV (editor of many ARRL handbooks and other publications), both of whom provided much appreciated encouragement and advice in our efforts to computer model an ES2B antenna. ■

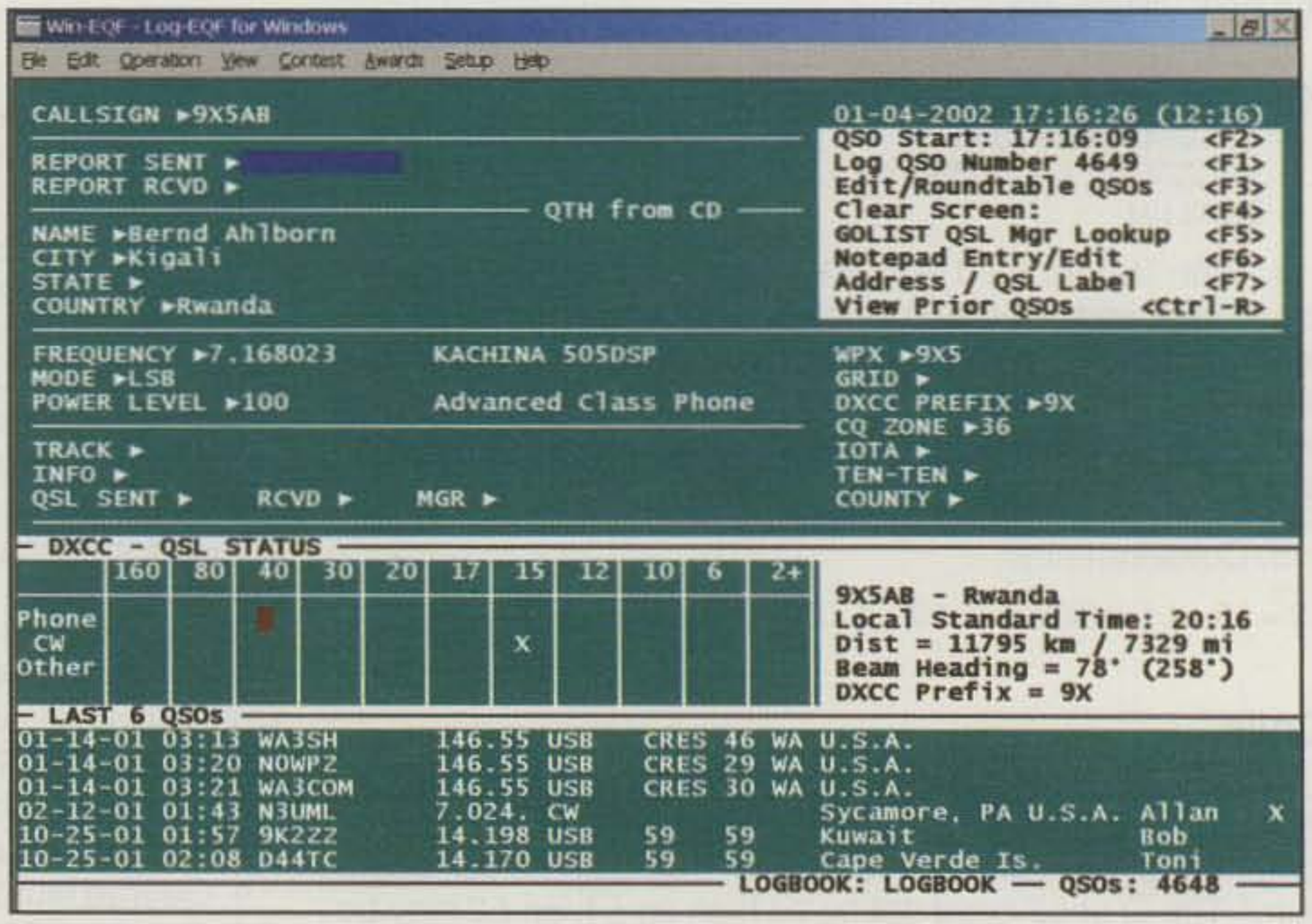
The Log-EQF logging program has come a long way since its introduction in 1989—from a shareware DOS logging program on a floppy disk to "Win-EQF," the Windows® CD edition released at Dayton 2001.

CQ Reviews:

Win-EQF Logging Program for Windows®

BY DENNIS McCARTHY,* AAØA

Twelve years ago Log-EQF was available only if you mailed an SASE and a blank floppy to author Tom Dandrea, N3EQF. "The program has snowballed ever since," says Tom, as the popular logging program makes the double transition from a DOS-based form on floppy disk to a Windows® version on CD-ROM (the DOS version is still available). The programs are similar in appearance and have in common another feature: They are super simple to install and use and have crystal-clear instructions. Win-EQF is a true 32-bit Windows® program. It looks different from most Windows® programs because the core is written in the text-based Windows® console mode.



Screen shot of the Win-EQF logging program. It will look familiar to users of the DOS version, Log-EQF. (Courtesy EQF Software)

Like its predecessors, Win-EQF also features contest logging. You can use any one of the 31 contests in the program or create your own.

Like its predecessors, Win-EQF also features contest logging. You can use any one of the 31 contests in the program or create your own. Tom promises to install even more contests as needs are shown, but logging is what Win-EQF does best.

Win-EQF does nearly everything other logging programs do, but it's not as exotic as some. For example, sexy female voices do not tell you when a needed country appears on the packet cluster. However, there is an audible alert and flawless packet operation.

The program interfaces with most computer-ready rigs, including the new software-controlled rigs such as the Kachina 505DSP and Ten-Tec's Pegasus and Omni VI. The frequency and mode selected on the rig will appear on the Win-EQF logging screen. Conversely, typing the frequency and mode on the screen will set them on the rig. Two complete stations can be configured in Win-EQF, including rig, rotator, antenna switch, and CW keyer. Thus, you can switch between the two stations right from the logging screen.

You can't create designer labels or QSL cards, but the program does produce several different types of labels.

Everything pops up in the window at the same time. You do not have to scan left and right or check separate boxes to see, for example, beam headings, names, locations, and grid squares. Importing your old log is a snap with ADIF. It also creates Cabrillo files so you can send in your contest logs and keep the sponsors happy.

*5022 Lansdowne Ave., St. Louis, MO 63109
e-mail: <Mccartdj@slu.edu>

Unlike the earlier versions which were shipped on floppy disks, Win-EQF comes on a CD for easy installation.

The *Radio Amateur Callbook, QRZ!,* Buckmaster, and SAM callsign databases work with Win-EQF. Just pop the call directory CD into your computer's CD-ROM drive and tell Win-EQF that it's there (via the setup screen). Then when a callsign is entered, the name and QTH from any of these programs are automatically entered into the logbook. *(With the plethora of unusual prefixes on the air today, it's very handy to have the computer tell you when you enter a callsign just where the station is located.—ed.)* Win-EQF also works with the GoList QSL Manager program and will fill in the QSL Manager information on the logging screen when it is available.

Win-EQF has a dandy programmable CW keyer, and it tracks a number of awards, including, of course, DXCC.

Win-EQF has a dandy programmable CW keyer, and it tracks a number of awards, including, of course, DXCC. In fact, it picked up a country I didn't know I had when I imported my log from another program.

You can order the program from EQF Software, 547 Sauter Drive, Crescent, PA 15046 (phone/fax 724-457-2584; on the web: <http://www.eqf-software.com>; e-mail <n3eqf@eqf-software.com>. The DOS program is still available for only $49.95, while the Windows® version is $59.95, with discounts for owners of older versions.

Finally, Tom, N3EQF, responds quickly and patiently to any questions or problems you may have, and he's a heckuva nice guy to boot! ■

Math's Notes

What's New And How To Use It

BY IRWIN MATH, WA2NDM

Seems Like Old Times

While researching the acorn tube last month to respond to a reader's comment about a mistake in January's column, I began to wonder how many of you realize just how far we have come. This month I would like to share a couple of memories with you to illustrate how technology has changed in a mere 50 years or so, as well as go over some of what was accomplished before the era of solid-state components.

c/o CQ magazine

Fig. 1 is a schematic of the first 2 meter hand-held transceiver I ever built, back in the 1950s. The unit covered the entire 2 meter band (and then some) and was an easy way to experiment with VHF. It was built into a Bud enclosure (yes, they were around then) that mea-

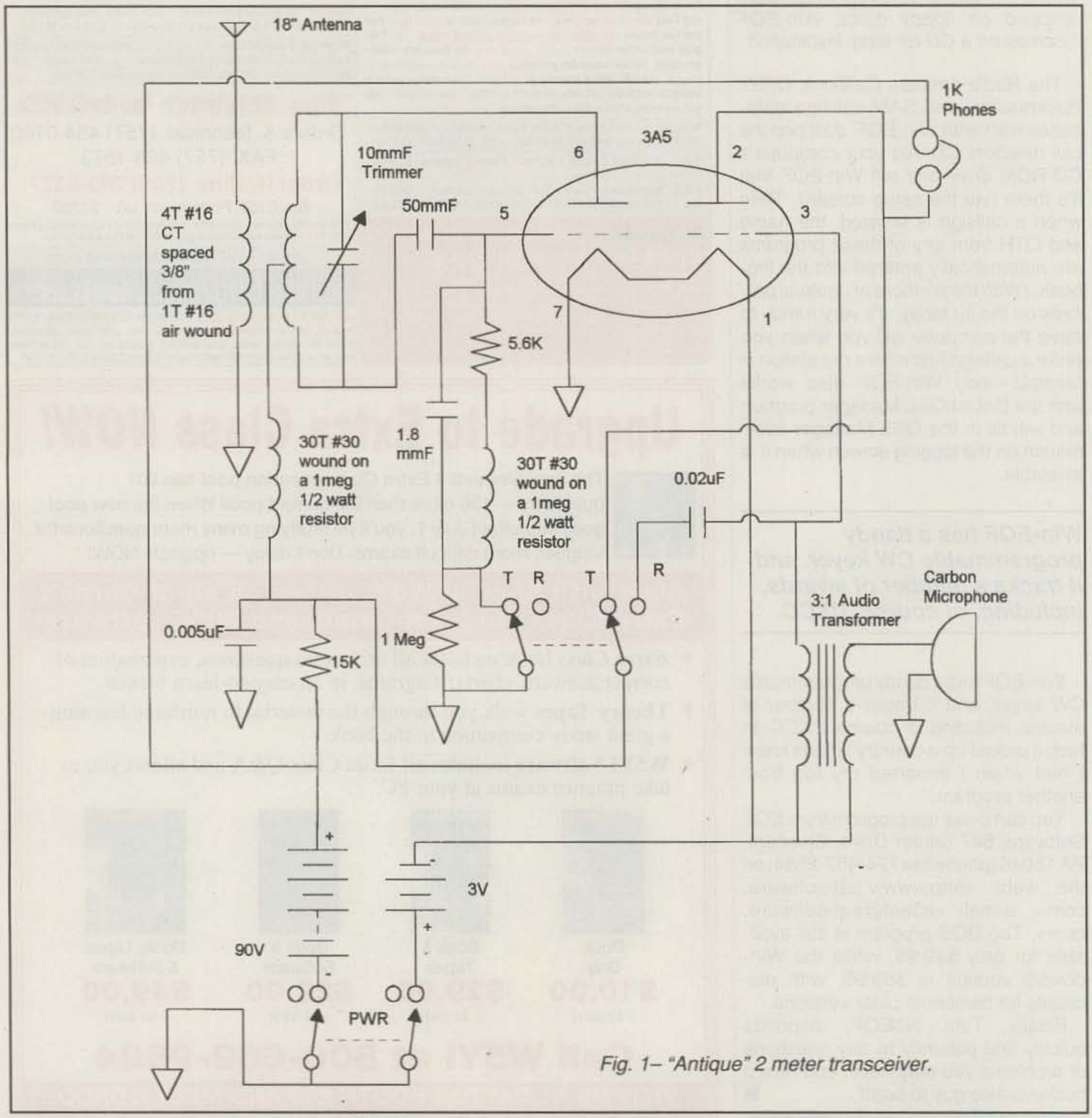


Fig. 1– "Antique" 2 meter transceiver.

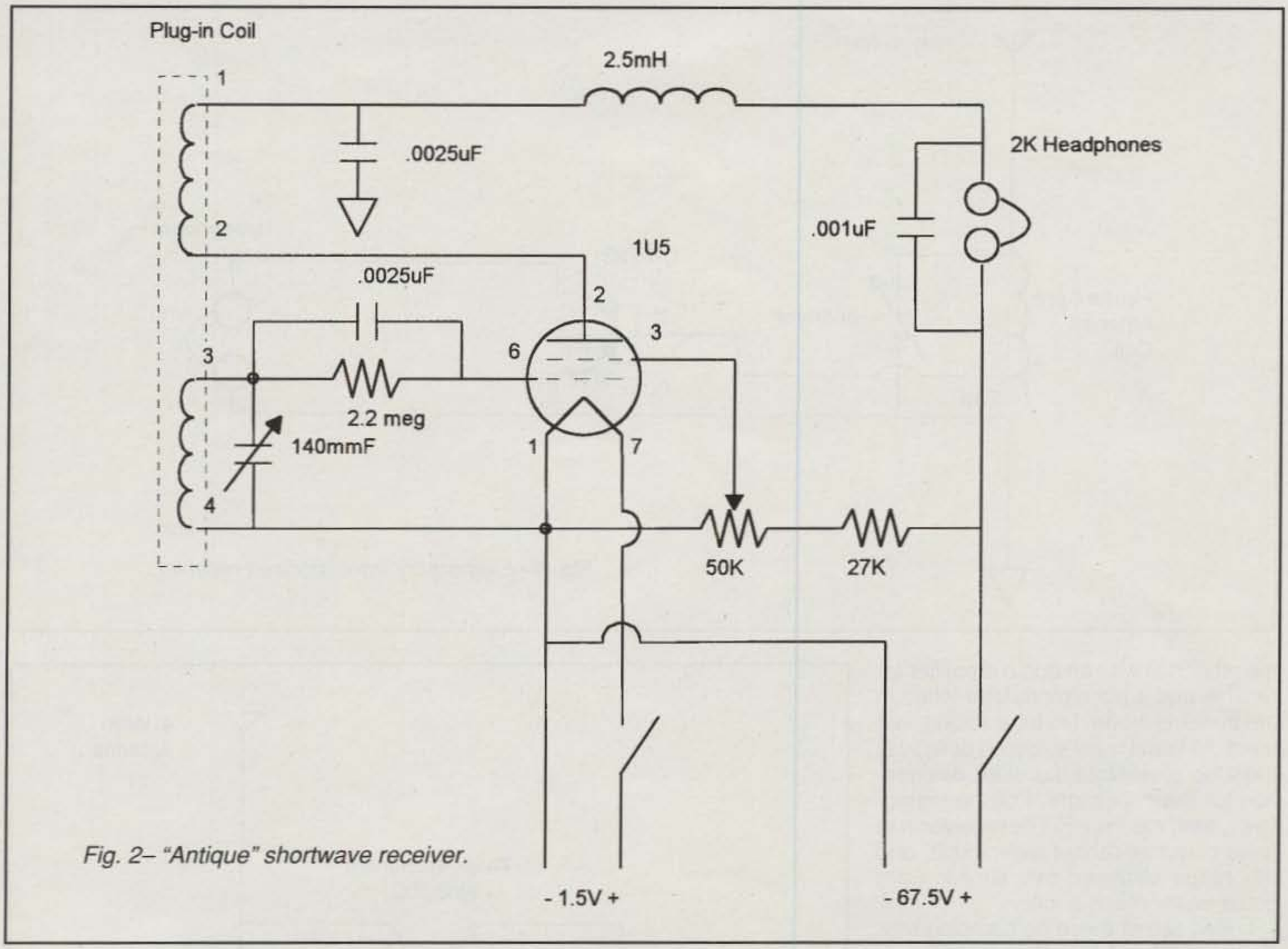
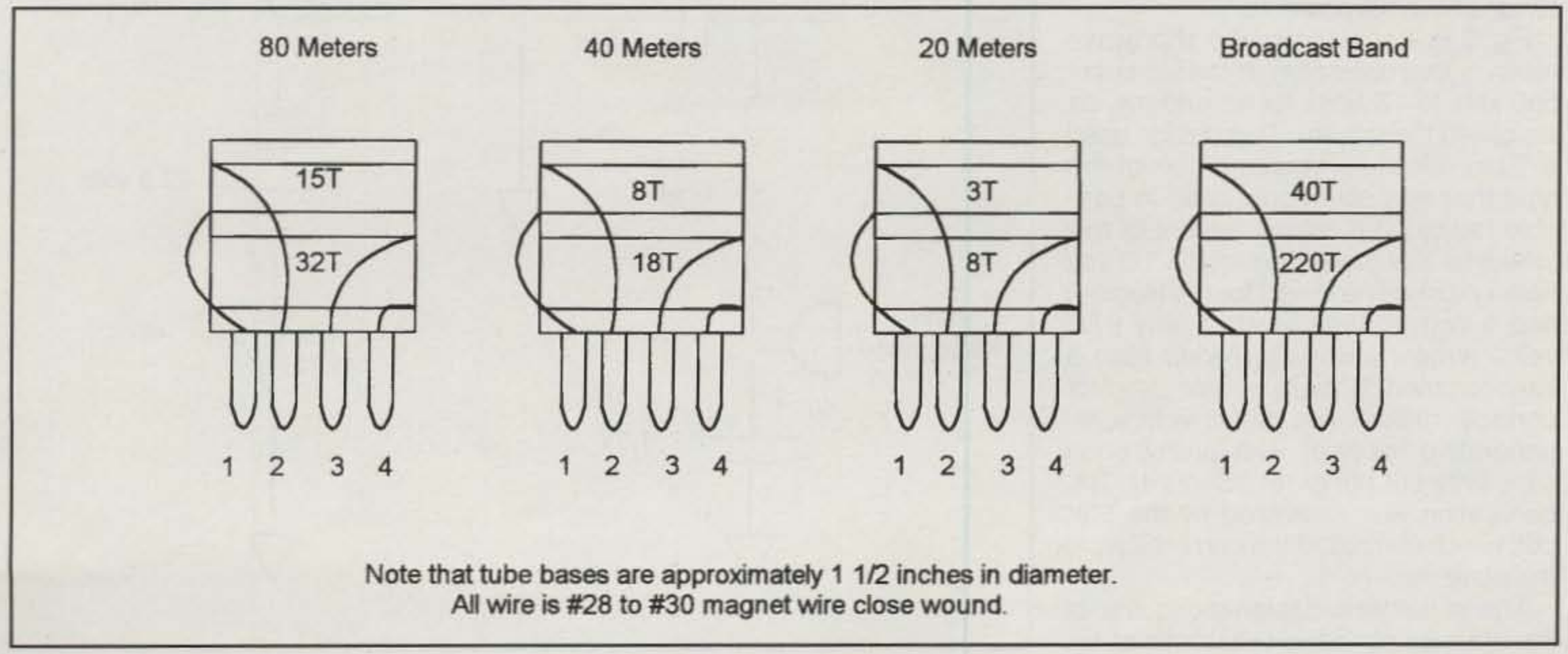


Fig. 2– "Antique" shortwave receiver.

sured 3" × 3" × 11" long and was meant to look like an old World War II walkie-talkie. The microphone and headphone were salvaged from an old telephone handset (In those days you could screw off the microphone cover and remove an excellent carbon microphone.). The earphone was half of a 2000 ohm Trimm™ headset. The telephone receiver had too low an impedance to work properly. Looking at the circuit you can see that a 3A5 dual triode was used as a super-regenerative receiver and a modulated oscillator transmitter. One half of the tube was the RF portion, and



Note that tube bases are approximately 1 1/2 inches in diameter.
All wire is #28 to #30 magnet wire close wound.

Fig. 3– Starting values for plug-in coils.

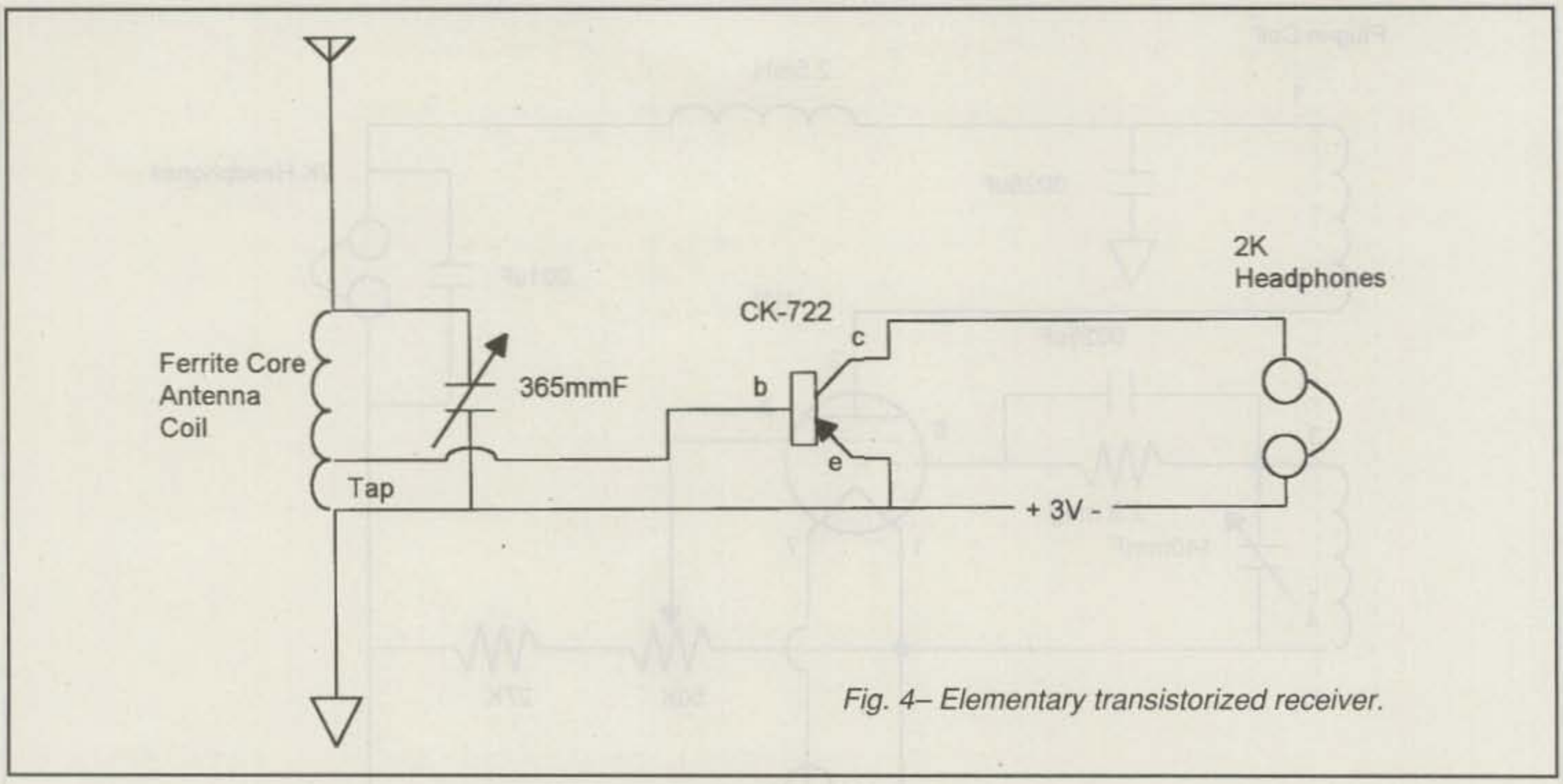


Fig. 4– Elementary transistorized receiver.

the other half was an audio amplifier for receive and a plate modulator when in the transmit mode. No tube socket was used. All leads were soldered directly to the tube pins. Note the older designation for the capacitors. For the youngsters, mmf means pF. The receiver was quite sensitive (about a microvolt) and the range between two similar units could easily reach a mile.

I used two of these on camping trips and had lots of fun. Who could ever have imagined repeaters in those days? I have reproduced as much information as survives in my old notes in case someone wants to try to build one. You will notice that without transistors, ICs, or phase-locked loops, VHF communications was still possible.

Fig. 2 is a schematic of a shortwave receiver that used plug-in coils to cover 500 kHz to 13 MHz (or kc and mc, as we called them then). This design used a 7-pin miniature vacuum tube of the type that was commonly used in portable radios. The unique feature of this tube was that it only required a 1.5 volt battery (usually a D cell) for the filament and a high-voltage level of only 67.5 volts, almost always provided from a very common "B" battery, also used for portable radios. The circuit was a regenerative receiver with pretty good sensitivity but not great selectivity. Regeneration was controlled by the 50K pot, which controlled the current flow to the plate.

The schematic designations are of the old type as in the schematic of fig. 1, but any close value will work fine. For

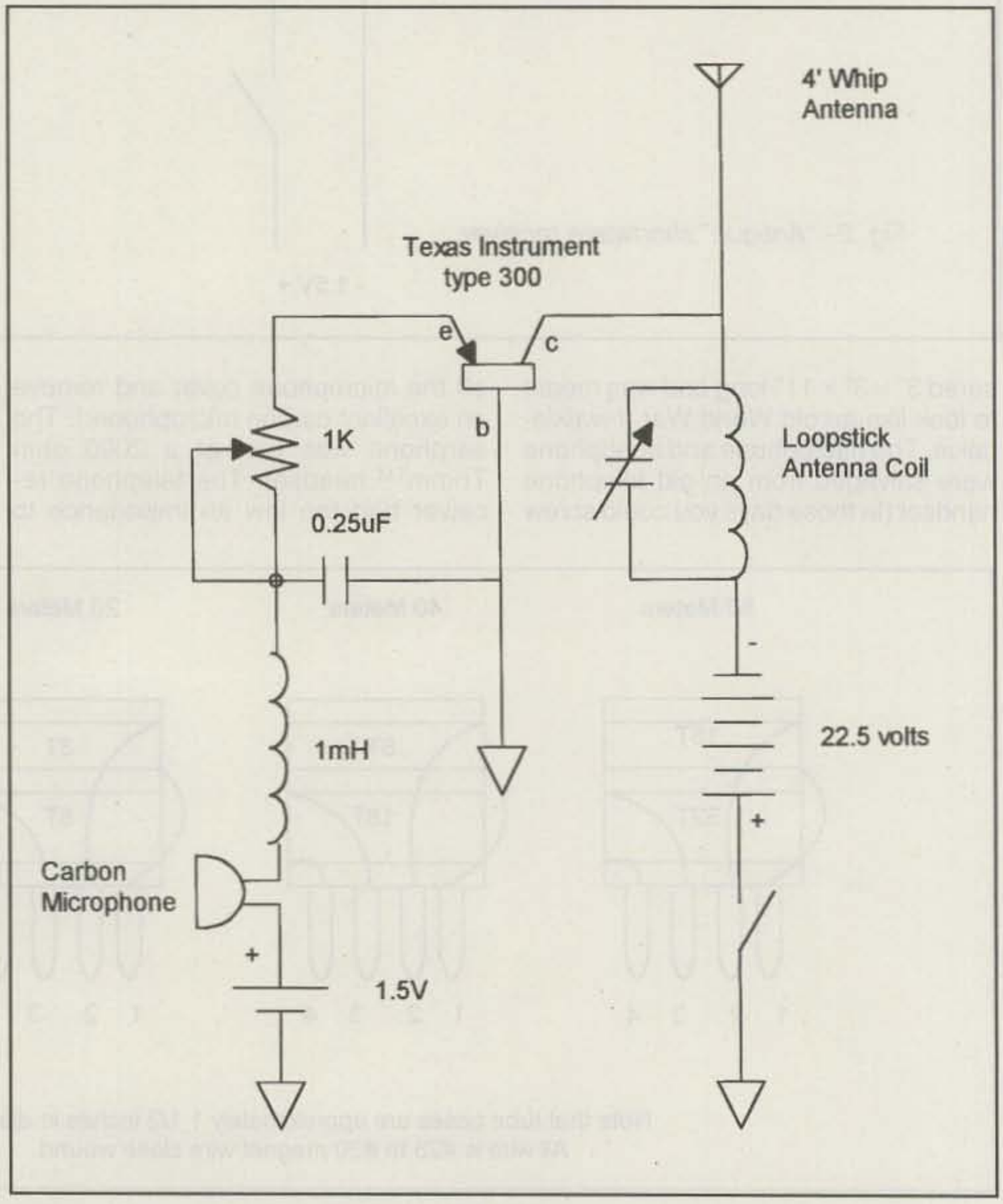


Fig. 5– Elementary transistorized transmitter.

the .00025 µF capacitors just use 220 pF ceramics. The plug-in coils used to be available from various distributors such as Allied (It was Allied Radio then.) and Lafayette Radio. If you wish to experiment, I have included information from my notes for four of them in fig. 3. Please remember that this information comes from the notes of a 15-year-old in an era when everything was experimental, so you may have to play with the turns to cover the ranges exactly. Back then we used the base from old tubes (of the type 30, 45, etc.) as coil forms. You can probably use PVC tubing as a reasonable substitute, but you will have to figure out a plug-in connector method. Just be aware that the plate circuit has 67.5 volts present. *You can get a shock if you are not careful!* (You can't even imagine how many times I did.) Finally, if you cannot get the circuit to regenerate, try reversing the leads to pins 1 and 2.

This circuit will not only receive AM, but with proper tuning (just to one side of the signal) it will work with FM as well. I am not sure about SSB, but since it is an oscillating detector, there is probably a setting of the 50K pot that will allow reasonable SSB reception. I spent many hours listening to most of the world with this receiver (connected to a 50 foot antenna strung to a nearby tree), and it was instrumental in getting me started in amateur radio.

