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CQ Amateur Radio

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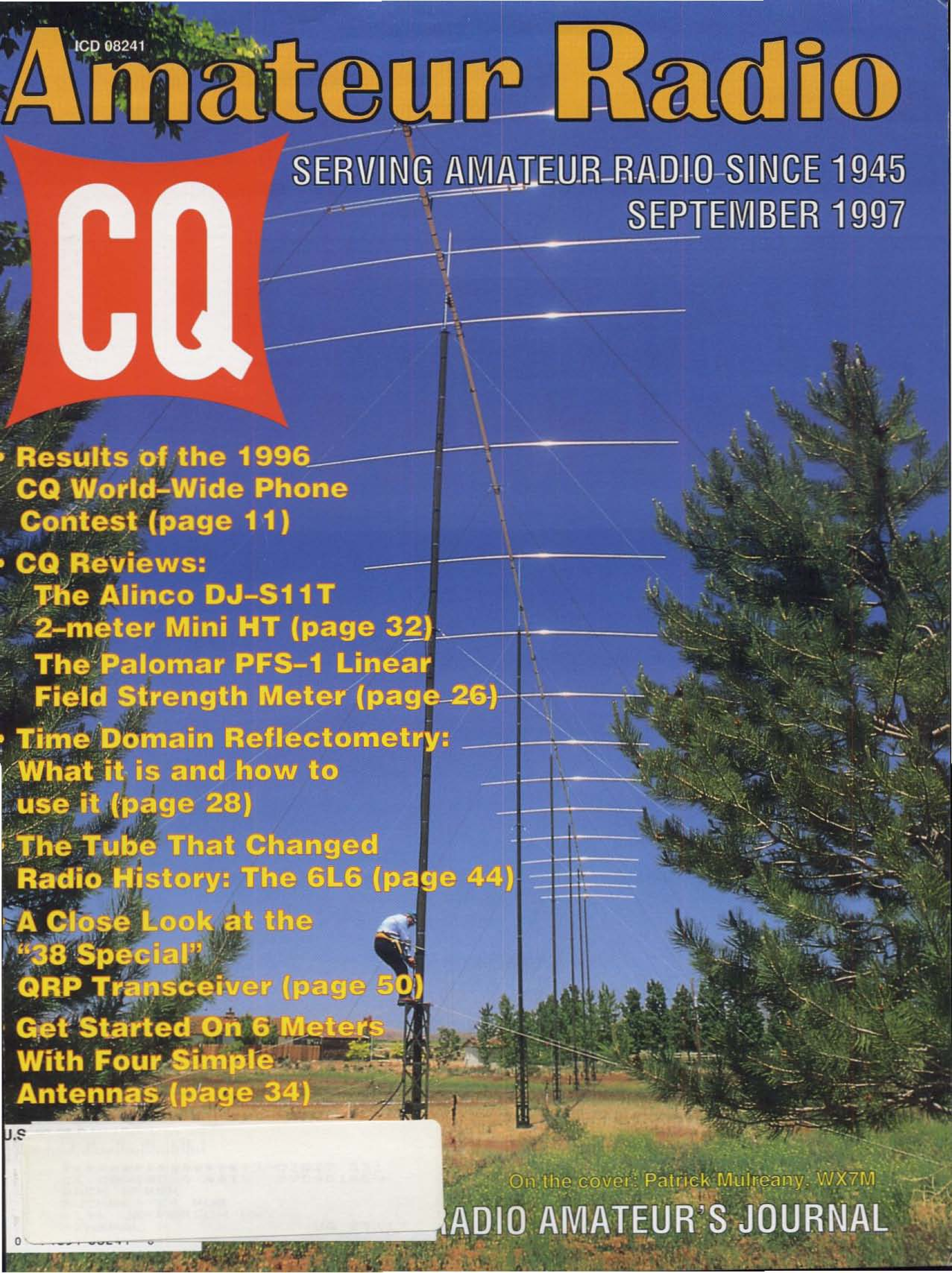


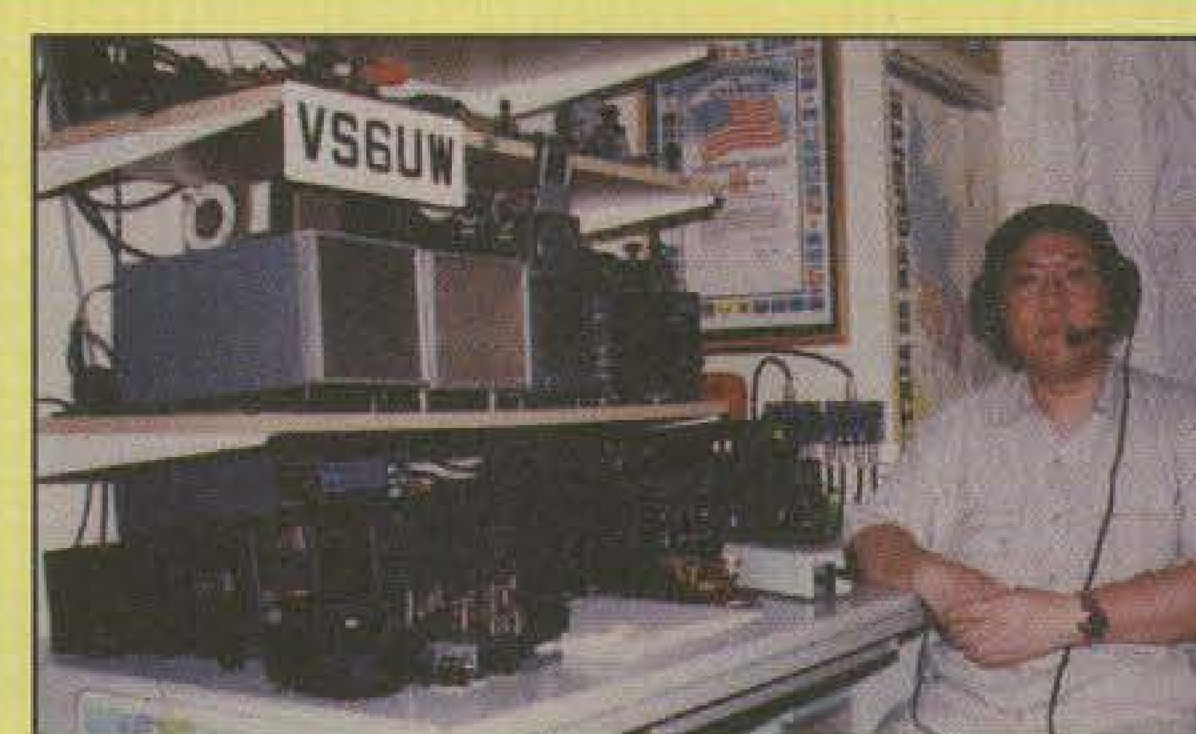
- Results of the 1996 CQ World-Wide Phone Contest (page 11)
- CQ Reviews:
  The Alinco DJ-S11T 2-meter Mini HT (page 32)
  The Palomar PFS-1 Linear Field Strength Meter (page 26)
- Time Domain Reflectometry: What it is and how to use it (page 28)
- The Tube That Changed Radio History: The 6L6 (page 44)
- A Close Look at the "38 Special" QRP Transceiver (page 50)
- Get Started On 6 Meters With Four Simple Antennas (page 34)

On the cover: Patrick Mulreany, WX7M

RADIO AMATEUR'S JOURNAL

CQ Amateur Radio
SEPTEMBER 1997 VOL. 53, NO. 9

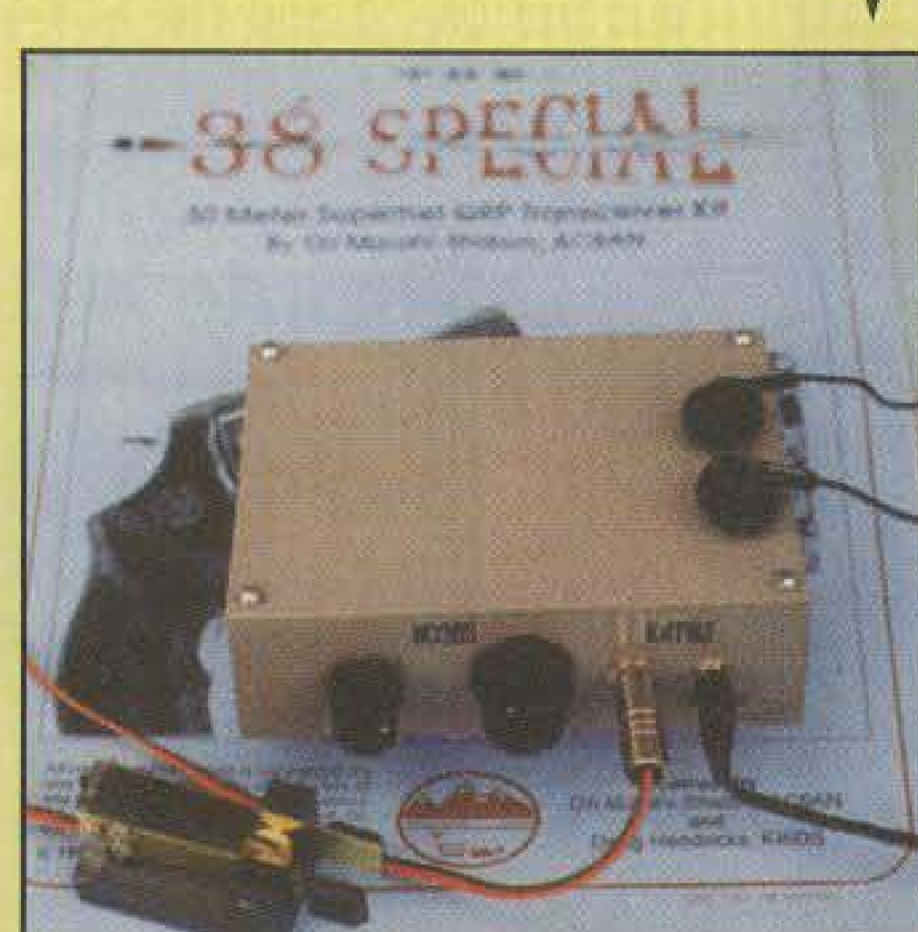
FEATURES



page 84

page 11 ←

page 50 ↓



DEPARTMENTS

ZERO BIAS

AN EDITORIAL

A shade over 50 years ago, Herb Becker, W6QD, then *CQ*'s DX Editor, mused over resurrecting the 1939 DX Marathon, which had been sponsored by *CQ*'s predecessor, *Radio* magazine. Herb's idea, fostered by avid readers and DXers, germinated and evolved into the amateur radio world's biggest operating event, the CQ World-Wide DX Contest. Therefore, in a sense, tradition, history, and purpose have brought us to the 50th anniversary of that idea and announcement.

