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Amateur Radio

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MARCH 1995

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50th Anniversary

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1994 CQ WW WPX SSB Contest Results

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THE RADIO AMATEUR'S JOURNAL

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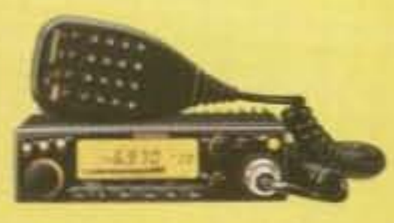

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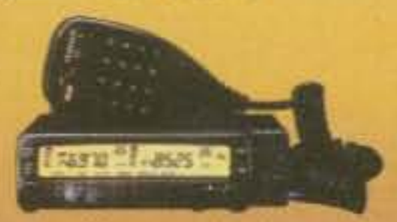

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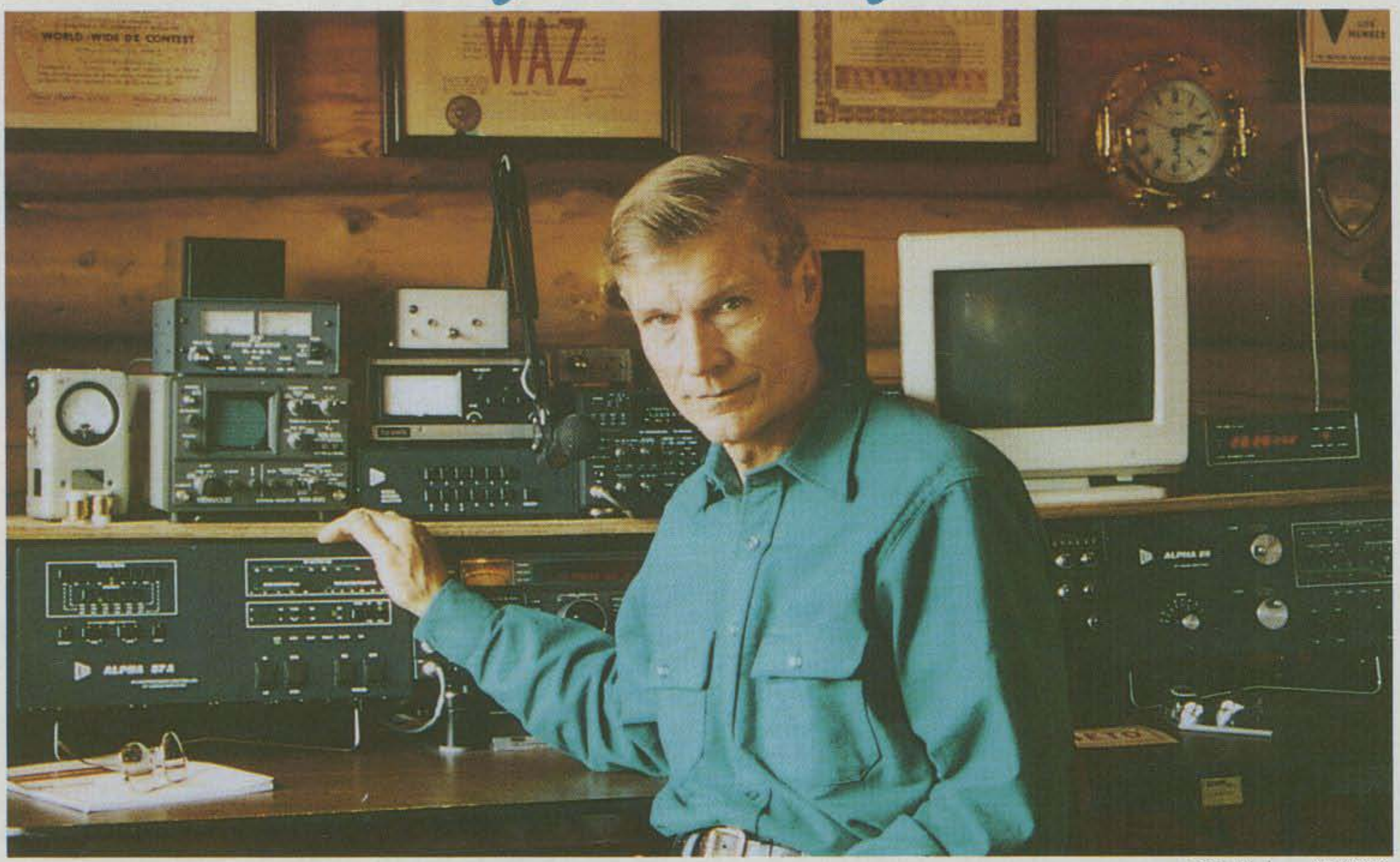

Dick Ehrhorn, W4ETO

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The Radio Amateur's Journal

ON THE COVER: Don Doughty, W6EEN, is a relative newcomer to the Ham contesting field, having begun to assemble his contest station after his retirement. He must have done a pretty good job . . . he finished 5th overall from the US in the CQ WW WPX SSB Contest in 1994! (Photo by Larry Mulvehill, WB2ZPI)

MARCH 1995 **VOL. 51, NO. 3**

FEATURES

DEPARTMENTS

ZERO BIAS

EDITORIAL

Consider, if you will, a large, bushy-tailed rodent (*Neotoma Cinerea*) of the Rocky Mountain area, sometimes called a wood rat. At the moment, I don't have a picture of one of these critters to show you, but for the purposes of this discussion it really doesn't matter. It's enough to reason that if one or more showed up at your local hamfest or even if one popped up at the Dayton Hamvention next month, it would be easy to spot. Probably, if a few showed up most folks would either try to catch them, or kill them, or both.

These hapless rodents share a distinct quality with most of us amateurs. We both are called pack rats. For some unspecified reason we both seem to like to bring shiny bits of metal and all sorts of good stuff back to our nest (errr . . . house) and store it away. I know that we can and do rationalize why we need this stuff and what we may do with it (it's always future oriented). Somehow I can't picture a little gathering of rats where one of them squeals, "I just picked up another one; that gives me three. You know that they only made eight, and someday I'm going to fix them up and use them, if only I can find the other five." That's a major area of difference between us and the wood rats. We can *say* those things and a rat can't.

For the uninitiated, though, the behavior may look the same. I doubt if there were a Mrs. Rat, Ms. Rat, or even Significant Other Rat that they would start harping on how full the nest was and that it was about time the nest was cleaned up and some of this good stuff tossed out. No, our little furry friend doesn't appear to have either this problem or what amounts to the little internal voice that tells him to shed some of these treasures. While I don't know how much stuff is enough for the average amateur, I do reason that there is a finite volume that the average home can accommodate. This higher order processing is either impossible or unimportant to the wood rat.

We as amateurs are obviously far superior, blessed with a larger brain and the ability to understand complex concepts such as volume and the conservation of matter. Perhaps without plan or design we happened on, then distilled, enhanced, and vastly improved upon, the ancient Greek custom of the *agora* (a great crossword-puzzle word), or open marketplace. With exquisite clarity it became crystal clear to the organizer of the first hamfest fleamarket that the way to have it all and then some is to keep a certain portion always in circulation. No matter what you sell, you always get to keep the emotional and historical tie to it. We all can recite the rigs we've owned and in what order. We all can rationalize (and correctly) that we can always buy another one if needed. Our physical inventory is somewhat down, freeing up funds to buy something new to add to our collection. In a way, we have it all. It's just that some of it is always someplace else at the moment.

A few years ago, probably around New Year's Eve, I resolved to break this insidious vicious cycle and to make a serious attempt to get rid of more volume than came in. Thereby at some eventual point I would have everything in order. So far it seems to be working. I've still got quite a ways to go, but considering what has left to date, I've made remarkable progress. If you're anything like me, you are probably involved with other hobbies and interests, each with its own good-stuff collection. Naturally, you sell off some of it, but the bulk of some of the more rare and exotic esoterica simply has to be given away or (shudder) tossed out. I can't bring myself to throw out some of the good stuff yet, so I try to find a home for it.

A number of years ago we ran a humorous article on fleamarkets in which the author at the end of the day simply walked up and down the aisles depositing unsold items on other people's tables when they weren't looking. I tried that, but it simply isn't fast enough and is only suitable for small items. Now I just go to various club meetings and ask who wants it. This is quite a bit faster, and you still know where it is in the event that you want to try to get it back. The down side to this is that now several of my friends' wives hate me and threaten me with grievous bodily harm if I give their husbands any more stuff to clutter up their homes.

I have one carton in my basement that's slowly filling with good stuff from my avid building days. About six months ago I promised to send it off to Dave Ingram for some of his projects. Well, every so often I go by the carton and take one or two things out, and then at other times I toss in a few more goodies. It is filling, though, and at some point I will ship it to Dave.

Don't get me wrong. I'm still out there with the best of them at most hamfest fleamarkets. I like to think of myself as being in my heuristic period, where for the most part I only bring home things that I will use within three months. It doesn't always work out that way, as some of you who see me at hamfests know, but it works out often enough these days. I don't see myself or any other amateur I know ever being a confirmed minimalist. I know, deep in my heart, that even the singular amateur who walks around a hamfest with a miniscule HT on his belt secretly longs for a bigger belt with three more HTs, a Leatherman® tool, a cellular phone, a GPS, and a beeper just to even things out.

Maybe there is a scintilla of similar genetic protein in us and *Neotoma Cinerea*. Maybe we both take delight in seeing the new and novel, and at least one of us sees the potential for recombination and future use. However, both of us tend to just pack our respective nests with good stuff, and obviously that in itself is satisfying. While there is no scientific truth nor working hypothesis in this analogy, rest assured that our friendly rodent can't articulate or rationalize his behavior, giving rise to an even greater similarity.

Obviously, the average or not-so-average amateur is far superior to the above-named rodent. We are the curators, the archivists, and the preservers, if you will, of the Electronic National Trust. Unlike the rodent, we have the ability to bridge one little synapse and instantly remember one tiny bit of good stuff tucked away in the basement or attic for many years, and just as instantly retrieve it. We also can just as instantly make use of our find and beam with delight in being vindicated for hanging on to whatever it is, as it is just the right thing to solve the problem. Let's see some rat do that.

Ooops!

Did you ever leave home in the morning, get in your car and start to go to work, when all of a sudden you have this gnawing feeling that you forgot something and you can't remember what it is? Well, this month it happened here at *CQ*. When this issue was completed we all had that feeling. Then it dawned on us that due to scheduling and mail delivery, we had not received the Awards column in time for the March issue. Sorry, Norm. We'll do much better in April, we promise.

A Formal End To An Era

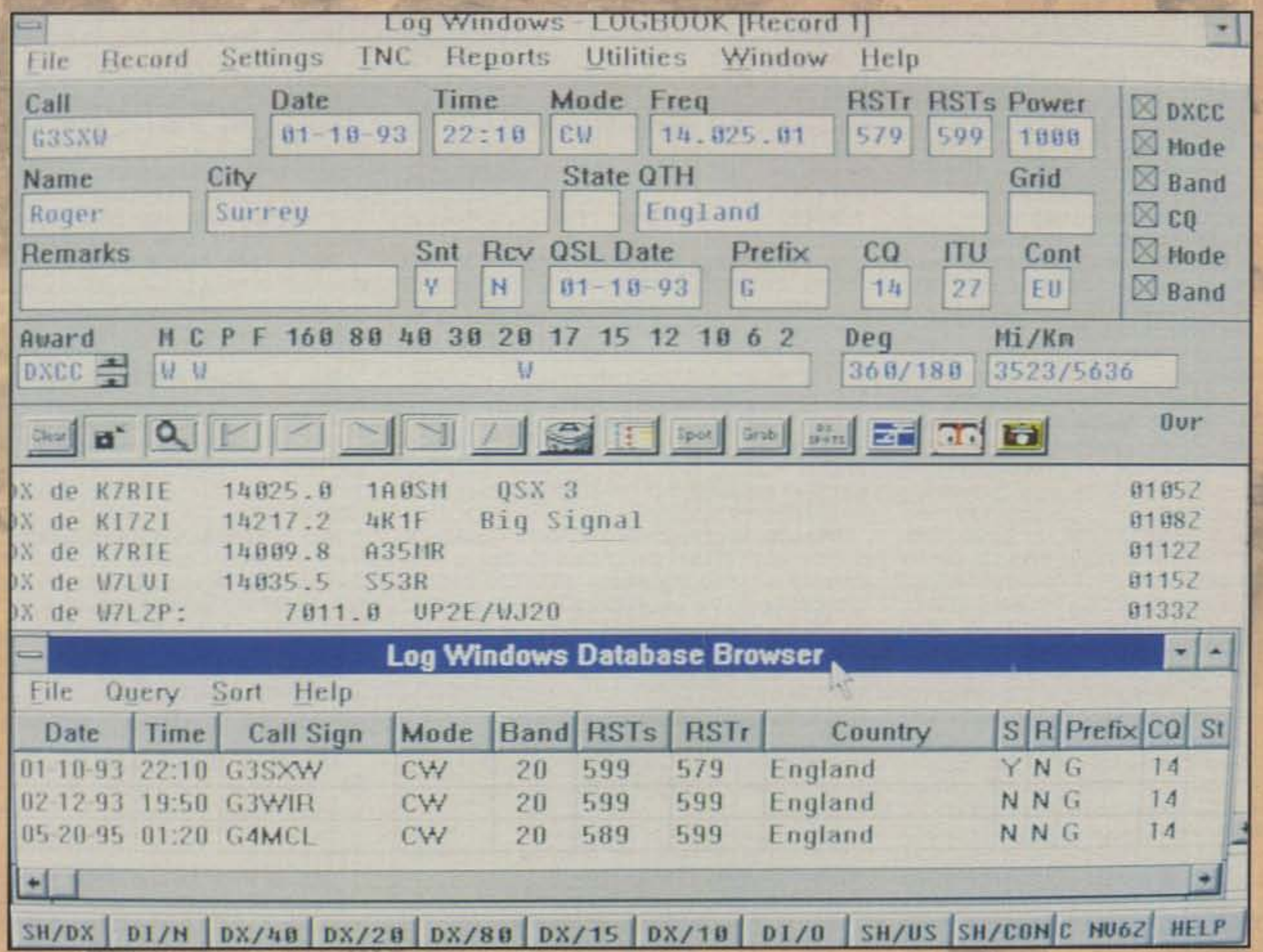
The other day I received a formal invitation from The Commanding Officer, U.S. Coast Guard Communication Area Master Station Atlantic—NMN, at Chesapeake, Virginia to attend, or per the invitation's wording "celebrate," a new era in Coast Guard communications. This formal event will mark the cessation of continuous wave (CW) after nearly a century of operations. Obviously, I graciously accepted the invitation and look forward to being there at the end of this month.

Over the years I've witnessed the many changes in technology with regard to amateur radio, and I've seen things come in and things go out. Most changes, however, were gradual, and things were replaced or lost to history without formal fanfare or ceremony. This upcoming occasion is different in that there is a formal day and time which will be witnessed and which will officially mark the end of one era and the beginning of another. That this event will someday affect the future of amateur radio is certain, but when and how is still open for conjecture.

In some ways it is sad to commemorate the demise of a mode, even one I've never been a personal fan of. It's a change in tradition, and not so much a change in technology, but a big change in the emotional content and attachment to CW. What is being formalized is the definition and not the emotional baggage. CW is a mode, like any other mode, with both good and bad points. Its time has run its course, and now it's time to move on. It's still hard to say goodbye. I don't know if people felt the same sense of loss with the end of spark and the smell of ozone in the air or with the slow but certain demise of AM and its incomparable audio quality, but CW is a whole other thing.

73, Alan, K2EEK

Save a Tree.



Do your logging on a computer.

Are you one of those poor saps still keeping a paper logbook? Are you stumped about what to do? You need Log Windows 2, the logging software that takes the paper out of doing paperwork.

Log Windows 2 is a complete Windows program for logging, rig control, antenna rotor control, and DX cluster monitoring, plus award tracking and reporting features.

DX spots are automatically displayed for you. Log Windows 2 lets you move to the designated frequency quickly, log the contact, and then save the information into a log.

Log Windows 2 is completely compatible with PC PakRatt for Windows 2. Now you can have the superior TNC control of PC PakRatt coupled with the advanced logging and tracking functions of Log Windows.

Sort and print your logs by any criteria with the special browser function. Turn your ProSearch, Heath IntelliRotor and Yaesu antenna rotors to the short path, long path or in an arbitrary direction right from the Log Windows' main screen. Update official ARRL DXCC list prefixes with ease. Query on-line call book databases such as SAM, QRZ, or HamCall for a call sign at any time.

Special filters can be set to only display and sound an alarm for DX spots that are needed. There is voice-synthesized DX alert capability which verbally announces the call sign and frequency of a DX.

Moving to Log Windows 2 couldn't be easier with the LW Import program included with Log Windows. All these logs can be easily imported to Log Windows 2: CT, DXLog, Log Master, Easy DX, Hyperlog, DX Base, N6RJ 2nd Op, Log View, DX Desktop, PC PakRatt, and any ASCII log.

Logging and tracking are supported for ARRL DXCC, WAS, VUCC, and CQ Magazine's CQ Zone and US-CA awards. Log Windows 2 also allows users to print QSO labels, print log books, see information displayed by the local Packet Cluster, and change the frequency and mode of the transceiver to the frequency shown by the Packet Cluster. Log Windows 2 doesn't even require an AEA TNC.

Quit lumbering along with your out-of-date log book, get Log Windows 2—the clear-cut choice for managing your logs. Call AEA's Literature Request Line at (800) 432-8873 for more information. Contact your favorite amateur radio equipment dealer for a demonstration and best pricing.

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ANNOUNCEMENTS

• **Newsline to assume administration of the Young Ham of the Year Youth Award Program –** The 1995 "Young Ham of the Year Award" is officially open to any U.S. licensed radio amateur age 18 or younger. The award highlights the accomplishments of the nation's many young radio hobbyists, and encourages the entry of more young people into the hobby. Nominating forms are available from Newsline at 28197 Robin Avenue, Saugus California 91350 or electronically via E-mail billwa6itf@aol.com or directly on the America Online BBS system.

• **Yaesu U.S.A. announces sponsorship of "DX-Caribe Cruise '95" –** This second in a series of amateur radio theme cruises is to be held June 18–25, 1995. Sailing from Aruba on board Dolphin Cruise Line's *S.S. Ocean Breeze*, passengers on DX-Caribe Cruise '95 will make stopovers in Dominica, Barbados, Martinique, and Curacao, before returning to Aruba. While on board in international waters, two fully-equipped Yaesu HF stations will allow maritime mobile operation. At each shore stopover optional shore excursions will provide the opportunity for passengers to operate "DXpedition" style from beach locations; current plans are for operation from three HF stations plus 6 meters, OSCAR, and 2 meter EME (moonbounce). Information regarding DX-Caribe Cruise '95, including booking of ship and airline passage, is being handled exclusively by Landry & Kling, Inc., 1390 South Dixie Highway (Suite 1207), Coral Gables, FL 33146 (800-448-9002). Inquiries from outside the United States are welcomed, and may be directed via FAX to Landry & Kling at 305-661-0977.

• **The Foundation for Amateur Radio, Inc. –** This non-profit organization with headquarters in Washington, D.C., plans to administer 56 scholarships for the academic year 1995–1996 to assist licensed radio amateurs. Licensed hams may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college, or technical school. The awards range from $500 to $2000, with preference given in some cases to residents of specified geographical areas or the pursuit of certain study programs. Clubs, especially those in Delaware, Florida, Maine, Maryland, New Jersey, Ohio, Pennsylvania, Virginia and Wisconsin, are encouraged to announce these opportunities at their meetings, on their nets, during training classes, and in club newsletters. Additional information and an application form may be requested by letter or QSL, postmarked prior to April 30, 1995 from: FAR Scholarships, 6903 Rhode Island Avenue, College Park, MD 20740.

• **Atlantic/NMN Chesapeake, Virginia –** U.S. Coast Guard Communications Area Master Station Atlantic/NMN will cease HF Morse code operations on 01 April 1995. A final message will be broadcast on 01 April at 0001Z on frequencies 5870, 8471, 12718.5, and 16976 kHz. NMN will issue a special certificate for those who copy the final message. For the certificate, submit copy of message to USCG Camslant, c/o NSGA Northwest, Chesapeake, VA 23322, Attn: TC3 S. Morales.

• **St. Louis County Skywarn Seminars –** The 1995 SKYWARN weather observer training seminars sponsored by St. Louis County Emergency Management will take place during March and April. Seminars are held at the Emerson Auditorium, St. Luke's Hospital, in Chesterfield. All classes are open to everyone, and certification is provided. For directions and further information, contact Mike Redman, KAØYXU, at 314-889-2362, or write to him at P.O. Box 16673, Clayton, MO 63105.

• **These Special Events are scheduled for March:**

"VOA" 2-land, from Piscataway, New Jersey; members of the Piscataway ARC will operate "VOA"; to commemorate the WWII operation of the VOA relay station WBOU; 0000Z March 18 to 2400Z March 19; CW—Novice subbands; phone—lower third of the General 80 through 15 meter subbands and the Novice 10 meter subband, RTTY operations will also be conducted on 80, 40, and 20 meters. For certificate, send QSL and a 9 × 12 inch SASE to the station worked.

W4ZBB, from Ft. Walton Beach, Florida; the Playground ARC; to celebrate the 25th Annual North Florida Ham/Swapfest; March 4 and 11 from 1500Z through 2200Z; operation in the center of the 15, 20, and 40 meter phone bands and on 147.00. For a certificate, send QSL and 9 × 12 SASE to PARC, P.O. Box 873, Ft. Walton Beach, FL 32549.

W4BKM, from the 13th Annual Cherry Blossom Festival, Macon, Georgia; The Macon ARC; 1400–2300Z March 18; phone 7.235, 14.235, and 21.335; CW 7.135, 14.035; 21.135. For certificate send QSL and a 9 × 12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

WA4TGF, from Virginia Beach, Virginia; The Virginia Beach ARC; to commemorate the 104th anniversary of the Norwegian Lady; 1400Z March 25 to 2000Z March 26; CW 10 kHz up from the bottom of the Novice subbands; phone 3.880, 7.280, 14.280, 21.280, 28.363, 146.550. For certificate, send QSL and SASE to VBARC, P.O. Box 62003, Virginia Beach, VA 23462.

VE3LPE, from Kincardine, Ontario, Canada; to commemorate the birthday of Albert Einstein and the peaceful use of nuclear energy; 1400–2200Z March 11; operation in the lower portion of the General 80, 40, 20, 15, and 10 meter subbands. For certificate send QSL and 9 × 12 SASE to Kevin Pickles, VE3LPE, 638 Johnston Crescent, Kincardine, Ontario, N2Z 1S7, Canada.

•**The following hamfests are slated for March:**

Mar. 4, **Shore Points ARC "Springfest '95" Hamfest**, Holy Spirit High School, Absecon, New Jersey. Contact SPARC, P.O. Box 142, Absecon, NJ 08201. (Exams.)

Mar. 4, **Black Warrior Swapfest '95**, from Northport Civic Center, Northport, Alabama. For general information contact Kelly Bruce, WD4DAT at 205-339-7882 after 6 pm; Fax info hotline 205-345-8845.

Mar. 5, **The Cleveland Winterfest**, Cuyahoga County Fairgrounds, Berea, Ohio. For more information contact: Hamfest Association of Cleveland, P.O. Box 81252, Cleveland, OH 44181-0252 (800-CLE-FEST; in Cleveland area 999-7388). (Exams.).

Mar. 5, **11th Annual MTARA Amateur Radio Fleamarket**, from Smith Vocational School, Northampton, Massachusetts. Vendor reservations contact Jim, K1MEA at 413-527-3199 eves. before 2200 EST; exams registration contact Jim, WA1ZUH at 413-245-3228 or @ MTMBBS via packet. (Exams.)

Mar. 10, **35th Annual Ham Radio Auction**, Concordia Turners Hall, St. Louis, Missouri. Contact Carl H. Hohenberger, WBØBZP, 5266 Parker Ave., St. Louis, MO 63139-1340 (314-351-7084).

Mar. 11, **The Mike & Key ARC 14th Annual Electronics Show and Fleamarket**, Puyallup, Washington. Exam info only 206-549-4062; table info 206-854-4031. (Exams.)

Mar. 11, **Red River Amateur Radio & Computer Electronics Fair**, West Fargo Fair Ground, Fargo, North Dakota. Contact ARCEF '95, P.O. Box 3215, Fargo, ND 58108-3215. (Exams.)

Mar. 11, **MTARS Annual Hamfest**, National Guard Armory, Tullahoma, Tennessee. For information contact Ian Haynes, AB4SW, at 615-649-5170.

Mar. 11–12, **1995 Charlotte Hamfest and Computer Fair**, Charlotte Merchandise Mart, Charlotte, North Carolina. For more information, contact Charlotte Hamfest, P.O. Box 221136, Charlotte, NC 28222-1136; or call 704-841-HAMS. (Exams.)

Mar. 12, **8th Annual York Springfest** (Ham & Computer), York Fairgrounds, York, Pennsylvania. For advanced info and registration, call 717-843-7864 (leave message or FAX) or write to York Springfest, P.O. Box 526, Red Lion, PA 17356. (Exams.)

Mar. 12, **Indiana Hamfest & Computer Show**, Indiana State Fairground's Pavilion Building, Indianapolis, Indiana. For table reservations or information, send SASE before Feb. 21 to Deanne Martin, N9TEJ, 39 Lake Shore Dr., #14, Martinsville, IN 46151 (317-342-4307).

Mar. 12, **Teays ARC Annual Hamfest**, Pickaway County Fairgrounds in 4-H building, Circleville, Ohio. For info contact Dan Grant, W8UCF, 22150 Smith-Hulse Road, Circleville, OH 43113 (614-477-3026).

Mar. 18, **Ararat Shrine ARC Hamfest**, Ararat Shrine Temple, Kansas City, Missouri. Exam registration only: P.O. Box 12757, Kansas City, MO 64117; for information send an SASE to Roger Bessmer, KBØIIG, 2525 Southwest Blvd., Kansas City, MO 64108; or call Bill, W5NI, 816-246-7280. (Exams.)

Mar. 18, **34th Annual '95 Michigan Crossroads Hamfest**, Marshall High School, Marshall, Michigan. For information, send SASE to SMARS, P.O. Box 934, Battle Creek, MI 49016; or call Wes Chaney, N8BDM at 616-979-3433.

Mar. 18, **Trojan ARC Swapfest**, Colby National Guard Armory, Colby, Kansas. Write to TARC, Box DX, Colby, KS 67701-0983 for further information.

Mar. 18, **IRS Hudson New Hampshire Fleamarket**, Hudson, New Hampshire. For details, contact John, KA1FYB, 1 Paget Drive, Hudson, NH 03051 (603-881-5796).

Mar. 18, **42nd Annual Kennehoochee ARC Hamfest**, Al Bishop Complex (formerly Cobb County Central Park), Marietta, Georgia. For more information, call Margaret, KB4QKW, at 404-977-4405; or send SASE to KARC, P.O. Box 1245, Marietta, GA 30060. (Exams.)

Mar. 18–19, **North Florida Ham/Swapfest**, Fairgrounds, Fort Walton Beach, Florida. For information, write to PARC, P.O. Box 873, Ft. Walton Beach, FL 32549.

Mar. 18–19, **Midland ARC Annual St. Patrick's Day Swapfest**, Midland County Exhibit Building, Midland, Texas. For more information, contact the Midland ARC, P.O. Box 4401, Midland, TX 79704. (Exams.)

Mar. 19, **49th Annual W7DP Swapfest**, Milton Freewater Community Center Building, Milton Freewater, Oregon. For further information contact David L. Pence, KB7WRT, 810 E. Sumach St., Walla Walla, WA 99362-1348 (509-525-2529).

Mar. 19, **WECAFEST 1995**, Yonkers Raceway, Yonkers, New York. For information contact Tom Raffaelli at 914-962-9666.

Mar. 19, **MMRA Ham Radio Fleamarket**, Westboro High School, Westboro, Massachusetts. Contact Walter, N1HBR, at 508-489-2282 or write to P.O. Box 2282, Lexington, MA 02173. (Exams.)

Mar. 19, **Tri-County ARC Annual Hamfest**, Jefferson County Fairgrounds, Jefferson, Wisconsin. Further information may be obtained by writing W9MQB, 213 Frederick St., Fort Atkinson, WI 53538 (414-563-6381 eves.).

Mar. 19, **Sterling-Rock Falls ARS 35th Annual Hamfest**, Sterling High School Field House, Sterling, Illinois. For information, tables, or tickets contact: Lloyd Sherman, KB9APW, Sterling-Rock Falls ARS, P.O. Box 521, Sterling, IL 61081-0521; or call 815-336-2434.

Mar. 25, **Michigan City ARC Annual Hamfest/ Computer Show**, Rogers High School, Michigan City, Indiana. For information call or write Ron Stahoviak, N9TPC, 213 S. Dickson St., Michigan City, IN 46360 (219-872-6594). (Exams.)

Mar. 25, **Four States ARC Hamfest**, Texarkana College Student Center, Texarkana, Texas. For more information, contact Four States ARC, c/o Bill Wilson, KB5WDV, #34 Dustin Terrace, Nash, TX 75569 (903-832-5644). (Exams.)

Mar. 25, **ARC of Parker County Hamfest**, Springcreek Baptist Church, Weatherford, Texas. Write for full information flyer and preregistration form to: ARC of Parker County, P.O. Box 1795, Weatherford, TX 76086; or send a packet message to: WA4IXN @N5AUX.#DFW.TX.USA.NOAM. (Exams.)

Mar. 25, **3rd Annual SWL Spring Fleamarket**,

(Continued on page 154)

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IC-2340H

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The IC-2340H also offers both an **Auto Repeater Function** and optional **Tone Scan Function**. Just as with the IC-2700H, IC-2340H will automatically select the proper duplex and offset direction for repeater operations. It will also scan for and set the subaudible tone frequency being transmitted by other stations.

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"Nothing would replace it on my limited spaced rented apartment balcony." Yuri Dzyuba (VE2XLT)

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Gain, dBi	3	3
Electrical Wavelength	Halfwave	Halfwave
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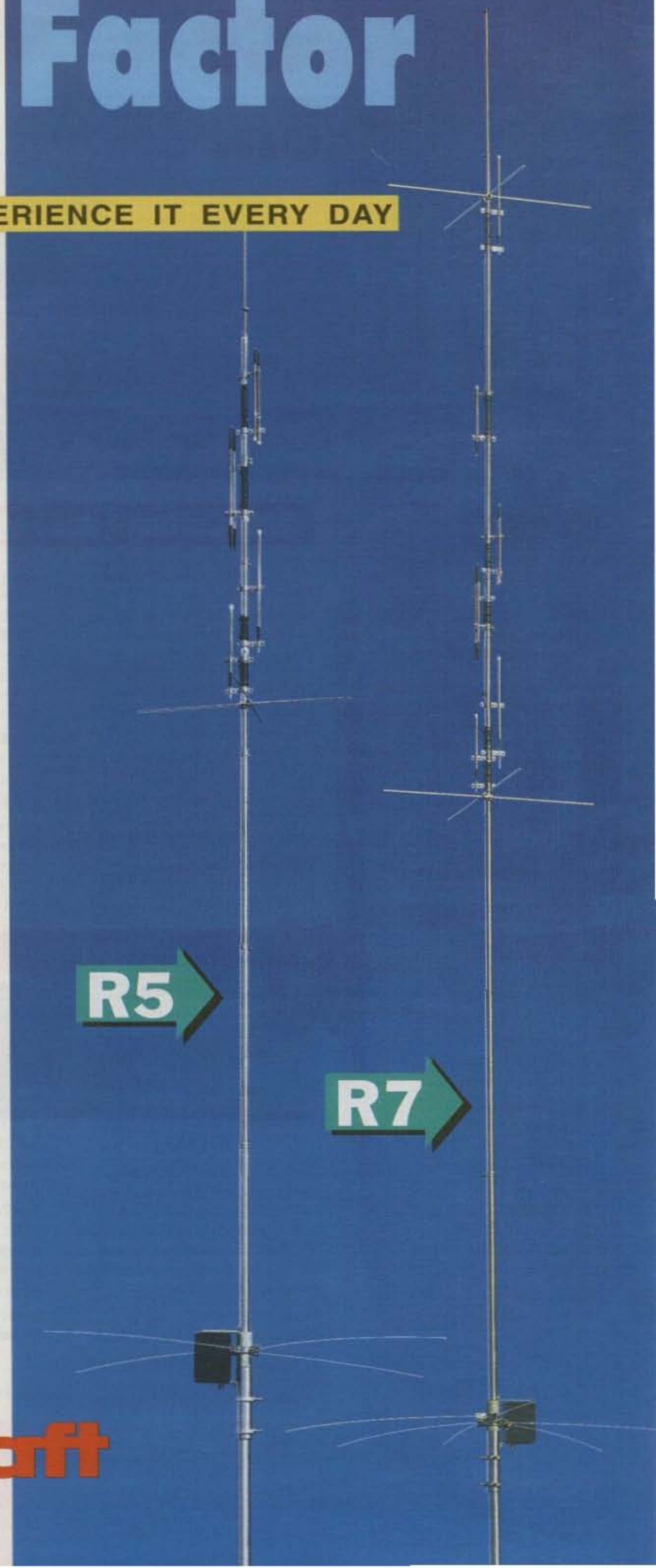
Power Rating, Watts PEP	1800	1800
Radiation Angle, Degrees	16	16
Frequency Selection	Automatic	Automatic
Horizontal Rad. Pattern Deg.	360	360
Height, ft (m)	17 (5.2)	22.5 (6.9)
Mast Size Range, in (cm)	1.5-1.75 (3.8-4.4)	1.5-1.75 (3.8-4.4)
Wind Load, ft^2 (m^2)	1.4 (.13)	2.25 (.21)
Weight, lb (kg)	8.7 (4)	12.3 (5.6)
49' Counterpoise Radials (Supplied)	4	7



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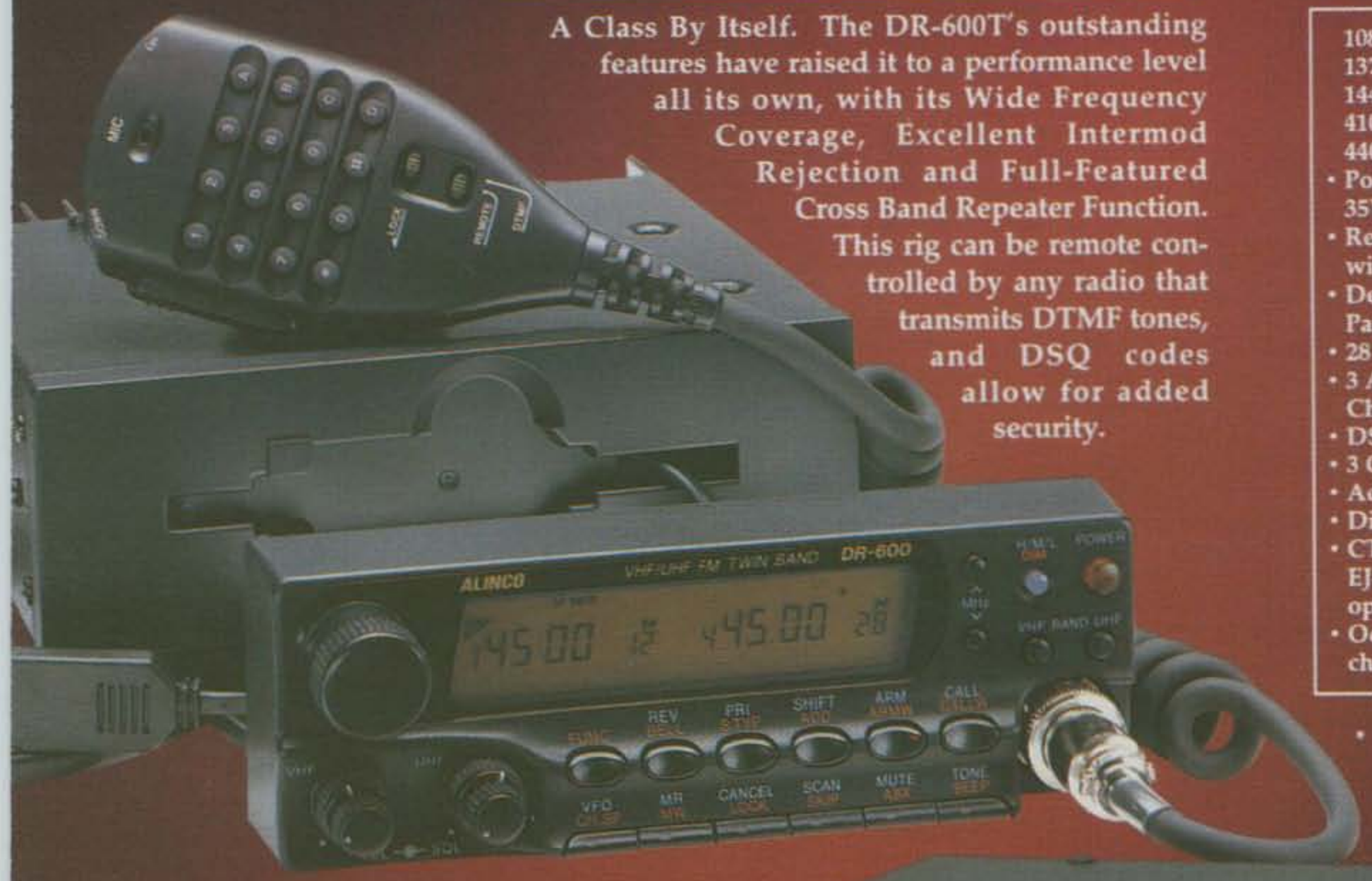

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- 144.000 – 147.995 MHz FM (TX)
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  Transmit: 144.000 – 147.995 MHz (FM)
- ✻ Power Output
  High: 50 W, Medium: 25 W, Low: 10W
- ✻ Remote Control by Microphone
- ✔ Channel Scope (Visual Search)
- ✻ Various Scan Modes
- ✻ 100 Memory Channels plus 1 Call Channel Memory, 1 Program Scan frequency Memory
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- ✻ S meter Squelch Function
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- ✻ Built in RF attenuator
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- ✻ 2 VFO's (A&B)
- ✻ TOT (Time Out Timer)
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Results of the 1994 CQ World-Wide WPX SSB Contest

BY STEVE BOLIA*, N8BJQ

The 37th CQ WW WPX SSB Contest is now in the record books. Conditions were not record breaking. However, some very notable scores were turned in from all parts of the world. One world record and several continental records did fall during the contest. Activity was up a little, with many using the WPX as an introduction to contesting. The 1994 contest saw the addition of a Single Op Assisted category and e-mail submission of WPX logs via the Internet. Both were successful and will be continued in 1995.

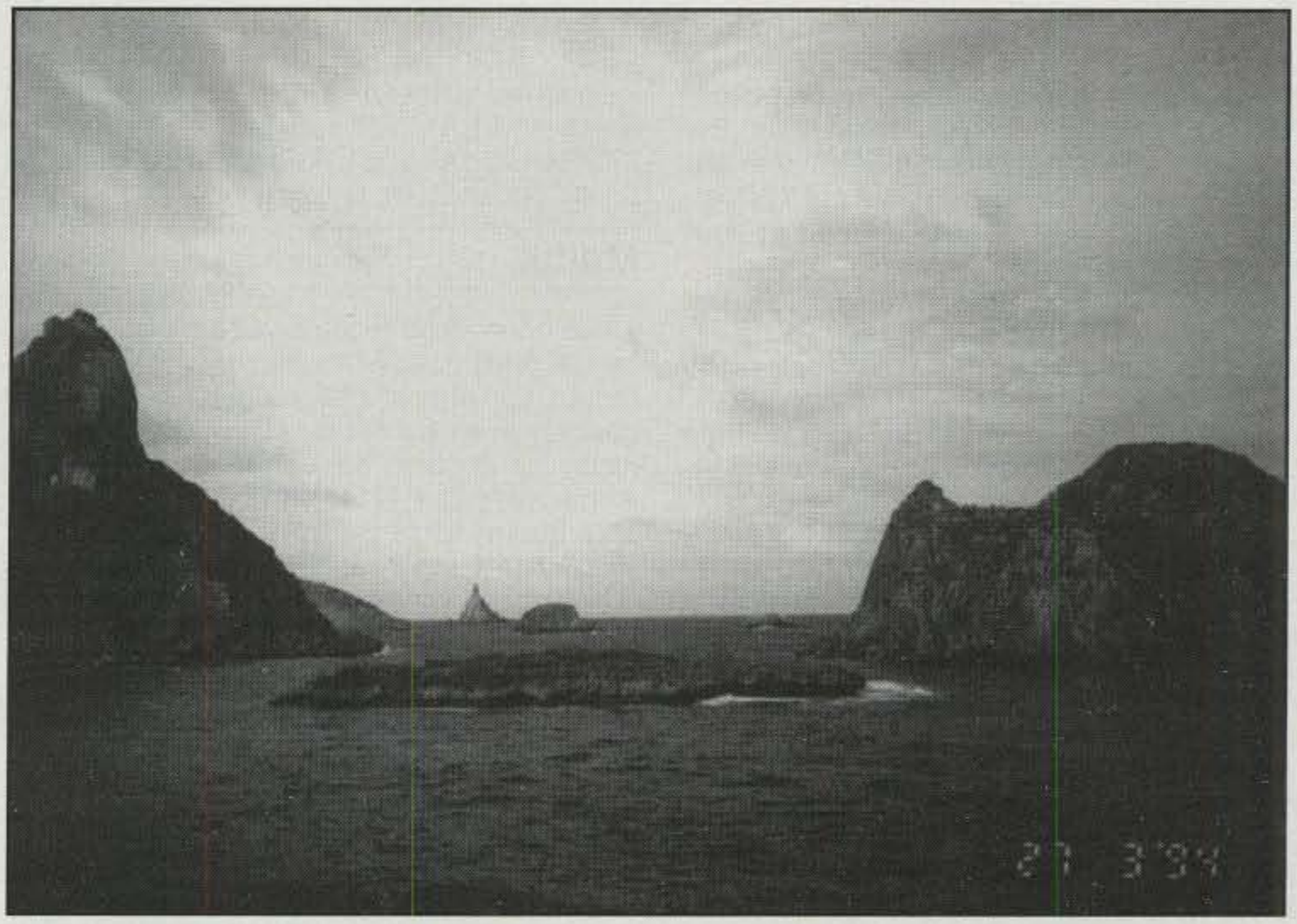
DX

In his first WPX SSB since 1969 ZD8Z (N6TJ) broke the African record, edging out 1993 winner P4ØV (AI6V) for the number one single op position. Carl had slightly more QSOs, but Jim's 68 more prefixes made the difference. K5TSQ at 6D2X finished third, just beating VE3EJ for North American honors. Al, WH6/WR6R, narrowly missed breaking his Oceania record on his way to a fifth place finish, with PQØMM (PP5JR) less than 40K behind. HH2PK finished seventh, with IQ4A (the top European entry) eighth, 5BØA (5B4ADA) ninth, and D3C tenth.

As can be expected at this point in the solar cycle, 10 meter scores started to decline and low band scores started to increase. Number one on 10 meters was L6ETB, followed by CX7BF, PP5JD, LU4D, and TI2KSR. Both CX7BF and TI2KSR were low power entries. Luis, ZPØY, QSYed to 15 meters and easily topped the 15 meter single ops. Finishing second was ZF1CQ operated by W8BLA. Vern's five million point effort was also the top low power score. EA8AFJ was third, followed by TM2V and IB4M, also a low power entry. EA8AH (OH1RY) came up 25K short of the world record on his way to an African record and the top spot on 20 meters. IU9S (IT9BLB) broke the European record with his second-place finish. S5ØA was third, followed by VX7A (VE7SV) and VE3RM. CT3BX was the top scorer on 40 meters (also an African record), followed by F2EE, OH1EH/OHØ, YV5MRR, and LR1I. On 80 meters EA8/OH1MA fell a little short in his quest for the African record, but his 2.7M was good enough for a world championship. VE7CC was tops in North America, followed by the new European record holder GW8GT. UA9CSS set a new Asiatic record with his fourth place finish, with OM7M taking fifth and N6VI/KH6 coming in sixth with a new Oceania record. On top band IO3MAU led a European sweep of the box, followed by OM3CQD, F6AML, OH1MLB, and T97T.

Forty-five stations entered the Single Op Assisted category, with K1YR finishing as the

Celebrating victory after the contest are the ops of ZXØF. From left to right are PY5CC, PY5EG and wife, PYØFF's wife, PYØFF, and PY5ZBU. Kneeling are PY5TM and PY5FF's daughter.



For those who wonder what Fernando de Noronha is like, here is a view from PYØFF's QTH.

*4121 Gardenview, Beavercreek, OH 45431

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

WORLD: Stanley Cohen, WD8QDQ Trophy. Won by: **Jim Nieger, ZD8Z.**
USA: Atilano de Oms, PY5EG Trophy. Won by: **Sal Anastasio, WM2H.**
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **Chris Saint-Arroman, D3C.**
EUROPE: Jim Hoffman, N5FA Trophy. Won by: **Station IQ4A operated by Luca Aliprandi, IK2NCJ.**
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **Carl Cook, P4ØV.**
OCEANIA: Philip Fraizer, K6ZM Memorial. Won by: **Al Crespo, WH6/WR6R.**
***JAPAN**: The DX Family Foundation Trophy. Won by: **Satoshi Hara, JH5FXP.**
WORLD QRP/p: Dayton Amateur Radio Association Trophy. Won by: **Rich Smith, HC8A.**
USA QRP/p: Doug Zwiebel, KR2Q Trophy. Won by: **Gordon Muise, WA1LNP.**

SINGLE OPERATOR, SINGLE BAND

WORLD: John N. Reichert, N4RV Trophy. Won by: **Luis Kemper, ZPØY (21 MHz).**
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **Hernani Correia, CT3BX.**
EUROPE: CQ Magazine Trophy. Won by: **Giuseppe La Parola, IU9S (14 MHz).**
OCEANIA: D. Craig Boyer, AH9B Trophy. Won by: **David Mcaulay, VK3EW (7 MHz).**
USA 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **John Rodgers, WE3C.**
USA 7 MHz: Lewis Sayre, N7AVK Trophy. Won by: **Steve Kelley, KC7EM.**
USA 21 MHz: Bernie Welch, W8IMZ Memorial. Won by: **Matt Strelow, KC1XX.**
USA 28 MHz Novice/Tech: Jon Engelhardt, KAØZFX. Won by: **Robert Lutz, WB2BZR/3/T.**

MULTI-OPERATOR, SINGLE TRANSMITTER

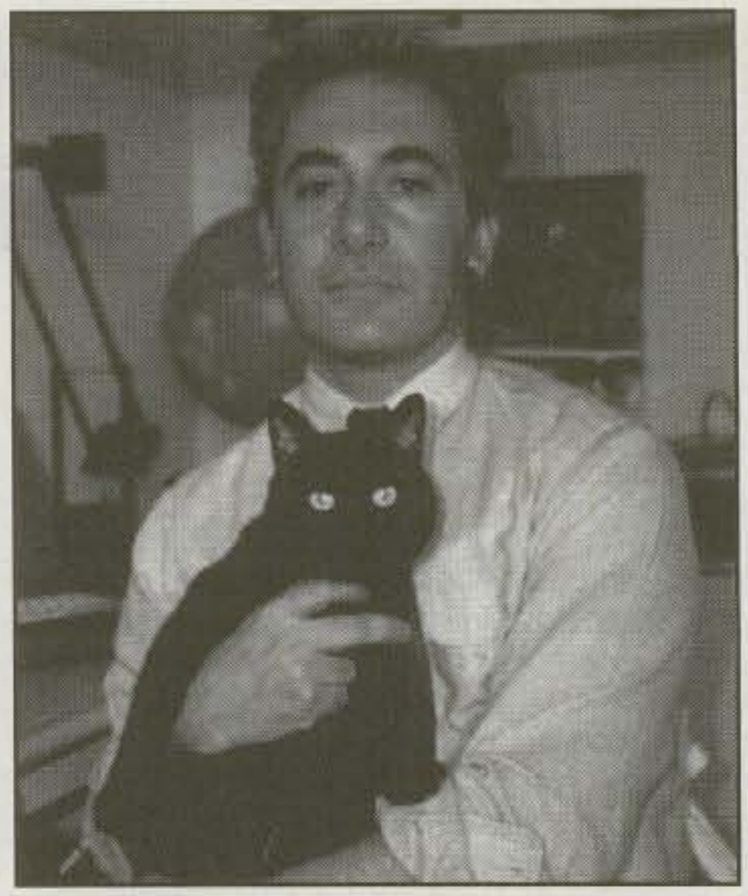
USA: Oklahoma Comm Center Trophy. Won by: **NX1H operated by NX1H, WT1S, N1HFE, NW1U, WB1HBB, K1MNS.**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Prince Georges Zulu Radio Club Trophy. Won by: **VP2EC operated by KC5EA, N5AU, N5HGB, K5RX, VP2EM.**
NORTH AMERICA: Burt Curwen, KL7IRT Memorial (James Dixon, NL7HI sponsor). Won by: **WZ1R operated by WZ1R, KY1H, NJ1F, KB1W, WM1K, AA1AA, AA1AS, K1MBO, KA1NCN, N1NQD, WA1ZAM.**
USA: Glenn Tracey, KC3EK Trophy. Won by: **W4MYA operated by W4MYA, KC4AUF, KD4JXY, KD4UEG, KD4KYQ, KD4VOZ, KD4YVO, WA4DAI, WA4ROV.**
EUROPE: Dick Frey, K4XU Trophy. Won by: **9A1A operated by OH6XY, F2CW, K4XU, 9A2AJ, 9A2AW, 9A2DQ, 9A2EU, 9A2HO, 9A2KL, 9A2KM, 9A2LJ, 9A2MP, 9A2NJ, 9A2OG, 9A2PA, 9A2RA, 9A2SD, 9A2WM, 9A3GW, 9A3MJ.**

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **9I2M operated by DL7VTZ, DL7VTM, DL7VLA.**



This is I4ABF and his mascot. The cat must have worked, as IB4M was the number two low power station on 15 meters and fifth overall.

first assisted champion. WAØPUJ was second, followed by KY2T and K2WK. DL3KDV was the top DX finisher and also number five in the world. Please make sure if you enter this category that you clearly show Assisted on your summary sheet.

Nearly 50% of all single op entries (632 out of 1276) came from the increasingly popular low power category. LT1N (LU2NI) topped the all band category, followed by YV4DSB, EL2PP, EA8BGY, and VO1SF. CX7BF was number one on 10 meters (number two overall), followed by TI2KSR, LU8HSO, and LW2DBM. ZF1CQ's 5M points was top on 15 meters, with IB4M (I4ABF) second and EF3CIL third. US4LAD edged out VA3JK and PY8MD for the top spot on 20. 9A2WV was tops on 40, with UT7DX tops on 80 and OZ3SK repeating as low power 160 meter champ.

Rich, N6KT, operated HC8A to a new QRP World Record, shattering the previous record held by VP2EXX (1990). Rich misread his power meter and ran only 1/2 watt for the first 30 minutes of the contest. His 7.5M score would have placed him in the top ten in the high power section. RV9C was second, followed by USA champ WA1LNP. LW1DIP topped the 10 meter scores, with UY3CC top on 15 and KA1CZF leading the way on 20. SKØPR, UX2MF, and UR3PDT are the champs on 40, 80, and 160, respectively.

Multis

Three continental records were broken in '94 by the multi-ops. While they did not a set a record, the gang at ZXØF topped the multi-single box with an outstanding 27.8M effort. Finishing second was EA8BR with a new African record. PT7CB and CT9M were third and fourth, followed by C49C and TM1C, VX2A, LT1V, P39P, and IR2W. VP2EC established a new North American Multi-Multi record at 39.5M points. Finishing second was 9A1A, followed by LU4FM, OT4A, HG73DX, and VS6WO, who broke the Asiatic record. Rounding out the top ten were WZ1R, EM2I, and ZP94B.

In the USA NX1H finished on top in the multi-single class, with K5XI and AA6TT very close behind. In the number four position was N1AU (who challenges any other father/son team in the 1995 WPX SSB). W6EEN took fifth, followed by KM5X, WX1Z, NCØP, and KN6SO. WZ1R topped the multi-multi entries, with W4MYA second and AIØY/9 third.

USA

There is a new single op champion for 1994. WM2H took the honors, with KF3P a very close second. WN4KKN/6 nearly broke the east coast dominance with his 5.9M point effort from the wrong coast. K3ZO finished fourth, with K5ZD number five. Rounding out the top ten in the states were WB5VZL, AA2GQ, KF2O, KE9I, and W6TKF. KE5FI changed bands in '94 and won the USA 10 meter title, with N5NMY providing the main competition. KC1XX, WE9V, KZ5D, and N8II were very close on 15, with Matt coming out on top. KK9A edged out KS3F for the top spot on 20 meters, followed by N3HBX, WM2C, and AC4NJ (WC4E). Forty meters was the closest US race, with 1993 winner KC7EM beating N6RO by less than 10K. Not very far behind was WU3V/5 operated by W5WMU. WE3C retained his USA 80 meter title, but KE1Y made things close for John. K1ZM topped the 160 ops with a fine 88K effort. 1993 champion AA4MM was second, followed by KØCS. Top-band scores should improve the deeper we get into the cycle, so don't forget this band in 1995. It provides a good place to pick up valuable multipliers and some additional double point QSOs.

WS1A turned in the top low power all band score, with ND8L, KQ3V, and WD5K second, third, and fourth. WB2BZR/3 was the top scoring Novice/Tech entry and also the top low power 10 meter scorer, followed by KB9BGV. The 1993 top two on 15 held their positions in '94 with N5NMX and N4MO leading the way. WF1L topped the 20 meter entries, followed by WA2UUK. NØBIW was the 40 meter champ, with KV7S taking 80 meter honors.

K1YR was the initial Single Op Assisted champion, followed by WAØPUJ, KY2T, K2WK, and KF2ET. It looks like the east coast packet network was working, with four out of the top five scores coming from the east.

WA1LNP was the new US QRP champion, followed by WA6IET and WA4PGM. WA6FGV topped the 10 meter ops, with WA7FAS doing

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Hern, CT3BX, works on the phasing line for his 40 meter antenna system. It must have worked, as CT3BX set a new African record and won the world.

likewise on 15. KA1CZF not only won the USA, but also the World on 20 meters. W8QZA/6 and W1MK topped 40 and 80, respectively.

The Rest of the Story

1994 was the first time that electronic submission of logs was attempted, and it appears to have been a hit. Approximately 60 logs arrived via the information superhighway for both modes. We will extend the experiment to the 1995 contest. If you wish to e-mail your log, my e-mail address is **SDB@AG9V.AMPR.ORG.** You are required to send a summary sheet, a prefix list, and your log in ASCII (they all can be in one file). The log must contain all required information (Time, Band, Call, RST & Nr Sent, RST & Nr Rcvd, Multiplier, and QSO Points). Most of the popular contest logging programs have a feature to produce the necessary files.

If you would like to send a binary file, or have a question about the format, please contact me before sending in your log. A confirmation will be e-mailed back upon receipt of your log. Please include your e-mail address or a phone/fax number on your summary sheet in case additional information is required.

Most of the top entrants either submitted their log on disk or sent along a disk with the paper log. This makes our lives a little easier and has enabled more of the top scores to be checked closely. We are primarily interested in your *.bin file if using CT, your *.dat file if using N6TR's program, the *.qdf file from NA, a *.dbf file or an ASCII file of calls by band. These file formats can be imported directly into our database without hours of converting and removing the formatting from the output files. With close to 300 logs received on disk in '94, any additional time spent converting or extracting what we need takes time away from log checking. Starting in 1995, you may be asked to resubmit your log in the required format. Please name your files with just your call. Nearly a third of the entrants who sent in their logs on disk read the instructions in the CT manual and named their files WPXSSB94.BIN.

Many thanks to N6AA, who provided some

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

ZD8Z	**18,118,880**
P4ØV	**17,201,184**
6D2X	10,652,400
VE3EJ	10,562,391
WH6/WR6R	**9,776,288**
PQØMM	9,734,663
HH2PK	7,743,450
IQ4A	**7,634,900**
5BØA	7,612,080
D3C	**7,311,152**
HC1OT	7,208,266
RZ9UA	6,972,109
S59A	6,635,920
IR8A	6,364,644
WM2H	**6,360,736**
KF3P	6,294,605
CT5P	6,073,740
WN4KKN/6	5,912,144
5NØMVE	5,904,000
II7M	5,176,004

28 MHz

L6ETB	5,578,020
*CX7BF	4,361,280
PP5JD	4,204,158
LU4D	3,657,376
*TI2KSR	2,551,077
C91J	2,145,946
LU7HLF	1,864,680
TG9GI	1,795,239
*LU8HSO	1,579,578
*LW2DBM	1,554,266

21 MHz

ZPØY	**10,939,487**
*ZF1CQ	5,003,019
EA8AFJ	4,015,017
TM2V	3,504,460
*IB4M	3,269,420
KC1XX	**2,951,454**
IO4LEC	2,908,464
WE9V	2,649,340
S53ZO	2,589,372
S59L	2,413,616

14 MHz

EA8AH	8,194,536
IU9S	**5,677,177**
S5ØA	4,865,545
VX7A	4,534,944
VE3RM	3,600,175
9A7A	3,312,720
S53M	3,224,312
G3NLY	3,021,825
IR3O	3,002,180
KK9A	2,813,748

7 MHz

CT3BX	**5,187,480**
F2EE	3,364,050
OH1EH/OHØ	2,865,000
YV5MRR	2,727,450
LR1I	2,632,104
FM5DN	2,353,208
S5ØE	2,251,104
VK3EW	**2,022,804**
CT3BD	1,882,440
9A3XV	1,527,246

3.7 MHz

EA8/OH1MA	2,690,714
VE7CC	1,554,658
GW8GT	1,473,868
UA9CSS	1,074,780
OM7M	1,017,288
N6VI/KH6	1,016,652
WE3C	**1,008,268**

1.8 MHz

IO3MAU	247,904
OM3CQD	133,172
F6AML	122,748
OH1MLB	120,900
T97T	106,652

LOW POWER ALL BAND

LT1N	4,112,703
YV4DSB	3,462,696
EL2PP	3,123,810
EA8BGY	2,459,889
VO1SF	2,046,264
LU7FEU	1,995,520
NP2I	1,877,675
WS1A	1,867,131
LU5ER	1,807,344
TE5T	1,661,936
EA3BKI	1,651,650
ON5GQ	1,595,054
5U7Y	1,487,370
CJ6V	1,464,732
ND8L	1,461,680
UR5QMA	1,358,721
S5ØR	1,294,512
KQ3V	1,266,408
CE2EZE	1,265,103
VD2SPY	1,252,240

28 MHz

CX7BF	4,361,280
TI2KSR	2,551,077
LU8HSO	1,579,578
LW2DBM	1,554,266
CX8AT	1,432,219
5Z4FO	1,269,000

21 MHz

ZF1CQ	5,003,019
IB4M	3,269,420
EF3CIL	1,609,812
DU3CWS	1,405,697
JI2UNR	1,268,813
UA4LCQ	901,842
KH6GMP	896,782
XE2AF	853,006
WA7BNM	841,940
EA7HF	724,306

14 MHz

US4LAD	963,900
VA3JK	928,800
PY8MD	917,990
CR8BWW	834,418
WF1L	818,950
WA2UUK	731,025
VA3WTO	669,940
EA9KB	401,617
HI8OMA	365,848
VE6BMX	350,532

7 MHz

9A2WV	1,126,634
RW9AB	742,848
UX2VZ	371,700
US5QRW	240,908
S51QZ	205,320

3.7 MHz

UT7DX	515,200
S5ØC	514,080
T91ENS	382,432
UR5DXX	275,070
ED2BFM	203,775

1.8 MHz

OZ3SK	92,400
RV1CC	49,742
SP9HNB	16,856
IOØKHP	13,588
YL3GHD	5,200

ASSISTED

K1YR	3,028,524
WAØPUJ	2,601,300
KY2T	2,504,904
K2WK	2,046,698
DL3DKV	1,820,406
KF2ET	1,348,040
S56A	1,289,874
ON6AA	1,188,368
OE8XXK	1,107,848
JH4NMT	1,040,298

QRP/p

HC8A	**A**	**7,520,562**
RV9C	A	1,362,975
WA1LNP	**A**	**1,161,646**
F1BEG	A	639,808
EA3FHT	A	491,596
LW1DIP	28	77,550
LU1FNH	28	59,940
UY3CC	21	149,388
EA4CRI	21	110,290
KA1CZF	14	133,431
IK5RUN	14	42,444
SKØPR	7	35,076
JA2DLM	7	22,776
UX2MF	3.7	147,994
VE5RMO	3.7	24,300
UR3PDT	1.8	1,392

MULTI-OPERATOR SINGLE TRANSMITTER

ZXØF	27,883,050
EA8BR	15,311,851
PT7CB	14,409,600
CT9M	14,396,824
C49C	12,250,266
TM1C	11,983,340
VX2A	9,243,923
LT1V	8,982,636
P39P	8,912,547
IR2W	8,797,950
LT5F	8,705,683
OM5M	8,002,174
LZ5W	7,819,958
VD2ZP	7,278,600
L2ØA	7,008,185
ED3TT	6,966,680
CT8T	6,767,562
NX1H	6,744,654
K5XI	6,681,816
UN8LW	6,375,522

MULTI-OPERATOR MULTI-TRANSMITTER

VP2EC	**39,530,455**
9A1A	**28,051,245**
LU4FM	25,072,710
OT4A	21,205,080
HG73DX	18,525,420
VS6WO	16,555,040
WZ1R	**16,029,400**
EM2I	12,828,809
ZP94B	11,160,837
CZ7Z	10,793,303
ZW4Y	10,630,180

**Denotes low power.*

USA TOP SCORES

SINGLE OPERATOR ALL BAND

WM2H	**6,360,736**
KF3P	6,294,605
WN4KKN/6	5,912,144
K3ZO	5,134,266
K5ZD	4,700,124
WB5VZL	3,409,656
AA2GQ	3,270,814
KF2O	2,337,855
KE9I	2,324,884
W6TKF	2,036,445
KA4RRU	2,036,259
KI6CG	1,978,344
*WS1A	1,867,131
WE6G/1	1,660,312
WA6BXH	1,645,569
K4VUD	1,552,666
*ND8L	1,461,680
KAØZFX	1,389,285
W3BGN	1,357,945
AE6Y	1,345,520

28 MHz

KE5FI	297,964
N5NMY	207,577
***WB2BZR/3/T**	**68,808**
*KB9BGV/T	42,636
*KD6DAE/T	28,322

21 MHz

KC1XX	**2,951,454**
WE9V	2,649,340
KZ5D	2,049,164
N8II	2,037,770
WD6GTP/4	1,491,336
KF8UM	890,812
*WA7BNM	841,940
*N5NMX	556,320
W6BSY	533,400
WB6MZQ	462,208

14 MHz

KK9A	2,813,748
KS3F	2,504,656
N3HBX	1,619,118
WM2C	1,556,875
AC4NJ	1,501,543
K9ZO	1,405,098
*WF1L	818,950
*WA2UUK	731,025
KM6YX	570,051
K1KJT	557,175

7 MHz

KC7EM	**1,317,876**
N6RO	1,307,332
WU3V/5	1,154,560
W3GH	948,288
KS9K	798,160

3.7 MHz

WE3C	**1,008,268**
KE1Y	955,200
W9LT	522,704
NI4P	515,328
AB6ZV	444,878
KO1F	314,552

1.8 MHz

K1ZM	88,560
AA4MM	20,022
KØCS	3,570

LOW POWER ALL BAND

WS1A	1,867,131
ND8L	1,461,680
KQ3V	1,266,408
WD5K	1,062,120
ACØW	831,068
KE2ZU	821,219
KJ6HO	819,708
WW3S	813,852
NZ5O	698,610
N7LOX	664,560

28 MHz

WB2BZR/3/T	**68,808**
KB9BGV/T	42,636
KD6DAE/T	28,322
W2KZE	23,436
NØOST	18,960

21 MHz

WA7BNM	841,940
N5NMX	556,320
N4MO	450,570
WA6KUI/4	342,286
WZ8T	333,333

14 MHz

WF1L	818,950
WA2UUK	731,025
AKØA	207,792
KL7NL/W4	121,737

7 MHz

NØBIW	97,944
WA6WPG	26,208
W2FGY	1,292

3.7 MHz

KV7S	178,088
N2QAN	25,048
KJ8V	21,600
NOØY	7,392
WF5E	2,560

ASSISTED

K1YR	3,028,524
WAØPUJ	2,601,300
KY2T	2,504,904
K2WK	2,046,698
KF2ET	1,348,040
KA5W	893,487
KN6M/5	867,220
W2HG	377,010
WJ2W	325,755
WA3WJD	294,972

QRP/p

WA1LNP	A	1,161,646
WA6IET	A	420,472
WA4PGM	A	398,748
WA6FGV	28	19,040
N2LWL	28	8,415
WA7FAS	21	54,622
KA1CZF	14	133,431
W8QZA/6	7	10,366
W1MK	3.7	12,750

MULTI-OPERATOR SINGLE TRANSMITTER

NX1H	**6,744,654**
K5XI	6,681,816
AA6TT	6,076,625
N1AU	5,135,832
W6EEN	4,355,140
KM5X	4,274,125
WX1Z	3,694,372
NCØP	3,586,949
KN6SO	3,334,020
NJ1V	2,877,492

MULTI-OPERATOR MULTI-TRANSMITTER

WZ1R	**16,029,400**
W4MYA	**7,095,172**
AIØY/9	5,109,524
AD6E	2,778,888
AB5AE	921,526

**Indicates low power.*

much needed database support using N6TR's fine software. Dick's report on each log shows uniques, bad calls, and calls which don't show up in the other computerized logs. Just about all of the top logs were run through the database. The computer has not replaced the human, though. A real, live person still decides what stays and what goes in each log. The computer is very good at finding busted calls and typos. Please make sure that you check your log closely for incomplete calls and typing errors. A few positions were exchanged following score reductions.

There are no major rule changes for 1995. Rule IV 2(b) (see below) has been reworded slightly to clarify that all multi-multi operations must be conducted from the same operating site. It is not the intent of the contest rules to have stations set up all over the country. All transmitting and receiving must be done from one site in accordance with the current rules. Use of packet spotting networks is legal, but all transmitting and receiving must be done from only one site.

Rule IV. 2 (b) Multi-Transmitter: No limit to transmitters, but only one signal and running station allowed per band. *Note:* All transmitters and receivers must be located within a 500 meter diameter or within property limits of the station licensee's address, whichever is greater. **All operation shall be from the same operating site.** All antennas must be physically connected by wires to the transmitters and receivers.

For the 1995 WPX SSB Contest the Northern California Contest Club will sponsor a plaque for the top USA 1.8 MHz station. Also starting with the 1995 contest, K7YHA will sponsore a plaque for the top USA QRP/p station in the WPX CW Contest. Additional trophy sponsors are still needed for the Low Power and Packet Assisted categories. If you would like to sponsor a WPX contest plaque, please contact me for details.

Many thanks again to all the folks who go on expeditions or go to the trouble to get a special callsign for the contest. Among them are PQØMM, 5BØA, D3C, all of the special Italian calls, ZF1CQ, VX7A, 9I2M, ZXØF, HC8A, C49C, P39P, L2ØA, ZP94B, EM2I, 6D2X, CG1B, J31K, BV5AF, BV/KC6CNV, BV/KK6BB, A71CW, VS6WO, EMØF, EN6Q, 9M6LS, VK9NS, C4YY, 4D3HS, and VP2EC. These stations, and many others, provide the unique multipliers and new DX countries which keep the contest fun and the pile-ups big.

An additional member has been added to the WPX Contest Committee. Sergio, EA3DU, joined the team and will be helping out with the logs sent to *CQ Radio Amateur* in Spain. Sergio joins N9AG and WR3G on the committee.

The 1995 WPX SSB Contest will be 25 and 26 March (GMT). It will be a good opportunity to fill in the blanks for your CQ 50th Anniversary awards. Logs and contest rules are available from CQ for an SASE. Copies of previous results can also be obtained from the folks in Hicksville. Please continue to mark your logs so that they get to me on time.

See you the last weekend in March.

73, Steve, N8BJQ

Correction To 1993 WPX CW

The following score was omitted from the CW listings: ZS6EZ on 14 MHz, score 2,421,534, QSOs 1473, prefixes 554.

Random Comments

We are a new station. This is the first time to join the CQ WPX Contest . . . *BY4BPT*. Propagation was quite bad especially on 10 meters and during the night. As in every WPX, we had the greatest fun of the year . . . *C49C*. JA's we missed you!! Managed a squeaker over last year's score and no equipment failures . . . *CK7K*. Working XU7VK . . . *EI9FN*. Had quite a few problems with equipment but enjoyed our first WPX contest . . . *GCØDPX*. Jammed VFO, total strip down 30 minutes before start, then all worked well. What happened to the bands? . . . *GXØOBS*. Tube rigs, wire antennas, manual antenna tuners, and 7 of 9 operators licensed less than 3 years. We had a great time . . . *KJ5IP*. Training exercise for new contesters. Where were the JA's on 40? . . . *KM5X*. "On the next test, will you please put a beacon on the SSTV freq. Several times we were told "U are on the SSTV freq" . . . *KQ4HC*.

Bad propagation + high line noise = low score. L2ØA was special call for LU4AA Radio Club Argentino . . . *L2ØA*. Special thanks to Mr. Dalmiro Larrea and Mr. Bernardino Acosta . . . *LU4DRC*. The best contest we work at all . . . *LY3MR*. We hereby challenge any other father-son team for the 1995 WPX SSB Contest! But next year we won't waste 7.7 hours of off-time! . . . *N1AU*. I sure missed the almost 1500 QSOs we made on 10 meters just two years ago . . . *NJ1V*. Unfortunately, the WPX SSB Contest seems to be the contest with Murphy participating also. Our 20 meter Yagi showed BAD SWR . . . *PA6WPX*. First time ever that our club station is in this contest, so we worked a lot of exotic prefixes! Enjoyed it very

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Freq. Range	144-148 MHz	430-450 MHz
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Gain.....	18-20 db	17-19 db
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Max. Transfer Power (PEP) PTT Operation	750 Watt	350 Watt
Connector....	Type N	Type N

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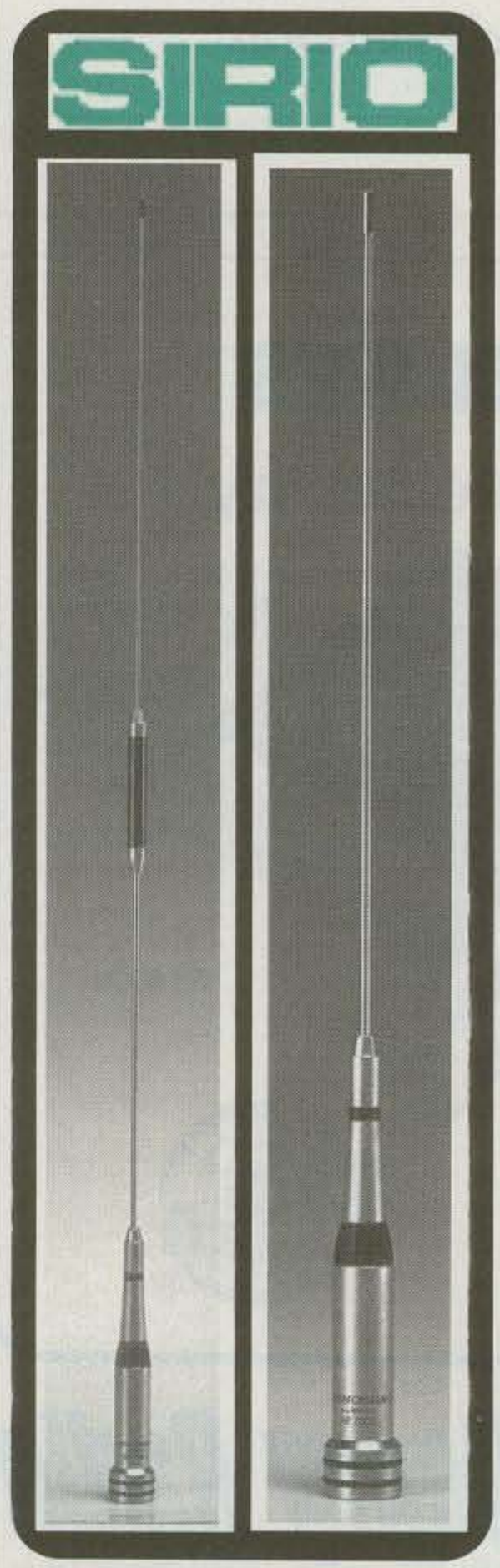

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much! . . . *PI4ALK*. Heavy static noise first day . . . *S53DCM*. It was a real pleasure to team up with Yuri, UU2JX, of the UR8J/UU5JYL contest team. He was in Canada for a two-month academic exchange . . . *VD2ZP*. We were lonely ops for 10 meters . . . *VE6SV*.

Lousy score this year. Did better last year with special call, XL7U. We did however continue with VE7UBC's WPX tradition of having a barbecue . . . *VE7UBC*. Very interesting contest. We have 18 new ops—our members of RadioClub Senta. It was first contest for many of them . . . *YZ7A*. Murphy was here. We had lots of fun. We will be back again . . . *AB5AE*. An excellent European run all night long the second evening on 40 and 20 allowed us to surpass the previous Asian Multi-Multi record . . . *VS6WO*. First time ever tried a multi. Sure learned some lessons this time. Had a great time though . . . *W7WHY*. QSL via DL6KVA . . . *4K9W*. Support for 80/40 inverted vee broke just before contest. Started on 20, then 15 and 10. Ten was so good I decided to enter only on 10! . . . *5Z4FO*. Got strained back muscles from moving back and forth between transceiver and computer. Next year keyboard sits in front of the rig . . . *7J1AQH*.

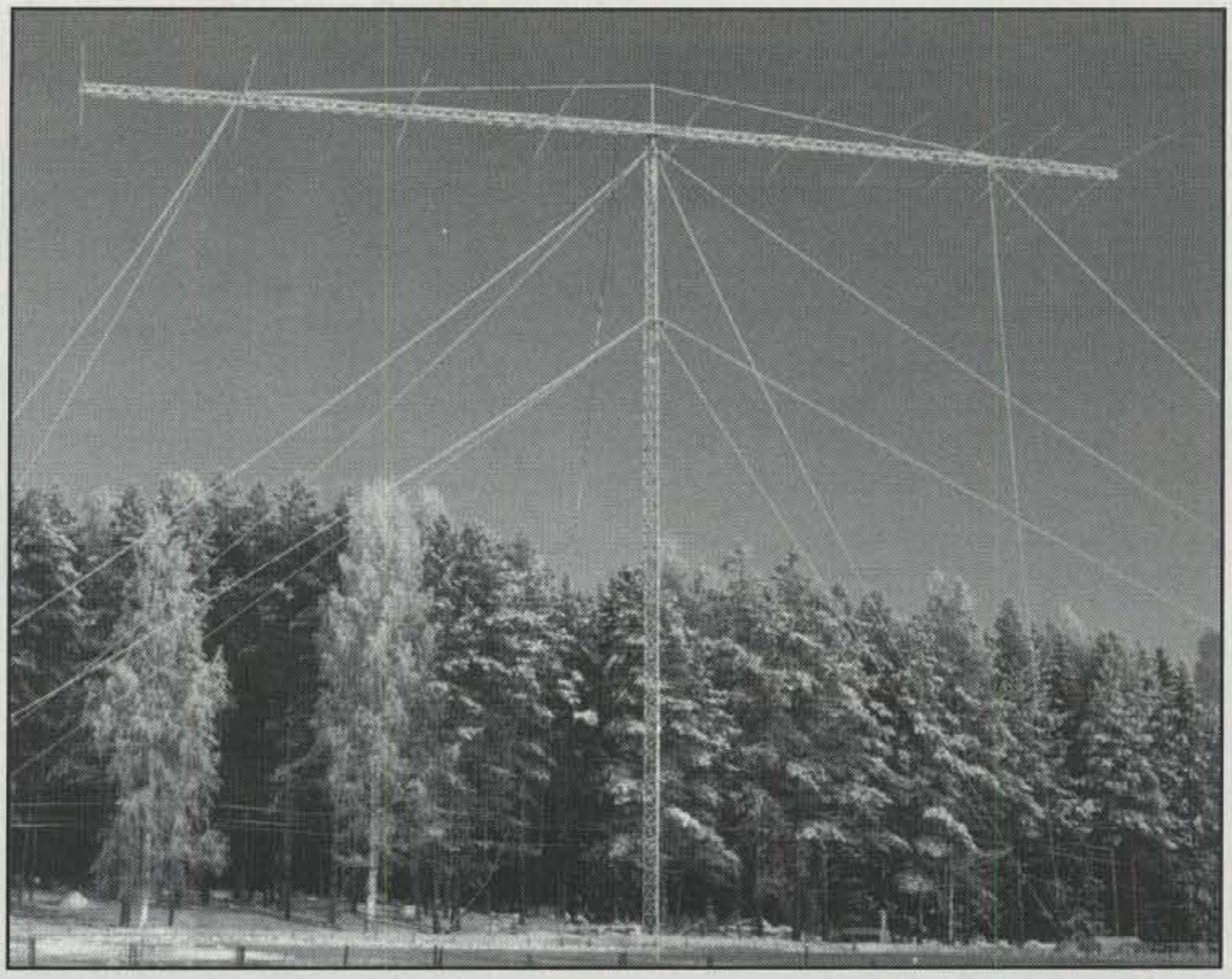
Operating on a veranda surrounded by hummingbirds and bananquits . . . *9Y4/W2IHP*. If awards were allotted by prefix, would this be worth honorable mention? . . . *AAØMQ*. Had a power shutdown due to storm. Burned up my linear, but lucky I had my old homebrew spare. Lost about 2 hours because of this . . . *AA4MM*. First contest using TS-940s—big improvement over TS-930s . . . *AA6EE*. Great to compete after a three-year break! Had a great time! . . . *AA9IA*. Fun to be the "pile-upee" rather than the "pile-upor" for a change. Besides radiating everywhere, the R5 heard everywhere . . . *AC6V*. Condos and Contesting don't mix . . . *AEØM*. Low power from Kansas stinks. No more for me. Low power, that is . . . *AKØA*. Conditions were sure better than last year, which I didn't enter. The abundance of prefixes was amazing . . . *CG1B*. My first serious participation on a contest, the great WPX! . . . *CO2HA*.

To work single band low power on 10 meters was either heroism or dumbness. I think the two go together most of the time . . . *CQ7P*. With prefix CR8 to promote Universal Expo 98 in Lisbon. A lot of fun. I was a multiplier for a lot of people with this special prefix . . . *CR8BWW*. A hard job to do with only 20 watts. Nevertheless, worked 4U9ITU, but C49C only heard—not enough power . . . *DHØLQU/P*. Unfortunately was QRYL on Sunday! . . . *DL1MFL*. Good sigs from West Coast. Lots of DX. Missed 4 hours—was too sleepy. Best score ever . . . *DL6ET*. Not so bad conditions here in Berlin, but had not so much time . . . *DL7UTA*. Fairly good cndx and a lot of multipliers. Not too much activity from stateside on 80 meters . . . *DL8PC*. First time to try the contest and had a fun time in spite of a lot of QRM . . . *DU1JUI*. I lost my voice after the contest . . . *DU3CWS*. Conditions were poor, but contest was very good as usual . . . *EMØF*.

Always the same pleasure to contact many places of the world . . . *F2EE*. It is a phone contest, not a spread spectrum contest! . . . *F6FGZ*. Always very happy by the WPX Contest. Two new ones (7P8 and 9X5) . . . *FE6FNA*. Computer entry is lovely; scored lively; really a must in your shack. I hate pencils— hi! . . . .*FM5DN*. Currently rebuilding tower and antennas, so this was "fun run" playing with temporary vertical for an hour or two while connected to local cluster . . . *GW4BLE*. The radio conditions were not so good as I expected this year . . . *HL5AP*. Gads. S9 QRN on all bands! Lousy propagation to boot. Looking forward to next year from HP3! . . . *HL9UH*. Fifteen was fantastic this year! I try for first time from my new QTH and my new antenna system located on the beach: very great fun . . . *IB4M*. Very good competition! . . . *II2T*. Only 80 meter, but very fun contest! . . . *IK2QEI*.

This is my second WPX contest. My first was in 1983 (I was 17 years old). It started the same day I received my license . . . *IK8CHL*. My new WPX personnal goal: over 2 million points . . . *IN3QBR*. Good propagation on Saturday toward the stateside with W6 and W7, only a few JA's. Opposite Sunday with a better opening toward the JA's . . . *IO4LEC*. I wish to thank the "Monte Capra DX Gang—IQ4A" and all its members for the opportunity to operate from the IQ4A shack . . . *IQ4A*. My first time in all bands single op class. Big enjoyment to select the strategy of the match! . . . *IR8A*. First experiment in stacking HF Yagis: the lower hardware worked for just half contest . . . *IU9S*. I enjoyed WPX SSB for the first time . . . *JAØTEA/9*. I am an opthalmologist and 29 years old. It is my great dream to win the CQ WPX Contest . . . *JH4UYB*. I usually run this contest QRP. The new QTH antennas are below roof level, making 100 watts as challenging as QRP, and just as much fun . . . *KØOSH*.

Line noise was severe until 0300 second day. After that, no noise at all thanks to rainstorm . . . *K3ZO*. Fun



This is OH6RM's monster 20 meter beam. It is 11 elements on a 140 foot boom at 100 feet. Estimated gain is around 11 dB.

test. Biggest problem: finding someone with a # lower than mine . . . *K7ABV*. First contest using the R7. 5N, DU, and VS proved as I had heard, that the R7 beats a dipole . . . *K7NPN*. I'm glad I have the option of submitting my entry over the Internet; it's a great convenience . . . *K8JLF*. Guess I spent too much time chasing multipliers! . . . *K8MR*. Wish stations would sign their callsigns more often . . . *K9BQL*. PCARS . . . *K9ES*. A lot of fun this year; added a few new countries to my logbook . . . *KAØKCN*. Was my first WPX contest; had an absolute ball! . . . *KA7ZUM*. Isn't it amazing how the bands only open during contests? . . . *KB2HV*. Fun running WITHOUT packet this year . . . *KB2SE*. Worked a 4N from Macedonia—a Germany station wanted to shoot the breeze instead of contest . . . *KB3AGZ*.

This was my first contest and I'm hooked. Turned the radio on for 5 minutes while I shined my boots and worked LU5ER and P40V. Wow! . . . *KB8OKK/T*. I made my goal of getting over 1 million points. I should have done alot better, but an inverted vee at 30 feet doesn't cut it on 40 and 80 . . . *KC6X*. Murphy stepped in and trashed my radio with 14 hours to go. Next year there will be a backup rig in the shack. Still lots-a-fun . . . *KC7EM*. First contest that I competed in . . . *KD1TM*. The best part was when N6VI/KH6 called me on 75 meters. With 75 like that, who needs 10? . . . *KD4LHA*. Had a great time. As a beginner, I learn more with each contest . . . *KD4TYE/T*. First WPX Contest. Wasn't on long, but I enjoyed it . . . *KE4CVG*. Had to attend a Luau during prime time for Hawaii, but the food was worth the exchange for points lost. Wish you were here . . . *KH6FKG*. My wife went into labor with our first child about the time the contest ended. James Christopher was born the next morning at 1631Z . . . *KI4HN*.