For my final entry I have presented two transistorized circuits that were among the first I ever worked on. Fig. 4 is a receiver utilizing a Raytheon CK-722 germanium PNP device. This receiver is really nothing more than a simple crystal-set/audio-amplifier. RF is detected by the base-emitter junction. The tiny current flowing through the junction varies the collector current and provides an amplified signal to the headphones. The ferrite antenna coil was a unit made by Grayhill and was referred to as a "loopstick." The tap was sometimes provided, but if not, 30 turns of #30 wire wound directly over the existing coil sufficed. Although simple, this radio received standard AM broadcast-band signals with five to ten times the volume of a crystal set alone and was unique in that it used a "real" transistor. A good antenna and ground were necessary, although we sometimes got away with clipping the antenna lead to the metal finger stop on a rotary-dial telephone.

Fig. 5 is my first transistorized transmitter. This one also worked in the broadcast band and put out a signal that could be picked up on a car radio almost a quarter mile away. The transistor used here was from a "start-up" named Texas Instruments and came in a metal case, not plastic like the CK-722s. To use it you tuned to a dead spot in the broadcast band, and then adjusted the loopstick and 365 mmF variable capacitor until you received the signal. We used two of these for communications when two cars had to follow one another. As long as we could see the other car all worked well, but when the distance increased to a couple of blocks, we lost the signal. An early start to the FRS service?

The above examples have not really been presented as projects, but rather to illustrate how near (and also how far away) we were a scant 50 years ago. As I said at the start of all of this, it is interesting to see the development of today's technology from a glimpse of the past. If this sort of thing interests you, please do not hesitate to tell me. I would be glad to devote a column to this sort of nostalgia from time to time.

73, Irwin, WA2NDM

How It Works

BY DAVE INGRAM, K4TWJ

Theory 'n Practice

Portable and Survival-Ready Antennas

The delightfully warm days of summer return once again and every enthusiastic ham's thoughts naturally turn to—antennas! This year I sense a growing interest in portable antennas for both vacationing and emergency preparedness. In light of that fact, our focus will be on lightweight signal radiators for impromptu/on-the-spot use. Also, as terrorist threats continue, knowing the details of various quick-to- install antennas to fit different circumstances could prove to be a great asset during an emergency.

Even simple antennas "work out" better today than in in the past. Why? Sunspot counts are still fairly high, band conditions are very good, and general interference, or "QRM," is exceptionally low. Any decent antenna will work great under those circumstances. If you have ever wanted to have fun on HF, right now is the time for action!

This month we have some neat antenna views and notes I am sure you will find interesting. Let's begin with a new "pocketable" HF antenna for "walk 'n talk HFing."

New Monoband "Walkabouts"

Remember the retractable "Walkabout" portable HF antenna made in England, imported by MFJ, and highlighted in our QRP column of December 2001? The antenna covered 80 through 6 meters, handled up to 25 watts, extended to 4.5 feet for operating and retracted, plus separated into two 12 inch long sections for carrying. Well, friends, the antenna now has some cool-going monoband cousins that are even more trim and affordable than their multiband counterpart. If your operating habits tend to favor one or maybe two bands and the idea of a snap-on and go HF antenna for traveling or vacationing catches your interest, these new gems warrant a second look. They are available from amateur radio dealers nationwide.

The new single-band Walkabouts measure approximately 54 inches when extended, and they work with any of the modern transceivers (photos A and B). Just remember the antennas' maximum power limit is 25 watts and lower your rig's output accordingly. The 30 meter version Walkabout I have been using recently is super handy and it seems to work out as well as or slightly better than a similar size mobile whip. There is a special added component to gain such good performance, however. The antenna should be complemented with a quarter-wavelength counterpoise or ground-simulating wire. Without a proper-length counterpoise, the resonant frequency of a monoband or multiband Walkabout may easily shift up or down one megahertz, and its SWR will also rise excessively.

In dinking with portable pull-up whips and counterpoise wires, one quickly learns that every location differs in ground effects and obstacles in its field of radiation. Sometimes the counterpoise works best or produces the lowest SWR when it is 5 or 10 percent longer than a quarter wavelength; sometimes a 4 or 5 percent shorter counterpoise is needed. It is strictly a "try and see what's best" situation. Martin Jue,

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

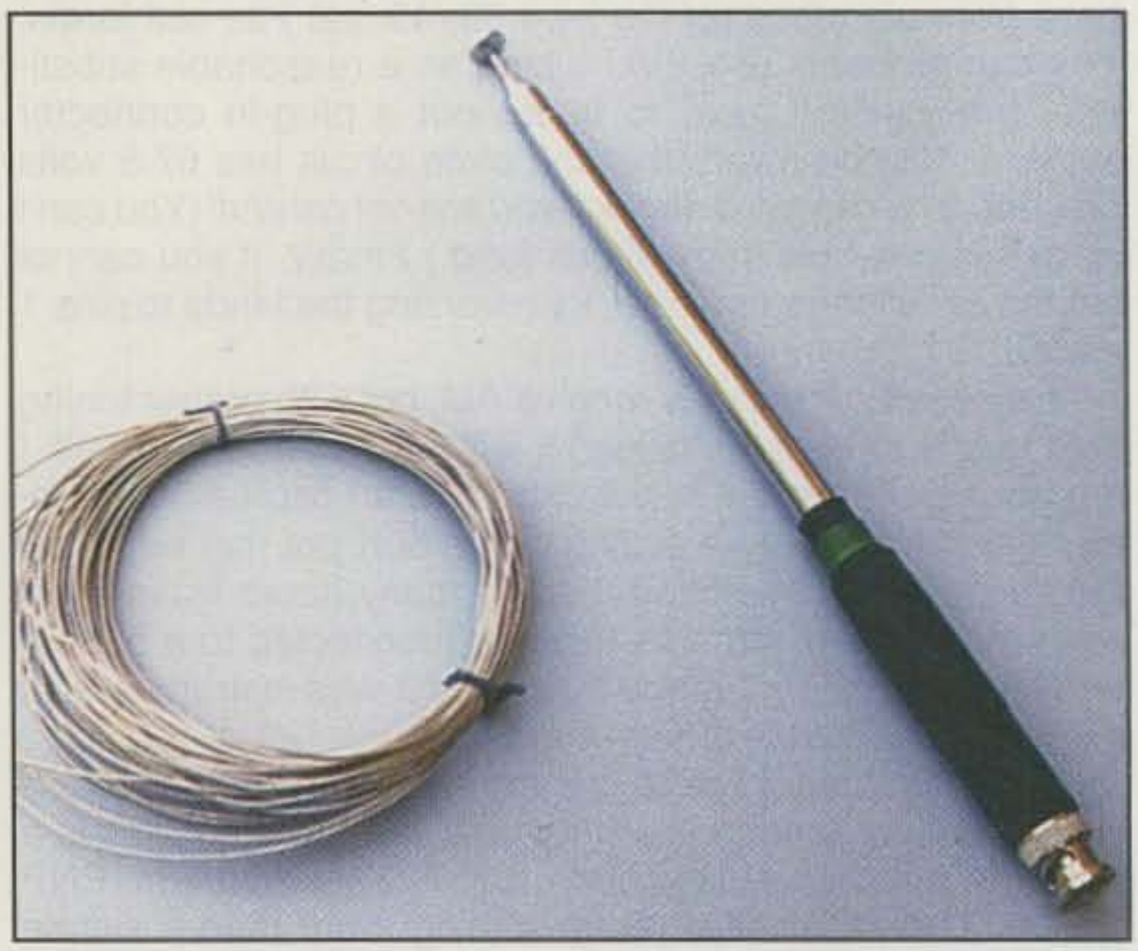


Photo A– Like to join your favorite HF activities while traveling light or vacationing? MFJ's new monoband Walkabout pull-up antennas are a handy answer and they work with any transceiver. Just roll out a quarter-wave counterpoise wire, reduce your rig's power to 25 watts or less (always a good idea for close-by antennas), and enjoy!

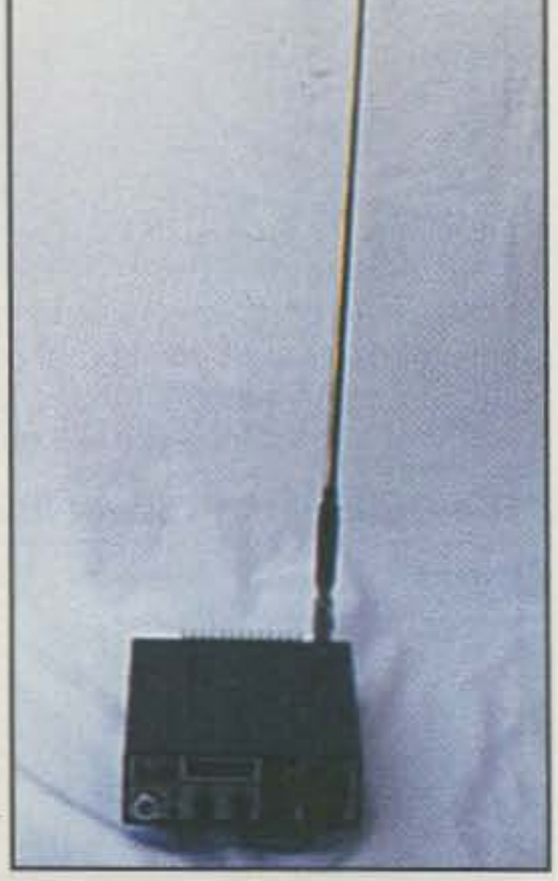


Photo B– Here is how a new MFJ monoband Walkabout antenna looks when extended to 4.5 feet, fitted with a BNC and right-angle PL-259 adapter, and connected to a transceiver. With counterpoise added to simulate ground, the antenna works out like a similar-size mobile whip. →

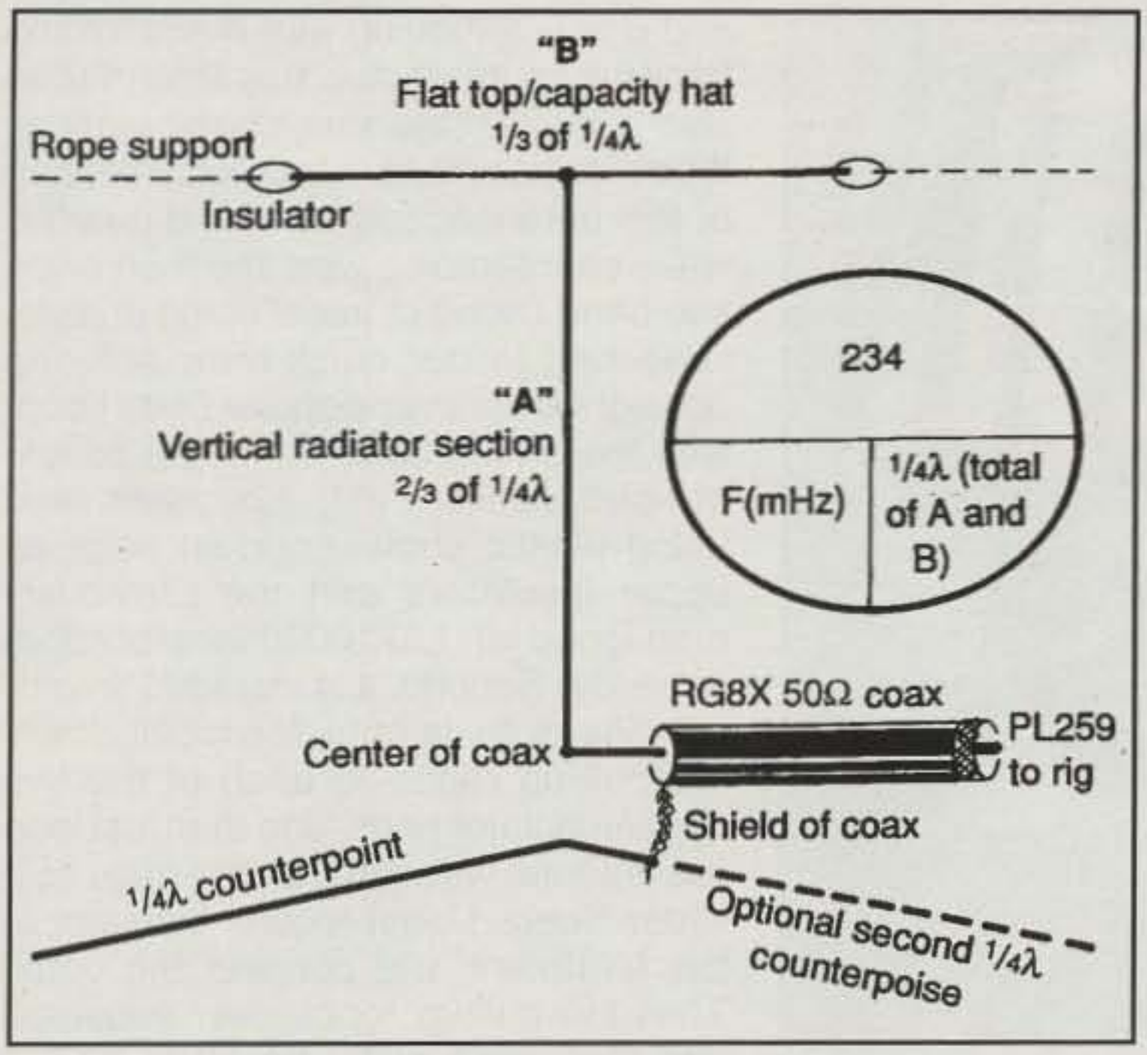


Fig. 1– Assembly details of the Flat-Top Tee wire antenna. Combined length of "A" and "B" is one-quarter wave for your desired band, with "A" comprising two thirds of that length and "B" comprising the remaining one third of the length. (Discussion in text.)

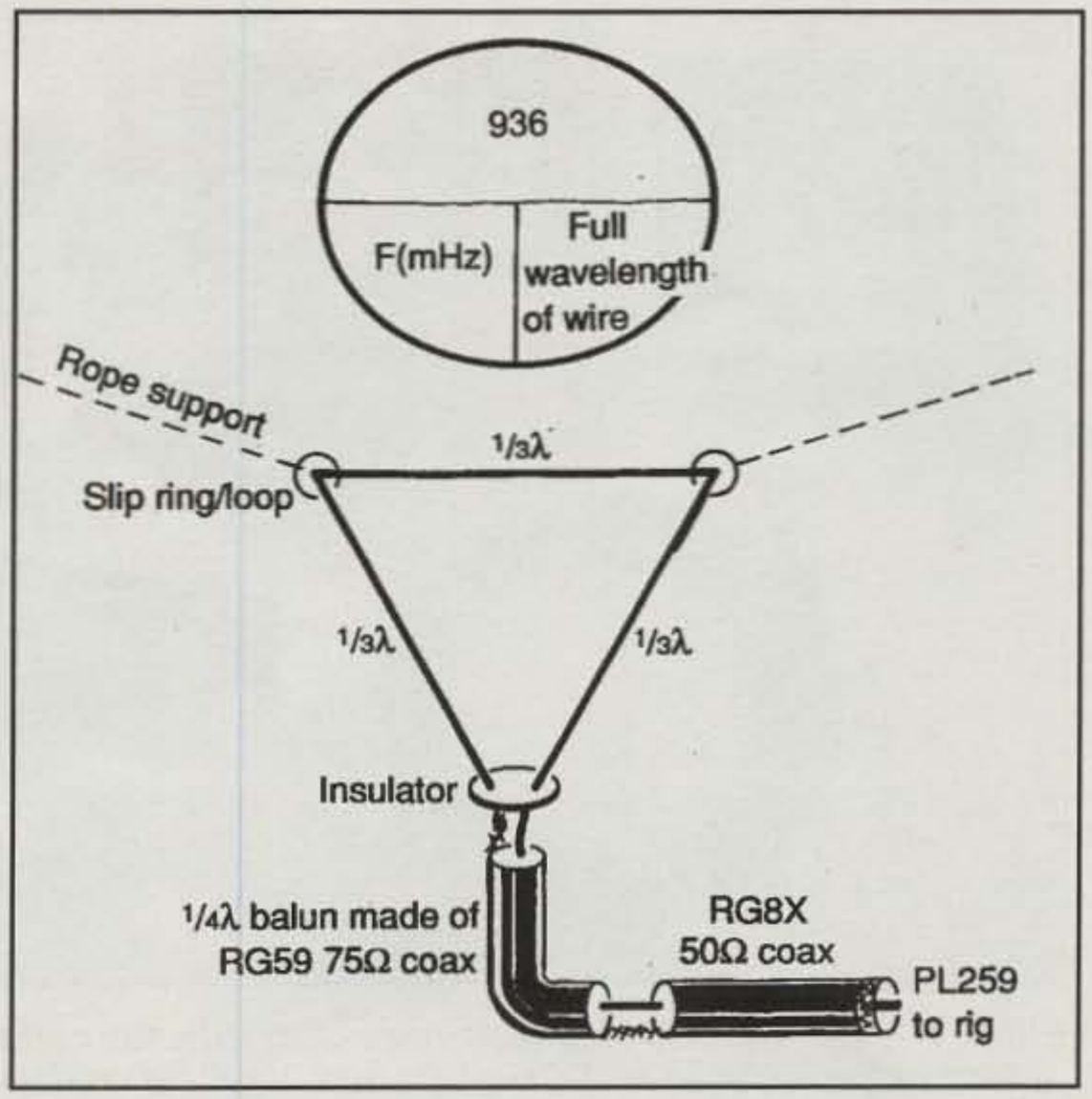


Fig. 2– Outline of the quick-brew, high-performance Delta Loop. The feedpoint-down configuration places the maximum amount of signal-radiating wire high in the air. The use of slip loops/rings for corner insulators lets the antenna assume a position according to the location of the supports and avoids snapping in the wind.

K5FLU, and I discussed this idiosyncrasy and concluded that the best bet is using a slightly (10 percent) longer than necessary quarter-wave counterpoise and then folding it back along its length to roughly tune SWR. A rubber band works fine for holding the folded back end in place, and it also makes "re-tweaking" the length easy. The whip's overall height can then be shortened slightly to fine-tune SWR in a desired band section.

Neat Wire and Antennas

As Martin, K5FLU, and I further discussed portable antennas, he told me about the new MFJ-8710020 multi-strand, 20-gauge woven wire that is now available in 100 foot rolls for $9.95. The wire, which is shown rolled up beside the 30 meter Walkabout in photo A, is super flexible, kink resistant, and can be reused time and again. It is ideal for making a counterpoise or for quickly brewing a wire antenna such as a dipole or Delta Loop. What type of antenna works best in portable environments? That depends on available supports. Walkabouts are self-supporting and go anywhere. Wire antennas are configured to fit available supports. It's that simple.

Thinking further along that line, a couple of easy-up wire antennas for portable or vacation use are highlighted in figs. 1 and 2. The first antenna is a Flat-Top Tee, and it is particularly good for working the lower HF bands from limited-space locations (an always challenging situation). Study this antenna's design and you will see it is akin to a top-loaded vertical with wire *A* acting as the vertical radiator and wire *B* serving as a large capacity hat. The combined length of wires *A* and *B* should equal one-quarter wave for your desired band/frequency, with *A* comprising roughly two thirds of the length and *B* comprising approximately one third of the length. Using 30 meters as an example, 234/10.1 MHz = 23.16 ft. and .66 × 23.16 ft. = 15.3 ft. for *A*, and .33 × 23.11 ft. = 7.65 ft. for *B*. Take a second look at those figures, incidentally, and you will notice that by slightly juggling the lengths of *A*

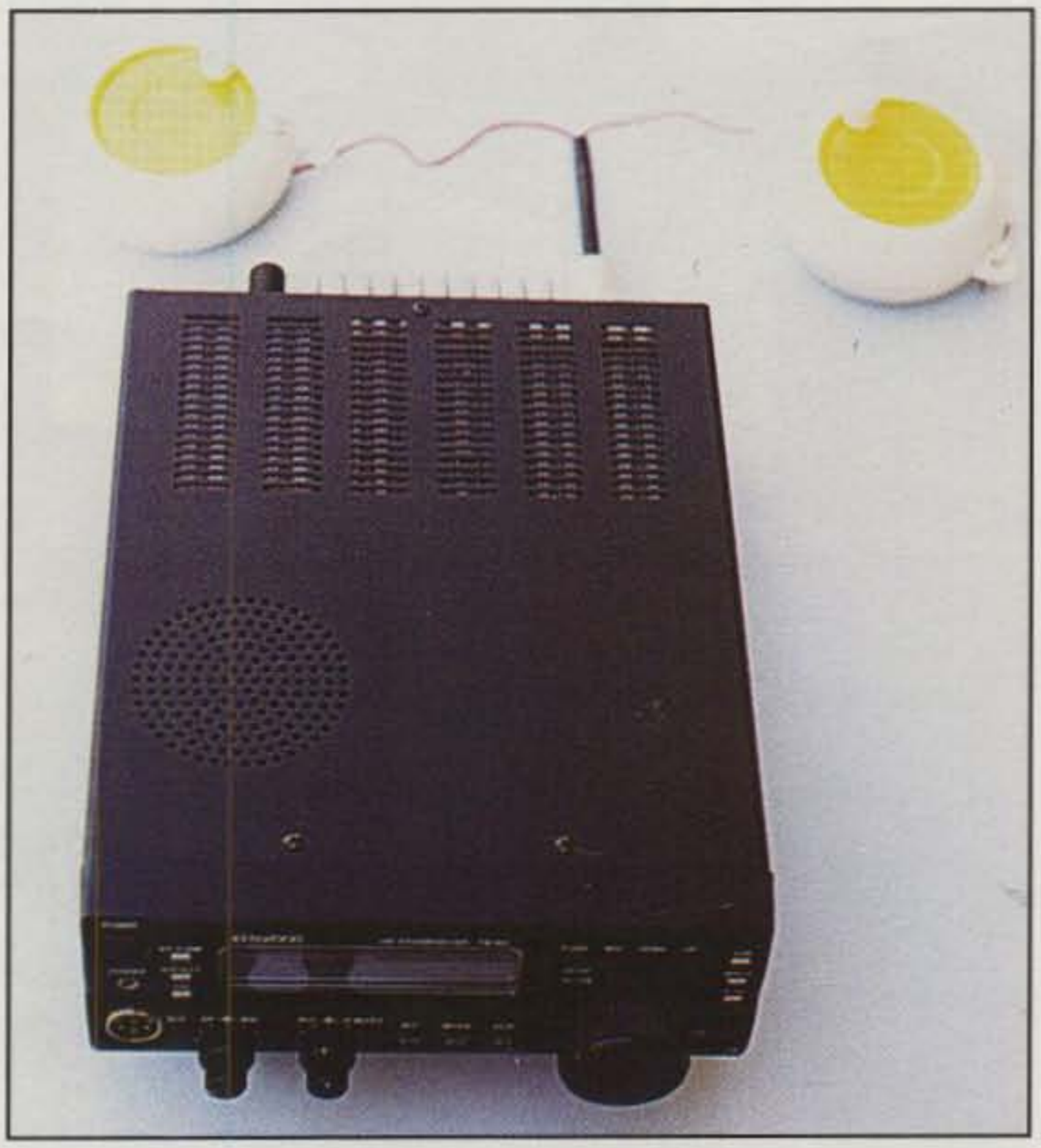
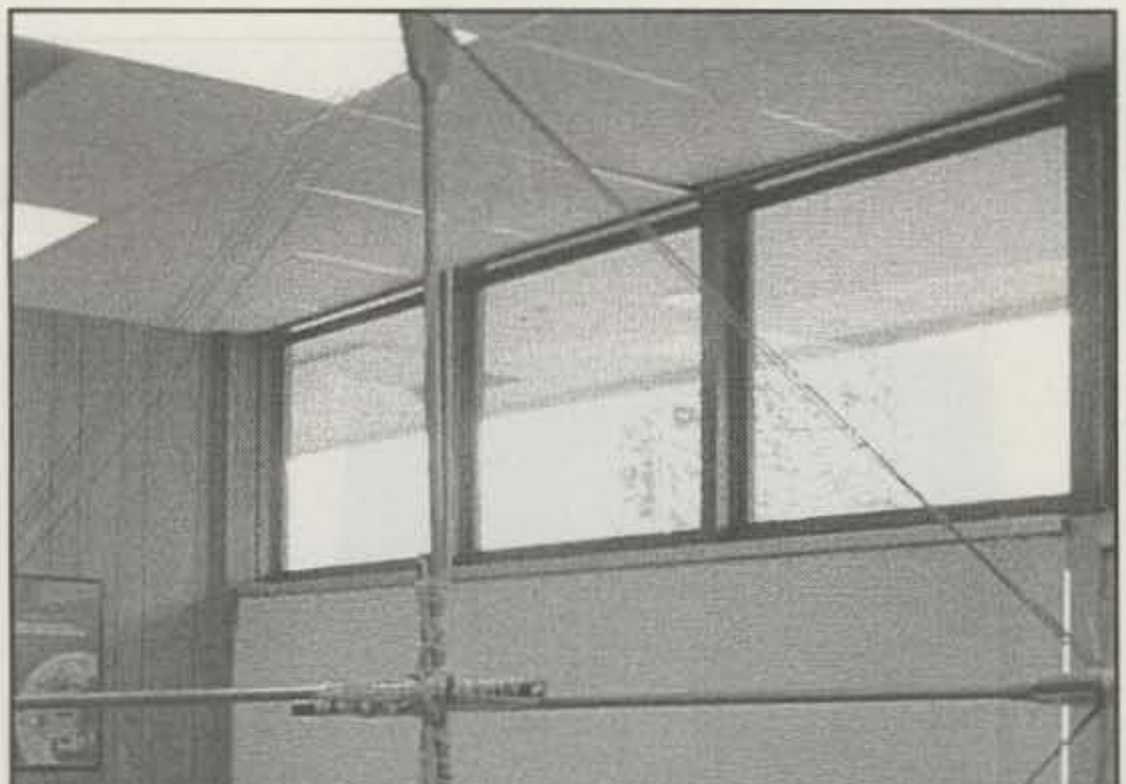


Photo C– Want full-size dipole performance plus wind-up-reel convenience for on-the-spot operations? Check out this unique "Yo-Yo Tenna Deluxe" from DWM Communications. Each reel contains 40 feet of insulated wire, with a PL-259 adapter at the "dipole"'s center. Just plug it into your rig, stretch out the wires, and ham it up!

Photo D– The new configure-as-necessary Stealth portable and emergency antenna kit introduced by SCG at Dayton 2002. Kit contains SG-237 Automatic Antenna Coupler, 80 feet of insulated wire, 30 feet of support rope, 20 feet of pull-up rope, six antenna mounting clips, 12 cable ties, and instruction manual. (Photo courtesy SGC)

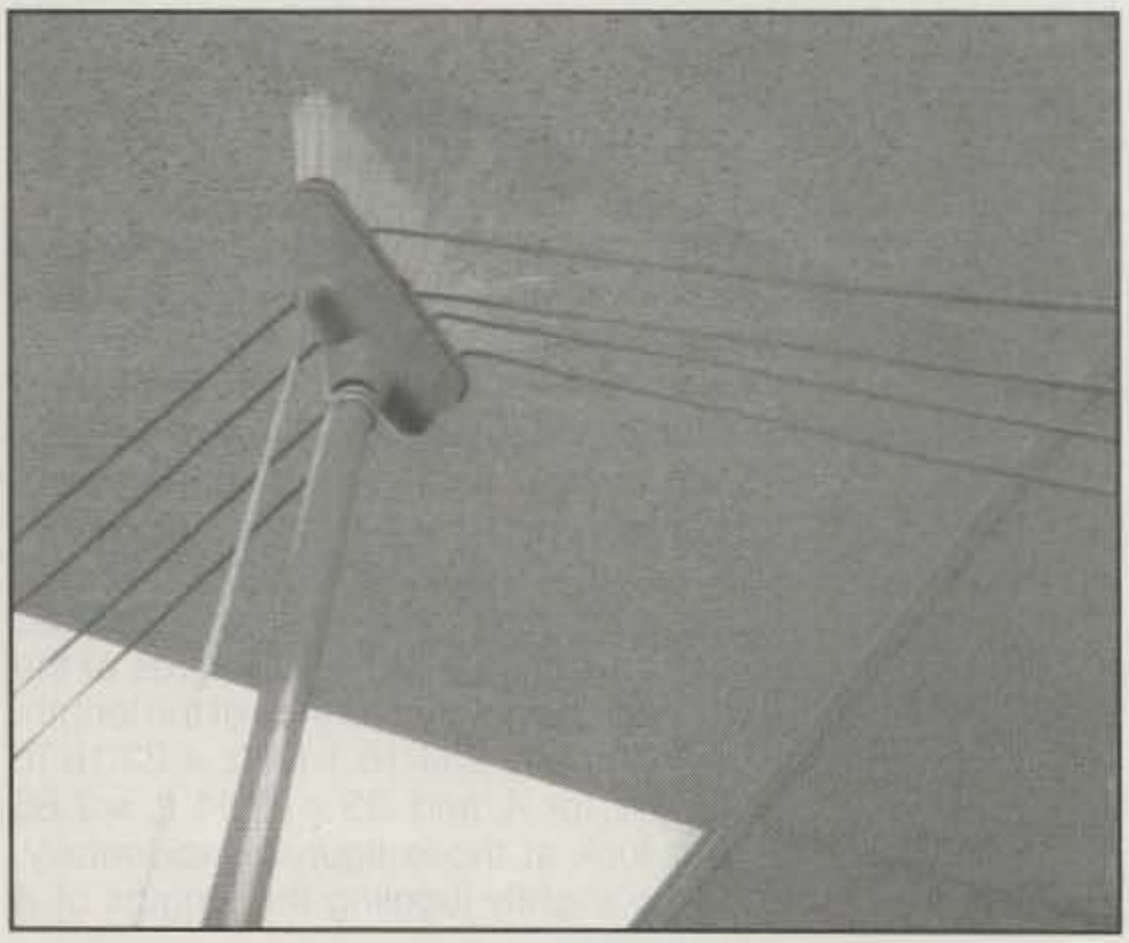
and *B* plus removing wire *B* and folding back the counterpoise, this antenna can also work 20 meters as a basic vertical. If you wish to make a top-notch version of this antenna, add a second quarter-wave counterpoise wire and then enjoy low-band DXing or vacationing in style.

