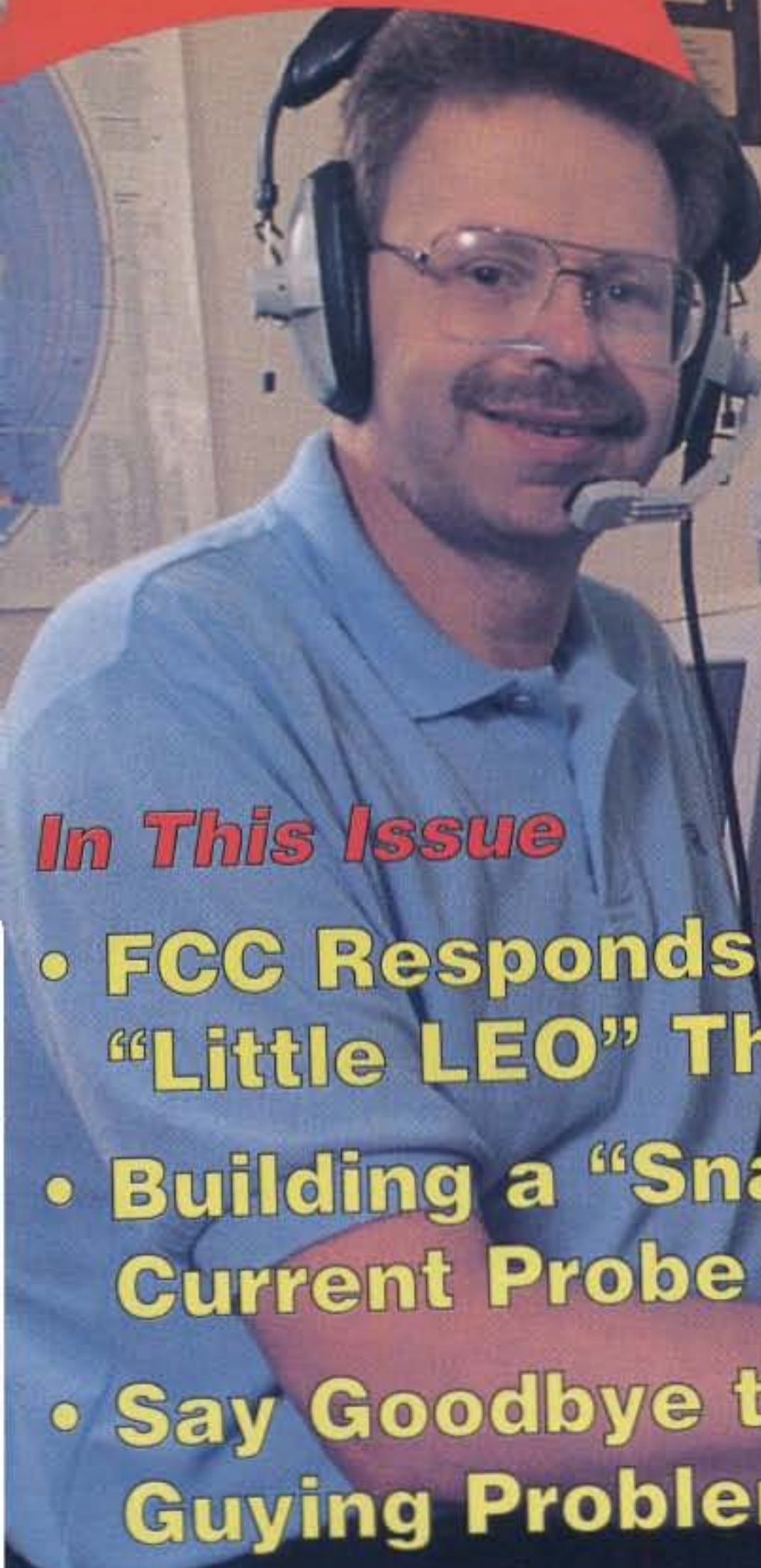


ICD 08241

Amateur Radio

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AUGUST 1996

CQ



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- **FCC Responds to the "Little LEO" Threat**
- **Building a "Snap-On" RF Current Probe**
- **Say Goodbye to Tower Guying Problems**
- **Westhampton Wildfires—Ham Radio's There!**
- **1995 CQ WW RTTY Contest Results**

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ON THE COVER: Don't be fooled by the relatively simple layout of Fred Lass, K2TR's Altamont, New York shack. As any contester knows, it comes to life during the contest season as competitors from all over converge on Fred's QTH and assemble one of the finest multi-op stations around. Outside, Fred has an equally impressive array of stacked Yagis on nearly every HF band (including 40 meters) spread across multiple 100+ ft. towers. Once in the early '80s, Fred participated in an ARRL Field Day operation. While some folks are content to install their spare tribanders, Fred decided that stacked 20M 4-el Yagis on 40 ft. booms at 80 ft. were in order and up they went!

When Fred's not doing radio, he's doing TV as Chief Engineer of the local Channel 6 outlet, WRGB-TV. (Photo by Larry Mulvehill, WB2ZPI)



Smart Dual-Bander

144MHz/440MHz Dual-Band Operation

Ultra compact, lightweight in design, this smart FM dual-bander offers a superb combination of operating ease and powerful performance for handheld communications. As well as providing single-band operation, the TH-79A(D) features extensive dual-band functions, including full-duplex operation and the ability to receive two frequencies simultaneously, even on the same band. And for especially demanding applications, a high-power version — the TH-79A(D)H — is also available.

Dot-Matrix LCD & Menu System

In addition to frequency data, the easy-to-read dot-matrix LCD, a Kenwood exclusive, offers access to a menu system with full alphanumeric display of functions and settings. You can also scroll through a summary of your current operational status.

Scan Mode
Time 17

Input ID
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82 Non-Volatile Memory Channels with ID

The memory channels are all capable of storing transmit and receive frequencies independently—thus allowing split-frequency operations—and an alphanumeric ID can be used to identify each one.

Guide Function

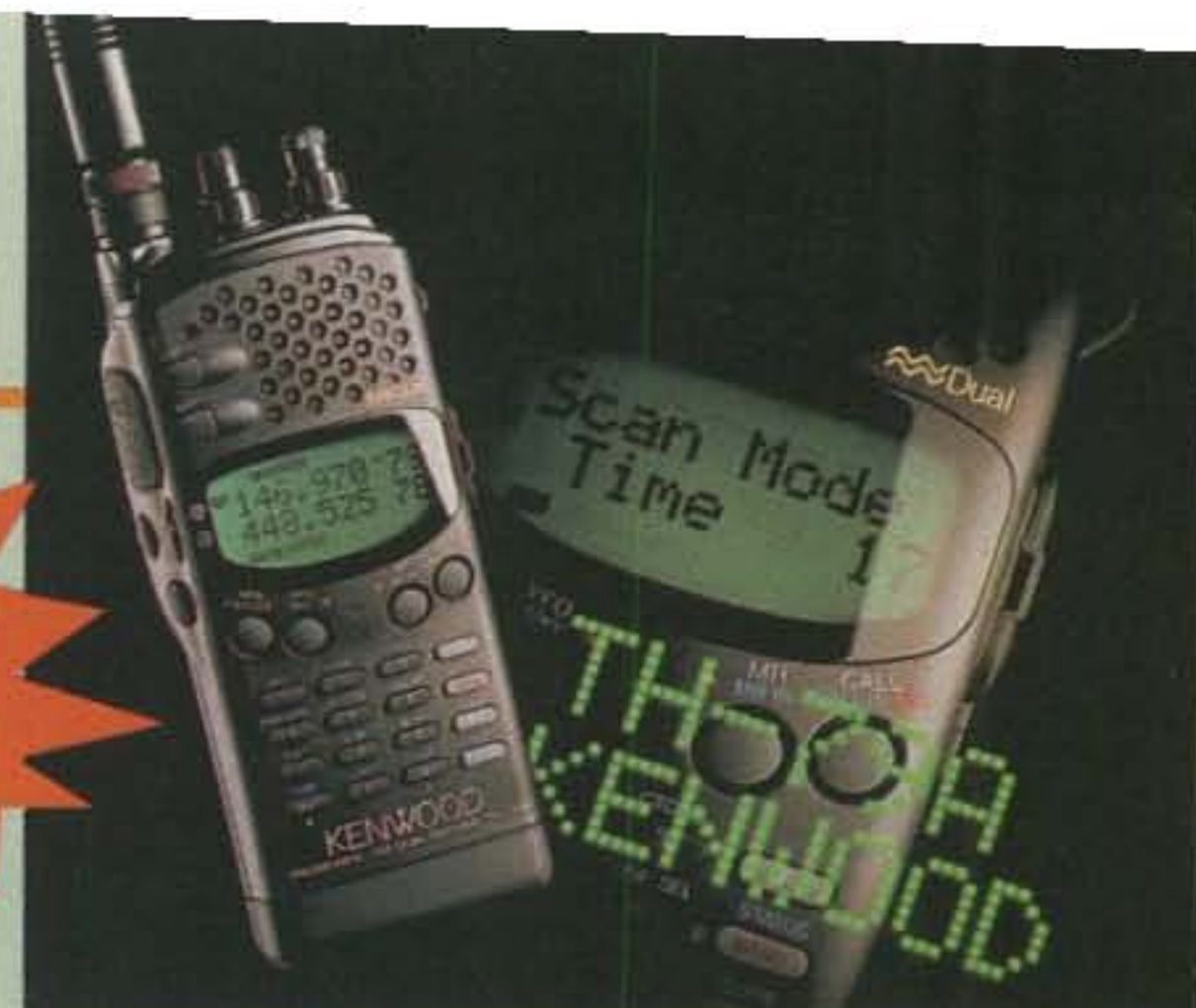
There's no need to carry a manual with you: the dot-matrix LCD provides access to a handy guide function that displays simple to understand operating instructions at the touch of a button.

Guide Func
Turn the E

Wide-Range Flexible Antenna

A high-performance flexible antenna ensures excellent reception over the TH-79A(D)'s extended RX range — including Air Band, weather channel and other service frequencies.

**NEW 5 Watt
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ZERO BIAS

AN EDITORIAL

I have to admit that it wasn't too long ago when I first heard the name "Little LEO." Not wishing to display ignorance, I smiled knowingly, but inwardly my mind searched frantically for meaning. A character perhaps in Damon Runyon's *Guys and Dolls*? You know, a jovial and benevolent underworld figure who sings and dances his way into your heart. No, I didn't remember any ties to amateur radio in either the play or the movie. Maybe it was someone a bit more sinister, with strong connections to certain organized crime families, who held an amateur radio license and was also being indicted. Wrong again, although similes can be drawn in both means and method.

No, Little LEO was not a flesh-and-blood person at all, in the same manner that there really wasn't some person named OSCAR who invented the amateur radio satellite. While they are both names of people, they actually are acronyms. An acronym is a word or name made up from the first letter of each word of a descriptive title. People work very hard to come up with descriptive titles with certain word order so that cute acronyms can be formed. LEO actually stands for Low Earth Orbit and refers to a satellite in that mode. OSCAR stands for Orbiting Satellite Carrying Amateur Radio—cute and descriptive. We all are lucky that some project engineer didn't decide to describe it as Not So High Thing Going Around The Globe, or we all would be up in arms trying to pronounce Little NSHTGATG. By the way, if it wasn't for OSCAR, this whole thing would be academic. LEO, you should have more respect for your father.

The Little LEO bombshell hit the amateur radio scene during the last week in May with a call to arms by the ARRL's Executive Vice-President, Dave Sumner, K1ZZ. Dave explained the WRC-97 preparations and the actions of IWG-2A, an informal working group acting as an FCC WRC Advisory Committee. The basic area, or focus, of IWG-2A is space and satellite communications. The Little LEO group had a marvelous idea, truly inspired to win friends and influence people. They thought it would be grand if they essentially could have all of 2 meters and the 420–450 MHz band for LEO to romp in. Now Little LEO isn't really that little, and for all intents and purposes LEO's family name is Motorola. Perhaps "Big LEO" would have been a better choice of names. Well, 420–450 MHz came off the table quicker than turkey at Thanksgiving. The Air Force's new super-duper over-the-horizon radar system just happens to fall out right in the middle of that, so that wasn't a point up for too much discussion. In the old days there was an Air Force General who also happened to be an amateur and who simply would have cut

some orders alluding to bricks stuck together in Schaumburg and that too would have been that. At this writing, it appears that it's just 2 meters ripe for the picking.

While this indeed is serious and of vital concern to every licensed amateur in the United States, there are a couple of really annoying questions evolving out of the whole situation. First, while we're appreciative of the fact that the League brought the matter to our attention, the question comes up as to why they sat on the information for three weeks. According to what was published, Paul Rinaldo and Dave Sumner knew about this on May 7th. The following week was the Dayton Hamvention, where there was ample time for forums or other dissemination of this critical information. Nothing was said to anyone there, albeit it was a secret from the 30,000 or so attending. Using the Newington euphemism "behind the scenes," we learned that unilaterally it was decided to threaten Little LEO *et al* with a scathing *QST* editorial unless IWG-2A, Washington, D.C., and Schaumburg, Illinois blinked. Obviously, they didn't blink, quiver, or sweat. So started the saturation e-mail message wars.

Part of this is good, as it wakes up a number of people to a potential threat. It would have been a bit better if *QST* had decided also to publish the text of the offending proposal, as we all would know exactly what it is we're supposed to be mad at and not some interpretation. In the last two weeks I've talked to a number of people angry over this, and so far I can't find anyone who's actually read the original document. Therefore, I'm left with the belief that the ARRL is specifically speaking for and to its 170,000 or so members and not for the majority of licensed amateurs in this country. I know *CQ* doesn't speak for any majority, and I presume *73* doesn't either. I do know that I am big enough and/or secure enough that had I found out this information first, I would have been on the phone with Newington and Wayne and anyone else who could have provided a forum for this information. The issues affect each and every one of us and not simply one organization or one publication. What is supposed to be our principal organization is in fact just another organization with no principles and a monumental display of ego.

What of IWG-2A and the Little LEO group? First, let me explain that none of their machinations fall under the purview or authority of the Wireless Telecommunications Bureau, the bureau in charge of amateur radio. This basically had nothing to do with them, nor was it likely discussed with them beforehand. Second, this system apparently is analogous to some agency appointing a fox to guard the hen house. The fox then is given the authority to order up his favorite meal.

Nobody has asked the farmer's opinion. Anthropologically, everyone knows and accepts that a fox or a shark does fox and shark things. It's when they also begin to nibble on you and me that we all begin to yell that something is wrong with this picture. If Little LEO had developed a taste for some other service's frequencies, none of us would have been too upset. It's our 2 meters, and we know what it means to us and what we're able to do with it, and we're not about to give it up lightly. Here the operant words are *our*, *we*, and *us*. It's everyone.

What about the FCC? Elsewhere in this issue you'll find a copy of a letter I received from Cecily C. Holiday, Director of the WRC-97 Preparatory Team. The letter is self-evident and explains her position. Following the letter, we publish the latest procedures for submitting comments to the WRC-97 Advisory Committee. Be sure to make your views known. Be factual and respectful. You don't get anywhere with threats and ultimatums, and generally you tick off the wrong people, who then manage to find a way to get even at some later date. This situation is not an abnormal phenomenon, but is typical of how things are done. Everything is up for grabs simply because it fits someone's idea or perceived need. This time it's our ox who's been gored and we're doing the yelling. Instead of yelling wildly and blindly, file comments on amateur radio's use of 2 meters, especially noting public service and emergency communications. We're sort of aware of Little LEO's appetite and what he'd like to eat. It's up to us to explain why it wouldn't be in his best interest or the interest of the country.

It's up to you and every other amateur you talk to in this country to do something. While the ARRL might like to profess that they wear the mantle of authority and representation for amateur radio, over 75% of licensed amateur radio operators in this country are not members. Primarily, the ARRL represents the views, likes and dislikes, biases, and petty politics of their members, which is what they are chartered to do. The overwhelming majority of amateurs, for whatever reason, do not wish to align themselves by becoming members of the ARRL. So it falls to the great numbers of amateurs who are just out there to do something constructive and positive. That may be you and the folks with whom you share the repeater. Don't simply nod your head or fire off a letter to me or Dave Sumner. Instead, file a rational and well-informed comment with the WRC-97 Advisory Committee. Each and every one of you has the power to affect change. Don't give it away, don't relinquish it, and don't assume that someone else will do it for you.

73, Alan, K2EEK

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ANNOUNCEMENTS

• **Polar Bear Express DXpedition.** At about 0800 hours on Aug. 3 the Ontario Northland "Polar Bear Express" will be leaving from Cochrane, ON on its 186 mile journey to Moosonee, ON. An additional attached passenger car will have a team of nine amateurs aboard. Several HF stations will be set up and will be DXing on the way up north. The group will be trying to activate Akemiski Island in James Bay. The island will have a special VE8 callsign. Special QSLs will be issued to those who either contact the train or the train station when the groups split up. To get a rail schedule and fee info for making the round trip from Cochrane to Moosonee, call Ontario Northland at 800-268-9281; for tourist info call Stephanie Wright at 800-354-9948; for info about the DXpedition contact Laird Solomon, VE3LKS via packet <ve3lks@va3bbs>; internet <lsolomon@osha.igs.net>; official homepage <http://www.durhamradio.ca>; unofficial homepage <http://www.osha.igs.net/~lsolomon>.

• **Radio Club of State of Queretero Special Prefixes** will be a worldwide invitation to contact members of the club. They will be celebrating the 465th anniversary of the founding of Queretero. The rules of the contest sponsored by them during July include: (1) The special prefix can only be used by the members of the club; (2) they will use all amateur bands 80-10; (3) prefixes will only be used during July; (4) every QSO with an amateur using the special prefix and confirmed counts for one point; (5) five points will earn a commemorative diploma; (6) modes include SSB, CW, and AM; (7) logs and QSLs should be sent to the Queretero Radio Club, A.C. Apartado Postal #632, Queretero 76000, Queretero, Mexico; (8) the last day to apply is Aug. 31, 1996; (9) amateurs living in cities named "Santiago de ..." will receive a special confirmation.

• **These Special Events are scheduled for August:**
WB2ELW, from Erie County, New York; South Towns ARS; to celebrate the 157th Erie County Fair; Aug. 18; on 21.330-21.370, 14.255-14.295; 7.40-7.80, 3.80-4.0 MHz. For folded certificate, send large SASE, for flat certificate send 9 x 12 SASE to John Leitten, KA2RFT, 6120 McKinley Pkwy., Hamburg, NY 14075.

W2OB, from "Old Barney," Barnegat Lighthouse in Barnegat Light, New Jersey; Old Barney ARC; to celebrate National Lighthouse Day; Aug. 10-11 from 1300-0000 UTC each day; operation on the lower 25 kHz of the General phone bands 40, 20, 15 meters; also 28.400 SSB, 146.52 simplex, and 146.835 repeater. For QSL send SASE. For special certificate and QSL, send 9 x 12 SASE with 2 units of postage to Joe Fleishinger, NU2F, 75 Joshua Drive, Manahawkin, NJ 08050.

AC2P, from the Montauk Point Lighthouse, Long Island, New York; to celebrate the bicentennial of the lighthouse; 1400Z Aug. 3 to 1900Z Aug. 4; SSB on standard IOTA frequencies; CW as announced. For commemorative QSL send QSL and SASE to the CBA of AC2P.

KB2UYI, from Herkimer County Fair, Frankfort, New York; 1400-1900Z Aug. 18; in 20 meter General phone, and 40 meter Novice CW and 40 meter General portion of 2 meters, 145.110. For certificate send QSL and SASE to John Reed, N2WTF, 617 Jeffrey St., Herkimer, NY 13350.

2-land, from the 16th Annual "Wings of Eagles Airshow," Genesee County Airport in Batavia, New York; Genesee Radio Amateurs Club; Aug. 17 and 18 between 1300 and 2100 UTC on 40 meters at 7.250 ±20 and on 20 meters at 14.250 ±20. For certificate, send QSL and 9 x 12 inch SASE to G.R.A.M., Box 572, Batavia, NY 14021-0572.

K3MJW, from Arnold, Pennsylvania; Skyview Radio Society; to commemorate the centennial of the City of Arnold; 1200Z Aug. 10 to 0400Z Aug. 11; on 50.150, lower portion of General phone, Novice CW on 10, 40, and 80, and Novice phone 28.464. For certificate, send QSL to K3MJW, 2335 Turkey Ridge Rd., New Kensington, PA 15068.

KB3BMW, from Vintondale, Pennsylvania; the Dividing Ridge ARC; from 150th anniversary of Eliza Furnace; Aug. 31; on 7.225-7.300, 14.225-14.350.

For certificate, send QSL and SASE to DRARC, 199 Bender Rd., Apt. 1, Patton, PA 16668.

KB4ALC, Bowling Green, Kentucky; to celebrate the 1996 Corvette Homecoming on Labor Day weekend; Aug. 31-Sept. 2; operation 5-10 up from bottom end of General class bands. Contact KB4ALC; send QSL and SASE to Kenneth E. Newman, KB4ALC, 505 Emmett Drive., Bowling Green, KY 42101.

W6UW, from San Jose, California; SCCARA 75th anniversary; Aug. 17 from 1600-2200Z; operation on the lower General phone and CW on 20, 15, and 10 meters. For certificate, send SASE to SCCARA, P.O. Box 6, San Jose, CA 95103-0006.

W7AIA, from Vancouver, Washington; Clark County ARC; to celebrate the Northwest Antique Aircraft Club annual "fly-in;" 1500-2200Z Aug. 17-18; in the lower portion of the General class bands, and on 28.450 Novice/Tech 10 meter band, plus 2 meters, to be announced on the 147.84/24 W7AIA repeater. For QSL/certificate, send SASE to CCARC, P.O. Box 1424, Vancouver, WA 98668.

KA8GOH, from 34th Annual Tyler County Fair; Tyler County Amateur Radio Organization; 1400-2200Z Aug. 9-10; phone portion of General 80-10 meters. For certificate, send QSL and 9 x 12 SASE to TCARO, P.O. Box 287, Middlebourne, WV 26149.

W9DK, from on-board the WWII submarine the U.S.S. *Cobia*, Manitowoc, Wisconsin; the ManCoRad Club; to commemorate the 50th anniversary of its decommissioning; 1400-2200Z Aug. 17; on or about 7.250, 14.250, and 21.350. For QSL, send #10 SASE to ManCoRad Club, P.O. Box 204, Manitowoc, WI 54221-0204.

KBØTLX, from Petersburg, Nebraska; The Albion ARC; to celebrate the Nebraska State Antique Tractor and Horse Plowing Contest; 1800Z Aug. 24 to 1800 UTC Aug. 25; on 7.240, 14.240, 21.130, and 28.330. For QSL, send name, address, and QSL to Steve Wright, KAØVEU, 929 Park, Albion, NE 68620.

KAØKWM, from Bemidji, Minnesota; Paul Bunyan ARC; to celebrate Minnesota's Centennial; 1700-1700Z Aug. 10-11; on 3.910, 7.250, 14.250, and 146.730. For certificate, send QSL and 9 x 12 SASE to Vern Skretvedt, KAØKWM, 908 Grant Ave., Bemidji, MN 56601.

WØMME, from the Midwest Old Threshers Reunion, Mt. Pleasant, Iowa; Mt. Pleasant, Iowa ARC; Aug. 28-Sept. 2; in General portion of the 80-10 meter phone bands. For QSL, send SASE to Dave Schneider, WDØENR, 1675 Old Highway 34, Mt. Pleasant, IA 52641-9580.

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

Aug. 3, **The 1000 Islands International Hamfest**, Clayton Recreation Park Arena, Clayton, New York. Contact Janet Long, N2ZMS, P.O. Box 523, Brownville, NY 13615 (315-788-8543). (Exams.)

Aug. 3, **Macoupin Computer Fair/Hamfest '96**, Macoupin County Fairgrounds, Carlinville, Illinois. Call 217-854-7920. (Exams.)

Aug. 3, **8th Annual Lomer L. McMahan Memorial Hamfest**, High Point National Guard Armory, High Point, North Carolina. Contact Judy Walker, HPARC Hamfest Publicity Chairman, P.O. Box 1163, Jamestown, NC 27282 (910-887-3281).

Aug. 3-4, **1996 Greater Jacksonville Amateur Radio & Computer Show**, Osborn Convention Center, Jacksonville, Florida. Contact Greater Jacksonville Hamfest Assn., P.O. Box 27033, Jacksonville, FL 32205. (Exams.)

Aug. 3-4, **Eastern Washington ARRL Spokane Hamfest**, University High School, Spokane, WA. Contact JoAnn Gemmrig, KA7SUZ at 509-928-1808; fax 509-921-6912; or write 6812 E. Third, Spokane, WA 99212. (Exams.)

Aug. 4, **E.M.A.R.C. Swap '96**, St. Clair County Community College Student Center, Port Huron, Michigan. For information or reservations, contact Jim Wilson, N8SVI, 810-367-3059; or write to E.M.A.R.C., P.O. Box 611230, Port Huron, MI 48061-1230. (Exams.)

Aug. 4, **3rd Annual Tri-State ARA Hamfest**, Matamoras Airport Park, Matamoras, Pennsylvania. Contact Paul, KD3L, at 717-491-4808; Ray, WY2D,

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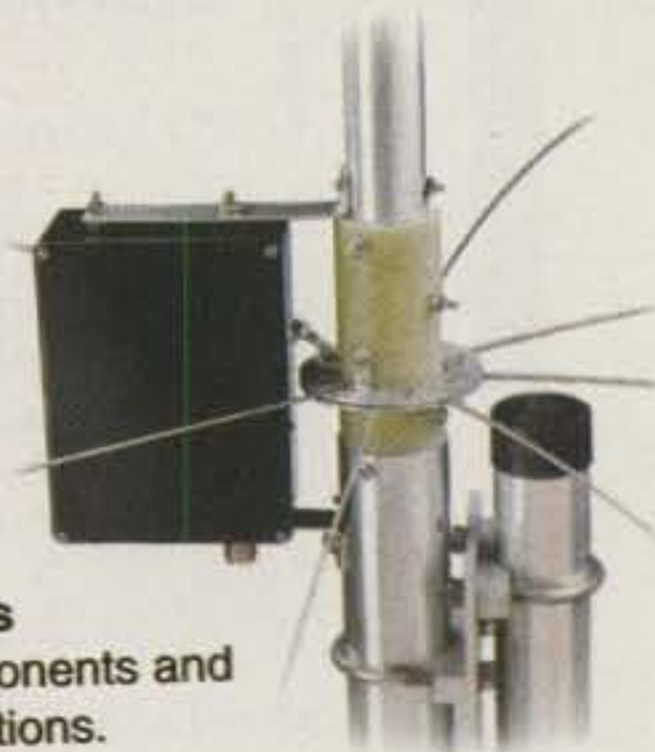
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at 914-856-1733; or Ray, AA2WC, at 914-856-0426.

Aug. 4, **Hamfesters Radio Club 62nd Annual Hamfest**, Will County Fairgrounds, Peotone, Illinois. Contact Hamfesters Radio Club, Inc., John Dvorak, 5750 S. Newcastle Ave., Chicago, IL 60638 (312-586-0128).

Aug. 4, **Annual Land of Lakes Angola Hamfest**, Steuben County 4-H Fairgrounds, Crooked Lake, Angola, Indiana. Contact Sharon Brown, WD9DSP, 905 W. Parkway Drive, Pleasant Lake, Indiana 46779 (219-475-5897). (Exams.)

Aug. 4, **Livingston County Hamfair**, Fowlerville Fairgrounds, Fowlerville, Michigan. Contact L.A.R.K., P.O. Box 283, Howell, MI 48843; or call Ray at 517-546-9209. (Exams.)

Aug. 4, **Portage ARC Hamfair '96**, Portage County Fairgrounds, Randolph, Ohio. Contact Joanne Solak, K13O, at 330-274-8240.

Aug. 4, **Marshfield ARS 5th Annual Hamnic**,

Wildwood Park, Marshfield, Wisconsin. Contact Guy A. Boucher, KF9XX, 107 W. Third St., Marshfield, WI 54449 (715-384-4323); packet <KF9XX@W9IHW.WI.USA.NA>.

Aug. 4, **Livingston County LARK HamFair**, Fowlerville Fairgrounds, Fowlerville, Michigan. Contact LARK, P.O. Box 283, Howell, MI 48843-0283; or phone Ray at 517-546-9209. (Exams.)

Aug. 4, **The Delaware Lehigh ARC 50th Anniversary Hamfest**, Career Institute of Technology, Easton, Pennsylvania. Contact Amy Zimmerman, KD3TI, Hamfest Coordinator at 717-386-3513; or the DLARC answering machine at 610-820-9100. (Handicapped accessible). (Exams.)

Aug. 4, **45th Annual Winchester Hamfest & Computer Show**, Clarke County Ruritan Fairgrounds, Berryville, Virginia. Contact Irv Barb, KD4BHV, at 540-955-1745; or write to him at Route 3, Box 5383, Berryville, VA 22611. (Exams.)

Aug. 4, **Ham Radio Flea Market**, Pepsico Pavilion, Babson College, Wellesley, Massachusetts. Contact Barbara Holdridge, N1ICQ, 107 Church St., Westwood, MA 02090 (617-329-2628); or Gerry Driscoll, NV1T, 107 Church St., Westwood, MA 02090 (617-444-2686).

Aug. 4, **The Skyview Radio Society Annual Hamfest**, Washington Township Fire Hall, North Washington, Pennsylvania. Contact Robert Reihms, N3NOS, 192 North Washington Rd., Apollo, PA 15613 (412-727-2194 after 9 PM).

Aug. 9-11, **5th Annual Sky High Hamfest**, Silver Star Mountain Resort, Vernon, B.C., Canada. Contact the North Okanagan Radio Amateur Club, P.O. Box 1706, Vernon, B.C., Canada, V1T 8C3.

Aug. 10, **16th Annual Finger Lakes Hamfest**, Dryden High School, Dryden, New York. Contact TCARC, P.O. Box 4144, Ithaca, NY 14852 (phone 607-844-4302; e-mail <mb@cornell.edu>). (Handicapped accessible; exams.)

Aug. 10, **Crossville Hamfest**, Cumberland County Community Complex, Crossville, Tennessee. Write to AC4AA V.E. Test Session, Route 1, Box 20 Legion Loop, Crossville, TN 38555. (Exams.)

Aug. 10, **Lewistown Hamfest**, Decatur Fire Company Fairgrounds, 8 miles from Lewistown, Pennsylvania. Call 814-237-1591.

Aug. 10, **Porter County Hamfest and Computer Show**, Porter County Expo Center, Porter County, Indiana. Contact Rich, N9QLQ, at 219-762-0484; or send SASE to PCARC Hamfest, P.O. Box 1782, Valparaiso, IN 46384-1782. (Handicapped accessible; exams.)

Aug. 10, **Tri-State ARA Hamfest**, Holiday Inn Gateway Convention Center, Huntington, West Virginia. Contact Georgia Overby, KA8QME, phone 304-522-1811; or T.A.R.A., P.O. Box 4120, Huntington, WV 25729. (Exams.)

Aug. 10, **Reno Hamfest**, Stead facility, 10 miles north of Reno, Nevada on Hwy 395 North. Contact Bob Davis, KG7IY, 3775 Sleepy Hollow Dr., Reno, NV 89502 (702-856-2826 home). (Exams, preregistration suggested; contact Jesse Bond, N7BIP, 2860 Santa Ana Dr., Reno, NV 89502, phone 702-826-0329 home.)

Aug. 10, **Chanute Area ARC Hamfest**, Central Park Pavilion, Chanute, Kansas. Contact Jerry Young, 1333 W. Sycamore, Chanute, KS 66720 (316-431-3268).

Aug. 10-11, **6th Annual Paulding County Hamfest**, Paulding County Fairgrounds, Paulding, Ohio. Contact Jon, KB8MDT, at PCARG, Inc., 10392 SR 500, Paulding, OH 45879 (1-419-399-4507). Exams pre-registration only; call KA8IAF at 419-795-5763.

Aug. 11, **Central Kentucky ARRL Hamfest**, Western Hills High School, Frankfort, Kentucky. Contact Bill DeVore, N4DIT, 112 Brigadoon Pkwy., Lexington, KY 40517 (606-257-3343 days; or 606-273-8345 eves). (Exams.)

Aug. 11, **Charlotte ARC Hamfest and Computer Fair**, Roll-A-Round Skate Center, Charlotte, North Carolina. Contact Buck Escott, WB4OTP, 704-522-4971, ext. 3330.

Aug. 11, **Cascades ARS Hamfest**, Jackson Community College, Jackson, Michigan. Contact Terry Osborn, 508 Dalton, Jackson, MI 49201 (517-784-2398).

Aug. 11, **St. Cloud Radio Club Hamfest**, St. Cloud, Minnesota. Contact the St. Cloud Radio Club, W0SV@NF0H#CMN.MN.USA.NOAM; or 401 Great Northern Drive, Waite Park, MN 56387; e-mail to <jmaus@cloudnte.com>.

Aug. 17, **The Brantford ARC Flea Market**, Burford Fairgrounds, Burford, Ontario, Canada. Contact Richard La Rose, VE3RLX, 153 Dunsdon St., Brantford, ON N3R 6N3 (519-752-2437); or The Brantford ARC, P.O. Box 25036, Brantford, ON N3T 6K5. (Exams.)

Aug. 17, **Northwoods Hamfest**, Sugar Camp Town Hall, Sugar Camp, Wisconsin. Contact Mary Berger, NS9Q, 367 Lois Street, Rhinelander, WI 54501 (phone 715-362-9296). (Exams.)

Aug. 17, **The Lower Columbia ARA 5th Annual Ham Radio, Computer & Electronic Equipment Swap Meet**, Cowlitz County Fairgrounds, Longview, Washington. Call Bob Morehouse, KB7ADO, at 360-

(Continued on page 115)

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FCC Responds To Amateurs' Concerns Over Little LEO

BY ALAN DORHOFFER*, K2EEK

If you take a few minutes to read my editorial this month, you will find out why many of this country's amateurs are concerned, upset, confused, and in some cases irate. Most of us are not skilled in politics, diplomacy, and how the "system" works. Ms. Holiday, Director of the WRC-97 Preparatory Team, gives us an overview of what has been happening, and most important, the correct procedures for filing comments to make our feelings known.

FEDERAL COMMUNICATIONS COMMISSION Washington, DC 20554

June 5, 1996

Mr. Alan Dorhoffer, Editor
CQ Magazine
76 N. Broadway
Hicksville, NY 11801

Dear Mr. Dorhoffer:

In recent days, over 1000 members of the Amateur Radio community have contacted me regarding the upcoming 1997 World Radiocommunication Conference in Geneva and expressed strong concern that U.S. proposals will impact adversely on spectrum allocated for Amateur bands. My purpose in writing to you is to respond to these concerns and to provide you with additional information regarding the WRC-97 preparatory process and its relation to existing services.

Many of the comments I received have focused on a list of "candidate" frequency bands discussed at the May 7 meeting of the WRC-97 Industry Advisory Working Committee Informal Working Group 2A (IWG-2A). The comments suggest that the Amateur Radio Service bands, specifically the 144-148 and 420-450 MHz bands, have been targeted as a source of spectrum for future Mobile Satellite Service (MSS) operations.

First, I want to assure the amateur radio community that no amateur bands have been selected for reallocation. The list of bands generated on May 7th represent only the IWG-2A's initial efforts to study spectrum use below 1 GHz in order to assess the feasibility of proposing worldwide MSS allocations in that range. Before recommending preliminary proposals for consideration by the Commission, IWG-2A participants must first conduct sharing studies among a range of services using frequencies below 1 GHz. These studies are necessary in order to determine the feasibility of sharing between services, and whether recommending any specific frequency band will be fruitful.

Second, the bands listed reflect only the initial component of a long-term effort to conduct sharing studies before submitting the Committee's proposals to the Commission for review. We intend to conduct sharing studies in bands currently occupied by government and non-government users. In any case, I want to emphasize that the survey on spec-

trum use is an international matter which involves all frequencies below 1 GHz.

Finally, the current WRC-97 preparatory process, as in years past, operates under a Congressional statute designed to encourage maximum participation by all interested parties. Therefore, all written and electronic comments received at the Commission to date by Amateur Radio operators have been included as part of the public record on WRC-97 proceedings. However, in the interest of efficiency, we have created a designated FCC office and e-mail site to channel future WRC-97 comments directly to the WRC-97 Committee Chairs. I have included our latest Public Notice outlining these changes and urge you to share it with your members.

I appreciate the many valuable contributions the amateur radio community has made to the progress of radio technology and to ensuring the safety of the American public. I look forward to working with you so that we can continue to advance the use of exciting telecommunications technology both in the U.S. and abroad.

Sincerely,
Cecily C. Holiday
Director, WRC-97 Preparatory Team

PROCEDURES FOR SUBMITTING COMMENTS TO THE WRC-97 ADVISORY COMMITTEE

On March 14, 1996, the Commission released Public Notice (No. 61997) (Streamlining Notice), that announced its new streamlined World Radiocommunication Conference (WRC) preparatory process. Under this new process, formal Notice of Inquiry (NOI) proceedings are eliminated in favor of developing WRC proposals in the Commission's WRC-97 Advisory Committee. This removes the redundancy that was inherent in our previous "NOI-WRC Advisory Committee" process and enables the United States to respond more effectively to the rapidly evolving international environment and to the ITU's new two-year WRC schedule.

The Streamlining Notice included general guidelines for submission of public comments to the Advisory Committee. The Notice stated that procedures would be developed to ensure that members of the public continue to have full opportunity to participate in the development of WRC proposals under the new streamlined process, including those parties who do not attend meetings of the Advisory Committee and IWGs.

(Continued on page 108)

*Editor, CQ

Results of the 1995 CQ WW RTTY DX Contest

BY ROY GOULD*, KT1N, AND RON STAILEY**, AB5KD

Entries were up by 15 percent from the 1994 contest, with a total of 466 logs. New countries appeared in a RTTY contest for the first time, and conditions were somewhat improved for the '95 contest. New low power records were set by YV5NFL, with a new world record in the Single Op Low Power category; I2KHM, with a new world record Multi-Single Low Power score; and AB5KD, with a new USA/VE Single Op Low Power entry.

It will be nice to see 10 meters come back in future contests, and with the new state-of-the-art-equipment, computers, and software, I'm sure in the years ahead we will see some very large scores.

Single Operator Category

This year we had a real war between CR9Y and P40JT over who was going to win the Single Operator (SOH) category. When the dust settled, Fr. Hermani, CT3BX, operating as CR9Y, took top honors with a score of 1,791,180, also setting a new world record. Jay, WS7I, operating as P40JT, took second place with a score of 1,668,194. Jay also set a new South American High Power record. Marijan, S56A, finished third with a score of 1,254,800, taking the European high score plaque. Next was Robby, VY2SS, with a score of 1,047,510, picking up the North American high score plaque. Very close behind was Steve, VE3XO, with a

*P.O. Box DX, Stow, MA 01775

**504 Dove Haven Dr., Round Rock, TX 78664

score of 1,004,910. The top five all finished with over a million points.

In the Single Op Assisted (SOA) category Rick, K11G, operating at K1NG, took top honors this year with a score of 1,347,367, also setting a new world record. Congratulations, Rick, for an outstanding performance. Not many set a new world record from within the U.S.A. Roland, DK3GI, no stranger to the winner's circle, took second place, scoring 1,042,368 points. Nick, UT2IZ, operating as UT0I, took third place with a score of 706,800 points.

The TG9VT Memorial plaque for North America went to Jerry, NO2T, with Roy, N4ONI, very close behind.

Single Band Category

With very little activity and a 12 hour requirement for awards, there were no 28 MHz single band entrants.

On 21 MHz Daniel, LU8EKC, narrowly took first place with a score of 267,410 points. Jan, ZS6NW, was close behind with 222,120 points. Ernesto, LU6BEG, operating at LT1A, took third with a score of 216,625.

On 14 MHz again this year Zelimir, 9A2DQ, took the honors pretty easily with a score of 340,648. In second place was Serge, UT2IO, operating at UT7I with a score of 279,948 points. In third place was Tsutomu, JA5EXW, scoring 252,650 points. It's nice to see a Japan station scoring high, as it's been a while.

On 7 MHz Jeff, K1IU, took all the honors with his score of 185,277 points, setting a new world record at the same time. This isn't anything new

to Jeff, as he seems to set a new record about every other year, as he has for the last six years. Next was 9A1A with a score of 155,414. Then Robert, G1ØKOW, finished with a close score of 154,876. Hermann, DJ2BW, was in the race, finishing with 150,801 points.

On 3.5 MHz there were three ops all very close together. Zdravko, 9A9A, took first place with a score of 42,700 points. Very close behind was Slavo, S57DX, with his 40,250 points. Barberos, IK1HXN, took third place with 36,573.

Multi-Operator Category

Serge and the crew of RK9CWA once again took all the honors in the Multi-Operator High Power (MOH) category, and at the same time achieved the highest score of all categories that had log submissions. The score was 2,552,754 points. In second place was John, ON4UN, and the crew using the callsign OT5T, making a very nice score of 1,968,102. Close behind was Rob, PA3ERC, and crew operating as VP5C, taking the North America plaque with a score of 1,845,152 points.

Multi-Multi Category

Only two logs were received in the Multi-Multi category this year. W3LPL made their usual slam-dunk score with 2,154,385 points, while KB8ECG scored 377,598 points.

Summary

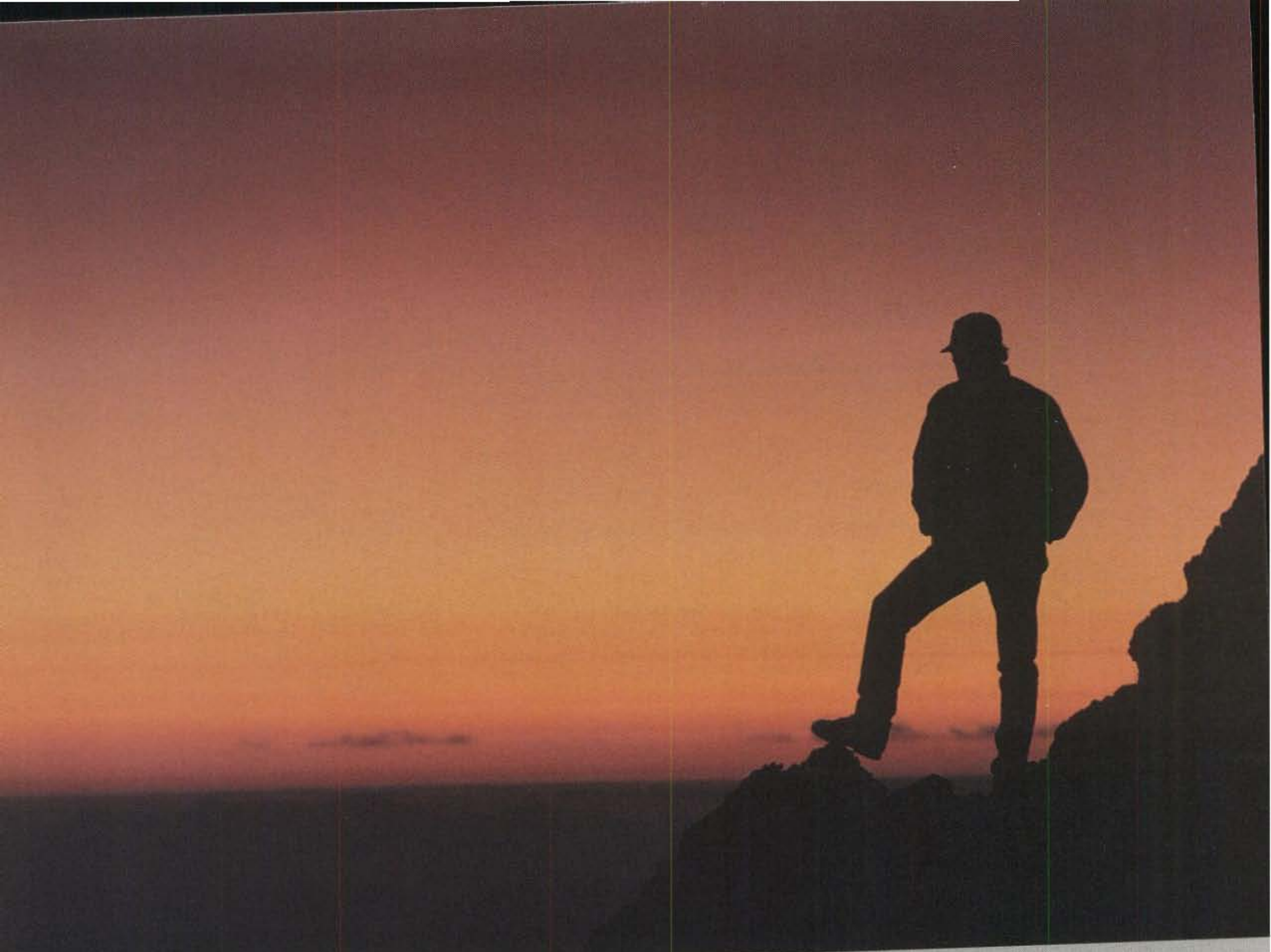
This was the first year Ron, AB5KD, assisted



Herm, CT3BX, operated as CR9Y for a new world record Single Op High Power from this shack, which is a 3m x 4m room at a repeater site high in the mountains of Madeira Island.



First place world Single Op Low Power belongs to Ricardo, YV5NFL, and this great shack. Looks like he already has made room on the wall for the plaque.



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PLAQUE WINNERS

World Single Operator, High Power: Station CR3Y (CT3BX), Hernani M. F. Curreia.

World Multi-Op Multi-Transmitter: Station W3LPL (Ops: W3EKT, K4GMH, KF3P, WB4ITN, NE3H, N3KTV, N3UN, ND3F). Sponsored by *CQ* magazine.

World Multi-Op Single Transmitter, High Power: Station RK9CWA (Ops: UA9CGA, RW9CF, UA9CR, RA9DK). Sponsored by Advanced Electronic Applications (AEA).

World Multi-Op Single Transmitter, Low Power: Station I2KHM (Ops: IK2SGF, IK2ZJJ, I2GXS). Sponsored by HAL Communications Corp.

World Single Operator, Low Power: Station YV5NFL, Ricardo Medina. Sponsored by East Washington Amateur Group.

World Single Operator Assisted: Station K1NG (KI1G), Rick Davenport. Sponsored by *CQ* magazine.

North America Multi-Op Single Transmitter, High Power: Station VP5C (Ops: PA3ERC, PA3BBP, PA3EWP, PA3FQA). Sponsored by Eddie Schneider, W6/G0AZT.

North America Single Op, Low Power: Station AB5KD, Ron Stailey. Sponsored by International Digital Radio Association.

North America Single Operator Assisted: Station NO2T, Jerry Jankowitz. Sponsored by Jeff Bouvier, K1IU.

United States Single Operator, High Power: Station N4CC, Greg Wilson. Sponsored by RTTY by WF1B.

United States Single Operator, Low Power: Station WS1E, John Gaffey. Sponsored by Dunestar Systems.

Continents, Single Operator All Band

Africa: Station ZS6NW, Jan Van Niekerk. Sponsored by Phil Duff, NA4M.

Asia: Station JA2IVY, Yohmei Sujita. Sponsored by the N5JJ Memorial Award.

Europe: Station S56A, Marijan Miletic. Sponsored by HAL Communications Corp.

North America: Station VY2SS, Robby Robertson. Sponsored by the TG9VT Memorial Award.

Oceania: Station VK9NH/VK4 (7K3UZY), Ken Yamashita. Sponsored by *The Digital Journal*.

South America: Station P40JT (WS7I), Jay Townsend. Sponsored by Neal Sulmeyer, AE6E.

World 3.5 MHz: Station 9A9A, Zdravko Balen. Sponsored by Neal Campbell, AB4MJ/ON9CNC.

World 7.0 MHz: Station K1IU, Jeff Bouvier. Sponsored by Tri-County DX Association.

World 14 MHz: Station 9A2DQ, Zelimir Klasan. Sponsored by Kunihiko Fujii, JH1QDB.

World 21 MHz: Station LU8EKC, Daniel Cosso. Sponsored by Denis WD4KXB & Mike KA4RRU.

Roy, KT1N, as Co-Director of the contest by checking logs. We would like to thank everyone who participated in the CQ WW RTTY Contest and who sent in logs.

Checking logs is always a chore, as we want to do the best job possible. A special thanks goes to all those who sent in check logs. They were very helpful in making some final decisions.

We got a real kick out of reading the comments many added to their logs this year. Maybe we should have some kind of Best Excuse Award for not doing well in the contest. If we did have this award, this year it would definitely have to go to Bob, K0RC. We quote: "Ron/Roy: I took time out during the contest to install a new ground system at my QTH, and assisted with an 80 foot self-supporting tower at KF0QR's QTH. I also discovered the RX in my TS-950 had a source internal noise problem (S-3 to S-5) with no antenna connected. My apologies to all who may have called whom I could not hear." (*There are three solid, good excuses for this year's score.—ed.*)

For the 1996 CQ WW RTTY Contest we need more plaque sponsors. If you would like to support the program, please get in touch with Ron, AB5KD, or Roy, KT1N. We will be in touch with some of you in the future. We would appreciate your support of the contest's program.

Many thanks to Jerry, N1DGC, and Jim, W1EWN, for printing the certificates again. Many thanks also goes to Co-Director Ron for his assistance in checking logs and organizing the plaque program.

Our thanks to all the participants, to our sponsors, and to the hundreds who take part every year but do not send in a log. Special thanks to Gail at *CQ* and the rest of the staff.

It will be nice to see 10 meters come back in future contests, and with the new state-of-the-art-equipment, computers, and software, I'm sure in the years ahead we will see some very large scores.

See you the last full weekend in September (28-29) for the 1996 RTTY Contest, our tenth one, which again will be co-sponsored by *The*



Part of the antenna farm at ON4UN, second place in the world Multi-Op High Power as OT5T.



Eddie, W6/G0AZT, looking happy after adding a new multiplier at AA5AU, third place world Multi-Op Low Power.

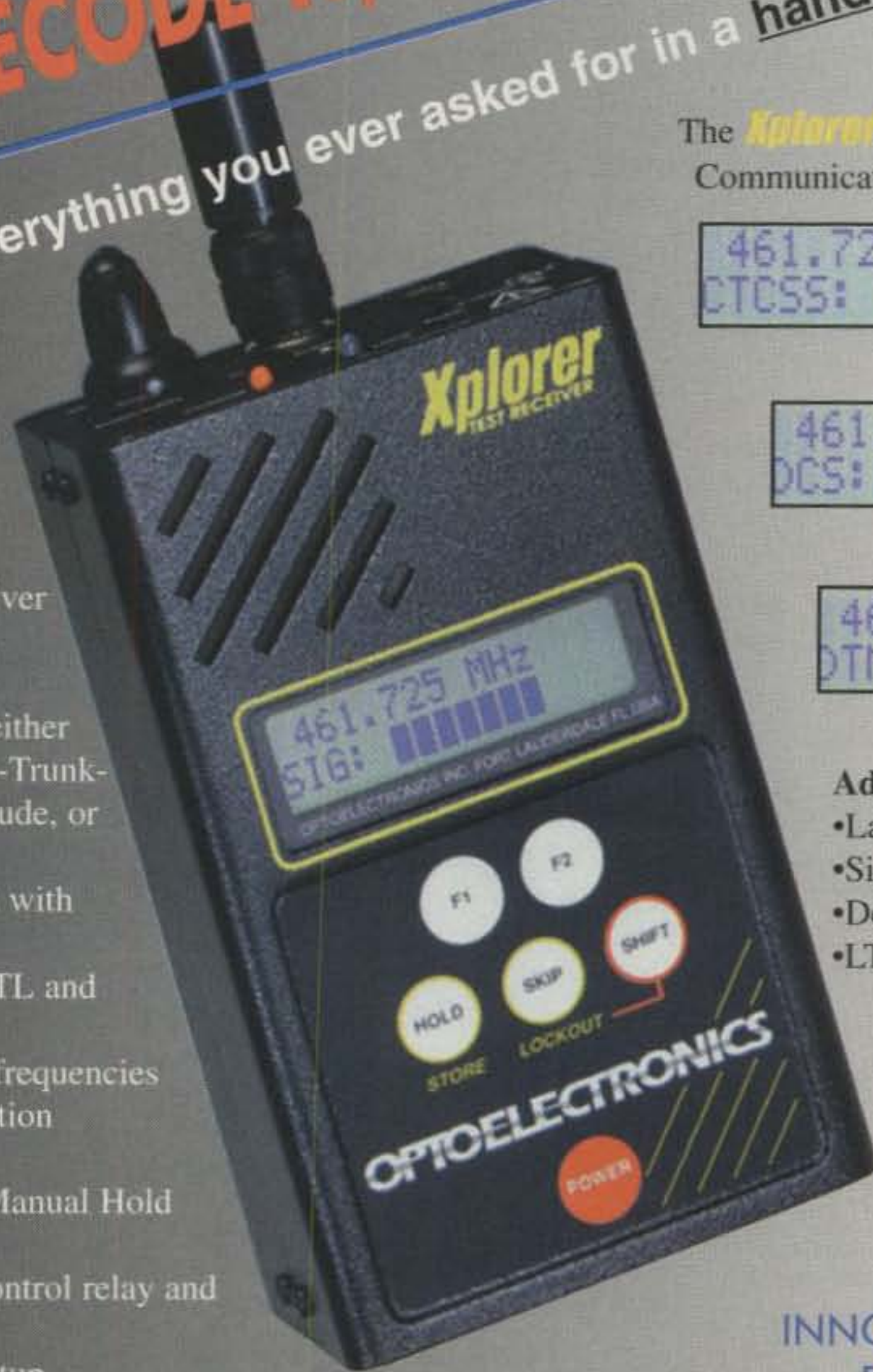
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*Software for mapping applications is planned by third party Software Design Companies. Inquire about the availability and specific Companies to contact.



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OWNERS SAY IT BEST

It's one thing for us to say the OMNI-VI has the finest amateur receiver in the world, it's quite another to hear it from your fellow hams. So take a look in our mail bag - here are just a few of the letters we receive from active DXers and Contesters. OMNI-VI owners say it best!

"The OMNI-VI has finally ended my search!"

"I have owned 18 different HF rigs including most high end models from your three competitors. I used each intensively, many side by side. I pick 2 to retain, then purchase another to run more comparisons - my personal quest to find the 'ultimate' rig. With high hopes, I purchased and then sold when each did not quite deliver. I thought I might be looking for something that did not exist. The OMNI-VI has finally ended my search! If there were a word that defined better than superb, I would use it for the OMNI's receiver. It is a serious operator's rig - not a fashion designer's creation with little substance beneath the veneer."

— Gregory Buhyoff, KN4FR

"Performance to cost ratio makes this radio a best buy."

"In my 40+ years of hamming, I have owned and operated most equipment that has been built. I am still a very active DXer. To say I am pleased with my OMNI-VI would be a wild understatement. Quietness, selectivity and dynamic range is the best I have seen. Performance to cost ratio makes this radio a best buy."

—Ralph Napolitano, W9LKJ

"For the first time I am not bothered by strong adjacent stations."

"I dreamed for many years of having this type of performance and you have done it. For the first time I am not bothered by strong adjacent stations. Recently I was listening to a very weak station on 40 and only discovered after tuning up in frequency a little that an

80 dB over 9 was only 1.5 KHz away [we'll forgive Tom's enthusiasm, that's a BIG signal]. I was so impressed that I nearly jumped up and shouted. Thanks for such great performance."

— Tom Jednacz, KA2G

"It truly does pull in the weak ones."

"I have to say I am pretty picky and spent considerable time making up my mind. My observation is that the OMNI-VI is 20% better than the competition which I had for 10 years. Easy to operate and the receiver is all I hoped it



would be. It truly does pull in the weak ones and in this down spiraling sunspot cycle being able to hear them is the competitive edge. The filtering exceeds my expectations. I now realize there is a stateside company that hams can still rely on. TEN-TEC staff have been extremely kind; a cheerful and helpful voice is just a phone call away."

— Tommy Farr, WJ60.

"Nothing I have tried comes close to the receiver performance of the OMNI-VI."

"I spent several years being disappointed by the available transceivers. I like to work DX, contests, and most especially weak signal DX on the low bands. From the Mid-West there is no more demanding situation than 40 meters at contest time, each 1 KHz away, and trying to work the weak Europeans. On my OMNI, the Europeans are crystal clear and although very weak a pleasure to work. On the competitions' transceivers they are indistinct and confusing in the noise. Nothing I have tried comes close to the receiver performance of the OMNI-VI."

— Bill Maxson, N4AR

Would I buy it again? I sure would!

"You may be interested in my response to a letter from a ham who saw my station pictured in QST. He asks if the OMNI-VI performs as well as advertisements say and, further, would I buy it again? I sure would! I have used TEN-TEC for 25 years and consider it tops. OMNI-VI is the best in a long line of transceivers. You just can't beat their service." I know from personal experience."

— John Thompson, W1BIH/PJ9JT

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TEN-TEC

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Digital Journal. (See the rules for the contest elsewhere in this issue.) Until next year . . .
73, Roy, KT1N, and Ron, AB5KD

Comments From Around The World

ZS6NW: After working one after the other familiar callsigns, I searched and found 143 stations that had been worked before. It was indeed a great feeling to work so many old friends. **V31JU:** Thought I would not get up the inverted L for 80—army ants at foot of tower—but as a good field biologist, I braved the menacing hoard. The contest must go on! **ZS6EZ:** A burst geyser costs me 4 hours, then my radio died. Just wasn't my weekend. **K1IU:** Conditions were just great! Too bad I overslept during the second morning sunrise. Sure wish we didn't have to wait one year for the next CQ/DJ WW RTTY Contest!

N8FEH: Can't beat RTTY ops for courtesy. **VE3LPE:** Most fun I have had on the radio in a long time. **VE2FFE:** I have to find a way to operate on 40 and not freeze the computer. **N1RCT:** Had a great time and worked eight new countries. **SO5TW:** I worked a few new ones I haven't found on CW or SSB. **VK5GN:** Had fun despite Murphy's attention in this contest. **KA4RRU:** Best score for me ever, and I know I can do better—next time. **ZL2AMI:** Took time out to run AMTOR traffic with New Zealand yacht fleet protesting French nuclear testing. **AA4M:** The good news is I worked two all-time new RTTY countries. The bad news is I missed my own state! Is it legal to work yourself?

W3FQE: This was my first CQWW RTTY test; hope not my last. I had a blast. **VE2JR:** Conditions a pleasant surprise. DSP filter really works. **LU8EKC:** This was the best contest; many stations to work. **WS1F:** My first RTTY contest. Had a blast. Can't wait for the next one. **W8CNL:** Worked seven new countries and my last state for RTTY WAS. **KB4WQO:** Halfway through the amp died. **N2FF:** Forty meters was a disappointment. There should have been more activity on that band. **N5NMY:** I'm hooked! See ya next year. **LX1NO:** My first RTTY contest. I've never had so much fun in a contest. Hope to print all of you again. **DL7VZF:** My first CQ RTTY contest. A very big pleasure.

VK1PJ: First RTTY contest for me. Had a ball. **DJ2BW:** Another great contest again. **GU0SUP:** Great fun! 14 MHz in good shape. I

TOP SCORES		
SINGLE OPERATOR HIGH POWER ALL BAND	SINGLE OPERATOR ASSISTED ALL BAND	MULTI-OPERATOR MULTI-TRANSMITTER
CR9Y.....1,791,180	K1NG.....1,347,367	W3LPL.....2,154,385
P40JT.....1,668,194	DK3GI.....1,042,386	KB8ECG.....377,598
S56A.....1,254,800	UT0I.....706,800	
VY2SS.....1,047,510	DL4MCF.....539,392	SINGLE OPERATOR SINGLE BAND
VE3XO.....1,004,910	NO2T.....501,042	3.5 MHz
IK2QEI.....952,302		9A9A.....42,700
ZX2A.....808,640		S57DX.....40,250
DJ6QT.....798,600		IK1HXN.....36,573
OM5ZW.....720,643		
N4CC.....710,940		7.0 MHz
	MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER	K1IU.....185,277
	RK9CWA.....2,552,754	9A1A.....155,414
	OT5T.....1,968,102	GI0KOW.....154,876
	VP5C.....1,845,152	
	DF7RX.....1,326,528	14 MHz
	RK2FWA.....1,206,000	9A2DQ.....340,648
		UT7I.....279,948
		JA5EXW.....255,910
SINGLE OPERATOR LOW POWER ALL BAND	MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER	EA2IA.....244,084
YV5NFL.....979,572	I2KHM.....925,628	YU1NR.....229,824
4X6ZK.....809,994	UX2F.....832,522	
AB5KD.....639,846	AA5AU.....630,400	21 MHz
4X0A.....487,012	RU4L.....587,479	LU8EKC.....267,410
WS1E.....462,672	K8UNP.....554,652	ZS6NW.....222,120
KA4RRU.....437,987		LT1A.....216,625
V31JU.....421,820		
KA1SIE.....399,434		
N1RCT.....391,678		
WA4ZXA.....285,948		

caused many pileups with my "GU" call. **EY8MM:** I will remember this contest—15 new DXCC countries and my second son was born at 2359Z. **VE3XO:** Not the greatest of WW contests. Had numerous visits from Murphy! **PY2XB:** I didn't have contest s/w. I will try to get contest s/w for next year. I had a lot of fun.

Station Operators, Multi

DF7RX: DF7RX, DK2OY, DL2NBU, DL6RAI. **PI4COM:** PA3ACA, PA3ALP, PA3DMH, PA3GBQ, PB0AIC, PB0AOE. **KB8ECG:** K8AQM, N8CC, KG8CO, KG8CW, KG8EF, KB8MGY, KB8NVJ, KB8NVL, KB8QJF, KB8VIT, KB8YFT. **VE3UR:** VE3DEH, VA3MAO, VE3LIB. **LZ1KMS:** LZ3GM, Todor, Ivanov, Venny Atanasov. **TY8G:** TY1PS, LA9IY, LA4GHA, LA5IIA. **T99MT:** T94EU, T94NE, T94NF, T94TF, T94TU. **SP6YFU:** SP6NVK & SP6OPE. **UX2F:** UT9FJ, UU2JZ, UR5FJA, UR5FEL, US-F-044, and 18 boys and girls from 11 to 18 years old. **PI4CC:** PA0VHA,

PA3EDP, PA3FWV, PB0AIU, Pemzr. **N9ENA:** N9NCX, KB9KOZ, KB9FYB. **I2KHM:** IK2SGF, IK2ZJJ, I2GXS. **IK2MPV:** IK2FEO, IK2IKT, IK2RXV. **VK9LZ:** N4TQO, KE6FV, W6OTC. **EA3AOK & EA3BT.** **RU4L:** UA4LCQ, UA4LM, UA4LL, RA4LDW, RA4LFG, RA4LCC, Sergey, Eugeni, Vitalij. **DA0WCY:** DJ5LA & DJ1XT. **HA3KNA:** HA3OV & op. **VE3FJB:** VE3FJB, VA3CW, VE3VSM, VE3ABG, VE3IJM, VE3NDA. **AA5AU & G0AZT.** **RK2FWA:** UA2FF, UA2FX, UA2FZ, UA2FBA, RA2FA. **OL3A:** OK1DX, OK1CM, OK1MR, OK1AY. **K8UNP:** KR4GJ, YV5DTA/W4, K7UPJ, WT3A, N4OLE, KB4PNH, KD4CGP, W4OVU. **I2UIY & IK2DUU.** **K2TW & W9NGA.** **4U0ITU:** LX1OM & LX1KQ. **WU3V:** W5WMU, K15XP, N5SYF, WD0GML, WN5IJZ, W5VSZ. **OT5T:** ON6TT, AB6MJ, ON9CNC, ON1CIK, ON4UN. **VP5C:** PA3BBP, PA3ERC, PA3EWP, PA3FQA. **WA4VQD:** AF4Z, KC4HW, AD4TG, AA4FC, W3ZNB, KD4HHF, KB9YW, WB4NPL. **W3LPL:** W3EKT, K4GMH, KF3P, WB4INT, NE3H, N3UN, N3KTV, ND3F.