My first WPX contest. Lots of fun . . . *KJ4KX*. Had a great time. Can't wait until next year . . . *KJ6HO*. Working Alaska—great contest; will be back next year . . . *KJ8V*. My very first contest was the 1980 WPX. I've been hooked on contesting ever since . . . *KK9A*. First time in WPX contest and not the last one; lots of fun . . . *KP2BH*. Surprised not to hear any UK hams . . . *KP4CZ*. First time I have run this contest all band. Didn't get enough sleep prior to the test, so my effort suffered accordingly . . . *KQ3V*. Band was noisy, but "I love this stuff" . . . *KQ4GC*. Working first DX contacts . . . *KR4IQ*. Always great to meet old friends on the radio . . . *KS2M*. Had S3-5 hissing noise on 15 meters. Only discovered it was due to the switching power supply on my laptop PC after the contest . . . *KU6T*. Come 3 AM I found myself keying mic and wondering why the ventriloquist wasn't talking . . . *KV7S*.

THANK YOU for the new Single Op Assisted category! Semi-rare prefix makes this contest really FUN! . . . *KY2T*. Vy hard aurora, QRN up to S-9 + 10 dB most of contest time . . . *LA8WG*. No condx on 10 meters . . . *LZ3YY*. First time ever that everything worked. Wish propagation could have been better, but 10 was far from dead. Good operators, enjoyable contest . . . *NØOST*. Enjoy this test. Propagation pretty good considering early predictions . . . *N1KWJ*. This is the first time I've tuned into a large contest. What little I was able to work was fun. Boy those Italians hit stateside with quite a punch! . . . *N1PBT/AE*. Up 20K from last year . . . *N2ALE*. Conditions were pretty bad on 10 meters compared to three years ago. Didn't have a single European or Japanese QSO . . . *N2LDU/T*. Had fun. Contacted four new DXCC countries. This is my highest number of QSOs in a contest . . . *N2LQQ*.

Glad I upgraded to Extra. Will need a beam next year to do anything. Bands were tuff! . . . *N2PEB*. Ten is not the only band failing. Fifteen is tough nowadays as well for lil pistols . . . *N4MO*. A struggle to stay alive with low power this year. Operating time was reduced as well . . . *N5NMX*. Ten meters was alive and well with Japan and Europe worked on skew paths . . . *N5NMY*. Conditions on 10 surprisingly good for this point in the cycle. Lots of DX, but virtually no US stations to work . . . *N6EE*. My goal was to break the Oceania record and that happened. I was pleased to see a combination of competition and courtesy among participants . . . *N6VI/KH6*. Sunday: 0037 XX9TZ, 0044 BY4SZ, 0046 BZ4DJW, 0047 KL7Y, 0047 VS6WO (S9+25 dB), loudest ever heard a VS6 on 15 meters . . . *N8II*. It was sure great to see 15 meters still in good shape . . . *ND9O*. A small station with small antennas needs a lot of big sunspots! But I did get a couple of new ones in spite of the condx . . . *NI9C*.

Had to work this weekend. Had fun in contest! . . . *OHØNJ*. Lost the first night my coax balun—was in short circuit. Needed daylight to fix it . . . *OH3OJ*. The propagation did not favor the northern latitudes. I'll be waiting for more sunspots! . . . *OH6NIO*. QSL via OM3CGN . . . *OMØW*. Unfortunately was only able to operate a few hours due to illness . . . *ON9CJM*. Due to windstorms, QRN level S7 to S9 for most of contest . . . *P4ØV*. I work in this contest as single op single band more stations than in the Dutch PACC on all bands (hi) . . . *PAØIJM*. Heavy QRM from the W and K people . . . *PAØKDM*. Contest clashed with my birthday, so only 32 hours active! . . . *S56A*. Spent too much time on 160/80 and 10 meters! Next time better strategy, I hope . . . *S59A*. "I would like to thank everyone of the DX stations which have big patience with my "LP" signal. I like amplifier, but I don't have him (hi)." . . . *T92X*.

Good contest! . . . *T94MV*. Few QSOs but fun anyway

This is Pekka, EA8AH (OH1RY), the number one station on 20 meters.

Matt, IK2SGC, used II7M in the WPX Contest.

Ivo, 5B4ADA/T93A, who finished ninth in the world as 5BØA.

. . . *TG9AJR*. Bad conditions on 21 MHz. I guess that we are near to the minimum of sunspot cycle . . . *U1BA*. It was my first participation in this contest single op single band and that was very nice . . . *UR5DXX*. Very thanks for a great contest! See you next year . . . *USØHZ*. The usual excellent contest in spite of the lousy propagation . . . . *VA3PI*. Thanks for the new category of Single Op Assisted. It certainly helped out on 10 meters this year . . . *VA3VET*. My first. Won't be last! . . . *VE1XDX*. Polar propagation not very good. Computer logging is the only way to go . . . *VE8KM*. Very strange conditions. Had to aim south 90% of time to work anywhere. Very few Europeans heard . . . *VE9ST*. Band conditions were fair during my limited operating time except for closing hours. I was almost begging for contacts to achieve my 12 hours . . . *VK4AAR*.

My first KH6 and VK on 40 meters. Great! . . . *VO1SF*. This is my first WPX contest participation and I had so much fun that you can count on me for next year . . . *VX2DR*. Great contest. Thanks to all who stopped by to say hello and give me a few points . . . *VX7A*. Can't we make it a rule that every 6 minutes a different call area aims north? . . . *VY1JA*. Gripe: Hot shot DX stations rarely confirm report—often say QRZ . . . *WØACT*. Henry wiped out early in the contest. No help. Had to operate barefoot . . . *W1BK*. A great contest, lots of DX activity . . . *W4WTO*. Enjoyed first CQ WPX SSB Contest . . . *W6BIP*. Got plenty of snooze time . . . *W6HAL*. Had a great time. Operated about 31 hours. Most I've ever done and most points I've ever made . . . *W6TKF*. Forty meter contact with VK9NS and 33 new countries on 40 with dipoles put up 24 hours before the contest . . . *W7KEU*. Thrill for 10 meters to be open . . . *WA3DMH*.

W7RM's QTH is like a "Disneyland for Hams" . . . *WA6BXH*. My first WPX SSB test. Went well with pizza and M&M's! . . . *WA6KUI/4*. Had 100 mph winds for three days before contest. Only had one vertical left. Wait until next year . . . *WC7S*. Low power plus low G5RV equals low score, but thanks to all the Canadian prefixes—it was a blast! . . . *WD9HTC*. Not very good propagation on 80, but new all-time high for prefix total. Lots of fun! . . . *WE3C*. WOW! . . . *WF1L*. Twenty meters Sunday around 0500–0700 UTC made the contest fun with all continents calling! . . . *WH6/WR6R*. I'd like to see P4ØV's and ZXØF's contest setup . . . *WI1K*. Had lots of fun, but little European activity despite strong signals . . . *WM2C*. Only search and pounce. With my prefix, one could feel like he was on the other end of a DXpedition otherwise! . . . *WO1P*. Just playing. Still recovering from the broken leg in September 93 . . . *WX9U*.

I couldn't believe it—first time in the contest and more than 1000 QSOs! . . . *XE2AF*. On 40 meter band, having QRM from broadcast . . . *YB6INU*. Nice contest. Thank you very much to all the people calling to me . . . *YC3SPS*. WPX's are always interesting contests and with good participation . . . *YO4NF*. This was my 19th CQ WW WPX SSB Contest and my 1672 log entry at all . . . *YU7SF*. First time in this contest with my new call. I was YU3QI . . . *YZ1MB*. My first WPX SSB since 1969 when we put ZD8AR on multi-multi. Really enjoyed this one . . . *ZD8Z*. The most fun I have ever had in a contest. The pile-ups were from all parts of the world at the same time! . . . *ZF1CQ*.

Station Operators Multi-Op Multi-Transmitter

7S7CA: SM7ATL, SM7CRW, SM7NZB, SM7PXS, SM7SEL, SM7SHY, SM7SJR, SM7SJV, SM7SPP, SM7UFR, SM7UFW, SM7THS, SM7TVC, SM7UJI. **9A1A**: K4XU, OH6XY, F2CW, 9A2's AJ, AW, DQ, EU, HO, KL, KM, LJ, MP, NJ, OG, PA, RA, SD, WM, 9A3GW, 9A3MJ. **AB5AE**: AB5AE & W5GQU. **AD6E**: AD6E, AA6MC, KD6WKX. **AIØY/9**: WØAIH, NØAXL, DL1QQ, AIØY, KØEA, KØFVF. **BVØFMT**: BV2FR, BV2DQ, JP1RIW. **CZ7Z**: VE6BSV, VE6PDQ, VE7's AV, AMS, DPG, EME, EMS, EQN, GGG, PTT, RBL, SK, TCP, UBU. **EM2I**: UT2IZ, UT2IA, UT2IB, UT2ID, UT2II, UT2IJ, UT2IM, UT2IO, UT2IV, US1IDX, UR3IKY. **HG73DX**: Ops of HG5A, HG6N, HG6Y. **II9E**: IT9EWG, IT9JOF, IT9THD, IT9KWF. **JA1YXP**: JF1QOW, JJ1OJG, JK1ATC, JP1AEQ, JR1ISK, JS1INN, 7K1's EWD, QOE, 7L1's CBL, DGK, ETO, 7N1's NQK, SYP, JL2TSY, JS2XHN. **KA5BAT**: AA5UR, KC5BBT, KB5TTS, KC5ENC, KB5TZK, KA5BAT.

LU4FM: LU7FW, LU5FAO, LU2FFD, LU9FIO, LU6FEC, LU5FYV, LU4FPZ, LU6FAZ, LU9FDG. **LY7A**: LY1DI, LY1DF, LY2NK, LY2FN, LY2BMX, LY2BUH, LY2QN, LY3BBC, LY3NDA, LY2UF, LYR346, LY41751, LYR1853. **OK2KJU**: OK2BXU, OK2BXE, OK2BCJ. **OT4A**: DF1JM, DL2KMS, DL3EBM, ON1AEI, ON1AFF, ON1ARZ, ON1AWB, ON1GL, ON2AIM, ON4ACA, ON4AID, ON4ALT, ON4ALW, ON4AMI, ON4AMX, ON4ASB, ON4AWU, ON4AWV, ON4BI, ON4DB, ON4FG, ON4FI, ON4HY, ON4QQ, ON5CD, ON5DH, ON5DO, ON5DT, ON5OT, ON5UM, ON6DN, ON6EV, ON6ML, ON6MR, ON6OW, ON6PU, ON6UA, ON6AW, ON7BD, ON7NB, ON7NQ, ON7SF, ON7UN, ON7VQ, ON7VU, ON7YD, ON7ZM, ON7YZ, PA3BUD & XYL'S. **VP2EC**: KC5EA, N5AU, N5HGB, K5RX, VP2EM. **VS6WO**: VS6WO, VR2GO, VR2IH, 9V1YC, JE1CKA, KJ4VH, K3WUW, DL5XX.

W4MYA: W4MYA, KC4AUF, KD4JXY, KD4UEG, KD4KYQ, KD4VOZ, KD4YVO, WA4DAI, WA4ROV. **W7WHY**: W7WHY, NO7F, KG7DK. **WZ1R**: WZ1R, KY1H, NJ1F, KB1W, WM1K, AA1AA, AA1AS, K1MBO, KA1NCN, N1NQD, WA1ZAM. **ZP94B**: ZP5XHM, ZP5HFD, ZP6HR, ZP5CGL, ZP5JLC, ZP5JPB, ZP5MGR, ZP5LEL, ZP5RDP, ZP5ROR, ZP5RPO, ZP5REY. **ZW4Y**: PY4BA, PY4BHB, PY4JDS, PY4OY, PY4VD.

Station Operators Multi-Op Single Transmitter

4D3HSP: 4F3AAL, 4F3CW, DU3's FBB, CWU, BRA, CWX, MY, NCM, RIG, AMW, RDM, CWR, DY3's CWD, CWG, VCW, MHZ, BGY, ZLL, CWC, FZR, OST, NOR, ERL, RDY, KD4YRJ. **4U9ITU**: DF6IC, DJ4XA, DK7UY, DL5IAR. **6E2T**: XE2BGD, XE2ENG, XE2EOS, N6AZE, N6KI, W6UQF, K2VIV, KD6QK. **9A9D**: 9A4KK, 9A4DD, 9A4UU. **9I2M**: DL7VTZ, DL7VTM, DL7VLA. **AA6TT**: AA6TT & NL7GP. **AM4URE**: EA4AD, EA4AV, EA4BOD, EA4BPJ, EA4BT, EA4CM. **BV2B**: BV2WA, BV2A, BV2AD, BV2DD, BV2DQ, BV2FG, BV2KI, BV2IP, BV2BT, BH2HS, BV2HQ. **BY1QH**: Gray, Helen, Henry, Jean, Mike, Nick, Rick, Sean, Will. **BY4BCN**: BZ4DHI & BZ4DHL. **BY4BPT**: Ned, Dick, Rafe. **C49C**: 5B4KH & 5B4WN. **C4YY**: 5B4YY, 5B4ABU, 5B4AAJ, KC5PF, GØIVE, Frank, Martin, Nina. **CI6AO**: VE6MD, VE6AMR, VE6KC, VE6JO, VE6BIR. **CK7K**: VE7ETY & VE7KD. **CQ5P**: CT1ETE & CT1ENQ. **CQ7V**: CT1ENI & CT1FBP. **CT8T**: CT1DVV & CT1ESV. **CT9M**: CT3BM, CT3EE, CT3CK, CT3CD, CT3HA, CT3HB.

DAØRG: DG1SDO, DG4NAV, DH1OAH, DL3OBU, DL8OBC. **DF7RX**: DF7RX, DL4RDJ, DK2OY, DL6RAI. **DFØRI**: DL8OBQ, DL4ARL, DK3DM. **DF4SA**: DF4SA & DL9SCU. **DLØHGW**: DL9GWD, DL9GRE, DL9GMN, DL6KWU, DL3KVB, DL1MGB, DGØGK. **DLØNO**: DL5HBD, DL1XAT, DL1HAZ, DL1LAD, DL5ZBJ, DJ5HZ, DL5HCK, DJØVI, DF2LH. **EA6URP**: EA6ABK, EA6AU, EA6ACW, EA6HI. **EA8BR**: EA8BR & EA1AK. **ED1WWE**: EA1FDI, EA1EZV, EC1CFD, EA1FCR, EA1DAX, EA1EPB, EA1FFH. **ED3RKG**: EA3BOW, EA3BOX, EA3DGQ, EA3EIO. **ED3TT**: Club Group. **ED5WPX**: EA5ABE, EA5GQI, EA5CIO. **EI9FN**: EI9FN & EI/G3YOG. **F6KAW**: Club Group. **F8KOJ**: F5RAV, F5REM, F5RRX, F5RWM. **FK8GM**: FK8GM & FK8FI. **G3OZF**: G3OZF, G4DQW, GØLMX, G4WVX. **G4UJS**: G4UJS, G4APA, G4XUM. **GB6AR**: G4XKR, G4XFA, GW4VAG. **GCØDPX**: GWØPSV, GWØTKX, GWØSGL. **GC3SCA**: GØKXL, GØIEQ, G4WSE, GØLHW, G1AOF, GØDBE. **GIØKOW**: GIØKOW, GIØNWG, GIØSAP. **GXØOBS**: 2E1BSL, 2E1BVK, GØIZM, GØKYM, G1MLK, G4JGV, G4JYE, G4WMH, G8CQH.

HB4FG: HB9AGC, HB9AIB, HB9ALM, HB9APU, HB9DLV. **I1VDM**: I1VDM, I1HAG, I1PHX, I1ANF, IK1NPH, IK1MJG, IK1BEA. **II1D**: IK1OUK, IK1VBE, I1XOI, IK1AIF, IK1CBQ, I1JZV, IK5MDF, IK1JPV, IK1TXM, I1EAZ. **II2M**: IK2SFZ, IK2GWH, IK2RGT. **II4M**: I4MES, I4GZV, IK4HLQ, IK4FAQ. **II7I**:

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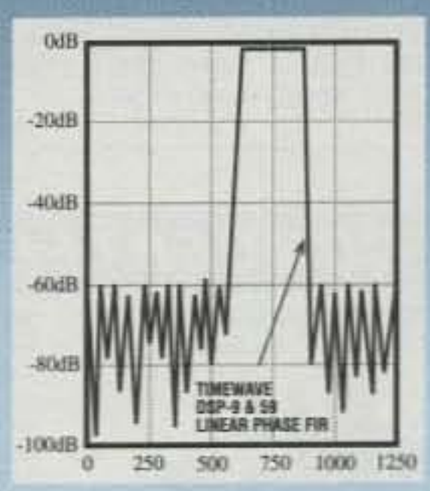

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CONTINENTAL LEADERS

AFRICA

A	**ZD8Z**	**18,118,880**
28	C91J	2,145,946
21	EA8AFJ	4,015,017
14	EA8AH	8,194,536
7	**CT3BX**	**5,187,480**
3.7	EA8/OH1MA	2,690,714
1.8	No Entrant	

ASIA

A	5BØA	7,612,080
28	JH6AUS	85,440
21	JI2UNR	1,268,813
14	RZ9OO	2,439,360
7	RW9AB	742,848
3.7	UA9CSS	1,074,780
1.8	No Entrant	

EUROPE

A	**IQ4A**	**7,634,900**
28	DL2ARD/P	111,066
21	TM2V	3,504,450
14	**IU9S**	**5,677,177**
7	F2EE	3,364,050
3.7	GW8GT	1,473,868
1.8	IO3MAU	247,904

NORTH AMERICA

A	6D2X	10,652,400
28	TG9TI	1,795,239
21	*ZF1CQ	5,003,019
14	VX7A	4,534,944
7	FM5DN	2,353,208
3.7	VE7CC	1,554,658
1.8	K1ZM	88,560

OCEANIA

A	**WH6/WR6R**	**9,776,288**
28	VK4LW	194,427
21	YCØARO	1,740,480
14	KH6FKG	1,536,712
7	**VK3EW**	**2,022,804**
3.7	N6VI/KH6	1,016,652
1.8	No Entrant	

SOUTH AMERICA

A	**P4ØV**	**17,201,184**
28	L6ETB	5,578,020
21	**ZPØY**	**10,939,487**
14	LU7FPI	1,089,362
7	YV5MRR	2,727,450
3.7	YV4AZF	173,628
1.8	YV1DRK	19,392

MULTI-SINGLE

AF	EA8BR	15,311,851
AS	C49C	14,396,834
EU	TM1C	11,983,340
NA	VX2A	9,243,923
OC	FK8GM	3,860,567
SA	ZXØF	27,883,050

MULTI-MULTI

AF	No Entrant	
AS	VS6WO	16,555,040
EU	**9A1A**	**28,051,245**
NA	**VP2EC**	**39,530,455**
OC	No Entrant	
SA	LU4FM	25,072,710

**Denotes low power.*

QSOs BY BAND
SINGLE OP ALL BAND

Band	ZD8Z	P40V	6D2X	VE3EJ	WH6/WR6R
160	0	3	0	87	0
80	35	109	16	559	203
40	563	579	808	636	613
20	1192	1320	607	822	744
15	1753	1836	2765	1398	1125
10	2011	1794	0	109	1011

QSOs BY BAND
MULTI-OP MULTI-TRANSMITTER

Band	VP2EC	9A1A	LU4FM	OT4A	HG73DX
160	80	364	0	442	467
80	374	1007	34	1111	852
40	1384	2156	343	1746	1215
20	3505	2717	1385	2003	1824
15	3375	1676	2540	1142	1999
10	2115	212	2466	377	110

QSOs BY BAND
USA SINGLE OP. ALL BAND

Band	WM2H	KF3P	WN4KKN/6	K3ZO	K5ZD
160	0	0	3	0	43
80	191	351	212	185	287
40	191	25	195	133	172
20	945	1498	901	1314	718
15	1320	1093	1686	745	898
10	85	27	74	41	72

QSOs BY BAND
MULTI-OP. SINGLE TRANSMITTER

Band	ZXØF	EA8BR	PT7CB	CT9M	C49C
160	0	0	0	9	0
80	75	219	39	456	158
40	1113	863	461	413	601
20	2012	953	1781	875	1320
15	2340	1287	952	1703	2320
10	2007	1007	1501	787	28

IK7RWD, IK7FJR, IK7EES. **IK3TPN**: I3QKO, I3VFJ, IK3DVX, IK3ELC, IK3QAR, IK3TPN, IW3FT, IW3GSD. **IK6QRH**: IK6QRH, IK6JNH, IK6NGH. **IO2A**: IK2RZP, IK2HKT, IK2VFW. **IO4IB**: IK4HVR, IK4RSN, IK4CLF, IK4SXJ, I4FYF, IK4QIB. **IO5A**: I5JHW, I5NSR, I5OYY, I5VXG, IK5JAN, IK5PWC, IK5NAW, IK5CRH, IK5ATM, IK5ORP. **IR2W**: IK2EGL, IK2OHG, I2EOW, I2VXJ. **IV3DXW**: IV38LQ, IV3DIW, IV3DLW, IV3DXW, IV3HWT, IV3KTY, IV3TAN, IV3TMV, IV3VFR, IV3WDH. **IV3NTA**: IV3NTA & IV3JVJ.

JA1YDU: JHØNZN & JF7TFK. **JA6YCL**: JF4CZL, JI6MYW, JL6UOM. **JE6ZIH**: JR6GKT, JA6QJG, JF6DEA, JG6CVO, JG6GNR, JI6BRB, JG4KEZ. **JG2ZQZ**: JA2BY, JA2BIV, JA2AXB, JH2MYN, JI2KAR, JE2OTM, JA2JSF. **JH5ZJS**: JA5BJC, JA5CJZ, JA5FDJ, JA5JCC, JR5PDX. **JJ3YBB**: JA3FHL, JA3PJL, JE3XTA, JH1ORL, JH3FQF, JI3ERV, JS3VEX. **K2SIG**: K2SIG & WA2EOV. **K5XI**: K5XI, K5GN, K5GA, W5ASP, KI3L, K5RC, NZ5I, KE5IV. **K8EEH**: Club Group. **KF9PL**: KF9PL, NM9H, NO9Z. **KG8AL**: KG8AL & KB8OWE. **KG8BZ**: K8AEM, K8AQM, KB8ECG, KC8EK, KG8BZ, KG8CO, N8CC, N8DPH, N8YDZ, WB8G, WB8GFN, Melody. **KJ5IP**: KB5UHS, N5RBC, N5QVS, AB5KK, K5ZTY, WA5DWX, KB5ZKO, KB5YUT. **KM5X**: KM5X, KI5JC, KI5PA, K5MR. **KN6SO**: KN6SO & W6REC. **KO4EA**: KO4EA, WB4PJW, N4YET, WA4KQX, KD4FKT. **KQ4HC**: KQ4HC & KO4EW.

L20A: LU1CN, LU2BDG, LU2DW, LU6BEG, LU6EF, LU7DW, LU8EWD. **LP4H**: LU4HMF, LU4HKN, LU3HEO, LU3HIP, LU3HUJ. **LT1V**: LU1VK, LU4VZ, LU5VC, LU9VY, LU2VD, LU1VV. **LT5F**: LU5FCI, LU5FIC, AZ8FAG, LU1FZR, LU2FLN. **LU1YY**: LU8YAP & LU7YAR. **LU4DRC**: LW2DVY, LW1EXU, LW1EIC, LW2EGD, LW9EVF, LW9EYX. **LXØRL**: LX1RA, LX1RL, LX1PX, LX1HX, LX1HT, LX1OM, LX1EP, LX1XL, LX1KQ. **LX4A**: LX1AT, LX1EA, LX1IQ, LX1JH, LX1KC, LX1NO, LX1NW, LX1RQ, LX1SP, LX2KW, DA1DW. **LY3MR**: LY1FF, LY1FR, LY2BKF, LY3NFW, LY1DS. **LZ1KBB**: LZ3FN & LZ4AX. **LZ5W**: LZ3ZZ & Milen. **LZ5Z**: LZ2UU, LZ3DJ, LZ3DX, LZ3OM, LZ3SM, Ivo, Vasco. **NØKFE**: NØKFE & NØPKX. **N1AU**: N1AU & KC1F. **N1HRA**: N1HRA, N9LYE, KA1VMG, KA1ZZR, KB1AVI. **N3KEG/KH6**: K3KEG/KH6 & N8HTG. **NCØP**: NCØP, WRØG, NØAMI, WAØFLS, WOØV. **NJ1V**: NJ1V, WV5S, N5CE, AA5OR. **NN5O**: NN5O & KN6WE. **NW5H**: NW5H, WØRRY, N5CG, KB5ZUD. **NX1H**: NX1H, WT1S, N1HFE, NW1U, WB1HBB, K1MNS.

OE1XTU: OE1TKW, OE4BKU, OE1MCU. **OH7AAC**: OH4LTK, OH6LNI, OH7KIR, OH7MHL, OH7MS, OH7WV. **OI6AY**: OH6FT, OH6IG, OH6MW, OH6NU, OH6RV, OH6SC. **OK2KOD**: OK2BDI, OK2BGR, OK2BHM, OK2PID, OK2WAZ. **OL3A**: OK1AYP, OK1DXS, OK1ICM. **OL5A**: OK1FYA, OK1DXF, OK1FFC, S55AA, S53BM, S53TK, S56JPB. **OM2I**: OM3CAV, OM3CTA, OM3TXM, OM3WPB, OM3YLA, OM3TSQ, OM3TXW. **OM5M**: OM3TCW, OM3TPW, OM3TPG, OM3TRG, OM3TYQ, OM3TLU, OM3EI, OK2PZW, OM3TSW, OM3TSY. **ON6AH**: ON4GO, ON5OO, ON6AH, ON6VL, ON6QR, ON7PC. **ON6BR**: ON4ASD, ON4AYL, ON5TQ, ON6JN, ON7HW, ON7XN. **OT4L**: ON1AFN, ON4's AEK, AKL, BN, BR, ON5BR, ON6JZ, ON6NL, ON7WK, ON7YP, ON7YT. **OT4V**: ON6KZ, ON4ALL, ON4AMM, ON4AYM, ON4AWK, ON2AHJ, ON1AFW, ON1IH. **OZ5EDR**: OZ1IVA, OZ5ABD, OZ5LH.

P39P: Theodoros, Nestor, Nicholas, Stavros. **PA6WPX**: PI4COM, PA3BBP, PA3ERC, PA3EWP, PA3FQA, PA3GBQ, PA3DMH. **PI4ALK**: PA3DLA, PA3CVY, PA3FQW, PAØBGB, PAØXAW. **PI4TUE**: PA3GBU, PA3EZL, PA3GBV, PA3FYW, PE1NEX, PE1PEB, PE1NDG, Robert Oleg & XYL. **PQØZ**: PY1NEZ, PY1NEW, PY1WCS. **PT7CB**: PT7CB, PT7BZ, PT7NK. **RK1OWZ**: UA1OZ, UA1OMX, UA1-113-244, UA1-113-619. **RK4WWA**: Igor, Vlad, Willy. **RK9CWY**: RX9CAZ, RV9CDW, UA9-154-2276. **RK9JWJ**: RA9JAC, UA9JHM, UA9JAF, UA9WO/9. **RUØL**: RUØLI, UAØLS, UAØ1Ø7-696, UAØ1Ø3-454. **RU3A**: RA3AUM, RX3ACS, RA1CZ, RZ3GE, RK3DT, RW3GU, RW3GW. **RU6L**: UA6LV, UA6NP, UA6-15Ø-11Ø3, UA6-15Ø-14Ø3, UR5IBG, UT2IW. **RZ4WWB**: UA4WGU, RW4WJ, UA4WJF, A. Kosarev. **S53DCM**: S52MY, S53RY, S57AD, S57DX.

S56M: S56M, S51EA, S51FA, S57AL. **SKØHB**: SMØSYP, SMØMLZ, SMØTHN. **SK6PS**: SM6UQJ & SM6VAO. **SK7BV**: SM7AIO, SM7/YO9FVU, SM7SEA. **SM3KOR**: SM3KOR, SM3SGP, SM3RPK. **SN7L**: SP7MTR, SP7NJX, SP7MTU. **SP6KEP**: SP6LUV, SP6TTQ, SP-23Ø22. **SP6YFU**: SP6NVK & SP6OPE. **TA1KA**: TA1CDE, TA1AN, TA1BW. **TA2ZO**: TA2ZO & Fatih. **TM1C**: F5MZN, F5SNJ, F6CTT. **TM2T**: F5PFP, F5PUI, F5ROP, F5PXT, F5SIH. **TM3M**: F5NRG, DL4VCG, DL4VAD. **UN8LW**: UN9LW, UN7LAN, UN9LT. **UR4PWC**: Club Group. **UX8IXX**: US-I-6Ø4, US-I-6Ø2, US-I-6Ø3, US-I-7ØØ. **UZ9AWE**: UA9AFA & RA9ATH. **VD2ZP**: VE2ZP & UU2JX. **VE2PK/VE3**: VE2PK/VE3, VE3KWR, VE3LBZ. **VE3AGR**: VE3AGR & Emmanuel. **VE4VV**: VE4XT, VE4DRM, VE4VV. **VE5SF**: VE5SF & VE5CPU. **VE6SV**: VE6SV, VE6NAP, VE6LDX, VE6JHB, VE6EZ. **VE7UBC**: VE7CNV & VE7TTQ. **VK1DX**: Club Group. **VK4IZ**: VK4DD & VK4FFX. **VX2A**: VE2WJ, VA2RB, VA2SL, VA2LR. **VX3LRL**: VE3LRL, KA3SQL, VA3TA, VA3LY.

W6EEN: W6EEN, K6XC, KA6SAR. **W7VNJ**: N7VLM, KB7QEF, KB7UHO, N7SVX, N7SEH, N7NPC, AB7BJ. **W8FY**: N8PCN, N8OSO, N8YUF, KB8JYV, KB8KBI, KA8ZGE, W8DHG, WD8LLO, WD8LPY. **WA1PMA**: N1JZQ, N1NRR, N1PFV, WS1F, WA1PMA. **WA2SYN**: WA2SYN & WM2V. **WA7IIM**: WA7IIM, WA7OEM, W7TWL. **WB4PHW**: WB4PHW & KD4LIF. **WD6DJY**: WB6LMN, KC6ABM, KJ6HC. **WE9R**: WE9R & N9TCF. **WN1V**: WN1V, K1TWF, N1CKN, WB1ELA, N1HEO, WO1N, WA1TET. **WX1Z**: K1KP, KB2R, WX1Z, WA1S, N1OEK. **WY3T**: WY3T, N3JRX, WB3AAL. **XJ6ITT**: VE6AQ, VE6LB, VE6BIC. **YE1ZC**: YBØFTE, YCØCVV, YCØFTD, YCØJBE, YCØPGN, YCØRVY, YCØYTL, YB1CBT, YB1GAG, YC1UAG. **YL1XW**: Ziedonis, Oleg, Mike, Dave. **YL1ZE**: Yuris & Ivars. **YO2KBB**: YO2BYD & YO2LFP. **YT7ØX**: YT7NW, YT7TY, YU7AL. **YV5USB**: YV5NQZ, YV5NSV, YV5NEC, YV5NEH. **YZ7A**: Club Group. **Z3ØM**: Z31GX, Z32JA, Z31PK, Z32ZM, Z32RY, Z31ET, Z32DR, Z32RC, Boby. **ZXØF**: PY5EG, PY5CC, PY5ALP, PYØFF, PY5TM.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

SSB RESULTS
QRP/p SECTION

WORLDWIDE

HC8A	**A**	**7,520,562**	**3377**	**714**
RV9C	**A**	**1,362,975**	**1017**	**425**
WA1LNP	**A**	**1,161,646**	**1110**	**523**
F1BEG	**A**	**639,808**	**702**	**416**
EA3FHT	**A**	**491,596**	**692**	**388**
SP3SLA	**A**	**452,540**	**575**	**340**
WA6IET	**A**	**420,472**	**531**	**338**
WA4PGM	**A**	**398,748**	**496**	**329**
WT3W	**A**	**343,023**	**444**	**327**
OK1DKS	**A**	**334,647**	**514**	**309**
UA9QA	"	313,728	425	258
EA3CKX	"	283,542	455	301
YU7ØKN	**A**	**258,808**	**450**	**346**
N1CC/2	**A**	**258,594**	**416**	**282**
EA1GT	"	203,456	410	272
NM1Q	"	179,520	324	240
JR2BNF/1	**A**	**171,384**	**317**	**222**
ER1FW	**A**	**86,768**	**278**	**187**
OH5NHI	**A**	**78,195**	**260**	**195**
KZ1L	"	74,534	200	166
LA1XDA	**A**	**67,392**	**239**	**162**
VE5AEO	**A**	**64,935**	**195**	**135**
DU7AFT	**A**	**54,054**	**161**	**117**
VK4NEF	**A**	**53,846**	**182**	**109**
N6AZR	"	53,196	202	132
JA2MWV	"	43,036	127	116
PA2PDN	**A**	**28,288**	**166**	**128**
YO5CUQ	**A**	**26,103**	**123**	**113**
EA3ERT	"	25,252	133	118
UX8IX	**A**	**20,909**	**124**	**103**
OM3CAJ	**A**	**20,482**	**142**	**98**
UA2FBR	**A**	**10,988**	**71**	**67**
UX3FW	"	10,374	100	91
DL2YET	**A**	**4,230**	**53**	**45**
N8AXA	**A**	**1,590**	**61**	**60**
LWØD	**A**	**1,295**	**56**	**37**
JE7DOT	"	918	21	18
N8ET	"	504	14	14
7K1CFN	"	300	10	10
SP5NOG	"	128	8	8
LW1DIP	**28**	**77,550**	**183**	**150**
LU1FNH	"	59,940	161	135
WA6FGV	**28**	**19,040**	**276**	**119**
S52SK	**28**	**18,000**	**97**	**72**
JF3EIU	**28**	**10,556**	**73**	**58**
N2LWL	**28**	**8,415**	**60**	**51**
S51RW	"	4,182	42	34
JQ1JQJ	"	364	15	13
UY3CC	**21**	**149,388**	**332**	**211**
EA4CRI	**21**	**110,290**	**0**	**0**
JA2JSF	**21**	**88,576**	**219**	**173**
DU1CHD/6	**21**	**86,850**	**210**	**150**
WA7FAS	**21**	**54,622**	**189**	**166**
EF5CQI	"	47,859	212	159
VE6SH	**21**	**38,142**	**145**	**117**
SP6DVP	**21**	**13,585**	**74**	**65**
KA1CZF	**14**	**133,431**	**275**	**237**
IK5RUN	**14**	**42,444**	**177**	**162**
ZP1BO	**14**	**26,296**	**173**	**152**
SP4GFG	**14**	**24,634**	**140**	**113**
DL1RPA	**14**	**20,482**	**146**	**98**
SKØPR	**7**	**35,076**	**132**	**111**
JA2DLM	**7**	**22,776**	**85**	**78**
W8QZA/6	**7**	**10,366**	**76**	**73**
PA2CHN	**7**	**462**	**23**	**22**
ON6CQ	"	0	1	1
UX2MF	**3.7**	**147,994**	**318**	**217**
VE5RMO	**3.7**	**24,300**	**94**	**81**
W1MK	**3.7**	**12,750**	**89**	**75**
JH1HRJ	**3.7**	**396**	**11**	**11**
JL6IPK	"	24	6	6
UR3PDT	**1.8**	**1,392**	**31**	**29**

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K5ZD	**A**	**4,700,124**	**2190**	**747**
WE6G/1	**A**	**1,660,312**	**1269**	**584**
WV1C	"	660,982	706	434
K2SX/1	"	558,928	607	386
NC1A	"	135,201	319	241
WA1KSY	"	92,308	246	188
WW1A	"	88,587	247	193
AA1GV	"	61,215	221	165
AE1D	"	56,769	187	149
K2LP	"	35,616	118	96
WS1M	**28**	**20,060**	**105**	**85**
WA1VRD	"	1,896	30	24
KC1XX	**21**	**2,951,454**	**1825**	**681**
KD1OG	"	4,554	48	46
K1KJT	**14**	**557,175**	**757**	**437**
W1LQQ	"	263,190	377	310
WA1MKS	"	11,682	69	66
KE1Y	**3.7**	**955,200**	**875**	**400**
KD1F	"	314,552	390	274
***WS1A**	**A**	**1,867,131**	**1254**	**567**
***AA1EY**	**A**	**485,002**	**548**	**343**
*W1QK	"	184,040	291	214
*WA1ECA	"	179,646	302	237
*KD1ON	"	174,570	318	230
*K8JLF	"	161,397	301	237
*KD1TM	"	111,384	309	221
*AA1CB	"	31,920	70	70
*N1QVE	"	23,463	105	99
*N1OEZ	"	11,310	70	65
*N1PBT/AE	"	3,770	29	29
***W2IQL**	**21**	**143,376**	**273**	**232**
***WF1L**	**14**	**818,950**	**1151**	**550**
*WI1K	"	14,432	94	88
WM2H	**A**	**6,360,736**	**2720**	**788**
AA2GQ	**A**	**3,270,814**	**1855**	**739**
KF2O	**A**	**2,337,855**	**1388**	**631**
KB2SE	"	546,915	578	361
KS2M	"	455,952	583	354
WR2V	"	324,621	431	297
WY2V	"	270,840	345	244
W2FR	"	186,784	249	208
WA2ZGO	"	79,236	186	186
W2OMV	"	41,120	189	142
WV2HJK	"	23,730	118	105
KA2AEY	**14**	**6,566**	**50**	**49**
K2ONP	**3.7**	**23,958**	**187**	**121**
K1ZM	**1.8**	**88,560**	**527**	**205**
***KE2ZU**	**A**	**821,219**	**730**	**469**
***N2INN**	**A**	**324,510**	**435**	**290**
*K2QMF	"	302,232	335	257
*N2PKN	"	199,326	367	239
*WB2MWW	"	180,780	332	230
*N2PSL	"	86,640	266	190
*N2PEB	"	75,690	219	174
*N2TNW	"	60,741	196	153
*N2LQQ	"	54,483	178	143
*W2OAE	"	31,622	113	97
*N2DWS	"	29,120	118	112
*N2ULU/AA	"	25,179	130	109
*WB2DVU	"	225	9	9
***W2KZE**	**28**	**23,436**	**116**	**93**
***N2LDU/T**	**28**	**8,216**	**62**	**52**
*N2IJW	"	55	5	5
***N2TAW**	**21**	**2,368**	**33**	**32**
***WA2UUK**	**14**	**731,025**	**765**	**475**
***W2FGY**	**7**	**1,292**	**19**	**19**
***N2QAN**	**3.7**	**25,048**	**158**	**124**
KF3P	**A**	**6,294,605**	**2984**	**865**
K3ZO	**A**	**5,134,266**	**2412**	**738**
W3BGN	**A**	**1,357,945**	**1025**	**505**
KB3TS	"	1,047,530	841	445
KC3MR	"	512,800	569	400
NI3I	"	396,268	514	314
K3IE	"	151,728	307	218
WA3DMH	"	148,137	288	201
N3RC	"	81,375	190	155
W3KV	"	34,133	118	107
W3FQE	"	7,824	56	48
N3EQQ	28	8	2	2
			(Op: K3UA)	
K3LQO	21	44	4	4
			(Op: K3UA)	
KS3F	**14**	**2,504,656**	**1840**	**749**
N3HBX	**14**	**1,619,118**	**1298**	**586**
W3FSB	"	6	2	2
			(Op: K3UA)	
W3GH	**7**	**948,288**	**941**	**448**
K3UA	"	5,214	35	33
WE3C	**3.7**	**1,008,268**	**883**	**443**
K3IXD	"	17,544	90	86
KA3EXO	"	0	2	2
			(Op: K3UA)	
***KQ3V**	**A**	**1,266,408**	**1049**	**533**
***WW3S**	**A**	**813,852**	**800**	**468**
*K3MD	"	517,945	561	355
*NY3C	"	150,568	300	232
*K3ND	"	101,400	212	156
*KB3AGZ	"	66,493	205	161
*AA3FY	"	43,740	143	135
***WB2BZR /3/T**	**28**	**68,808**	**426**	**183**
***K3WW**	**21**	**165,335**	**302**	**215**
*WJ3N	"	5,684	62	58
KA4RRU	**A**	**2,036,259**	**1362**	**621**
K4VUD	**A**	**1,552,666**	**1672**	**634**
AB4RU	**A**	**994,560**	**948**	**518**
W4WTO	"	628,768	705	401
KE4BM	"	596,008	645	367
KD4DWT	"	505,386	634	378
N4MM	"	271,694	364	262
W4WKQ	"	224,143	363	251
W4YDY	"	170,400	290	213
W1ENZ	"	134,469	280	201
KC6VWI/4	"	91,008	263	192
W4OGG	"	46,950	230	150
AA4KD	"	39,162	133	122
AD4FX	"	35,616	126	106
WD6GTP/4	**21**	**1,491,336**	**1284**	**538**
WA4QMQ	"	264,020	376	307
AC4NJ	**14**	**1,501,543**	**1594**	**691**
			(Op: WC4E)	
K9ES	"	355,856	600	368
W4/HK3GZB	"	184,965	400	295
NI4P	**3.7**	**515,328**	**480**	**264**
KQ4GC	"	65,340	224	165
WB4UBD	"	9,430	41	41
AA4MM	**1.8**	**20,022**	**265**	**141**
***AD4KE**	**A**	**517,194**	**571**	**354**
***KI4HN**	**A**	**514,371**	**608**	**363**
*K7GM	"	482,584	520	337
*AB4KL	"	351,897	417	273
*KJ4KX	"	332,340	463	348
*KD4LHA	"	254,868	421	268
*K4BAI	"	170,178	314	226
*KN4MD	"	164,250	305	219
*K4UVT	"	60,208	170	142
*W3AP/4	"	14,241	95	89
*KR4KL	"	6,000	65	60
***KE4BXT**	**28**	**13,041**	**72**	**63**
*KD4RHT	"	12,880	84	70
***KD4TYE/T**	**28**	**5,203**	**43**	**43**
*W9CNF/M4	"	2,106	29	26
*KR4IQ	"	1,566	58	27
***N4MO**	**21**	**450,570**	**503**	**345**
*WA6KUI/4	"	342,286	449	322
*KE4CVG	"	50,196	162	141
*WA4YNP	"	20,398	100	94
***KL7NL/W414**		**121,737**	**220**	**187**
*W9HNI	"	20,988	120	106
*N3AHI	"	10,730	77	74
WB5VZL	**A**	**3,409,656**	**2102**	**732**
N5QDE	**A**	**435,954**	**544**	**339**
WD5IGA	"	276,573	428	289
NA4M	"	270,254	575	326
KI3L	"	211,344	530	296
N5FG	"	132,888	313	226
KE5FI	**28**	**297,964**	**628**	**326**
N5NMY	"	207,577	476	251
KZ5D	**21**	**2,049,164**	**1598**	**628**
AD1S/5	**14**	**475,042**	**943**	**449**
WU3V/5	**7**	**1,154,560**	**912**	**451**
			Op: W5WMU)	
***WD5K**	**A**	**1,062,120**	**941**	**530**
***NZ5O**	**A**	**698,610**	**842**	**438**
*N5XUS	"	136,713	309	229
*WDØGTY	"	84,864	298	208
*WK5K	"	76,128	242	208
*N5PEF	"	945	24	21
***W5EIJ**	**28**	**5,382**	**50**	**39**
*KB2HV	"	3,488	40	32
***N5NMX**	**21**	**556,320**	**925**	**456**
***WF5E**	**3.7**	**2,560**	**43**	**40**
WN4KKN/6	**A**	**5,912,144**	**3055**	**784**
W6TKF	**A**	**2,036,445**	**1685**	**635**
KI6CG	**A**	**1,978,344**	**1638**	**639**
AE6Y	"	1,345,520	1439	605
KC6X	"	1,137,048	1318	584
KC6CEX	"	741,748	920	449
KJ6DL	"	712,480	1122	488
W6BIP	"	407,050	520	350
WA5VGI	"	137,934	329	237
WB6NFO	"	113,564	253	178
WX6M	"	111,852	204	156
N6WR	"	35,510	170	134
KI6VY	"	32,770	142	113
AEØM	"	15,886	105	94
K6NA	"	4,477	44	37
KT6V	"	0	70	62
N6EE	**28**	**20,418**	**102**	**82**
KA6ING/T	**28**	**16,800**	**95**	**84**
W6ISQ	"	1,518	26	22
W6BSY	**21**	**533,400**	**808**	**420**
WB6MZQ	"	462,208	635	368
AC6V	"	408,157	717	431
WM2C	**14**	**1,556,875**	**1520**	**625**
KM6YX	"	570,051	1251	491
N6RO	**7**	**1,307,332**	**850**	**403**
W6MVW	"	12,100	57	55
AB6ZV	**3.7**	**444,878**	**639**	**301**
***KJ6HO**	**A**	**819,708**	**915**	**498**
***W6HAL**	**A**	**136,024**	**288**	**196**
*KK6RG	"	123,906	313	214
*W6IXP	"	82,250	272	175
*WA6FIT	"	74,418	200	158
*K6MA	"	39,816	144	126
*N2ALE	"	26,880	151	112
*AA6EE	"	22,230	136	114
*WA8LLY/6	"	17,775	91	79
*N6JM	"	16,401	80	71
*K6SG	"	16,296	100	97
***KD6DAE/T**	**28**	**28,322**	**173**	**119**
*KD6OPB/N	"	4,416	53	46
***KU6T**	**21**	**125,475**	**307**	**239**
*KD7EY	"	77,922	272	222
*N6RQE	"	10,293	81	73
***NP4IW/W6**	**14**	**67,600**	**276**	**200**
***WA6WPG**	**7**	**26,208**	**78**	**72**
WA6BXH	**A**	**1,645,569**	**1338**	**531**
KA7ZUM	**A**	**763,994**	**883**	**451**
KE7GH	"	700,875	798	445
KC7V	"	370,233	488	279
N6HR	"	258,842	422	331
W7KEU	"	204,039	305	229
K7ABV	"	177,152	338	256
KI7WO	"	153,428	338	242
W7LR	"	106,190	233	185
WA7IVZ	"	63,360	173	144
K6XO/7	**21**	**432,796**	**667**	**377**
			(Op: KI7WX)	
W7FP	"	295,260	657	399
W7AYY	"	142,296	283	231
KC7EM	**7**	**1,317,876**	**913**	**406**
KG7XG	"	6,120	57	51
NT7Y	**3.7**	**64,380**	**321**	**185**
***N7LOX**	**A**	**664,560**	**744**	**468**
***W7QN**	**A**	**296,725**	**468**	**325**
*KC7UP	"	128,702	267	203
*W7HS	"	126,684	269	207
*K7NPN	"	110,860	366	241
*WA7VNI	"	95,550	266	210
*AA7VY	"	88,620	289	210
*WJ7R	"	50,874	180	122
*WC7S	"	6,642	99	81
***N7SDI**	**28**	**3,552**	**42**	**32**
***WA7BNM**	**21**	**841,940**	**923**	**473**
*WJ7S	"	209,576	393	268
*WN7J	"	66,993	177	163
***KV7S**	**3.7**	**178,088**	**533**	**273**
WB8TLI	**A**	**589,992**	**614**	**366**
NE8T	**A**	**446,420**	**528**	**340**
K8DD	"	398,748	501	329
W8RC	"	102,422	237	166
W8IDM	"	23,205	100	91
K8MR	"	0	124	111
N8II	**21**	**2,037,770**	**1358**	**602**
KF8UM	"	890,812	817	481
W9LT	**3.7**	**522,704**	**693**	**359**
***ND8L**	**A**	**1,461,680**	**1274**	**605**
			(Op: N6WLX/8)	
*W8UPH	"	166,254	307	229
*K8QLK	"	145,755	254	237
*AF8C	"	122,536	312	212
*KL7FAP/WX8	"	35,644	158	133
***N8KOJ/T**	**28**	**18,564**	**97**	**78**
*KE8NH	"	15,194	90	71
*KB8OKK/T	"	1,875	29	25
***WZ8T**	**21**	**333,333**	**435**	**333**
***KJ8V**	**3.7**	**21,600**	**253**	**150**
KE9I	**A**	**2,324,884**	**1676**	**718**
AJ9C	**A**	**969,680**	**1010**	**527**
WX9U	"	572,319	624	369
ND9O	"	551,460	675	404
WB9HRO	"	536,400	860	450
AA9IA	"	376,156	489	332
WD9HTC	"	290,880	451	303
KBØC	"	210,707	315	217
WA9CCQ	"	100,926	226	162
K9UQN	"	73,120	202	160
N9NUN/T	**28**	**18,954**	**101**	**81**
WE9V	**21**	**2,649,340**	**1675**	**695**
WA9BOW	"	230,112	349	288
N9LCR	"	178,263	375	261
KK9A	**14**	**2,813,748**	**1828**	**779**
K9ZO	**14**	**1,405,098**	**1234**	**622**
W9JOO	"	235,060	363	292
KS9K	**7**	**798,160**	**780**	**440**
			(Op: NØBSH)	
***W9IL**	**A**	**417,410**	**538**	**335**
***NG9L**	**A**	**301,716**	**425**	**306**
*AK9N	"	214,528	365	256
*NI9C	"	205,737	451	291
*K9OM	"	202,608	381	268
*AA9DW	"	150,495	330	237
*WX9E	"	78,916	241	181
*KØOSH	"	27,405	127	105
***KB9BGV/T**	**28**	**42,636**	**178**	**132**
***NEØP/9**	**21**	**1,755**	**42**	**35**
KAØZFX	**A**	**1,389,285**	**1752**	**615**
KMØL	**A**	**914,022**	**905**	**493**
WXØU	"	488,579	725	413
KAØWWT	"	367,850	573	350
WAØETC	"	233,334	371	261
KIØE	"	117,012	216	199
WAØDCB	"	83,622	225	181
WAØNIK	"	42,334	151	122
WWØQ	"	33,285	131	105
WØPPF	"	27,360	111	95
WBØGFV	**28**	**10,790**	**65**	**65**
WØACT	**21**	**262,824**	**393**	**282**
AAØFB	"	164,970	340	270
WA2HFI/Ø	"	28,296	108	108
NIØS	**14**	**2,268**	**44**	**42**
KCØEI	**3.7**	**12,636**	**140**	**117**
KØCS	**1.8**	**3,570**	**133**	**85**
***ACØW**	**A**	**831,068**	**762**	**443**
***KSØT**	**A**	**290,136**	**446**	**314**
*K9BQL	"	281,400	434	300
*AAØMQ	"	112,860	289	209
*NWØF	"	30,960	150	120
*NVØP	"	26,606	117	106
*KAØKCN	"	26,404	120	92
*WØSPF	"	21,266	118	98
*AAØNB	"	15,244	85	74
*W5GR	"	9,794	64	59
***NØOST**	**28**	**18,960**	**98**	**79**
***AKØA**	**14**	**207,792**	**500**	**333**
*KBØIHM	"	20,216	177	133
***NØBIW**	**7**	**97,944**	**177**	**159**
***NOØY**	**3.7**	**7,392**	**87**	**77**

MEXICO

6D2X	**A**	**10,652,400**	**4178**	**880**
			(Op: K5TSQ)	
***XE2AF**	**21**	**853,006**	**1008**	**382**

CANADA

VE3EJ	**A**	**10,562,391**	**3590**	**903**
VE7IN	**A**	**2,746,200**	**1626**	**597**
VE6JY	**A**	**2,145,745**	**1410**	**607**
VY2LI	**A**	**1,969,394**	**1311**	**574**
VE1UK	**A**	**1,551,426**	**1485**	**589**
VE3FNY	"	315,828	427	279
VE7XO	"	309,943	401	281
VE1XDX	"	217,864	311	241
VE3ZTH	"	173,264	294	221
VE3CWE	"	119,712	246	174
VE4RP	**A**	**114,741**	**236**	**183**
VE9ST	**28**	**248,712**	**450**	**241**
VE7SZ	**21**	**2,174,872**	**1864**	**547**
			(Op: VE7NTT)	
VX7A	**14**	**4,534,944**	**2675**	**776**
			(Op: VE7SV)	
VE3RM	**14**	**3,600,175**	**1952**	**731**
CG1B	**14**	**2,648,940**	**1832**	**636**
			(Op: VE1AL)	
VE5MX	**14**	**2,525,670**	**1867**	**633**
VE5RA	"	1,080,658	955	446
VE8KM	**14**	**290,400**	**465**	**300**
VX2DR	**7**	**1,040,232**	**717**	**356**
VE7CC	**3.7**	**1,554,658**	**971**	**379**
VA3VT	**3.7**	**267,600**	**310**	**223**
***VO1SF**	**A**	**2,046,264**	**1270**	**552**
***CJ6V**	**A**	**1,464,732**	**1270**	**522**
			(Op: VE6JAV)	
***VD2SPY**	**A**	**1,252,240**	**858**	**440**
***VE7CFD**	**A**	**896,636**	**1066**	**401**
*VD2QK	"	500,340	558	310
***VA3PI**	**A**	**177,246**	**282**	**229**
*VE3HOX	"	145,948	263	214
***VY1JA**	**A**	**145,359**	**532**	**279**
***VE9FF**	**A**	**105,560**	**239**	**182**
*VA3KEI	"	21,432	103	94
***VE3HX**	**28**	**5,080**	**47**	**40**
***VE2EW**	**21**	**109,431**	**216**	**189**
***VA3JK**	**14**	**928,800**	**785**	**450**
*VA3WTO	"	669,940	681	410
***VE6BMX**	**14**	**350,532**	**508**	**321**
***VE5GC**	**14**	**290,907**	**585**	**251**
***VE3KUK**	**14**	**266,220**	**373**	**290**
*VA3TA	"	121,552	243	214
***VE1REC**	**14**	**94,116**	**214**	**186**
***VE4COZ**	**14**	**88,816**	**223**	**182**
*VE3ISN	"	24,288	101	96

HAITI

HH2PK	**A**	**7,743,450**	**3257**	**825**

GRENADA

J31K	**A**	**4,302,360**	**3203**	**612**
			(Op: W8KKF)	

MARTINIQUE

FM5DS	**A**	**442,618**	**550**	**341**
FM5DN	**7**	**2,353,208**	**1049**	**484**

GUATEMALA

TG9GI	**28**	**1,795,239**	**1884**	**453**
***TG9AJR**	**21**	**222,480**	**433**	**240**

BRITISH VIRGIN IS.

VP2VF	**28**	**1,347,984**	**1560**	**396**

DOMINICAN REPUBLIC

HI8ROX	**21**	**403,144**	**579**	**313**
***HI8OMA**	**14**	**365,848**	**616**	**278**
*HI8LC	"	26,112	100	96

US VIRGIN IS.

***NP2I**	**A**	**1,877,675**	**1849**	**475**
***KP2BH**	**A**	**1,205,643**	**1112**	**479**

COSTA RICA

***TE5T**	**A**	**1,661,936**	**1588**	**482**
			(Op: TI4SU/5)	
***TI2KSR**	**28**	**2,551,077**	**2071**	**411**

PANAMA

***HP2CWB**	**A**	**1,204,281**	**1303**	**423**

BELIZE

*V31JU	A	1,203,266	1283	427

ALASKA

*NL7DU	A	345,554	570	278

PUERTO RICO

*KP4CZ	A	174,528	338	216

CAYMAN IS.

*ZF1CQ	21	5,003,019	2763	771
		(Op: W8BLA)		

CUBA

*CO2HA	21	161,568	360	216

AFRICA

ASCENSION IS.

ZD8Z	A	18,118,880	5526	992
		(Op: N6TJ)		

ANGOLA

D3C	A	7,311,152	3141	794
		(Op: D2SA)		

NIGERIA

5NØMVE	A	5,904,000	2698	720

SOUTH AFRICA

ZS6YA	A	3,621,538	1844	653
ZS6SA	A	1,752,500	1172	500
ZS4WD	14	10,659	63	57

CANARY IS.

EA8BXQ	A	340,366	454	247
EA8AD	*	242,788	397	203
EA8AFJ	21	4,015,017	1894	711
EA8AH	14	8,194,536	3303	852
		(Op: OH1RY)		
ED8BWW	14	2,717,544	1525	597
EA8/OH1MA	3.7	2,690,714	944	481
*EA8BGY	A	2,459,889	1313	573
*EC8AAZ	*	18,936	89	72

CUETA

*EA9AI	21	366,336	480	257
*EA9KB	14	401,617	499	269
*EA9UG	7	76,500	125	102

MADIERA IS.

CT3BX	7	5,187,480	1399	622
CT3BD	*	1,882,440	780	405

MOZAMBIQUE

C91J	28	2,145,946	1437	506
		(Op: WA4WKY)		

LIBERIA

*EL2PP	A	3,123,810	1687	610

NIGER

*5U7Y	A	1,487,370	1159	430

KENYA

*5Z4FO	28	1,269,000	1016	423

ASIA

CYPRUS

5BØA	A	7,612,080	3263	690
		(Op: 5B4ADA)		

ASIATIC RUSSIA

RZ9UA	A	6,972,109	2912	907
RA9FDR	*	394,680	476	264
RZ9OO	14	2,439,360	1501	630
RX9CP	*	1,906,176	1211	584
UA9KM	*	1,409,785	996	533
UA9CSS	3.7	1,074,780	606	315
*UA9SHM	A	400,754	431	302
*4K9W	*	10,856	69	59
*UA9UPR	14	250,560	366	270
*RA9XSL	*	154,033	270	209
*RW9A8	7	742,848	543	318
UAØSR	7	39,338	97	89
*UAØCKA	A	35,112	165	133
*UAØSMF	28	42,957	328	111
*UAØZBK/Ø	3.7	6,480	103	54

TAIWAN

BV5AF	A	3,644,352	2733	648
			(Op: AB6NJ)	
BV/KC6CNV	*	168,840	608	210
BV/KK6BB	*	156,906	561	207

KAZAKHSTAN

UN7LZ	A	2,577,771	1499	593

QATAR

A71CW	A	1,480,002	993	438

TURKEY

TA2ZI	A	776,358	883	297
			(Op: W6POK)	

HONG KONG

VS6BG	21	296,115	548	285

KUWAIT

9K2ZC	21	166,563	289	199

TURKMENISTAN

EZ8BO	21	37,878	160	118

INDIA

*VU2MOP	A	171,598	306	206

KOREA

*HL5BUV	A	57,018	161	129
*HL9UH	*	46,900	177	100
			(Op: KG6UH)	
*HL5AP	*	22,927	111	101

ISRAEL

*4X1VF	28	38,184	150	86

KYRGYZSTAN

*EX8MF	21	443,784	583	328

GEORGIA

*EK4JJ	21	180,428	361	172

CHINA

*BY1BJ	14	6,900	64	50
			(Op: BZ1IDA)	

JAPAN

JH5FXP	A	5,115,104	2165	716
JH7PKU	A	4,384,434	2056	687
JR4QZH	A	2,111,354	1264	581
JH2UVL	*	1,748,376	1085	504
JA6GCE	*	1,352,920	978	454
JA2ADH	*	1,061,760	842	448
JA5APU	*	423,384	499	312
7J7ABC	*	325,584	456	266
JA5IP	*	311,780	415	262
JN3SAC	*	80,936	206	151
JF6DXC	*	16,302	100	78
JA1BNW	*	15,691	81	71
JA3WFQ	*	1,420	23	20
JH6AUS	28	85,440	232	160
JA2BNN	21	832,652	759	412
JA6EFT	*	101,752	214	184
JM1LAW	*	80,178	226	166
JA6QDU	*	27,440	102	98
JJ1NUI	*	9,348	66	57
JA1XPU	*	8,690	73	55
JA4JJI	*	460	23	20
JAØGZ	*	275	11	11
JH7QXJ	14	284,279	394	271
JE1ZGB	*	56,295	156	139
JE1LGY	*	3,132	61	54
JA7BEW	*	2,322	30	27
JA3CE	*	850	29	10
JL3SBE	*	585	18	15
JH4UYB	7	122,760	333	198
JA2ESR	*	13,700	51	50
JA7FFN	*	7,176	40	39
*JN1ZDF	A	658,031	615	367
*JF1SEK	A	512,240	569	337
*JH1UUT	A	292,680	423	270
*JK2VOC	*	276,080	461	280
*JJ1KZZ	*	213,306	359	219
*JA1GYO	*	183,184	302	214
*JR9NVB	*	160,680	290	195
*JF3IUC	*	137,808	308	176
*JR7WAB	*	125,123	302	211
*JL1MWI	*	124,405	265	179
*JQ2BBC	*	104,580	243	180
*7J1ABD	*	102,350	264	178
*JA8WY	*	97,497	220	157
*JQ1NBL	*	95,635	221	155
*JH3CUL	*	90,449	213	151
*JN1NOP	*	87,822	243	153
*JL4CMT	*	86,870	244	146
*7J1AQH	*	85,272	233	152
			(Op: VE7HA)	
*JI3MVQ	*	85,251	181	157
*JA4DHN	*	85,162	202	158
*JA9HDH	*	84,728	210	136
*JA1AB	*	84,026	114	82
*JFØSGW	*	80,748	132	122
*JA1BUI	*	73,600	178	160
*JJ6TWQ	*	73,408	189	148
*JR1MRG	*	71,788	222	131
*JA4XRN	*	65,274	151	129
*JE9EMA	*	62,609	170	137
*JE9LLO	*	53,703	166	117
*JG5OYU	*	53,675	157	113
*JR7LVK	*	53,317	161	131
*JA3JOT	*	44,157	157	123
*JA2GHP	*	41,747	161	109
*7J1AAL	*	28,700	122	100
*JA1QN	*	26,128	114	92
*JH1JGZ	*	21,165	104	85
*7L1FPU/Ø	*	18,880	124	80
*JG1TVK	*	16,415	82	67
*JA1STY	*	14,129	85	71
*JG1RDV	*	13,764	88	62
*JA3TBT	*	13,440	89	70
*JH2WHS	*	12,935	80	65
*JG1GBL	*	11,590	82	61
*JA3MXP	*	9,185	64	55
*JA6BWH	*	8,550	61	45
*JA4HIX	*	6,132	51	42
*JI1RCB	*	5,781	62	41
*JA4AQR	*	5,400	51	45
*JH1RMH	*	4,950	55	45
*7J1ABC	*	3,400	35	34
*JO6GIV	*	3,040	42	38
*JH9WSX	*	2,320	33	29
*JAØTEA/9	*	2,146	30	29
*JE6GIQ	*	832	18	16
*JO1MCC	*	429	13	13
*JI7WPV	*	378	16	14
*JG3WCZ	*	44	4	4
*JJ4GTY	*	21	4	3
*JA8RJE	28	33,277	139	107
*JH2ABL	28	30,943	165	97
*JH7BMZ	*	18,091	97	79
*JE2IFM/1	*	1,625	29	25
*7N1HFK	*	1,334	26	23
*JA9XAT	*	988	21	19
*JG1EHF	*	912	19	16
*JA1AAT	*	768	18	16
*JQ1AHZ	*	377	15	13
*JI2UNR	21	1,268,813	927	511
*JQ1NQT	21	465,716	555	346
*JHØEPI	*	388,120	464	310
*JH8DHV	*	60,200	163	140
*JE3UHV	*	28,764	116	102
*JH1YTU	*	25,203	107	93
*JA5EO	*	20,500	106	82
*JHØTIS	*	20,461	105	79
*JR2WLQ	*	6,272	54	49
*JF2PXB	*	3,738	54	42
*JAØCJK	*	2,784	33	32
*JM3RGT	*	2,709	53	21
*JM3QIS	*	2,128	30	28
*JE1KSO	*	1,430	25	22
*JA1KAH	*	1,296	26	24
*JA2XOA	*	1,180	29	20
*JA3FZI	*	675	21	15
*JM2BHI	*	630	18	18
*JG1GCO	*	275	13	11
*JL7PVR/1	*	207	9	9
*JI3BFC	14	153,340	273	220
*JR4GPA	14	80,562	236	174
*7K2GNK	*	44,652	144	122
*JH6SQI	*	40,560	131	120
*JHØHON	*	36,874	114	103
*JR7WFC	*	12,870	73	66
*JL2ICO	*	7,844	56	53
*JE2NWN	*	4,104	40	36
*JA1POS	*	2,145	38	33
*JA7AXP	*	1,134	22	21
*JR7OMD/27		26,864	78	73
*JA5PEE	*	7,252	38	37
*JM1CMA	*	5,952	33	32
*JM1NKT	*	5,256	40	36
*JK2HDC	*	506	11	11
*JE1SPY	3.7	2,352	27	24

EUROPE

CROATIA

9A5Y	21	2,273,622	1413	618
			(Op: 9A3LG)	
9A7A	14	3,312,720	2042	720
			(Op: 9A3TR)	
9A2ZT	*	19,008	112	96
9A3XV	7	1,527,246	1116	483
*9A3UF	A	399,360	472	390
*9A2WV	7	1,126,634	1006	431
*9A3SC	*	11,392	72	64

PORTUGAL

CT5P	A	6,073,740	3024	820
			(Op: CT1DIZ)	
CT1KT	A	1,184,859	1091	507
CT1UO	21	29,082	141	131
CR7A	14	48,720	218	168
			(Op: CT1ELP)	
CQ1A	3.7	424,650	478	285
			(Op: CT1EEB)	
*CR5A	A	611,992	907	454
			(Op: CT1AHU)	
*CQ6E	*	398,736	560	351
			(Op: CT1EAT)	
*CQ7P	28	51,850	163	122
			(Op: CT1ERK)	
*CT1QF	21	123,388	265	218
*CR8BWW	14	834,418	1125	479
			(Op: CT1BWW)	
*CS1D	*	240,846	741	293
			(Op: CT1END)	

GERMANY

DL8PC	A	3,512,089	1766	763
DL6ET	A	2,962,960	1693	728
DK2XX	A	2,529,949	1542	677
DF6QV	*	2,459,475	1549	643
DL1MFL	*	1,638,585	1240	585
DL8UCC	*	949,311	805	473
DF1IAZ	*	852,840	868	460
DAØBAY	*	804,895	868	455
DF2RG	*	502,040	603	385
DL4YBP	*	393,056	513	346
DL7UTA	*	267,376	400	272
DL2ECZ	*	166,296	300	246
DF3IS	*	147,323	292	227
DK4IO	*	106,575	260	203
DK7ZT	*	105,300	240	195
DL7ZR	*	90,681	235	181
DL9ZEA	*	73,383	216	183
DL6HBQ	*	53,156	170	137
DK7FP	*	49,780	161	131
DL6DVU	*	48,720	193	145
DK5KJ	*	41,752	175	136
DL6KVB/p	*	38,456	198	88
DL5JBN	*	22,339	100	89
DK3AX	*	15,200	84	76
DL8UED	*	11,224	68	61
DL4AMA	*	4,368	58	52
DK3ML	*	3,627	63	31
DL2ARD/P	28	111,066	325	214
DK3KD	*	10,136	71	56
DF5VK	21	100,280	236	184
DL2BWH	*	21,750	100	87
DL9NCR	14	233,935	415	295
DL3WB	*	7,056	70	63
DK5WL	7	1,248,480	960	459
DF1JC	*	262,600	409	260
DL9XW	*	1,980	33	30
DL3LAB	3.7	455,920	674	328
DL8OH	*	415,736	584	314
DL9FCY	*	91,224	217	181
*DL1JBQ	A	573,076	691	388
*DL8SDC	A	248,469	390	277
*DL5IO	*	226,576	405	272
*DL1JPL	*	211,428	366	252
*DJ1OJ	*	153,624	304	222
*DL2RMS	*	139,378	347	227
*DL2JAA	*	109,888	279	202
*DK7ZH	*	109,800	230	183
*DL3NBL	*	83,284	213	169
*DL8UVG	*	49,152	184	128
*DL2YAK	*	34,688	159	128
*DL2GBB	*	26,304	120	96
*DL6UEG	*	22,932	100	78
*DL1HSR	*	19,040	111	85
*DL1NOF	*	10,716	86	76
*DL2FAG	*	8,763	75	69
*DL3YDY	*	6,834	81	67
*DL1SUA	*	2,850	41	38
*DL3HRA	28	6,174	53	42
*DL1AKL	*	36	4	4
*DJ9ZB	21	104,952	203	172
*DL3AG	*	27,160	103	97
*DJ6TK	*	5,236	44	44
*DL7UBA	14	178,318	339	271
*DL5SVB	*	6,438	72	58
*DL9ZWG	*	5,320	76	56
*DJØBX	7	5,202	58	51
*DJ2YE	*	2,408	30	28
*DL6SWR	3.7	16,720	100	88
*DHØLQU/P	*	5,724	58	53

SPAIN

EA7DHP	A	1,623,010	1322	545
EA3GFW	A	1,055,650	974	491
EA5CAQ	*	807,300	691	390
EA5OL	*	571,506	687	416
EA3AEL	*	149,450	406	245
EA3CZM	*	63,336	215	168
EA5WW	*	50,320	208	148
EA1FGJ	*	33,087	139	123
EA2CMF	*	25,555	102	95
EA2CR	*	21,080	98	85
EA5GRM	*	6,000	50	48
EA7AYY	28	9,128	60	56
EA4DJF	*	2,352	31	28
EA5BY	21	2,005,760	1383	640
EA2IA	21	1,773,409	1185	613
EA1FDO	*	100,450	263	205
EA3AAY	14	382,284	685	369
EF3CR	3.7	281,562	510	281
			(Op: EC3ACR)	
EA3ELM	*	158,330	319	223
EA3ELC	*	36,750	145	125
*EA3BKI	A	1,651,650	1314	550
*EA3GHQ	A	1,141,248	1055	512
*EA1UX	A	994,136	1024	484
*EA3ELZ	*	713,576	712	408
*EA3AFR	*	494,072	623	409
*EA1CAI	*	301,834	505	338
*EA1IF	*	257,224	459	296
*EA1EMZ	*	242,760	402	280
*EA3CT	*	218,407	402	287
*EA3AET	*	201,824	424	272
*EA1FFC	*	100,014	266	211
*EC3ACG	*	76,500	273	170
*EA5GRC	*	75,651	213	167
*EA1EYG	*	74,106	217	179
*EA1US	*	51,984	176	144
*EA1EJE	*	48,972	217	159
*EA3EAN	*	38,192	157	124
*EA3NA	*	26,652	133	116
*EA1EXB	*	23,241	163	127
*EA5YJ	*	20,352	114	96
*EC5AAK	*	18,643	117	103
*EA1FFO	*	13,188	100	84
*EC3DEJ	*	5,940	67	55
*EC2BAW	*	5,763	55	51
*EA3FFE	*	3,420	42	38
*EA2ARD	*	3,330	49	45
*EA1AAA	*	3,320	41	40
*EA5EKI	*	1,457	32	31
*EA3GHZ	28	17,496	91	72
*EA7BYM	*	11,092	71	59
*EF3CIL	21	1,609,812	1244	582
*EA7HF	*	724,306	732	451
*EA5GRP	*	103,284	308	228
*EC3ACW	*	36,288	158	126
*EC3CTQ	*	31,878	201	126
*EA3AFD	*	17,952	94	88
*EC3CMT	*	3,276	46	39
*EA5GRL	14	143,072	376	263
*EA5TS	*	140,112	372	252
*EA1NK	*	121,030	353	247
*EA1FEQ	*	38,745	149	135
*EA3GJH	7	178,200	301	220
*ED2BFM	3.7	203,775	357	247
*EC3ABU	*	3,690	43	41

BALEARIC IS.

*EA6WL	A	49,285	75	64
*EA6JN	*	14,141	85	79

ESTONIA

ES5RIM	A	9,504	77	66
*ES6PZ	A	480,144	719	336
*ES6RHT	*	2,490	30	30

FRANCE

F6FGZ	A	4,487,175	1999	735
F6AOJ	A	2,084,701	1348	577
F6HNX	*	497,240	608	310
F5RPL	*	21,266	121	98
F8IN	*	7,000	100	70
F5PFX/P	*	2,337	44	34
TM2V	21	3,504,460	2074	685
			(Op: F6GLH)	
TMØK	21	2,094,157	1442	533
			(Op: F5MYH)	
TM3UN	14	1,792,992	1398	608
			(Op: F5PGP)	
F6CYV	*	136,776	296	246
F6FUN	*	22,533	123	111
F2EE	7	3,364,050	1740	615
F5NBX	3.7	505,180	603	335
F6AML	1.8	122,748	327	193
*TM2P	A	546,624	610	416
			(Op: F5TCN)	
*F5PRH	A	477,603	621	361
*F8WE	A	476,814	712	369
*F2RO	*	261,976	409	286
*FE6FNA	*	171,444	305	273
*F5NYK	*	72,275	229	195
*F5SHQ	*	19,976	106	88
*F5JBF	*	9,350	111	55
*F6BVB	21	152,382	286	233
*F5JDG	7	19,608	129	86

ENGLAND

G5LP	A	290,656	466	293

Ameritron *no tune* Solid State FET Amplifier

No tuning, no fuss, no worries -- just turn on and operate . . . Incredibly low $1299 includes AC power supply, 600 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no warm up, no tubes to baby, fully SWR protected, extremely quiet, very compact

- **Ameritron's** *revolutionary* ALS-600 is amateur radio's *only* linear amplifier that uses four rugged TMOS RF power FETs -- gives unequaled *no tune* solid state performance
- **$1299 includes** Ameritron's *no tune* FET Amplifier *and* a 120/220 VAC, 50/60 Hz AC power supply for home operation

ALS-600
$1299
Suggested Retail
(*Includes* AC Power Supply)

- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate
- **Output Power** -- 600 Watts PEP, 500 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **SWR Protection** -- prevents amplifier damage if you switch to wrong band, use wrong antenna or have high SWR
- **Over Power Protection** -- if output forward power or reflected power exceeds safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to exciter
- **Extremely quiet** -- low speed, low volume fan is so quiet you'll hardly know it's there, unlike noisy blowers used in other amps
- **Very Compact** -- 6 x 9½x12 inch amplifier takes up less desktop space than your transceiver and weighs about the same -- only 12½ pounds
- **Illuminated Cross-Needle SWR/Wattmeter** -- lets you read SWR, forward and reflected *peak* power simultaneously
- **Operate/Standby Switch** -- lets you run "barefoot", but you can instantly switch to full power if you need it
- **Front Panel ALC Control** -- *exclusive* Ameritron feature -- convenient front panel control lets you adjust your output power
- **Transmit, ALC, SWR LED indicators** -- keeps you informed
- **12 VDC output jack** -- lets you power low current accessories
- **Separate** ALS-600PS power supply (included) can be placed conveniently out of the way and plugged into your nearest 120 VAC outlet -- no special wiring needed
- **Made in USA**
- **Enjoy** 600 Watts of *no tune* solid state power. Call your favorite dealer for your best price and order your ALS-600 with power supply today

ALS-600PS Heavy Duty Power Supply

ALS-600PS power supply included with ALS-600 amplifier

- **Massive choke input filter** greatly improves voltage regulation and reduces peak AC line current
- **Ameritron's** exclusive *Multi-Voltage Power Transformer* lets you compensate for stressful high line voltage and performance robbing low line voltage
- ***Step-Start Inrush Protection***™ stops damaging inrush currents and extends life of power supply components
- **Illuminated** Cross-Needle Meter monitors voltage and current of 50 VDC line
- **Extremely** quiet fan
- **Very compact** 6 x 9 ½x12 inches -- can be placed conveniently out-of-way
- **Wired for 120 VAC,** supplies 50 VDC at 25 amps to ALS-600 amplifier
- **Also** use on 100-130 VAC and 220-250 VAC, 50/60 Hz
- **Draws** less than 12 amps at 100 VAC and less than 6 amps at 230 VAC
- **Includes prewired cable** to plug into ALS-600 amplifier
- **Made in USA**

Ameritron Mobile *no tune* Solid State Amplifier

Ideal mobile amplifier -- ***uses 13.8 VDC mobile electrical system, very compact 3½x9x15 inches, extremely quiet, 500 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, SWR protected***

ALS-500M
$799
Suggested Retail

- **Mobile *no tune* Solid State Amplifer** -- uses four rugged 2SC2879 high power linear RF power transistors
- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate -- makes mobile QSOs safer
- **Very Compact** -- just 3½x9x15 inches -- fits in nearly any mobile installation; weighs only 7 pounds, that's less than some mobile HF transceivers
- **Extremely quiet** --quiet low speed, low volume fan stays off and silent until temperature rises
- **Output Power** -- 500 Watts PEP, 400 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **Load Fault Protection** -- disables and bypasses amplifier if antenna has excessively high reflected power or if bandswitch is set lower than exciter frequency -- virtually eliminates damage because of operating error; has Load Fault LED indicator
- **Thermal Overload Protection** -- disables and bypasses amplifier if temperature is excessively high; automatically resets when temperature drops to safe level; has Thermal Overload LED indicator
- **Excellent harmonic suppression** -- multiple section output network and push-pull output circuit gives excellent harmonic suppression
- **DC current meter** lets you monitor collector current
- **ON/OFF Switch**-- bypasses amplifier for "barefoot" operation without having to disconnect high current power supply cables
- **Remote ON/OFF Control** -- lets you remotely control ON/OFF function for out-of-the-way mounting of amplifier
- **Exciter Drive** -- less than 100 watts input gives full output
- **Power Supply Requirements** -- requires 13.8 VDC at 80 amperes peak current for PA transistors and separate line for 12-15 VDC at 4 amperes for control and bias circuits
- **Made in USA**
- **Call you favorite dealer** for your best price and order your ALS-500M today

Exact power output of amplifiers may vary on each band.

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CIRCLE 142 ON READER SERVICE CARD

G3NLY	14	3,021,825	1954	645
*GØRTI	A	27,285	103	85

NORTHERN IRELAND

*GIØRDJ	A	48,081	202	141

SCOTLAND

GM3BCL	A	520,490	624	365
*GMØGNT	A	9,546	87	74
*GM3CFS	14	78,800	263	200

WALES

GW8GT	3.7	1,473,868	1282	451
			(Op: G4IFB)	

HUNGARY

HA8ZO	28	24,904	117	88
*HG8QB	28	8,619	69	51

ITALY

IQ4A	A	7,634,900	2993	839
			(Op: IK2NCJ)	
IR8A	A	6,364,644	2901	858
			(Op: I8QLS)	
II7M	A	5,176,004	2465	853
			(Op: IK2SGC)	
IR1A	"	3,218,453	1775	749
			(Op: IK1GPG)	
II1L	"	1,641,328	1319	607
			(Op: IK1LBL)	
I6NOA	"	454,223	560	347
IK8CHL	"	445,260	622	362
IN3XUG	"	207,480	376	285
IK8ROB	"	185,702	347	253
IK5QGO	"	175,890	293	246
I1QBI	"	108,870	262	191
IK2REA	"	47,750	189	142
IK5WGK	"	38,499	150	123
IKØTRT	"	29,520	146	120
IK7WUJ	"	20,425	103	95
IK4GNH	28	34,662	138	109
IO4LEC	21	2,908,464	1711	624
IU6F	21	2,098,995	1318	615
			(Op: IK6BOB)	
I8ØC	"	1,293,336	984	506
I8DLO	"	95,550	229	182
IR3O	14	3,002,180	1763	740
			(Op: IK3ORD)	
IN3QBR	14	2,001,406	1390	638
IV3YYK	7	1,191,632	794	442
IN3ZNR	3.7	502,920	674	330
IK2QEI	"	424,146	666	317
IO3MAU	1.8	247,904	486	254
*IQ8X	A	713,388	841	442
			(Op: IK8UND)	
*IO7G	A	226,050	394	275
			(Op: IK7NXU)	
*KR4CQ/I8	"	225,216	433	288
*IL3Z	"	154,305	349	243
*IK2RPE	"	100,425	253	195
*IK5RLR	"	97,865	270	185
*IK1TWC	"	69,083	192	153
*II2T	"	53,132	218	148
			(Op: IK2IQR)	
*IK7RVY	"	44,900	205	164
*IK2UCK	"	34,008	125	104
*I3BLF	"	4,514	39	37
*IØIKV	28	14,606	84	67
*IB4M	21	3,269,420	1687	772
				(Op:
I4ABF)				
*IK6CAC	14	137,611	427	241
*I4PZP	"	65,044	217	161
*IK8WEL	"	46,866	201	146
*I4CSP	"	28,188	124	116
*IK8IFW	"	4,346	64	53
*IØØKHP	1.8	13,588	96	79

SARDINIA

*ISØLLJ	A	75,651	225	167
*ISØGSR	"	13,764	78	74
*ISØNHT	21	602,910	670	385

SICILY IS.

IT9PZM	A	3,264,462	2090	729
IU9S	14	5,677,177	3370	869
			(Op: IT9BLB)	

NORWAY

LA2JR	A	85,377	152	149
LA5TFA	A	32,292	171	156
LA9GY	"	27,072	97	94
LA2DDA	"	20,300	110	100
LA1PHA	14	38,383	157	131
LA9DFA	"	35,328	175	138
LA2SAN	7	1,150	50	23
*LA1BJA	A	175,230	422	297
*LA4EU	A	120,834	204	147
*LA2EIA	"	112,500	300	225
*LA2GCA	"	85,613	247	181
*LA2AD	"	58,384	245	164
*LA3WEA	"	11,730	103	85
*LA8WG	21	7,458	78	66
*LA5FBA	1.8	2,808	39	36

LUXEMBOURG

LX1KC	21	1,117,947	935	447

LITHUANIA

LY3BA	A	799,220	853	445
LY2DX	A	551,670	759	370
LY3BH	"	222,345	366	243
LY2TZ	"	113,016	303	204
LY2BG	"	18,919	131	98
LY2IJ	14	991,851	1038	511
LY1DD	"	530,688	700	384
LY2BN	"	303,550	516	325
LY6K	3.7	968,014	1059	401
				(Op:
LY3BS)				
LY1DR	"	507,822	717	339
*LY2PBM	A	98,894	284	197
*LY2PAQ	"	39,360	162	123
*LY3KB	"	30,120	150	120
*LY3BY	"	1,786	43	38
*LY1NDN	"	680	23	20
*LY2OU	14	83,720	252	182
*LY2EW	"	26,329	154	113
*LY2CX	7	6,536	57	43
*LY2TX	3.7	27,648	303	108

BULGARIA

LZ1BJ	A	268,710	472	318
LZ5G	14	2,161,576	1984	628
			(Op: LZ1NK)	
LZ2FQ	7	24,080	112	86
LZ6R	3.7	619,512	610	311
*LZ3YY	A	648,048	1004	368
*LZ2GS	28	12,312	83	57

AUSTRIA

OE5SPW	A	242,825	400	275
OE8KDK	"	20,010	106	87
*OE1KYW	A	822,110	838	458
*OE18KA	"	5,760	48	48

FINLAND

OH1AF	A	2,590,504	1805	668
			(Op: OH6NOA)	
OH2BC	A	2,541,980	1721	670
			(Op: OH6EI)	
OH1BV	"	352,370	614	334
OH1NSJ	"	309,858	368	258
OH3NM	"	73,848	250	181
OH5NBJ	"	71,214	219	166
OH6TV	"	67,124	199	173
OH6NIO	21	1,225,686	965	539
OH8LQ	14	2,762,946	2117	711
OH6RM	14	2,301,027	1818	683
OH6KIT	"	1,768,898	1641	647
OI3AI/1	"	1,655,500	1462	602
OH3OJ	7	292,824	444	252
OH1MLB	1.8	120,900	321	186
*OH3MMH	A	155,718	351	246
*OH7NW	"	76,744	269	181
*OH2KWC	"	51,678	222	162
*OH2RL	"	50	6	5
*OH3HM	21	247	13	13
*OH2MPO	14	3,825	58	51
*OH3LZU	3.7	126,420	315	210

ALAND IS.