CQ's 1948 DX Marathon was just that—a marathon which was to last a whole year, from January 1st through December 31st 1948, with continual updated listings every month in the pages of *CQ*. These days that would be a logistical nightmare. I guess the "I hate contests" curmudgeons of that day railed at Herb for supporting the idea that amateurs could have fun, work DX, and be competitive all at the same time. Maybe it was a simpler age and time, and amateurs were caught up in the spirit of working DX and seeing how well they could do compared to the next guy. If anything, the rules were extremely simple and basic. It's almost as if everyone was on the honor system. Today we've evolved to two pages of small type to try to explain, categorize, and codify what you can and cannot do in a 24 hour period. Probably as 1948 progressed and the marathon went on, there had to be a few amateurs out there who saw the "opportunity" to be creative and individually interpretive with regard to the rules. As a result, as the contest evolved so did the rules.

In reality, though, the DX Marathon never really gained momentum, although its intentions were noble. However, it was *CQ*'s first operating event and held the promise of being able to work DX and achieve recognition for working all sorts of new countries emerging after WW II. It was designed to generate activity, and to some degree it did. What it did, and did remarkably well, was to inspire several people to come up with something that would generate activity and at the same time pick up the pace dramatically. It also would allow more participation by more people in far less time. Simply put, a contest running two weekends would draw more people willing to spend some time at it and would add excitement, create a sense of urgency and competition, and certainly be a lot of fun. While some of this may be supposition on my part, I base it on the personality of Larry LeKashman, W2IOP, then *CQ*'s Managing Editor. Herb Becker's tenure at *Radio* magazine would also indicate a fast-paced, like-minded individual who was used to the idea of contests and marathons.

As 1948 progressed, news of the Marathon moved further and further to the back of *CQ*. In the July issue on page 62 is the first mention of the CQ World-Wide DX Contest as such. There was no discussion leading up to it, just the announcement. The first set of contest rules appeared in the August issue on page 32. This contest was to be fast paced, more inclusive, and absolutely more competitive. My guess is that it probably took a bit of time for Larry to sell the idea to *CQ*'s management at the time, and he and Herb opted for a marathon to start things off. The DX Marathon was obviously too slow for most people to get excited about. I think, though, it gave Larry time to prepare himself and his station for a contest. This became evident to me, at least, when I saw the October 1948 issue, the month of the first CQ WW DX Contest. The cover shows what is described in a featured construction article, "The Gold-Plated Special." This was truly a state-of-the-art multiband exciter designed by Bill Scherer, W2AEF. It is a remarkable piece of engineering and construction and "coincidently" was Larry's contest rig. In later years Bill became *CQ*'s Technical Editor and often told how he had built it for Larry. Obviously, it was designed and built in plenty of time for the contest, although by the time that October issue was out there wasn't enough time for it to be duplicated. You just knew what you had to beat in the way of technology.

The marathon idea ended with 1948 and the contest blossomed. In June 1949 the first WW DX Contest results were published, and plans were being made for the second one. What made the CQ World-Wide DX Contest different and far more appealing than any other contest or operating event was that from day one it was designed for amateurs all over the world. It wasn't simply how many amateurs out there could contact American amateurs. It provided for everyone working everyone, wherever you were. This created local competitions, sub-categories, and an equal chance to achieve amateur radio fame. It truly was and is world-wide.

The initial results published in 1949 showed a turn-out several times the eventual number of DX Marathon entrants. People obviously responded to a good idea that was deemed universally fair. Over the years in order to keep it universally fair and interesting, more and more rules and sub-categories were added. Admittedly, some of the rules changes were needed to shore up "loopholes" enthusiastic, aggressive contesters found and tried to manipulate. However, the CQ WW proved that each and every contact had value, activity could be generated even on dead bands, and DX, however you construe it, is available more times than not.

Today we've gotten used to the idea of contest DXpeditions, special prefixes, exotic equipment, and monumental efforts put forth by many groups just for a weekend of high anxiety. Do many of us schedule our social and family obligations around the contest? Do many of us check out the ads and catalogs for the latest bit of something that could possibly squeak a few extra points into the log? Sure, we're all caught up in it, whether we spend a few hours or the whole time frame operating. We all want a piece of the excitement that goes along with the contest. The CQ WW is where the action is!

If you check out the SSB results in this issue, you will notice an interesting phenomenon that proves the point. The 1996 CQ WW DX SSB Contest, during the pits of the sunspot cycle, had the second largest participation of *any* amateur radio DX contest in recorded history. The CQ WW in 1990 (when conditions were infinitely better) was first by the slim margin of 234 logs. In 1996, complete with the doldrums, there were amateurs taking part in the contest from over 230 countries. It doesn't mean that you could have worked them all, but it does mean that they were there and you had an equal shot, the same as anyone else.

I don't really know whether we have Larry or Herb to thank for the idea or whether it was a sort of collaboration among them and a few others. Whoever it was, thank you. Probably over the 50 year span well over a million amateur radio contacts were logged during those two weekend periods. That is tradition. That is a rich legacy that continues to grow year by year. By virtue of showing up ready to take part, every amateur worldwide is "real," worthy, and a very valuable addition to everyone else in the contest.

The CQ World-Wide DX Contest has been around longer than the number of years most of us have held an amateur radio license. Most of us know very little of its history, its record-breaking achievements, its stars, and yes, even its villains. The CQ WW is like two big annual parties where everyone is invited to come, enjoy, and have fun. It's also a perfect showcase to introduce new people to amateur radio. Invite someone over this year to hear the rest of the world calling you, all without wires. After 50 years, it's still amazing.

73, Alan, K2EEK

CQ WW 160 Meter SSB Contest Date Change

The CQ 160 Meter SSB Contest will change dates in 1998 to February 27 through March 1st. Every ten years or so the dates for the CQ 160 Meter SSB Contest coincide with the ARRL's CW DX Contest due to the vagaries of the short month of February. Rather than create a conflict among contesters, we decided to move our dates in 1998 to accommodate the longer established contest. This gives everyone a chance to enter both. Be sure to let your friends know about the change.

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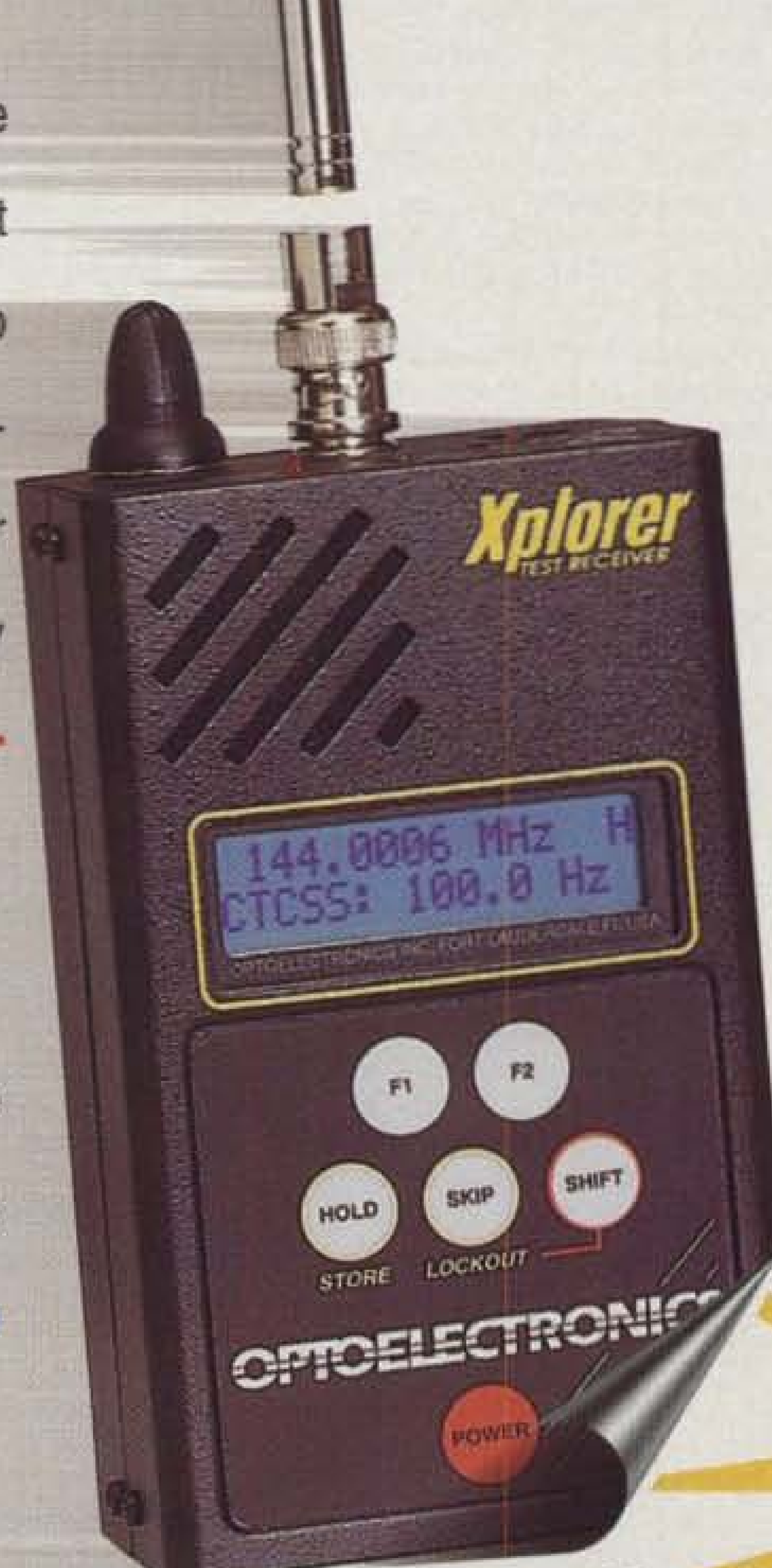