Ari, PT2BW, operating as ZX2A for a second place South America, and seventh place world, Single Op High Power.



Elvira, IV3FSG, at this neat station took first place 14 MHz for Italy.

S51DX	14	194,740	514	1,391	27	70	43
S57DX	3.5	40,250	282	575	10	49	11
S52SK	7	32,308	209	394	25	46	11
S54A	7	26,426	164	362	25	48	0
S57J	SOL	9,300	61	150	20	28	14
S59L	SOL	7,224	61	129	14	33	9
S57KM	SOA	4,446	57	114	9	30	0

SPAIN

EA2IA	14	244,084	665	1,756	21	66	52
EA7GXD	SOL	209,160	346	840	47	131	71
EA3GJH	SOH	138,662	327	779	32	96	50
EA5EYJ	SOL	98,280	212	546	41	89	50
EA5YJ	SOL	54,670	168	497	34	76	0
EA5GRL	SOL	45,655	180	397	29	68	18
EA5GRC	7	36,750	226	490	11	44	20
EA1AW	SOL	31,556	139	322	19	57	22
EA7HBP	21	25,915	155	355	13	41	19
EA4ATP	14	12,354	40	213	10	35	13
EA5FEL	SOH	12,155	67	187	14	25	26
EC2BAW	SOL	8,664	63	152	14	33	10
EA7GXX	SOL	6,380	50	110	15	39	4
EA4BNQ	SOL	4,346	47	106	10	24	7
EA3CZM	SOL	2,220	27	60	15	22	0
EA1BLF	SOL	2,204	27	58	11	27	0
EA1DLN	SOL	2,016	26	56	10	26	0
EA7HAB	SOL	440	10	22	8	9	3

SWEDEN

SM5FUG	SOH	542,164	797	1,876	56	182	51
SM5FQQ	SOH	303,048	504	1,242	58	139	47
SM8AGD	14	85,375	277	683	25	68	32
SM4RGD	SOL	80,595	278	597	31	96	8
SM5EIT	SOH	63,210	205	490	29	80	20
SM7BHM	SOL	50,076	202	428	29	82	6
SM6AAY	SOL	41,400	192	414	23	64	13
SM6CST	SOL	4,840	38	88	19	35	1

THE NETHERLANDS

PA3EVY	SOA	191,874	342	849	51	127	48
PA3GKT	SOL	114,450	261	654	42	94	39
PA3DHR	SOL	95,040	255	594	36	93	31
PA0YN	SOL	34,966	43	92	7	26	5
PA0WRS	SOL	31,125	106	249	37	77	11
PA3BUD	SOL	26,051	100	239	28	67	14

UKRAINE

UT8I	SOA	706,800	995	2,325	70	182	52
UT7I	14	279,948	689	1,707	33	84	47
UR6QA	7	109,595	425	953	25	75	15

WALES

GW4KHQ	SOL	124,135	288	671	31	111	43
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YUGOSLAVIA

YU1NR	14	229,824	641	1,596	32	58	54
YU7GMN	14	104,400	353	900	22	58	36
YU1BO	SOL	57,120	230	476	21	81	18
YU7AE	SOL	46,592	197	416	23	84	5

NORTH AMERICA

ALASKA

KL7/KG5EG	14	74,284	319	758	20	31	47
KL7WP	SOL	4,802	42	98	15	16	18

BARBADOS

8P6SA	SOL	48,236	166	389	24	46	54
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BELIZE

V31JU	SOL	421,820	733	1,610	41	87	134
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CANADA

VY2SS	SOH	1,047,510	1,251	3,090	57	159	123
VE3XO	SOH	1,004,910	981	2,451	77	181	152
VE7SAY	SOH	337,194	568	1,287	50	82	130
VE2AXO	SOL	135,168	300	704	36	75	81
VE7QO	SOH	118,664	288	652	41	58	83
VE7OR	14	92,575	349	805	25	45	45
VE3IAY	SOL	87,814	243	529	26	47	93
VE2BOB	SOL	83,838	236	534	26	51	80
VE6WQ	14	83,625	299	669	26	55	44
VE3LPE	SOL	77,778	239	522	26	43	80
W1VXV/VE2	SOL	49,077	171	399	25	45	53
VE2JR	SOH	43,036	150	371	28	49	39
VE7IN	SOH	42,984	186	398	25	25	58
VE7IRA	14	26,568	170	369	15	22	35
VE2FFE	SOL	10,010	65	154	16	26	23
VE5SF	SOH	5,194	51	106	10	7	32
VE3EVV	14	392	12	28	4	3	7

MEXICO

XE2/K6OJ	SOL	45,885	164	345	27	27	79
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PANAMA

HP1KZ	21	19,765	164	335	9	12	38
HP1DGX	14	14,824	94	218	13	24	31

RADIO WORKS

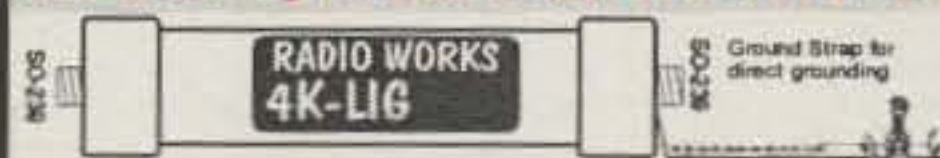


New! 6:1 UnBalun

The **86-1.5K** is a new 6:1 "UnBalun," made especially for you. It's the balun you've been waiting for. Build that OCF you want now. Or, even better, get yourself the real 80 - 10 meter performance leader - it's the **CAROLINA WINDOM 80**. You can't beat it!

Current Baluns

B1-2K	1:1	2 KW	80 - 10 m	General Purpose	\$18.95
B1-4K	1:1	4 KW	160 - 10 m	High Isolation	\$24.95
B1-5K	1:1	5 KW	160-10 m	Precision	\$29.95
Y1-4K	1:1	4KW	160 - 10 m	YagiBalun™	\$24.95
Y1-5K	1:1	5 KW	160-10 m	The YagiBalun™	\$29.95
B4-1.5K	4:1	1.5KW	80-10 m	General Purpose	\$22.95
B4-2KX	4:1	2 KW	160-10 m	4:1 Current Balun	\$39.95
B6-1.5K	6:1	1.5 KW	80-10 m	Unbalanced for OCF ants.	\$45.00
RemoteBalun™				High Power, Current-type, 4:1, 160-10 m	\$47.95



For really tough **RFI** and **RF feedback** problems, you can't beat the new **4K-LIG Ultra Line Isolator**. The 4K-LIG has a built-in ground strap for direct line Isolator grounding to your station's ground system. Before coax enters your station, **stray RF is shunted directly to ground**. Stray RF and feedline radiation just doesn't have a chance, yet signal attenuation is nearly zero!

"When I moved my shack to the second floor of my home, stray RF in the shack made my new transceiver go nuts. The 4K-LIG Ground Ultra Line Isolator solved my RF feedback problems. Now I work all band at full power." Jim, W4THU

Line Isolators, 50 Ohms, High power

4K-LI	4 KW	160-10m	SO-239 in, SO-239 out	\$19.95
4K-LIG	New! Grounded, 4 KW, 160-10m			\$25.95
4KRF-LI	4 KW	160-10m	PL-259 in, SO-239 out	\$25.95
4KV-LI	Vertical antenna Line Isolator, 160-10 m			\$27.95
Terminator-3	Ultra Line Isolator for transmatch			\$27.95

Aug Specials - PL-259 Silver/Teflon	\$ 1
200' 3/16" MilSpec Dacron Line (with any \$58 purchase)	\$12
RG-8X Premium, 95% shield, per 100'	\$14

CAROLINA WINDOM - still the best 80-10 antenna. 6 product reviews and users say so. Still only \$79.95

Antenna Wire and Parts

PL-259ST	Silver-Teflon, USA	\$1.29 or \$25/pk of 25
PL-259GT	Gold-Teflon, USA	\$1.49 or \$30/pk of 25
N/9913	For 9913, 9086, Flexi, etc.	\$3.25
N/9913S	As above but silver & Teflon	\$4.25
N-200	Silver-Teflon, installs like PL-259	\$3.25
CQ-8X	95% shield, Type IIA non-contaminating	23¢
CQ-8XMM	Solid dielectric, tinned, 95%, Type IIA	27¢
CQ-213	Enhanced RG-213, 96%++ braid	40¢

RG-213 95% Mil-type 35¢
CQ-Flexi Flexible, 9913 type 60¢

R1 Rotator	8 conductor (2 x #18, 6 x #24)	22¢
R2 Rotator	8 conductor (2 x #16, 6 x #18)	37¢
R4 Rotator	8 conductor (2 x #14, 6 x #18)	48¢
#14 HD	Stranded, 7 x 22 hard-drawn	8¢
#14 CW19	19-strand, copper-clad, tinned	10¢
#13 CW	19-strand, copper-clad, insulated	16¢
450 Ladder	New! #14 stranded cond. poly. windows	28¢
450 Ladder	Stranded #16 cond., poly. windows	18¢
Ladder-Loc	Center insulator for ladder line	\$11.95
Delta-C Kit	ARC-PLUG center insulator & 2 end insulators	\$29.95

Coax & cable must be in 50-foot multiples for ad prices. Quantity pricing, too.

Antenna Support Line MilSpec Dacron, single braid, solid, fungus & sun resistant line. 3/16" 700# test 100' hanks \$8
Kevlar - no stretch, .075" dia. 500#-test, Dacron jacket 200' sp! \$15.95

The RADIO WORKS

Orders & Technical (804) 484-0140
FAX (804) 483-1873

Order Hotline (800) 280-8327

Box 6159, Portsmouth, VA 23703

VISA and MC welcome. Give card #, exp. date, signature. Add shipping (figure 10%, \$6 min) Prices subject to change.

email - jim@RadioWorks.com

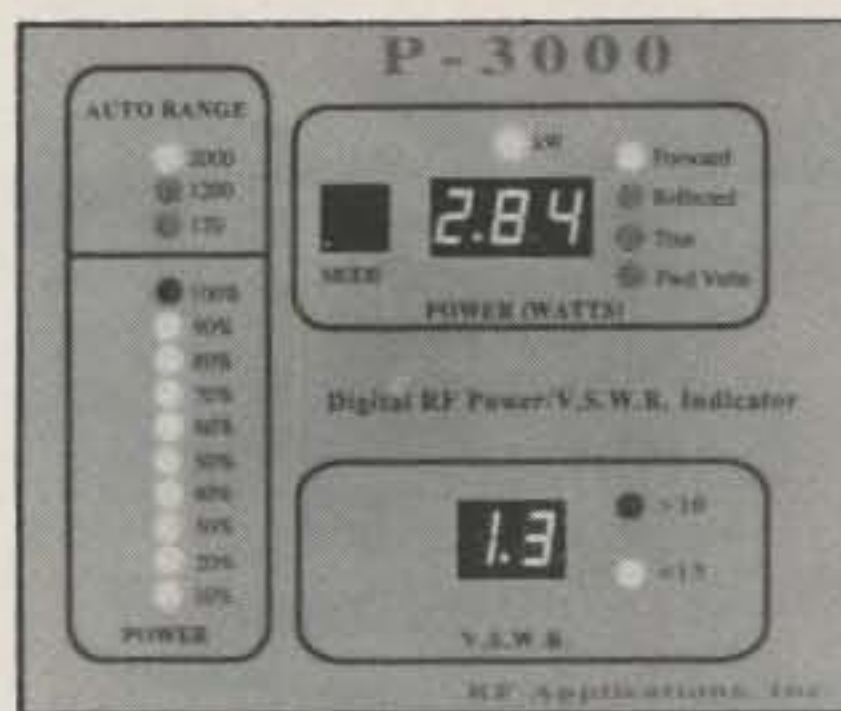
Reference Catalog 128 pgs, articles, data, charts, etc. Free with any \$50 order, while supplies last.

General Catalog New! Catalog 961. 96 pages of baluns, Line Isolators, high performance wire antenna systems, wire, cable, coax, connectors, station accessories, tuners, coax switches, support line, etc. Free, allow 2-3 weeks for bulk mail or send \$2 for Catalog by Priority Mail

CIRCLE 76 ON READER SERVICE CARD

RF Applications, Inc.

P-3000 Digital RF Power/V.S.W.R. Indicator



Features

- In use around the world
- 1.8 - 30MHz, 15W - 3kW
- Remote coupler
- Accurate, peak reading
- Bright numeric displays
- Autoranging bargraph
- Made in the U.S.A.

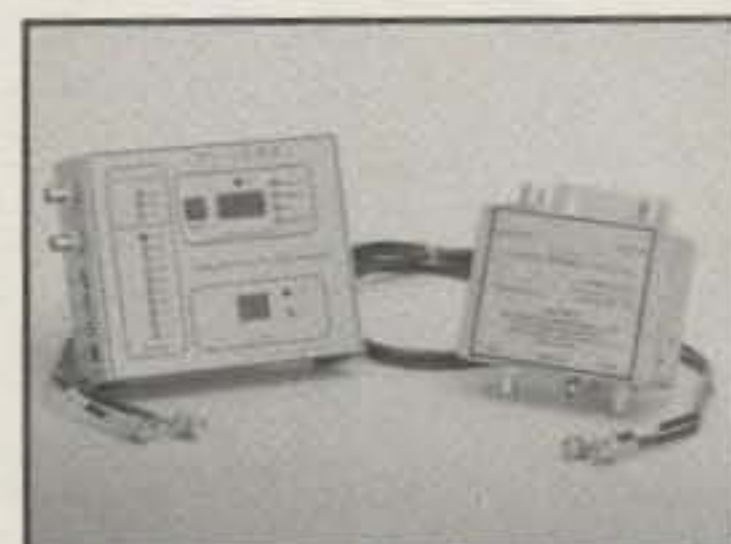
An Available Meter With A High V.S.W.R. Relay

The P-3000 gives you peak reading power up to 3kW. It continuously monitors your V.S.W.R. and opens a relay contact when you go above 3.0:1. Plus, you never have to make an adjustment. The P-3000's microprocessor does it for you! Nothing could be simpler. Shouldn't you be protecting your station with a P-3000?

The P-3000 is available from stock to four weeks at \$299. Includes cables. Two year warranty. Order yours today!

Available from AES, Henry Radio & ARW
See the review on page 40 of 10/94 CQ!
9310 Little Mountain Rd., Kirtland Hills, OH 44060
phone 216.974.1961 • fax 216.974.9506

800.423.7252



CIRCLE 71 ON READER SERVICE CARD

MFJ-989C 3 KW Antenna Tuner

More hams use MFJ-989s than any other 3KW tuner in the world! Why? . . . Because MFJ uses super heavy duty components to make the world's finest 3 KW antenna tuner . . .

In Stock at ham dealers everywhere!

Call your dealer for your best price

\$349⁹⁵
MFJ-989C



- New for 1996 -- MFJ AirCore™ Roller Inductor
- Super Heavy Duty Components • Made in U.S.A.
- Handles 3000W PEP SSB
- peak/average Cross-Needle SWR/Wattmeter
- Antenna Selector • Balun • Built-in Dummy Load

More hams use MFJ-989s than any other 3 KW tuner!

MFJ uses super heavy duty roller inductor, variable capacitors, antenna switch and balun to build the world's most popular 3 KW antenna tuner.

The rugged MFJ-989C handles 3 KW PEP SSB and covers 1.8 to 30 MHz, including all MARS and WARC bands.

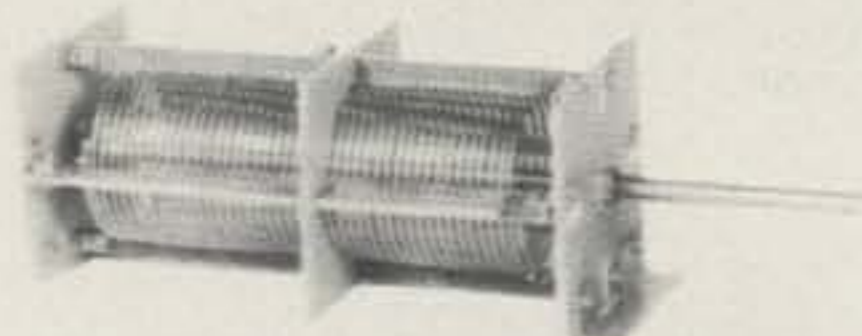
MFJ's new 1996 AirCore™ Roller Inductor, three-digit turns counter and spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax or balanced lines.

You get everything you've ever wanted in a high power, full featured, antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, antenna switch, built-in dummy load, balun, convenient flip-stand -- all in a sleek, compact cabinet.

MFJ builds the world's most popular 3 KW antenna tuner using these super heavy duty components . . .

MFJ AirCore™ Roller Inductor



MFJ's exclusive super heavy duty AirCore™ Roller Inductor has an air core that can't burn up! You get ultra high-Q, the lowest loss, highest efficiency and highest power handling of any roller inductor in ham radio.

MFJ's exclusive Self-Resonance Killer™ keeps potentially damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives excellent low-resistance connection without arcing or contact burning.

A solid 1/4 inch brass shaft with self-align bearings gives smooth non-binding rotation.

Some competing "legal limit" tuners use a lossy, low Q, solid core with erratic electrical contacts and have potentially damaging self-resonant frequencies. This can cause excessive heating and can destroy the core.

Massive Transmitting Capacitors

Look inside . . . you'll see two super heavy duty transmitting variable capacitors that can handle 6000 volts. Extra wide (0.27 inch) stator plate spacing gives you arc-free operation.

Specially shaped plates give low minimum capacitance when unmeshed. This and a hefty 250 pf maximum give you an extremely wide matching range -- even on 160 and 10 Meters.

The nearest competing "legal limit" tuner has variable capacitors physically much smaller than the MFJ-989C's. Theirs is rated at 4500 volts -- a full 25% less than the MFJ-989C. Theirs is more likely to arc -- not what you want in a "legal limit" tuner!

Super Antenna Switch

The MFJ-989C super heavy duty antenna switch is made of two individual ceramic wafers wired in parallel. Extra wide spaced, heavy duty contacts handle extreme voltages and currents. We've never burned one up!

You can select two coax antennas (directly or through tuner), balanced line/random wire, or built-in dummy load.

3 KW Current Balun

MFJ's super heavy duty 3 KW current balun for balanced lines uses two giant 2 1/2 inch toroid cores. It's wound with Teflon® wire connected to high voltage glazed ceramic feedthrough insulators.

The MFJ-989C lets you safely operate high power into balanced feedlines without core saturation or voltage breakdown.

Some "legal limit" tuners have inferior voltage baluns with smaller diameter toroid cores and use soft plastic feedthrough insulators that can arc and melt.

More reasons why the MFJ-989C is the world's finest 3 KW tuner . . .

Built-in Dummy Load

A full-size 300 watt non-inductive 50 ohm dummy load is built into the MFJ-989C.

You'll find it handy for transmitter tuning, testing and repairing your rig, setting power level, adjusting your mic gain and more.

Some "legal limit" tuners don't have a built-in dummy load. They want you to pay for an external dummy load that just gets in your way.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle SWR/Wattmeter lets you monitor SWR, forward and reflected power simultaneously. Read both peak and average power in two power ranges.

Sleek and Compact

The compact MFJ-989C slides right into your operating position -- you'll hardly know it's there. It's just 10 3/4 x 4 1/2 x 15 inches. Do you really want a bulky "legal limit" tuner that's bigger than your amplifier?

Superior Cabinet

The MFJ-989C's premium, low-profile all-aluminum cabinet has a sub-chassis that adds strength and RFI protection.

Every cabinet is chemically treated and has a tough, scratch-proof vinyl cladding -- not paint that can scratch or chip off. You won't find a tougher, longer-lasting finish anywhere.

Detailed logging scales and legends are permanently silk screened on real aluminum front and back panels -- they aren't decals or glued-on paper strips that can peel off.

Superior Construction

Every MFJ-989C uses PEM nuts (not self-tapping screws), wing-nut for ground post (not a cheap nut), fire-retardant epoxy glass PC board (not canvas based), heavy gauge wire throughout (not small gauge), locking compound on nuts/bolts (not loose hardware).

No Matter What™ Warranty

Every MFJ-989C is protected by MFJ's famous one year No Matter What™ unconditional warranty. We will repair or replace your MFJ-989C (at our option) no matter what for a full year.

Others may give you a limited warranty on defects in material and workmanship.

But what do you do if your "legal limit" tuner burns up and they say, "Sorry, your limited warranty does not cover that?"

Outstanding Customer Service

We're here to help keep your MFJ-989C performing flawlessly -- no matter how long you own it -- just call 800-647-TECH(8324).

Call your dealer for your best price

In stock at ham dealers everywhere!

Order today or pick one up at your favorite dealer or hamfest -- no shipping, no waiting.

Free MFJ Catalog

Nearest dealer/Orders: 800-647-1800

76206.1763@compuserve.com FAX: (601) 323-6551

•1 year unconditional warranty •30 day money back guarantee (less s/h) on orders from MFJ •Add s/h

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MFJ . . . the world's most trusted name in antenna tuners!

CIRCLE 149 ON READER SERVICE CARD

How To Build A "Snap On" RF Current Probe

Are your radials working, or are they truly dead and buried? VK9NS has come up with a clever device to check our radial farms for signs of life.

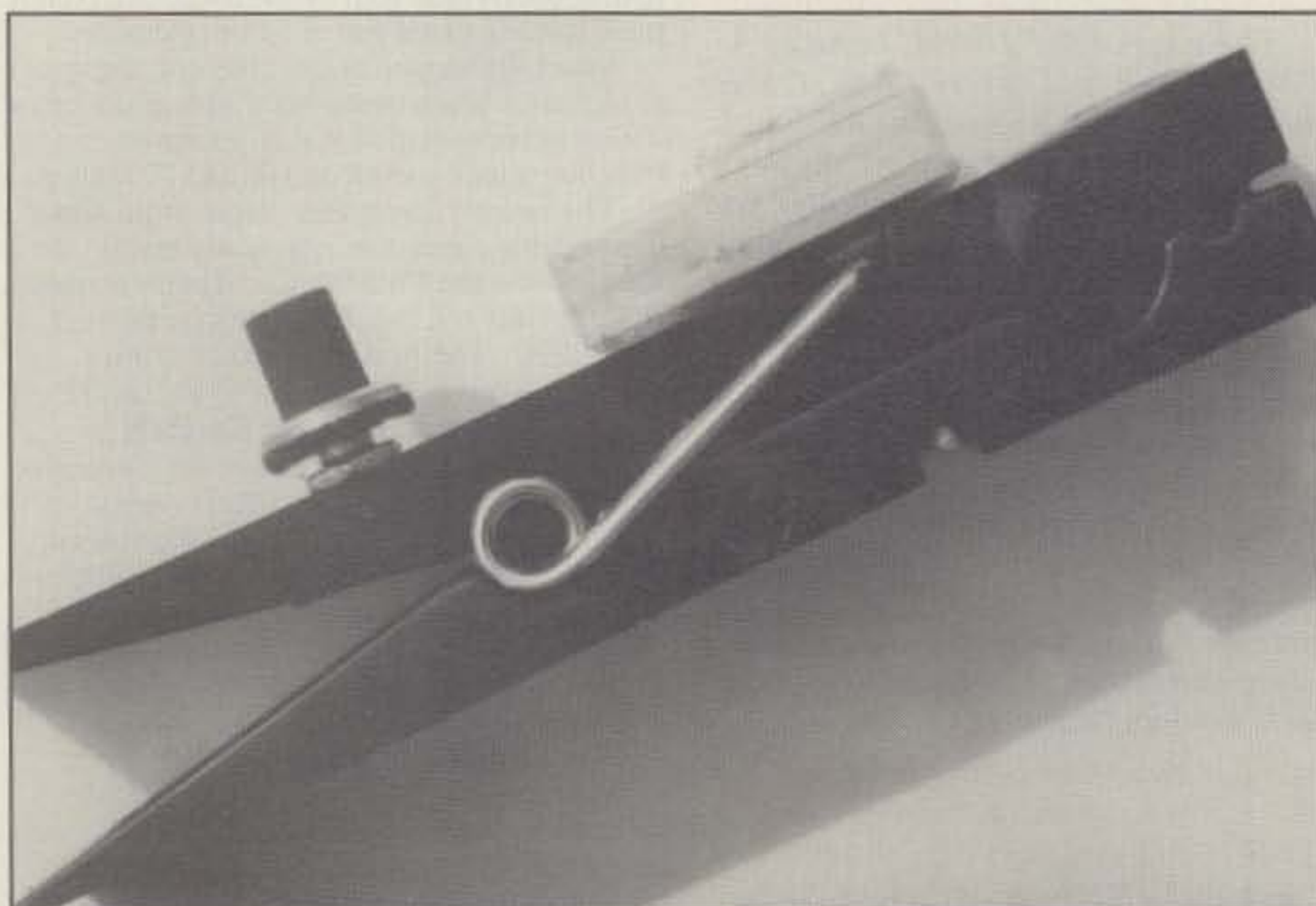
BY JIM SMITH,* VK9NS

This simple device is dedicated to my fellow addicts of the vertical antenna, and devotees of the shovel, buried radials, elevated radials, *et al.* For us life isn't easy. To make a low-band vertical really work takes lots of time and effort. Straight-up real estate is free and relatively boundless, but very few of us can erect a 135 foot (or so) quarter-wave vertical for 160 meters. Even half of that height, which would be needed for an 80 meter quarter-wave vertical, is a major investment. As a result, the majority of us are limited to shortened versions, loaded somewhere or another. Regardless of the height, the image plane under the vertical is of major importance. As the vertical antenna's height is shortened, the base impedance falls dramatically, often to a few ohms. Therefore, if possible, the ground losses have to be kept lower than this figure. Efficiency is the name of the game.

The key to success becomes the radial system. For a given situation, it is the only part of the efficiency equation that we can strive to improve. Most of us know and accept that we can't simply bury the classic 120 radials at precisely three-degree intervals, so we compromise—a short radial here, a longer one there, and so on. With that in mind, my goal was to build a cheap, quick, and easy "pocket-sized device" that would allow me to check the RF current in a radial—in fact, in each of my radials. My idea, although not new (see the November 1972, November 1984, and October 1992 issues of *Radio Communication*, a British publication), has been taken a step further by avoiding external meters. It has become a very versatile device, and in all honesty I wonder how I managed before without it.

Some Basics

RF current can be measured easily by means of an RF ammeter in series with the wire. The ammeters are usually of the "hot wire" principle, very accurate, and normally expensive. AC current typically is measured by electricians



The original snap-on probe was built in a very large plastic clothes-pin designed as a desk ornament to hold papers.

through the use of a current clamp. The theory behind the clamp involves the phenomenon that AC current flowing in a wire through the center of a toroidal core acts as a one-turn primary in a transformer. The turns wound on the core become the secondary of the transformer. The voltage across the primary is proportional to the current and turns ratio. This configuration can be calibrated quite accurately, because by using the correct core, the toroid is non-frequency sensitive over the range in question.

First, let's cover a major pitfall to avoid. Accurately splitting a toroid in two (despite scoring a line, placing it in a vice, and hitting it with a hammer) becomes a hit or miss affair—mainly miss. I quickly turned to that old amateur radio standby, the junked TV set, to find a small ferrite-core transformer with a split-U type core. This was ideal. It had perfectly square mating

surfaces, and the clamping action was simple and easy to visualize.

Serendipity and The Artful Builder

If you like to tinker, design, and build, a lot of everyday items lend themselves to easy adaptation. The only difficulty is to remember where you last saw the item. In my travels around the shopping metropolis of Norfolk Island, I remembered seeing a rather large plastic clothes-pin, a novelty item designed for use on an office desk. Its stated purpose was to hold batches of paper together, and it featured a rather strong spring. A few weeks later as this project developed, it dawned on me where I had seen the big clothes-pin, and I rushed back to see if it was still there. Luckily for me it was, and it

* P.O. Box 90, Norfolk Island, Australia 2899

MFJ TUNERS

MFJ-949E Deluxe 300 Watt Tuner

More hams use MFJ-949's than any other tuner in the world!

More hams use MFJ-949's than any other antenna tuner in the world!

Why? The world's leading antenna tuner has proven reliability and can match any real antenna!

Tunes any Antenna

The MFJ-949E tunes out SWR on dipoles, verticals, inverted Vs, beams, random wires, mobile whips, SWL.

Use coax, random wire, or balanced lines with heavy duty 4:1 balun.

Full 1.8-30 MHz Operation

1000 volt tuning capacitors, extra heavy duty inductor switch, Teflon® insulators and proper L/C ratio gives you arc-free operation 1.8 to 30 MHz. Handles 300 watts PEP SSB.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle Meter shows you SWR, forward and reflected power simultaneously. Read peak/average on 300/30 watt ranges.



Free AC adapter for meter lamp.

\$139⁹⁵

Super Antenna Switch

8 position super antenna switch selects two coax fed antennas, random wire/balanced line or built-in dummy load for use through your MFJ-949E or direct to your transceiver.

QRM-Free PreTune™

MFJ's QRM-Free PreTune™ lets you pre-tune your MFJ-949E off-the-air into

its built-in dummy load.

Full Size Dummy Load

A full size -- 3/4 inch diameter by 5 inches -- non-inductive 50 ohm dummy load easily handles 300 watts of abusive tune-up power.

Custom Inductor Switch

The inductor switch is custom designed to withstand extremely high RF voltages and currents.

Superior Cabinet

Each MFJ-949E cabinet is

chemically treated and has a new tough scratch-proof vinyl cladding. You won't find a tougher, longer lasting finish anywhere.

Detailed logging scales and legends are permanently silk screened on a real aluminum front panel and back panel.

Superior Construction

Every MFJ-949E uses Teflon® insulating washers, wing-nut for ground post, fire-retardant epoxy glass PC board, heavy .063 inch thick aluminum chassis, heavy gauge wire, custom cabinet.

No Matter What™ Warranty

Every MFJ-949E is backed by MFJ's famous No Matter What™ unconditional warranty. We'll repair or replace your MFJ-949E (at our option) no matter what for a full year.

In Stock at all Ham Dealers!

More hams use MFJ tuners than all other tuners in the world! Why settle for an imitation when you can have the real thing?

Famous MFJ-989C 3 KW Tuner



MFJ-989C More hams use MFJ-989s than any other 3 KW tuner in the world! **\$349⁹⁵**

The rugged MFJ-989C handles 3 KW PEP SSB and covers 1.8 to 30 MHz including all MARS and WARC bands.

MFJ's new AirCore™ Roller Inductor, three-digit turns counter and spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax or balanced lines.

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-needle SWR/Wattmeter, antenna switch, built-in dummy load, balun, convenient flip-stand -- all in a sleek, compact cabinet.

MFJ's versatile 1.5 KW Tuner



MFJ-962C Use your barefoot rig now and have the capacity to add a 1.5 KW PEP amplifier later! Lighted Cross-Needle SWR/Wattmeter. 6 position antenna switch, Teflon® wound balun, ceramic feedthru insulators for balanced lines. 1.8-30 MHz. 10 1/4 x 4 1/2 x 14 7/8 in. **\$249⁹⁵**

MFJ's portable/QRP Tuner

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 watt QRP ranges. 6x6 1/2 x 2 1/2 in. **\$89⁹⁵**



MFJ's super value Tuner



MFJ-941E The new MFJ-941E gives you a 300 watt PEP tuner with lighted Cross-Needle Meter. Covers 1.8-30 MHz. **\$109⁹⁵**

Antenna switch selects 2 coax lines (direct or thru tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors.

Call your dealer for your best price!
Nearest dealer/Free Catalog ... 800-647-1800

2 Knob Differential-T™ Tuner



MFJ-986 The MFJ-986 Differential-T™ 2 knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. 3 KW PEP. 1.8-30 MHz. **\$299⁹⁵**

Roller inductor makes tuning smooth and easy. Turns counter lets you quickly re-tune to frequency.

Lighted Cross-Needle Meter reads SWR/forward/reflected/peak/average power in 2 ranges. Current balun reduces feedline radiation and forces equal currents into unbalanced antennas.

MFJ's mobile Tuner

MFJ-945E extends your antenna bandwidth -- don't stop to go outside and adjust your mobile whip. New MFJ-945E now includes 6-Meter operation and has tuner bypass switch. **\$99⁹⁵**

Small 8x2x6 inches uses little room. Lighted Cross-Needle SWR/Wattmeter with lamp switch. 1.8-60 MHz. 300 watts PEP SSB. Mobile mount, MFJ-20, \$4.95.

MFJ's 6 Meter Tuners

The MFJ-906 has lighted cross-needle SWR/Wattmeter, bypass switch. Handles 100W FM, 200W SSB. For coax fed antennas. MFJ-903, same as MFJ-906, less SWR/Wattmeter, bypass switch. **\$49⁹⁵**
MFJ-906 **\$79⁹⁵**

MFJ's smallest Versa Tuner

The MFJ-901B is our smallest -- 5x2x6 inches -- (and most afford-able) 200 watt PEP tuner -- when both your space and your budget is limited. Great for matching solid state rigs to linear amps. **\$69⁹⁵**

MFJ's random wire Tuner

Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 inches. **\$39⁹⁵**

MFJ's VHF or UHF Tuners

MFJ-921 or MFJ-924 **\$69⁹⁵**
MFJ-921 covers 2 Meters/220 MHz. MFJ-924 covers 440 MHz. SWR/Wattmeter. 8x2 1/2 x 3 in. Simple 2-knob tuning for mobile or base.

MFJ's artificial RF Ground

Creates artificial RF ground. Eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. **\$79⁹⁵**

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MFJ... the world's most trusted name in antenna tuners

CIRCLE 95 ON READER SERVICE CARD

was ideal for what I had in mind. It had a strong clamping action and a wide jaw movement of about one inch or so. Get the picture?

Design Limitations

As with anything, this device has limitations of design. These can easily be adapted in your version, depending on available parts and your needs. Some of my considerations were:

1. The meter I use is a typical "El Cheapo" VU type, chosen because it's small and readily available. The edge-type VU meters are also very good for this purpose. They usually have a very sensitive movement, typically about 100–250 microamps FSD.

2. Due to the small component size, all testing is done at the low power level. I usually energize the antenna with a maximum of 8–10 watts and get quite adequate current readings. Be careful using higher power levels.

3. I made no attempt to calibrate the meter scale in this version. The 25K sensitivity potentiometer gives plenty of control, and the device is basically an arbitrary reading of certain parameters:

(a) Is there any current in the radial or wire?
(b) Roughly how much? A lot, quite a lot, or not much?

(c) Is it more or less than the chosen reference radial or wire?

4. The coil is wound with 12–14 turns of 22 SWG enameled copper wire. Wrap a layer of tape over the core before winding, as the ferrite edges are very sharp. Wrap tape over the completed winding, making sure that the leads of the coil are clear.

5. The aluminum plates I used were about 6½" x 2". Obviously, you can adapt the size to suit your own needs.

Buried Radials, Dead or Alive?

Over many years and many vertical antennas I have managed to inter a lot of wire. Many hours were spent burying these radials (the wire is buried to prevent law suits) as my antenna farm grew. Do I remember where all of those wires are? Well, not really, but I do have a general idea of where they are.



This one's alive and well and doing its job.

Recently, while tidying up the base area of my new vertical antenna, I had to redo the ends of the radial wires. I generally prefer a square ground plate at the base of my vertical antennas to accommodate as many radials as I like on each side of the square. I bring each wire through a small clamping device with a one-turn loop to lock it. The ends have solder lugs, which in turn are bolted to the ground plate. This tail-end is quite long enough to be readily accessible for checking with my clamp-on tester. With a little bit of power applied, it becomes relatively easy now to see which are alive or dead.

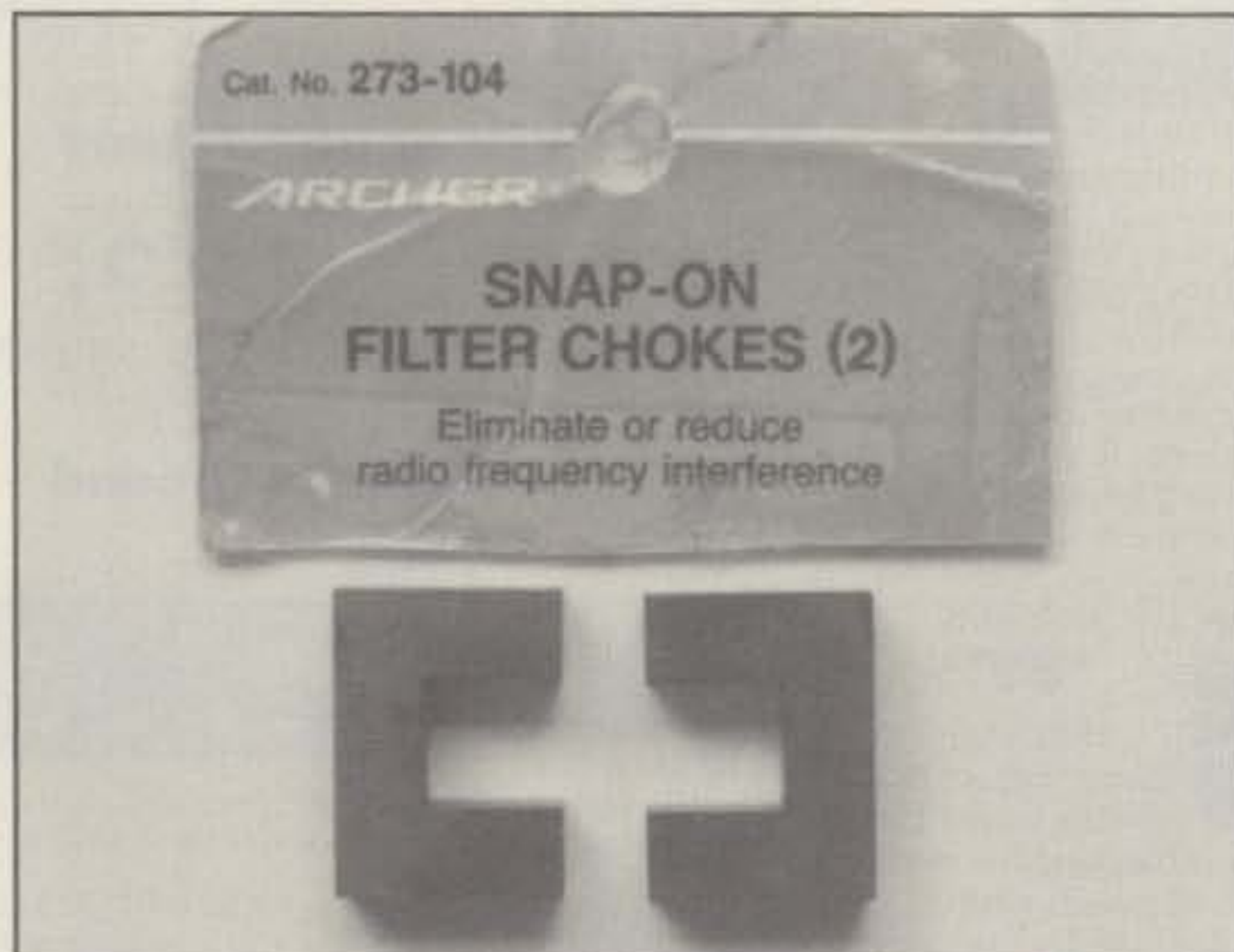
Does It Work and How Well?

The supreme test was at hand. I applied a few watts of power at 1830 kHz to the coax of my new, matched 160 meter vertical antenna and clamped the tester to radial one. Radial one is a known test length of wire on the surface of the ground. Bingo! The meter gave a good reading, which I adjusted to FSD with the sen-

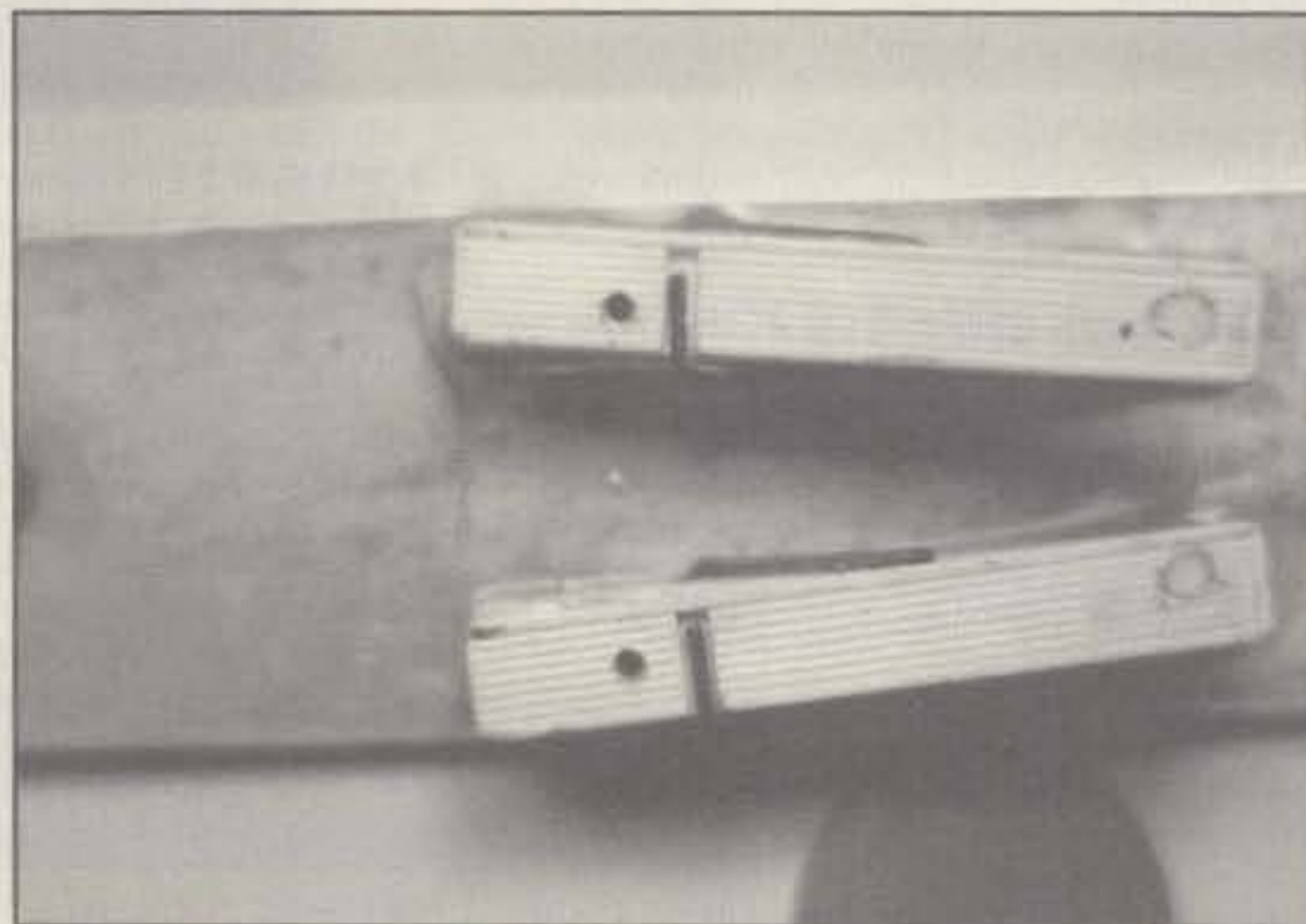
sitivity control. This then became my reference, and I logged the readings of 20 or so radials on one side of the square.

The differences were amazing. Six of my buried radials had little or no current indication. On a hunch I unearthed one and quickly found a very short piece of wire. As a general rule I do not bury short pieces of wire, so at some point over the years that radial had accidentally been broken. Incidentally, several radials shone like beacons, and these were a few of my very first radials, buried in 1981, using heavy-gauge, hard-drawn copper wire. Not so good were the rusted-out remains of a few galvanized wire radials buried some years ago. This device was a revelation, and several days later every radial was working properly and the others were junked.

It proves that all available radials can be checked very quickly and a general performance picture formed. Simply pick any known one as a reference and go from there. After a short period of use you will almost be able to tell the length of the radial.



The basic cores are available from RadioShack and several other suppliers.



Normal-sized plastic clothes-pins are epoxied to the aluminum plates to provide tension.

Construction Details

Construction details are mainly mechanical and are dependent upon the materials with which you have to work. As you can tell, this project can be built with practically anything available locally. Initially I tried to source the giant clothes-pin so that anyone could duplicate the project exactly. This proved to be impractical and would create a continued source of discarded TV sets to acquire ferrite cores.

Ferrite cores can be found at a number of sources, including RadioShack (273-104). The two halves of the snap-on filter choke are mounted "piggy-back," whereas the resultant hole is about 0.4 inch, which is ideal for my purposes. This arrangement also gives a flat mating surface for the top section to sit flush and tight. I typically use the center core (with dielectric) of old coax for radials, and the 0.4 inch hole makes a nice fit.

As the pictures indicate, I've made another version using two aluminum plates as the jaws of my homemade "clothes-pin." The two plates are separated and held in tension by two small clothes-pins which are attached to the plates by self-tapping screws. This makes it easier for construction and/or modifications. It's simple to put together and take apart. The following are hints you can use in laying out your version:

1. The inside clearance of the two plates has to be larger than the depth of the meter used. This depth is achieved by the size and placement of the two small clothes-pins and should be about 0.6 inch.

2. Place the two plates together. Mark and cut out the rectangular area for the top and bottom cores. The fit should be reasonable tight. On the top plate (the one with the meter) file the long edges with a half-round file to make sure the coil winding has clearance and is not touching the metal.

3. When closed, the jaw end of the plates should be parallel, thus ensuring the accurate mating of the top and bottom ferrite surfaces.

4. Once you are sure that the spacing of the ferrite cores allows sufficient room for the meter and potentiometer, epoxy the bottom core (the side without the meter) to the arm.

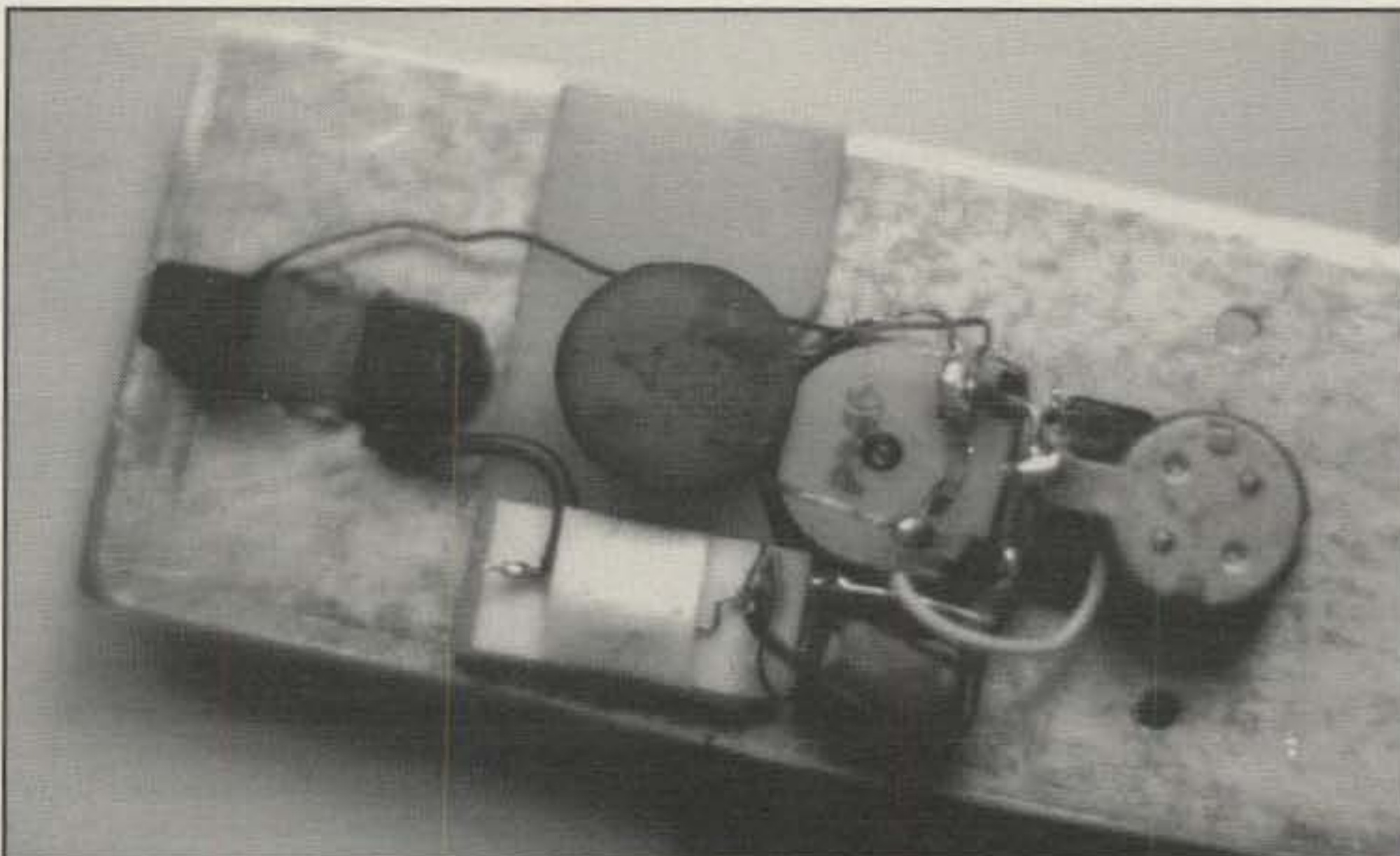
5. To fine tune the spacing, place a drill bit or other round object (about .125 inch) in the "jaw" opening to simulate a radial. Close the arms or plates and hold them fast with a few rubber bands. The top core will ease out of the opening you filed and be at the proper height. Be sure that no part of the coil touches the plates or arms. Carefully epoxy in place. Try to avoid epoxy dripping through. A thin piece of paper between the cores can prevent their accidentally being cemented together.

6. When the epoxy sets, you can coat the entire top of the coil and core with more epoxy for protection. You can also epoxy the underside area of the top core.

7. Remove the rubber bands and the drill bit and you will find the jaws are now set for the right tension for grasping a radial.

8. Remove the self-tapping screws, separate the halves, and complete the wiring. Now re-assembly should be easy.

This device is simple enough to be duplicated easily as a club project, and it certainly lends itself to many modifications. Best of all, it's easy to use and it works. ■



The wiring is simple and straightforward.

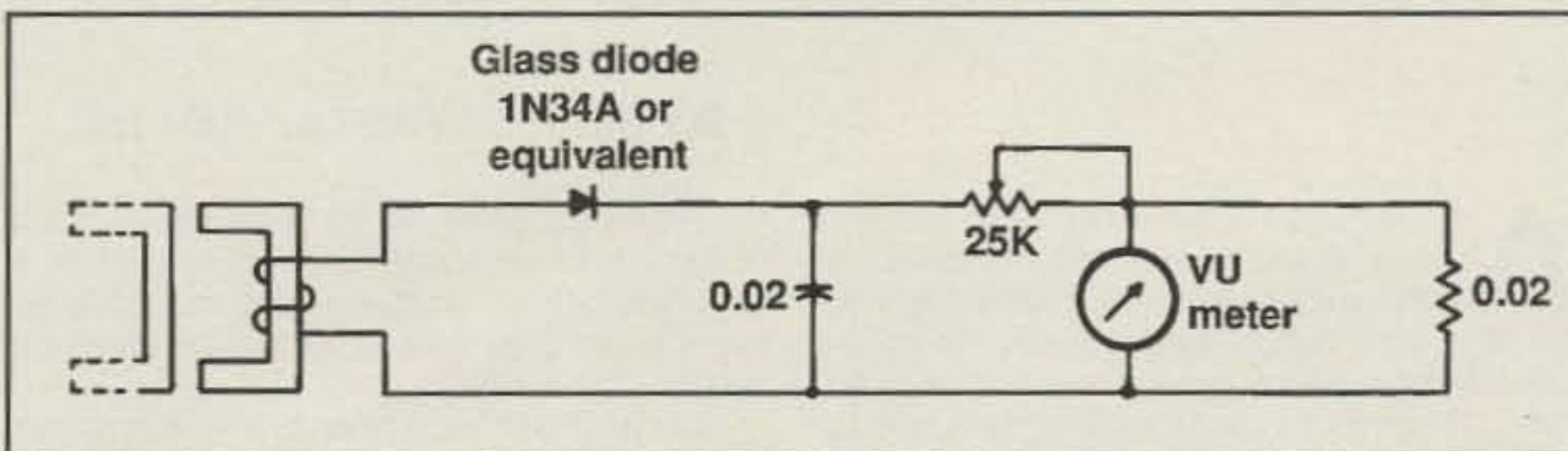


Fig. 1— Schematic of the RF current probe.

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One Year Later

The Westhampton Wildfires

Amateur Radio's Finest Hour

It's been a year since the great fires of Long Island destroyed over 11,000 acres of woodland. KB4JKL presents an outstanding critique of amateur radio accomplishment during those trying times. Yet the unasked question remains: Are our local governments any better prepared with regard to communications than they were a year ago?

BY JEFF SAVASTA,* KB4JKL

Amateur radio is a most unique hobby. It allows us as amateur radio operators to communicate with each other daily at the push of a button. I can't count the many times that this hobby has kept me company on a long journey or a long midnight work shift. It has proved very reliable as a communications service to my family, and I have found it just

**9 Peppermint Road, Commack, NY 11725*

downright enjoyable. When some people think of this communications mode, they think of it as just a hobby. However, due to first-hand experiences, I certainly refer to it as more of a service than anything else.

We often have heard stories of how amateur radio has provided communications in a disaster-torn area, but it really never struck me in such a manner as it did in August 1995. This is a month that I will not soon forget. Between

August 20 and 28, 1995, I had decided to take a week off to use some vacation time from my job. I have been a police officer for 10 years with the Suffolk County Police department and have been involved in the law enforcement profession for 17 years total.

I had thought that this was going to be a week of relaxation and frolic, with occasional 2 meter mobile contacts, HF DX work, and much needed club work to accomplish as president of the

Heroic firefighters battling the smoke and fire. (Photo courtesy of Newsday Newspapers.) →

A horrific view of a line of fire sweeping through a forest area. (Photo courtesy of Newsday Newspapers) ↓



Suffolk Police Amateur Radio Club (SPARC). As I soon found out, this was not to be the case. It was lucky for me—or unlucky, as my wife says—that the worst brush fires in 90 years of Long Island history occurred between these dates. What is now known as the “Great Westhampton Fires” proved truly to be amateur radio’s finest hour.

On August 22 I was notified by SPARC Honorary Member Andrew Feldman, WB2FXN, that due to extremely dry drought-like conditions, there was a brush fire spreading rapidly in the Rocky Point, Long Island area. Some of you may remember this town as the site of the old commercial RCA Morse code transmitting site. Andy, aside from being a club member, is also the Suffolk County District Emergency Coordinator and a New York State RACES officer. Andy advised me that ARES/RACES was being mobilized to the American Red Cross office in Brookhaven. He asked me to respond to the office to assist in communications efforts between the Suffolk County Red Cross and the Red Cross Emergency Response Vehicles (ERVs). These vehicles were responsible for supplying support to the fire line, command posts, and Red Cross Emergency Shelters. There was no real mode of communications between the various locations other than via amateur radio. In all, 38 amateurs participated in this incident for approximately 398 hours of combined effort.

The fire was brought somewhat under control by August 23, 1995. Approximately 4000 acres of woodlands were destroyed by this fire in the Rocky Point area. Good work was done by the amateurs involved in the incident and I was glad to be a part of it. Aside from that, only two days of my vacation were interfered with. It was now time to get back to playing—or so I thought!

On Thursday, August 24, 1995 I could not help but look to the east, where I noticed a large amount of smoke billowing into the sky. Just as I saw this, my XYL advised me that Andy was on the phone. I was hoping that it was a social call, but I somehow knew that this was not going to be the case. Andy advised me that there was a large brush fire which again had erupted in the east, this time around the campus of Suffolk Community College in Riverhead, Long Island. This is nearer to the south fork of Long Island. He also advised me that this fire was spreading much more quickly than the Rocky Point fires of two days earlier due to a high wind condition in the area of the fire line.

Andy wanted me to report directly to the Suffolk County Emergency Operations Center (EOC) along with fellow SPARC member Robert Giglio, N2JJM, who is a Suffolk County Sheriff’s dispatcher. As Andy put it, he wanted to get as many as possible of the so-called “professionals” to the EOC for net control duties. This appeared to be a more severe incident than the earlier fires of the week, and was bound to be a more confusing incident. Amateurs had to establish a very wide communications net between various agencies and locations. The County EOC was manned by county and town officials, along with net control of the ARES/ RACES organization. In all, amateurs were responsible for providing communications between the county and the Red Cross, the Red Cross and the ERVs, the fire line, and the three disaster shelters.

Three local repeaters were utilized for the incident: the 146.820 W2OQI Manorville, NY machine sponsored by the Rock Hill ARC; the

145.310 WB2DRK Farmingville, NY machine sponsored by the Suffolk Police Amateur Radio Club; and the 145.210 W2DQ machine sponsored by the Suffolk County Radio Club. In conjunction with the 145.310 repeater, an emergency 440/2 meter link was established by the Suffolk Police Amateur Radio Club at police headquarters in Yaphank. This link was utilized in the incident to extend the range of low power stations and handhelds.

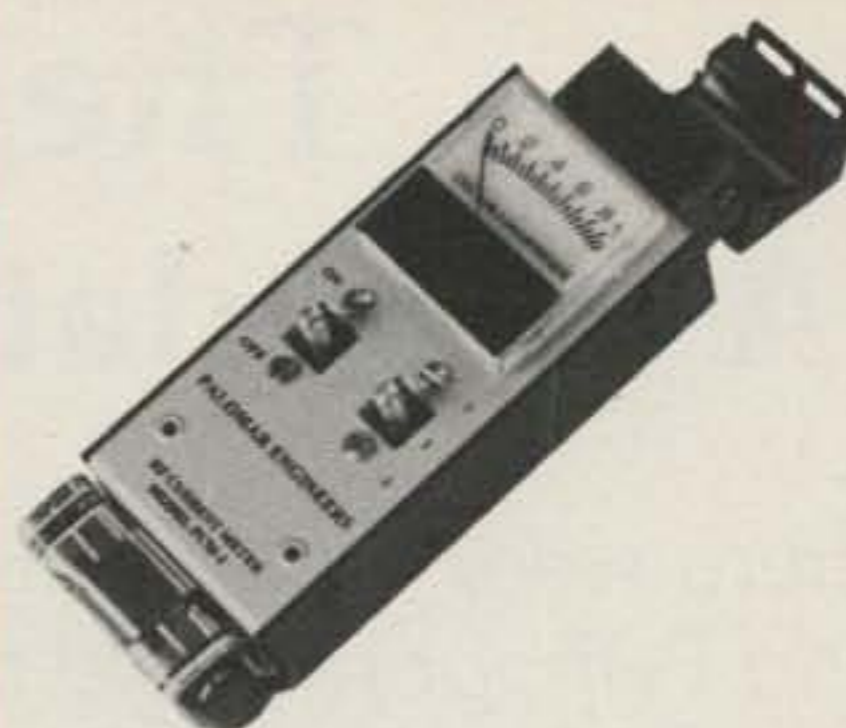
Along with Bob and myself at the EOC, fellow SPARC member Vicki Lotten, N2VBH, assisted in the operations center. Members John Dericco, KD2MI, and Anthony Frontino, KB2HRB, both of whom are Suffolk County Corrections officers, assisted in manning emergency shelters. Volunteer firefighters and SPARC members Roy LoBocchiaro, KB2KOP, and Douglas Lotten, N2JHO, both of whom are employed as Suffolk County police officers, assisted in up-to-the-minute reports from the fire line.

I know that I am a bit biased, as I am so very proud of the members of my organization who rallied to the call, but I am also just as proud of the members of the general amateur population who assisted in the incident. There were approximately 88 amateur operators involved in the incident, with a combined total of 2000 man-hours. The incident involved over 178 fire departments, some from as far away as Arizona, Washington, and New Mexico, with over 2000 firefighters involved. When it was finished, over 7000 acres of woodlands had been consumed with no loss of housing or life. This truly was a major disaster!

Looking back at the incident, one occurrence which really showed me the worth of our service clearly sticks in my mind. When I was net control at the EOC, an amateur called me frantically from one of the Red Cross ERVs to advise me that a New York City fire department truck desperately needed a suction device to extract water out of a nearby lake. They don’t fight too many brush fires in New York City, for obvious reasons. The firefighters were unable to communicate with the other departments due to their radios and the incompatible frequencies of their departments. Yet we as amateurs are somehow always able to do it! It reminds me of an editorial of some years back by the CQ magazine’s editor, Alan Dorhoffer, K2EEK. In it Alan wrote, “We as amateurs manage to communicate with relative ease during any trying situation and also manage to organize as we go along. It is no longer amazing that we do it time after time. We know we can. What is amazing after all of this time is that no governmental agency, even with all of their resources, can do it once.”

As a side note, the members of my police work team were mobilized that week for traffic direction at various locations of the fire line. From what I have been told, there was even some overtime made from the incident. Even with this in mind, I was very glad that I wasn’t working. I may have walked away with my pockets lighter, but I certainly can say that my volunteer job was just as important, if not more important, than any other job at the incident. In 17 years of public service I can honestly say that those who are employed in the field are not necessarily in all cases the professionals. When it comes to communicating, the amateur radio operators are the “true” professionals. I am very proud to be among their ranks, and especially during this incident, which truly was amateur radio’s finest hour! ■

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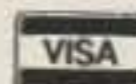
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The Guying Problem

A Calculator Approach To Real Life

There were no amateurs around when everyone thought the world was flat and Pythagoras held the answer to most problems. These days the Earth is round, amateurs want towers and masts, and Pythagoras can't handle most situations. N4PC presents a tutorial on how to compute guy-wire lengths in real-life conditions, without having a few hundred feet left over stored in your basement.