Second in our quick-brew antenna spotlight is the ever-popular Delta Loop, with the one in fig. 2 offering a couple of special frills. First, it is assembled using plastic shower-curtain rings as upper insulators and the previously mentioned MFJ-8710020 wire for super flexibility. Second, it is installed "inverted style" with its apex/feedpoint down. Tie pull-up ropes to each of the two upper insulator rings, and then just loop the antenna wire through the rings so it slides freely. Use a regular insulator at the feedpoint and connect the coax. Toss the pull-up ropes over supports, and then keep slight pressure on the feedline while raising the antenna into position. The wire will slide on upper insulators and conveniently assume a classic Delta configuration. In addition, this Delta's "inverted" configuration places the greatest amount of wire highest in the air for maximum signal radiation and the feedpoint closest to ground



← *Photo E– What can you do with four brooms and a new Stealth kit from SGC? Whip up a 5 foot multiband loop, of course! First strap the brooms together and then wind a four-turn loop around their ends. Add an SG-237 Automatic Antenna Coupler, route its feedline to your rig, hang the loop from its top broom, and hit the air in style! (Photo via SGC)*

Photo F– Close-up view of broom end being used as a spreader for the four-turn loop. Could this be the next big-time antenna design to challenge Yagis and tribanders? (Photo courtesy Pierre Goral of SGC) ↓



for minimum feedline loss. The Delta Loop will exhibit a feedpoint impedance of around 75 ohms, or a 1.5:1 SWR. If desired, SWR can be reduced to near 1:1 by adding a balun made from 75 ohm/RG59u cable. That 75 ohm cable's length is calculated as one-quarter wave times the cable's velocity factor. As an example (30 meters), 234/10.1 = 23.16 ft. x .66, or a 15.28 ft. length. Connect one end of the 75 ohm cable to the Delta's feedpoint, its other end to the 50 ohm feedline cable, and enjoy the big-signal results!

Clever Rollout Dipole

Are you looking for a versatile wire antenna you can buy pre-assembled, pack into a corner of a briefcase, and install in record time? Check out the unique Yo-Yo Tenna Deluxe made by DWM Communications and shown in photo C. This roll-out dipole contains two 40 foot lengths of insulated wire, each length wound on a fishing-reel-type winder and connected with a PL-259 at the center. You just plug the PL-259 into your transceiver or tuner (or extension coax cable for a remote-outdoor installation), separate the Yo-Yos so each antenna "side" is one-quarter wave for your desired band, quickly tweak SWR, and start hamming. Taking down and/or recovering the antenna after use is also a snap: Just loosen or lower the pull-up ropes holding the end-defining Yo-Yos in place, rewind the wire, and pack up the dipole.

I first tried a Yo-Yo Deluxe when I was visiting a new friend with unknown wire antenna problems. I had no idea what to expect upon arrival, but reasoned the wind-up dipole should attach to some kind of supports and go up in 15 or 20 minutes. It worked like a champ right from the start, and that is the best reference imaginable. Want to know more about (or purchase) the Yo-Yo Tenna Deluxe? Just contact Bill Lauderbach, WA8MEA, of DWM Communications at P.O. Box 87, Hanover, MI 49241, or via telephone 1-517-563-9022, or on the web at <http://qth.com/dwm>.

SGC "Tuner Plus" Antenna

Another quite versatile antenna package for both portable operations and emergency preparedness is SGC's new Stealth (Smart Tuning Emergency Antenna Loop Tactile HF) kit shown in photo D, E, and F. Essentially, this package is a combination wire antenna you configure to fit your needs and available space and an SG-237 Automatic Antenna Coupler which also works with SGC's multiband mobile whips. The new Stealth kit covers 2.5 to 60 MHz and handles up to 100 watts. It is supplied with 80 feet of insulated wire, 30 feet of nylon rope, and half-dozen antenna mounting clips, 12 cables ties, a comprehensive manual, and an SG-237 Tuner. Following details presented in the manual, you can quickly assemble a loop, rectangle, or triangle antenna of one to four turns with the auto-tuning SG-237 at its feedpoint. In studying those possibilities, we find a single-turn loop (actually a square) measures approximately 20 feet per side, and a four-turn loop measures only 5 feet per side. The most attractive aspect of this antenna is it goes together quickly and works multiple HF bands without an external ground, SWR tweaking, or fumbling with wire lengths. You just form a suitable-size loop on the floor or ground, use supplied pull-up support ropes to raise it into position, and transmit. The SG-237 coupler/tuner automatically senses band, impedance, and SWR and selects the proper L-C combination to present an optimum match to your transceiver.

Surely the most captivating antenna configuration suggested in the manual is the "four broom and quad loop" arrangement shown in photos E and F. The four brooms are strapped together to form an "X," and then the 80 foot length of wire is wound around the frame four times and connected to the SG-237 mounted at the frame's bottom. The loop is suspended from the ceiling by a rope tied to the top broom. It is then rotated to achieve the best transmitted and received signal strength, and secured in position with guy ropes tied to the side brooms. Other types of wood could be used to make this antenna's frame, incidentally, but I doubt if they would have the sheer class and flash of genuine broom sticks. There is simply no comparison to going first class!

SGC may be contacted at 13737 SE 26th Street, Bellevue, WA 98005 (phone 425-746-6310; fax 425-746-6384; e-mail: <sgc@sgcworld.com>; web: <www.sgcworld.com>).

Conclusion

As we all know, emergency situations can arise anywhere, anytime, and the more antenna designs or ideas you can come up with, the better you are prepared to face the situation. Presenting some helpful, thought-inspiring ideas was the purpose of this month's column, and we hope it helped expand your knowledge of various antenna designs to fit a wide variety of needs.

73, Dave, K4TWJ

Public Service

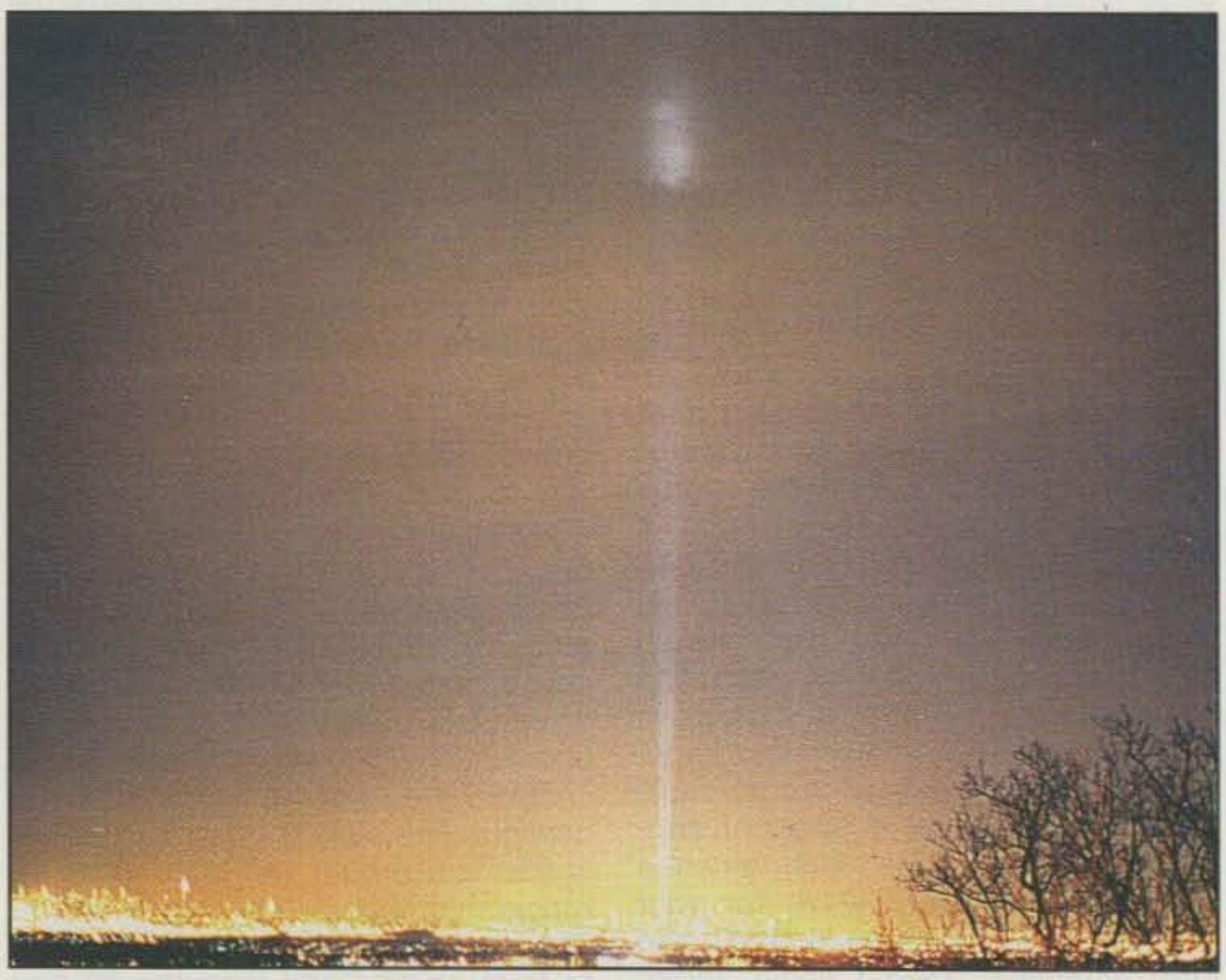
BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

Looking Back at that Day in September

All eyes were focused on the East Coast as planes crashed into the World Trade Center, the Pentagon, and a field in western Pennsylvania. September 11, 2001: Hams responded to situations none of us had seen before and hopefully will never see again, but for which we now must be prepared to respond should it happen again.

The events of 9/11 also triggered an amateur radio response in areas of the world far removed from New York and Washington, D.C. As commercial aircraft were being told to land, many Pacific/Asian routes were being diverted from their U.S. West Coast destinations. Many of these flights were diverted to the Vancouver International Airport in Richmond, British Columbia. In a short period of time several thousand passengers had to be accommodated until alternative travel arrangements could be made.



On the six-month anniversary of the attacks on New York City, two "towers of light" were turned on near the site of the collapsed World Trade Center towers. Visible for miles in all directions, the lights were kept on every night for a month as a memorial. (W2VU photo)

Canadian Hospitality

Brian Summers, VE7JKZ, president of the Richmond Amateur Radio Club, told *CQ* that "Club emergency communications manager Hu Reijne, VA7HR, received a call from the City of Richmond emergency communications manager, Derrick Lim, at 4.30 PM PST on September 11th requesting the support of local radio amateurs." Twelve club members with HTs "set up 2 meter stations at the local emergency operations center and a couple of community centers where passengers were processed." Within two hours the initial group of 12 and other area amateurs began to assemble at the Emergency Operations Center for assignment. Once the hotels were filled, passengers were put up at local churches and other places. "Needless to say, things were quite busy," said Summers. "A lot of local traffic in support of the civil authorities was handled."

Activity commenced at 6 PM and was joined by amateurs from other clubs in the Vancouver area who heard of the activity on the 2 meter repeater. Operations lasted until 11 PM at night.

The next day amateurs were assigned to a local church to assist some 100 passengers from an Air China flight who spent the night there. Summerfield said, "Many of them spoke little English, and as Richmond has a large Chinese speaking community, there were Cantonese- and Mandarin-speaking local residents acting as interpreters. Amateurs were provided with about 12 cell phones provided by the local telephone company which were used to allow passengers to make long-distance calls to loved ones informing them of their whereabouts. Amateurs passed a lot of traffic between the church, a workers compensation building residence, and the EOC."

The traffic involved the tracking and locating of friends and relatives who had been put up in other areas. Other traffic was passed on behalf of social services (meals, baby needs, etc). The work of the local amateurs did not go unnoticed. Summers said Gerry Cowper, VE7FIR, was interviewed by a TV crew and the clip was shown on local and national news.

Several amateurs were assigned to the local Delta Inn hotel. A "No Vacancy" sign did not apply here. Not only were all the rooms filled, but two ballrooms were used to house 200 passengers.

Getting people back together again was an important part of this operation. Summers described one success story: "She had the luggage; he had the tickets. Knowing where they were billeted, Hu, VA7HR, drove him to her and got them reunited! Approximately 25 amateurs served in the public interest during the two-day event. Summers pointed out that having a good net control—in this case Bill Williams, VA7BW—was important.

NTS Messages

Summers asked, "How much attention was given to formal procedures with message forms?" during the September 11th response. *CQ* went back to some of our contacts and asked.

At the Pentagon, ARRL Virginia Section Public Information Coordinator Pat Wilson, W4PW, said, "Much of the early traffic was simply between those enti-

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

ties helping at the site itself, such as the Red Cross and the Salvation Army, and not much information was flowing out to the general public." The official NTS format was used if the message was going into the NTS system, but other than that, it was a little more informal and hectic at the beginning, but calmed down substantially as time passed."

In western Pennsylvania, where a plane crashed into an open field, all RACES traffic was handled informally on the local repeaters. RACES Officer Jim Crowley, NJ3T, said the messages were "short and to the point." Initial messages were primarily between the Emergency Management Director at the site and the county Emergency Operations Center.

In New York City, District Emergency Coordinator Charles Hargrove, N2NOV, said there were "no NTS messages passed during the incident. All traffic was of a tactical nature on behalf of served agencies (Red Cross, NYC Office of Emergency Management, Salvation Army) and was handled either as such on the VHF and UHF repeaters or via e-mail and telephone."

Tactical Communications—Nothing Else

We asked Bart Lee, KV6LEE, about Red Cross tactical communications. Lee served as the Red Cross Radio night-shift supervisor for ten days starting September 12. He described the experience as "indelible and surreal."

"That's all there was for us at Red Cross as far as the hams were concerned," said Lee. He credits Jay Ferron, N4GAA, for the success of the amateur radio operation at the Red Cross. "I was privileged to play a part in it," said Lee. "We were very, very busy in the opening days of World War III. What I have to say to my brother amateur radio operators is Drill, Drill, and Drill, because it ain't over yet."

Understanding the Needs

In any disaster there is a need to understand the needs of the organization for which you are supplying communications. In this case there was no need for HF communications. On Sept. 11th Lee monitored RACES coordinating out-of-state Disaster Medical Assistance Teams (DMAT teams) and other traffic not related to the Red Cross. Beginning the next day when Lee became active, the RACES net had the Red Cross as its primary client. "We had to communicate with a dozen or more shelter locations and three Office of Emergency Management sites. This was all tactical on Tac 2 on 2 meters and Tac 10 on 70 cm. It's important to remember that the Office of Emergency Management and its RACES station was destroyed when the building it was stationed in also collapsed."

The RACES net control would yield the net to the Red Cross operator, who would then run a subnet of the Red Cross stations to poll for the number of people staying in each shelter, firefighters at the OEM respite site in need of food or cots, and the like. Then he would turn it back over to the RACES net control station. In each shelter the radio operator had a "client," who was the shelter manager. She or he alone could initiate traffic, and all traffic went to her or him. "So what I saw, at least, was all tactical," said Lee. "ARES, in my view, should concentrate on tactical nets and training."

Don't Sell NTS Training Short!

Lee continued, "NTS message handling skills and drills are very important, because handling disaster traffic is stressful and fatiguing, especially as the days run on.

"N2NOV got us ARRL message forms from the internet. We used those forms. They are a great help in disciplining the traffic to Who, What, When, Where, and How. Crafting clear, concise, and unambiguous messages is a learned skill," said Lee, "and NTS is a great place to start. We logged and kept track of the messages as well as we could. We only had scrounge-pads in the first couple of days for logging."

In the future Lee would like to see big spiral notebooks stored at every possible operating site, along with lots of other stuff, of course, so that good logs can be kept from the beginning. Lee suggested "pencil carbon paper" so that a handwritten message on a message sheet can automatically be copied into the log for later reference. No matter what, it will turn out to be important, often within minutes, to keep a good record of traffic passed.

"Lots of it comes back with questions, gets redirected, or becomes important in another context. This happened many, many times, and both good messages and good logs were useful in distress," said Lee.

Little Health & Welfare

"What traffic I saw was almost all working tactical messages with very little Health and Welfare traffic, at least on RACES," said Lee. "I hope there will

St. Paul's Chapel of Trinity Episcopal Church in New York City, the oldest public building in continuous use in Manhattan, is a block from Ground Zero. Miraculously unharmed by the collapse of the World Trade Center, its walls and fences became an impromptu memorial in the days after the attack, and its doors were opened to rescue and relief workers. As of mid-May, both roles continue. (Photo by Susan Moseson)

never again come a time when fear and uncertainty are so high that Health and Welfare messages have to get through, but that would be an important role for NTS, even if it is limited to getting H&W traffic to a working e-mail connection. But from what I experienced in New York, tactical skills and capability came into play; without them, in the first days of that enormity there would have been no Red Cross communications."

Training

"Training should focus on amateur radio basics, discipline, and the ability to mobilize a wide-area response," said New York/Long Island Section Emergency Coordinator Tom Carrubba, KA2D. "Drilling with the neighboring areas is a must. Knowing the neighboring area command structure was a big plus in our mobilization of relief for the NYC hams during 9/11 WTC. The sections of NLI, ENY, NNJ, and CT worked seamlessly to supply relief operators for NYC. We (outside of the affected area) were very fortunate to have telephone and internet service. We did not have to tie up a busy net with our traffic. At the request of NYC OEM, we were asked to restrict spectrum use."

Lessons Learned from the WTC

Carrubba passed along some of the lessons learned in New York.

• Emergency communications is 24 hours a day/7 days a week. This is not a 9–5 work day. Carrubba said we need to "sell this to the populace of the amateur radio community."

• "During WTC we had numerous recruiters who spent many hours answering telephone and e-mail queries. Hams asked, 'How can I help? What is going on?'" The Amateur Radio Incident Commander should follow his training and common sense. Carrubba said, "It's not all by the book." Establish shift time limits: "You gotta rest!" Use your staff—delegate, don't micromanage.

• Assign a Public Information Official team. There is a need to make sure that all information coming in and out is the correct information. In some areas this might be a rumor-control function.

• Assign shift managers responsible for sign-in, orientation, debriefing, and liaison with served agencies. Do *not* hesitate to question the mission—what it is and the time required. There are times when the served agency needs guidance.

• Compile an accurate after-action report.

Lessons for volunteers. Carrubba suggested that volunteers follow their training and common sense. Only respond to requests from your ARES Emergency Coordinator or his assistant. Make sure that your family is safe and secure, as well as your property. Once that is done, monitor your assigned local ARES frequency and follow the instructions you receive from the net control station.

Lessons for others outside the affected area. Do not attempt to contact the management team in the affected area. They are busy doing their jobs. If additional resources are needed, this will be requested through channels, so stand by and be ready. Don't forget that you

FEMA workers learn how to use safety masks to prevent the inhalation of dust and smoke. Is this part of your emergency response training? (FEMA News Photo by Larry Lerner)

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SS-30	25	30	3¾ x 7 x 9⅝	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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

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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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SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

Is Your Repeater in Jeopardy?

Maybe you have heard the comment that tower space is valuable. Commercial users are paying hefty rental fees for getting their antennas high on a tower. The same can be said for the roofs of tall buildings. Owners have learned that they can sell roof real estate to the highest bidder. The days of a ham climbing a broadcast tower have gone by the wayside as tower owners become concerned over what liability insurance the ham carries against damage to other antennas and equipment. In addition, there are concerns about high RF fields on the roof.

Where does that leave the ham's repeater antenna? Some groups have said they no longer have the radio coverage they used to have because they have had to move their repeater antenna to another location. In some cases the tower owner said they could stay there for a price, but sometimes this is a price that a ham club can't afford.

Have you or your club had a problem of this sort with your repeater antenna? Have you had to move the antenna to another location? Has this prevented you from providing the type of public-service and emergency communications that you used to? Have you been able to work out an "arrangement" with the tower or building owner? If not, what have you done?

Please drop us a note and share your experiences with us. Send your comments via e-mail to <wa3pzo@cq-amateur-radio.com> or by mail c/o *CQ*. Thanks!

may be needed in *your* area. Press and information releases will be via ARRL bulletins and web-page updates.

PA Hams Recognized

When Flight 93 went down in a remote field in Somerset County, the importance of amateur radio was recognized. Somerset County Commissioner Jim Marker praised amateurs as having a "unique hobby."

"When cell phones and other radio communications are swamped or nonexistent," said Marker, "ham radio is relied on for communications and sometimes initial communications out of the affected areas, providing critical information to the emergency operations center."

Pennsylvania Emergency Management Agency Western Area Director Timothy Baughman commented how amateurs demonstrate time and time again their ability to come to the aid of their friends and neighbors and the government when needed. Baughman said, "If the government had to levy a tax to pay for the resources and capabilities that hams bring to bear for us, we all would be in the poor house. It's virtually impossible for the government to replace the great benefit that hams provide for their communities. At PEMA, we make sure that emergency management agencies in our district incorporate amateur radio as a vital resource in communication support into their emergency plans.

"We also encourage them to involve hams in public safety and other aspects of emergency management," Baughman added, ending his remarks with, "on behalf of PEMA we thank you very much for your support." He also thanked the spouses who may not be hams for supporting their husband's or wife's hobby. "Their sacrifice is equally noted and appreciated."

Jim Crowley, NJ3T, RACES Radio Officer for Somerset County, said he has been "blessed with a number of amateur radio operators located in or near our county who have demonstrated over and over their willingness to help during any disaster when called upon. Each time they demonstrated in a professional manner their abilities to provide emergency communications from the field to the Emergency Operations Centers. Many times ham radio was the only communications for the first several hours of an event, providing critical information to various organizations. I want those amateurs to know that their efforts do not go unnoticed or unappreciated. People like them make the local RACES, ARES, and Skywarn programs successful. Thanks to all who have helped."

Questions Still to be Answered

As I covered the events of September 11th I recognized that there are situations which those involved handled as hams normally do. However, I have to ask whether the amateur radio community is truly ready to respond to the extraordinary, or whether it truly can be. In New York there was dust everywhere. We all saw pictures of relief workers wearing masks while doing their jobs. The hams used face masks to block the dust. Was that enough? Is there a need to better protect volunteers when faced with an unknown danger? If a ham is wearing a more protective facial mask, can sufficient audio be projected into the HT? If the HT or other radio is exposed to an unknown substance, what is the proper method of cleaning the equipment? Is there a risk involved in moving the equipment out of the dust zone and taking it home?

We don't know the answers to these questions, but they need to be asked, particularly in planning how we might respond to future needs—not only terrorist attacks, but more "routine" emergencies such as chemical leaks, etc.

With thanks...

This month I want to thank Brian Summers, VE7JKZ, president of the Richmond Amateur Radio Club; District Emergency Coordinator Charles Hargrove, N2NOV; Bart Lee, KV6LEE; New York/Long Island Section Emergency Coordinator Tom Carrubba, KA2D; and Jim Crowley, NJ3T, RACES Radio Officer for Somerset County.

Do you have a story to tell of your group serving in the public interest? How about some discussion on the questions raised above? Until next time...

73, Bob, WA3PZO

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

An Effective, Cheap, Portable Emergency Antenna for 2m/70cm

One of the words that best describes what ham radio operators do is "adapt." Most of the innovations that hams have come up with in the last century involved adapting ordinary items for extraordinary use. For instance, the term "breadboarding" came about years ago when hams swiped the kitchen breadboard and used it as a makeshift chassis for early transmitters and receivers.

This month we feature a guest columnist, Wayne Yoshida, KH6WZ. Wayne and I worked together at ARRL Headquarters back in the early 1980s. He's not a electrical engineer, but he is a really great "tinkerer." The electrical design for this project came straight out of a *QST* reprint readily available (see below), so there is no point in wasting space printing it here. If you want to build this project, you can get the electrical specifications easily enough.

The point is this: You can adapt a given idea to fit your own circumstances with just a little bit of creative thinking. Never hesitate to take someone else's idea and make it your own. Just don't claim credit for something you did not do. That's not nice.

By the way, I have used a similar antenna taped to the glass of a large window. This works fine, unless the window is under the jurisdiction of a "neat freak." It can be somewhat ugly.

Now here is Wayne, KH6WZ (e-mail: <wyoshid1@irf.com>):

This project started as a proposed emergency antenna for fire department vehicle use in an upcoming Huntington Beach (CA) RACES drill later this summer. The fire trucks are aluminum, so mag-mounts won't work. Several fire vehicles *are* equipped with 2m/70cm ham antennas for RACES use, but not all are. Design objectives, not in any particular order, are:

- Dual-band coverage for 2 meters and 70 cm, with some gain over quarter-wave whips or "duckies"
- Inexpensive
- Compatible with non-metallic surfaces
- Portable
- Safe for fire and volunteer personnel

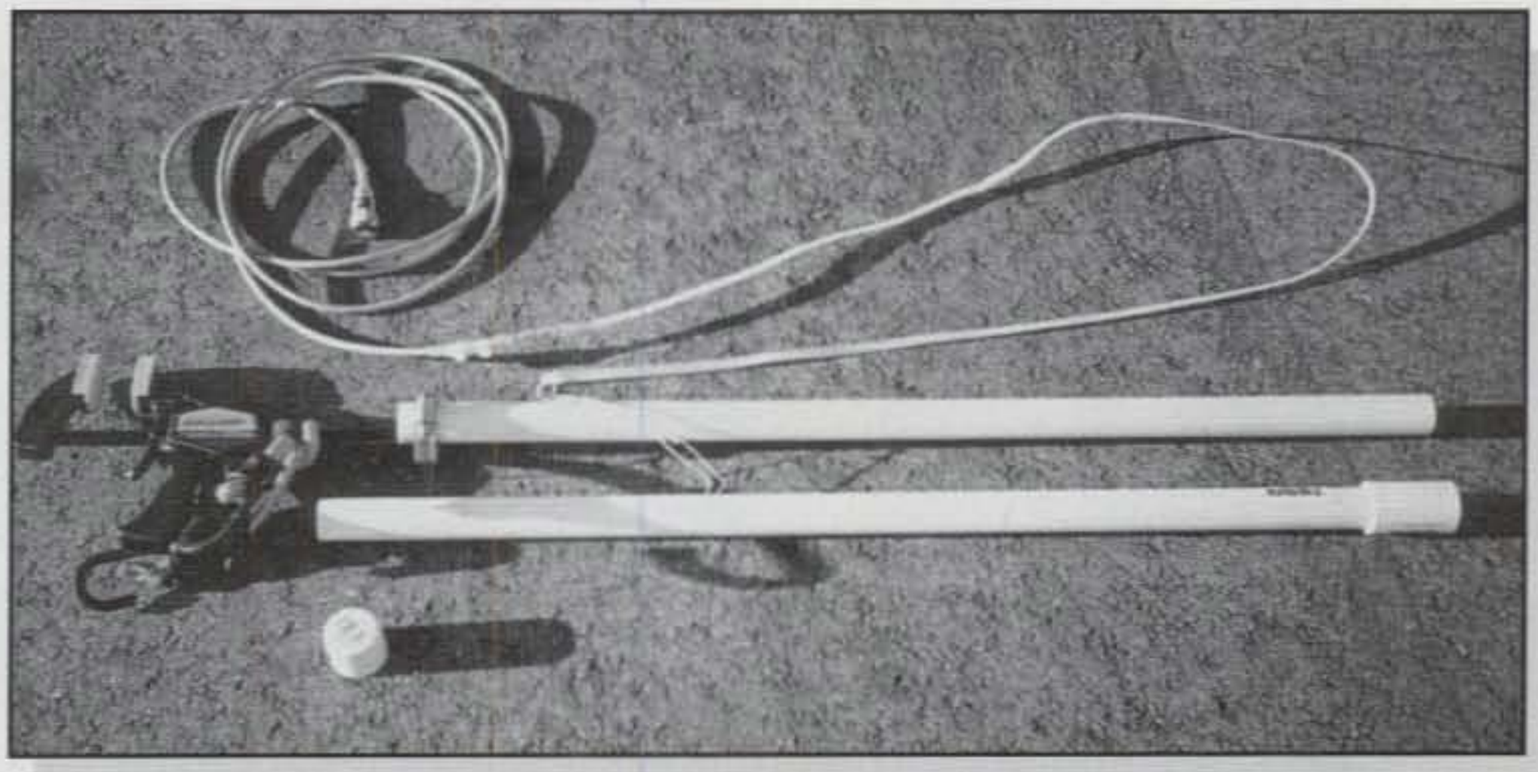


Photo A– The twin-lead antenna is enclosed in two lengths of 1/2 inch PVC pipe. This makes the "floppy antenna" rigid for mobile use and foldable for storage. (Photos by Wayne Yoshida, KH6WZ)

Photo B– This is the mounting mechanism for the fire truck J-Pole. It is a Quick-Grip® mini bar clamp used by woodworkers. It has a "quick-action" sliding trigger to squeeze onto things. They are available at any hardware store for about $25 a pair. Notice the hose clamp that holds the pipe to the "tail" of the clamp. Note: This clamp prefers square, rather than round objects to clamp to. Other suitable clamps may be available.