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ANNOUNCEMENTS

• **Air Force 50th Anniversary QSO Party –** In celebration of the creation of the U.S. Air Force on Sept. 17, 1947, the Headquarters U.S. Air Force Directorate of Communications and Information is sponsoring a QSO party for all amateur radio operators from 0001Z Sept. 20 to 2359Z Sept. 21 (see this month's "Contest Calendar" for details). For more information contact Bernie Skoch, K5XS, Colonel, U.S. Air Force Director of Communications & Information, Headquarters Pacific Air Forces, 604 Julian Ave., Hickam Air Force Base, Honolulu, HI 96818; or e-mail <75376.12 @compuserve. com>.

• **Attention Grid Square CN85 Residents –** The Metropolitan Amateur's Picnic will be held from 11 AM to 3 PM on September 13 at Red Sunset Park in Gresham, Oregon, rain or shine. For more information, contact Gene Buell, KA7KBH, at 503-614-0563.

• **These Special Events are scheduled for Sept.:**

W1AW/6, from 1997 ARRL Southwestern Division HAMCON '97, Holiday Inn, Riverside, California; Sept. 12–14; on SSB 3.875, 7.250, 14.250, 21.350, 28.450; CW 3.530, 7.030, 14.030, 21.030, 28.030; plus 2 meter repeater and 146.550 simplex. For special QSL send contact Fred Roberts, W6TKV, 5464 Peacock Lane, Riverside, CA 92515 (909-687-8145).

K2BR, from the Miss America Pageant, Atlantic City, New Jersey; SCARA; Sept. 8–13; beginning at 1400Z on the 8th; operation on phone 25 kHz inside lower General class band edge; CW 65 kHz inside lower General class band edge; and Novice 28.100–28.500 kHz. For QSL, send #10 SASE via SCARA, P.O. Box 121, Linwood, NJ 08221.

KB2YCT, Nutley, New Jersey; RDGULARA commemorating "CQ Labor Day"; 1200Z Aug. 30 to 2400Z Sept. 1; within 20 kHz of 14.303, 28.420, 52.525, and 146.520. For certificate, send name and address to RDGULARA, P.O. Box 716, Nutley, NJ 07110-0716.

KM3N, from Darby, Pennsylvania; Delaware County ARA; commemorating the 20th anniversary of the Delaware County ARA; 1200Z Sept. 20 to 0100Z Sept. 21; operation on 147.360 KM3N repeater; 3.700 CW 3.860 phone; 7.125 CW 7.248 phone; 14.100 CW 14.230 phone; 21.125 CW 21.368 phone; and 28.365 phone. For certificate, send QSL to KM3N, DCARA, P.O. Box 236, Springfield, PA 19064.

KE4ZXW, from the Virginia Air & Space Center, Hampton, Virginia; VASC Amateur Radio Group, celebrating 2 years of 9600 baud satellite station operation and an amateur radio exhibit. Sept. 27–28 from 1500–2200Z both days. On HF listen at :00+ on 7.265 MHz and at :30+ on 14.265. For UHF/VHF satellite operators, both days from 0–2400Z, send via KO-23 or KO-25. An anniversary QSL will be issued to those sending QSL and SASE to Ed Brummer, W4RTZ, 108 Oyster Cove Rd., Yorktown, VA 23692.

KY4X, from Munfordville, Kentucky, Civil War Days, 1400–?Z Sept. 6; General portion of 20 and 40 meters. For certificate send 9 × 12 SASE to KY4X, Box 23, Summer Shade, KY 42166.

W4MT, from Langley Air Force Base, Virginia; United States Air Force 50th anniversary, Air Combat Command; Peninsula ARC; 0900–1700Z Sept. 6; lower portion of General 10, 15, 20 (SSB/CW) and 144.630 MHz (FM). For QSL send QSL to Rene B. Valladares, 178 Goodwin Neck Rd., Yorktown, VA 23692.

NC8O, from Kalamazoo, Michigan; The Southwest Michigan Amateur Radio Team; commemorating the 75th anniversary of The Kalamazoo Symphony Orchestra; 1800Z Sept. 20 to 0200Z Sept. 21; operation on 3.975, 7.275, 14.275, 28.475, and 51.375 MHz. For certificate send QSL to SMART c/o Dennis Fitzpatrick, 4378 Vauxhill Drive, Paw Paw, MI 49079.

W9EBN, from Matthews, Indiana; Grant County ARC; 27th Cumberland Covered Bridge Festival; 1500– 2200Z Sept. 6; on 7.240, 14.260, 146.46. For certificate, send QSL and large SASE to Chuck Newlin, P.O. Box 135, Matthews, IN 46957-0135.

VE3MIS, from the Halton County Radial Railway, Mississauga, Ontario, Canada; The Mississauga ARC; 1430–2000Z Sept. 27–28; SSB on 3.930, 7.230, 14.240, 18.130, 21.330, 24.940, and 28.340 MHz; also MARC repeater 145.430 MHz (–600 offset, CTCSS 103.5 Hz) and 446.100 MHz simplex. Send requests for QSLs to MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Crescent, Mississauga, ON L5N 1X6, Canada with an SASE. *(Note: U.S. stamps cannot be used to send mail from Canada to the U.S.)*

• **These hamfests, etc., are for late Aug. and Sept.:**

Aug. 24, **Tri-County Radio Group Hamfest/ Computer Show**, McHenry County Fairgrounds, Woodstock, Illinois. Call Robert, N9KXG, 708-944-0500.

Sept. 5–6, **Mena Hamfest**, Queen Wilhelmina State Park, Mena, Arkansas. Contact Charlotte Lee, KC5DOR, 415 Crosstrails Rd., De Queen, AR 71832 (870-642-7656).

Sept. 6, **Central Missouri RA Hamfest & Computer Fair**, Good Time Country Club, Columbia, Missouri. Contact Perry Ogletree, NØNMC, 3609 Bray Avenue, Columbia, MO 65203-0877 (phone 573-445-2662; e-mail <pogletre@mail.coin.missouri.edu>). (Exams by preregistration.)

Sept. 6, **Uniontown ARC Gabfest**, club grounds, Old Pittsburgh Rd. just north of intersection of Rts. 51 and 119. Contact Carl (WA3HQK) or Joyce (KA3CUT) Chuprinko, Rt 6 Box 231-CC, Morgantown, WV 26505 (304-594-3779).

Sept. 6, **45th Annual W9DXCC Convention and Banquet**, Holiday Inn, Rolling Meadows, Illinois. Contact Phil Camera, KB9CRY, 806 Portsmouth, Westchester, IL 60154 (phone 708-343-1696; fax 708-343-4394; e-mail <iphil@megsinet.net>; or the W9DXCC Web Page <http://www. qth.com/ w9dxcc>.

Sept. 6, **Gonzales Hamfest**, Gourmet Catering, Inc. building, Prairieville, Louisiana. Contact AARC, c/o David Fountain, KJ5MD, 43517 N. Lone Oak, Gonzales, LA 70816 (504-675-5911). (Exams.)

Sept. 6, **Erie Hamfest '97**, Franklin Township Firehall, Erie, Pennsylvania. Contact Chris Robson, KB3A, 4485 Kell Rd., Fairview, PA 16415 (phone/fax 814-474-1211; e-mail <crobson@erie.net>. (Handicapped accessible; exams at 9 AM at the Franklin Center Methodist Church, Route 98, one mile north of hamfest.)

Sept. 6–7, **The Greater Louisville Hamfest**, Kentucky Fair & Exposition Center, Louisville, Kentucky. Write to The Greater Louisville Hamfest Association, P.O. Box 34444-Q, Louisville, KY 40232-4444.

Sept. 6–7, **Manitoba Amateur Radio Museum Third Annual Hamfest**, Manitoba Agricultural Museum, Austin, Manitoba, Canada. Contact the Manitoba Amateur Radio Museum, Inc., Box 10, Austin, Manitoba R0H 0C0, Canada.