BY PAUL CARR*, N4PC

If the world were flat, many of our guying problems would be greatly simplified. The old, familiar Pythagorean theorem could be used to calculate the lengths needed for our guying requirements. All too often, however, we find ourselves in a situation where this theorem will no longer suffice. These guy lengths can be determined by using some simple laws of trigonometry. Don't panic! With the use of a simple, inexpensive scientific calculator, the exercise becomes easy. Perhaps you will even find it fun. Here is how it is done.

Case I—The Earth is Flat

Ahh . . . here is the easy case. The assumptions are that the mast will be perpendicular to the earth, and both the attachment height on the tower and the distance from the tower to the anchor are known. (If they are not known, they can be measured very easily.) We have all the components necessary to use the Pythagorean theorem.

Just as a matter of review, the Pythagorean theorem may be stated as follows: In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the two remaining sides. The hypotenuse is the longest side of the triangle, and the two remaining sides are sometimes called the legs. As an equation, this becomes:

$$c^2 = a^2 + b^2$$

As a matter of convention in this article, I will use lower-case letters to denote the sides of a triangle, and upper-case letters to denote the angles opposite the respective sides.

Example for Case I. For this example, assume that we have a mast with a guy attachment height of 40 feet. Also assume that we have a ground attachment of 20 feet on one side and 25 feet on the other side (see fig. 1). This will give us a chance to solve the example twice.

Let's review what is known, and determine

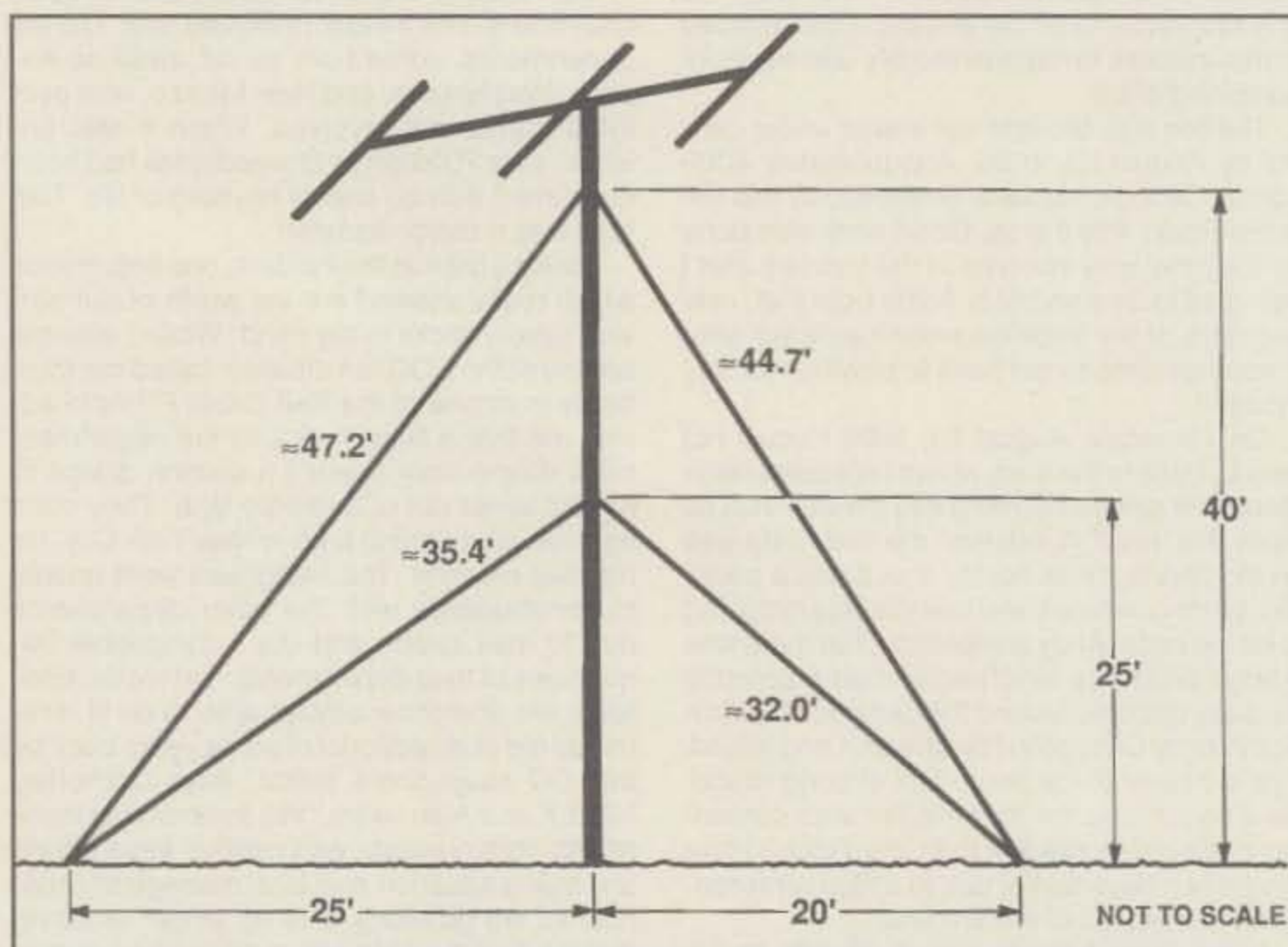


Fig. 1—The tried and true Pythagorean method.

what is to be calculated. We have two triangles, and we know the leg lengths in both cases. So here we go.

Remember the equation is:

$$c^2 = a^2 + b^2$$

By substituting the known information into the equation, we have:

$$c^2 = (40)^2 + (20)^2$$

The information is most easily entered into the calculator on a right-to-left format. Enter 20 (square) (plus) 40 (square) (equals) 2000. (I have shown the function keys in parentheses for clarity.) Now the only thing remaining is to extract the square root of the number. The

number 2000 should be displayed on the calculator so (square root) reveals the answer—44.72136. The square root function is often on the same key as the square function, and it is accessed by hitting the "second function" key. This means that we will need about 45 feet for the guy plus any surplus for attachments on both ends.

I will give the next problem in the form of an equation and let you practice the key strokes to establish your confidence. This is for the example where you have the ground attachment distance of 25 feet.

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= (40)^2 + (25)^2 \\ c^2 &= 2225 \\ c &= 47.169906 \end{aligned}$$

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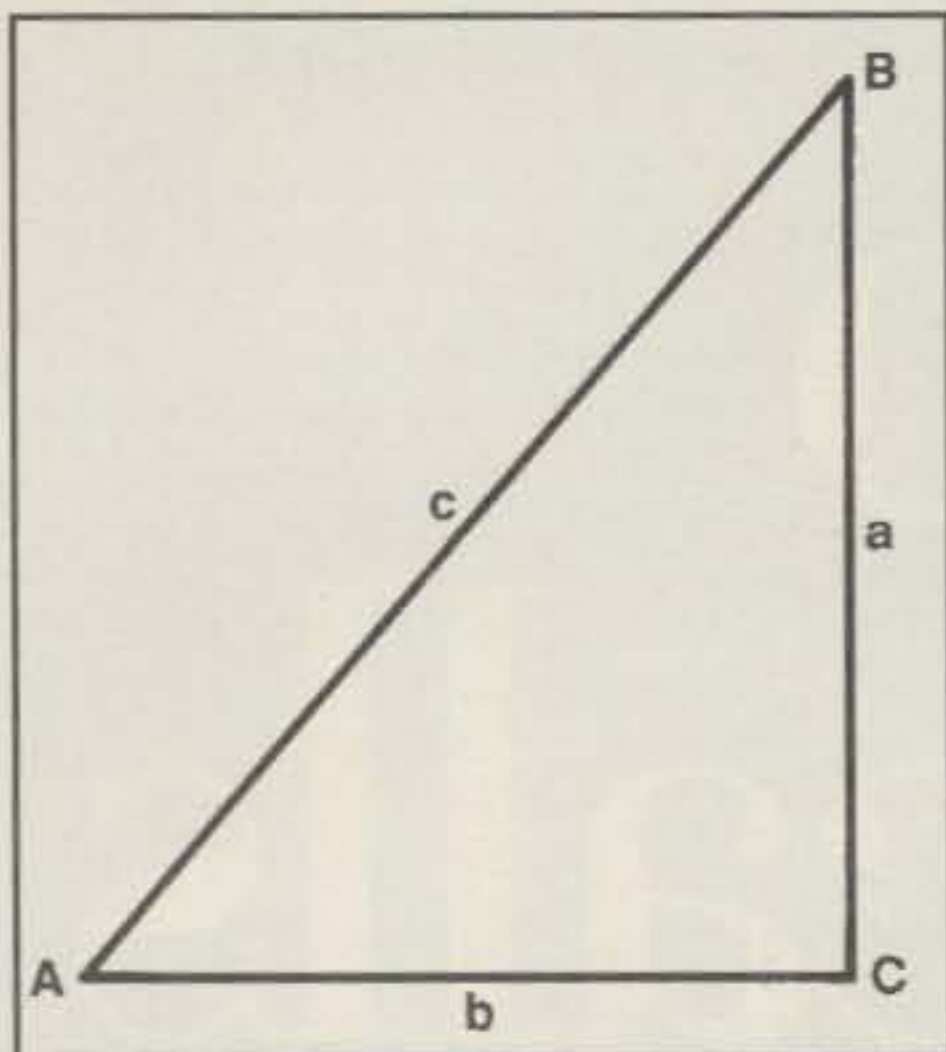


Fig. 2—Basic right-angle trigonometry.

The net length for this guy is about 47 feet, plus the length for the attachments on both ends of the guy.

You would probably want to guy a tower of this height in two places. Now practice calculating guy lengths for an attachment height of 20 feet. The answers are shown in fig. 1.

For this example, it is easier to calculate the guy lengths than it is to write about it. Remember, practice makes perfect.

Beyond The Pythagorean Theorem

The Pythagorean theorem will work very well if we restrict our study to situations that involve only flat ground and right triangles, but this is the exception rather than the rule. As a result, we need to develop mathematics that will handle the general case of triangles.

Basic Trigonometry. The measure of all parts of a triangle can be determined if we know three parts, one of which must be a length. In order to accomplish this task, we need to establish the relationship between the sides of a triangle and the angles opposite. This can be done using a right triangle (see fig. 2). The three functions that we will develop are Sine A, Cosine A, and Tangent A. There are three additional functions which are the reciprocals of these functions, but these are all we will need. These functions may be defined as follows:

$$\text{Sin}A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{Cos}A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{Tan}A = \frac{\text{opposite}}{\text{adjacent}}$$

Now that we have established these three functions, we can develop two laws that will allow the solution of general triangles.

The Law of Sines. The law of Sines may be stated as follows: In any triangle, the side lengths are proportional to the Sines of the opposite angles. As an equation, this becomes:

$$\frac{a}{\text{Sin}A} = \frac{b}{\text{Sin}B} = \frac{c}{\text{Sin}C}$$

This formula is useful when two sides and the angle opposite one of the sides is known, or when two angles and one side are known. (If two angles are known, the remaining angle can be determined by finding the sum of the two known angles and subtracting the result from 180 degrees.) Remember that the sum of the interior angles of a triangle equals 180 degrees. This is a very handy formula, but we will find another law more useful for the guying problem. I have not shown an example using

this law, but I have included it for completeness.

The Law of Cosines. The last law that we will need for our problem is the law of Cosines. At first glance it appears to be an expanded version of the Pythagorean theorem. The law may be stated as follows: In any triangle, the square of any side is equal to the sum of the squares of the two remaining sides minus twice the product of those sides and the Cosine of their included angle. As an equation, this becomes:

$$a^2 = b^2 + c^2 - 2bc\text{Cos}A$$

$$b^2 = a^2 + c^2 - 2ac\text{Cos}B$$

and

$$c^2 = a^2 + b^2 - 2ab\text{Cos}C$$

This law is for the case when two sides and the included angle are known, or when three sides of the triangle are known. For our purposes, the first case will apply.

If this law is applied to a right triangle, the last term of the formula disappears because the Cosine of 90 degrees is zero. We now have the tools necessary to attack the more difficult guying situations.

Case II—The Earth is Not Flat

This statement should come as no great surprise. Most of our guying situations will involve situations where the Pythagorean theorem will not apply. Consider the case where the antenna mast must be placed on an incline (see fig. 3). In this case, we will use a tower attachment of 40 feet, and anchor points of 20 and 25 feet, respectively. In both cases, we can measure the distance to the anchor points, but we must calculate the angle formed between the tower and the ground. Here is one way to accomplish the task.

Again look at fig. 3. The 19 foot distance from the anchor point on the high side perpendicular to the tower can be found rather easily, but you still will need some additional equipment. You will need some string, a plumb line, a string level, a helper, and perhaps a step ladder. The plumb line and the string level can be purchased at a hardware store for a nominal price.

Have a helper hold a string at the anchor point. Stretch the string horizontally until you are over the location of the base of the tower. Place the string level on the line and raise the line until it is level. Use the plumb line to determine when the proper horizontal length has been reached. Measure the horizontal line length. You now know two sides of a right triangle. The angle at the base of the tower can be calculated using trigonometric functions.

We know the hypotenuse of the small right triangle and the measured length of the side opposite the angle in question, so we can use the Sine function. Remember that the formula for the Sine function is:

$$\text{Sin}A = \frac{\text{opposite}}{\text{hypotenuse}}$$

By substituting we have:

$$\text{Sin}A = \frac{19}{20} \quad \text{or}$$

$$\text{Sin}A = 0.95$$

We are trying to determine the angle the Sine

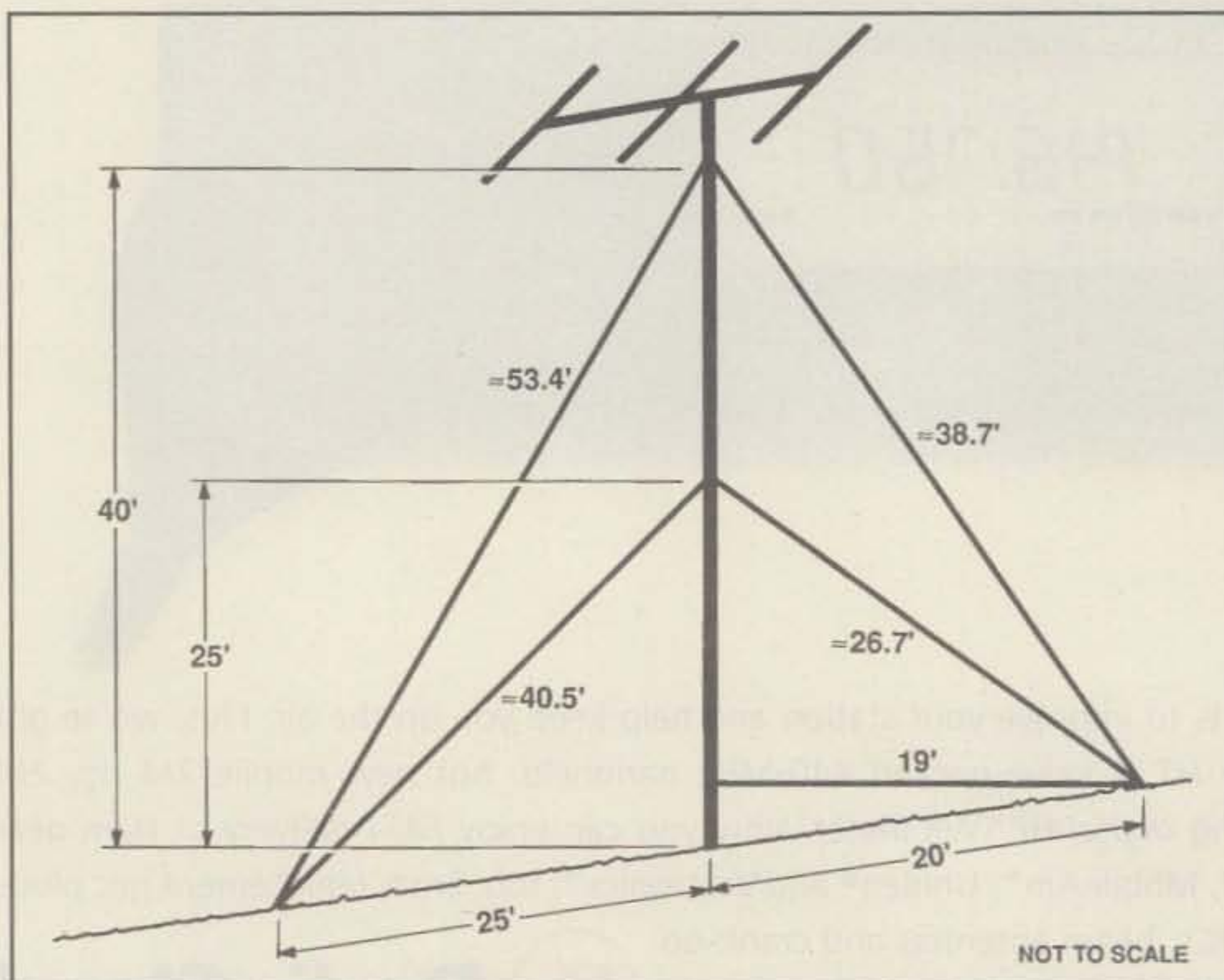
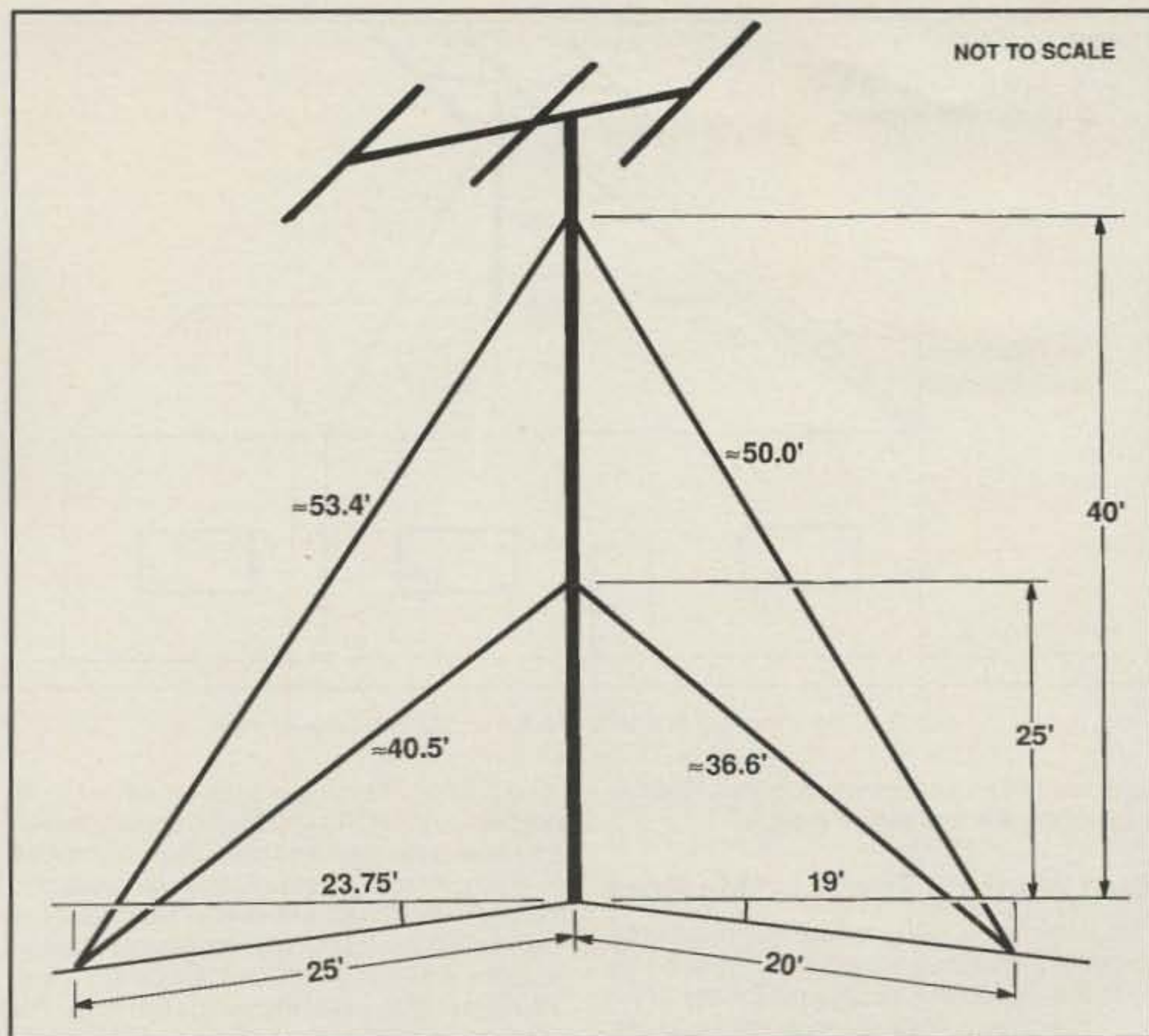


Fig. 3—If you live on an incline, there is an alternative to renting a bulldozer to flatten it out.



NOT TO SCALE

Fig. 4— Taking advantage of a bump in the terrain for additional height doesn't have to pose a great guying problem.

of which is 0.95, so enter 0.95 and press (second function) Sin (equals) 71.805128. The angle at the base of the tower is approximately 71.8 degrees. We can also calculate the remaining angle at the base of the tower. Since these two angles are supplementary—i.e., their sum is 180 degrees—the remaining angle is $180 - 71.805128$, or 108.19487 degrees. This angle will be used when calculating the remaining guy length.

We still have the guy length calculation to complete. If we examine the known data, we find that we have an oblique triangle, and we know two sides and the included angle between those sides. The remaining side length can be determined by using the Law of Cosines. The formula that we need is:

$$c^2 = a^2 + b^2 - 2ab\cos C$$

by substituting, we have:

$$c^2 = (40)^2 + (20)^2 - 2(40)(20)\cos(71.805128)$$

Key the information into the calculator as follows: 2 (times) 40 (times) 20 (times) 71.805128 (Cos) (equals). The number "499.59984" should appear on the screen of the calculator. Store this number in the calculator memory. Continue to key the information into the calculator as follows: 40 (squared) (plus) 20 (squared) (minus) (memory recall) (equals) 1500.4002. The only thing remaining is to extract the square root of that number, and this produces the desired answer of 38.734999. So we need about 38.7 feet of guy material plus any length needed for end connections.

For the remaining guy length, I am going to

put the necessary information in the formula and let you do the calculations. The formula is:

$$\begin{aligned} c^2 &= a^2 + b^2 - 2ab\cos C \\ c^2 &= (40)^2 + (25)^2 - 2(40)(25)\cos(108.19487) \\ c^2 &= 2849.4998 \\ c &= 53.380706 \end{aligned}$$

The thing that you may have noticed when you obtained the Cosine of the angle was the fact that the result was negative. This is because the Cosine of an angle between 90 and 180 degrees is negative. This is one of the properties of the Cosine function. The guy lengths for the 25 foot attachment point are shown in fig. 3.

Let's look at another possibility: Perhaps the antenna will sit on a slightly elevated spot of terrain. We amateurs want to take advantage of every bit of elevation that we can find (see fig. 4). Again, I am assuming anchor points at 20 feet and 25 feet. This time have your helper hold the end of the string at the point where the base of the mast will be placed. Using the same technique with the string level and plumb line, measure the horizontal distance from the base of the mast to the anchor point. (Again, I have shown 19 feet for this example.) If we find the ratio of the horizontal distance to the length along the ground, we again have 0.95. This will be the Cosine of the small angle at the base. Key the information into the calculator as follows: 0.95 (second function) (Cos) (equals) 18.194872. This angle must be added to 90 degrees to find the measure of the angle at the base of the antenna, which is 108.194872. The calculation technique will be the same as the second guy shown above. The actual calcula-

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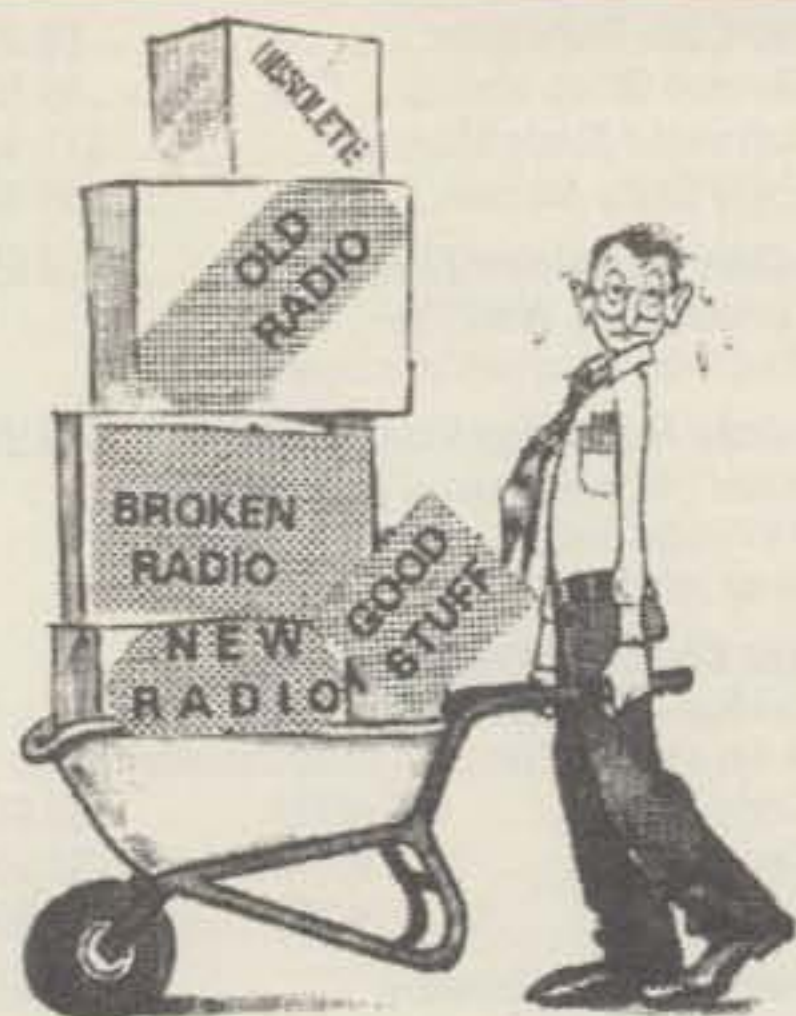
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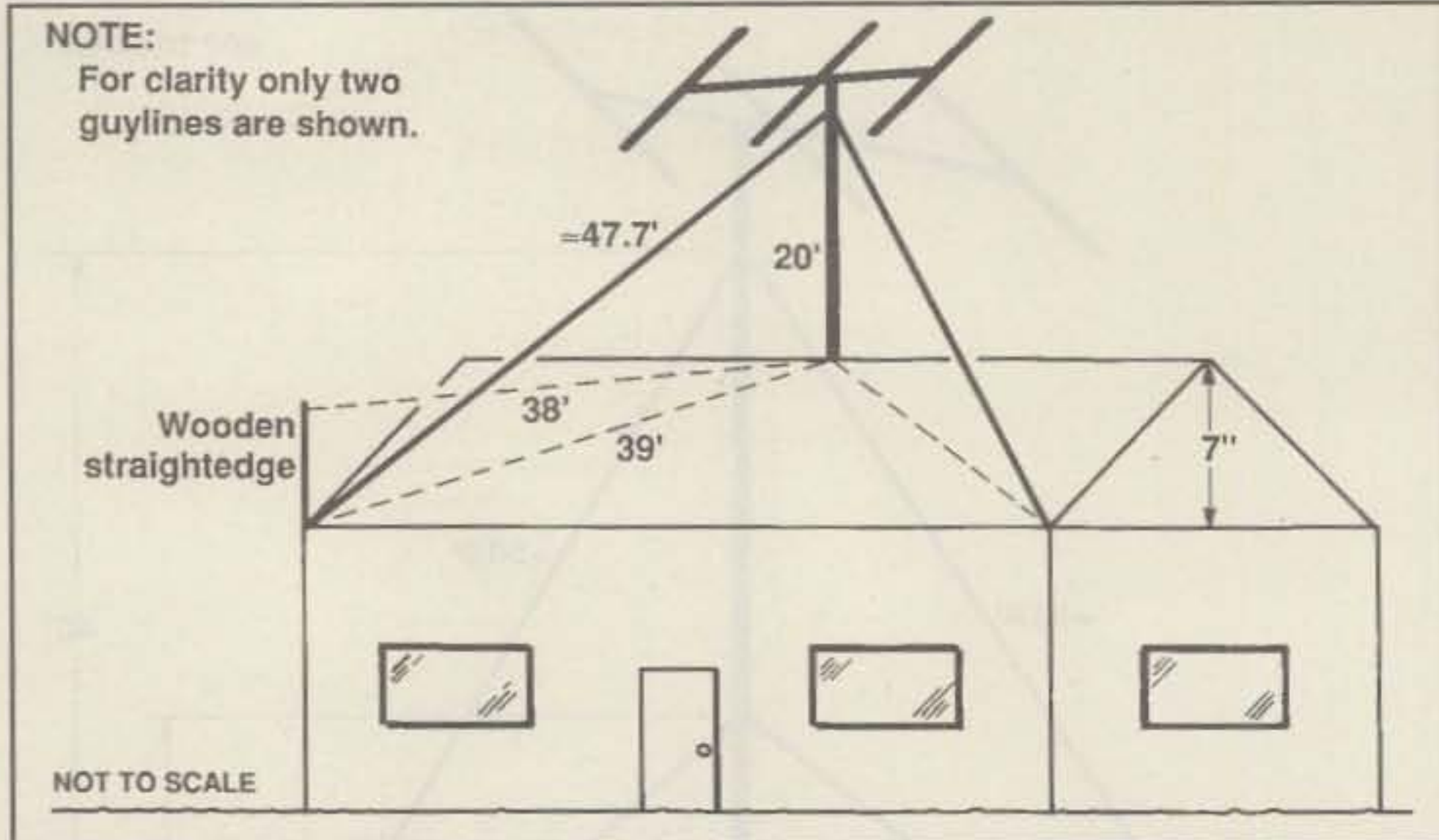


Fig. 5— The universal scenario—a tower or mast on your roof.

tions are left as an exercise for you. The calculated lengths are shown in fig. 4.

But I Want My Tower on My Roof

This is the case that provides the most challenge for guy calculations. However, since we have developed the techniques for the previous examples, no new theory is necessary for this case.

For this example, assume that you are going to place a mast with a 20 foot attachment height in the center of a roof structure as shown in fig. 5. Remember, the measurements that we make in this example must be made at roof height. **Be extremely cautious—safety first.**

The distance along the roof can be made using a tape measure. Have your helper hold one end of the measuring tape at the point where the base of the mast will be placed. You probably will need a ladder to reach the roof position where the guy will be attached. Let's assume the roof measures 39 feet for this example.

Next we need to determine the horizontal distance from the anchor point to the base of the mast. For this measurement we will need a straight piece of wood that is longer than the vertical height difference between the base of the mast and the anchor point. We will also need a carpenter's level. The measurement can be made as follows.

Attach the string to the wood and place the string level on the string. Have your helper hold the end of the string at the place where the base of the mast will be placed. Use the carpenter's level to be sure the string is perfectly aligned over the anchor point. Check the string level to make sure that the string is perfectly horizontal. When both these conditions are reached simultaneously, the length of the string will be the same as the long leg of the right triangle shown in fig. 5. For this example I am going to assume that distance is 38 feet. We now have the information needed to calculate the guy length.

We will use the two measurements just obtained to calculate the Cosine of the small angle between the base of the mast and the surface of the roof. The Cosine of this angle will be the ratio of 38 feet to 39 feet, or 0.9743589. Key the information in this manner: 0.9743589 (second function) COS (equals

13.002826). This angle must be added to 90 degrees to yield 103.00283, the angle between the base of the mast and the surface of the roof.

We now have all the information needed to calculate the length of the guy. Key this information into the formula for the Law of Cosines as follows: 103.00283 (COS) (times) 20 (times) 39 (times) 2 (equals) (store in memory). The number -350.99861 should be stored in memory. Continue the calculation: 20 (square) (plus) 39 (square) (minus) (memory recall) (equals) 2271.9986. Now take the square root by entering (second function) (square root), and 47.665487 should appear on the calculator display. The net guy length is approximately 47.7 feet. Now that was not so bad was it?

Remember, the accuracy of the calculation is dependent on the accuracy of your measurements. I never think it sufficient to make only one measurement when solving these problems.

For this last example, I have not repeated the formulas. Refer to the previous examples for statement of these formulas. Perhaps you could have the formulas memorized by now!

Afterthoughts

Perhaps your calculator operates a bit differently than what I have described. If you encounter difficulties, refer to your calculator instruction book.

I have made no attempt to cover all possible guying problems that you may encounter, but I have tried to equip you with a working knowledge of some of the more helpful laws of trigonometry. When working on your guying problems remember these basic rules:

1. Think.
2. Make a sketch of your guying situation and label all known information.
3. Make careful measurements.
4. Verify your measurements.
5. Make careful calculations.
6. Verify your calculations.
7. Ask yourself if your calculations are reasonable.
8. Safety first.

Perhaps this presentation will help to remove any fear that you may have about mathematical calculations. It is not as bad as you may think. Good luck! ■

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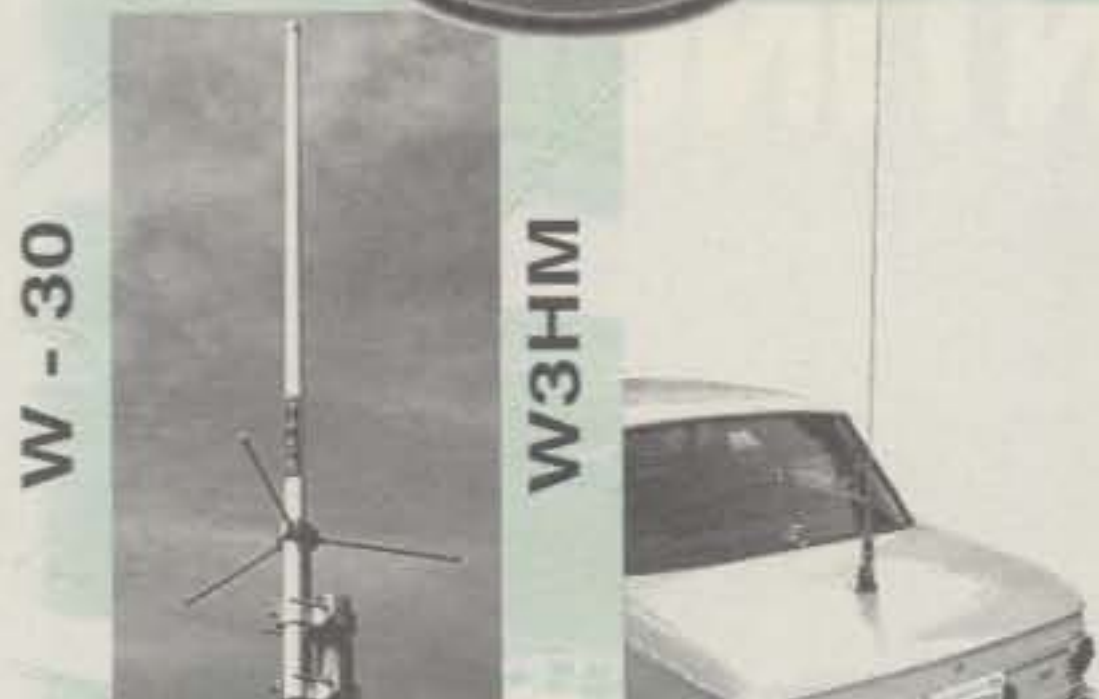
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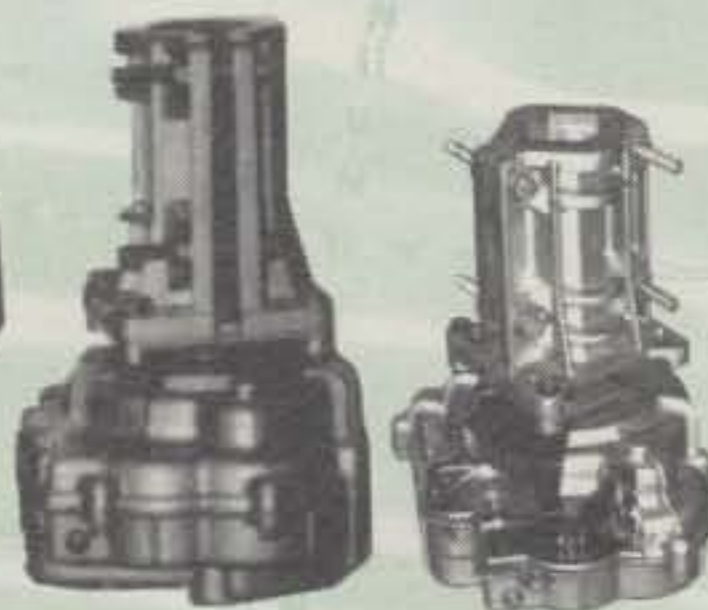


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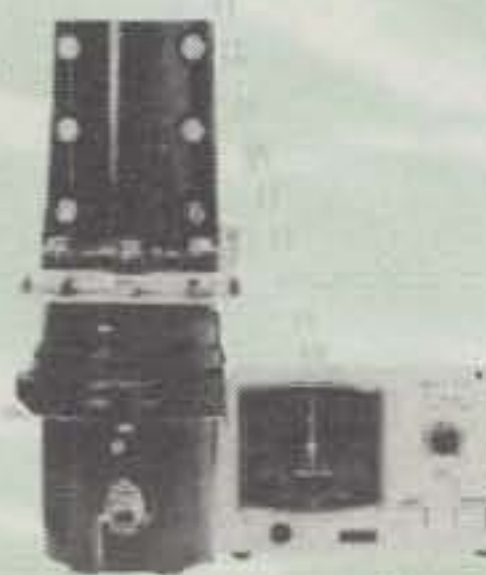
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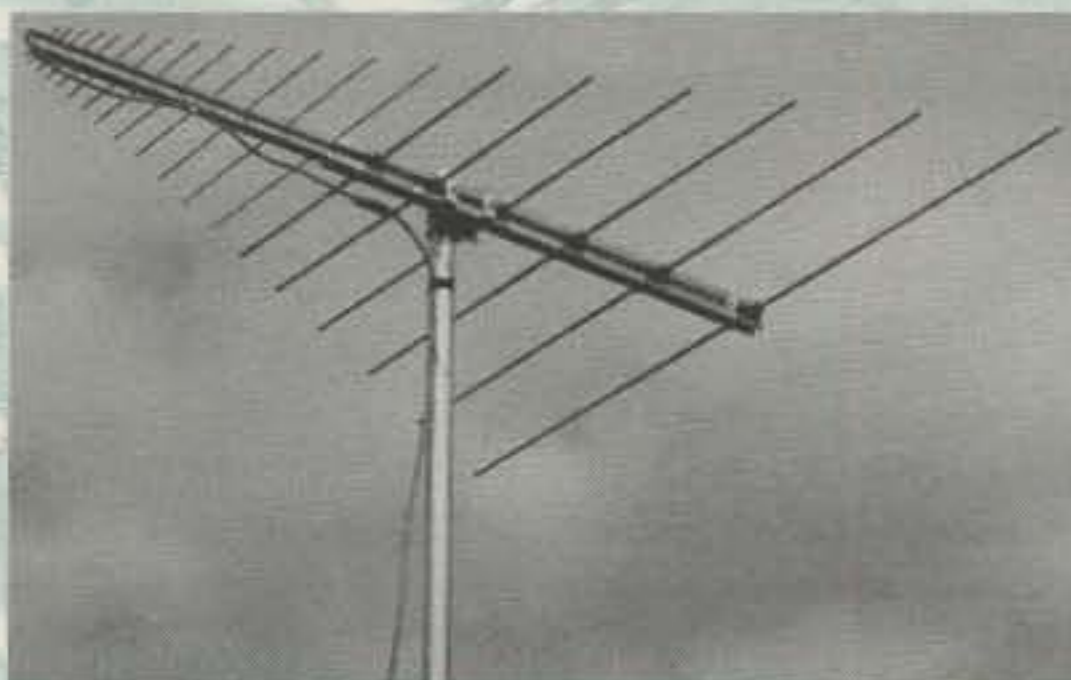


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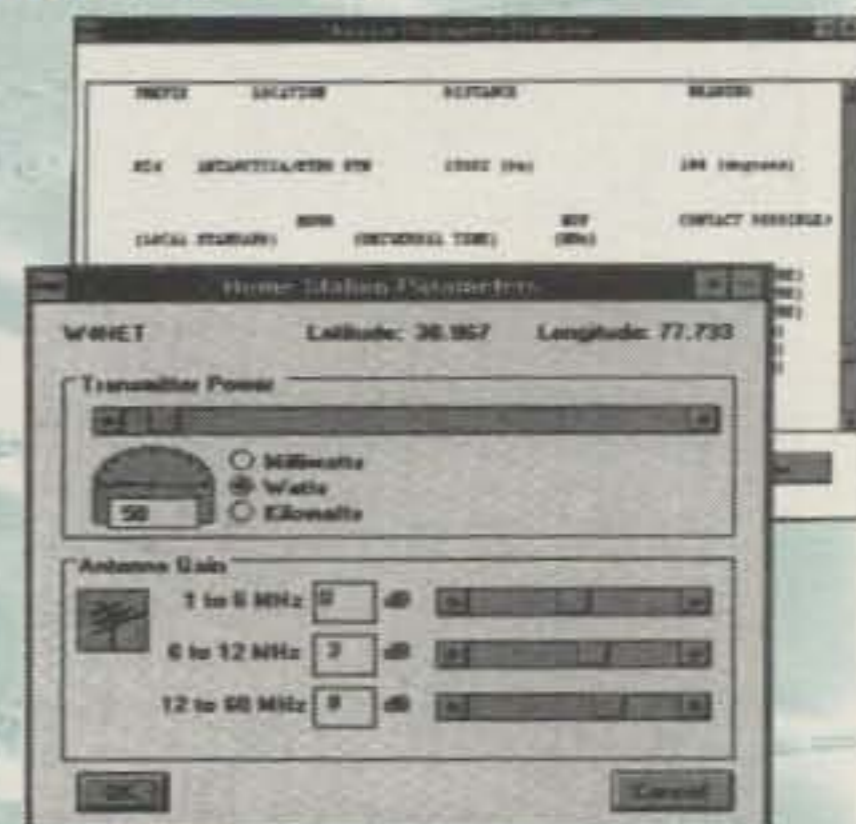


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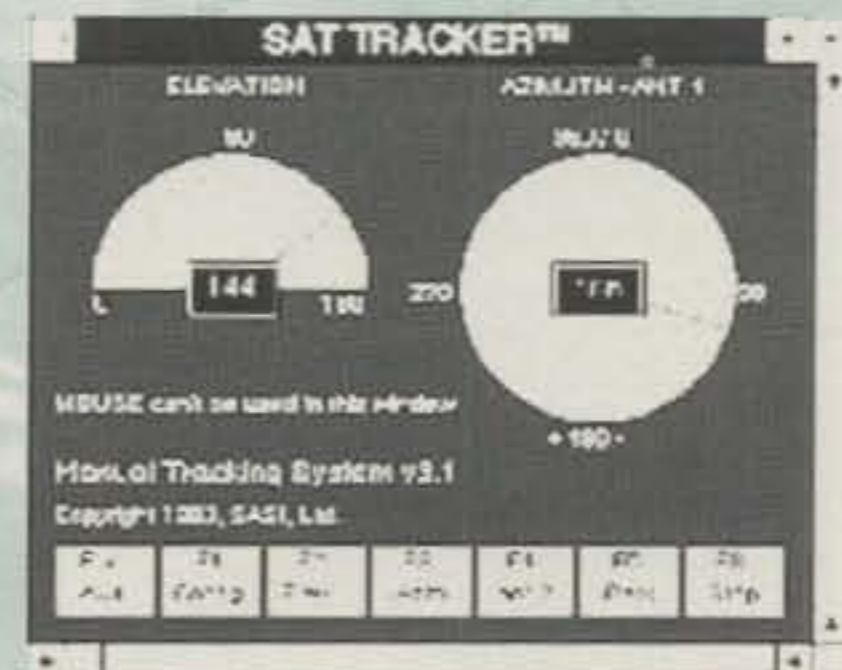
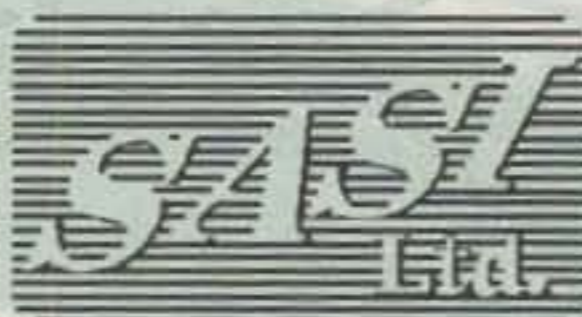
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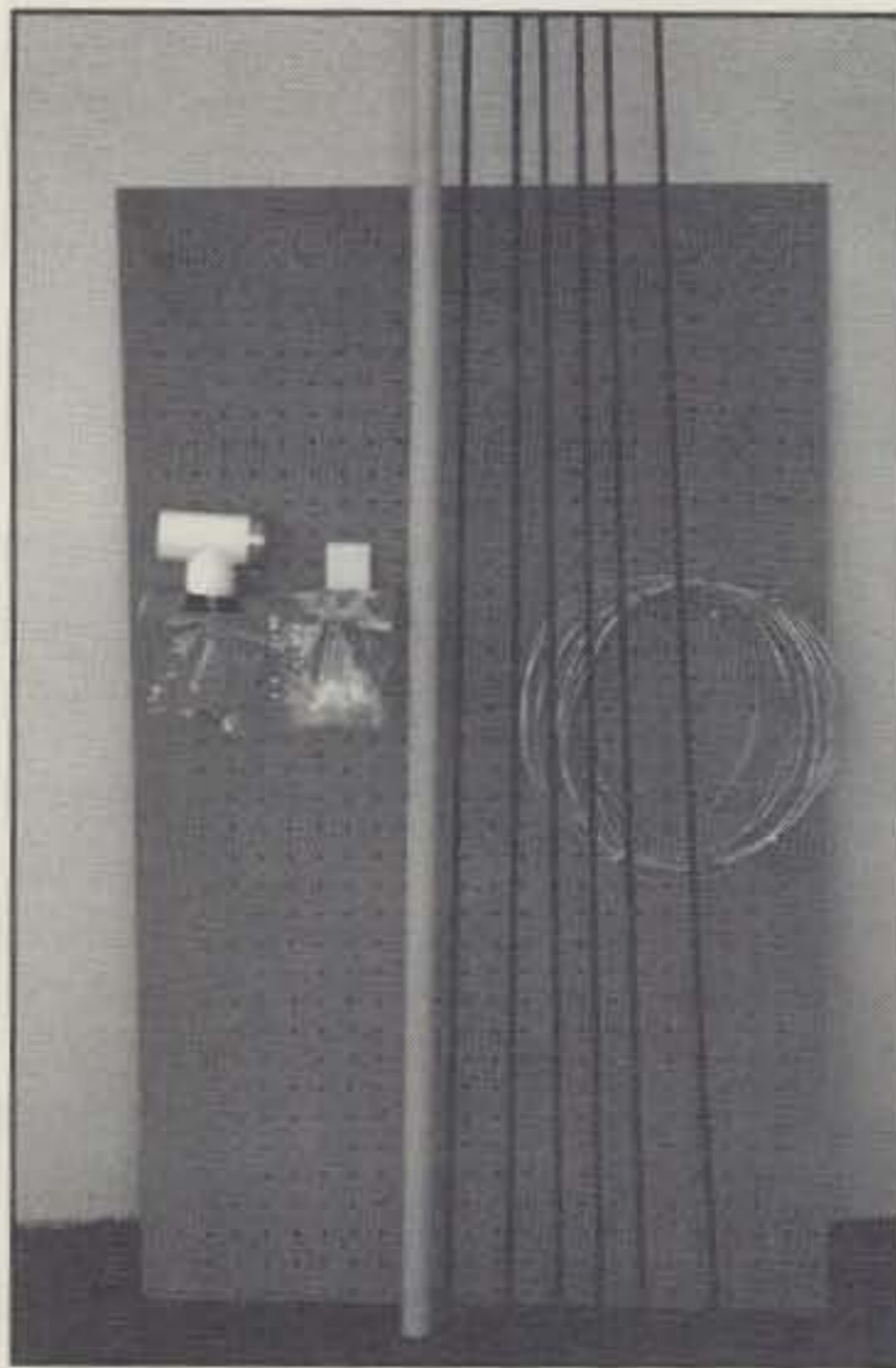
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VHF/UHF Quad Antenna Experimenter Kits From CUBEX

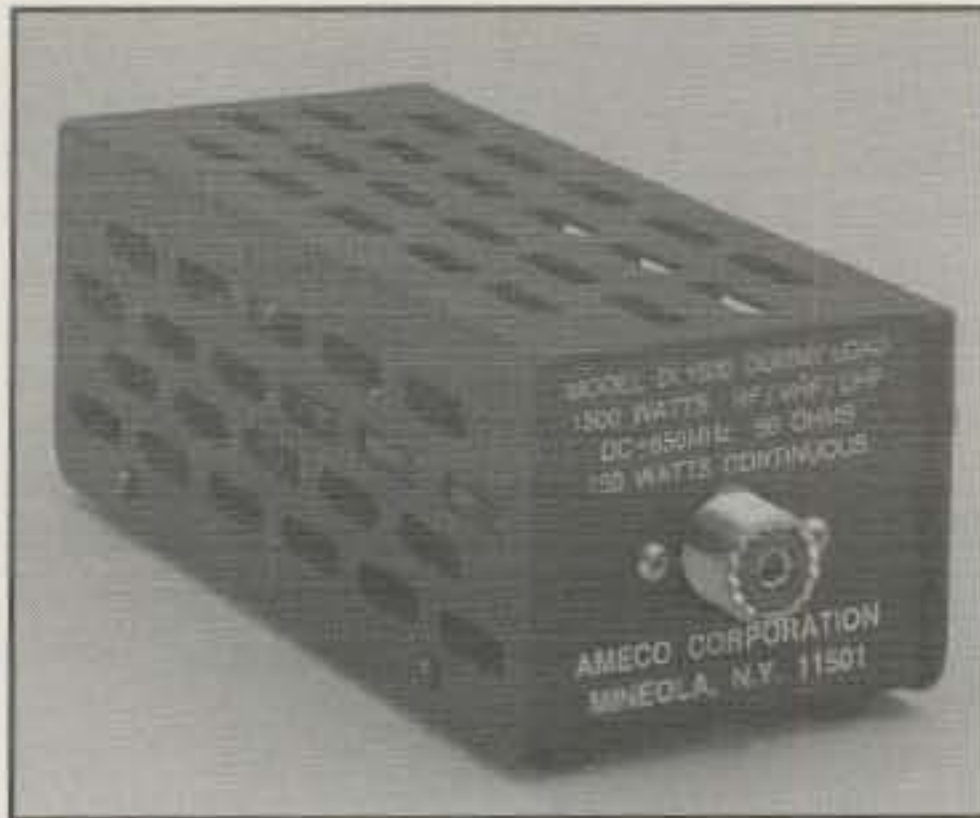
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For further information, contact Donna L. Bates, Customer Service, Ameco Corporation, 224 East Second Street, Mineola, NY 11501 (phone 516-741-5030; fax 516-741-5031), or circle number 103 on the reader service card.

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MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

A Short Primer on Rechargeable Batteries

Now that we are in the midst of summer, I am sure that most users of portable equipment are well into the pleasures and headaches of using rechargeable batteries. Since this is a common concern this season, we thought an indication of what the industry has in store for us now and in the very near future would make interesting reading.

Due to the vast growth of the portable cellular marketplace, several new types of batteries are making a bid to replace the common lead-acid and nickel-cadmium power sources with which we all are familiar. As you might imagine, the primary concern for batteries slated for use in portable products (such as pocket-sized cellular phones or HTs) is total power capacity, weight, cost, and recharge time. Another emerging concern is how eventually to dispose of these cells with minimal environmental impact when they cannot be recharged.

The combination of these factors has resulted in three new battery types: the nickel metal hydride (NiMH), the lithium-ion, and the lithium-metal. All three are fully rechargeable and offer different characteristics.

Table I compares the new batteries to the two older types. While the individual details are important, in my opinion the single parameter that sums it all up is the number of watts per pound the battery will deliver. This parameter tells me not only how long I can operate, but does so as a function of how much the battery pack weighs. If you think about it, a high-power "lead anchor" is not much good for handheld use, but might be fine for a fixed field-day station. Watts per pound is also a good indication of how efficient the battery is, as well as how "modern" the battery's technology is. Other factors such as recharge time and storage capacity are important, but if a tiny, ultra-light, infinite-capacity battery can be developed, I will wait an extra hour to charge it.

Lead-acid is, of course, the grandfather of rechargeable batteries. Used to start automobiles for almost a century, for backup emergency lighting purposes, and even as the power source for some toys (such as self-propelled kiddie cars), these devices are no longer really desirable for HT- or amateur-type portable use. They simply are too heavy, take hours to recharge, will corrode everything if they leak, and cause an environmental impact if they are disposed of carelessly. As a result, the nickel cadmium has almost totally replaced them.

Nickel-cadmium batteries are the most commonly available and used types today. They offer more power per pound than lead acid, are available in versions that can be charged in less than an hour, and normally do not leak. They cost roughly twice as much as lead acid and require full discharging to prevent "memory effects" from reducing their available power. This can be a real pain in the neck when you want to keep the HT "topped off" and ready for instant use. The cadmium in nickel-cadmium

batteries is a hazardous substance, making the disposal of these batteries subject to mandatory recycling.

The nickel metal hydride battery (or NiMH, as it is called) is the first of the newcomers. Offering almost twice the watts per pound of lead-acid, these batteries do not contain any hazardous substances and can be disposed of with no environmental concerns. They exhibit the same voltage per cell as nickel-cadmiums and can be used as direct replacements in most cases. Cost is almost double that of an equivalent nickel-cadmium, but so is the available power, so you can operate longer between recharges. While NiMH batteries require special charging circuitry, there is no memory effect and they can easily be "topped off." A negative feature of the NiMH battery is its high self-discharge rate, limiting its use to applications where the battery is used and recharged on a daily basis.

The lithium ion battery offers a higher voltage—typically 3.6 volts per cell—thereby requiring a smaller number of cells to achieve a given voltage. The number of watts per pound is more than double that of the nickel-cadmium, but so is the cost. A special charging circuit is required for this type of battery, and special ICs have been developed for this purpose. Fig. 1 is a schematic diagram of such a charger from National Semiconductor to give you an idea of the type of circuitry that is used. The lithium ion battery has no memory effect and is of no environmental concern.

Of the newer batteries described, the most

promising is the lithium metal cell. This device has the highest power per pound rating of them all, more than three times that of the nickel-cadmium battery. Unfortunately, it also has the highest cost.

Lithium metal batteries may constantly be trickle charged with no memory effects and will retain a charge for more than a year if not used. The voltage per cell is high, and a two-cell 6 volt battery will deliver 4 to 4.5 volts for most of its life before recharging is necessary. A factor offered by these types of batteries that is unmatched by any of the other examples is the wide operating temperature range of -30 to +55 degrees C. Lithium metal batteries are totally non-toxic and may be discarded with no environmental impact.

All of the above batteries are either already available or will be shortly. All are available in the common AA, C, and D cell sizes, so mounting or replacement should not be a problem. The next time you are designing or looking for a suitable battery for your portable equipment, consider one of the newer ones described above. The cost versus the result you get might be more of a bargain than you would expect.

For still more details on the above batteries, I would suggest that you read a copy of an article entitled "Make The Right Battery Choice For Portables" published in the April 1 issue of *Electronic Design Magazine*. Much of the data for this column was extracted from that article, which is oriented toward designers of portable equipment.

73, Irwin, WA2NDM

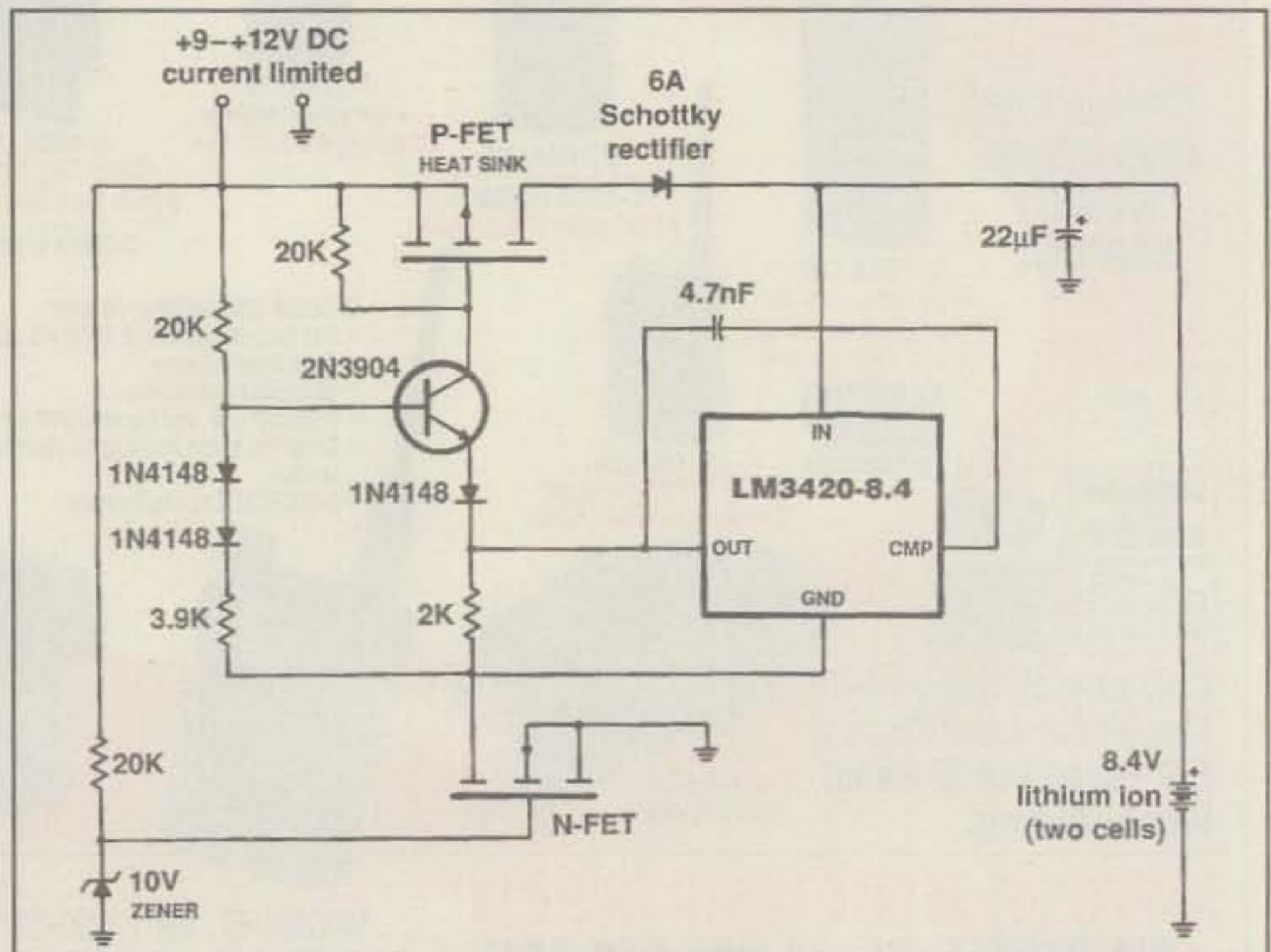
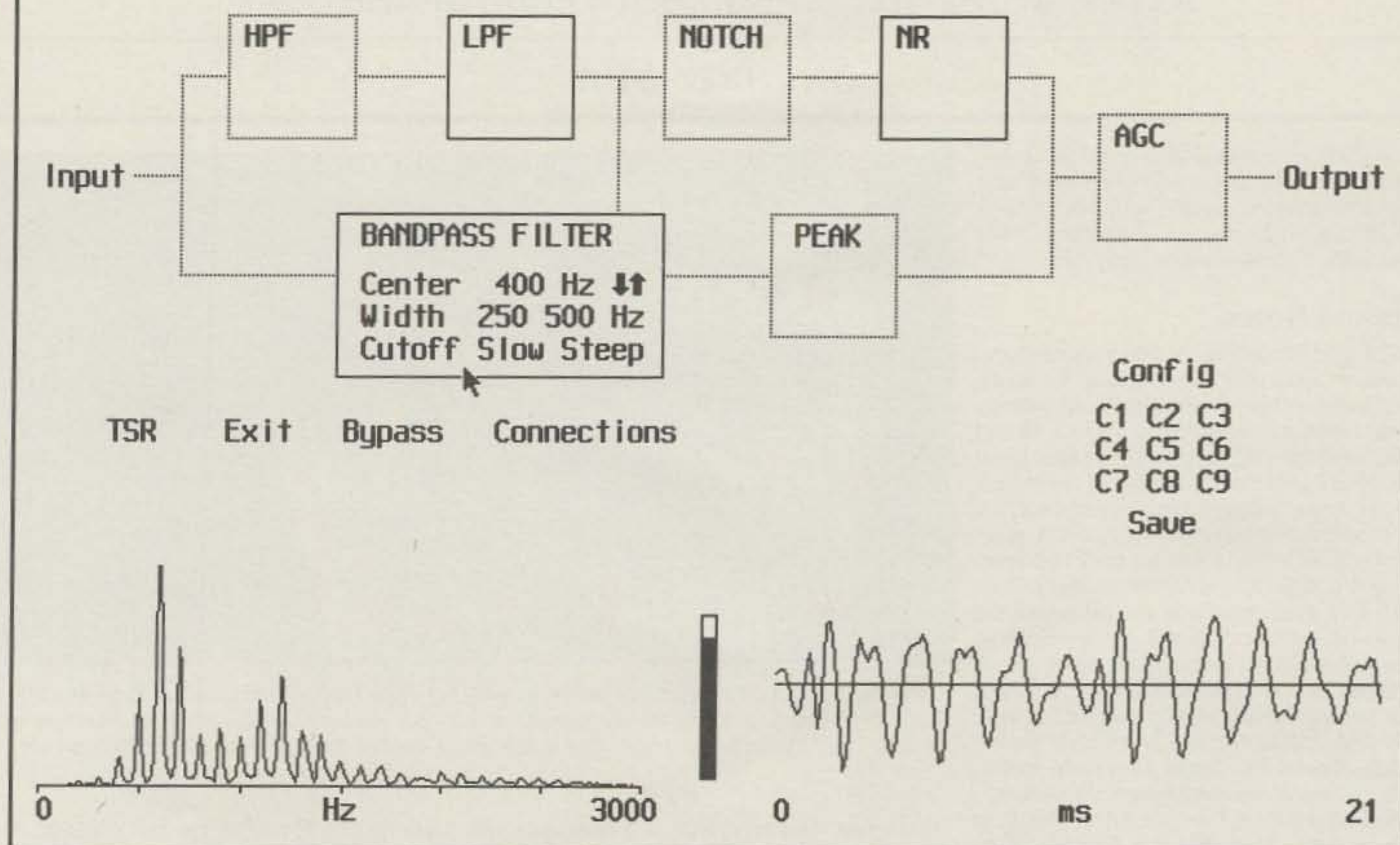


Fig. 1- Schematic of the lithium-ion charging circuit.

c/o CQ magazine



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K6STI's new \$100 *DSP Blaster*™ provides DSP filtering without DSP hardware. *DSP Blaster* is software that uses your PC and a 16-bit Creative Labs sound card to replace DSP boxes costing hundreds of dollars.