The antenna is a 2m/70cm J-pole made from TV twin-lead. This antenna is not a revolutionary design. In fact, here's a link to the instructions on the ARRL website: <http://www.arrl.org/tis/info/pdf/9409061.pdf> (This is a reprint of an article that appeared in the September 1994 issue of *QST*, pp. 61–63.)

I have made many of these antennas, and all of mine work beautifully, with relatively flat SWR on both bands. I did not need a balun or "special anything" for this antenna. However, SWR does

**123 NW 13th Street, Suite 304-2, Boca Raton, FL 33432*
e-mail: <wb2d@cq-amateur-radio.com>

Photo C– Here's a hint for any line of coax: After a rather dusty Field Day last year, I decided that some sort of "boot" is needed for coax lines used in portable situations. Film cans are free, and this PL-259 boot is a good way to recycle plastic. Also notice the heat-shrink strain relief and property label on the end. Another hint pictured: After "losing" many coax adapters, I decided to store each adapter in its own case—a 35 mm film can—and store them all in one place. Each can is labeled with the adapter type, such as "BNC male to SO-239." One film can is used to keep an inventory of the collection. When an adapter is being used, the container remains open until it is returned. I have not lost any adapters for over a year now.

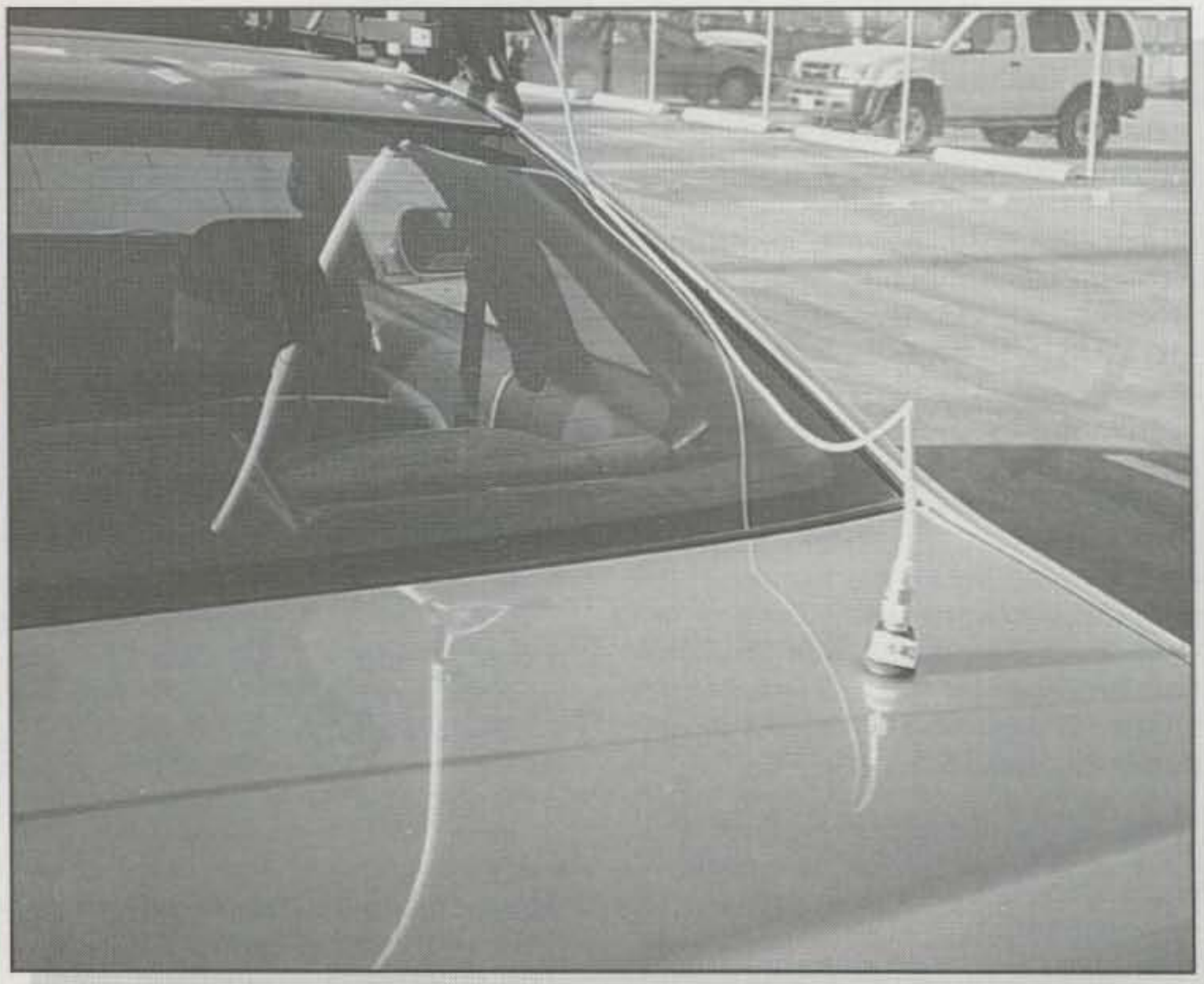


Photo D– The J-pole feedline can be fed through a window, or in this case can be connected via an adapter to the normal mobile whip connection. The coax is fed via an "NMO to Type M" antenna adapter. In practice, the coax should be taped down to prevent scratching the paint.

Photo E– The 2m/70cm J-pole set to go.

seem to interact with feedline length; a very short feedline will make the SWR go way up. I tried to make a version that would directly fit into a "type M" (SO-239) mobile mount, with a 2 inch coax "pigtail," but the SWR was over 3:1.

In the past I simply rolled the antenna with attached coax line and stuffed it into the fanny sack, thinking that a place to hang the antenna will just turn up. This is almost never the case. After participating in several events with no supports, and thus not being able to use the J-pole, I decided a mast or something else was needed.

In order to make this "floppy antenna" more suitable for portable and mobile use, it must be rigid. I've tried several alternatives to stiffen the antenna, including radio-controlled airplane control rods and wood dowels, but these "solid" items affected SWR. Then I enclosed the antenna in a piece of PVC pipe. This seems to be the cheapest and sturdiest way to go.

The 1/2 inch PVC pipe "radome" now needed to be attached to the vehicle in some way. A woodworker's "quick clamp" drew my attention in my shop (see photo A). The pipe is in two pieces so that it can be folded for easier storage in the trunk.

I have another version of this antenna for use at RACES functions. I cut the pipe into foot-long or so pieces and added couplers so it can pull apart and be folded, and the antenna can get stuffed into a fanny sack as part of the Huntington Beach RACES "Grab-n-Go" bag.

Feedback on Feedback

Here is some follow-up feedback involving an error in the Feedback section of this column for April 2002.

William Shanney, W6QR, suggested using coaxial cable for the counterpoise legs in an HF installation in an apartment. The braid is left unattached, to prevent coupling RF to household wiring and appliances: "I noticed two errors in my feedback...I must have been tired when I wrote it and was not thinking it might get published. (1) The quarter-wave coax radials are open at the far end; that presents a short at the station ground. (2) Cho-Sorb beads are made by Chomerics; check out the company's very informative website: <www.chomerics.com>."

During a recent event, one of these twin-lead J-poles was used for 2 meter simplex operations and APRS. The operators at the temporary command post mentioned that the antenna seemed to be "fussy" with regard to position and SWR. Further experimentation seems to be in order.

In the meantime, my mobile setup extends my simplex range and access to the repeater from S-zero to full quieting, a noticeable improvement.

Call for Photos and Stories

We'd like to hear from you about your experiences as a newcomer. If you have questions, we'll try to incorporate them into future columns. If you have photos (color prints or slides okay) of your station or antennas, please send them along and we'll publish the best ones. If you have a solution to a common problem that new hams experience, we'd like to hear about it so we can pass it along. You can contact me at <wb2d@cq-amateur-radio.com> or Peter O'Dell, WB2D, Beginner's Corner, 123 NW 13th St., Suite 313, Boca Raton, FL 33432.

World Of Ideas

BY DAVE INGRAM, K4TWJ

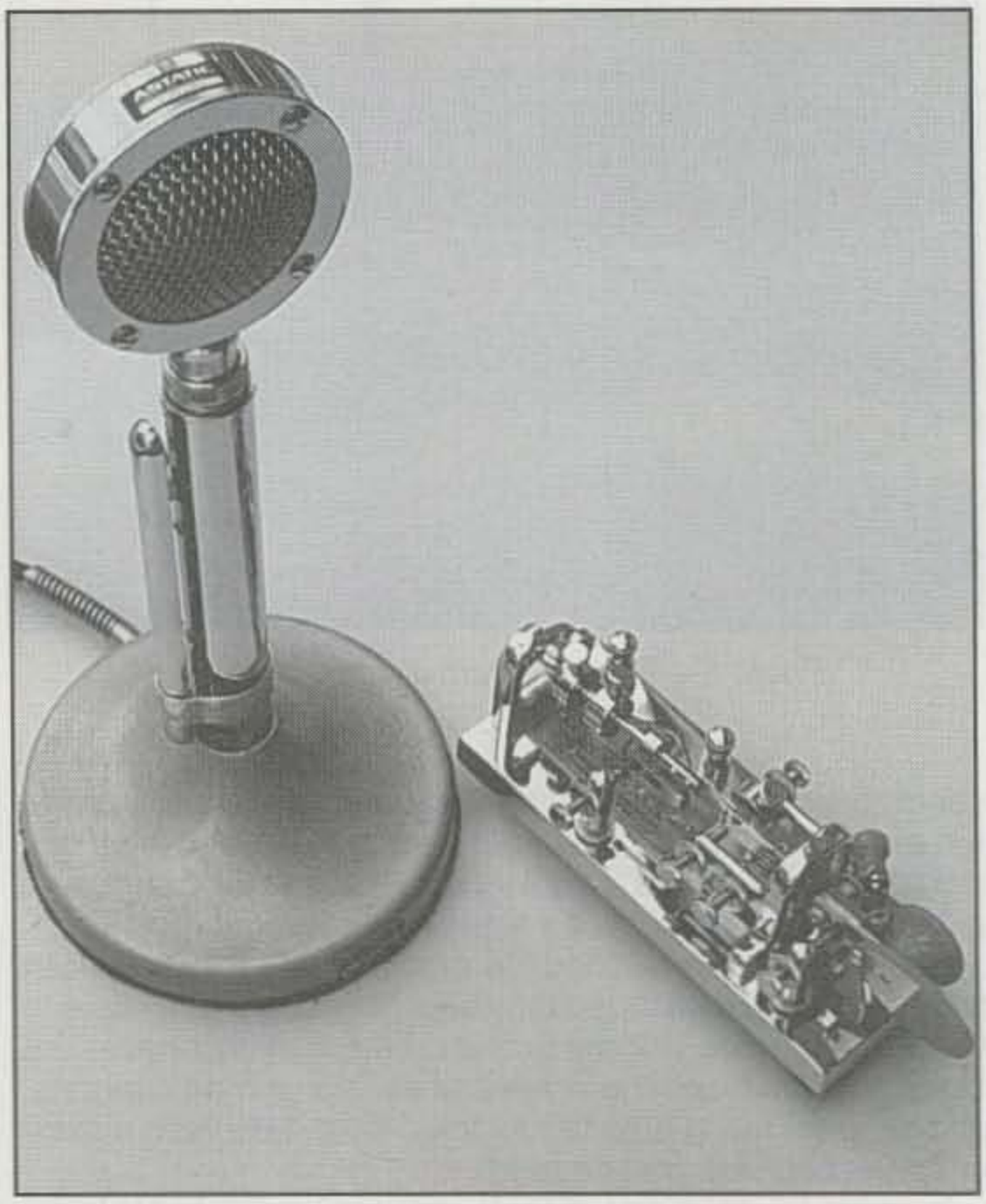
A Look At The World Around Us

Ham Pride: True Tales, Legacies, and Traditions

This month's topic is slightly different from the usual, mainly because it relates to amateur radio's philosophies and traditions rather than rig designs and circuit diagrams. Why this topic? Amateur radio is a very special hobby, hams are very special people, and our legacy will continue only if the details of our thoughts and achievements are passed on from generation to generation. In several respects, an analogy might be made between this handing down of amateur radio information and a story I heard several years ago about a famous pianist.

A senior pianist entered a large church, walked over to its majestic piano, unlocked the keyboard cover, and began to play. The sound was magnificent and quickly filled the church with beauty. A junior pianist who was standing at a side door listened with sincere devotion. The senior pianist concluded his piece and locked the keyboard, and then walked over to the junior pianist, handed him the legacy-endowed key, and exited the church, listening as he walked. The junior proceeded to the piano, unlocked the keyboard, and began to play. His music filled the church; it flowed to the windows, the rafters, out into the street, filled the countryside, and was soon heard around the world. The young pianist's name was Johann Sebastian Bach, and the story is true.

This month we present a short collection of true tales and legacies in amateur radio to our newer members, or "junior ops," with sincere encouragement for your world-class success in every endeavor. You have a proud history behind you and an unlimited future in front of you. I am sure your endeavors both in experimenting with circuits and communicating via amateur radio now and in the future will also be heard around the world. Keep the passion of amateur radio alive!



Whether used on a daily basis or only occasionally or simply for display purposes, a classic microphone and key in your amateur radio setup is a shining reflection of our proud past. As illustrated by the classic D104 and Vibroplex Bug shown here, the mic and key need not be exotic.

Pacesetters and Pioneers

Ever since the early days of wireless communications (approximately 1910) radio amateurs have specialized in accomplishing seemingly impossible feats—and have had a ball in the process. When radio began, for example, people assumed long waves (or lower frequencies) rather than short waves (higher frequencies) were most useful for covering long distances. They reasoned that only a few wavelengths of a signal could reach between the U.S. and Europe with mild attenuation, whereas shorter wavelengths would fizzle out by mid-path. Frequencies below 1 MHz thus were considered prime (and restricted) spectrum, and amateurs were allowed free access to the vast "wasteland" above 1 MHz. Ah, but using the higher frequencies proved most beneficial, and radio amateurs were first in communicating across the Atlantic via short waves. People in authority quickly took notice and "restructured" the HF spectrum, allocating much of the range for international broadcasting and restricting radio amateurs to newly defined ham bands.

Around that same time period, the *Titanic* sank during its maiden voyage from England to the U.S. Radio amateurs from Maine to Florida (and several inland states as well) copied the ship's SOS on their hopped-up crystal-set receivers. They reported details of the event to local newspapers, but reports were ignored because the double-hulled *Titanic* was touted as "unsinkable." After the ship sank, large sea-going vessels were required to carry wireless gear, and hams became widely recognized for their special communications capabilities.

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

Evolution in Communications

- Amateur radio began during the early 1900s with the use of *spark-gap gear*, which was also known as wireless telegraphy.
- The first evolution of mode expansion occurred around 1915 with the introduction of *CW* (Continuous Wave) and single-frequency signals.
- The evolution of speech communications began around 1920 with the introduction of *loop modulation*.
- Between 1925 and 1955 speech communications expanded to embrace *AM*, *FM*, and *SSB*.
- Now on the horizon is the evolution of *digital audio*, a mode that promises to require less bandwidth and support more users than SSB and even support multiple language translations.

Hams' High Integrity

Radio amateurs have always been recognized for their honesty, integrity, sincerity, and dedication to public service. My first "real job" involved retail amateur radio sales, and the first lesson old-pro salespeople taught me was hams—real hams—will go hungry before they will write a bad check. Through the years I have seen that philosophy hold true. I have sold my self-published books and traded gear nationwide and worldwide and never been short-changed or received a bad check. If any dealer has been short-changed, he probably was dealing with an "outsider" posing as a radio amateur. Maybe the old practice of checking to ensure a customer is indeed a duly licensed amateur before selling "license required for transmitting" gear still holds merit.

Now let's fast forward a few decades and discuss television, which actually began with a rotating-wheel system in 1925. Have you ever pondered why television signals are confined to VHF and UHF ranges and relayed by satellite rather than being directly transmitted over long distances via short waves? The reason is bandwidth. A typical TV signal is 6 MHz wide, and only five TV channels would completely fill the prime HF range from 1 to 30 MHz. VHF and UHF signals are not routinely reflected by the Earth's ionosphere, so TV stations reuse these ranges every few hundred miles for local area broadcasting. During the late 1950s, a young radio amateur named Copthorne MacDonald addressed that limitation by "slowing down" a regular TV signal one thousand times to produce Slow Scan TV. The bandwidth also dropped accordingly, resulting in audio tones that could be transmitted directly worldwide by regular HF SSB gear. For several entities, an example being Pitcairn Island (VR6), SSTV was their first video link with the outside world (and I was also glad to play a role in that venture).

During more recent times, radio amateurs using handheld FM talkies and autopatching repeaters were the forerunners of the present cell-phone revolution. Today, FM repeating OSCAR satellites set the pace for future trends by supporting the long-range "talkie" communications from remote areas where even cell phones are still useless. Rapidly evolving digital-audio concepts with optional hard-copy printouts plus language translations so parties of all nations can communicate in their native tongue are now on the horizon for development. Radio amateurs have always been, and will always be, pacesetters and innovators in personal communications systems and concepts. It is that unique bond and kinship that makes us a special group of people celebrating international friendships through on-the-air QSOs. May the thrill and pleasure last forever!

Traditions, Traditions

A few years back, the FCC relaxed the rules involving logging and station IDing requirements. However, many amateurs realized the benefits of both practices and still continue to log and ID in the traditional way. Why? A log is akin to a diary—a list of special friends and their interests, of your own gear's performance, your antenna's SWR curves, and

much more. Never feel limited to simply filling in the blanks in a log. Add your own notes as often as desired. In my log, for example, in addition to the normal QSO information, I add rigs and antennas used at various times, amplifier knob settings, idling current, output power for various plate currents, and SWR for each band. After special DX QSOs I often add QSL route information, sunspot count,a d WWV reports for the time. I even include notes on my equalizer settings, plus dates on which a new antenna, coax cable, and/or guy wires were installed. If a station says my transmitted signal seems different from my usual, a quick check or comparison with proven-successful references in my log helps determine what's happening. Several years of log books are on hand and contain various written records that can be reviewed anytime and anywhere.

Since IDing requirements were relaxed, many operators have ceased giving their callsign on a regular or almost-every-transmission basis. However, amateurs continuing the old tradition may have a special advantage here. On SSB, for example, there is no obvious carrier dropout or squelch tail signifying when a station stops transmitting and starts listening. Add in weak signals, changing band conditions, and/or noise plus omissions of "over" or "go ahead," and one is left wondering if the other station faded into the noise, switched back to receive, or gave up and turned the rig off. Even if only part of a callsign exchange is heard amidst high band noise, the other operator will recognize it as "over." If the exchange marks the QSO's end, other stations tuning across the frequency (including perhaps radio friends from past QSOs) can recognize your call letters and stop to share greetings. This sure beats tuning across a frequency and hearing "okay, 73," followed by another unknown station saying "QRZ" and then silence (Who was that masked man?). Your callsign is as special as you are! Say it with pride and clarity—not necessarily every five-word transmission, but often. Include it on your stationery in your e-mails, too!

Speaking of pride and clarity, strive to analyze your on-the-air sound and mannerisms at regular intervals, such as every couple of months, and continuously aim for perfection. You can perform this check by using an auxiliary receiver and tuning in your own signal (and no, punching on your rig's built-in monitor is not adequate here). Do not connect an antenna to the auxiliary receiver. Switch on its RF attenuator, reduce its RF gain so your own signal is below S9, and listen with earphones. If your words sound weak, mushy, and slurred, listen to some professional radio DJs for inspiration (not car commercials or NOAA weather stations, please!) and practice your speech for greater clarity. Replacing your rig's standard or supplied microphone with a world-famous Heil microphone will further enhance your audio quality. When operating CW, strive to send near-perfect code with perfectly timed dots and dashes plus accurately spaced letters and words (using a keyer and a good paddle helps immensely). Follow these suggestions and your on-the-air image (and your success!) will improve at least 10 dB.

Closing Notes

I understand a number of our readers recently acquired their General or Extra Class license but have yet to experience the blow-out fun of HF activities. I encourage you to give it a go—right now. If you are new to HF and want inside guidance for maximum success right from the start, you can direct-order my new book *Your Guide to HF Fun*. It's loaded with great information! Just send $16 plus $2 book rate or $4 Priority Mail to me at the address at the beginning of this column and I will send a copy to you.

Making friends with other amateurs nationwide and worldwide is a thrill of the best kind. Operating international contests and contacting rare DX stations in far-away places such as Mongolia, Hong Kong, and Malaysia is more exciting than winning an old-fashioned drag race. Yes, and here is the special kicker: There are fewer U.S. stations active on our HF bands today than in many years past (weekends of major contests excluded, of course). Translated that means the ratio of DX to U.S. stations is high (in our favor), and even basic transceiver and dipole or vertical setups work out great. I'm serious!

Only a couple of days before writing this column, for example, I worked VU2XX in India on the big-time band 20 meters via the long path (over the South Pole), and my rig ran only 50 watts to a vertical. A week earlier I worked several JA's and VK's on 30 and 12 meters; Indonesia, Israel, and Fiji on 20 meters; and filled several log pages with QSOs with European stations on 10 meters—and my rig was a little 5 watt FT-817.

I listen in the CW band segments many mornings, at at first tuning they sound empty. I turn on my rig's preamp, turn up the volume, and listen closer, and down near the noise level I hear DX working DX like crazy. Can they also hear my mild-mannered setup or QRP rig (or *your* station, if you join the fun)? Sure—especially if their beam antennas are halfway pointed to favor the U.S. Just time your call accurately, maintain a positive "can do" attitude, and start working toward contacting your first 100 countries for the CQ DX Award and the ARRL's DXCC Award. Now that's living!

If you have any spare time, listen for me too and give me a call. I frequent 30 meters CW weeknights at around 0200 UTC, and 14.200–14.260 MHz SSB Saturdays and Sundays at around 2230 UTC. Good luck, and may the force of good signals always be with you.

73, Dave, K4TWJ

Try HF!

Have you recently upgraded to a General or Extra Class license but have not set up a station for big-time HF operations? Get cracking right now while the sunspot count is high and DX conditions are terrific! Our low bands are the heartbeat of hamming, the bright lights and glamour side of amateur radio, and reading about the fun never compares to actually being right in the middle of its globe-spinning action. Indeed, the international friendships, contests, and special events on the HF bands every week and weekend are prime factors that make amateur radio the world's greatest hobby—pursuit. You do not need a fancy setup and a huge antenna to have a ball on HF. Just gear up with a basic transceiver and antenna and hit the bands today, while the DXcitement is booming!

Try Something Different!

Some old pros tell us they have worked HF for many years, have contacted all the countries, and have only a mild interest in contests. They ask, as Peggy Lee sang, "Is that all there is?" No! Try SSTV, OSCAR, QRP! Go motor-scooter or pogo-stick mobile! Try maritime mobile from a rowboat. Build a two-transistor pocket rig and then work the world with it from a lounge chair on the beach. In amateur radio everyone can be special, and you can accomplish any goal if you set your mind to it. Go for your time in the limelight!

Washington Readout

BY FREDERICK O. MAIA, W5YI

Regulatory News In The World Of Amateur Radio

Question Pool Committee Proposes New Technician Class Outline

. . . asks for assistance in developing new Element 2 exam questions

"The availability of federal funds to administer the Amateur Radio Service need not and should not be permitted to preclude amateur radio involvement for the young or elderly. Amateurs must be permitted through voluntary efforts supervised by the FCC to supply the services, including examinations, to those who would benefit from them, as funds are not available to supply these services any longer."—*from January 1982 introduction of Senate Bill 929 by Senator Barry Goldwater, K7UGA*

The Technician Class license exams that are given beginning a year from now, on July 1, 2003, will be the first to be designed "from the ground up" by amateurs. It is the latest step in the 20-year evolution of volunteer examining.

Up until the early 1980s the FCC developed all of the written test questions used in amateur radio operator license examinations. When FCC funding cuts forced cutbacks in the number of testing opportunities, then-Senate Telecommunications Subcommittee Chairman Barry Goldwater, K7UGA, essentially created the volunteer examiner program. On September 13, 1982 legislation signed by President Reagan authorized the FCC to use licensed radio amateurs on a voluntary basis to prepare and administer amateur exams.

The first exams administered by amateurs were given 7 1/2 months later at the 1983 Dayton Hamvention®, and nationwide volunteer examinations began later that year, with the FCC getting completely out of administering amateur exams by the end of 1984. However, responsibility for the volunteer testing program was turned over to the amateur community in stages.

At first, the FCC selected the exam questions and maintained quite a bit of control over the exam process. In 1985 the FCC eliminated the requirements that Volunteer Examiner Coordinators (VECs) give FCC Field Offices prior notification of upcoming examination sessions and that applicants who failed examinations would have to wait 30 days to be retested.

In August 1986 the FCC further deregulated the amateur testing program, transferring the responsibility for maintaining the written examination question pools to the VECs effective December 31, 1986. In addition, individual Volunteer Examiners (VEs), as well as VECs, were authorized to select the specific questions to be administered to applicants. The VECs formed a Question Pool Committee (QPC) that would be responsible for the future development and revision of the various question pools from which the exam questions were drawn.

Restructuring Impacts Ham Testing

As part of the FCC's 1998 Regulatory Review, the FCC issued a Notice of Proposed Rulemaking (NPRM) seeking to restructure the U.S. Amateur Service. The major change that resulted from this action was the reduction in the number of amateur license classes from six to three, and the elimination of the 13- and 20-word-per-minute code tests. However, the FCC also looked at the future preparation and content of the various written examinations.

The FCC asked in an NPRM whether the examination topics should continue to be mandated by the Commission. At the time, FCC rules specified ten general topics and a specific number of exam questions that had to be asked from each topic in the written examination for each license class. Noting that the "written examinations have been prepared and administered under the VE system for over a decade...." the FCC asked in the NPRM whether the required number of questions from each general topic should continue to be established by rule.

The VECs said in their comments that it is not necessary for licensees to understand electronics and other technical subjects in order to properly operate commercially-manufactured equipment. They recommended that the Commission eliminate the mandated ten topics and that the "...Question Pool Committee determine the topics and questions that are appropriate as part of the process of reviewing and revising the various question pools." The ARRL disagreed, however, and said it wanted "...some version of the syllabus to remain in the Rules."

In its Report and Order, the FCC said that "the VECs had consistently shown since 1986 their ability to maintain the question pools," that "the Question Pool Committee has a better ability to ensure that the question pools reflect current technology than we do by specifying general topics in our Rules,..." and that the QPC "...is capable of both specifying topics and organizing questions by topic...."

The Part 97 Rules were amended "...to require that the Technician Class and General Class written examination elements consist of thirty-five questions each, and that the Amateur Extra Class written examination element consist of fifty technically-oriented questions, including questions about administering amateur radio operator license examinations."

The FCC's ruling came out at the end of December 1999, and the new rules took effect on April 15, 2000. The QPC had to do a rush job in condensing the five original written exam question pools (Novice, Technician, General, Advanced, and Extra) into three—Technician (Element 2), General (Element 3) and Extra Class (Element 4)—so that VE teams would be ready to give the new exams as of April 15.

Basically, the QPC combined questions from the existing Novice and Technician pools for the new Element 2, left the General Class pool pretty much as it was, and incorporated questions from the existing Advanced and Extra Class pools into the new Element 4.

Now that the Question Pool Committee has adequate time to do a more thorough job of revising the pools, a new syllabus has been developed for the Element 2 (Technician) Question Pool with revisions due to take effect on July 1, 2003. On April 4, 2002 Scotty Neustadter, W4WW, Chairman of the VECs Question Pool Committee, released a proposed Element 2 (Tech-

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

Revised Element 2 (Technician Class) Outline – 35 Questions in Exam from 35 Groups

T1 FCC Rules – [5 Exam Questions 5 Groups]

T1A Definition and purpose of Amateur Radio Service, Amateur-Satellite Service and Radio Amateur Civil Emergency Service in places where the FCC regulates these services and elsewhere; Communications Act, Part 97 and FCC regulation of the amateur services; Penalties for unlicensed operation and for violating FCC rules; Prohibited transmissions.

T1B International aspect of Amateur Radio; ITU Regions, International and domestic spectrum allocation; Spectrum sharing; International communications; reciprocal operation.

T1C All about license grants; Station and operator license grant structure including responsibilities, basic differences; Privileges of the various operator license classes; General eligibility; License grant term; Modifying and renewing license grant; Grace period.

T1D Qualifying for a license; Purpose of examination; Examination elements; Upgrading operator license class; Element credit; Provision for physical disabilities.

T1E Amateur station call sign systems including Sequential, Vanity and Special Event; ITU Prefix; Call sign formats.

SUBELEMENT T2 Methods of Communication – [2 Exam Questions 2 Groups]

T2A How Radio Works; Electromagnetic spectrum; Magnetic/Electric Fields; Nature of Radio Waves; Wavelength; Frequency; Velocity; AC Sine wave/Hertz.

T2B Frequency privileges granted to Technician class operators; Amateur service bands; Audio and Radio frequency; Unmodulated RF carrier; Emission types and designators; Modulation principles; AM/FM/Single sideband/upper-lower, international Morse code (CW), RTTY, packet radio and data emission types; Full quieting.

SUBELEMENT T3 Radio Phenomena – [2 Exam Questions 2 Groups]

T3A How a radio signal travels; Atmosphere/troposphere/ionosphere and ionized layers; Skip distance; Ground (surface)/sky (space) waves; Single/multi-hop; Path; Ionospheric absorption; Refraction; Line of sight.

T3B HF vs. VHF vs. UHF characteristics; Types of VHF-UHF propagation; Daylight and seasonal variations; Tropospheric ducting; Maximum usable frequency (MUF); Sunspots and sunspot Cycle, Characteristics of different bands.