OHØNJ	A	46,992	151	132
OHØBHU	14	8	2	2
OH1EH/OHØ	7	2,865,000	1446	573

CZECH REPUBLIC

OK1AOU	A	65,532	230	172
OK2TBC	14	358,207	550	323
OK1AEZ	1.8	7,168	58	56
*OK1EP	A	421,385	468	355
*OK1BLC	A	268,785	475	297
*OK1DXW	"	42,291	153	127
*OK2SWD	"	32,132	140	116
*OK2EC	"	22,090	111	94
*OK1MP	28	10,494	159	66
*OK1FHI	21	26,505	112	95
*OK2VVN	14	53,724	204	148
*OK1AXV	7	111,748	237	182
*OK1JJB	3.7	127,434	280	201

SLOVAKIA

OM5A	A	4,373,862	2143	822
			(Op: OM3LA)	
OM8A	A	4,216,245	2149	759
OMØW	"	818,064	934	414
OM3A	21	1,729,323	1257	513
			(Op: OM3WDX)	
OM7M	3.7	1,017,288	1020	398
			(Op: OM3TZW)	
OM5R	"	398,684	657	286
OM3CQD	1.8	133,172	336	197
*OM3YK	A	202,055	398	251
*OM3TLI	"	176,834	384	238
*OM3CPY	28	240	10	8
*OM3TWR	14	86,699	301	181
*OM3CAB	7	31,900	139	110
*OM7V	3.7	154,242	362	209

BELGIUM

ON9CJM	A	147,648	203	163
				(Op:
WQ2M)				
*ON5GQ	A	1,595,054	1177	601
*ON4XG	A	163,799	315	233
*ON9CCQ	"	135,374	316	226
*ON8BK	"	115,200	261	200
*ON7SS	"	43,901	170	143
*ON4CU	"	12,345	76	75

DENMARK

OZ5EV	A	405,072	484	388
OZ5BO	"	67,802	221	167
OZ5MU	"	45,990	153	126
OZ1INN	21	193,534	340	209
OZ1KRF	14	757,754	803	446
OZ5KF	"	589,871	658	401
*OZ2ZZZ	A	229,512	388	262
*OZ9SIG	"	85,113	247	193
*OZ1ACB	"	79,119	239	177
*OZ8T	"	58,500	175	156
*OZ1FMO	14	5,124	70	61
*OZ3SK	1.8	92,400	272	175

THE NETHERLANDS

PAØIJM	14	500,905	713	355
PAØYN	"	1,134	28	27
*PAØKHS	A	405,426	575	343
*PAØKDM	"	80,976	213	168
*ZS6IR/PA	"	69,576	178	156
*PAØMIR	"	66,030	201	155
*PAØDOM	21	22,841	97	91
*PA3ELD	14	172,920	371	262
*PA3FNE	"	128,148	325	236
*PA3GAB	"	56,320	211	160
*PA2ALF	"	23,920	142	115
*PA2REH	7	1,250	25	25
*PA2SWL	3.7	126,720	312	198

SLOVENIA

S59A	A	6,635,920	2509	872
			(Op: S59UN)	
S53ZO	21	2,589,372	1546	612
S59L	21	2,413,616	1488	601
S5ØM	"	740,154	734	439
S5ØA	14	4,865,545	2523	835
S53M	14	3,224,312	1956	721
			(Op: S52ZW)	
S5ØE	7	2,251,104	1366	537
			(Op: S59AB)	
S59KW	3.7	815,626	837	391
S51NA	3.7	726,604	898	373
S54DL	"	638,664	754	356
S58DX	"	606,624	773	356
S57BZD	"	311,910	549	281
*S5ØR	A	1,294,512	1087	543
*S59ZZ	28	39,536	148	112
*S57U	14	289,068	530	327
*S51QZ	7	205,320	367	236
*S5ØC	3.7	514,080	693	336
			(Op: S57MYC)	

SWEDEN

SM3JLA	A	2,404,430	1841	686
SM7DXQ	"	210,112	360	268
SM3CER	"	99,876	257	20
SM5AAY	"	17,460	110	97
SMØKV	21	540	16	15
SMØARR	"	496	17	16
SMØLPO	14	532,518	720	409
SM2JDU	"	25,857	130	117
*SMØBDS	A	80,910	240	186
*SM7HSP	"	59,290	208	154
*SMØFM	"	37,536	143	136
*SM6NJK	"	18,200	125	100
*SM3CVM	"	18,142	107	94
*SM5PPS	21	1,450	27	25
*SM6AHU	14	28,677	161	121
*SM5BUS	"	1,725	25	23

POLAND

SP8NR	A	691,748	724	412
SP9HZF	A	125,292	283	212
SP2JMR	"	78,624	249	126
SP4AVG	"	53,774	180	161
SP6JZB	"	30,765	120	105
SP6YAQ	14	710,101	746	427
SP4CUF	"	39,864	156	132
SP6CDK	7	604,736	679	352
SP5IVC	"	110,960	262	190
SP7GIQ	3.7	650,760	827	348
*SP7SEW	A	398,419	600	329
*SP7FQI	A	150,936	318	228
*SP7ELQ	"	100,206	233	171
*SP8UFB	"	96,906	237	186
*SP9UOG	"	57,330	183	147
*SP9LDP	"	43,684	143	134
*SP6SOX	"	30,104	110	106
*SP9ROH/P	"	29,792	114	98
*SP2AHD	"	28,608	104	96
*SP8OON	"	8,880	100	48
*SP6EQZ	"	5,610	56	51
*SP7LHX	"	4,266	74	27
*SP9DGO/A	"	2,716	35	28
*SP7HKK	28	330	11	10
*SP9RVD	21	59,631	169	139
*SP5BB	"	24,206	120	91
*SP6GTN	"	14,184	77	72
*SP1EOI	14	131,488	307	224
*SP4SHD	"	60,192	300	114
*SP2GNB	"	57,339	207	159
*SP8HXN	"	46,953	203	141
*SP5MXA	"	31,702	158	121
*SP6DHH	"	20,064	135	96
*SP2WDW	"	4,366	40	37
*SP7KDJ	"	1,311	25	23
*SP9CAY	7	67,326	170	147
*SP9KRT	3.7	17,952	97	88
*SP9HNB	1.8	16,856	103	86
*SP8GMU	"	3,438	64	29

GREECE

SV3AQR	A	316,122	515	282
SVØAN	"	240,462	300	219
*SV2BFN	A	659,707	693	421
*SV1IG	21	256,389	423	203

DODECANESE

*SV5/DL1DAS/P	A	204,100	686	260

BOSNIA

T93M	14	2,219,984	1878	676
T97A	"	2,279	48	43
T97M	3.7	453,776	652	316
T94MV	"	68,544	218	153
T97T	1.8	106,652	283	182
*T91ELD	A	289,664	465	292
*T91DNO	14	69,078	259	174
*T91EKK	7	36,612	146	113
			(Op: Sajo)	
*T91ENS	3.7	382,432	612	296
*T92X	"	74,456	208	164

EUROPEAN RUSSIA

RU3VN	A	1,710,420	1458	580
UA6NZ	"	102,176	277	206
U1BA	"	79,947	301	189
UA6MZ	21	356,704	608	341
RW4WR	14	1,922,984	1493	644
RU4AA	"	555,539	874	433
RK1NF	"	258,736	623	314
RW3DU	7	270,144	249	201
RA3VV	3.7	34,220	151	118
*RA3AUU	A	1,103,960	1100	520
*RA3DUT	"	171,572	403	236
*RA3THN	"	115,500	300	210
*UA4LCQ	21	901,842	983	438
*UA3PP	14	75,361	251	103
*RA3WA	3.7	172,608	351	232
*UA6YHG	"	95,400	261	180
*UA6LKA	"	39,032	156	119
*RV1CC	1.8	49,742	181	133

UKRAINE

EMØF	A	4,032,768	2449	768
			(Op: UXØFF)	
US5WE	A	3,542,000	1982	700
UX2HO	A	1,931,480	1723	545
UXØMM	"	1,431,556	1179	602
UUØJ	"	863,478	1312	441
UX7FN	"	766,000	1020	400
UY5TE	"	284,934	557	281
UR5TA	"	25,875	132	125
EN6Q	21	1,411,182	1182	558
			(Op: UT7QF)	
UTØH	21	899,480	920	452
			(Op: UT1HZM)	
UR4TLX	"	414,211	551	329
UT7LA	"	202,860	364	245
UT7IG	"	40,176	127	124
UU2JA	"	11,284	80	62
UT4UZ	14	1,180,388	1131	556
UT5UGR	14	1,078,704	1238	528
US9LJ	"	22,754	220	62
US9Q	"	4,004	54	44
			(Op: US9QA)	
UT7ND	7	113,344	246	184
UR7TZ	3.7	276,962	532	271
USØHZ	"	237,660	472	255
UX1VT	"	151,404	339	222
UT1WZ	"	143,736	338	212
UY5BA	1.8	75,680	234	172
*UR5QMA	A	1,358,721	1292	553
*UY2ZA	A	550,462	765	382
*UX8ZN	"	504,630	694	378
*UT8IM	"	254,009	507	277
*UT3LL	"	23,325	218	153
*UT1IF	"	21,120	96	88
*UT4PZ	"	13,632	73	64
*UT1WW	"	9,860	158	145
*UB5EVD	"	6,468	66	60
*UR5LBX	21	73,548	202	162
*UXØHA	"	29,403	135	99
*UR5ZMI	"	25,308	157	76
*UT1ZZ	"	1,050	26	21
*US4LAD	14	963,900	1100	420
*UT3IQ	"	209,088	524	297
*UT5XF	"	74,102	257	158
*UX2VZ	7	371,700	497	295
*US5QRW	"	240,908	387	229
*UT4EK	"	128,554	257	196
*UT7DX	3.7	515,200	831	322
*UR5DXX	"	275,070	517	265
*UR5ZHQ	"	104,528	260	188

BYELORUSSIA

EU1EU	A	265,540	511	284
EW6TU	3.7	125,960	323	194

MOLDAVIA

ER3DX	21	32,448	142	96
ER1CW	14	154,575	527	229
ER1AA	"	123,228	254	163

LATVIA

YL1WW	A	1,370,718	1199	542
			(Op: YL3CW)	
YL2SW	"	95,232	288	192
YL2KO	21	235,382	429	238
YL2PJ	"	33,787	150	113
YL2IP	3.7	84,480	215	176
*YL3GHD	1.8	5,200	52	50

ROMANIA

YO4NF	14	1,682,737	1841	571
YO6KNW	7	124,410	292	195
YO7LCX	3.7	97,128	216	152
*YO7LFV	A	624,481	808	397
*YO3FF/P	"	344,160	365	239
*YO4DIJ	"	126,012	335	194
*YO3FLQ	14	6,630	85	26
*YO3JF	7	123,840	231	180
*YO5OFJ	"	9,324	92	84
*YO5OFH	"	6,716	83	73
*YO8RTR	3.7	88,426	241	179
*YO3NL	"	25,452	123	101

YUGOSLAVIA

4N7ØAV	A	4,972,275	2528	825
			(Op: YU7AV)	
YU7BW	A	2,903,124	1698	714
YU7YZ	"	9,699	72	61
YU7SF	28	7,224	61	43
YT9C	21	2,042,180	1363	580
			(Op: YU1IG)	
YT1R	21	1,579,572	1018	522
			(Op: YU1ZZ)	
YT7A	14	2,122,372	1616	662
			(Op: 4N7DW)	
YU1NR	"	838,380	1048	471
YU1ADO	"	99,072	264	192
YU7KM	"	51,925	230	153
4N1A	3.7	724,172	770	394
			(Op: 4N1DXX)	
YTØT	3.7	722,190	768	399
			(Op: YU1UA)	
YU7ØF	"	473,426	702	369
			(Op: YU1EA)	
YZ1MB	"	229,376	420	256
YU1JW	1.8	63,220	206	145
*YU1RA	A	1,566	27	27
*YU1GR	28	588	15	14
*YU7ØHA	3.7	194,530	364	245

MACEDONIA

Z32KV	A	72,583	470	162

ALBANIA

*ZA1AJ	3.7	81,344	244	164
			(Op: OK2PSZ)	

OCEANIA

EAST MALAYSIA

*9M6LS	A	1,155,452	1303	302

MARIANA IS.

*AHØT	A	2,017,505	2005	295

THE PHILIPPINES

DU1SAN	14	221,450	357	215
*DU3CWS	21	1,405,697	1360	347
*DU1JUI	"	333,700	500	235

HAWAII

WH6/WR6RA		9,776,288	3689	736
KH6FKG	14	1,536,712	1099	488
N6VI/KH6	3.7	1,016,652	639	273
*KH6GMP	21	896,782	860	359

PAPUA NEW GUINEA

P29DK	A	215,897	338	209
*P29NB	A	229,770	359	230

MARSHALL IS.

V73C	A	1,035,980	835	374

AUSTRALIA

VK5GN	A	3,762,844	1921	668
VK3TZ	A	3,516,816	1705	656
VK6HQ	A	72,044	311	217
VK4LW	28	194,427	305	171
VK4AAR	14	437,976	499	308
VK3EW	7	2,022,804	843	414
*VK4ICU	21	214,848	382	192
*VK8BE	21	4,320	40	36
*VK1LC	14	16,416	76	72
*VK3SM	14	1,825	25	25

NORFOLK IS.

VK9NS	A	2,971,080	1696	567

INDONESIA

YB6INU	A	1,529,880	1161	418
YBØASI	A	1,322,552	1037	418
			(Op: AA4U)	
YC1DYY	28	900	23	15
YCØARO	21	1,740,480	1212	490
YB5AQG	21	1,382,055	1027	463
*YC1FCC	A	127,328	237	184
*YC8FEJ	"	48,706	170	98
*YC3SPS	21	671,160	653	357

NEW ZEALAND

ZL2AMI	A	1,599,870	1109	510
ZL4NF	A	1,217,160	898	460

SOUTH AMERICA

TRINIDAD

*9Y4/W2IHPA		6,075	81	75

CHILE

3G4B	28	1,100,682	1014	374
*CE2EZE	A	1,265,103	885	467
*XR2NJ	14	52,954	134	133

URUGUAY

CX4SS	A	1,176	27	21
CX3C	28	3,230	66	49
			(Op: CX9BT)	
*CX7BF	28	4,361,280	2396	616
*CX8AT	28	1,432,219	1102	443

ECUADOR

HC1OT	A	7,208,266	3073	767
*HC4L	A	46,781	451	287

COLOMBIA

HK3JJH	A	5,014,568	2456	676
HK6ISX	1.8	7,383	36	23
HK6AUG	"	4,540	25	20

ARGENTINA

L6ETB	28	5,578,020	2729	699
			(Op: LU6ETB)	
LU4D	28	3,657,376	2099	592
LU7HLF	"	1,864,680	1293	492
LU4MEE	"	1,548,768	1300	408
LU3HL	"	1,339,880	1111	410
LU4OJS	"	556,200	613	309
LU2ODQ	"	20,418	89	83
LU7FPI	14	1,089,362	789	478
LR1I	7	2,632,104	873	556
			(Op: LU1IV)	
*LT1N	A	4,112,703	2080	673
			(Op: LU2NI)	
*LU7FEU	A	1,995,520	1064	640
*LU5ER	"	1,807,344	1196	528
*LU6AMD	"	651,948	625	363
*LU8HSO	28	1,579,578	1180	462
*LW2DBM	28	1,554,266	1142	469
*LU3OJZ	"	301,323	408	253
*LU8DY	"	279,258	441	218
*LU5EVK	14	12,864	75	67
*HA5AND/LU	"	7,500	50	50

PERU

OC4EI	A	3,185,360	1805	580

ARUBA

P4ØV	A	17,201,184	5592	924
			(Op: AI6V)	

BRAZIL

PQØMM	A	9,734,663	3661	857
			(Op: PP5JR)	
PR2R	A	1,801,040	1311	470
			(Op: PY2KP)	
PY1LI	"	394,254	378	378
PP5JD	28	4,204,158	2190	651
PY3BD	21	172,676	304	196
PW8EM	"	55,282	158	131
ZY2E	7	48,412	96	91
*ZY2APQ	A	302,080	431	256
*PY2LET	21	339,700	455	316
*PY2OZF	"	73,287	176	153
*ZX2A	"	35,840	120	112
			(Op: PT2BW)	
*PY1RSA	"	15,184	78	73
*PY8MD	14	917,990	798	410
*PU2MTS	3.7	3,330	39	37

VENEZUELA

4M6L	28	461,852	674	236
YV4VN	21	119,890	230	190
YV5NPQ	14	245,640	363	230
YV5MRR	7	2,727,450	947	495
YV4AZF	3.7	173,628	193	156
YV1DRK	1.8	19,392	68	48
*YV4DSB	A	3,462,696	2005	552
*YV4FZM	"	7,182	41	38
*4M4T	14	2,079	35	33
			(Op: YV4EYA)	

PARAGUAY

ZPØY	21	10,939,487	3887	953
			(Op: ZP5JCY)	

SINGLE OPERATOR ASSISTED

UNITED STATES

K1YR	A	3,028,524	1841	703
WAØPUJ	A	2,601,300	1657	754
KY2T	A	2,504,904	1539	708
K2WK	"	2,046,698	1240	578
KF2ET	"	1,348,040	956	536
KA5W	A	893,487	760	471
KN6M/5	"	867,220	1066	524
W2HG	"	377,010	477	354
WJ2W	"	325,755	428	285
WA3WJD	A	294,972	431	282
AA5NT	"	268,472	449	296
K8CV	A	258,930	373	274
KE3GA	"	251,968	345	254
N3RD	"	171,665	327	247
WA6SDM	A	161,216	300	229
W6OAT	"	152,544	302	227
WO1P	"	132,480	205	160
KF8GE	"	124,047	249	179
N1NQD	"	108,900	250	220
N1KWJ	"	82,764	212	171
AAØA	"	72,933	200	161
K5EC	"	40,326	172	141
W1BK	"	35,420	116	92
W6TKV	"	28,776	128	109
K8CX	"	3,060	35	34
N4SLR	A	1,782	27	27

DX

DL3DKV	A	1,820,406	1310	623
S56A	A	1,289,874	1006	537
ON6AA	A	1,188,368	1010	514
OE8XXK	A	1,107,848	1001	511
JH4NMT	A	1,040,298	834	434
YT1AD	A	594,048	766	364
VA3VET	A	503,355	506	345
IKØNGI	A	347,904	366	256
DF1IC	"	236,520	333	270
DL5IC	A	186,979	306	247
GW4BLE	A	151,425	285	225
DJ3WE	"	72,275	211	175
IK3SCB	"	49,560	138	118
JH8KYU/1	"	29,516	120	94
I2CMA	"	22,496	93	74
JA7SUR	"	17,787	101	77
JQ1VNM	"	15,610	87	70
PBØAND	A	4,797	50	39
VE2JDR	14	76,950	182	171
IK2VJF	14	10,780	70	70

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

NX1H	6,744,654	2917	882
K5XI	6,681,816	3056	927
AA6TT	6,076,625	2868	865
N1AU	5,135,832	2501	767
W6EEN	4,355,140	2246	710
KM5X	4,274,125	2261	775
WX1Z	3,694,372	2139	748
NCØP	3,586,949	2120	821
KN6SO	3,334,020	1993	724
NJ1V	2,877,492	2055	732
NW5H	2,545,598	2216	737
K2SIG	2,448,368	1556	632
KF9PL	2,163,480	1603	660
KG8BZ	1,687,376	1436	647
WA1PMA	1,145,313	948	507
WE9R	1,123,536	956	526
KJ5IP	779,500	1241	500
KQ4HC	618,624	617	358
NN5O	610,615	1177	485
WN1V	529,995	609	397
N1HRA	502,500	704	402
WD6DJY	492,264	612	387
KO4EA	490,295	615	397
WY3T	450,288	586	354
NØKFE	348,688	460	304
WA2SYN	345,510	509	348
WA7IIM	208,170	329	257
W8FY	195,024	366	239
W7VNJ	157,048	556	268
KG8AL	129,078	269	202
K8EEH	63,027	188	141
WB4PHW	39,294	143	111

NORTH AMERICA

VX2A	9,243,923	3731	871
VD2ZP	7,278,600	3047	840
CK7K	5,532,672	2860	768
XJ6ITT	5,104,800	2669	709
VE6SV	4,622,940	2443	756
CI6AO	4,232,592	2826	646
6E2T	3,693,402	2393	558
VX3LRL	3,010,896	1524	609
VE4VV	2,951,232	2060	608
VE2PK/VE3	1,458,114	1118	466
VE5SF	791,600	858	400
VE7UBC	496,563	598	309
VE3AGR	281,196	363	292

AFRICA

EA8BR	15,311,851	4315	953
CT9M	14,396,824	4182	958
9I2M	6,000,736	2918	687

ASIA

C49C	12,250,266	4396	822
P39P	8,912,547	3588	733
UN8LW	6,375,522	2590	681
C4YY	6,291,975	3046	645
JH5ZJS	5,706,644	2348	759
JJ3YBB	5,700,096	2389	768
JA1YDU	3,521,600	1757	620
JE6ZIH	3,300,912	1694	648
JG2ZQZ	2,365,579	1307	557
RK9JWJ	1,989,225	1218	525
JA6YCL	1,386,816	1024	466
BV2B	1,096,125	1948	375
UZ9AWE	1,019,652	866	372
RK9CWY	918,918	728	374
BY1QH	632,060	745	374
RUØL	287,712	405	243
BY4BPT	265,995	736	257
BY4BCN	54,386	257	142
TA2ZO	1,197	22	21

EUROPE

TM1C	11,983,340	4194	955
IR2W	8,797,950	3282	950
OM5M	8,002,174	3129	958
LZ5W	7,819,958	3858	1087
DF7RX	7,419,639	2919	879
ED3TT	6,966,680	2853	895
CT8T	6,767,562	3098	862
TM2T	6,331,520	3030	832
IO5A	6,166,944	2677	874
OL3A	5,966,730	2764	861
RU6L	5,853,736	3122	872
S56M	5,684,280	2392	808
OE1XTU	5,624,604	2565	828
G3OZF	5,202,148	2491	826
GIØKOW	5,157,162	2720	774
IV3DXW	4,696,230	2216	798
II4M	4,664,872	2363	811
4U9ITU	4,511,358	2511	782
ED1WWE	4,199,382	2451	762
ED5WPX	4,168,140	2563	762
LX4A	4,117,086	2166	762
OT4V	4,051,824	2304	778
OH7AAC	3,953,275	2100	775
G4UJS	3,570,688	2112	704
Z3ØM	3,534,210	2275	734
PI4TUE	3,482,292	1792	759
LZ5Z	3,425,578	1909	734
PA6WPX	3,387,972	1801	742
ON6AH	3,268,392	1851	744
F6KAW	3,252,350	1863	725
S53DCM	3,223,260	1813	705
II2M	3,131,496	1961	732
RZ4WWB	3,105,323	2213	689
OI6AY	3,098,368	2027	728
GXØOBS	2,936,920	1894	680
ED3RKG	2,839,788	1825	708
RU3A	2,736,855	1605	663
ON6BR	2,730,992	1776	649
I1VDM	2,430,050	1560	655
YT7ØX	2,418,339	1762	627
OL5A	2,062,800	1429	600
OM2I	1,823,302	1434	598
LXØRL	1,736,856	1341	561
LY3MR	1,729,677	1576	537
IK6QRH	1,703,526	941	487
RK1OWZ	1,686,810	1424	590
GC3SCA	1,673,250	1604	575
RK4WWA	1,511,285	1513	545
F8KOJ	1,508,178	863	482
OT4L	1,500,852	1114	543
IO4IB	1,498,224	1257	588
GB6AR	1,495,865	1196	541
DF4SA	1,432,275	1130	565
DFØRI	1,422,682	1068	551
OK2KOD	1,402,080	1123	552
9A9D	1,326,675	1196	525
AM4URE	1,313,375	1265	553
IV3NTA	1,203,725	1004	541
LZ1KBB	1,196,784	1224	483
SKØHB	1,134,628	1154	482
YZ7A	1,128,960	1032	512
HB4FG	1,128,468	1003	498
YL1XW	1,050,831	1209	477
DAØRG	1,040,904	935	488
TM3M	1,005,873	1003	489
IO2A	884,330	967	463
II1D	874,962	975	491
IK3TPN	843,971	791	487
SM3KOR	796,224	948	464
SN7L	794,640	821	420
SP6KEP	784,322	925	463
DLØHGW	753,830	793	445
II7I	696,292	756	436
EI9FN	624,360	858	430
SK7BV	505,875	649	375
DLØNO	468,720	615	372
GCØDPX	467,116	595	338
EA6URP	352,240	603	340
YO2KBB	270,270	503	297
SP6YFU	252,146	430	278
UX8IXX	208,260	508	260
SK6PS	156,456	381	246
TA1KA	100,100	315	202
OZ5EDR	98,892	269	201
PI4ALK	88,985	227	185
CQ5P	51,684	165	118
CQ7V	43,337	220	151
UR4PWC	38,676	200	132
YL1ZE	38,130	167	123

OCEANIA

FK8GM	3,860,567	2279	557
VK1DX	3,302,352	1852	568
VK4IZ	1,971,576	1404	417
N3KEG/KH6	1,774,425	1343	401
4D3HSP	1,529,464	1379	328
YE1ZC	576,128	1413	448

SOUTH AMERICA

ZXØF	27,883,050	7447	1086
PT7CB	14,409,600	4661	948
LT1V	8,982,636	3594	811
LT5F	8,705,683	3128	833
L2ØA	7,008,185	2926	815
PQØZ	2,518,260	1545	564
LP4H	2,517,624	1276	584
LU1YY	2,270,376	1430	552
YV5USB	2,174,436	1227	561
LU4DRC	383,214	447	289

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

WZ1R	16,029,400	6099	1150
W4MYA	7,095,172	3551	994
AIØY/9	5,109,524	2882	917
AD6E	2,778,888	2064	714
AB5AE	921,526	1086	523
W7WHY	838,384	936	488
KA5BAT	196,482	511	286

DX

VP2EC	39,530,455	10768	1285
9A1A	28,051,245	8030	1269
LU4FM	25,072,710	6748	1213
OT4A	21,205,080	6753	1196
HG73DX	18,525,420	6316	1212
VS6WO	16,555,040	7464	967
EM2I	12,828,809	6058	1057
ZP94B	11,160,837	3970	982
CZ7Z	10,793,303	4330	937
ZW4Y	10,630,180	3974	916
JA1YXP	5,298,422	2091	766
LY7A	4,518,624	2747	778
II9E	3,195,666	2272	713
7S7CA	2,144,288	1780	593
OK2KJU	792,984	796	444
BVØFMT	24,426	195	118

DISQUALIFIED: LT5H—Excessive bad calls and multipliers.

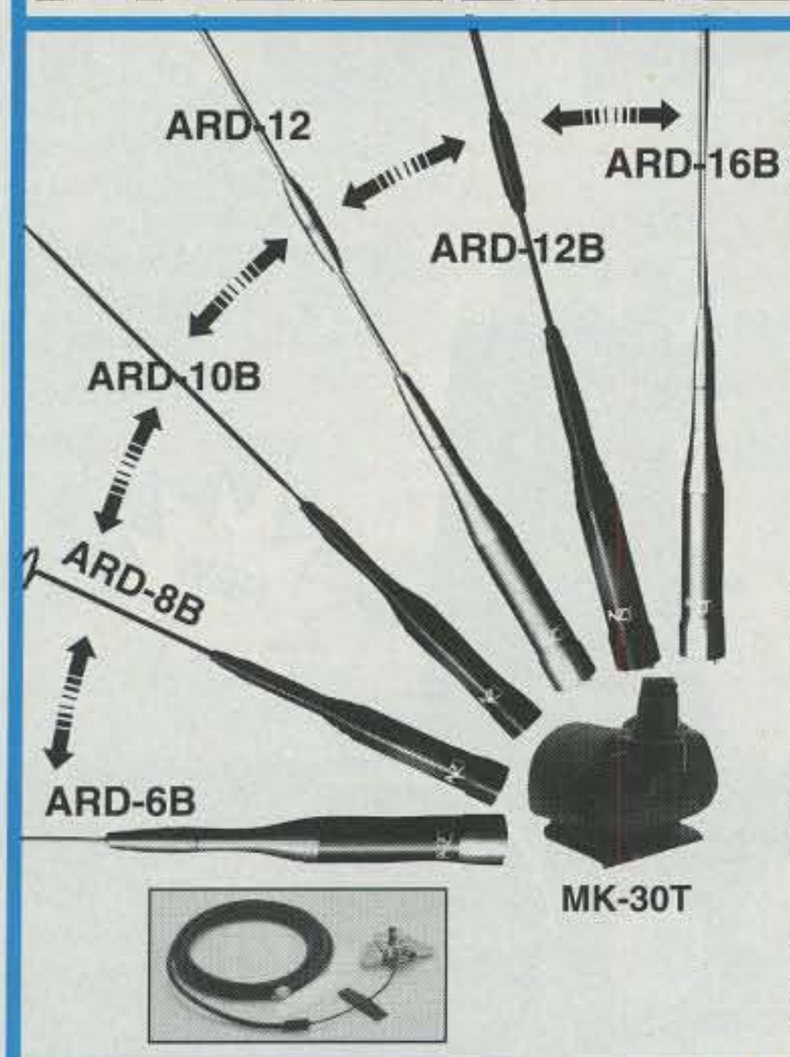
CHECK LOGS

The following logs were used for cross-checking. Check logs and SWL logs are always appreciated. Thank you.

CP1FF, DE2DDR, DFØEFA, DJØMAQ, DL/PAØTV, DL1ASF, DL1SWB, DL2YAK, DL3ARX, DL3BRA, DL3HWW, DL3SUG, DL5DWW, DL7UMS/A, DL9BBA, ES5RW, EU3BB, EW3LB, HK3MKQ, IK1VCH, IK3SSX, IK8NBL, JA2PEI, KC5BKT, KE4HHZ, KX7J, LA2WIA, LA3WBA, LA4BN, LA5XAA, LA7CL, LA8YIA, LU1CQ, LY2BAG, LZ1EV, LZ3HI, N8BJQ, OH2ME, OH3LZU, OH3WR, OH4LBX, OH5NG/9, OH6MIL, ON5FV, ORØOST, OZ1CID, PT2NP, RU3RR, RW6HCB, SMØBNK, SMØCSX, SMØUGV, SM6KMD, SP-Ø189-GD, SP1DMD, SP1JXC, SP1MVW, SP2LNW, SP2WEP, SP3EJJ, SP4GDC, SP4HKN, SP4SKW, SP5MXY, SP5XMM, SP6FIB, SP6TPM, SP7EOE, SP7RFF, SP7VCK, SP8EEX, SP8MCP, SP9AVZ, SP9BBH, SP9CLO, SP9MCU, SP9MQH, SP9QME, SP9WZJ, SP9XCN, UAØZBK/Ø, UA3ICJ, UA3WCN, UA4ZA, UA9QGB, UN9PQ, UR7IAY, UT2XX, VE3ZD, VQ9SS, W4FFO, W6CN, W7LQU, WB4RUA, WB6KUM, WL7AFD, XE3LMV, YB2BKJ, YL2GUH, YM94KK, YO3AS, YO8CRU, YO8KOS, YV4DYW, Z21CS, ZL4TCG, ZV2NP.

These are the operators of OM3KFF, who used OM5M during the contest. From left to right are OM3TLU, OM3TPW, OM3TPG, and OK2ZW. Seated are OM3EI and OM3TCW.

Maldol Antennas For Today's Amateur



PERFORMANCE PLUS! THE ARD SERIES 2m/70 cm ANTENNAS

Meet the hottest new line of dualband mobile antennas on the road today. Maldol's ARD Series. They are world-famous for style and performance and extend the range of any mobile rig new or old. ARDs are pretuned, broadbanded, weatherproof, available in chrome or black finish, and truly make the going first class!

Model	*Height*	*Signal Gain (dbs)*	*Power(max)*
ARD5B	19.3″	2m:/70cm:3.8	120w
ARD6/6B	26.5″	2m:2.6/70cm:4.9	100w
ARD10/10B	34.4″	2m:3.0/70cm:5.5	120w
ARD11/11B	41.5″	2m:3.7/70cm:6.1	120w
ARD12/12B	48.2″	2m:4.3/70cm:6.8	150w
ARD16/16B	64.8″	2m:5.0/70cm:7.7	150w

Selection Guide: Taller models give max range, shorter models are good choices for use in cities and parking decks. Models with /B are black finish.

MK-30 MOTORIZED TILT-OVER MOUNT

The mobileer's dream! Ideal mate for ARDs, but also works great with other antennas up to 56″ tall. Neat motorized unit quick-installs on trunk lid. Remote up/down switch fits under dash. Permits one-touch tilting for low overhangs. ***NOTHING ELSE LIKE IT.*** MK-30T/Trunk lid, R/Roof gutter, H/Hatchback, K/Auto Rack. Also available AM-01B manual tilt-over mount.

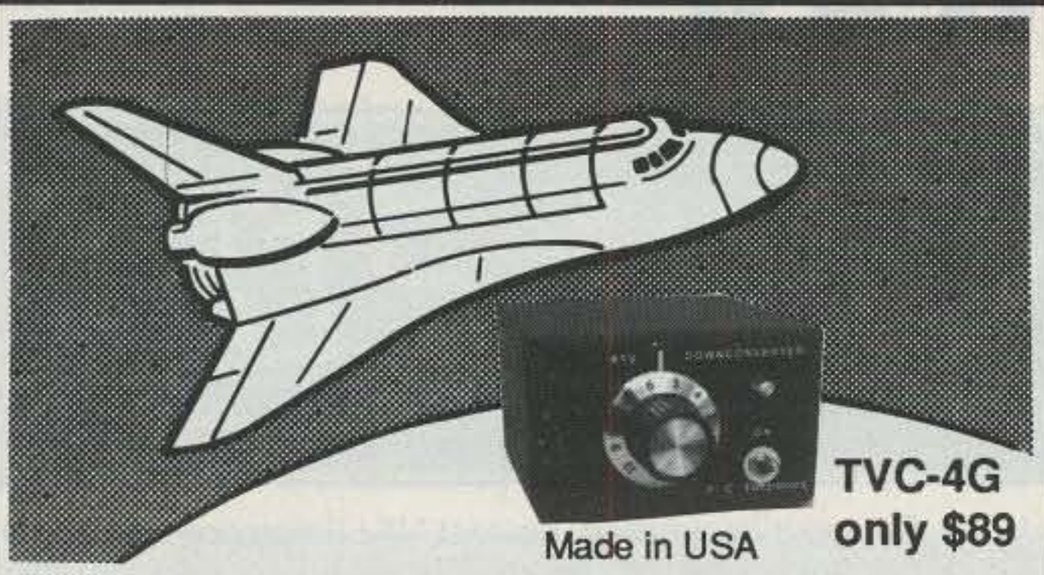
RG-4M AND NL SERIES MATING CABLE SETS

For quick, easy and professional installation of full antenna system. Preinstalled antenna socket and screw-apart PL-259 for routing through crevices. The finishing touch! Economical RG-4M or NL5MM with thin end for routing around narrow trunk edges.

Maldol USA Sales Office
4711 N.E. 50th Street, Seattle, WA 98105
AnswerFax: 206-525-1896 Fax: 206-524-7826 E-Mail: MALDOLUS@PNW.NET Prodigy: VJSH80A

South America Controles Radiocommunicaciones S.R.L.
Loyola 412 (1414) Buenos Aires, Argentina Tel 54(1)775-4837 Fax: 54(1)833-2100

AMATEUR TELEVISION



Made in USA

TVC-4G only $89

SEE THE SPACE SHUTTLE VIDEO

Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Spacenet 2 transponder 9 or weather radar during significant storms, as well as home camcorder video. If it's being done in your area on 420 - check page 501 in the 94-95 ARRL Repeater Directory or call us, ATV repeaters are springing up all over - all you need is one of the TVC-4G ATV 420-450 MHz downconveters, add any TV set to ch 2, 3 or 4 and a 70 CM antenna (you can use your 435 Oscar antenna). We also have ATV downconverters, antennas, transmitters and amplifiers for the 400, 900 and 1200 MHz bands. In fact we are your one stop for all your ATV needs and info. We ship most items within 24 hours after you call. **Hams, call for our complete 10 page ATV catalogue.**

(818) 447-4565 m-f 8am-5:30pm pst. **Visa, MC, COD**
P.C. ELECTRONICS
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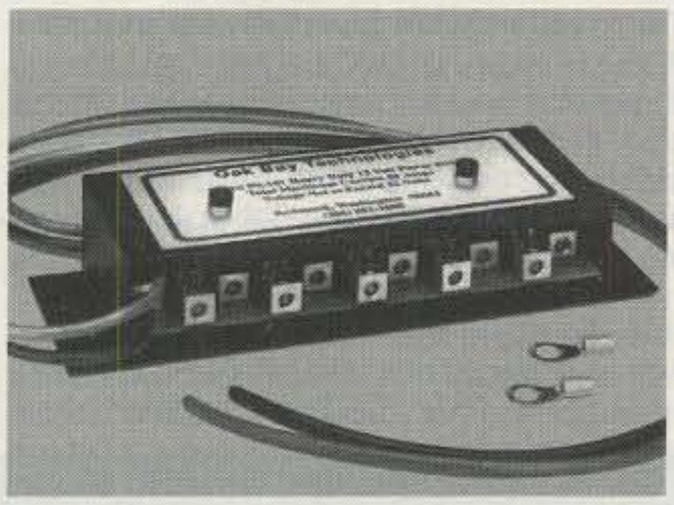
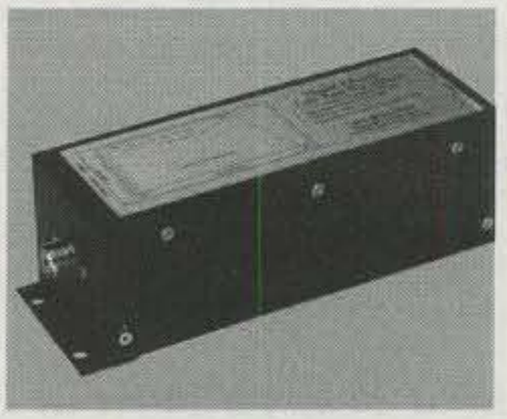
Maryann (WB6YSS)

Heavy Duty 50 Amp 12 Volt Power Strip & Low Pass Filter

Model PS-101



- **Perfect for HF Radios**
- **5 Fused Outputs**
- **50 Amps total Current**
- **Heavy Duty Steel Enclosure**
- **Wire and Fuses Included**
- **Commercial Design**
- **Low Insertion Loss**
- **Upper Cutoff 30 MHz**
- **> 85 db Attenuation**
- **Operating Frequency 1.8 - 29.7 MHz**
- **1000 Watts**
- **Helps eliminate TVI**



Model LP-11P

Available now from your favorite Radio Dealer!

Oak Bay Technologies, Inc.
Port Ludlow, WA 98365

CIRCLE 83 ON READER SERVICE CARD

CQ World-Wide WPX SSB Contest All-Time Records

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	UL7ACI('91)	331,008	128
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	NP4A('86)	6,668,184	654
14	ZZ5EG('88)	8,219,627	871
21	ZPØY('90)	12,070,245	955
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060
QRP/p	HC8A('94)	7,520,562	714

Multi-Operator Single Transmitter

HC8A('93)	32,502,677	1107

Multi-Operator Multi-Transmitter

ED8ACH('91)	47,278,236	1319

U.S.A. RECORD HOLDERS

Single Operator

1.8	K5UR('85)	122,664	228
3.5	K1ZM('92)	1,266,844	422
7.0	KC7EM('92)	1,396,646	397
14	K2VV('87)	3,546,294	687
21	WN4KKN/6('92)	4,538,050	814
28	WM5G('89)	4,213,127	799
AB	KM1H('92)	7,854,840	945
QRPp	KR2Q('92)	1,269,960	557

Multi-Operator Single Transmitter

WC4E('92)	11,611,929	1113

Multi-Operator Multi-Transmitter

WZ6Z('89)	18,737,170	1138

CLUB RECORD

Northern California Contest Club('92) 97,527,906

QRPp RECORD

HC8A('94) 7,520,562

WPX (Prefix) RECORD

HG73DX('91) 1,337

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	OH1RY/CT3('87)	290,140	163
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	CT3BX('94)	5,187,480	622
14	EA8AH('94)	8,194,536	852
21	TR1G('90)	6,788,925	825
28	FR5DX('91)	7,543,818	831
AB	ZD8Z('94)	18,118,880	992

ASIA

1.8	UL7ACI('91)	331,008	128
3.5	UA9CSS('94)	1,074,780	315
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	JH1AJT('89)	4,848,480	740
AB	7Z2AB('92)	9,177,296	809

EUROPE

1.8	LZ2BE('84)	261,504	144
3.5	GW8GT('94)	1,473,868	451
7.0	IO4VEQ('93)	4,184,292	654
14	IU9S('94)	5,677,177	869
21	CT2A('92)	6,029,559	919
28	9H1EL('89)	5,882,825	787
AB	YZ9A('91)	8,518,112	928

Multi-Operator Single Transmitter

AF	EA8BR('94)	15,311,851	953
AS	TA5/NØFYR('91)	16,474,965	1005
EU	IJ4R('91)	16,027,956	1146
NA	VP2EC('92)	24,409,580	1115
OC	P2ØX('93)	13,440,570	858
SA	HC8A('93)	32,502,677	1107

NORTH AMERICA

1.8	CG3MFA('85)	319,140	162
3.5	VA3EJ('91)	1,950,592	448
7.0	NP4A('86)	6,668,184	654
14	TI2CC('87)	5,491,290	790
21	FG5R('89)	9,936,240	912
28	J68AX('92)	4,709,985	651
AB	KP2A('93)	16,694,570	1006

OCEANIA

1.8	T32AF('83)	16,872	37
3.5	N6VI/KH6('94)	1,016,652	273
7.0	T32AF('93)	3,995,928	437
14	KG6DX('90)	4,558,527	733
21	AHØK('92)	7,206,850	698
28	P2ØA('92)	5,184,625	703
AB	WR6R/KH6('93)	9,803,972	758

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	YV3A('91)	1,664,476	362
7.0	YV5A('91)	3,460,900	530
14	ZZ5EG('88)	8,219,627	871
21	ZPØY('90)	12,070,245	955
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060

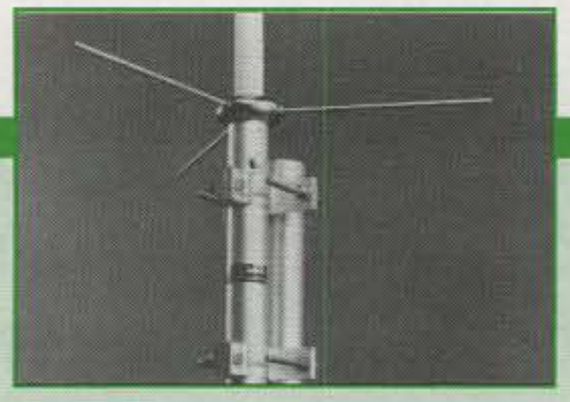
Multi-Operator Multi-Transmitter

AF	ED8ACH('91)	47,278,236	1319
AS	VS6WO('94)	16,555,040	967
EU	HG73DX('91)	30,664,095	1337
NA	VP2EC('94)	39,530,455	1285
OC	FKØAW('89)	26,538,972	1002
SA	ZZ5EG('87)	38,096,250	1250

COMET

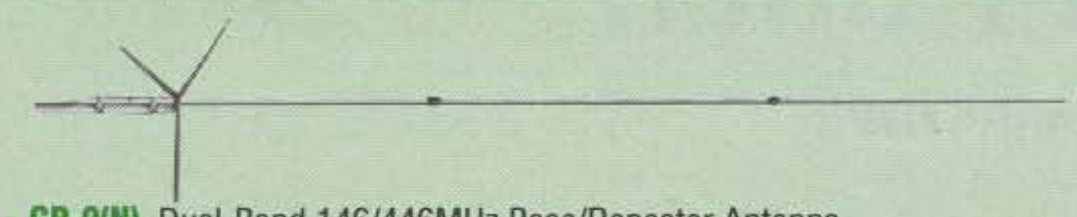
MODERN, MULTI-BAND ANTENNA SYSTEMS

BASE/REPEATER ANTENNA PRODUCTS



Featuring the COMET exclusive SLC System. The SLC actually increases the gain of the Dual/TriBand Antennas. A completely pre-formed phasing coil and phosphorous copper element produces a low-loss, highly effective, high gain antenna. All COMET antennas are pre-tuned and come complete will all mounting hardware. Simply mount to your mast and experience incredible COMET performance!

COMET DUAL-BAND

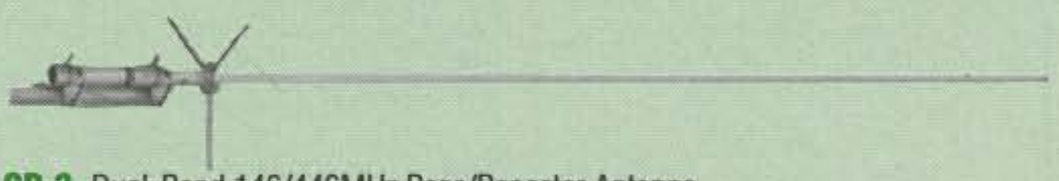


NEW!

GP-9(N) Dual-Band 146/446MHz Base/Repeater Antenna
Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
446MHz 11.9dBi 5/8 wave x 8 **Length:** 17' 8" **Weight:** 5lbs. 11ozs.
Connector: SO-239 (GP-9), N-type (GP-9N) **Mounts to Mast Size:** 1.25"-2.50"
Construction: Heavy duty fiberglass, 3 sections, 92MPH wind survival

NEW!

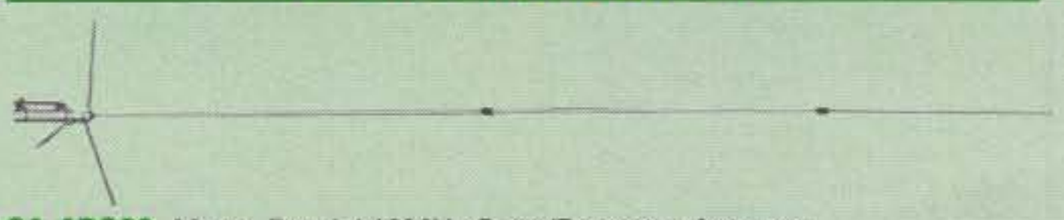
GP-6 Dual-Band 146/446MHz Base/Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
446MHz 9.0dBi 5/8 wave x 5 **Length:** 10' 2" **Weight:** 3lbs. 8oz.
Connector: Gold-Plated SO-239 **Mounts to Mast Size:** 1.25"-2.50"
Construction: Heavy duty fiberglass, 2 sections, 112MPH wind survival



NEW!

GP-3 Dual-Band 146/446MHz Base/Repeater Antenna
Gain & Wave: 146MHz 4.5dBi 5/8 wave **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
446MHz 7.2dBi 5/8 wave x 3 **Length:** 5' 10" **Weight:** 2lbs. 9ozs.
Connector: Gold-Plated SO-239 **Mounts to Mast Size:** 1.25"-2.50"
Construction: Single piece fiberglass, 130MPH wind survival

COMET MONO-BAND



CA-ABC23 Mono-Band 146MHz Base/Repeater Antenna
Gain & Wave: 146MHz 7.8dBi 5/8 wave x 3 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
Connector: SO-239 **Length:** 14' 12" **Weight:** 3lbs. 8 ozs.
Mounts to Mast Size: 1.25"-2.50"
Construction: Thick-wall aluminum, 3 sections, 70MPH wind survival

CA-712EF Mono-Band 446MHz Base/Repeater Antenna
Gain & Wave: 446MHz 9dBi 1/2 wave x 12 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
Connector: N-type **Length:** 10' 5" **Weight:** 2lbs. 12ozs.
Mounts to Mast Size: 1.25"-2.50"
Construction: Heavy duty fiberglass, 2 sections, 105MPH wind survival

CA-62DB Mono-Band 6 Meter FM Antenna
Gain & Wave: 52MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 500W PEP
Connector: SO-239 **Length:** 21' 8" **Weight:** 5lbs. 11ozs.
Mounts toMast Size: 1.25"-2.50"
Construction: Thick-wall aluminum, 5 sections, 100MPH wind survival

COMET products are available from most major dealers. For customer service, or a complete catalog, please call us at 800/962-2611. We're confident COMET products and accessories will enable you to enjoy Amateur Radio to its fullest!

NCG COMPANIES
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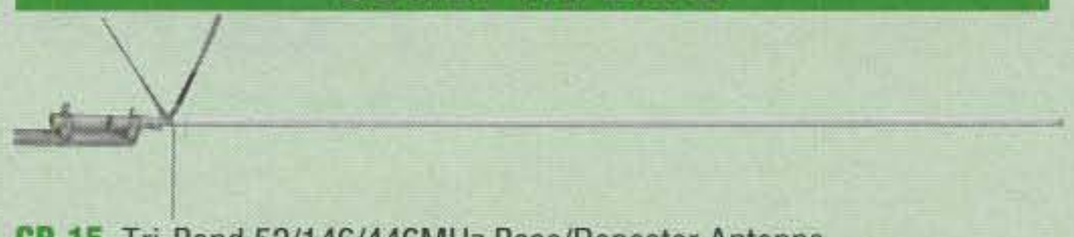
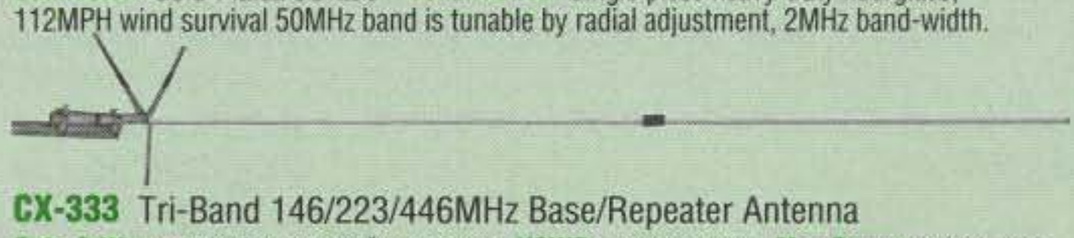
COMET TRI-BAND

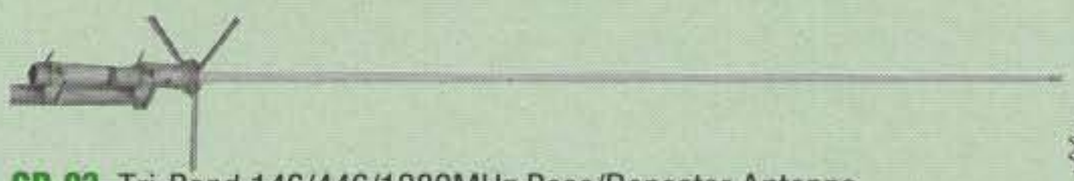


NEW!

GP-15 Tri-Band 52/146/446MHz Base/Repeater Antenna
Gain & Wave: 50-54MHz 3.0dBi 5/8 wave **VSWR:** 1.5:1 or less **Max Power:** 300W PEP
146MHz 6.2dBi 5/8 wave x 2 **Length:** 7' 11" **Weight:** 3 lbs. 1 oz.
446MHz 8.6dBi 5/8 wave x 4 **Mounts to Mast Size:** 1.25"-2.50"
Connector: Gold-Plated SO-239 **Construction:** Single piece heavy-duty fiberglass, 112MPH wind survival 50MHz band is tunable by radial adjustment, 2MHz band-width.

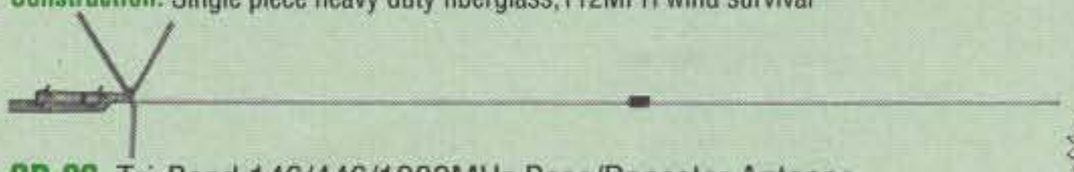


CX-333 Tri-Band 146/223/446MHz Base/Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 120W PEP
223MHz 7.8dBi 5/8 wave x 3 **Length:** 10' 2" **Weight:** 3 lbs. 10 ozs.
446MHz 9.0dBi 5/8 wave x 5 **Mounts to Mast Size:** 1.25"-2.50"
Connector: Gold-Plated SO-239
Construction: Heavy duty fiberglass, 2 sections, 112MPH wind survival



NEW!

GP-93 Tri-Band 146/446/1280MHz Base/Repeater Antenna
Gain & Wave: 146MHz 4.5dBi 5/8 wave **VSWR:** 1.5:1 or less **Max Power:** 300W PEP (146MHz)
446MHz 7.2dBi 5/8 wave x 3 **Length:** 5' 7" 200W PEP (446/1.2)
1280MHz 10dBi 5/8 wave x 6 **Mounts to Mast Size:** 1.25"-2.50" **Weight:** 2 lbs. 8ozs.
Connector: Gold-Plated N-type
Construction: Single piece heavy duty fiberglass,112MPH wind survival



NEW!

GP-98 Tri-Band 146/446/1280MHz Base/Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 300W PEP (146MHz)
446MHz 9.0dBi 5/8 wave x 5 **Length:** 9' 8" 200W PEP (446/1.2)
1280MHz 13.5dBi 5/8 wave x 12 **Mounts to Mast Size:** 1.25"-2.50" **Weight:** 3 lbs. 8ozs.
Connector: Gold-Plated N-type
Construction: Heavy-duty fiberglass, 2 sections, 112MPH wind survival

CROSS NEEDLE METERS

- Separate Meter and RF Sensor allows for convenient placement of the meter.
- Cross Needle Meter provides FWD, REF, and VSWR simultaneously.
- The RF-Sensor is a compact design, and has an extremely low-loss circuit.
- Beautifully illuminated when connected to power supply.
- 6 foot cable standard.
- Optional EKS-3 10 foot extension cable for a total of 16 feet between the sensor and meter.
- Compact Size: (L) 4.75" x (W) 1.75" x (H) 3.5"

CMX-1	CMX-2	CMX-3
1.8-60MHz	1.8-200MHz	140-525MHZ
0-2KW	0-200W	0-200W
30/300/2KW	20/50/200W	20/50/200W

NEW!

CIRCLE 149 ON READER SERVICE CARD

The Lazy H antenna doesn't fall down on the job even though it's horizontal. N4PC reminds us that it's easy to build, fun to use, and boasts some respectable gain.

The Lazy H Antenna Packs A Punch

BY PAUL CARR*, N4PC

Here's the news from 97 West Point Road, Jacksonville, Alabama. After 25 years as an elementary school teacher, my XYL retired. The redecorating bug has bitten. The most recent focus of her efforts was the family den.

I have a small commercial mobile rig that occupies a space on the bookcase adjacent to my reclining chair. I must admit that the installation was not as neat as it might have been, so I took it upon myself to "clean up the mess" in my corner of the den. I restricted myself to only one antenna to satisfy my casual operating desires at this location. This gave me

*97 West Point Road, Jacksonville, AL 36265

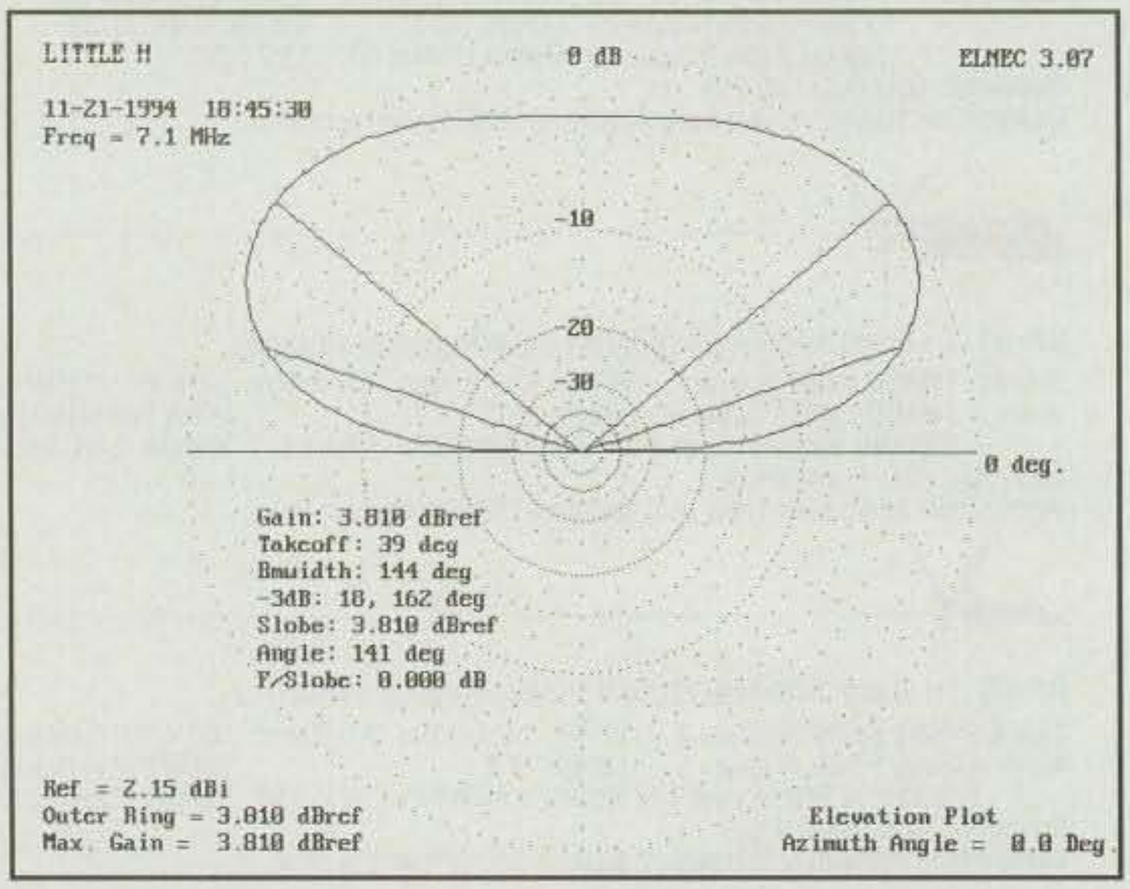


Fig. 1(A)– The 40 meter vertical pattern.

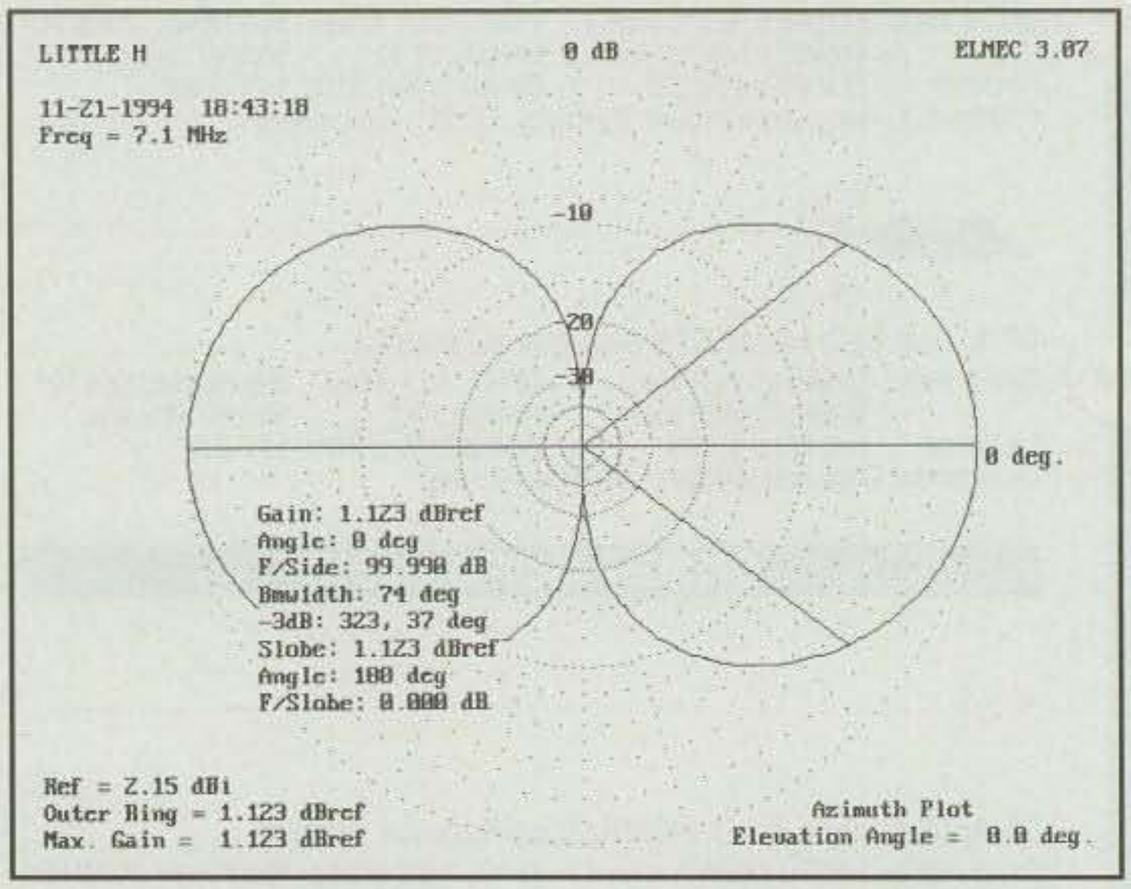


Fig. 1(B)– The 40 meter horizontal pattern.

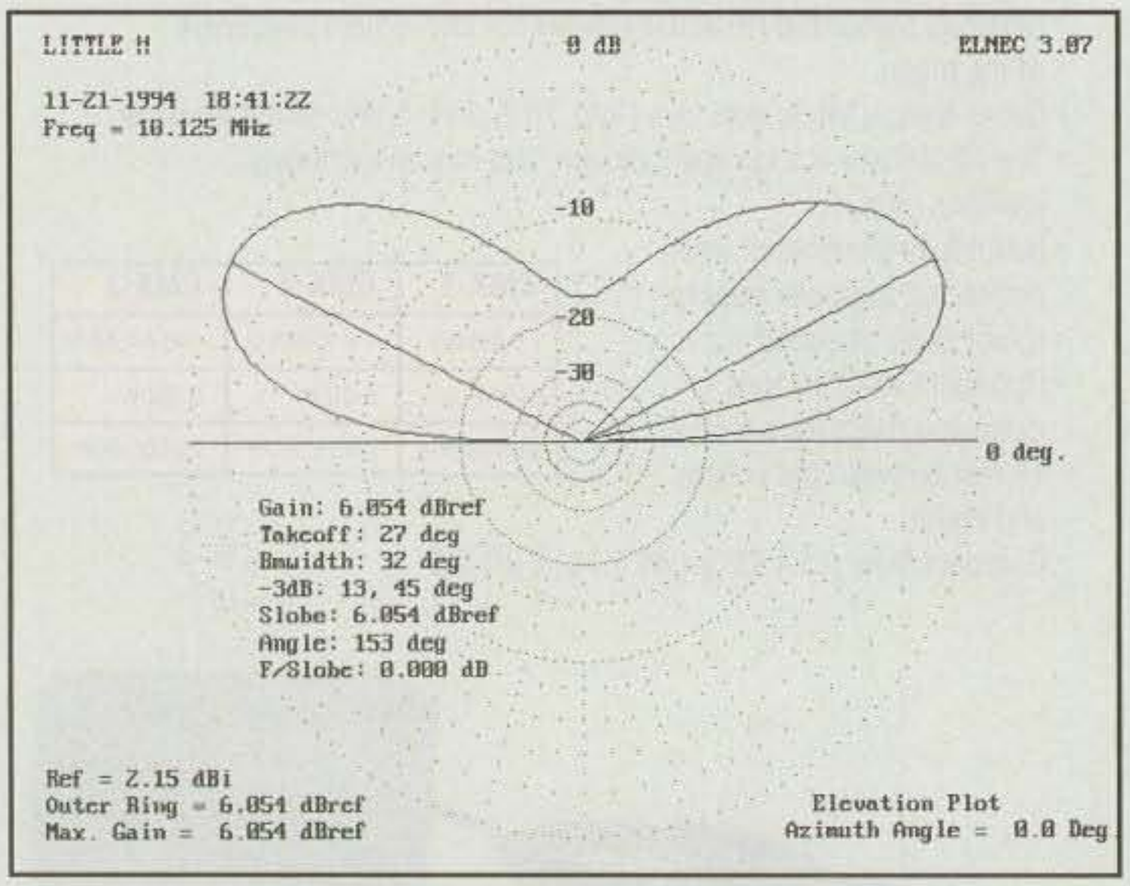


Fig. 2(A)– The 30 meter vertical pattern.

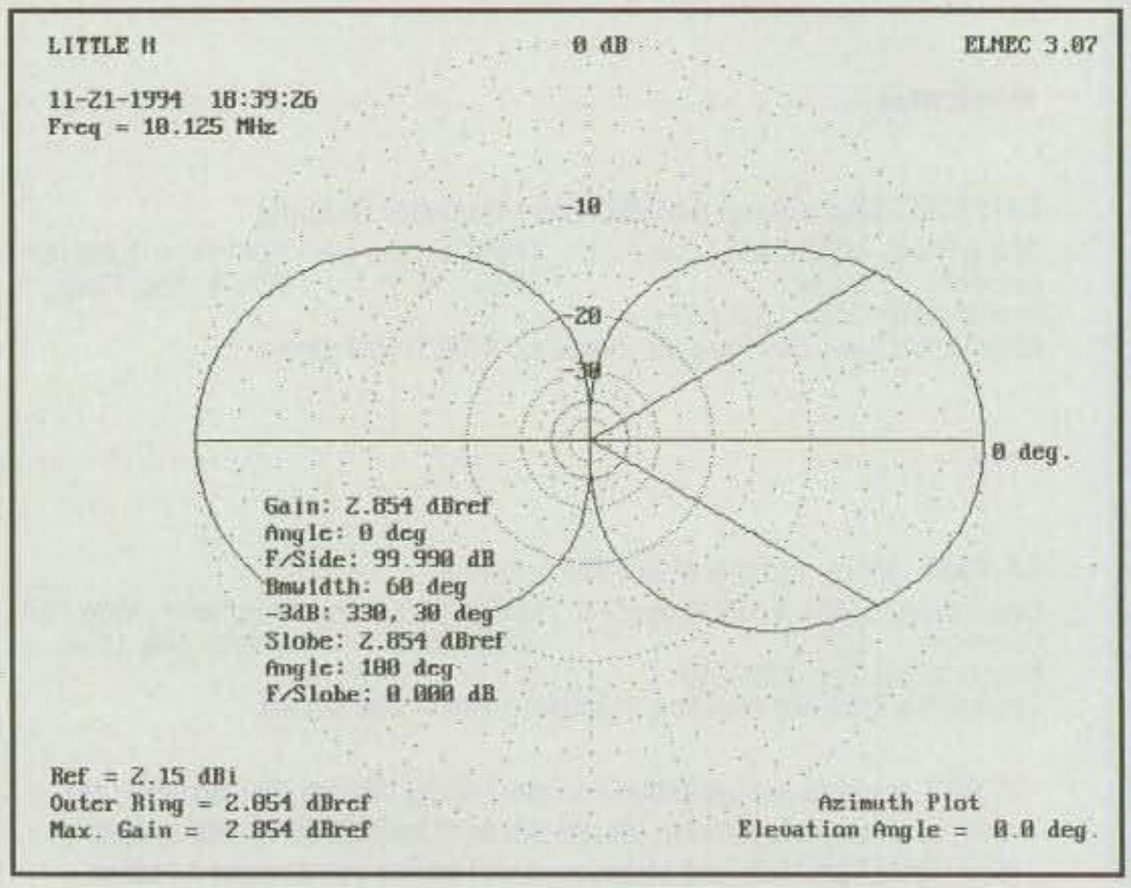


Fig. 2(B)– The 30 meter horizontal pattern.

MFJ-949E *Deluxe* 300 Watt Tuner

More hams use MFJ-949's than any other tuner in the world! Why settle for an imitation when you can have the real thing?

In Stock at ham dealers everywhere!

Pick one up at your favorite dealer -- no shipping, no waiting, no hassles

MFJ-949E

$139.95

Call your dealer for your best price

Includes FREE AC adapter for meter light

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

Why? Because the world's leading tuner has *earned* a worldwide reputation for being able to match just about anything.

MFJ-949's have been highly refined and have years of *proven* reliability.

Every MFJ-949E comes with . . . MFJ's famous one year *No Matter What*™ unconditional guarantee . . . first-rate performance . . . unbeatable quality . . . the best tuner value in ham radio -- *all from the world's most trusted name in antenna tuners.*

Now the latest MFJ-949E gives you even more features and more value than ever at a new lower price.

Why take chances with an imitation when you can have the *real thing* from the world's most trusted name in antenna tuners.

More reasons why more hams use MFJ-949's than any other antenna tuner in the world . . .

Full 1.8-30 MHz Operation

1000 volt tuning capacitors, extra heavy duty inductor switch, Teflon® insulating washers and proper L/C ratio gives you arc-free no worries operation with up to 300 watts from 1.8 to 30 MHz.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle Meter shows you SWR, forward and reflected power *simultaneously*. It reads both *peak* and average power on 300 or 30 watt ranges.

The meter is illuminated for easy reading in dim light and has an ON/OFF lamp switch. The meter lamp uses 12 VDC or 110 VAC. A *free* AC adapter is included at no extra cost.

Tunes *any* Antenna

The MFJ-949E tunes out SWR on dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas . . . nearly anything!

Use coax feed, random wire or balanced lines. Has oversized *heavy duty* 4:1 balun.

Super Antenna Switch

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

MFJ's Cross-Needle SWR/Wattmeter is always active for monitoring forward and reflected power and SWR.

QRM-Free PreTune™

MFJ's *QRM-Free PreTune*™ lets you pre-tune your MFJ-949E off-the-air into a built-in dummy load without causing QRM.

Pre-tuning into a dummy load makes tuning your actual antenna faster and easier.

Why take chances?

Why take chances with an imitation when you can have the* real thing *from the most trusted name in antenna tuners?

Full Size Dummy Load

The MFJ-949E has a *full size* non-inductive 50 ohm dummy load measuring 3/4 inch diameter by 5 inches. It *easily* handles 300 watts of abusive tune-up power.

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

Watchout for cheap midget size dummy loads that changes resistance as it heats up -- marginal ones could burn up your transceiver.

Custom Inductor Switch

The inductor switch is the most likely component to burn up in *any* antenna tuner.

The inductor switch in the MFJ-949E was *custom* designed to withstand the extremely high RF voltages and currents that are developed in your tuner -- it's not a flimsy *plastic* switch made for small signals and wired with *tiny* gauge wire.

Superior Cabinet

Each MFJ-949E cabinet is chemically treated and has a new 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 a *real* aluminum front panel and back panel -- it's not merely a plastic decal or glued-on paper strip that can peel off.

Superior Materials . . . *Superior* Construction

Every MFJ-949E use Teflon® insulating washers, countersunk screws for meter bracket, wing-nut for ground post, fire-retardant epoxy glass PC board (*not* canvas based), heavy .063 inch thick aluminum chassis (*not* flimsy .050 inch), heavy gauge wire used throughout (*not* small gauge), custom cabinet (*not* multi-purpose with unused holes and internal protruding screws).

No Matter What™ Guarantee

Every MFJ-949E is backed by MFJ's famous one year *No Matter What*™ unconditional guarantee. That means we will repair or replace your MFJ-949E (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 it burns up and they say, "Sorry, your *limited* warranty does not cover that?"

Continuing Service

Only MFJ gives you a *direct* toll-free technical help line -- not merely a sales line. It's answered by *electronic technicians* who are experts in antenna tuners. We're here to help keep your MFJ product performing flawlessly -- no matter how long you own it -- just call toll-free 800-647-TECH(8324).

Call your dealer for your *best* price

In stock at ham dealers everywhere!

Order your MFJ-949E today or simply pick one up at your favorite dealer or hamfest -- no shipping, no waiting, no hassles.

Free MFJ Catalog

Write or call toll-free . . . 800-647-1800

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24 Hour FAX: (601) 323-6551
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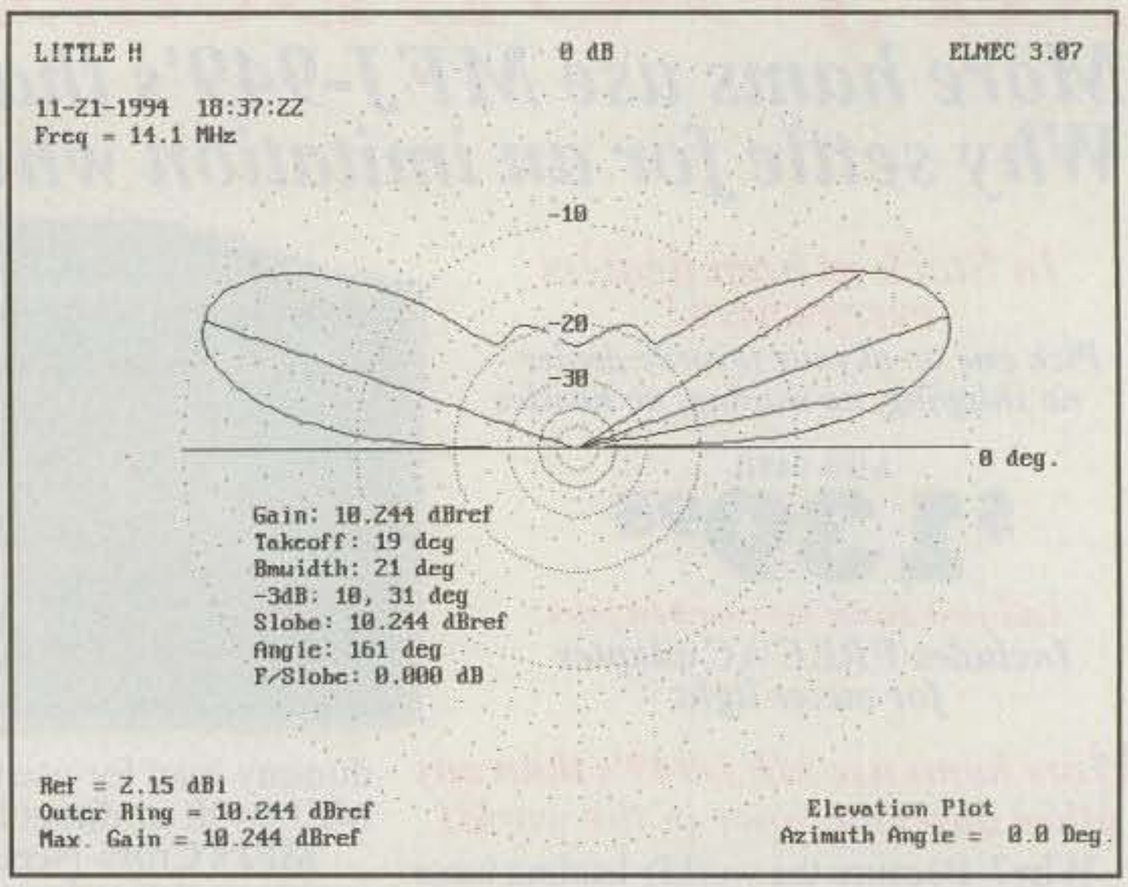


Fig. 3(A)– The 20 meter vertical pattern.

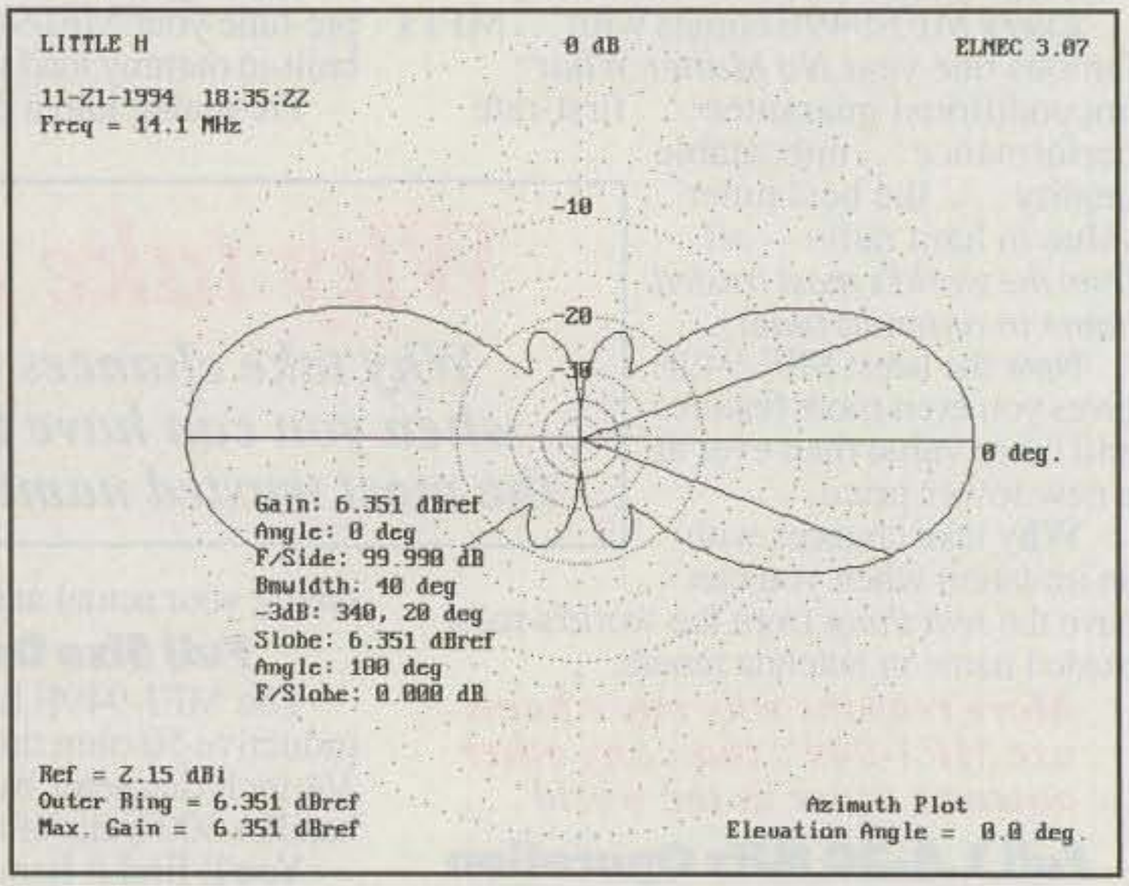


Fig. 3(B)– The 20 meter horizontal pattern.

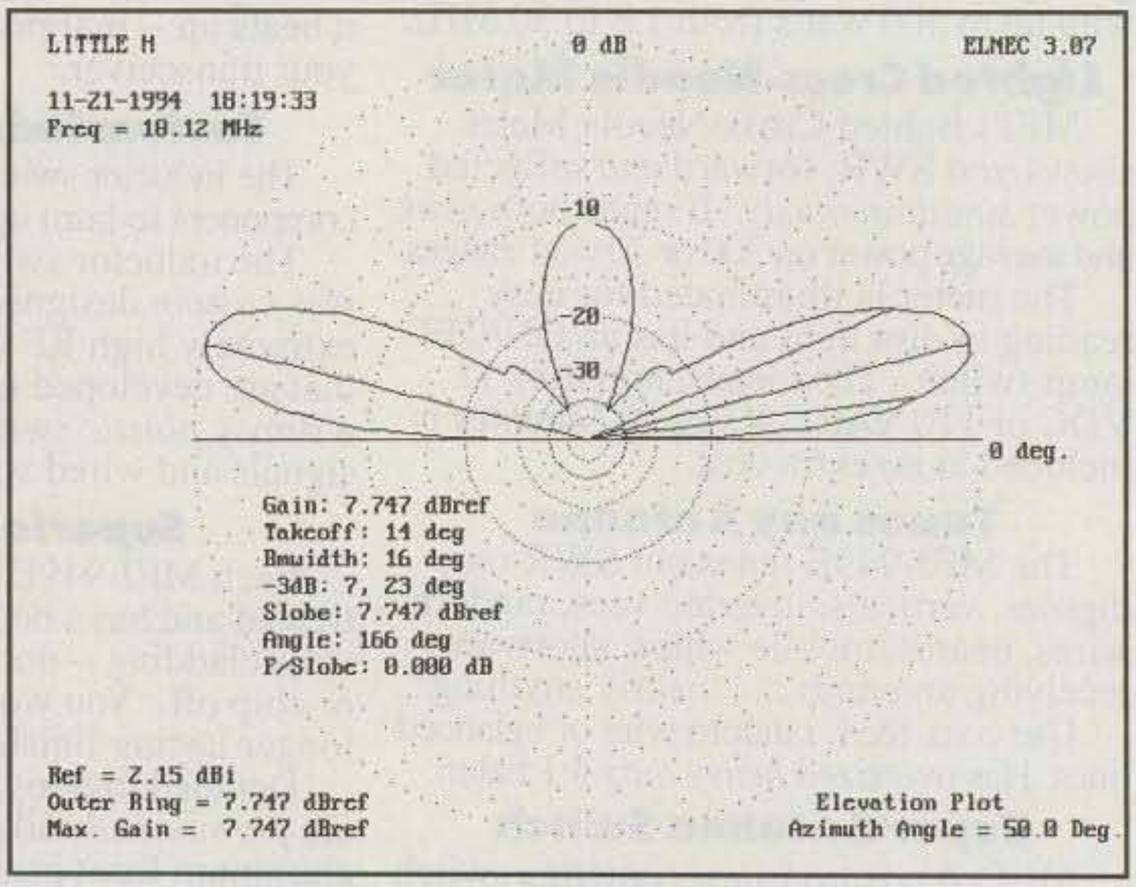
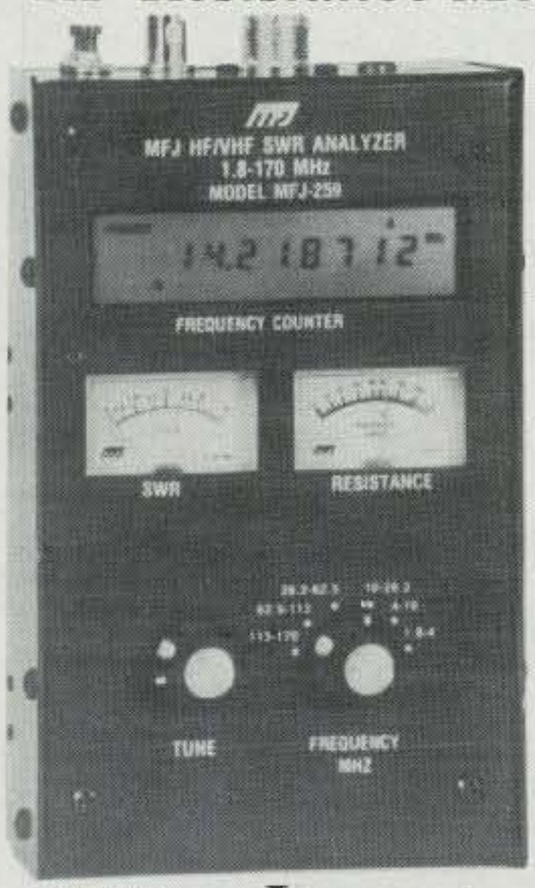


Fig. 4(A)– The 17 meter vertical pattern.