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DSP Blaster displays the received-audio spectrum. Use the display to select filter cutoffs and to obtain insight about the signals you're hearing. It's fascinating to correlate spectral features with the sound of a voice. Use the waveform display on the right to investigate audio-distortion problems. Move the mouse cursor over a filter block to display its properties. Click to alter them or to activate the filter.

You can run *DSP Blaster* by itself, pop it up over another application like a logging program, or hot-key a new filter configuration without switching to it. *DSP Blaster* requires a 486 or better, math coprocessor, VGA, mouse, and Creative Labs Sound Blaster 16, Vibra 16, or AWE32 sound card ("compatible" cards won't work). The faster your computer, the more filters you can cascade, the sharper their cutoffs, and the lower their stopbands. But even a 486/33 can provide highly effective filtering.

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Summer Sun

It's certainly no secret that summer is well underway at this point. And since we're also well into antenna season with this column, we'll get down to business without delay. As is our custom, let's turn first to antennas.

Antenna Notes

TapeTenna. Sometimes it takes ingenuity to operate or "work out" when you're an apartment dweller or if you have antenna restrictions on your home or condo. Often you are forced to use invisible antennas and the like. Larry Feick, NF0Z's Hamco has come to the rescue with the TapeTenna™ Hidden Antenna Kit. The kit consists of 108 ft. of highly conductive, 3.5 mil copper foil tape, two feedpoint connectors, and a detailed instruction manual. Both the 1/2 inch wide tape and the adhesive are strong and durable and will adhere to most household surfaces, indoors and out. With the kit you can construct "stealth" antennas of most types, including verticals, dipoles, quads, Yagis, and J-poles, for UHF, VHF, and HF (see photos). The kit also lends itself quite well to mobile, portable, and emergency operations.

You can solder to the tape if you like. One particularly nice feature is that after you have completed antenna assembly and testing (such as on a siding, wall, ceiling, or rafter), you can paint over the antenna to render it practically invisible. Or, as Larry says, "Stick it on and color it gone!"

The user manual includes chapters on antenna theory and philosophy; transmission lines; construction details for antenna tuners and matching networks; and various project plans for invisible, mobile, and portable antennas.

The TapeTenna kits are \$34 postpaid, 108 ft. tape refills are \$24, and a kit plus a refill ordered at the same time is \$54. For more information, contact Hamco, 3333 W. Wagon Trail Dr., Englewood, CO 80110 (303-795-9466).

Lynics Lightning Surge Protectors. Lynics International's President Kiyoshi Endo, AE4EZ/J A0BSL, sent us a detailed packet of information on his line of standard and custom RF connectors and lightning surge protectors. Lynics is a leading Tokyo-based manufacturer of original equipment RF connectors and lightning surge protectors, having made more than 200,000 of the protectors over the last 10 years. Although they're not well known in the amateur community in this country, they are trying to change that with the direct sales of some of their products.

To this end, they have introduced their UL-listed "Super-Grade" Lightning Surge Protectors. These incorporate an easily replaceable, tube-type arrestor element that the company says can protect equipment from voltage surges up to 2500 volts that are induced by nearby lightning strikes, for up to as many as



Larry Feick, NF0Z's Hamco has come up with the TapeTenna™ Hidden Antenna Kit. The kit consists of 108 ft. of highly conductive, 3.5 mil copper foil tape, two feedpoint connectors, and a detailed instruction manual. See this month's column for further details. (NF0Z photo)

600 times. This reportedly is equivalent to 30 years' usage. You can mount outdoor versions of the arrestors at the base of an antenna tower after weatherproofing them with heat-shrink tubing or vinyl electrical tape.

The Lynics devices are available in male/female and female/female configurations with UHF and N connector types (see photo). Each can be used with up to 2 KW on HF, 800 watts on VHF, and 120 watts on UHF (up to 1 GHz). Insertion loss is claimed to be 0.3 dB and impedance is 50 ohms.

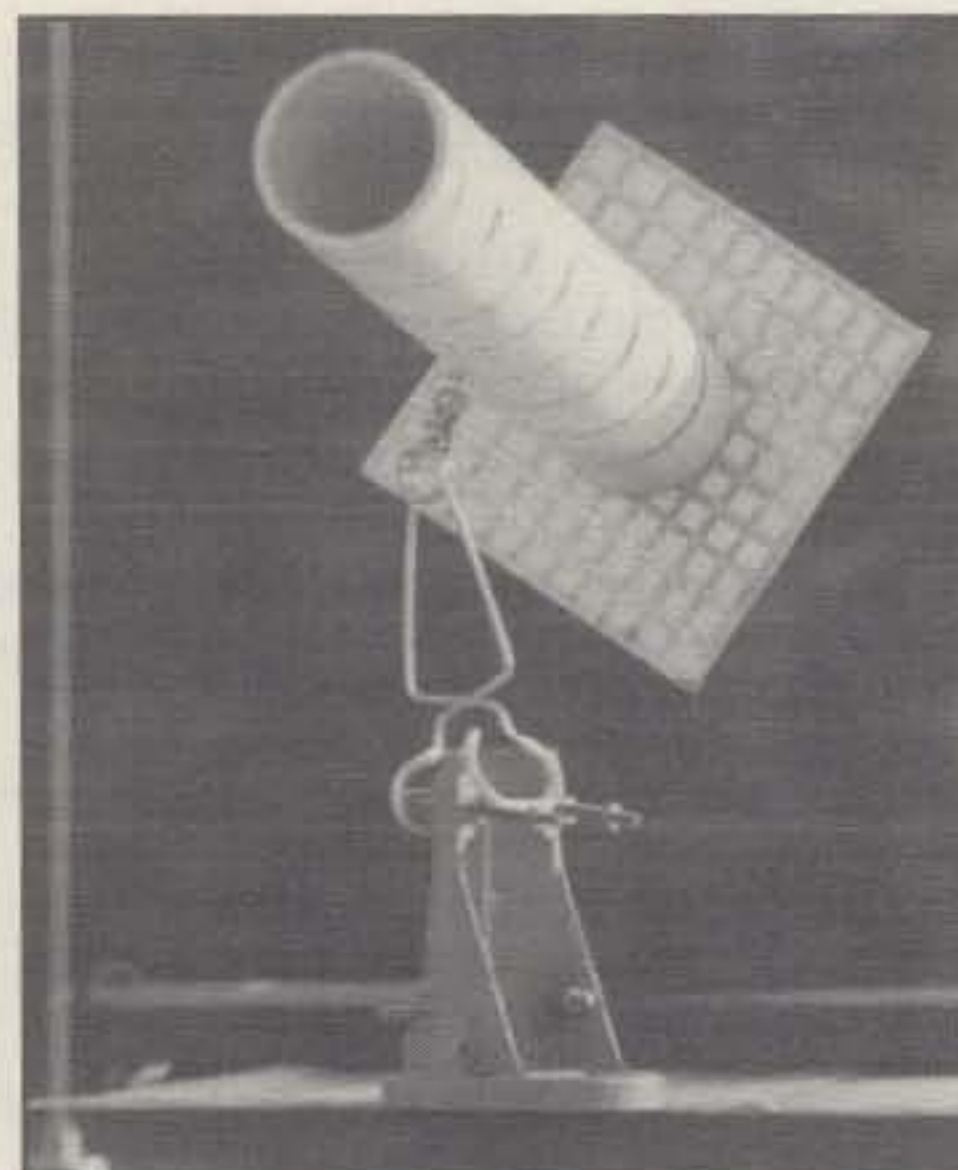
For more information and pricing, contact Lynics International Corporation, 8 Amlajack Blvd., Suite 362, Newnan, GA 30265 (tele-

phone 770-251-2235; Internet <103222.760@compuserve.com>).

The Bozak Antennas. Stephen G. Bozak, WB2IQU, offers the "Bozak Antenna" line of VHF and UHF antennas for the 146, 222, and 446 MHz bands. The various 5/8-wave ground-plane antennas offered are fiberglass enclosed, weatherproof, and constructed with



Lynics International has introduced several UL-listed "Super-Grade" Lightning Surge Protectors. These incorporate easily replaceable, tube-type arrestor elements that the company says can protect equipment from lightning-induced surges up to 2500 volts. The devices are available in male/female and female/female configurations using UHF or N connectors. A female/female Type N surge protector is shown here. (Photo courtesy Lynics International Corporation)



Besides conventional, wire-type antennas, you can make some unusual antennas with Tape-Tenna™, too. Here's a circularly polarized, helically wound 1.2 GHz antenna Larry Feick, NF0Z, built. You can even use the material for feedline, coils, traps, baluns, transformers, counterpoises, capacitors, etc. (NF0Z photo)

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stainless steel hardware. They're claimed to handle 200 watts and stand up to 100 MPH winds. Also available is a 5-element Yagi for 52 MHz, an adjustable HF whip antenna, a 146/446 MHz rubber duckie, and a coaxial lightning protector. Newly announced products include both a 6 meter groundplane and an FM broadcast antenna.

A catalog isn't available, but for more information on products, contact Bozak Antenna, 100 Church Hill, Waterford, NY 12188 (telephone 518-373-8069; Internet <75022.766@compuserve.com>).

Electronic Switch Company Update. As we noted in the January 1995 issue, the Electronic Switch Company imports amateur antennas and accessories from various German manufacturers, including Hofi, Schurr, Kurt Fritzel, and others. As a distributor, the firm makes these products available through major amateur dealers. The firm also offers the ESCO line of antenna switches. These include manually and remotely controlled coax switches as well as lightning protection devices.

A specially developed remote-controlled RF switch allows very short switching times and operation over a wide temperature range. The five-position remote device is controlled through an 8-line cable using 12 VDC and a five-position switch. When the user chooses a position, the motor turns the electrically-braked remote device to the correct position.

Reportedly, the double-knife-contact switch system used has an advantage over coaxial relays in that the contacts are self-cleaning. The device requires voltage only during switching so that unwanted switching during a power failure is prevented. The switches are available in two series, one with UHF connectors and the other with N connectors. Power handling is 3 KW at 30 MHz.

For more information and product flyers, contact Electronic Switch Company, Inc., 8491 Hospital Drive, Suite 328, Douglasville, GA 30134 (770-920-1024).

Radio Engineers-Technitron Update. In several previous columns, most recently in August '91, we described the unique products offered by Radio Engineers-Technitron. We first covered their 2 meter portable quad antenna, the PortaQuad, and later the VectorFinder VHF direction finding (DF) systems.

As we noted, the VectorFinders are handheld VHF units that are available in several configurations. The VF-142/M/MS series covers 144-230 MHz and features an audible response only, while the VF-142Q/QM series covers 144-500 MHz and features audible and LED left/right direction indicators. The units are priced from \$139.95 to \$289.95, depending on specific features.

All models provide a compact, lightweight, active antenna system suitable for use in the field with handheld transceivers (HTs) and scanners. The mechanical design lets you fold back the sense antenna to present a compact unit that is easily stowed or transported. The units interface with any FM receiver or transceiver via the antenna and earphone jacks.

All units offered operate on the phase shift technique, which uses the audible response generated by the equipment and heard on the user's receiver or transceiver. The VHF-142Q models incorporate left-right indicators as well as an audible response to help determine the true direction of the signal.

A recent catalog shows the addition of sev-

eral other directional antenna systems. One is the Type HFDX Vector-Beam, an active, tabletop HF directional antenna system that can be used to reduce or cancel manmade noise or other interfering stations. The antenna system consists of a high-gain RF amplifier coupled to a tunable Faraday shielded loop antenna. Several accessory loops provide coverage from 8 to 50 MHz in four bands. The basic HFDX unit is \$129.95 with one loop; additional loops are priced at \$19.95.

Also offered is the HFDF Vector-Gun handheld direction-finding system, which also covers 8 to 50 MHz. It consists of a high-gain RF amplifier coupled to a tunable Faraday shielded loop antenna; as with the HFDX system, several loops are available. To aid in the DF process, an internal 30 dB attenuator is provided. The HFDF system is \$149.95 and comes with one loop; additional loop elements are \$19.95 each.

The firm also offers a number of DF accessories and various specialized products. These include a modulation monitor, to view signals on narrow bandwidth or older oscilloscopes; a switchable step attenuator for up to 100 dB signal attenuation; and an "ELT Stalker," a device to locate signals from aircraft or marine Emergency Locating Transmitters (ELTs). Also offered are two series of marine-grade 137 MHz weather satellite antennas.

For more information and a product flyer, contact Radio Engineers-Technitron, 7969 Engineer Road, Suite 102, San Diego, CA 92111 (619-565-1319).

Software Notes

Electrosoft HTMORSE. In the May 1995 column we profiled the Electrosoft YT-1 Yaesu FT-990 Control Program offered by Steven Stuntz, N0BF. As we noted, the software controls the Yaesu FT-990 transceiver, and it works on any IBM-compatible PC with a serial port. Used with the Yaesu FIF-232c interface, the program reads the frequency, bandwidth, and mode for both transceiver VFOs and for 90 memory channels, storing the data in a computer file. The program can read previously saved files and put the frequencies, bandwidths, and modes back into the radio.

Recently Steven announced a novel new program, HTMORSE. He designed it to help No-Code Technicians learn the Morse code required for higher class licenses using their handheld transceivers (HTs). The new program turns a laptop or tabletop PC into a Morse keyboard that sends code over any HT by connecting the microphone jack of the HT to the PC's serial port using an optional cable. You can use HTMORSE for two-way contacts on a simplex frequency or for net code practice over a local repeater.

HTMORSE also generates random code practice messages similar to those used in VE exams. The program sends code from 5 to 100 WPM, has an adjustable dot/dash ratio, and has ten 200-character buffers for stored messages. The CW sidetone can be enabled or disabled. A split-screen display separates message sent from those in the type-ahead buffer.

HTMORSE is available in several options. The program disk only is \$30, both disk and cable are \$40, and extra cables are \$10. Included is a simple circuit diagram with Radio Shack part numbers for building your own cable inexpensively. Contact Electrosoft, P.O. Box

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1462, Loveland, CO 80539, for more details.

G8LOV & G4LUE UK Call Book on Disk. According to information received from Ernie Bailey, G4LUE, he offers a United Kingdom (UK) callbook on disk. The DOS and Windows programs come on three 1.44 MB high-density diskettes and include simple installation routines. At this writing the package covers all UK amateurs as of March '96, as well as all UK and European repeaters. It's updated regularly.

Ernie says that he doesn't have a dollar account, but to purchase the package you can either send UK sterling (£14.00) or \$20 U.S. cash. He also says that he will honor any sale should the letter and cash be lost in transit.

For more information, contact Ernest Bailey, G4LUE, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN, England.

VHF-DX Version 3. In the July and October 1995 columns we highlighted Mark Hoersten, N8VEA's VHF-DX amateur radio logging software. The DOS-based package is designed for VHF/UHF contesting, VHF/UHF Century Club (VUCC) award tracking, DXing, and OSCAR satellite operation on 50 MHz to 10 GHz. The program handles 4- or 6-character grid locators and keeps track of both worked and confirmed QSO and grid count by band. The program handles the unique requirements of VHF and higher operation and logging.

Mark sent us the most recent update, Version 3, which adds new capabilities. These include support for three additional VHF/UHF contests (the CQ magazine VHF Contest, SMIRK 6 Meter Contest, and ARRL International EME Contest); DXCC award tracking; EME-

Initials (new stations worked via EME) for each band; separate entry for propagation mode, letting you keep track of the many ways a contact might be made, such as by meteor, EME, OSCAR, or Tropo; many new log reports; and support for international date formats.

Of the new features, the added DXCC function probably is the most significant for many users. Now the program automatically determines the DXCC country based on callsign prefix. It keeps track of how many countries are worked and confirmed on each band. The feature is particularly useful for EME, OSCAR, and 6 meter operation where international contacts are possible. If more than one DXCC country is associated with a prefix, a window appears that lets you make the proper choice.

VHF-DX is \$21.95 postpaid and includes a printed, 30+ page manual. Contact VHF Products, Inc., P.O. Box 23391, Chagrin Falls, OH 44023-0391 (phone 216-543-2748; Internet e-mail to <vhfdx@aol.com>).

WinSoft PowerLib Math. An interesting series of products for the technically-inclined among us is WinSoft® PowerLib™ Scientific Reference Software. PowerLib Math, which was sent to me for evaluation, is the first in a series of easy-to-use digital reference books and scientific document building tools. The programs are intended to be of particular use to students, educators, engineers, researchers, scientists, programmers, high-tech companies, and libraries (see fig. 1).

PowerLib Math makes finding and working with mathematical formulas easier than you might imagine. It allows you to instantly refer-

ence more than 12 math books having over 2000 equations, diagrams, charts, and tables for use in studies, analysis, reports, programming, and research.

The program covers algebra, geometry, trigonometry, hyperbolic functions, probability, and many other math topics, and it also includes a chemical periodic table for reference. The whole idea of the software is to give you the power to access detailed scientific and technical information easily.

Also included is the PowerLib™ Equation Editor™, which lets you develop your own custom library of frequently referenced formulas and develop "personal books" of customized reference information. The Equation Editor reportedly is the same one included with the Microsoft® Word wordprocessor software. The package also includes a conversion utility that lets you easily convert formulas and measurements in terms of area, density, energy, force, length, math, power, pressure, speed, temperature, time, volume, and weight.

On balance, I was impressed with the product, especially by the novel on-screen presentation metaphor which is based on a small, six-ring notebook that's opened and spread out across the screen. The on-screen thumbwheel, which you can "thumb" with your mouse to quickly change pages, was rather neat as well.

Of course, I would like to see a specific electronics PowerLib book in addition to the math book that was available at this writing. Also, the conversion utility should include more electronics, electrical, and astronomical conversions. Otherwise, PowerLib Math is a nice

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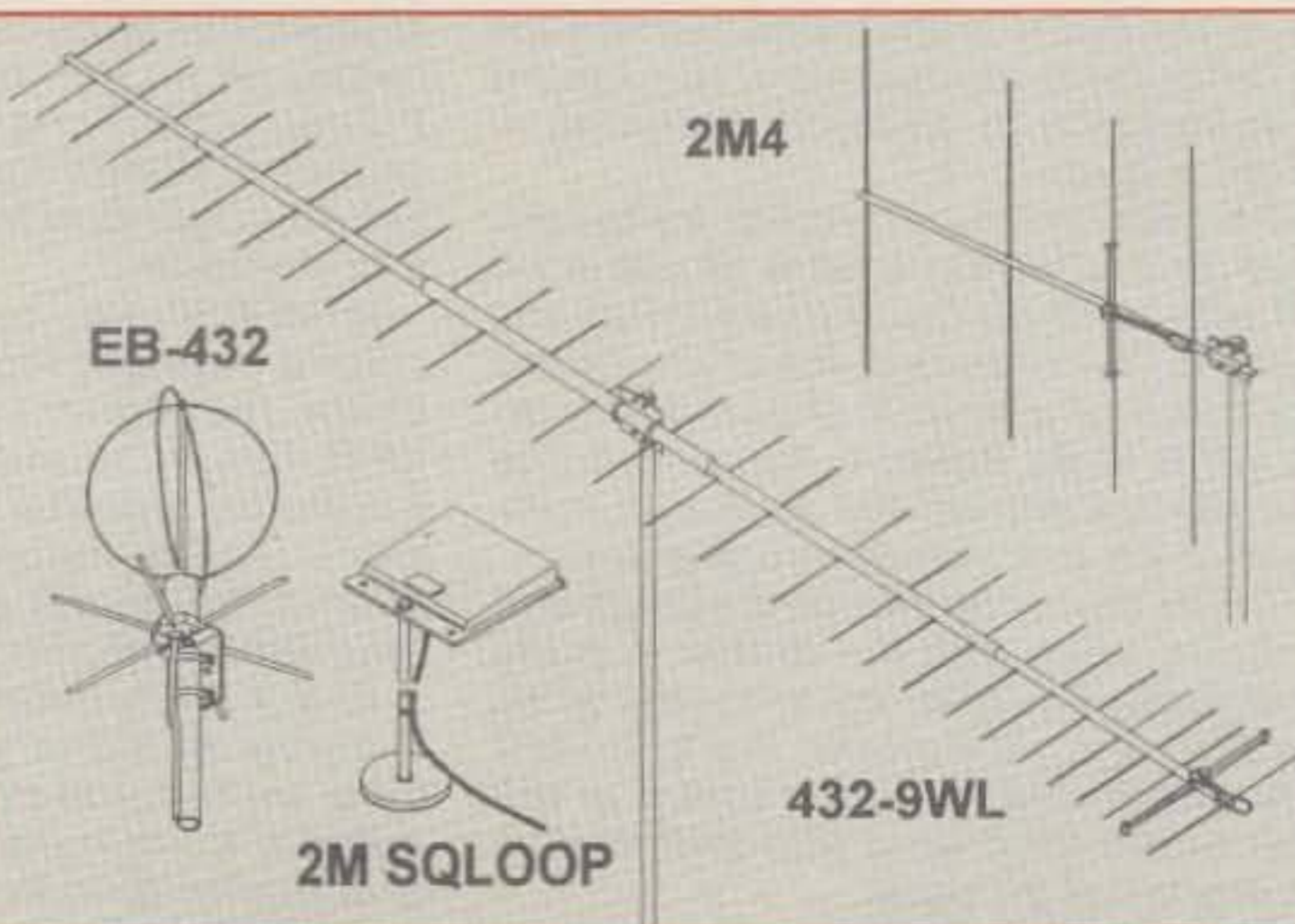
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Books For The Hamshack

Heil Ham Radio Hambook. Bob Heil, K9EID, is a sound engineer, one who is involved with the intricacies of "sound reinforcement" for concert sound by touring acts, club bands, and concert stars. He's the founder and president of Heil Sound, Ltd.

Less well-known is that Bob also is a writer, specializing in VHF SSB, repeater systems, 10 meter FM, and sound enhancement in amateur radio. He is the author of the *Heil Ham Radio Handbook*, a 168-page resource book that explores the difficulties of actually getting on the air and deals with some of the more practical aspects of the hobby.

While the book's copyright date of 1988 means that it's not a new release, the book sticks with some of the more timeless aspects of the hobby, and thus avoids becoming overly dated. Chapters include operating procedures, antenna systems (HF and VHF), remote bases and repeaters, mobile operation, simple electronics (including approximately 40 projects), homebrewing techniques, troubleshooting, and more. The book also includes details on microphone selection, audio equalization, and audio compression, topics not usually covered well in other handbooks.

The handbook is \$12.95 postpaid from Melco Publishing, P.O. Box 152, Marissa, IL 62257-0152 (fax 618-295-3441).

The ARRL Antenna Book and Operating Manual. It's no surprise to antenna aficionados that "... there is greater room for increased performance through superior antenna systems than in any other part of the equipment." These very true words are from *The ARRL Antenna Book, First Edition*, circa 1939.

Today the *Antenna Book* still is the authoritative source of information on modern antenna and transmission-line theory and construction. The newest version, the 17th edition, edited by R. Dean Straw, N6BV, contains 736 pages in an 8" x 11" format. This edition offers definitive coverage of antenna fundamentals, propagation, transmission lines, Yagis, quads, and wire antenna designs. The book includes a new chapter on HF Yagi arrays and a revised radio-wave propagation chapter.

Antenna computer-modeling techniques are more prominently featured in this edition than in previous editions, perhaps reflecting that computer-modeling pioneer Brian Beezley, K6STI, was a contributing editor to the 17th edition. Included is a diskette with software for Yagi analysis, propagation prediction, transmission-line evaluation, and more. The 1994 *Antenna Book* is priced at \$30, which includes the bundled software.

The ARRL Operating Manual, Fifth Edition, edited by Steve Ford, WB8IMY, is an excellent, authoritative reference covering on-the-air operating practices. Each of the 17 chapters has been revised by authors who are experts in their fields, to reflect the many changes that have taken place in the hobby in recent years. The *Operating Manual* attempts to be a "one

stop" source of operating information that encompasses most types of on-the-air activities. It includes a comprehensive reference section as well as a colorful new section that features dozens of U.S. and overseas operating awards.

While not a license study manual, the 576-page book makes an effort to be a major entry vehicle for Technicians. Of special interest are chapters on basic operating, antennas, DXing, contests, operating awards, packet radio, HF digital communications, FM and repeaters, amateur satellites, emergency communications, traffic handling, and image communications.

The 8" x 11" ARRL book is \$22. Both books are available from the ARRL, 225 Main St., Newington, CT 06111 (860-594-0200).

ARRL Historical Oldies but Goodies. Recently I came across two ARRL "sleeper" pubs—books the existence of which I had only vaguely been aware, but which upon inspection proved to be quite interesting and timeless from a historical standpoint. Amateur radio history buffs will almost certainly like them both.

One of these books is *From Spark to Space: A Pictorial Journey Through 75 Years of Amateur Radio*, by Debra A. Jahnke and Katherine A. Fay, N1GZO, both of whom are ARRL staffers. The 95-page, highly colorful photo-journalistic book describes the historical path of amateur radio and the League from 1914 to 1989, when the book was published commemorating the League's 75th (diamond) anniversary. As the foreword indicates, the book

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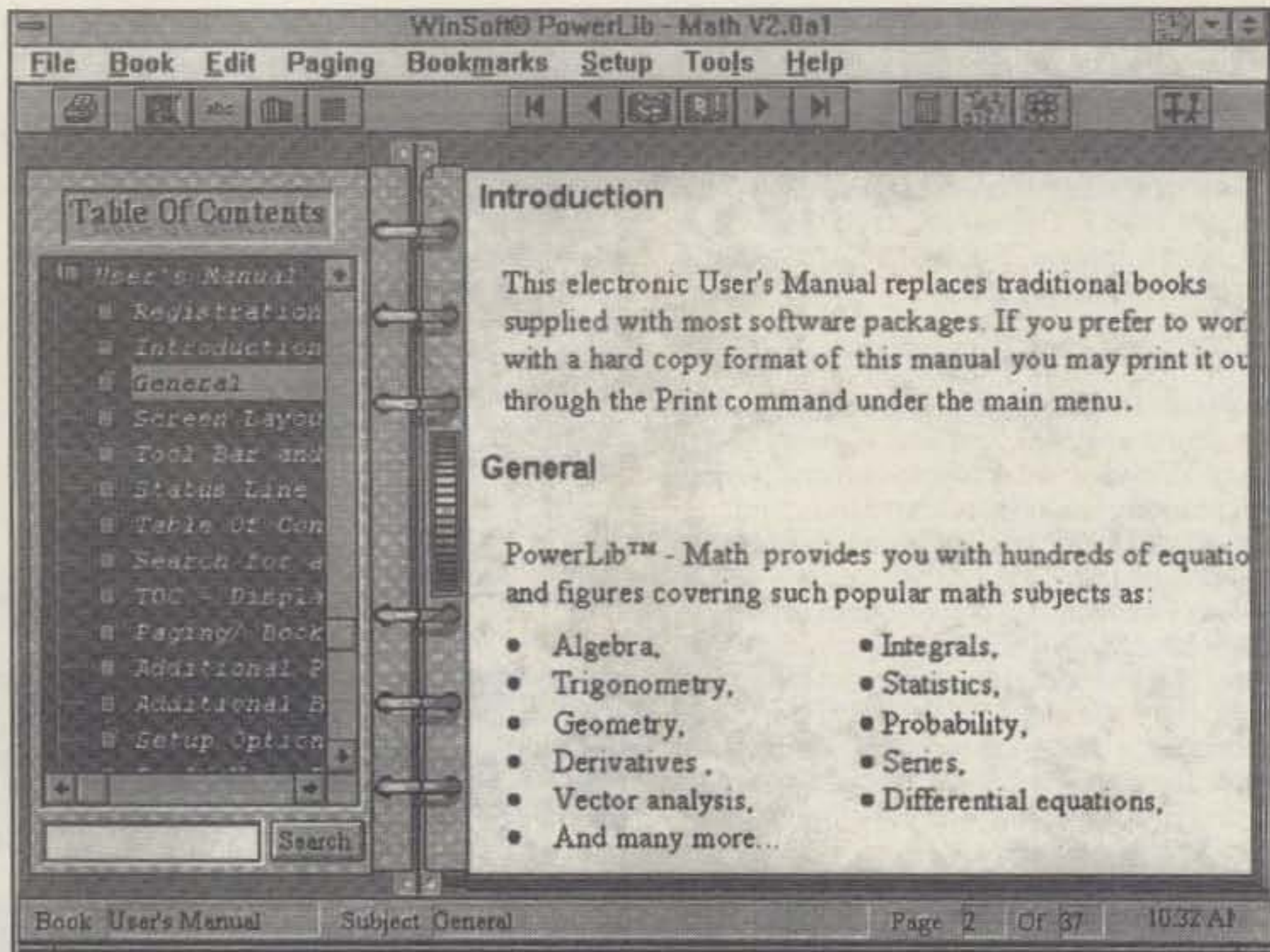


Fig. 1— WinSoft® PowerLib™ Math is the first in a series of digital reference books and scientific document building tools. The programs are intended to be of special use to students, educators, engineers, researchers, scientists, programmers, high-tech companies, and libraries. The electronic user's manual, depicted here, replaces the traditional books supplied with many software packages. (See this month's column for details.)

invites you to "sit back, smell the ozone, and hear the crackle of a spark gap generator"—and then turn the pages to see the Oscar I satellite launched into space. It's \$20.

The second book is a real oldie. It's Clinton B. DeSoto's original 1936 story of amateur radio, *200 Meters & Down*, reprinted by the ARRL

in 1981. While the \$8 reprint is written in the style and prose of the mid-1930s, the book accomplished a very important thing: it lucidly chronicled the full history of amateur radio from its earliest days through the mid-1930s, for the benefit of generations to come.

Page 1 profiles the "typical" radio amateur of

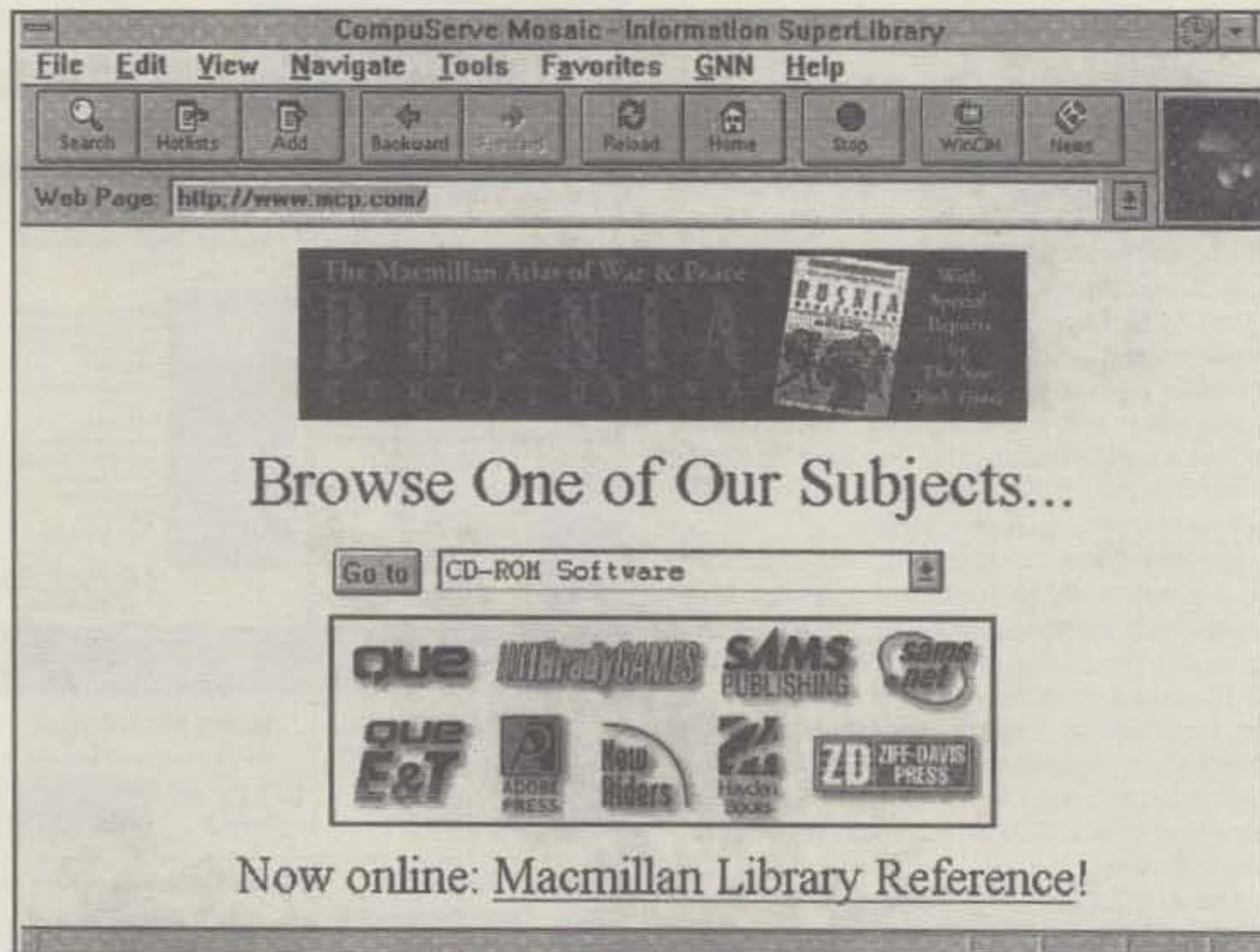


Fig. 2— You can obtain free information and a variety of computer resources from Macmillan Computer Publishing USA's Web site, Superlibrary™, shown here. Besides an online computer book catalog, the MCP site has much more, including sample book chapters and tables of contents. The site also offers a large software library that includes files from MCP books and updated shareware, freeware, and demos. You'll find it at <http://www.mcp.com/>.

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MAGNUM 2 / 2 @ 74'
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80/75, 40 fun even w/ low power
C-3 @ 53'
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- ◆ The element-to-boom brackets are pre-aligned on the boom, so every element is straight and will not move.
- ◆ The C-4 maintains the same turning radius, weighs about 40 pounds, with separate feedline so that the C-3 remains intact.
- ◆ Force 12 has more than 60 HF antennas from 3 el 80/75 mtr yagis to 6 mtr beams. The **MAGNUM 2 / 2** shown above is a 2el 80/75 and 2el 40 mtr on a single boom with two feedlines. The **MAGNUM 2 / 2** uses EF-180B (66.5') elements on 80/75 and EF-140 (44.5') elements on 40. At about 14 sqft, the **MAGNUM 2 / 2** is the answer to gain on both bands. Other 80/40 available.
- ◆ Force 12 now offers magnetic transmitting / receiving loops for 40 and 80/75, perfect for limited space and NVIS use: the **MTR-66** (6'x6') and the **MTR-618** (6'x18'), both made with 2" tubing. These mount vertically on the ground, deck, balcony, etc.
- ◆ Force 12 has verticals for 40, 80/75 and 160 mtrs. Add to this the several 20-40 yagis, the 40-30-20 yagi and multiple band antennas like the 5BA (20-10) and the 4BA (17-10). Force 12 offers a pair of 50 ohm 1:1 baluns; fully tested and vacuum impregnated for reliability. The B-1 is rated at 3KW and the B-1/C commercial version with N-connector, rated at 25KW.

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1936, noting that "... His station, which is homemade from manufactured parts purchased largely at the neighborhood parts store, utilizes radiotelegraphy exclusively, although he expects some day to try radiotelephony. The actual value of his station is about one hundred dollars ... " Interesting characterizations, indeed! For more information on either book, contact the ARRL at the address above.

The Electronic Experimenter's Journal. This is an interesting hybrid publication—part magazine, part catalog, part advertisement, and part data book—which is issued free by Debco Electronics.

EEJ is the result of the merger of the Debco computers and electronics catalogs. The firm hopes *EEJ* will grow into a comprehensive resource for the electronics, computer, and amateur radio hobbyist and experimenter. Planned are articles on some of the kits they sell, along with hints on how to put them together, improve on them, and use them. Also planned is an amateur radio page focused on amateur kits, projects, and software. Electronics and microprocessor application notes, hints, and tips for experimenters, PC users, and radio amateurs, also are on tap.

A firm publication schedule hasn't yet been set, but you can get on the mailing list by contacting Debco Electronics, Inc., at 4025 Edwards Rd., Cincinnati, OH 45209 (1-800-423-4499).

Two from Osborne McGraw-Hill. Several excellent computer books from Osborne McGraw-Hill have crossed our desk in recent months, and we'd like to share two of them with

you. One is *The Internet Complete Reference, Second Edition*, by Harley Hahn, the author of the *Internet Yellow Pages*. Hahn's latest illustrated opus (836 pages, \$32.95) offers just about everything you need to know to use the Internet effectively.

A second book from the same publisher should be of special interest to *CQ* readers. It's a specialized edition of the *Internet Yellow Pages*, called *The Internet Science, Research and Technology Yellow Pages, Special Edition*, by Rick Stout and Morgan Davis (400 pages, \$22.95). The new edition features thousands of new Internet addresses in the areas of science, research, and technology, from amateur radio to artificial intelligence to zoology. The book's easy alphabetical organization, along with its detailed table of contents and index, can help you save hours of online search time.

The two books are available in bookstores, or for a catalog contact Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (phone 1-800-227-0900; Internet <<http://www.osborne.com>>).

Que's Mega Web Directory. As we've pointed out, the biggest problem in navigating the Web is *finding* stuff—avoiding getting lost in cyberspace. The latest thing in Internet books is huge tomes with thousands of Web site listings, backed up with an included CD-ROM, a fully indexed electronic version of the book with online searching software. This describes *Que's® Mega Web Directory*, a 1040+ pager that lists over 18,000 Web addresses. The book and accompanying CD-

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Contact Macmillan Computer Publishing USA, 201 West 103rd St., Indianapolis, IN 46390 (1-800-858-7674) for a catalog. You also can access the Macmillan Information SuperLibrary™ Web site (fig. 2) at the Internet address <<http://www.mcp.com/>>. You can download valuable Internet software tools from the MCP Web site, or you can use the Macmillan Gopher site (<gopher.mcp.com>) or FTP site (<ftp.mcp.com>). The publisher also maintains the MCP Forum on CompuServe.

We Get Letters

Once more we're just about out of space. Before closing, however, we'd again like to acknowledge just a few of the many folks who have written, faxed, e-mailed, or otherwise corresponded with your columnist over the past several months. A tip of the hat goes to Jim Eiland, KR4JY; Lawrence Thompson, KE4RPX; Marc Abramson, KC9VW; Ted Cohen, N4XX; Jerry Wagman, K2EWA; John Drum, W4BXI; and Dale Parfitt, WA2YPY. Thanks for corresponding, and keep up the cards and letters.

Looking Back Five

Okay, so now you know what the column is like for August 1996. But what was hot in August 1991? That column was entitled "Antenna Potpourri—Part III."

Turning first to antennas, we featured the LSU-111 Lightning Sensor Unit from Stormwise™ and McCallie Manufacturing Corp.; the Static Buster AS-1 Antenna Static Discharger; the T2FD multiband sloping dipole and sources for noninductive power resistors for it; the Palomar Engineers PA-355 Super-Snooper, a miniature SWL antenna; the Oak Hills Research and Electron Processing catalogs; and a Radio Engineers VectorFinder VHF DF system update (also discussed up-front in this month's column).

Moving to computers and software, we highlighted the DELTACOMM Communication Manager for the ICOM R-7000 receiver; PC-ECAP, a shareware circuit analysis program from Circuit Systems; the Circuit Search database, with references to circuits drawn from 250 technical and scientific magazines; the LOG-PCF Database, a PC-File compatible shareware logger; an update on the LOG-EQF logbook; and PC-Kwik and Power Disk, a PC performance enhancing utility from Multisoft Corporation.

We concluded this column with an update to your columnist's "brush with lightning" story. This referred to a 1990 nearby lightning strike that wreaked miscellaneous havoc on lots of electronic equipment in and around our home and hamshack, but one that fortunately had a pleasant ending.

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: Do you ever get the feeling that on the Information Superhighway on-ramp your car just stalled out?

73, Karl, W8FX



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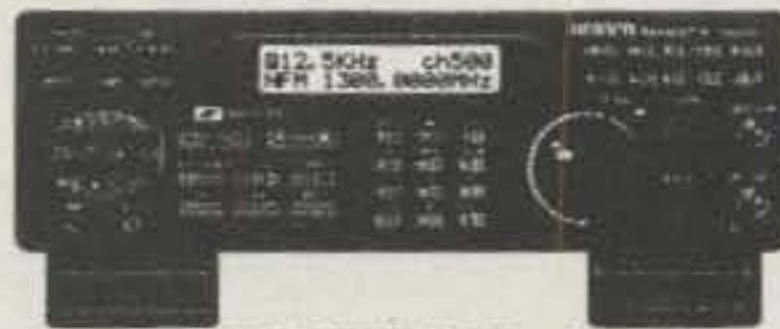
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FCC Proposal Targets 2 Meters

In a move that stunned amateur radio communities around the world, the FCC's Mobile Satellite Service Informal Working Group 2A (MSS IWG-2A) has targeted amateur radio's 2 meter band for possible sharing with commercial little Low Earth Orbiting (little LEOs) satellite users.

At the group's 7 May meeting, the little LEO industry representative, Mary Kay Williams, presented a list of frequencies which it would like for the FCC to consider for such sharing of services. Noting that both the 2 meter and 70 cm bands were on the list, amateur radio's representative, the ARRL's Paul Rinaldo, W4RI, vigorously objected. He was told that he had to file his objections in writing, which the League did on 15 May through its offices in Washington, D.C.

Despite the written objections being presented by the League, these amateur bands continued to remain on the list. This prompted the League's Executive Vice-President Dave Sumner, K1ZZ, to advise the IWG-2A committee that unless they were removed, he would have no choice but to mount a campaign of "a call to action" via his editorial in the July issue of *QST*.

In response to Sumner's notice, the IWG-2A officials told officials from the League that (according to the League's May 29, 1996 press release) "... as long as little LEO allocations requirements remained unsatisfied, everything had to remain on the table."

Sumner then issued the above-cited press release. And according to its press release, in an unusual move, the League went to press with its July issue on 28 May, several days ahead of schedule.

The results were predictable. Within just a few days Mr. Warren Richards, the U.S. Department of State representative and Chair of the LEO WRC-97 Committee, reported to *Amateur Radio Newline's* Bill Pasternak, WA6ITF, in an interview aired over its network (ironically via repeaters, mostly on 2 meters) during the week of 7 June, that he had received over 600 faxes and e-mail messages from amateurs across the country. Unfortunately, Richards was, in effect, blindsided by this traffic, as he didn't know it was coming nor why.

At the same time Richards was being inundated, FCC's Cecily C. Holiday, the director of the WRC-97 Preparatory Team, wrote to Sumner, commenting that the FCC had received in excess of 1000 e-mail messages and faxes. Trying to allay the hams' fears, Holiday wrote that the FCC was not looking at reallocating the Amateur Service off the bands in question, but rather "... the bands listed reflect[ed] only the initial component of a long-term effort to conduct sharing studies before submitting the

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VHF PLUS CALENDAR

August 3-4	ARRL UHF Contest.
August 4	Good EME conditions.
August 5	Last quarter Moon.
August 9	Highest Moon declination.
August 11	Poor EME conditions.
August 14	Moon apogee and New Moon.
August 15-18	East Coast EME Conference. (See text for details.)
August 17-18	First weekend of ARRL 10 GHz and Up Cumulative Contest. (See text for details.)
August 18	Moderate EME conditions.
August 21	First quarter Moon.
August 24	Lowest Moon declination.
August 25	Very poor EME conditions.
August 28	Full Moon and Moon perigee.
August 31	Postmark deadline for submitting CQ WW VHF Contest logs.

*EME conditions courtesy W5LUU.

Committee's proposals to the Commission for review." Concluding in a friendly note, she wrote, "I appreciate the many valuable contributions the amateur radio community has made to the progress of radio technology and to ensuring the safety of the American public. I look forward to working with you so that we can continue to advance the use of exciting telecommunications technology both in the U.S. and abroad."

However, almost simultaneously Scott Blake Harris, the Chair of the Industry Advisory Committee (IAC), sent Sumner a scathing letter attacking him for mounting a "... campaign to protest [the] work being conducted by the ... IWG-2A [committee]." Chiding Sumner for the League's campaign, Harris wrote, "The tactic ARRL has chosen to use is ... neither necessary nor appropriate." Harris also took Sumner to task for naming Leslie Taylor and Williams in the League's press release, claiming that they were not responsible for the inclusion of the two amateur bands.

Further, in commenting on the League's request to exclude the two bands from consideration, he wrote, "But arbitrarily to exclude a portion of the band from the technical sharing studies would undermine not only the FCC process, but also the position the U.S. takes in all its international spectrum allocation negotiations." Finally, he showed his ignorance by "inviting" the ARRL to participate in the IWG-2A's committee meetings, which it had been doing all along through its representative, Paul Rinaldo.

Unfortunately, Harris's letter only exacerbated the IAC's problems for three reasons. First, as they say on the farm, the "horse was already out of the barn." Second, the facts pertaining to Taylor and Williams were on the League's side. Finally, while he was blasting the League, asking Sumner to stop the "campaign," the FCC was simultaneously setting up provisions to handle it.

Sumner responded by writing that his campaign was not a protest, but rather an "educational campaign" of the League's members, adding there was no reason to stop because earlier that day the FCC had released revised instructions for the submission of comments by the public on IAC matters. He then reminded Harris that the FCC had previously issued an invitation that stated, in part, "Interested parties should note that input to the Advisory Committee may be sent at any time. ..."

In the matter of Leslie and Williams, quoting the minutes of the IWG-2A committee's 7 May meeting, Sumner wrote Harris, stating, "Mary Kay Williams presented a list of candidate bands to be included. ... Paul Rinaldo expressed concern regarding the bands listed which are also allocated for amateur radio, including 144-148 MHz and 420 MHz." Then, adding a bit of repartee sarcasm, Sumner asked, "If the two named individuals [in Harris's correspondence] are not responsible ... , we certainly would be interested in knowing who is responsible (emphasis his)." Continuing his taunt, Sumner asked, "If the idea is an orphan, as it appears to be since no one is willing to accept responsibility for it in a supposedly public proceeding, then may I respectfully suggest that the bands must immediately be dropped from consideration?"

Additionally, in answering Harris's statement about arbitrary exclusion, Sumner wrote, "Other non-government spectrum between 138 MHz and 1 GHz has been excluded from consideration without explanation." Curiously, at some point during this month-long time frame (between 7 May and 7 June), the 70 cm band was dropped from the list because of *military* opposition.

Nevertheless, Sumner concluded his letter to Harris on a bit of a conciliatory note by advising him that he (Sumner) had ordered the presses stopped in order to insert the new FCC instructions for sending responses. Further, he

stated that he did not include Taylor and Williams' voice phone numbers in the original press release in order to prevent harassment directed to them. Additionally, he quoted a portion of his editorial where he asked respondents to "be civil" in their comments. Finally, he wrote that no names were mentioned within the editorial. Nevertheless, he reserved his and the League's right to cite specific individuals to target should it be so warranted in the future.

Still the word was out. Hams, not only in the U.S. but also in many foreign countries, have been sending comments to the FCC. In Canada, officials of its national amateur radio organization, the Radio Amateurs of Canada, issued a press release urging its members not to inundate it with comments, but to target the FCC instead, adding, "... [RAC] President Farrell Hopwood, VE7RD, and RAC VP Jim Dean, VE3IQ, [would be] co-ordinat[ing] the [Canadian] amateur response to this crucial threat."

Amateurs who subscribe to different reflectors on the Internet in various parts of the world began copying their e-mail to the FCC to their respective reflectors. As of this writing (mid-June), the response continues to be a growing cloud directed at the FCC. Hopefully, the cloud will not be a mushroom cloud, but one that signifies the end of the storm over 2 meters.

"We Have Found The Enemy ..."

No, this headline is not a claim that this writer has discovered a Benedict Arnold in the private industry who has sold out the amateur radio community through the inclusion of the 2 meter ham band for consideration in the above FCC proposal. Rather, it is the first half of the former cartoon-strip character Pogo's comment, which concludes, "... and it is us!" I use this quote because I have come to the conclusion that we are our own worst enemy.

We are our own worst enemy for two reasons. One we can't help and the other we can. What is the only nongovernment, noncommercial service that has LEO satellites? Amateur radio. Where in the spectrum are these LEOs located? You guessed it—2 meters. It was in the early 1960s when amateur radio launched its first satellite which sputtered out a "HI" in Morse code as it swept through its low earth orbit. Now today, more than 30 years later, we have several "little LEOs" operating on 2 meters. Here's the problem: While we developed our technology, industry quietly looked over our shoulders. This is nothing new, and there is nothing we can do to stop it. Sometimes the results of industry looking over our shoulders are good, and sometimes they are detrimental to our hobby. Nevertheless, as we continue on our merry way, as we must, in developing new technology, industry will continue to look over our shoulders. A bit of an oddity exists here, though. If we don't have the spectrum to do our development, then we won't do it and industry won't be able to look over our shoulders.

This is a segue into my next point: Use of the spectrum allocated to us. Sadly, we are grossly *under* utilizing it. If it is possible for me, sitting in the parking lot of Southern Methodist University on the north side of Dallas, to be able to tune across the entire band of 2 meters with my trusty IC-706 and hear not a single signal on the band, it is also possible for an industry representative to do this. Not only is it possible, it is also possible that the industry repre-

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More than 100 VHF+ operators met at the first annual "VHF Weak-Signal Group Get-Together" during the 1996 Dayton Hamvention. Guests included Gordon West, WB6NOA (the featured speaker), CQ VHF magazine Editor Rich Moseson, NW2L, and ARRL 2nd Vice-President Joel Harrison, WB5IGF. (Photo courtesy NW2L)

sentative is taping the "silence" to use as evidence. While my experience in Dallas is typical for many parts of the country, there are parts where significant use of the band takes place. Nevertheless, during the day, during the week, even in these metropolitan locations, the band is woefully under utilized.

As the ARRL Section Manager of Oklahoma who was deeply involved in the amateur radio communications following the Oklahoma City bombing, I am the first to cite the importance—in fact the absolute necessity—for frequency spectrum for emergency use. Nevertheless, at the peak of our operation we tied up only three repeaters. The rest of the 2 meter band was not used, nor needed, for our operations. Furthermore, if we had it to do again (God forbid!), we would be using low-power repeaters situated at the site, which in themselves would not cause interference to LEOs, nor would the LEOs bother the operation.

If we don't have the numbers justification for the use of the spectrum, how should we attack the problem? First, we should cite the potential numbers. That can be done by doing growth projections based upon *previous* growth. Second, we should give the technical reasons why the 2 meter band itself would not be in the best interest of the commercial user for reliable low-power satellite communications. There are several. However, I will only discuss propagation, with which I am most familiar. Aurora, meteor scatter, FAI, sporadic-E—all are present at various times and cause the ionization of the E-layer of the atmosphere. One of the most serious deterrents to a successful EME weekend is an aurora. During a full-blown aurora, signals just don't get through to the earth's natural satellite, the Moon, either going to it or coming back.

Speaking of EME, several of the guys who work EME send signals into space that are often several kW ERP, and this is not just from the U.S. If a LEO were to orbit through one of these blasts of EME at the Moon, how would its front end fare from the potential interference? Probably not very well!

What about tropospheric enhancement? Amateur-radio originated signals could travel

some distance in a tropo duct, such as between the mainland and Hawaii, before leaving the Earth's atmosphere. It is entirely possible that an amateur-radio-originated signal from some distance (thousands of miles away) could interfere with the satellite. Furthermore, trans-equatorially (TE) propagated signals have been known to be received by our satellites, again even when they are several thousand miles away from each other.

As you can see, we have several *technical* reasons to show why the spectrum would be less than ideal for private industry's intended use. It is up to us to intelligently and rationally—and most important quickly—comment on this issue to the FCC. If you are e-mailing your comments, send them to <wrc97@fcc.gov>. If you are sending a written comment, mail an original and one copy to: Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. According to "The ARRL Letter," "Each comment should include at the top, 'Reference No. ISP-96-005' and 'Advisory Committee Informal Working Group 2A.'"

Making Meteor-Scatter Contacts

This is the month for the most well-known meteor shower, the *Perseids*. If you have never worked a station via meteor scatter, this is the month to consider so doing. If you regularly operate 10 meters or 6 meters, you already may have made a random meteor-scatter contact without knowing it. Sometimes those brief bursts of propagation in which you complete a QSO are actually caused by the ionization of the E-layer because of meteor scatter. Nevertheless, the most likely time to make a meteor-scatter contact is during a meteor shower.

During a meteor shower random contacts often are possible. One station will call a very brief CQ and listen for a response. A station hearing the first station will call that station, give his callsign, and either his grid locator or a signal report. The first station then announces the calling station's callsign and gives the responding grid locator or signal report. The second station responds by saying "Roger" several times. The contact is considered complete if both par-

ties have all they need for the QSO. The entire contact may take as little as 10 seconds to complete, if that.

For most meteor contacts (shower or otherwise), however, a structured schedule is set between two stations who wish to talk to each other. If you set such a schedule, you'll probably run for half an hour. You'll transmit for 15 seconds and listen for 15 seconds. The westward station transmits first. Some operators break at the end of 7 seconds and listen briefly for the other station. Be sure to clarify operating procedures with the other station before beginning your sked. The initial exchange includes the other station's callsign and your callsign, without either of you saying "this is."

For example, if I, in Oklahoma, grid locator EM15, were running with Herman, WB4DBB, in Virginia, grid locator FM07, I'd start by saying "WB4DBB N6CL" over and over again for 15 seconds. I would then listen for Herman to repeat "N6CL WB4DBB" over and over again during his 15 seconds of transmission time.

After one of us has heard "complete callsigns," the receiving station starts transmitting a signal report. So when I've heard both my call and Herman's call (in no particular order), I start repeating "S-2" during my 15 second segment, interspersing our callsigns—just in case Herman has yet to hear complete callsigns.

The signal report of "S-2," rather than the traditional "59," is a way of telling the listener the length of the burns being heard. The letter "S" stands for the word "signal" and the number 1, 2, or 3 stands for the length of the burn. Number 1 stands for "pings"; number 2 stands for burns long enough to make a contact; and number 3 stands for very long burns—at least 15 to 30 seconds in length. Therefore, a signal report of "S-2" means that the sending station is hearing the receiving station on burns long enough to make a contact. As a matter of convenience, most operators stick with "S-2" much like HF operators stick with "59."

Assuming Herman has heard both calls and the signal report "S-2," he'll start saying "Roger, S-2" over and over again during his 15 seconds. Once I have heard "Roger, S-2" I reply with "Roger" over and over again. Once Herman has heard my "Rogers" the QSO is considered complete. As an option, Herman can come back and say "Roger, 73" repeatedly during his sequence. However, it's not necessary to complete the contact.

Occasionally, the sequence can be broken. For example, when I ran with Ted Goldthorpe, WA4VCC, during the 1992 *Perseids*, I heard him give callsigns during the last 3 to 4 seconds of his 15 second segment. I immediately said, "WA4VCC N6CL. WA4VCC N6CL. S-2, S-2, break." Hearing me, Ted came back and said, "Roger, S-2. Roger, S-2, break." Continuing to hear him, I replied, "Roger, roger, roger, break." Hearing my "Rogers," Ted responded, "Roger, 73. Roger, 73. Break." I then replied "73, 73." At that point we both considered the contact more than complete just three minutes into the half-hour schedule.

Band Conditions: What band conditions can you expect during meteor showers? Unfortunately, it's not entirely possible to predict band conditions with certainty, especially considering the propagation modes that may be present at that time (sporadic-E, tropo, etc.). However, some generalizations can be made based on past experiences. On 12 meters it will seem as if the band is open everywhere (on

short skip) during the hour or so long peak. On 10 meters conditions will be much the same. If the storm is very intense, the same conditions that exist on 10 meters may also be present on 6 meters. On 2 meters stations may have propagation over a given path for up to a minute or so. On 135 cm propagation may exist for up to 5 seconds or more. Propagation on 70 cm may exist for a fraction of a second up to a couple of seconds.

Current Meteor Showers

As mentioned above, the big meteor shower for this month is the *Perseids*. As mentioned last month, activity for this shower starts appearing around mid-July. The most intense period is the four days leading up to the predicted peak. There should be several stations operating from rare grids during the peak days. Additionally, because of its close proximity to the weekend, several operators may get "meteor sickness" (not really) on Friday and stay home from work in order to "work" the shower.

After too many years of trying to report a predicted peak, and failing miserably, I am staying away from exact times. Nevertheless, your best bet is usually the early morning hours of 11–13 August. For skeds be sure to check 3818 and 3843 kHz and the VHF reflector on the Internet.

Current Contests

The annual UHF contest is scheduled for 3–4 August. The contest period is for 24 hours beginning 1800 UTC Saturday. There are several categories for entry.

Scoring: Count three points for 222 or 432 MHz contacts, six points for 902 and 1296 MHz contacts, and 12 points for contacts on 2.3 GHz and above. Exchange is your four-digit grid square. Again this year pins are available, such as those also available in other ARRL contests. The minimum number of contacts necessary for a pin is five. Submit your log by 4 September to the League to be eligible for awards. What is new this year is that the Rover scoring is like the Rover scoring for all other ARRL VHF contests. For complete rules, see July *QST*.

The dates for the first weekend of the eighth annual ARRL 10 GHz cumulative contest are 17–18 August (the second weekend is 21–22 September). The operating times are 8:00 AM to 8:00 PM, local time each day. The exchange is the six-digit Maidenhead grid locator. Scoring is adding the sum of the distances in kilometers of each station worked to the sum of each unique callsign worked multiplied by 100. For example, if you work four unique stations (two of which operated from two separate locations) that are 97, 107, 154, 205, 157, and 147 km apart (for a total of 867 km), then your final score would be 1267 (867 + 400). To be eligible for contest awards, submit your log by 22 October. What is also new this year is that the contest includes all bands, 10 GHz and above. Plus there are two entry categories from which to choose: 10 GHz only and 10 GHz and up. For complete rules, see June *QST*.

Note: When submitting your logs to the ARRL, you may do so either in writing or by several electronic ways. Consult their rules for instructions on how to do so.

Remember, 31 August is the deadline for submitting your logs for the CQ WW VHF contest. Please send the completed logs to me by that date in order to be eligible for scoring awards. If you need logs and/or entry sheets,



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ARRL June VHF QSO Party

Most participants reported better 6 meter conditions than last year. While Saturday seemed slow, Sunday brought up the slack, with some 6 meter ops reporting upwards of 125 Qs per hour runs during the peak (and some double-hop propagation). The highlight out west was a 20 minute 2 meter opening that stretched between Utah and Arizona on the west end and the Midwest on the east end. In the other end of the country, some groups reported that Murphy really soaked them, in some cases with almost continuous rain during the contest hours.

Lots of operators reported that they gave their IC-706s their first true tests, with results being predictable; many reported problems with the noise blanker and adjacent frequency interference. A couple of the guys reported that they used their IC-706s for IFs, for frequencies up to 1296 MHz. Interestingly, a sleeper radio, MFJ's 6 meter monobander, the 9406, performed surprisingly well, being almost impervious to adjacent frequency interference. It kind of figures, though. With Rick Littlefield, K1BQT, surrounded by the likes of WA1OUB, W1JR, KM1H, K1WHS, and other big guns, he had to design a radio to endure that kind of assault

and still be able to receive those weak Europeans from across the pond. Nice going, Rick!

Current Conferences

The following was excerpted from the Internet.

1996 International EME Conference: The 1996 International EME Conference, Washington, D.C., sponsored by the East Coast EME Group, will be held 15-18 August in Bowie, Maryland at the Comfort Inn between Baltimore, MD and Washington, D.C. There will be extensive slide shows, EME equipment demonstrations, door prizes, refreshments, noise-figure measurement contest Saturday night, guest speakers, electronic fleamarket area, and more!

Those EME operators who cannot attend the '96 EME International Conference may send slides. Send ten slides and one page explaining the slides and station to Willie, W1ZX (telephone 301-645-5584 between 2000 and 2230 ET; fax 301-645-6853; 24 hour e-mail at <xkiz73a@prodigy.com>; or postal address Willie Mank, W1ZX, 7620 Bensville Rd., Waldorf, MD 20603).

There are two hotels side by side: Comfort Inn (301-464-0089, fax 301-805-5563, and Econo Lodge 301-464-2200). Both are in Bowie, Maryland. The EME Group has a block of rooms at either hotel beginning Thursday

night. For reservations call the above numbers, with your credit card information handy. Room rates: Comfort Inn \$65 a night; Econo Lodge \$52 a night.

At the door, registration cost is \$62.00. Registration includes deli sandwiches Thursday night, Saturday evening dinner, and one copy of the Proceedings ('96 EME International call letter name Badge with pre-registration only). Cost of extra copies of the Proceedings is \$11.00, plus shipping. Spouse dinner cost is \$22.00. For registration, contact Don Carlson, W4RDI, 16307 Horizon Road, North Ft. Myers, FL 33917 (phone 941-543-8432; e-mail <dcarlson@gate.net>).

VHF+ Op First Vanity Callsign Recipient

VHF+ regular Mark Mandelkern, now ex-KN5S, was issued K5AM under the provisions of Gate 1 of the Vanity Callsign program. Congratulations, Mark. I hope to work you under the new call during the *Perseids*.

And Finally

It was at the HamCom Convention this past weekend that the point of strength in numbers was driven home to me. ARRL West Gulf Division Vice Director Jim Haynie, WB5JBP, commented to those in attendance at the ARRL forum that he recently attended a National Rifle Association convention in Dallas. At that convention he learned that the NRA has 20,000 members in the Dallas-Fort Worth area alone. Commenting on that statistic, he added, "Just think what the amateur radio community could do with those kinds of numbers!"