SUBELEMENT T4 Station Licensee Duties – [3 Exam Questions 3 Groups]

T4A Correct name and mailing address on station license grant; Places from where station is authorized to transmit; Selecting station location; Antenna structure location; Stations installed aboard ship or aircraft.

T4B Designation of control operator; FCC presumption of control operator; Physical control of station apparatus; Control point; Immediate station control; Protecting against unauthorized transmissions; Station records; FCC Inspection; Restricted operation.

T4C Providing public service; emergency and disaster communications; Distress calling; Emergency drills and communications; Purpose of RACES.

SUBELEMENT T5 Control Operator Duties – [3 Exam Questions 3 Groups]

T5A Determining operating privileges, Where control operator must be situated while station is locally or remotely controlled; Operating other amateur stations.

T5B Band selection; Selecting a transmitting channel; Transmitter power standards; Interference to stations providing emergency communications; Station identification requirements; Observing frequency boundaries.

T5C Authorized transmissions, Prohibited practices; Third party communications; Retransmitting radio signals; Participation in message forwarding system; One-way communications.

SUBELEMENT T6 Good Operating Practices – [3 Exam Questions 3 Groups]

T6A Calling another station; Calling CQ; Sending messages; Typical amateur service radio contacts; Proper language; Courtesy and respect for others; Popular Q-signals; Signal reception reports; Phonetic alphabet for voice operations; Coordinated Universal Time (UTC).

T6B Occupied bandwidth for emission types; Mandated and voluntary band plans.

T6C TVI and RFI reduction and elimination, Band/Low/High pass filter, Out of band harmonic Signals, Spurious Emissions, Grounding, Telephone Interference, Shielding, Receiver Overload.

SUBELEMENT T7 - Basic Communications Electronics – [3 Exam Questions 3 Groups]

T7A Fundamentals of electricity; AC/DC power; units and definitions of current, voltage, resistance, inductance, capacitance and impedance; Rectification; Ohm's Law principle (simple math); Decibel; Metric system and prefixes (e.g, pico, nano, micro, milli, deci, centi, kilo, mega, giga).

T7B Analog vs. digital communications; Audio/RF signal; Oscillator; Bandwidth; Amplification.

T7C Concepts of Resistance/resistor; Capacitor/capacitance; Inductor/Inductance; Conductor/Insulator; Diode; Transistor; Semiconductor devices; Step up/step down transformer; Filter; Resistor Color Code system; Electrical functions of and schematic symbols of resistors, switches, fuses, batteries, inductors, capacitors, antennas, grounds and polarity; Construction of variable and fixed inductors and capacitors; Factors affecting inductance and capacitance.

SUBELEMENT T8 Good Engineering Practice – [6 Exam Questions 6 Groups]

T8A Basic amateur station apparatus; Choice of apparatus for desired communications; Setting up station; Constructing and modifying amateur station apparatus; Station layout for CW, SSB, FM, Packet and other popular modes

T8B How transmitters work; Operation and tuning; VFO; Transceiver; Dummy load; Power supply; Amplifier; Stability; Microphone gain; FM deviation; Block diagrams of typical stations.

T8C How receivers work, operation and tuning, including block diagrams; Superheterodyne including Intermediate frequency; Reception; Demodulation or Detection; Sensitivity; Selectivity; Frequency standards; Squelch and audio gain (volume) control.

T8D How antennas work; Radiation principles; Basic construction; Half wave dipole length vs. frequency; Polarization; Directivity; ERP; Directional/non-directional antennas; Multiband antennas; Antenna gain; Resonant frequency; Loading coil; Antenna switch; Electrical vs. physical length; Radiation pattern; Transmatch.

T8E How transmission lines work; Standing waves/SWR/SWR meter; Impedance matching; Types of transmission lines; Feed point; Coaxial cable; Balun.

T8F Voltmeter/ammeter/ohmmeter/multi/S-meter, peak reading and RF watt meter; Building/modifying equipment; Soldering; Minimum tools needed for building kits; Making measurements; Test instruments..

SUBELEMENT T9 Special Operations – [2 Exam Questions 2 Groups]

T9A How an FM Repeater Works; Repeater operating procedures; Available frequencies; Input/output frequency separation; Repeater ID requirements; Simplex operation; Coordination; Time out; Open/closed repeater; Responsibility for interference.

T9B Auxiliary, beacon, satellite, space, EME communications; Radio control of models; Autopatch; Slow scan television; Telecommand; CTCSS tone access; Duplex/crossband operation.

SUBELEMENT T0 Electrical, Antenna Structure and RF Safety Practices – [6 Exam Questions 6 Groups]

T0A Sources of electrical danger in amateur stations: lethal voltages, high current sources, fire; avoiding electrical shock; Station wiring; Wiring a three wire electrical plug; Need for main power switch; Safety interlock switch; Open/short circuit; Fuses; Station grounding.

T0B Lightning protection; Antenna structure installation safety; Tower climbing Safety; Safety belt/hard hat/safety glasses; Antenna structure limitations.

T0C Definition of RF radiation; Procedures for RF environmental safety; Definitions and guidelines.

T0D Radiofrequency exposure standards; Near/far field, Field strength; Compliance distance; Controlled/Uncontrolled environment.

T0E RF Biological effects and potential hazards; Radiation exposure limits; OET Bulletin 65; MPE (Maximum permissible exposure).

T0F Routine station evaluation.

nician written exam) syllabus into the public domain for comments. The comment period has now closed, and the QPC shortly will be developing the questions for the new Technician Element 2 examination. The new syllabus still contains ten different topics, but they have been completely overhauled. The following is a breakdown of the previous outline and the new one:

The ten FCC-mandated topics and questions currently in effect are:

(1) FCC rules, 9 questions; (2) Operating procedures, 6 questions; (3) Radio propagation, 3 questions; (4) Amateur radio practices, 4 questions; (5) Electrical principles, 3 questions; (6) Circuit components, 2 questions; (7) Practical circuits, 2 questions; (8) Signals and emissions, 2 questions; (9) Antennas and feed lines, 2 questions; and (10) Radiofrequency safety, 3 questions. (Total: 35 questions)

The ten QPC-developed topics in new Element 2 syllabus are:

(1) FCC rules, 5 questions; (2) Methods of communication, 2 questions; (3) Radio Phenomena, 2 questions; (4) Station licensee duties, 3 questions; (5) Control operator duties, 3 questions; (6) Good operating practices, 3 questions; (7) Basic communications electronics, 3 questions; (8) Good engineering practice, 6 questions; (9) Special operations, 2 questions, and (10) Electrical, antenna structure and RF safety, 6 questions. (Total: 35 questions)

Element 2 Technician Questions to be Revised

The Question Pool Committee, of which I am a member, is now seeking input from the amateur community on helping to write the specific questions that will be on the new Technician Class exams. There are specific guidelines for proposing questions, which appear elsewhere in this column. Please refer to the breakdowns of subtopics in the new syllabus, also in a sidebar in this column, for guidance on your question proposals.

There will be approximately 350 to 400 questions in the new Element 2 pool. It will be released to the public on December 1, 2002, and the new Element 2 questions must be used in all Technician Class examinations administered on or after July 1, 2003. We look forward to your participation in developing the next set of Technician Class amateur exams.

73, Fred, W5YI

How to Submit Suggested Element 2 Questions

(1) All proposed questions must be no longer than 210 characters including spaces and punctuation. (Three lines of 70 characters each.) This requirement exists to facilitate implementation of computer testing and use of software-generated examinations by VE teams. Try to be as concise as possible.

(2) Each question must be accompanied by four possible multiple-choice answers only one of which is correct. Be certain that the three incorrect answers are definitely wrong and cannot be construed as correct. Each multiple choice answer is limited to 140 characters. (Two lines of 70 characters.)

(3) Include any schematic diagrams or symbols that are necessary to answer the question. It is desirable to have more than one question relating to a single diagram. A text-only version of the question also would be helpful for use in examinations to the sight impaired.

(4) The question comprehension level should be on the Middle or Junior High School reading and math skills level. Remember that many youngsters are administered the beginning Technician Class examination.

(5) It is very helpful to include a reference from a published source confirming the correct answer. Questions on FCC Rules should reference the appropriate regulation.

(6) All suggested questions should be on the topics included in the syllabus (outline) contained at the end of this column. Indicate the "Subelement" and "Topic" number at the top of the question. For example, a question on Ohms Law would list "Subelement: T7, Topic: T7A" above the question.

(7) Here is an example of a properly submitted question:

Subelement: T7, Topic: T7A
Correct Answer: D
Reference: Part 97.3(b)(6)
What is the term for the average power supplied to an antenna transmission line during one RF cycle at the crest of the modulation envelope?
A. Peak transmitter power
B. Peak output power
C. Average radio-frequency power
D. Peak envelope power

(8) If you are offering a suggested revision to an existing question, indicate the number of the question you are revising. The current Element 2 question pool may be found at: <www.arrl.org/arrlvec/pools.html>.

Suggestions for new multiple choice questions should be directed to each of the following four QPC members:
Scotty Neustadter, W4WW, <w4ww@arrl.net>
Bart Jahnke, W9JJ, <vec@arrl.org>
Fred Maia, W5YI, <w5yi@w5yi.org>
John Johnston, W3BE, <Johnston.John1@worldnet.att.net>

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

More Summer Stuff

This month your "What's New" columnist shines the *CQ* product spotlight on a variety of new radio gear and accessories, antennas and antenna accessories, net doings, and more. Without further delay, let's examine our current July crop of "more summer stuff."

Radio Gear

Alinco DJ-S40T Pocket HT. Alinco has introduced the DJ-S40T Pocket HT, billed as a "second generation," pocket-size UHF transceiver (photo A). The new unit is a pager-size transceiver that replaces the popular Alinco DJ-S41. The new model has several improvements over the original, and it can transmit with up to 1 watt output with the optional Ni-MH battery or with external DC power.

The DJ-S40T has a "normal" output of 500 milliwatts, 100 memories, a call channel, several scan modes, and more. It covers the entire U.S. UHF amateur radio allocation of 420 to 450 MHz, with receiving capabilities extending beyond the allocated transmission range. There are 38 CTCSS encode and decode settings and four tone bursts that make the unit usable for repeater operations in many parts of the world. The large, illuminated display is easy to read and provides information to the user about a number of useful features. The manufacturer's suggested retail price for the DJ-S40T is $109.50, but dealers often set "street prices" below the suggested retail.

For more information, contact Alinco through its North American distributor, Atoc Amateur Distributing, LLC, 23 S. High St., Covington, OH 45318 (937-473-2840; e-mail: <alinco@alinco.com>; web: <http://www.alinco.com>).

Alpha Delta PathFINDER Digital Automatic Antenna Tuner. Alpha Delta Communications has introduced its new PathFINDER Digital Automatic Antenna Tuner with digital readout (photo B). In one unit the new tuner combines features previously available only in several separate products.

The PathFINDER provides continuous coverage, tuning from 1.8 through 30 MHz plus 6 meters. As a result, it's considered ideal for amateur radio as well as MARS, CAP, and commercial/government uses. The tuner runs under microprocessor control, with an average tuning time of 3 to 4 seconds—automatically.

The digital readout is a precision, multifunction bar-graph/numerical display that simultaneously reads RF watts (5 through 200 watts), peak and average VSWR, and all tuner functions. Front-panel, pushbutton-switched outputs for coax, longwire, or balanced-line antennas are provided, and there's a custom-designed, built-in balun. The new unit has a 200 watt power rating on HF and 100 watts on 6 meters with a 50% duty cycle. The PathFINDER is available through Alpha Delta dealers or direct. The price is $399.95 plus $8.00 shipping/handing for direct U.S. orders.

For more information, contact Alpha Delta Communications, Inc., P.O. Box 620, Manchester, KY 40962 (telephone 1-888-302-8777; e-mail: <sales@alphadeltacom.com>; web: <http://www.alphadeltacom.com>).

Accessories for the Shack

West Mountain Radio's RIGrunner 4012 Power Panel. According to the manufacturer, a RIGrunner (photo C) is the most convenient way to connect all of your 12 volt equipment to a power source. It's a 13.8 VDC power panel that uses the excellent Anderson Power Products connectors to standardize all of your connections.

Photo A– The Alinco DJ-S40T Pocket HT is billed as a "second generation," pocket-size UHF transceiver. The new unit is a pager-size transceiver that replaces the popular Alinco DJ-S41. It has several improvements over the original and can transmit with up to 1 watt output with the optional Ni-MH battery or external DC power. (Photo courtesy Alinco)

Some of the unit's many features include conformance to the ARES and RACES emergency 12 volt connector standard; 40 ampere fused maximum current capability; 12 fused outlets; a precision window comparator power monitor that provides LED and audio alerts of safe-, over-, and under-voltage conditions; quick-change fuses accessible from the outside of the case; effective RF suppression; quick-disconnect PowerPole input cables available in several choices; and much more.

Photo B– Alpha Delta Communications has introduced the new PathFINDER Digital Automatic Antenna Tuner with digital readout. The tuner combines features previously available only in several separate products. It provides continuous-coverage tuning from 1.8 through 30 MHz plus 6 meters. (Photo courtesy Alpha Delta Communications)

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

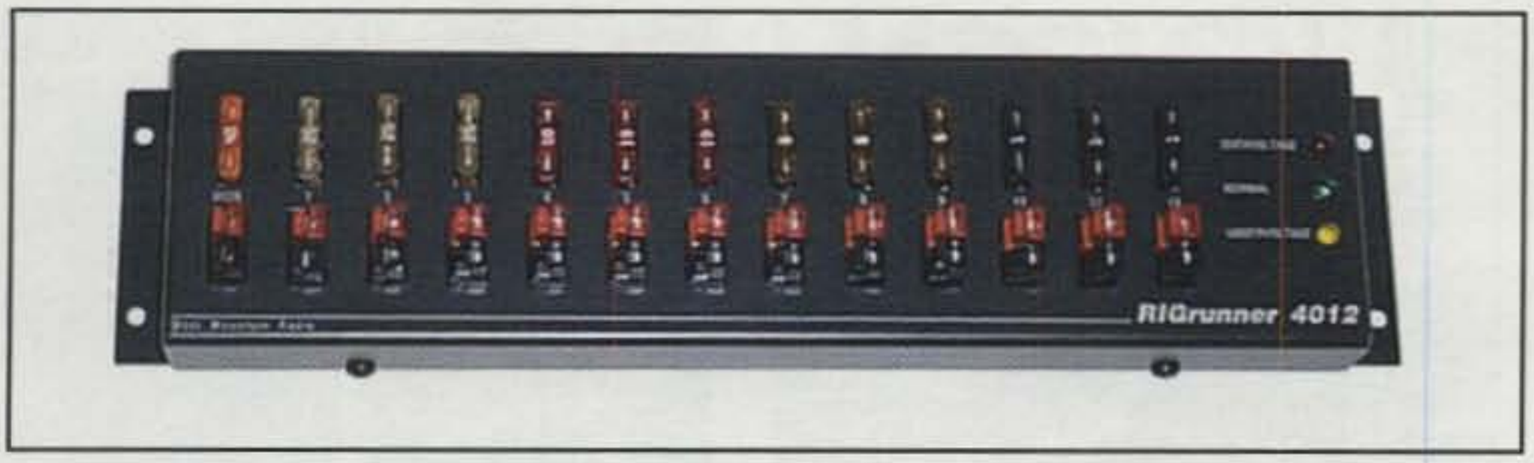


Photo C– According to West Mountain Radio, the RIGrunner 4012 Power Panel is the most convenient and easy way to connect all of your 12 volt equipment to a power source. It's a 13.8 VDC power panel that uses Anderson Power Products connectors to standardize all of your connections. (Photo via the West Mountain Radio website)

For pricing and additional information on the RIGrunner 4012, contact West Mountain Radio, 18 Sheehan Ave., Norwalk, CT 06854 (203-853-8080; e-mail: <sales@westmountainradio.com>; web: <http://www.westmountainradio.com>).

WAVECOM W51PC PCI Bus Decoder. WAVECOM has announced a "high end" digital-signal-processing (DSP) decoder, the W51PC PCI Bus Decoder. Actually a professional PCI short plug-in card for your PC, the 32-bit, 33 MHz unit sports fast data transfer up to 99 MB/sec between the card and the PC. A variety of sophisticated communications modes are available, including PACTOR-FEC, ACARS, and more. In addition, more than 20 signal-analysis functions are available. The new card is designed to operate under the Windows™ 98/2000/NT/XP operating systems. You'll find complete technical details on the manufacturer's website.

The firm also offers access to a variety of authoritative online frequency databases, including utility, broadcast, and VHF/UHF/SHF records in the new shoc® RSM Database; and in the Klingenfuss Utility and Broadcast Databases. For more information on the firm's products and services, contact shoc R. Haenggi, Inc., The Radio Monitoring Company, CH8499 Sternenberg/Gfell, Switzerland (phone +41-52-394 12 55; e-mail: <hgr@shoc.ch>; web: <www.shoc.ch>).

Breakthrough Surge Protectors from ZeroSurge. Zero Surge, Inc., which bills itself as "the series mode surge-suppression leader," has developed what it says is a revolutionary surge suppression technology, Spectrum WVR™. This patent-pending technology is said to operate effectively over the range 85–265 volts, dynamically stopping surge current as well as surge voltage. Spectrum WVR is effective for most surge-protection applications, but is ideal where voltage variations exist, such as in brownout conditions and where standby generators are used.

The company notes that typical surge suppressors' fixed clamping levels do not tolerate fluctuations in voltage. If the voltage goes too high, the clamp can cause distortion to audio, video, or computer signals, and even go into thermal run-away, or simply fail. If the voltage is low, as in brownout conditions, clamping effectiveness—and thus surge protection—is degraded.

The company manufactures certified Grade A endurance, Class 1 performance, Mode 1 application surge suppressors, which it calls "surge removal filters." These units are designed to eliminate the surge damage often experienced with common MOV (metal oxide varistor) type surge suppressors. Zero Surge has over 50 models which accommodate a wide range of applications. The products don't contain MOVs and they don't wear out, as MOVs do.

For more information, contain Zero Surge, Inc., 944 State Rt. 12, Frenchtown, NJ 08825 (1-800-996-6696; e-mail: <info@ZeroSurge.com>; web: <http://www.ZeroSurge.com>). You'll find detailed product information on the firm's updated website.

Pelican® Micro Cases from Jensen Tools. Crushproof, watertight, and corrosion-proof are appropriate words to describe these handsome new cases from Pelican. They're designed to provide "ultimate protection" for electronic equipment such as multimeters, cell phones, pagers, HTs, radios, and other small pieces of electronic gear. The Pelican Micro Cases (photo D) come equipped with an automatic pressure-purge valve that compensates for changes in temperature. They also feature a removable, shock-absorbing rubberized tub in the bottom and convoluted foam in the lid. The cases are available in a variety of convenient sizes, allowing them to fit easily into luggage, glove compartments, or attache cases.

Photo D– Crushproof, watertight, and corrosion-proof describe these new cases from Pelican®. They're designed to provide "ultimate protection" for small electronic equipment such as multimeters, cell phones, pagers, HTs, etc. (Photo courtesy Jensen Tools)

Photo E– Jensen Tools' 2002 Master Sourcebook is a 316-page, full-color catalog that contains thousands of products from leading manufacturers, including an extensive selection of tool kits, carts and cases, test equipment, hand and power tools, wire/cable and fiber optics, soldering and desoldering equipment, and much more. (Photo courtesy Jensen Tools)

We also note that Jensen Tools offers its all-new Master Sourcebook for 2002 (photo E). The 316-page, full-color catalog contains thousands of products from leading manufacturers, including hundreds of new items. The new Master Sourcebook features an extensive selection of tool kits, carts and cases, test equipment, hand and power tools, wire and cable, fiber optics, soldering and desoldering equipment, lighting and optical products, shop supplies, and much more.

For more details or a catalog, contact Jensen Tools, Inc., 7815 S. 46th St., Phoenix, AZ 85044-5399 (1-800-426-1194; e-mail: <jensen@stanleyworks.com>; <http://www.jensentools.com>).

Antennas and Accessories

Three New Antenna Products from MFJ. It seems that MFJ Enterprises is constantly developing new radio gear and accessories, not the least of which are antennas. Now MFJ offers a new trio of antenna products, all designed for amateurs who live in "antenna restricted neighborhoods." This is just in time, I might suggest, for those brave amateurs among us who must operate in such frustrating, amateur-unfriendly environments.

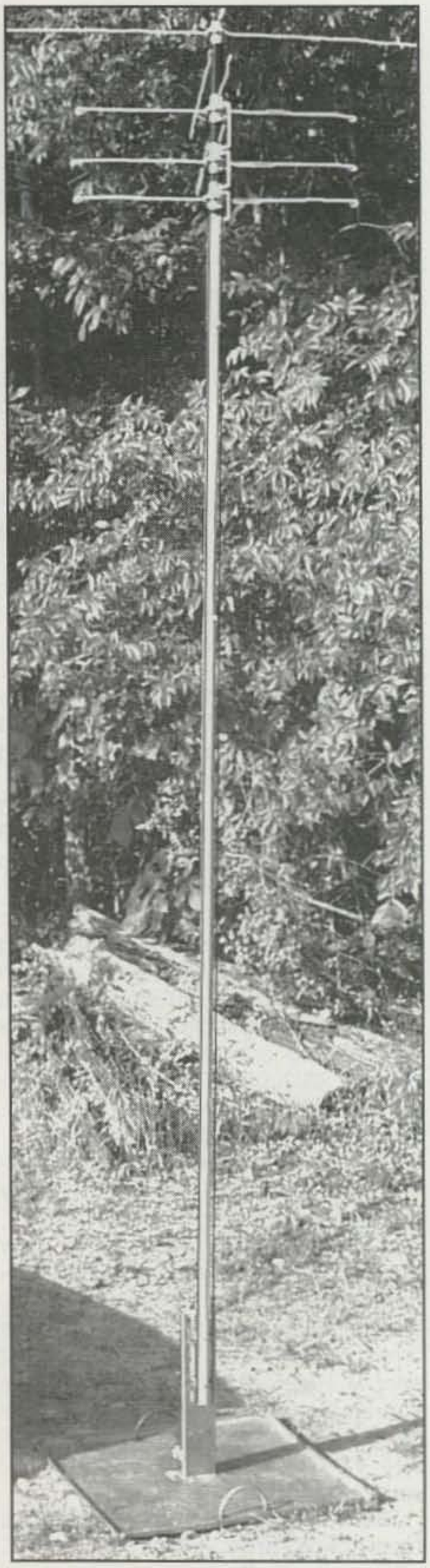


Photo F– The MFJ-1795 Lightweight Vertical Antenna is designed for use on the 40, 20, 15, and 10 meter bands. Featuring automatic bandswitching, it's claimed to be the ideal antenna for antenna-restricted neighborhoods because of its small height and weight. (Photo courtesy MFJ Enterprises)

The "Big Four" Contact Information

ICOM: ICOM America, Inc., 2380-116th Avenue N.E., Bellevue, WA 98004 (425-454-8155; web: <http://www.icomamerica.com>).

Kenwood: Kenwood Communications Corporation, Amateur Radio Products Group, 3975 Johns Creek Court, Suwanee, GA 30024; or P.O. Box 22745, Long Beach, CA 90801-5745 (310-639-4200; web: <http://www.kenwood.net>).

Ten-Tec: 1185 Dolly Parton Parkway, Sevierville, TN 37862 (865-453-7172; web: <www.tentec.com>).

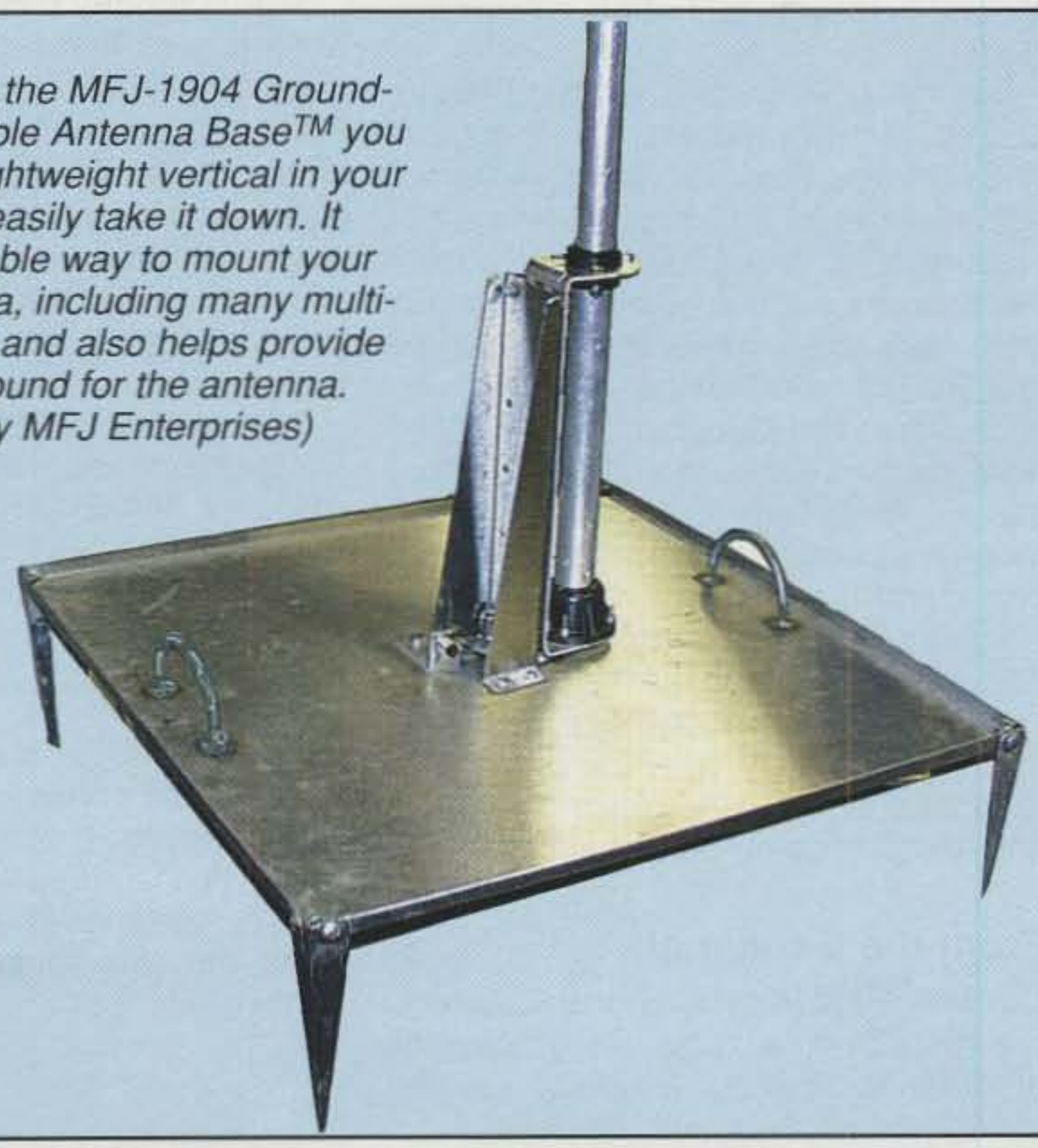
Yaesu: Vertex Standard, U.S. Headquarters, 17210 Edwards Road, Cerritos, CA 90703 (562-404-2700; e-mail: <amateursales@vxstdusa.com>; web: <http://www.vxstdusa.com>).

Fig. 1– The "big four" amateur radio equipment manufacturers listed above have very comprehensive, easy-to-navigate websites. These sites make it simple for you to find out "what's new" in terms of amateur gear that may be just what you're looking for.

First up is the MFJ-1622, a window-mount antenna for apartments and antenna-restricted neighborhoods. The new MFJ-1622 Apartment Antenna lets you operate 40 through 10 meters on HF and on 6 and 2 meters on VHF, all with a single antenna. The antenna's universal mount/clamp lets you easily attach it to window frames, balconies, and railings. You also can use it indoors, mounted to a desk, table, or bookshelf. The antenna sports an efficient, air-wound "bug catcher"-style loading coil and a telescoping 5 1/2 ft. radiator that collapses to 2 1/2 ft. for easy storage and carrying. The antenna comes complete with a coax RF choke balun, coax feedline, counterpoise wire, and safety rope. The MFJ-1622 is $99.95.

Next up is the MFJ-1795 Lightweight Vertical Antenna (photo F), designed for use on the 40, 20, 15, and 10 meter bands. Featuring automatic band-switching, it's claimed to be the perfect antenna for antenna-restricted neighborhoods because of its small height and light weight. The end-loaded, adjustable antenna, which is only seven to ten feet tall, can be put up in a matter of minutes—and then taken down "so the neighbors don't turn you in." The antenna can easily be hidden behind trees, fences, or buildings, or in bushes. The MFJ-1795 antenna may be ground mounted with a suitable ground such as the MFJ-1904 Ground-Coupled Portable Antenna Base™ (described below), radials, or ground rods. The MFJ-1795 is $169.95.

Photo G– With the MFJ-1904 Ground-Coupled Portable Antenna Base™ you can mount a lightweight vertical in your backyard and easily take it down. It gives you a stable way to mount your vertical antenna, including many multi-band verticals, and also helps provide an effective ground for the antenna. (Photo courtesy MFJ Enterprises)



Finally, we come to a very useful and versatile antenna accessory, the MFJ-1904 Ground-Coupled Portable Antenna Base (photo G). With it, you can mount a lightweight vertical in your backyard and easily take it down, day or night. The MFJ-1904, priced at $99.95, gives you a stable way to mount your vertical antenna, and it also helps provide an effective ground for the antenna. The unit is a 2 × 2 ft. stainless-steel square with reinforcing bends that greatly strengthen it; there's a 6 inch stainless-steel leg on each corner. Two antenna mounts let you use a variety of vertical antennas, and two handles make carrying and removing the base fast and easy. You also can attach radials for improved performance, and you can even hide the base by covering it with dirt.