MFJ *HF/VHF* SWR Analyzer with RF Resistance Meter

Read your antenna SWR from 1.8-170 MHz . . . 10-digit LCD frequency counter . . . RF Resistance Meter™ . . . smooth reduction-drive tuning . . . simple-to-use . . .



MFJ-259
$219.95 If you work with antennas, MFJ's revolutionary new *SWR Analyzer*™ is the best investment you'll ever make! Now you can diagnose a wide range of antenna problems instantly with one easy-to-use instrument.

What the MFJ-259 Does

The MFJ-259 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz -- you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial--just like your transceiver. SWR is displayed instantly!

RF Resistance Meter™

Does 2:1 SWR mean 25 ohms or 100 ohms? *The new MFJ-259 tells you at a glance!*

Now you can measure RF resistance up to 500 ohms at minimum SWR -- instantly -- on MFJ's *exclusive* side-by-side RF Resistance and SWR Meters!

Take the guesswork out of building matching networks and baluns for your antennas.

Watch the effects of spacing on radiation resistance as you adjust your antenna.

Here's What You Can Do . . .

Find your antenna's true resonant frequency from the shack.

Tune the antennas on your tower and watch SWR change instantly as you make each adjustment. You'll know exactly what to do by simply watching the display.

Tune critical HF mobile antennas in seconds -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on a single band, or analyze multiband performance over the entire spectrum from1.8 to 170 MHz!

Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss.Test RF chokes, transformers, baluns.

Adjust your tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259 is really *four* test instruments in one: an accurate RF signal generator, a high resolution 170 MHz frequency counter, *RF Resistance Meter*™ and an *SWR Analyzer*™.

Free Manual

MFJ comprehensive 18 page instruction manual is packed with useful applications -- all explained in simple language you can understand!

For free manual write or call MFJ.

Take It Anywhere

The MFJ-259 is fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-1312B, $12.95. It's in a rugged all metal cabinet that's a compact 4x2½x6¾ inches. Take it to remote sites, up towers, on DX-peditions -- anywhere your antennas are located.

For rough service, pick up a convenient **MFJ-29**, $19.95, padded carrying pouch to keep your MFJ-259 close at hand and looking like new.

How Good is the MFJ-259?

MFJ SWR Analyzers™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Professional installer and technicians use them worldwide.

Get More by Paying Less

With the MFJ-259, you get full 1.8 to 170 MHz coverage, simple operation, instantaneous readings, a high accuracy frequency counter and MFJ's exclusive *RF Resistance Meter*™-- all for a low $219.95.

1.8-170 MHz *SWR Analyzers*™

MFJ-249
$199.95 **MFJ-249** *HF/VHF SWR Analyzer*™ has all the features of MFJ-259 but less RF resistance meter. Includes 1.8-170 MHz *continuous* coverage, 10-digit LCD frequency counter and smooth vernier tuning.

MFJ-209
$109.95 **MFJ-209** *HF/VHF SWR Analyzer*™ is same as MFJ-259 without LCD frequency counter and RF resistance meter. Has jack for external frequency counter. MFJ-249/MFJ-209 are 4x2½x6¾ inches and uses 8 AA cells or 110 VAC with MFJ-1312B, $12.95.

Carrying Pouch

MFJ-29
$19.95 **Tote** your MFJ-249, MFJ-259 or MFJ-209 *SWR Analyzer*™ anywhere with the MFJ-29 custom Carrying Pouch.

Made with a special foam-filled fabric, the MFJ-29 cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work--the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Protect your investment and keep your analyzer safe and looking like new!

Dip Meter Adapter

MFJ-66
$19.95 **Plug** a dip meter coupling coil into your *MFJ SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter.

With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. Determine resonant frequency of tuned circuits and measure Q of coils. Set of two coils cover 1.8-170 MHz depending on your *MFJ SWR Analyzer*™.

Free MFJ Catalog

Write or call . . . 800-647-1800

10-160M *SWR Analyzer*™

MFJ-207
$79.95 **If** you're an HF man, this compact MFJ-207 *HF SWR Analyzer*™ will help you build 10-160 Meters antennas that'll make working DX almost routine.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. 7½x2½x2¼ inches.

2 Meter *SWR Analyzer*™

MFJ-208
$79.95 **MFJ-208** 2 Meter *VHF SWR Analyzer*™ finds the SWR of any antenna from 138-156 MHz. Jack for external frequency counter. 7½x2½x2¼ inches.

For Commercial VHF Radio

Same as MFJ-208 but for commercial VHF. **MFJ-217**, $79.95, covers 30-50 MHz and **MFJ-218**, $79.95, covers 150-170 MHz.

440 MHz *SWR Analyzer*™

MFJ-219
$99.95 **Read** SWR of any antenna 420 to 450 MHz -- just plug coax of your antenna into SO-239 connector, set frequency and read SWR. Uses microwave integrated circuits and microstrip technology. Jack for external frequency counter. 7½x2½x2¼ in.

MFJ-219N, $99.95, sames as MFJ-219 but with "N" connector.

MFJ-219/218/217/208/207/203 uses 9 volt battery or 110 VAC with MFJ-1312B, $12.95.

Bandswitch Dip Meter™

MFJ-203
$99.95 **The** MFJ-203 is a sensitive *Bandswitched Dip Meter*™ that covers all hams bands from 160-10 Meters. There are no plug-in tuning coils to keep up with or break.

Has detachable coupling coil, dual FET oscillator, op-amp meter amplifier and jack for external frequency counter. 7½x2½x2¼ in.

MFJ Antenna Bridge

MFJ-204B
$79.95 **Great** for determining feedpoint resistance of antennas and for designing impedance matching networks. Measure RF resistance up to 500 ohm. Covers all ham bands 160-10 Meters. Built-in resistance bridge, null meter, tunable oscillator-driver, frequency counter jack. 7½x2½x2¼ inches. Use 9 volt battery or 110 VAC with MFJ-1312, $12.95

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Technical Help: 800-647-TECH(8324)

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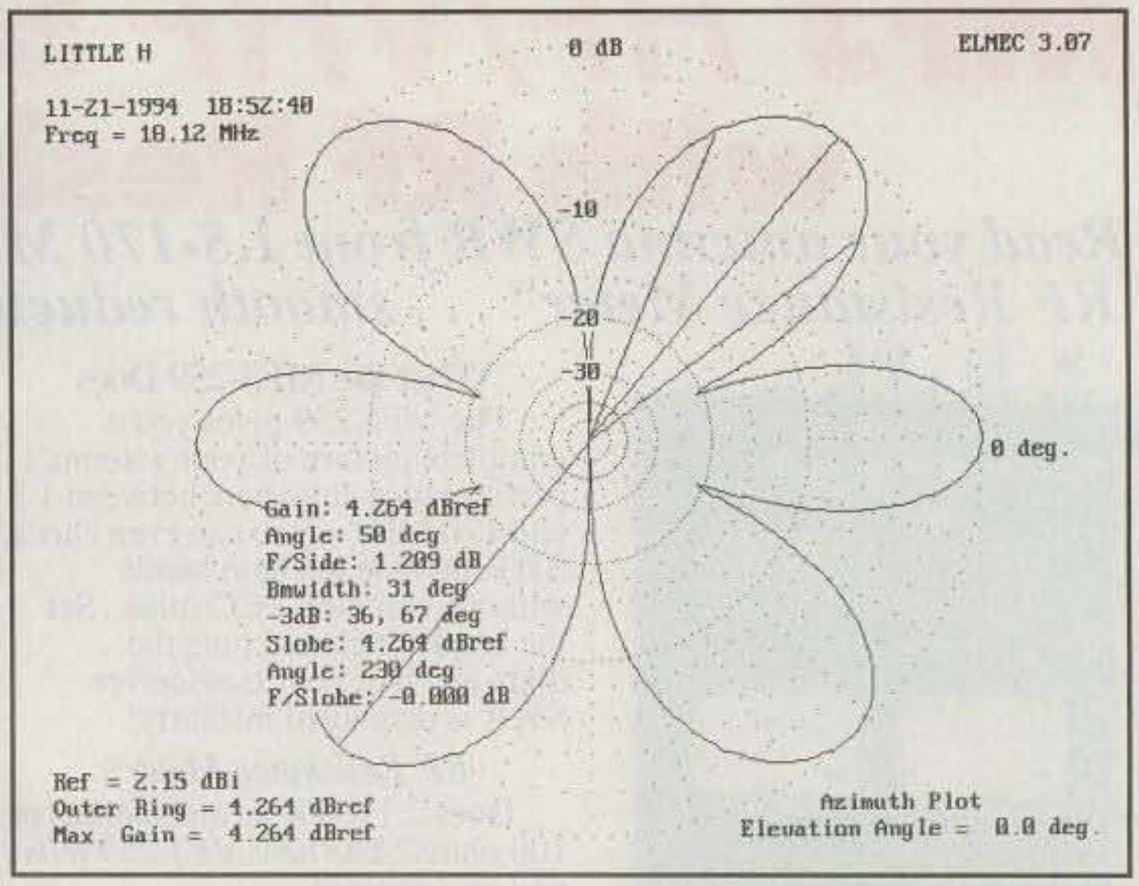


Fig. 4(B)– The 17 meter horizontal pattern.

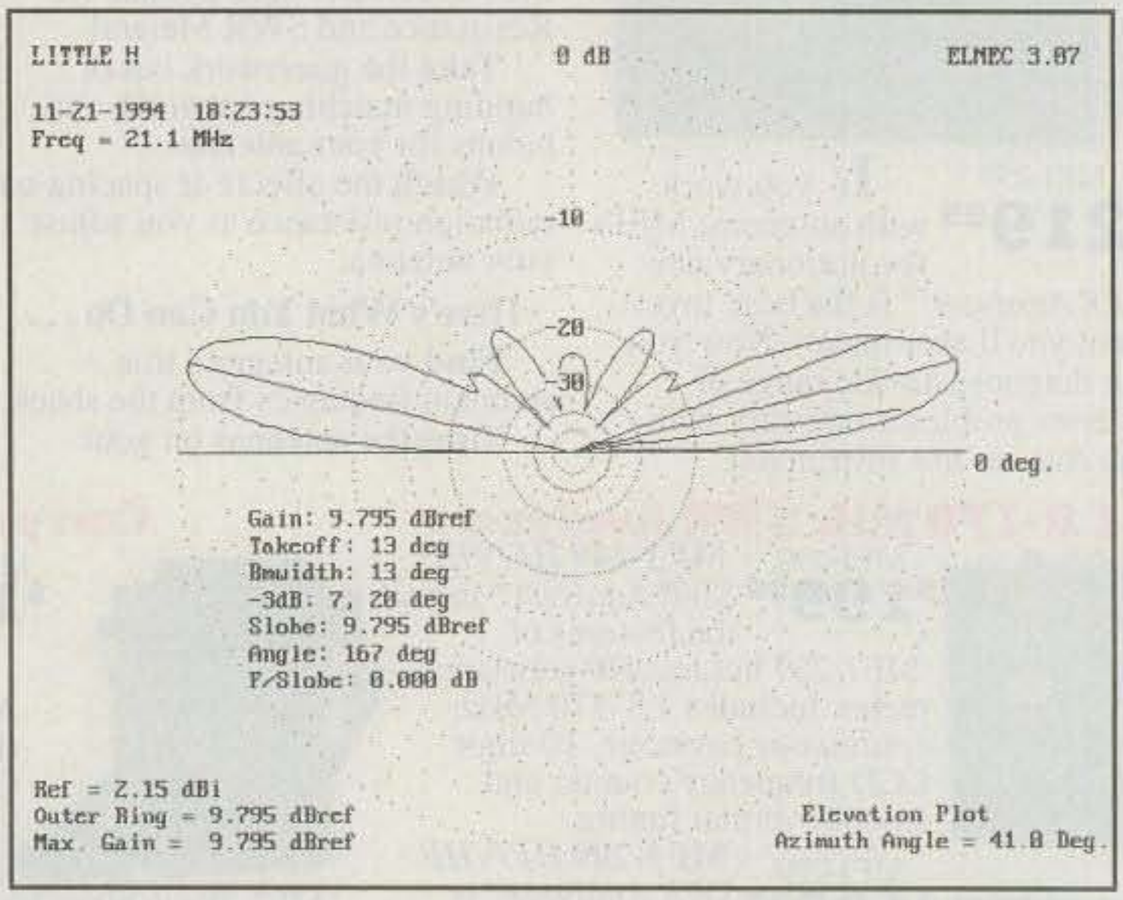


Fig. 5(A)– The 15 meter vertical pattern.

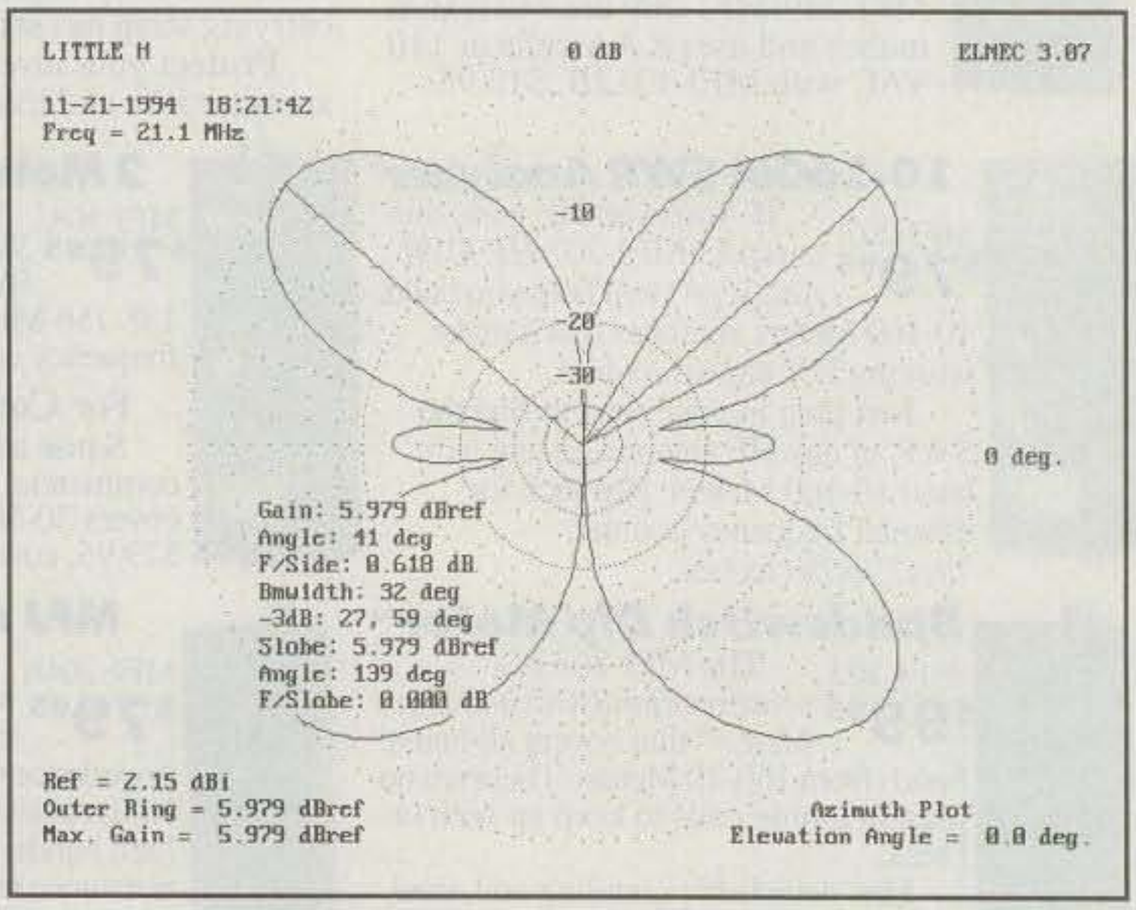


Fig. 5(B)– The 15 meter horizontal pattern.

MFJ ACCESSORIES

Compact Speaker/Mics

MFJ-284 or MFJ-286
$24.95

Here's a* Compact *Speaker/Mic that fits comfortably in your hand and has a* full size *speaker for crystal clear audio.

No need to remove your handheld from your belt to talk or monitor calls. Clip it near your ears so you can easily hear every call with the volume turned down.

First-rate electret mic element and full size speaker gives superb audio on transmit *and* recieve. Earphone jack, PTT, light-weight retractable cord. Gray. 1¼x2x3 in.

MFJ-284 fits Icom and Yaesu. **MFJ-286** fits Kenwood.

Mini Speaker/Mics

MFJ-283, MFJ-285, MFJ-285L, MFJ-285W, MFJ-287 or MFJ-287L
$24.95

These* tiny *MFJ Speaker/Mics are so small and so lightweight you'll forget they're there -- until you get a call.

Excellent audio from electret mic element and speaker. Has swiveling lapel /pocket clip, PTT button with transmit LED, earphone jack, lightweight retractable cord. Available with L or regular connector. *Tiny* 2x1¼x¼ in.

Order MFJ-285/MFJ-285L for ICOM, Yaesu, Alinco; **MFJ-287/MFJ- 287L** for Kenwood; **MFJ-283** for split plug Alinco; **MFJ-285W** for IC-W2A.

L Connector also available - order L model.

MFJ Artificial RF Ground

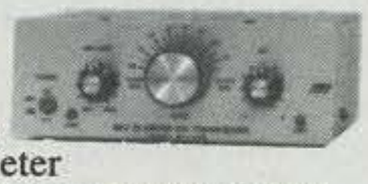
MFJ-931
$79.95

Creates artifical RF ground that eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding.

Greatly improves your signal if you're using a random wire or longwire antenna with an ineffective ground.

Electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

20 Meter CW Transceiver



MFJ-9020
$179.95

Throw this *tiny* MFJ 20 Meter CW Transceiver in a corner of your briefcase and enjoy DXing and ragchewing wherever you go. You get a high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, sidetone, speaker, up to 5 watts output, semi/full break-in, much more. *Free* manual. See *free* MFJ catalog for 40, 30, 17, 15 Meter versions, keyer, audio filter, power pack, tuner, antennas.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to- operate active antenna...quiet...excellent dynamic range...good gain... low noise...broad frequency coverage... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz - 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote has 54 inch whip, 50 ft. coax. 3x2x4 in. 12 VDC or 110 VAC with MFJ-1312, $12.95.

$129.95 MFJ-1024

Cross-Needle SWR Meter

MFJ-815B
$69.95

Peak/ average Cross-Needle SWR/ Wattmeter. Shows SWR, forward/ reflected power in 2000/500 & 200/50 watt ranges. 1.8-60 MHz.

Mechanical zero. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

"Teflon® is a registered trademark of Dupont"

MFJ Coax Antenna Switches

$34.95 MFJ-1701

$21.95 MFJ-1702B

$59.95 MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. One year *unconditional* guarantee.

MFJ-1701, $34.95. 6 position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. 10x3x1½ in. DC-60 MHz.

MFJ-1702B, $21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. *MFJ-1702BN, $31.95, N connectors, DC-1.1 GHz.*

MFJ-1704, $59.95. 4 position cavity switch with lightning/surge protection. Center ground. 2.5 KW PEP, 1 KW CW. 50 dB isolation at 500 MHz. 50 ohm. 6¼x4¼x1¼ in. *MFJ-1704N, $69.95, N connectors.*

Dry Dummy Loads for HF/VHF/UHF

MFJ has a full line of dummy loads to suit your needs. Use for tuning to reduce needless (and illegal) QRM and save your finals.

$29.95 MFJ-260B

$59.95 MFJ-264

MFJ-260B, $29.95. VHF/ HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. 300 Watts for 30 seconds, derating curve. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2½x2½x7 in. *MFJ-260BN, $34.95, N connectors.*

MFJ-264, $59.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. 100 watts/10 minutes, 1500 watts/10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 in. *MFJ-264N, $69.95, N connector. MFJ-5803, $4.95, 3 ft. coax/ PL-259.*

MFJ Low Pass Filter

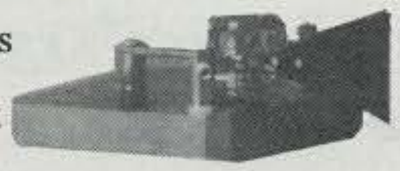
Suppress TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna. 9 poles, MFJ's exclusive *Teflon® Dielectric Technology™* capacitors, hi-Q inductors, ground plane shielding, RF tight cabinet gives excellent TVI/ RFI protection. Full legal power 1.8-30 MHz. Mounting tabs.

MFJ-704
$39.95

MFJ Iambic Paddles

MFJ Deluxe Iambic Paddles feature a full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. For all electronic CW keyers.

MFJ-564
$49.95



Full Color FAX

Use your computer and transceiver to receive, display and transmit *brilliant full color* news photos and incredible WeFAX weather maps with all 16 gray levels. Also receive/transmit RTTY, ASCII and CW.

Animate weather maps. Display 10 global pictures simultaneously. Zoom any part of picture or map. Manager lists over 900 FAX stations. Automatic picture capture and save.

MFJ-1214PC
$149.95

MFJ/Bencher Keyer

The best of all CW worlds --a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

MFJ-422B
$134.95

Iambic keying, speed (8-50 wpm), weight, tone, volume controls. Automatic keyer or semi-automatic ("bug")/tune mode. RF proof. 4⅛x2⅝x5½ in.

MFJ-422BX, $79.95, keyer only for mounting on your Bencher paddle.

12/24 Hour LCD Clocks

$19.95 MFJ-108B

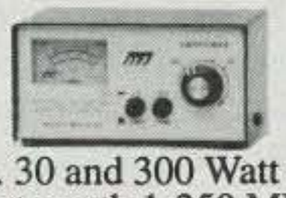
$24.95 MFJ-112

MFJ-108B dual clock has separate UTC and local time displays. Huge 5/8 inch LCD digits are easy-to -see. Brushed aluminum frame.

MFJ-112 shows hour/minute/ second, day, month, date, year at any QTH on *world map*. 12 or 24 hour display. Daylight saving time feature.

VHF SWR/Wattmeter

MFJ-812B
$29.95



Covers 2 Meters and 220 MHz. 30 and 300 Watt scales. Relative field strength 1-250 MHz, SWR above 14 MHz. 4½x2¼x3 in.

Code Practice Oscillator

MFJ-557
$24.95

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable. 9-volt battery or 110 VAC with MFJ-1305, $12.95.

Earphone jack for private practice, tone and volume controls for a wide range of sound. Speaker. Adjustable key. Can be hooked to transmitter. Sturdy. 8½x2¼x3¾ in.

MFJ Multiple DC Outlet

MFJ-1118
$64.95

Use your rig's 12 VDC power supply to power two HF/VHF rigs and six or more accessories with this MFJ *high current* multiple DC outlet.

2 pairs of 30 amp 5-way binding posts separately fused for rigs. 6 switched, fused pairs for accessories. DC voltmeter, "on" LED, RF bypassed, 6 ft. of 8 guage power cable. See *free* MFJ catalog for more DC outlets.

Write or call . . . 800-647-1800

Free MFJ Catalog

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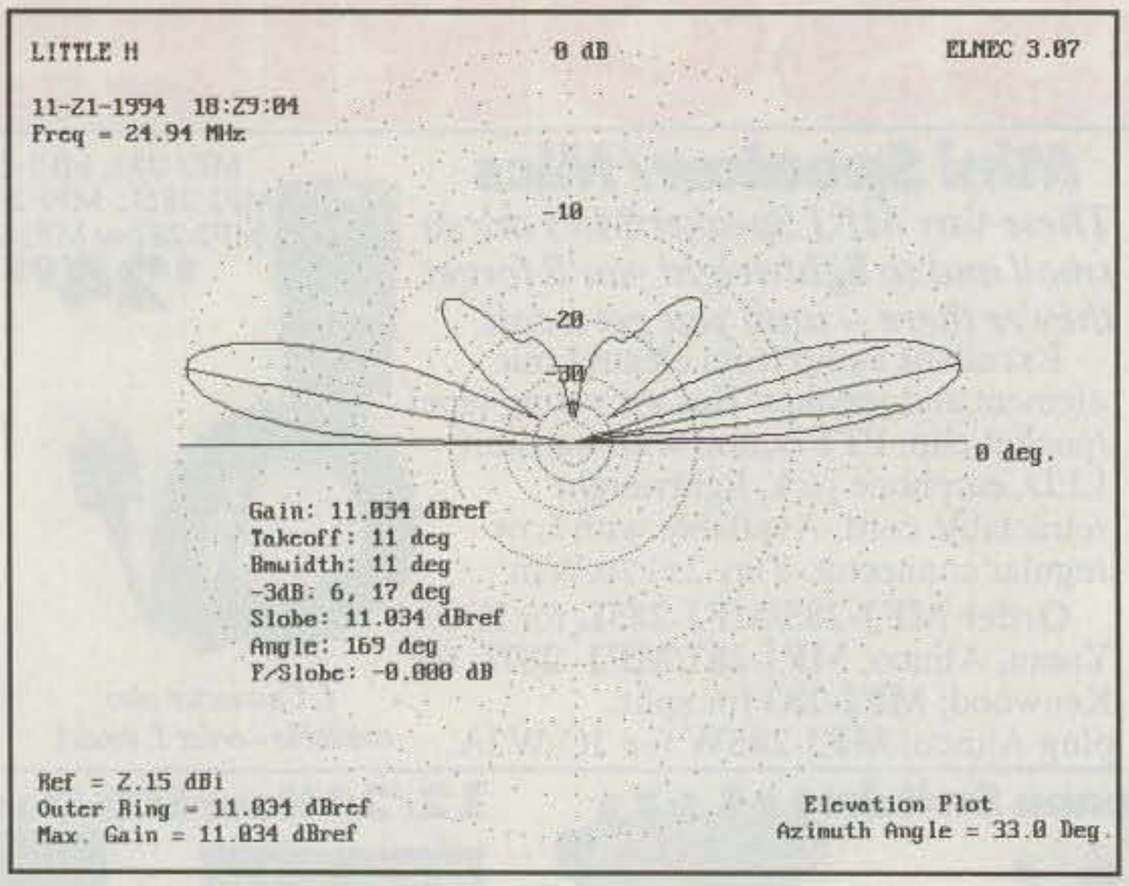

Fig. 6(A)– The 12 meter vertical pattern.

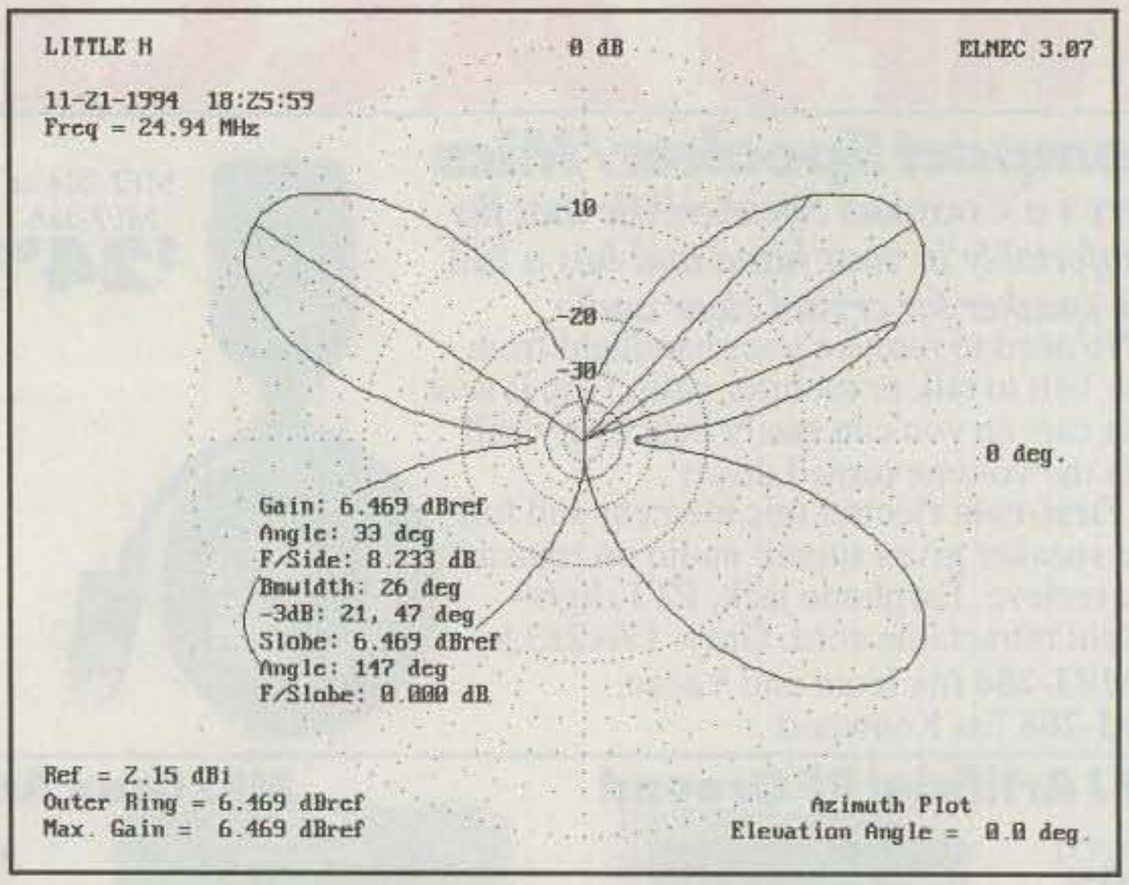

Fig. 6(B)– The 12 meter horizontal pattern.

the opportunity to design another antenna and make the installation domestically acceptable. Here then is the result of that effort.

Why A Lazy H?

Let me take a moment for a bit of antenna theory. The Lazy H is a member of the dipole family of antennas. The most widely known antenna in this family is the half-wave dipole. This antenna produces the familiar "figure 8" pattern. This basic pattern is maintained until the length of the antenna exceeds one wavelength, at which point the pattern begins to produce side lobes.

We can use this fact to sculptor the radiation pattern to suit our needs. If we put two dipoles into a properly phased array, we can attain good gain and maintain the desired pattern. This is the basic philosophy I used for the antenna described here.

Antenna Patterns

Let me give you a few specifics about the parameters used in generating the antenna patterns. The top wire was modeled at 60 feet above average ground, and the bottom wire was 33 feet below at a height of 27 feet. The wires were 78.5 feet with both wires fed in phase. The horizontal patterns were generated in free space, and the vertical patterns used the real ground option. This gives us a fairly realistic gain figure that we can discuss, and an anticipated vertical launch angle. I used Roy Lewallen's ELNEC analysis program. The wires are routed from top to bottom on each pattern (see figs. 1– 7).

My favorite band of operation from my auxiliary location is 17 meters. I wanted an antenna with multiple lobes that would produce gain in the desired directions. The antenna described here has six lobes and produces a predicted free-space gain of about 4 dBd. That was the primary goal, and it was readily attained.

The spacing of 33 feet between the radiating conductors was chosen to take advantage of the gain available in this configuration. For 20 meters the estimated gain over a dipole in free space is better than 6 dBd. There are some multi-element beams that can't claim this figure. From the on-the-air tests, I have no reason to doubt this computer estimate.

I have generated patterns for the antenna from 40 through 10 meters. In the interest of brevity, I will allow you to make your own evaluation.

Construction Details

Construction of the antenna is very simple. Here's how to proceed.

Start by cutting two pieces of wire to a length of 78.5 feet. Next fold each wire back on itself and cut them again. You

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Single U-bolt mounting for 1 to 1½ inch mast. Cutting chart included for 220/440 MHz. Made in USA.

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2 Meter halfwave J-pole antenna

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Roll up this *halfwave* 2M J-pole antenna and stick it in your pocket! It's the perfect *gain* antenna for traveling.

Get home station performance on the go. Just hang your *MFJ Pocket Roll-Up*™ in the clear and plug the BNC connector into your handheld.

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B. *FlexiDuck*™, **MFJ-1716, $16.95.** Similar to MFJ-1717. Full ¼ wave on 440 MHz, efficient loaded ¼ wave on 2 Meters. 8¾ inches.

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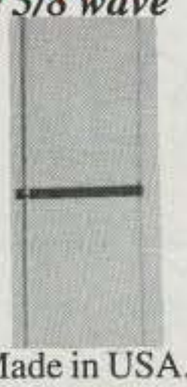

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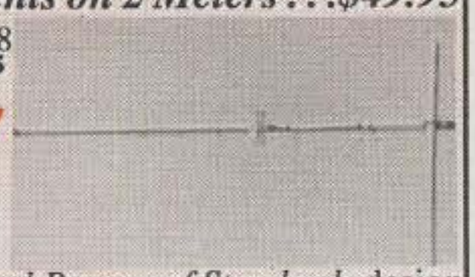

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Portable 3 element Yagi for 2 M

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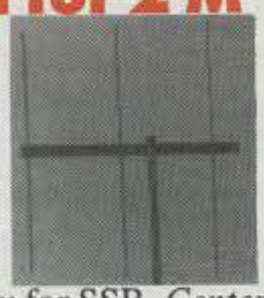

You can set up or take down MFJ's *portable* 3 elements 2 Meter Yagi in seconds! Elements simply screw into the boom.

You can take it with you wherever you go and have the "oomph" and directivity of a beam.

It's easy to store and sturdy enough to use as your home station antenna.

Mounts vertically for FM/packet or horizontally for SSB. *Center* or *end* mounts with single U-bolt. Great for packet/PacketCluster™.

It's compact 2¾ foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

Extra thick elements maintain high gain and directivity over entire 2 Meter band. MFJ's *FerriteChoke*™ decouples feedline.

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B. *Dual Bander*™ for 2 Meters and 440 MHz, **MFJ-1712**, $14.95. Got a new dual band handheld or separate units? One antenna fits all. It's a ¼ wave for 2 Meters and a ⅝ wave with gain for 440 MHz. 7¼" collapsed, 19" extended.

A. B. C.

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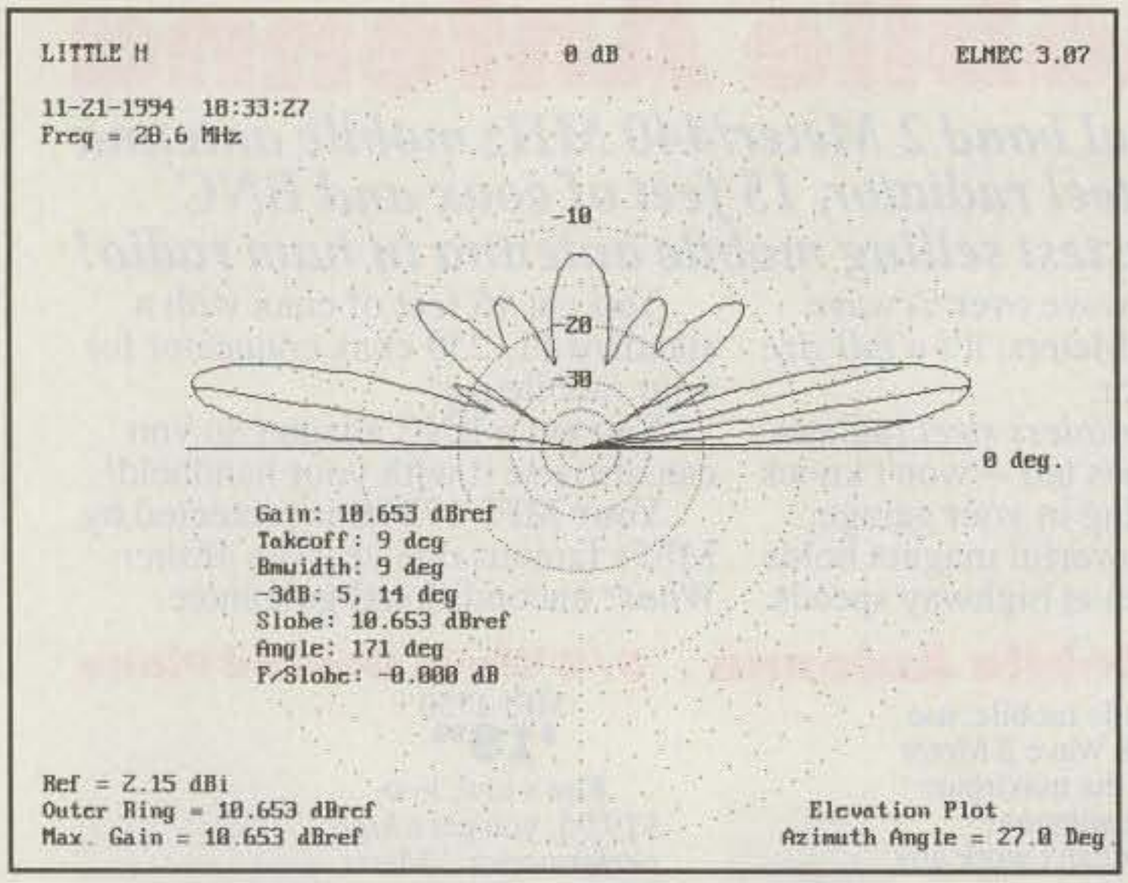

Fig. 7(A)– The 10 meter vertical pattern.

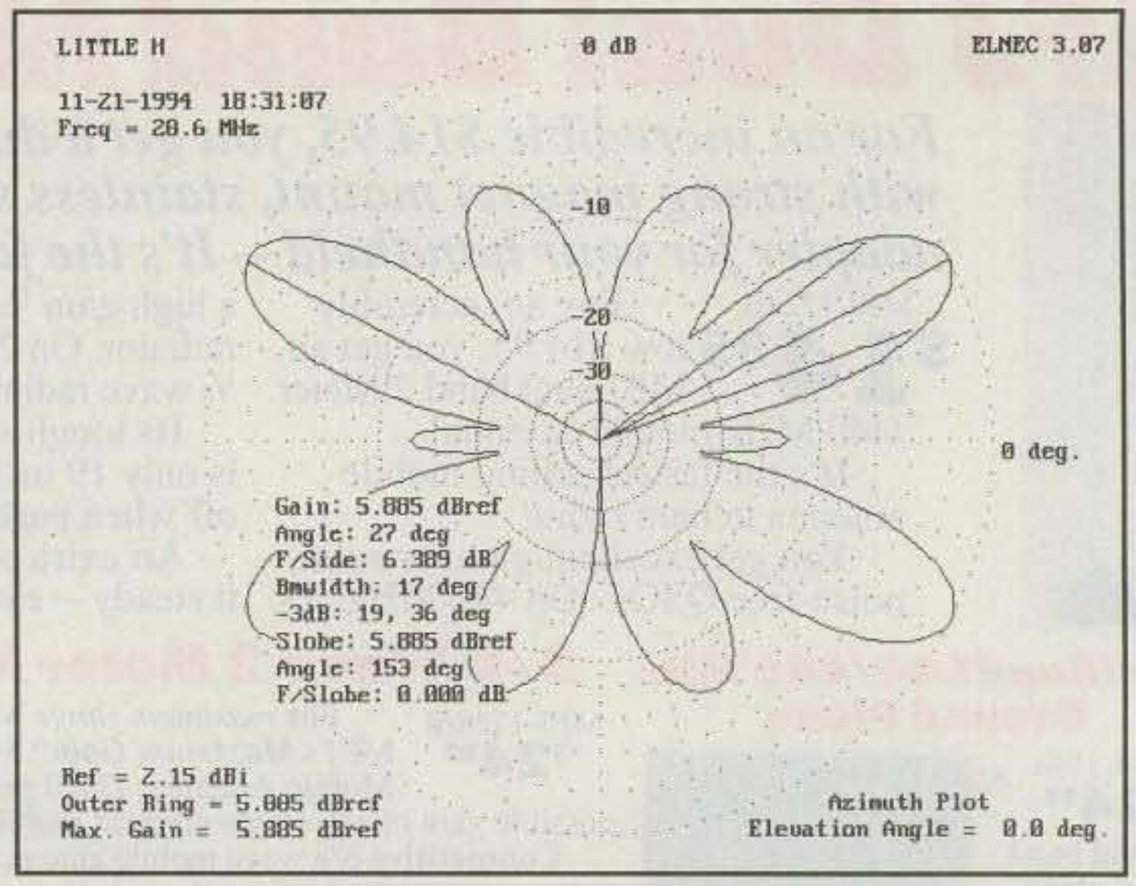

Fig. 7(B)– The 10 meter horizontal pattern.

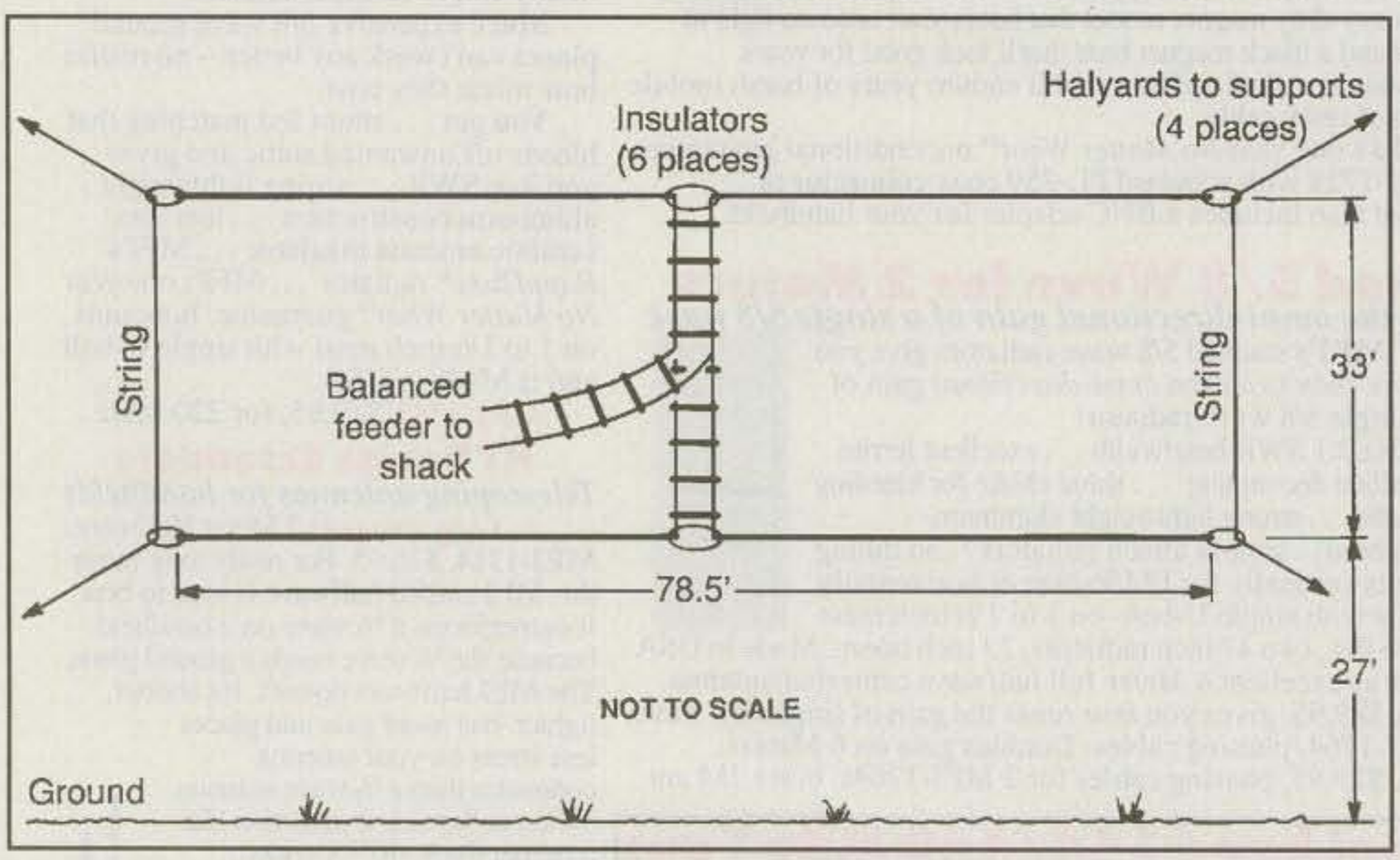

Fig. 8– Construction details of the Lazy H antenna.

now have four pieces of wire approximately 39 feet in length. These will become the two dipoles for the array. Place an insulator in the middle and at each end of the dipole element. Make a second dipole identical to the first.

Now cut 33 feet of balanced transmission line to use as the phasing harness. (I used 450 ohm insulated ladder line, but any balanced feed line that will handle the power will suffice.) Fold the balanced line back on itself to locate the center and remove the insulation if necessary. This will be the feedline attachment point. Lay the phasing line flat on the ground and solder it to wire extending to the center insulator just as if you were building a dipole element. To verify that everything is okay, take an ohmmeter and check continuity at the ends of the dipole elements. The ends of the antenna that will be on the same side of the array should show a very low resistance. Remember, the top and bottom elements must be in phase for the antenna to work properly.

We are almost finished. Connect a balanced feedline to the center of the phasing harness. Cut two pieces of nylon string to a length of 33 feet each. Tie these strings to the end insulators to ensure proper spacing when the antenna is in the air. Inspect all work. Verify that the phasing is proper and all soldered connections are well made. Check to see that the strings are tied properly. Make any corrections that are necessary. The antenna is ready to go into the air.

Antenna Placement

I am sure that you have your own favorite way of getting a wire into the air. For your consideration, here's the way that I accomplish the task. I use a sling-shot and a lead weight attached to the end of a monofilament line from a fishing reel. I fire the lead weight over the chosen branch of the support tree. I use the fishing line to pull a length of builder's twine across the branch. Then I attach a halyard to the builder's twine and pull the halyard across the branch. The halyard can then be used to pull the end of the antenna into its final position.

One word of caution: Be sure to have halyards attached to the ends of the bottom dipoles before you hoist the antenna into final position. This will be necessary for proper tension of the antenna array. When using a sling-shot, use caution. Remember, these devices can be very dangerous weapons. **SAFETY FIRST!** Route the end of the feedline to your operating position and attach to the balanced input of your transmatch. Now you are ready for the initial test.

On-The-Air Results

I have been very pleased with the antenna since its installation. It loads smoothly on all bands from 40 through 10 meters. I took special care to verify the predicted lobes on 17 meters, and they seem to be just as predicted by the antenna analysis program. Please remember the orientation of the lobes when choosing your support structures. I have my antenna placed in a north-south orientation and that seems to be ideal for my part of the world.

Afterthoughts

Although the Lazy H antenna has been around for many years, you may not be familiar with its characteristics. Some of the good points about the antenna: it's easy to build, it's inexpensive, it works well, and it can easily be tailored to fit specific needs. This may be just the antenna you have been looking for. ■

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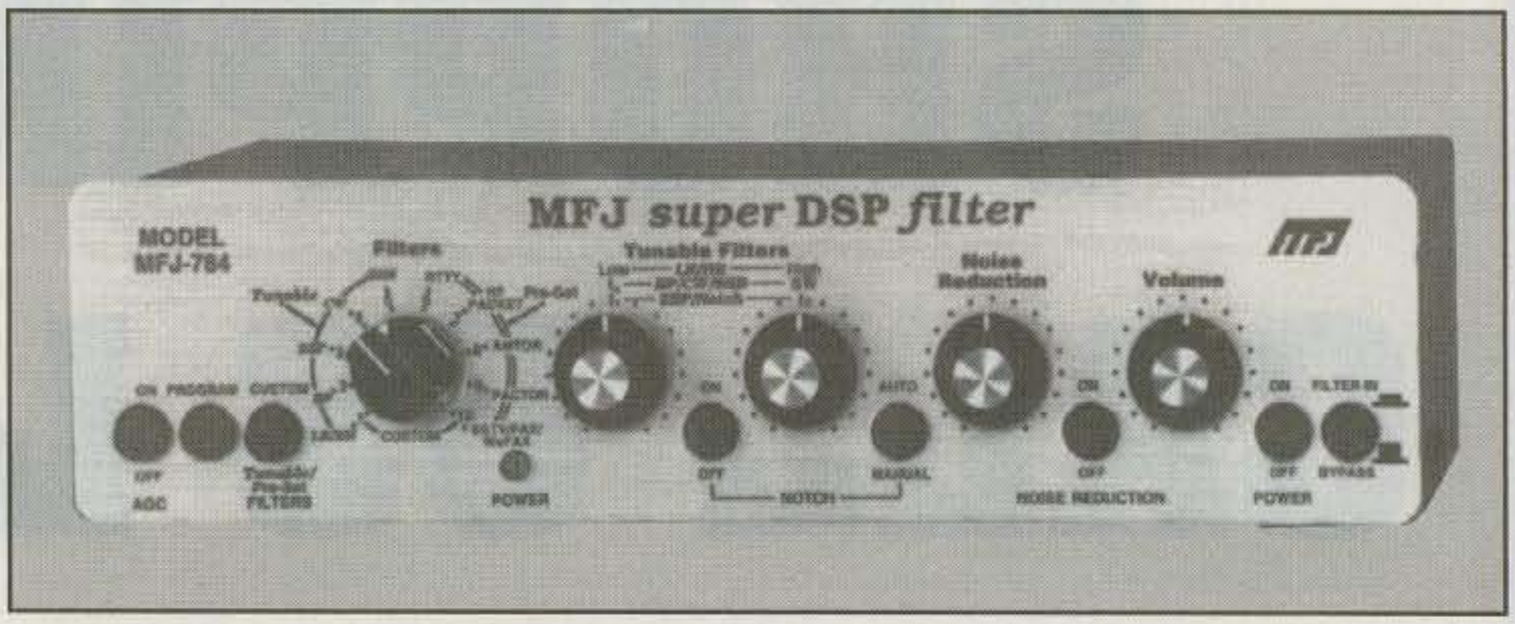
CQ REVIEWS:

The MFJ-784 Super DSP Filter

BY DOUG DeMAW*, W1FB/8

One of the most significant technical advances in radio communications occurred when W9GR introduced his digital signal processing (DSP) circuit in the amateur literature. Since that historic time there have been a number of commercially manufactured DSP units introduced on the amateur market. MFJ Enterprises, Inc. recognized the utility of this type of device among amateurs who were willing to pay for received-signal enhancement to minimize noise, QRM, and pesky heterodynes from "tuner uppers." The MFJ-784 was therefore born and adorned with some interesting and special "extras" that weren't available on competitive DSP products. This product review describes the 784 features and performance observations at W1FB.



Exterior front view of the MFJ-784 DSP filter.

How DSP Works

A DSP circuit changes analog input signal energy into digital information. This occurs at audio. The conversion is accomplished by sampling the input signal many thousands of times per second with an analog-to-digital (A-to-D) converter—a common technique from the early days of computers. The recovered digital information is composed of a string of "numbers" that represent the amplitude and frequency of the input signal. This resultant digital data can then be processed by means of several digital-filter algorithms. This produces a digitized signal from which the undesired components have been removed. The digital signal energy is changed back to audio by means of a digital-to-analog converter (D-to-A). The reconstructed signal is then amplified and routed to the speaker or headphones. The DSP unit connects between the receiver headphone jack and a speaker or headphones.

MFJ Circuit Features

Unlike some of the other DSP units on the market, the 784 has tunable filters for the various operating modes. Two panel controls permit the operator to adjust the center frequency and bandwidth of the filters to suit his or her particular needs. Preset filter responses are available for CW, SSB, RTTY, HF packet, Amtor, Pactor, and SSTV/FAX/WeFAX at the flick of a panel switch. There is a separate switch position for a bandpass filter response, plus a position that allows the operator to create a band-reject filter (narrow or wide rejection notch). The upper and lower cutoff frequencies are set by means of two panel controls.

Although the MFJ DSP filter has preset filter responses for the various operating modes, provision has been made to tailor the filter responses manually and store them in a built-in memory. Up to ten filters can be programmed from the front panel of the unit. The DSP memory will then remember all of the custom settings. They may be called up and used after pushing the CUSTOM button. When the button is released, the factory preset, tunable filters are reinstated. The custom programming cannot be used to control the on-off, filter bypass, AGC, or volume functions. These customized filter responses can't be adjusted for frequency and bandwidth from the front panel, as can the factory preset filters.

Noise-Reduction Feature

A special noise-reduction circuit is included in the MFJ-784 DSP filter. It is made operational by means of a push-button switch and operates in all of the filter modes. It is not functional when the DSP unit is in the BYPASS mode. A noise-reduction potentiometer is located on the front panel of the DSP filter. It is adjusted for the degree of noise reduction desired. Random noise (depending on its nature) can be reduced more than 20 dB with this feature.

The Notch Filter

Unwanted heterodynes are eliminated when the NOTCH circuit is activated. In the AUTO mode this effective circuit hunts for and notches up to four interfering frequencies. Attenuation can be as great as 50 dB in the automatic mode. In the manual mode two frequencies can be nulled out, and attenuation is on the order of 40 dB. The automatic notch feature is disabled for CW, RTTY, HF packet, Amtor, Pactor, SSTV, and FAX/WeFAX. However, it may be used for these modes in the MANUAL position. The notch frequency and depth are adjustable from the front panel when using the MANUAL mode.

Bypass Mode

The MFJ-784 may be left connected to the station equipment at all times. During non-filter operation it is necessary to apply power (+12 volts) to the DSP unit (POWER ON) to permit its 2 watt audio amplifier to operate the headphones or speaker. The FILTER IN/BYPASS push-button, however, is set for the BYPASS mode.

Performance Observations

I had the opportunity to test one of the early DSP filters that was built from a kit by a colleague of mine, Harold Johnson, W4ZCB. I was greatly impressed with the enhanced reception of signals when interference was present. I was not convinced that I needed such a device for

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**FNB-26(S)	7.2v @	1500 MAH
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**1/4" longer than FNB27

FNB-31	4.8v @	600 MAH
FNB-33(S)	4.8v @	1500 MAH
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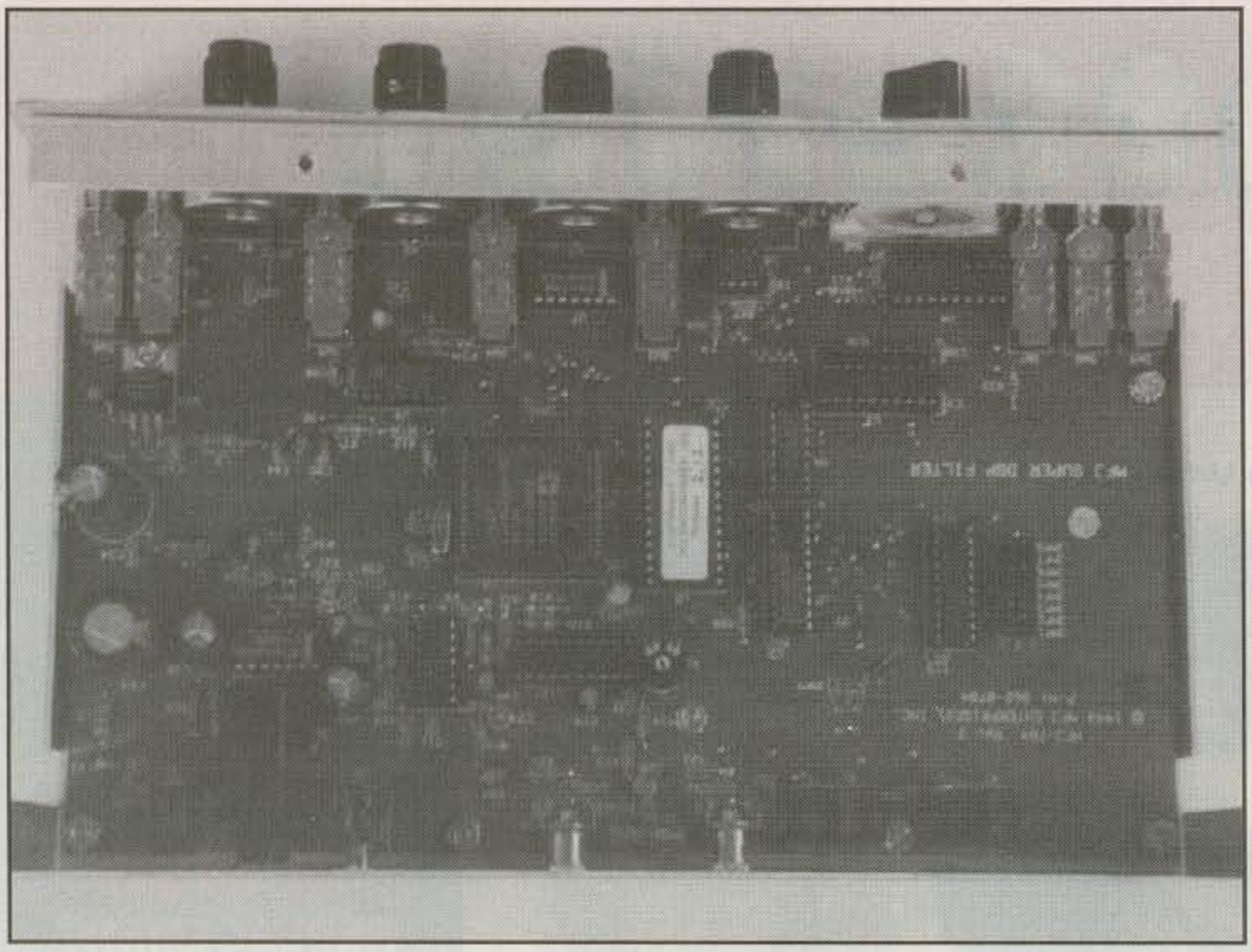


Interior view of the DSP filter showing the orderly placement of component parts.

the type of amateur operation I conduct (CW and SSB), and since I am no longer a DXer or contester, weak-signal reception amid QRM and noise no longer presents a challenge for me. However, the added features of the MFJ-784 make having a DSP filter a definite asset, even for casual ragchewing on the MF and HF bands.

It is important to point out that any DSP filter changes the so-called "natural" quality of the voice that is being processed. Its effect may be equated generally to listening to an SSB signal from an operator that is using a speech processor with a relatively high level of compression. This makes the signals stand out above the noise threshold, and the narrower the bandwidth is set the greater the effect.

The 784 has a selectable AGC circuit that helps to keep signals at a constant level when QSB is prevalent. This audio-derived AGC keeps the signal amplitude constant when incoming signal-level changes are less than 17.8 dB. I found that this circuit works as specified, and that it is an asset especially when band conditions are unstable.

Care must be exercised during initial setup of the 784 to ensure that the receiver audio output level is correct for the DSP filter. It should be set for normal volume without the filter in the line. Once the receiver AF gain control is properly set for the input level required by the 784, the audio gain is adjusted with the VOLUME control on the DSP unit. Should the receiver deliver too much signal to the 784 under the foregoing conditions, the operator will need to adjust the INPUT LEVEL ADJUST control on the rear panel of the unit. Excessive audio input causes a distorted output signal. Insufficient audio input energy prevents the filter from functioning.

CW Operation

The filter bandwidth for the CW mode is adjustable from 30 to 700 Hz over a peak frequency range of 300 to 1000 Hz. I was able to lift weak, unreadable CW signals out of the residual noise to provide RST 539 copy while using the DSP filter. Removing nearby beat notes from other CW signals was a simple matter while using the notch feature, which is adjustable from 150 to 3400 Hz.

SSB Operation

The SSB filter center frequency is adjustable from 600 to 1700 Hz. Variable bandwidth for this mode is 1000 to 2500 Hz. The settings for these two characteristics will depend upon the composition of the voice signal being received. I tend to juggle these controls to make the voice energy pleasing to my ear. The narrower bandwidth settings are used when QRM is a problem. Beyond a doubt, the SSB filter boosts the signals above the background noise and gives them "presence" that is not there without the filter. The automatic notch feature is a blessing because it removes unwanted carrier beat notes that can render a signal unreadable. Whether the QRM is intentional or not, the notch circuit gets rid of that annoyance.

Noise-Reduction Feature

I was skeptical about the value of the noise-reduction capability of the 784 when I first hooked it up. After years of disappointment with the noise blankers in HF-band transceivers, except for certain types of pulse noise, I suspected that this function was window dressing rather than an effective tool. I was wrong. Loud static crashes are not minimized by the DSP filter, but various types of constant background noise, such as power line noise, can be made unoffensive (up to 20 dB reduction).

As an example, one morning while operating SSB on 160 meters a weak station joined our QSO. My S-meter showed a residual band and manmade noise level of S8. The weak signal appeared to be S8 also. I could only copy a word now and then, until I engaged the noise-reduction option. After advancing the noise-level control almost fully clockwise, the weak signal became Q5, and

the noise was scarcely discernible with the receiver audio gain set for a normal listening level. There was some degradation of voice quality while operating in this mode, but it was a worthwhile tradeoff for being unable to copy the weak signal. This is not an option that most amateurs would use constantly, but it represents an asset when the going gets rough. Experimenting with the 784 center frequency and bandwidth controls is recommended for improving the voice quality when using the noise reducer.

Other Features

Two DIN jacks are located on the rear apron of the DSP filter. They can be used for radio to TNC connection. These ports permit the 784 to be interfaced with MFJ TNCs or other TNCs without disturbing the speaker or headphone connections. These ports can be connected to practically any radio by means of preassembled MFJ-50XX series cables that are sold by the manufacturer.

Internal plug-in jumpers are available for making a number of performance changes in the 784. Notable among them is the ability to activate a CW sidetone filter frequency and to change the data mode mark-space frequencies for RTTY, HF packet, Amtor, and Pactor. Detailed data for this feature is contained in the operating manual. Basically, the jumpers may be used to override the filter default settings.

Physical Characteristics

The MFJ-784 is 2½"H × 9½"W × 6"D. The cabinet is black and the panel has a brushed aluminum finish. Interconnect cables are not provided with the filter.

An outboard power supply (10 to 16 VDC @ 350 ma peak) is required. MFJ provides a mating wall transformer (MFJ-1315, $14.95) for those who don't have a suitable power supply.

In Summary

I am greatly impressed with the performance of the MFJ-784 DSP filter. It is unusual for me not to find fault with some feature of a new product, but this one is a winner! The interior reflects what I frequently call a "sanitary" condition. The PC board is well populated with neatly arranged ICs and component parts, and the wiring is tidy and well done. I recommend this unit as a day-to-day tool for any amateur station.

The price class of the MFJ-784 is $220. The manufacturer is MFJ Enterprises, Inc., Box 494, Mississippi State, MS 39762 (phone 601-323-5869; orders 1-800-647-1800). ■

K7YHA begins this two-part series with a discussion of just what QRP is and the amazing things that can be accomplished with far less than you might think.

A Low-Power (QRP) Primer

Part I—What It's All About

BY RICH ARLAND*, K7YHA

"It is vain to do with more, what can be done with less."

—William of Occam (1290–1350)

Even though the invention of radio communications was over 500 years in the future, I think Bill would have made one heck of a low-power communicator!

I know what you're thinking: With the sunspot cycle winding down and the lower HF bands becoming very crowded, how can any sane radio amateur even entertain the idea of using low power to communicate on a global scale? To start with, conditions on the HF bands are not as gloomy as many "experts" might have you believe. This article will serve to acquaint the newcomer to low-power communications with what to expect when he or she drops the RF output down to 5 watts (or lower) and enters the QRP arena.

First of all, let's define QRP as practiced by today's radio amateur. True QRP (low-power operation) is done with an RF *output* power of 5 watts *or less.* Now this is *not* a lot of radiated power. As a matter of fact, 5 watts of RF energy will light a small Christmas tree bulb to full brilliance. It is hard to comprehend that this meager amount of RF power can actually span the globe and provide a medium of communications for amateur radio operators worldwide.

While the "Q-signal" **QRP** really means "Please reduce your power" (or if used with a question mark "**QRP?**" means "Shall I reduce my power?"), this particular Q-signal has been used for many years to denote low-power operations in general.

Harry Bloomquist, K6JSS, formed the QRP Amateur Radio Club International (QRP ARCI) in 1961 to promote the economic use of RF power. In the beginning the QRP ARCI defined QRP operation as using 100 watts *input* power (or less). The idea was to reduce the interference (QRM) on the bands by reducing the amount of RF power used. In 1980 members of the QRP ARCI redefined the term *QRP* to mean RF power *output* of 5 watts or less. A major change in the club bylaws and structure occurred, and the QRP ARCI became the largest organization in the world exclusively dedicated to true low-power communications.

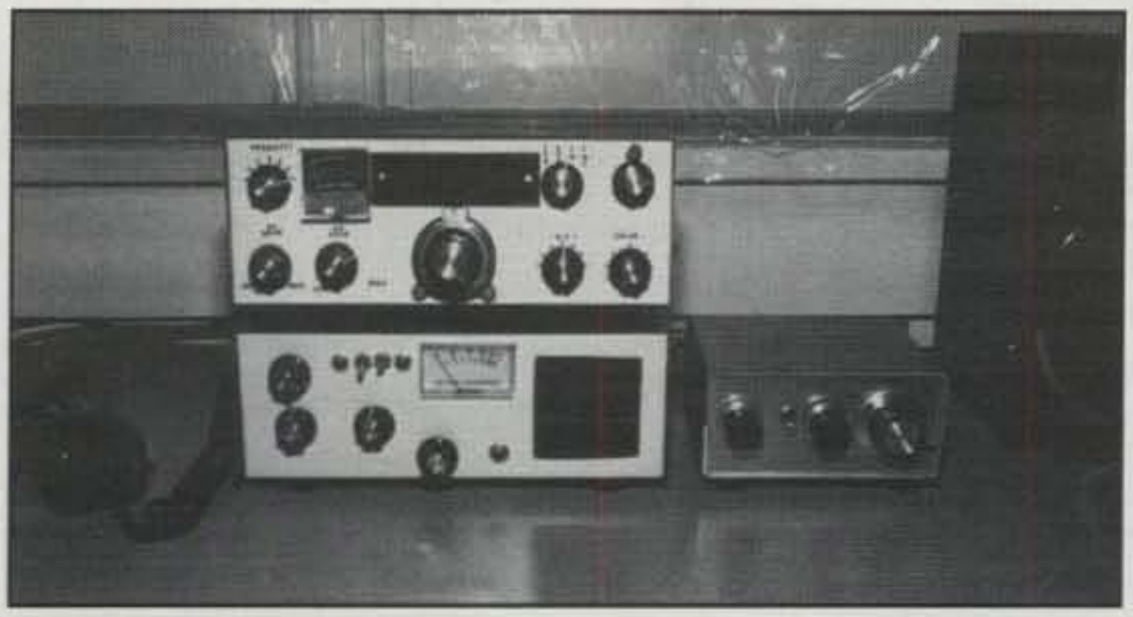
*25 Amherst Avenue, Wilkes-Barre, PA 18702-1606

Fred Turpin, K6MDJ, lives in the mountains above Los Angeles and is a founding member of the legendary Zuni-Loop Mountain QRP Expeditionary Force, the premier QRP Field Day group. Fred's shack is an outstanding example of simplicity and comfort. (Photo by Cheryl Turpin)

We have defined QRP, but what *is* QRP? Up until the last several years QRP was primarily low-power CW practiced by radio amateurs using a variety of commercial and/or homemade equipment. Then came the digital computer explosion. With the advent of low-cost personal computers and multi-mode data controllers (MMDCs) the entire spectrum of digital communications was suddenly open to the low-power communicator. By hooking up a Kantronics KAM to a Ten-Tec Argonaut 509 HF QRP transceiver I was able to work low-power RTTY, AMTOR, and HF packet radio, in addition to computer-generated CW and of course SSB.

Several of the Low Earth Orbit satellites (namely the Russian RS-10 and 12 satellites) respond quite well to QRP power levels on their respective uplink frequencies. This opens the door to satellite communications for the low-power communicator. So how do we *now* define QRP? It is full-blown amateur radio done at the 5 watt level.

In 1923 Robert Kruse, 1XAM, then Technical Editor of *QST*, in an article entitled "Miles Per Watt: An Argument For The Small Set and For Intelligence In Place of Brute Force; Also a New Efficiency Contest" wrote, " . . . doesn't more credit belong to the man who hauls signals 50 miles per watt than to the one who has to use greater power to haul them only 25 miles per watt?" As you can see, the high-power versus low-power debate has raged for over 70 years, and Kruse was a big fan of the low-power operator. In his



Lou Hilenski, KA3ICD, designed and built this tiny SSB/CW transceiver for 80, 40, 10 meters. His creation features a superhet receiver, with digital readout, RIT, and active audio filtering. The rig sits atop a matching SWR/antenna tuner and power supply. Next to the homebrew rig is a NorCal-40 single band CW rig currently offered as a kit by the Northern California QRP Club. (Photo by K7YHA)

Cam Hartford, N6GA, contest manager for the QRP ARCI, sits at his shack in Claremont, California. Cam is very active on the bands and has a nice selection of QRP gear, including two generations of Ten-Tec Argonauts, a Heath HW-9, a NorCal-40, and NorCal Sierra. You can find Cam lurking on the CW portions of the bands. Give him a shout. (Photo by Robin Hartford)

1924 *QST* series entitled "The New American Amateur" he did little to hide his contempt for the "ether busters," "watt hogs," and "thunder factories" that crowded the bands with intense interference.

The "New American Amateur" as defined (in 1924) by Kruse and the ARRL was not satisfied with mediocre station and antenna performance. He (the "New American Amateur") sought an efficient station by employing low-loss, high-efficiency designs in his equipment and antennas. He studied and became an expert in propagation theory and antenna design, constantly seeking to upgrade his station. Finally, he practiced good operating techniques and worked to improve his skills for making contacts and handling traffic.

In over 70 years of amateur radio not much has changed. We still suffer from crowded band conditions and interference caused by the "watt hogs," "ether busters," and "thunder factories." In George Santayana's in series of books entitled *The Life of Reason, Vol. I, Reason In Common Sense, George* said, "Those who cannot remember the past are condemned to repeat it." Is there a message for us here?

Using low power (and I'm talking *real* QRP) on the HF bands makes good sense in this day and age. We are at the beginning of a new century, one that will yield many new wonders and drastic changes in our lifestyles. QRP operation dovetails

nicely with the current trends in doing more with less. Its low bio-environmental impact makes QRP *the* communications philosophy of the 21st century.

Low-power communications also offers the frugal QRPer the option to design and build some or all of his station. QRP transmitters, receivers, and transceivers range from the ultra-simple one- or two-transistor rigs to full-blown superhet designs with offset tuning, digital readout, single-signal reception, and outstanding performance. All this can be had for a fraction of the cost of higher powered commercial offerings. Home construction and QRP seemingly go hand in hand. The great majority of QRPers have built some of their station equipment, and as a result they have gained valuable electronics knowledge and construction experience. These same QRPers have also experienced the thrill of working DX using homebrew equipment.

Many QRP operators also tend to gravitate toward natural power sources such as wind, solar, and hydroelectric generators to power their stations. Take a couple of 40 watt solar panels, add a set of deep-cycle batteries and a charge controller, and you have many years worth of "free" power available for your QRP station. These non-polluting energy sources, coupled with the lower amounts of radiated RF energy used in QRP, lead us back to our low bio-environmental impact statements earlier in this article.

As you can now see, QRP makes sense from a number of points of view. It might make sense, but will it work? Will I be able to make contacts on the bands, or will I just become the laughing stock of my local amateur radio club?

Relax. Low-power communications works. The accompanying chart shows relative S-meter readings as referenced to specific power levels over identical transmission paths. We arbitrarily assign 1000 watts to equal an S-9 signal. We can demonstrate a relationship between S-meter readings and radiated power using this method. Technically, each S-unit differs from the preceding S-unit by a factor of 6 dB. Another way to state this is that for each increase (or decrease) of one S-unit, the associated power must increase or (decrease) by a factor of four! Let's see if we can make sense out of this chart.

Going from S-9 to S-8 (a 6 dB drop) yields a power decrease from 1000 watts to 250 watts (a four-fold drop in RF energy). As we go from S-8 to S-7 the power level again takes a four-fold drop from 250 watts to 63 watts. If 63 watts equates to S-7, dropping down to S-6 means we decrease our power by another factor of four, to 16 watts. Taking this one step further, going from S-6 to S-5 yields another four-fold drop in RF power to 3.9 watts. At last! We are now in QRP country.

Let's look at the chart closely. In reality there is only a four S-unit difference between our kilowatt "ether-busting thunder factory" and our 4 watt QRP signal. An S-5 signal is not a difficult signal to copy for those radio amateurs with more than embryonic operating skills. In reality, the kilowatt station normally would be well over S-9 (somewhere in the region of 10 to 20 dB over), which would mean that our QRP signals would be proportionally larger, making an even stronger case for the use of QRP on the HF bands.

Now that we theoretically have shown that QRP will work, you are probably chomping at the bit to get on the air and start making low-power contacts. Let's put on the brakes for a while and go over some basic operating philosophy.

First of all, the nice thing about QRP operation is that unlike many specialized facets of the radio hobby, you don't have to dash right out and buy some new piece of gear. You can get a real feel for low-power communications by using your existing HF rig and antennas. There are two ways to proceed from here. First: Jump right in and turn the power down on your HF rig to 5 watts *output* and start answering other amateurs calling "CQ."

A more attractive alternative to option number one is to take your commercial transceiver and turn down the power from 100 to 25 watts. Now proceed to make some contacts at the 25 watt level for a week or two. This will serve to whet your

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QRO VS. QRP POWER LEVELS									
S-units:	S-9	S-8	S-7	S-6	S-5	S-4	S-3	S-2	S-1
Power (w):	1000	250	63	16	3.9	.97	.24	.06	.02

Table I– Relative S-meter readings as referenced to specific power levels over identical transmission paths. (Note: Power levels have been rounded off to the nearest watt or decimal equivalent.)

appetite for even lower power as you find out how easy it is to make contacts using only one fourth of your transceiver's full output power.

After a week or two at the 25 watt level, drop the power down to 10 watts and try some QSOs at this power level. One thing you will notice is that there is very little difference between the 10 watt and 100 watt level when it comes to the ease of making contacts. Finally, after making a few contacts using 10 watts, go "whole hog" and reduce your output power to a meager 5 watts. Now you are truly QRP. You will be amazed at the ease with which you are able to initiate QSOs with other stations using this level of power.

At this point someone is sure to bring up the "other operator" and his dedication and skill at pulling your peanut-whistle signals out of the noise. Without trying to sound condescending, let me state that to say the "other operator" is doing all the work when you run low power is utter nonsense. If the other operator lacks the basic operating skills needed to carry on a conversation on the HF bands without his S-meter being bent around the peg, then he/she needs to take up another hobby.

Let's back track a bit and clarify one thing. In the previous exercise of gradual power reduction from 100 watts down to 5 watts, we were working in the CW mode. There are two reasons for this. First, it is much easier for the new QRPer to turn down the RF drive control on the transceiver in the CW mode. In most modern HF transceivers the ALC circuitry in the SSB mode has to be modified or "tricked" using external batteries (as with the ICOM family of HF rigs) to work properly at reduced RF drive. In most cases your transceiver's manufacturer can provide the details for modifying your rig for QRP SSB operation.

Second, it is easier to copy CW signals than it is to copy SSB signals over the

Paul Stroud, AA4XX, and Fran Slavinski, KA3WTF, swap QSL cards to confirm an historic event. On December 26, 1994 these two QRPers established a new world record of 1.9 million miles per watt on the 40 meter amateur band. Paul used a modified Oak Hills Research "QRP Classic" transceiver adjusted to 221 microwatts and a three-element wire beam to contact Fran, 422 miles away. Known as "hard core QRP," microwatting on the HF bands takes desire, patience, tenacity, and dedication, not to mention a quiet location. (Photo by K7YHA)

same transmission path, against the same background noise. CW enjoys a better than two to one margin over SSB for ease of copy under adverse conditions. Actual figures (as presented in *The Shortwave Propagation Handbook* by George Jacobs, W3ASK, and Dr. Theodore Cohen, N4XX (2nd edition, copyright 1982, pg. 16) show that a CW signal has to be only 3 dB above band noise at the receiving station for readable copy as compared to 7 dB for SSB signals. Hence, the majority of QRP takes place using CW.

Since you are now fully entrenched in the QRP philosophy, it is time to reflect a bit on some tried-and-true operating habits that will make life in the QRP trenches a bit easier.

When it comes to the question of calling CQ or answering someone else who is calling CQ, opt for the latter. You will find that your success rate when answering someone calling CQ is about ten times higher than when you call CQ. The reason is simple. Your power output is about 13 dB below a normal 100 watt station. This is slightly over two S-units, but it is enough to cause others to tune right over your signals when you call CQ. When you answer someone else's CQ you stand a much better chance of establishing a contact, since that person is listening for stations and can readily recognize his (or her) callsign even when it is sent by a station several S-units below normal signal levels.

Learn the fine art of "tail-ending." This technique is extremely effective for the low-power communicator because it is highly unlikely that your QRP signals will produce significant interference to the QSO in progress. Following is how tail-ending works.

Let's say I'm listening to a QSO between two stations. ZA1A is in QSO with W9KNI, and I want to establish contact with the ZA, since he would be a new country for me. After listening to the exchange, I slide my callsign in just as W9KNI signs back over to ZA1A. Nothing elaborate; just a quick "K7YHA QRP" will suffice. Since the comparative signal strengths between Bob's signal and mine will be drastically different, ZA1A will mostly likely hear my weaker signal underneath W9KNI's and know that I'm standing by to work him. Don't over-use this technique. However, when the need arises, this is a great "equalizer" against the QRO crowd.

Don't hesitate to tune slightly above or below what you think the other station's optimum frequency happens to be. We all have become accustomed to hearing a CW sidetone of about 750 to 800 Hz. Many experienced CW operators prefer a much lower beat note—somewhere around 500 Hz. If the other operator is using a very steep-skirted CW filter, there is a good chance you will not even enter

the audio passband of his receiver if you use a 750 to 800 Hz tuning offset. So tune around. It's worth a shot.

Stay away from the pile-ups. On occasion I have busted a pile-up using as little as 2 watts output power, but that is the exception rather than the rule. One memorable evening I was tuning around 10 meters and heard a pile-up trying to work VP8CKA in the Falkland Islands. Several of the "big gun" locals were in the fray, so I elected to listen for several minutes just to get down the operating characteristics of the VP8. He was moving about only slightly, and the entire pile-up was directly on the VP8's frequency.

I came back to the pile-up after about 20 minutes only to find propagation had shifted and he was working stations in the two and three call areas. Once I got the timing down, I did a tail-ending maneuver, sending "K7YHA QRP" just once. No sooner had I finished than the VP8 stood by for me! "Go ahead the QRP station." I gave him a "59" report (yes, it was a SSB contact) and sat back listening to the crescendo of the pile-up quickly build again after the VP8 operator acknowledged my report. Several *loud* QRO stations tried the "QRP" trick, but the VP8 was too smart to fall for that ruse. I noticed that two of our local "big guns" were still in the melee trying to get the VP8's attention as I tuned off frequency to find another juicy DX tidbit.

Learn to listen. As simplistic as this sounds, it is absolutely vital for the QRP operator to develop superior listening skills. What is there to listening? Grab a set of headphones and tune around the band, right? Wrong! Listening skills are some of the most difficult skills to develop, but they are also the most essential to the low-power communicator.

Honing your listening skills need not be classified as drudgery. I regularly play a listening game called "bandscanning," in which I pick a band and, starting at the low band edge, proceed to tune upward. I try to identify each station I hear as quickly as possible. The idea here is to be able to rapidly form an idea of what shape the band is in and into which areas the propagation corridors are open. This exercise is a lot of fun, and it accomplishes several things.

First, it challenges you to quickly pick out callsigns. Second, by identifying both stations in QSO you can get an idea of how the propagation is running on that particular band. Third, bandscanning causes you to become very adroit at "search and pounce" techniques, which come in handy for contesting. Finally, this exercise helps you understand each band. Every HF band is different. Propagation peaks differently and at different times. Getting to know the bands intimately is a very good way to ensure success in the low-power arena.

Timing is everything in the low-power world. Even when there is no pile-up, your timing when transmitting your callsign is of paramount importance. Don't waste time trying to send a two-by-two reply; "ZA1A ZA1A de K7YHA K7YHA QRP" is way too long. The ZA operator will surely be giving a signal report out to someone else while you're still in the middle of signing your callsign. Instead just insert your callsign once—"de K7YHA QRP"—and even if the other operator is only semi-skilled, he will know you are there and awaiting his reply. Also, wait up to two or three seconds *after* the other station signs his callsign to transmit your call. If there are others calling him, by delaying your callsign you are more likely to hit a lull in the bedlam and have a chance of being heard. Obviously, if you run across a DX station all alone and calling "CQ" with no one answering him, take the time to give him a one-by-two reply: "BY1PK de K7YHA K7YHA QRP."

One comment about appending your callsign with "QRP." The mainstream of low-power communicators are split as to whether or not to include the "QRP" suffix along with their callsign. Sometimes it works; sometimes it doesn't. Since you are giving up a 13 to 20 dB power advantage, why not use every trick you can to get into the other guy's logbook? It certainly can't hurt.

Learn to interpret the National Bureau of Standards WWV/WWVH propagation information given at 18 minutes after each hour on *exactly* 2.5, 5, 10, 15, and 20 MHz. Knowing how the **A** and **K** indices interrelate can save you hours of frustration trying to use low power on bands that are suffering from heavily disturbed propagation. Tracking the flux index on both a short- and long-term basis can help you make the best use of your operating time. Knowing that the sun shows us the same surface area every 27 days can help you plan your operating schedule to take advantage of times of increased sunspot activity.

Always use the highest frequency band that has propagation into the area to which you want to communicate. This is where propagation prediction programs can make a tremendous impact on your QRP operating. Taking advantage of increased sunspot activity and the associated increase in solar flux can really make the difference in low-power communications. Knowing where to go and when is all important. When 10 meters is in, it is undeniably the best QRP band, followed by 15 and 20, respectively. If the flux is depressed and there is not enough ionization to enable 10 meters to "open up," then drop down to 15 or 20 and give things a try.

Forty meters is the best of the "low bands" for QRP operation, followed closely by 30 meters. On 40 meters you can work DX, rag chew, check into nets, and do about anything else you can imagine. There are probably more 40 meter single-band QRP transceivers in existence than for any other band. Why? Because 40 offers something for everyone. During QRP contests (yes, we do have contests just for low-power operators) 40 is *the* band to be on at any given time. After local midnight propagation lengthens, and I have worked consistently the west coast from my northeast Pennsylvania QTH using only 900 milliwatts RF output. When you do contact other QRPers on 40 meters, you will be amazed at their signal strengths. RST 599 reports are not all that uncommon on 40 CW between two low-power stations.

The WARC bands—30, 17, and 12 meters—all offer virgin hunting grounds for the low-power communicator. The trick is to get efficient antennas erected for these three bands in order to take advantage of their unique propagation characteristics. Of the three, 30 meters is probably the best all-around QRP band. It has the propagation characteristics somewhere between 40 and 20 meters, while the maximum allowable RF output on the band is only 250 watts! This is a real boon to the QRPer. QRM is less and your chances of being heard are greatly increased.