And why not? While Jim's ultimate pitch was League membership, his point was not lost on illustrating the lack of overall numbers in our hobby. Like it or not, we in the U.S. do not have the most amateurs among our population. Japan far exceeds us.

So while Jim was encouraging us to "each one get one" to join the League, I was thinking about how each one of us could get someone new into the hobby, or for that matter someone who used to be in the hobby back in. Here in seminary, I am working on my boss and her husband. With Gate 1 of the Vanity Callsign program now open, her husband has a bit of an incentive—that of obtaining his father's old call. With my encouragement, he made a visit to HamCom this past weekend to pick up the study materials for the Technician license.

Whom are you trying to recruit? Write or call me and tell me so that I can let the rest of our readers know. You know the usual places to find me. My e-mail, phone, and post office addresses are at the beginning of this column.

One final point concerning this present threat to our spectrum. In seminary I have learned about how during times of persecution religious groups thrive. This phenomenon is not unique to religious groups. Perhaps this threat to our hobby will be the uniting force which causes us to thrive. Only time will tell.

With this column I start my sixth year of writing about your activities. I have enjoyed every bit of it. Some of you have contacted me asking me how I am going to keep this up now that I am in school. I don't know, but I sure will try. And with you continuing to send me your good news, my job will be just that much easier. Thanks to you for making this, your column, a success. Until next month . . .

73, Joe, N6CL

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Tube: Svetlana 4CX1600B Tetrode (1)
QSK: Standard Feature
Line Voltage Requirement: 200/240V, 50/60Hz
Cabinet Size: To be announced later
Shipping Wt: To be announced later

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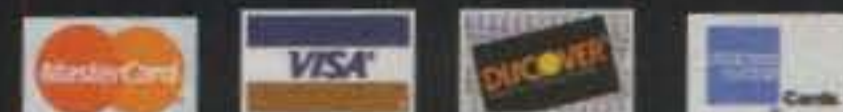
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Listening in a few days later, I found the same signal in the 17 meter band at about 18.17 MHz—an identical raspy sound and plenty loud! My curiosity was aroused. Who was emitting this messy signal? I decided to do a search to see if it was anywhere else in the spectrum.

YES! The same signal turned up near 15.15 MHz, 9.09 MHz, and 6.06 MHz, and the mother of all noisy signals was finally tracked to 3.03 MHz. It was S-9 plus 60 dB at this frequency! The bar indicator that served as an SWR meter on the transceiver shot over to the right and hit the edge of the display! The signal was very unstable, had hairy sidebands, and was continuous, seemingly 24 hours a day.

What in the world was creating this mess? It was so loud I concluded it must be in my immediate vicinity, perhaps next door or (horrors!) in my own house.

The Search For The Ugly Signal

I decided to start in my house. I took the antenna off the transceiver and put a clip-lead in the center pin of the antenna receptacle. This reduced the signal to about S-9 plus 20 dB.

Where to begin? The computer was turned on and off. The copy machine and fax were turned on and off. The laser printer, the stereo, the radar oven—all were tested, but the noise was unvarying.

Very discouraging. I then sat down with a cool glass of California Chardonnay (Napa Valley 1993) and racked my brains. Where to look next? The only thing I had not looked at was the telephone. But what part of the phone system would cause such trouble? Aha!

The "Wireless Phone Jack"

Some time earlier I had installed a "Wireless Phone Jack System" available from a nearby Radio Shack.

"Your home is already wired," screamed the write-up in the catalog. "No expensive hookup!" You merely use the existing electrical outlet and wiring as the interconnect between the wireless system and an extension phone. No phone wires needed (fig. 1). Not a bad idea. The exten-

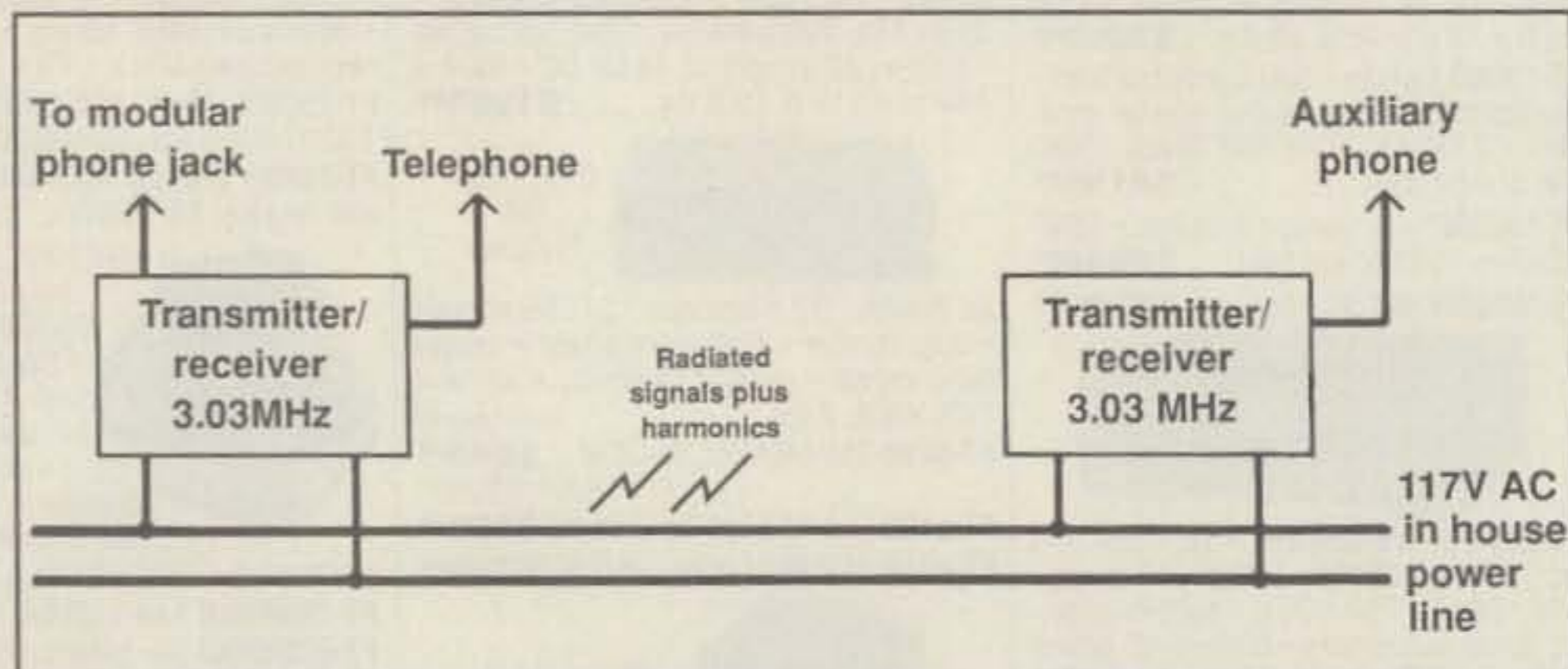


Fig. 1—Phone traffic modulates two-way transceiver to activate auxiliary phone. Power line conducts (and radiates) signals.

sion set was given to me a few months earlier, and I found it worked like a charm. I placed one extension unit in my garage shop and a second one in the kitchen—very convenient.

Jackpot! I unplugged the so-called base unit and the nasty signal disappeared. I plugged it back in the wall outlet and the signal swooped into my receiver—fascinating.

The next step was to dial a number and see what I would hear in my transceiver. I called my buddy Tiff, W6GNX, and breathlessly told him what I had discovered. While I talked to him, I listened to the buzzy signal on my transceiver, and I could hear some distorted speech on it. Mine! I switched the transceiver from the SSB mode to the FM mode and the buzz dropped out, leaving crystal-clear speech.

The mystery was solved. The transmitting unit (Radio Shack 43-160, called the Base Unit) was an FM transmitter, operating near 3.03 MHz, deriving power from the phone line, and transmitting the telephone signal back into the power line.

Plugged into the power line, at a location chosen by the user, was the extension unit (Radio Shack 43-161), presumably an FM receiver.

I quickly found that there was more to it than that. Since it was a two-way system, there had to be a transmitter and receiver at each end. Each unit, in fact, was a 3.03 MHz FM transceiver. The idea was a slick one, with the exception that the harmonics of the little transmitters were radiated back down the power line, along with the desired signal.

A notice on the back of each unit stated the devices complied with Parts 15 and 68 of the FCC rules. If this was the case, why were the loud harmonics ruining my reception in the 18 and 21 MHz bands, and at other points in the HF spectrum?

Now that I knew what I was hearing, I monitored 3.03 MHz for a few hours. Sure enough, I heard a much weaker signal that turned into intelligible speech when I switched the trans-

ceiver to the FM mode. Obviously, it was a wireless phone jack system in a neighbor's house.

This was a fine kettle of fish. Another radiating and poorly shielded gadget sold to the general public that can wreak havoc with a nearby communication system! I don't mind the use of an unfiltered power supply in the units (although it does create sidebands to the radiated signals), but I do protest the powerful harmonic signals that are spewed across the bands. They are very intrusive.

Worse yet, the General Electric Company is advertising these phone jack systems in several national consumer magazines. No doubt one of them will eventually end up next door to you. Expect trouble. You have been warned!

What To Do About This Pest?

First of all, I hope Radio Shack (Tandy Corp.) and the FCC Compliance and Information Bureau are aware of this problem and that they determine if the units really comply with parts 15 and 68 of the FCC Rules. I toyed with the idea of looking inside one of the units, but it is not easy to open the plastic enclosure without damaging it, and I doubt if there is much room in the case to make any modifications to reduce radiation. Why aren't systems such as these engineered properly in the first place? Harmonic suppression should be high on the list of design criteria.

What Can Be Done About The Immediate Problem?

The quick and dirty solution is to retune the units so the harmonics don't fall in the amateur bands. That costs nothing. But the root problem still remains to be solved.

One scheme that may be helpful is to place in the power line a low-pass filter that passes 3.03 MHz but rejects signals above that frequency. A filter in the phone line at the base

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Cooling Fan	NO	NO	NO	YES	NO
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The FT-8000R is the first mobile to provide superwide receiver coverage – from 110 to 550 MHz and 750 to 1300 MHz*, receiving public safety, marine, and weather channels. Using Yaesu's exclusive Enhanced Smart Search™, the FT-8000R automatically seeks out and loads active simplex channels into up to 50 ESS memory channels in just seconds – ideal when traveling.

Built-to-last, the FT-8000R brings together the most-requested dual band features and a MIL-STD 810 rating for enduring performance. Dual receive (V+V, U+U or V+U), Crossband Repeat (bidirectional or one-way), up to 50 Watts of VHF power output (35 Watts on UHF) with High/Medium/Low selection on each band, and "plug and play" 1200 or 9600 bps packet are just a few.

Clearly a standout, the FT-8000R boasts 110 memory channels (55 per band including

one-touch "Home" channels) that store repeater shift, CTCSS encode tone, and packet baud rate. Other essential features include a backlit microphone (another Yaesu first), Time-Out Timer, and an all-new S-Meter Squelch that opens based on the S-meter reading. And, for a programming alternative, the optional ADMS-2C Personal Computer Programming Kit simplifies operation even more.

The FT-8000R is the most affordable, easiest-to-operate dual band mobile on the market today! Bring its high-tech performance features home with you. Available at your Yaesu dealer now!

Features

- Frequency Coverage
RX: 110–550 MHz
750–1300 MHz*
TX: 144–148 MHz
430–450 MHz
 - 3 Power Output Levels
2m 50/10/5 Watt
70cm 35/10/5 Watt
 - 110 Memory Channels (55 per band, including "Home" channels)
 - Enhanced Smart Search™
 - CTCSS Encode
 - Time-Out Timer (TOT)
 - S-Meter Squelch
 - Dual Receive (V+V, U+U, V+U)
 - Crossband Repeat (bidirectional or one-way)
 - PC Programmable w/optional ADMS-2C
 - Intelligent Band Display (IBD)
 - Receiver Muting
 - Auto Power Off (APO)
 - MIL-STD 810 Rating
 - Omni-Glow™ Display
 - 1200/9600 bps Packet Compatible
 - Alternating-Band Memory Selection (ABMS)
 - DTMF Autodialer (one memory per band)
 - Accessories
- Consult your local Yaesu dealer.

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FT-8500
Dual Band Mobile
Detachable remote front panel, Alphanumeric Display, Spectra-Analyzer™, Digital Voltage Display, 110 memories in 5 banks, choice of microphones, offers high performance operating flexibility.



One tough little dual bander!

Features

- Frequency Coverage
Wide Band Receive
RX: 76-200 MHz, 300-540 MHz, 590-999 MHz*
TX: 144-148 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Digital Coded Squelch (DCS)
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Transmit Battery Saver (TBS)
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- Full line of accessories



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"Yeah, it's Mil Spec tough like a commercial HT."



"Easy to operate, small, great price!"

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Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50R is ADMS-1C Windows™ PC programming compatible, too. To round out the FT-50R, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50R is one tough little dual bander with all the features you want!

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FT-10/40R
Ultra Compact Handhelds
VHF or UHF. Similar to FT-50R including MIL-STD 810, and other exclusive features.

unit seems to do no good at all. The power-line circuit seems to be the radiating path.

I will report more about this troublesome device as I hear about it. Does anyone in the field have any solutions?

An Update on Power-Line Noise

Before we leave the unpleasant subject of radio noise, I want to mention a new publication that concerns power-line noise. The name is the *Power-Line Noise Mitigation Handbook*. It specifically deals with noise problems at Naval Receiving sites and is the culminating report of noise specialists who are consultants to E-Systems, Falls Church Division, 1595 Springhill Rd., Vienna, VA 22182. I don't know if the publication is available to the general public, but electric utilities may possibly obtain a copy by writing to the above-mentioned company.

The handbook lists the most common noise sources on overhead distribution lines. They are as follows:

1. Breakdown of a thin layer of oxide separating the metal parts of bell insulators.
2. Damaged lightning arrestors.
3. Minute sparking between loose items of pole-line hardware.
4. Small discharges between line conductors and insulated tie wires.
5. Small discharges between inadequately spaced and unbonded metal components.
6. Improperly assembled cable heads.

Over 25 additional noise sources are also identified.

One surprising conclusion given in the handbook is that the common practice of washing insulators on a distribution is not an effective noise-mitigation action. Dirty insulators have never been identified as a source of noise. Washing may temporarily render a noise source inactive, but the noise returns when the noise source is dry.

A valuable section of the book is devoted to noise-free techniques useful for new overhead line construction; tips on avoiding practices that lead to line noise in the future; and there's plenty of hands-on dope on chasing down power-line noise—the right way! All in all, this handbook is a practical addition to the never-ending pursuit of power-line noise.

A Really Neat QRP Rig For 80 Meters

My good friend Charles Kitchin, N1TEV, sent me the following information on a small transmitter using a single inexpensive AD811AN op-amp. Run from a 12 volt supply, 1 watt output is provided in the 80 meter band. Here is what he has to say about it.

This novel circuit uses a low-cost, high-speed op-amp as a crystal oscillator. Since the op-amp is a complete amplifier with a high-current, low-impedance output, it replaces the usual multiple-transistor circuit with its interstage transformers, toroids, RF chokes, and a large number of other components. In addition, since the crystal is tied to a high-impedance input, crystal current is practically zero. Another advantage is that a commonly available 99-cent microprocessor crystal can be used. The entire circuit should cost less than \$10 to build.

How The Transmitter Works. The transmitter circuit is shown in fig. 2. The AD811AN op-amp is biased to mid-supply voltage by R1 and R2. Oscillation occurs due to positive feed-

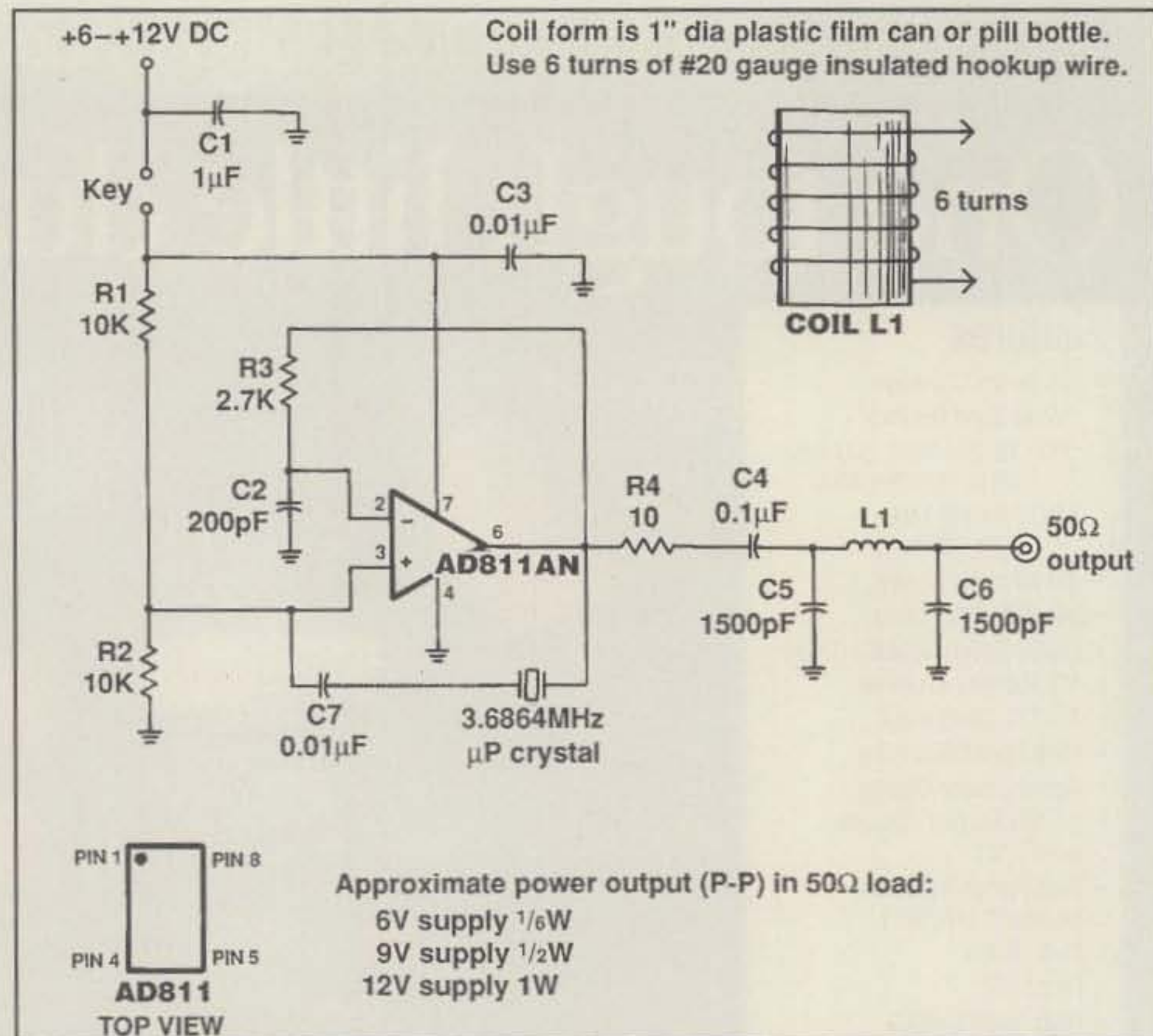


Fig. 2—An ultra-simple QRP transmitter for 80 meters. (Courtesy C. Kitchin)

back through the crystal and C7 to the positive op-amp terminal. DC stability is maintained by a negative feedback loop through R3 and C2. Capacitor C2 rolls off the higher frequencies while operating the op-amp at a DC gain of one. The output impedance of the device, in series with R4, is about 30 ohms.

The waveform of the oscillator is a rough sine wave which is low-pass filtered by C5, L1, and C6, which form a pi-network. This greatly reduces harmonics generated by the oscillator.

Coil L1 is wound on a plastic film can using standard insulated hookup wire. Resistor R4 isolates the op-amp from the low-pass filter network. Without it, the circuit can break into secondary oscillations. The pi-network provides a 50 ohm port for a coax cable to the antenna circuit.

How the Transmitter Operates. The AD811AN has a 100 mA output current capability, and if properly matched to the antenna, can provide a watt or more of power with a 12 volt supply. Under these conditions a small heat sink may be needed to protect the unit from overheating. These numbers are conservative, as this is a CW transmitter and operates intermittently. It may be possible to extend the power beyond 1 watt by using a 15 volt (or greater) supply, while increasing the value of R4 to maintain stability, and by adding the heat sink. The use of an external antenna tuner will help in getting the most power from this circuit.

Transmitter keying. The power supply to the transmitter is keyed. A 1 µF (or greater) bypass capacitor is located before the key. If it was on the other side of the key, the oscillator would turn on too slowly and there would be a "chirp" on the signal.

Possible Circuit Modifications. Since the AD811AN has a 140 MHz 3 dB bandwidth, the circuit can easily be modified to operate at other

frequencies as long as the value of C2 is changed so that its capacitive reactance is about 200 ohms at the operating frequency. Other op-amps could also be used, as long as the builder experiments with the values of C2 and R4 (select the minimum value for both, which still provides stable oscillation).

The Analog Devices' AD811AN op-amp is priced at \$4.69 in singles and is available from Newark or Allied Electronics.

Thanks, Charles, for your interesting circuit!

W6GXN—Silent Key

My good friend Hank Olson, W6GXN, passed away suddenly on March 9th of this year. I mourn his passing, along with his family. Hank had an inquiring mind and was interested in all branches of radio communication. He wrote over 150 articles for amateur and technical publications and taught night classes in electronics at Foothill College.

A graduate of Stanford University, Hank was fortunate enough to have had Dr. F. E. Terman as an instructor in radio engineering. While a student, he worked as a research assistant for the Radio Propagation Laboratory at Stanford under Dr. "Mike" Villard, W6QYT, and Dr. Allen Peterson, ex-W6POH. Later Hank transferred to Stanford Research Institute (SRI International) for continuing work with the Radio Physics Laboratory.

Hank and I spent many a happy hour at extended lunches discussing the vicissitudes of amateur radio and batting back and forth ideas for experiments and articles, some of which actually were written. Hank's latest article is in the forthcoming issue of *Communications Quarterly*.

A good fellow and a staunch friend, I will miss him.

73, Bill, W6SAI

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DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Small Parts and Kits—An Overview

I receive a vast number of phone and mail inquiries concerning parts procurement and sources for electronics kits. It is not uncommon to be asked, "Do you sell PC boards and parts for your CQ articles?" The answer is "no." Others frequently ask, "Can you recommend a supplier that has all of the parts I need for your latest project?" Another common question is, "Who sells the best kits?" There can be no direct answer to the last two questions. Any recommendation I might provide would be subjective, at best.

Gone seem to be the days when amateurs were willing to scrounge for parts by trading with amateur radio friends. We used to get on the air and ask others if they had a part we needed. The person at the other end of the QSO might look in his junk box and come up with precisely what was being sought. It was sold for a modest fee or traded for a part he needed, or he simply might have said, "It's all yours for the asking, at no charge."

I can remember when some of my complex projects required weeks or even months to complete, because I had to acquire the parts by trading and searching through electronics surplus stores for special items. This was part of the amateur radio challenge and mystique in those bygone days. Now we seem to exist in a society that demands instant gratification in all walks of life, amateur radio notwithstanding!

A Special Note to Readers

We authors receive a flood of mail and phone calls from readers. Most of the correspondents include a return envelope with postage (SASE). Some do not. I do not answer letters that don't include an SASE. The cost of postage, paper,

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envelopes, and computer toner is prohibitive when authors answer 10 to 25 letters per week. Your favorite author will appreciate the courtesy of an SASE when you write for technical advice. Also, an SASE usually ensures an answer to your inquiry.

Finding Those Elusive Parts

Some *CQ* and *Monitoring Times* readers of my columns have implored me to design projects around RadioShack components. They believe that one-stop shopping will solve their parts-procurement dilemmas. Not true! W1VD and I tried this approach in *QST* when I was the ARRL technical department manager some years ago. The problem with this admirable concept is that (1) Amateurs in many remote regions do not have access to RadioShack stores. (2) RadioShack has a history of discontinuing certain stock items without notice. (3) Many times the buyer finds a tag on the needed part rack that says, "Out of Stock. Re-order." In my experience it always seems to be the parts I need that are out of stock.

RadioShack sells quality components at reasonable prices, but it is difficult to design a comprehensive project around what is available in those stores. The same is true of almost any electronics parts vendor—especially those who deal in surplus. What may appear in one of their catalogs may be absent in their next edition. One-stop shopping is a fantasy, at best. It has always been a fantasy. We builders need to "shop around" by searching through the many catalogs that are available.

The list of suppliers at the end of this article represents the vendors with whom I do most of my business. There are many other reliable suppliers of surplus small parts today. Your success at parts procurement will improve

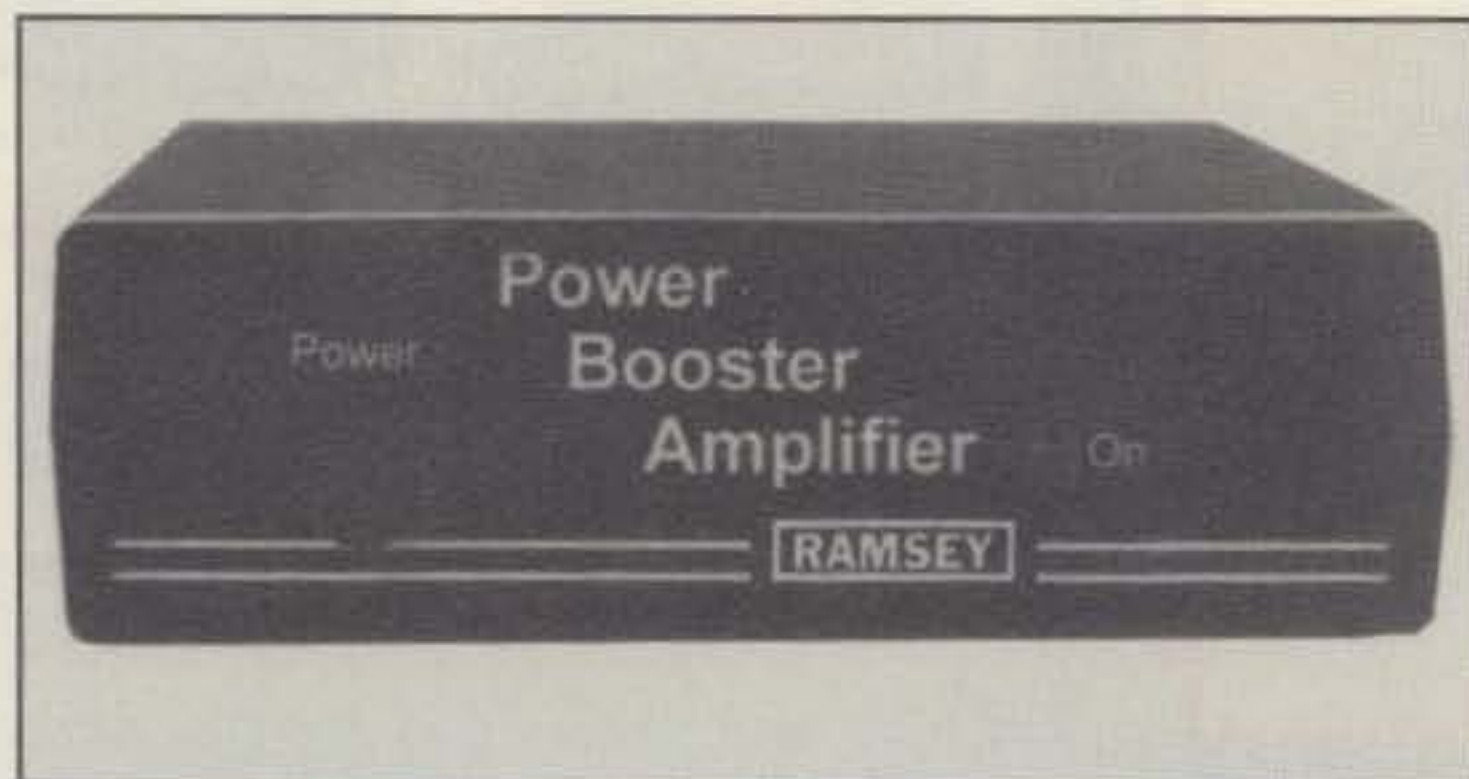
markedly if you develop a library of catalogs and keep it up to date.

The World of Kits

Most amateur-equipment builders continue to lament the passing of Heathkit. One could purchase everything needed for a pet project in one box. No outside shopping was required. Although someone else designed the equipment and provided predrilled chassis and panels, most builders experienced a feeling of accomplishment when the item was completed and operational. That same thrill awaits you if you construct one of the many kits available today from other manufacturers. Let's discuss some of these companies and their products.

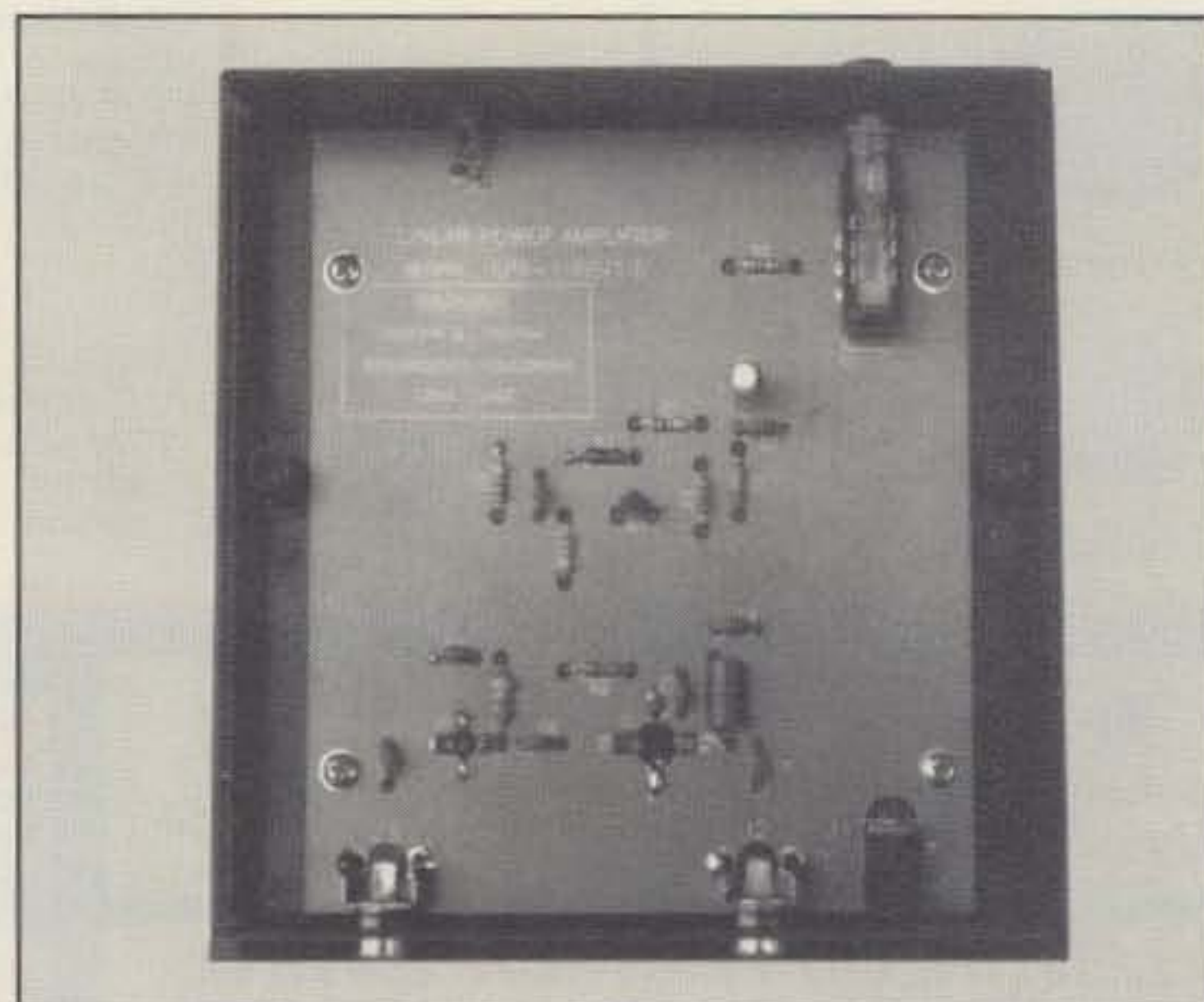
Ramsey Electronics Inc. Kits. If you have not seen a recent Ramsey catalog, you've missed an adventure in browsing! This supplier of kits offers something for nearly every amateur or hobbyist group. Amateur transmitter and receiver kits are available at modest cost for HF, VHF, and UHF. QRP enthusiasts will find many exciting projects to build and use. SWLs may construct, for example, the Ramsey AR-1 VHF aircraft receiver to monitor the commercial airline transmissions. I built one of these \$30 kits and use it to monitor airport traffic as distant as 300 miles. Since it is an AM super-het receiver, I also use it to track down power-line noise.

Other items, such as CW keyers, RF-actuated antenna switches, packet radio accessories, active antennas, and low-noise preamps for LF through the microwave frequencies are available at low cost in kit form. Fig. 1 shows a 1 watt broadband amplifier (No. LPA-1) that operates from 100 kHz to 1000 MHz from a 12 volt DC supply. I have used this module as the heart of a multiband QRP transmitter,



▲ Ramsey Electronics offers kits for making items such as this power booster amplifier.

Interior view of the Ramsey 100 kHz to 1000 MHz, 1 watt broadband linear amplifier. It is contained in a Ramsey accessory plastic cabinet. (See text for applications.) ➔



Recommended Parts Suppliers

Digi-Key
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Mouser Electronics
2401 Hwy. 287 North
Mansfield, TX 76063-4827
Phone: 1-800-346-6873

Hosfelt Electronics, Inc.
2700 Sunset Blvd.
Steubenville, OH 43952-1158
Phone: 1-800-524-6464

All Electronics Corp.
14928 Oxnard St.
Van Nuys, CA 91411
Phone: 1-800-826-5432

and also as an instrumentation amplifier for scopes and signal generators. Ramsey also offers 20 watt linear amplifiers for 80, 40, 30, and 20 meters. This QAMP series is handy as a "pair of shoes" for use when the QRP rig output power (1 to 2 watts) lacks the punch to complete a rare DX contact.

The foregoing items represent but a small part of the vast listing of kits available from Ramsey Electronics. I have built several of their kits and find the PC boards and components to be of high quality. Ramsey also sells cabinets with adhesive-backed panel faces for many of its kits. Each kit I built worked perfectly on the first try after construction and testing. You may obtain the Ramsey catalog by telephoning 1-800-446-2295.

Ten-Tec, Inc. Kits. Ten-Tec has long been a well-known producer of quality American-made products. Many years ago this remarkable company emerged in Sevierville ("severe-vil"), Tennessee with the once-famous PM-2 and PM-3 QRP transceivers. The basic circuits for these and some of my designs were copied by a then well-known kit manufacturer. My experience with the early and late Ten-Tec QRP rigs, and their more recent and complex SSB/CW transceivers, has indicated that quality and customer service are the priorities of this company, which was founded by Al Kahn, K4FW, and Jack Burchfield after their leaving Electro-Voice Corp. in Michigan and moving to Tennessee.

Ten-Tec has again entered the marketplace of kits (T-Kits) and accessory amateur gear. Although I have yet to build and test their latest kits, I am hopeful that I soon can acquire one and report my findings to you. Ten-Tec offers kits for the popular G5RV dipole antenna, their model 1253 nine-band shortwave receiver, numerous module boards, and some other HF receivers. A recent product is the No. 1209 six meter FM transverter kit which is driven by an existing 2 meter HT or base-station transceiver. This kit sells for a modest \$95. How about the model 1553 non-iambic electronic keyer kit for only \$12? If you have a Scot's blood in your veins, you will appreciate this gadget! The keyer can be built into your existing QRP or QRO rig.

Many other kits and cabinets are available

from Ten-Tec. Notable is their 15-memory 2 meter FM transceiver for \$195. You may order your T-Kit catalog by phoning 1-800-833-7373.

CCI Kits

Communications Concepts Inc. is located in Beavercreek, Ohio. This company has been around for many years, but most amateurs are not aware that it exists and sells quality kits.

I confess that I do not have CCI's latest catalog, but the one in my file lists numerous solid-state medium- and high-power linear amplifier kits for HF and VHF. Most of their products are based on proven Motorola designs. The AR305 kit produces 300 watts from 10 to 175 MHz. You can order a 1 kW amplifier kit for use from 2-50 MHz if you are a QRO enthusiast. PC boards and individual components for the CCI kits may be ordered separately. This is a cost-saving option for those who want to make their own PC boards, or who may have some of the parts on hand.

Items such as heat sinks, toroid cores, Arco trimmer capacitors, chip capacitors, broadband transformers, and mica capacitors can be purchased from CCI. A wide variety of RF power transistors, ICs, connectors, RF chokes, and diodes also are available from CCI. Low-pass harmonic filters are among the products offered. If you are interested in fast-scan ama-

teur TV, you may purchase CCI's ATV3 or ATV4 ham-TV converters. Digital frequency readouts, power splitters, and combiners are available also. Although I have not had the occasion to build and test the CCI products, I have received reports from customers who indicate that quality kits are produced by this company. You may obtain a catalog by phoning 513-426-8600. The address is 508 Millstone Drive, Beavercreek, OH 45434-5840.

Getting It Together

No amateur can realize the complete experience of our pastime without building some of his or her station equipment. You need not be a technician or engineer to accomplish this. All you need is enthusiasm and a moderate thirst for technical knowledge. Kit building provides familiarity with components and how they are used. Duplicating a CQ construction project helps the builder to comprehend schematic diagrams and learn how to apply specific parts in various places in a circuit. This type of experience is beneficial for those of you who wish to upgrade your amateur license. But more important, perhaps, is experiencing the feeling of accomplishment that accompanies building and operating something that was created with your mind and hands.

73, Doug, W1FB

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P40V	S	397,024	532
ON4UN	S	396,245	724
WB9Z	S	382,956	1644
AA5BL	S	360,100	1421
W2GD	M	355,872	1416
AB4RU	M	315,450	1483
WW2Y	S	312,930	1237
IR4T	M	280,007	571
AA8U	M	266,829	1271
WR8C	M	258,720	1259
XE1RCS	M	255,600	619
GI0UJG	S	222,859	527
KH6CC	S	219,657	378
VE3DXV	S	217,442	776
W7XU	M	207,225	1227
WD9INF	M	204,294	1107
W3GH	S	201,608	1067
RW2F	M	201,292	763
K8XX	M	195,129	1159
NC0P	M	194,028	1122
UA2FJ	S	192,038	641
N8ATR	M	183,668	1110
VE3RM	S	180,422	631
KN2T	M	180,026	1001
IV3TAN	M	175,950	510
VE3DC	M	169,861	601
LX4A	M	169,128	619
KV0Q	S	164,223	1013
N8JSK	M	161,246	948
KD9SV	S	160,056	848
OM7M	M	155,406	507
KB0KRO	M	151,775	1068
YU7BJ	S	150,670	481
S58AB	S	150,282	431
YV2IF	S	147,832	228
WA4SVO	S	144,074	730
AA0RS	S	143,883	832

T93M	S	143,584	491
UR0D	S	143,568	820
VA2AN	M	141,886	482
AC4NJ	M	139,315	666
PY0FF	S	138,690	210
N3MKZ	S	133,200	751
S57DX	S	132,691	447
W3TS	S	131,852	871
WZ4F	S	129,779	878
AA4MM	S	128,152	596
AA2MF	M	126,071	730
N5IA	S	125,188	834
K1HTV	S	123,968	871
KB7WON	M	121,572	785
N0BPM	S	121,024	869
EA3KU	M	120,846	337
K4JYO	S	118,680	760
KG8PE	S	118,338	802
DJ6QT	S	118,104	450
HB9CXZ	M	115,700	461
WA2UKP	M	115,413	651
W4IY	M	113,685	778
OT6L	M	106,176	371
OY9JD	S	105,154	425
W3MM	S	104,520	706
KE4TV	M	104,020	676
K1BNQ	S	103,726	755
S53M	M	101,136	356
ES5Q	M	100,550	391
WY3T	M	100,295	680
K4JRB	S	100,270	543
S54E	S	100,011	395
WA0DEY	S	99,072	696
NW6N	S	97,944	639
K3JT	S	96,384	666
AA7TF	S	95,465	677
LY7A	M	95,304	435
DF7RX	S	92,792	346
K3MD	M	92,008	663
OH1LEU	M	91,188	351
9A2TW	S	91,143	298

Call	CW		QSOs
	M	Score	
P40WA	S	1,288,000	1038
VP9AD	S	1,220,880	1630

ON4UN	S	1,133,370	1275	W3BGN	S	388,278	853
PJ9Z	M	1,066,016	963	F5IN	S	376,728	673
P49I	S	973,940	892	SL3ZV	M	376,112	762
PA6A	M	892,504	1128	VE3DO	S	375,648	748
W2GD	M	835,328	1515	S57AW	S	370,216	714
WW2Y	M	823,980	1438	G3XTT	S	368,928	589
W1KM	M	798,240	1379	SM4HCM	S	358,778	600
RK2FWA	M	781,432	1184	W3GH	S	352,512	1057
VE3EJ	S	742,366	1287	XE2/WA7UQV	M	349,425	910
9A1A	M	696,632	1071	LY2ZZ	S	347,895	769
8P9DX	S	659,718	905	OK5TOP	M	345,576	724
OZ1LO	S	565,440	979	DK6WL	S	344,080	677
KY1H	M	551,464	1273	KH6CC	S	336,742	530
SP5GRM	S	542,152	832	S50R	S	334,602	660
G0IVZ	S	542,016	863	HG1G	M	333,986	724
T11C	S	541,403	838	DK2OY	M	327,918	632
OM7M	M	528,736	804	OT6A	M	324,408	672
N2NT	S	523,587	1136	GI0KOW	M	321,554	621
SN3A	S	516,576	917	K4VX	S	318,742	1066
AA1K	S	496,225	1196	S57DX	S	317,352	674
DK1NO	M	483,173	797	LA9VDA	S	313,014	705
I4JMY	M	467,274	820	UA2FJ	S	311,411	539
OM5M	M	465,216	846	K5ZD	S	308,832	711
OY9JD	S	464,314	968	WZ3Q	S	305,184	963
N2LT	S	463,314	1157	AA0RS	M	305,030	955
AB4RU	M	462,735	1108	YU7BJ	S	300,042	696
K3WW	M	448,690	1088	4X4NJ	S	295,188	451
VE9AA	S	443,515	678	ES5MC	S	291,445	686
SP2FAX	S	440,280	843	K8CC	S	290,605	1176
WB9Z	S	430,008	1123	KV0Q	S	289,784	983
TO5T	S	425,355	676	KQ2M	S	280,000	875
HG5A	M	425,070	827	N4RJ	M	276,262	918
OK1CM	S	424,800	767	N6AR	S	274,752	671
S50A	S	423,801	801	HA8BE	S	268,837	572
PA6Z	M	415,010	723	DK0EE	M	268,600	624
KC8MK	S	413,952	1082	PA0CLN	S	267,456	531
AA5BL	S	410,773	1165	9A2TW	S	265,356	539
IL3/IK2NCJ	S	395,338	797				

High-Claimed Club Scores

Club	Score
Frankfort Radio Club	9,513,839
Southeastern DX Club	3,860,449
Yankee Clipper Contest Club	3,747,599
Slovenian Contest Club	2,940,304
Mad River Radio Club	2,586,990

Amplifiers, ATU Down Converters & Hard to Find Parts

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AN779L (20W)	AR313 (300W)
AN 762 (140W)	EB27A (300W)
EB63 (140W)	EB104 (600W)
AR305 (300W)	AR347 (1000W)

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440-450 MHz Amplifiers
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B-34-G
\$99

Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical Mirage B-34-G output power

Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

For an incredibly low \$99, you can boost your 2 Meter handheld to 35 watts -- the power of an expensive mobile!

Your handheld becomes a powerful mobile or base when you need it -- for a lot less money.

The Mirage B-34-G is perfect for both HTs and all mode SSB/CW/FM 2 Meter rigs.

A built-in low noise GaAsFET receive preamp gives you 18 dB gain for weak signals.

Works with HTs up to 8 watts. Power Curve gives typical output power. 5 1/4 x 1 3/4 x 4 3/4 inches.

Here's why the Mirage B-34-G is MIRAGE RUGGED!

... First-class strip-line techniques and modular construction -- gives you superb RF performance and unsurpassed reliability.

... Custom wrap around heatsink -- runs cool for extra long life

... Reverse Polarity Protection -- this Mirage feature can save your amp -- and your pride -- if you connect power backwards.

... Low input SWR -- keeps your handheld safe from overheating

... Positive-action RF sense transmit/receive switch -- ensures precision transceiving.

... LED indicators -- On-Air, receive preamp and power -- gives you confidence

... Pushbuttons -- select FM/SSB, receive preamp on/off and power on/off

... Free mobile mounting bracket

... Full one year MIRAGE warranty

... Legendary MIRAGE ruggedness

35 watts, FM only... \$79

B-34, \$79. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3 1/8 x 1 1/4 x 4 1/4 inches.



MIRAGE Dual Band 144/440 MHz Amp

MIRAGE RUGGED!

BD-35
\$199

Suggested Retail



Power Curve -- typical Mirage BD-35 output power

Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

- 45 Watts on 2 Meter/35 W on 440 MHz
- Automatic Band Selection
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- Reverse polarity protection
- Includes mobile bracket • "On-Air" LEDs
- Works with all FM handhelds up to 7 watts
- One year Mirage Warranty

Add this Mirage dual band amp and boost your handheld to a powerful mobile or base -- 45 watts on 2 Meters or 35 watts on 440 MHz!

Mirage's exclusive FullDuplexAmp™ lets you talk on one band and listen on the other band at the same time -- just like a telephone conversation! (Requires compatible HT)

B-5016-G
\$299

Suggested Retail



MIRAGE RUGGED!

Power Curve -- typical Mirage B-5016-G output power

Watts Out	130	135	140	145	150	155	160	165	170
Watts In	20	25	30	35	40	45	50	55	60

MIRAGE's most popular amplifier gives you 160 watts of brute power for 50 watts input!

The B-5016-G is ideal for your 20 to 60 watt 2 Meter mobile or base station. Power Curve chart shows typical output power for your input.

You'll talk further, longer and clearer on all modes -- FM, SSB or CW -- and hear weak signals better than you've ever heard before!

Low noise GaAsFET preamp gives you excellent 0.6 dB noise figure for pulling out weak signals. Select 20 dB or 15 dB gain to minimize receiver overload and intermod.

The B-5016-G is legendary for its ruggedness. We know of one that has been in constant use since 1979!

Your B-5016-G is fully protected with features found only in pricey commercial amps.

The Mirage B-5016-G prevents damage from high SWR or excessive input power by bypassing the power amplifier. LED warns you.

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The B-5016-G knows when you're transmitting and kicks in 160 watts of power. Adjustable

time delay gives you smooth transmit/receive switching. Also has remote external keying.

Extra heavy-duty heatsink spans entire length of cabinet. Draws 17 to 22 amps from 13.8 VDC. 12x3x5 1/2 inches.

Place your B-5016-G out of the way. RC-1 Remote Control turns On/Off, pre-amp On/Off, selects SSB/FM. RC-1, \$45, with 18-foot cable.

More 160 Watt, 2 Meter Amplifiers...

B-2516-G, \$299. For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

B-1016-G, \$379. MIRAGE's most popular dual purpose HT or mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

B-215-G, \$379. MIRAGE's most popular handheld amp. 150 watts out/2 watts in; 160 watts out/3.5 W in. For 0.25 to 5 watt handhelds.

6 Meter Amplifiers (50-54 MHz)

Bust through 6 Meters with 150 watts of brute power and work exotic DX! The A-1015-G, \$389, is the world's most popular all mode FM/SSB/CW 6 Meter amplifier. For 1 to 15 watt

transceivers. 150 watts out for 10 in. A-1035-G, \$659, 350 watts out for 10 in. Both are a compact 12x3x5 1/2 inches.

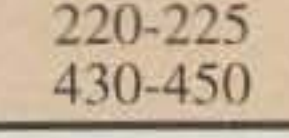
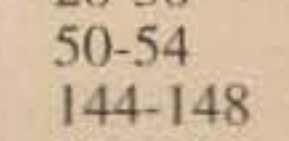
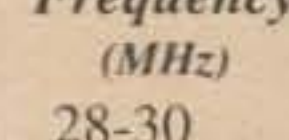
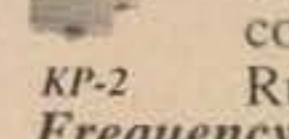
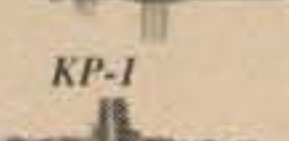
70 cm Amplifiers (420-450 MHz)

MIRAGE's most popular 70 cm amp -- the D-3010N, \$365 -- gives 100 watts out for 30 in. For 5 to 45 watt mobile/base.

D-1010-N, \$395, 100 watts out for 10 in. Dual purpose

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220-225	KP-1/220	KP-2/220
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WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Mobiling '96: Rolling Out in Style—Part II

We are back with Part II of this year's views of modern-style mobiling, and like last month's column, this second part is also filled with tips and new product information to help you get rolling in high style. Whether the subject is cars, keys, or rigs, folks seem always to be interested in my views on new trends. In the case of mobiling, the latest rage is combining 6 meters with HF (or VHF) operations, as desired. A quick scan through recent new equipment ads in our monthly magazines illustrates that fact. Manufacturers such as Alinco, ICOM, and Standard are including 6 meters in their new mini-transceivers, and they are today's hottest items. Meanwhile, companies such as Outbacker and Comet are producing new mobile antennas that cover several bands including 6 meters.

What is so special about 6 meters? First, its wide frequency span of 50 to 54 MHz supports both FM and repeater activities such as 2 meters, plus SSB and CW activities such as the HF bands. Second, 6 meters has better "direct" and "repeater" range than 2 meters, and occasional ionospheric conditions often "open" 6 meters on a nationwide and/or intercontinental basis (working DX with low power is common when 6 meters is hot). Finally, all amateurs holding a Tech or higher class license can join 6 meter action.

Is 6 meters your cup of tea? I would say it at least warrants checking out, so try it for yourself and see. Investigating new areas and ideas is what keeps amateur radio life exciting year after year!

Since last month's column focused on rig installations and Fortex's new super "Stealth" antenna, there was not room to describe the first (and conventional) mobile antenna I installed on my '96 model Camaro. Some interesting lessons were learned in the process, so let's continue from that point this month.

Ground—What's That?

Being anxious to get rolling "lowband mobile," I used one of the popular trunk-lip mounts to support my homebrewed antenna described in last year's mobile column (photo 1). That's when I learned some body sections on several models of newer vehicles are not metal, but are "composite material" (ground up compost and doggy milk bones?). Not realizing such, I marked the mount's set screw positions under the lid, then started scraping off the paint to ensure a solid metal ground connection. Regardless of how much I scraped, the VOM continued to show an open ground connection (what is all this white powdery stuff? Boy, they must have really clear-coated this paint!). Fortunately, XYL Sandy stopped me before I whittled a big chunk out of the lid!

Ah, but out of this unusual story comes some

4941 Scenic View Drive, Birmingham, AL 35210



Photo 1— Trunk-lip or hatchback mounted antennas are popular because they are easy to install and they position the antenna over a metal ground. The concept works fine, provided the car's body is actually metal rather than non-conductive "composite material"!

'96-style mobiling tips everyone can use—such as adding radials to synthesize ground and/or setting up a mobile ground-plane antenna rather than just using a whip "floating in the air." Are the end results worth the effort? You bet. Signal radiation efficiency is noticeably improved! Read on!



Photo 3— Here is a performance-improving idea everyone can use advantageously: Quick-strap a spare whip or resonator to a mount's ground connection, and use it to make a "one radial ground plane." As long as you are carrying them, you might as well put them to work in the rear window, right?

The overall performance of any mobile antenna is proportional to its ground or the amount of metal directly below its base. That explains why an antenna mounted in the middle of a metal roof pumps out such a good signal, and an antenna without a metal ground below it has trouble radiating a signal around

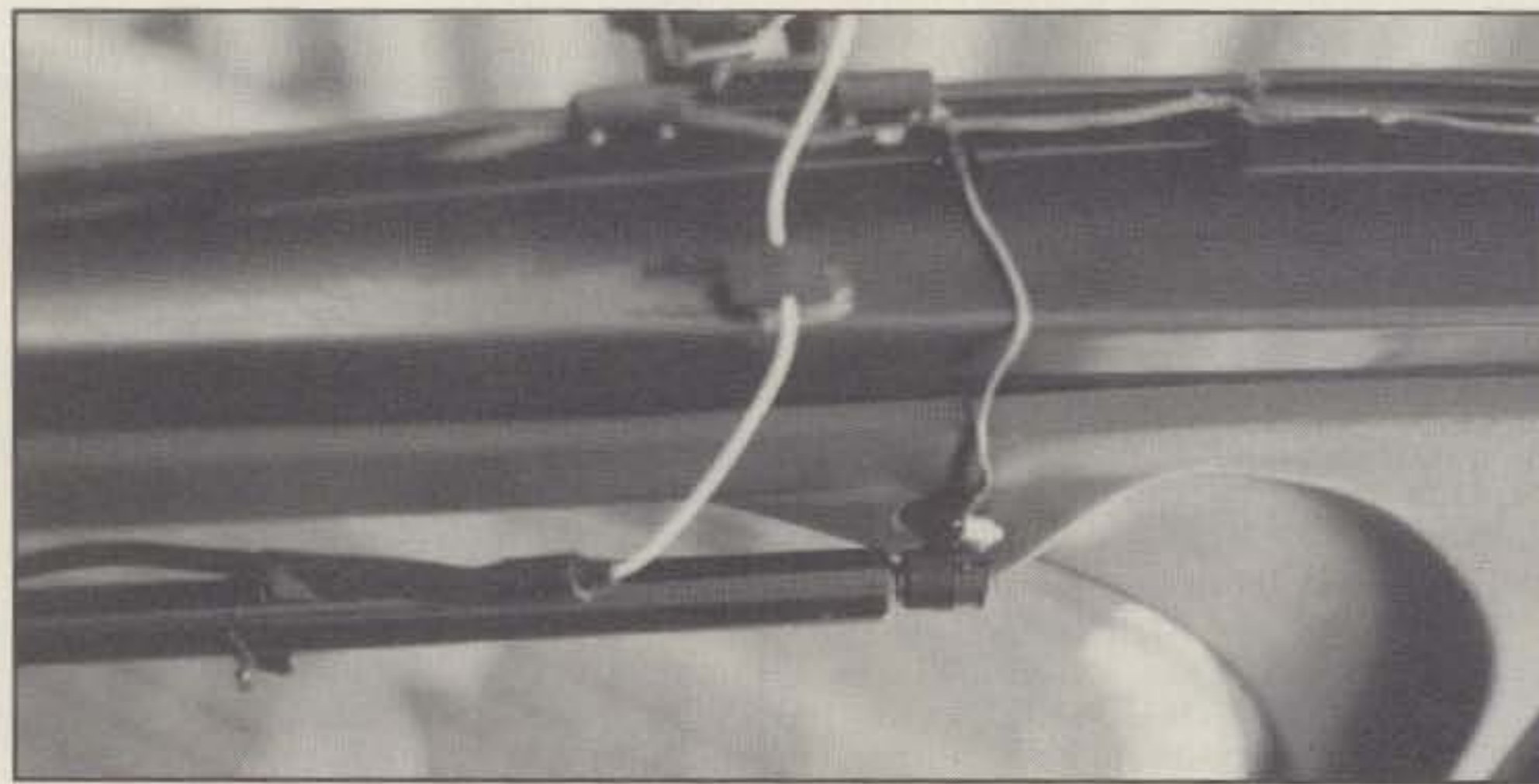


Photo 2— One quick and easy solution for getting an antenna to work when mounted on a non-metallic trunk or hatch is adding copper strapping or braid to act as a ground. The longer and wider the straps or braid, the better! This view of a raised hatch shows the braid under the lip. (See details in text.)

the block. Add to that fact *more and more vehicles are being made with less and less metal*. If you own or are considering buying a new car, check it out with a 2 meter mag mount. In my case, it would not stick on the roof, trunk, back area, or any part of the bumper ("composite material" everywhere!). Okay, back to the story.

Although I had run a ground strap a couple of feet to a hatch brace (which my VOM showed connected to ground), the resultant SWR was 3:1 and my signal was pitifully weak. Evidently the brace had electrical continuity through half the car before connecting with frame-ground. Panic struck. I installed a 2 meter antenna with 3/8-24 threads in the lip mount and tried 2 meters. The SWR was horrendous, the rig cut back its output, and even nearby repeaters were "noisy copy." I then attached a long length of shield/braid removed from some RG-58 coax to the mount and secured it to the hatchback lip's underside with double-sided tape (photo 2). One end of the braid was slipped under a hatch-lid hinge bolt, hoping for a more direct and solid ground with the car's frame. The SWR dropped below 1.5:1 on most HF bands and decreased to 1.2:1 on 2 meters, and all my antennas began tuning more like they should.

In Pursuit of Perfection

Still intent on improvement, I compared notes with mobileer extraordinaire N4KEL. Sy suggested converting the antenna into a mobile ground plane—possibly by using some of the short "firestick" resonators found each year at Dayton. Now that should really stop traffic!

I then modified his suggestion for "social acceptance" by making a "one radial ground plane." A 2 foot length of shield was routed from

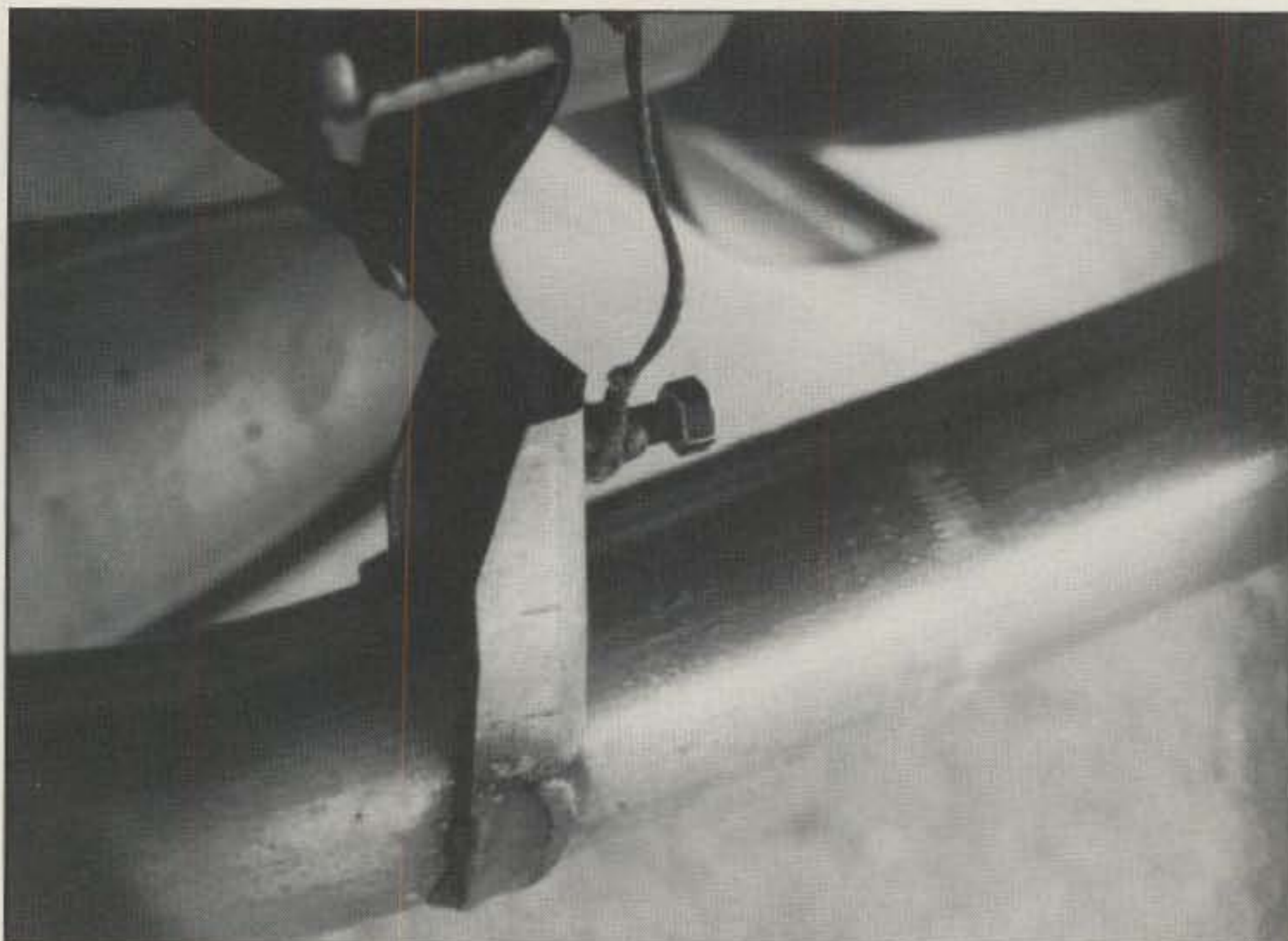


Photo 4— This through-rear-fenderwell view is a reminder to ground-strap your car's tailpipe for reducing ignition noise. The process is easy: Just loosen two bolts, slip some braid in place, and retighten the bolts. In a hurry? Just put alligator clips on the braid, reach under the car, and clip it in place.

the antenna mount to a spare mobile mini-mast and resonator laid widthways behind the rear seat and "looking out the rear window" at the antenna (photo 3). I reasoned that adding the longest possible length would be the most ben-

eficial for this radial, so I used a resonator for the lowest band I had available.

Did the lash-up help? Yes indeed! So much so, in fact, I am now in the process of adding two "resonator radials" out of sight inside the

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FNB-17	7.2v @	600 MAH
FNB-25	7.2v @	600 MAH
FNB-26	7.2v @	1200 MAH
**FNB-26(S)	7.2v @	1500 MAH
FNB-27	12v @	600 MAH
**FNB-27(S)	12v @	800 MAH
***1/4" longer than FNB27		
FNB-31	4.8v @	600 MAH
FNB-33(S)	4.8v @	1500 MAH
FNB-35(S)	7.2v @	600 MAH
*FNB-35(S)(S)	7.2v @	1500 MAH
FNB-38	9.8v @	600 MAH

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Photo 5— This clever new "Ne-Ke" was designed and is being made by Boyd Mason, N8VKA. It is a leg-strapped, smooth-handling iambic paddle, just the ticket for mobile CW.