Sept. 7, **55th Findlay Hamfest**, Hancock County Fairgrounds, Findlay, Ohio. Call the Findlay Radio Club answering machine at 419-423-3402 (answers after 10 rings); or e-mail <kanga@bright.net>; or <http://www.bright.net/~kanga/w8ft/>.

Sept. 7, **Bolingbrook ARS Hamfest/Computer Show**, Inwood Recreation Center, Joliet, Illinois. For more info, call the BARS Hotline at 630-759-7005 between 6 AM and 9 PM. (Exams 9 AM to 12 noon.)

Sept. 7, **Butler County ARA Hamfest/Computer Show**, Butler Farm Show Grounds, Butler, Pennsylvania. Contact K3LL, 1080 N. Boundry Rd., #C, Cranberry Twp, PA 16066; phone 412-538-9491; e-mail <k3ll@nauticom. net>.

Sept. 13, **R.A.C.E.S. 12th Annual Hamfest**, Saratoga County Fairgrounds, Ballston Spa, New York. Contact Darlene Lake, N2XQG, 84 Wilton Mobile Park, Saratoga Springs, NY 12866 (phone 518-587-2385; or e-mail <lake@capital.net>. (Exams.)

Sept. 13, **Great Plain Radio Club Hamfest**, Shattuck at the Red Barn, Oklahoma.Call 1-405-921-3676; or e-mail <donald@brightok.net>. (Exams.)

Sept. 14, **Wheeling Hamfest and Computer Show**, Wheeling Park, Wheeling, West Virginia. Contact TSRAC, 2011 St. Hwy. 250, Adena, Ohio 43901 (phone 614-546-3930; e-mail <k8an@aol.com>.

Sept. 14, **FallFest '97**, Tall Cedars of Lebanon Picnic Grove, Trenton, New Jersey. For more info, contact FallFest '97, P.O. Box 7024, West Trenton, NJ 08628 (609-882-2240).

Sept. 14, **L'Anse Creuse ARC 25th Annual Swap & Shop**, L'Anse Creuse High School, Mt. Clemens, Michigan. Contact Richard Dzick, 31572 Juniper Lane, Warren MI 48093 or call 810-268-4671. (Exams 11 AM, contact Don Olszewski, WA8IZV, 810-294-1567; Prodigy ID#SSTG41a.)

Sept. 14, **SEMARA Hamfest**, Southeastern Massachusetts ARA, Inc. Clubhouse, 54 Donald St., South Dartmouth, Massachusetts. Contact Bill Miller, K1IBR, at 508-996-2969.

Sept. 14, **OARS Annual Hamfest/Potluck Dinner**; City Park, Monett, Missouri. Call Joe, KBØRVB, at 417-235-8359; or e-mail <nixit@mo-net.com>.

Sept. 14, **WECA Radio & Electronics Hamfest**, Yonkers Raceway, Yonkers, New York. Call 914-741-6606. (Handicapped accessible.)

Sept. 20, **Southern Kentucky Hamfest**, Cave City Convention Center, Cave City, Kentucky. Contact Larry Brumett, KN4IV, 108 Withers Dr., Glasgow, KY 42141 (telephone 502-651-2363; e-mail <ibrumett @glasgow-ky.com>). (Exams.)

Sept. 20, **Chanute ARC Hamfest**, Central Park, Chanute, Kansas. Contact Mike, KBØBSG, at 316-431-4577; or Charlie, WDØAKU, at 316-431-6402.

Sept. 20, **Sonoma County Radio Amateurs Annual Swapmeet, Auction & VE Testing,** Holy Ghost Hall, Sebastopol, California. Contact Rick Reiner, K6ZWB, 2120 Slater St., Santa Rosa, CA 95404 (707-575-4455); or c/o Sonoma County RA, Inc., P.O. Box 116, Santa Rosa, CA 95402. (Exams.)

Sept. 20, **Lake of the Woods Hamfest & Banquet**, Warroad Area Community Center, Warroad, Minnesota. Contact David Landby, KBØHAP, Rte. 3, Box 10, Warroad, MN 56763 (218-386-1092). Banquet reservations suggested. (Handicapped accessible; exams.)

Sept. 20–21, **26th Annual Anchorage ARC Hamfest**, Kincaid Park Rec Center, Anchorage, Alaska. Contact Lillian Marvin, NL7DL (phone 907-277-6741; or e-mail <rlment@alaska.net>. (Exams both days; FCC commercial license exams Saturday only.)

Sept. 21, **MIT/Harvard Flea Market**, Albany and Main St., Cambridge, Massachusetts. For more information, call 617-253-3776.

Sept. 21, **Suncoast ARC 7th Annual Hamfest & Computer Show**, New Port Richey Recreational Center, New Port Richey, Florida. Contact the Suncoast ARC, P.O. Box 1992, New Port Richey, FL 34656; or call Mimmie, KO4FB, 813-937-7455; or e-mail Marv, N2AT, at <marvb@ix.netcom.com>.

Sept. 21, **AARC 25th Annual Hamfest & Computer Show**, Lenawee County Fairgrounds, Adrian, Michigan. For more information, contact Brian J. Sarkisian, KG8CO, at 517-265-1537; e-mail <kg8co@juno.com>; or the Web at <http://www.qsl. net/w8tqe>. (Exams.)

Sept. 21, **Western Connecticut Hamfest**, Edmond Town Hall, Newton, Connecticut. Contact Bill Schaeffer, N1PJG, P.O. Box 3441, Danbury, CT 06813-3441 (203-798-2831).

Sept. 27, **22nd Annual Elmira International Hamfest & Computerfest**, Chemung County Fairgrounds, Horseheads, New York. For more information, contact Elmira Hamfest, c/o Dave Lewis, 465 CR 13, Van Etten, NY 14889 (607-589-7495). (Exams.)

Sept. 27, **New East Central Florida Hamfest**, Embry Riddle Aeronautical University Campus at Daytona Beach International Airport, Daytona Beach, Florida. Contact John Munsey, 904-677-8179; e-mail <k4bv@juno. com>; or on the Web at <http://erau.db. erau.edu/~stokess/hamfest.html>. (Handicapped accessible; exams.)

Sept. 27, **Anderson Hamfest & Computer Fair**, New Civic Center of Anderson, Anderson, South Carolina. For more information, contact Anderson Hamfest, Anderson Radio Club, P.O. Box 1525, Anderson, SC 29622 (fax 864-225-0567; phone 864-226-7156). (Exams.)

Sept. 28, **Framingham Fleamarket**, Framingham High School, Framingham, Massachusetts. For more information, contact Bev Lees, N1LOO, FARA, P.O. Box 3005, Framingham, MA 01705 (508-626-2012). (Exams, contact Dick Marshall, K1KTK, 508-877-0563.)

Sept. 28, **Metro 70cm. Network Fleamarket**, Lincoln High School, Yonkers, New York. For more information, contact Otto Supliski, WB2SLQ at 914-969-1053. (Exams.)

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A publication of

CQ Communications, Inc.
76 North Broadway
Hicksville, NY 11801-2953 USA.

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: (516) 681-2922. FAX (516) 681-2926. E-mail cqmagazine@aol.com. Website: http://members.aol.com/cqmagazine/. CQ (ISSN 007-893X) is published monthly by CQ Communications Inc. Periodical postage paid at Hicksville, NY and additional offices. Subscription prices (all in U.S. dollars): Domestic—one year $27.95, two years $49.95, three years $71.95; Canada/Mexico—one year $40.95, two years $72.95, three years $110.95; Foreign Air Post—one year $52.95, two years $99.95, three years $146.95.
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Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

OUR READERS SAY

A Linear Amplifier Circuit For The IC-706

Editor, *CQ:*

Re: "A Linear Amplifier Circuit for the IC-706," by John Seybold, K4PRC, June *CQ*, p. 24. The 706 manual is incorrect stating that the keying circuit will handle only 20 ma. Further, the circuit does not use a relay to pull external relays to ground. It is a transistor with a 1 amp rating. ICOM knows about this but recommends the current be limited to 200 ma. I have keyed much more than that (500 ma at 35 VDC) and never had a problem. There are also *two* jacks where "Key To Ground" comes out. The wire connector shown in the article is okay, but a better choice is to use the RTTY jack, which is a miniature stereo jack, and then one can easily put a male RCA on the other end and you are done.

Mike Staal, K6MYC,
Owner, M^2 Antennas
Fresno, CA

A Close Look At The 40 Meter Zepp and Double-Zepp . . .

Editor, *CQ:*

Re my article "A Close Look at The 40 Meter Zepp and Double-Zepp . . ." in the July issue, p. 20. I received my July issue today, but heard from a reader in Florida five days ago telling me what a great article it was. He agreed with me about what a fabulous antenna it is because he has been using Zepps for many years. He went on to tell me that he thought there were some mistakes in the diagrams of figs. 2 and 3. He was so right!

Two half-wave wires were drawn up in the air with nothing connected to them in fig. 2. Then in fig. 3 there are two quarter-wave wires all alone with no connections to them either. In both diagrams the open-wire feed lines are directly shorted at the top. In both figures the top of the feedlines should be connected to the 66 ft. flattop antenna wires instead of being shorted together at the top.

Bob Shrader, W6BNB
Sebastopol, California

How To Keep Your Emergency Back-Up Station Battery Charged

Editor, *CQ:*

Re: "How To Keep Your Emergency Back-Up Station Battery Charged," by Phil Salas, AD5X, June *CQ*, p. 56. The circuit, as shown, has a switch, S1, that can connect the battery directly to the power supply and load. According to the author, this should only be done when the power is OFF. However, there are no safeguards to protect for one's forgetting that the switch is on. If this were to happen and the power supply then turned on, there is a very great possibility that the battery could explode from severe overcurrent. Even if this did not happen, there is a good chance the battery could be damaged if it was not large enough (an amp-hour rating of about ten times the maximum current potential of the power supply!). To avoid this problem a second latching relay should be used to disconnect the power supply when running battery power.