(To Be Continued)

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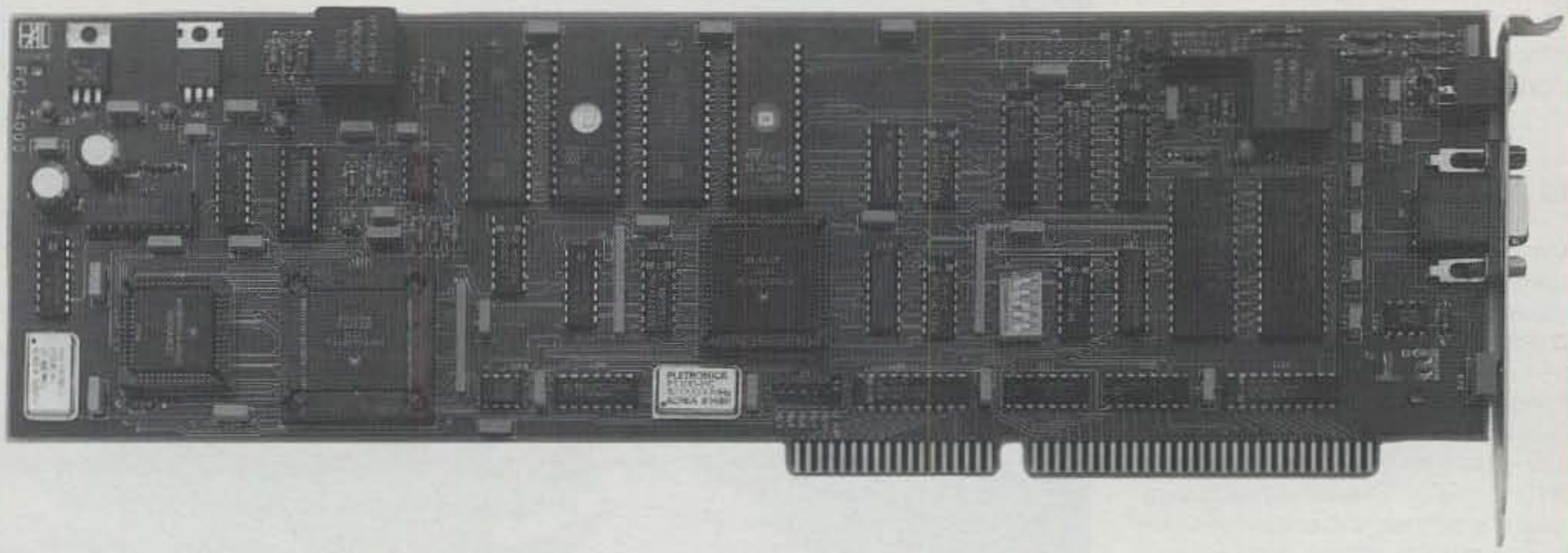

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Random Reflections

This time we'll reflect on and update many of the "Antennas and Accessories" topics we covered in earlier columns, and we'll also cover considerable new territory. Let's begin where we should—with antennas.

This month we profile the Lakeview Company of Anderson, South Carolina. Lakeview makes a comprehensive line of inexpensive, high-quality, and good-performing fixed-station and mobile antennas and accessories. Here is company president Butch Shira, N4WHB, hard at work (or so he says). (N4WHB photo)

Antenna Notes

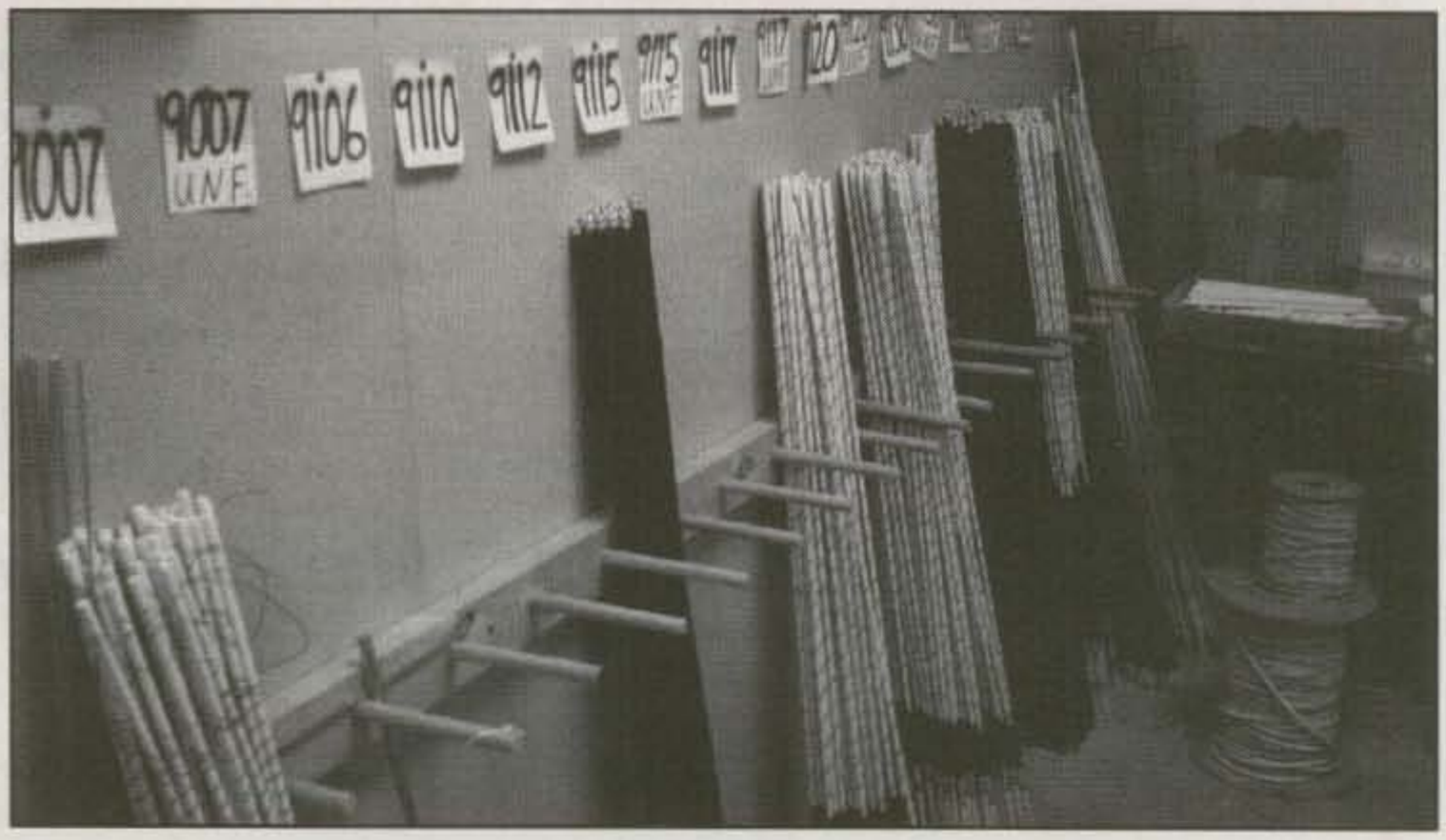
The Lakeview Company: A Profile. On several occasions we've mentioned the inexpensive, high-quality, and good-performing fixed-station and mobile antennas and accessories made by the Lakeview Company of Anderson, South Carolina. We began covering Lakeview products in the early 1980s after discussions with founder George Shira, WD4BUM, at southeastern hamfests, where he proudly exhibited his latest antennas and antenna accessories. We were impressed with what we saw.

George founded the company in 1982. His thinking was the cost of a simple antenna was entirely too high, and he could build antennas himself that would outperform others. This "build a better mousetrap" approach resulted in the first Hamstick mobile HF antenna. Since George introduced the original WD4BUM Hamstick, many companies have copied the Hamstick design and the name as well.

To start, George assembled the antennas in his garage with the help of XYL Rosie, WD4RUA, building them during the week and selling them at hamfests on the weekends. As with any good product, business increased, and eventually a separate building was built to manufacture the antennas. The first employee was hired in 1984, and in 1987 the building that housed the manufacturing operations was enlarged.

George retired from the company in 1991, turning the reins over to son Butch, N4WHB, as company president. Butch expanded the product line to include many more HF, VHF, and UHF antennas for base-station and mobile use, along with additional accessories and mounts. Butch believes in "buying American," so all the products are made in the Anderson shop using American-made parts. He plans to keep the innovations coming and the service (including good technical support for his products) up to his dad's high standards.

The Lakeview product line now is offered by over 100 dealers, but the company still sells direct. A six-page flyer covers the entire Lakeview product line and includes the Hamsticks, the Carolina Bug Katcher, the WD4BUM Inducti-Match, and an enhanced discone scanner antenna. For a free catalog, contact Lakeview Company, Inc., 3620-9A Whitehall Road, Anderson, SC 29624 (1-800-226-6990).



When Lakeview founder George Shira, WD4BUM, retired in 1991, son Butch took the reins. He expanded the product line to include many HF, VHF, and UHF antennas for base-station and mobile use, along with more accessories and mounts. Here are the company's Hamsticks in various stages of construction. (N4WHB photo)

Maldol USA Antenna Products. Last year Maldol, a major Japanese antenna manufacturer, set up shop in Seattle under Jim Smith, KA7APJ, for better stateside distribution of its products. Maldol makes well over 100 different antenna products, including various single band and multiband VHF and UHF mobile antennas, antenna mounts, duplexers, and power/SWR meters.

One of the company's more unusual products is the MK-30 series Power Mounts. These are motorized, tilt-over mobile antenna mounts that let you swing your vehicle's antenna down

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The C-4: 40-20-15-10

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Our customers tell us that the *C-3*, and now the the *C-4*, outperforms every commercially made, trapped tribander, regardless of boomlength. And, the *C-3* is the easiest to assemble and put up, plus coverage on 17 and 12 mtrs. The forward gain is superior to high-claimed marketing numbers from trapped antennas.

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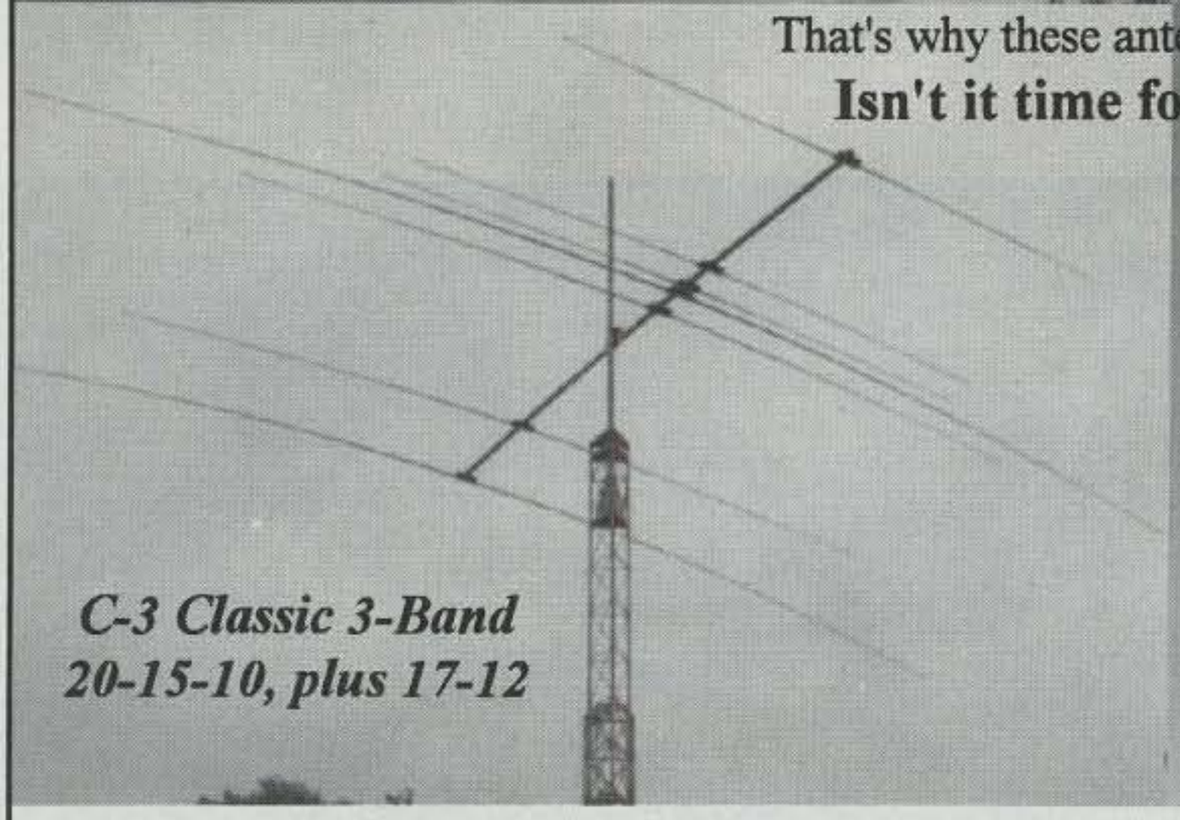
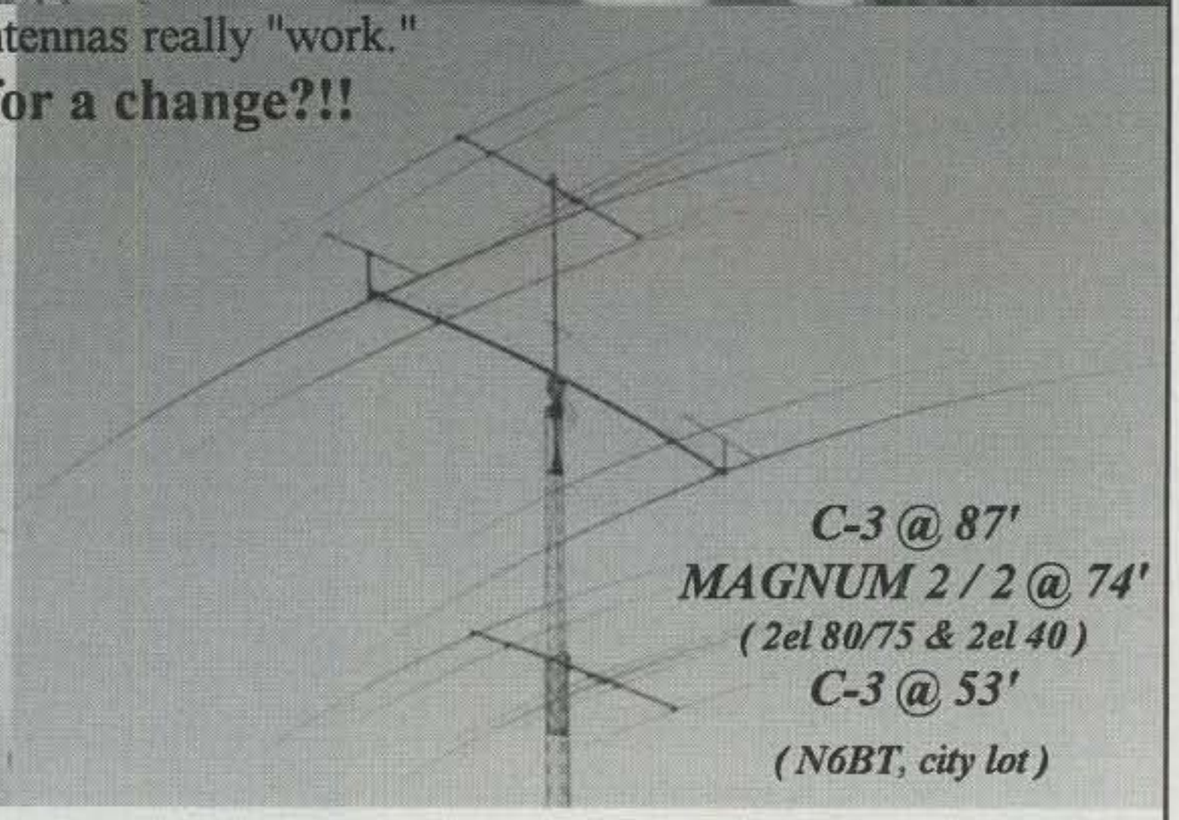


C-3 Classic 3-Band
20-15-10, plus 17-12



C-3 @ 87'
MAGNUM 2 / 2 @ 74'
(2el 80/75 & 2el 40)
C-3 @ 53'
(N6BT, city lot)

The fantastic ***C-3*** performance has been extended to 40 meters. The ***C-4*** incorporates a re-designed EF-140S 40 mtr element on the standard ***C-3*** boom for more than 100 kHz 2:1 VSWR coverage on 40 mtrs. If you are presently enjoying the great performance of a ***C-3***, you can upgrade it to a ***C-4***. To recap some ***C-3*** features, it has 7 elements that are strong and tapered, for a pleasing look. Utilizing Force 12's forward stagger and NOMAD designs, all 7 elements function on all the bands to enhance the performance. The ***C-3*** has deep side nulls and a fine pattern; F/B 14-18 dB. The ***C-3*** has an 18' boom and is fed with a single 50 ohm coax. Its light 32 pounds, 19.8' turning radius and exclusive Easy-On™ mounting make the ***C-3*** easy to put up anywhere. It can be temporarily assembled for field use and assembles with standard wrenches and a hand riveter. The element-to-boom brackets are pre-aligned on the boom, so every element is straight and will not move. Small rotators are fine. The ***C-4*** maintains the same turing radius and weighs about 40 pounds. A separate feedline for 40 mtrs is provided, 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.

The C-3 is available at all 12 HAM RADIO OUTLET stores. List is $449.95. The C-4 lists at $599.95. Buy now & have fun!

Force 12
Antennas and Systems

For full brochure: **(408) 720-9073, (800) 248-1985**, FAX **(408) 720-9055**.
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Here a Lakeview employee patiently winds a Hamstick, one of the company's most popular and most widely imitated products. Your columnist always wondered how they wound those things! (N4WHB photo)

In this photo a Lakeview Company worker is shown busily hand-winding a VHF antenna coil. All the products are made in the Anderson shop using American-made parts. (N4WHB photo)

by remote control from the driver's seat to avoid damage from parking garages and other low overhangs. The mounts are available for roof, trunk, or rack mounting, and they handle antennas up to 65 inches long.

Maldol also emphasizes antennas for limited space, especially for what they call the "balcony ham." One of these is the 10 pound VC-3 Triband HF Antenna for 40, 15, and 10 meters. It can be mounted either vertically or at an angle to the ground (in V-dipole fashion, something like a corner reflector). The VC-3 handles 150 watts and is $269.99.

Another Maldol limited-space antenna is the LGP "L" Ground Plane. The LGPs are loaded verticals designed for monoband (40, 20, 15, 10, and 6 meters) and dual-band operation on 40 and 15 meters. The LGP series vertical antennas handle 100 watts and are priced from $74.99 to $149.99, depending on the particular band(s) and configuration.

On a side note, in keeping up with modern product information and technical support trends, Maldol has installed a dial-up "FAX on demand" system, which it calls AnswerFax. It lets you use your FAX machine's voice handset to call and request documents from an extensive menu, and receive the documents via FAX immediately. Besides technical information and product literature, product reviews, hints and tips, hamfest schedules, and VEC testing dates are offered.

Before we move onto another topic, we should mention that Maldol's "FAX on demand"

or "FAX retrieval" technology is rapidly changing the way you get tech support on computers and other electronic gear, and the technology is starting to have a positive impact on amateur radio support as manufacturers come on board. Now you can call a vendor's dedicated FAX line, 24 hours a day, from almost anywhere; enter a simple, voice-prompted menu; and have product and support information sent to your FAX or PC immediately.

Such systems often offer a wealth of information. You typically can order various product information and technical support documents such as installation guides, diagnostic information, troubleshooting guides, application notes, problem notices, bug fixes, and more, just by pressing numbers on your telephone keypad. Using prerecorded messages in a question-and-answer voice tree, the system tells you that it can transmit documents by FAX and offers you the choice of ordering a catalog of documents or specific documents. The system also asks you for your FAX number, and then it transmits the documents to your own FAX machine or PC.

'Nuff said about that little sidelight. For a Maldol catalog, contact Maldol USA, 4711 N.E. 50th Street, Seattle, WA 98105. Their FAX on demand and voice mail are at 206-525-1896.

Davis RF Communications Accessories Catalog. In the July 1989 and January 1992 columns we profiled the Davis RF communications products catalog. As we said then, Davis RF is a full-line supplier of antenna wire, cable, and parts.

The Davis RF catalog has grown considerably since we last perused it. Presently it features a large selection of wire aerial parts, ground radial wires, openwire feedline, ladderline, Dacron UV rope, coaxial cable, standard and remote—control coax switches, relays, baluns, insulators, stainless steel hardware, and other RF accessories.

The centerpiece product offered by Davis RF (for which they are the wholesale distributor) is the Hybrid #14 AWG, 168-strand Flex-Weave™ copper dipole/quad wire. This strong, highly flexible, and long-lasting wire is rapidly taking the place of common 7- or 19-strand copper weld or solid armor-clad wire often used in wire antennas; the alternative wire helps avoid kinking, rusting out, and mechanical difficulties in working with conventional wire. The Flex-Weave antenna wire can even be tied in knots to insulators and can be used as the "dead end" off of an end insulator to a tree or even run through a pulley.

The current 34-page catalog also includes an interesting two-page primer on vertical phased-array antenna systems. As pointed out by Stephen F. Davis, K1PEK, Davis RF proprietor, these antennas are increasingly popular on 160, 80, and 40 meters for both long- and short-haul DX. Included in the catalog is a good deal of useful information on phased vertical theory and switching networks, a description of currently popular designs, and a list of various information sources on vertical array design and construction.

A free catalog, which includes a short sample piece of the Flex-Weave wire, is available. For a copy, contact Davis RF Co., P.O. Box 230, Carlisle, MA 01741 (1-800-328-4773).

Coaxial Dynamics Update. About a year ago we profiled Coaxial Dynamics, which specializes in industrial-quality RF power measurement and computation equipment and

components. In a catalog received from John R. Ittel, the company's sales manager, we see offered a variety of RF measurement products, including portable and rack-mounted directional RF wattmeters and plug-in elements for them, dummy loads, RF couplers, meters, station monitor alarms, and other RF accessories.

Of most interest to amateurs are the "Cadillac quality" RF Peak Reading Wattmeter Model 83000-A series and the RF Directional Wattmeter Model 81000-A series. The Model 83000-A converts from average reading to peak reading with the flip of a switch. It's designed to measure power levels from 0.1 watt to 10 KW over the range 2 to 2300 MHz, depending on the plug-in element used. It has a 4 1/2 inch mirrored scale and is $321 plus plug-in elements and various optional accessories.

The Model 81000-A measures RF power over the same power range—from 0.45 to 2300 MHz. The unit can be used with accessory cables up to 200 feet from the meter. It has a shock-mounted meter with a 4 1/2 inch scale and is $200 plus the plug-in elements and optional accessories.

For product information, contact Coaxial Dynamics, Inc., 15210 Industrial Parkway, Cleveland, OH 44135 (1-800-262-9425).

Jade Products Update. In May 1994 we profiled the Jade Products Twin-Lead Marconi. It's a complete, ready-to-install antenna kit which includes all hardware, wire, twin-lead (300 ohm ladderline), connectors, and support rope. The antenna is approximately 126 feet long (for 160 meter coverage) and can be installed with a portion of the twin-lead running vertically. The end-fed antenna includes a special support elbow for the twin-lead, thus preventing its failure from fatigue and flexing. The 160 meter version is $44.95, while a shorter (64 foot) 80 meter version is $37.95.

Since our profile appeared, Jade Products has introduced a raft of new HF and VHF antennas, many of which are of ladderline construction for the flattop. For HF there's a ladderline multiband dipole, an off-center-fed Windom, and a center-fed G5RV antenna. For VHF (50, 144, or 220 MHz) there's a twinlead ladderline portable J-pole indoor antenna which can be hung from any convenient support. Comparable PVC "Jade Poles" also are available for fixed-station use. Various antenna mounting kits and accessories are stocked.

A flyer showing more details is free from Jade Products, P.O. Box 368, East Hampstead, NH 03826-0368 (603-329-6995).

Force 12 Update. In the January 1994 column we profiled the Force 12 antenna systems offered by Tom Schiller, N6BT. At least three major HF directional beam product lines, each bearing military-type names (Strike Force, Elite Force, Magnum Force, and Nomad) are currently available; the antennas offered include both multiband and monoband systems.

A key feature of Force 12 beams is wind survival. The name is cleverly based on the "force 12" of the Beaufort wind scale, which defines wind force 12 as being 73–136 MPH, or hurricane force, where devastation occurs. Force 12 antenna minimum survival is computed at 75 MPH or more. Each beam element and the boom are modeled for maximum strength with minimum profile and weight. Element-to-beam attachment is by a hot-dip galvanized steel clamp around the boom. The beams are wind balanced using proprietary wind balancing and compensation software.

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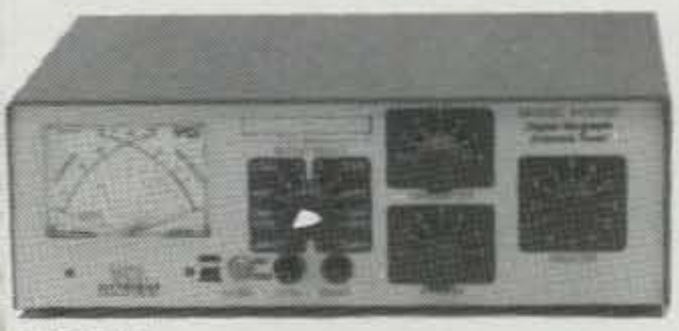

VC300D
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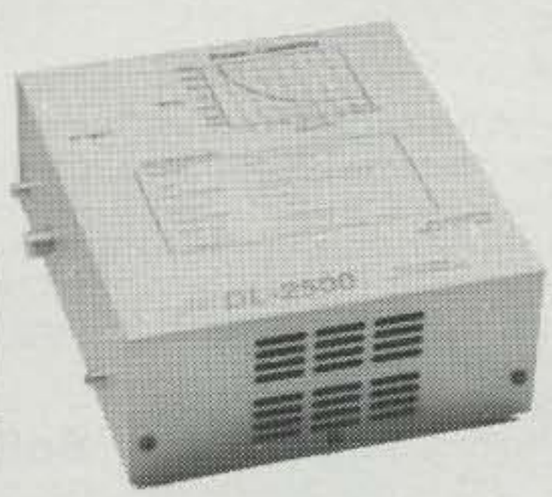
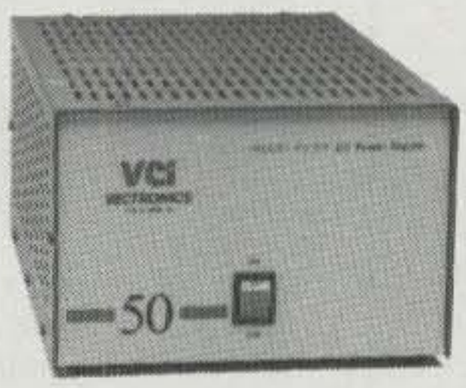
DL650M
1500W
Dummy
Load

PS30VM
13.8Vdc 30A Linear
Power Supply

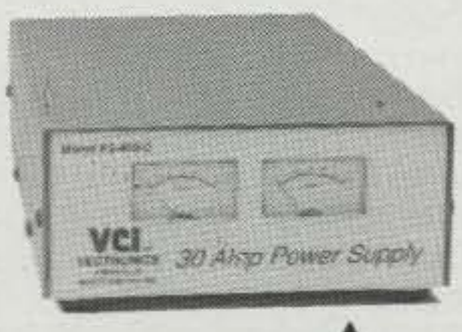
HFT1500
2000W PEP Antenna Tuner



DL2500
2500W Dummy Load



PS50F
13.8Vdc 50A Linear
Power Supply



PS400C
13.8Vdc Switching
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8/29/94 Microsoft Excel - DXCC.SLK 15:38

File Edit Formula Format Data Options Macro Window Help

Normal

J3

Millbrook, AL	DXCC Information (Alphabetical by Country Prefix)					
32.5 Latitude						
-86 Longitude	Prepared for K5ODZ, Tom Hoke					
Prefix	Name	Latitude	Longitude	Degrees	Miles	Kilometers
1A0	Sov. Mil. Order of Malta	35.9	14.5	54	5473	8808
1S	Spratly Islands	15	115	333	8865	14266
3A	Monaco	43.8	7.4	50	4876	7847
3B6,7	Agalega & St. Brandon	-10.5	56.7	66	9637	15509
3B8	Mauritius	-20.3	57.6	78	10063	16194
3B9	Rodriguez Island	-19.8	63.4	72	10372	16692
3C	Equatorial Guinea	1.5	10.5	85	6558	10554
3C0	Pagalu Island	-1.5	5.5	90	6379	10266
3D2	Fiji	-17.5	179	257	7127	11469
3D2	Conway Reef	-23.7	174.7	254	7578	12195
3D2	Rotuma Island	-12.5	177	263	7065	11370
3DA	Swaziland	-26.5	31.5	101	8725	14041
3V	Tunisia	34	9.5	58	5300	8529
3W, XV	Vietnam	16.7	106.7	344	8930	14371

Ready

Fig. 1– Tom Hoke, K5ODZ, offers DX Finder, a computer spreadsheet for the IBM PC and the Apple Macintosh that lets you enter your latitude and longitude, and then print out an alphabetical list by prefix, followed by country name, latitude, longitude, beam heading, miles distant, and kilometers distant for every DXCC country. Anyone with a PC program that can open a SYLK (.slk) spreadsheet file, or a Mac with a program such as ClarisWorks, can use DX Finder. (See the text of this month's column for details.)

Although a variety of beam configurations are offered, one of the most popular designs currently offered is the lightweight C-3. It's a "classic" three-bander for 20, 15, and 10 meters (17 and 12 meters can be used with reduced performance and the need for an antenna tuner). The low-profile C-3 is seven elements on an 18 foot boom with a single 50 ohm feedline. The elements are full size with no traps, and the preset tuning covers the whole band (even 10 meters). The antenna boasts SWR under 2.1:1, a forward gain of at least 10.2 dBd, and front-to-back (F/B) ratio of 14 dB or more, depending on band. The antenna is $449. Several other versions are offered, including a similar but larger 10-element, 33 foot boom C-3XL, at $895.

For a brochure, contact Force 12 Antennas and Systems, 3350 Scott Blvd., Bldg. 6102, Santa Clara, CA 95054 (1-800-248-1985).

Transel Technologies Update. In the September 1993 column we highlighted Transel Technologies. As we noted, Transel offers "made in the U.S.A." mobile antennas and accessories. Products include handheld radio antennas; base-loaded and slimline mobile HF radiators; VHF/UHF mobile antennas; base station collinear antennas; and a variety of brackets, mounts, cable assemblies, springs, and other accessories. The antennas, mounts, and brackets offered cover practically any imaginable vehicle antenna installation configuration, including "problem vehicles."

Also offered by Transel are several dual-band VHF/UHF mobile vertical antennas and a dual-band 6 inch rubber duck; these antennas cover the 144–148 and 440–450 MHz ranges. Transel also offers the PACK-IT, which protects your HT and other devices you carry from damage. Other products include coaxial cable, wire, connectors, kits, and CB gear.

The company's flyer has grown from four to 16 pages and is available free from Transel Technologies, 123 East South St., Harveysburg, OH 45032 (1-800-829-8321).

Software Notes

YO 6.0 Yagi Optimizer. We've watched with growing interest the evolution of Brian Beezley, K6STI's comprehensive, high-accuracy IBM PC antenna modeling software over the years. Two complementary programs, AO Antenna Optimizer and YO Yagi Optimizer, are the linchpins of his modeling packages.

Brian's YO Yagi Optimizer is a highly intuitive and graphical program that automatically optimizes Yagi-Uda beam designs for maximum forward gain, best pattern, and minimum SWR. YO handles stacked Yagis, dual-driven and tapered elements, matching networks, skin effect, and ground effects from HF to microwave. While YO runs much faster than MININEC, it's calibrated to NEC for accuracy and has been carefully validated against real-world antennas.

The new version, YO 6.0, is the first revision to the popular Yagi modeling program in over two years. It features an advanced optimizing algorithm, high-speed 32-bit graphics, mouse control, and numerous other enhancements. The new optimizer typically converges in half the number of iterations previously required and yields better designs. In addition, "good enough" thresholds let you focus on the remaining objectives once a particular parameter exceeds your design goal.

YO 6.0 offers a fascinating way to experiment with element lengths and positions: you can simply grab an element with your mouse and stretch it or move it. The patterns, element-current profile, and performance figures change instantly and continuously as you vary antenna geometry. This characteristic helps you to gain insight into the effects of each element on overall performance. It also can help you develop an intuitive feeling for the sensitivity of a given antenna design to its various dimensions.

YO 6.0 is $100 and is copy-protected. It comes with NEC/Yagis 2.0, which implements the Numerical Electromagnetics Code (NEC); you can use NEC to verity YO designs and to model large, rectangular Yagi arrays.

For more information, contact Brian Beezley, K6STI, 507½ Taylor, Vista, CA 92084 (619-945-9824).

KIT. Victor Musika, VE7AUK, offers KIT, an IBM PC shareware program that is of considerable value to electronics students, amateurs who design circuits, and those who are just curious about the relationships between circuit components and who wish to discover how they operate.

KIT has 200 menu-driven topics that range from basic Ohm's Law to complex integrated circuits. One-half of the program is devoted primarily to passive components such as resistors, capacitors, and inductors; the other half is devoted to active semiconductor devices. The learning curve for the program is short, since there are only seven active keys used in the main program, along with ten digit keys for the various menu selections. Circuit parameters are changed by holding the up- or down-arrow keys to increment or decrement component value.

The program is offered as shareware and is available for downloading on many bulletin board systems (BBSes) that feature amateur radio software. It's also available directly from the author for a disk and an SASE mailer; the author requests a $10 donation if you find the program useful.

Contact Victor Musika, VE7AUK, 26831 29th Ave., Aldergrove, BC V4W 3C1, Canada. (Canadian amateurs: KIT was reviewed in the September 1994 issue of *The Canadian Amateur Radio Magazine*.)

DX Finder. Tom Hoke, K5ODZ, offers a computer spreadsheet for the IBM PC and the Apple Macintosh that lets you enter your latitude and longitude, and then print out an alphabetical list by prefix, followed by country name, latitude, longitude, beam heading, miles distant, and kilometers distant for every DXCC country. Anyone who has access to a PC with a program that can open a SYLK (.slk) format spreadsheet file, or a Mac with a program such as ClarisWorks, can use DX Finder.

DX Finder requires only two entries: your latitude and your longitude. Based on NASA-generated data, DX Finder contains the most precise data available for latitudes and longitudes for the 334 DX countries. For the really rare DX countries which are just a dot on most maps, the precision of NASA's data is important.

After you change the latitude and longitude on the spreadsheet to match your own QTH, and after a good deal of computer number crunching, the complete DXCC list appears on your screen (see fig. 1). You can view the formulas using your spreadsheet program, and you can easily make changes to the spread-

DeLorme's Map'n'Go CD-ROM brings all kinds of North American travel information to your PC. This information includes road maps, hotel and campground information, and restaurant reviews, everywhere in the U.S., Canada, Mexico, and even the Caribbean. (Photo courtesy DeLorme Mapping)

sheet to reflect dropped or added countries.

DX Finder is available on a 3.5inch high-density disk as a SYLK file, or as a ClarisWorks spreadsheet file. Cost is $5 per disk from Thomas T. Hoke, K5ODZ, 4805 Willowbend Blvd., Houston, TX 77035 (specify PC or Mac). You also can download DX Finder (in either version) from America Online in the Ham Radio Club area. Remember, DX Finder is a filled-in spreadsheet, *not* a program.

PC-ECAP Update. Technically inclined amateurs make use of a wide range of radio and electronic formulas using computers. Currently available programs simplify calculations involving Ohm's Law; resistors and capacitors; power supplies; resonant frequency; transmission lines; filters, stubs, and traps; series and parallel inductors; and the like.

More complex calculation programs handle electronic circuit design problems that are not limited to radio applications. One of these is the IBM PC shareware program PC-ECAP, which we first mentioned in August 91. As we reported then, the software is an easy-to-use linear circuit analysis program that should be useful to amateurs or anyone interested in electronics. The program analyzes circuits consisting of resistors, capacitors, inductors, transistors (bipolar and FET), operational amplifiers, and transconductance amplifiers. The program is completely menu driven and contains an online help function.

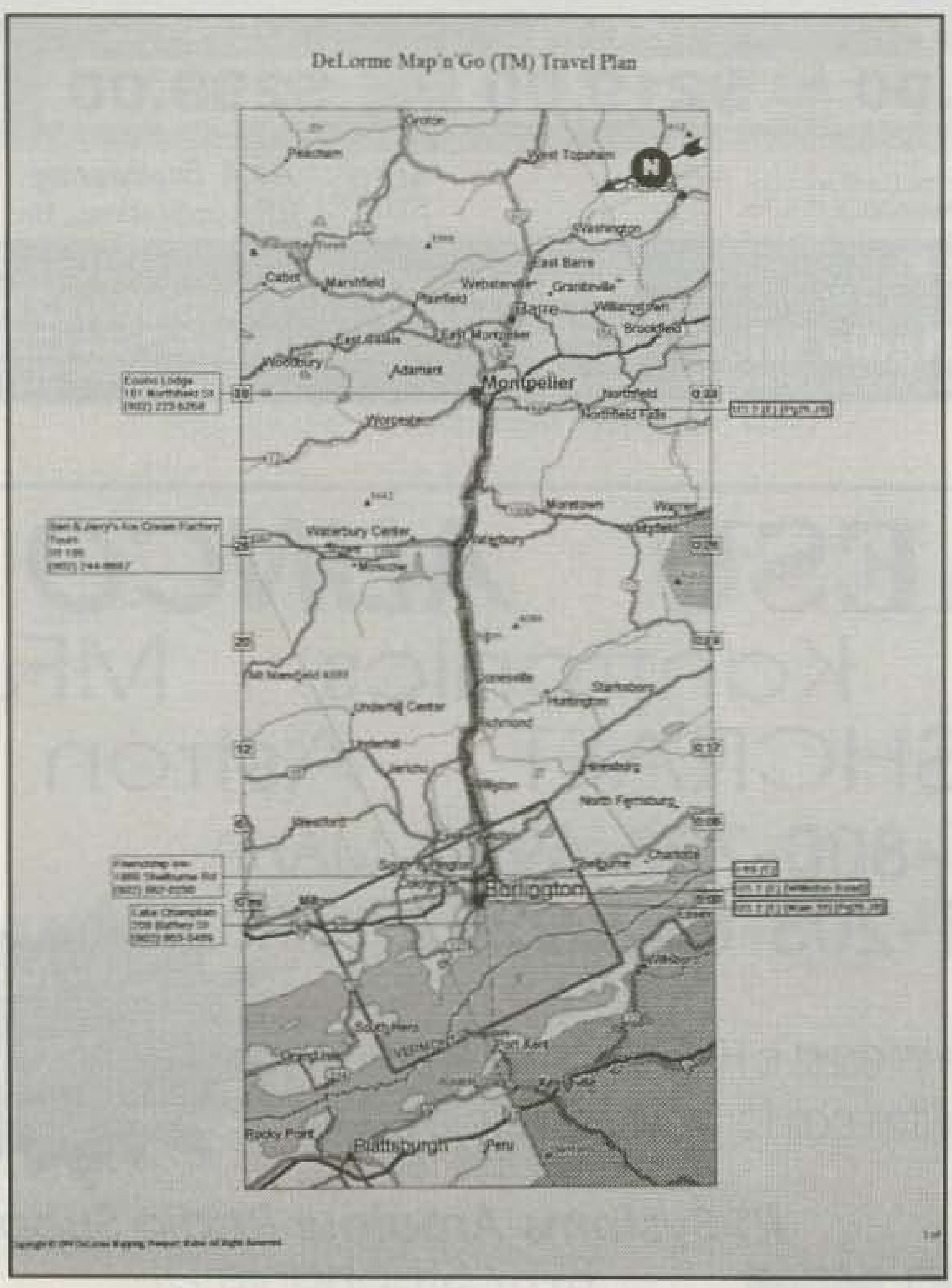
Many useful features that are of special interest to amateurs have been added to V3.01. These include group delay, impedance, SWR, return loss, transient analysis, and transmission-line calculations. Printer support has been improved, and analysis speed has been improved up to 200 percent over previous versions. Now circuits can be as large as 90 nodes.

Peter Volpa, N2REA, of Circuit Systems continues to market PC-ECAP as shareware, although it's now available through other channels as well. The program cost is $89 (plus $2 s&h) for a registered disk only, or $99 (plus $4 s&h) for a disk and a professionally printed and bound manual. For anyone with a modem, the fastest way to get an evaluation copy is from a BBS specializing in amateur radio software. Or, if you want a registered copy, contact Peter Volpa at Circuit Systems, 418 Church Road, Sicklerville, NJ 08081-1727 (609-875-5433). Registered users are assured of support and low-cost upgrades.

Map'n'Go. The CD-ROM drives of many contemporary PCs, coupled with the multimedia and graphical characteristics of Microsoft Windows™, open up some powerful new opportunities for productively using your computer. One of these is the ability to use mapping and other graphics-intensive software—disk space hogging data that could fill up one's hard drive in a twinkling.

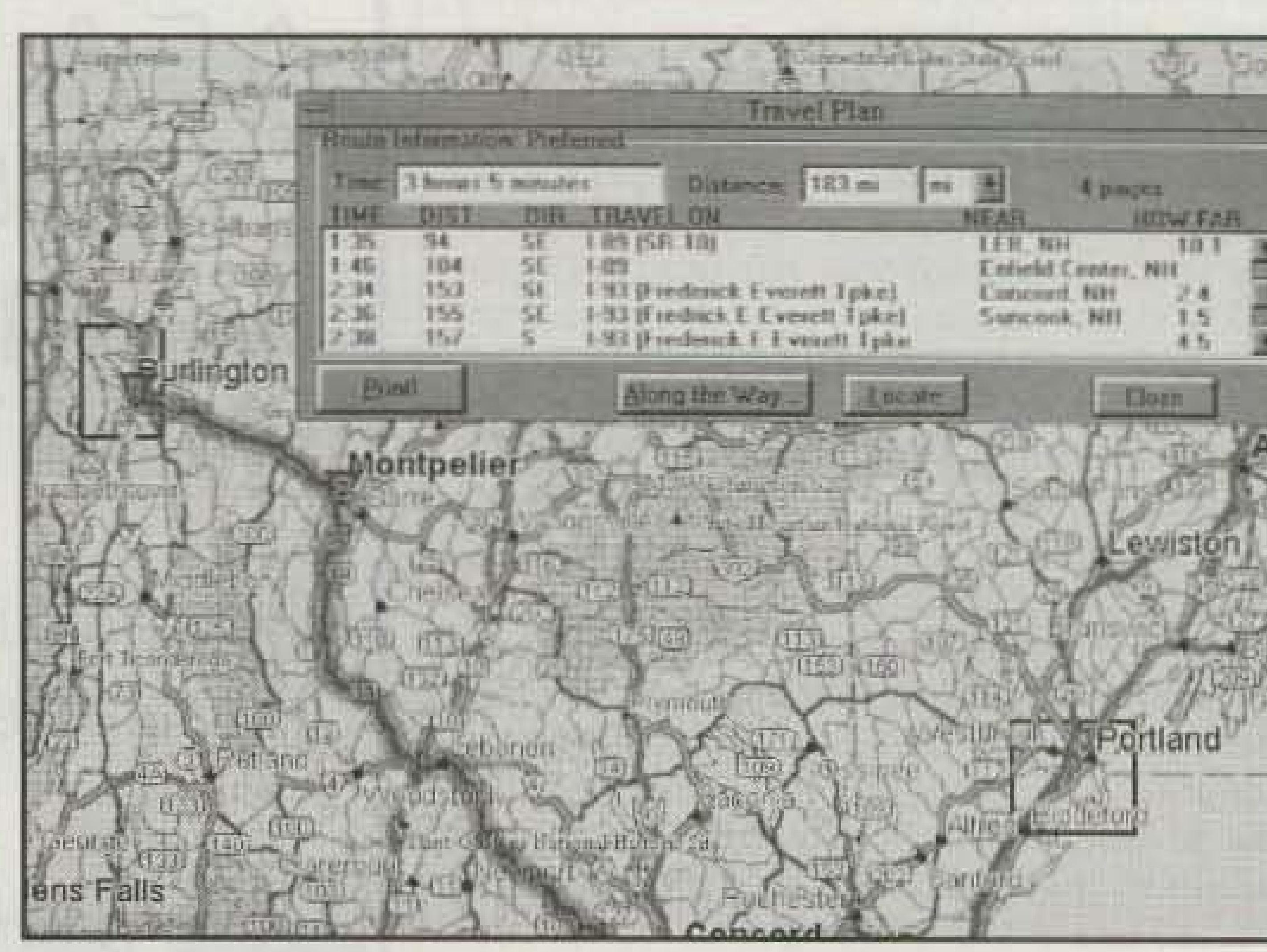
Two mapping products we described in previous columns are DeLorme Mapping's Street Atlas USA™, a slick computerized street map of the entire United States that we examined in April 1994, and Global Explorer™, a "computer globe" that presents the world in much greater detail than any computer or printed atlas. We profiled it in October 1994.

DeLorme has another equally impressive product, Map'n'Go, which brings all kinds of North American travel information to your PC. This information includes custom road maps, hotel and campground information, restaurant reviews (sorry, no hamfest food reviews), everywhere in the U.S., Canada, Mexico, and even the Caribbean. It has color photos and accompanying voice-narrated descriptions of thousands of places to visit, making it great for inter-city travel, sightseeing, and vacationing. The package includes a 128-page *North Am-*



Map'n'Go's travel planner feature prints a customized, detailed map to take along with you on your trip. You'll know where to turn and where to stop for the night without driving miles past your destination. (Photo courtesy DeLorme Mapping)

Once you've decided where to go, Map'n'Go quickly calculates the ideal route to suit your preferences, measures the distance between points, and lets you know how long the trip will take. (Photo courtesy DeLorme Mapping)



erica Atlas & Gazetteer™, a road atlas that's closely coordinated for use with the computer-generated maps.

Once you've planned a trip at your computer, the program prints out a custom, personalized travel plan with a detailed map of your route. You can plan routes from more than 1 million miles of roads and choose accommodations from more than 26,000 hotels, inns, motels, and campgrounds.

Interestingly, Dave DeLorme of DeLorme Mapping notes that Map'n'Go was the biggest project his company had ever undertaken. He says that 100 people worked on it, and during the last few months before release they had to run staggered shifts from 5 AM to midnight seven days a week to get the product out on time. Certainly not "vaporware"!

Map'n'Go is list priced at $50. Contact DeLorme Mapping, P.O. Box 298, Main Street, Freeport, ME 04032 (207-865-1234).

Short Bursts

"Good Enough for Government Work"? The "good enough" feature we noted in Brian Beezley, K6STI's YO Yagi Optimizer brought to mind this old saying (no criticism of government workers intended), referring to just how much precision you actually need achieve with your calculations. Do you need to measure your rig's power output to a fraction of a watt, record SWR to three decimal places, or get upset if your AC line voltage varies by as little as 1 volt? Do these things *really* matter?

Aristotle (384–322 B.C.) gave some thought to the nature of precision. He wrote: "It is the mark of an instructed mind to rest satisfied with that degree of precision which the nature of the subject admits, and not to seek exactness where only an approximation of the truth is possible."

Food for thought, indeed, and thanks to Victor Musica, VE7AUK, for this very appropriate observation. It also appears as a screen in his shareware program KIT, described elsewhere in this column.

Alternative Ham Radio Insurance. Our column is not normally a vehicle for addressing insurance needs. However, we did receive information from Bill Hill, W3IBT, President of Ham Radio Insurance Associates (HRIA), that we would like to pass along because of some special coverage options he makes available.

HRIA, in conjunction with the Great American Insurance Group, offers an "all-risk" amateur radio equipment insurance alternative to the ARRL's popular program, one that can provide coverage for towers, antennas, and rotors. You also can add mechanical breakdown and electrical injury coverage as well as computer and software protection. These specialty features require an additional premium and higher deductibles than HRIA's basic plans, which can be had for as little as $25 per year with a $50 deductible. The HRIA plans are available to any licensed U.S. amateur without a membership requirement.

For further information, contact Bill Hill, W3IBT, at Ham Radio Insurance Associates, Inc., P.O. Box 201, Canonsburg, PA 15317-0201 (1-800-545-8881).

Looking Back Five

Five Years Ago in "Antennas and Accessories." Last month we experimented with a new feature in the column, "Looking Back Five." In that column we briefly reviewed the key items found in the column exactly five years ago, in February 1990, with the view toward seeing the progress in antennas and computer software since then, and also to stimulate your interest in some of the subjects we covered back then.

That being said, what did the column look like in March 1990? "From the Notebook—Part II" made it an interesting month. Among the topics covered in the issue were the receiving antenna and accessory products offered by Electron Processing, such as the Vak-Tenna, Super Turnstile, and Window Coupler. We discussed Near Vertical Incidence Skywave and mobile NVIS antennas. We also looked at two imported Diamond vertically polarized, wideband, amplified receiving antennas. And we described the custom Great Circle maps offered by the Great Circle Map Co.

On the software side of the March 1990 column we looked at the N6RJ Electronic Second Op by Jim Rafferty, N6RJ, a specialized logging system distributed by Ham Radio Outlet. We also peeked at MorseMan Plus 2.5, a Morse Code tutorial program by Robin Gist, NE4L, of Renaissance Software & Development. We described recent enhancements to LOG-EQF, a shareware logging program offered by Tom Dandrea, N3EQF, and we dissected PC Tools Deluxe 5.5, a comprehensive IBM PC DOS utility program from Central Point Software (they are up to around Version 9 or so for DOS and Version 2 for Windows these days). Rounding out the column for the month, we offered yet another tongue-in-cheek variation of Murphy's Law with all of 15 axioms.

If you find a topic we covered in a previous column to be of interest, please try to obtain the back issue directly from *CQ*'s New York headquarters, rather than requesting the article from us. Most back issues are available for $3.50 postpaid. (*CQ* also offers various "back issues specials" to help you complete your *CQ* collection. Check their ad, or call them at 1-800-853-9797 to order back issues.)

All things considered, March 1990 was a very interesting month in the column. Were you there in *CQ* with us?

Wrap-Up

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

Overheard: It always seems that when the going really gets tough, everyone just *leaves.*

73, Karl, W8FX

Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

A Simple 160 Meter Ferrite Rod Loop For Low Noise Reception

For me 160 meters has always been a problem band. Living in an urban area on a samll lot, surrounded by other homes, the 160 meter QRN level at my QTH is very discouraging. With no effort at all I can hear exotic DX such as light dimmers, TV sweep oscillators, line noise, and other unpleasant sounds. Using my transmitting antenna for reception is a waste of time, as the noise level is many dBs over S9 much of the time.

On the other hand, I am fortunate in that my transceiver has an auxiliary input for a separate receiving antenna. That opens up interesting possibilities as far as using a different antenna for reception than for transmission.

My first experiment was with a loop antenna about 3 feet in diameter, feeding an "Ameco" preamplifier. Signal output of the loop was low, so the amplifier's additional gain was required in order to have readable signals.

This setup worked well. Results were interesting. The loop had a broad figure-8 signal pattern (fig. 1) with deep nulls off the face of the loop. The nulls were quite sharp. In operation I would peak up the noise with the preamplifier and then rotate the loop for minimum noise.

What's Wrong With Bozeman, Montana?

Over a period of time I found that most loud static crashes came from the northeast, almost in a line from San Francisco to Bozeman, Montana. Aiming the loop null at Bozeman dropped the summer static noise up to 20 to 30 dB.

I still had to contend with local noise. Since I was surrounded by noise makers, I had no clue as to where to aim the loop. Experiments showed that I could achieve an impressive noise reduction when the loop was properly oriented. The direction of maximum noise rejection was easy to determine, and it probably had something to do with the electric wiring inside the house.

In any event, during the winter DX months Bozeman didn't cause any problem, static was low, so I could adjust the loop for maximum local noise rejection.

48 Campbell Lane, Menlo Park, CA 94025

Finally—Results!

I played SWL for several weeks, listening to the big boys working 160 meter DX around sunrise. With my big antenna I could not hear the juicy stations they were working. Nulling out the QRN and other racket with the receiving loop, I could hear down to a basic noise level, which was about S3 on the meter. Switching back and forth between the loop and the big antenna made a believer out of me! I could clearly hear SSB signals in a roundtable in Australia, many JA signals on CW, plus an occasional UAØ in Siberia. In most cases, when a DXer worked an exotic station I could hear it. (Working it was another matter!)

How About A Ferrite Rod Loop?

Yes, how about it? The conventional loop I was using was too big. It sat on a little platform beside my operating desk, and I could rotate it by hand. But it was a nuisance, and top-heavy to boot. Many times it fell over when I was fiddling with it.

I've read descriptions of ferrite rod loops in various publications, but never had the urge to try one until I had to face the decision: If I wanted a noise-rejecting antenna, it had to be a loop, and that loop had to be small enough to go on the operating table.

I was moved off dead-center by a simplified ferrite-rod loop design described in the November 1994 issue of *Radio Communication* (a monthly publication of the RSGB). This is a construction article by Richard Marris, G2BZQ, covering the assembly of a small ferrite-rod loop antenna for the top band.

This simple gadget consists of a tuned circuit and coupling link on a ferrite rod. It covers the 160 meter band. The tuned circuit is balanced to ground and resonated by a two-gang variable capacitor. What could be simpler (fig. 2)?

G2BZQ reports that a long, thin ferrite rod with a center winding produces sharp, deep nulls required for noise reduction. His rod consists of two short nickel-zinc ferrites, epoxied end to end to form an 8 inch rod. The rod is Q2 material, having a permeability of 125. The rods are 0.25 inch diameter.

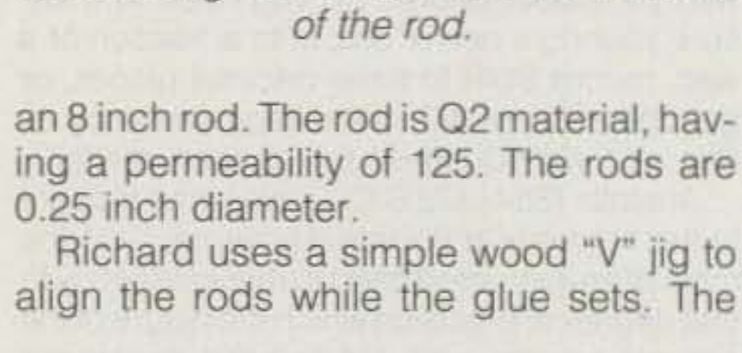


Fig. 1– Pattern of small loop antenna showing sharp nulls off face of loop. Large loop (quad) has nulls off ends. When using ferrite rod, nulls are off ends of the rod.

Richard uses a simple wood "V" jig to align the rods while the glue sets. The

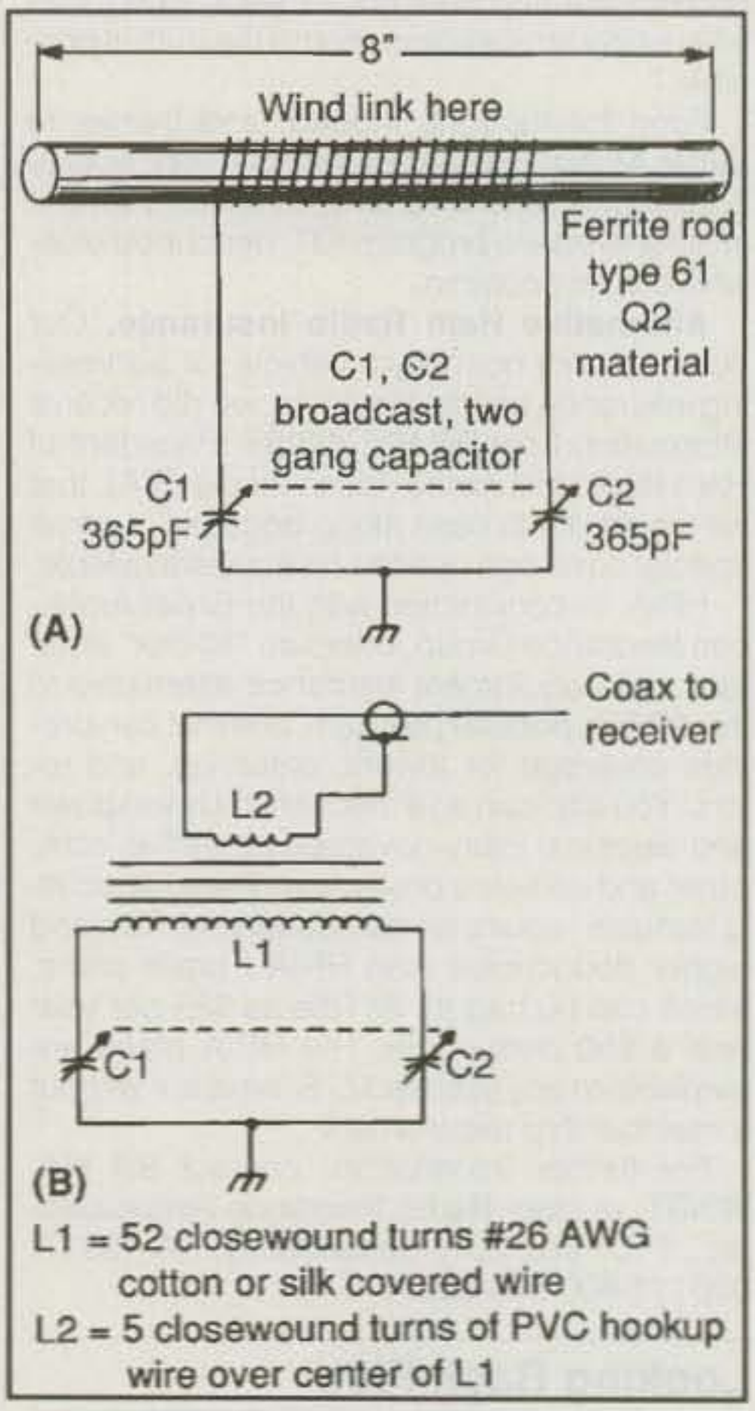


Fig. 2– The layout and schematic of the ferrite rod loop.

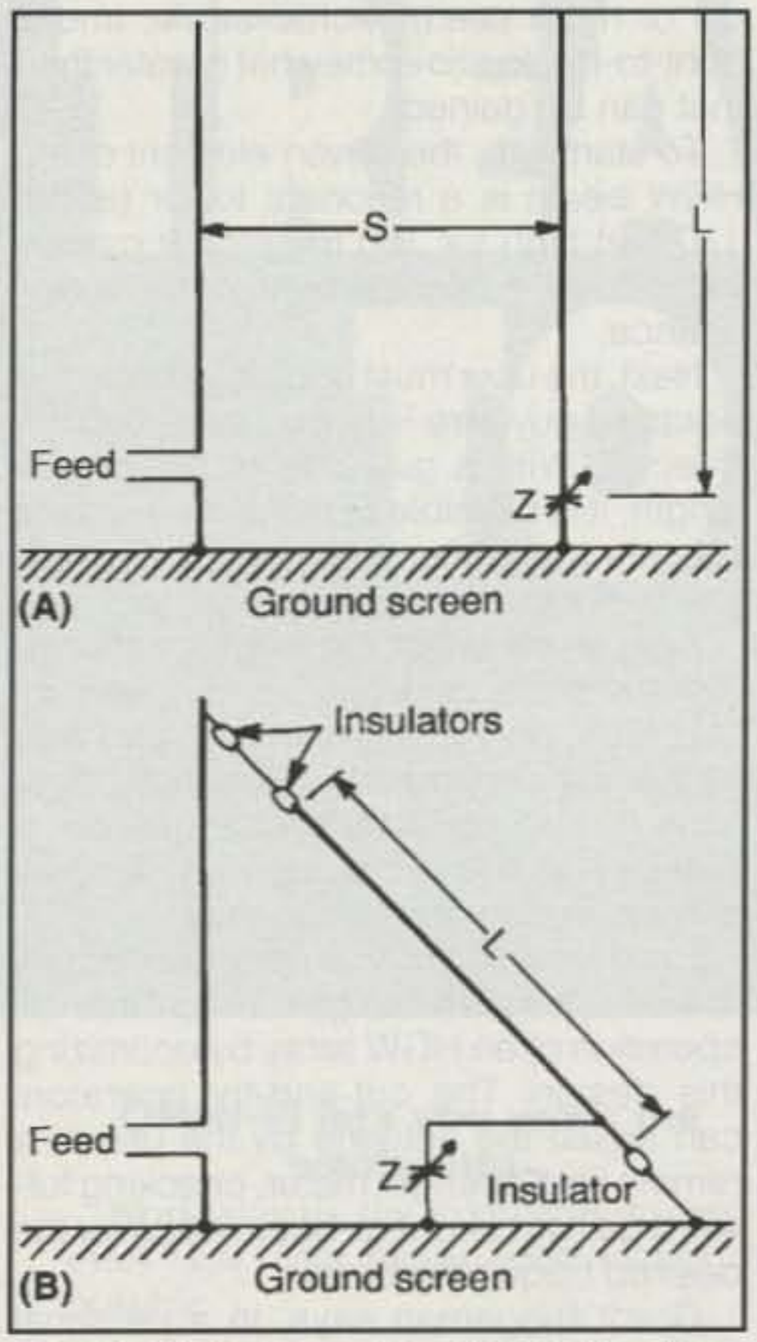


Fig. 3– Derivation of the HGW directional antenna.

rods are then pushed inside a length of 5/16 inch outside diameter polycarbonate plastic tubing, available from Aquarist shops. Aquarist shops? An English-American dictionary told me this is equivalent to a pet store, or an aquarium shop for exotic fish, fish tanks, heaters, etc.

G2BSQ then places a short layer of masking tape over the tubing and winds the coil over the center of the tube-covered rod. Double cotton-covered or plastic-covered wire is used to slightly space the coil turns. Total coil length is about 1.5 inches. The pickup coil is 5 turns of hookup wire, with the ends twisted together for connection to the feedline.

Loop Assembly and Testing

A copper-clad circuit board is used for assembly. The two-gang broadcast-type tuning capacitor is mounted to the board, with a short extension shaft for the dial to reduce hand capacity. The rod is mounted above the capacitor.

Two surplus ceramic insulators plus nylon cable clamps hold the ferrite rod firmly in position, and an extra cable clamp affixes the end of the RG-58 coupling cable to the baseboard.

You can test the antenna on local noise, or use a nearby signal generator with a short antenna on it as a signal source. When you hit resonance, you'll observe a sharp increase in signal level.

Loop directivity is very broad, but the signal nulls are deep and sharp. Swinging the loop about will locate a position where the signal is at a maximum and the noise a minimum. I placed the little antennna on a "lazy susan" from the kitchen.

You'll notice that signal output from the loop is very low. Many transceivers don't have enough RF gain to provide a comfortable signal level. Then a preamplifier (sometimes called a preselector) between the loop and the transceiver is necessary. There are several units on the market which will do the job.

A final note: A preselector should be protected during transmission periods. You may need a relay that will break the coax between loop and preselector to prevent overload damage to the input circuitry of the preselector.

A More Exotic Ferrite Loop Antenna

My good friend Doug DeMaw, W1FB, has spent plenty of time and effort designing and working with 160 meter loop antennas. The performance of the basic G2BZQ loop design can be enhanced by following some of the pointers outlined by Doug in the *ARRL Antenna Book* and in his article "Beat the Noise With A Scoop Loop" (*QST*, July 1977, pages 30–34).

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DJ-180TH • Same as DJ-180T, 5W standard.

DJ-580T 2m/440MHz Twin Band HT • 2.5W • receives 130-174 & 410-470MHz. Modifies for MARS/CAP tx, + 118-136MHz+ • 40 memories • CTCSS encode/decode • DTMF encode • DSQ. • full duplex cross band repeat • scan • autodialer • back-lit keypad • simult. rx on both bands-separate controls • 6½"h x 2¼"w x 1¼"d, 0.97 lbs.

DJ-F1T 2m Mini HT • 2.5W • receives 130-174MHz and 118-136MHz • scanning • autodialer • back lit keypad, 40 memories • call channel • CTCSS • DTMF encode • DSQ paging • 4⅜"h x 2⅛"w x 1½"d, 14 oz.

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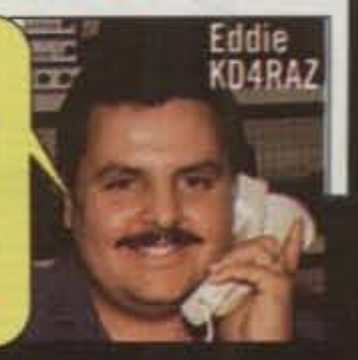

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mis-tune the wire half way between director and reflector operation, you will get a peanut-shaped pattern with high current and voltage stresses, poor bandwidth, poor stability, etc. So you might find your antenna beams East at one frequency, West at another frequency, and both directions at some middle frequency. . . . "

Explicit construction and tuning information is not available, as it depends upon the characteristics of the particular tower in question, length of the parasite guy, and the ground screen. This is not a how-to-do-it article, but it is supposed to start you thinking about how to use this scheme in your own installation.

It would seem logical that two guys could be used as director and reflector, giving additional gain, but this has not been tried. And as I said before, installations of this type have been done by commercial engineers on specific antennas, so little amateur-type data is at hand.

Spooky Signals Galore

Now that wide-range receivers (200 kHz to 29.7 MHz) are a part of many new transceivers, more and more amateurs are finding exciting listening outside the amateur bands.

In the "good old days" that traditional approach to amateur radio was via short-wave listening. SWL to amateur was the road to a ticket. Not so today. Amateurs seem to be created with little knowledge of the world outside the amateurs bands—that is, until they start tuning around with their spiffy new transceiver.

The fun of listening to the BBC, VOA, Radio Moscow, and HCJB often gives way to close attention to other mysterious signals on the air, a mess of illegal and covert radio transmissions coming from where?

You'll hear the mysterious "numbers stations," a male or female voice that continually broadcasts a string of numbers: 04107, 08076, 56745, 35988, and so on. What do they mean? Who listens to these goofy signals? The number strings may be broadcast in Russian, Bulgarian, German, English, or Spanish, and sometimes a mixture of languages.

Some listeners have attempted to locate these stations by direction-finding. Some broadcasts originate in the United States, some in Cuba, Honduras, and points in the Pacific. The mystery remains.

"Charlie-India-Oscar" stations abound on HF; the "KKN" group of signals, marker signals, "beeps," "rasps," "foghorns," and other unusual sounds appear and vanish.

All manner of strange signals have frustrated listeners for years. None of the stations are listed in frequency directories or callbooks. However, the *Underground Frequency Guide*, written by Donald Schimmel, is an in-depth analysis of the unusual signals you can hear and the meaning and reason for many of these specialized transmissions.

There's thorough coverage of specialized transmission methods, such as packet and piccolo used by underground stations, as well as a discussion of single-letter HF beacons and dope smuggler communications. You would be amazed at what is going on every day in the HF region!

This book is good stuff. It is the third edition and really covers the field of specialized transmissions. The *Underground Frequency Guide* contains 224 pages in a 6 by 9 inch softcover format (ISBN 1-878707-17-5) and is avaliable at your radio distributor or on order from HighText Publications, Suite 110, Solano Beach, CA 92075. Price is $14.95 plus $3 shipping. Check it out!

And Many Thanks!

My thanks and 73 to the following who have commented on my column. I really appreciate hearing from you! W6PUO, WB2YVY, GØIXC, N1QVQ, OZ7SM, W6AD, N2ZOA, KI1JX, K1JZZ, PY2SFI, NV7K, G4ZU, and WB4HFL.

73, Bill, W6SAI

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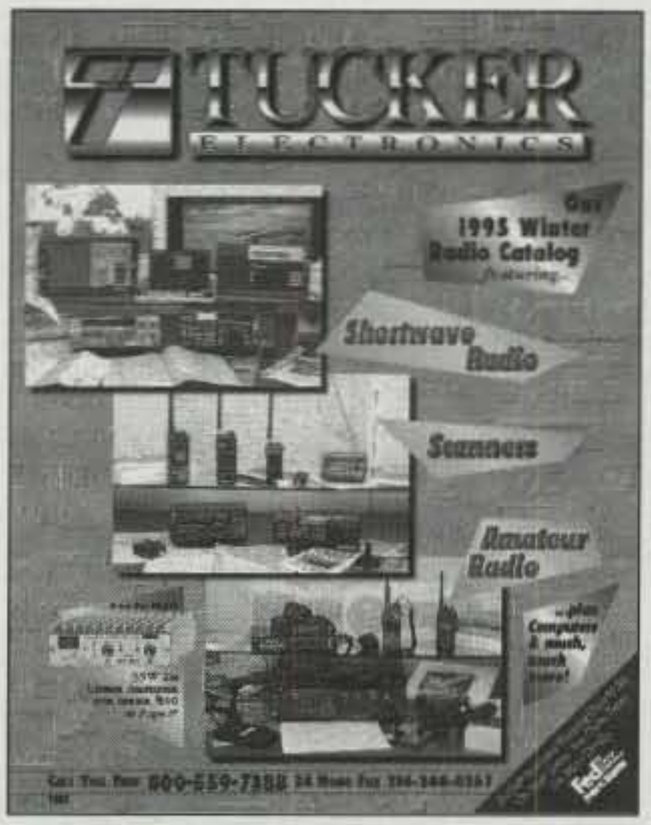

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CIRCLE 169 ON READER SERVICE CARD

DOUG'S DESK

BY DOUG DeMAW, W1FB

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORYs

Antenna Performance and 160 Meters

There is scarcely an evening when someone doesn't join one of my 160 meter QSOs to ask, "How's my signal? I'd appreciate a signal-strength reading." Some of the signals from these near and distant amateurs are alive and well, and they rise well above the ever-present atmospheric noise that is a part of the "top band" experience. On the other hand, many signals from those who request signal reports are barely readable or are lost in the noise. Almost without exception the very weak signals are from stations that are trying 160 meters for the first time. Most of the operators are attempting to communicate with 100 watt transmitters and grossly inferior antennas. When I ask for a description of the antenna, I am often told, "I'm trying to load up my 75 meter dipole with an antenna tuner." Others may say, "I strung up 100 feet of wire today and decided to try it." Generally speaking, these "make-do" antennas are very close to the ground—sometimes only 15 or 20 feet high, which further degrades the signal strength. This article provides some tips for getting started on 160 meters with a signal that can be heard throughout the USA when band conditions are favorable.

The Matter of Antenna Height

Antenna height versus operating frequency is a subject of importance that is often overlooked by amateurs. Predictable, classic antenna performance is based on a height above ground of ½ wavelength or greater. At lower heights dipoles and other horizontally polarized radiators show very little directivity and the radiation angle is high. It becomes pointless to orient a dipole for some favored direction when it is, say, ¼ wavelength or less above ground. Typically, this type of antenna radiates a ball of energy of equal magnitude in all directions and at a high launch angle (not good for distant communications).

It is easy to be misled as we look skyward at a 160 meter dipole that is 35 feet above ground, because after all, that seems high in the air from our vantage point. The truth of the matter is that a 1.9 MHz dipole should be 273 feet high for a ½ wavelength spacing above ground! The 35 foot height on 1.9 MHz can be equated to a height of 2 feet above ground for a 10 meter dipole. Few amateurs would consider such an inefficient system for 10 meters. Therefore, it is essential that we erect our 75 and 160 meter antennas as high as practicable, recognizing that a height of 273 feet is beyond the means of most amateurs, myself included.

What Not to Use

Almost any resonant horizontal or vertical antenna for 160 meters will vastly outperform a dipole for some higher band that is being force-fed with an SWR disguiser (antenna tuner). The tuner allows the transmitter and receiver to interface with the desired 50 ohms (good), but that's where the free ride ends. A dreadful mismatch still exists at the dipole feedpoint, and maximum power transfer can only occur when unlike impedances are matched. The foregoing statements are based on the use of coaxial-cable feed lines. Tuned open-wire or ladder-line feeders and an antenna tuner will, on the other hand, permit reasonable 160 meter performance when using a 75 meter dipole, although much better results will be had if the dipole is resonant (longer) on 160 meters. Alternatively, it has been common practice for many years to short the center and outer conductors of the coax feeder at the transmitter and treat the feed line and 75 meter dipole as a flat-top T antenna. In effect, the coaxial feeder then becomes a single wire that exhibits vertical polarization. The dipole elements function as a top-hat loading device, but they do little radiating. The shortcoming associated with this method is that the overall 75 meter dipole system functions as a ¼-wavelength radiator (when matched to the transmitter), and this requires a quality ground-radial system if there is to be reasonable efficiency. The same is true of a short random-length wire or even a ¼-wavelength wire. A counterpoise or radial ground system is necessary in order to obtain good performance. Ground rods or household water pipes are not substitutes for an RF

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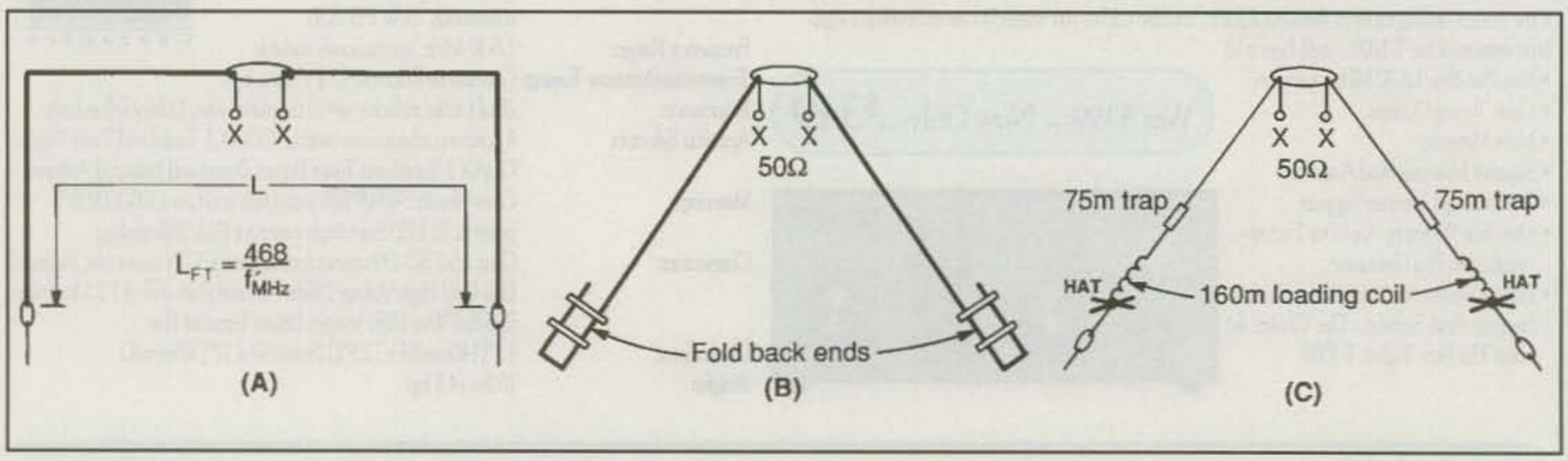

Fig. 1– Examples of shortened dipoles for 160 meter use. Antenna (A) is a horizontal dipole that has its voltage ends drooped toward ground. An inverted V may be erected in a similar manner. Example (B) shows how to fold back the voltage ends of a dipole to physically shorten the antenna. A two-band shortened dipole is illustrated at (C). A 75 meter dipole can be used also on 160 meters by adding two 75 meter traps and two 160 meter end-loading coils, as shown. This antenna can be fed with a single coaxial feed line, once adjusted for each of the bands.

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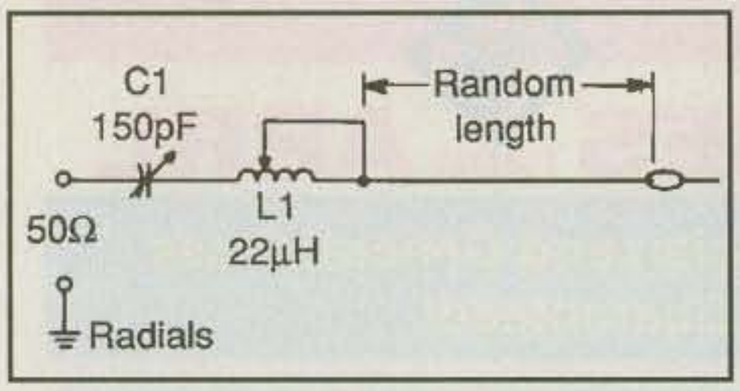

Fig. 2– A random length of wire may be matched to a 50 ohm transmitter by using series C and L as shown.

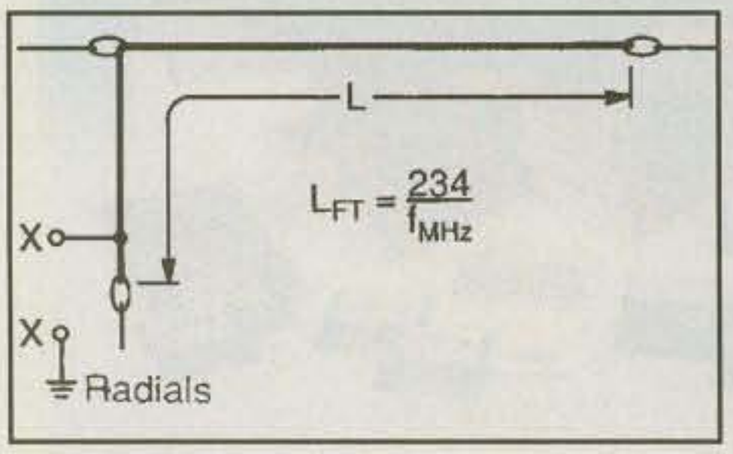

Fig. 3– The popular inverted-L antenna is depicted here. The greater the length of the vertical part of the wire the better the antenna performance. A ground radial system is required for this antenna and for the one in fig. 2. The horizontal part of this antenna acts as a top-loading device and does little radiating.

ground screen. All they can provide is a DC ground for ensuring operator safety.

The Problem of Limited Real Estate

Many of the weak 1.9 MHz signals I encounter come from stations where the operator laments about having too little yard space for a 160 meter dipole. They say that they can't even erect a 160 meter inverted V, which is an antenna that is used by many top-band operators. However, there are a number of ways to construct a shortened half-wave inverted V for 1.9 MHz. Fig. 1 illustrates some techniques that have provided good results for any band that requires a smaller-than-normal or "scrunched" dipole. If a horizontal dipole is erected, it is practical to droop the voltage ends toward ground (fig. 1[A]), thereby keeping the radiating current portion of the antenna higher above ground. The voltage ends of the dipole may be bent back on themselves (fig. 1[B]) by means of spreaders. Still another trick that works is to use a 75 meter dipole for 160 and 75 meters by installing a 75 meter trap at the ends of the 75 meter dipole, then adding a 160 meter loading coil and capacitance hat (fig. 1[C]) at each end of the dipole, beyond the 75 meter traps. Once adjusted for the chosen portions of the two bands, the antenna may be fed with coaxial cable and used without a tuner. Inexpensive traps made from RG-58 coaxial cable were described by R. Sommer, N4UU, in December 1984 *QST*. These traps are detailed also in *The ARRL Antenna Book*, 15th edition, 1988.

Short end-fed lengths of wire (the longer and higher the better) may be pressed into service on 160 meters by means of the matching network shown in fig. 2. C1 and L1 are adjusted until the fed end of the wire presents a 50 ohm load for the transmitter. Although a roller inductor of 22 µH or greater offers greater ease of adjustment, a tapped coil can be utilized in the network. It is important to mention that this system also functions as a 1/4-wavelength radiator, thereby requiring a ground screen for optimum performance. I have known a few amateurs who relied upon the cold-water pipes and their chain-link fences for ground screens when using 1/4-wave 160 meter antennas. Some of them reported good results, so the trick may be worth trying. The greater the number of large outdoor metallic objects that can be combined in a ground system the more effective the composite ground screen will be. Even a few on-ground or buried radials will make a big difference in the antenna performance.

The Old Standard Inverted L

An inexpensive but effective wire antenna for 160 meters is the long-established "inverted L." This antenna is shown in fig. 3. The radiator consists of 1/4 wavelength of wire (any gauge), insulated or bare, that is erected so that a large part of the wire is vertical—the more the better. The system functions as a top-loaded vertical, and the height above ground is not a significant consideration.

The matching network in fig. 2 may be used with this antenna. C1 can be motor driven remotely for maintaining a low SWR when QSYing within the band. Again, it is essential to operate this 1/4-wave antenna against a ground radial system or equivalent quality ground screen. A dozen or more radial wires can be buried in the lawn by using a lawn-edging tool to make slits in the turf, then tramping them closed after the wires are in place. The wires need not be 125 feet in length, although that size is the ideal. Wires as short as 40 or 50 feet will aid performance, since they are better than no wires at all. In a like manner, the often-recommended minimum of 125 buried radials is arbitrary. I have had excellent DX results with short top-band verticals on a small city lot when using only 15 or 20 radials of assorted lengths.