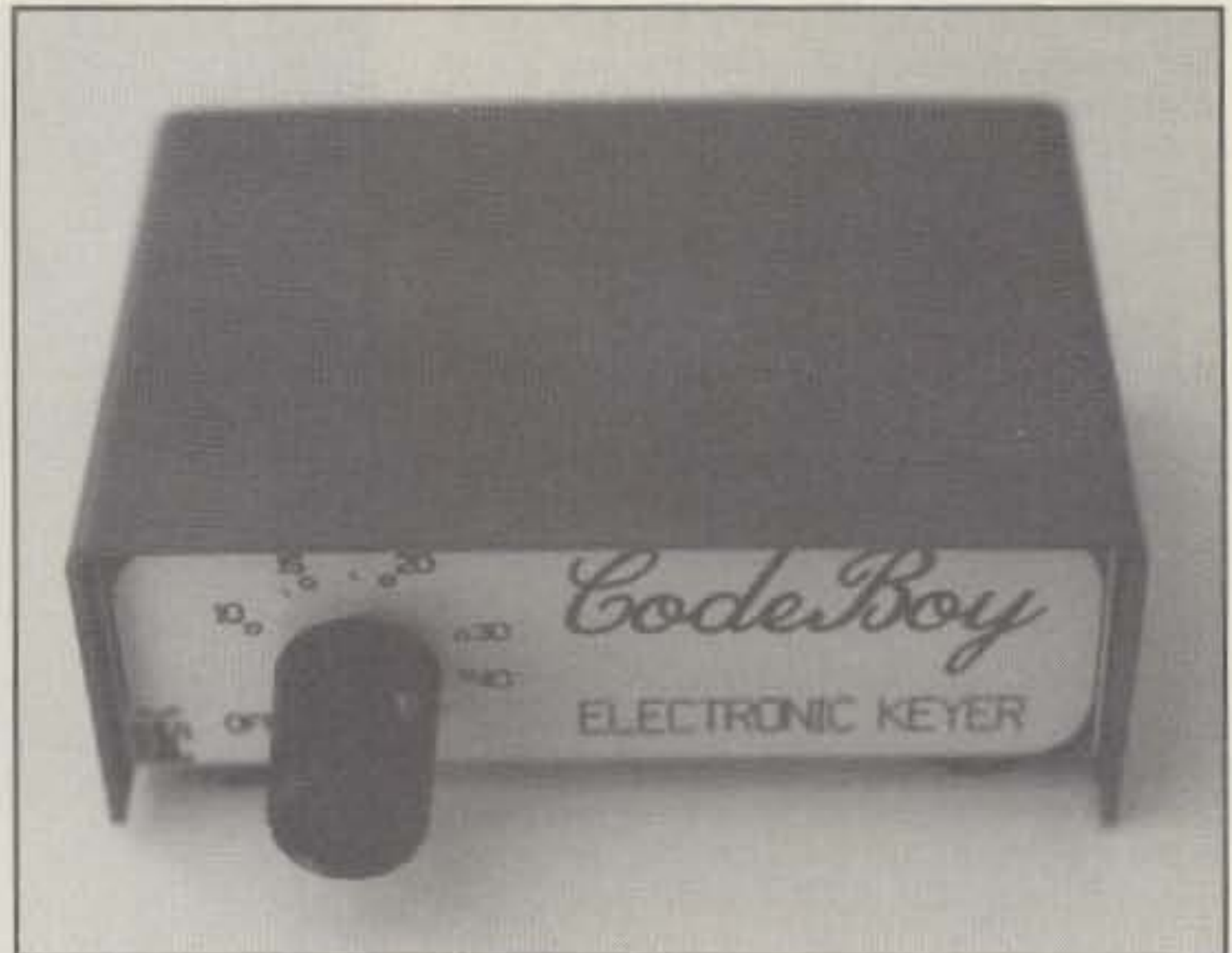


Photo 6— Say you need a tiny yet fancy electronic keyer for mobile and portable operations? The new Code Boy is only 1"H x 3"W x 3"D and runs over 250 hours key-down on a single battery.

rear rubber bumper of my car. They will copper-strap-connect to the Fortex custom body mount featured in last month's column. That, plus some additional copper strapping strategically placed under the car's body, should compensate for the vehicle's lack of metal. Keep these ideas in mind, friends. They seem like the only viable solution to big-time mobilizing in the new "composite material" cars that all manufacturers are making.

Like any devoted mobileer, my next step was

inspecting the exhaust system of my new vehicle and grounding the tailpipe to minimize ignition noise. I looked under the car and sure enough: the fancy stainless steel tailpipe was mounted with rubber-insulated hangers. A quick check with my VOM revealed the complete motor and tailpipe were composite-material-insulated from the frame, so a couple of braid grounding straps were added (photo 4). Ignition noise dropped from S7 to S2. I mention this in the hope that other mobileers will

also be moved to check their setup's tailpipe. Grounding makes a noticeable improvement in reducing ignition noise!

A Clever, New Mobile Key

Shifting gears slightly, we now have details on a neat little gem to share with all our CW mobile friends—the leg-strapped "Ne-Ke" shown in photo 5. I know, I know. You're saying it doesn't look like a key (actually, it's an iambic paddle

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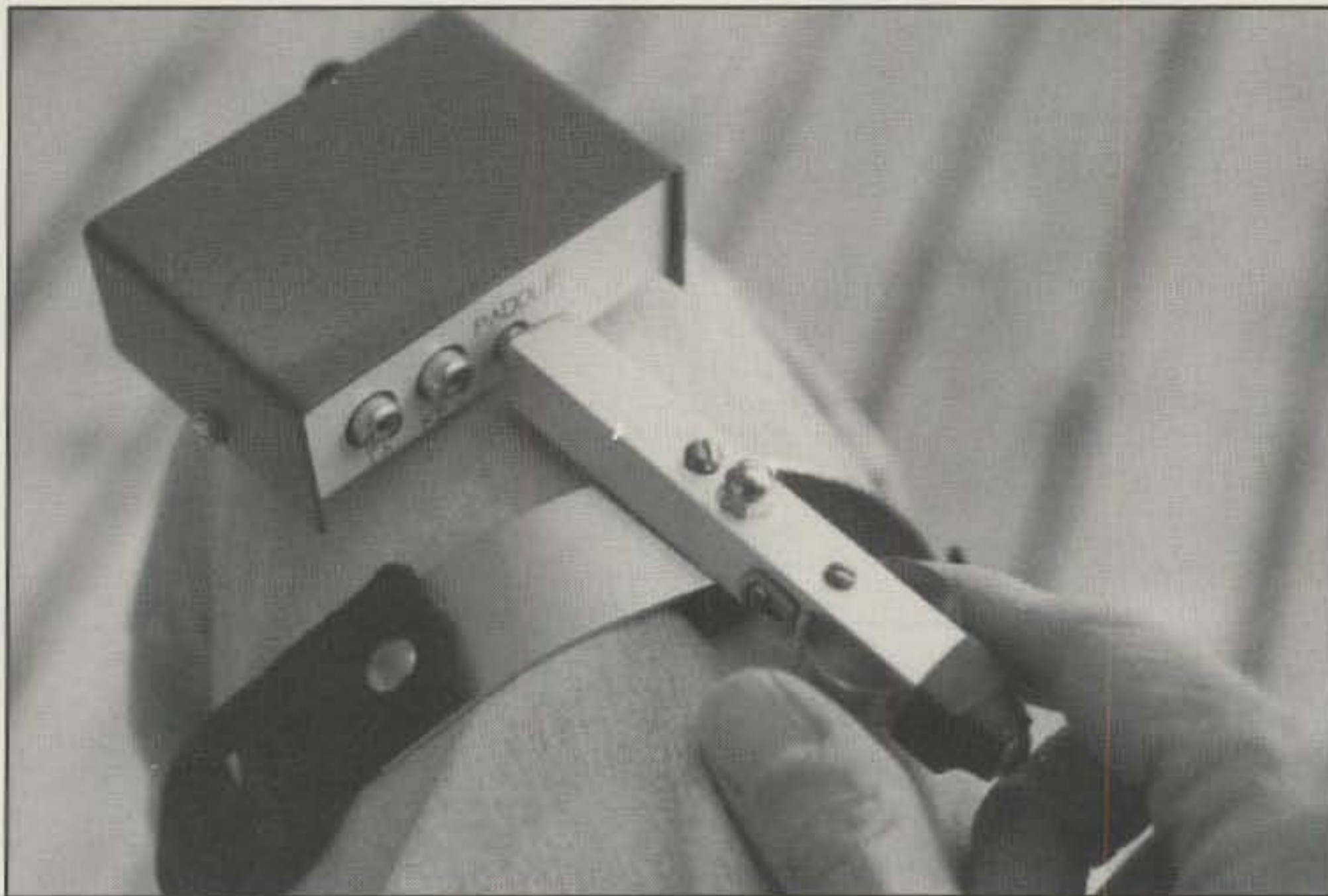


Photo 7— The Code Boy's rear socket and the stereo mini-plug built onto the Ne-Ke's rear align like they were made for each other. For safety's sake, however, I added a short metal support strap under the paddle and keyer.



Photo 8— The new Perth Plus Outbacker mobile antenna poses against a most appropriate backdrop in eastern Tennessee. The 6½ foot tall antenna operates 80–10 meters plus 6 and 2 meters. (Photo by Outbacker's Don Arnold, WD4FSY.)

for an electronic keyer), but that's also what XYL WB4OEE said the first time she saw it. She handed it to me, and I was equally as intrigued, so I plugged it into my keyer and started fiddling with the thing. Lo and behold, lightly touching the left side's curved spring sent a string of quite accurately controlled dots, while touching the right side's spring sent a group of equally well-controlled dots. This funky little thing actually works—and it works well!

I practiced with it a couple of minutes, then flipped on 30 meters and made some friendly contacts with it, and have been enjoying it "carefree mobile style" since that time. The Ne-

Ke is quite inexpensive, hearty for mobile use, low-profile enough that theft seems unlikely, and handles really well. The Ne-Ke is bolted to a curved aluminum strap attached to an adjustable belt. There is a buckle on one end and a Velcro fastener on the other end. You just



Photo 9— Outbacker's new OB-360 mount for the Perth Plus. It is supplied with spring and preassembled cable, and installs on a trunk or hatch lip in only a couple of minutes. (Photo by Don, WD4FSY.)

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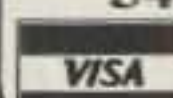
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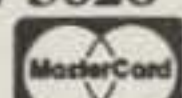
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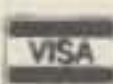
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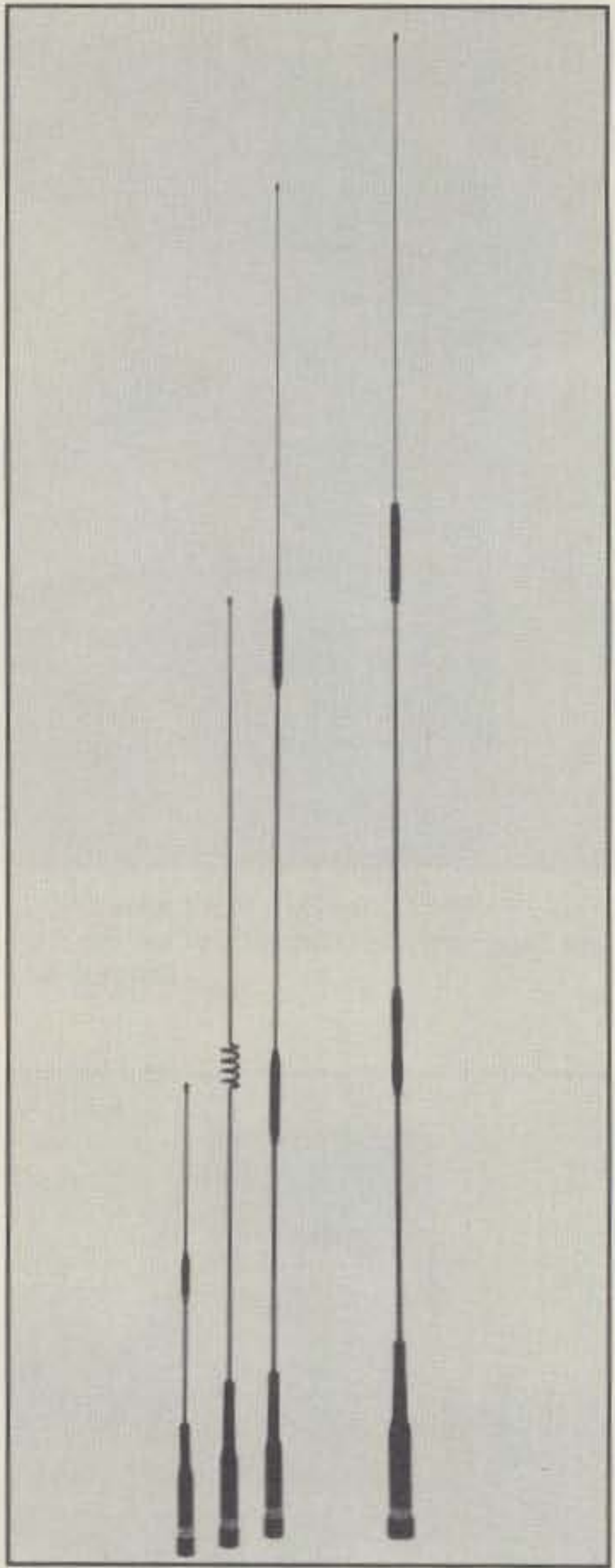


Photo 10- The new Comet SBB-15 mobile antenna for 6 meters, 2 meters, and 70 cm (right) is 56 inches tall, black coated, and looks great. It's shown here posing beside its little brothers, the SBB-2, SBB-5, and SBB-7 dual-band 2 meter/70 cm antennas. (Photo by Wayne Holden of Anaheim, California.)

whip it around your leg (or a passenger's leg if you are a left-handed passenger), snap the end, and start sending CW. The leg strap and bracket are unquestionably the best and most secure I have ever seen. It holds the Ne-Ke paddle in place beautifully—just as if it were on a desk. The curl cord also unplugs from the Ne-Ke for quick disconnect fans. Finally, a desk model is available for home use.

The Ne-Ke is made by Boyd Mason, N8VKA, of 8297 Cleveland, W. Coopersville, MI 49404 (telephone 616-837-7182). Ring him up and start living the good life. Not only is CW mobile a treat, it also avoids incredulous stares from other motorists. ("Look, Ma. He's talking into his hand!") You just smile, chew gum, and transmit with an out-of-view key!

... And Mobile Keyer

Like many of today's economy transceivers, my TS-50 lacks a built-in electronic keyer. I thus

have been hunting for a super-small, self-contained keyer for mobile and portable use. Being a true CW enthusiast, I know Morse mobile often involves simply "bumping" a paddle's fingerpieces and relying on the keyer to send perfect code. The keyer also needs memory to "follow behind me" when my fist and a selected speed are different.

Recent ads featuring the Code Boy keyer from Radio Adventure Corp. (P.O. Box 339, Seneca, PA 16346; telephone 814-677-7221) looked enticing, so I ordered one and had a Code Boy in operation a few days later. The little keyer proved to be superb! It has iambic action, dot/dash memory, and a paddle debounce circuit to minimize errors; it runs off an internal long-life 3 volt lithium battery; and a single knob turns it on/off plus sets speed (photo 6). The Code Boy is available fully assembled and ready to use, or in kit form. The Code Boy's rear-paddle socket also lines up perfectly with the Ne-Ke, allowing both paddle and keyer to be strapped to the leg for easy mobiling (photo 7). If you are looking for a fair-priced keyer to mate with a favorite paddle (always a challenge!) check out the Code Boy. It is a sharp little item.

New Model Outbacker Antenna

From the bush country of Australia and the eastern Tennessee home of Don Arnold, WD4FSY, comes news of a new model Outbacker antenna for modern mobileers—the Perth Plus. This latest addition to Terlin's fine line of mobile antennas is shown in photo 8. The new Perth Plus works it all, from 80 through 10 meters, including WARC bands, to 6 meters

and 2 meters. Ten bands in one go-anywhere antenna is a capability that is hard to beat! Like all varieties of Outbackers, the "Plus" is factory pretuned and comes ready to install. Like its cousin, the world-famous "Perth," the "Plus" also has a built-in "Roo" impedance matching coil in its base.

Overall height of the Perth Plus is approximately 6.5 feet. Its lower section (which is approximately 3 feet tall) has a weatherproofed helically wound radiator with stainless-steel taps for band selection. Three stainless-steel top stingers complete the "Plus"—one stinger for HF, one for 6 meters, and the third stinger for 2 meters. Outbacker has also come out with a new heavy-duty trunk-lip/hatch-mount complete with spring for the "Plus"—the OB360 shown in photo 9. Together they make a clean, low-profile mobile antenna system that is neat and quite rugged.

So how does the Perth Plus stack up for mobiling '96 style? Quite well, in my estimation. It does not pump out a killer signal like the super-size Fortex "Stealth" discussed in last month's column, but it can "hold its own ground" when compared to other antennas of its size (or a tad taller).

Ah, but there is more to an Outbacker than just performance. Each type is very well made, easy to carry, and works without dinking. Just screw one into a regular 3/8-24 thread mount, plug its "Wander Lead" into a desired band socket (or change stingers for 6 and 2 with the "Plus"), and go. Don Arnold is also very helpful in guiding new mobileers through ground strapping auto body sections. He is another "good guy" of amateur radio.

New Comet Triband Antenna

If you are a Tech licensee or if 6 meters, 2 meters, and 70 cm are your bands of mobiling preference, check out Comet's new SBB-15 triband antenna shown in photo 10. This gem pumps out a healthy signal on our popular FM bands, plus its stylish design adds class to any car (vehicles without amateur radio antennas look so pitifully plain!). The SBB-15 has a bottom SO-239-type connector, so use one of the popular "UHF mounts" such as Comet's new break-apart CQ-5M for quick "can't miss" installation. The SBB-15 is a full quarter-wave radiator on 6 meters, has plenty of long-range gain on 2 meters and 70 cm, stands 56 inches tall, and has a fold-over feature for garaging. It's an ideal mate for triband FM rigs such as Standard's new C-5900DA.

Conclusion

Okay, friends, those are the views of what's happening in mobiling from this end. Now it's time for you to tell (and show!) us what you are doing at your end. Yes, and let's also hear from some bicycle mobileers. How many of our two-wheeling silent sport fans are running HF setups? Is grounding a problem? How about sports-car mobileers? Shoot a good photo of your setup (maybe use a self-timer, so you can be in the picture), tell us about your adventures, and we will feature your work in a future mobile column. Meanwhile, keep on rolling and hamming in style! I'm sure our paths will soon cross on 30 meters.

73, Dave, K4TWJ



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Note the following operator classes.

IV. Operator Classes: There is a **High Power** category (greater than 150 watts) and a **Low Power** category (less than 150 watts). **Only Single Operator All Band and Multi-Op Single Transmitter** entries are eligible to enter the **High** or **Low Power** category. Enter one or the other, and so note on your log. Single Band entries, Single Operator Assisted, and Multi-Multi entries are **not** eligible to enter the High or Low Power category.

1. Single Operator, All Band and Single Band. One person performs all operating and logging functions. Use of spotting nets, DX Alert Packet systems, telephone, etc., is *not* permitted.

2. Single Operator Assisted, All Band Only. One person performs all operating and logging functions. However, the use of DX spotting nets or any other form of DX alerting assistance **is** allowed. The operator can change bands at any time. Single operator stations are allowed only one transmitted signal at any given time.

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(a) All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must physically be connected by wires to the transmitter.

V. Entry Categories: Single Operators may enter as (a) All Band High Power or Low Power; (b) Single Band; or (c) Single Operator Assisted All Band.

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VI. Modes: Contacts may be made using Baudot, ASCII, AMTOR, PACTOR (FEC & ARQ), CLOVER, and Packet (no unattended

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X. Countries: The ARRL and WAE country lists will be used.

Note: The USA and Canada count as country multipliers.

Example: The first US State and Canadian area you work not only count as a multiplier for the state or area, but also count as a country multiplier for each band.

XI. QSO Points: One (1) QSO point for contacts within your own country. Two (2) QSO points for contacts outside your own country but within your own continent. Three (3) QSO points for contacts outside your own continent.

XII. Multiplier Points: One (1) multiplier point for each US state (48) and each Canadian area (13) on each band. One (1) multiplier point for each DX country in the ARRL and/or WAE lists on each band. **Note:** KL7 and KH6 are country multipliers only and not state multipliers. One (1) multiplier point for each CQ Zone worked on each band. Maximum of 40 Zones per band.

Note: Canadian areas are VO1, VO2, VE1 NB, VE1 NS, VE1 PEI, VE2, VE3, VE4, VE5, VE6, VE7, VE8 NWT, and VY Yukon.

XIII. Final Score: Total QSO points times the total multipliers equals the total claimed score.

XIV. Contest entries and logging instructions: CQ WW RTTY DX logs and forms should be used to facilitate scoring and checking. All logs **must** show:

1. Times in UTC.

2. All sent and received exchanges are to be logged (callsign, RST, Zone, country, State/VE, points claimed).

3. Indicate State/VE area, Zone, and Country Multiplier only the *first* time they are worked on *each* band.

4. Use a separate log sheet for *each* band.

5. A check list of duplicate contacts for *each* band (dupe sheet). Logs must be checked for duplicate contacts, correct QSO points, and multipliers. Submitted logs must show duplicate contacts clearly marked.

6. A *multiplier* check sheet for each band.

7. An overall *summary sheet* showing total QSOs, Points, Zones, Countries, and States/VE areas worked.

8. Each entry must be accompanied by a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

Contest forms are available from CQ, *The Digital Journal*, and the Contest Directors. Please include a large SASE with two units of US first-class postage or IRCs.

9. **Disks:** Logs may be sent on disk. Clearly label the outside of the disk with the call, file names, and type of program. All disks **must**

be accompanied by a paper log satisfying all logging instructions.

10. **Internet:** Watch for an announcement of an Internet address to send your logs to also.

XV. **Disqualifications:** Operating in an unsportsmanlike manner, manipulating scores or times to achieve a score advantage, or failure to omit duplicate contacts which would reduce the overall score more than 2% are grounds for disqualification. The use of non-amateur means such as telephones, telegrams, etc., to elicit contacts or multipliers during the contest is unsportsmanlike, and the entry is subject to disqualification. Actions and decisions of the Contest Committee are official and final.

XVI. **Awards:** Plaques will be awarded to the first-place finishers in each of the operator classes. Certificates will be awarded to second and third places. Certificates will be awarded to the first-place finishers in each DXCC country. In countries or sections where returns justify, certificates may be awarded to second and third place. All scores will be published. To be eligible for an award, a Single Operator station must operate a minimum of 12 hours, and a Multi-Operator station a minimum of 18 hours. A Single Band entry is eligible for a single band award *only*. If a log contains more than one band, it will be judged an all band entry, unless specified otherwise. All certificates and plaques will be issued to the licensee of the station used.

XVII. **Deadline:** All entries must be postmarked **no later** than December 1, 1996. An extension may be given if requested. Logs should be mailed to: Roy Gould, KT1N, CQ WW RTTY DX Contest Director, P.O. Box DX, Stow, MA 01775 USA.

XVIII. **Plaques (Donors):** Single Operator and Multi-Operator All Band plaques are awarded to the high scorer, either High Power or Low Power, whichever is highest.

Single Operator, All Band

World High Power—AEA, Advanced Electronic Applications, Inc.
World Low Power—Open
North America High Power—TG9VT Memorial
North America Low Power—International Digital Radio Assn.

South America—Neal Sulmeyer, AE6E

Europe—HAL Communications Corp.

Oceania—*The Digital Journal*

Asia—N5JJ Memorial

Africa—Phil Duff, NA4M

United States High Power—RTTY by WF1B

United States Low Power—Dunestar Systems

Single Operator, Single Band

3.5 MHz—Neal Campbell, AB4MJ/ON9CNC

7.0 MHz—Tri-County DX Assn.

14 MHz—Kunihiko Fujii, JH1QDB

21 MHz—Denis WD4KXB & Mike KA4RRU

28 MHz—Open

Single Operator Assisted

World—CQ magazine

North America—Jeff Bouvier, K1IU

Continents—Open

Multi-Operator, Single Transmitter

World High Power—AEA, Advanced Electronic Applications, Inc.

World Low Power—HAL Communication Corp.

North America High Power—W6/GØAZT Award

Continents—Open

Multi-Operator, Multi-Transmitter

World—CQ magazine

Continents—Open

There are many plaques looking for sponsors: High Power, Low Power, Single Band, a specific country, Multi-Op by continent, etc. If you are interested, contact the contest co-director, Ron Stailey, AB5KD, 504 Dove Haven Drive, Round Rock, TX 78664 (Internet: ab5kd@easy.com). ■

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Antennas and Digital RF Communications

This month's column deals with the specifics related to various types of antennas. We will consider everything from an isotropic radiator to a beam (dipole plus parasitic elements).

Packet radio is one of those communications modes that tells the world what kind of antenna system is at the station of the originating signal. In fact, if the antenna is not constructed and erected so it will provide good capture of signals and have the lowest noise component with respect to terrestrial noise, then no one is to blame except the person who created the antenna system design and installation.

Your packet station's antenna is about to become your doorway to the world. Everyone who has spent any time around me will confirm that "Buck is a perfectionist when it comes to his antenna." I am very particular where my packet antenna or even the HF voice antennas are concerned. Even when I go to buy cable and connectors, I specify the best quality. Over the years the antenna is the one part of the station that gets the least amount of attention after it is installed. I want to build my antenna so that

it will withstand the elements and provide dependable communications for a long, long time.

With over 40 years as an amateur and over 30 years as director of engineering for a group of television and radio stations, and with my experience as a communications engineering consultant, I've learned some very valuable lessons with regard to the radiating element of the station. *Signal quality begins at the tip of the antenna, travels down through the transmission line, and reflects off the operator at the other end.* Let your reflection be a good one.

Radiation and Resonance

If we were to feed an RF signal to a piece of wire suspended in the air, the signal would radiate over a wide area. To obtain maximum coverage, the wire should be a resonant length at the transmitter operating frequency.

Antennas can be constructed to radiate with directional, omni-directional, and bi-directional patterns. The kind of pattern desired depends on the coverage area requirements. Likewise, the type of antenna selected will determine the kind of pattern you have. Another major factor in antenna selection and installation is the distance above the ground at which an antenna is suspended.

Antenna theory as related to antennas suspended in free space states simply that the ground below will provide a reflection, or mirror effect. This mirror effect gives an antenna the appearance of having greater gain when the antenna is mounted at distances that are "in-phase," or a given wavelength above the earth. The greater the height, the greater the gain.

It is understood that radio waves travel at the velocity of light in free space. Therefore, radio waves travel at 300,000,000 meters per second, or close to 186,000 miles per second. Hey, that's the same speed at which light travels!

A formula for determining the resonant length of an antenna for a given frequency is based on the speed-of-light theory. One of the first formulas that we learned when studying for our FCC licenses was the formula for computing the length of an antenna. The formula for the length of an antenna, in meters, is:

$$\text{Wavelength (meters)} = \frac{300,000,000}{\text{Frequency (Hz)}}$$

Band Considerations

Up to this point we've discussed some simple, but general antenna theory. Now we go directly to the application of antennas and the fre-

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ONE HALF WAVELENGTH CHART HF

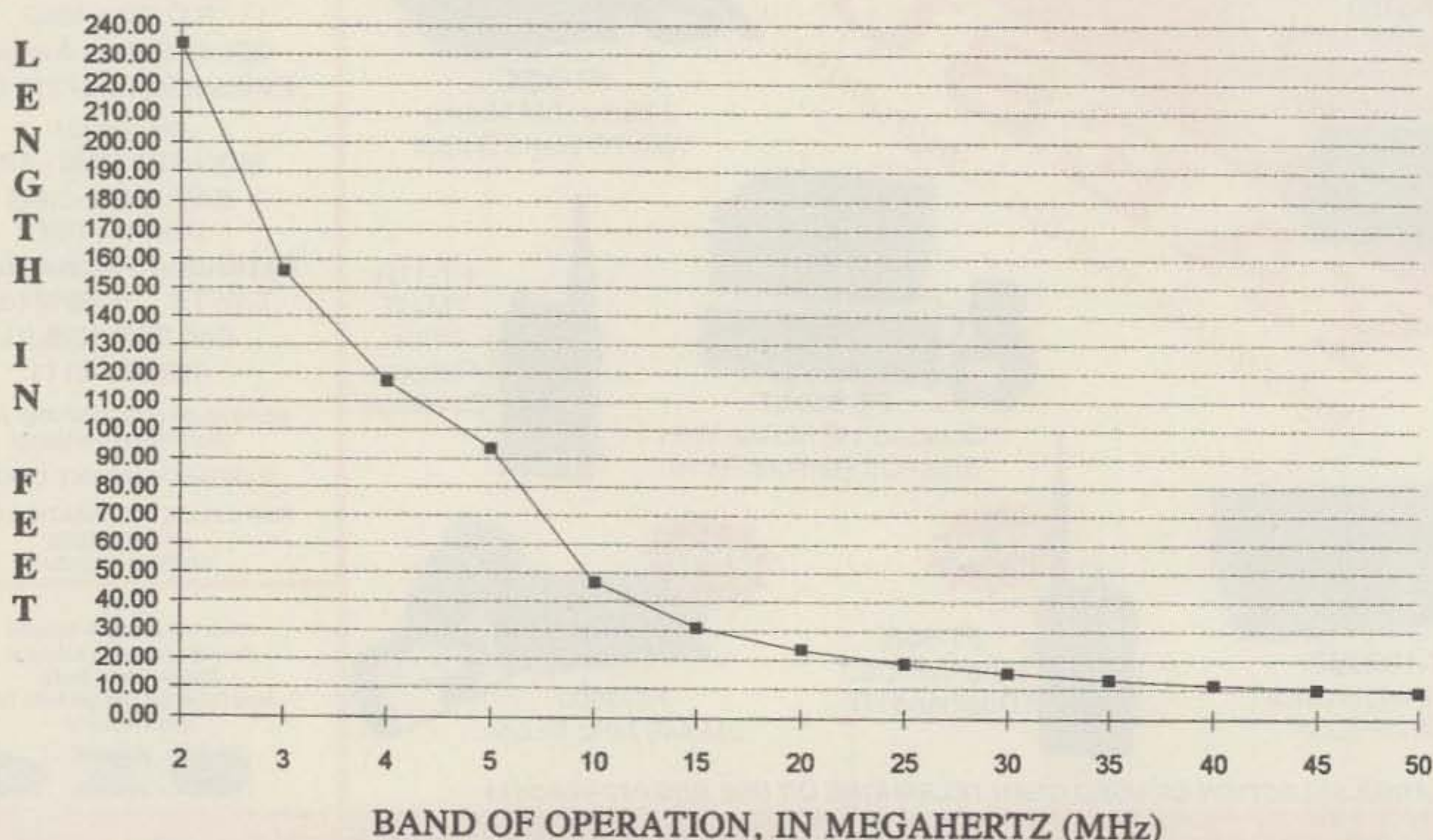


Fig. 1— One-half wavelength chart, HF bands.

ONE QUARTER WAVELENGTH CHART, VHF & UHF

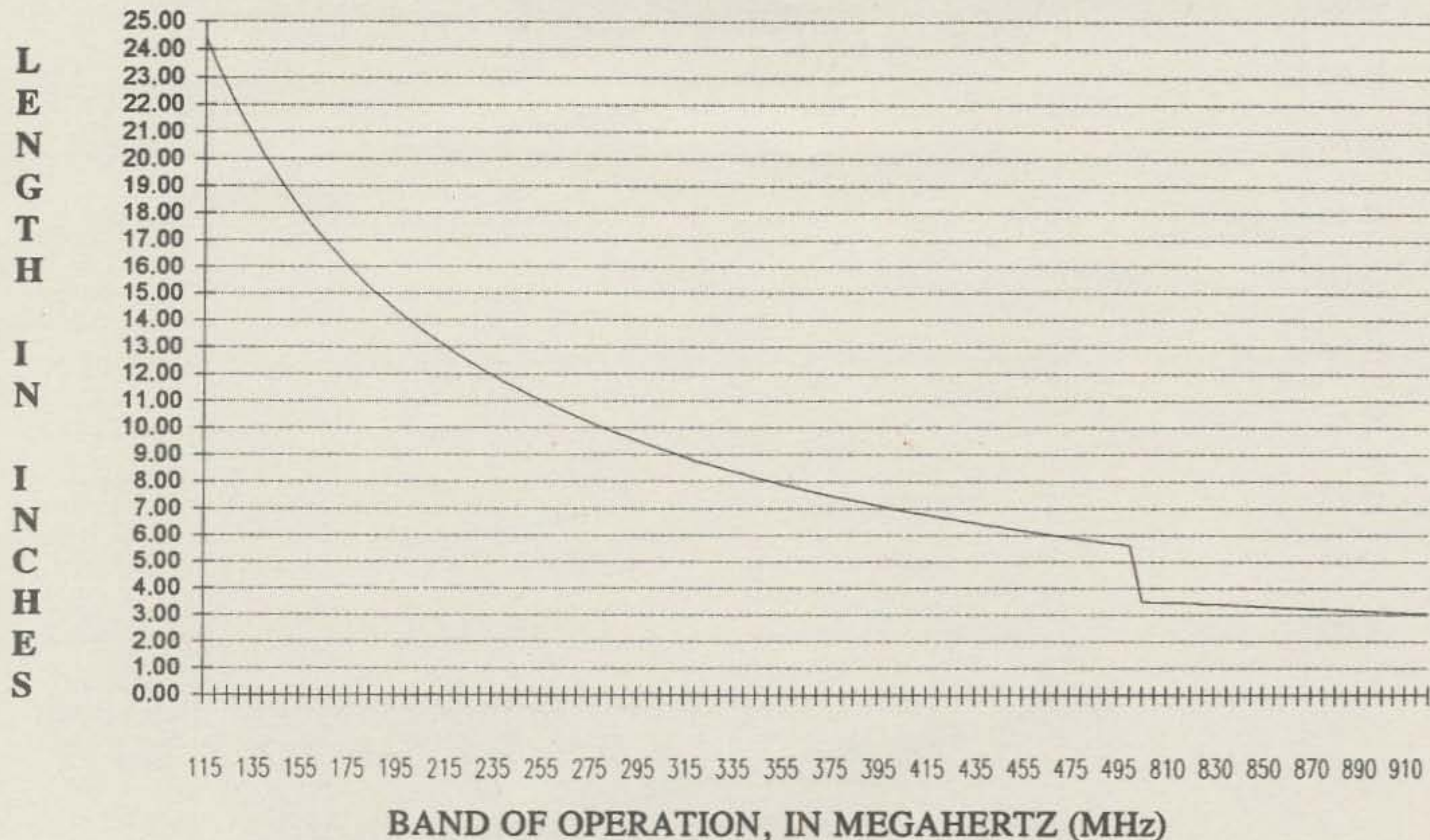
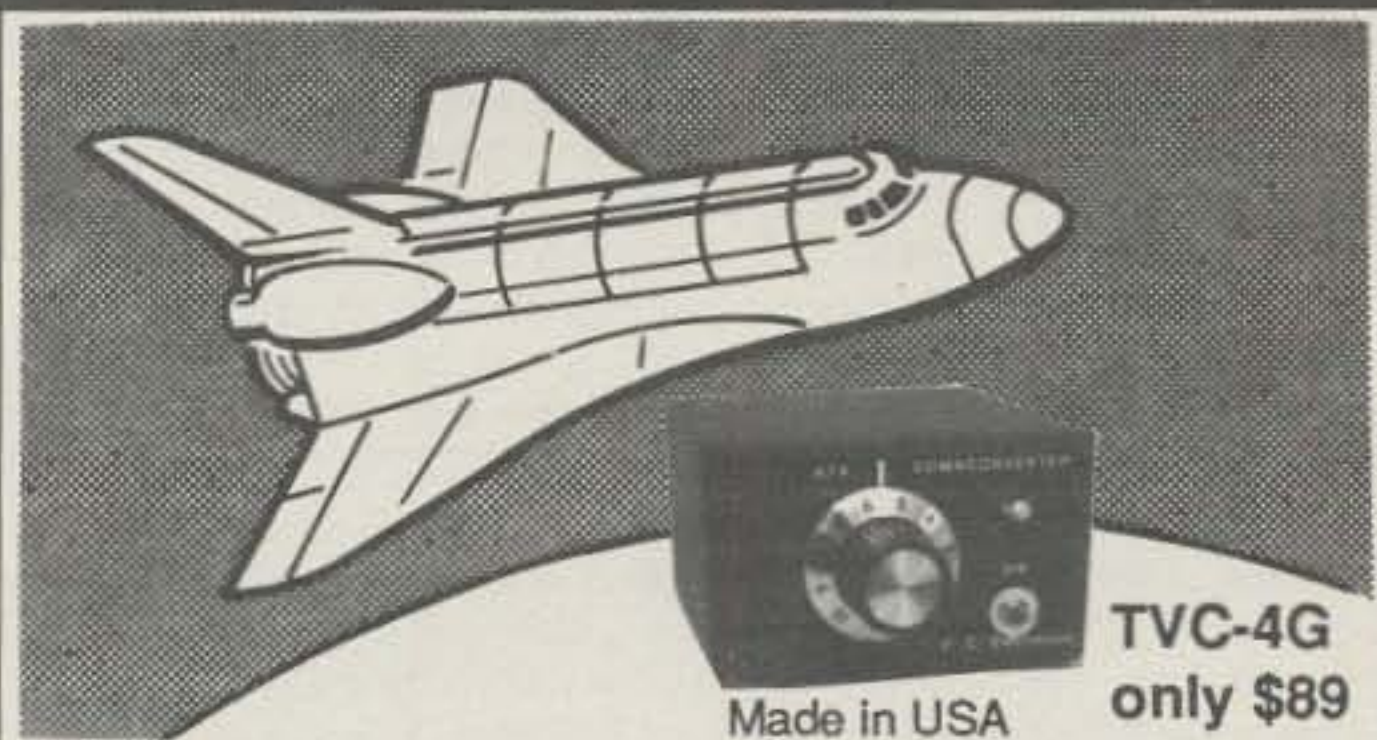


Fig. 2- One-quarter wavelength chart, VHF and UHF bands.

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ONE HALF WAVELENGTH CHART VHF & UHF

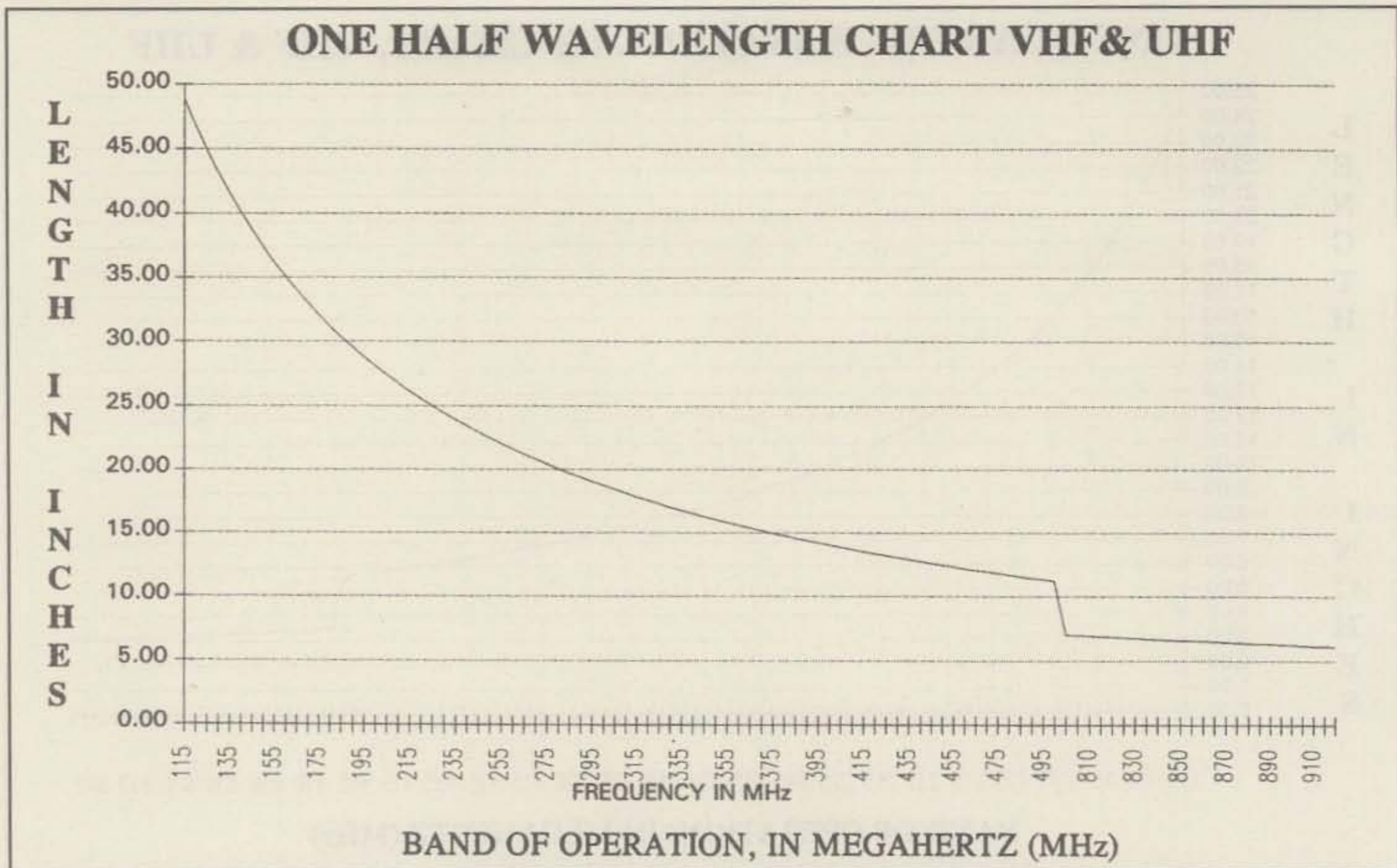


Fig. 3— One-half wavelength chart, VHF and UHF bands.

quency of operation. This is another way of looking at our "needs and requirements."

Almost all antenna basics can be analyzed in terms of the elementary dipole. A dipole consists of two charges of opposite polarity. In the case of a real antenna the charges take the form of two elements which receive signals of opposite polarity.

We have learned through theoretical as well as practical experience that any antenna will exhibit the same characteristics, whether it is used to receive or to transmit signals, provided the impedance of the feed system and the radiating elements are the same.

Several kinds of high-frequency (HF) antennas are simple in design and construction. The simplest is the end-fed or long-wire antenna. In most cases the long-wire is a one-half wavelength antenna cut for the frequency of operation. When designing or building an antenna, consideration should be given to the size or diameter of the element (wire).

A better known formula for determining an antenna of *one-half* wavelength, expressed in feet, is (see fig. 1):

$$\text{Length (ft)} = \frac{492}{f(\text{MHz})}$$

But wait! Isn't that the formula for an antenna in "free space"?

Ground Influence

Another consideration is to be added to the computations when we consider the influence

of the ground on the antenna system. It is stated in the following manner:

$$\text{Length (ft)} = \frac{468}{f(\text{MHz})}$$

This ground influence is often referred to as the **K** factor. The **K** factor is a constant of 0.95 that is used to make the formula follow a more accurate standard with wire sizes close to number 16 gauge. For our purpose, the above formula is most accurate for determining antenna length between 1.8 and 30 MHz.

As we leave the HF spectrum and enter the VHF and UHF spectrum (for $1/4$ wave see fig. 2 and for $1/2$ wave see fig. 3), the antenna design changes, too. Most antennas above 30 MHz are constructed of aluminum tubing or rod, and since the tubing can sometimes be much larger than the wire size mentioned earlier, it stands to reason that a new **K** factor must be considered. An antenna handbook usually will have a listing of **K** factors for different diameter-to-length ratios.

At HF frequencies I use everything from a doublet to a beam for my packet operation. If I want to get on the air quickly, then I go for an old tried and proven antenna called the *dipole*.

The dipole by nature is a center-fed antenna. If we consider all the different factors related to this antenna, we will find that it has the closest impedance to the coax feed lines that are available to us today.

Theory says that the impedance of a wire antenna, measured at the center, is approximately 72 ohms when it is at a height of about one-half wavelength above ground. The dipole

usually is suspended between two poles or trees, and supported at each end by a non-conductive material (insulator).

Even as a coil and capacitor form a resonant circuit, so does an antenna. Depending on the ratio of inductance (coil) to capacitance, or **L** to **C**, these two have something in common. An antenna has **Q**, as do the coil and capacitor. This **Q** affects the gain versus bandwidth product of the circuit, whether it is coil/capacitor or the antenna.

Where the **Q** is affected by the ratio of **L** to **C**, the **Q** of the antenna is affected by the size of the wire used in its construction. If the antenna is a VHF or UHF, the **Q** becomes more pronounced as the size of the tubing is increased.

A lower **Q** will provide increased bandwidth. However, there is a tradeoff at this point, since we don't get something for nothing. We decrease the gain factor as we increase the bandwidth factor. Conversely, if we decrease the size of the tubing, the **Q** will increase. Therefore, the gain also increases, but the bandwidth decreases.

Horizontal Polarization vs Vertical Polarization

Short and to the point, a vertically polarized antenna can be good when used in a beam configuration at VHF to reduce absorption of atmospheric noise. It does require that reflector and parasitic elements be added to improve directivity and increase gain. On the other hand, if only a vertical driven element is used in a ground-plane design, then the resulting pattern, when viewed from above, will appear

as if it were a doughnut with a small hole.

It goes without saying (but I will anyway) that HF beam antennas with long elements, and towers with guy wires affixed near the top, don't work well together when the beam is vertically polarized. Something will have to bend or break—either the guy wire or the element that is in its path. For this and other reasons, most HF beams are *horizontally* polarized.

Voice vs Digital

Don't be deceived by the heading of this section. I am not about to begin a conflict between these two modes. My intention is to look into the types of antennas that are best suited for the digital mode of communications, as related to the antenna commonly used for voice communications.

If it is distance you want, then the class of beam antenna used for voice is sufficient. If it is coverage you prefer, again I prefer the beam type of antenna as a power booster. I tend to try for a happy medium with respect to the digital and/or packet modes. The Yagi type antenna, in a horizontal configuration, is one way to go if you want coverage and reduced wind resistance.

That happy medium I spoke of takes the form of a vertically polarized Yagi or a cubical quad. The reason I chose the latter is because the quad is well known for its favorable gain/bandwidth characteristics. Second, the quad offers a better signal-to-noise ratio because *influence from terrestrial noise is greatly reduced* when receiving with a cubical quad antenna. This inherent rejection to terrestrial noise is one of the reasons you might consider the quad for use in a digital data medium.

Point-to-Point Communications

There are fewer repeaters (digipeaters) for VHF packet than there are repeaters for VHF voice operations. This condition alone makes it favorable for the packeteer to choose a beam or other type of directional antenna. This way you can reach those far-off nodes that are just out of range for your omni-directional antenna.

Even though packet is a "store and forward" medium, the ardent packeteer and digital amateur radio operator should choose an antenna wisely, because packet is a point-to-point medium that is based on simplex operations. "The most reliable path is one which can be regarded as a 99% path by the user, since the perfect path is considered less than 100%." If you find you have reached a point where your VHF signal is marginal and you would like to make it a "95%" path between two beam headings, maybe you should try stacking another antenna of the type you are using. If your beam is a Yagi, you can achieve another 3 dB of gain by stacking a similar Yagi beam *one-half* wavelength away.

The Role of The Transmission Line

The antenna for the digital modes, as well as any other modes of communication, is only as good as the transmission line that feeds it. Consult the handbooks and catalogs for the latest and greatest coax or transmission feedline. Look at the manufacturer's printed specifications for a given type of feedline or coax.

The main points of interest are the specs regarding the loss factor of coax (expressed in

Type	Impedance	Velocity of Propagation	MHz	Loss/100 ft.
RG-8U	50 ohm	Solid Polyethylene 66%	100	2.2 dB
RG-8U	50 ohm	Foam Polyethylene 78%	100	1.8 dB
9913	50 ohm	Semi-solid Poly "spiral" 84%	100	1.4 dB

Table 1—Some often-used coaxial cables and their specifications.



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dB) per hundred feet. This measurement must also consider the velocity factor and the frequency at which the measurement was taken. Over the long haul, the "hard-lines" or multiple-shielded coax cables will prove to be the better value.

Your next question probably is: "Why are we interested in the velocity factor of the feedline or coax?" The coaxial (coax) cable or the transmission line plays a major role in antenna performance. That was not a trick question, but a way to make a statement that can easily be remembered. The antenna feed line is *both*, because the complete antenna system is part of the tank circuit. The coax is the "life-line" that delivers the energy to the antenna. Since the energy is handled by the coax, this means the coax is either an external extension of the "tank circuit" or part of the antenna. Which is true?

The coax is a vital part of the overall antenna system, but the coax has a personality of its own and can wreak havoc if it is not cut to or "tuned" for optimum performance along with the antenna. It is even more important to say that antenna performance depends on the behavior of the transmission line at the time of antenna tuning or setup. In other words, if the coax is not prepared before the antenna is tuned, then tuning of the antenna will not render optimum performance.

Now we begin to understand why the antenna should be tuned. This is where we discover that tuning the antenna is another way of achieving "maximum transfer of energy."

To bring this understanding of antennas and their feeding into perspective, let's consider this analogy. Imagine a pump with a capacity to deliver 100 gallons (watts) of water/pressure per

second. This would mean that a pipe of ample size would be needed to deliver the water to the distribution tank. This pipe should be the exact right size to handle the pressure. If the pipe is too small, a "back pressure" will occur (VSWR); if the pipe is too large, a loss of pressure will occur (mismatch). The "back pressure" could represent standing waves, and the loss of pressure could represent a mismatch of impedance at the antenna. As I stated, the analogy is crude, but it helps us to understand why the coax (pipe) size and length are important.

Consider The Velocity Factor

Now we understand why tuning our coax should be the first item we consider. But how do we tune a piece of coax? A feed line that is measured and cut in exact multiples of one-half (electrical) wavelength at the operating frequency will display the same impedance at each end when connected to an antenna that is cut and tuned to a given frequency.

There is one small caveat, and that is the "electrical" wavelength. To determine the "electrical" one-half wavelength for our operating frequency, we must know the "velocity factor" of the coax we plan to use.

Table 1 is a short list of some often-used coaxial cables and their specifications. These specs include the velocity factors as stated in the manufacturer's printed specs. However, the list is not complete and is for illustration only. Further information is available from most coaxial cable manufacturers' master catalogs.

By using a modified version of the one-half wavelength antenna formula we discussed earlier, we can now determine the required length

of our coax in multiples of a one-half wavelength from this formula:

$$\text{Length (ft)} = \frac{492 V}{f(\text{MHz})}$$

where V = velocity factor and f = frequency in MHz.

Let's assume that we have assembled our antenna and adjusted it for 145.050 MHz. We plan to feed the antenna with RG-8U polyethylene (foam) cable. We find the velocity factor of the RG-8U (foam) coaxial cable to be 78%. Our goal is to determine the length (L) in feet of the coax feedline, but first we need to know the length of *one-half* (1/2) wavelength of the RG-8U cable for the frequency of 145.050.

We calculate in the following manner:

$$\text{Length (ft)} = \frac{492 \times .78}{145.050 \text{ MHz}} = \frac{383.76}{145.050} = 2.64 \text{ ft}$$

If we care to go a step further, we can convert the feet to inches and arrive at a half wavelength of RG-8U foam coax for 145.050 MHz. The length is approximately 31 3/4 inches.

The distance to our antenna is about 48 feet. To be on the safe side, we want the cable to be the next one-half wave longer than the distance to the antenna. By dividing the 2.64 feet of the *one-half* wave of cable into the 48 foot length of cable we need to feed our antenna, we arrive at 18.18 times the 2.64 feet. Let's go to the nearest greater length and call it 19 times:

$$19 \times 2.64 \text{ ft} = 50 \text{ ft } 2 \text{ in (approx.)}$$

A Shortcut

The easy way to make this measurement is to use an antenna bridge. There are several of these units around, but I used one that is designed for use between 1.8 and 30 MHz. It is manufactured by MFJ (model No. MFJ-204B). If you have one of these antenna bridges, then follow procedure number "II" in the instruction manual. By using the antenna-bridge method, there is no guesswork involved, and the results are realized sooner.

The Antenna is The Key "Element"

Some of our explanations may seem a bit long, but the final measure of the radiating elements of the packet station will manifest itself in the proof of performance when we put it on the air. More than once I've responded to a call for help from a fellow packeteer who tried to make do with a piece of twin-lead fashioned as an "A," "B," or "J" antenna fed with a random length of feed line. Only after we rebuilt the antenna system as I've just described did the packeteer really understand the full importance of the antenna *system*. Consider the radiating element of the packet station as if it were a long-term investment—because it surely is!

My e-mail address is <buck4abt@usa.pipeline.com>. For a look at more packet radio information and schematics for packet radio interfacing, look at the packet home pages at <http://www.webcom.com/sedan>. CQ magazine information is available at <http://www.webcom.com/sedan/cqmag>.

Until next month . . .

Happy Packeting de Buck4ABT

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 Gain & Wave: 146MHz 2.5dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 3 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W

CX-224/CX-224NMO • Tri-band 146/220/446MHz w/fold-over
 Gain & Wave: 146MHz 2.15dBi 1/2 wave • 220MHz 3.5dBi 5/8 wave • 446MHz 6.0dBi 5/8 wave x 2 • Length: 36" • Conn: CX-224 PL-259, CX-224NMO NMO • Max Pwr: 100W

B-20/B-20NMO • Dual-band 146/446MHz w/fold-over
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CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Timing is Everything!

August's Contest Tip of the Month

The months of August and September are filled with great warm-up contests for the fall season. Check out this month's Contest Calendar and get involved. One way to add "dB" to your signal is to get your callsign in the minds of others. How do you do that? By getting radio active—today!

It's well understood that the skill of timing in pile-ups is a valuable asset in your contest operating arsenal. Now while I hardly feel worthy of guru status on this topic, I thought it would be useful to bring up the topic for discussion this month.

Let's take a straw poll—in written form. How many of you eventually work most of the stations you're calling in a pile-up? How many of you work a good deal of the stations you call in a pileup on the first attempt? How many of you routinely work stations in a pile-up with your feet up on the table and a cigar sitting in the ashtray while yelling into the mic from across the room and reading a newspaper?

The fact is that finesse needs to be a part of every contest operator's skill set, whether it's at the QTH of W3LPL or KF1XYZ. Let's invest a few words in the concepts behind timing and calling in pile-ups. I most often call stations with short and rapid repeats. I've found that allowing for split-second breaks during the calling process provides valuable information about what's happening in the pile-up. You'll also make more friends by not being one of those incessant callers who prefer to double over the station they're calling rather than just work him.

Perhaps one of the most common tricks used in pile-ups is the addition of a small delay prior to the start of your calling sequence. Human nature forces us to enter "attack mode" as soon as the DX station's VOX lets up. You can differentiate yourself from the rest of the crowd by dragging your feet for half a second and allowing the tail end of your callsign to stand by itself. This is especially useful if you're not the loudest guy on the block. If you've ever been on the other end of a big pile-up, you'll recall that more often than not, stations tend to blend together in pile-ups with no one being especially dominant. This is why timing can be such a valuable tool when calling.

If you have the good fortune to be using a recognizable call or one that is short and sweet, take advantage of that fact. There's generally two types of pile-ups. First, there are those who just roll along at a fast and steady pace. Then there is the type where a fair amount of calling time takes place in between QSOs. This is when a quick, non-phonetic "K1AR" call can

Calendar of Events

July 27-28	RSGB IOTA Contest
July 27-28	Venezuela CW DX Contest
Aug. 3	European HF Championship
Aug. 3-4	North American CW QSO Party
Aug. 3-4	ARRL UHF Contest
Aug. 4	YO DX Contest
Aug. 10-11	Worked All Europe CW Contest
Aug. 10-11	Maryland-DC QSO Party
Aug. 17-18	SARTG WW RTTY Contest
Aug. 17-18	North American SSB QSO Party
Aug. 17-19	New Jersey QSO Party
Aug. 24-25	Utah Centennial QSO Party
Aug. 25	Summer QRP QSO Party
Sept. 1	Panama XXV Anniversary Contest
Sept. 7-8	All Asian SSB DX Contest
Sept. 7-8	LZ DX Contest
Sept. 8	North American CW Sprint
Sept. 11-13	YLRL Howdy Days
Sept. 14-15	Worked All Europe SSB Contest
Sept. 14-16	ARRL VHF QSO Party
Sept. 15	North American SSB Sprint
Sept. 21-22	Scandinavian CW Activity Contest
Sept. 28-29	1996 CQ WW RTTY Contest
Sept. 28-29	Scandinavian SSB Activity Contest
Oct. 9-11	YLRL CW Anniversary Party
Oct. 12-13	Pennsylvania QSO Party
Oct. 23-25	YLRL SSB Anniversary Party
Oct. 26-27	CQ WW DX SSB Contest

sneak in and work someone. It's very similar to tail-ending techniques. And it works!

On CW, a method related to pile-up timing is frequency management. I've spent the past few years operating with mediocre antennas from my home station. What I've learned over this period of time is how to perfect the skill of working CW QSOs by calling slightly off frequency. This technique simply takes advantage of what is common sense: If you're in the middle of a mess of dots and dashes and another station is just a brief RIT spin away, who do you think will be worked first in many cases?

Now despite the temptation, I wholeheartedly deplore the concept of using partial callsigns in pile-ups. Unfortunately, it has become a widely accepted and used operating practice. I've even begun hearing it used on CW! Yes, it does sometimes help you get through a pile-up simply by squeezing through an "Alpha Radio" during a brief pause in the pile-up. However, it's frequently a burden to the station you're calling by forcing him to take extra time to fill in your call even though it probably would have been copied in its entirety on the first pass.

If you really want to practice this skill, I suggest you spend a little time calling guys in DX pile-ups. You may even want to try working guys barefoot to add an extra challenge. The bottom line of this discussion is that pile-up timing is nothing more than perfecting a skill so that you're calling when most of the other guys are not. It's having the ability to use a very short VOX delay to your advantage and slipping in

that callsign when everyone else is figuratively drinking a cup of coffee. The important thing to remember is that the majority of folks who break through pile-ups are not always the loudest guys. Timing is truly everything!

CQ's Contest Hall of Fame

The tradition continued this year with the induction of several new members into CQ's Contest Hall of Fame during the Contest Banquet at the 1996 Dayton Hamvention. It is with pride that I report the following new members of this elite group:

Ville Hiilesmaa, OH2MM
Lew Gordon, K4VX
Bob Cox, K3EST

Ville Hiilesmaa, OH2MM. It's just that you simply haven't turned on your rig if you haven't made a contest QSO with Ville Hiilesmaa, OH2MM. Don't be fooled by Ville's genteel personality. When it comes to "the contest," he's one of the best, both as a strategist and as an operator.

Ville began his notorious contest career in the 1960s as part of the OH2AM operating group. Since that time, he has travelled all over the world from QTHs such as ZD3, YB0, PY, FY, and EA8.

OH2MM has left his mark on contesting in so many ways. Not only has he shown consistent excellence in this contest work with world-class single operator wins, but he has been an influential contributor to the sport as well. Ville has been a DX advisor to the CQ WW contest committee, instrumental in moving forward the science of log analysis, and is currently a contributing columnist to CQ Contest magazine.

Through the years Ville has given back to contesting and amateur radio much more than he has taken, and he is a worthy addition to CQ's Contest Hall of Fame.



K4VX is shown here receiving his CQ Contest Hall of Fame plaque from Bob Cox, K3EST. (Photos in this month's column courtesy of Joe Pearlstein, NU3Y.)

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Here's Lew Gordon, K4VX, surrounded by just a few of his many admirers. Shown from left to right are WX3N, K4VX, NSØZ (XYL), KRØY, K3EST, and W6OAT.

Lew Gordon, K4VX. Lew Gordon is one of contesting's true gentlemen. Originally licensed as W9APQ and later as W4ACY, his contesting career began with the Potomac Valley Radio Club in the 1960s. Lew had the honor and good fortune of being Elmered and motivated by one of the best—Len Chertok, W3GRF. That helping hand from Lenny spilled into Lew's very being as he became known as one of contesting's most prolific host operators, inviting new talent and youth to his station and ultimately into our sport.

Even during his days in Washington, D.C., Lew always offered his station to outside operators. And, to state the obvious, he's no slouch himself when it comes to manning the bands!

Lew's presentation was memorable at Dayton this year because he was honored by two of his upstart operators, WX3N and KRØY. Here are some comments from Jeff, KRØY:

"I remember seeing Lew's classified ad in the back of QST (circa 1981): 'Contesters: K4VX moving to Missouri. Operators needed.' I was 16 at the time, hamming for just two years, and knew K4VX was a 'Big Gun.' What confirmed my big-gun suspicions was a picture in the 1977 ARRL DX Contest results. There was a photo of Lew next to a fallen title with the caption 'K4VX was lucky in a sense; at least Lew's tower made it through the contest weekend(s).' WOW, I thought. This guy puts up towers just for ONE contest!

"Although the content of our first conversation is somewhat disputed (Lew says I was a bit arrogant on the phone), there's no disputing that the next five years were beneficial to us both. I was an 'eager beaver' who had to drive 100 miles to Hannibal for nearly any contest. Lew was the station owner who wanted to prove to the boys back east that 'you CAN win from Missouri.'

"I owe Lew a lot. He provided me with not only the keys to a big gun station, but with his vast knowledge of technical and operating skills. And let's not forget his XYL Terry, NSØZ, who is very supportive of Lew and adopted us 'young ops' as one of the family. I have to admit it probably didn't hurt that I went to college with their daughter, Sharon, and provided her with cheap transportation home for the weekend!"

What else can we say about Lew except congratulations!

Bob Cox, K3EST. We had a lot of fun work-

ing on Bob's induction into the CQ Contest Hall of Fame. As Bob is the chairman of the selection committee, it's a natural conflict to induct oneself. And there was probably no one more deserving to be a member than Bob. For that reason, we lowered the "cone of silence" and began a secretive project to nominate Bob and induct him at Dayton this year. Surprise it was!

K3EST has been a profound contributor to contesting for decades. His roots go back to the 1960s, when amateur radio became an obsession. That obsession helped develop a wealth of radio/contest knowledge that few can match. While well-earned folklore exists about the "online" knowledge database that Dave Sumner, K1ZZ, maintains, Bob is in Dave's league. Whether it's a conversation about possible prefixes/callsigns, or the FAX number of JE1CKA, Bob has the data. It's just astounding!