The other caution is assure that the battery is large enough to sustain the charging current from the power supply. If not well regulated, the battery can be permanently damaged. Resistor R1 is supposed to be selected to do this. When selecting R1, one should keep the current to less than ten percent of the amp-hour rating of the battery. Gelled-Electrolyte batteries are particularly sensitive to over/undercharging. Care should be used when working with them.

If an inexpensive source for batteries is available, then simple circuits will work to have a backup battery available. However, their life will most often be short lived.

To properly maintain a battery, Motorola, Unitrode, ICS, and others have developed some fine integrated circuits to handle this task. If long life and reliability are necessary, these circuits should be investigated.

Dennis Blanchard
Chief Engineer, Jade Products, Inc.
East Hampstead, NH

Correction For "Build A Quick and Easy Curve Tracer . . ."

In the article "Build A Quick and Easy Curve Tracer To Test Components" by Lew Ozimek, N2OZ, on p. 9 of the June issue, the caption for fig. 12 should read "Integrated circuit test results . . ." and not "Transistor test results. . . ."

Addendum To Doug's Desk

There are several corrections/additions to Doug's Desk, July issue p. 62, "QRN Squasher Upgrades."

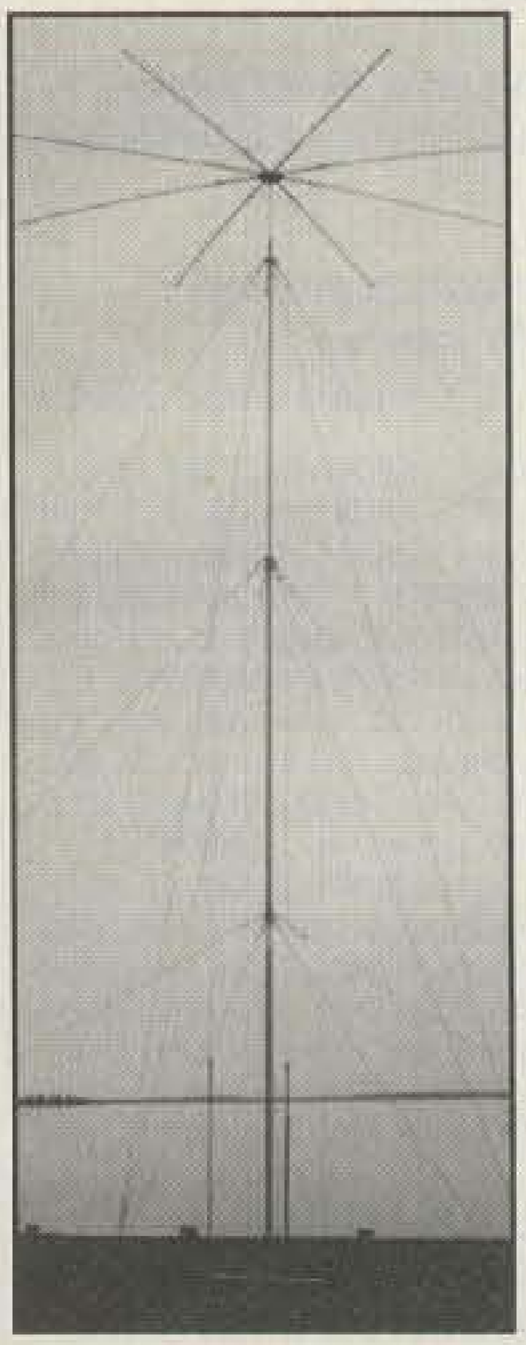
1. The fig. 6 panel artwork on p. 65 was mistakenly published at less than scale, despite the caption stating it is shown to scale. The width should be increased by 2 inches and the height by 1/2 inch.

2. The reference under "Circuit Additions" on p. 62 should read fig. 1 and not fig. 2.

3. D13 is a 50 PRV, 1 amp rectifier diode. There is no D14; D15 should have been numbered D14.

4. The two blank pads in fig. 8 are for the RG-174 coax cable that connects to J2.

July Cover



The July *CQ* cover showed Ron Bailey, AA4S, doing a little "tune up" work on one of his antennas. In writing the cover description, *CQ* publisher K2MGA misidentified the antenna as a Uni-Hat. We regret the error. It is a home-brew loaded vertical. The Uni-Hat CTSVR (photo here) is a commercially manufacturered top-loaded, trap-free antenna covering 160, 80, 40, and 17m. It is manufactured and marketed by the Uni-Hat Corp., 3816 Royal Lane, Suite 100, Dallas, TX 75229 (214-352-4623).

Results of the 1996 CQ World-Wide DX SSB Contest

BY BOB COX*, K3EST

It was the sunspot minimum. Ignoring this fact, tens of thousands of like-minded contesters from all over the world flipped on their rigs and prepared for 48 hours of adventure. Using the CQ WW database, our estimate is that 31,000 amateurs from over 230 countries took part in the 1996 CQ WW DX SSB Contest.

It was terrific to see the 80 or so DXpeditions that were on during the contest. There sure were some rare stations that got into a lot of logs: XZ1N, XY1U, ZS8IR, D25L, TL8MS, J28JY, TR8IG, 9G1BJ, 7P8/OE2VEL, C91CO, 5X4F, 9X4WW, S79MAD, 9L1MA, 3V8BB, SØ1M, 5X4F, A71CW, AP2NK, T77WI, 9M8R, A35SQ, 9K2RA, C31LD, ZB2BU, T88T, FK5DX, CYØXX, XX9X, HS1AZ, TK1A, and HBØ/HB9AON, to name just a few. I'm sure that I speak for all participants in saying "thanks" to all the DXpeditions and rare stations that made an effort to make the 1996 CQWW the second largest radio DX contest in the known history of the world (1990 was 234 more logs!).

NH2C operated by (left to right) Seo, JG3RVO; Kazu, JG3RPL; Aki, JI3ERV; and Toshi, JR7OMD.

Single Operator High Power

Of the top ten finishers, all but two were DXpeditions. Quite a lot of frequent-flier miles were racked up! The winner of this coveted category was Jim, N6TJ, operating at ZD8Z. Jim took full advantage of his rare country and zone. Believe it or not, Jim won for the world with ZD8Z in 1968 and is only the second contester to win in four decades! The first was KH6IJ. Jim seems to be getting better with time. The battle for second place was very close. Jose, CT1BOH, carried P4ØE over John, W2GD (P4ØW), in the last hours of the contest.

In the USA Randy, K5ZD/1, took the top slot. Randy's unique rate set an example for all other all band operators. Second place USA went to Bill, KM9P/4.

The battle in Europe reversed itself from last year. This time GIØKOW came out ahead of Tine, S5ØA. The conditions to the states were a big advantage to GIØKOW.

Single Operator Low Power

The low power category continues to attract the most participation. This category allows for everyone to get on and have a good time. The world all band winner was Heinz, DK5WL, operating TA4ZM. Heinz took a plane trip to nearby Asiatic Turkey and carried away the top low power trophy. Down Argentina way, LP7N piloted by LU2NI finished second. DK5WL worked lots of Europeans and LP7N worked lots of USA. The top USA score came from WA4ZXA.

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Jimmy sure caught the right wave to make it into the world top ten. Joining him in the top ten was AC1O/4, who took the silver. In Europe Steve, G4KIV, pushed the gas pedal to the floor to edge out IR4R operated by IK4ALM.

JAØQNJ took top honors in the far east. The low power category sure filled a need in Japan, where interference can be a nightmare.

QRP

As the sunspots bottom out, the QRPers really take a beating, as was reflected in their lower overall scores. First-place QRP in the world went to F5BEG with 525k. Gendron, while making most of his contacts on 20 (302/18/67) meters, actually worked the most multipliers on 15 meters (259/27/75). And how would you North Americans like to work 169 QSOs on 75 (as Gendron did) yet only be rewarded with 207 QSO points for that effort? Coming in second in the world (and second in Europe) was YU1EA with about 350k.

The real upset, though, was in the QRP battle for the USA. N1AFC, after many years of "also ran," finally put it all together and dethroned AA2U with a score of 328k versus 307k! Once again it was a battle of QSOs versus multipliers, and once again QSOs won out.

A big congratulations to Peter, who hung in there year after year to finally take the prize. Finally, it is very interesting to note that UA9ACJ (who was eighth in the world QRP) made *zero* QSOs with North, Central, and South America, and the Pacific. He made only two QSOs in Africa. It's hard to imagine a box score entrant who didn't even work *one* QSO in Zone 5, 8, or 9. Let's hope the SFI is better the next time around.

Assisted

The Single-Operator Assisted category has definitely gone worldwide now, with two of the top three scores from Africa! DL4NAC operated the station of CT3FN to world high, followed by top European LY5A (Opr. LY2BTA) and 7P8/OE2VEL. The top U.S. station was AA1K, narrowly edging out runner-up KE3Q, with KS1L coming in third.

Following LY5A in Europe were IR2W (Opr. IK2PZC) and DLØWW. JH7PKU led all Asian entrants.