For your nearest dealer, or to order, contact MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; web: <http://www.mfjenterprises.com>).

New on the Net

"Big Four" Amateur Radio Websites. Are you aware that the "big four" amateur radio equipment manufacturers—ICOM, Kenwood, Ten-Tec, and Yaesu—operate very comprehensive, feature-rich, and easy-to-navigate websites? These sites make it easy for you to find out "what's new" in terms of amateur gear, equipment and accessories, items that may be just what you're looking for.

Besides being among the first to announce new products, the "big four" websites also provide a variety of interactive features that facilitate user-to-manufacturer communication. While the features of the four manufacturers' sites vary, they generally include, in addition to "what's new" information, accessory listings, customer and technical support pages, warranty information, dealer listings, DX activities, company news and contact information, and considerably more.

Fig. 1 lists contact information, including web addresses, for the "big four." Why not visit each of these websites today? Most likely you'll be pleasantly surprised at the wide-ranging support and sense of community they offer you.

From the Bookshelf

Contact East 2002 General Catalog. Contact East, a major distributor of products for testing, assembling, and repairing electronic equipment since 1963, has released its updated 2002 General Catalog (photo H). The 340-page guide contains some 64,000 specialty products from leading manufacturers, including many new items.

Photo H– Contact East, a major distributor of products for testing, assembling, and repairing electronic equipment, has released their updated 2002 General Catalog. The free 340-page guide contains some 64,000 specialty products from leading manufacturers, including many new items. (Photo courtesy Contact East, Inc.)

The company's new catalog offers, among other items, test and measurement instruments, toolkits and cases, static-protection devices, adhesives, cleaners and aerosols, measuring tools, soldering and desoldering products, workbenches and chairs, and much more. Contact East is known for its wide range of quality products at low prices, with online ordering available.

For a free copy of the catalog, dial up Contact East, Inc., 335 Willow St., North Andover, MA 01845 (1-800-225-5370; e-mail: <sales@contacteast.com>; web: <http://www.contacteast.com>).

Wrap-Up

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

Overheard: If the good Lord didn't grant you a great deal of common sense, then the very least you can do is hang out with those folks who have some of it!

73, Karl, W8FX

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by Dave Mangels, AC6WO

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by Jerry Sevick, W2FMI

This volume is the source for the latest information and designs on transmission line transformer theory. Discover new applications for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples.

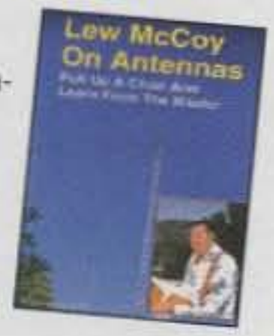
Order No. BALUN **$19.95**

McCoy on Antennas

by Lew McCoy, W1ICP

Unlike many technical publications, Lew prsents his invaluable antenna information in a casual, non-intimidating way for anyone!

Order No.MCCOY **$15.95**



The Vertical Antenna Handbook

by Paul Lee, N6PL

Learn basic theory and pratice of the vertical antenna. Discover easy-to-build construction projects

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CQ Communications Inc., 25 Newbridge Rd., Hicksville, NY 11801/516-681-2922; Fax 516-681-2926

Announcing:

The 2002 CQ/RJ WW RTTY DX Contest

Sponsored by *CQ* magazine and *The New Rtty Journal*
September 28–29, 2002
Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday

Logs are due no later than October 31, 2002

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 or 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 output power is 150 watts or less. 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).

(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). There are no power subcategories in this category.

2. Multi-Operator (all band operation only)

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

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

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

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

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 13 Canadian areas transmit RS(T) report plus State or Area (Canada only) plus CQ Zone. All other stations transmit RS(T) and CQ Zone.

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

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

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

X. Multipliers: One multiplier point for each US state (48) and each Canadian area (13) on each band. Please use only official U.S. Postal Service abbreviations to identify states (e.g., Michigan = MI; Massachusetts = MA, Ohio = OH). One multiplier point for each DX country in the ARRL and/or WAE country lists on each band. *Note:* KL7 and KH6 are counted as country multipliers only and not as state multipliers. One multiplier point for each CQ Zone worked on each band. Maximum of 40 Zones per band.

Canadian areas are VE1 (NB, NS), VE2, VE3, VE4, VE5, VE6, VE7, VE8 (NWT), VO1, VO2, VY1 (YT), VY2 (PE), VYØ (NU).

XI. Scoring:

Final score = total QSO points x 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:

1. Logs must be submitted no later than **October 31, 2002**.

2. Electronic Submissions. All electronic logs must be submitted in Cabrillo format via e-mail to **<rtty@cqww.com>** ***(please note NEW e-mail address)***, or on disk.

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

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

(c) If the Cabrillo format is unavailable, contact the log checker, Eddie Schneider, W6/GØAZT, at <edlyn@california.com>.

3. Disks and paper logs may be submitted via mail to CQ/RJ WW RTTY Contest, 25 Newbridge Rd., Hicksville, NY 11801.

Questions pertaining to the CQ/RJ WW RTTY Contest may be sent to the Contest Director, Glenn Vinson, W6OTC, 488 Locust Street #401, San Francisco, CA 94118; 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, or unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the CQ/RJ 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 or she will be ineligible for any CQ contest awards for three years.

XV. Deadline: All entries must be e-mailed or postmarked NO LATER than **October 31, 2002** ***(please note new deadline).*** Logs received after the deadline may be listed in the results but will be ineligible for any awards.

BY CARL SMITH, N4AA

News Of Communication Around The World

DXpeditions and QSL Managers

With just two weeks until the annual trek to the Dayton Hamvention®, I find myself thinking about all the "goodies" that will be on display there. Manufacturers like to bring their new products to the marketplace for the first time at Dayton. I'm sure I won't be alone wandering through the exhibits to see what new gadgets are being offered this year. We're bound to find something that we just can't live without, whether it's a radio, some accessory gadget, a new logging program, or some other great new offering.

Kevin, BD4XA, and Mary, BD4XYL, make a "radiating couple" from this very nice station in China. Outside they have a 5-element tribander for 20, 15, and 10 meters and a 2-element Yagi for 40. Dipoles are used on the other bands. (Photo courtesy John, KDØJL)

DXpeditions and "Ole Sol"

We got a rude awakening in late April when the sun spewed forth all that energy which almost wiped out the bands for DXing. Many DXers walked outside to see if their antennas were still there. I know, because a few of them called me to ask what was going on. Well, into early May the numbers kept telling us that propagation was not that great, as if we needed to see those numbers to tell us that. Just turning on the radio and listening across the bands told us that things were not what we had become accustomed to this spring. Ah, but DXers are a persistent group of people, and we found DX to be worked in spite of the sun's tantrum.

VK9ML from Mellish Reef took a real "hit" from Ole Sol, but still managed to put 51,000 Q's in the log. It was touch and go on the higher HF bands, but they were there, and with some superb operating by the team, we were able to make those contacts. If you are into statistics, check out their website at <http://www.qsl.net/vk9ml/2002/>. It has charts and graphs that break down almost every conceivable statistic you could ask for.

K1B – The Baker Island team came up on April 28 signing that strange callsign— K1B. A lot of folks thought they were working some lighthouse in New England, until the word got around that it was, in fact, a special call that had been assigned to the team for the DXpedition, similar to K5K, which was issued to Kingman Reef. In short order the K1B team started racking up the Q's, and in the first three days they had over 35,000 Q's in the log from their three-camp setup running six stations. An interesting detail reported was that when the team met at the airport in Los Angeles, all of the non-U.S. team members took the U.S. exam for Extra class to be able to qualify for operation from the U.S. possession of Baker Island.

P5/4L4FN – North Korea has been on and off the air recently. Ed was off on a two-week trip to Southeast Asia the end of April and was expected to return in early May. It has been reported that he will be in North Korea until July 2003, and hopefully everyone will have an opportunity to work him now that his operation has been approved for DXCC credit. That DXCC approval is only for SSB contacts, so don't ask for CW or RTTY. The QSL Manager Bruce, KK5DO, has been busy responding to the QSL requests. There is an on-line log search for P5/4L4FN at <www.amsatnet.com/p5.html>.

FR5ZU/T – Tromelin. Jacques was due to visit Tromelin again for the month of June (ending up July 5). He's been there before and provided many with their first FR/T QSO and QSL card, mine included. I'm going to throw out a plea for our friends in France to investigate

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

The WPX Program

SSB

2829 ..... ER1VS
2830 ..... XE3D
2831 ..... N2CJN
2832 ..... WA2RZJ

CW

3085 ..... DH4BAZ
3086 ..... RU3BK
3087 ..... VE9FX
3088 ..... HB9DOG
3089 ..... WA2RZJ

Mixed

1894 ..... 9A2KL
1895 ..... JHØSGG
1896 ..... WA2RZJ

CW: 400 DH4BAZ, HB9DOT. 600 VE9FX. 800 WA2RZJ. 900 K1NU. 1000 JG3LGD. 1250 RU3BK. 4250 N6JV.

SSB: 400 XE3D. 600 WA2RZJ. 650 JA3WFQ. 1100 K1NU.

MIXED: 650 9A2KL. 700 JA3WFQ. 1000 JA9AVU. 1100 WA2RZJ. 1450 WZ4P, OZ1CID. 1500 K1NU. 2200 WB4RUA. 2300 ON4CAS. 3650 WB2YQH. 5000 W2FXA.

10 meters: N9DI, OZ1CID, NØYYO
15 meters: OZ1CID, WA2RZJ
20 meters: 9A2KL, OZ1CID, WA2RZJ
40 meters: JH8WT, WA2RZJ
80 meters: WA2RZJ

Asia: 9A2KL, OZ1CID
Africa: OZ1CID
No. America: OZ1CID, N2CJN, JG3LGD
So. America: OZ1CID
Europe: 9A2KL, OZ1CID
Oceania: OZ1CID

Award of Excellence Holders: K6JG, 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.

160 Meter Endorsement: K6JG, 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.

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.*

Left to right: Warren, DU1EIB, Roger, DU1KT, and Tim, N4GN. Warren and Roger are two of the most active locals from the Philippines. They are currently making improvements to the DX1S club station, where you often will find them in major contests. (Photo courtesy Tim, N4GN)

The call K9EID may not be familiar, but the name certainly should be. This is Bob Heil at his "idea desk" thinking up new ways to make audio even better for hams. Heil Sound has been working for over 20 years to improve the sound quality of our headsets and microphones and has set a standard in the industry. (Photo via Carl, N4AA)

the possibility of an operation from Juan de Nova (FR/J). It's interesting to note that in the last survey by both *The DX Magazine* and *425 DX News*, Juan de Nova was ranked #8 on their Most Wanted lists. With it being that high on those lists, I would hope that someone, somewhere would be looking into at least a reasonable-size DXpedition to that location. I realize it is one of those environmentally protected areas, but then so is South Sandwich (VP8). While it took time and effort to gain the permission of the governmental agencies concerned for the four-day operation from South Thule in the South Sandwich Islands, it was accomplished. Surely the necessary permission can be obtained for Juan de Nova, or is this just wishful

The WAZ Program

10 Meter SSB

533 .....K2YOF 534 .....JL7BRH

12 Meter SSB

24 .....W8AXI

15 Meter SSB

573 .....JH6OSR

20 Meter SSB

1093 .....W4ABW

10 Meter CW

176 .....W3EPR

12 Meter CW

30 .....KØCA

15 Meter CW

300 .....F6FXW 302 .....YV1DIG
301 .....W3EPR

17 Meter CW

40 .....KØCA 41 .....JG3LGD

20 Meter CW

527 .....4F2KWT 528 .....W3EPR

30 Meter CW

50 .....KØCA 51 .....W3EPR

40 Meter CW

223 .....UA6AF 225 .....W3EPR
224 .....K4ZA

6 Meters

33 .....LZ2CC (39 zone endorsement)
03 .....JI1CQA (36 zone endorsement)
08 .....JF1IRW (35, 36, 37, 38 zones endorsements)
36 .....YV1DIG (27 zones) 39 .....K1MS (26 zones)
37 .....KØAZ (27 zones) 40 .....ES2RJ (30 zones)
38 .....WB8XX (27 zones)

All Band WAZ SSB

4768 .....WS4F 4771 .....KD4EWG
4769 .....W7LWI 4772 .....VA3FC
4770 .....K4AR

Mixed

8142 .....6K2BTX 8146 .....DH5JG
8143 .....IK4ZGX 8147 .....AA1BQ
8144 .....W8HGH 8148 .....KT2C
8145 .....JF1AGB

All CW

311 .....DL1DQJ 313 .....YV1DIG
312 .....JI1BJB

RTTY

134 .....JR1BAS

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>.

Mellish Reef

By John R. Harvey, W9CY

As the atom is the basis of all things known,
with electrons flowing along their path,
about their center . . . circling about.

Look to the heavens to see the stars and far off suns,
we see the magic of it all . . .
the undulations of life.

Now come sound waves with which to hear
from the fog horn to the songs of voice and music,
the pleasures of being.

At the top of the frequencies abound
the colors of light for the eye to see,
come the beauty of nature and pictures to delight . . .
the mind can appreciate the miracle of it all.

As those on the Mellish Reef use the swing and sway
of the ether . . . the radio waves
sending their call sign of "Victor Papa Nine Mike Lima"

We note the different bands of frequencies
within from which they enchantingly call
for those who would share this communications mystique.

One ponders and deliberates the meaning of it all;
no one has yet to see . . . a radio wave,
but the excitement of it . . .

To communicate with those on this desolate place . . .
amateur radio is the utmost delight and calls upon us
to contemplate

The wonderment of it all.

(Photos courtesy <www.qsl.net/vk9ml/2002/>)

thinking on my part? How about some response from our French DXers?

XZ – Myanmar will see action in August for nearly three weeks as a group from Germany, Italy, Indonesia, and Laos plans to operate all bands and modes as XY3C on CW, XY5T on SSB, and XY7V on the digital modes. A very informative website is at <http://www.dx-pedition.de/myanmar2002/>.

QSLing and the Postage Rate Increase

Don't forget about the U.S. postage rate increase effective June 30th. Rates go to 37 cents for up to one ounce first-class mail and postcards go to 23 cents. I also note that periodicals postage (magazines) increases by an average of 10% at the same time. It is becoming increasingly more expensive to do business by mail, no matter what we do. In light of this, I am looking forward to hearing more about the E-QSL project at the ARRL. Once this system finally "plays," it will be a tremendous boost for everyone in reducing the cost of getting

5 Band WAZ

As of May 15, 2002, 598 stations have attained the 200 zone level and 1267 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
W1MK DL8WN

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)
K2UU, 199 (26)
W1FZ, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
K7FL, 199 (23)
W1DIG, 199 (24)
KY7M, 199 (34)
W8AEF, 199 (40)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
KØSR, 198 (22, 23)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
LA7FD, 198 (3, 4)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)
W6BCQ, 198 (37,34on40)
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)

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

N1SV (173 zones)
K8DX (189 zones)
N5DD (153 zones)
KKØDX (155 zones)
K1AR (197 zones)

Endorsements:
K1NU (175 zones) W8AEF (199 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>.

those much sought-after cards. Hopefully, it will also reduce the complaints about stations not answering QSL requests.

The cost of printing QSL cards keeps going up, as does postage. For many stations these costs are high enough to make them stop answering QSL requests. Perhaps it is the number of different awards today, versus ten years ago, but it seems that more people are asking for cards. More cards, more expense, and more time required to answer. If a DX station has to answer 25- or 30-percent more QSL requests today, they have less time to be on the air. The more they are on the air, the more requests are generated and thus the less time to get on the air. It's a

Paul, ET3PMW (left), with Worku (right), who is a buyer and finds various supplies for Paul. He also did a lot of work assisting Paul in getting his license. In front is Yohannes, who helps with antenna work, etc. Paul made nearly 9000 Q's in the first nine weeks of operation, mostly on 15, 12, and 10 meters. A 268 ft. center-fed wire, with ladder line feeding, is used for the WARC and low bands. Dale, N3BNA, joined Paul for the WPX CW Contest the end of May. (Photo courtesy KDØJL)

CQ DX Awards Program

SSB

2375.....VE6ZT 2376.....WAØFQK

SSB Endorsements

320 .....W4WX/330
320 .....W2FKF/329
320.....K6BZ/327
320 .....KE5K/327
320 .....K7TCL/326
320 .....EA3BMT/323
310 .....YV5NWG/311
275.....W9ACE/283
250 .....VE6ZT/264
28 MHz.....WAØFQK

CW Endorsements

320.....G4BWP/333
320 .....N4AH/330
320 .....K1HDO/328
320 .....W7IIT/322

RTTY Endorsement

300.....G4BWP/312

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

M8C via G4DFI
2SØF via MØCMK
3B9R via K7ZD
3D2CY via YT1AD
3D2IF via KQ1F
3D2IZ via N6IZ
3D2PR via KQ1F
3D2RW via ZL1AMO
3D2RW/R via ZL1AMO
3DAØBW via GØIAS
3DAØBX via GØIAS
3DAØLJ via JM1LJS
3G5A via XQ5SM
3V8BB via YT1AD
3W6KA via IK2DUW
3W6LI via IK2DUW
3ZØCDP via SP6CDP
4A1UN via N1NK
4E9D via 4F9EAQ
4J7WMF via 4K7Z
4K6GF via TA2ZV
4L1FX via DJ1CW
4N7N via YU7BPQ
4S7/N6AA via K6VNX
4S7DA via W3HNK
4S7RO/6Y5 via GØIAS
4X4BL via WA2KNC
5B4/T93 via YW2FB
5H1F via KQ1F
5H1F/3 via KQ1F
5H1X via KQ1F
5H1X/2 via KQ1F
5H1X/3 via KQ1F
5WØIR via DJ2MX
5W1CW via ZL1AMO
5W1SA via JH7OHF
5W1VE via DL9HCU
5X1GS via WB2YQH
5X1GS/M via WB2YQH
5Z4FM via 5Z4FM
5Z4GS via WB2YQH
5Z4RL via GØIAS
6KØZS via IK2DUW
6V1A via 6W1RD
6Y4Y via YO3YB
6Y8Z via WO9Z
7J1AAS/3 via KQ1F
7Q7AH via GØIAS
7Q7BW via GØIAS
7Q7BX via GØIAS
7Q7DC via GØIAS
7Q7DX via EA5IQ
7Q7EH via KC9L
7Q7FM via GØIAS
7Q7HB via GØIAS
7Q7JL via GØIAS
7Q7JWL via GØIAS
7Q7LA via GØIAS
7Q7PA via N5PA
7Q7RL via GØIAS
7Q7RM via GØIAS
7XØMT via F5MSR
7X3WDK via EA5KB
8J2OOI via JR7OMD
8J3EAG via 7K1MAG
8Q7BT via EA3BT
8Q7FO via JR2FOR
8Q7HS via JA2AZX
8Q7IC via JA2AIC
8Q7JA via JA2ALN
8Q7MI via JJ2KYT
8Q7NK via JA2AAU
8Q7OK via EA3BT
8Q7TE via JA2ATE
8Q7WA via NT1N
8Q7WQ via NT1N
8Q7WX via NT1N
8R1RPN via OH0XX
8SØF via SMØOGQ
8S5A via SM5AJV
9AØC via 9A3TF
9A5D via 9A1BHI
9A8M via 9A1CCJ
9G1OH via EA5KB
9G1PW via WB2YQH
9G5DX via JH8PHT
9G5MD via F5VCR
9H1PF via K5YG
9H3KI via GØIAS
9H3M via DL7IO
9H3YR via DL1NEG
9K2GS via W6YJ
9L1DX via EA4CEN
9MØP via F6BFH
9M6BG via VR2BG
9M6JU via JA1RJU
9M6TCR via KQ1F
9M6TPR via KQ1F
9N1ARB via EA5KB
9N7WU via JA8MWU
9Q5MJ via F6BFH
9V1XE via DL4DBR

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 901-641-0109; e-mail: <golist@wk.net>.)

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 333	EA2IA 333	W8XD 332	KA7T 330	K1HDO 327	I5XIM 325	W7IIT 322	CT1YH 313	K9HQW 299
K2FL 333	F3AT 333	WØHZ 332	I4LCK 330	I1JQJ 327	K5UO 325	K6CU 321	K9OW 313	F6HMJ 296
K9BWQ 333	DJ2PJ 333	WØJLC 332	VE7CNE 330	YU1TR 327	N5HB 325	N4OT 321	N7WO 312	WG7A 295
K2ENT 333	K2JLA 333	K8LJG 332	4N7ZZ 330	I4EAT 327	YU1AB 325	HA5DA 321	K9DDO 312	W9IL 294
N7FU 333	W7CNL 333	N5FG 331	K3JGJ 330	DL8CM 327	IK2ILH 325	VE7DX 320	W3II 312	KD8IW 288
K3UA 333	YU1HA 333	PT2TF 331	N4AH 330	SM6CST 327	W4UW 325	HA5NK 319	KF8UN 308	EA3BHK 282
K9MM 333	PA5PQ 333	K6LEB 331	K7LAY 329	N4KG 327	N5FW 325	K1FK 318	PY4WS 308	YC2OK 282
K2OWE 333	DL3DXX 333	N4JF 331	K9IW 329	IT9TQH 326	9A2AA 325	SM5HV/HK7 317	IKØADY 307	UA9SG 279
N4MM 333	IT9QDS 333	VE3XN 331	WB4UBD 329	K7JS 326	K4JLD 325	G3KMQ 317	W6YQ 306	XE1MD 278
W4OEL 333	G4BWP 333	W1WAI 331	NØFW 329	I2EOW 326	LA7JO 324	K8JJC 315	YT1AT 304	EA2CIN 278
W7OM 333	N7RO 332	K2JF 331	G3KMQ 329	NC9T 326	W6SR 323	WG5G/QRPp 315	LU3DSI 302	I3ZSX 276
F3TH 333	K6GJ 332	N4CH 330	KZ4V 329	OK1MP 325	9A2AJ 323	OZ5UR 315	F5OIU 302	G3DPX 275
WB5MTV 333	K4IQJ 332	W6DN 330	K8PV 327	W4LI 325	KUØS 322	HB9DDZ 314	YU7FW 301	
W2FXA 333	K4CN 332	W2UE 330	W4QB 327	WA8DXA 325	KE5PO 322	N1HN 313	KH6CF 301	

SSB

K4MZU 333	N5FG 333	WØYDB 332	K1UO 331	K3JGJ 329	UY5XE 327	K6CF 322	YT1AT 313	K7ZM 292
K2TQC 333	DJ9ZB 333	OE2EGL 332	YV5IVB 331	W2FKF 329	K6BZ 327	LU7HJM 322	NØMI 313	OA4EI 292
K2FL 333	EA2IA 333	K4JLD 332	VE2GHZ 331	KE4VU 328	KE5K 327	K5NP 322	KD5ZD 312	KØOZ 291
W6EUF 333	XE1L 333	KSØZ 332	KX5V 331	K1HDO 328	W6SR 326	NI5D 322	W5GZI 311	I3ZSX 290
K2JLA 333	W6BCQ 333	N5ZM 332	I8LEL 331	K5UO 328	N4KG 326	PY2DBU 322	WZ3E 311	N8SHZ 290
K6GJ 333	XE1AE 333	WB4UBD 332	K9OW 331	KF8UN 328	K7TCL 326	N3RX 321	VE3CKP 311	W4PGC 288
K2ENT 333	4N7ZZ 333	WB3DNA 332	W2CC 331	EA3EQT 328	W5LLU 326	EA8TE 321	CT1YH 311	YV5NWG 287
K6YRA 333	KE5PO 333	CT1EEB 332	W4WX 330	KB2MY 328	W9HRQ 326	XE1CI 321	YV5NWG 311	RW9SG 286
K4MQG 333	PY4OY 333	K4CN 332	W9SS 330	AE5DX 328	W4QB 326	W6MFC 321	LU3HBO 310	N5WYR 286
K7LAY 333	VE1YX 333	K9PP 332	W7FP 330	W2JZK 328	K8PV 326	DL3DXX 320	SV3AQR 310	VE7HAM 285
IK1GPG 333	XE1VIC 333	W6SHY 332	WDØBNC 330	KZ4V 328	DL6KG 326	WA4ZZ 320	HA6NF 310	F5RRS 284
K5OVC 333	IN3DEI 333	I8KCI 332	K3UA 330	KD8IW 328	W4LI 326	KØFP 320	HB9DDZ 310	CT1CFH 284
NØFW 333	I4LCK 333	VE4ACY 332	K8CSG 330	I1EEW 327	IKØIOL 325	EA1JG 320	EA3BHK 307	WØIKD 283
OZ5EV 333	VE3XN 333	LU4DXU 332	W6DN 330	SV1ADG 327	K1EY 325	EA7TV 320	N1ALR 306	EA3CYM 283
K9MM 333	OE7SEL 333	W5RUK 332	WA4IUM 330	DL8CM 327	YV5AIP 325	SV1RK 320	XE1MDX 305	W9ACE 283
ZL3NS 333	W2JZK 333	VE3MRS 332	EA3KB 330	W2FGY 327	K9IW 325	K3LC 320	EA5OL 305	WN6J 281
N4MM 333	EA4DO 333	VE2WY 332	VE4ROY 330	I1JQJ 327	WA4JTI 325	N4CSF 320	WB2AQC 305	F5JSK 281
OZ3SK 333	VE3MR 333	VE7WJ 331	YV1CLM 330	F9RM 327	NI5D 325	N4HK 320	N1KC 305	YU1TR 280
N4CH 333	K5TVC 333	PT2TF 331	K9HQM 330	XE1MD 327	KC4MJ 325	WA4DAN 319	KE4SCY 304	KK5UY 280
IØZV 333	PA5PQ 333	W8KS 331	LA7JO 330	I4EAT 327	K7HG 324	CE1YI 318	KC4FW 304	KA5OER 280
YU1AB 333	K8LJG 333	W8AXI 331	WS9V 329	W3GG 327	AC7DX 324	YV4VN 317	K3BYV 303	AC6WO 278
W7OM 333	W4UW 332	W3AZD 331	I2EOW 329	AA6BB 327	KØHQW 324	EA5GMB 317	YC2OK 303	EA3CWT 278
KZ2P 333	K9BWQ 332	OE3WWB 331	K2JF 329	SM6CST 327	ZL1BOQ 324	W5OXA 317	WB2NQT 303	VE2DRN 277
K7JS 333	KØKG 332	DL9OH 331	ZL1AGO 329	W9OKL 327	WØULU 324	CT1AHU 316	VK3IR 303	XE2NLD 277
DU9RG 333	W4NKI 332	N2VW 331	N5FG 329	WD8MGQ 327	W9IL 324	N5HSF 316	W2GZI 302	9A9R 277
W4UNP 333	VE2PJ 332	YZ7AA 331	DU1KT 329	CX4HS 327	EA3BKI 323	K6RO 316	N5QDE 302	W6UPI 276
N7BK 333	YV1KZ 332	YV1JV 331	4Z4DX 329	IØSGF 327	K4JDJ 323	WR5Y 315	KD4YT 302	VE2AJT 275
N7RO 333	YV1AJ 332	WA4WTG 331	VE7DX 329	IT9TQH 327	EA3BMT 323	LU5DV 315	YT7TY 300	Z31JA 275
IK8CNT 333	W2FXA 332	N4JF 331	N5ORT 329	IT9TGO 327	WW1N 322	CP2DL 314	4X6DK 300	G4URW 275
VK4LC 333	W8ZET 332	EA1JG 331	CT1EEN 329	DK5WQ 327	F6BFI 322	K9YY 313	KK4TR 293	

RTTY

K2ENT 331	NI4H 321	K3UA 315	KE5PO 297	I2EOW 291	EA5FKI 284	W4QB 280	YC2OK 280	PA5PQ 272
WB4UBD 325	W2JGR 316	G4BWP 312	W4EEU 291	I1JQJ 289				

Mike, WØYR/OE (left), and Markus, OE2MBN, at the OE2S contest station near Salzburg. Mike says he enjoyed visiting and operating the station last spring, adding, "10 meters was fabulous and we had a great time for about three hours." (Photo by Wolf, OE2VEL, and provided by Mike, WØYR)

vicious cycle to be trapped in for many DX stations around the world. Having stateside QSL Managers helps a lot, especially when you consider the cost of those IRCs at $1.75 each. A QSL Managers website has been created to assist DX stations in locating appropriate managers. Check it out at <www.qsl.net.qslmanagers>.

More on QSL Managers

For those planning DXpeditions, I would suggest that you seriously consider having QSL Managers at least in the countries/continents where most of the contacts will be made, such as the U.S., Europe, and Japan. Many DXpeditions have operators from these particular areas, and it should not be a problem for the logs to be made available to a QSL Manager for each of them. It would certainly be a credit to DXpedition planners if they considered this proposal. Any country where mail theft is known to be a problem should be avoided by DXpedition planners for QSLing purposes. It is inappropriate to "force" DXers to have to send Registered Mail to "try" to get a QSL request delivered to one of these countries. I urge those planning these operations to give more thought to the DXing community when they get to the QSLing question.

That should be enough to ponder for the month until the next column. Good luck in working any or all of the upcoming DXpeditions. Let's hope the sun will let us have a good summer for chasing DX. 73, Carl, N4AA

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

What was Your First Contest?