If I were to summarize Bob Cox in one word, I would call him contesting's *ambassador*. There are few members of our contest society who have focussed so hard on nurturing international understanding between contesters—or put simply, contest friendships! Whether it's Japan, Slovenia, Russia, or Finland, K3EST is known as a friend and diplomat of amateur radio, and contesting in particular.

Many of you know that Bob has been a director of the CQ WW Contest since the late 1970s. Anyone who has been involved with this labor of love as long as Bob has deserves some type of Congressional medal. When you consider how much the CQ WW Contest has moved forward under Bob's leadership, you truly have to take a step back and offer a round of applause.

In recent months Bob has taken a "pet project" to fruition with CQ Contest magazine. For years a dream of Bob's has been to offer a contest magazine with a special appeal to contesters around the world. I'm sure you will agree that Bob is hitting his editorial goal head-on with this project.

To really know what Bob has done in contesting requires you to really get to know Bob. In so many quiet ways he has helped scores of contesters around the world. As an operator, his record speaks for itself, as one can attest from his participation, which ranges from the W3AU operations to those of PJ1B.

The contributions of K3EST continue to go forward as we speak. He has, along with many others, been a driving force behind WRTC '96.



A very surprised K3EST enjoying the thrill of being inducted into CQ's Contest Hall of Fame. Left to right are K1AR and K3EST.

This event may very well be the most significant happening in the history of contesting. And it's probably no surprise that Bob has been a driver, right in the middle of it. Way to go, Bob!

Final Comments

When you get the chance, congratulate our new CQ Contest Hall of Fame inductees. This achievement is no small accomplishment and worthy of our praise!

As an addendum to the K4VX story, many of you may be following the accomplishments of Phil, KT3Y. Phil has been making Top 10 scores of late with a wire-only antenna farm. For you trivia buffs, his QTH is across the street from where K4VX used to live.

By the time you read this, WRTC '96 will be history, and history making it will be. I'll be reporting on the highlights in next month's column. Stay tuned for the details.

As always, please get your contest calendar submissions for November CQ to me no later than September 1st.

73, John, K1AR

ARRL UHF Contest

1800Z Sat. to 1800Z Sun., Aug. 3-4

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Exchange: Grid square locator.

Points: Take three points for 220 or 432 MHz contacts, six for 902 or 1296 MHz. Credit 12 points for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band. Final score is the total QSO points from all bands times the sum of the grid-square multiplier from each band.

An award pin program is available for this contest for making 5 QSOs. Details, including the full rules, were published in the July issue of QST. It is suggested you send a large SASE to the ARRL for official log and summary sheets.

Send logs to ARRL UHF Contest, 225 Main Street, Newington, CT 06111.

YO DX Contest

0000Z to 2000Z Sun., Aug. 4

This is the annual running of the YO DX Contest sponsored by the Romanian Amateur

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Classes: Single operator all bands/single band and multi-operator/single transmitter.

Frequencies: CW—3510–60, 7010–40, 14010–60, 21010–60, 28010–60 kHz. SSB: 3700–75, 7040–90, 14150–250, 21200–300, 28400–600 kHz.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter country abbreviation for their zone.

Scoring: 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. QSOs within your own country are valid for multiplier credit only. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU Zones worked on each band.

Deadline for logs is September 4th and they should be mailed to: RARF, P.O. Box 22-50, R-71100 Bucuresti, Romania.

North American QSO Party

CW: 1800Z Sat. Aug. 3 to 0600Z Sun. Aug. 4
SSB: 1800Z Sat. Ag. 17 to 0600Z Sun. Ag. 19

This is a short but fun QSO party that can have some fast rates at times. Any licensed radio amateur may enter with the object being to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitter. Multi-operator stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Single operator stations may operate 10 out of 12 hours (multis may use the full 12 hour period). Off-times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in Phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are CW 1815, 3535, 7035, 14035, 21035, and 28035 (35 kHz up from band edge for Novice); and phone 1865, 3850, 7225, 14250, 21300, and 28600 (28450 for Novices) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters at 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian provinces/territories, and other North American countries (do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., W6EEN op by KA6SAR) must be registered with W9NQ on CW and N4TQO on SSB. The team registration infor-

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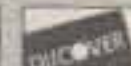
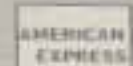
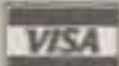
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mation must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five plaques will be awarded for the high score for the Single Operator CW, Single Operator Phone, Multi-Operator CW, Multi-Operator Phone, and Single Operator Combined score categories. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country.

CW contest logs must be sent to Bob Selbrede, W9NQ, 6200 Natoma Ave., Mojave, CA 93013. SSB logs go to: Steve Merchant, N4TQO, 1795 Cravens Lane, Carpinteria, CA 93501. Entries must be postmarked no later than 30 days after the party to be eligible for trophies and awards. Logs may be submitted by K8CC's NA program or MS-DOS ASCII files if generated from another logging program.

European DX Contest

CW: Aug. 10-11 SSB: Sept. 14-15
0000Z Saturday to 2400Z Sunday

This is the 42nd annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all five bands, 3.5-28 MHz. (IARU Region 1 regulation of frequencies for contest operation.)

A reminder that the WAEDC has returned to a 36-hour limit for single operator entries. In addition, there is no longer a multi-multi category.

Classes: (a) Single operator, all band. (b) Multi-operator, single transmitter. Only one signal on any band at the same time. (c) SWL. Note: DX packet cluster spotting is allowed for all classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and one point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked in each band (see WAE country list). Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only the single operator, all-band class may be used. The same callsign, European or non-European, may only be logged once per band. The log must contain both callsigns and at least one of the control numbers. Each QSO logged counts 1 point, each complete QTC 1 point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional one-point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (e.g., 1300/DL2DN/134, which means that at 1300Z you

worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported.

If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

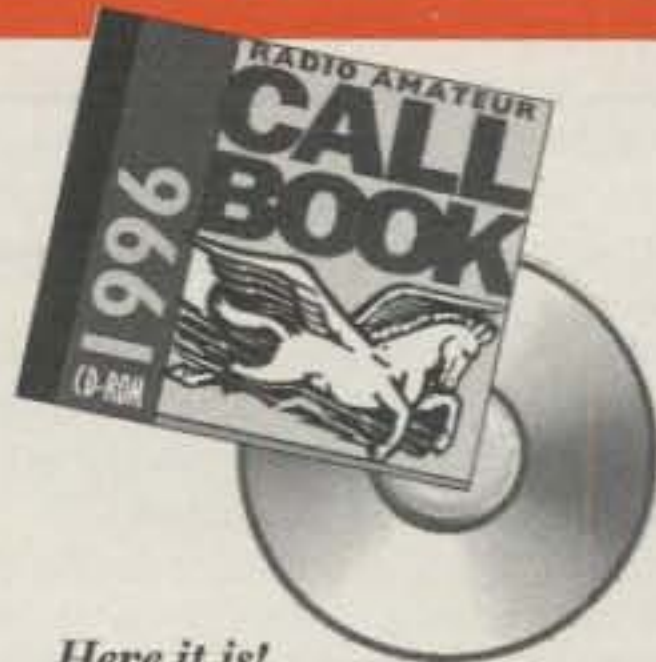
Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a min-

imum of three logs must be received from a club. Entries must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates will be awarded to the top scorers in each class in each country. Each participant with at least half the score of the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

Logs: It is suggested that you use the official DARC or equivalent log form. Logs may also be sent on MS-DOS disks in ASCII files. Use 40 contacts to the page and a separate sheet for each band. Submit a dupe sheet for

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each band with 200 or more contacts. A summary sheet showing the score and a signed declaration are also required (sample log forms are available with an SASE and/or IRCs).

WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HB0, HV, I, IS, IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OH0, OJ0, OK, OM, ON, OY, OZ, PA, S5, SM, SP, SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, T9, TA1, TF, TK, UA1346, other EU-CIS republics, YU1267, ZA, ZB2, 1A0, 3A, 4J1M-V, 4U1 Vienna, 9A, and 9H1.

Mailing deadline is September 15th for CW entries and October 15th for SSB to: WAEDC Contest Committee, P.O. Box 1126, D-74370 Sersheim, Germany.

Maryland DC QSO Party

1600Z Sat. to 0400Z Sun. Aug. 10-11
1600Z to 2359Z Sun. Aug. 11

The Maryland/DC QSO Party is sponsored by the Antietam Radio Association. Non-Maryland stations work Maryland/DC operators. Maryland/DC station may work anyone. Stations may be worked once per band/mode and mobiles/portables that change counties may be worked again for QSO credit.

Exchange: QTH (county for MD stations, state/province/DXCC country for others) and operating category (Club, QRP, Mobile, Novice/Technician, and Standard).

Frequencies: SSB—3920, 7230, 14260, 21370, 28380, 50150, and 146550 kHz. CW—3643, 3701, 7035, 7126, 14040, 21115, 28040, and 28115 kHz.

Scoring: Each Maryland county, Baltimore city, and D.C. are multipliers. Score 10 points for club station QSOs, 5 points for mobiles, 4 points for QRP/Novice and Technician QSOs, 3 points for a CW contact, and 1 point for any other valid contact. QSO points are cumulative (i.e., mobile MD stations count 5 points). Final score is total QSO points times multiplier (25 maximum).

Awards: Plaques are available to the high-

scoring MD-DC, non-MD-DC, and MD-DC club. Certificates will be awarded to the high scorer from each state and Canadian province. In addition, there will be awards to the high score from a MD mobile, top 10 MD logs, Novice, Technician, DX station, and MD YL. *Note: Certificates will be issued to all entries making at least 50 or more QSO points.*

Logs are to be postmarked by September 10th and sent to: Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741. Be sure to indicate your operating class on the summary sheet. If you want the final results, include an SASE with your entry.

SARTG RTTY Contest

Three Periods GMT
0000-0800 & 1600-2400 Sat., Aug. 17
0800-1600 Sun., Aug. 18

This is the 25th annual contest sponsored by the Scandinavian Amateur Radio Teleprinter Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band QSO and multiplier credit.

Classes: Single operator all band, single operator single band, multi-operator single transmitter, and SWL.

Exchange: RST and QSO number.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points.

Multiplier: Each DXCC country and each W/K, VE/VO, and VK call area.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band. SWLs use same scoring, but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: SARTG Contest Manager, Bo Ohlsson,

SM4CMG, Skulsta 1258, S-710 41 Fellingsbro, Sweden.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun., Aug. 17-18
1300Z Sun. to 0200Z Mon., Aug. 18-19

This is the 37th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest. The same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO number, RS(T), and QTH. County for NJ, state/province or country for others.

Scoring: All stations credit 3 points for each contact. Multiply total QSO points by multiplier to compute final score. Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400 kHz, and 50-50.5 and 144-146 MHz. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates go to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards will be available if four or more logs are received from that section. Also available are Novice/Tech and mobile awards. There are four plaques donated by the section managers for NNJ and SNJ to the winning stations in those sections.

Use UTC time and indicate the multiplier only the first time it is worked. Be sure to include a QSO check sheet, and a summary sheet showing scoring, etc. Send a large SASE if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage in all counties may be planned.

Logs must be received no later than Sept. 14th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

Utah Centennial QSO Party

1500Z Sat. to 2100Z Sun., Aug. 24-25

Utah is celebrating its 100th anniversary and this is your opportunity to work this rare one. Maximum operating time is 24 hours out of the 30-hour period. Minimum off-time periods are 30 minutes and must be clearly shown in the log.

Classes: Fixed, mobile, portable single operator, and portable multi-operator. Only one signal may be transmitted at a time and all QSOs must be simplex.

Scoring: Fixed station QSOs—SSB 2 points, CW 4 points. Utah mobile/portable QSOs—SSB 4 points, CW 8 points. If a Utah mobile/portable moves to another county, that station may be worked again for QSO/multiplier credit. Multipliers are states, provinces, and CQ WW countries per band. All other entries count Utah counties per band (29 total). The same station may be worked once on each band and mode for QSO points and multipliers. Final score is total QSO points multiplied by total multipliers.

Awards: A minimum of 50 QSOs is required to qualify for an award. The highest scoring Utah and non-Utah entries will receive trophies. The top-scoring Utah and non-Utah entries will receive a Utah Beehive Honey Jar. Certificates and other special awards will also be available.

Logs must be postmarked no later than Oct. 15th and sent to: UCQP c/o AH3C, Peter Grillo, 2150 East 6200 South, Salt Lake City, UT 84121 or via e-mail to <alan@es.com>.



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Using Beacons

One of the reasons why DXing at the bottom of the sunspot cycle is more difficult than DXing when the sun is active is because of crowding into the "open" bands. The low level of solar activity means the ionosphere is weakly ionized. This in turn means the maximum usable frequency (MUF) on most paths is too low to permit long-range communication on the higher amateur bands. All amateurs seeking DX contacts head for the 20 meter band. The resulting crowding limits DXing to those with the best signals. Many DXers with average stations find they can't break the large pile-ups.

There is hope for the average DXer at sunspot minimum, however. Thanks to the Northern California DX Foundation (NCDXF) and the International Amateur Radio Union (IARU), there is an excellent multi-band beacon network coming on the air this year. This network will allow any amateur to determine which bands are open *now*, to which parts of the world. DXers can use this information to send directional CQs and work DX on bands that do not appear to be open due to lack of signals.

At sunspot maximums DXers simply assume all bands are open. At lower levels of solar activity, however, many DXers quickly tune across a band looking for signals, and finding none, head for 20 meters. While the first three rules for successful DXing are listen, listen, listen, this is one exception to that rule. If everyone is listening, the band will appear to be "closed," even though that band may well provide propagation to distant stations.

Some enterprising DXers have found a way around this problem. Chris Burger, ZS6EZ, likes to hang out on 10 meters at sunspot minimums. Chris runs an automatic CQ from a continuous tape, with regular listening breaks. He turns the transmit monitor function off, turns up the receiver volume, and leans back with a good book while beaming north. European stations and others tuning across the band hear his CQ and give him a call. Chris hears the call and then pauses the automatic CQ and completes the contact. After an hour or so of this semi-automatic operation, he can tune across that band and hear lots of signals. That first contact on a supposedly dead band was enough to encourage others to try some CQs, with positive results.

If more southern hemisphere DXers used this technique, those of us in the northern hemisphere would learn that the higher bands are open on north-south paths far more often than casual tuning would suggest. Unfortunately, the DX community does not have enough amateurs with the propagation knowledge and persistence of Chris Burger. However, there is an alternative. The NCDXF/IARU International Beacon Project (IBP) expects to have a worldwide network of 18 five-band beacons running by this summer.

The NCDXF got into the beacon business in



Ali Rahal, ZP5ALI, at YK1AO's shack in Syria.

the 1970s, thanks to the foresight of Lee Shaklee, W6BH, one of the founders and first president of NCDXF. The first NCDXF beacon was W6WX, which went on the air in 1979 near San Jose, California. The beacon transmitted on 14100 kHz at various power levels into an omnidirectional vertical antenna. This beacon was soon joined by others, including 4U1UN in New York City, KH6WO in Hawaii, YV5B in Venezuela, and several more. These beacons shared 14100 kHz, taking turns transmitting in a 10 minute cycle. DXers (and others) could tune to 14100 and in about 10 minutes know to what parts of the world 20 meters was open and what power level was needed for communication to each area.

During the past year the NCDXF and other organizations have embarked upon an ambitious program to expand the original beacon network. The plan is to air 18 beacons that transmit in sequence on 14100, 18110, 21150, 24930, and 28200 kHz. Each beacon consists of a Kenwood TS-50 transceiver feeding a Cushcraft R-5 vertical antenna, timed by a Trimble Navigation GPS receiver, all controlled by a custom circuit.

Each beacon transmits for 10 seconds per band. Each transmission begins with the beacon's callsign sent at about 22 words per minute. The identification is followed by four 1 second "dahs" at power levels of 100, 10, 1, and 0.1 watts. The beacon then QSYs to the next higher band and repeats the transmission. Meanwhile, the next beacon in sequence begins its 14100 kHz transmission, etc. The entire sequence is repeated at 3 minute intervals.

As of June 1996, seven of the 18 beacons are on the air. In order of transmission, these

are 4U1UN in New York; W6WX near San Jose; JA2IGY 150 miles west of Tokyo, Japan; ZS6DN near Pretoria, South Africa; 4X6TU at Tel Aviv University; LU4AA in Buenos Aires, Argentina; and YV5B in Caracas, Venezuela. Some of the additional beacons due to come on the air this summer are VE8AT in northern Alberta; KH6WO near Honolulu, Hawaii; OH2B in Helsinki, Finland; CT3B on Madeira Island; 5Z4B in Kenya; and beacons in New Zealand, China, Russia, Sri Lanka, western Australia, and Peru.

DXers will be able to listen to one of the five frequencies, and over a span of only three minutes, determine to what parts of the world that band is open and what power level is required. Or DXers who program the beacon frequencies into their rigs can hop from band to band with a given beacon, quickly determining the MUF in that direction.

This network promises to be a major step forward in DXing. Most DXers will be (pleasantly) surprised by two observations. First, the higher bands are open to more parts of the world than casual tuning would indicate. Second, power levels of 1 or even 0.1 watt may readily be copied at long distances. QRPers are well aware of this latter conclusion, but most DXers still feel that full power is necessary for any DX contact. Perhaps some listening to 1 watt signals will cure this tendency to fire up the amplifier every time.

This undertaking has been neither cheap nor easy. The NCDXF has been working on its beacon project for more than 15 years. The main reason why the 5-band beacon is moving ahead at this time is because of the generosity of Lee Shaklee, W6BH, whose donation of

The WAZ Program Single Band WAZ

15 Meter SSB

494.....HB9BGV 495.....JA5PEE

20 Meter SSB

983.....IN3ZNO 985.....LU2FFD
984.....JH8DBJ 986.....W2DFZ

10 Meter CW

152.....EA6BD

15 Meter CW

267.....EA6BD

40 Meter CW

188.....HB9DDZ

All CW

91.....KN2L 92.....K3GGN...

160 Meter WAZ

87 SV8JE.....30 Zones 89 K0CS.....32 Zones
88 W1WAI.....31 Zones 90 SM5BHW .40 Zones

All Band WAZ SSB

4328.....EA5BHK 4330.....HL5BDD
4329.....KN2L 4331.....K5ALQ

CW/Phone

7672.....EA2CLU 7678.....IK5ATM (CW)
7673.....DL4BQE (CW) 7679.....SP2BUC
7674.....K9BJM 7680.....ZL1CDX
7675.....W4OGG 7681.....SM5OJH (CW)
7676.....JH8DBJ (CW) 7682.....Z32KV
7677.....AB6EJ

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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

\$10,000 helps pay for the custom controllers and shipping. Many others organizations and individuals have been keys to the success of the project. Kenwood donated the 18 TS-50 rigs, Cushcraft provided the R-5 antennas, and Trimble Navigation gave the NCDXF a generous discount on the GPS units that ensure the precise timing necessary for a usable network. In addition, Kantronics provided a special discount on the control boxes.

The circuitry of the controllers was designed and assembled by Bob Fabry, N6EK. Jim Pepper, W6QIF, worked with Bob to design the printed-circuit boards for the controllers. The IARU helped line up sponsoring organizations in many countries to ensure local support of each beacon. The entire project has been ably coordinated by John Troster, W6ISQ, a member of CQ's DX Hall of Fame.

DXers listening to the network may hear 10 or 20 second breaks in the transmission sequence. This is because not all the beacons are up and running at the same time. Also, the W6WX and KH6WO beacons await FCC per-



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M1850A 50'	16 sq ft, 85 MPH w/Hazer 6	\$2292.64
M1860A 60'	15 sq ft, 85 MPH w/Hazer 7	\$3195.00
M1870A 70'	15 sq ft, 85 MPH w/Hazer 7	\$3485.00

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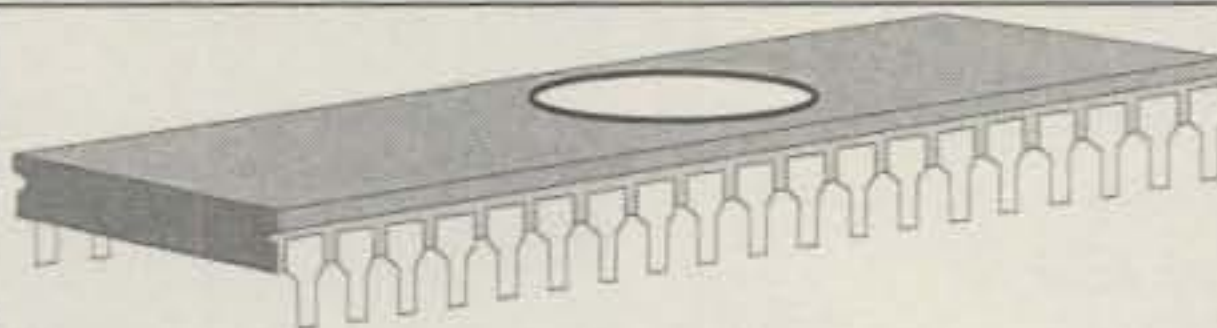
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The WPX Program

SSB

2585.....LU3FCI	2592.....EA3GHQ
2586.....BV8BC	2593.....LW2DBM
2587.....HP1DGX	2594.....WB3DLG
2588.....AB5RM	2595.....OZ7DN
2589.....KI7CM	2596.....AB5SE
2590.....EA6JN	2597.....5W1GC
2591.....EA1JW	

CW

2912.....DL1KT	2914.....BV7FC
2913.....EA8PP	2915.....5W1GC

Mixed

1740.....Z32KV	1743.....OZ7DN
1741.....EA2CLU	1744.....F5NBX
1742.....IK5ATM	1745.....5W1GC

Mixed: 450 Z32KV, EA2CLU, IK5ATM, OZ7DN, F5NBX, 5W1GC. 500 EA2CLU, IK5ATM, OZ7DL, F5NBX, 5W1GC. 550 F-11556, EA2CLU, IK5ATM, OZ7DN, F5NBX, 5W1GC. 600 F-11556, EA2CLU, IK5ATM, OZ7DN, F5NBX, 5W1GC. 650 N1KCE, EA2CLU, OZ7DN, F5NBX, 5W1GC. 700 N1KCE, EA2CLU, OZ7DN, F5NBX, 5W1GC. 750 N1KCE, EA2CLU, OZ7DN, F5NBX, 5W1GC. 800 N1KCE, EA2CLU, OZ7DN, F5NBX, 850 OZ7DN, F5NBX. 900 OZ7DN, F5NBX. 950 OZ7DN, F5NBX. 1000 IZ7DN, F5NBX. 1050 OZ7DN, F5NBX. 1100 OZ7DN, F5NBX. 1150 OZ7DN, F5NBX. 1200 OZ7DN, F5NBX. 1250 OZ7DN, F5NBX. 1300 OZ7DN, F5NBX. 1350 F5NBX. 1400 F5NBX. 1450 F5NBX. 1500 F5NBX. 1550 I121171, F5NBX. 1600 F5NBX. 1650 F5NBX. 1700 F5NBX. 1800 LU8DY. 1850 K4RDU. 1900 K4RDU. 2200 KS4S. 2250 KS4S. 2700 KS3F. 2900 N2AC.

SSB: 350 LU3FCI, BV8BC, HP1DGX, EA3GHQ, WB3DLG, OZ7DN, AB5SE, K0DEQ, 5W1GC. 400 LU3FCI, BV8BC, HP1DGX, EA3GHQ, OZ7DN, K0DEQ, 5W1GC. 450 LU3FCI, BV8BC, EA3GHQ, OZ7DN, K0DEQ, 5W1GC. 500 LU3FCI, BV8BC, EA3GHQ, OZ7DN, K0DEQ, 5W1GC. 550 LU3FCI, BV8BC, EA3GHQ, OZ7DN, K0DEQ, 600 LU3FCI, BV8BC, EA3GHQ, OZ7DN, K0DEQ. 650 LU3FCI, N1KCE, BV8BC, EA3GHQ, JR6SVM, OZ7DN. 700 LU3FCI, N1KCE, BV8BC, EA3GHQ, JR6SVM, OZ7DN. 750 LU3FCI, BV8BC, EA3GHQ, OZ7DN, KJ5LJ. 800 LU3FCI, BV8BC, EA3GHQ, OZ7DN. 850 BV8BC, EA3GHQ, OZ7DN. 900 BV8BC, EA3GHQ, OZ7DN. 950 JA2OCU, EA3GHQ, OZ7DN. 1000 JA2OCU, EA3GHQ, OZ7DN. 1050 EA3GHQ, OZ7DN. 1100 EA3GHQ, OZ7DN. 1150 EA3GHQ, OZ7DN, KW0U. 1200 EA3GHQ, OZ7DN, KW0U. 1250 OZ7DN. 1550 N2AC. 1600 KS4S. 1800 LU8DY. 2100 KF7RU. 2450 LU8ESU. 2500 LU8ESU. 2950 F2VX. 3000 F2VX.

CW: 350 EA8PP, BV7FC, 5W1GC. 400 EA8PP, BV7FC, 5W1GC. 450 EA8PP, BV7FC, 5W1GC. 500 BV7FC, KU0A, 5W1GC. 550 5W1GC. 700 DL3JSW. 800 DL3JSW. 850 DL3JSW. 900 DL3JSW. 1000 DL3JSW. 1150 KT2C. 1500 KS4S, IK3GER. 1800 G4SSH. 1850 G4SSH.

10 Meters: OZ7DN
15 Meters: JH5OXF, OZ7DN
20 Meters: N1KCE, JH5DXF, JR6SVM, BV7FC, OZ7DN,

5W1GC
40 Meters: K0DEQ, 5W1GC
80 Meters: N1KCE, F-11556, K0DEQ, OZ7DN, I8KCI
160 Meters: JH5OXF, K0DEQ

Asia: JH5OXF, K0DEQ, 5W1GC
Africa: SP5AUB, K0DEQ
No. Amer.: HP1DGX, KI7CM, SP5AUB, 5W1GC
So. Amer.: KA4GYU, SP5AUB
Europe: F-11556, JH5OXF, BV7FC, 5W1GC
Oceania: JH5OXF, SP5AUB, JR6SVM, K0DEQ, 5W1GC

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Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YLW4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCY, I2MQP, I0RIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, K0JN, ZS6EZ, JA0SU, I5ZJK, I2EOW, KS4S, KA1CLV, K0IFL, K9LJN, WT3W, IN3NJB, S50A, AA6WJ, W3AP, K0DEQ.

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 88101-9511 USA.



Flav Jankauskas, K3JA (center), with Anatoly, UA2AO, and Dima, RA2FA, in RW2F's shack.

Beacon Frequencies

Slot	Country	Call	14.100	18.110	21.150	24.930	28.200	Operator	Status
1	United Nations	4UIUN	00:00	00:10	00:20	00:30	00:40	UNRC	Shipped
2	Canada	VE8...	00:10	00:20	00:30	00:40	00:50	RAC	Being built
3	USA	W6WX	00:20	*00:30	00:40	*00:50	01:00	NCDXF	On the air
4	Hawaii	KH6WO	00:30	*00:40	00:50	*01:00	01:10	UHRC	Ready to ship
5	New Zealand	ZL...	00:40	00:50	01:00	01:10	01:20	NZART	Being built
6	Australia	VK6...	00:50	01:00	01:10	01:20	01:30	WIA	Being built
7	Japan	JA2IGY	01:00	01:10	01:20	01:30	01:40	JARL	In Japan
8	China	BY...	01:10	01:20	01:30	01:40	01:50	CRSA	Locating site
9	Russia	UA...	01:20	01:30	01:40	01:50	02:00	?	Locating site
10	Sri Lanka	4S7	01:30	01:40	01:50	02:00	02:10	RSSL	Being built
11	South Africa	ZS6DN	01:40	01:50	02:00	02:10	02:20	ZS6DN	On the air
12	Kenya	5Z4B	01:50	02:00	02:10	02:20	02:30	RSK	Being built
13	Israel	4X6TU	02:00	02:10	02:20	02:30	02:40	U Tel Aviv	On the air
14	Finland**	OH2B	02:10	02:20	02:30	02:40	02:50	U Helsinki	Being built
15	Madeira**	CT3B	02:20	02:30	02:40	02:50	00:00	ARRM	Being built
16	Argentina	LU4AA	02:30	02:40	02:50	00:00	00:10	RCA	On the air
17	Peru	OA4...	02:40	02:50	00:00	00:10	00:20	RCP	Being built
18	Venezuela	YV5B	02:50	00:00	00:10	00:20	00:30	RCV	On the air

* The W6WX and KH6WO beacons are not yet licensed for 18.110 and 24.930 MHz operation.

** The OH2B and CT3B beacons are still transmitting in the older format on 14.100 MHz.

5 Band WAZ

As of April 30, 1996, 440 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

SM6AHS EA5AT EA8PP
SV8JE DL1KS

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

N4WW, 199 (26)	OE6MKG, 199 (31)
AA4KT, 199 (26)	HA8IB, 199 (2 on 15)
K7UR, 199 (34)	DK1FW, 199 (31)
NA0Y, 199 (26)	US1DX, 199 (37)
W0PGI, 199 (26)	UA3AGW, 198 (1, 12)
W2YY, 199 (26)	VO1FB, 198 (19, 27)
W9WAQ, 199 (26)	EA5BCK, 198 (27, 39)
W1JR, 199 (23)	KZ4V, 198 (22, 26)
VE7AHA, 199 (34)	K4PI, 198 (23, 26)
W1FZ, 199 (26)	G3KDB, 198 (1, 12)
IK2GNW, 199 (1)	DK2GZ, 198 (1, 24)
W9CH, 199 (26)	KG9N, 198 (18, 22)
AC0M, 199 (34)	KM2P, 198 (22, 26)
IK8BQE, 199 (31)	GM3YOR, 198 (12, 31)
JA2IVK, 199 (34, 40m)	DK0EE, 198 (19, 31)
K1ST, 199 (26)	K0SR, 198 (22, 23)
AB0P, 199 (23)	YO3APJ, 198 (29, 35)
KL7Y, 199 (34)	OH2DW, 198 (1, 31)
UY5XE, 199 (27)	K3NW, 198 (23, 26)
NN7X, 199 (34)	WB6OKK, 198 (22, 37)
DL3ZA, 199 (31)	

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

EA5AT, 200 Zones	ON4AGX, 196 Zones
LU2FFD, 187 Zones	KI6PG, 151 Zones
DL1KS, 200 Zones	

Endorsements:

WB6OKK, 198 Zones	W1WAI, 196 Zones
HB9BGV, 194 Zones	US1DX, 199 Zones
SM6AHS, 200 Zones	N4DW, 195 Zones
SV8JE, 200 Zones	EA8PP, 200 Zones

1004 Stations have attained the 150 Zone level as of April 30, 1996.

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 Manager, Jim Diorina, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

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"...placed in the top 3 worldwide on 10m in the 1995 WPX with 400 w and a Raibeam." ...ZL1AXB

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"...only 2 elements and it beat my Log-periodic on DX by 3 to 4 S-units... unbelievable!" ...W5CKP

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CIRCLE 77 ON READER SERVICE CARD

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4692.....F9RM	3184.....I2PJA	2866.....HA0DU	2434.....4N7ZZ	2075.....N6JM	1729.....HA8QC	1491.....I2EAY	1262.....CT1EEB	977.....WB2PCF
4657.....9A2AA	3166.....N4UU	2847.....YU7SF	2416.....K8LJG	2070.....KS4S	1725.....WB8ZRL	1454.....KC6X	1222.....YV7QP	906.....KB5OHT
4187.....K2VV	3165.....N4MM	2834.....YU7BCD	2385.....S53EO	2067.....W6OUL	1716.....WB3DNA	1444.....JH3SAC	1216.....AA7FL	891.....JR3TOE
3962.....IT9TQH	3141.....YU1AB	2756.....K9BG	2384.....SM6DHU	2049.....W8UMR	1683.....LU8DY	1402.....I1-21171	1212.....CT3CU	835.....AA1KS
3672.....EA2IA	3101.....I1EEW	2689.....IT9QDS	2380.....S50A	2007.....WB4RUA	1681.....I2AOF	1383.....OZ1ACB	1177.....WT3W	801.....EA2BNU
3623.....W2FXA	3078.....ZP5JCY	2658.....YT7DX	2377.....K2POF	1978.....S58MU	1670.....VE9RJ	1383.....A16Z	1168.....Z32KV	774.....W2EZ
3475.....K6JG	3063.....KA5W	2657.....N2AC	2270.....HA5NK	1976.....9A4RU	1662.....PY2DBU	1346.....WA3HUP	1137.....YU7FW	679.....W4RTE
3451.....N4NO	2990.....WA8YTM	2621.....KF2O	2252.....S51NU	1967.....W9IL	1563.....CT1YH	1339.....IK1GPG	1123.....IK2PZG	663.....HI8LC
3358.....VE3XN	2981.....UA3FT	2601.....SM7TV	2249.....IK2ILH	1947.....KB0G	1555.....HA9PP	1305.....W9IAL	1119.....G4SDJ	636.....9A2AJ
3345.....N6JV	2948.....HA8XX	2601.....I2MQP	2165.....K5UR	1899.....G4OBK	1550.....EA3CWK	1305.....NH6T	1054.....VE6BMX	
3239.....W1BWS	2903.....9A2NA	2494.....I2EOW	2132.....DK5AD	1858.....WB2ABD	1532.....AE5B	1269.....W0IZV	1019.....N4PYD	
3229.....SM3EVR	2885.....PA0SNG	2437.....WB2YQH	2131.....W4UW	1846.....W3KH	1532.....K0IFL	1268.....HP2CWB	1001.....WU1F	
3198.....N9AF	2884.....W9DWO	2436.....HA0HW	2105.....N2AIF	1834.....SM6CST	1516.....F5NBX	1265.....VE4CY	999.....VE6FR	

SSB

4593.....F9RM	2754.....EA8AKN	2240.....I8KCI	1876.....K5UR	1473.....CT1DIZ	1310.....IK2AEQ	1053.....EA8AG	907.....KF7IO	738.....EA1OT
4025.....I0ZV	2708.....I1EEW	2237.....WA4QMQ	1851.....IN3QCI	1470.....KB0C	1278.....G4OBK	1040.....DF7HX	889.....W6RQQ	724.....I2EAY
3948.....IT9TQH	2699.....OZ5EV	2220.....YU7BCD	1779.....SM6DHU	1447.....AE5B	1266.....CT1EEB	1037.....EA1IF	887.....SV3AQR	712.....DF1IC
3552.....K2VV	2678.....N4NO	2164.....I2EOW	1754.....K2POF	1447.....K2EEK	1252.....IK1GPG	1036.....IK0JMS	853.....I6KYL	709.....SM6CST
3514.....VE1YX	2616.....I4CSP	2141.....EA5AT	1748.....LU8DY	1441.....W6OUL	1232.....NG9L	1027.....EA8PP	831.....VE4ACY	705.....IK4HPU
3497.....ZL3NS	2565.....KA5W	2126.....PY4OY	1638.....N6FX	1439.....WN5MBS	1213.....T30JH	1024.....NH6T	831.....LU3HBO	682.....US1IDX
3234.....K6JG	2558.....HA8XX	2087.....CT1AHU	1636.....IK2DUU	1428.....CT1BWW	1138.....KC6X	1012.....N4PYD	821.....EA3EQT	676.....HI8LC
3220.....F6DZU	2525.....PA0SNG	2050.....KF7RU	1633.....K8LJG	1419.....WB3CQN	1136.....HP2CWB	976.....WT3W	811.....JR3TOE	650.....VE9RJ
3192.....I2PJA	2447.....I5ZJK	2038.....4X6DK	1606.....YU7SF	1396.....K8MDU	1129.....K80G	973.....IK2PZG	799.....EA5DCL	639.....VE4ROY
3172.....WD8MGQ	2362.....I2MQP	2014.....N4UU	1594.....W5AWT	1393.....K3IXD	1124.....W9IL	965.....IT9JPK	786.....HA9PP	626.....VE6BMX
2966.....ZP5JCY	2350.....WA8YTM	1997.....K5RPC	1574.....KS4S	1376.....HA5NK	1118.....EA5GKE	943.....S51NU	786.....EA7CRL	609.....JA2OCU
2903.....CT4NH	2317.....LU8ESU	1965.....KD9OT	1564.....N2AIF	1355.....DK5WQ	1107.....EA1KK	939.....A16Z	782.....YV7QP	604.....KZ5ZD
2812.....N4MM	2294.....EA3AQC	1954.....CX6BZ	1533.....LU7HJM	1355.....IK0EIM	1107.....WA2FKF	915.....WU1F	756.....AE4MJ	601.....EA1MK
2798.....F2VX	2287.....9A2NA	1948.....EA2AOM	1532.....OE2EGL	1349.....WB8ZRL	1106.....K0IFL	912.....ZS6Y	744.....N3DRO	
2772.....EA2IA	2262.....KF2O	1933.....LU4UW	1483.....N2AC	1321.....I3ZSX				

CW

3911.....IT9TQH	2389.....N2AC	1998.....S51NU	1775.....W5AWT	1649.....N2AIF	1426.....DJ1YH	1182.....EA6AA	914.....YV7QP	729.....KF7JF
3681.....WA2HZR	2318.....W9DWO	1949.....KA7T	1752.....K5UR	1633.....VR2UW	1412.....LU2YA	1100.....WB8ZRL	870.....W9IL	701.....VE6BMX
3601.....K2VV	2283.....WA8YTM	1939.....EA7AZA	1742.....N6FX	1607.....I7PXV	1342.....EA7TG	1090.....A16Z	851.....K2LUQ	691.....K0IFL
3328.....N6JV	2268.....G4UOL	1933.....JA9CWJ	1741.....W1WAI	1591.....VE9RJ	1320.....JN3SAC	1067.....EA2CIN	845.....NH6T	679.....9A3UF
2993.....N4NO	2264.....YU7BCD	1903.....G3VQO	1740.....OZ5UR	1552.....W6OUL	1300.....IK2ECP	1066.....IK5TSS	844.....YU1TR	656.....HA9PP
2957.....YU7LS	2224.....LZ1XL	1863.....HA8XX	1730.....SM6CST	1542.....I1EEW	1277.....KA1CLV	1056.....AC5K	833.....PY4WS	649.....WT3W
2792.....N4UU	2190.....KA5W	1858.....K8LJG	1707.....G4SSH	1510.....G4OBK	1266.....9A3SM	1024.....W9IAL	831.....LU3DSI	637.....ZS1AFZ
2735.....EA2IA	2173.....N4MM	1857.....SM6DHU	1687.....IT9VDQ	1504.....KS4S	1256.....HI8LC	1021.....W4UW	830.....LU7EAR	635.....IK1GPG
2722.....K6JG	2117.....W8IQ	1818.....KF2O	1684.....ZS6EZ	1480.....IK3GER	1241.....9A2HF	988.....4X6DK	796.....I2EOW	602.....VE4ACY
2564.....YU7SF	2085.....S51NR	1809.....T14SU	1680.....S58MU	1477.....ZP5JCY	1231.....EA7AAW	983.....KC6X	792.....KB5OHT	600.....K3WWP
2435.....K9QVB	2024.....K0DEQ	1798.....K2POF	1662.....KB0G	1440.....EA6BD	1191.....G4MVA	921.....I2MQP	760.....EA2BNU	



Wes Strauch, W5VBX, president of the New Orleans International DX Convention, presents the DX of the Year plaque to 1995 recipient, Vince Thompson, K5VT (right).

mission to operate on 17 and 12 meters. (The stations already have special operating permission for the 20, 15, and 10 meter bands.)

To get maximum benefit from this network, DXers should note the propagation indices from WWV at 18 minutes after the hour. They should then note which beacons are copiable at what power levels. With some experience, a DXer who regularly monitors the beacon network will be able to know what parts of the world are open at what times on what bands. Then the DXer can try CQs in appropriate directions and bands, relieving congestion on 20 meters.

As the level of solar activity increases, DXers can watch additional beacons coming through as solar flux rises. The beacon network promises to be one of the most useful DXing tools ever conceived. Is 17 meters open to South Africa? Is 10 meters open to South America? What power level is needed to talk to western Australia on 15 meters? The NCDXF/IARU beacon network will answer these questions and more.

W6OAT, CQ's DX Hall of Fame

At the Dayton Hamvention this past May, Rusty Epps, W6OAT, was inducted into CQ's DX Hall of Fame. The presentation was made by Steve Bolia, N8BJQ, at the DX Dinner on the Saturday evening of the Hamvention weekend. Congratulations, Rusty!

73, Chod, VP2ML

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MODEL VS-50M

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE

- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)

SL SERIES



- LOW PROFILE POWER SUPPLY

MODEL	Colors		Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
	Gray	Black				
SL-11A	•	•	7	11	2 ⁵ / ₈ x 7 ⁵ / ₈ x 9 ³ / ₄	12
SL-11R	•	•	7	11	2 ⁵ / ₈ x 7 x 9 ³ / ₄	12
SL-11R-MC	•	•	7	11	5 ³ / ₄ x 7 ¹ / ₄ x 9 ³ / ₄	13
SL-11R-GE	•	•	7	11	5 ³ / ₄ x 7 x 9 ³ / ₄	13
SL-11R-RA	•	•	7	11	4 ³ / ₄ x 7 x 9 ³ / ₄	13
SL-11R-EFJ	•	•	7	11	5 ¹ / ₈ x 7 ¹ / ₄ x 9 ³ / ₄	13
SL-11MG	•	•	7	11	5 ¹ / ₈ x 7 ¹ / ₈ x 9 ³ / ₄	13
SL-15R	•	•	12	15	2 ⁵ / ₈ x 7 x 9 ³ / ₄	13
SL-15R-GE	•	•	12	15	5 ¹ / ₈ x 7 ⁵ / ₈ x 9 ³ / ₄	14
SL-15R-RA	•	•	12	15	4 ³ / ₄ x 7 ¹ / ₄ x 9 ³ / ₄	14
SL-15R-EFJ	•	•	12	15	5 ¹ / ₈ x 7 ¹ / ₈ x 9 ³ / ₄	14

RS-L SERIES



- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RS-4L	3	4	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	6
RS-5L	4	5	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	7

RM SERIES



MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RM-12A	9	12	5 ¹ / ₄ x 19 x 8 ¹ / ₄	16
RM-35A	25	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
RM-50A	37	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50
RM-60A	50	55	7 x 19 x 12 ¹ / ₂	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 ¹ / ₄ x 19 x 8 ¹ / ₄	16
RM-35M	25	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
RM-50M	37	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50
RM-60M	50	55	7 x 19 x 12 ¹ / ₂	60

RS-A SERIES



MODEL RS-7A

MODEL	Colors Gray Black	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RS-3A	•	2.5	3	3 x 4 ³ / ₄ x 5 ³ / ₄	4
RS-4A	•	3	4	3 ³ / ₄ x 6 ¹ / ₂ x 9	5
RS-5A	•	4	5	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	7
RS-7A	•	5	7	3 ³ / ₄ x 6 ¹ / ₂ x 9	9
RS-7B	•	5	7	4 x 7 ¹ / ₂ x 10 ³ / ₄	10
RS-10A	•	7.5	10	4 x 7 ¹ / ₂ x 10 ³ / ₄	11
RS-12A	•	9	12	4 ¹ / ₂ x 8 x 9	13
RS-12B	•	9	12	4 x 7 ¹ / ₂ x 10 ³ / ₄	13
RS-20A	•	16	20	5 x 9 x 10 ¹ / ₂	18
RS-35A	•	25	35	5 x 11 x 11	27
RS-50A	•	37	50	6 x 13 ³ / ₄ x 11	46
RS-70A	•	57	70	6 x 13 ³ / ₄ x 12 ¹ / ₈	48

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RS-12M	9	12	4 ¹ / ₂ x 8 x 9	13
RS-20M	16	20	5 x 9 x 10 ¹ / ₂	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 ³ / ₄ x 11	46
RS-70M	57	70	6 x 13 ³ / ₄ x 12 ¹ / ₈	48

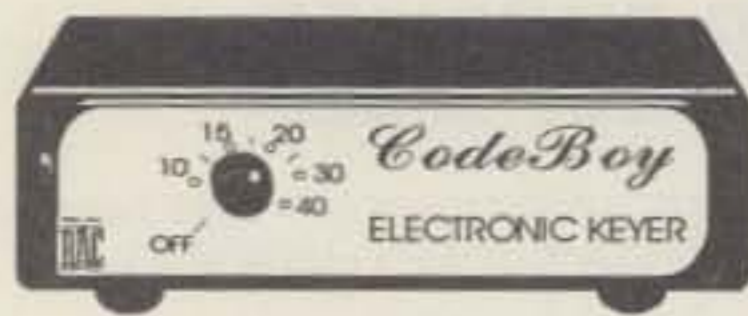
VS-M AND VRM-M SERIES



MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty [Amps]			ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
	@13.8VDC	@10VDC	@5VDC			
VS-12M	9	5	2	12	4 ¹ / ₂ x 8 x 9	13
VS-20M	16	9	4	20	5 x 9 x 10 ¹ / ₂	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 ³ / ₄ x 11	46
VS-70M	57	34	16	70	6 x 13 ³ / ₄ x 12 ¹ / ₂	48
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
VRM-50M	37	22	10	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50



Very Small Very Smooth!

1 3/16 H x 3 1/8 W x 2 7/8 D 3 1/2 oz.

FEATURES:

- Speed Range 10 to 40 wpm •Calibrated Speed Control •Iambic A or B Style Operation •DIT and DAH memory •Space and Weight Compensation •Paddle and Straight Key or Bug Input •Autospace Feature on Straight Key and Bug Input •De-Bouncing on Key and Bug Input •Mosfet Keying Transistor Output •Built-in Long Life Battery •Based on RAC C1A Keyer Chip •Attractive Aluminum Case, Dark Brown & Eggshell White with Black Lettering

DESCRIPTION	STOCK#	PRICE
Complete Kit Including Battery (Less Paddle)	A1K	\$ 37.95
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Printed Circuit Board Kit (A1K less case)	BK-167	\$ 24.95
C1S CMOS Keyer Chip	68-3	\$ 14.95
C1A CMOS Keyer Chip	68-1	\$ 14.95
Vibroplex Brass Racer Iambic Paddle	VP145	\$ CALL
Vibroplex Iambic Deluxe Paddle (Chrome)	VP130	\$ CALL

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CIRCLE 72 ON READER SERVICE CARD

ANTENNA OPTIMIZERS

AO 6.5 automatically optimizes antenna designs for best gain, pattern, impedance, SWR, and resonance. AO optimizes any arrangement of wire or tubing. AO uses an enhanced, corrected MININEC for improved accuracy and assembly language for high speed. AO features 3-D radiation patterns, 3-D geometry and wire-current displays, 2-D polar and rectangular plots with overlays, automatic wire segmentation, automatic frequency sweep, skin-effect modeling, symbolic dimensions, symbolic expressions, current sources, polarization analysis, near-field analysis, and pop-up menus.

NEC/Wires 2.0 accurately models true earth losses, surface waves, and huge arrays with the Numerical Electromagnetics Code. Model elevated radials, Beverages, wire beams, giant quads, delta loops, LPDAs, local noise, or entire antenna farms.

YO 6.5 automatically optimizes monoband Yagi designs for maximum forward gain, best pattern, minimum SWR, and adequate impedance. YO models stacked Yagis, dual driven elements, tapered elements, mounting brackets, matching networks, skin effect, ground reflection, and construction tolerances. YO optimizes Yagis with up to 50 elements from HF to microwave. YO uses assembly language and runs hundreds of times faster than NEC or MININEC. YO is calibrated to NEC for high accuracy and has been extensively validated against real antennas.

NEC/Yagis 2.5 provides reference-accuracy Yagi analysis and easy modeling of arrays of Yagis. Use NEC/Yagis to model large EME arrays.

TA 1.0 plots elevation patterns for HF antennas over irregular terrain. TA accounts for hills, valleys, slopes, diffraction, shadowing, focussing, compound ground reflection, and finite ground constants. Use TA to optimize antenna height and siting for your particular QTH.

Any one program, \$60; three, \$120; five, \$200. 386+387 and VGA required. Visa, MasterCard, Discover, check, cash, or MO. Add \$5 overseas.

Brian Beezley, K6STI • 3532 Linda Vista
San Marcos, CA 92069 • (619) 599-4962

QSL INFORMATION

3C1DX to EA6BH
3D2RW to ZL1AMO
3DA8MA to DK8FS
4B1CO to XE1BEF
4F2IR to DU3DO
4J3M to UD6DJ
4K8F to UA9AB
4L1DX to OZ1HPS
4M0I to I2CBM
4N4L to 9A2AA
4N7DW to YU7BJ
4U1SCO to F5SNJ
4U1UN to WB8LFO
5U7AA to HH2HM
5X4F to KB4EKY
7Q7EH to W1EH
7Q7RM to G0IAS
7Q7SB to AB4IQ
8P9DX to VE3ICR
8R1ZG to W4FRU
9A3A/4U to 9A2AJ
9G1BJ to G4XTA
9G5RC to N1OCS
9H3SB to DL5XAT
9H3WK to DK9IP
9K2MU to WA4JTK
9L1PG to NW8F
9M2JJ to SM0OEK
9M2TO to JA0DMV
9M8CC to PB0ALB
9Q5TR to 4Z5DP
9U/EA1FH to EA1FFC
9U/F5FHI to F2VX
9X4WW to ON5NT
A61AD to WB2DND
AL7EL/KH9 to K4HQI
BV4OQ to W3HCW
C56AA to G0UCT
C56CW to DL7DF/DL7U0U
CEBY/DK9FN to DK9FN
CN2LN to DJ0QJ
CO2JD to HI3JH
CX9AU to KA5TUF
DL5XX/HC8 to KU9C
EA8/DJ9HD to DJ9HD
ED9SSC to EA9AO
EM5DIG to UY5AA
EW1WZ to DL1OY
FG5HR to F6BUM
FM5WE to W4FRU
FO8DI to DK1RV
FO8MOD to AE6C
FOBYOS to JA3IG
FP5EJ to K2RW
FT5WE to F5GTW
FY5FJ to IK2HTW
FY5YE to W5SVZ
H44MS to DL2GAC
H99I to HP2CTM
HAM3MQ to HA3MQ
HC1OT to KG8CY
HC5EA to K8LJG
J3K to WB8GEX
J52AK to IV3TIQ
J56CK to I4LCK
J56DY to IK4SDY
J77A to K0SN
JW1BJA to LA5VK
JW5VK to LA5VK
KG4CM to N5FTR
KG4GC to KQ4GC
LZ0A to LZ1KDP
NP4A to W3HMK
OD5RY to N4JR
P29WK to N3ART
P48MR to VE3MR
P48WA to K9UWA
P49V to A16V
PJ8/W9LNQ to N9ALC
PT5T to PP5LL
PY0TI to PY1UP
PZ5JB to N3BTE
R1FJL to DF7RX
S07NY to EA4URE
S8A to EA2JG
S8RASD to EA2JG
SU3AM to DL5ZBV
T9/OI6XY to OH3GZ
T92A to S57MX
T99W to DL1QQ

TA2DS to WA3HUP
TD9IGI to KA9FOX
TF3/ON6QR to ON4GO
TG/KA9FOX to N9ISN
TJ1GB to WA6SLO
TJ1PD to N5DRV
TL8MS to DL6NW
TT8BP to IK5JAN
TT8FT to DL7FT
TU2DP to K4MQL
UA8AZ to W3HMK
UA9MA/C91 to DK8FS
UR4WWT to WR3L
UX2MM to DL3BQA
V21CW to KA2DIV
V31JZ to NN7A
V31RC to WG9L
V31RL to NG7S
V40Z to AA7VB
V44KJ to WB2TSL
V47NZ to N0BSH
V47W to AA7VB
V51CM to WA2JUN
V73GT to WF5T
VK4FW/P to VK4CRR
VK9CR to DK7NP
VK9XM to JA1BK
VK9XY to DK7NP
VP2ESJ to W5SJ
VP2MDY to NW8F
VP2MHP to JA1OEM
VP5/JJ2QEH to JJ2QEH
VP5/JJ2QXI to JJ2QXI
VQ9DX to AA5DX
VR2NR to WA3RHW
VR2RJ to JH1BED
XX9AS to KU9C
YS1ZV to KB5IPQ
YW5P to WS4E
Z32XA to KM6ON
Z358GBC to Z37GBC
ZD7VJ to G4ZVJ
ZF2KV to N0KV
ZK1DI to DK1RV
ZK1PYD to K8PYD
ZK1WTS to WT8S
ZL7BTB to OH5TB
ZS/UA9MA to DK8FS
ZSM6A to WA3HUP
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6W1QU to P.O. Box 2068, Dakar, Senega
9A2AJ to Tomislav Polak, P.O. Box 613, 41000 Zagreb, Croatia
9G1BS to John Barbat-Soskos, P.O. Box 3248, Accra, Ghana
C6AIC to P.O. Box 30/154, Stella Maris, Long Island, Bahama Islands
CN8TM to Ali Sekkat, Avenue de Fes, Californie, 20150 Casablanca, Morocco
DJ6SI to Baldu Drobnica, Zedernweg 6, D-50127 Bergheim, Germany
HP2CTM to Ricardo Lee, P.O. Box 152, Colon, Rep. of Panama
JX9ZP to Amateur Radio Station JX9ZP, N-8099 Jan Mayen, Norway
OD5PI to Jamal, P.O. Box 230, Zahle Bekaa, Lebanon
OH0XX to Suite 599, 1313 So. Military Trail, Deerfield Beach, FL33442, U.S.A.
OK1TN to OK-DX Foundation, P.O. Box 73, 293 Bradlec, Czech Republic
PA0GIN to Geert Heemstra, Noorderkroonstraat 16, Groningen NL-9742, Netherlands
TD9IGI to Gerry, P.O. Box 1690, Guatemala City, Guatemala
UA1MU to Victor G. Topler, P.O. Box 38, 192241 St. Petersburg, Russia
UN7FW to Vadim Mikhin, UL Lenina 47-27, Ekibastuz 638710, Kazakhstan, C.I.S.
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VR6MW to Meralda Warren, P.O. Box 27, Pitcairn Island
VU2PAI to P.O. Box 730, 575003 Mangalore, India
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ZL2TT to R. Wills, 163 Mark Ave, Grenada Village, Wellington 6004, New Zealand

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2189.....VE4ACY 2192.....US1IDX
2190.....JG5UNR 2193.....W9IL
2191.....W5RUK 2194.....TU2QW

CW

940.....IK0TUG 942.....W9IL
941.....KB1ALE

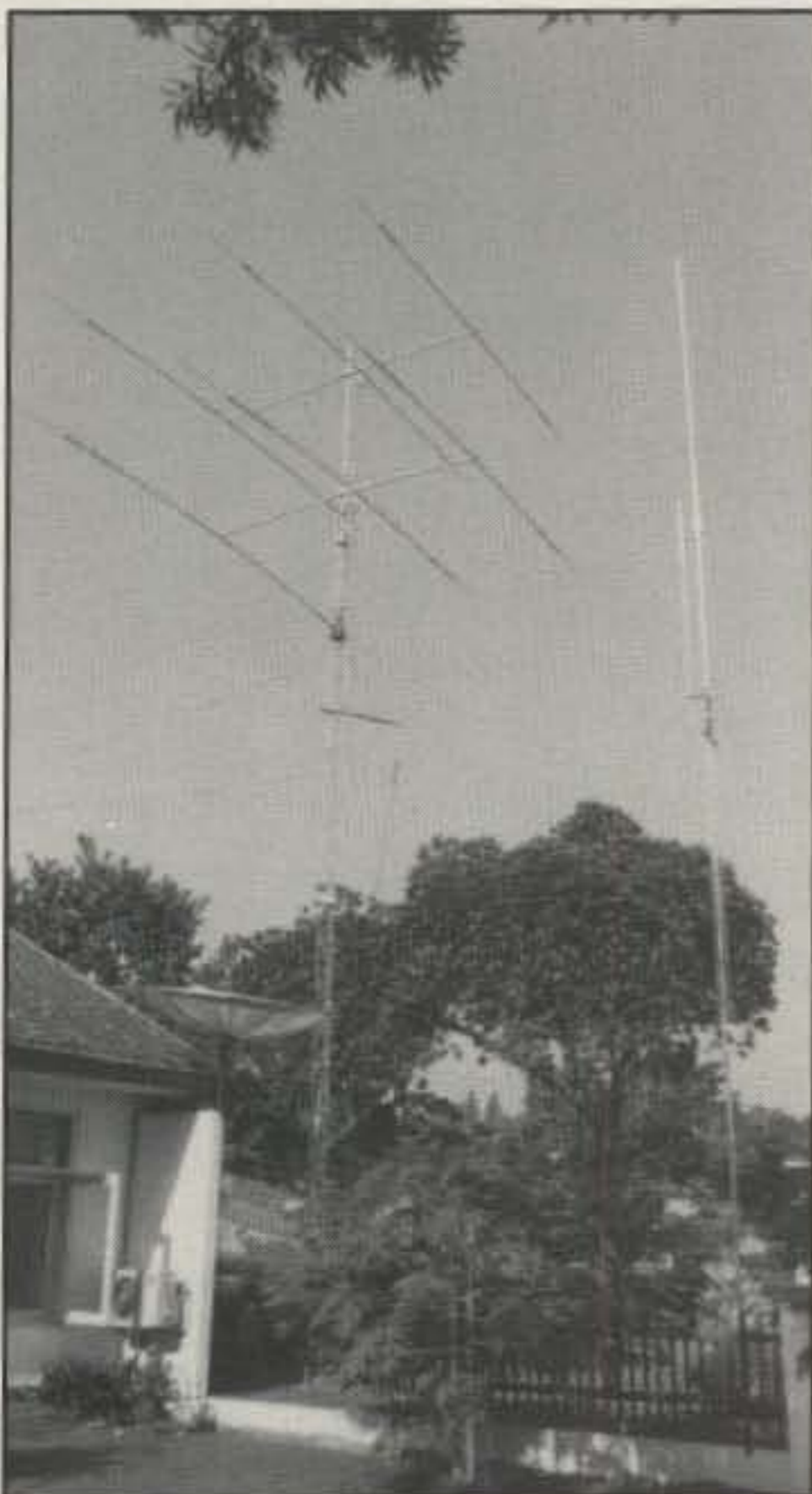
SSB Endorsements

320.....N7RO/328	310.....W8AXI/317
320.....K6YRA/328	310.....W5RUK/314
320.....W6BCQ/328	300.....W9IL/307
320.....K5OVC/328	275.....TU2QW/286
320.....K2ZP/328	275.....US1DX/275
320.....W7OM/327	250.....WB6SOF/250
320.....WB4DBB/324	Mobile.....WB4DBB
320.....AB7AU/320	3.5/7 MHz.....US1DX
320.....CT1EEB/320	28 MHz.....US1DX
320.....VE4ACY/318	

CW Endorsements

320.....DL8CM/328	320.....WB5MTV/321
320.....N7RO/328	310.....WB4DBB/311
320.....N7MC/327	275.....KH6CF/294
320.....W7OM/326	275.....G4MVA/289
320.....W0HZ/325	250.....W9IL/251

Total number of active countries is 328. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.



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1130 RG213/U 95% shield mil spec NCV jkt.....36
1140 RG214/U dbl silver shld mil spec.....1.85
1705 RG142B/U dbl silver shld, teflon ins.....1.50
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1410 RG58/U mil type 50 ohm 95% shield.....12

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PL258AM Amphenol female-female (barrel).....1.65
UG175/UG176 reducer for RG58/59 (specify)......22
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UG88C BNC plug.....1.55
RG58,223,142.....1.55

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MH-PB-33 - 1200mah 6v	MH-FNB-12 - 900mah 12v
MH-PB-34 - 900mah 9.6v	MH-FNB-27 - 900mah 12v
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CIRCLE 55 ON READER SERVICE CARD

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

FCC Presentation at 1996 Dayton Hamvention

At the 1996 Dayton Hamvention the FCC made a presentation covering the amateur radio happenings of the past year. The forum was hosted by the FCC's John B. Johnston, W3BE, who started off by saying that the previous year had been a busy one for the Commission. This month's column is a copy of his remarks, which we think you'll find interesting. Let's begin.

FCC Presentation, Dayton '96

By John Johnston, W3BE

The Telecommunications Act of 1996 was enacted. We held some spectrum auctions. Electronic filing by your VECs has become the standard. Some of the VECs are electronically filing applications directly from the exam room so that you can get on the air within a few hours. Automatic renewal notification came online, and licensing of club stations was resumed. Your access to the 219-220 MHz band was affirmed. You came up with a novel approach to the newer digital modes.

We initiated a *Notice of Proposed Rule Making* for your comments on various and sundry items. There was the vanity call sign system.

License Examination Changes

The TeleCom Act eliminated two unpopular requirements of your VEC system. First, the law prohibited publishers and manufacturers and their employees from being VEs. The purpose probably was to prevent the appearance of favoritism toward examinees who buy certain manuals or equipment.

All of your exams, however, are drawn from the same pools. Each exam is administered by three VEs and coordinated by one of your VECs. It is highly unlikely that anyone could unfairly benefit.

The most controversial unintended consequence was to prohibit instructors from administering examinations when they distributed manuals to their students.

Second, your VEs had to keep records of their expenses and annually certify them. Many of your VEs forewent reimbursement rather than go to all of that trouble. The maximum allowable examination reimbursement fee of \$6.07 should be enough to keep your expenses necessary and prudent. [Most VECs charge \$6.05, however, rounding out the amount to the nearest five cents.]

Digital Communications

To many people, one of the most astounding aspects of amateur radio is that the way has cleared for you to communicate with other hams in every country of the world. There are some conditions in the international Radio Regulations that are necessary to make this

possible. One is "... that transmissions between amateur stations in different countries be in plain language." Your rules, therefore, prohibit transmitting in codes or ciphers intended to obscure the meaning.

As digital communications have evolved over the years, there have been a number of accommodations made in the rules in order to satisfy those conditions. First, there was the Baudot code for RTTY. There was an international standard that could be specified in the rules, the rationale being that because there is a standard, then messages in Baudot are in a plain language.

Next came ASCII. Again there was an international standard that the rules could specify. Then came AMTOR. Strictly speaking, there is no international standard for AMTOR, but it is based on an international standard that can be cited.

Around this time you were able to obtain personal computers, and some of you started developing your own digital codes. You got around the international agreements by using your codes in domestic communications only. You used the shorter wavelength bands, where international communication is unlikely (1.25 m).

Paul Rinaldo [W4RI, ARRL Technical Manager] pointed out that some of you were concerned about the propriety of using the new codes on the HF bands because your rules specified only Baudot, ASCII, and AMTOR. Therefore, the League worked with the developers of the CLOVER, G-TOR, and Pactor codes to document the technical characteristics so there would be standards to reference in the rules. Now they authorize your stations to use any digital code that has had its technical characteristics documented.