Multi-Single

Competition in this highly prized category was rugged. It was the battle of the guys on the

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
World All Band
ZD8Z (Opr. Jim Neiger, N6TJ)
Donor: Dave Rosen, K2GM
WA2RAU Memorial

World Low Power
TA4ZM (Opr. Heinz Josef Pick, DK5WL)
Donor: Slovenian Contest Club

World QRP
Gerard Gendron, F5BEG
Donor: Doc Sayre, N7AVK

World Assisted
CT3FN (Opr. Martin Riederer, DL4NAC)
Donor: Snake River Contest Club

USA
Randall Thompson, K5ZD
Donor: Potomac Valley Radio Club
KC8C Memorial

USA Low Power
Jimmy Floyd, WA4ZXA
Donor: North Coast Contesters

U.S.A. Zone 3
Lewis Sayre, N7AVK
Donor: Bill Fisher, W4AN

U.S.A. Zone 4
Mike Wetzel, W9RE
Donor: Dennis O'Connor, K8DO

Canada
CI3EJ (Opr. Gary Caldwell, VE7NTT)
Donor: Niagara Frontier Int'l DX Assn.
VE3WT Memorial

Caribbean/C.A.
4V2A (Opr. Ivo Pezer, 9A3A)
Donor: Alex M. Kasevich, VP2MM

Europe
R.W.C. Cummings, GI0KOW
Donor: Potomac Valley Radio Club
W4BVV Memorial

Europe Low Power
Steve Bowden, G4KIV
Donor: N3RA & K3LR

Africa
3V8BB (Opr. Hrane Milosevic, YT1AD)
Donor: Gordon Marshall, W6RR

Asia
Krysztof Darbrowski, A71CW
Donor: 2 AM Dayton Pizza Gang

Japan
Kazuhiko Endou, JA0QNJ
Donor: Japan Crazy Contesters Club

Oceania
V85HG (Opr. Hajime Kato, JO1RUR)
Donor: Northern California DX Club

South America
P40E
(Opr. Jose Carlos Cardoso Nunes, CT1BOH)
Donor: Yankee Clipper Contest Club

SINGLE OPERATOR, SINGLE BAND
World—28 MHz
PQ5W
(Opr. Walter Vicente Gomesfilho, PP5WG)
Donor: Joel Chalmers, KG6DX

World—21 MHz
ZX5J
(Opr. Sergio Lima de Almeida, PP5JR)
Donor: CQ Magazine

World—14 MHz
D25L (Opr. Alex C.J. van Eijk, PA3DZN)
Donor: North Jersey DX Assn.
K2HLB Memorial

World—7 MHz
IG9/IT9GSF (Opr. Fabio Grisafi, IT9GSF)
Donor: Fred Laun, K3ZO
K7ZZ Memorial

World—3.7 MHz
IG9/I4UFH
(Opr. Fabio Ern Schettino, I4UFH)
Donor: Fred Capossela, K6SSS

World—1.8 MHz
IG9/IV3TAN (Opr. Alberto Annesi, IV3TAN)
Donor: Robert Wruble, W7GG

USA—28 MHz
Sydney Leach, K5XI
Donor: Donald Thomas, N6DT

USA—21 MHz
Stephan Sacco, Jr., KC2X
Donor: David Hueben, KB0ISS

USA—14 MHz
David Donnelly, K2SS
Donor: Southern California DX Club

USA—7 MHz
Larry Pace, N7DD
Donor: Stanley Cohen, WD8QDQ

USA—3.8 MHz
Jeffrey Briggs, K1ZM
Donor: Arnold Tamchin, W2HCW

USA—1.8 MHz
Peter Hutter, WW2Y
Donor: CQ Magazine

Carib./C.A. (14 MHz)
VP2E (Opr. Robert Wood, W5AJ)
Donor: Snake River Contest Club

Europe—28 MHz
9H0A (Opr. G. Morris, 9H1EL)
Donor: Chod Harris, VP2ML

Europe—21 MHz
Joao Rafael Faustino Almeida, CT1BOP
Donor: Tine Brajnik, S50A

Europe—14 MHz
Jiri Sanda, OK1RI
Donor: A.G. Anderson, GM3BCL

Europe—7 MHz
IR4T (Opr. Maurizio Panicara, I4JMY)
Donor: Roger Burt, N4ZC

Europe—3.7 MHz
N.S. Shirko, UA2FJ
Donor: Marconi Contest Club
I3MAU Memorial

Europe—1.8 MHz
Josef Burian, OK1AY
Donor: Robert Kasca, 9A3A

Japan—21 MHz
Ooshika Tarou, JI2UNR
Donor: DX Family Foundation

Japan—14 MHz
Tadeo Katsuta, JH7DNO
Donor: Take Yokoyama, JL1BLW

MULTI-OPERATOR
SINGLE TRANSMITTER
World
ZX0F (Oprs: PY5EG, PY5CC, N5FA, PY0FF)
Donor: So. Calif. DX Club
W6AM Memorial

U.S.A.
KF2ET (Oprs: KF2ET, AA2DU, KE2NL, WR2I, K2UU, WB2DVK)
Donor: Carolina DX Association

Carib./C.A.
8P9Z (Oprs: K4FJ, K3KG, KI6IM, WA9L, W2NA)
Donor: Eric Scace, K3NA

Asia
RW0A (Oprs: RV0AR, RU0AB, RV0AU, RA0AM, UA0AGI, UA0ANW)
Donor: Edward L. Campbell, AH2BE

Europe
IQ4A (Oprs: I4VEQ, I4IND, I4LCK, I4TJE, I4IKW, I4EAT, I4AVG, I4PVP, I4YRW, IK4EWK, IK4DCT, IK4QJH, IK4CZF, IK4XQH, IK4MGP, IK2NCJ, IW4ANU)
Donor: Bob Cox, K3EST

Oceania
NH2C (Oprs: JG3RPL, JR3RVO, JI3ERV, JR7OMD)
Donor: Junichi Tanaka, JH4RHF

South America
HC8N (Oprs: WN4KKN, WX3N, AG9A, VE3EJ)
Donor: Jerry Boyd, K6BZ

MULTI-OPERATOR
MULTI-TRANSMITTER
World
PJ9E (Ops: WA3LRO, N3ED, K3EST, KB2XZ, N4RV, N7ZZ, K2SB, NL7GP, W3UM)
Donor: W6QHS and KK6QM

U.S.A.
KC1XX (Ops: KM3T, KC1F, AD1C, WZ1R, K1DG, KB1AWE, K1EA, AA1ND, PU1JTE)
Donor: Paul Hellenberg, KS9K

Europe
TK1A (Ops: DL4MCF, DL1MAJ, DF9LJ, DK6WL, DL4MEH, TK5NN, TK5EP, DF9RX, TK5MH, TK1BI, DK4VW, DL6RAI)
Donor: Finnish Amateur Radio League

Japan
JH5ZJS (Ops: JA5BJC, JA5FDJ, JA5JCC, JA5THU, JH5RXS, JR5JAQ, JR5VHU)
Donor: Ryozo Goto, JH3JYS

CONTEST EXPEDITIONS
World Single Operator
7P8/OE2VEL (Opr. Wolfgang Klier, OE2VEL)
Donor: National Capitol DX Association
W2GHK Memorial

WORLD MULTI-OPERATOR
XX9X (Ops: OH1KAG, OH2BH, OH2BVF, OH2PM, OH6DO, XX9AL, XX9KC, XX9MD)
Donor: The German CDXG & SDXG
DJ3NG & DJ4EI Memorial

SPECIAL SINGLE OPERATOR AWARDS
World—All Band Under 21 Years Old
C40M (Opr. Stavros Tsiakkouris, 5B4AFM)
Donor: Gene Zimmerman, W3ZZ

World—All Band High YL
Mieko Inoue, JA0QWO
Donor: Yutaka Tanaka, JH3DPB

equator—ZXØF at 3 degrees south in the Atlantic versus HC8N at 0 degrees in the Pacific. Wow, what a struggle! When all was finished, ZXØF took top honors. Their openings on 10 meters made the difference.

In Europe, perennial powerhouse IQ4A put their hilltop cave to great use and took the very competitive European trophy. Second place went to the TM2Y crew, who operated at F6BEE's QTH.

In the USA, KF2ET of the Frankford Radio Club beat out another FRCer, N3RS. The friendly rivalry with the FRC is one of the secrets to their great club score success.

Multi-Multi

Just before the contest began the crew of PJ1B (now PJ9E) received word that their mentor and founder, PJ9EE, had passed away. In an effort to honor his memory, they secured the callsign PJ9E. Once again this well-oiled crew won for the world. Second place went to V26B. The story of their adventure can be found in the September issue of *CQ Contest* magazine.

The Bavarian Contest Club traveled down to TK and with a lot of hard work and fine operators took first place in Europe over the tough competition from 9A1A. Both crews spent many months thinking about their efforts.

Here in the US, Matt's crew at KC1XX put their QTH in NE USA to work. From the top of their stacked beams tower you can see EI on a good day. Hi. They did not run away from it and had to overcome a tenacious effort from the New Jerseyites at N2RM.

Team Contesting

Team Contesting this year was the largest ever! Eighteen sent in their teams, representing every continent. Placing four of their five team members in the all band world top five, Neiger's Tigers racked up a staggering 42M points! All the team members are to be congratulated.

The real battle was for second place between Team Nippon and Yugoslavian Team #1. Team Nippon took the silver position. All teams are to be congratulated. Why don't you try team contesting? The five members can be from anywhere on Earth, and your personal score can *still* be added to your local radio club aggregate.

New Records, Special Mention

The following stations set new world or continental all-time records:

World 1.8 IG9/IV3TAN; L3.7 9A4RU; L1.8 S54E; Q14 RW9AB; Q3.7 YU1YV; A14 IR8A (I8QLS); A1.8 EA3ALD; USA 3.7 K1ZM/2; A1.8 W4DR.