July's Contest Tip of the Month

Who says contest operating can't also be a spectator sport? If you really want to learn from the best, one way to do it is to listen to them operate. While it may not be quite as bad as watching grass grow, listening to seasoned, experienced operators' on-the-air style may be worth the investment. In particular, take note of items such as frequency management, methods of calling CQ, what's said (and not said), etc. You'll quickly learn that improved contest scores is not entirely about signal strength and equipment!

Calendar of Events

June 23-24	ARRL Field Day
June 23-24	King of Spain Contest
July 1	RAC Canada Day Contest
July 6-7	Venezuela Independence SSB Contest
July 13-14	IARU HF Championship WRTC 2002
July 20-21	**CQ WW VHF Contest**
July 20-21	North American RTTY QSO Party
July 20-21	Georgia QSO Party
July 27-28	IOTA Contest
July 27-28	Venezuela Independence CW Contest
Aug. 3	European HF Championship
Aug. 3-4	North American CW QSO Party
Aug. 10-11	Worked All Europe CW Contest
Aug. 10-11	Maryland-DC QSO Party
Aug. 17	SARTG RTTY Contest
Aug. 17-18	North American SSB QSO Party
Aug. 17-18	New Jersey QSO Party

Life is full of firsts. There was our first day at school, our first date, that first job, first car; the list goes on and on. Most of us can also remember those firsts we've had in ham radio. It may be that very first QSO or your first DX contact. It could be the first time you climbed a tower . . . and of course, there's your first contest.

What I've heard over the years is that the majority of contest operators more or less stumbled into the sport. We'd come into the shack on a Saturday morning, hear utter bedlam on the air, and wonder, "What the heck is all this commotion?" Or, we'd read about these events called "contests" in the ham magazines and get on the air to see what all the fuss was about.

In my case, I guess I was destined to be a contester right from the start. While we all have our stories, let me take a few minutes and tell you mine. Hopefully, it will bring back some pleasant memories for some of you. For others, it may serve to offer up some ideas about how you can get newcomers involved in contesting.

Some K1AR History

I became aware of ham radio as a youngster—probably around the age of 12 years old or so. I had always had an interest in electronics and quickly became enamored with shortwave listening. You couldn't miss seeing some of those old ads in *Popular Electronics* and other magazines for shortwave receivers.

Naturally, at 12 years old I had little money, so after skillful negotiations with my parents, I purchased my first solid-state shortwave receiver. With that initial purchase you would have thought that someone gave me the keys to the world. I spent countless hours listening to that box. Overnight, it seemed, I grew up as I listened to the world around me. I was fascinated by the possibility of copying stations from around the world, all with a small shortwave radio and a piece of wire strung out my bedroom window to a tree in the back yard.

Maybe some of you also can remember those days in the late 1960s. I vividly recall tuning into *Radio Moscow, the BBC, Radio Prague, Radio Berlin International,* and many others. As my skills and "ears" improved, so did the DX that I was able to log. I remember one early evening listening to a weak, but very clear broadcast from *All India Radio* somewhere around the less-populous frequencies above 9800 kHz. On another occasion I remember hearing a very faint and wobbly rendition of Japan's national anthem as *Radio Japan* signed off the air for the day with their English-language broadcast to North America. To this day, this sort of thing still gets me excited—and yes, I did QSL everyone! Somewhere in the bowels of my basement I still have all of those cards—every one of them. I even wrote to shortwave stations that I had not actually heard on the air just to get information about their country. I was perhaps the very first 12-year old in Holtsville, New York, to have my very own copy of Mao Tse-tung's *Little Red Book*.

Needless to say, then, I was primed for ham radio. That, together with my interest in DXing, made contesting a foregone conclusion in my ham future.

As the summer of 1969 approached, my dad asked me if I'd be interested in going with him to a ham radio field exercise at his company's amateur radio club. It happened to be late June, and we all know what that means—Field Day. Ironically, I wasn't that sure I wanted to do it at first. But as we drove up and I saw the tents, antennas, and radio gear, it was clear that this was going to be a life-changing event—and life changing it was.

I remember sitting in the tent with a fellow who ultimately became my radio elmer, Julio, W2YX, and tuning the dials of a Collins KWM-1 for the first time. Sounds of Spanish stations came pouring out of the rig as we tuned 15 meters. Finally we stopped and talked to an English-speaking ham from Argentina, and I was given the microphone. Some may argue that was one of the great mistakes of ham radio—giving K1AR a microphone(hi!)—but we talked and I was enthralled.

Soon the "event" was about to start. Julio said, "Why don't you hang out with me, kid; I'll show you the ropes." As Field Day started that year, I watched and listened as he operated. Julio wasn't a particularly good operator, but he maintained a decent rate and certainly kept my interest at a high level. Then came the magic moment. Julio said, "John, why don't you give this a try."

Now it may surprise some of you who know me well (he says in tongue-in-cheek fashion), but there was no hesitation. I grabbed that D-104 and started calling CQ—calling CQ as best as someone knows how to do for the first time. After two or three times with no answer, I began to wonder if I was doing something wrong. In fact, I was just learning a bit of what contesting would always be in the future—management of rate! Then, after a fourth CQ a miraculous event happened—a JA called me. No, not Iowa, not Florida, but a JA. That was my first contest QSO, and I wasn't even a ham yet!

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

As the events of that Field Day weekend in 1969 came to a close, I was permanently hooked. In fact, you could not have pried the enthusiasm out of me with any force known to mankind. In the ensuing weeks I studied Morse Code and the technical details required to get a Novice license. Fortunately, school was over, so I had no other distractions. I studied day and night. I remember coming back to that shortwave receiver with a new focus as I listened to hams almost around the clock. There was no BFO (beat frequency oscillator) in the radio, so my CW copying was limited to a pulsating, white noise tone from W1AW's code-practice sessions each and every night. Slowly but surely I started to improve my copying speed. For whatever reason (some argue it's my other interest in music), CW came very easily to me . . . and the rest is history.

In September 1969, WN2LQZ was born. Ironically, I actually didn't get on the air with my license until later that winter. There was plenty to do, though. My reward for getting my ham license was being given a Heathkit HW-16 by my parents. Somehow I managed to build it myself, turn it on and have it work for the very first time! To be honest, I'm not sure I could do that today, hi! My elmer, Julio, was such as great friend. He helped me all along the way and guided me into checking out what has been defined as one of ham radio's great, old operating events—the Novice Roundup.

Yes, the 1970 ARRL Novice Roundup was my first real contest. Just as with my Field Day experience, I was equally unprepared for this event. Some of you may recall that the Novice Roundup took place over a week's timeframe, not just your typical weekend affair. Every available spare moment found WN2LQZ operating his HW-16, trying to work guys in "the contest." There I was, day and night, operating my radio, and when all was said and done, I had managed to log about 200 stations over the week—or roughly what someone does in EA8 in about 45 minutes on CW. However, I wouldn't trade my Novice Roundup experience for those 45 minutes in a million years.

I believe my experience was not unique. I'll bet hundreds of you have stories similar to mine. While we may have gotten a little more cynical in our modern era of the internet and cellular telephones, the fact is ham radio can still have the same kind of appeal to kids. It's all in how you sell it. So can contesting. While the average age of ham operators, and contesters in particular, continues to climb, the contest surveys I've been receiving this spring still have a number of younger participants. Contesting and that first experience can still have the same allure it did decades ago; I'm convinced of it! Hopefully, you are, too. The challenge for all of us is learning how to leverage that experience into growth for contesting and the hobby overall. If you have a compelling story along these lines, send it to me at <K1AR@contesting.com>. I'd like to share it with others.

Final Comments

This has been a fun month to reminisce about the past. While the past was a great time for ham radio, so is the future, as you've already indicated in your 2002 survey responses.

Speaking of the 2002 CQ Contest Survey, I encourage you again to submit your responses. Time is running out! In case you missed it, you can find the questions and submit your responses via the internet at <http://hamgallery.com/survey> or via the convenient link found on the home page of <http://www.contesting.com>, and on *CQ*'s home page <http://www.cq-amateur-radio.com>. I've received well over 1000 responses to date, including some very interesting DX QSOs. You can look forward to the analysis in about two months.

73, John, K1AR

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

County Lines—Again

A recent inquiry via e-mail asked if there was any limit to how many counties could be worked on a county line. This person had heard that it was two. The situation involved a contact in the Illinois QSO Party which claimed four counties at once, and he needed three of them. The USA-CA rules don't make any reference to county lines, so if there is no rule and no obvious cheating going on, each of the four could conceivably counted for USA-CA.

Personally, I would be somewhat nervous about doing that. How do the operators *know* they are right on top of that little geographical intersection? Is there a plaque or marker? Are they relying on a GPS unit? Is their antenna on the spot, or is it the radio? Perhaps as an alternative, you could write in the counties in pencil and plan on working other stations operating in those counties. Illinois, for example, is not a Pacific island reef only seldom visited by expeditions, so its counties should be somewhat readily available. Common sense should be exercised.

Robert Bailey, K3AQH
USA-CA All Counties #1037

This month we hear from Bob, K3AQH, who was awarded USA-CA All Counties #1037 on February 16, 2002.

3077! What a big number! It did not seem so large when I first started, but after several years it seemed as if the quest would never end. But it did; all 3077 were done.

I started my ham life in the U.S. Air Force when the base where I was stationed started a code class. In two weeks I was the only one left. I got lots of attention at that point and learned the code very well. After leaving the Air Force, I went to work for the Philco Corp. and met a few hams there, one of whom gave me my Novice test. I passed, but did not complete my station in the one year that you had as a Novice back then, and of course made no contacts.

Next came the Technician license, and I did fine with that and passed the test. My Tech years were very good ones, and I worked many folks all over the country—100 watts AM, CW, RTTY, with any of four antennas. The 6-element Yagi on 6 meters even tilted up and down 20 degrees! This was to test the take-off angle of RF for various distances. Working into Kansas City from my home in Philadelphia when the band was open seemed to help in receiving and transmitting—a true Tech.

65 Glebe Road, Spofford, NH 03462-4411
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Cliff Smith, K6JN
USA-CA All Counties #1041
April 20, 2002

Bob Allen, KK5MI
USA-CA All Counties #1042
April 24, 2002

This went on for some years until there were too many complaints from neighbors and others. There was no joy in spending all my time fixing their TVs, so I went off the air for about eight years. Then I decided I would like to work the world on HF; thus came the General license. This time the rig had to fit on my desk and not take up three 6 foot racks. I got the rig up and running and indeed worked the world. I have learned more about peoples and nations than I ever learned in school.

Then I found out about the county hunters. It has been great fun with the help of the many county hunters I have met on the 14.336 county hunters net. I particularly would like to call your attention to WA3TUC, whom I will unashamedly call my mentor. He straightened me out on many occasions! Then there was N4CD, KZ2P, KC4UG, and many more—too many to mention individually, as they say. But thanks to all of those who were such a great help to me in getting this most interesting award.

Now I'm told it's time to start on a second time around. We'll see!

—73, Bob, K3AQH

USA-CA Honor Roll

500		2000	
K6JN	3191	K6JN	1231
		KK5MI	1232
1000			
K8ZZ	1594	**2500**	
K6JN	1595	K6JN	1152
KK5MI	1596	KK5MI	1153
1500		**3000**	
K6JN	1333	K6JN	1063
KK5MI	1334	KK5MI	1064

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, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

Short-Term Awards

Worldwide Museum Ships Weekend. The *USS Salem* Radio Club, K1USN, is sponsoring this sixth annual event July 20–21 beginning at 0000Z and running the full 48 hours of the weekend. Participation by more than 70 museum ships throughout the world is expected, paddlewheelers through aircraft carriers. Activating a ship on the ham bands sounds like a great idea for a summer weekend! Frequencies used will be as follows: SSB 3.860, 7.260, 14.260, 18.160, 21.360, 24.960, 28.360, and 50.160 MHz; CW 3.539, 7.039, 10.109, 14.039, 18.099, 21.039, 24.899, and 28.039 MHz.

Each ship will issue its own QSL card. A certificate will be available from the *USS Salem* Radio Club for working ten or more ships during the weekend event. Last year's certificate was personalized to show each of the ships the participant contacted and its location. A certificate is available by sending a 9" × 12" SASE along with log information of ships worked to George Clisham, KC1XI, 126 Billings Rd., North Quincy, MA 02171.

For a QSL for K1USN contacts send a business-size SASE to Harold Pugh, K1RV, 78 Temple St., Abington, MA 02351 (<k1rv@arrl.net>; <http://www.qsl.net/k1usn/event.html>).

Pistoia Award. This award requires contacts with Pistoia, Italy stations, and you have all of the month of July to do this. SWL okay. All HF bands SSB, CW, and RTTY are valid. You must earn at least 50 points according to the following schedule: Each Pistoia contact = 2 points for Europeans and 5 points for all others. If the station is a member of the Radio Club of Pistoia, or if contact was made by RTTY, point values are doubled. Contacts with special station IQ5P count 5 points for Europeans and 10 points for all others.

As is typical of so many of the European awards, this one's excellent design and use of photo images make it a special prize. Send a list of contacts with all log information and fee of 5 Euro, or $US5 to: Sez. A.R.I. Pistoia, P.O. Box 46, I-51100 Pistoia, Italy (e-mail: <aript@tin.it>; on the web: <http://www.donati. firenze.net/>).

A certificate will be available from the USS Salem *Radio Club for working ten or more ships during the museum ships special event weekend in July.*

The Diploma Viatka is issued by the Kirov Radio Club (KRC) of Russia.

The Pistoia Award requires contacts with Pistoia, Italy stations during the month of July.

Pistoia members list: I5ECW, I5ESR, I5IIG, I5JFG, I5JHW, I5MIK, I5PCK, I5PFX, I5PKP, I5QNJ, I5RCR, I5UFX, I5VPV, I5WCJ, I5XWW, IK5AUL, IK5BSC, IK5DDM, IK5DVQ, IK5FTQ, IK5FTU, IK5GMU, IK5HVP, IK5JJS, IK5JRY, IK5OWQ, IK5QGN, IK5QQB, IK5QQE, IK5UAN, IK5VQI, IK5VQK, IK5WQP, IK5XXK, IK5YDS, IK5YLY, IK5YZS, IK5YZT, IK5YZX, IK5YZY, IK5ZPW, IK5ZWA, IK5ZWB, IZ5AQV, IZ5BLN, IZ5BRV, IZ5DKF.

DX Awards

Diploma Viatka. This one is from the Kirov Radio Club (KRC) of Russia. It is a bit difficult to earn, but still has a reasonably low contact requirement, especially if you work just one of their special event stations. Even if you don't, it's just 5 contacts for North Americans. Look for those UA4's. Contacts with club members after 1 January 1994 count for the award. SWL okay. Earn the following number of points:

The recently revised awards series of the Vasteras Radio Club of Sweden includes the Worked All Vasteras award.

The Multiband Ukraine Award is issued by the Ukrainian Amateur Radio League. It requires working different Ukrainian oblasts on five different bands.

Applicant's QTH	Points Needed	QSOs on Different Bands	Fee
Russia (EU)	20	4	50 RUR
Russia (AS)	15	3	50 RUR
Europe (incl. CIS)	10	2	5 IRCs
All others	5	1	10 IRCs

Contacts with former members of the KRC are valid as well and equal 1 point each. You may contact the same station on different bands or modes. QSOs via repeater are not valid. QSOs via satellite are 1 point each. QSOs with special event callsigns UE4Nxx count as any necessary band or equal 3 points.

Send GCR list and fee mentioned above to: Tsirul Oleg Vladimirovich, P.O. Box 470, Kirov 610011, Russia (e-mail: <ra4naj@olegts.kirov.ru>; web: <http://www.qsl.net/rw4nm/dipleng.htm>).

List of ex-KRC members: RA3CW, RA3UP, RAØSZ, RK3BL, RV3OK, RW3DR, RZ9OP, UA1NA, UA1ZAZ, UA3GM, UA6JY, UAØJFF, ex-UW6AS. List of KRC callsign series worth 1 point: UA4Nx, UA4Nxx, UA4Ox, RA4Nx, RA4Nxx, RZ4Nxx, RW4Nx, U4Nx (where "x" is any letter). All the stations from oblast "KI" count as KRC members. Special event calls, giving 3 points or any one necessary band, are: UE4NAA, UE4NAB, UE4NBE, UE4NBH, UE4NDA, UE4NFT, UE4NKI, UE4NKO, UE4NMM, UE4NNN, UE4NSH, UE4NVK, UE4NWQ, UE4NWW, UE4NXF.

Vasteras Radio Club Award Series. The Vasteras Radio Club of Sweden has recently revised their award series. The group has sponsored awards for a long time, as I recall earning the original version back in the late 1960s. (They provide a small image of the original award on the new one.) The initial certificate must be earned before applying for a special pennant, which serves as an endorsement.

General Requirements: Contacts after December 31, 2001 count. Repeaters may be used. All bands and modes. Endorsements for a single band or mode. GCR list accepted. SWL okay. Award fees vary; refer to the rules below for each individual award. Apply to: Vasteras Radioclub, Box 213, S-721 06, Vasteras, Sweden.

Worked All Vasteras (WAV) Award. Contact any station in the Vasteras area (Commune U11) for 1 point. The same station may be worked on different bands for 1 point each time. Contacts with club stations SK5AA and SK5BB count for 2 points. SM stations in the Vasteras area need to earn 40 points; OH, OZ, LA, and other SM 20 points; other Europeans 10 points; all others 5 points. Endorsements are available for single band or mode. Fee is 5 IRCs, 5 Euros, or $US5.

VRK Honorary Award. Holders of the WAV award may earn this attractive colored pennant by working additional Vasteras area stations. Total points needed, which includes those collected for the basic WAV award, are as follows: SM's in the Vasteras area 80 points; OH, OZ, LA, and other SM 40 points; other Europeans 20 points; all others 10 points. No endorsements. Fee is 25 IRCs, or $US12.

The Multiband Ukraine Award (MBUA). This award is issued by Ukrainian Amateur Radio League and requires working different Ukrainian oblasts on five different bands. This is not all of the oblasts in the Ukraine, but it is enough to make it an interesting challenge. Note that there are a number of foreign check points available, all shown on the Ukrainian Amateur Radio League's website: <http://www.uarl.com.ua>. U.S. stations may contact Vladimir Ttryasorukov, WY6DX (ex-UY5DX), <kf6mic@juno.com>.

There is a basic award, 5 band Ukraine, and endorsement stickers. The basic award may be earned by all licensed amateurs and SWLs for confirmed QSOs (including contests) since January 1, 1992 with different Ukrainian oblasts on five bands (160–6 meters) using any mode. A special endorsement for a single mode is available on request. Stickers are given for each additional band (only if the band was not included in the basic award application): 160, 80, 40, 30, 20, 15, 17, 12, 10, and 6 meters. The award then becomes 6 band Ukraine, 7 band Ukraine, etc., up to 10 band Ukraine. Number of contacts required (on each band): Europe 20 oblasts; others 15 oblasts.

The award is a full-color plastic plaque, and it may be viewed on the league's website. The fee for the award is CIS countries $US3, or 4 Euros; Europeans $US3, or 5 Euros; all others $US5. Endorsement fee: CIS countries $0.80, or 1 Euro; Europeans $US1, or 1 Euro; all others $US1.20. IRCs are accepted at the rate of 1 IRC = $US0.80 = 1 Euro. There is no fee for endorsement stickers earned with the first application. GCR list is accepted, and it must include QSO data and oblast abbreviation. Apply to: George Chlijanc , UY5XE, P.O. Box 19, Lviv 79000, Ukraine.

URL of the Month

The Radio Society of Bermuda features the rules for their very beautiful award series at: <http://www.bermudashorts.bm/rsb/awards.htm>. The Worked All Bermuda award is free of charge and is signed by the governor in power at the time the award is earned.

I'm still looking for a sample of your club's award certificate. Count on this column to help promote your award.

73, Ted, K1BV

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

The Fall Predictions Are Out

For anyone living in or near a college town or a city that has a professional football franchise, to say the fall predictions are out is to indicate that the local and national sports writers have picked their favorite football teams for the season. In this column, however, I am writing about the *Leonids* meteor shower (storm) predictions for this November's show—and they are good!

The International Science Symposium on the Leonid Meteor Storms at the National Museum of Emerging Science and Innovation (MESCI) in Tokyo, Japan is one of the conferences associated with the Leonids MAC (multi-instrument aircraft campaign) Project, which took place May 2–5, 2002. Updates of previous years' predictions given at the symposium indicate that according to all concerned, it will be a high-scoring show with two peaks in activities. Here are the details:

First, a bit of recent history: There are three sets of *Leonid* predictions that indicate a high probability of a storm this year. One set of predictions was made last year by the team of Robert McNaught of the Australian National University and David Asher of the Armagh Observatory in Northern Ireland. Using computer modeling of the Earth's orbit and the location of the various orbits and discharges from the shower's parent comet, the *Tempel-Tuttle Comet*, they observed that the Earth is expected to travel through not one, but two different clumps of debris, or dust trails. First traveling through the 1797 debris, the Earth will see a zenith hourly rate (ZHR) of around 3000 that will mainly affect western Africa, western Europe, northern Canada, and northeastern South America. This peak is predicted to occur around 0358 UTC on November 19.

Later in the day, however, is when the excitement really gets going. About 6–7 hours later another peak will occur (they predict at about 1036 UTC). This one, the result of the Earth running into debris from the 1833 passing, will result in a ZHR of around 10,000, and it will mainly affect North America.

Another among last year's predictors is Peter Jenniskens of the SETI Institute. Writing in *WGN*, the journal of the International Meteor Organization (29: 5, October 2001; <see http://www.imo.net>), he indicates that the 1866 dust trail will be influenced by the 1699 dust trail. Concerning his predictions of the 2002 *Leonids* storm, he wrote, "The 1767 dust trail is now expected to give the highest peak rate for Earth-based observers, an estimated ZHR^{max} = 4200....The 1866 dust trail will contribute only in the range of 2000–3500 and the 1699 dust trail in the range of 1300–2500. However, the latter storms are slightly wider and both will merge into a single profile with a total fluence [a flux of particles passing across a unit area] 1.6 times higher."

Updating at the above-mentioned symposium, Jenniskens stated that although his previous calculations of the position of the 1767 dust trail now appear to be a bit off, he nevertheless indicated that the recalculation will not affect his predictions for 2002, which currently stand at 4000 ±1000 per hour for the 1767 dust trail encounter in Europe at 0358 UTC, and 5,000 ±2,000 per hour for the 1866 dust trail encounter in the United States at around 1036 UTC (again, times by McNaught and Asher).

Finally, Finnish astronomer Esko Lyytinen, who made the most accurate prediction for the 1999 *Leonids* meteor storm (Meta Research Bulletin 8, 33-40, 1999; see <http://metaresearch.org/publications/bulletin/bulletin.asp>), is this year's most conservative forecaster, indicating that both peaks will be on the order of less than 2500.

There you have it—two major population areas of the world to experience major propagation from the effects of the *Leonids* meteor storm. As we get closer to this shower, we will have more news about the storm in this column and in *CQ VHF* magazine.

VHF Plus Calendar

July 1	Moon apogee.
July 2	Last quarter Moon.
July 7	Poor EME conditions.
July 9	Highest Moon declination.
July 10	New Moon.
July 13	Moon perigee.
July 14	Very good EME conditions.
July 17	First quarter Moon.
July 20-21	**CQ VHF Contest** (See text for details.)
July 21	Very poor EME conditions.
July 22	Lowest Moon declination.
July 24	Full Moon.
July 26-28	Central States VHF Society Conference. (See text.)
July 28	Moderate EME conditions.
July 29	Moon apogee.

• EME conditions courtesy W5LUU

New Extra Class Question Pool in Effect

It is July 1, 2002 and the new Extra Class question pool is now in effect. Studying for the test has become just a bit more difficult because there are now 806 questions, as opposed to 665 in the old Extra Class pool. It also contains more technical material than the old pool. More than half of the new questions covers electrical principles, circuits, and signals and emissions.

My wife Carol, W6CL, has recently been tutoring a friend who was trying to beat the deadline for the new question pool. As of this writing, she is still struggling to pass the test. Listening to Carol quiz her friend, I realized just how much of the Extra Class license material is relevant to us on the VHF+ frequencies. For example, looking through the text version of the question-pool file that I downloaded from the ARRL website at <http://www.arrl.org/arrlvec/2002_Extra_Pool2_.txt>, I came across the first question related to the VHF ham bands:

What is the maximum mean power permitted to any spurious emission from a transmitter or external RF power amplifier transmitting at a mean power greater than 25 watts on an amateur service VHF band?

Your answer choices are:

A. 60 dB below the mean power of the fundamental emission
B. 40 dB below the mean power of fundamental emission
C. 10 microwatts
D. 25 microwatts

If you run more than 25 watts, you need to know that the answer to this question is "A," because although it is a little vague, it is the correct answer as indicated in FCC regulations §97.307(e), which states, "The mean power of any spurious emission from a station transmitter or external RF power amplifier transmitting on a frequency between 30–225 MHz must be at least 60 dB below the mean power of the fundamental. For a transmitter having a mean power of 25 W or less, the mean power of any spurious

P.O. Box 73, Oklahoma City, OK 73101
(phone 918-627-6625; fax 918-835-9785)
e-mail: <n6cl@cq-amateur-radio.com>

emission supplied to the antenna transmission line must not exceed 25 µW and must be at least 40 dB below the mean power of the fundamental emission, but need not be reduced below the power of 10 µW. A transmitter built before April 15, 1977, or first marketed before January 1, 1978, is exempt from this requirement."

I have a problem with this question. The end of the question reads, "on an amateur service *VHF* band" *(emphasis mine—ed.)*. The FCC regulations state "on a frequency between 30–225 MHz." In this column we casually talk about the VHF+ ham bands. At first blush, one might think that there is a glitch in this question because the FCC regulations apply to only the ham bands between 30–225 MHz. However, here is where understanding what is defined as *VHF* is an important key to knowing more about the correct answer to the question. The VHF spectrum is from 30 MHz to 300 MHz. Therefore, the ham bands inclusive in the VHF spectrum are the 50–54 MHz, 144–148 MHz, 219–220 MHz, and 222–225 MHz ham bands.

The next designation for frequency spectrum is UHF (ultra high frequency). It encompasses 300–3000 MHz. There are several ham bands within this spectrum. They include (for us here in ITU Region 2) 420–450 MHz, 902–928 MHz, 1240–1300 MHz, 2300–2310 MHz, and 2390–2450 MHz.

Getting back to the discussion on the correct answer to the Extra Class question, VHF+ linear amplifier builder and marketer Steve Powlishen, K1FO, using his Lunar-Link Systems website <http://home.cshore.com/lunarlink/tech/spurious.html> as a venue, comments on the equipment currently available that operates under this ruling. He states in part, "It's a sorry fact that much of the amateur equipment operating at these frequencies does not even come close to meeting the –60 dBc spurious requirement. For example, a very popular 8877 2 meter amplifier design from the 1970s that has been duplicated by many hams and 'for sale by' amplifier builders typically has 2nd harmonic emissions of only –30 to –35 dBc and third harmonic emissions of about –35 to –40 dBc!"

Elsewhere on his website (<http://home.cshore.com/lunarlink/tech/imd.html>), Steve makes another point concerning currently available products: "Hams always seem to complain about other operators' signals. Many times those complaints are justified. Old design tetrodes such as 4CX250 class tubes were originally intended for class C service. Although they can be adapted to SSB voice linear service, their distortion products (Intermodulation Distortion or IMD) are not very good in linear service; typically 3rd order products are down about –25 dB from PEP output when these tubes are run within their ratings, properly tuned, neutralized, and not drawing any grid current. When pushed, these type tubes can have less than –20 dB IMD and create splatter. These distortion products are the result of mixing among the different voice frequencies. These IMD products make a signal appear to be wide and give it that off-frequency clicking, popping, and chsh, chsh, chsh sound.

"The move to transistors hasn't made the situation any better. While very linear transistors have been around for over 20 years, their 28 and 56 VDC requirements and high prices have kept them from gaining any appreciable acceptance in the amateur market. Virtually all 100 to 200 watt solid-state amplifiers use 12 VDC (13.8 VDC nominal) devices that were originally designed for class C FM service. They have been adapted to linear SSB voice operation, but their distortion characteristics are no better than 4CX250 class tubes that were designed in the early 1950s! Many of the "brick" amplifiers do not even have adequate linear bias circuits and have 3rd order IMD products down not much more than –20 dB (from PEP). Virtually all VHF multimode transceivers use the similar 12 V devices with better biasing but not much better IMD."

This discussion concerning amplifiers and their relative clean signal output (or lack thereof) emphasizes that although the question quoted here is on the Extra Class exam, any licensee, regardless of class of license, who operates a transmitter in the Amateur Radio Service must have knowledge of the regulations pertaining to the operating of that transmitter and must keep it operating within the FCC regulations for that transmitter. The bottom line is that while for licensing in your class of license you may not be tested on every aspect of amateur radio, you are still responsible for knowing the regulations. Therefore, why not go ahead and study for the Extra test anyway?

In future columns I will present additional comments concerning what the weak-signal operator and the Extra Class examination have in common. Hopefully, these comments will be such that you too will want to upgrade your license.

FCC Proposes Upgrade of Amateur Status on 2400–2402 MHz

On May 2 an FCC announcement that contained good news for HF operators of a proposed new HF band (5.25–5.4 MHz) and for LF enthusiasts a sliver band at 136 kHz also gave us weak-signal and satellite operators a bit of good news, that of proposing to upgrade the amateur frequencies of 2400–2402 MHz to primary status for us. We amateurs are primary on the frequencies of 2390–2400 MHz and 2402–2417 MHz. Adding this sliver to primary status for us will close a gap that potentially could allow Part 15 and Part 18 devices a toehold on our spectrum that could be disruptive to both the weak-signal operator and the satellite user alike. By now, public comments are being taken by the FCC on these proposals. Check their website <http://www.fcc.gov> for instructions on how you can add your comments.