RM-8737 is a petition from the League. It wants to expand the types of spread-spectrum transmissions that are authorized.

Notice of Proposed Rulemaking, WT95-57

The National Conference of VECs wants recognition for your session managers. The League wants the eligibility for a club station license to be increased to four members. Currently, only two are required. Each of you may hold only one, but only one, station license having only one call sign.

When you append a self-assigned indicator to your call sign, the rules require that it come after your call sign. Some of you want to append it to the front. The FCC proposed all possible combinations.

You had asked that we reserve a block of 750 one-by-one call signs for temporary use by your special event stations. This item also proposed that your VECs give exam credit to former amateur operators. We have under consideration your 27 comments.

International Amateur Radio Permit

RM-8677 is another petition from the League. This one is to implement the *Inter-Am-*

erican Convention on an International Amateur Radio Permit. CITEL is a component of the *Organization of American States*. It is developing a mechanism modeled after the triple AAA's International Driver's Permit that would also provide for reciprocal operation.

Instead of obtaining a reciprocal operating permit from the FCC in order to operate in the U.S., citizens of Argentina, Brazil, Chile, Colombia, Ecuador, Honduras, Mexico, Paraguay, Peru, and Uruguay would obtain an IARP in their home country. Currently we issue about 125 reciprocal permits annually to amateurs from these countries.

The League is the U.S. member organization of the IARU. The ARRL has offered its services to the Department of State to issue the IARPs to those of you planning on traveling to those countries.

Vanity Call Signs

Most of the good unassigned call signs were those of amateur operators no longer with us. These are the very ones that those of you who have worked hard for your Extra want to get. You told us that a first-come, first-serve system would be fair, but you want some linkage between the sequential and vanity systems. You want former holders to have first crack at their old call signs. You want close relatives of former holders now deceased to have first crack at those call signs.

You want Extras to reach into the call sign cookie jar before Advanced. You want Advanced to go before Generals, Techs, and Novices. You want the club to which the deceased amateur belonged to be able to get a jump on the call sign before other amateurs.

The purpose of Gate 1(A) is as a short-term priority for old-line club stations to get the call signs of deceased members. The club must have held a license on March 24, 1995, the date the FCC resumed licensing new club stations. That date was picked so that individuals would not form clubs merely to gain early access to the good call signs. Club trustees can still apply for call signs, *in memoriam*, when the gates open for their class of operator license.

The order of selection is:

1. Former holders [Gate 1];
2. Close relatives of deceased former holders [Gate 1];
3. Clubs of the deceased former holders, with close relative's approval [Gate 1(A)];
4. Amateur Extra operators and club stations for which they are license trustees [Gate 2];
5. Advanced operators and club stations for which they are license trustees [Gate 3];
6. All other operators and clubs [Gate 4].

When you become a ham, the sequential system assigns your station a call sign according to the region of your mailing address and your license class. There are thirteen call sign regions. They have evolved from the nine Naval Districts as they existed early in this cen-

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tury. In your comments there was a call for a strict conformance to the regions so that you can determine the location of the station.

Both systems allow you to have a call sign corresponding to your class and mailing address. Unless you ask, your call sign is never changed regardless of where you move or your upgrade. The choice is yours. Knowing your call sign, anyone can find your mailing address and operator class. The information is available in several formats.

To find your options under the vanity system, there are several tools that you will need. The first is the current version of the Fact Sheet that describes the sequential system. It is PR-5000 #206 dated February 1995. [Copies of this form, and others, are available from the W5YI office at no charge. Write to P.O. Box 565101, Dallas, TX 75356. Please include a large, self-addressed, stamped envelope.]

The sequential system apportioned out the 15 million possible call sign combinations into four groups: Group A is for Amateur Extra; Group B is for Advanced; Group C is for Technician, Technician Plus, and General; and Group D is for Novice and clubs. The sequential system also designated certain prefix and numeral combinations for your 13 regions. [Regions 1 through 10 correspond to call sign district 1 through 0. Region 11 is Alaska, Region 12 Caribbean, and Region 13 is Hawaii and the South Pacific.]

You will need a copy of the licensee data base. You're going to search out those call signs that are not assigned. You want the latest version you can get. Several parties are downloading the data base and making it available. Any recent version may serve your purpose now. After the system gets rolling, however, the more recent the data base you are using, the more successful you will be. [The W5YI Group offers a custom-made call sign availability computer disk for \$15.95.] There are over 700,000 listings. Of course, you'll be looking for the 14 million call signs not listed.

You will need an FCC Form 610-V. That is the form that you use to request a vanity call sign. You mail it to our fee collection contractor: Federal Communications Commission, Amateur Vanity Call Sign Request, P.O. Box 358924, Pittsburgh, PA 15251-5924. Include your check [payable to the FCC] for \$30.00.

You are going to need Fact Sheet PR5000 Number 206-V. The current version is dated October 1995. It describes the procedures of the vanity system.

A "vanity call sign" is one that is selected from your list. Only primary stations and club stations are eligible. RACES and military recreation stations are not. On the Form 610-V you list up to 25 call signs in order of preference. Write those call signs as clearly as possible. Some of you are going to have to write a lot better than you have been on your applications.

If the processor can't be sure of what you have written, they will skip down your list until they find one that can be read. You must give the exact prefix, numeral, and suffix for each call sign. The system only works with actual call signs. Do not use general terms such as "any call with my initials" or "any 1-by-2."

The applications will be processed in the order they are received from the fee contractor. When that instant in time arrives for your application, the processor will key stroke the call signs from your list—one by one—until there is a match with an assignable call sign for

your operator class and the region of your mailing address. At that point, your current call sign is replaced with the vanity call sign. You can begin using it just as soon as it appears on the data base. Your vacated call sign will not become available for reassignment for two years. There are three exceptions to the two-year eligibility policy. I'll explain that in a moment.

Your class of operator license determines your eligibility for a call sign group:

- Amateur Extra Class—Group A, B, C, or D
- Advanced Class—Group B, C, or D
- General, Tech Plus, or Technician Class—Group C or D
- Novice Class—Group D

There is one exception to the above, which I'll explain at a more appropriate point.

Your mailing address determines your eligibility for a prefix. If your mailing address is any place where the U.S. Postal Service delivers mail, you are eligible for a call sign corresponding to any Region 1 through 10... W1, K2, etc. For a call sign in Region 11, 12, or 13, your mailing address must be at a place corresponding to the call sign requested. Again, the eligibility policies are:

1. A vacated call sign becomes assignable after two years;
2. Your operator class determines the call sign group—A, B, C or D;
3. Your mailing address determines the format and region number;

Now about those three exceptions to the three policies.

The first policy is for a former holder. For you, all three exceptions do apply:

1. You do not have to wait two years before applying for your old call sign;
2. You do not have to hold the operator class corresponding to the call sign group;
3. You do not have to have a mailing address in the region of the call sign.

The second policy is for a close relative of the former holder, now deceased. Only two of the exceptions apply:

1. You do not have to wait the two years following death before applying for the call sign.
2. You do not have to have a mailing address in the region of the call sign.

A close relative, however, does have to hold the operator class corresponding to the call sign group. Who are your close relatives? They are the same people to whom you cannot administer the examinations. They include your spouses, children, grandchildren, parents, grandparents, siblings, aunts, uncles, nieces, nephews, and in-laws.

The third policy is for a club station that requests a call sign in memoriam. With the consent of a close relative, a club station can obtain the call sign in memory of the deceased. This exception also applies to only two of the three policies:

1. The club does not have to wait two years following the death of the holder.
2. The club does not have to have a mailing address in the region of the call sign. If the Dayton Amateur Radio Club can get written concurrence from a close relative of Smurdley, it can get that KH6 call sign.

Gate 1(A) will be a special opportunity for an old-line radio club in which Smurdley was a member to request his old call sign in-memoriam. This is not open to the new clubs that have sprung up over the past year. The club must have held a license on March 24, 1995.

The license trustee of a club making an in-

memoriam request, however, does have to hold the operator class corresponding to the call sign group.

Now all of this is not going to start on day one. There will be a series of gates. Each gate will open the system to another group. If you file before your gate opens, your application will be dismissed. There will be a public notice announcing each gate.

Gate 1 will open May 31st. It is to provide a short-term priority to former holders and, where the former holders are deceased, to their relatives who hold the necessary class of operator license.

The former holder exceptions apply. If you once held a Group A call and you are now a codeless Technician, you are eligible to get it back. If you want the call sign of your deceased relative, you do not have to have a mailing address in the region. You do have to have the proper operator class.

When the dust settles from Gate 1, Gate 1(A) will be opened. The exact opening date should be announced shortly. It is for your club to request in-memoriam the call signs of former members. For this gate your club must have held a club station license grant on the day that issuing club station licenses resumed—March 24, 1995. If your club was licensed after that date, you will have to wait until your license trustee becomes eligible under a later gate.

For an Extra, that opportunity arrives at Gate 2. Starting on that date, an Extra can apply for any assignable call sign from any group for the primary station of the club station. An Extra Class trustee can also make a request in-memoriam for the club station.

Starting with Gate 3, Advanced Class operators can start applying. The system opens to any class operator at Gate 4. That will be the end of the gates. From then on, any amateur operator can request a vanity call sign.

Now let's look at the answers to some interesting questions that we've actually received. The call signs that I'll mention are for example only. They have been altered to protect the identities of the questioners.

Gates

Q. When is Gate 1 going to open?

A. May 31st.

Q. When will Gate 1(A) open?

A. My guess is that Gate 1(A) should probably open about a month after Gate 1 opens. [Johnston also guessed that Gate 2 would open a month after that and that all gates would be open by this fall. This, of course, depends upon how many applications are submitted and how smoothly the system is working.]

Q. How can I be moved to the head of the line when the gate for my license class opens?

A. Except for the former holder provisions, it is first-come, first-serve. You can increase your chances by carefully making your selection of preferred call signs from those which are currently unassigned for your license class and mailing address.

Q. Can I mail my application to the bank the day before the gate opens and gamble on it arriving just after the gate opens?

A. That's up to you. There is no assurance that you will win.

Q. For which call signs am I eligible? I have never held another call sign and I don't have any dead relatives who were amateurs.

A. You are eligible for any unassigned call sign for your operator class. Unless your mailing address is in Alaska, Hawaii, or the Pacific or Caribbean Insular Areas, you cannot request a call sign designated for those places.

Q. Am I eligible for my former call sign KZ5XX, which I had while I was in the Canal Zone?

A. Yes. You are considered a former holder, although the license you formerly had was issued by the Department of Interior. The KZ5 series is now administered by the FCC.

Format & Prefix

Q. I am an Extra Class operator and my mailing address is Dayton, Ohio. What call sign prefix can I request?

A. Unless you are the former holder, or a close relative of the former holder, you can request Group A, B, C, or D call signs for Regions 1 through 10. You will be eligible when Gate 2 opens.

Q. I am an Advanced Class operator and my mailing address is Agana, Guam. What call sign format and prefix can I request?

A. Unless you are the former holder, or a close relative of the former holder, you can request two-letter suffix call signs having the prefix AH2, KH2, NH2, or WH2. You can also request three-letter suffix call signs having the prefix KH2 or WH2. Further, you can also request Group B, C, or D call signs for Regions 1 through 10. You will be eligible to file when Gate 3 opens.

Q. I am in the military overseas. My operator class is General. My mailing address is in APO New York, NY. What call sign format and prefix can I request?

A. Unless you are the former holder, or a close relative of the former holder, you can request Group C or D call signs for Regions 1 through 10. You will be eligible to file when Gate 4 opens.

Multiple Call Signs

Q. I want a vanity call sign, but I also want to retain my present call sign. Is there some way that I can get a vanity call sign for my primary station and move my present call sign to a new club station?

A. That cannot be guaranteed. When you obtain a new call sign, you vacate your present call sign. Assuming that a former holder, or the relative of a former holder, doesn't reclaim it, it goes into limbo for two years, after which you, as a club license trustee, and other eligibles can apply for it. If you die, however, your relative, or your club with the consent of your relative, can obtain the call sign immediately, provided they hold the proper class of operator license. You might also consider simply requesting the new vanity call sign for your club station.

Q. My wife and I are both hams. We want to obtain call signs having the same suffix. Can we submit our applications stapled together?

A. That might work, but they could become separated before they reach the processor's work station.

Q. What if I obtain a vanity call sign, and then my wife applies listing 25 call signs having the same suffix?

A. That should increase your chances. There may be other ways that might result in what you want to have happen.

Passing on Call Signs

Q. Is there any way that I can designate who gets my call sign after I die?

A. No. That is a matter left to your close relatives.

Q. Which relative has priority?

A. The one whose application document arrives at the bank first.

Q. Is there some way that I can get a vanity call sign for my primary station and my son get my current call sign?

A. That cannot be guaranteed. When you obtain a new call sign, you vacate your present call sign. It also goes into limbo for two years, after which your son and other eligibles can apply for it. If you die, however, he and your other relatives are eligible to apply for it immediately.

Q. My deceased close relative had a call sign back in the 1920s that did not have a letter prefix (such as 3XX, for example). Can I get that call sign?

A. No. Such call signs are not in the sequential system.

Q. Those call signs were later given the prefix "W." Am I eligible for W3XX?

A. You are eligible if your relative actually held call sign W3XX and it is otherwise assignable. Otherwise, no.

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CIRCLE 98 ON READER SERVICE CARD

Q. My best friend died recently. In his will, he stipulated that his Group C call sign should go to me. I am an Advanced Class operator. Can this be done?

A. Because you are not a close relative of the deceased, you are not eligible to request the call sign until it becomes generally assignable two years following the person's death.

Q. Do I have any other options?

A. You could form a radio club and obtain a club station license with yourself as the license trustee. With the consent of a close relative, you could apply in-memoriam when Gate 3 opens.

Q. I've held my call sign for over 50 years, and I can't bear the thought of it going to a new ham. Is there some way I can have it retired?

A. No. [But a close family member could obtain a beginner's operator license and apply for it immediately after death, never use it, and continually renew it.]

Q. I do not want to give up my present 1x3. My deceased father held a 1x3 and the family doesn't want it assigned to anyone else. Can we have it set aside or retired?

A. No. You might consent to have your father's call sign assigned to a club station in memoriam.

Q. How soon does an expired call sign become available?

A. Normally two years following license expiration, surrender, revocation, set aside, cancellation, voiding, or death of the grantee. Where the grantee dies, however, the call sign is assignable immediately to the primary station of a close relative and to a club station in memoriam.

Club Stations

Q. How many club station licenses can the same club hold?

A. There is no limit.

Q. Does this mean that one person can obtain a number of vanity call signs?

A. Yes.

Q. Is there a limit on the number of clubs for which the same amateur can be the trustee?

A. No.

Q. Does the mailing address for the club station trustee have to be the same as the mailing address for his or her primary station?

A. No. They can be different.

Q. We want to honor the memory of a former member of our club who is now deceased by obtaining his old call sign for our club station. How can we do this?

A. Obtain a letter consenting to the assignment from a close relative of the deceased person. If your club station had a license grant as of March 24, 1995, your club station license trustee is eligible to apply beginning at Gate 1(A).

Q. The former member we want to honor died less than two years ago. Are we still eligible to apply?

A. Yes, provided your club station had a license grant as of March 24, 1995. Otherwise, you will have to wait until the gate opens for your class of operator license.

Q. Our club station did not receive a license grant until after March 24, 1995. How can we

obtain the former call sign of a deceased member in-memoriam for our club station?

A. If a person has been dead for at least two years, and if the license trustee is Amateur Extra Class, the application can be filed beginning with Gate 2. If Advanced Class, this application can be filed beginning with Gate 3. If any other class, the application can be filed when Gate 4 opens.

Q. We want to honor the memory of a non-member of our club who is now deceased by obtaining his old call sign for our club station. How can we do this?

A. If the person died more than two years ago, the call sign is assignable to the first eli-

gible requestor. A club can apply starting at Gate 2 if the trustee is Amateur Extra Class, at Gate 3 if Advanced, or Gate 4 if any other class.

Q. But the person just died. Do we have to wait two years?

A. You do unless you obtain a letter from a close relative of the deceased consenting to the assignment.

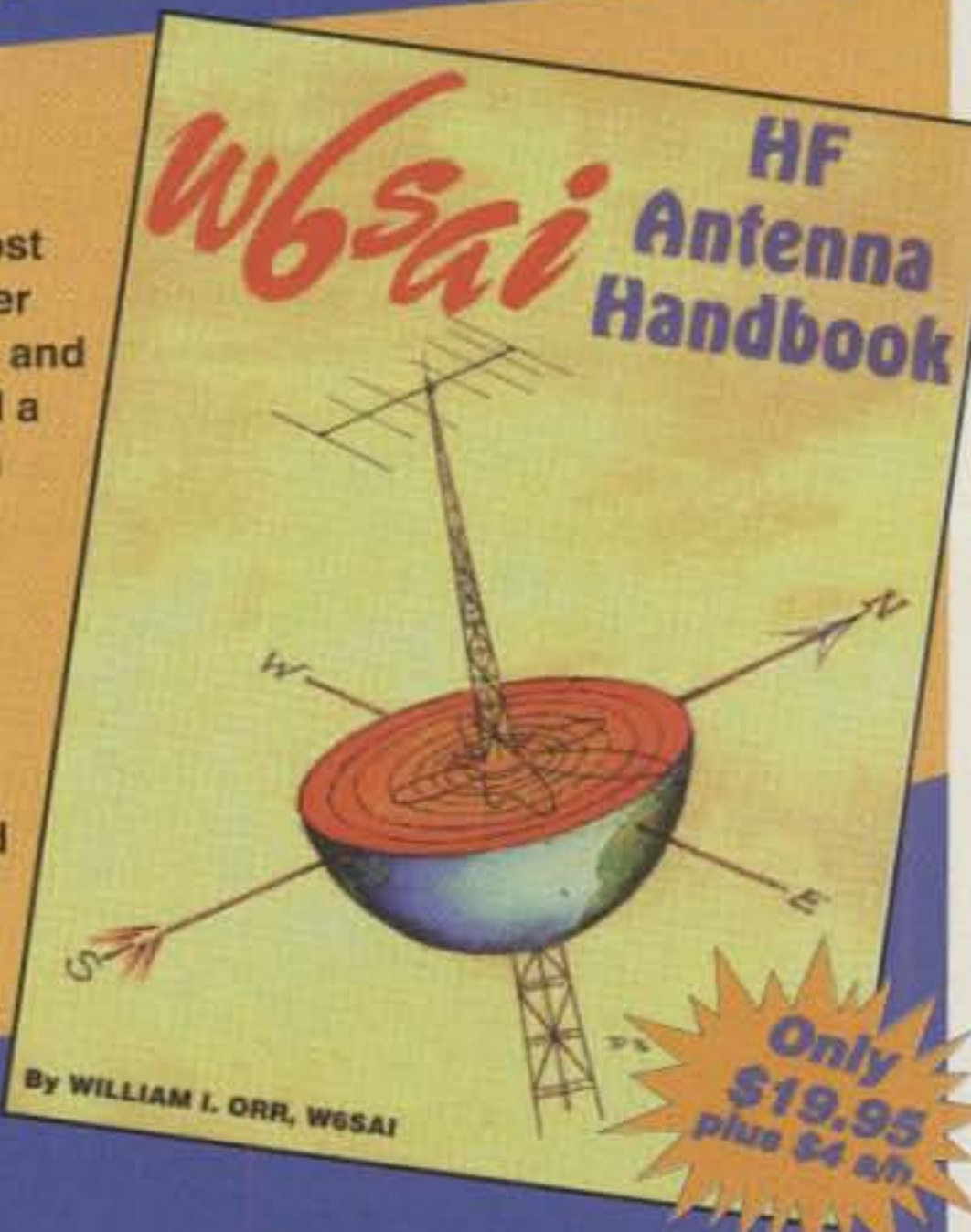
Here end the excerpts from John Johnston's presentation. We hope the above questions and answers, in particular, have helped to clarify the requirements of the vanity call sign system for you.

73, Fred, W5YI

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International Agreements Applicable To Amateurs

Our government has two sets of international agreements which are particularly important in regard to operation by United States amateur radio operators. The current reciprocal operating (FCC 55622) and third-party (FCC 55633) traffic agreement lists are both dated 5 September 1995. We have reciprocal operating agreements with 123 "countries." We have third-party traffic agreements with 45 "countries." Both of these agreements are in effect with 40 "countries." In some cases, an agreement with one country (such as France or England) constitutes an agreement with many other places that have DXCC credit.

One set of agreements (reciprocal operating) permits USA amateurs to operate in foreign countries, and it permits amateurs of those countries to operate in this country. This is called *reciprocal operating*. In neither case are amateurs required to pass tests to operate in the other country; all nations' licenses are accepted as proof of operating qualification. This reciprocal operating system is greatly appreciated by active amateurs who visit other countries.

The other set of agreements (third-party traffic) concerns the exchange of noncommercial (personal) traffic (via amateur radio) between people in different countries, which is greatly appreciated as a person-to-person service. Table I shows the countries with which we have reciprocal operating (R) and/or third-party traffic (T) agreements.

Reciprocal Operating and Licensing

The FCC only issues reciprocal operating permits to visiting alien amateur radio operators who are licensed by (and are citizens of) the indicated countries. Alien amateurs must apply for a permit to operate from any area where amateur radio is controlled by the FCC. USA citizens are not eligible to receive an FCC-issued reciprocal operating permit. If an alien amateur holds an FCC-issued reciprocal operating permit, it is superseded by whatever FCC-issued USA amateur radio license she/he obtains. In this case, the alien's operating privileges are no longer related to her/his home country's privileges; they are the privileges of the class of FCC-issued amateur license she/he earned. Foreign amateurs are encouraged to obtain USA licenses, if they are going to be in this country a long time. Except for representatives of foreign governments, anyone may apply for a USA amateur radio license. Such applicants simply have to pass the same examination elements that are administered to Americans.

Alien amateurs may apply for a permit by completing an FCC form 610-A, attaching a copy of her/his (foreign) valid amateur license, and mailing these items to the Federal Communications Commission, Consumer Assistance Branch, 1270 Fairfield Road, Gettysburg, Pennsylvania 17325-7425 USA. The telephone number of the Personal Radio Branch in room 5322 is 202-632-4964. Some USA missions (in foreign countries) have the FCC form 610-A, and it can be obtained by writing to the FCC, 1919 M Street NW, Washington, DC 20554 USA. An FCC-issued permit is valid for one year, until the alien's home country amateur license expires, or until the alien obtains a USA amateur license, depending on which occurs first.

Operating privileges of a permit holder are detailed in the FCC Rules and Regulations. Part 97 governs the USA Amateur Radio Service. Basically, the permit holder is limited to the operating privileges that apply to her/his class of license in her/his home country. However, FCC regulations must be obeyed and USA Extra class operating privileges may not be exceeded by reciprocal licensees, regardless of the privileges existing in their home countries. As an example of this, reciprocal licensees are not allowed to transmit (on voice) in the 14,100 to 14,150 kHz portion of the 20 meter DX voice segment. Reciprocal permit holders have only the privileges of their own licenses, but not to exceed U.S.A. Extra Class operating privileges. Violations should be reported to the FCC. The exact callsign shown on the permit must be used by the reciprocal licensee when identifying her/his station. The appropriate USA letter-numeral prefix precedes the reciprocal licensee's home callsign. As an example, if CP5WDX is operating in California, his identification is W6/CP5WDX (code) or W6-stroke (or slash)-CP5WDX (voice). The

45527 Third Street East, Lancaster, CA 93535-1802



Here is Jere Dillon, KC5NRB, of Belton, Texas. His wife is Carol, KC5OSE. I was his first contact after he put up his R-7 vertical. Jere was an Army Morse intercept operator for 20 years. He works the 10 through 80 meter bands. Since he retired from the Army in 1977, Jere has held several jobs, including disc jockey, newsman, and sales manager at various radio stations. He was also the office manager of a Houston manufacturing company. Jere is presently a desk clerk at the Stagecoach Inn of Salado.

entire callsign must be used when identifying a station. The reciprocal licensee is required to indicate (in English) the approximate geographic location (city and state, etc.) from which she/he is operating. This information is required at least one time during each contact. Canadian amateurs still identify the original way with the American indicator following their callsign, such as VE7SR/W6.

USA amateurs who want to obtain reciprocal operating permits from the countries with which we have such agreements should request the appropriate forms from officials of those countries. USA-based foreign embassies and legations may have the required forms; if not, they should be able to provide information about where such forms can be obtained. Forms may also be obtained by requesting them from the amateur radio



Franci Giuliano of Sardinia is shown holding her toy crocodile at the control point of her father's shortwave station. Her dad is Alfonso and his SWL identifier is IS0483CA. SWL enthusiasts greatly appreciate receiving QSL cards from amateurs they have heard on the air. Simply make certain such written reports are correct before responding to received SWL cards.

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RCS-4, \$134.00, 4 position HF switch. Similar to RCS-8V. No control cable needed. Handles 1500 watts continuous.

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Gibraltar (see United Kingdom)	*	*	Tuamotu Archipelago (see France)	*	*
Gough Island (see United Kingdom)	*	*	Tubuai Island (see France)	*	*
Great Britain (see United Kingdom)	*	*	Turks & Caicos Islands (see United Kingdom)	*	*
Greece	*	*	Tuvalu	*	*
Greenland (see Denmark)	*	*	United Kingdom	(5)	(6)
Grenada	*	*	Uruguay	*	*
Guadeloupe (see France)	*	*	Venezuela	*	*
Guatemala	*	*	Wallis and Futuna Islands (see France)	*	*
Guernsey (see United Kingdom)	*	*			
Guyana	*	*			
Haiti	*	*			
Honduras	*	*			
Hong Kong (see United Kingdom)	*	*			
Iceland	*	*			
Ile Amsterdam (see France)	*	*			
Ile Saint-Paul (see France)	*	*			
Iles Crozet (see France)	*	*			
Iles Kerguelan (see France)	*	*			
India	*	*			
Indonesia	*	*			
Isle of Man (see United Kingdom)	*	*			
Israel	*	*			
Italy	*	*			
Jamaica	*	*			
Japan	*	*			
Jersey (see United Kingdom)	*	*			
Jordan	*	*			
Kiribati	*	*			
Kuwait	*	*			
Liberia	*	*			

Notes

1. No reciprocal operating permits are required between Canada and the United States.

2. Also applies to Greenland.

3. Also applies to French Guiana, French Polynesia (Gambier, Marquesas, Society, and Tubuai Islands, plus Tuamotu Archipelago), Guadeloupe, Ile Amsterdam, Ile Saint-Paul, Iles Crozet, Iles Kerguelan, Martinique, New Caledonia, Reunion, Saint Pierre and Miquelon, plus Wallis and Futuna Islands.

4. USA/ITU agreement authorizes third-party traffic to be exchanged between the USA and 4U1ITU (Geneva, Switzerland) and 4U1VIC (Vienna, Austria).

5. Reciprocal licensing also applies to Bermuda, British Virgin Islands, Cayman Islands, Channel Islands (including Guernsey and Jersey), Falkland Islands (including South Georgia Islands and South Sandwich Islands), Great Britain, Gibraltar, Hong Kong, Isle of Man, Montserrat, Northern Ireland, Republic of the Marshall Islands, Saint Helena (including Ascension Island, Gough Island, and Tristan da Cunha Island), plus Turks and Caicos Islands.

6. Third-party traffic may be exchanged with United Kingdom special events stations (GB prefixes), except stations with the GB3 prefix.

← Table I— List of countries with which the U.S.A. has reciprocal operating (R) and/or third-party traffic (T) agreements.

licensing authority of the country you intend to visit. The ARRL has a reciprocal licensing expert who provides names, callsigns, addresses, telephone numbers, and related data in response to requests for reciprocal licensing information received from American amateurs. The ARRL's address is 225 Main St., Newington, CT 06111.

When USA amateurs operate (as reciprocal licensees) in other countries, they must abide by the regulations which apply to those countries. ITU Region II (North, Central, and South Americas) regulations do not go with you when operating in ITU Region I (Europe and Africa) or ITU Region III (Australasia and the rest of the Southern Hemisphere). All licensees must abide by the radio regulations of the International Telecommunications Union (ITU).

Third-Party Traffic

Third-party traffic involves at least one person in addition to the operators who are handling the traffic. Third-party traffic includes message traffic handled directly between amateurs, plus telephone (phone) patch traffic, in which people (not just amateurs) speak to each other directly (normally using the telephone in their homes) via amateur radio. Any recognized language may be used when handling international third-party traffic, but station identification must be in English. AMTOR, ASCII, RTTY, and other modes may also be used. Third-party traffic must be of a personal nature. Business messages are prohibited, except during emergencies. FCC-licensed amateurs are not allowed to exchange third-party traffic with amateurs in countries with which this country does not have a third-party traffic agreement. Amateurs are not allowed to accept money, services, or goods in exchange for handling third-party traffic.

Only personal messages may be handled by amateur radio operators under normal circumstances. These messages must be such that they would not normally be sent by any existing means of electrical communications, or would not be sent by any means except for an amateur station being available. These messages must be in plain language.

No FCC-regulated amateur station shall be used to handle third-party traffic with any foreign amateur station that is not included in the accompanying list. This ban does not apply to any message for a third-party person who is eligible to be the control operator of the station being used.

The callsigns of both (foreign and American) stations must be transmitted to identify stations handling third-party traffic. Your own callsign (alone) does not suffice in this case. If you have a question about the status of a country (in regard to these lists), you could call the ARRL or the Personal Radio Branch of the FCC at 202-418-0680 to obtain the latest information. USA amateurs are allowed to communicate directly with all other amateurs throughout the world; there is presently no country which has issued notice that it objects to USA amateurs contacting their amateurs. Such contacts do not constitute the exchange of third-party traffic.

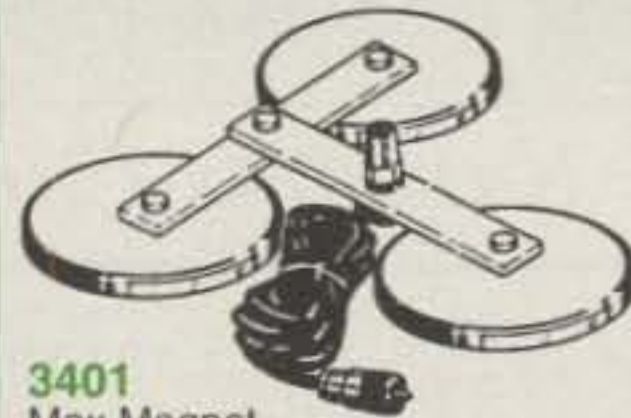
Expanding The Opportunities

The U.S. Government is willing to establish reciprocal operating and/or third-party traffic agreements with other countries. Such agreements are negotiated through the U.S. Department of State. The support of the other country's amateurs is necessary to initiate meaningful negotiations. It is best to have action initiated by the country seeking to reach an agreement with the U.S.A., since their cooperation is essential in getting the task completed. Our government is receptive to providing draft notes, which could form the basis of such agreements, to any interested country. Notes can be requested from the U.S. Department of State or from the Federal Communications Commission. The FCC address is Washington, DC 20554, and requests should be directed to the Chief of the Spectrum Engineering Division. DX amateurs are urged to initiate appropriate action in their countries, if they do not presently have both agreements with the U.S.A. American amateurs could help expand these lists by discussing these agreements with foreign amateurs, particularly when visiting their countries.

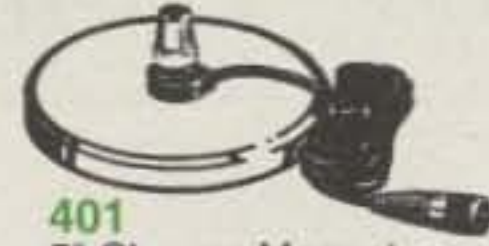
Used Equipment

Tony Musero, K3UKW, has sold used equipment for 24 years, and he is still providing lower priced access to amateur radio gear. His address is 1609 South Iseminger Street, Philadelphia, PA 19148-1010 (telephone 215-271-8898). Many of us cannot afford to buy new equipment, and used gear is a reasonable choice. A lot of the older equipment provides excellent communication performance. 73, Bill, W6DDB

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CIRCLE 64 ON READER SERVICE CARD

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspots Continue To Decrease

The Royal Observatory of Belgium reports a mean sunspot number of 5 for April 1996. There was little day-to-day variation reported, with the sun being spotless on 16 days, and reaching a high of only 19 on April 18.

The mean value for April results in a 12-month running smoothed sunspot number of 12 centered on October 1995. This is a drop of 1 point from September's level. A smoothed sunspot count of approximately 6 is predicted for August 1996.

A corresponding decrease was reported in the 10.7 cm solar flux level. Canada's Dominion Radio Astrophysical Observatory in Penticton, B.C., reports a monthly mean of 69 for April 1996. This results in a smoothed value of 74 centered on October 1995. A smoothed level of approximately 72 is forecast for August 1996.

Cycle 22 Progress

Table I is a listing of smoothed sunspot numbers observed to date for the present Cycle 22, and a prediction for the remainder of this cycle and the beginning of Cycle 23.

The experts generally consider the "low" period of solar activity to begin when the count of one cycle drops below a smoothed level of 30, and continuing until the count of a new cycle rises above 30. The present period of low solar activity and its accompanying poorer HF propagation conditions began during July 1994 and is expected to continue until December 1997.

While the present propagation doldrums are likely to continue for more than another year, there is no need to give up on the HF bands. To repeat a note of optimism: Whatever the sunspot count, even at the very minimum of a cycle, there will always be plenty of DX to work on the HF bands used by radio amateurs. Indeed, however, the challenge is greater and a bit more patience may be required during the remaining period of low solar activity. DX openings are likely to occur for shorter periods of time and peak on different bands than during periods of high solar activity, but the fun and excitement will still be there. Take this as a guarantee from someone who has operated on the HF bands through five sunspot cycles!

Mail Bag

The power of e-mail! In response to my column of March, in which I noted that I had completed 45 years as Propagation Editor for CQ, I received two letters of congratulations via snail mail, but more than three dozen via e-mail.

A most unusual one was received from Pete Malvasi, WB2BYQ, who has read all of my columns for 45 years even though he is only 43 years old! When he first began reading the Propagation column about 20 years ago, he says that he found them so interesting that he went back into a collection of CQ magazines,

11307 Clara Street, Silver Spring, MD 20902
g.jacobs@ieee.org

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for August 1996

Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 5, 10, 21	A	A	B	C
High Normal: 2, 6, 9, 11-12, 20, 22, 26, 29	A	B	C	C-D
Low Normal: 1, 3-4, 7-8, 14-15, 18-19, 23-25, 30-31	B	C	D	D-E
Below Normal: 13, 17, 28	C	C-D	D-E	E
Disturbed: 16, 27	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 S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find propagation index associated with particular band opening from 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 band opening for any date of the month. For example, an opening shown in the charts with a propagation index of 3 will be fair (C) on Aug. 1st, good (B) on the 2nd, fair (C) on the 3rd and 4th, excellent (A) on the 5th, etc.

and read each column back to the March 1951 initial one. Wow!

Pete goes on to say:

"I have both of your books on shortwave propagation (the original and new handbooks) and find them excellent reading and a valuable reference. However, the subject of the STRATWARM condition which is part of WWV's alerts is not covered in much detail, so I assumed it

was not a factor of HF propagation. As you may know, however, the DX cluster network includes the STRATWARM alert when the condition exists. When I asked some of the big-gun DXers what it was about, nobody knew for sure. I got several interesting 'theories,' some of which were later declared to be the 'right answer,' and all of these shook my confidence in the value of physics courses I took in school.

"It seems to me that thermal warming of the stratosphere, no matter over the pole or anywhere else, cannot affect HF propagation since I don't see how that would affect ionization densities. Is that true or what? One gentleman told me that stratosphere warming increases signal absorption significantly over the polar path (he also said that this caused a decrease in absorption at the opposite pole). Another said that this is a condition which causes Tropo ducting (which initially sounds good), but stratosphere warming occurs only in winter months in high latitudes.

"Anyway, I am confused. Can you or any of your readers shed some real facts on this subject? I would greatly appreciate e-mail responses to <Pmalvasi@aol.com>."

I tend to agree with Pete's assumption that stratosphere warming can have very little, if any, effect on HF propagation. The stratosphere is that part of the earth's atmosphere which lies between approximately 8 and 30 miles above the earth's surface. The ionosphere begins at about 50 miles above the earth's surface and extends to beyond 300 miles. As the sun's ultraviolet radiation sweeps across the ionosphere, it loses all of its ionizing energy by the time it reaches the stratosphere. The gases existing in this region are electrically neutral and therefore cannot have any effect on an HF signal.

As I understand it, and I am no expert on this subject, stratosphere warming is associated with the ozone layer, which exists in the upper regions of the stratosphere. Ozone is oxygen that has been transformed, but not ionized, by sunlight. Through absorption, it keeps the sun's ultraviolet radiation from reaching the earth at

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Jan.		18	58	142	151	148	124	71	37	24	10*	6**
Feb.		20	65	145	151	148	116	69	35	23	9*	8**
Mar.		22	71	150	152	147	108	67	34	22	8*	10**
Apr.		24	78	154	149	146	103	64	34	21	7*	12**
May		26	84	157	147	146	100	60	33	19	7*	14**
June		28	94	158	144	145	97	56	31	18	7*	16**
July		31	104	159#	141	146	91	55	29	17	6*	18**
Aug.		35	114	158	141	147	84	52	27	16	6*	20**
Sept.	12	39	121	157	142	145	80	49	27	13	6*	23**
Oct.	13	44	125	157	142	142	76	45	27	12	5*	26**
Nov.	15	47	130	158	142	138	74	41	26	12*	5*	28**
Dec.	16	51	138	154	144	132	73	39	26	11*	5**	31**

Table I—Progress of Sunspot Cycle 22 and Predictions for 1995–1997. The peak of Cycle 22 occurred July 1989 (#). Cycle 22 is expected to end during late 1996 or early 1997. Predicted values for the remainder of Cycle 22 are shown with a single asterisk (*). Predictions for Cycle 23 are shown with a double asterisk (**).

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in () after the time of each predicted opening. 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.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight, 12 is noon, 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate daylight time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength 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.

6. 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.

Central & South Asia	Nil	08-11 (1) 20-23 (1)	06-08 (1) 18-21 (1)	07-08 (1) 18-21 (1)
Southeast Asia	Nil	08-11 (1) 19-22 (1)	06-08 (1)	06-08 (1)
Far East	Nil	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 18-19 (1)	06-08 (1)
South Pacific & New Zealand	13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-07 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	03-04 (1) 04-07 (2) 07-08 (1) 06-07 (1) 04-07 (1)*
Australasia	16-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	03-04 (1) 04-07 (2) 07-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
Caribbean, Central America & Northern Countries of South America	12-14 (1)** 14-16 (2)** 16-17 (1)**	06-07 (1) 07-08 (2) 08-10 (4)	19-20 (1) 20-21 (2) 21-04 (3)	22-02 (1) 02-04 (2) 04-07 (1) 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-11 (2) 11-16 (1) 16-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound Antarctica	Nil	07-09 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

August 15-September 15, 1996 Time Zone: EDT (24-Hour Time) EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	10-12 (1) 14-17 (1)	07-08 (1) 08-10 (2)	18-19 (1) 19-20 (2)	20-21 (1) 21-22 (2)
Northern & CIS (former European USSR)	10-12 (1) 14-16 (1)	07-08 (1) 08-10 (2)	19-21 (1) 21-23 (2)	21-23 (1) 23-01 (2)
Eastern Mediterranean & Middle East	13-16 (1)	07-08 (1) 08-09 (2)	19-21 (1) 21-23 (2)	22-00 (1) 23-00 (1)
Western Africa	10-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-16 (2) 16-17 (3)	20-23 (1) 23-02 (2) 02-04 (1)	22-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern & Central Africa	14-16 (1)	15-17 (1) 17-19 (2)	20-22 (1) 22-00 (2)	22-00 (1)
Southern Africa	10-12 (1) 12-14 (2) 14-15 (1)	07-15 (1) 15-17 (2) 17-19 (1)	21-22 (1) 22-01 (2) 01-02 (1)	22-01 (1) 22-00 (1)*

Time Zones: CDT & MDT (24-Hour Time) CENTRAL USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	13-15 (1)	06-07 (1) 07-09 (2)	20-22 (1) 22-01 (2)	22-02 (1)
Northern Europe & CIS	13-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-22 (1) 22-00 (2) 00-02 (1)	22-01 (1)
Eastern Mediterranean & Middle East	12-14 (1)	07-12 (1) 12-15 (2) 15-18 (1) 21-23 (1)	20-23 (1)	21-22 (1)
Western Africa	10-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-01 (2) 01-02 (1)	22-23 (1) 23-00 (2) 00-01 (1)
Eastern & Central Africa	13-15 (1)	07-09 (1) 15-17 (1) 17-18 (2) 18-20 (1)	21-00 (1)	Nil
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-18 (1) 22-01 (1)	20-21 (1) 21-23 (2) 23-01 (1)	22-00 (1)
Central & South Asia	Nil	07-08 (1) 08-10 (2) 10-11 (1) 18-21 (1)	06-08 (1) 19-21 (1)	07-08 (1) 20-21 (1)



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Southeast Asia	17-20 (1)	07-08 (1)	06-08 (1)	06-08 (1)	21-22 (2)	12-14 (2)
		08-10 (2)			22-00 (1)	14-15 (1)
		10-12 (1)				21-23 (1)
		20-23 (1)				
Far East	16-19 (1)	07-08 (1)	03-06 (1)	05-07 (1)		
		08-10 (2)	06-07 (2)			
		10-12 (1)	07-08 (1)			
		17-19 (1)				
		19-22 (2)				
		22-00 (1)				
South Pacific & New Zealand	16-18 (1)**	07-08 (1)	00-01 (1)	02-04 (1)		
	12-14 (1)	08-10 (2)	01-03 (2)	04-06 (2)		
	14-19 (2)	10-12 (1)	03-06 (3)	06-07 (1)		
	19-20 (1)	12-14 (2)	06-08 (2)	04-06 (1)*		
		14-18 (1)	08-09 (1)			
		18-21 (2)				
		21-23 (3)				
		23-01 (2)				
		01-04 (1)				
Australasia	16-19 (1)	06-07 (1)	02-04 (1)	04-05 (1)		
		07-08 (2)	04-07 (2)	05-07 (2)		
		08-09 (3)	07-09 (1)	07-08 (1)		
		09-10 (2)		05-07 (1)*		
		10-11 (1)				
		18-20 (1)				
		20-00 (2)				
		00-02 (1)				
Caribbean, Central America & Northern Countries of South America	11-14 (1)**	06-07 (1)	19-21 (1)	21-00 (1)		
	14-16 (2)**	07-08 (3)	21-23 (2)	00-03 (2)		
	16-17 (1)**	08-10 (4)	23-03 (3)	03-06 (1)		
	08-10 (1)	10-12 (3)	03-06 (2)	00-05 (1)*		
	10-14 (2)	12-15 (2)	06-07 (1)			
	14-17 (3)	15-17 (3)				
	17-18 (2)	17-19 (4)				
	18-19 (1)	19-21 (3)				

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)**	07-08 (1)	21-22 (1)	22-01 (1)
	08-09 (1)	08-11 (2)	22-23 (2)	01-04 (2)
	09-11 (2)	11-15 (1)	23-01 (3)	04-06 (1)
	11-15 (1)	15-17 (2)	01-03 (2)	02-05 (1)*
	15-16 (2)	17-19 (4)	03-05 (3)	
	16-17 (3)	19-21 (2)	05-06 (2)	
	17-18 (2)	21-23 (1)	06-07 (1)	
	18-19 (1)	23-00 (2)		
		00-02 (1)		
McMurdo Sound, Antarctica	15-18 (1)	08-10 (1)	01-03 (1)	03-06 (1)
		20-21 (1)	03-06 (2)	
		21-23 (2)	06-07 (1)	
		23-00 (1)		

Eastern Mediterranean & Middle East	Nil	07-08 (1)	20-23 (1)	21-22 (1)
		08-10 (2)	06-08 (1)	
		10-12 (1)		
		12-13 (2)		
		13-14 (1)		
		20-22 (1)		
Western Africa	12-14 (1)	07-08 (1)	21-01 (1)	21-23 (1)
		08-09 (2)		
		09-14 (1)		
		14-15 (2)		
		15-16 (3)		
		16-17 (2)		
		17-19 (1)		
Eastern & Central Africa	Nil	12-15 (1)	20-22 (1)	Nil
		15-17 (2)	06-08 (1)	
		17-18 (1)		
Southern Africa	10-12 (1)	07-09 (1)	20-21 (1)	20-22 (1)
		12-14 (1)	21-22 (2)	
		14-16 (2)	22-23 (1)	
		16-18 (1)		
		22-00 (1)		
Central & South Asia	17-19 (1)	07-08 (1)	06-08 (1)	06-07 (1)
		08-10 (2)	18-20 (1)	
		10-12 (1)		
		17-19 (1)		
		19-20 (2)		
		20-21 (1)		
Southeast Asia	16-20 (1)	08-09 (1)	02-05 (1)	06-07 (1)
		09-11 (2)	05-07 (2)	
		11-13 (1)	07-08 (1)	
		18-21 (1)		
		21-23 (2)		
		23-00 (1)		
Far East	17-19 (1)	07-08 (1)	01-02 (1)	03-04 (1)
		08-10 (2)	02-06 (2)	04-06 (2)
		10-12 (1)	06-07 (3)	06-07 (1)
		12-14 (2)	07-08 (1)	04-06 (1)*
		14-18 (1)		
		18-19 (2)		
		19-21 (3)		
		21-22 (2)		
		22-23 (1)		
South Pacific & New Zealand	16-18 (1)**	07-08 (1)	22-23 (1)	23-02 (1)
	12-15 (1)	08-10 (2)	23-00 (2)	02-06 (2)
	15-16 (2)	10-17 (1)	00-06 (3)	06-07 (1)
	16-18 (3)	17-19 (2)	06-07 (2)	02-06 (1)*
	18-20 (2)	19-20 (3)	07-08 (1)	
	20-21 (1)	20-22 (4)		
		22-23 (3)		
		23-00 (2)		
		00-02 (1)		
Australasia	14-17 (1)	17-19 (1)	00-02 (1)	02-04 (1)
	17-20 (2)	19-20 (2)	02-03 (2)	04-06 (2)
	20-21 (1)	20-23 (3)	03-05 (3)	06-07 (1)
		23-01 (2)	05-07 (2)	04-06 (1)*
		01-07 (1)	07-08 (1)	
		07-10 (2)		
		10-13 (1)		
Caribbean, Central America & Northern Countries of South America	11-13 (1)**	06-07 (1)	18-21 (1)	20-22 (1)
	13-16 (2)**	07-10 (3)	21-22 (2)	22-02 (2)
	16-17 (1)**	10-15 (2)	22-01 (3)	02-05 (1)
	08-09 (1)	15-16 (3)	01-04 (2)	23-03 (1)*
	09-14 (2)	16-18 (4)	04-07 (1)	
	14-17 (3)	18-20 (3)		
	17-18 (2)	20-22 (2)		
	18-19 (1)	22-02 (1)		
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-13 (1)**	06-07 (1)	20-22 (1)	22-02 (1)
	13-15 (2)**	07-10 (2)	22-23 (2)	02-04 (2)
	15-16 (1)**	10-15 (1)	23-01 (3)	04-05 (1)
	08-09 (1)	15-17 (2)	01-03 (2)	02-04 (1)*
	09-10 (2)	17-19 (4)	03-05 (3)	
	10-12 (1)	19-20 (3)	05-06 (2)	
	12-15 (2)	20-22 (2)	06-07 (1)	
	15-17 (3)	22-00 (1)		
	17-18 (2)			
	18-19 (1)			
McMurdo Sound, Antarctica	16-18 (1)	08-10 (1)	00-03 (1)	03-06 (1)
		17-19 (1)	03-06 (2)	
		19-21 (2)	06-07 (1)	
		21-23 (3)		
		23-00 (2)		
		00-02 (1)		

Time Zones: PDT (24-Hour Time) WESTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	Nil	06-08 (1)	20-21 (1)	22-23 (1)
		08-10 (2)	21-23 (2)	
		10-12 (1)	23-00 (1)	
		12-14 (2)		
		14-16 (1)		
		22-00 (1)		
Central & Eastern Europe	Nil	06-08 (1)	19-20 (1)	21-23 (1)
		08-10 (2)	20-22 (2)	
		10-12 (1)	22-23 (1)	

* Indicates best times for 160 meter openings.
 ** Indicates best times for 10 meter openings.
 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.

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CIRCLE 11 ON READER SERVICE CARD

FCC Responds (from page 11)

Since the release of the Streamlining Notice, we have gained experience with our new process. We now provide these procedures for submitting comments to the Advisory Committee.

Comments on Ongoing Advisory Committee Matters: Parties that wish to comment on the ongoing deliberations of the Advisory Committee and its IWGs may do so at any time.

Comments on Preliminary Proposals: As announced in the Streamlining Notice, preliminary WRC proposals developed by the Advisory Committee will be released by the Commission in periodic Public Notices. These Public Notices will allow an opportunity for public comment and will provide the appropriate procedures, such as filing deadlines, to be followed.

In either case, parties wishing their comments to be considered directly by the appropriate Advisory Committee group and to become part of the Advisory Committee's pub-

lic record should submit their comments in writing to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554, or by e-mail at <wrc97@fcc.gov>. Commenters are requested to file an original plus one copy.

The comment should reference the Advisory Committee public record file number, "Reference No. ISP-96-005" and the appropriate Advisory Committee Informal Working Group, if known, in which their submission should be considered. The FCC staff will ensure that comments filed are considered in the appropriate groups.

For the most expeditious and efficient consideration of their comments, parties should refrain from filing comments directly with the Chair of the WRC-97 Advisory Committee, with the Chairs and Vice-Chairs of the Informal Working Groups, with individual FCC staff members or private sector participants in the Advisory Committee process.

For additional information, contact Cecily C. Holiday, Federal Officer of the WRC-97 Advisory Committee, or Damon C. Ladson, Alternate Federal Officer at (202) 418-0749, or consult the WRC-97 Homepage on the Internet (<http://www.fcc.gov/ib/wrc97/>).

dangerous levels. However, the amount of ozone in the stratosphere is extremely low, normally on the order of 0.001% by volume. I would doubt that such a low volume could significantly absorb energy from HF radio signals.

I would appreciate it if readers who respond to WB2BYQ on this subject, drop a copy to me at <g.jacobs@ieee.org>.

John Troster, W6ISQ, wrote thanking us (Jacobs, Cohen, and Rose) for including a review of HF beacons in *The New Shortwave Propagation Handbook*, and to tell us how much he has enjoyed the book. John is QCWA Editor for *Worldradio* and one of the founders of the International Beacon Project of the Northern California DX Foundation and the International Amateur Radio Union (NCDXF/IARU).

August Propagation

During August an occasional 10 or 12 meter DX opening should be possible to southern and tropical areas. Best bet is during the afternoon when conditions are expected to be High Normal, or better. Frequent short-skip openings between distances of about 500 and 1400 miles can also be expected.

Look for no more than an occasional 15 or 17 meter DX opening towards Europe and the east before noon, but chances should be much better during the afternoon hours, particularly towards Africa, South America, the South Pacific and Oceania. Expect frequent short-skip openings between distances of about 400 and 1400 miles.

During August, 20 meters should continue to be the best band for DX propagation. Openings are forecast to most areas of the world between sunrise and midnight, when conditions are at least Low Normal. Peak conditions should occur, with strongest signals, during a two to three hour window just after local sunrise, and again during the late afternoon and evening. When conditions are High Normal or better, 20 meters may remain open through much of the period of darkness, particularly towards southern and tropical areas. Excellent short-skip openings are also expected to continue on 20 meters from shortly after sunrise to almost midnight. These should range from a few hundred miles out to the one-hop limit of about 2300 miles.

Some fairly good 30 and 40 meter DX openings are forecast for the early evening hours towards the east and south. Conditions should improve towards the west and south after midnight, with the bands remaining open for DX until sunrise. Look for excellent short-skip openings between about 250 and 750 miles during the daylight hours, and between 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should also be possible on 80 meters during the hours of darkness. Conditions should peak just as the sun begins to rise on the "light" side of the path. Try 80 meters for short-skip openings up to about 250 miles during the daylight hours, and between 250 and 2300 miles at night.

It's still too early for 160 meter DX openings, but an occasional one may be possible during the hours of darkness and the sunrise period. Short-skip on 160 meters looks good during the hours of darkness for distances up to at least 1300 miles.

Since the summer propagation season usually ends by mid-September, this month's DX

Propagation Charts cover only a one month period rather than the usual two months. Short-Skip Charts for August appeared last month.

VHF Ionospheric Openings

Although sporadic-E ionization is expected to decrease during August, some 6 meter short-skip openings still should be possible. These openings should normally extend between approximately 750 to 1300 miles, but during periods of wide-spread sporadic-E ionization, 6 meter "two-hop" openings may be possible up to as great as 2500 miles. During periods of intense sporadic-E ionization also check for possible short-skip openings on 2 meters over a range of about 1100 to 1300 miles.

What is likely to be the year's most prolonged and intensive meteor shower should take place between August 11 and 15. Called the *Perseids*, it is expected to peak on August 13 with

an average count of 50 meteors an hour. Ionization produced by these meteors as they enter the earth's atmosphere should make possible numerous meteor-scatter-type openings on the 6 and 2 meter bands. The range of such openings could be up to several hundred miles, and at times somewhat greater.

August is not usually a good month for auroral-type propagation on the VHF bands, but some could occur during times when the ionosphere is disturbed. Check the Last-Minute Forecast appearing at the beginning of this column for those days that are expected to be Below Normal or Disturbed. These are the days when chances are best for auroral-type openings on the VHF bands.

Auroral-scatter openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading and Doppler shift on SSB signal.

73, George, W3ASK

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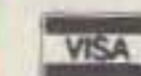
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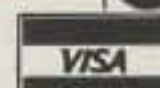
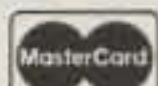
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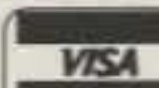
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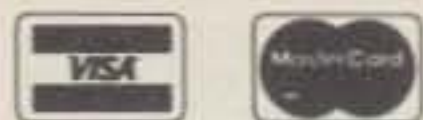
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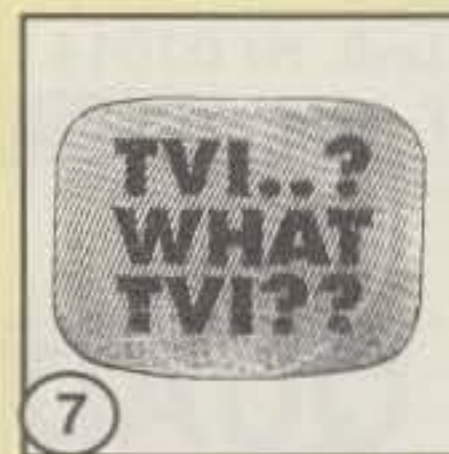
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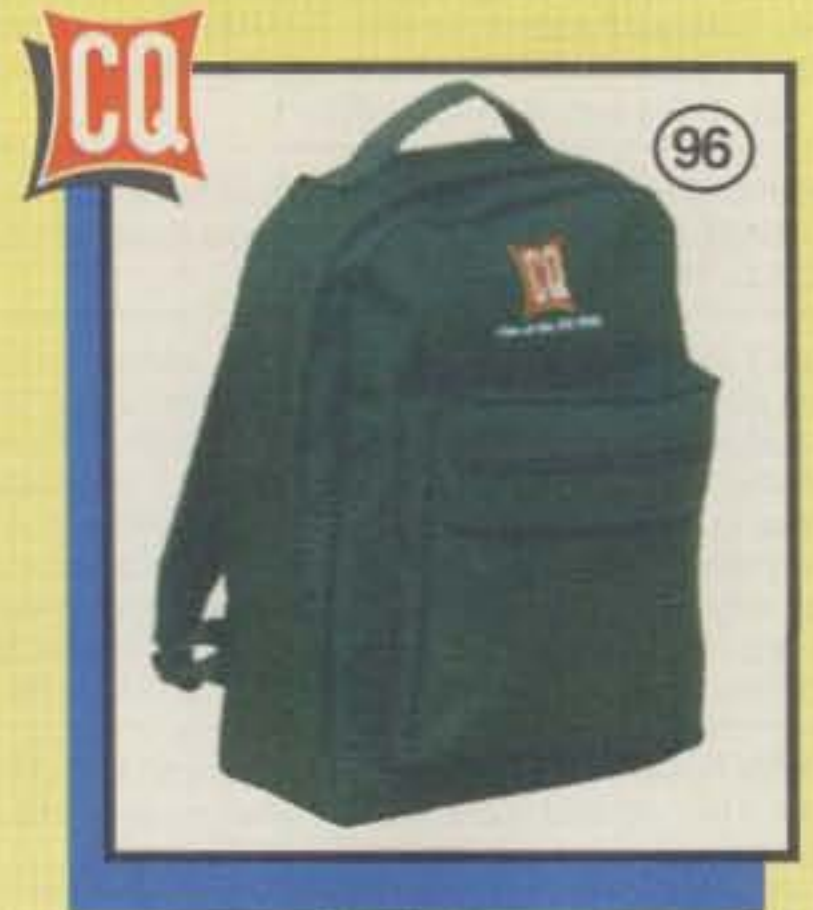


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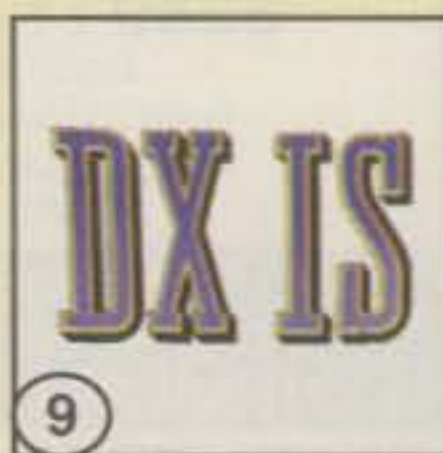
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Announcements (from page 8)

425-6076 eves.; or write to LCARA Swap Meet, P.O. Box 906, Longview, WA 98632; e-mail <KB7ADO@aol.com>.

Aug. 17, **Warroad Amateur Radio Hamfest and Banquet**, Warroad Area Community Center, Warroad, Minnesota. Contact David Landby, KB0HAP, Route 3, Box 10, Warroad, MN 56763 (phone 218-386-1092). The first 20 pre-registrations will receive a free coffee mug. (Handicapped accessible; exams.)

Aug. 17-18, **The 1996 Huntsville Hamfest**, Von Braun Civic Center, downtown Huntsville, Alabama. Call 205-534-7175; or check into <http://www.hamfest.org> on the web.

Aug. 18, **19th Union County ARC Ham and Computer Fest**, Broadway Community Building, Broadway, Ohio. Contact Gene Moore, N8YRF, 24461 Claibourne Road, Marysville, OH 43040 (513-246-5943).

Aug. 18, **39th Annual Warren Hamfest**, Trumbull Branch Campus Kent State University, Warren, Ohio. Contact Al VanSlyke, N8IKX, Warren ARA Hamfest, P.O. Box 809, Warren, OH 44482 (330-889-3378).

Aug. 18, **DuPage ARC Hamfest Computer Show**, Hawthorne Race Course, Stickney, Illinois. For more information, send SASE to DARC Hamfest '96, 7511 Walnut Ave., Woodridge, IL 60517. (Handicapped accessible.)

Aug. 18, **WECA Summerfest 1996**, Yonkers Raceway, Yonkers, New York. Contact Tom, WB2NHC, or Jeanne, N2NQY, Raffaelli at 914-962-9666.

Aug. 18, **The Central Kansas ARC Hamfest**, Bicentennial Center Heritage Hall, Salina, Kansas. Contact CKARC, P.O. Box 2493, Salina, KS 67401; or Dan Cook, AA0TT, at 913-263-8540.

Aug. 23-25, **22nd Eastern VHF/UHF Conference**, Quality Inn & Conference Center, Vernon, Connecticut. Contact Eastern VHF/UHF Society, Rae Bristol, K1LXD, 328 Mark Dr., Coventry, CT 06238 (860-742-8650).

Aug. 24, **Mohawk ARC Hamfest**, Mohawk Drive-In Theater, Gardner, Massachusetts. Contact John, WF1L, 508-249-5905 (4-9 PM), or Paul, N1IPG, 508-632-9432 (6-10 PM).

Aug. 24, **St. Charles ARC Annual Hamfest**, Blanchette Park, St. Charles, Missouri. Contact William Horn, N0YY5, 314-898-2421; or write to RR2, Box 240, Troy, MO 63379.

Aug. 24, **West Virginia State Amateur Radio ARRL Convention**, Jackson's Mill, WVU Convention and 4-H Conference Center, Weston, West Virginia. Contact Dave Ramezan, KA8ZXP, at phone 304-462-7560, e-mail <gsa00106@mail.wvnet.edu>; or Dick Fowler, II, at phone 304-623-9479, e-mail <n8fmd@westvirginia.com>. (Exams.)

Aug. 24, **Bridgewater SCARS Hamfest**, Somerset County 4H Center, Bridgewater, New Jersey. Contact Pete, WA2OCN, at 908-429-9093; or write to SCARS, P.O. Box 742, Manville, NJ 08835.

Aug. 24-25, **The Mountain ARC 15th Annual Campfest**, Colorado Lions Campgrounds, Woodland Park, Colorado. Write to MARC at P.O. Box 1012, Woodland Park, CO 80866-1012; or call Don, AA0NW, at 719-687-3692.

Aug. 25, **Yonkers ARC Hamfest and Computerfest**, Yonkers Municipal Parking Garage, Yonkers, New York. Send SASE to Y.A.R.C., P.O. Box 378, Centuck Sta., Yonkers, NY 10710-0378; or call Jim at 914-969-5182, or John at 914-963-1021.

Aug. 30-31, **5th Annual New Orleans International DX Convention**, Royal Sonesta Hotel on Bourbon St., in the French Quarter of New Orleans, Louisiana. Contact Michael Mayer, W5ZPA, 5836 Marcia Avenue, New Orleans, LA 70124.

Aug. 31, **Alamogordo (NM) ARC 12th Annual Hamfest**, Otero County Fairgrounds, Alamogordo, New Mexico. Contact Larry Moore, WA5UNO, 505-434-0145; or Jim Patton, N7IOM, 505-439-8349. (Exams.)

Sept. 26-29, **55th National Convention of the Federation of Mexican Radio Experimenters**, Acapulco, Mexico. For further information, contact Cesar Figueroa V., XE1KVF, FMRE, Apartado Postal 907, 06000 Mexico D.F., Mexico (phone 011-52-5-563-1405).

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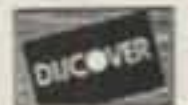
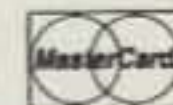


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