North America 1.8 CG1ZZ (VE3BMV); L14 XO7A (VE7SV); L3.7 VP2E/WB5CRG; L1.8 CO3JA; Q7 WØKEA; A1.8 W4DR.

Africa 1.8 IG9/IV3TAN; AA CT3FN (DL4NAC).

Asia L21 4Z4T (4Z4UT); Q14 RW9AB; A14 JE2HCJ.

Europe L14 IY4M (I4ABF); L7 S54ZZ; L3.7 9A4RU; L1.8 S54E; Q14 YU1NR; Q3.7 YU1YV; AA LY5A (LY2BTA); A14 IR8A (I8QLS).

Oceania L14 DU1COO; L7 KH6/K6GSS; L3.7 KH8AL; L1.8 KH8AL; Q21 VK3NDS.

South America 21 ZX5J (PP5JR); L3.7 YV4AZF; L1.8 HK6ISX.

There were many outstanding efforts this year. Here are a few. Alberto, IV3TAN, traveled down to IG9 to set a new world record on 160 meters. He worked 102 countries and did not lose a single one when his log was checked. His QTH was on a point high over the water, an ideal location for 160. He was just one of seven different IG9 stations put on the air by the Marconi Contest Club. The battle on 40 meters out in USA zero-land between WØUN and KVØQ was fantastic. The final difference was less than one QSO! The MM of XX9X prompted three other XX9's to submit logs. An all-time high for that country. Steve, N2IC/Ø, was the highest score in the USA east of Indiana. What a terrific job this WRTCer did.

The Royal Omani Radio Amateur Society, where A45ZN was located.

Comments

A. Rule modifications: Please take the time to read the rules which appear in this issue of *CQ*. There have been a few modifications since last year. Look for the bold lettering in Rules III, XI.5, and XII for these changes.

B. Questions: If you have a question about anything concerning the CQ WW, send a letter to <questions@cqww.com>. Most contesters assume that their contesting software does it all for the them, but it may not. Here are some of the most common violations of the rules. Please help us and try to avoid the following:

1. No dupe sheet (Rule XI.9).
2. A disk is sent without a paper summary (Rule XI.5).
3. Failure to divide mults into countries and zones (Rule XI.7).
4. Failure to indicate QSO totals on summary sheet (Rule XI.7).
5. Failure of Low Power and QRP stations to indicate POWER used on their summary sheets (most only give rig type) (Rule XI.11).

C. Electronic Submission: This year we received 1224 electronic submissions—disks or e-mails. We really appreciate your efforts to make your contest the best. Even with that many submissions there were 1296 computer logs with *no* disk or e-mail log! If you use a computer to generate your log, *please* take the time to send a disk plus a paper summary sheet or e-mail your log. It is cheaper for you to mail a disk than it is to mail your whole log. E-mailing your log is cheapest of all! Thanks for all your help. Refer to Rule XI.5 for directions on how to submit a disk.

D. CQ WW SSB Contest e-mail submissions <ssb@cqww.com>: You can submit your log via internet. E-mail is easier for you and us. For e-mail we require *two files* to be included in your message:

1. A SUMMARY sheet in plain-text ASCII.
2. Your LOG, which should be sent in one of two ways—as a plain-text ASCII file (for the most popular programs submit your CT: yourcall.ALL file, TR: yourcall.DAT; other fixed-column ASCII formats are acceptable) *or* as a binary file (acceptable examples for submission of files for the most popular contest programs—acceptable binary formats are NA: yourcall.QDF; OH2BQS). If you send a binary file, it will have to be encoded for transmission via e-mail. All popular encoding schemes are acceptable, including UUencode, Base64, and BinHex. Your software may automatically encode your log as an attachment.

If you must send the files in separate messages, be sure to put the MODE and the station CALLSIGN in the Subject: line of each message. When you send your log, it should automatically be acknowledged by the server. If we eventually have trouble with reading your file, we may ask you to send a disk. Submit your 1997 CQ WW SSB log to <ssb@cqww.com>.

E. SWL: For SWLs reading these results please contact Bob Treacher, BRS32525, at the address in *CQ Contest* magazine or on e-mail at <101526.1041@compuserve.com>. He runs the SWL part of the CQ WW, called the October Challenge.

Thanks

Thanks to the CQ WW log checkers who validated the winners. The 1996 hard-working crew included K1DG, K3UA, K3ZO, K6NA, KR2Q, N2AA, N2NC, N3ED, N3RA, N5NJ,

TOP SCORES

WORLD

SINGLE OPERATOR HIGH POWER
All Band

ZD8Z	11,253,304
P4ØE	10,479,765
P4ØW	10,018,332
9Y4H	9,650,784
3V8BB	8,529,792
8R1K	7,516,158
4V2A	6,857,970
V85HG	5,811,663
GIØKOW	5,787,323
FG5BG	5,699,938

28 MHz

PQ5W	631,116
LU6ETB	439,101
LU4HAW	394,709
ZP6CC	357,216
LU3FZW	278,502
LU1MA	229,932

21 MHz

ZX5J	2,976,190
CT1BOP	1,054,144
AY7D	1,009,936
AH8A	890,910
LU2QC	708,513
ZP5MAL	704,082

14 MHz

D25L	2,212,080
5B4MF	1,293,424
OK1RI	1,265,704
IT9BLB	1,148,648
IG9/IK2QEI	1,114,578
CE3F	1,091,249

7 MHz

IG9/IT9GSF	1,103,021
9M8R	834,240
IR4T	745,820
9Y4VU	609,650
LZ5W	588,350
AY1I	568,400

3.7 MHz

IG9/I4UFH	787,710
EA8AH	735,072
P49I	453,921
K1ZM/2	292,100
UA2FJ	256,452
FM5BH	205,110

1.8 MHz

IG9/IV3TAN	441,252
CG1ZZ	91,803
OK1AY	64,154
YU1ZZ	63,154
S54DL	54,940
SM6DOI	49,506

LOW POWER
All Band

TA4ZM	3,238,785
LP7N	2,178,399
CT3/OH6LI	1,579,550
TR8IG	1,486,680
9G1BJ	1,391,250
G4KIV	1,255,128
WA4ZXA	1,227,842
EK4GK	1,193,825
IR4R	1,145,000
AC1O/4	1,070,307

28 MHz

CX8CP	289,599
LU9HZS	282,264
LU9VY	213,600
LW2DBM	206,617
ZD8DEZ	178,911
4X1VF	176,900

21 MHz

4Z4T	865,094
LU7FJ	735,124
RQ4L	637,014
SØ1M	535,704
CN8NK	525,735
S57J	315,185

14 MHz

IY4M	807,764
4A1FEC	723,040
XO7A	682,620
IR9B	540,799
LU5FCI	531,520
ES2RJ	464,352

7 MHz

S54ZZ	213,194
EA3BD	129,105
RAØFA	126,430
TMØZK	104,544
UA4LL	89,964
S5ØO	87,780

3.7 MHz

9A4RU	102,885
KH8AL	57,050
9A3QK	51,587
IQ5Q	50,232
IT9THD	46,720
VP2E/WB5CRG	43,416

1.8 MHz

S54E	38,871
HA8BE	35,644
OK1FFU	24,274
DJ9LJ	19,668
GW6J	17,936
IK4LZH	17,629

QRP
All Band

F5BEG	425,784
YU1EA	362,212
N1AFC	328,068
AA2U	307,060
EA1GT	297,686
YU1KN	280,576
UR5UW	163,530
KA1CZF	158,148
UA9ACJ	149,730
SP7LZD	148,824

ASSISTED
All Band

CT3FN	7,795,760
LY5A	5,879,094
AA1K/3	2,882,554
KE3Q	2,800,749
KS1L	2,645,277
IR2W	2,481,570
K3NZ	2,462,136
K3WW	2,456,019
N3AD	2,402,360
DLØWW	2,387,730

MULTI-OPERATOR SINGLE TRANSMITTER

ZXØF	20,167,146
HC8N	17,715,256
EA8ZS	12,108,690
CT3BX	11,372,445
IQ4A	10,703,504
8P9Z	10,593,882

MULTI-OPERATOR MULTI-TRANSMITTER

PJ9E	32,588,850
V26B	25,249,032
TK1A	17,035,667
9A1A	14,725,445
M6T	12,777,856
OT6A	12,604,410

EUROPE

SINGLE OPERATOR HIGH POWER
All Band

GIØKOW	5,787,333
S5ØA	4,206,860
UT7EZ	4,141,984
YT1AD	3,630,844
IO4LEC	3,333,804
DJ4PT	3,183,040
YU7AV	3,151,470
UT4UZ	2,973,500
GW4BLE	2,839,187
YU7BW	2,749,918

28 MHz

9HØA	223,010
CT4NH	154,399
EA7EZ	106,941
I8KPV	89,380
IK5QGO	80,344
S51AY	79,076

21 MHz

CT1BOP	1,078,608
S59A	651,128
IK4GRO	632,431
F5NBX	579,790
S5ØU	564,510
S53R	479,210

14 MHz

OK1RI	1,265,704
IT9BLB	1,148,648
OZ7X	885,066
MI6I	878,150
OI1JD	744,480
OI4OC	735,048

7 MHz

IR4T	745,820
LZ5W	588,350
S5ØC	531,918
9A4D	491,102
YT7A	474,498
S53EA	443,856

3.7 MHz

UA2FJ	256,452
YTØT	183,500
LY6K	179,170
9A7A	149,796
IU2X	165,204
LA9VDA	165,025

1.8 MHz

OK1AY	64,154
YU1ZZ	63,154
S54DL	54,940
SM6DOI	49,506
SV8CS	47,272
OZ3SK	44,540

LOW POWER
All Band

G4KIV	1,244,524
IR4R	1,137,672
RZ6LJ	1,033,410
LY3BA	1,027,138
ON5GQ	907,710
S51FA	818,975
EA3BKI	817,740
DL2OBF	813,279
YL8M	803,011
DK2OY	799,268