Inverted-L antennas yield a low angle of radiation if the vertical portion is fairly

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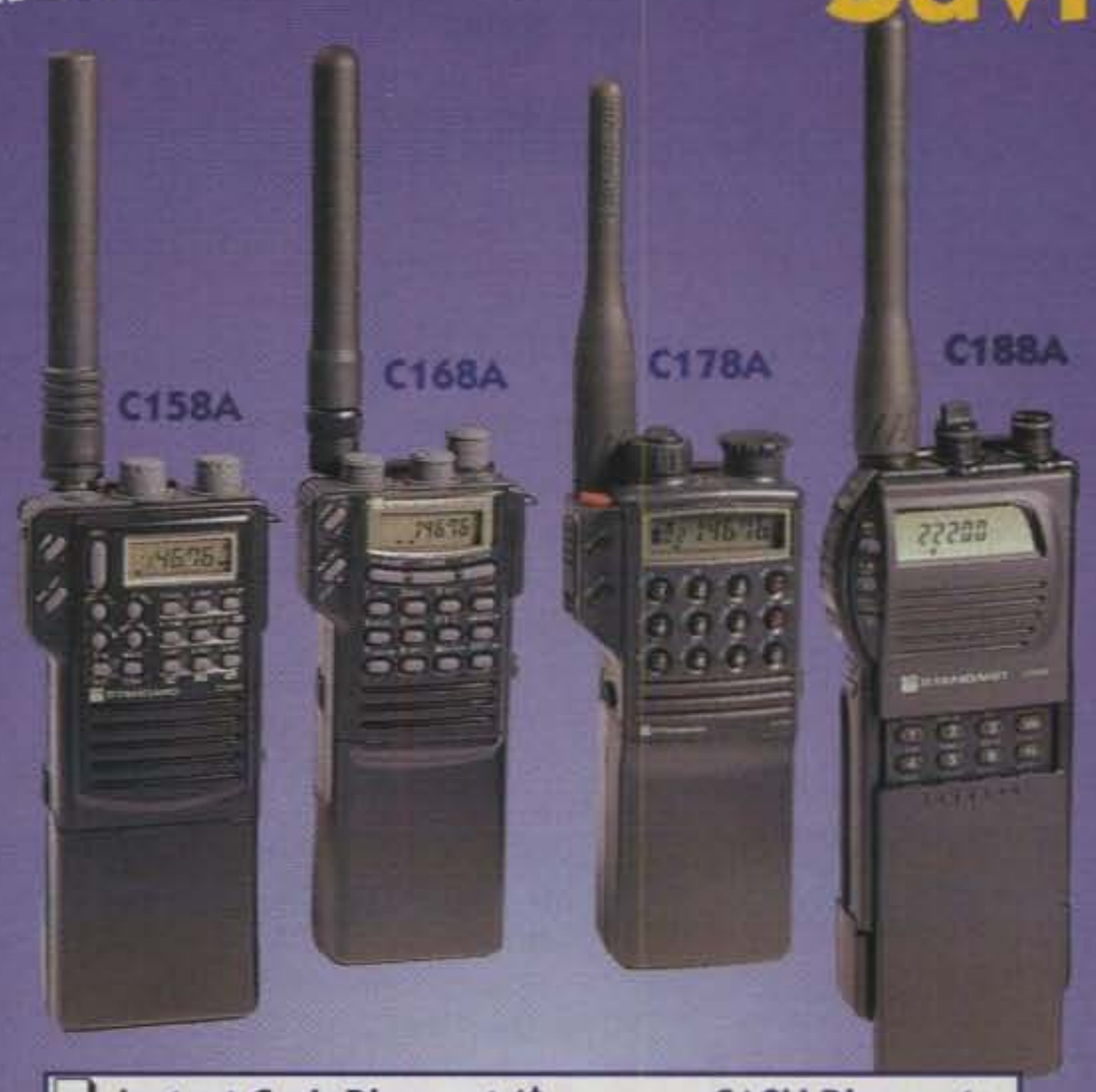

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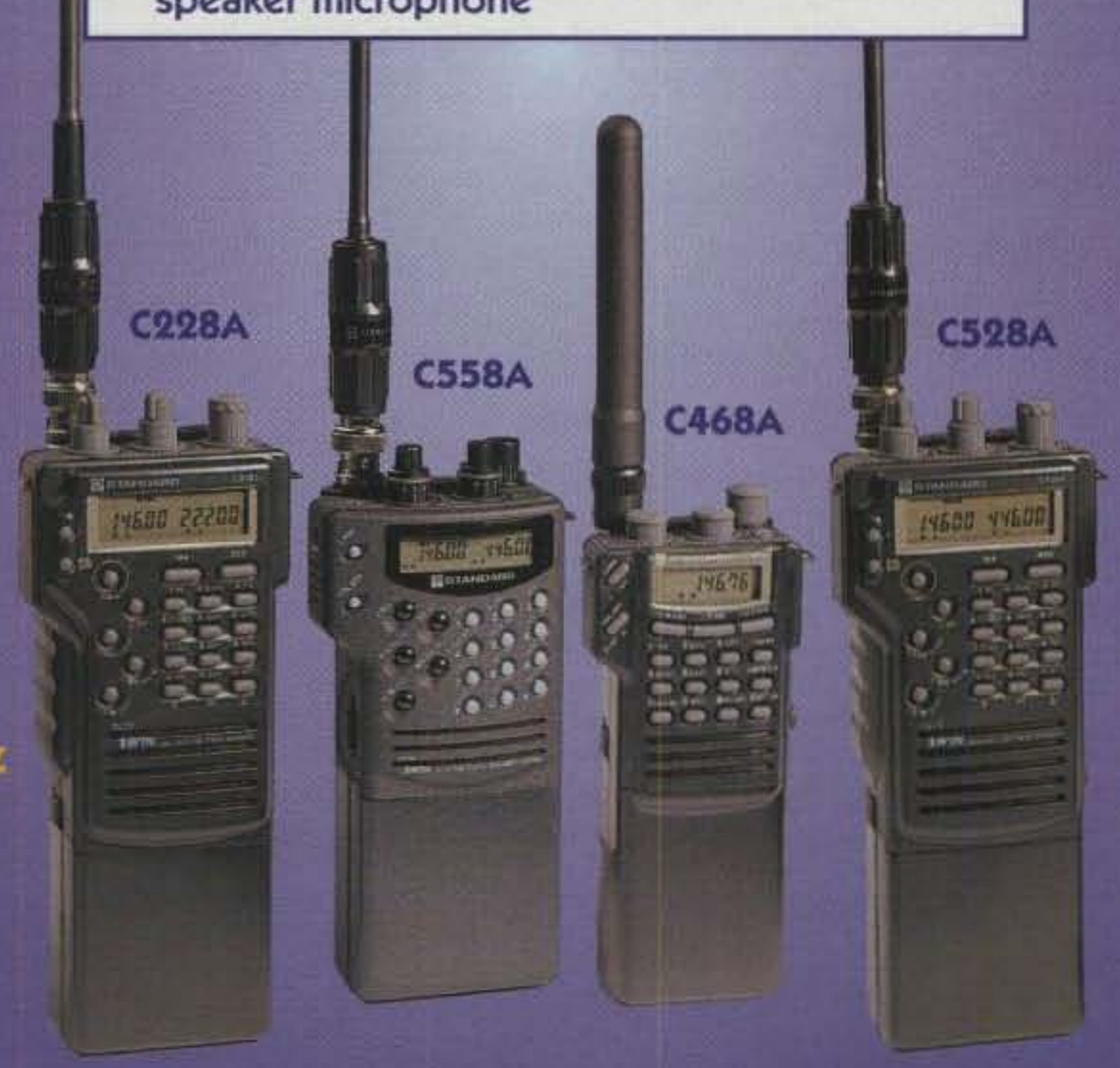

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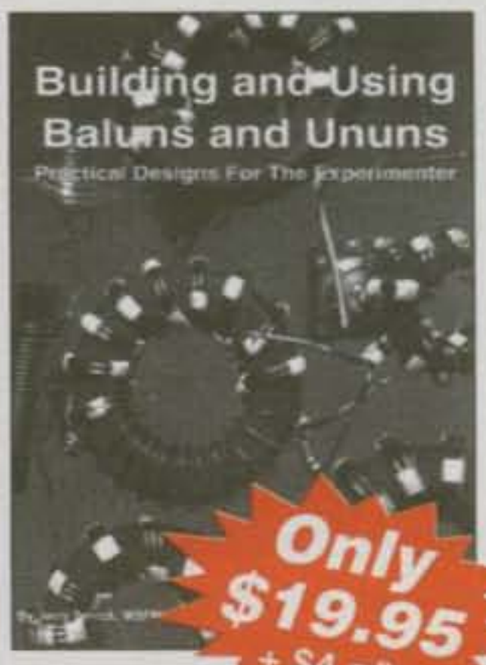

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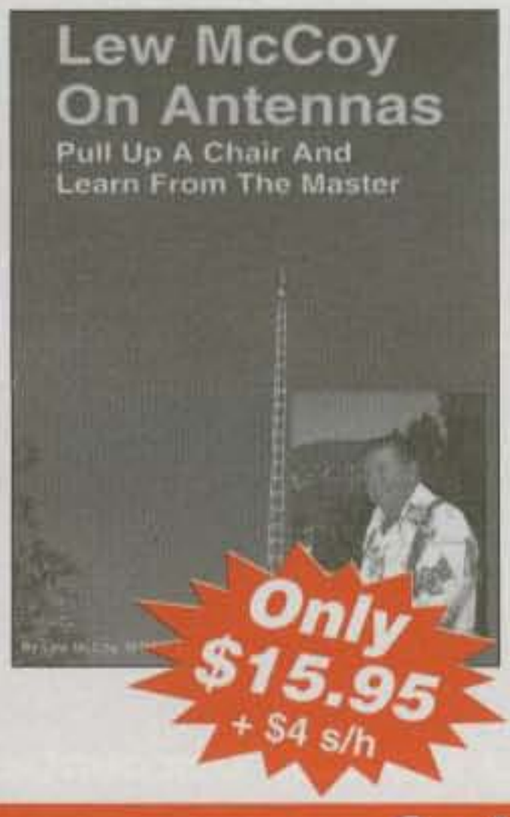
Lew McCoy on Antennas

by Lew McCoy, W1ICP



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long. This makes them useful for stateside and DX operation. The trade-off is that they are more responsive to man-made noise than are horizontal antennas. This is true of all vertically polarized antennas. If you live in a noisy location, you may have difficulty sifting weak DX signals out of the QRN.

If the inverted L is made slightly shorter than 1/4 wavelength, it can be matched easily by placing a tapped coil at the feedpoint, as illustrated in fig. 4. The upper tap is adjusted (using a dip meter) to resonate the antenna. The lower tap is then chosen to provide a 50 ohm feed impedance for the RG-8 coax feeder. There is some interaction between the taps. Three or four experimental adjustments may be required before an acceptable SWR is obtained. Typically, a 50 kHz bandwidth (SWR below 2:1) is possible without readjusting the coil taps on 160 meters. The bandwidth will increase to approximately 100 kHz, given the same overall antenna Q, for a 75 or 80 meter system.

The DX Answer

Few of the antennas described in this article will cut the mustard for long-haul communications, although any dipole, short-ended or not, has good DX capability if it is truly high in the air. The inverted L is the notable exception to the foregoing rule. I was able to confirm 72 countries with 100 watts of CW power in the winter of 1977 while living in Connecticut and using an inverted L for which the flat top was only 50 feet above ground. My ground system consisted of 24 buried radials. The longest one was 125 feet long and the shortest one was 40 feet in length.

Large, effective antennas such as full-size verticals with numerous buried radials, or full-size horizontal 160 meter loops at substantial height, are excellent for DX-ing on top band. W4ZCB in Hendersonville, North Carolina uses a 1/2-wavelength inverted L for 160 and 75 meters (60 feet high) and therefore he needs no ground screen. His signal into Michigan and points of greater distance is always loud. Of course, living atop a small mountain doesn't hurt Harold's signal a bit!

I have good results from Luther, Michigan while using my 160 meter inverted V at 70 feet above ground. The antenna is fed with 125 feet of 450 ohm ladder line. It performs admirably from 1.8 through 29 MHz. The antenna matcher or Transmatch "floats" at RF to permit using it as a balanced tuner, per the excellent article by A. Roehm, W2OBJ, that appears in the 2nd edition of *The ARRL Antenna Compendium*, page 172. This method eliminates the need for a balun transformer, which provides, at best, questionable performance in a multiband antenna system that employs tuned, balanced feeders. A balun in such a changeable environment scarcely knows whether to "wind its watch or burst into flame," depending upon the transmitter power level and the impedance reflected down the feed line at a given frequency.

A Few Words About Helicals

If you have no supports for an inverted-L antenna, it may be worth considering a helically wound short vertical (fig. 5) for that city lot. You can use 20 or 25 feet of PVC pipe for the coil form. Space wind 1/2 wavelength of wire on the PVC pipe to cover all of its length. Install a capacitance hat (the larger the better) at the top of the antenna. This will decrease the antenna Q and prevent it from becoming a Tesla coil when you speak into the microphone or key the transmitter (a ball of flame!), and it will increase the antenna bandwidth. The helically wound anten-

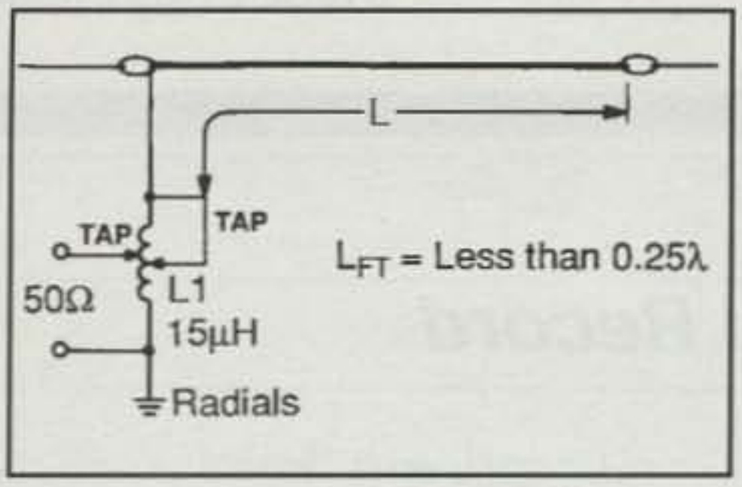

Fig. 4– Simple system for matching an inverted L or any 1/4-wavelength antenna to a 50 ohm source. The antenna should be slightly less than 1/4 wavelength overall to permit L1 to establish resonance. The upper tap is selected for antenna resonance while using a dip meter. The lower tap is chosen to provide a 50 ohm feed impedance.

na is tuned to reasonance by trimming turns at the bottom for the lowest SWR at the chosen part of the 160 meter band (it won't be 1:1). Tuning is done with the ground system in place. The simple matching networks described earlier in the article are suitable for this antenna.

In the early 1950s I used an antenna of this description and had excellent results with only 50 watts of AM transmitter

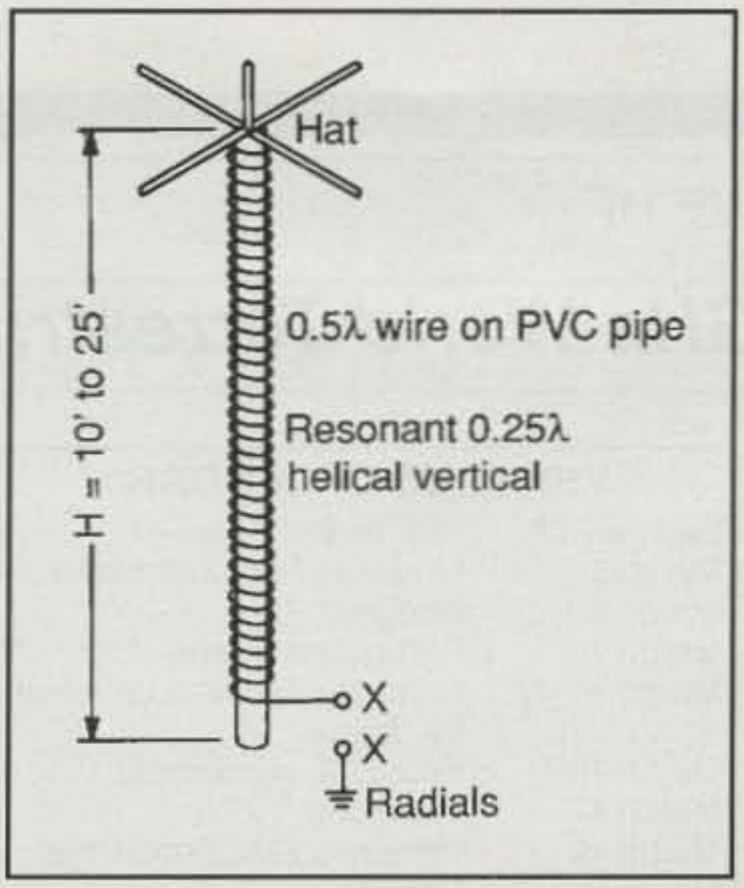

Fig. 5– A short helically wound vertical may be used effectively over a ground plane when space does not permit erecting larger antennas. The longer the helix he better the performance (see text).

power. I used a 16 foot wooden handrail I obtained from a lumber yard. It was treated with two coats of spar varnish (exterior polyurethane varnish may be used) and wound with 250 feet of No. 14 vinyl-covered house wiring. After I resonated the antenna I added two coats of spar varnish to help keep the spaced turns from moving and to protect the winding from the weather. The capacitance hat was fashioned from a 10 inch OD aluminum pie tin that was connected to the upper end of the helical winding. I had no difficulty maintaining regular contacts with stations as far away as 500 miles at night (sunspots were at an ebb), and worked a station in Death Valley, California from Michigan on two occasions.

Summary Remarks

If you want to enjoy success on 160 meters, you will need to use the best antenna system you can manage. This truism applies especially to top band, where noise levels are often high (atmospherics and manmade noise), and where some signals are somewhat puny because of poor antennas. Although I am by no means a power monger, it is beneficial to have a linear amplifier that operates on 160 meters for those times when noise levels or propagation make it almost impossible to be heard with a barefoot rig. My Ameritron AL-80A is called into service many times when conditions merit the use of additional power.

73, Doug, W1FB

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

New 10 GHz World Terrestrial Record

Thanks to a forwarded e-mail report from Dave Meier, N4MW, your editor contacted Walter Howse, VK6KZ, concerning a record-breaking 10 GHz contact in Australia. The following report from Walter was sent to me as a result of my e-mail query to him.

"Just to let you know that Roger Bowman, VK5NY, and I will be claiming the world distance record for 10 GHz. Roger and I worked on Friday last 30 December at 1232 UTC over a path of 1911 km (1187 miles). Roger was portable about .5 km (.3 miles) from his home QTH in Adelaide (PF94hs) and I was portable at Torbay near Albany OF84tw. Roger was using 180 mW to a 400 mm dish and penny feed and I was using 100 mW to the same size dish and a dipole/reflector feed.

"Sideband signals were 41/52. I was also heard by, and heard, David Minchin, VK5KK, a few kilometres farther away and slightly to the north of Roger, but no two-way contact resulted. I worked Roger, VK5NY, just over two hours after the initial contact and exchanged Ross Hull VHF Contest numbers with him!

(Ross Hull was an Australian VHF+ pioneer who later went to work for the American Radio Relay League. While there, he was the first to demonstrate that contacts on 50 MHz and above were indeed possible "beyond the horizon." In honor of his memory Australians hold an annual contest named after him.—ed.)

"There was the typical high-pressure cell in the Great Australian Bight and signals on 144, 432, and 1296 MHZ were quite good over the 1900+ km (1180+ mile) path. We tried to increase the distance the following night without success with the VHF paths dropping while Roger drove the 250+ km (155 mile) path to a new portable location. Roger was about 400 meters (1300 feet) above sea level and I was about 200 meters (650 feet).

"It was not an all water path, as I had a headland peaking at about 220 meters (720 feet) about 30 km (18 miles) away. (The initial takeoff was over water.) I am not sure about Roger's clearance of the Cape Yorke peninsula west of Adelaide. I only noticed it today when studying a map of south Australia.

"Roger is only the second station I have worked on 10 GHz narrowband! The first station I worked was Neil Sandford, VK6BHT/p, in Geraldton over a 377 km (234 mile) path to my portable location about 14 km (9 miles) from my home QTH on 29 November 1994. That contact was a new Australian distance record and we followed it on 14 December 1994 with contacts at 403 (250), 434 (270), 516 (321), and 545 km (339 miles) as I drove south to Rockingham, Mandurah, Bunburry, and Busselton. Neil was portable at Geraldton. All of these contacts were made essentially with both of us at sea level. About 250 km (155 miles) of the path of the first two contacts was over land with the final contact being an all sea path.

"My home QTH is Perth, the capital city of Western Australia, and I have to choose the right time to drive south to work across the Great Australian Bight. It involves over 1000 km (621 miles) of driving to go there and back home.

"I have previously held world distance records on 432 and 1296 MHz from the southern coastline to South Australia and Victoria.

"As you can read into this account, I am a very keen portable operator and a close observer of the likely conditions for anomalous propagation on VHF/UHF/microwave bands. The Great Australian Bight is renowned for long-distance propagation with Reg Galle, VK5QR (Adelaide), and Wally Green, VK6WG (Albany), holding world distance records on 1296, 2304, and 3456 MHz for a number of years before Chip Angle, N6CA, and his beacons operated by Paul Lieb, KH6HME, enabled bridging of the Pacific between Hawaii and California."

The previous North American 10 GHz record of 698 miles was established on 25 August 1994 between Frank Kelly, WB6CWN, and Jack Henry, XE2/N6XQ. Frank was operating in the central California coastal range on 5200 foot high Santa Rita Peak and Jack was operating ar 2000 foot elevation in the Sierra Los Indios Mountains on the Vizcaino Peninsula in Baja California, Mexico.

Incidentally, Dave reports the following concerning his "family" of beacons: "On January 3, 1995, the 144.280 MHz was activated from FM17kn (New Kent, VA). Power is 30 watts. The antenna is an M² Sqloop at 20 feet. The beacon is located at my station location. Operation will be continuous except for periods of station operation. To allow continuous operation, the beacon will be relocated if/when a remote site is found. Other bands will be added soon."

VHF PLUS CALENDAR

February 28	New moon.
March 5	Moderate EME conditions.
March 8	Apogee.
March 10	First quarter moon.
March 11–12	Charlotte Hamfest. (See text for details.)
March 12	Poor EME conditions.
March 17	Full moon.
March 19	Moderate EME conditions.
March 20	Perigee.
March 24	Last quarter moon.
March 26	Moderate EME conditions.
March 31	New moon.

**EME conditions courtesy W5LUU.*

ARRL CAC Reexamines Rover Rules

Perhaps the most controversial issue in the VHF+ arena is the Rover rules for the ARRL contests. After considerable debate was generated over the challenge to the then existing Rover rules during the January 1993 ARRL VHF Sweepstakes contest, the CAC was faced

Joe Pater, WB8GEX (left), and John Walker, WZ8D (right), surround Chris Dove, V44KB, at the installation site of the V44K 6 meter beacon. (Photo courtesy WB8GEX)

P.O. Box 73, Oklahoma City, OK 73101

with having to make recommendations for changes to the rules.

Enter Emil Pocock, W3EP, editor of *QST*'s VHF column. I should say "enter again," because it was Emil, along with Curt Roseman, K9AKS, and Michael Owen, W9IP, who at the time they were the editors of the *NCJ* VHF contest column proposed the "Rover" category for League contests. Based on input from their readers, they developed rules that were put into effect in the 1991 ARRL VHF contests.

In an effort to satisfy the complainers and close some loop-holes, Emil proposed revising the rules so that scores from each grid locator would add together rather than multiply together (see this column in the July 1994 *CQ* for the complete rules). Last year these rules were adopted by the League for contests beginning January 1995.

Even before these rules were put into effect, they were challenged by many who are active Rovers. Additionally, so called "big gun" stations (and not so big guns) commented on how important Rovers were to their scores. For example, I reported in my December 1994 column that Larry Lambert, NØLL, had a total of 437 QSOs and that 131 contacts were with Rover stations.

Because of the ongoing controversy, the ARRL Contest Advisory Committee (CAC) has issued the following memo to the Awards Committee concerning the CAC and the Rover. It is authored by Mark Beckwith, WA6OTU, dated January 5, 1995, and was forwarded to the Internet via Roger Keating, KD6EFQ:

"The Contest Advisory Committee herewith recommends to the Awards Committee to direct the Headquarters staff to facilitate a solution to the continuing Rover issue by performing the following tasks:

1. Collect a database of active Rovers and VHF clubs by scanning the participants of all the ARRL-sponsored VHF/UHF contests since the inception of the Rover Category. Initiate a questionnaire to some or all of these participants asking any questions helpful to the solution of the Rover Issue, including: (a) Do you think under the old rules Rovers should have been excluded from Club Competition? (b) Do you think Rovers would be inspired to put more or less grids on the air using: Additive scoring (new way) or Multiplicative scoring (old way)? (c) Do you think the practice of "grid-circling" or "grid-dancing"should be against the rules? (d) Do you think Rovers should be limited to one callsign per Rover Expedition regardless of the "Family Rule"?

In the mailing of this questionnaire, include an announcement that the new reflector is being set up, soliciting representatives from the clubs and individual non-club affiliated Rovers to participate in the preparation of a new recommendation.

Interested Rovers should be required to request in writing that they be added to the reflector list, and clubs wishing to field a representative should be required to request in writing that their named individual be added to the list also. (Everyone to include their e-mail addresses).

2. Set up said e-mail reflector.

3. An attempt should be made to coordinate events, discussions and deadlines so that an answer is reached in time to announce it for the 1995 running of the June VHF Contest.

4. Issue a press release publicizing this fact, including the words "On January 5, 1994, the Contest Advisory Committee of the American Radio Relay League recommended . . . " and a second press release announcing the outcome.

On the surface, one group that appears not to be examined is composed of fixed stations that rely heavily upon Rover contacts to make or break their contest effort. Your editor thinks this group has input and should be consulted along with the Rovers. Naturally, it will take more work to determine who these stations are because they can only be identified by examining their logs for an abundance of Rover contacts.

All this discussion about Rovers brings me back to my survey. As you may recall, I published a survey concerning the Rover issue and the January contest on page 150 of the January issue. It has a February 28 mail-in date. In light of the CAC's reexamination of the ARRL's Rover rules, I feel that this survey will have some worth. Therefore, I will make the results available to the members of the CAC as soon as I have them tabulated. As most of you are receiving this issue prior to February 28, here is a gentle reminder that if you qualify to fill out the survey, please do so and send it in today. Thanks.

ARRL Files Comments on 2400 MHz NPRM

According to the "W5YI Report" newsletter, the American Radio Relay League filed comments on the FCC's NPRM concerning reallocating major portions of this band to commercial use. In 29 pages of comments the ARRL stated unequivocally that "It must be absolutely understood . . . that NTIA has not complied with the Reconciliation Act . . . NTIA did not appropriately consider the uses made by the Amateur Service of the 2390–2402 MHz, or the 2402–2417 MHz bands." It went on to ask that the Amateur Service be given primary allocation status between 2402 and 2417 MHz and that it be given co-primary status between 2390 and 2402 MHz.

Additional comments favoring the Amateur Service included In-Flight Phone Corporation, which said, "Given the limited number of amateur users of the 2390–2400 MHz band and the directional, point-to-point nature of amateur transmissions, the probability of interference to the reception of AAVS signals on board aircraft from amateur operations is believed to be small."

Both Microsoft Corporation and Apple Computers, Inc., also made strong positive statements in support of continuing the allocation of the 2390–2450 MHz portion of the band to the Amateur Service. Other commentors made mention that if the use by the amateurs remained small, then interference to their particular specialized communications would not occur.

Unfortunately, as use of the lower VHF frequencies reaches saturation levels there will be (actually, already is) an upward push to the lesser used bands. The 13 cm band is the most logical place to accommodate future growth in the Amateur Service. Two major factors will contribute to that growth in the next few years: the launch of the Phase 3-D satellite which will have a downlink in this band and the decreasing cost of equipment for the band. Already commercially designed equipment is being tested for the amateur market. Should movement by amateurs to this band warrant intro-

On Nov. 4, 1994 (5 Nov. UTC) Serge Veiky, VE1KG, completed a record-breaking 2 meter terrestrial QSO of 1687 miles with Rene Shaw, WB4MQG, using this EME array.

duction of such equipment, it could happen fairly quickly.

Considering the threat to this portion of the amateur radio spectrum, we should carefully watch the developments of this proposed reallocation over the next several months.

First EME Operation From Antarctica

It was one of those once-in-a-lifetime opportunities. Antarctica had never been on EME. For a couple of weeks, beginning in late December 1994, Mike Staal, K6MYC, was working on a government project at McMurdo Base. Being the amateur operator that he is, he brought equipment to operate EME on 2 meters. The following reports are from Mike Staal, K6MYC, and Lionel Edwards, VE7BQH.

Mike states, "On 2 meters I had 15 QSOs plus many heard. I had difficult conditions and low power; I was running 120 watts until Jan. 1, when I finally got 700 watts out of a damaged 8877 amp. Antennas were 4 x 2M9SSB M² (naturally). I ran the 6 meter beacon only on Jan. 1, and it was heard briefly in VK3. I was snowed out on Jan. 5, the only good EME day to Jimmy, W6JKV, and Bob, K6QXY. My QTH was a bad location for the 6 meter station.—73 de Mike, K6MYC/KC4."

According to Lionel, Mike worked the following stations on 2 meters: W4ZD, KB8RQ, VE7BQH, K5GW, WB5LBT, WA1JXN, KL7FB, W7HAH, HB9CRQ, SM7BAE, SM5FRH, OK1MS, SM5BSZ, SM5MIX, and possibly DL5MAE.

Lionel adds, "I think there may be one or two more contacts. Mike had difficulties with horizon obstructions plus local noise on occasion. On top of all that he was there to do a particular job! However, you know Mike; unless he has six projects in the air at once he is not happy!"

What about future operations from KC4? Logistical conditions have to be just right, and it is highly unlikely that this will occur any time in the near future. Congratulations to those fortunate fifteen.

New North American 144 MHz Tropo Record

During a rather intense tropo opening the evening of 4 November operators along the eastern seaboard and inland from New England to south Florida were enjoying QSOs on frequencies between 144 MHz and 1296 MHz. Highlighting the evening was a 2 meter QSO between Serge Veiky, VE1KG, and Rene Shaw, WB4MQG. The following is from Serge.

"On November 5 I got a phone call from Ron, WZ1V. Ron was able to copy the Sable Island beacon, which is 300 miles southeast of me. I am in FN84cm in Nova Scotia. There was a tropo opening that evening to the south of me. After hearing and calling Frank, W4FF, with no completion, I finally worked Rene, WB4MJE, in the Florida Keys (EL94) for a distance of almost 1700 miles. *(The distance was confirmed to be 1687 miles or 2715 km—ed.)* I am mostly active on EME, so it was exciting to work so far as terrestrial. Running here 1 kw to two 17-element M² five-wavelength antennas with elevation."

The old record of 1468 miles (2362 km) was held since 1968 by K5WXZ and K1RJH. One wonders what the record might have stretched out to be if the guys in Havana had been on the air!

Old Year Rings Out With Band Openings

On the last days of 1994 operators of 6 and 2 meters were treated to quite spectacular openings. From **Bill Sattler, NØXX/7**, comes the following: "Who would have guessed that the last day of 1994 would turn out to be one of the most exciting days of the year for VHFers here in Oregon? I was watching the Chiefs play the Dolphins when I got a call from Lew, N7AVK, alerting me to 6 meter sporadic-E at about 2215 UTC. I turned on the 6 meter rig and found double hop into the Southeast, Texas to Florida, pounding in.

"While listening to Lew run double hop on 6 meters I heard Larry, NØLL, call Lew and ask him to try 2 meters. Lew's 2 meter rig was torn apart, so I broke in and told him I'd fire up on 2 and listen. I tuned up and called a quick CQ on 144.200, only to have NØLL (EM09) answer me immediately. A few minutes later WS5R was worked (DM95) in a brief opening his direction.

"The band shifted north and WØBJ (DN91) came through, followed by QSOs with KØNG (EN10) and KØGCJ (EN00). I heard a weak CW station and shifted to CW, only to have him peak suddenly, and it was KMØA (EM48)! We worked quickly, and that was the last contact of the opening, at 2336, but the band was open for another 45 minutes, with the opening fading in and out.

"More stations could have been worked, but no new stations were heard. NØLL was in for the full opening, from when I got on at 2248 with the band already open until around 0000 UTC. None of the stations were loud here in southern CN84, but N7AVK got his 2 meter rig working and reported that at his QTH, 45 miles north of me, many of the stations peaked 20-30 dB over S9. I assume I was at the southern edge of the opening.

"I didn't hear any other stations in this area, so don't know the extent of the opening on this end. By the way, the distance from my location to KMØA, according to 6-digit grids, is 1718 miles! Not a record, but a heck of a long way on single-hop 2 meter sporadic-E. After 2 meters closed, I listened to 6 meters for another hour and a half of double hop into the midwest, WØs, 9s, and 8s.

"What a way to end the year. After waiting all summer for a good 2 meter sporadic-E opening, we had our first good one in the middle of the winter. I guess it just proves you need to keep an ear on the radio whenever possible, and have a good "phone-tree" to alert your buddies when something does happen.

"Incidentally, my address is no good in the *Callbook*. QSLs for me should be sent to 618 Spaulding Avenue, Brownsville, OR 97327. Thanks."

The ending of such a fantastic opening is sometimes followed by a propagation mode known as *field aligned irregularities*, or *FAI*. This one featured just such an opening. **John Godwin, KB5IUA** (EL29), reported that he worked K7CA (DM26), KE7OI (DN31), NJ7A (DN30), and K7ICW (DM26) on 2 meters over a 2½ hour period ending around 0250 UTC.

Tim Marek, NC7K, reports the following: "What a way to start the New Year! At 0055 UTC 31 December I was rewiring the packet station to accept a new to me IC22A when the 6 meter rig squelches opened. The first opening in three weeks. It was pretty typical for December—one hop to AZ lasting from 0055 to 0210. The next morning I was almost finished with the mods to the 22A when at 1922 WDØEMY in DN86 popped in for ten minutes or so. At 2138 I heard N7NPC in DN62. At this point I ran into town to pick up microphone and power cable components, grabbed a burger (*somehow Tim always works food into his reports!—ed.)*, and filled the gas tank. At 2315 I had just gotten home from my errands and the band was *wide* open with single and double hop into the center of the country. At 2322 I worked KB9JQ (EN52), KU8Y (EN61, we set up a 2M EME sked), and at 2343 WA7HQD in DN31! That's less than 400 miles east. I dropped the mike and ran to the living room, flipped the 2 meter kilowatt on, lowered the

More than 60 of the 100 participants of the 1994 Microwave Update conference posed for this group picture. (Photo courtesy WØMXY)

EME ant to the horizon, and started CQing 144.200 CW. Not long after I heard NØLL (EM09) on SSB via FAI. He was S3 and a bit distorted, so I called him on CW and we completed at 2349. CQing the band got some weak responses. Finally out of the noise I copied on CW 'CQ CQ CQ de WØHP WØHP WØHP K K.' WOW! I had worked Fred off the Moon earlier this month for state number 26, but never expected to hear him terrestrially. He was audible from 0005 through 0012, then 144 MHz seemed to quiet down.

"Going back to 6 meters at 0024, I worked KF9B (EN51), 0026; WA2VOI (EN35), 0027; WBØLJC (EN34, QRP!). Then 6 meters started to quiet down. The first E cloud moved north, and then I worked the following: 0100 VE6PG (DO31); 0104 VE7DRC (DO00); 0115 VE7FEI (CN88).

"The second E cloud seemed to have moved west and south. Off the back at 0124: N5EPA (DM65); 0152 VE7CA (CN89); and 0216 N5ZVG (EM18).

"Larry Lambert, NØLL, called me to say he had a 1½ hour long 2 meter opening on FAI. He reported Seattle working Minneapolis, Boise working St. Louis, and others. Quite a treat for the last evening of 1994 (first morning of 1995, UTC)."

Herb Spoonts, W3IWU, reports the following: "In an attempt to uphold the honor of the eastern USA, the following sketchy 50 MHz info is forwarded. I have used six-place grid locator since in many cases propagation was very localized with stations 15–20 miles distant experiencing different conditions. On 24 Dec., 0015–0130, LA, MS; 30 Dec., 1630–0420, GA, FL, LA, MS, AR, Cuba, Cayman Is., Bahamas; 31 Dec., 2115–0600, CA, NV, AZ, VE1, VE9, ME, NH, MA, VE2.

"My European friends have also reported the following, specifically from IO83or: 26 Dec., 1230–1330, Video from NE, OH1 beacon, ES5MC, several SMs; 28 Dec., 1030-1900, SM, LA, OH, ES, OZ, DL, OE, SP; 29

Dec., 1900–2000, DL, I; 01 Jan., 1500–1900, SP, ES, YL; 02 Jan., 1620–?, OK, OM. No other details.

"One common report is that we've all experienced *long* openings during this period—up to 12 hours."

Steve Lund, WA8LLY/6, reports the following: "I worked TI2NA (EJ79) on 30 Dec. 1994 at 2352Z. This is my best DX via multi-hop sporadic-E to date. (I also have worked him on Aurora [?] during the big one several years ago.) I was listening for C6AGN, who had been reported on PacketCluster working W5s. TI2NA was the only station I heard. He was 55 here in CM88 (north of SF)."

Commenting on the 31 December opening, Oscar Morales, CO2OJ, writes, "A fantastic opening yesterday evening! I worked stations from the central, western, and southern side of the US. Double hop with KB6NAN in CM87 and K7CA in DM26. Lots of QSOs with Texas and the Central States and one with VE3ECL in FN03. I also heard TI2NA with a 5/7 signal, but he didn't hear me."

Roger Keating, KD5EFQ, writes, "From about 2030 UTC 31 Dec., until as late as 0120 01 Jan., San Diego stations were contacting stations in MO, OK, ND, MN, ID, CO, and other states on 6 meters.

"Signals were very loud to moderate, and reports of our signal were much better than my reports to them (poor rig at our station I estimate). Slow QSB with periods of 4 to 10 minutes of reliable SSB communications were possible.

"W6RDF (DM12jq) made contact via SSB using 10 watts in three-element Yagi with stations in DN25, DN86, EN24, EN26, EN34, EM14, EM15, EM16, and EM49.

"It was remarkable how many stations were on the air given the holiday events. What a way to start off the log book for 1995."

Dave Bernhardt, N7DB, comments, "Starting around 1830 UTC 31 Dec. began one of the best winter 'E' openings seen from the northwest. The opening began on 6 to NM and TX. About 2230 OH, MI IA, IN, and IL were worked by K7RWT (CN85). Dave also worked MN, MO, TN, NB, KS, CO, UT, and AZ and heard some W2s and 3s. I was not able to be on that much today, but did pick up KS, CO, AR, AZ, MO, AL, MI, UT, TX, and LA. The 6 meter band was still open to WØMTK (DM59) at 0525 1 Jan. Missed NI5F in EM26 (would have been a new grid here). N7AVK (CN84) worked three stations in NB and KS, including NØLL this afternoon on 2 meters. K7RWT and I have been active on 6 for quite a few years and would rate this the best winter 'E' we have seen. The wide coverage and length were quite unusual."

From Mark Ammann, KMØA, is the following: "It was a rainy, chilly New Year's Eve afternoon, about 5 PM (2300 UTC). In the fireplace the logs are crackling and the comforting fragrance of the fire filled the family room. Snuggled on the sofa with a book in hand, I was watching the Kansas City Chiefs get beat. Somehow I was moved to get up and go downstairs to the shack.

"Wow! Six meters was wide open to just about everywhere west of the Mississippi. Seemed like a giant airburst of ionization over the Western plains and Rockies.

"Sounded pretty good to me. I thought about turning on the 2 meter rig. Nah, couldn't be 2 meter E skip in December, could it?

"On went the 2 meter rig. Immediately (2310) I heard and worked Bill Sattler, NØXX/7, in CN84 in Oregon. A new state, grid, and my best terrestrial DX on 2 meters—1718 miles! Then at 2311 I worked W7ZRC (DN13) and at 2329 WA7GSK (DN13). Bill, WAØKBZ, worked three stations in Washington state; he did not hear the Oregon station, and we did not hear the Washington stations here in St. Louis. Bill is 90 miles southwest of here.

"A few days later Bill, NØXX/7, called me on the phone. I was the farthest east he worked. He was as excited as I was!

"Never again will I say 'never' to winter E skip on 2 meters! This was the best E skip here in years, summer included. Even the 6 meter opening was more intense than anything seen this past summer."

One wonders what might have been if Kansas City were winning. Would Mark have been so enthused that he would not have "been moved" to go downstairs and get on the radio? I guess both Mark and Bill are thankful that Kansas City got beaten.

The following is from Jim, NZ7T, and Paul, KB7MFJ, Rudnicki: "I seem to remember that you warned me about the possible addiction to the VHF bands. Well, you were right! Santa blessed me last month with an old Yaesu FT-620B six meter rig. I don't have a real antenna yet, so I'm using my HF tribander. I don't know why it works, but it does!

"Now for the propagation report. I had only heard sporadic-E once since I had the rig

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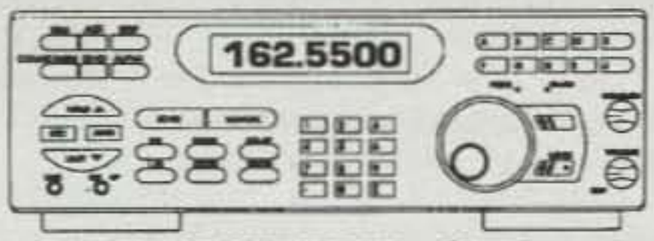

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(EL19). I figured I just didn't have enough of an antenna. Saturday afternoon, Dec. 31, changed all that! My son Paul, KB7MFJ, and I in just a few hours worked into Canada (DO33) and Mexico (DL98), as well as the west coast and east to Nebraska and Minnesota.

"We had a house full of guests, so we couldn't devote too much time to radio. But judging from our logs, we cannot complain.

"Six was wide open, netting contacts from almost every direction. Mind you, we were running barefoot (10 watts input) to the trusty tribander. It truly is a magic band. Talk about ham radio fun! When we worked the DM09 contact we began to think about an opening on 2 meters. Sure enough, it happened! One of the guys in Salt Lake City worked EL29 on 144.200! However, we didn't hear the opening here. Remember all the company in the house?

"All in all, it was a great opening. Lee Ernstrom, WA7HOD, who lives several miles west of me and farther from the mountains, worked several grids down into the Texas and Louisiana area, and several hams along the Wasatch front netted many new grids. Here are the grids we worked: CM's 87, 88, 97; CN's 72, 82, 85, 87, 88, 97; DL98; DM09; DN's 34, 86; DO's 20, 33; and EN's 10, 24."

The following report is from Bill Hudson, WAØKBZ: "On December 31 we had a spectacular sporadic-E opening on 2 meters! From EM48gc I worked the following stations on 144.205 MHz SSB: N7KSI (CN86), Washington, 2322 UTC; WI7Z (CN87ab), Washington, 2323; W7FHI (CN96), Washington, 2327; and on CW, W7ZRC (DN13), Idaho, 2348. KSØF, also in EM48, worked WA7GSK (DN13), also in Idaho. At the same time 6 meters was open to the west coast, signals were very strong and had heavy distortion."

Larry Lambert, NØLL, reports that he sent his wife out in a snowstorm to pick up their kids during the opening. He says that while she was not thrilled with the trip, she is a bit more understanding of the eccentricities of amateur radio operators now that she is one (KBØNTC).

During the snow Larry worked stations on the west coast and Arizona, as well as N7AVK and NØXX/7, plus many others.

Chip Margelli, K7JA, reported working a wide swath of stations from Montana to New Mexico. Rudy Stam, VE7FEI, reported working 125 stations in 50 grids; he worked as far south as DL98 (XE2LQB) and as far east as EL91 and EN62. He said that it was just an incredible opening. Rudy also reports that Jimmy Sutton, WM7A (CN87), worked Nebraska and Iowa on 2 meters. Talk about frustration, Rudy mentions that Mike, VE7SKA, was on a car ferry listening to the FM band going wild. No ham radio in the car, though.

St. Kitts Beacon On The Air

Joe Pater, WB8GEX, reports that while he and John Walker, WZ8D, were on a DXpediton to St. Kitts in November they helped install a new beacon.

Going on the air on 24 Nov., it is signing V44K on 50.055 MHz. It is mounted atop a 3000 ft. mountain and uses a vertical antenna.

The beacon and power supply were made and donated by Jerry Becker, WA8R. It was installed by John, Joe, Joel Libburd, V44KAI, and Basil Woods, V44KBW. Joe reports that both Joel and his brother Oliver, V44KAO, are active on 6 meters.

Joe gives a special thanks to Chris Dove, V44KB, the telecommunications officer for St. Kitts, for allowing them to install the beacon on the island. Incidentally, reception reports should be sent to John.

Regular Operation Of DM02 Begins

Kent Tiburski, WA6TBO, began regular VHF operations from San Clemente Island (DM02) in January. The island belongs to the Department of Defense, which limits access to it. Kent works for NOSC in San Diego, which has a facility on the island. Kent writes the following concerning his activity on the island: "My job takes me to the island usually 14 days a month. I have been assembling extra equipment to keep a station out there (sans rig). I have been into VHF since OSCAR 10 went up. I bought gear to get on the bird but now have found better uses for it!

"I got on during the *Geminids* in December 1994. I had Larry, K6AAW, call me and we arranged for a schedule. I had until then never had a QSO via meteors. On the 13th we started running at 2200 local. I heard Larry several times both meteors and tropo! We finally exchanged 'Rogers' at 2217. Wow!

"I then went up to 144.2 MHz to try to work random MS and was 'QRMed' by stations on the Oregon border and northern valley! Nevertheless, I managed to work a number of them.

"I've had reports that I was Q5 in DM09 (I

had the beam to the northwest). I can't believe what a great location the island is!

"I'll be using Yaesu FT-736R (6/2/432) brick amps for all bands with 150/200/100 watts, respectively. Antennas are 5 elements on 6 meters, 13 elements on 2 meters, and 30 elements on 70 cm. I have mast-mounted GaaS-FETs for each band too. I'm bringing out the two top sections of my Rohn HDBX-48 and rotor to setup."

Notes on Newsletters

"Great Lakes VHF/UHF" is a new newsletter covering the Michigan, Ohio, and southern Canada area. Edited by Dave Bostedor, Jr., N8NQS, it's full of info on activities of the guys in this area. For your subscription, send $5.00 to Dave at 434 Pattie Ave., Jackson, MI 49202.

Current and Coming Conferences

Charlotte Hamfest and Computerfair: Ted Goldthorpe, WA4VCC, reports that the 4-Landers, the VHF organization from Georgia, will be putting on an A/V presentation at the Charlotte Hamfest on 11 March. The leaders will be Ron Hooper, AB4RU, and Jim Hunt, N3AHI. These ops have attained several top five finishes and one national championship, so expect an excellent program. For ticket information, contact Charlotte Hamfest and Computerfair, P.O. Box 22136, Charlotte, NC 28222-1136, or call 704-536-7373.

EME Conference: The following is from Bob Taylor, WB5LBT. An international conference for 2 meter EME is planned for May 25–28 in Baton Rouge, Louisiana. Please mark your calendar. Also, if anyone would like to submit a program or subject matter contact us.

"Expect subjects on DSP audio filters and noise reduction from a factory rep. Additionally, information about DSP signal processing developed by AF9Y will be presented (a must).

"Let me know if you plan to attend and I will forward details of accommodations. Reply thru e-mail, EME net, or EME BBS mail to Bob Taylor, WB5LBT, 10715 Waverland Dr., Baton Rouge, LA 70815 (phone 504-275-6556; Internet: WB5LBT@aol.com)."

New North American VHF Directory Available

Tim Marek, NC7K, reports that a new *North American VHF Directory* is now available. At the time of this writing the price had not been set, but it is estimated to be around $12.00. It will be 64 pages long and include over 5000 listings of VHF+ operators throughout North America. Among items to be included are grid locators, phone numbers, and possibly Internet addresses. For your copy, contact Tim at 360 Prestige Ct., Reno, NV 89506, or call 702-972-4722.

Silent Keys

Both of these reports are from the Northeast Weak Signal Group and are forwarded by Ron Klimas, WZ1V.

"In early November 1994 Don Cook, K1DPP, passed away. As an avid VHF-UHF-SHF enthusiast Don was active on 6 meters through 2304 MHz, and 10 GHz. As many of us are, Don was one of the pioneers in this area of the hobby. I'm sure he will be missed by all.

"On December 15 1994, Paul Doane, W1HAD, passed away. As an avid VHF-UHF enthusiast, Paul was active on 2 meters and 432 MHz. Paul had one of the most powerful 2 meter signals in New England from as early as the AM days. Paul is survived by his wife Betsey, K1EIC, the ARRL CT Section Manager."

Your editor shares with all of you the sadness of losing these two well-respected members of our VHF+ family.

And Finally . . .

Some of you know that my brother, Bill, is battling colon cancer. Actually, we Lynches are battling the cancer. I spent two weeks in San Diego with Bill over the Christmas holiday and was cheered by his positive attitude toward his treatment. It is rigorous, five days on chemotherapy and 25 days off. He feels like he is riding a roller coaster. Nevertheless, he feels that he will beat the cancer with proper medical treatment and his faith in God.

I gave him a bit more incentive by telling him that I would give him a 2 meter rig when he passes his Technician class license (he said that he would break out the Gordon West study books right away).

We three Lynch kids are very close (I have a sister, Pat, who also lives in San Diego). We became that way after our father had to put us in an orphanage a year or so following our mother's death. This illness has made the importance of family even more relevant to us.

I don't want to sound maudlin in this column, but I do want to convey to you, my extended family, how much I appreciate you. We in the fraternity of amateur radio and, more specifically, in the sub-fraternity of the weak-signal VHF and above operators, know how special the camaraderie is to us. We should do everything to promote it and nothing to take away from it.

This brings me back to the Rover issue. I know that some of us have taken this issue personally. I can tell by the sheer volume of communications on the Internet that this issue is a very hot topic. However, some of the disagreement has been directed personally toward different individuals. Some of our fellow VHFers are not speaking (or are barely civil) to others. Even my friend Emil is taking quite a bit of heat over the issue.

There is nothing served by shutting down the lines of communications or attacking one another. Life is too short to maintain these sorts of attitudes.

It is my wish that while we have intelligent disagreements with one another on this, or any other issue, for that matter, we do not make it a personal issue.

Enough of the soapbox.

Thanks ever so much to all of you who regularly correspond with me via my address at the beginning of this column, phone me at 405-528-6625, send me FAXes at 405-528-0746, or send me e-mail at 72124.2734@compuserve.com. Without you I could not make this, your column, a success. Thanks also to you who tell me you are thinking of and praying for my brother. Until next month . . .

73, Joe, N6CL

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

CQ 1994 Contest Survey—Final Results

Publishing a contest survey is one of the best parts of this job. Not only does it allow me to learn what's on your mind, it also provides invaluable input as to the topics you want me to cover in future contest columns.

The purpose of the *CQ* contest survey is to allow you to react to some of the "hot topics" of the day. I recall several years ago receiving a letter from a respondent who coincidentally was also a market researcher. He had many criticisms of the research methodology used in these surveys. The fact is that he was right. This is not a professionally directed survey, but rather a way to give you insight into what people are thinking about and more importantly, to have some fun!

This year, although down some from the 1993 survey, we received 284 responses. However, this year's DX participation was up substantially, with 68 international responses received from 30 countries. And with only six anonymous entries, I guess I'll have to make next year's version much more controversial.

If you've bothered to leave your house this past year, you've heard all the talk about Internet and being a participant on the Information Superhighway. Contesters are participating with force, as 36% of your responses came to me electronically.

This year's survey yielded an average level of contesting experience of 16.7 years (almost the same as last year, indicating that many of us must be 39 years old!). There was a wide range of responses, from hand-written tallies on scratch-pad paper to several seven-plus page renditions. I can't say enough how much I appreciate all of your efforts.

What was most surprising in general terms this year was the support for change in some of contesting's most long-standing traditions. For example, there was nearly 50% support for the creation of "contest-free" operating frequencies. A full one-third of you want to see the old "599" signal report go away in favor of something more meaningful.

So with some of that information to tease you, let's get on with the results!

Calendar of Events

Feb.	**24-26**	**CQ WW 160 Meter SSB Contest**
Feb.	25-26	U.B.A. SSB Contest
Feb.	25-27	YLRL YL-OM CW Contest
Mar.	4-5	ARRL SSB DX Contest
Mar.	11-12	DIG QSO Party
Mar.	12-13	Wisconsin QSO Party
Mar.	14-15	CLARA & Family HF Contest
Mar.	18-19	Bermuda Contest
Mar.	18-20	BARTG Spring RTTY Contest
Mar.	**25-26**	**CQ WW SSB WPX Contest**
Apr.	1-2	EA RTTY Contest
Apr.	1-2	YU DX Contest
Apr.	22-23	Friendship Contest
Apr.	29-30	Helvetia (HB9) Contest
May	6-7	ARI International DX Contest
May	6-7	Connecticut QSO Party
May	21-22	Michigan QSO Party
May	**27-28**	**CQ WW CW WPX Contest**

March's Contest Tip

With sunspots near a minimum, bands such as 160 meters are even more important to maximized contest scores. With my relatively small three-quarter acre New York lot, I had pretty much dismissed any serious operation on that band. However, a 70 foot oak tree and 130 feet of wire can support an inverted-L that has worked VP8SGP, T32J, and many others. Check out the inverted-L antenna. It's an easy passport to 160M and higher contest scores.

Survey Results

1. Do you favor the concept of limiting contest operation to portions of bands, thus creating "contest-free" operating zones?

There was surprising support for this often debated topic. It has always been my view that the non-contester was the leading advocate of this idea, but there were an unexpected number of positive responses to this question from leading contesters. To be fair, however, 39% of the "yes" responses used the WARC bands as their example of where this idea would be implemented. Many Europeans used a positive response to make their point for eliminating SSB operation below 7040 kHz. When you take these responses out of the summary, the responses are much more skewed towards leaving things alone. Some of those who answered negatively simply said that it was a good idea on paper, but impossible to implement.

Yes—139
No—145

2. Who would you recommend should be the next inductee into the CQ Contest Hall of Fame?

The answers to this question did not surprise me. There were a large number of worthy operators mentioned as candidates for the CQ Contest Hall of Fame. Here's just a sample of who you thought should be inducted: N3RS, W9IOP, K4BAI, W2GD, K5NA, N4IN, K2TR, K1AR, W3LPL, N2AA, WL7E, WN4KKN, AI6V, W6ISQ, N4ZC, K1EA, KL7Y, K6SIW, K6UA, UA1DZ, K6NA, N5AU, N6KT, GW4BLE, CT1BOH, CT4NH, ON4UN, OH2KI, N1GL, N6ZZ, ZS6EZ, N6AA.

You will note that we have been inducting a number of people into the Hall of Fame each year because there are so many worthy nominees. This year will be no exception.

3. What do you predict the winning CQ WW scores will be in the year 2000 for the following categories?

Single Operator/USA SSB
Single Operator/World SSB
Single Operator/USA CW
Single Operator/World CW

Based on the lack of answers, this question probably ranks as the least relevant to most of the respondents. It seems that the only people thinking about a topic like this are the operators actually making the top scores (with a few exceptions). Of the 30 of you who actually answered the question, there was one common theme. Escalation of scores will continue into the next sunspot cycle. This is my belief as well. I still remember the comment from K1EA as I finished last year's CQ WW SSB contest with 3.5 million points. For me it felt like a contest in slow motion after the excitement of the previous sunspot-filled years. However, Ken pointed out that 3.5 million points was a fine score just 10 years ago.

The average range of scores in the year 2000 from your responses indicated that 10 million will be achievable from the USA on SSB and 20 million will happen on SSB from the DX side. Similar, albeit scaled down, scores were suggested on CW. From my perspective, if someone can make 10 million points while operating from the US, who needs to get on an airplane?

4. Do you support the elimination of the traditional 59/599 portion of contest exchanges in favor of more meaningful information?

Yes—189
No—95

Although I wasn't shocked to see some support for eliminating "cookbook" exchanges, the strong preference for changing the tradition was surprising. The overwhelming feeling on this subject is that contest exchanges should be a meaningful part of the contesting process. The CQ WW was often used as an

Question #	Yes	No	% Yes Responses
1	139	145	48.9%
2	N/A		
3	N/A		
4	189	95	66.7%
5A	95	189	33.3%
5B	112	172	39.5%
6	N/A		
7	N/A		
8	N/A		
9	221	63	77.8%
10	N/A		
11	168	116	59.2%
12	N/A		
13	N/A		

Table I–Summary analysis of "Yes-No" survey questions.

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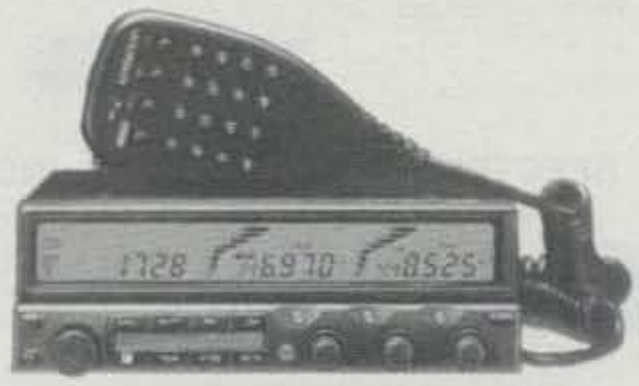

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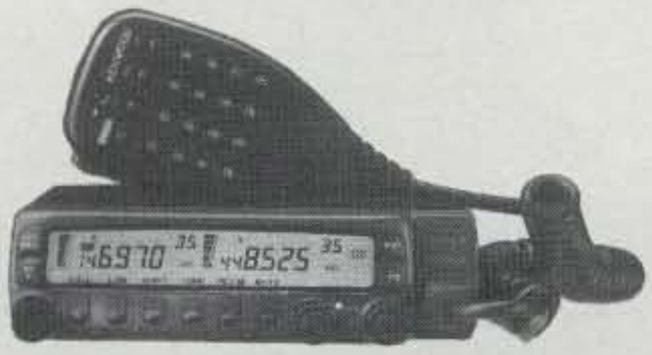

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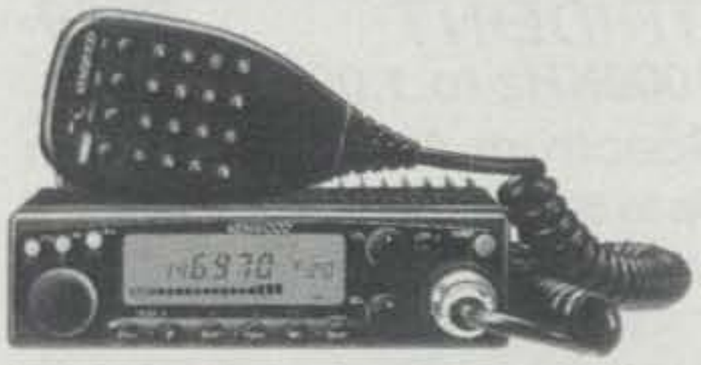


TM-241A

TM-255A

Call Area	# Responses
W1	20
W2	34
W3	24
W4	31
W5	15
W6	25
W7	11
W8	13
W9	17
WØ	14
VE	6
DX Country	**# Responses**
G	6
DL	7
KL7	3
SM	3
PY	2
F	2
S5	10
OH	2
5N	1
A2	1
VK	1
I	2
KH6	2
LU	3
CU	1
TF	1
VS6	1
JA	1
YV	1
ZS	2
OE	2
LY	1
ON	2
TI	3
LU	3
P4	1
8P	1
CE	1
KH2	1
YO	1
None indicated	6
Total	**284**

Table II– Geographic response analysis.

example of a contest that is simply a callsign-copying exercise in this context. There were a number of suggestions, but the most common idea was simply to replace signal reports with a serial number. That would sure make for an interesting DX exchange in the ARRL DX contest (e.g., 137 400). How about the All Asian Contest for a YL (e.g., 355 00)?

There was one very compelling reason given for keeping things the way they are. Simplicity, in theory, enhances participation by the casual operator. Let's face it. Most people can handle: "QSL, you're 59 New York." I'm fairly certain (although you'd never know it by the activity in the ARRL SS) that less people would casually operate in some contests with more complicated exchanges.

5. Should the single operator category:
a) Be limited to using only one radio?
Yes—95
No—189

Although the vast majority of responses indicated that they do not use two radios when operating single, there was widespread support for this strategy. Perhaps it's just the acceptance of reality, but my guess is most contesters think of two-radio use as just another aspect of a station's hardware, sort of like stacked beams or automatic antenna switching.

For those who did feel single operators should use a single radio, there was a nearly 100% correlation with a positive response on not using packet spotting as well. Many of you fall into the "traditional" single operator mode —one operator, one radio, one log, one QSO.

b) Be allowed to use packet spotting?
Yes—112
No—172

Are you surprised at the number of "yes" responses to this one? I was. The primary argument for use of packet as a single operator is that it fundamentally does not offer that much of an advantage in their minds. Until some of the top single operators use their stations in this category, I'm afraid that this debate will rage on.

6. What was your first contest operation?

Okay, we all know that Field Day isn't a contest, right? Well, for me and 24% of the other respondents Field Day was our first competitive operating event as contesters. With all the recent talk about the end of the Novice Roundup, 17% claimed it was their first operating event (it was the first contest in which I submitted a log under my callsign). Another interesting observation was in the number of people who claimed the SS to be their first contest. Again, with the complexity of the exchange you would think this would scare away most newcomers. Finally, where is the ARRL DX contest? While a couple of you indicated it in your answer, there wasn't enough response to justify a separate breakout in the analysis.
ARRL Field Day—68
ARRL Novice Roundup—49
ARRL SS—37
CQ WW—31
CQ WPX—25
Other—19
VHF Contest(s)—18
ARRL CD Party—12
ARRL 10M Contest—6
Worked All Europe—6
IARU—5
QSO Parties—5

7. How did you become interested in contest operating? (circle all that apply)

a) Contest Elmer—45
b) Discovered contest operating while operating radio—153
c) Local radio club—68
d) Magazine—114
e) Other—28

Despite the belief by many that a "person" was the catalyst for your interest in contest operating, Elmering is way down the list with the respondents of this survey. Nearly 54% of you literally stumbled into contesting while being "on the air." Magazines announcing contest rules was another popular route. Some of the more interesting methods included books, packet radio, desire to improve DX totals, and a way to just have more fun in the hobby (now that's a concept, eh?).

8. At what age did you start operating contests?
Average Age—23.33

I'm not sure what this answer proves except to say that our beginnings as contest operators did not necessarily begin with the start of our amateur radio careers. If you asked me to guess the answer to this question, I would have leaned more towards the late teens (e.g., high

school/early college years). By the way, there were 9 responses that indicated they began contesting after the age of 65. Who says it's too late to learn new tricks!

9. Do contests still have the same appeal for you that they did when you began?

Yes—221
No—63

Based on your answers, this is a question that is very dependent on the sunspot cycle. Quite a few of you indicating negative responses noted that band conditions, not other factors, strongly influenced your decision. There were a significant number of you, however, who were honest in your disdain for some of the real and perceived negative aspects of contesting (band congestion, power abuse, cheating, etc.).

On the positive side, over 50% of the "yes" answers also indicated that they enjoy contesting even more than ever!

10. As a contest operator, what feature(s) would you like to see in the next generation transceiver?

There were a number of good ideas generated by this question. If manufacturers could implement many of the following suggestions in a cost-effective way, contest operating would be taken to a new level from an equipment standpoint. Here's a summary of your suggestions.

- •Advanced digital signal processing (especially at IF frequencies)
- •Integrated voice keyer
- •Higher output power (200w+)
- •Front-panel selection of alternate RX antennas
- •Easy integration of second radio (e.g., "radio networking")
- •Ability to receive on one band while simultaneously transmitting on another
- •Real, usable RF noise blanking
- •Built-in support for packet
- •Integrated PC support (eliminate need for external PC)
- •Better support for accurate low-power (QRP) operation
- •The return of analog metering
- •Two radios/one package
- •Modular design to all for the adding of features as needed
- •Remote tuning control away from radio
- •A TS-930 with the above (couldn't resist reporting this one!)

You should know that in volume terms there wasn't even a close second on this one. Contesters want integrated DSP on receive. Nearly 31% of the responses to this question included this feature. While other areas such as more PC integration, output power, and metering came out, it should be no surprise to you that the main topic on your minds is better receiver technology. The old axiom "if you can't hear it, you can't work it" applies here!

11. Are you in favor of limiting transmitter output power to 100 watts for domestic contests?

Yes—168
No—116

There has been a lot of debate in other discussion mediums about this topic. A small number of positive respondents (6%) were supportive of the concept because they don't own an amplifier. Most others simply felt that high power does not have a meaningful impact on activity or enjoyment of domestic contests. And, with the ever-present criticism that con-

A Spouse's Opinion

How wives really feel about contesting!

Gentlemen:

Any and all wives know you do not really want to know and certainly do not care how wives feel about contesting. But since you were gracious enough to ask, I think you deserve to receive an opinion.

Contest participants apparently all live in self-cleaning homes, lawns that mow themselves, garbage that carries itself out, and have dishes that hop into the dishwasher all by themselves. You either never have dirty socks or must have self-cleaning socks as well. For those who have the misfortune of being married to a "working woman," this must surely be the case. If this is not the case, then are you surprised when you detect some unhappiness from the XYL?

Just suppose it was your wife who was the ardent ham radio operator. You know how important schedules are. Surely you would not have the audacity to expect her to have dinner ready for you when she has an important net to meet or a radio schedule to keep. And cleaning the house, grocery shopping on weekends would certainly not be possible if she was going to be any good at contesting, now would it? As for your love life, certainly you could not expect her to work that in with an important contest to participate in? As for your dirty socks—wash them yourself, bud!

Ham radio contests will go on with or without the blessing of spouses. But life for spouses will and does go on with or without the radio operator's participation in things other than ham radio. If that is what is chosen, then so be it.

—Elsie Thompson, XYL of KI4KR

testing takes about band congestion, low power was viewed to be one constructive response from your answers. The North American QSO Party (low power only US contest) was cited as a shinning example in 36 survey returns.

12. If you had the power to change one and only one aspect of contesting, what would you recommend?

There were a number of interesting responses to this question. Here are just a few:

•All stations should identify with every QSO
•Improve the management of awards programs (more and faster)
•Reduce the feeling that $uper $tations are taking over
•Speed up the delivery of final results
•Outlaw voice keyers
•Limit all contests to a maximum of 24 hours
•Every country should have an award winner regardless of score/time operated
•Work on ways to improve the image of contesting with non-contesters
•Bring back the old ARRL CD Parties
•More categories
•Less categories
•Limit automation before it's too late
•Add assisted categories to more contests
•Require that callsigns be signed in their entirety

The majority of your responses pertained to operating practice and contest administration and not changes in rulemaking. We all should look at this list and see how we can work to make contesting better for everyone.

13. In a few words, how does your spouse really feel about your interest in contest operating? (Ladies, feel free to answer this question personally!)

This question was, by far, the most fun in the survey. Many of you obviously had fun with it as well. You'll note the sidebar written by the XYL of KI4KR. As he put it, "Whew!" Here's some of the more interesting responses to this question:

•"The contest fever seems to be the one passion that competes with my husband's libido!"
•"I still haven't found that one special woman I want to annoy the rest of my life."
•"My first date with my wife was postponed one week because of the 1989 CW WPX contest."
•"I think it $%@# . . . what a dumb way to spend a whole weekend . . . you spend too much time with it."
•"My last girl friend left me at the end of Nov. '93. Why do you think that happened?"
•"Your ham minds have stairs that do not go all the way to the attic."
•"My dog thinks contesting is great!"
•"Spouses don't count for QSO credit."
•"She likes contests; it's me she can't stand."
•"It's an attractive alternative to sky-diving."
•"Now I understand why I've been single all these years—thanks, *CQ*!"
•"I am very proud of my husband's success in contesting and support him 100%." (Wonder if she has any sisters?)

You may recall a column I did a few years ago on this topic. After reading these comments, it may be time to have some more fun again with this subject.

Final Comments

Thanks again for your participation in this year's survey. Feel free to contact me at any time to suggest topics we can cover in next year's version.

Please remember to provide any submissions for the June column to me by April 1. A few of you are beginning to catch on, but as you can imagine, you can really help by submitting your contest announcements to me on disk (using practically any data format) or via electronic mail. Thanks in advance!

73, John, K1AR

Wisconsin QSO Party

1800Z Sun. to 0100Z Mon., March 12–13

This popular party is a shorty, only 7 hours, and it is again sponsored by the West Allis Radio Amateur Club. The same station may be worked on each band and mode, and mobiles in each county change. Wisconsin stations may contact other in-state stations for QSO and multiplier credit. Only one transmitter on the air at the same time.

Classes: Single operator and multi-operator and transmitter, both fixed and mobile. And Novice/Tech, both single and multi-operator.

Exchange: RS(T) and QTH. County for Wisconsin; state or province for others.

Scoring: Phone QSOs count 1 point, 2 points for CW. Wisconsin stations multiply total QSO points by (U.S. states + VE provinces +

Wisconsin counties) worked for their final score. DX contacts count for QSO points only. Others use total Wisconsin QSO points by the number of Wisconsin counties worked (maximum of 72).

Wisconsin mobiles can add a bonus of 500 points to their final score for each county outside their own from which they operate (minimum of 15 QSOs from each county).

Frequencies: CW—3550, 3705, 7050, 7125, 14025, 21150. SSB—3890, 7230, 14290, 28400.

Awards: Awards will be sent to the highest scoring single operator in each class in each state and province. *Wisconsin:* The top 10 single operator scorers in each class will receive awards as will the highest multi-operator in each class and highest aggregate club score. A plaque will be awarded to the highest scoring single operator in the party. Logs with more than 100 QSOs must include with their entry a separate dupe sheet for each mode.

Complete rules and entry forms are available from the address below. Please be sure to include an SASE with your request. Send your logs to: West Allis RAC, P.O. Box 1072, Milwaukee, WI 53201. Deadline is March 31st.

CLARA & Family HF Contest

1700Z Tues. to 1700 Wed., Mar. 14–15

This is the 28th anniversary of the CLARA Contest, and it is open to YLs and OMs around the world on phone and CW on all HF bands. Each station may be contacted twice per band mode.

Classes: Single operator, all bands.

Exchange: Name, RS(T), QTH (Canadian province/DXCC country), and CLARA membership status ("yes/no").

Scoring: CLARA-CLARA QSOs 5 points; CLARA-YL QSOs 3 points; CLARA-associate OM QSOs 2 points; CLARA-OM QSOs 1 point.

Multiplier: Canadian provinces and DXCC countries.

Final Score: Multiply total QSO points times multiplier.

Awards: A variety of trophies and certificates will be awarded to high-scoring CLARA members, non-members, and OMs.

Send your entries no later than April 15th to: Janis Cameron, VE7AAP, 3528 11th Avenue, Port Alberni, B.C. V9Y 4Y7 Canada.

Bermuda Contest

0001Z Sat. to 2400Z Sun., Mar. 18–19

This is the 37th year for this popular contest open to all licensed amateurs. Activity will be on the 3.5, 7, 14, 21, and 28 MHz bands on SSB and CW. Cross-band or cross-mode contacts are not permitted.

You are limited to 24 hours out of the 48-hour contest period. Off

times of no less than two consecutive hours must be clearly indicated on the log. Participation is for single operator stations only, and previous winners are no longer restricted from official entries in the contest.

Exchange: RS(T) and serial number.

Scoring: Five points for each QSO. A station may be worked on SSB and CW, but you may not take credit for an additional multiplier. Final score is the sum of QSO points times the number of countries on each band multiplied by the number of different VP9 stations worked on each band. *(Note: It's each VP9 station, not each parish).*

Awards: Certificates will be awarded to the top-scoring station in each country (minimum of 100 QSOs and 3 VP9s). The overall worldwide winner will receive a trophy. **Note: The free trip to Bermuda for the top-scoring entry has been reinstated (accommodations remain the responsibility of the award winner).**

Use a separate log sheet for each band and a dupe sheet for logs with 200 or more contacts. A penalty of three contacts will be deducted for each duplicate contact for which points are claimed. An excessive number of claimed duplicates means disqualification. The usual signed declaration is also required.

Entries must be **received** no later than June 1st by the Radio Society of Bermuda, Box HM 275, Hamilton HM AX, Bermuda. Enclose 4 IRCs for acknowledgment.

BARTG Spring RTTY Contest

0200Z Sat. to 0200Z Mon., Mar. 18–20

This contest is sponsored by the British Amateur Radio Teleprinter Group and is administrated by John Barber, G4SKA. The contest is open to all amateurs in four classes-single operator (all band and single band), multi-operator, and SWL.

Activity will be on all bands 3.5–28 MHz, but no WARC. Operation is limited to 30 hours out of the 48-hour contest period. The 18 hours off may be taken at any time, but in not less than 3-hour periods.

Exchange: RST plus a three-figure contact

number and time in GMT (full four figures).

Points: Contacts with other stations count one point. The same station may be worked on each band for QSO and multiplier credit.

Multiplier: Total number of countries worked on each band and number of continents worked (continents are counted once only). W/K, VE/VO, and VK call areas will be counted as separate multipliers.

Final Score: Total QSO points × country multiplier × continents worked.

Shortwave listeners must show call of station being heard, report of message being sent, and call of station being worked.

Awards: Certificates to the top-scoring stations in each class and to the continental leaders. Also in each W/K, VE/VO, and VK call areas.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc. Log forms are available from G4SKA; include 6 IRCs to cover postage. Logs must be received by May 29th and go to: John Barber, G4SKA, 32 Wellbrook St., Tiverton, Devon, EX16 5JW England.

Virginia QSO Party

1800Z Sat. to 0500Z Sun., Mar. 18–19
1100Z Sun. to 0200Z Mon., Mar. 19–20

This is the 20th year the Sterling Park ARC has sponsored this party. The same station may be worked on each band and each mode for QSO credit. VA stations may work other in-state stations for QSO multiplier credit. And VA mobiles in each county change.

Exchange: QSO number starting with 001 and QTH. County for VA; state, province, or DX country for others.

Scoring: Credit one point for each SSB contact; two points for CW; three points for working a VA mobile. VA stations multiply total QSO points by sum of US states, VE provinces, DX countries, and VA counties. Others multiply total VA QSO points by the number of VA counties worked (maximum of 95). Mobiles add to this the bonus points for Virginia counties in which QSOs were logged.

Frequencies: CW—1805 kHz and 50 kHz up from low end of 10, 15, 20, 40, and 80 meter bands. SSB—1845, 3860, 7260, 14260, 21360, and 28360. Also Novice bands (10 kHz up from bottom of Novice sub-band and 28360).

Awards: Certificates to top scorers on each state, province, DX country, and VA county. There are six plaques as follows: CW only, QRP only, club, VHF only, VA mobile, Novice/Tech, and top out-of-state station. Special certificates will be issued to stations working all 95 VA counties.

Logs: Indicate each new multiplier in a separate column as it is worked. Include a summary sheet showing the scoring and other pertinent information.

Mailing deadline for all entries is April 15th to: Virginia QSO Party, c/o William T. Free, W3FTG, 3627 Great Laurel Lane, Fairfax, VA 22033-1212.

CQ World-Wide WPX Contest

SSB: March 25–26 CW: May 27–28
0000Z Sat. to 2400Z Sun.

Complete rules were published in the February issue. The following are a few points to keep in mind.

You may operate 36 hours out of the 48-hour contest period as a single operator station. Off times must be a minimum of 60 minutes in length. Multi-op stations can operate the full 48 hours.

The definition of the prefix multiplier is spelled out in detail, but consider a prefix to be the letter/number combination which forms the first part of a call.

The multiplier is determined by the number of different prefixes worked and is counted *once* only, regardless of how many times it is worked on other bands.

Another point to keep in mind is that in the multi-operator, single transmitter category only one transmitter and only one band may be used during the same 10-minute period. Picking up a new multiplier on another band during the same time period is prohibited.

An alphabetical/numerical check list of claimed prefixes is a requirement and must be included with your log. Note that contest logs may be submitted on disk (MS-DOS compatible) in standard ASCII or .bin, .res, .dbf, or .wks formats. To reduce the administrative burden, please label your computer entries with a unique name (e.g., N8BJQ.BIN).

An updated trophy and plaque awards list now shows over 40 awards. Be sure to check the awards that are available.

Deadline for submitting your SSB entry is May 10th, and July 10th for the CW section. **Be sure to indicate SSB or CW on the envelope.**

All logs go to: *CQ* Magazine, WPX Contest, 76 North Broadway, Hicksville, NY 11801.

Questions pertaining to the WPX Contest can be sent to the WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenview Drive, Beavercreek, OH 45431 U.S.A.

From those long-ago days of Harry Truman and "command set" (war surplus) radios right up to the present, CQ has published an extensive series of acclaimed and widely-read books on a broad variety of amateur radio topics.

CQ: More Than A Magazine

BY NEIL D. FRIEDMAN*, N3DF

Many early *CQ* books were real milestones in their fields. *CQ DX* (1947) was the granddaddy of all DX reference books. *Single Sideband Techniques* (1954) met the early need for information on the up-and-coming SSB mode. *Command Sets* (1957) and its successor, *Surplus Conversion Handbook* (1964), served as bibles for a generation of resourceful hams. *The New RTTY Handbook* (1962) introduced thousands to digital communications.

Other books in the famous "CQ Technical Series" remain sources of valuable information for present-day amateurs. *The Shortwave Propagation Handbook* (2nd ed., 1982) is an excellent tutorial on the principles and forecasting of ionospheric propagation. *The Amateur Radio Vertical Antenna Handbook* (2nd ed., 1984), still in print, is widely considered the best book ever written for hams on this subject.

Best of all, *CQ*'s many books make excellent hamfest flea-market collectibles. They are fun to look for, low in cost, easy to carry and store and interesting to read. I see several titles at virtually every hamfest I attend. To help you in your hunt, here is a chronological checklist of *CQ*'s small-format (about 6 × 9 inch) books published prior to 1985:

CQ DX: Useful Information for the DX Man. Lawrence LeKashman, W2IOP (1947).

TVI: Television Interference, Its Causes and Cures. Lawrence LeKashman, W2IOP (1948).

TVI: Television Interference, Its Causes and Cures, 2nd ed. Lawrence LeKashman, W2IOP (1949).

Radio Amateurs' Mobile Handbook. William I. Orr, W6SAI (1953).

Single Sideband Techniques. Jack N. Brown, W3SHY (1954).

CQ New Mobile Handbook. William I. Orr, W6SAI (1956).

Command Sets. Editors of *CQ* (1957).

CQ Anthology: The Best of CQ, 1945–1952. Editors of *CQ* (1958).

New Sideband Handbook. Don Stoner, W6TNS (1958).

CQ Amateur Radio License Guide. Barry Briskman, K2IEG (1959).

Surplus Schematics Handbook. Editors of *CQ* (1960).

VHF for the Radio Amateur. Frank C. Jones, W6AJF (1961).

CQ Amateur Radio Anthology II. Art Seidman, K2BUS (1962).

The New RTTY Handbook. Byron H. Kretzman, W2JTP (1962).

Electronic Circuits Handbook. Tom Kneitel, K2AES (1963).

Shop & Shack Shortcuts. Don Stoner, W6TNS (1964).

Surplus Conversion Handbook. Tom Kneitel, K3FLL (K2AES) (1964).

Antenna Roundup. Art Seidman, K2BUS (1964).

Antenna Roundup, Vol. II. Tom Kneitel, K2AES (1966).

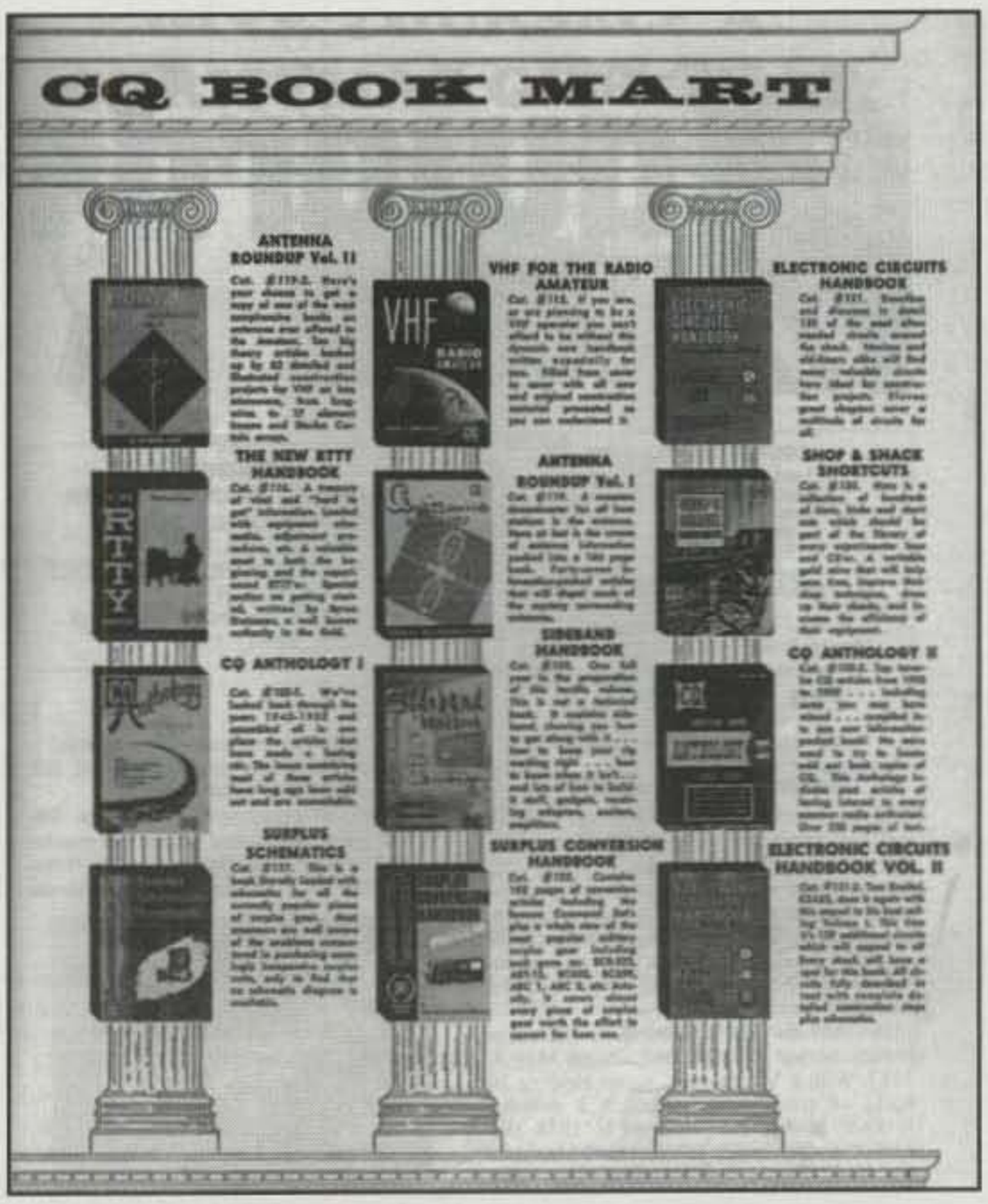
Antenna Handbook I. Ken Glanzer, K7GCO (1966).

Electronic Circuits Handbook, Vol. II. Tom Kneitel, K2AES (1966).

Amateur Radio DX Handbook. Don Miller, W9WNV (1968).

RTTY from A to Z. Durward J. Tucker, W5VU (1970).

The Amateur Radio Vertical Antenna Handbook. Paul H. Lee, K6TS (1974).



Short Wave Listener's Handbook. John Schultz, W2EEY (1974).

The Shortwave Propagation Handbook. George Jacobs, W3ASK and Theodore J. Cohen, N4XX (1979).

The Shortwave Propagation Handbook, 2nd ed. George Jacobs, W3ASK and Theodore J. Cohen, N4XX (1982).

The Amateur Radio Vertical Antenna Handbook, 2nd ed. Paul H. Lee, K6TS (1984).

Current Books

CQ's current outstanding lineup of books continues the tradition of quality established by those in the checklist. Not a week goes by when I don't refer to the *CQ 1994 Amateur Radio Almanac* by Doug Grant, K1DG, for information. *The Packet Radio Operator's Manual* by Buck Rogers, K4ABT, got me started right. There are a half-dozen more, plus titles from other publishers, so check the list in this issue

The books now share space in the *CQ* library with seven professionally-produced videos, with more to come. The CINDY award winning "Ham Radio Horizons: The Video" is among those now available. Videos bring a new dimension to *CQ*'s long-term commitment to interest and inform the amateur radio community.

**c/o CQ magazine*

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

A Minimum Component, Ultra-Simple IC Oscillator

We all are familiar with crystal oscillators, to be sure, and we also are aware of the many possible circuit variations to implement them. The decision as to what circuit to use in a particular application is not so simple, however, and the choice of component values can also be confusing at times.