JT44 Software Updates

On May 6, Joe Taylor, K1JT, announced the latest iteration of his JT44 software, Version 2.01. Joe continues to tweak it to remove the inevitable bugs that crop up when one is developing a major software package. Joe's work on his project continues to be a labor of love. For your copy of his latest version, visit his website at: <http://pulsar.princeton.edu/~joe/K1JT>.

Michael W Moreken, AB2IO, points out in the May 2002 issue of the *432 and Above EME News* that the use of JT44 requires accurate time. The URL <http://www.boulder.nist.gov/timefreq/service/its.htm> is the location for downloading software that will automatically keep your computer clock up to date by syncing your PC to the National Bureau of Standards clock in Boulder, Colorado.

How well is JT44 working? Reports such as this one from David Anderson, GM4JJJ, to Joe Taylor continue to testify to its practicality: "Joe, I thought you might be interested to know that I worked DF2ZC on 144 MHz EME tonight. We were both running barefoot about 60 watts at the power dividers into 4 × 3.0 WL here and 4 × 3.2 WL at DF2ZC. Signals peaked –23dB. So we still had some margin! JT44 really works as advertised!"

Perhaps soon we will be working on EME. Download your copy and get on the air tonight!

On the Air

There haven't been very many significant operator reports across the e-mail paths in recent weeks. One exception is from **Julio Medina, WP4LNY**, who reports the following activity: "Recently I made the following QSOs on 6 meters. On 2 March I worked D44TD, EH8BPX, TR8CA, and PWØT. On 9 March I worked LU2NI (FG72) at 0201 UTC; 10 March PU5AAD, LU9DFN, and LU1YBB; 14 March PY2PA on CW; 16 March CX4OL; 23 March ZD6CSA, XQ3SIX, FJ5DX, and CE4WJK; 24 March LU8MB and CX5LE; 26 March W6DC and XQ3SIX; 1 April LU8WAT; 4 April LU2EQQ; 19 April LU2EEQ; 20 April CX5BW and CX4CR; 21 April CX4CR and CX2AAL, and heard LU6DVG, AY3HR, and LU1FA. Most of the rest of time both 6 and 2 meters has been silent here in KP4 land."

Current Meteor Showers

The *Pegasids* peaks on July 9 with an

unknown time and a low ZHR. The *July Phoenicids* is a Southern Hemisphere shower that peaks on July 13 also with an unknown time and 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.

Current Conference

Central States VHF Society Annual Splash. The Central States VHF Society's Annual Conference will be held July 26–28, 2002 at the Sheraton Four Points near the airport in Milwaukee, Wisconsin (phone 414-481-8000; e-mail: <stay@fourpointshotel.com>; website: <www.fourpointshotel.com>). They have contracted for rooms at the rate of $82 per night, plus 14.6% tax (mention that you are attending the Central Sates VHF Conference).

The following information is from the spring newsletter of the CSVHFS: "One new aspect of this coming conference will occur on Friday morning while the antenna range is in operation. The Rover Row, or Dog Pound, will be a special area of the parking lot for just rovers. We'd like any rover who is willing to load up their equipment to bring their setup to show it off during this event. We've all seen basic presentations on how to rove. Now you have an opportunity to show off your 'shack.' You don't have to stay by your vehicle all morning. We'll have poster-board so that you can point out the highlights of your shack. If you don't want to bring the whole rover operation, then bring a display with some memorable pictures from memorable locations."

More information can be found at the society's website: <http://www.csvhfs.org>.

Current Contests

States Above 50 MHz Award. Started seven years ago by the Central States VHF Society, this contest is really going strong with heavy competition for the top awards. Last year there was one point between the winner and second place, and only nine points between second and third place (winner: KMØT, 161; second: K8TQK, 160 points; and third: VE3AX, 150 points). In the past, to be eligible for a certificate you 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 their website <http://www.csvhfs.org/cstest0.html> for any late-breaking changes in the point totals and/or other rules.

CQ VHF Contest

Complete rules for the CQ WW VHF Contest were in the June issue of *CQ* magazine and the Spring issue of *CQ VHF* magazine. They also can be found on the CQ website: <www.cq-amateur-radio.com>. The contest period is from 1800 UTC, July 20 through 2100 UTC, July 21. 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, Multi-Band; Multi-Op, and Rover. Scoring is one point per QSO on 6 meters and 2 points per QSO on 2 meters. Logs may be mailed to CQ VHF Contest, 25 Newbridge Rd., Hicksville, NY 11801; e-mail: <cqvhf@cqww.com>.

St. Paul Island DXpedition

Arliss Thompson, W7XU, reports that he and his wife, Holly, NØQJM, along with Ed Grey, WØSD, and his wife Edith, WØOE, will be operating a 6 meter station from St. Paul Island (CY9), grid square FN97, from 29 June to 8 July. Arliss says that they are going to plant themselves on 50.157 and remain there for the duration of the DXpedition. Both CW and SSB operations will take place on 50.157, although they may run split if they get a very good opening. The station will have a breakable beacon (on 50.157) running during slow times.

They will be using a large beam and an Acom 1000 amplifier. There will be a station on HF as well, but someone will be manning the 6 meter station from 5 AM until midnight. Liaison will be on 28.885 MHz and e-mail updates via Winlink 2000 to appropriate 6 meter internet sites.

If you are reading this around the first of July, then get on 6 meters now, because they should be there looking to work you!

CQ VHF Second Edition

Readers are saying some really nice things about the first issue of *CQ VHF*. For example, Dan Vanderplough, K9RQ, wrote, "Just got my issue today. Very impressive, this first issue. More technical than the old version, just the way it should be. Glad to have a VHF-oriented magazine again. Keep up the good work."

Here are some of the articles that we are working on for the Summer issue of *CQ VHF:*

For just about three years now a rather quietly run miniature satellite program called Project Starshine has been underway. The project is the launching of miniature satellites that are used for tracking atmospheric drag caused by the ionization of the Earth from solar storms. Despite their miniature size, these satellites are visible to the naked eye because of the hundreds of mirrors that are mounted on each satellite's surface. The project is unique in that its backbone is a cadre of volunteers. Bobette Doerrie, N5IS, writes about these volunteers, who are mostly school children, and the opportunity to incorporate them and their schools into the manufacturing process of the program's satellites. Their job—polishing the mirrors that will be mounted on the satellite. If you know of a school that is looking for a project for a science class, this is a great one. Learn how you or your school can become involved in the project by reading Bobette's article in the Summer edition of *CQ VHF.*

Contributing Editor Ken Neubeck, WB2AMU, focuses on some of the tools and tactics that were used by him and others in working the *F2* propagation last winter, and Features Editor Gordon West, WB6NOA, interviews some experts who blast the myths and know the truth about West Coast and Pacific area tropospheric ducting, which hits the bands from July through September. Bob Witmer, W3RW, writes about DXing with a Heathkit Twoer. Tommy Henderson, WD5AGO, gives us a construction article, a Low Noise Two-Stage Amplifier for 23 cm. Plus, our regular columnists will have their input and there are more articles coming, too.

Suffice it to say, however, if you are a regular reader of this column, then you need to subscribe to *CQ VHF* magazine. If you haven't already ordered your subscription, do so today!

And Finally . . .

Summer doldrums, hah! As you have read in this column, there is a lot of VHF+ related activity this month, so you had better get out your radios and get on the air. This is a great time to be active on the VHF+ ham bands. With new software now available there is no excuse for the urban ham not to get on EME. With one annual contest and one contest this month, there are opportunities for you to work other VHF+ operators. With the *Perseids* meteor shower starting up later this month, there is another opportunity to use the new software that Joe Taylor has developed. With one major conference at the end of the month there is the opportunity to learn something new about our niche in the hobby, as well as socialize with a great bunch of guys and gals who work on projects in our specialty. There is simply no excuse not to enjoy your hobby this month—or any other month for that matter.

Please let me hear from you concerning your enjoyment of this great hobby of ours. If what you write is long enough, I will look at perhaps placing it in *CQ VHF.* Whatever you have to say, I look forward to receiving it and publishing it in either this column or *CQ VHF.*

Until next month 73, Joe, N6CL

On the Cover

Our cover photographer had to stand so far back to get all of Dick Pooley, W7HUY's tower and antennas into the picture that Dick looks like no more than a dot on the tower … which is why we also squeezed in a close-up shot of Dick in action.

Dick, who's 81, is still climbing—not only towers, but mountains as well. "I've spent most of my life climbing," Dick says, noting that he was the first president of the National Mountain Rescue Association when it was formed in 1959. Towerwise, the only accommodation Dick has made to age is installing steps every 15 inches all the way up his 120 foot tower. On top of that tower live a 2-element 40 meter beam and a 5-element 20 meter beam.

When we asked Dick what his main operating interests are, he responded, "DX Is!" although his serious pursuit of DX began only seven years ago, after he married his wife Carolyn, WB7VBK, and moved into her home in Brush Prairie, Washington, with three acres on which to put up towers and antennas. Dick's goal at the moment is to make the DXCC Honor Roll, and he's most of the way there, so far having worked 322 of the 326 active "countries" and confirmed 318 of them, all on SSB.

Dick retired in 1986 as Facilities Manager of Tektronix. Prior to working there, he was in the broadcast industry and then worked independently as a consulting engineer. *(Cover photos by Larry Mulvehill, WB2ZPI)*

Propagation

BY TOMAS HOOD, NW7US

The Science Of Predicting Radio Conditions

What are Solar Flares?

Last month we talked about sunspots and how they relate to propagation. This month we explore solar flares, a spectacular visual phenomenon present on an active sun. Do they have a measured effect on the ionosphere and the Earth's magnetosphere? Is HF propagation affected by a solar flare?

Solar flares, recorded for the last five solar cycles, are enormous explosions in the solar atmosphere. A flare is officially defined as a sudden, rapid, and intense variation in brightness occurring when magnetic energy that has built up in the solar atmosphere is suddenly released. The radiation that is emitted ranges across virtually the entire electromagnetic spectrum, from radio waves at the long wavelength end, through optical emission, to x-rays and gamma rays at the short wavelength end. The first solar flare recorded in astronomical literature was on September 1, 1859. Two scientists, Richard C. Carrington and Richard Hodgson, were independently observing sunspots at the time they viewed a large flare in white light.

Solar flares occur near sunspots, usually along the dividing line (neutral line) between the two sets of spots, or areas of oppositely directed magnetic fields. These flares heat material to many millions of degrees and release as much energy as a billion megatons of TNT. The electro-magnetic energy (gamma rays and X-rays) are what affect ionospheric conditions within moments of a flare, and energetic particles (protons and electrons) ride the solar wind, to impact our magnetosphere.

Space is not a vacuum. Space in our solar system is filled with plasma. The sun's atmosphere extends very far out from the sun. The temperature of the sun's corona is so high that the sun's gravity cannot hold on to it. The solar wind streams off of the sun in all directions at speeds of about 400 km/s (about 1 million miles per hour). (When you see solar-wind-speed readings of around 400 km/s, you know that things are "normal" and our solar/geophysical "weather" should be normal, for the most part.) The solar wind changes speed and carries with it magnetic clouds, interacting regions where high-speed wind catches up with slow-speed wind. The solar wind speed is high (800 km/s) over coronal holes and low (300 km/s) over streamers. These high- and low-speed streams interact with each other and alternately pass by the Earth as the sun rotates. These wind-speed variations buffet the Earth's magnetic field and can produce storms in the Earth's magnetosphere. Many coronal mass ejections (CMEs) combine with the solar wind and cause shock waves which, if directed to the Earth, can ignite the aurora and major ionospheric/geomagnetic storms.

The Earth has a magnetic field, with north and south poles, which is enclosed in a region surrounding the Earth called the *magnetosphere.* As the Earth rotates, its hot core generates strong electric currents that produce the magnetic field, which reaches 36,000 miles into space. The magnetosphere prevents most of the particles from the sun, carried in solar wind, from impacting the Earth. The solar wind distorts the shape of the magnetosphere by compressing it at the front and causing a long tail to form on the side away from the sun. This long tail is called the *magnetotail.*

When a solar flare occurs, x-rays and gamma rays impact the ionosphere, causing an increase in the ionization of each layer. RF propagation is directly tied to the Ionosphere. The *F*-layer is the highest ionospheric layer and is responsible for worldwide propagation of radio signals. The more ionization occurring in the *F*-layer, the higher the frequencies which refract back toward the Earth. The highest frequency that will refract back from the ionosphere over a selected point-to-point path is known as the maximum usable frequency (MUF). The other (lower) layers of the ionosphere can block our transmissions. The lowest usable frequency, (LUF) is the lowest frequency that can propagate via the ionosphere over a particular point-to-point path.

When the *D*- and *E*-layer ionization increases, radio waves which normally punch through and reach the *F*-layer are blocked or absorbed. When the LUF increases to or above the MUF, then communications are next to impossible over the given path. Solar-flare x-ray and gamma-ray emissions cause a rapid increase in this ionization of each layer. This is known as a sudden ionospheric disturbance (SID). This particularly affects radio communications at frequencies below around 30 MHz that depend upon the reflection of the signal off the ionosphere for long-distance communications.

Flares are characterized by their brightness in X-rays (X-ray flux). The biggest flares are X-class flares. M-class flares have a tenth the energy, and C-class flares have a tenth of the X-ray flux seen in M-class flares. When M-

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2002

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 16, 22	A	A	B	C
High Normal: 3, 7, 12, 15, 17-18, 20-21, 23-26, 30	A	B	C	C-D
Low Normal: 1-2. 13, 27-29	B	C-B	C-D	D-E
Below Normal: 4, 6, 19, 31	C	C-D	D-E	E
Disturbed: 5, 8-11, 14	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 S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair to good (C-B) on July 1st and 2nd, good (B) on the 3rd, fair to poor (C-D) on the 4th, etc.

P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

and X-class flares occur, radio blackouts are likely, starting with the lower HF frequencies first. The radio blackout can be so intense that there is no propagation of any signal. Even atmospheric noise is absorbed and not propagated, making for a very quiet receiver. Many people have been fooled into thinking that their antenna or radio had malfunctioned! With smaller flares (C-class), the impact is minimal. Larger (M-class) flares will cause a longer shortwave fading, but very big flares (X-class), which are not as common, can wipe out shortwave for hours. The good news is that these SIDs only affect shortwave circuits in the sunlit hemisphere.

You can learn more about solar flares at <http://hesperia.gsfc.nasa.gov/sftheory/questions.htm>.

Solar Cycle Conditions

The present solar cycle, the 23rd observed since accurate records have been kept, continues its gradual decline in activity after peaking twice. The Royal Observatory of Belgium reports a monthly-observed mean sunspot number of 102 for April 2002, up from 98 for March. This results in a 12-month running smoothed sunspot number of 114 centered on October 2001, exactly the same as October 2000. The 10.7 cm monthly-observed mean solar flux for April 2002 is 190, up from March's 180, with a 12-month smoothed 10.7 cm flux of 192 centered on October 2001, 12 points higher than October 2000. The observed monthly mean *Ap*-index for April is 15, up 5 points from an *Ap* of 10 for March 2002. The sunspot low for the month was 71 on April 28, and the high of 162 occurred on April 12.

Expect a smoothed sunspot level of about 101 and a 10.7 cm solar flux of about 165 for July 2002. The geomagnetic planetary *A*-Index (*Ap*) generally will remain high through July and August, as we are in the summer season in the Northern Hemisphere. Cycle 23 is expected to remain in the High solar range for the remainder of 2002.

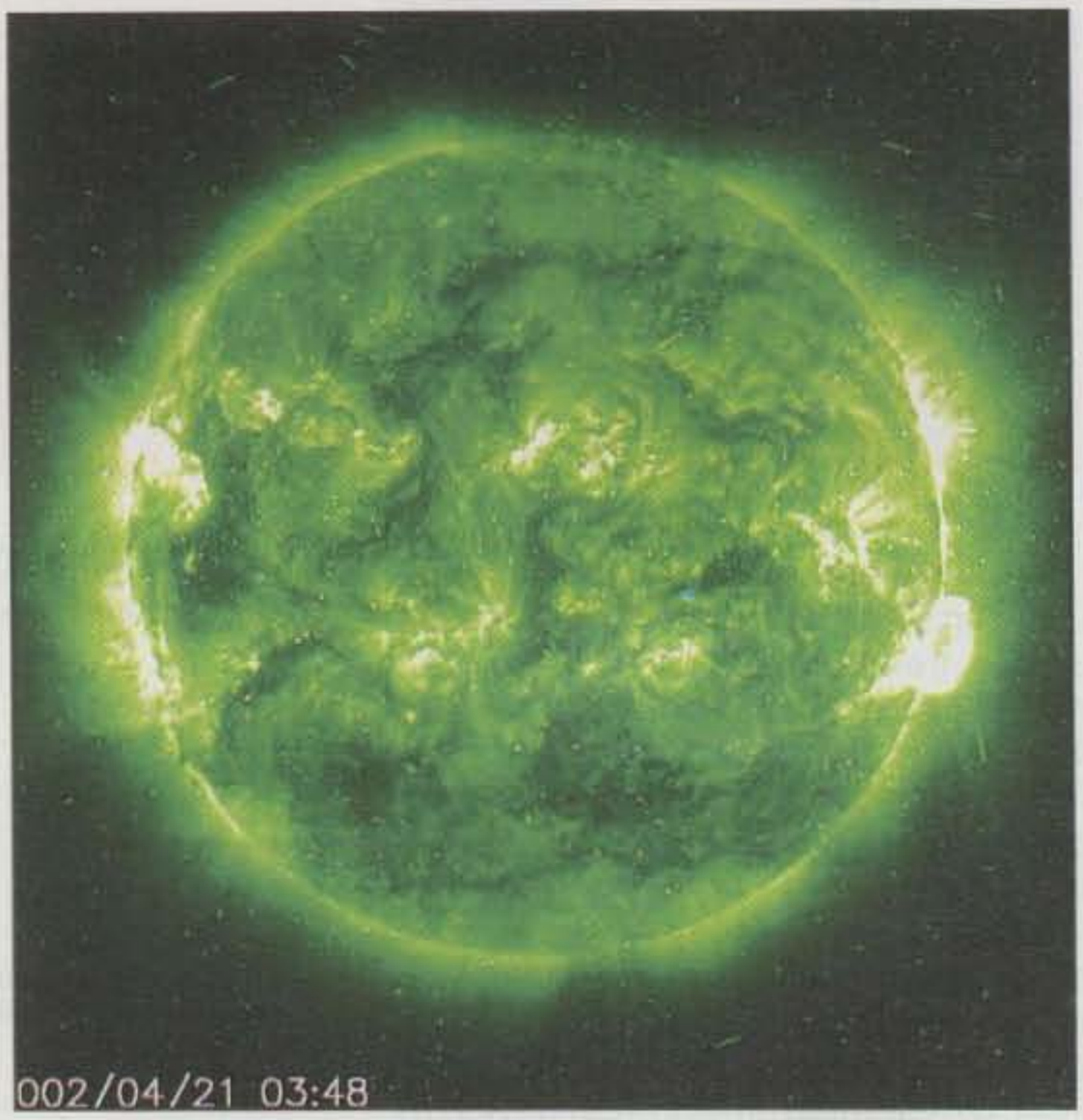
July Propagation

Many DX hunters view July as the least exciting month of the year. With generally lower summertime Maximum Usable Frequencies (MUF), the higher of the amateur HF bands are mostly unusable for long-distance propagation. On lower frequencies, with the long hours of daylight and the sun high in the northern sky, HF propagation conditions are more stable during July than during any other month. 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 HF amateur bands, and on 6 and 2 meters as well.

Ten and 12 Meters are in excellent shape in the Southern Hemisphere in July. Conditions to all points south of the equator will remain good. There could be occasional openings to other parts of the world in the Northern Hemisphere via long-path propagation. Look for short-distance contacts during July, as sporadic-*E* propagation will be most prevalent.

Fifteen meters still offers good propagation, especially on nighttime and north/south paths. Look for long-distance signals during local sunrise and sunset, even as the east/west Northern Hemisphere paths deteriorate. Seventeen and 15 meters will have strong openings into the Southern Hemisphere during the afternoon hours.

Twenty meters has replaced 15 meters as the most reliable daytime and long-distance band during July. Twenty meters is expected to remain open around the clock to one area of the world or another, with peak conditions forecast for several hours after local sunrise, and again during the late afternoon and early evening hours.



On April 21, 2002 a violent, though beautiful flare was seen at the western limb of the sun. The activity reached its peak at 0151 UTC. The X-ray flux checked off as an X1.5. (Photo courtesy of the Royal Observatory of Belgium)

Nighttime openings to many areas of the world are possible on 20, 30, and 40 meters, but 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.

Sporadic-*E* propagation peaks during the summer months. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters, with paths open between 50 and 2300 miles.

Look for frequent short-skip openings on 10, 12, 15, and 17 meters between distances of 500 and 1300 miles. During the afternoon hours skip may extend to beyond 2300 miles as a result of *F*-layer reflection. Short-skip openings should range between 250 and 2300 miles on 20 meters. Peak conditions are most likely to occur during the late morning and again during the late afternoon and early evening hours. Daytime openings on 40 and 30 meters should range between 100 and 600 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the maximum short-skip (one-hop *F*-layer reflection) of 2300 miles during the hours of darkness.

While no ionospheric openings will be possible on 160 meters during the daylight hours of July, expect some openings between sunset and sunrise for distances up to approximately 1300 miles, if the seasonally-high static levels permit.

VHF Conditions

Statistical studies show that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip prop-

agation over distances as great as 1400 miles should be possible about 10 percent of the time on 6 meters. Two meter openings may also be possible during periods of intense sporadic-*E* ionization.

Solar activity continues to be high enough to support occasional *F*-layer DX openings. During the daylight hours, monitor 6 meters for transcontinental openings, as well as between Hawaii and the western states, and the Caribbean and Central and South America. The best time to look for these openings is during the afternoon hours, especially when conditions are High Normal or better.

A number of meteor showers are expected during July, with the strongest occurring at the end of July and early August. The best chance for meteor-scatter openings will be during the last week of July, when the *Delta Aquarids* shower is expected to intensify. It should peak on August 8. The other showers are the *Pegasids,* peaking on July 9; the *Phoenicids,* peaking on July 13; and the *Perseids,* peaking on August 12 and 13, starting around July 17. For more details see N6CL's "VHF Plus" column in this issue.

While we are in the peak of solar Cycle 23, expect a high number of solar flares and CMEs, possibly triggering aurora during July. There are several web resources that you may consult for up-to-the-minute aurora condition reports. The Geophysical Institute at the University of Alaska, Fairbanks, has a web page, <http://www.gi.alaska.edu/predict.php3>, which provides forecasts of active auroral events. The Space Environment Center (SEC) provides a live graphical view of current auroral activity at <http://www.sec.noaa.gov/pmap/>. Another great resource may be found at <http://xyber.irisz.hu/cucc/aurora.html>. When the *Kp*-index is greater than 5, you can expect possible aurora. The higher the *Kp*-index, the more intense the aurora can become. Consult the Last-Minute Forecast to find those days that are forecast to be Disturbed or Below Normal. You may also visit my propagation page, <http://propagation.hfradio.org/> to view current conditions, including aurora activity.

I thank those of you who have taken the time to write to me. I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. See you on the air!

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 2002
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 2002
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 2002
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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Looking Ahead in

CQ

Here are some of the articles we're working on for upcoming issues of *CQ:*

- SSB Results, 2001 CQ World-Wide DX Contest
- Operating the CQ WW from D44TC, by SMØJHF
- An Automatic Power Supply/Battery Charger, by K7PF
- Military "Manpack" Radios, by G4BXD

Do you have a ham radio story to tell? See our writers' guidelines on the *CQ* website, <http://www.cq-amateur-radio.com>.

WANTED: KIM's, SYM's, AIM's, and related 6502 HW (including literature); ROBOT's, UNIMAT's, and Watchmakers/Jewelers Lathes. John Rawley, 1923 Susquehanna Rd., Abington, PA 19001; 215-884-9220; e-mail: <johnr750@aol.com>.

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 18th year of service. It is always easier to donate and usually more financially rewarding, BUT MOST IMPORTANT your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Make 2001 the year to help a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072; fax 516-674-9600; or e-mail <crew@wb2jkj. org>. Join us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 1:00–3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, 2755 Woodhull Ave., Bronx, NY 10469.

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Oops...

What's a century between friends? In our May issue, W7LR's story, "A Ham Radio 'Voyage of Discovery'," we said that Lewis and Clark began their famous mission of exploration in 1804 and returned in 1906. As W7LR pointed out, "they would have been pretty old guys by then!" For those of you who haven't already figured this out, Lewis and Clark returned from their travels in 1806, not 1906! In the same article, we inadvertently left out the photo credit for the beautiful picture that led off the article. It was taken by Harley Leach, KI7XF.

In the May issue in K4TWJ's "How It Works" column, on page 82, fig. 3, there is an error in the lower left-hand corner of the diagram. It shows a diode and a .1 capacitor connected between two grounds, which effectively short-circuits those two components. *(Thanks to Ernie Kampe, KBØLSX, for bringing this to our attention.—ed.)*

FREE HAM CLASSIFIEDS <http://hamgallery.com>

FREE GUIDE "THE TEN MOST COMMON TOWER BUILDING MISTAKES": Written by well-known tower expert Steve Morris, K7LXC, this guide will help you avoid dangerous mistakes. TOWER TECH, Box 572, Woodinville, WA 98072; e-mail <UpTheTower@aol.com> or call 800-TOWERS8 or on the web: <www.championradio.com>.

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FREE Ham Gospel Tracts, SASE. KW3A, 265 West Ave., Springfield, PA 19064.

FOR SALE: CQ/Ham Radio/QST/73 magazines and binders. SASE brings data sheet. W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

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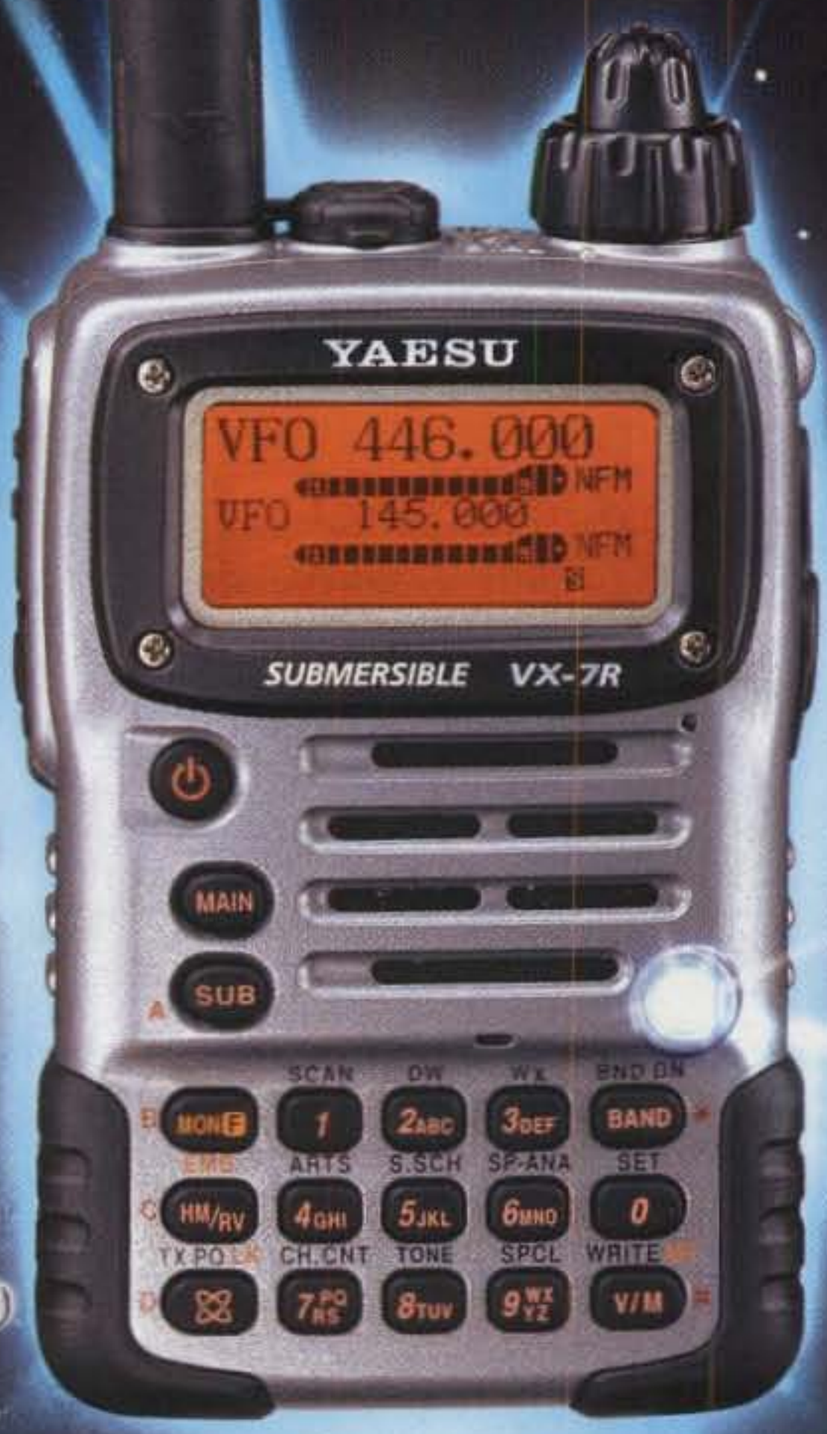

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