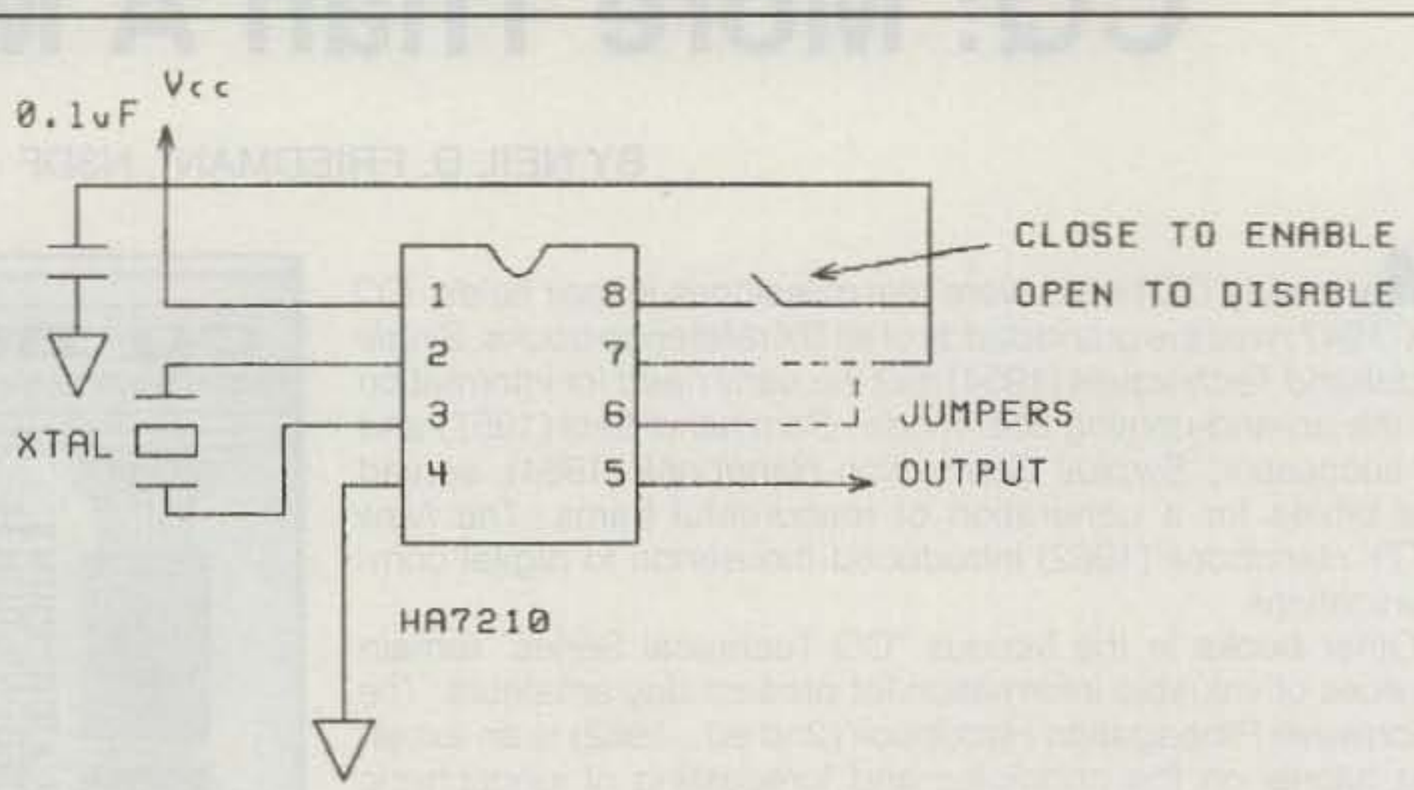
Our offering this month can go a long way toward simplifying the design of such oscillator circuitry, since it is a complete, self-contained crystal oscillator in an 8-pin IC. The HA7210, manufactured by Harris Semiconductor, is so simple it only requires the crystal, a 0.1 µF bypass capacitor, and a couple of jumpers for stable operation from 10 kHz through 10 MHz. The chip also features an enable/disable mode which switches the output to a minimum-current-drain/high-impedance state for standby operation.

Fig. 1 is a schematic of the circuit along with a table showing the upper arrangement for operation through the frequency

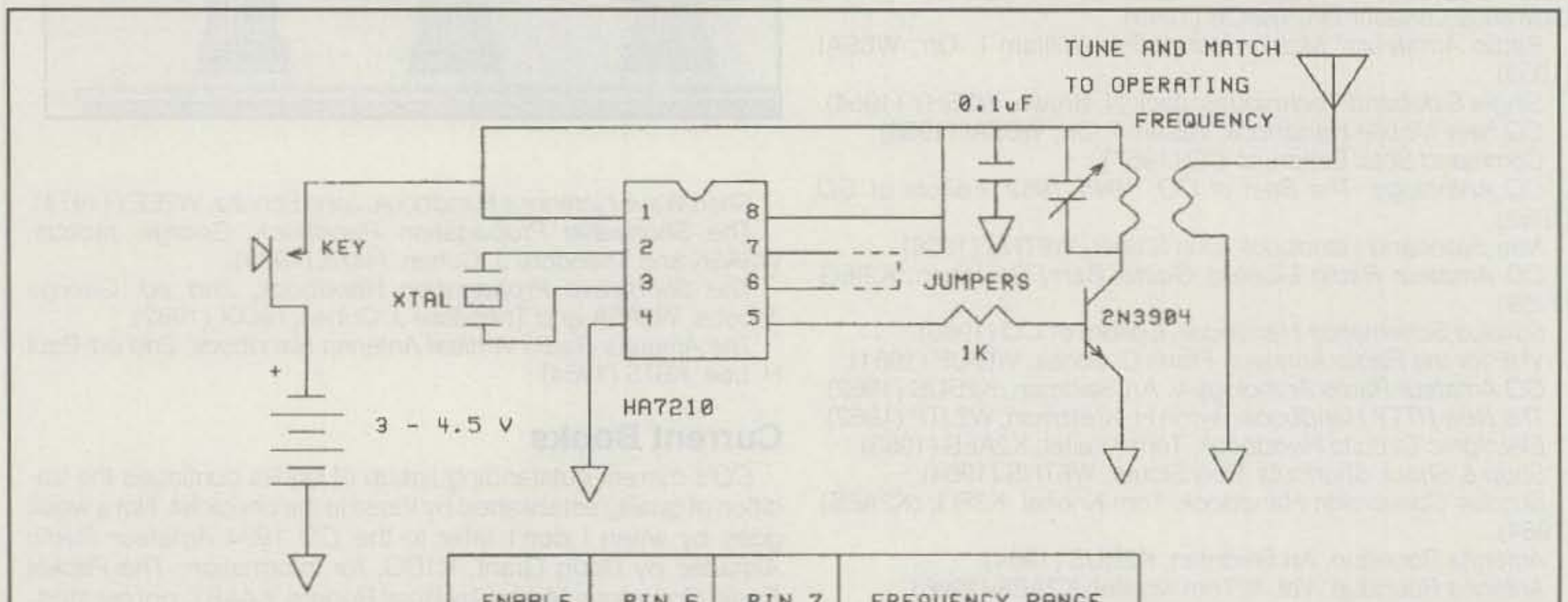
**c/o CQ magazine*

Fig. 1– Schematic of the basic HA7210 oscillator. →

Fig. 2– An ultra-simple QRP transmitter using the HA7210 chip. ↓



ENABLE	PIN 6	PIN 7	FREQUENCY RANGE
CLOSED	JUMP	JUMP	10 KHz-100 KHz
CLOSED	JUMP	OPEN	100 KHz-1 MHz
CLOSED	OPEN	JUMP	1 MHz-5 MHz
CLOSED	OPEN	OPEN	5 MHz-10 MHz
OPEN	-	-	HIGH IMPEDANCE



ENABLE	PIN 6	PIN 7	FREQUENCY RANGE
CLOSED	JUMP	JUMP	10 KHz-100 KHz
CLOSED	JUMP	OPEN	100 KHz-1 MHz
CLOSED	OPEN	JUMP	1 MHz-5 MHz
CLOSED	OPEN	OPEN	5 MHz-10 MHz
OPEN	-	-	HIGH IMPEDANCE

range. As shown, the circuit will drive two CMOS loads or produce 5 volts across a 5K resistor. Current drain for the chip itself, from a 5 volt supply, will be a maximum of 350 microamperes (0.35 ma), although the operating voltage can vary between 3 volts and 7 volts. Since the chip is available in a surface-mount package as well as a standard 8-pin plastic DIP, the overall size of the complete oscillator can be quite small. The operating temperature range of –40 to +85 degrees C is also quite impressive.

A chip such as the HA7210 can easily be used to implement a very simple QRP transmitter for 160, 80, or 40 meters as shown in fig. 2. This circuit is the same as fig. 1, but with the addition of a 2N3904 "power stage." Going a step further by using a surface-mount transistor, surface-mount crystal (Digi-Key CSM-7 series), a couple of hearing-aid or watch batteries, and some construction skill will result in a transmitter that can be hidden almost anywhere.

For further information you can contact Harris Semiconductor at 1301 Woody Burke Road, Melbourne, FL 32902 (407-724-3000). You might also be interested to know that Harris has acquired the entire RCA IC semiconductor product line and has many of the older RCA chips available under the same part numbers. And finally, major distributors such as Arrow/Schweber, Newark, Hamilton-Avnet, and Hall-Mark all carry the Harris line.

Until next month, best DX with your QRP rig! 73, Irwin, WA2NDM

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

Building (Or Adding To) Our 9600 Baud Network

One of the fun aspects of packet radio is its ever-changing fabric. Although packet sometimes may appear similar to the rest of our amateur radio modes, it is in the forefront of digital communications. In a recent issue of *CQ* (January 1995) I referenced several of the milestones responsible for our present-day digital communication modes. With that thought in mind, this month we will look at another landmark that enhances our packet radio hobby even more.

Each "Packet User's Notebook" column is written only after I've experienced first hand the topic covered in the column. I don't write this column until I've tried, and hopefully enjoyed, the new application or product(s) that I write about. Enjoyment is the most important aspect, because were it not for the intense enjoyment that we receive from our digital communication experiences, we probably would delve into another facet of the hobby to occupy our tireless search for mental challenge.

This month's topic is no exception. We will build (or add to) our 9600 baud network. The participants in this network node are the AEA PK-96 dual-baud TNC and the new Azden PCS-9600D Data Transceiver. I recently wrote a review about the AEA PK-96 dual-speed TNC. This TNC opened up a new era in which packeteers can enjoy both 1200 and 9600 baud packet operation using only one box. In that column I mentioned that we would later make it into a 1200 or 9600 baud node.

I would like to thank Dave Roberts, G8KBB, Neville Pattinson, GØJVU, and Andy Madsen, KB7B, for their contributions to making this month's topic possible. I discussed with Dave Roberts the possibility of making some changes to the X-1J2 code that would enable the PK-96 to be used as an X-1J2 node. He agreed to give it a try if he had an AEA PK-96 to work with. No sooner said than done. With the cooperation of Rod Proctor, KI7ZI, Kevin Cox, N7TKP, and Andy Madsen, KB7B, of AEA, the PKX-1J2 network node controller (NNC) project began.

Andy and Dave exchanged several Internet messages, and within a few

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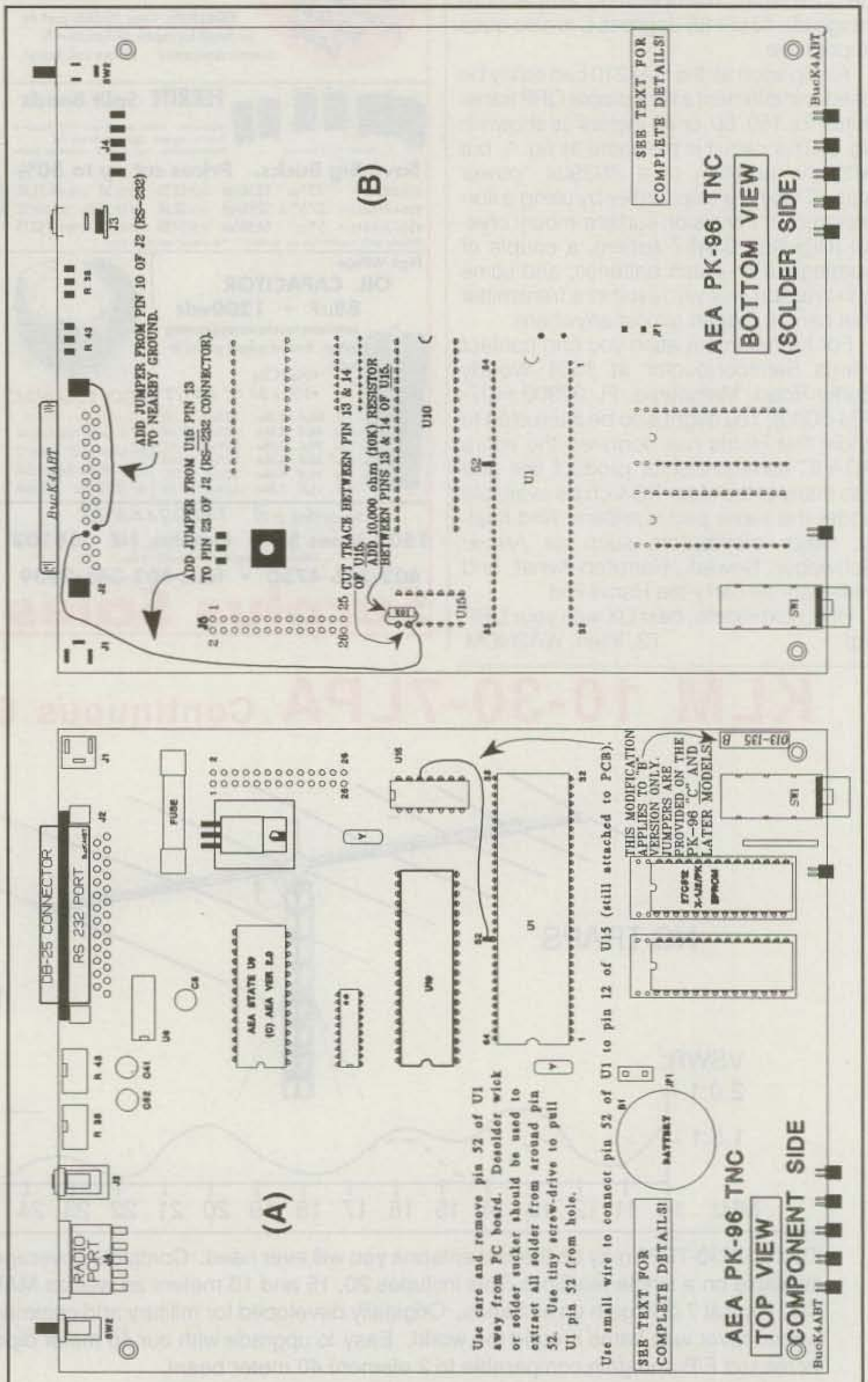

Figs. 1a & 1b– These figures illustrate the simple modification to the AEA PK-96 for use in node stacks and gateway applications. (See text for complete details.) This modification will enable the PK-96 node to interface with node stacks and gateways that already exist. To use more than two nodes/ports in the node stack or gateway, use the diode matrix shown in fig. 3. If only two nodes are employed as a 1200 to 9600 baud gateway, then use the cable configuration shown in fig. 2.

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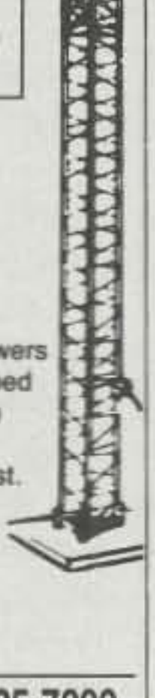

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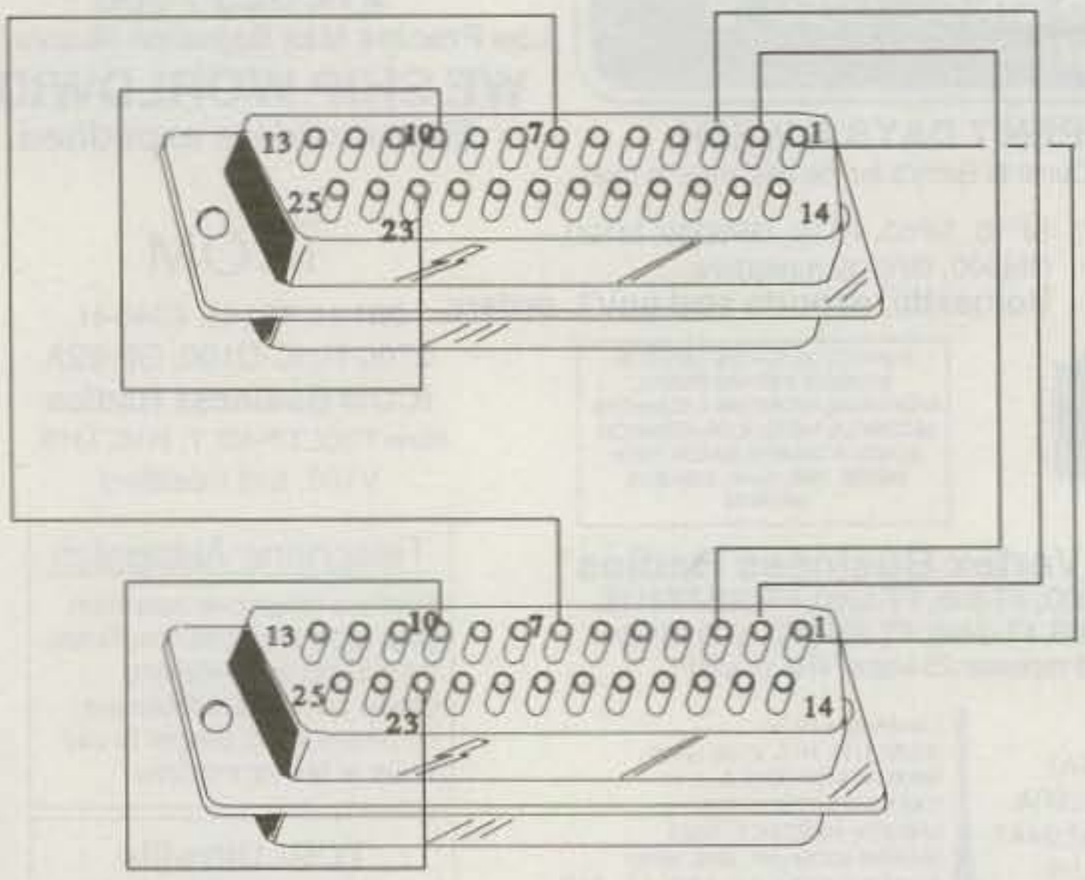

PK96 Node Port Settings		
Setting	Radio	RS232
0	300	300
1	600	600
2	1200	1200
3	2400	2400
4	4800	4800
5	9600	4800
6	19200	19200

*Fig. 2– The drawing shown here is used to link two nodes for use as a "gateway" or "bridge" between two frequencies or baud rates. When using the AEA PK-96 as an X-1J2 node, use the "BRATE" command to set the radio and RS232 port speed. An example of the setting used to set the radio port speed to 9600 baud and the RS232 port to 9600 baud is as follows: BRATE 5 5. This command is sent to the remote node by the node SYSOP. The SYSOP must have entered the SYSOP command mode using the SYSOP password. For the change in the BRATE command to become effective, the SYSOP must send the PK-96 node a warmstart "reset." Do not send the coldstart command (RESET RESET or RESET *), or the node will be set to the original or default settings.*

weeks I was having fun making the modifications (see figs. 1a and 1b) to the PK-96 and conducting the alpha and beta tests with the new PKX-1J2 node code.

To round out this plug-and-play backbone network node I needed an easy to interface UHF (data ready) radio. Azden has just the "ticket" in their new Azden PCS-9600D. My thanks to Sid Wolin, K2LJH, for making the Azden Data Transceivers available for this project.

As you read on you will come to understand what I mean by "plug and play." This pair of network backbone nodes was so easy to put together that when the components all had arrived at my lab, it took less than two hours to interface and have them linking with other systems in the packet world. The very next day this system was atop a nearby mountain, being used to link a local area network (LAN) into a wide area network backbone (WANB).

Please take note: The PKX-1J2 node code is not the same code as the X-1J2 and X-1J3 code used in the TNC2 clones. The PKX-1J2 code simply will not work a TNC2 clone. However, a PKX-1J2 node will work in concert with another TNC2 node (see fig. 2) or in a node stack (see fig. 3) that has existing TNC2 nodes that use the X-1J2 node code written for the TNC2 clones.

The SYSOP has the best of all worlds, as he/she may now establish different baud rates via ports and gateways to other frequencies (see fig. 4).

It is also important to note that future AEA PK-96s ("C" version and later) will have a set of solder lands to make the PK-96 TNC modification easy. It will be as simple as placing a jumper across two existing traces (see fig. 5).

The modification described in this article applies only to those AEA PK-96 TNCs that have the suffix "B" stamped inside and near the right front of the PC board (see fig. 1a).

From Necessity Comes Invention

Having characterized the evolution of the PKX-1J2 node, it is time to present the next addition to your node stack for the network's 9600 baud backbone.

The beauty of using the AEA PKX-1J2 as a node is that the radio port baud rates are set in software and thus can be configured by the SYSOP without traveling to the node site. This feature provides the SYSOP with another element of control for the remote node. In the past the node SYSOP had to travel to the site to make hardware changes to switch between radio port baud rates. Even then, there was the cross-connect formula for setting the DIP switches on the node. This configuration of switch settings had to be committed to memory or written on a piece of paper—that inevitably you forgot to bring with you to the site.

Since the PK-96 uses software terminal and radio port software setup, Dave included an easy setup of the PKX-1J2 node by the remote SYSOP. Why not? The capability to do so was already in the PK-96 TNC.

With the PKX-1J2 nodeware Dave has provided us with the baud rate command BRATE, which enables the remote SYSOP to set either the radio (port 0) or the RS232 (port 1) baud rate or both.

Baud Rate(s) Setup Method

The PK-96 hardware does not have the TNC2 hardware switched baud rates. Instead, it has software-selected baud rates and a 9600 baud modem as well as the 1200 baud modem. The node software supports this by the inclusion in the ROM default values of initial baud rates and by a SYSOP-only switch command to allow those to be changed during operation.

Each baud rate may be set in the range 300 to 19200 baud to one of seven standard rates (see fig. 2). This does not imply

the code will handle data at 19200 baud, but it seemed fun to include it.

The ROM defaults may be overridden by the BRATE command. The syntax of this is similar to the PARMS, MODE, etc., commands and has two parameters.

The first number is the radio port baudrate, while the second is the RS232 port baudrate (e.g., BRATE 5 5). Values are in the range 0 to 6 and have the following meanings:

Setting	Baud Rate
0	300
1	600
2	1200
3	2400
4	4800
5	9600
6	19200

When the BRATE command is used to change a setting, it does not take immediate effect. It will take effect after a warmstart. Coldstart will, of course, restore the ROM defaults. A warmstart may be effected by the RESET command (as SYSOP) or by powering the PK-96 off and on again.

The radio baud-rate setting also controls the modem selection. If the selected baud rate is 1200, then the 1200 baud modem is selected. If any other rate is selected, the 9600 baud modem is selected, but with the baud rate requested.

No, Not The Rear-Panel Push (RESET) Switch

Pressing the rear-panel switch will perform a coldstart. This may be done at any time other than just after a reset when interrupts are ignored. The easy way to perform a warmstart is to switch the power off and on again.

If you are setting the BRATE remotely, simply send "RESET" to the node. Send only the word RESET, nothing else.

Use PATCH96.EXE

When building your ROM image for the EPROM, be sure to use the new patcher, which is called PATCH96.EXE.

Notice that bank switching is different with the PK-96. There is no need for wires; just plug in the EPROM. The EPROM (27C512) is the same size/type as that used with the TNC2 TheNet version.

Both the PK-96 version THENET1.PKX and THENET2.PKX are configured in the same manner as were the THENET1.X1J and THENET2.X1J used in the TNC2s. Only THENET1.PKX is patched with the ROM defaults, though, and as a conse-

The AEA PK-96 dual-band TNC.

quence, THENET2.PKX is 4K shorter. The HELP text in THENET2.PKX, however, may not be 4K longer. Therefore, the patcher modifies only THENET1.PKX.

Crosslink Selection

The PK-96 prior to version C of the PCB does not support pin 23 of the RS232 for mode selection signal used in crosslink or dumb terminal mode. If you have version C or later, insert JP5 to connect the signal to RS232 pin 23.

Important: The signal goes directly to a CMOS gate input, so it must either be left open circuit (for terminal mode) or connected to GROUND (for crosslink or KISS protocol mode). **Do not connect it to any other voltage.**

The easy way to ground it is to connect JP4 in the TNC, which puts ground on pin 10. Connect pin 10 to pin 23 for crosslink (see figs. 2 and/or 3) and remove the connection, JP4 or JP5, for terminal mode.

If you have version B of the PCB, it can be modified with a bit of care. To see if it is version B, take off the cover and look at the type number next to the power on/off switch. It should read something like 013-135 B. The B signifies revision B (see fig. 1a). Caution is the only advice I can give the SYSOP who attempts this modification. I am not responsible for mistakes or errors. I also suspect that your PK-96 supplier will take a dim view of this with respect to the warranty. *To proceed is your judgment call.*

Having said that, proceed as follows.

1. Find yourself an anti-static work area and use it. You will be soldering to CMOS inputs.

2. Switch off. Remove power cord and other cables. Remove the case by removing the four case screws (two down each side), the RS232 connector mounting pillars on the back of the unit, and the fixing ring for the audio connector jack socket, also on the rear.

3. Remove the battery link connector (next to the battery) and subsequently take care not to short circuit the battery.

4. Remove the four PCB mounting screws (two at the front on each side, one near the DIN connector behind the reset switch, one at the site of the 5V regulator behind the fuse).

5. Slide the PCB backwards to clear the LEDs and power switch from the front panel and lift it clear.

6. Locate pin 52 of the CPU. The CPU

The Azden PCS-9600D Data Transceiver.

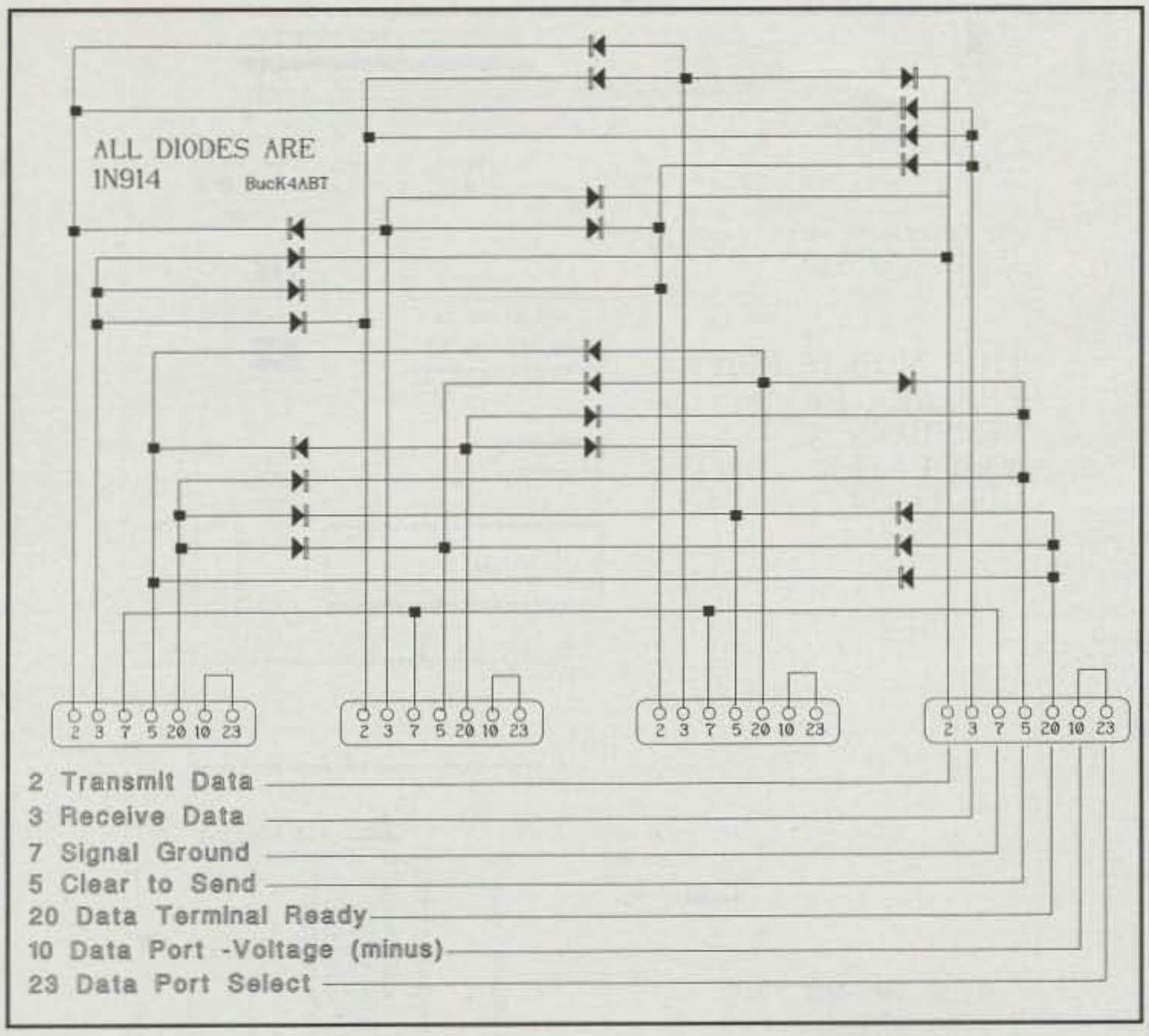

Fig. 3– When more than two nodes are employed in a node stack or gateway, the diode matrix shown above is used. The four-port coupler shown here requires twenty-four 1N914 or 1N4148 diodes. Preserve ground integrity by making pin one com mon to all connectors.

is the 64-pin device (0.07 inch pin spacing) located between the 40-pin 8530 chip, the ROM, and the RAM. It is labeled U1 on the PCB silk screen. This pin is connected to ground by tracks on both the top and bottom of the board. Use desoldering braid or a desoldering tool to completely desolder it, and carefully bend it up and out of the hole so that it can have a wire soldered to it. If you cannot completely desolder it, get a very fine screwdriver behind the pin on the top of the board and gently bend it out while applying minimum heat to the pin with a soldering iron from below. Do it carefully and the pin will come out without damaging the PCB tracks.

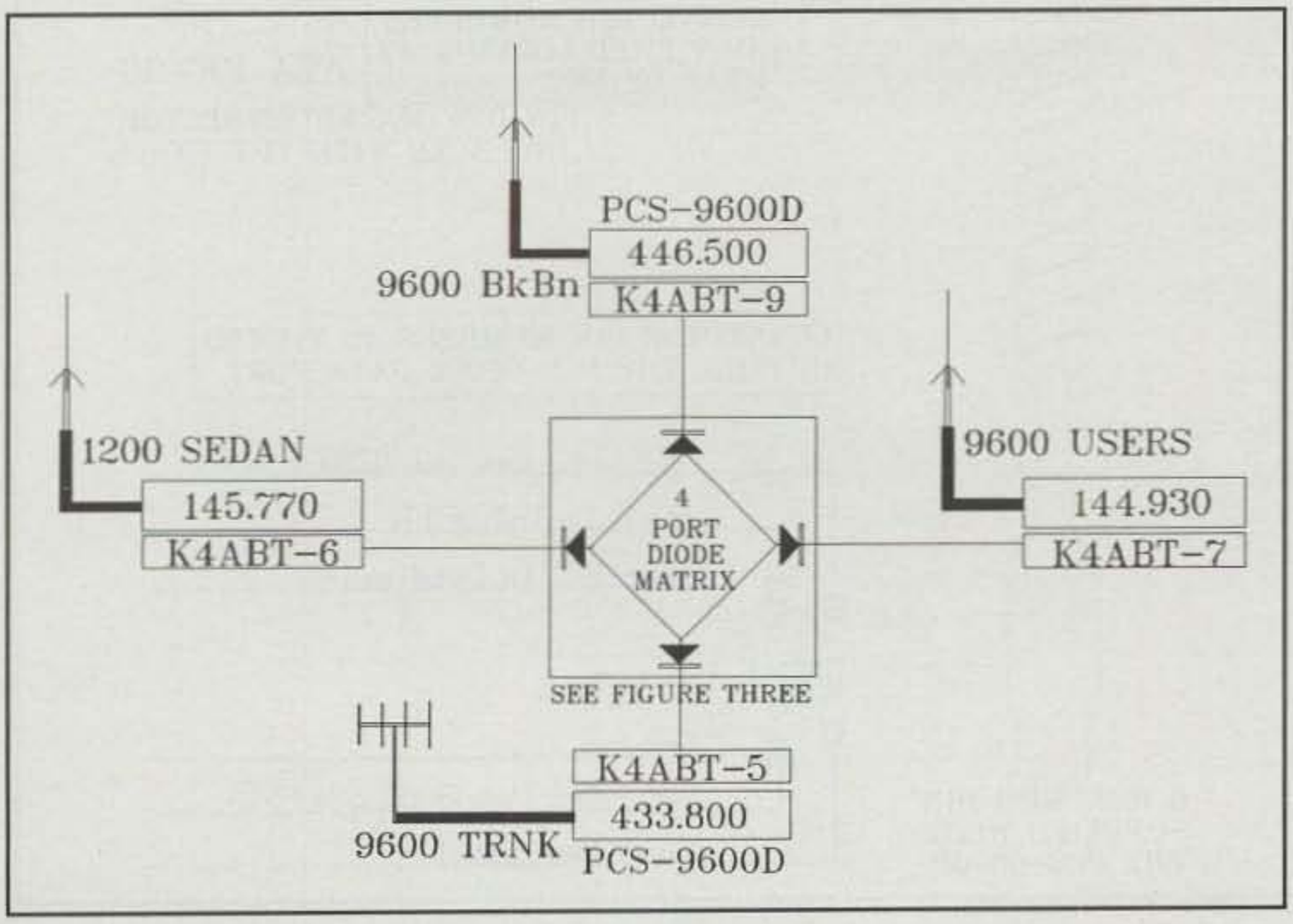

Fig. 4– The AEA PK-96s in a four-port configuration as nodes, gateways, backbones, and point-to-point trunks.

7. Locate pin 12 of U15. This is a 74HCT04 or similar located between the CPU, the 8530, and the modem disconnect header. Connect a short, fine wire on the top of the board from pin 12 of U15 to pin 52 (the one you bent out) of the CPU.

8. Turn the board over. There is a short piece of track between pins 13 and 14 of U15. Cut it with a scalpel.

9. Connect a 10K resistor between pins 13 and 14. Keep it close to the board, as you will need to replace the board in the case soon.

10. Locate pin 23 of the RS232 connector on the bottom of the board. (Remember that RS232 connectors number their pins along each row, so pin 23 will be third from the end nearest the power connector of the shorter row of PCB pins.) Connect a short piece of wire on the bottom of the board from RS232 pin 23 to pin 13 of U15.

11. Remove the EPROM and replace it with the TheNet EPROM.

12. Connect a short piece of wire from pin 10 of the RS232 connector to ground. A convenient point to use is one of the connector mounting points where the metal parts of the connector body are soldered to ground.

13. Replace the PCB in the case and refit the four mounting screws. Check that there

Current Conventions

The Mecklenburg ARS will sponsor the Charlotte, North Carolina Hamfest and Computer Fair on March 11–12 at the Charlotte Merchandise Mart. In addition to the dealer booths, fleamarket, prize drawings, and VES exams, there will be numerous forums, including an entry-level packet forum presented by Buck Rogers, K4ABT. For more information on the hamfest, contact Jim Stevens, KI4HN, 16225 Leeward Lane, Huntersville, NC 28078 (704-875-9642).

HAM RADIO '95 will be held April 7–9 (Friday 1–6 PM, Saturday 9 AM to 5 PM, and Sunday 8 AM to 1 PM) at the North Atlanta Trade Center, exit 38 off Interstate 85, Atlanta, Georgia. K4ABT also hopes to see you there on Saturday and Sunday. For more information and reservations call 404-518-7376, or FAX 404-642-9035. Exhibitor booths, flea-market tables, tailgate spaces. General admission is $8.00.

are no shorts from the wiring to the case.

14. Connect a voltmeter to pin 52 of the CPU with the negative lead to ground. Apply power to the TNC and switch on. All LEDs apart from the XMT LED should light and extinguish again if the node is working. The MAIL LED will then start to flash once per 2 seconds. The voltmeter should read low (i.e., about 0 volts). Link pin 10 to pin 23 of the RS232 connector. The voltmeter should read 5 volts (approximately). If this does not work correctly, switch off and recheck it.

15. Switch off and remove the power lead and replace the battery link connector at JP1.

16. Check to be sure the PCB mounting screws are tight and replace the case. Replace the RS232 mounting posts, audio connector ring, and all four case screws. Reconnect the cables, switch on, and check it.

The Azden PCS-9600D Just The "Ticket"

To round out the system, we now interface the node to its companion transceiver. The transceiver should be 9600 baud capable, and in this application I wanted a backbone node at UHF—thus the choice of the Azden PCS-9600D.

To support our backbone coverage we needed a bit more punch (35 watts output) than some 10 or 20 watt UHF transceivers could provide. We also needed a transceiver that would cover (Tx and Rx) below 440 MHz (433.800). The Azden PCS-9600D met all of the criteria. And with a temperature operating range from –10 to +50 degrees C (Virginia mountaintops are hot in summer and cold in winter), we considered this to be another plus of the PCS-9600D.

For data the Azden PCS-9600D has a data I/O port (see fig. 6) separate from the microphone port, and when using the data I/O port the oscillator is modulated directly (and you know how picky I am about using "true FM"). For the operators who wish to use the PCS-9600D in voice operation, it is "true FM." It is supplied with a DTMF-equipped dynamic microphone, 38 programmable PL tones, and any offset or storage function that I could ever expect to use.

On the dual-conversion receiver side, the PCS-9600D has better than 0.19 uV for 12 dB SINAD, and for our wide IF needs the selectivity skirts are +/–10 kHz @ –6 dB and +/–25 kHz @ –50 dB.

Yeah, I hear the prospective PKX-1J2 node SYSOP asking, "But what about switching, Buck?" The PCS-9600D uses pin diode switching between transmit and

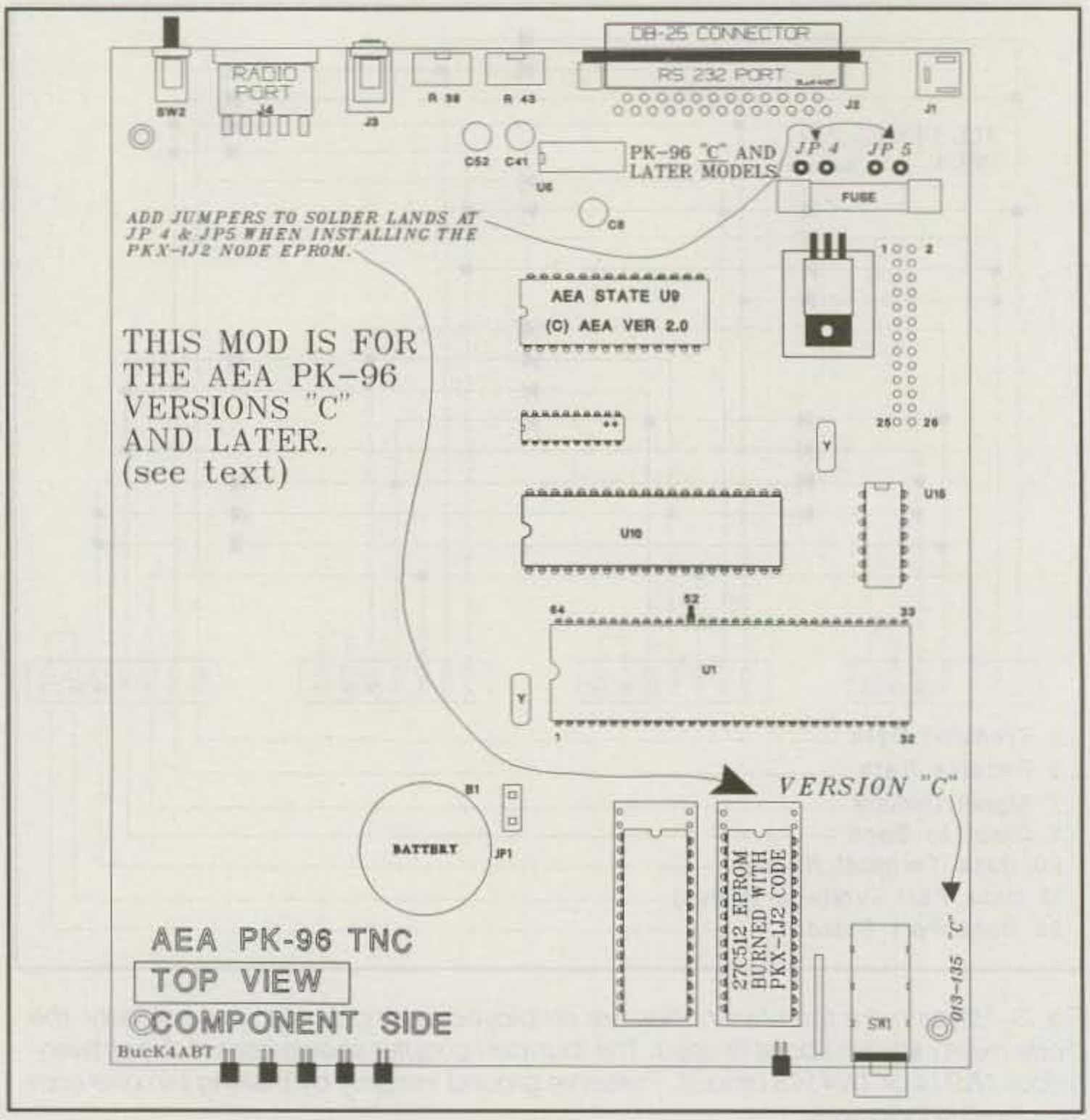

Fig. 5– For AEA PK-96 versions C and later, the simple modification shown above is all that is needed when converting to an X-1J2 node.

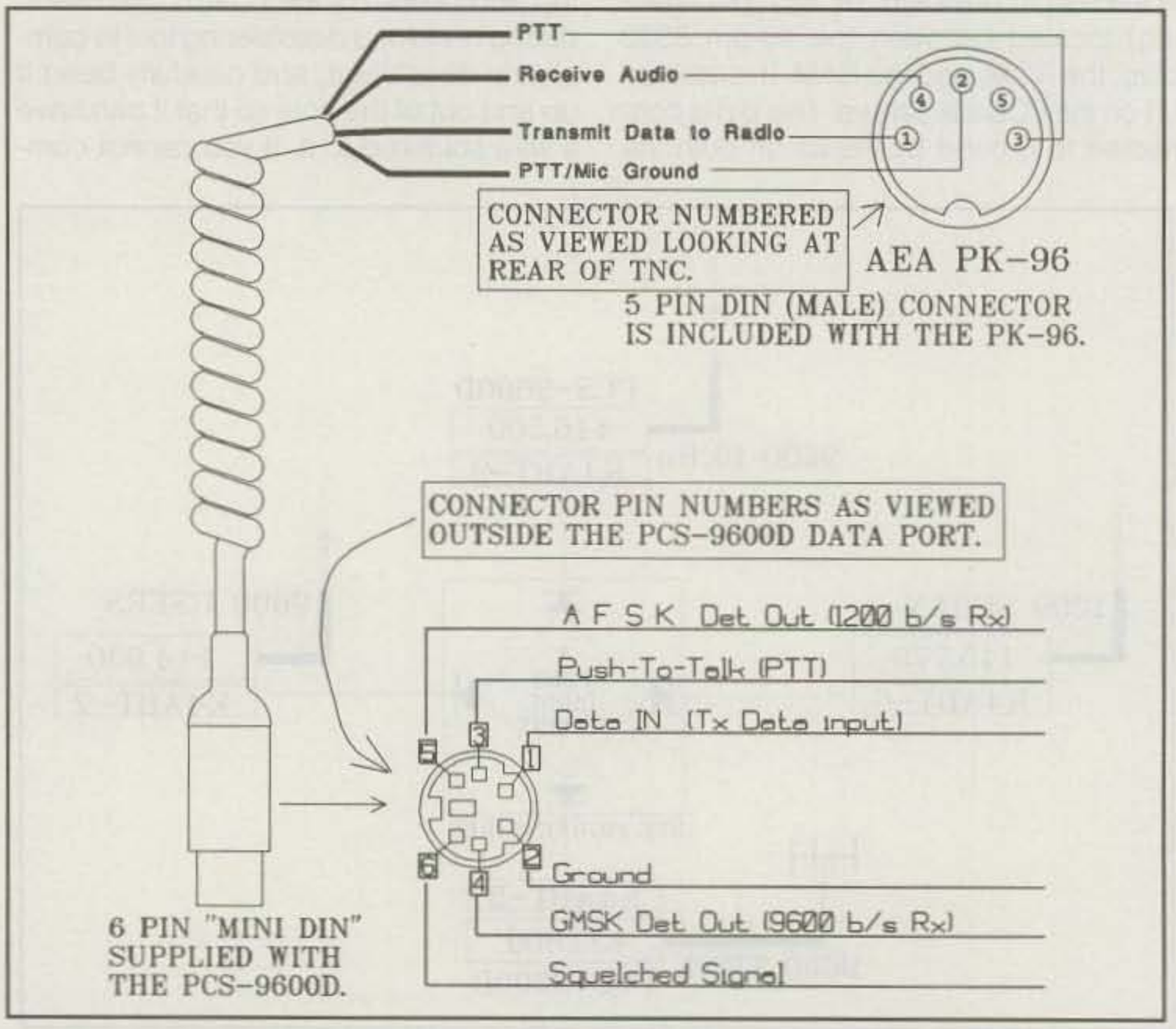

Fig. 6– Data port interface configuration for the Azden PCS-9600D and the AEA PK-96 multi-speed TNC/PKX-1J2 node.

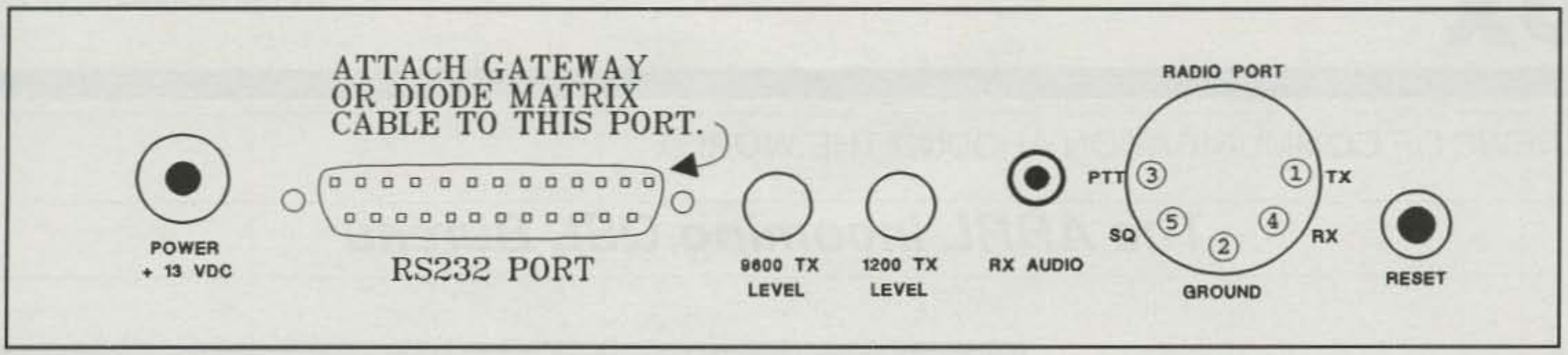

Fig. 7– At the back of the AEA PK-96 are the hardware connections and level adjuustments. Note that provisions are made to allow individual level control for each baud rate. Be aware of the RESET button at the rear edge of the PK-96. Once you have set the parameters into the PK-96, if you wish to reconfigure the unit from defaults, press and hold the RESET button about two seconds after switching the PK-96 on. The front-panel LEDs should cycle and go out, leaving only the POWER LED on.

receive. TXDelay! Fast, very fast. Enough said.

PKX-1J2 Node Code Lode

The mother lode for the PKX-1J2 node code is from AEA, or from me. If you wish to have a ready-to-install EPROM for your PK-96 node, contact Advanced Electronic Applications. AEA has two ways for you to acquire the PKX-1J2 EPROM.

1. If you have access to an EPROM burner, AEA will send you an initialization disc and an EPROM. You fill in the parameters of your choice and burn your EPROM. Price is $10.00.

2. If you prefer, AEA will burn the EPROM for you. You can call AEA and provide them with the the callsign, SSID, Alias, and password. AEA will customize and burn the EPROM specifically for your PKX-1J2 node. Price is $30.00 plus $5.50 shipping and handling.

Contact information for AEA is: Advanced Electronic Applications, Inc., P.O. Box C2160, Lynnwood, WA 98036 (phone 206-774-5554; FAX 206-775-2340).

For more information about the Azden PCS-9600D Data Transceiver, contact: Sid Wolin, K2LJH, Azden Corporation, 147 New Hyde Park Road, Franklin Square, NY 11010 (phone 516-328-7500; FAX 516-328-7506).

To obtain a disk of the PKX-1J2 node code, send me a formatted MS/DOS disc along with a postage-paid return disc mailer that has your return address and proper amount of postage affixed (as of January 1, 1995 postage stamps are 32 cents/ounce). **NO IRCs.** US currency or US postage only. Be sure to request the "PKX-1J2" code, as I also supply discs for other data and programs. Mail to: Buck Rogers, K4ABT, 211 Luenburg Drive, Evington, VA 24550.

Happy Packeting!

BucK4ABT @ WA4RTS.VA.USA.NA

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

The ARRL Incoming QSL Bureau

Late last year the Kansas City DX Club briefly suspended its operation of the WØ QSL bureau. This suspension was in response to perceived allegations of intentional mismanagement and even theft.

The suspension was very brief, and the flow of QSL cards through the WØ QSL bureau was not affected. However, the episode highlighted widespread ignorance about the incoming bureau on the part of DXers using the bureau. Since the more DXers know about the bureau and how it works the better they will be able to make effective use of the bureau, let's go behind the scenes and explore the inner workings of the ARRL incoming QSL bureau.

The bureau operates on three distinct levels. At the top is ARRL headquarters, where Joe Carcia, NJ1Q, oversees the entire operation and provides reimbursement for bureau expenses. Joe also oversees the first level of sorting the incoming cards. ARRL headquarters receives packages of QSL cards from many sources, including sister amateur radio societies in other countries, and from DXpeditions and QSL managers. For the most part, the cards in these packages are in random order. The packages are usually sent via sea mail and can take several months in transit.

Joe, his staff, and sometimes others must first divide these cards into stacks for each separate call area. (In the case of the fourth call area, the cards must be further sorted according to the number of letters in the prefix, as the fourth call area bureau is split between two radio clubs.) Once a month or so these stacks of cards are packaged and shipped to the 11 individual call area bureaus.

These call area bureaus are usually large, active radio clubs in the call area. Most of the clubs are DX or contest oriented, and are often the most prominent such club in a given call area. The clubs are selected with the advice and consent of the ARRL division director(s) involved.

There is usually one individual member of the local club designated as the bureau manager. This person makes regular trips to the post office to pick up the accumulated bureau mail. In addition to the packages of cards from the ARRL, this mail consists of those packages of cards mailed directly to the individual bureaus; packages of self-addressed, stamped envelope (SASEs) from individual DXers; payments for bureau-supplied envelopes and postage; and other correspondence.

Jose Pastora, TI2JJP (center), operated as TI9JJP from Cocos Island last October. He has a new QSL address for 1995: Office Box Account 321 CR, Jose Pastora, 6992 NW 50th St., Miami, FL 33166-5632.

The bureau manager typically opens the hundreds of letters and packages arriving each month, maintains records of funds provided for return of cards, answers routine inquiries, and sorts the incoming cards on the basis of the first letter of the suffix. Then the bureau manager takes the sorted cards, SASEs, address labels, etc., to the monthly meeting of the radio club that handles that bureau.

At the radio club meeting the individual letter sorters pick up their monthly allotment of cards and SASEs. Each letter sorter is responsible for all incoming cards with a given first letter of the suffix. Thus, WB2CHO's cards would be handled by the "C" sorter of the W2 bureau, which in this case is the North Jersey DX Association.

The letter sorter takes his or her package home and begins the task of sorting the incoming cards alphabetically by suffix. He or she must also sort the incoming SASEs and postage credits into alphabetical order. Since the flow of incoming cards is unpredictable, the letter sorter may have to maintain these files for several years.

Once the cards and SASEs are in callsign order, the sorter can start to match incoming cards with SASEs. The sorter stuffs the appropriate envelope with each DXer's incoming cards. When the envelope has enough cards to justify mailing, the sorter seals the SASE and drops it into the mail. A few days later, a happy DXer rips open the SASE from the bureau in hopes of finding a card for a New One.

There are some variations on this general pattern. Many bureaus sell postage credits, for example. Rather than having to deal with a morass of different-size envelopes and changing postage rates, the radio club deposits incoming funds into a central account and reimburses each letter sorter for postage used. The club buys envelopes in bulk, at a considerable cost saving over individual DXers purchasing the 6×9 or 5×7.5 inch envelopes. Some clubs have the letter sorters bring all sealed envelopes to the

P.O. Box 50, Fulton, CA 95439

The WPX Program

SSB

2487 ..... HL5AP
2488 ..... EA5OL
2489 ..... EA5GMB
2490 ..... EA7CRL
2491 ..... LU3OJZ

CW

2856 ..... IKØNKI
2857 ..... EA2BNU
2858 ..... JA9NPS
2859 ..... PT2DMS
2860 ..... 9A3UF

MIXED

1696 ..... EA2BNU

Mixed: 450 IKØNKI, EA2BNU. 500 IKØNKI, EA2BNU. 550 EA2BNU. 600 EA2BNU. 650 EA2BNU. 700 EA2BNU. 750 EA2BNU. 1150 KM1D. 1200 KM1D. 1250 KM1D. 1300 KM1D. 1350 KM1D. 1400 KM1D. 1450 KM1D. 1500 KM1D, W9IAL. 1800 KS3F. 1850 KS3F. 1900 HI8LC. 1950 SM6CST, HI8LC. 2550 HAØHW, WB2YQH. 3100 I1EEW. 3550 W2FXA.

SSB: 350 EA5OL, EA5GMB, EA7CRL, LU3OJZ. 400 EA5OL, EA5GMB, EM7CRL, LU3OJZ. 450 EA5OL, EA7CRL. 500 EA5OL, EA7CRL. 550 EA5OL, EA7CRL. 600 EA5OL, EA7CRL. 650 EA5OL, EA7CRL, NKØS. 700 EA5OL, NKØS. 750 EA5OL. 800 EA5OL. 850 EA5OL. 900 EA5OL, KM1D, DF7HX. 950 KWØU, KA4GYU, EA5OL, KM1D. 1000 KWØU, EA5OL, EA3KB, KM1D. 1050 EA5OL, EA3KB, KM1D. 1100 EA5OL, EA3KB, KM1D. 1150 EA5OL, EA3KB. 1200 EA5OL. 1250 EA5OL. 1300 EA5OL. 1350 EA5OL. 1550 KS3F. 1600 KS3F. 1850 IK4GNH. 2700 I1EEW.

CW: 350 WZ1R, EA2BNU, JA9NPS, PT2DMS. 400 WZ1R, YU1JU, EA2BNU, JA9NPS, PT2DMS. 450 WZ1R, YU1JU, EA2BNU, JA9NPS, PT2DMS. 500 WZ1R, EA7BNU, EA2BNU, JA9NPS, PT2DMS. 550 WZ1R, EA2BNU, JA9NPS, PT2DMS. 600 WZ1R, EA2BNU, JA9NPS, PT2DMS. 650 WZ1R, EA2BNU, JA9NPS, PT2DMS. 700 WZ1R, EA2BNU, JA9NPS, KM1D, PT2DMS. 750 WZ1R, KM1D, PT2DMS. 800 WZ1R, K1CVF, KM1D, PT2DMS. 850 WZ1R, KL7UR, KM1D, PT2DMS, DK8NM. 900 WZ1R, KM1D, PT2DMS. 950 WZ1R, KS3F, G3JTO, KM1D, PT2DMS. 1000 WZ1R, PT2DMS, KS3F. 1050 WZ1R, PT2DMS, 9A3SM. 1100 PT2DMS, 9A3SM. 1150 EA7AAW, PT2DMS. 1200 EA7AAW, PT2DMS. 1550 I1EEW. 1600 I7PXV. 1650 I7PXV. 1800 SM6CST.

10 Meters: KT2C, KM1D
15 Meters: DK8NM
20 Meters: KA4GYU, K2LUQ
40 Meters: KM1D, K2LUQ
80 Meters: KA4GYU, KM1D

Asia: JA9NPS
No. Amer.: KM1D
So. Amer. KM1D
Europe: DK2NZ, YU1JU, JA9NPS
Oceania: JA9NPS, KM1D

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MDD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, 9A2AA, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QFR, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, N4MM, KC7EM, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, I5ZJK, JAØSU, S51NU, K9XR, WØULU, HB9DDZ, F6HMJ, VE9RJ, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVD, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, KØJN, ZS6EZ, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV.

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.

next club meeting so that the manager can oversee the mailings and maintain accurate records.

What most DXers don't fully understand is how long it takes for cards to flow through the bureau. Let's say a DXer works a station in Japan who says he will QSL via the bureau. The Japanese amateur must first make out the card and then send it to the highly efficient JARL bureau. There the cards are sorted according to country of destination, packaged up, and sent via sea mail. By the time the cards get to ARRL headquarters, a few months have gone by. It may take another month to move through ARRL headquarters and get to the local radio club. If the mailing arrives just after the monthly club meeting, it may take another month before the individual letter sorter gets the cards. The sorter then may take another month or more before mailing the filled envelope. If the flow of cards is slow, the letter sorter may hang on to the partially filled envelopes for several months, so as not to waste the DXer's postage on just one or two cards.

Thus it takes at least several months for cards to arrive via the bureau, and it can take *much* longer. Cards from the USSR would frequently be delayed for many *years*, awaiting paper to print cards, etc. (I just scanned my latest shipment from the very well-run W2 QSL bureau and I find most cards are for contacts made in the 1989–1991 range!)

Many factors can contribute to additional delays. On very rare occasions cards may get missorted and go to the wrong letter sorter. This would add a delay of another month or two for the card to get back to the club meeting, be resorted, and then distributed to the correct letter sorter. Any time the manager or a letter sorter misses a club meeting, the process takes another month.

There are many opportunities in this system for things to go wrong. First, the entire system, except for Joe Carcia and his staff, is run by volunteers. None of the hundreds of dedicated amateurs in the bureau system gets one dime for his or her efforts. As with any all-volunteer system, there will be occasional lapses or

Peter, H44KA, has operated as XX9KA, ZF1KA, A22PWJ, and VK3EKA. (DK7PE photo)

burnouts. An individual letter sorter may be ill or overwhelmed with family or work obligations, and not process cards for some months. The bureau manager might miss a club meeting for various reasons, and the letter sorters thus not get any cards that month. Some clubs sus-

The WAZ Program

Single Band WAZ

80 Meter SSB

63 ..... 4X6DK

20 Meter CW

453 ..... K2TK

30 Meter CW

13 ..... 4Z4DX 14 ..... DL1PM

40 Meter CW

177 ..... K2TK

30 Meter Mixed

2 ..... G4BWP

All CW

62 ..... NV1C 63 ..... K2TK

SSB

4236 ..... K9MIE 4238 ..... K2PBP
4237 ..... N1BUA

CW/Phone

7517	DL6TQ (CW)	7524	JI1CZK
7518	OH7MKR	7525	JA1IFB
7519	KF2C	7526	IK4PLW (CW)
7520	SM6MCX	7527	JO1MQV (CW)
7521	KZØX	7528	K3KO
7522	K1MBO	7529	KØDEW
7523	K1ACL		

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.

Joe Pater, WB8GEX, Joel Libburd, V44KAI, and John Walker, WZ8D, install the antenna for the V44K 6 meter beacon on 50.055 MHz.

pend club meetings in the summer; thus the flow of cards may stop temporarily.

When my job at ARRL headquarters included managing the bureau system, the second greatest problem I encountered was impatient DXers who complained, "I worked all kinds of DX who promised to QSL via the bureau, and I haven't gotten any cards." In most cases, the DXer had not allowed sufficient time for the cards to work their slow way through the bureau. In a few very rare instances there was a temporary problem with an individual letter sorter. In these cases the bureau manager would quickly find another volunteer to pick up the letter, and work through the accumulated backlog. (What was the greatest problem? DXers who simply didn't want to get cards via the bureau but didn't provide instructions in writing to destroy their cards. In the absence of such written instructions, bureau volunteers almost never destroy the cards, creating a serious storage problem.)

Note that the way the bureau works also makes corresponding with the bureau and individual letter sorters a slow process. The typical inquiry from an impatient DXer must first be opened and sorted by the bureau manager. The inquiry then goes to the club meeting, and on to the letter sorter. That sorter then must find time to research and answer the inquiry.

A common problem is the time it takes for requested funds to be credited to a DXer's account. A letter sorter may include a note to a DXer that additional cards await more postage funds. Even if the DXer responds immediately, that payment may take a couple of months or more to get down to the individual letter sorter, for the reasons given above.

So what can individual DXers do to assist the hard-working bureau volunteers and get the best service from the bureau? Most of the important dos and don'ts are spelled out in the ARRL DXCC Countries List, which includes a list of all incoming bureaus. Any DXer who does not already have envelopes or postage credit on file with the appropriate incoming bureau should send a self-addressed, stamped envelope (SASE) to the appropriate bureau with a request for their information sheet. This sheet will spell out the preferred procedures for that individual bureau. Follow these procedures carefully for best results. Each bureau has worked out a system for efficient card processing, and the closer the DXer can follow his or her own bureau's procedures, the more quickly that DXer will receive cards.

Note that even the most casual DXer should have at least one envelope on file with the bureau. As mentioned above, the single greatest problem with the incoming bureau system is unclaimed cards. To give a single example of how unlikely a DXer may have cards at the bureau, consider what happened when a new manager took over the eight area bureau 20 years ago. The new manager was a Technician class amateur in the days before Techs had access to 10 meters. He could not imagine having unclaimed cards at the bureau, and had never sent in an envelope. Nevertheless, when he first went through the bureau records, he

5 Band WAZ

As of November 30, 1994, 402 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

None

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

N4WW, 199 (26)
K6YRA, 199 (34)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199(34,40m)
KM5W, 199 (26)
K1ST, 199 (26)
I1POR, 199 (1)
ABØP, 199 (23)
VE1AST, 199 (18)
SM6AHS, 198 (12, 31)
UA3AGW, 198 (1, 12)
KL7Y, 198 (34, 36)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
UY5XE, 198 (24, 27)
N5FG,198 (22,34 on 40)
KG9N, 198 (18, 22)
W2UE/7,198 (18,18on40)
K2ENT, 198 (28,40 on20)

The following have qualifiedfor the basic 5 Band WAZ Award:

HA6NF, 184 Zones
IK6FTZ, 152 Zones
G3LQP, 183 Zones
IK8MVH, 174 Zones

Endorsements:

K6FG, 178 Zones
K2AJY, 171 Zones
DL7UTA, 172 Zones
K2TK, 194 Zones

934 Stations have attained the 150 Zone level as of November 30, 1994.

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.

found six cards for his call in the files. Two were simply wrong calls, but four were for 6 meter DX contacts he had made with South American stations on 6 meters! If you have made even a single DX contact, you can make the bureau volunteers' lives easier by sending your bureau an appropriate-size SASE.

It is especially important to keep the bureau up to date with any change in address or when postage rates increase, such as happened at the beginning of this year.

Second to cooperation would be patience. The bureau system works slowly—sometimes *very* slowly. An exchange of correspondence can easily take several months, for the reasons given above. Funds sent to cover requests from individual letter sorters may take a few months to work their way down to that sorter. DXers should not assume that their

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 327 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K2TQC 327	K6LEB 327	YU1HA 326	WØHZ 325	W1WAI 322	KUØS 317	IK2ILH 310	VE9RJ 303	WB4DBB 295
K1MEM 327	KD8V 327	K8NA 326	I1JQJ 325	AA5NK 322	N5FW 316	KA7T 310	WB6OKK 303	KØHQW 294
W9DWQ 327	9A2AA 327	WA4IUM 326	N7MC 325	ON4QX 321	N6CW 316	K4CXY 309	WA4DAN 301	K7JYE 292
N4MM 327	N4KG 327	KZ4V 326	W7ULC 324	K9QVB 321	KA5TQF 316	VE7DX 309	HA5NK 301	KB3X 289
K2FL 327	OK1MP 327	K9IW 326	WØJLC 324	DJ2PJ 321	KB4HU 316	K4JLD 309	WG5G/QRPp 301	F6HMJ 284
DL1PM 327	WØIZ 327	I5XIM 326	WØSR 323	W8XD 321	W3BBL 315	G3KMQ 309	KA2DIV 300	KF5PE 282
K3UA 327	PAØXPQ 327	KB8DB 326	WA4JTI 323	IT9ZGY 320	N4AH 315	N5FG 307	YU1TR 300	W2LZX 279
K9BWQ 327	W2FXA 327	WA8DXA 326	AG9S 323	K1HDO 320	K2JF 314	N3DQN 306	WA8YTM 299	HB9AFI 278
K9MM 327	SM6CST 327	EA2IA 326	N7RO 323	K4XO 319	AA2X 314	N1HN 305	YU2TW 299	KE5PO 277
K2ENT 327	N4JF 327	F3TH 326	W7CNL 323	VE3HO 319	W5OG 313	WB4UBD 305	W6YQ 299	W3HQU 276
K2OWE 327	W2UE 327	K8LJG 325	K4IQJ 323	IT9TQH 319	K2JLA 312	I4LCK 305	CT1YH 298	WF9K 276
K4CEB 327	W9WAQ 327	IT9QDS 325	NC9T 322	WB5MTV 318	K1VHS 311	N5HB 304	HB9DDZ 297	G4MVA 276
I4EAT 327	AA4KT 327	W6DN 325	W4OEL 322	N6AV 318	OH3NM 310	OZ5UR 304	N4OT 296	YU7FW 275
K6JG 327	N6AR 326	G4BWP 325	DL3DXX 322	AA6AA 317	VE7CNE 310	G2FFO 303	W7IIT 296	

SSB

K4MZU 327	DL6KG 327	IK8CNT 326	WZ4I 324	K4PQV 321	XE1ZLW 318	WA9IVU 311	WA8MEM 302	IK8BMW 286
K2TQC 327	KZ2P 327	WØYDB 326	W2FGY 324	KS2I 321	EA8TE 318	K3NEE 311	KD4YT 302	NM5O 285
K2FL 327	DL9OH 327	OZ3SK 326	I2EOW 324	KA9I 321	K1UO 318	IN3ANE 311	RA2YA 301	N8BJQ 284
W9DWQ 327	KSØZ 327	W4EEE 326	WØSR 324	W7ULC 321	KF5AR 318	F1OZF 311	W2LZX 301	KJ5LJ 284
W9SS 327	W6EUF 327	AI8M 326	IK1GPG 324	W3AZD 321	I8IYW 318	EI6FR 311	XE2DU 301	CT1BWW 284
WA4IUM 327	OE3WWB 327	W4UW 326	K8YVI 324	WØULU 321	I1POR 318	IØSGF 311	VE6PW 301	NU4Y 283
DJ9ZB 327	W2FXA 327	KE4VU 326	NC9T 324	WB4DBB 321	VE2GHZ 318	EA2AOM 311	NO4J 301	VE3IMO 283
WB1DQC 327	SM6CST 327	WB6OKK 326	YV1CLM 324	4N7ZZ 321	KU9I 318	I2MQP 310	WP4AFA 300	XE1ILI 283
XE1AE 327	K6YRA 327	AG9S 326	YV5CWO 324	IØAMU 320	K8YVI 318	I4CSP 310	WA5SUE 300	KE6CF 283
EA2IA 327	N4KG 327	WA4WTG 326	W5LLU 324	K4CXY 320	KF8VW 318	W8AXI 310	YU2TW 300	YC3OSE 282
K2ENT 327	K3UA 327	W7OM 326	I8KCI 324	G4ADD 320	WB6PSY 317	KA5RNH 310	WT4T 300	YV1JV 282
OZ5EV 327	OK1MP 327	WD8PUG 326	KB7VD 324	OA4ED 320	WB3CQN 317	N5HSF 310	W7KSK 300	VE4MT 282
KA3HXO 327	W6DN 327	W2CC 326	KE5PO 324	I4WZK 320	9H4G 317	TI2JJP 309	VE3FJE 300	WAØQII 281
CX4HS 327	I2QMU 327	K2JLA 326	VE4AT 324	I4SAT 320	ZL1BIL 317	W3SOH 309	AB4UF 300	VU2DVP 281
F9RM 327	PAØXPQ 327	W6BCQ 326	IKØIOL 323	I8LEL 320	WA6DTG 317	XE1MD 308	WB4UHN 300	LU6FAZ 281
I4EAT 327	N4JF 327	VE2PJ 326	K9HQM 323	K4JLD 320	PY2DBU 317	WA8YTM 308	KB8NTY 300	KB5MRT 281
KB8DB 327	KB4HU 327	VE2WY 326	KC5P 323	KD5ZM 320	XE1XM 316	N6AV 306	I2ZGC 299	WN6J 281
VE3XN 327	KC4MJ 327	I8LEL 326	WDØGML 323	WE2L 320	LU7HJM 316	WD5P 306	NW5K 299	NXØI 280
YU1AB 327	OE2EGL 327	WB4UBD 326	WN5IJZ 323	WS9V 319	KV2S 315	TI2TEB 306	WB6GFJ 299	YU1TR 280
VE1YX 327	SV1ADG 327	IT9TGO 326	W7FP 323	VE4AT 319	WA9RCQ 315	VE3DLR 306	AB4NS 299	WN5K 279
N4MM 327	CX1TE 327	AA4KT 326	WW1N 323	ON5KL 319	KB8O 315	KX5V 306	VE3CKP 299	KK4TR 279
N7RO 327	K5OVC 327	K7LAY 326	YV5IVB 323	WA4DAN 319	N3ARK 315	KF8UN 306	KJ9N 298	KAØZFX 279
YS1GMV 327	W4UNP 327	PY4OY 326	K4SBH 323	AA6AA 319	NI5D 315	XE1MDX 305	EA5RJ 296	KQ4WD 279
K9MM 327	TI2CC 327	PT2TF 326	KØHQW 323	KI3L 319	KA4RAW 315	VK3JF 305	HP1JC 296	HA5NK 279
4Z4DX 327	WA4ECA 327	WB3DNA 325	WB2JZK 323	VE3HO 319	KE3A 315	W6SHY 305	HP6AYV 296	WØIKD 279
ZL1AGO 327	IØZV 327	KE4VU 326	XE1CI 322	XE1MD 319	K2AJY 315	4X4JO 305	VE3XO 294	VE7HAM 279
KF7SH 327	I4LCK 327	KM2P 326	W5XQ 322	KB1JU 319	IK7DBB 314	CT1EEB 305	KB5WQ 294	N5QDE 279
ZS6LW 327	AA6BB 326	WØSFU 325	K2ARO 322	CE7ZK 319	K7TCL 314	DL3DXX 305	IT9VDQ 293	VU2CVP 278
VK4LC 327	K5TVC 326	IT9ZGY 325	VE7DX 322	OE7SEL 319	AB7AU 314	EA5OL 305	OA4QV 293	EA3CWT 278
YV5AIP 327	I8ACB 326	KC8EU 325	KA5TQF 322	WDØBNC 319	OH5KL 313	N4KE 304	AA2FN 293	K4BYK 277
ZL3NS 327	N6AR 326	N4KEL/M 325	WB4PUD 322	WA5HWB 319	WDØDMN 313	K3LUE 304	TI2LTA 292	WN5MBS 277
K9IW 327	YU1HA 326	LA7JO 325	LZ1HA 322	EA3EQT 319	F6BFI 313	WF9K 304	K2EEK 291	VE2DRN 277
K6JG 327	WD8MGQ 326	K6LEB 325	N5FG 322	K9QVB 318	W5GVP 313	G4NXG/M 304	N6ITW 291	KQ4GC 277
WA6OET 327	XE1L 326	K8CSG 325	ZS6AOO 322	KB5FU 318	N6PTI 313	KJ6HO 304	YB1RED 291	GØLRX 277
WA4JTI 327	K8LJG 326	IK8BQE 325	K1HDO 322	AA4AH 318	KD9CN 313	WB2NQT 303	WA3KKO 290	KC6AWX 276
YV1AJ 327	K8NA 326	K7EHI 325	WA3HUP 321	G4GED 318	K1VHS 313	WA1DHM 303	I4UFH 289	WZ3E 276
YV1KZ 327	VE3MR 326	W3GG 325	K9HDZ 321	NJØC 318	W1LQQ 312	WA2FKF 303	EA5GKE 289	NX4Y 275
N6AHU 327	VE3MRS 326	IT9TQH 325	TI2HP 321	W6NLG 318	K4LR 312	K4JDJ 303	TI5RLI 287	
EA4DO 327	W4NKI 326	AA5NK 325	VE7WJ 321	IK8GCS 318	I8INW 312	W3YEY 302	OK1AWZ 287	
W9OKL 327	KZ4V 326	K2JF 324	I8XTX 321	W6MFC 318	K8CMO 311	N6RJY 302	4X6DK 287	
9A2AA 327	VE3GMT 326	WB5TED 324	I8YRK 321	N5ORT 318	K8NWD 311	WA9BDX 302	KG6LF 287	
KD8V 327	K9BWQ 326	W6BCQ 324	N5FW 321	N2VW 318	ZS6BBY 311	KD5ZD 302	IK2DUW 287	

RTTY

K2ENT 312	WB4UBD 291	K3UA 266	NI4H 252	W4EEU 250	KE5PO 248

bureau is not working merely because they don't get a timely answer to an inquiry. DXers too impatient to wait one to two months for answers to questions should probably QSL direct. Note that you should always provide an SASE with any inquiry to the bureau.

Also, DXers should restrict their communication with the bureau to the bureau's post office box address. Most bureaus attempt to keep the identity of their bureau sorters confidential so that they can do their jobs unhampered by direct communication with individual DXers. While there are exceptions to this general rule, they should be at the initiation of the bureau or the letter sorter and *not* on the part of the DXer. For example, when I was actively DXpeditioning as WA1SQB, the S sorter of the W1 bureau made special arrangements with me to store my hundreds of pounds of cards in her garage until it was time to bring in wood for the winter. Then I would rent a station wagon and drive to her house to pick up the thousands of cards for my DX operations. However, this was at her suggestion, not mine.

Given the volunteer nature of the bureau system, there will be occasional problems. What is remarkable is that the number of such problems is extremely small, and most are resolved quickly. Any DXer who feels that he or she is not getting reasonable service from the bureau should document all correspondence with the bureau and contact his or her ARRL division director. (In more than 90% of such cases that came to my attention while I oversaw the bureau system, the fault was with the DXer and *not* with the bureau.)

Some DXers help support their area bureaus with donations. These donations are *not* required. Any donation should be *clearly* marked as such, or it probably will be posted to the contributor's postage account. (Bureau expenses not covered by funds from DXers are paid by ARRL headquarters, so donations are unnecessary.) Note that ARRL membership is *not* required to use the incoming bureau system. However, your ARRL dues do help cover incidental bureau expenses,

Sixteen members of the Chinese Taipei Amateur Radio League operated as BOØM from Matsu Island last July. (Thanks to KDØJL for the photo)

plus extras such as bureau attendance at regional hamfests.

The QSL bureau system is an excellent example of how hundreds of volunteers work together to make DXing one of the most rewarding aspects of amateur radio. Without the thousands of hours that these volunteers put into handling your QSL cards, the costs of exchanging cards with fellow DXers worldwide would be prohibitive for all but the wealthiest DXers. Maybe the next time you communicate with your bureau you can include a short note of thanks for all this effort. Such notes are greatly appreciated by bureau workers.

March DX Activities

A team of Woodbridge, Virginia Wireless members will operate as **VP2MFM** March 1–6, including a multi-two entry in the ARRL SSB contest March 4–5. They will be on all bands, 160–6 meters, on CW and RTTY outside the contest. Operators are WB4NFS, WD4KXB, KJ4VG, KA4RRU, KO4FM, WA4PGM, W2HPF, and W4MYA. QSL VP2MFM via Denis Catalano, WD4KXB, 14453 Alps Drive, Woodbridge, VA 22193.

Dora Anna, NI5D, and husband Bill Fill, KD5IC, will operate ZP/ from northern Paraguay March 16 to April 15. Primary frequencies are 7250 and 14240 kHz SSB. QSL with SASE to their home address: 5712 Alta Vista Dr., North Little Rock, AR 72118. While in Paraguay they will be teaching math to blind students.

GOLIST Moves

DX-BBS and the GOLIST QSL Manager

CQ DX Awards Program

2113	NC3C	2118	KB5WQ
2114	AA2FJ	2119	NM5O
2115	EA8CAL	2120	K4JDJ
2116	EA5GMB	2121	N4/OA4OS
2117	EA5OL		

CW

916 ..... I4LCK

SSB Endorsements

320	KE4VU/326	310	IØSGF/311
320	KM2P/326	300	EA5OL/305
320	WA4WTG/326	300	K4JDJ/303
320	KB2MY/323	275	KB5WQ/294
320	WB2JZK/323	275	NM5O/285
320	K1HDO/322	275	WZ3E/276
320	4N7ZZ/321	200	EA5GMB/218
310	WA5HWB/319	28 MHz	EA5OL
310	PY2DBU/317	28 MHz	KB5WQ
310	K2AJY/315	28 MHz	NC3C
310	KE3A/315		

CW Endorsements

320	F3TH/326	300	N1HN/306
320	N7MC/325	300	I4LCK/305
320	WØJLC/324	275	CT1YH/298
320	W8XD/321	275	HB9DDZ/297
320	K1HDO/320		

Total number of active countries is 327. 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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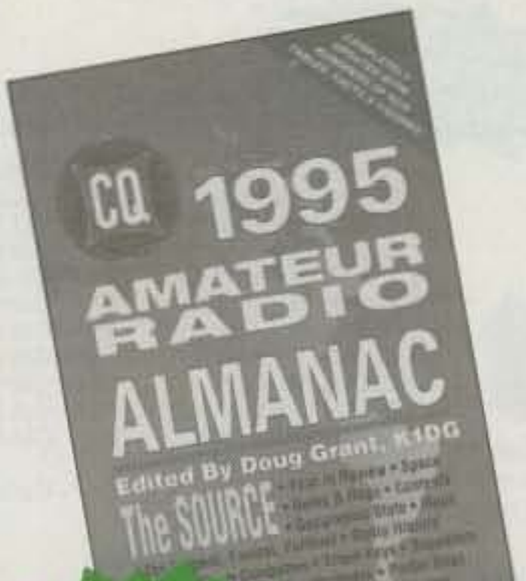

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- FCC General Class Question Pool
- Updated Records for all Major Contests
- Expanded Coverage of Internet Computer Services for Hams
- Proposed Vanity Callsign Rules
- Revised U.S. Ham Census
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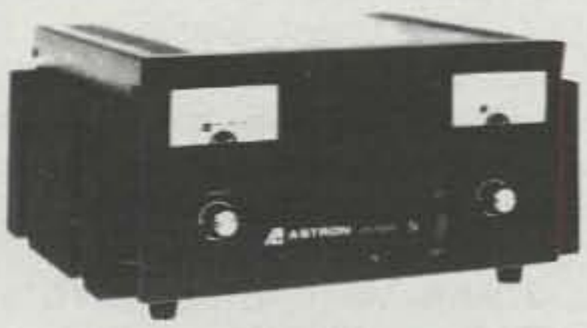

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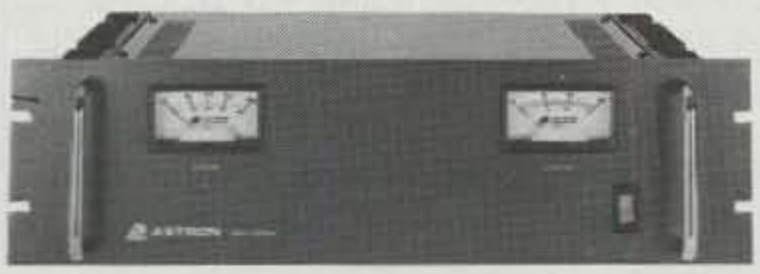
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

RS-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

RM SERIES



MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	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) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

list, including all support functions for PacketCluster™ SYSOPs, has moved from California to Kentucky. The new owners are Paul, AE4AP, and Nancy, KB4RGW, Smith. Paul, AE4AP (ex-N4FFO), is the new SYSOP for DX-BBS.

The new telephone number for DX-BBS is 502-898-8864. The DX-BBS Computer has physically moved, and all passwords are intact at the new location.

GOQSL SYSOPs should make their next upload to the new number.

The new GOLIST FAX number is 502-898-8865; voice 502-898-8863. Mail goes to P.O. Box 2306, Paducah, KY 42002-2306. (The printed edition of the GOLIST continues to be included in The DX Magazine, P.O. Box 50, Fulton, CA 95439.)

QSL Notes

US postage rates have increased as of the first of the new year. DXers should add additional postage to their domestic SASEs now. The "G" stamps that represent the $0.03 difference between the old and new domestic postage rates cannot be used for overseas postage.

QSL **V77Y** via KL7Y, direct or via the KL7 bureau.

QSL **V31VW** and **ZF2VW** via the Vancouver Mountain Radio Club, P.O. Box 1622, Vancouver, WA 98668.

QSL **V31ER** direct to Emil Rodriguez, 19 Joseph Andrews Dr., San Ignacio, Cayo District, Belize, Central America.

QSL **CO2KR** via DL5DCA, P.O. Box 6208, D-44536, Lunem, Germany.

Carl McDaniel, W3HCW, has added **3A50LZ, R9WA, UA9XS, EW1MM**, and **CO6AP** to the list of stations he manages. Carl's address is 2116 Reed St., Williamsport, PA 17701-3904.

QSL **J79AA** via K4BAI, **J79YL** via KQ1F, **J77J** and **J79XM** via K1XM, and **J79JS** and **J79VX** via G4WVX.

Kappy, WA4WTG, will handle QSLs for the 1994 CQ WW CW Contest operation of **C6AHX**. He also manages **V73Y** and **C6AHY**.

QSL **HSØAC** via GØCMM; direct to station manager HSØ/G3NOM, P.O. Box 1300, Bangkok 10112, Thailand; or via the HS bureau: GPO, Box 2008, Bangkok 10501, Thailand.

QSL **DU2ABS** and **DU2ABT** via the Cagayan Amateur Group, P.O. Box 73, 3500 Tuguegarao, Cagayan, Philippines.

QSL the 1994 CQ WW CW Contest contacts of **PYØFF** via CT1AHU. QSL non-contest PYØFF contacts via Bill Smith, W9VA, 1345 Linden Ave., Deerfield, IL 60015.

QSL the 1994 CQ WW SSB Contest operation of **8R1K** via Marko Myllymaki, OH6DO, Kurppakuja 3, SF-63700 Ahtari, Finland.

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Voltage (VDC)	3-15	13.8	1-15	1-15	13.8
Current (ICS)	12	14	30	40	5.2
Current (cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (ilbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES

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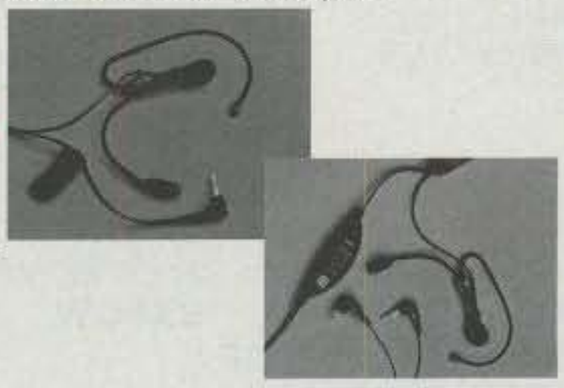
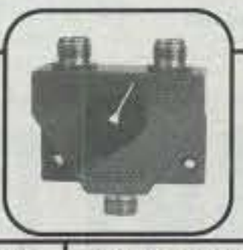


EX600- Earphone Mic for Cellular Phones

EX700- Earphone Mic for Handheld Transceivers with PTT Switch



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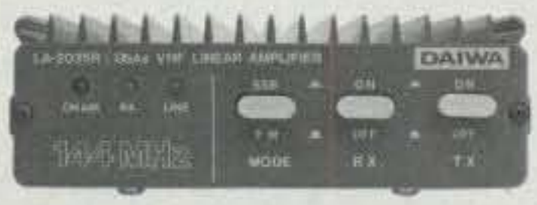

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4N7ØAT to DC3SZ
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5H3JB to NK2T
5H3JD to DK9MA
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5N1DMA to W4DVJ
5N3TDR to OE1YDA
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5R8ED to LA1SEA
5T5JC to F6FNU
5V7DB to DJ6SI
5WØBL to JH2ABL
5WØBY to JA2FBY
5WØJA to JF2RZJ
5W1MW to VK2BEX
5X1XT to WF5T
7Q7JL to GØIAS
7Q7RM to GØIAS
7Q7SB to AB4IQ
7Z5OO to W1AF
9G1BJ to G4XTA
9G5MT to WY7K
9G5RM to NZ7E
9G5VT to K5VT
9J2SZ to SP8DIP
9K2ZC to KC4ELO
9Q5AGD to SMØAGD
9Q5BB to EA4BB
9Q5RP/9X to F5DN
9U/F5FHI to F1FHI
9V1YC to AA5BT
9X5EE to PA3DLM
9X5HG to DK2SC
9Y4SF to WA4JTK
A22EX to N4CID
A22MN to WA8JOC
A35SS to AA6BB
A35ZB to DJ4ZB
AA5DX/KP4 to N2AU
BZ1QL to BY1QH
C53HG to W3HCW
C91AI to CT1DGZ
CO9OTA to CT1ZW
CP4BT to DL9OT
CP8XA to CP8AL
CR9WAG to DL8KWS
CT3EU to G3PFS
CU9CNE to CU1AC
D2SA to F6FNU
D2XX to PA3CXC
D3X to CT1EGH
D68HS to JA1ETQ
D68SY to JL1UXH
D68TA to JA1IDY
D68TK to JA1ELY
DL5XX/HC8 to DL5XX
EA8BYR to WA1ECA
EA9AU to EA9IB
EO5ØFI to RB5FF
EO5ØJS to LY1DS
ER1AM to SP9HWN
ET3YU to YU1FW
EU7SA to RC2SA
EW1WZ to DL1OY
EXØV to DF8WS
FG5FZ to F6FNU
FG5GZ to F6CLK
FK8FU to NA5U
FY5GJ to F2YT
GB3Ø1OTA to G3PMR
GP5KN to G4TTX
HC7SK to SM6DYK
HC8A to WV7Y
HH2LQ to KM6ON
HI8ROX to HI8OMA
HK/GØSHN to F6AJA
HKØHEU to HKØFBF
HL9DC to N7RO
HP1XBH to W4YC
HSØZAA to KM1R
HV4NAC to IKØFVC
HZ1AB to K8PYD
I1A/1PØ to I1RBJ
IC8/N2TGK to IC8WIC
IQØJ to IKØREH
IS1A/1P to I1RBJ
IUØYL to IKØPXD
IZ6ARI to I6LKB
J28BS to FD1PHW
J28DE to F2WS
J68AC to WA2USA
J68AH to ACØS
J68AK to W8QID
J68AS to N9AG
J68BT to W8KTQ
J68ER to W9UI
J68WX to WX9E
J88BS to WA4WIP
J88CW to WA6AHL
KC6OK to N5OK
KC6SS to WV5S
KC6WP to JA1WPX
KG4JO to WI2T
KG4ML to WB6VGI
KH2DD/KHØ to JA1SGU
KS2V/TI2 to KB5IPQ
LA1Z/P to LA6LHA
LX9DX to SP5SS
LY4ØMR to LY1BZB
OA5/IK1EDC to I1ZL
OH1NOA/OD5 to OH1MRR
OM5XX to OK3CQR
OQ5ØUSA to ON4RAT
OS4ANT to ON4ANT
OS5GK to ON5GK
OS6AA to ON6AA
OS7YY to ON7YY
P4ØJ to WX4G
PA3EVJ to VE3MR
PJ4/WA3LRO to K2SB
PJ7/OH2LVG to KE7LZ
PJ8X to KE7LZ
PJ9U to OH1VR
PPØF to PP1CZ
PZ5DX to K3BYV
RKØQXY to UAØKCL
RK4WWQ to AA4NU
RK9XWH to UZ9XWH
SØ1MZ to EA2JG
SØRASD to EA2JG
SNØUN to SP8KHT
SP5GRM to SP5ES
T3ØBH to ZL1AMO
T3ØRT to VK4CRR
T77BL to T7ØA
T91DNO to DL1DAZ
TA2DS to WA3HUP
TA2ZI to WB6EQX
TF4/DL2SCQ to DL6DK
TF4/SM6CAS to G4WFZ
TJ1AG to F5RUQ(94CB)
TJ1PD to N5DRV
TL8NG to WA1ECA
TMØP to F6BFH
TM4C to F6KAR
TM5IPA to F5LGQ
TOØP to F6BFH
TU2DP to K4MQL
TU2ZR to SM3DMP
TU4MV to F5JFT
U5WF/UR9P to SP5IUL
UAØQJG/Ø to UA1AGC
UK7R to UA9AB
UK8AX to UA9AB
UK8BA to ON7GB
UK8QU to K9FD
US5WE/US8P to SP5IUL
UU1JA to N4NWT
UX2MM to DL3BQA
V26E to AB2E
V26R to KA2AEV
V26Y to W2KKZ
V31CK to XE1CI
V31JY to KV5E
V31ML to N5FTR
V31MP to W5ZPA
V31ND to OH6ZS
V31YK to W5JYK
V47NF to WB8GEW
V47WK to AB4JI
V47WZ to WZ8D
V5/NØAFW to WA2FIJ
V5/N9NS to WA2FIJ
V63MN to JR1TNE
V73GT to WF5T
V73Y to WA4WTG
VE3MJQ/9X5 to VE2PR
VK1FF to WB2FFY
VP2EHF to KA3DBN
VP2VI to AB1U
VP8GAV to GMØLVI
VQ9QM to W4QM
VQ9ZX to K7ZX
VS6WV to KØTLM
XE1/JA1QXY to JA1HGY
XF4M to AA6BB
XX9AS to KU9C
XX9TSX to G3SXW
YJØAAY to W6YA
YS1DRF to W2PD
YU7ØGW to YU7GW
Z37GBC to YU5GBC
ZA/KA6ZYF to KA6ZYF
ZA1AJ to OK2PSZ
ZA1B to HB9BGN
ZA1E to I2MQP
ZD7BJ to W4FRU
ZD8KJ to GØFXQ
ZD8OK to N8ABW
ZD8Z to VE3HO
ZF1CQ to W8BLA
ZF1DX to W8BLA
ZF2LS to KJ6HO
ZF2RV/ZF8 to WJ7R
ZF2SY to K2UFT
ZK1NA to DL6NA
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ZP7AA to ZP5AA
ZP9XB to PY5BI
ZZ7DX to PP5LL
ZZ8SA to PW8NG

LU8DPM handles cards for **VP8CQQ, XQ8ABF, L50D, CXØCW, CW8B, CX8BBH,** and **CE3F**.

QSL **S79KMB** via Anika Leghley, KN2N, VAMC Building 21, Martinsburg, WV 25401.

QSL Tom Bridges, W7LN's African operations as **A25/W7LN, D2/C91AM, V51WL, Z2/W7LN, ZS6WLN, 3DAØ/W7LN, 7Q7WB,** and **9Q5LN** via his stateside address: 7140 Northampton Street, Warrenton, VA 22186.

QSL the Santa Catarina Island callsigns of **PQØMM, PØRR**, and **ZWØJR** via Sergio Lima de Almeida, PP5JR, Av. Rubens Arruda Ramos 1416/501, Cep 88015-700, Florianopolis SC, Brazil.

QSL **N7RK/ZB2** via Dave Hollander, N7RK, 2313 East Ocotillo Road, Phoenix, AZ 85016.

QSL **ZK2ZE** via operator LA9GY.

QSL **TL8NG** only via WA1ECA.

A22MN's QSL manager WA8JOC has lost his copy of the Oct. and Nov. 1994 logs due to a power surge. He expects a delay of at least three to four months before resuming QSLing. He asks DXers for patience, and not to send duplicate requests.

The new QSL route for **TJ1JR** and **5V7MD** is Chuck Degard, AB7BB, 919 West Vaughn St., Tempe, AZ 85283.

QSL **J68AR** via K9BQL and **J68AH** via ACØS.

QSL **LP3C** via Luis Paoloni, LU3CF, J.F. Aranguren 1680, C.P. 1406, BS. AS. Argentina.

QSL the 1994 CQ WW SSB Contest operation of **V47Z** via Ray Smith, AB4JI, 5515 Panorama Dr., Huntsville, AL 35801. This is also the route for **V47WK**.

73, Chod, VP2ML

OUR READERS SAY

Things That Go Bump In The Night

Editor, *CQ*:

Last night I read Bill Orr's "Radio Fundamentals" column (November '94), "Things That Go Bump In The Night." It went BUMP with me twice!

Pat O'Brien, VS6AE, was a dear friend of mine, 1957–63, while I was working in Shanghai and Hong Kong. Pat and Lyell, VS6BE, and Drake, VS6EK, and I met every Tuesday at the China Fleet Club in Wanchai for a couple of San Migs. Pat lived in an apartment block with dipoles on the roof, a homebrew rig, and a 75A4. He was very active and gave many a VS6 CW QSO. He died of a heart attack in 1963, and we laid him to rest at the Colonial Cemetery in Happy Valley.

With regard to D5FF in post-war Germany, I enclose photos of QSLs from DL1FF (ex-DA5FF/D5FF). I met Armin, who was really a top-notch operator, in 1950. He had a small radio/TV repair shop then, and when I walked in, there was a loud bang, as he had just switched on a HV power supply and one of the condensers exploded! We became friends over the years, and I regularly visited him during my home-leaves from VS6 on my way up to Denmark. Armin confided to me that he operated ham radio from a German Navy ship during WW II and was caught and courtmartialed towards the end of the war. He ended up in a camp in OK-land and walked back to his home in north Germany in the summer of '45. DL1FF worked VK—I believe it was VK3HO—every day for a whole year on 3.5 MHz CW just to prove the point. Unfortunately, his family split up and his business went sour. He died several years later in a home. He was one of the best known DL signals on the CW bands. I am sure many of your readers will remember his handwriting: DL1 dididahdit dididahdit!

Herb Asmussen, G/OZ7SM
(ex-VS6AD, VS6AJ)
Beoley/Redditch, Worcs., England

"The Fine Art of Soldering" (cont.)

Editor, *CQ*:

Re: "The Fine Art of Soldering," Oct. 1994 *CQ*, pg. 112. May I mention a few items that could have been included in this article written by Doug DeMaw, W1FB. I hope his article and my letter will encourage those who haven't to build or repair something.

First, the "gun" type, 100 to 275W, wire-tip irons have problems with oxidation where the tip nuts fasten the tip ends to the iron stems. If the iron heats slowly or won't solder quickly, therein lies the problem. It helps to tin where the nuts tighten down on a new tip before installation, and you may need to loosen and retighten the nuts to "refresh" the physical connection every so often. These irons are good for heavy jobs, but not for printed circuit work!

Second, I can't emphasize enough the value of purchasing irons with replaceable plated tips. When first heating up a new tip, tin the plated area with solder and then shut off the iron. Let it cool down to "prep" the tip for use.

Third, use a wet sponge when soldering. Wipe the tip clean and then solder your part. After you have soldered the part, DON'T WIPE OFF the tip on the sponge. Leave solder on the tip (always) while it is idling.

Fourth, when soldering it helps to speed heat transfer by applying a small amount of solder between the iron's tip and the part to be soldered. Then apply solder for the final joint when the heat is there.

Last, when you are finished soldering, don't just shut off the iron! Shut it off, wipe the tip clean on the sponge, completely retin the tip with solder, flick off the excess, and let it cool down. This will extend usable tip life greatly. I have tips still in active service after 15 years and thousands of solder operations.

I have one complaint: I would like to see manufacturers of soldering equipment go back to "iron" plated tips rather than the nickel plate they supply now. This plating (nickel) is easily broached, and then the tip has places where solder won't adhere and heat does not transfer.

Good soldering and 73 . . .

Dennis R. Murphy, KØGRM
Bismarck, ND

A Life's Commitment

Editor, *CQ*:

In the April 1994 issue in the "Awards" column on page 108 WA3RTY wrote a piece about Bill Peale, W5MW, of Dallas, Texas. Several things were said concerning Bill's colorful and exciting past, including that he has contacted every county in the United States to date. You also included a photograph of Bill in the article. In the picture he is feeding a bottle to an infant, my daughter, Elizabeth Angel Naeger.

As you noted, Bill and his wife, Peggy, babysit several infants during the week to assist young families who work. Bill and Peggy have been doing this wonderful work for 17 years. I know that I speak for every father and mother who has entrusted Bill and Peggy with their child, when I say that they have been an important part of our children's lives by nurturing them with love and attention. Bill also has this same spirit of life and commitment with his work on radio.

I was hoping that you might send me a copy of the article so that I may place it in my child's bedroom and remind her in the coming years how important people like Bill and Peggy are to our lives and to our society.

Martin F. Naeger
Lebanon, OH

Radio Classics A Work of Art

Editor, *CQ*:

The *CQ* Radio Classics 15-Month 1995–96 Calendar is OUTSTANDING! Joe Veras, N4QB, and Liesa Bates are to be congratulated on this absolutely beautiful work of art which I will be enjoying over the months. I am already looking forward to their next calendar and hope they will include a Heath DX-100 and Johnson Adventurer (I can help with the latter). Boy, what memories your calendar brings back! Thanks for the memories.

Nate Williams, W9GXR
Middleton, WI

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Equipment and Accessories—Part I of III

This article is intended to give new and potential amateurs a brief introduction to equipment and accessories that are commonly used in amateur radio stations. It should be particularly interesting to peoplewho are ready to purchase and install the items that will make up their first station. Previous W6DDB columns have covered specific related subjects; such columns are summarized at the end of this article for the benefit of readers who have access to (or may desire to purchase) previous issues of *CQ*.

References to equipment (in this article) are intended to denote transceivers, or transmitters and receivers. References to accessories are intended to mean everything else related to an amateur radio station. Typical accessories are AC power supplies, external loudspeakers, remote frequency controls, antenna tuners, telegraph sending devices (handkeys, electronic keyers, paddles, etc.), headsets, antennas, computers, visual display terminals, SWR/power meters, and several other auxiliary units. Accessories also include narrow-band filters, noise blankers, FM adapters, and other devices that can be added to modern transceivers to provide expanded and/or improved operating capabilities.

Modern transceivers often include built-in devices which previously had to be purchased separately and were usually installed external to the transceiver. Some of these items are the SWR bridge, second frequency control, antenna tuner, electronic keyer, digital frequency display, and four-digit clock. Older equipment often required antenna changeover circuitry, sidetone oscillators, and other devices built into modern transceivers.

Q-multipliers, preselectors, converters, and transverters are older accessory items that are not used with modern equipment. However, it is understood that many readers may be interested in acquiring older used items, so that area is covered in detail. The *Q-multiplier* enables an operator to put a peaking spike under the desired signal to boost it over noise and other signals in a receiver's passband. It also enables an operator to drop an interfering signal below the level of a desired signal; this is called nulling out a signal. *Preselectors* are wide-band radio-frequency amplifiers. They boost the received signal before it is fed to the receiver. These devices are not needed with modern receivers, including receivers built into transceivers. Adding an external preselector would degrade the performance of a modern receiver. Some relatively recent receivers feature effective built-in preselectors. *Converters* are normally used to convert a VHF (30–300 MHz) or UHF (300–3000 MHz) band (50–54, 144–148, 220–225, 420–450 MHz, etc.) to a frequency that can be tuned with an HF (3–30 MHz) rig. Converters usually produce an output on the 10 meter band. A separate transmitter is needed to communicate on the VHF/UHF band when using a converter. Separate external converters are a thing of the past for most amateurs. *Transverters* enable you to retain the excellent operating features of HF equipment while operating on VHF/UHF bands. The HF equipment output (usually 10 meters) is converted to a transverter output on the desired VHF or UHF band. The received VHF signals are converted to the desired HF band for normal processing. Transverters are internally mounted accesories with some equipment. Transverters are now outdated equipment.

45527 Third Street East, Lancaster, CA 93535-1802

This is Sam Silva, 4S7GF, operating maritime mobile aboard the M.V. Asian Challenger. *He is the radio officer aboard this ship, a container vessel which sails between Japan and South America. Sam has had more than 1000 contacts from this ship, and he sends cards to the amateurs he works.*

Equipment

The major piece of equipment in a modern shack is a transceiver. It has been many years since receiver and transmitter matched pairs were offered as new equipment. Even longer ago unmatched receivers and transmitters were very popular. Transceivers continue to improve, and the amateur radio transceiver has long been the best dollar value on the market in electronics. Considering the reduced value of the dollar during the past two decades, a top-quality, new transceiver costs less than a combination of a matching receiver and transmitter sold five years ago. In addition, a new transceiver is lighter, smaller, and performs much better than older equipment. The capabilities of a present-day transceiver are far superior to those of equipment marketed just ten to fifteen years ago. To state the existing situation clearly and simply, new amateur radio equipment is fantastic despite its very reasonable price. Before transceivers became popular with amateurs, one purchased a receiver and a transmitter. In addition to these two units, the antenna changeover relay and circuitry had to be added to most o f these combinations. Hookup and operation of the separate receiver and transmitter combination is more difficult than hookup and operation of a transceiver.

After all those glowing words about transceivers, it is appropriate to mention a few of their shortcomings. Novices and Technicians need code operating experience to increase code proficiency to the point where they can pass code tests required to upgrade licenses. Transceivers

are primarily designed to provide mobile voice communications; they are not primarily designed to provide code (A1A radiotelegraphy) communication capability.

Most transceivers are never mounted in a vehicle. Usually the only time they are in a car is when the amateur is bringing the unit home. The small size required of mobile equipment necessitates small switches, knobs, and meters. Tiny controls are not as easy to use as large controls. Miniaturization, compactness, and complexity combine to make it almost impossible to repair today's transceivers. It is better (and perhaps less expensive overall) to have equipment serviced by the manufacturer's maintenance people. That is a hard statement for an old do-it-yourselfer to make, but it is true.

As far as Novices and Technicians are concerned, the most obvious shortcoming of transceivers is the extremely short delay between the time one opens the key (lets it up) and the time when the receiver is reactivated. One of the three VOX/ (Voice Operated Xmit/transmit) controls is the delay control. It is supposed to be adjusted to the point where it provides a suitable delay between the time when you stop talking and the time when the receiver section comes out of the mute (silent) mode, restoring it to normal reception operation. You do not want the transceiver to continuously shift back and forth between the transmit and receive modes due to slight pauses as you are talking. On the other hand, you want the unit to automatically shift from transmit to receive when you stop talking to listen to the other amateur. The delay control is adjusted to provide a suitable delay between transmit and receive modes. The problem is that the delay required for normal voice operation is much shorter than the delay needed for slow code operation. Consequently, even with the delay set to maximum, the transceiver continuously shifts between transmit and receive modes as you send the dits and dahs of slow code. If the transceiver has a switch to permit manual changeover between the transmit and receive functions, that switch should be used to avoid the annoyance of continuous mode changes while operating slow code. This switch is usually labeled MANUAL or XMIT.

Since transceivers are fundamentally voice communication equipment, most of them are not sold with a suitably narrow filter for code operation. The typical voice range processed by amateur transceivers (during single sideband operation) is about 300 to 3000 Hz. In many cases this 2700 Hz range is wider than what is used; 2400 Hz is also common. The width of an A1A code signal is approximately five times the keying speed, assuming a properly designed transmitter. It is to your advantage to just listen to as much spectrum as you must cover to hear the signal

you want to copy. Consequently, if you are talking with an amateur who is sending code at 15 wpm, a 75 Hz filter would suffice. If you are using a 3000 Hz SSB filter, you are listening to noise and other stations in 40 times more spectrum than is necessary. Some filters are as sharp as 40 Hz, but 250 is the approximate minimum width of a useful filter. Sharper filters are subject to ringing. A 250 Hz (narrow band) code filter is suitable. Even a 500 Hz filter is good for code operation; it cuts out most of the unwanted noise and signals that could otherwise be heard along with the desired signal.

Noise is fairly evenly distributed across a band; there is no sense in listening to any more of it than is necessary. Listening to noise tires operators. A narrow-band code filter is needed to optimize code reception. Code filters are available as accessories to most transceivers, and they are easy to install. A glance through amateur radio publications will show that filters are also available from other than the transceiver manufacturers. Selectivity (narrowing the width of received frequency spectrum) can also be achieved by adding an external audio filter between the output of the receiver section and the external speaker or headphones.

Dual frequency control is a common feature of newer transceivers. This feature enables you to transmit and receive on different frequencies without having to frantically tune between them. A simple example of how this feature is used should help. During the May Armed Forces Day activities amateurs areallowed to contact military stations. The military stations transmit on their own frequencies just below (code) or above (voice) the amateur bands, and they state the frequency they are listening to (in the adjacent amateur band) for answers. As an example, a military station might transmit on 20.997 MHz and listen on 21.130 MHz. In this case the amateur sets one frequency control to receive 20.097 MHz and sets the second frequency control to transmit on 21.130 MHz. This split-frequency operation enables one to easily work such stations. The older transceivers do not include the dual frequency control feature; they require a separate (usually external) second frequency control (remote VFO) to accomplish this.

This completes the first portion of this three-part article. Part II will cover modern accessories, antennas, headphones/loudspeakers, lighting, clocks, electric power, and telegraph apparatus.

New Postage Rates And QSL Activity

When I started operating, we could attach a one cent stamp to a QSL card andmail it on its way to any domestic (U.S.A.) destination. At that time homes received two mail deliveries a day and businesses often had three deliveries per day, with a first-class letter mailing cost of 3¢. It seems reasonable to assume that each increase in postal rates should reduce the number of cards amateurs mail to each other. However, I have not noticed a decrease in the number of cards being received. Naturally, many new amateurs do not have cards printed when they start operating, but the ones who have them do send them, regardless of higher postage rates. As always, new amateurs are anxious to receive cards from amateurs they contact.

The postage rates for mailing each standard-size postcard (QSL) are 20¢ U.S.A., 30¢ for Canada/Mexico, and 40¢ other international destinations.

The first-class letter postage rates are 32¢ for the first ounce and 23¢ for each additional ounce up to 11 ounces for domestic (U.S.A.) mail. Postage rates of letter mail to Mexico are 35¢ for one-half ounce and 45¢ for one ounce. Letter rates of mail going to Canada are 40¢ for one ounce and 63¢ for two ounces. First-class postage rates of mail being sent to other countries are 50¢ for one-half ounce and 95¢ for one ounce.

Tiare Publications sells the *PSE QSL!* softcover book I wrote. If you are new to amateur radio, this book can help you determine the design of an effective QSL card. It tells you everything you need to know about effective QSL exchange. The domestic price is $11.95 per book. Tiare's address is P.O. Box 493, Lake Geneva, WI 51147. Many of thecards I receive contain errors, with some errors causing them to be useless as QSL cards. If you are going to QSL, do it correctly; don't waste your money.

Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer licensees. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Electronic Filing of Amateur Operator Applications

"Successful license examinees want their licenses granted as soon as possible so that they can operate their amateur stations. Recent modernization of the Commission's data processing capabilities makes it possible to greatly reduce the time it takes for us to grant licenses in the amateur service. By accepting from the VEC's electronically filed data from applications for new and upgraded amateur operator licenses, the time and effort required for the VEC's to send, and for the Commission to receive, application documents by mail would be eliminated."
—From FCC Order implementing electronic application filing.

How does getting your amateur license in two or three days after taking the required examinations sound to you? Last year it took two to three months! The delay was due to manpower shortages at the FCC's Gettysburg, Pennsylvania licensing facility. Keying in the application data is the most labor-intensive part of amateur radio licensing. The FCC simply did not have the people needed to get the job done in a timely manner, and the applications stacked up. It will now be completed by the VE/VEC community.

It was taking so long to get a new amateur ticket issued that the FCC suggested at the 1993 VEC Conference that newcomers be allowed to go on the air immediately after testing without an FCC license. First-time amateurs simply would use a temporary self-designated 2-by-3 format callsign until their license document and permanent callsign were received. The Western Carolina Amateur Radio Society/VEC, Inc. filed a Petition for Rule Making on June 28, 1983 seeking to implement that FCC recommendation.

On November 4, 1993 the FCC adopted a Notice of Proposed Rule Making that would allow newcomers to assign temporary callsigns from the unused WZ prefix block, followed by a VEC region number and a suffix containing the operator's three initials. The WZ prefixed callsign would be authorized for a maximum of six months and would identify the station as a new amateur station awaiting a license. That NPRM is still pending.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443)

New Amateur Operator Licensing System

The FCC has been working on overhauling their amateur service data processing program for more than two years now. It was a major undertaking, since it meant retiring their old 1970's vintage Honeywell mainframe computer system and replacing it with a new PC-based setup. New license processing and data base software had to be written from the ground up, and all new automatic license printing and mailing equipment had to be purchased and installed. This hardware was in place by June of last year.

Last summer at their annual conference the Volunteer Examiner Coordinators (VECs) were given a demonstration of the FCC's new amateur service licensing system in Gettysburg, Pennsylvania. FCC Private Radio Bureau Chief Ralph Haller stressed the importance of electronic filing of amateur applications.

"The speed-of-service will be in hours instead of weeks," he said. "Instant temporary licensing may not be necessary. We hope to send out the license the same day . . . " that the application information is received. Haller also said the FCC may be able to eliminate the need for an applicant to have a license document "in hand" before beginning operation.

Both the old and new data processing systems were tested last fall by running both systems in parallel. Once all of the bugs had been ironed out of the new system, the old Honeywell was turned off for the last time.

During the last couple of months of 1994 the FCC entered the final phase of their new amateur service system. Several "practice" computer files of Form 610 applications were transmitted over the phone lines from the volunteer examining system to the FCC in Gettysburg. The testing is now complete and electronic filing is now ready to begin in earnest!

Extremely rapid license turnaround should be a reality by the time you read this. Just how fast depends on how quickly the Volunteer Examiners and VECs can get the licensing information keyed in and transmitted to the FCC.

It should be pointed out, however, that no VEC is required to electronically file the Form 610s of the applicants they test. Some of the smaller VECs may still send in paper Form 610s to the FCC. Others may key the information into a PC and send a computer disk with the data to the FCC. The more the VEC organization does, however, the faster the FCC will grant a license.

The chances that your application will be handled fast are good, however, since the W5YI-VEC and the ARRL-VEC are committed to electronic filing. Together these two amateur testing organizations account for nearly 90 percent of the amateur radio examination "market."

Just What is Electronic Filing?

Electronic filing is the submission of FCC Form 610 application data and examination session information directly into the FCC's computer licensing system by a VEC organization. No FCC personnel have to key in anything. The test session data is entered into a PC and saved as a file on a hard drive or floppy disk. Special input software has been written by the FCC for VEC use. The file is then transferred over the phone lines by high-speed modems to the FCC.

The W5YI-VEC found that the FCC written input program was huge and very cumbersome, so we wrote our own VEC-SOFT software. To install the FCC's version of VEC electronic filing requires Microsoft Windows Version 3.1 and an additional nine megabytes of hard disk space. It is also designed only to be used by VECs. The program we wrote is 97 percent smaller in size (less than 300K) and is MS-DOS based. Both programs feature "Mouse" support, graphics, and pull-down menus.

The biggest difference between the FCC and the W5YI-VEC Electronic Filing programs is that our version permits the VE team itself to participate in electronic filing. The FCC's version anticipates that solely the VEC organizations will handle electronic filing. We believe that getting the VE teams involved will further speed up the granting of amateur radio licenses since we will not have to wait for the Form 610 applications to arrive by mail. Depending upon the location of the VE team, "snail mail" can take up to an additional couple of weeks.

With VE-to-VEC electronic filing of new amateurs we will immediately be able to screen the application and session data, and our VEC Office will not have to key in the data. We will, of course, compare the VE teams' filing to the original test session paperwork once it does arrive.

CIRCLE 92 ON READER SERVICE CARD

CIRCLE 81 ON READER SERVICE CARD

CIRCLE 34 ON READER SERVICE CARD

"We firmly believe in the principle that government should be responsive to user needs," the FCC said in the Order authorizing electronic filing. "The rules that we are amending will enable us to use procedures that are responsive to requests from VEs, VECs, and applicants that the Commission reduce the time it takes to authorize new amateur service licenses to operate their stations. When these procedures are fully implemented, such authorizations will be made very quickly."

VE to VEC to FCC Electronic Filing

There can be no doubt that it is the new amateur who suffers the most in the amateur service licensing process. Section §97.9(b) of the rules allows a person holding an amateur license and callsign to begin using his new privileges immediately after upgrading. The first-time licensee, however, must wait until he has a callsign to use on the air.

The goal of the W5YI-VEC is to get the newcomer to amateur radio up and running as fast as possible. Any VE team that has the following computer hardware may electronically file the application data of first-time amateurs directly with our VEC Office. You need an IBM/compatible 286 (or higher) personal computer, 512K of free RAM, 4 Mb of disk space on the hard drive, a serial communications port, and a 1200, 2400, or 9600 baud Hayes-compatible modem.

The W5YI-VE input software is provided to the VE team at no cost. It features a special imbedded "checksum" security feature that automatically invalidates data that has been tampered with during the VE-to-VEC transmission process.

The W5YI-VEC will be making use of the easy file-transfer capability of MCI-Mail to get the application file from the W5YI-VE team to the W5YI-VEC office. We chose MCI-Mail, since is a managed, secure, password-protected network, and MCI Communications has granted us a special discounted price on their service. (Cost is only a one-time $10 registration cost, plus 50 cents a message. An alternate plan costs $10 a month for 40 messages—only 25 cents each.) We may authorize use of other online services (including the Internet) for future application file transfer from the VE team to the VEC office.

In addition, MCI will furnish their Express LITE communications software at no cost. This program features full screen editing, return receipts, automatic network polling, easy file attachment, on-line help, and free "800" telephone support 24 hours a day, 7 days a week. Access to the MCI-Mail network is through a toll-

free number available throughout North America.

The use of other online services as a file transfer medium has not been ruled out for the future. We are concerned, however, about the speed, security, and reliability of the Internet as well as other consumer services. The Internet is an unmanaged, self-routed network. Still, there may be ways to safely use its file transfer features. Although the W5YI-VE input software generates an ASCII file, e-mail cannot easily be used because of certain security features. The file must be attached rather than appear in the text of a message.

Contact the W5YI-VEC at 1-800-669-W5YI (9594) if you or your amateur radio club is interested in VE team electronic filing of first-time amateurs. Complete information will be furnished to you.

Both the FCC Electronic Filing and W5YI-VECSOFT Electronic Filing input software programs have been thoroughly tested. Towards the end of 1994 several actual amateur licenses were generated during the test phase of these two programs. We have also completed Beta testing of the W5YI-VE input software.

At presstime the VE/VEC community was waiting for the word to begin electronic filing of amateur service applications. Electronic filing should be in operation by the time you read this.

The New Regulations

Two decisions were made earlier that impacted amateur service licensing. Amateurs are no longer given a new ten year term when they upgrade or modify their license. Instead the new amateur operator license bears the same expiration date as the original license. The only way licensees can obtain a new ten year term is to renew their license.

This position was in part necessary due to the "Vanity" callsign program that is in the process of being implemented. Amateurs will be able to choose a primary callsign of their choice for a ten year period when they pay a $70 Regulatory Fee.

The American Radio Relay League had hoped to get the $70 for ten year Regulatory fee changed to a one-time $150 application cost. The 103rd Congress adjourned, however, without passing the telecommunications legislation it was considering. The $150 fee was tagged to that bill.

In any event, licensees who upgrade or modify their license, or those with "vanity" callsigns, will not get a new ten year term when they change their licensing status as previously was the case.

Beginning this year the FCC will send out a new short-form renewal card. An FCC 610-R will be mailed to a licensee's address of record about 90 days before license expiration. The filled-in card need only be signed and returned if your licensing information is still correct. The FCC will still allow amateurs to use the longer Form 610s to renew their license if they wish to " . . . because we cannot be certain of delivery of the form to every licensee in every instance."

You should also be aware of a brand new Part §97.23 Rule that requires amateurs to notify the FCC when there is an address change. The penalties could be severe if you don't! "Revocation of the station license or suspension of the operator license may result when correspondence from the FCC is returned as undeliverable because the person failed to provide the correct mailing address."

Technician Plus is Now A License Class

Technician "Plus" status is no longer an endorsement of the Codeless Tech ticket. Effective December 20, 1994 there are six full amateur service license classes instead of five.

Until recently Technician "Plus" privileges were vested by the Certificate of Successful Completion of Examination issued to a No-Code Technician. No "Technician Plus" ticket was issued. The CSCE indicated that the examinee had passed a code examination and was

therefore authorized to operate on Novice HF spectrum. And even though they qualified for Technician Plus, Novice operators passing Element 3A (the Technician written examination) were issued a Technician license. VEC records, however, showed the examinee to be a Tech Plus operator.

As of last summer the Commission is mailing out Technician Plus licenses. While the FCC did not go back and reissue Technician Plus licenses to those who qualified earlier for them, they did update their amateur service data base. This was accomplished by entering the VEC-maintained Technician Plus information to show all No-Code Technicians who passed a code test between February 14, 1991 and June 8, 1994, and Novices who passed Element 3(A).

If you made Tech Plus during this period, you might want to check with the FCC to be certain that their data base reflects your proper license class. Some of the smaller VECs neglected to furnish information to the keeper of the VECs Tech Plus data base.

Amateur Licenses Are Granted—Not Issued

To pave the way for electronic application filing, Congress adopted legislation two years ago stating that the Commission did not have to see a signature on its application forms before granting a license.

The decision to grant a license occurs when the FCC license processing facility enters the data into the amateur service licensee data base. Previously, a new amateur operator had to wait until a license document could be printed, mailed, and delivered before beginning operation. The old Part §97.7 Rules specifically required a person " . . . to hold a license document" before transmitting. No more.

This rule has now been changed to read that a control operator is a person who has been "granted" (rather than "holding" or being "issued") an amateur license document. You no longer need a "hard copy" license before beginning operation on the amateur air waves.

The FCC said, "Requiring a license document to be in the personal possession of an amateur service licensee is not as necessary as in the past because we generally rely upon the licensee data base to confirm that the licensee is authorized to operate a station in the amateur service."

A person is now considered to be licensed once his or her name, address, and class appears in the FCC records. This happens instantly when the data is keyed (or transmitted) into the FCC licensing computer at Gettysburg. Furthermore, this information can be given out over the telephone, and the FCC has established a new toll-free telephone number (1-800-322-1117) for license status inquiries. The FCC wants callers to be patient, since their line could be busy for long periods.

"We intend in the future to make the current licensee data base publicly available through an accessible on-line, read-only electronic system," the FCC added. " . . . information technology is making our amateur service licensee data base more widely available, thus diminishing the need for an amateur operator to hold a license document. . . . "

So if you are ready to get involved in high-tech amateur radio testing and application filing, let us know! The W5YI-VEC also has free software for Novice through Extra Class amateur radio testing. General and Advanced Class VEs may examine the Novice, Technician, and Tech Plus applicant. All other classes require an Amateur Extra Class VE. If you are already accredited by another VEC, just send us a photocopy of your badge or credentials and we will forward you a W5YI-VEC accreditation. Getting an amateur radio ticket has never been easier—or faster!

73, Fred, W5YI

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Monthly DX Predictions—March

GEORGE JACOBS, W2PAJ*

"We have received many requests to bring back CQ's DX predictions, so here they are. W2PAJ would like to know how well your observations check his forecasts."

The above headline is from the March 1951 "Propagation" column, and it was the first I wrote for *CQ*. This month's column begins my 44th year as *CQ*'s Propagation Editor. Since this is the 50th anniversary of *CQ* magazine, the January issue is full of reminiscences, including mine, so there is no need to repeat them here. Suffice to say, I still look forward to preparing this column each month in an effort to "take the mystery out of HF propagation."

Solar Cycle Progress

Sunspot Cycle 22 is now in its 103rd month, and it continues to decline steadily as expected. The Royal Observatory of Belgium reports a monthly mean sunspot level of 18 for November 1994. This results in a 12-month running smoothed sunspot number of 33 centered on May 1994. This is a decline of one number from the previous month's level. During November daily levels of solar activity varied between a high of 48 observed on November 2 and a low of 7 reported for the 21st.

According to daily observations made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the adjusted mean level of 10.7 cm solar flux for November 1994 was 81. This results in a 12-month running number of 88 centered on May 1994. The level of 10.7 cm flux is paralleling very closely the decline in the sunspot count.

During the 1994 CQ World-Wide DX Contest CW weekend the recorded sunspot number on November 26th was 17 with a 10.7 cm solar flux level of 83. On November 27th solar activity increased to a sunspot number of 20 with a solar flux level of 80.

A smoothed sunspot number on the order of 20 and a 10.7 cm solar flux level in the upper 70s are forecast for March 1995.

Critique of Conditions During The 1994 CQ WW DX Contest

Regretfully, Mother Nature did not cooperate during the 1994 CQ WW DX Contest weekends, and HF propagation conditions suffered considerably during both the SSB and CW weekends as a result of radio storminess.

This column forecast generally Low Normal conditions to most areas of the world during the SSB weekend of October 29 and 30. Actual conditions varied between somewhat poorer to considerably poorer than forecast.

The contest period started much as predicted, but by 0300 UTC on October 29 radiation from a solar flare which occurred a few days earlier flooded the earth's atmosphere. The storm began shortly after 0300 UTC, reaching major proportions between 0900 and 1200 UTC. It then subsided somewhat, but continued through the entire weekend period. The A_p index, which measures geomagnetic activity on a worldwide basis over a 24-hour period, reached 49 on October 29 and dropped to 41 on October 30. HF propagation conditions varied rapidly and considerably depending upon paths. In low and mid-latitudes conditions were reported between Low and Below Normal, but with frequent periods of signal degradation. Upper middle latitude and trans-polar paths were subject to Below Normal and Disturbed conditions, with fading, absorption, and multipathing being the main sources of signal degradation. Auroral activity spread considerably southward during this storm, and there were some blackout periods on trans-Atlantic and trans-Pacific paths.

The CW contest weekend was held on November 26 and 27, exactly 28 days after the SSB weekend. A problem with contest periods separated by approximately 28 days is that the conditions that take place during the first period are very likely to recur during the second period, since there is a known tendency for HF propagation conditions to recur over an approximate 27- to 28-day cycle.

This column predicted mainly Low Normal conditions for the first day of the CW weekend, with the possibility of radio storminess dropping conditions to Below Normal at times during the second day. Actual conditions were somewhat poorer than forecast.

This is what happened during the CW weekend of November 26 and 27. Much as during the SSB weekend four weeks earlier, the CW weekend started off with close to normal conditions, but the recurrent storm began at 0900 UTC on November 26 and lasted through most of the weekend. While not as severe as the storm during the SSB weekend, the A_p index rose to 39 on November 26 but dropped to 25 on November 27. While low- and mid-latitude openings varied between Low and Below Normal, trans-polar openings and paths passing through the upper latitudes often suffered moderate to severe signal degradation, particularly on November 26.

Because of the major radio storms that took place during both the SSB and CW contest weekends, along with the considerably reduced sunspot cycle activity, scores during the 1994 CQ World-Wide

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for March 1995

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 12, 22-23, 29	**A**	**A**	**B**	**C**
High Normal: 1, 3, 11, 18-19, 21, 28	**A**	**B**	**C**	**C-D**
Low Normal: 5-7, 10, 13, 16-17 20, 25-27, 30	**B**	**C**	**D**	**D-E**
Below Normal: 4, 8, 15, 24, 31	**C**	**C-D**	**D-E**	**E**
Disturbed: 9, 14	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between 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 good (B) on March 1, excellent (A) on the 2nd, good (B) on the 3rd, fair-to-poor (C-D) on the 4th, fair (C) on the 5th, etc.**

11307 Clara Street, Silver Springs, MD 20902

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 kw PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

Short-Skip Propagation Chart
March & April 1995
Local Standard Time
At Path Midpoint

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	08-19 (0-1)	08-13 (1-0) 13-16 (1) 16-19 (1-0)
15	*Nil*	08-16 (0-1)	09-12 (1) 12-17 (1-2) 17-18 (0-1)	08-09 (0-1) 09-10 (1) 10-13 (1-2) 13-14 (2) 14-17 (2-3) 17-18 (1-2) 18-20 (0-1)
20	*Nil*	07-08 (0-1) 08-09 (0-2) 09-14 (0-3) 14-16 (0-2) 16-23 (0-1)	07-08 (1) 08-09 (2) 09-10 (3) 10-14 (3-4) 14-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-20 (1-2) 20-23 (1) 23-05 (0-1)	06-07 (0-1) 07-08 (1-2) 08-09 (2-3) 09-10 (3) 10-15 (4-3) 15-18 (4) 18-19 (3) 19-20 (2-3) 20-21 (1-2) 21-05 (1) 05-06 (0-2)
40	07-09 (0-1) 09-10 (0-2) 10-12 (2-3) 12-17 (3-4) 17-19 (2-3) 19-20 (1-2) 20-22 (0-1)	06-07 (0-2) 07-09 (1-4) 09-10 (2-4) 10-15 (4-3) 15-17 (4) 17-19 (3-4) 19-20 (2-4) 20-22 (1-2) 22-00 (0-2) 00-06 (0-1)	06-07 (1) 07-08 (4-2) 08-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-20 (4) 20-22 (2-4) 22-00 (2-3) 00-06 (1-2)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-21 (4-3) 21-22 (4) 22-00 (3-4) 00-02 (2-3) 02-06 (2)
80	07-08 (2-3) 08-11 (3-4) 11-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1) 06-07 (1-2)	07-08 (3-2) 08-11 (4-1) 11-16 (4-0) 16-18 (4-2) 18-20 (4-3) 20-22 (3-4) 22-00 (2-4) 00-06 (1-2) 06-07 (2)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-00 (4) 00-05 (2-3) 05-07 (2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-00 (4-3) 00-05 (3) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (0-1) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

ALASKA
Openings Given in GMT

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Eastern USA	*Nil*	22-00 (1)	22-00 (1) 00-02 (2) 02-04 (1)	06-13 (1) 07-12 (1)*
Central USA	*Nil*	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1) 00-03 (2) 03-05 (1)	07-09 (1) 09-12 (2) 12-14 (1) 07-12 (1)*
Western USA	*Nil*	20-22 (1) 22-00 (2) 00-03 (1)	19-22 (1) 22-00 (2) 00-02 (3) 02-04 (2) 04-06 (1)	06-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-15 (1) 08-10 (1)* 10-12 (2)* 12-14 (1)*

HAWAII
Openings Given in Hawaiian Standard Time

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Eastern USA	*Nil*	08-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	02-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-21 (1)	18-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Central USA	11-15 (1)	08-09 (1) 09-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	03-05 (1) 05-08 (2) 08-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-19 (1) 19-21 (2) 21-01 (3) 01-04 (2) 04-05 (1) 19-21 (1)* 21-01 (3)* 01-02 (2)* 02-03 (1)*
Western USA	11-15 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	02-04 (1) 04-06 (2) 06-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-21 (2) 21-23 (1)	17-19 (1) 19-20 (2) 20-23 (4) 23-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

*Indicates best time to listen for 80 meter openings. Openings on 160 meters are also liely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances use the preceding Short-Skip Chart.

#See explanation in "How To Use Short-Skip Charts" in this column.

DX Contest are expected to be considerably lower than those recorded during previous contest periods over the past decade—or longer!

New Propagation Book Coming

Robert B. Rose, K6GKU, has joined Dr. Theodore Cohen, N4XX, and myself in authoring a new book on HF propagation. The book will replace the now out of print *Shortwave Propagation Handbook*.

While the title for the new book had not yet been decided upon at the time of this writing, the book will be considerably more than a handbook. While much of the data appearing in the original handbook will be included in the new book in updated and expanded form, the book will be approximately twice the size of the original handbook. It will also contain considerably more tutorial data about sunspots, sunspot cycles, radio storms, ionospheric parameters, etc., as well as an entire chapter devoted to computerized HF propagation programs.

The book is now in preparation and should be out sometime in late spring. Watch for notices in upcoming issues of *CQ*.

March Conditions

Spring and fall are called the *equinoctial* seasons. These are the times when the sun is most nearly overhead at the equator,making night and day of almost equal length in all parts of the world. On March 21 and September 22 the sun is *directly* over the equator, and the length of night and day is exactly equal.

The vernal, or spring, equinoctial period in the northern hemisphere has a noticeable influence on HF propagation conditions for a period of several weeks lasting from late February through late April. The effects of the autumnal, or fall, equinoctial period are felt from early September through late October.

During the equinoctial period it is always spring in one hemisphere and fall in the other. This tends to create an ionosphere of more similar characteristics throughout the world than is possible during other times when it is summer in one hemisphere and winter in the other, and there are extreme differences in the ionosphere. It is this "ionospheric equalization" which takes place during the equinoctial periods that is responsible for optimum DX conditions.

An improvement in DX propagation conditions is usually most noticeable on the long circuits between the northern and southern hemispheres—for example, from the USA to Australia, South America, southern Africa, southern Asia, Antarctica, etc. Look for these openings during this coming month on the HF bands. The best times to look for these openings are shortly before sunrise and again shortly after local sunset on the 160, 80, 40, and 30 meter bands, and for an hour or two after sunrise and again for an hour or two before sunset on 17 and 20 meters. On 15, 12, and 10 meters check for inter-hemispheric openings towards the southeast and south from a few hours before noon through the early afternoon hours. Check later in the afternoon for openings towards the south and southwest and towards the west.

Twenty meters is expected to be the best band for DX propagation from sunrise to sunset during March, followed by 15 and 17 meters. A few 10 and 12 meter DX openings are also forecast for March, mainly to southern and tropical areas during the daylight hours.

During the period between sunset and sunrise 30 and 40 meters are expected to be the optimum bands for DX propagation, with good openings forecast to many areas of the world. Some fairly good DX openings are also predicted for 80 meters during the hours of darkness, and some 160 meter DX openings may also be possible during this period. When propagation conditions are High Normal or better, the 20 meter band may also remain open to some areas of the world during the hours of darkness.

For specific times of DX openings for each amateur band 10 through 160 meters during March, refer to the DX Propagation Charts, which appeared in last month's column. This month's column contains Short-Skip Propagation Charts for March and April, and charts centered on Alaska and Hawaii. The Short-Skip Charts contain propagation forecasts for distances between approximately 50 and 2300 miles.

For day-to-day changes in HF propagation conditions expected in March, see the Last Minute Forecast, which appears at the beginning of this column.

VHF Ionospheric Openings

The possibilities for ionospheric openings on the VHF bands usually improve during March and the spring months.

A seasonal increase in short-skip openings due to sporadic-*E* propagation generally takes place during March, and an occasional 6 meter openings may be possible by this mode during the month. Sporadic-E openings most often occur during the daylight hours over distances between approximately 1000 and 1400 miles.

Auroral activity often peaks during March, especially during those periods when HF conditions are Below Normal or Disturbed.

Not much meteor activity is expected during March, but some might be possible for very brief periods during minor showers that may occur on March 14–15 and 24–25.

73, George, WA3ASK

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TRANSCEIVERS: Kenwood TS430S $600, TS520S $375, TS830S $600. DRAKE TR4C/AC4 $395. K1BW, 413-538-7861.

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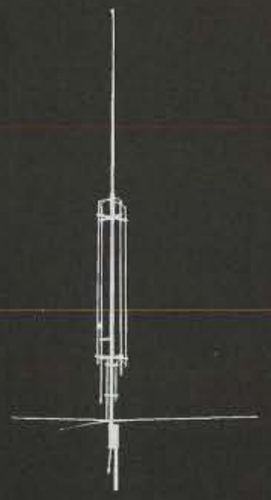
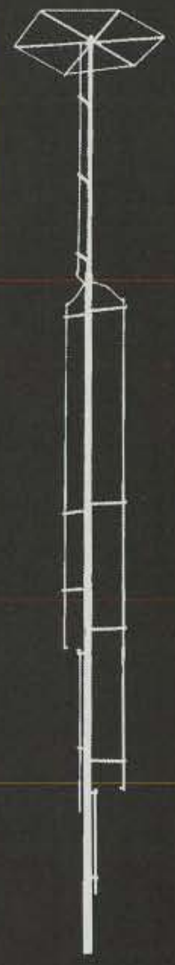
We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX

Challenger DX



Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

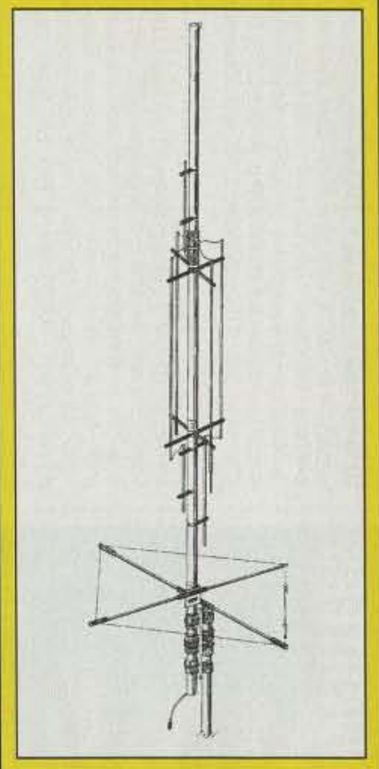
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

New Release: TITAN DX



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX (Just Released)			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$289
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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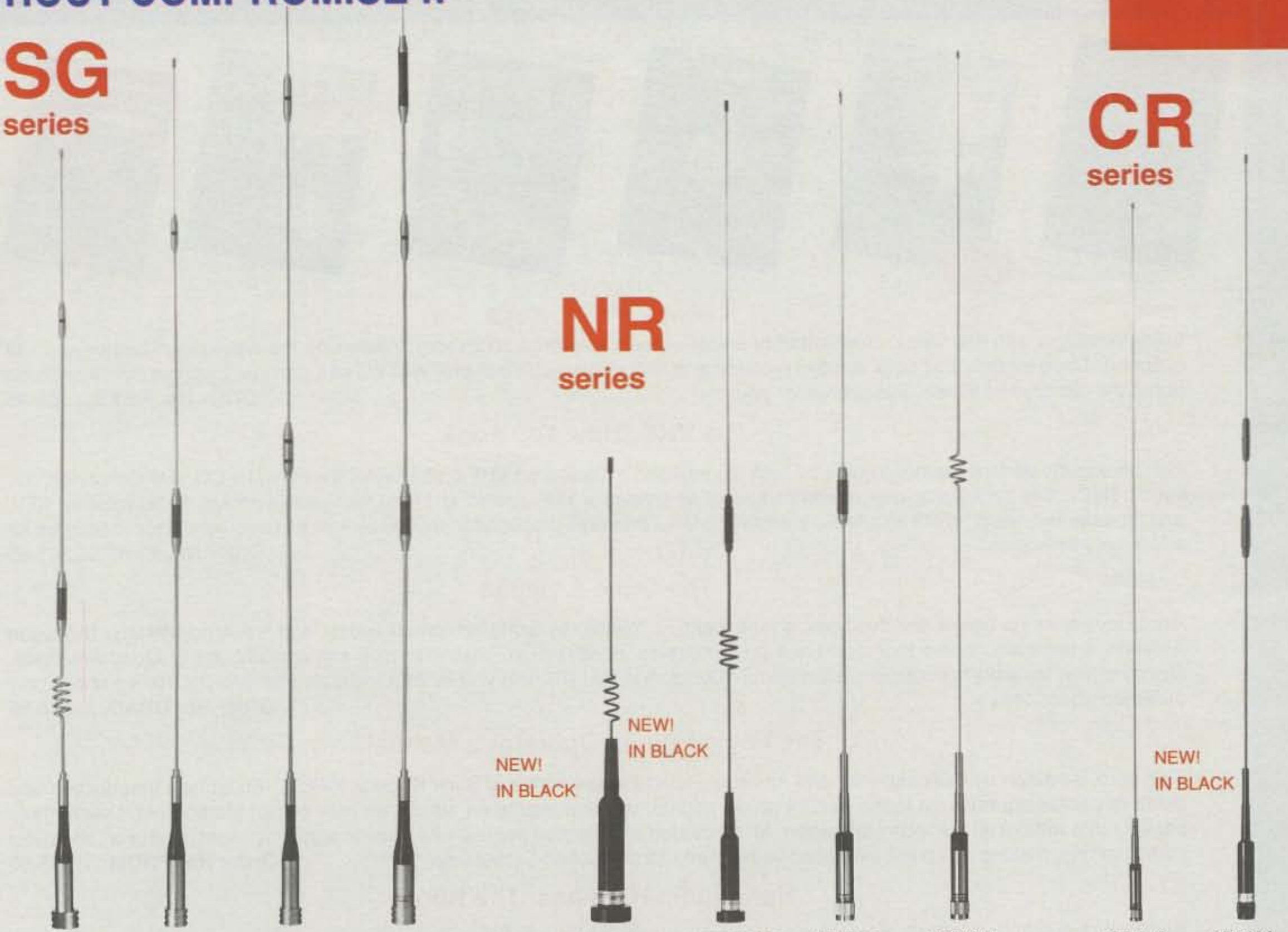

SG7200NMO SG7500 SG2000 SG7900 NR72BNMO NR73BNMO NR770R NR770H CR214S CR320A

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
NR-72BNMO	2m/70cm	2.15	100	NMO	13.8	1/4 λ ,1/2 λ
NR-73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2 λ ,2-5/8 λ
NR-770SA	2m/70cm	2.15/2.15	100	UHF	16.9	1/4 λ ,1/2 λ
NR-770HA	2m/70cm	3.0/5.5	200	UHF	40.2	1/2 λ ,2-5/8 λ
NR-770HNMO	2m/70cm	3.0/5.5	200	NMO	38.2	1/2 λ ,2-5/8 λ
NR-770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2 λ ,2-5/8 λ
NR-790A	2m/70cm	4.5/7.2	120	UHF	57.5	6/8 λ ,3-5/8 λ
SG-7000	2m/70cm	2.15/3.8	100	UHF	18.5	1/4 λ ,6/8 λ
SG-7200NMO	2m/70cm	3.2/5.7	150	NMO	36.6	1/2 λ ,2-5/8 λ
SG-7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2 λ ,2-5/8 λ

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
SG-7900	2m/70cm	5.0/7.6	150	UHF	62.2	7/8 λ ,3-5/8 λ
SG-2000	2m	5.2	150	UHF	62.6	7/8 λ
NR-140A	1-1/4m	3.8	100	UHF	36.2	5/8 λ
NR-124	23cm	8.4	100	N	25	4-5/8 λ
CR-214S	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2 λ ,5/8 λ
CR-224A	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8 λ ,2-5/8 λ
CR-320A	2m/1-1/4m/ 70cm	2.15/3.8/5.5	200/ 200/100	UHF	37.4	1/4 λ ,1/2 λ , 2-5/8 λ
NR-2000NA	2m/70cm/ 23cm	3.15/6.3/9.7	100	N	39	1/2 λ ,2-5/8 λ , 5-5/8 λ

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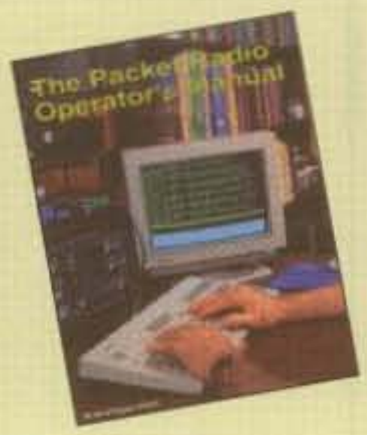

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Hams love antenna books and this book is no exception. Written by world renowned author Bob Haviland, W4MB, The Quad Antenna is the authoritative technical book on the design, construction, characteristics and applications of Quad Antennas. Discover how to easily build a quad antenna for your station that will help you fill your logbook with rare DX that you have only dreamed about before. **Order No. QUAD..... $15.95**

The Packet Radio Operator's Manual

This book is written by CQ columnist and Amateur Radio Packet authority Buck Rogers, K4ABT. An all new introduction and guide to packet operation, it is the perfect single source, whether you're an advanced user or just starting out. Learn about packet radio without all the technical jargon. Also included are detailed hookups for dozens of radio/packet controller/ computer combinations, making this book the definitive resource for the active packet user. **Order No. PROM..... $15.95**

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Written by Peter O'Dell, WB2D, this is a book about ham radio that every beginner can enjoy! If you want to get in on the fun and excitement of Amateur Radio, Ham Radio Horizons is the perfect way to get started. HRH is full of tips from expert hams in: DXing, Contesting, Serving the Public, Ham Radio in Space, Experimenting, Digital Communications — you name it! This exciting book is an excellent gift to a prospective ham or for use in your club's licensing classes and library. **Order No. BHOR..... $12.95**

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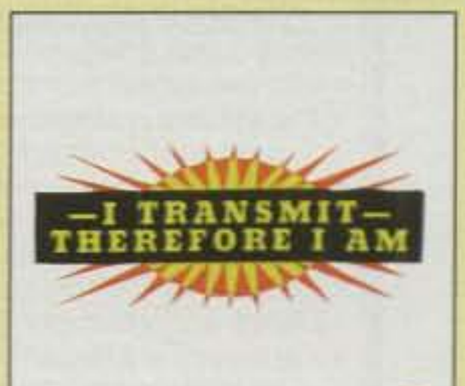

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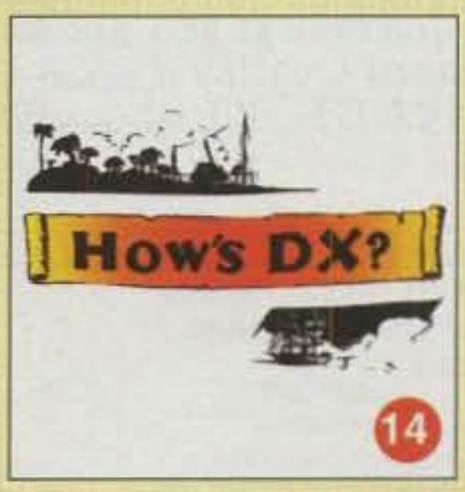

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WANTED: ICOM IC-SP2 Speaker and C-30/ARC-5, J-28/ARC-5 control box. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

FOR SALE: Alinco model 160 two meter HT for sale. Comes with three batteries and manual. Price $150, no personal checks. Also have the Ten-Tec Paragon II model 586 HF Transceiver for sale. Paid over $2600 for this brand new in March of last year. Can't use where I am, so want to sell it; price $1500 firm, as with above 2 meter rig. For fast response send FAX to 1-904-778-4638.

NEEDED: Assembly manual and operating manual for the Heathkit Oscilloscope Model IOD-4540. Will pay for copies and mailing costs. Ken, KF8BC, 7716 Oceola Lane, West Chester, OH 45069 (513-779-4148).

WANTED: Kenwood TR7200A parts and XTALs for this fine old 2 meter mobile rig. Also need technical or user manual. Will pay shipping/copy costs. Call Jim, AA8RF @ 313-426-7345.

WANTED: Old Broadcast & Shure Microphones. Also one of the following linears: AL-80A, AL-80B, SB-1000, or SB200. Also want an old Crystal Set. What do you have? James Lowe, W6JVK, 1521 Scenic Drive, Pasadena, CA 91103 (818-793-7374).

TRADE EVEN up my new 4-400-C, socket, chimney, value $200 ,4 UR mint NC-270 rcvr. Send photo to W4CJL, 202 Baker Drive, Florence, AL 35630.

WANTED: Hallicrafter HA-5 VFO, Hallicrafter HA-1 Keyer. Calll 407-546-3847.

SELL: SB 220 $550, SB200 $475, Ten-Tec Corsair II $750, Omni D-$650, both with VFOs and P.S. Kenwood TS520 $200. Other equipment available. Phone 503-769-1836.

WANTED: Collins Radio items. Military HF XMTR for use on USS REQUIN memorial. Brian Roberts, K9VKY, 3068 Evergreen, Pittsburgh, PA 15237 (412-931-4646).

FOR SALE: Crystals for Drake R4C and T4XC. SASE for list. $5 each. Ken, KF8BC, 7716 Oceola Lane, West Chester, OH 45069 (513-779-4148).

MINT (RARE) ICOM MT-100 100 watt 160–10 manual tuner (built by Nye Viking). Same case as IC-PS15 power supply. $145. New Antenna Specialists ASP-143 2M thru-glass "cellular," $35. F.O.B. K1LEC, 1824 Teabrook Court, Raleigh, NC 27610-4554 (919-231-1626).

222 MHZ TRANSVERTER WANTED with 28 MHz IF. I want to put Miss. on 222 MHz MS this year and need a transverter. Please call WB5KYK, Larry, at 601-426-2403.

KENWOOD TS-900 HF Transceiver with matching power supply, speaker, cables, service manuals, in the box, $375. BK 1541 O'Scope, $650. Magellen Handheld GPS $500. Phone Doug, N7JHS, at 208-524-2110.

NCL-2000 $650, UT-2000 $200. Palomar QRP 100 watt amp $200, Much Drake & Heath gear, parts, manuals. U-ship. List $1 & SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

FOR SALE: 1993 CALLBOOKS—U.S. $12, Foreign $12; or $20 for both. Include SASE in case already sold. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

ASTATIC D-104 freq. counter, 2M cavity, roller inductors, 50 ohm VHF attenuator, Simpson "A" 2M XCVR, ham parts, more. SASE lists. Bill Tucker, W4FXE, 1965 A-1-A, Apt. 15-G, Hallandale, FL 33009 (305-456-1349).

WANTED: GOES setup: antenna, LNA, decoder, and software. T.N. Colbert, 13609 Colony, Burton, OH 44021.

HELP: Need a (schematic) electrical wiring diagram and/or a 110V 60 Hz AC power cord. I have a Ratheon military ham radio Model 34 Sideband Engineering SN 136 522. Bob Mazon, 30 Josh Rd., Elka Park, NY 12427.

WANTED: Swan 250 Manual/copy. Call WB7DEJ 504-641-2779, or 1434 Ridgecrest Dr., Slidell, LA 70458.

HV POWER SUPPLY PLATE TRANSFORMER. 3KV-1A. Hipersil, taps $179. Electrolytic Capacitors, 2100MFD–400VDC, new $8. Filament transformer, 7.5V to 75A, taps $109. Eimac SK-300 Power Tube socket $325. Cardwell 2100PF-2.5KV, Variable capacitor, New $75. Alan, K6GA, 8956 Swallow Ave., Fountain Valley, CA 92708 (714-964-3912).

WANT: Sadelco, JFD, Channel Master UHF-VHF Signal Strength Meter. T.N. Colbert, 13609 Colony, Burton, OH 44021.

Advertiser's Index

(continued on page 155)

Announcements *(from page 6)*

Trinity Presbyterian Church Hall, Willowdale, Ontario, Canada. For more information, or to register, contact John Grimley, VE3RTI, 416-444-4771.

Mar. 25, **Lincoln Trail ARC Hamfest**, Pritchard Community Center, Elizabethtown, Kentucky. Contact: Whitey Hensley, P.O. Box 342, Vine Grove, KY 40175 (502-877-2234).

Mar. 25 & 26, **Greater Baltimore Hamboree and Computerfest**, Timonium Fairgrounds, Timonium, Maryland. Call 410-HAM-FEST, or 1-800-HAM-FEST, or write to G.B.H. & C., P.O. Box 95, Timonium, MD 21094. (Exams.)

Mar. 26, **Fifth Annual Down East Hamfest**, Kinston, North Carolina. For information, write to Down East Hamfest Association, Inc., P.O. Box 1778, Kinston, NC 28503.

Mar. 26, **Two Rivers ARC 23rd Annual Hamfest/ Computer Show**, Pittsburgh Expo-mart (Eastwing), Monroeville, Pennsylvania. For information, send SASE to Two Rivers ARC, P.O. Box 225, Greenock, PA 15047-0225 or phone/FAX 412-754-0562.

Mar. 26, **LAMARSFEST '95, Lake County Fairgrounds**, Grayslake, Illinois. For information or reservations write LAMARSFEST '95, 650 Green Bay Road, Lake Bluff, IL 60044; or call Frank Avellone, W9GLO at 708-234-4124 before 10:00 PM. (Exams.)

Mar. 31–Apr. 1, **Little Rock Hamfest and ARRL State Convention**, The Little Rock Expo Center (formerly the outlet mall), Little Rock, Arkansas. For information contact: Jim Blackmon, KB5IFV, 1008 Pine Street, Arkadelphia, AR 71923-4919; phones: 501-246-6734 (08:00 to 17:00 Monday–Friday); 501-246-7833 (24-hour recorder); 501-246-6736 (24-hour FAX). (Handicapped accessible.)

Apr. 1, **Chestnut Ridge ARC Annual Flea Market**, Education Building, Saddle River Reformed Church, Upper Saddle River, New Jersey. Contact Jack Meagher, W2EHD, at 201-768-8360.

Apr. 21–23, **International DX Convention**, Holiday Inn, Visalia, California. For information, send SASE to International DX Convention, Attn: Ted Davis, W6BJH, P.O. Box 494243, Redding, CA 96049.

Advertiser's Index *(cont'd)*

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New, Compact HF Transceiver With 100kHz-30MHz Receive

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FT-2500M
Heavy Duty, 2 Meter Mobile 50 Watts, Large LCD Display

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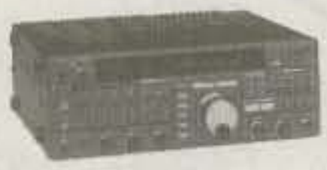
FT-5100
Compact 2M/70cm Mobile. Built-In Antenna Duplexer

YAESU

NEW

FT-51R
Dualband Handheld Easy-To-Use Scrolling Instruction Menu-Cloning Memories

FT-990
100 Watt HF Transceiver w/General Cov. Receiver



FT-736R
Multi-Mode VHF/UHF Full Duplex Base, Optional Modules For Extra Bands

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2 Meter Mobile. Compact Size With 3 Power Levels

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FT-5200
Dual Band Mobile With Snap-Off Front Panel

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FT-530
2M/440MHz Handheld With Multiple Power Levels, 82 Mem. And Aircraft Receive

FT-900
New Compact HF Transceiver

- Snap-Off Front Remote Control Panel
- 100 Watts
- Built-In Antenna Tuner

FT-290MKII
True Field Operation For Fun Or Emergency. All Mode, 2 Meter, 25 Watts

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LOWEST PRICES

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50kHz-30MHz Receiver With 50 Memories and New Broadcast Band Mode

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FT-11R
2 Meter, FM Handheld. World's Smallest Size HT With Full Sized Keyboard

STANDARD

C558A
VHF/UHF FM HT Super Compact Size, Cross-Band Operation, Twin Band Scanning, Receive AM

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C188A
Ultra Thin 2 Meter FM HT, 200 Memory Channels, Keyboard Under A Slide-Cover Plus Wakeup Feature

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A3S	$329.95
A4S	$389.95
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R7	$343.00
13B2	$ 94.95
17B2	$159.95
124WB	$ 49.95
ARX2B	$ 49.95
AR270	$ 59.95
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ARX270	$184.95
A148-3	$ 34.95
A148-10	$ 57.95
A449-11	$ 59.95
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SL11A	$ 69
RS12A	$ 72
RS20A	$ 89
RS35A	$143
RS50A	$215
RS12M	$ 85
RS20M	$109
RS35M	$161
RS50M	$233
RS70M	$265
VS20M	$127
VS35M	$177
VS50M	$244

MFJ

MFJ-989C

MFJ-1270C

MFJ-493

1214PC	$135	411	$ 69
1270C	$109	422B	$119
1276	$139	452	$116
1278B	$257	462	$129
1289	$ 55	490	$147
1701	$ 32	492	$ 88
1702B	$ 19	493	$119
1704	$ 54	498	$159
1763	$ 37	784	$198
1768	$ 45	815B	$ 59
1786	$249	817	$ 69
1796	$165	8621	$108
1798	$229	9020	$144
209	$ 94	9420	$179
249	$165	934	$144
259	$188	949E	$119
283, 284, 285, 286	$ 22	962C	$195
346	$169	986	$242
407	$ 63	989C	$292

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2 M, 440MHz Mobile Packet Ready

9600 Baud Packet Ready From The Box. 50W On 2M, 40W On 440MHz

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FT-2500M/FT-7400H 2m/70cm Mobiles

DX-CARIBE CRUISE '95
for details call or write
Yaesu USA Today!
1995

Specifications

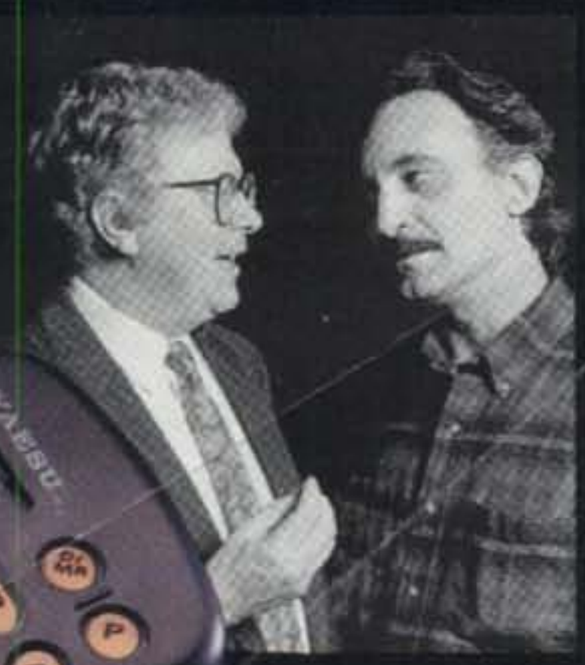
- **Frequency Coverage:**
  FT-2500M
  RX: 140-174 MHz
  TX: 144-148 MHz
  FT-7400H
  RX/TX: 430-450 MHz
- Rugged Military Spec Design
- Advanced Track Tuning (ATT)
- Selectable Alpha-Numeric Display
- Largest Display Available
- Power Output:
  FT-2500M 50/25/5 Watts
  FT-7400H 35/20/5 Watts
- Flip Up Front Control Panel Hides Seldom Used Buttons
- Backlit DTMF Mic
- 31 Memory Channels
- CTCSS Encode Built-in
- Automatic Power Off (APO)*
- Time-Out Timer (TOT)*
- Manual* or Automatic Backlighting Adjustment
- **Accessories:**

FTS-17A	CTCSS Decode Unit
FRC-6	DTMF Paging Unit
SP-4	External Speaker
FP-800	Power Supply

*FT-2500M

"The first mobile with a Military spec rating. This radio can really take it!"

"New Omni-Glow display and backlit DTMF Mic, too. Both Yaesu 'firsts'!"



"3-stage advanced track tuning really reduces intermod. Its great!"

"Yaesu did it again."

US MILITARY APPROVED MIL-SPEC 810

Performance beyond the call of duty.

Just when you thought you had the most formidable mobile built, we made the FT-2500M – the next evolution of powerful, rugged mobile radios.

The FT-2500M takes the durable quality, features, and performance of the popular FT-2400H and goes one better! A new easy-to-operate front panel design with rubber coated knobs, new, large state of the art Omni-Glow display to provide enhanced viewing at all angles and light levels, and Yaesu's exclusive 3-Stage Advance Track Tuning feature that reduces intermodulation and front-end overload puts the FT-2500M as close as you can get to commercial grade performance in amateur frequencies.

The FT-250M is the first mobile with a Military spec rating and the most often used controls on the front and those you "set and forget" neatly hidden. It's the first mobile radio with a backlit DTMF mic, too. With its extra large heat sink and one-piece die-cast chassis, the tough FT-2500M is unlike any other mobile in its class.

Test the mettle of your mobile. If it doesn't measure up to the endurance standards of the U.S. Military, get the FT-2500M. For flawless performance in rough and rugged situations, the FT-2500M is really formidable – just what you'd expect from Yaesu. See it at your dealer today!

YAESU

Performance without compromise.℠

FT-2200/7200

Just 5.5"W x 1.6"H x 6.5"D, the FT-2200/7200 radios are designed to fit into today's more compact cars with ease.

SPECIFICATIONS • Frequency Coverage: FT-2200 RX: 110-180 MHz, TX: 144-148 MHz. FT-7200 RX/TX: 430-450 MHz. • Wide Receiver Coverage: 110-180 MHz • AM "Aircraft" Receive: 110-139 MHz • Built-in DTMF Paging/Coded Squelch • Selectable Channel Only Display • 10 Memory DTMF Auto Dialer • Backlit DTMF Mic • Power Output 50/25/5 Watts (FT-7200 35 Watts) • 50 Memory Channels • Remote Operation w/ Optional MW-2 • CTCSS Encode Built-in • Optional Digital Voice Storage System. Accessories: See your authorized Yaesu dealer.

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

NEW!

FT-11R/41R
2m/70cm Handhelds

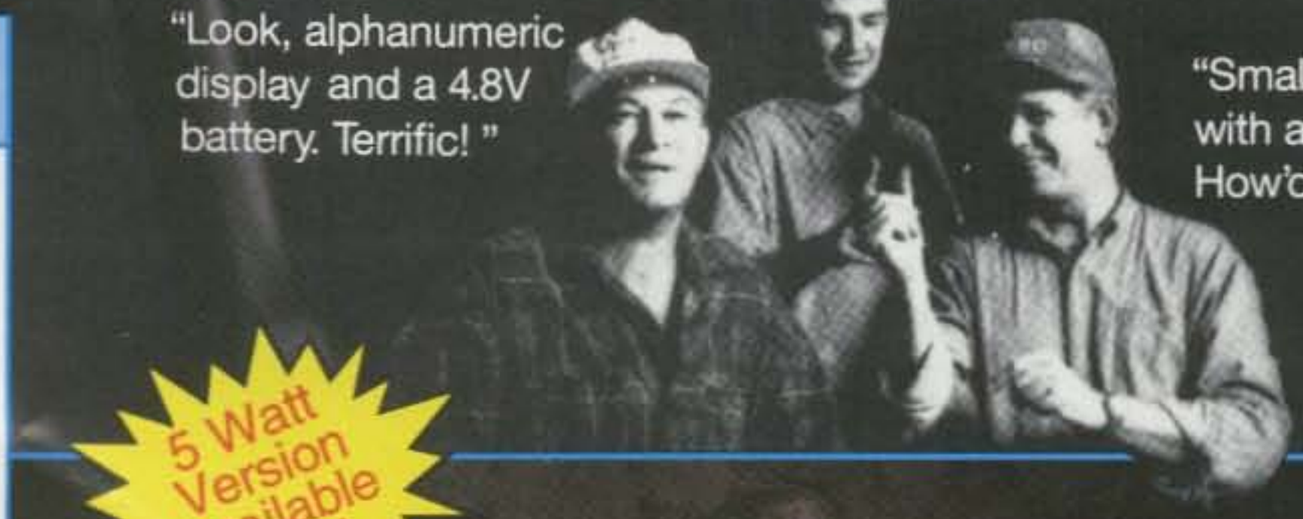
- **Frequency Coverage:**
  Wide Receiver Coverage:
  FT-11: 110-180 MHz RX,
  144-148 MHz TX
  FT-41: 430-450 MHz RX/TX
- Selectable Alpha Numeric Display
- New Compact Battery Design
  4.8V produces 1.5 Watts
  9.6V produces Full 5 Watts*
- 150 Memory Channels
  (75 when Alpha Numeric)
- AM "Aircraft" Receive
  (110-136 MHz)
- Small Compact Size w/ Easy Operation (measures only:
  4"H x 2¼"W x 1"D)
- Rx/Tx Battery Savers
- High-efficiency MOS FET Power Module
- Large Back-Lit Keypad and Display
- Up/Down Volume/Squelch Controls
- Built-in DTMF Paging/Coded Squelch
- Automatic Power Off (APO)
- **Accessories:**
  FNB-31 4.8V, 600 mAh Battery
  FNB-33 4.8V, 1200 mAh Battery
  FNB-38 9.6V, 600 mAh Battery
  FBA-14 6 AA Size Battery Case
  FTS-26 CTCSS Decode Unit
  NC-50 Dual Slot 1-Hour Desk Charger
  CA-10 Charge Adapter (required w/ NC-50)

*FT-11 Only.
FT-41, 3.5 Watts

"Look, alphanumeric display and a 4.8V battery. Terrific!"

"Small and thin – with a full sized keypad! How'd they do that?"

"Yaesu did it again!"



5 Watt Version Available Now!

NEW Alphanumeric Display
First time for Yaesu HT Full function LCD combines letters and numbers.

NEW Up/Down Thumb Control
with Volume and Squelch Bar Graph. No other radio has this. Back lit, too!

NEW Compact Battery Design
4.8V gets you 1.5 Watts. A first for amateur radio.

DX-CARIBE CRUISE '95
for details call or write Yaesu USA Today!
1995

Get a grip on this!

World's smallest size HT with a full sized keypad
Measures only: 4"H x 2¼"W x 1"D

"Small" is relative, isn't it? It could mean size – which in this case it does. And, it could mean "reduced", which it doesn't! Nothing missing from the hot new FT-11R HT from Yaesu except bulk! You're going to wonder just how all the features of this full-function radio fit in. Until you remember Yaesu pioneered 2-way radio micro technology.

To see what this really means to you, check out all the new features. Like the alphanumeric display. This Yaesu HT first, lets you tag your favorite frequency by name, call sign or number. Or, the new "voltage stingy" battery. It's an industry first for amateur radio. Smaller and compact, the 4.8V battery gives you 1.5 watts on TX. And, if that's not enough, there's an optional drop in, dash mount battery charger.

You see it's not a small time performer. Just small sized. The FT-11R. Another small example of Yaesu superiority. See your dealer today!

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Performance without compromise.℠

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

"Built-in VOX? Right!"

"Dual Decode. Now that's a first!"

"Wow, a real Battery Voltage Readout!"

"Yaesu did it again!"

DX-CARIBE CRUISE '95
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FEATURES	Yaesu FT-530	Kenwood TH-[illegible]	Alinco [illegible]	Icom [illegible]AT
Memory Channels	82			
Slide-out Lithium Battery	YES			
Dual CTCSS Decoder	YES			
Battery Voltage Readout	YES			
Automatic CTCSS Tone Search	YES	NO		
Transmit Battery Saver (Repeater & Simplex Operation)	YES	NO	NO	NO
Built-In Vox	YES	NO	NO	NO
One Touch Reverse Button	YES	NO	NO	NO
Dual In-Band Receive (V+V, U+U)	YES	YES	NO	YES
Programmable External Speaker Audio	YES	NO	NO	YES
Optional Digital Display Mic with "S" Meter	YES	NO	NO	NO
AM Aircraft Receive	YES	YES	YES	YES

$50.OFF
SEE YOUR DEALER FOR DETAILS
LIMITED TIME OFFER.

The Best vs. "the rest".

FT-530
Dual Band Handheld

- **Frequency Coverage:**
  2-Meter 130-174 MHz RX
  144-148 MHz TX
  70 cm 430-450 MHz RX/TX
- 4 TX Power levels:
  w/FNB-25: 2.0, 1.5, 1.0, 0.5W
  w/FNB-27: 5.0, 3.0, 1.5, 0.5W
- DTMF Paging and Coded Squelch
- AOT – Auto On-Timer with built-in clock and alarm functions
- IBS – Intelligent Band Select (provides automatic TX band select on scan stop)
- Backlit keypad and display with time delay
- Built-in cross-band repeat function
- APO – Automatic Power Off
- 5 Watts output w/ FNB-27 battery or 12 VDC
- 2 VFO's for each band
- **Accessories:**
  NC-42 1-Hour Desk Charger
  FNB-25 600 mAh Battery (2 watt)
  FNB-26 1000 mAh Battery (2 watt)
  FNB-27 600 mAh Battery (5 watt)
  FBA-12 6 AA Cell Holder
  CSC-56 Vinyl Case w/ FNB-25
  CSC-58 Vinyl Case w/ FNB-26/27
  E-DC-5B 12 VDC Adaptor
  YH-2 Headset for VOX
  MH-12A2B Speaker Mic
  MH-18A2B Lapel Speaker Mic
  MH-19A2B Mini Earpiece Mic
  MH-29A2B LCD Display Mic with Remote Functions
  MMB-54 Mobile Mounting Hanger

No other dual band handheld beats the FT-530 on features for performance and ease of use. With the largest backlit keypad available, 82 memories, exclusive Dual CTCSS Decode and AM Aircraft Receive, the FT-530 is simply the best value there is.

Compare for yourself, then forget "the rest." See your dealer for the best dual band handheld you can buy. The FT-530.

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ICOM'S REMOVABLE REMOTE CONTROL PANEL IS A FIRST! –

ICOM's superior technology and design have once again produced a first in the amateur world with the IC-Z1A – a dual-band handheld (2M/440 MHz) with a control panel that detaches from the body of the radio. Better than a speaker-mic, it provides a full functional display of all operating conditions (including bands and frequencies) and complete control of volume, operating modes, tuning, scan, band selection*, ON/OFF, and PTT. The remote control panel is a standard feature that comes with an extension cable and lapel clip, and is backlit for night time operation. Clip the main body to your belt or put it in a pocket or purse. For mobile operation, it can be easily positioned where it won't interfere with driving.

It's more than just a speaker mic!

ALPHANUMERIC MEMORY DISPLAY – Up to 6 characters provide quick and easy memory channel identification. A total of 104 memories (46 regular and 6 scan edge per band) may be displayed by memory channel and either the frequency or alpha name (does not reduce the total number of memories available). An EEPROM prevents losing memory information if the battery runs down.

ALPHANUMERIC MESSAGE AND PAGING – Use the alpha display to transmit and receive up to 6 characters (using DTMF tones) as a simple message pager, acknowledgments, etc....

EASY TO USE BACKLIT KEYPAD – The keys are large, well-spaced and backlit. Keypad labels are easy to understand, eliminating the need for an internal "guide" function.

CALL ICOM'S FREE BROCHURE HOTLINE: (206) 450-6088

NEW! dual-band IC-Z1A

the first removable
REMOTE CONTROL-PANEL
handheld

• FEATURES •

- Independent tuning knobs
- Power MOS FET PA module
- Multiple power-saver functions
- Impressive audio output
- 700 mAh nicad battery
- Battery voltage readout
- *UHF/UHF, VHF/VHF, or VHF/UHF main/sub band operation
- Simultaneous receive on both bands
- Slim design. Weighs only 13.4 oz
- Operation capable with 4.5V to 16V external power supply
- CTCSS encode standard (tone decode and tone scan with optional UT-93)
- New HS-85 optional headset
- Auto repeater offset and memory
- Selectable DTMF auto dialing speed
- Adjustable power output (3 levels)
- Compatible with the BC-79A drop-in charger (AD-51 required)
- MARS/CAP modifiable

All features, including the displayed alphanumerics, may also be operated in the single unit configuration

This device has not yet been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.

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