28 MHz

CT1ELP	84,095
CT1ESO	68,195
EA7HBP	57,780
EA7FIU	51,888
EA3FCQ	45,235
OM5FA	33,573

21 MHz

RQ4L	637,014
S57J	315,185
YO3JF	282,080
IR6W	265,680
SP3SLA	240,000
F5PGP	226,366

14 MHz

IY4M	807,764
IR9B	540,799
ES2RJ	464,352
YU7BJ	463,386
Z3ØM	423,948
IV3FSG	299,550

7 MHz

S54ZZ	213,194
EA3BD	129,105
TMØZK	104,544
UA4LL	89,964
S5ØO	87,780
S54A	81,125

3.7 MHz

9A4RU	102,885
9A3QK	51,587
IQ5Q	50,232
IT9THD	46,720
OK1FPS	41,331
S57CBS	40,158

1.8 MHz

S54E	38,871
HA8BE	35,644
OK1FFU	24,274
DJ9LJ	19,668
GW6J	17,936
IK4LZH	17,629

QRP
All Band

F5BEG	425,784
YU1EA	362,212
EA1GT	297,686
YU1KN	280,576
UR5UW	163,530
SP7LZD	148,824
UA6LKA	87,236
ER1FW	75,774
OH5NHI	64,200
UA4YJ	61,305

ASSISTED
All Band

LY5A	5,879,094
TM2V	3,226,720
IR2W	2,481,570
DLØWW	2,387,730
DL3KDV	1,610,848
DL2NBU	1,528,372
IU2M	1,512,034
ES5Q	1,480,171
II2A	1,409,408
IO4A	1,260,672

MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A	10,703,504
TM2Y	7,928,800
TM1C	7,907,906
HG1H	7,828,380
SN2B	6,948,096
ON4UN	6,281,604

MULTI-OPERATOR MULTI-TRANSMITTER

TK1A	17,035,667
9A1A	14,725,445
M6T	12,777,856
OT6A	12,604,410
EM2I	9,003,738
S53M	8,521,296

USA

SINGLE OPERATOR HIGH POWER
All Band

K5ZD/1	3,878,064
KM9P/4	3,438,505
N6BV/1	3,113,496
K3ZO	3,021,699
K1IU	2,793,190
W9RE	2,553,226
W3BGN	2,491,055
K1RU	2,480,016
N2IC/Ø	2,292,796
KE9A/4	2,220,596

28 MHz

K5XI	62,320
W4YV	44,005
WA3CGE	13,080
W6KFV	7,781
WA7KLK	5,697

21 MHz

KC2X/4	638,528
N4BP	350,300
K4JYO	293,040
N4CT	285,208
KS9U	218,250
WA2QNW	202,293

14 MHz

K2SS/1	955,260
WT1S	739,713
W7RM	701,590
NI8L	678,026
K2HFX	650,312
K3ZJ/8	405,112

7 MHz

N7DD	288,904
WØUN	240,385
KVØQ	240,370
AI7B	138,528
W8JGU	91,512
KF2BH	61,204

3.7 MHz

K1ZM/2	292,100
K1UO	152,568
N6AR/4	119,691
AB6ZV/7	72,570
K9HMB	46,696
W8WW/4	20,276

1.8 MHz

WW2Y	14,809
KC8MK	10,308
AA4MM	7,904
W2VO	6,440
WB9Z	6,016
WA2IZL	4,715

LOW POWER
All Band

WA4ZXA	1,227,042
AC1O/4	1,070,307
NY3Y	834,000
WA1S	792,816
KØEJ/4	764,286
KQ3V	723,415
WA7BNM/6	663,300
WD5K	642,600
KJ4WH	506,985
WA6KUI/4	451,560

28 MHz

KB5ZFO	20,350
KC3PZ	18,630
N8FWA	9,540
N2TDT/3	5,520
WA7NIY	4,785
N2QWR	4,455

21 MHz

AI2C/4	96,728
KJ6HO	90,155
WR3L	79,002
W6EUF	68,355
NW7Q/Ø	63,960
W1XK	55,170

14 MHz

K1VUT	188,727
N4MO	170,107
NI5M	154,070
W7FP	142,692
K2MFY	141,700
KB8IBS	108,720

7 MHz

WB2ZTH	22,659
WW3S	21,762
W2FGY	11,407
W3CPB	6,435
N2ALE/6	440

3.7 MHz

W1MK	2,016
AF8C	252

QRP
All Band

N1AFC	328,068
AA2U	307,060
KA1CZF	145,112
KØRI	106,863
WB3ECU	40,584
W8QZA/6	40,040
NZ5A	37,973
N8AXA	28,792
WØHEP	6,132
N7JXS	5,700

ASSISTED
All Band

AA1K/3	2,882,554
KE3Q	2,800,749
KS1L	2,645,277
K3NZ	2,462,136
K3WW	2,456,019
N3AD	2,402,360
N3RR	2,305,840
K1KP	2,191,080
K2TW	2,030,427
NN3Q	1,656,480

MULTI-OPERATOR SINGLE TRANSMITTER

KF2ET	5,281,560
N3RS	4,559,520
K1NG	4,169,364
K4ISV	4,164,464
WA2VUY	2,835,150
K5MR	2,748,825

MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	10,773,260
N2RM	10,653,600
K3LR	10,332,618
W3LPL	10,113,178
W2PV	7,975,702
K1KI	6,937,164

BAND-BY BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
ZD8Z	19/11/16	180/22/51	609/25/74	1148/35/138	2295/31/138	1294/27/124
P4ØE	169/9/25	436/18/57	1003/23/87	1378/31/117	2380/28/110	729/23/57
P4ØW	127/10/29	465/19/77	857/23/81	1378/25/93	2270/26/102	970/22/57
9Y4H	283/10/29	533/21/73	838/24/82	1213/25/76	2298/31/124	683/21/56
3V8BB	289/10/56	575/20/80	716/26/90	1192/34/121	1080/34/122	346/21/73
8R1K	96/8/18	328/16/66	765/23/84	1351/31/95	1740/27/97	346/16/38
4V2A	4/3/4	341/14/54	1078/23/84	1926/33/120	2174/25/103	255/16/31
V85HG	5/5/5	45/15/24	633/26/55	1088/31/76	1928/32/89	818/23/56
GIØKOW	233/8/50	636/14/70	593/23/90	2077/33/122	856/33/124	89/10/362
FG5BG	78/6/20	429/13/60	979/19/68	1335/26/100	1310/20/80	571/17/53

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

Station	160	80	40	20	15	10
ZXØF	25/9/27	250/26/86	1736/32/119	1541/38/159	3546/36/156	1022/30/131
HC8N	264/12/28	489/24/84	1474/30/108	2213/34/142	3111/34/142	737/23/71
EA8ZS	36/6/32	4590/22/87	1192/31/115	1431/35/132	2104/33/141	204/23/98
CT3BX	59/7/42	541/17/73	505/25/90	1291/34/138	2486/34/136	573/19/96
IO4A	91/12/69	319/29/113	1019/34/139	1821/39/156	1455/38/156	181/26/97
8P9Z	249/10/31	401/19/82	1418/28/111	1614/32/137	1930/31/120	798/23/78

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

Station	160	80	40	20	15	10
PJ9E	723/16/58	1590/26/105	2178/31/118	4165/38/169	3453/32/151	1437/24/93
V26B	637/15/56	1306/21/90	2414/28/114	3989/36/162	3595/32/154	1360/23/97
TK1A	969/12/71	1968/24/113	2717/33/132	3411/39/166	1771/38/165	1141/23/97
9A1A	849/17/83	1468/35/127	1979/37/132	2434/39/162	1890/38/169	422/25/95
M6T	955/9/67	1722/27/108	1811/31/131	2622/40/174	1622/35/172	316/22/80
OT6A	907/10/63	1534/23/100	2019/34/129	2480/40/144	1129/35/142	387/21/78

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K5ZD/1	41/11/28	236/16/74	304/27/86	966/34/125	724/27/110	70/9/26
KM9P/4	44/12/29	176/23/71	155/25/73	952/35/135	551/29/116	143/14/33
N6BV/1	26/8/23	158/17/56	140/23/69	898/32/122	815/24/116	71/11/20
K3ZO	30/9/23	203/21/63	281/28/83	974/36/123	454/25/100	50/8/18
K1IU	24/5/15	137/17/58	284/24/81	722/29/104	862/24/95	70/10/24
W3BGN	45/11/28	172/19/64	134/25/68	684/33/107	607/24/98	75/11/27
W9RE	45/10/27	115/21/60	172/26/76	605/34/125	578/27/114	95/11/35
K1RU	25/4/13	110/14/56	168/24/71	681/34/107	740/23/105	66/10/23
N2IC/Ø	34/12/21	135/22/47	302/29/74	1019/35/120	182/25/82	22/7/13
KE9A/4	30/9/20	96/15/55	127/24/69	749/32/112	518/26/102	58/9/21

USA MULTI-OPERATOR SINGLE TRANSMITTER

Station	160	80	40	20	15	10
KF2ET	29/10/29	247/21/83	333/30/98	1208/36/142	826/27/138	87/16/50
N3RS	39/12/35	287/26/87	199/29/87	836/37/155	847/27/142	65/18/53
K1NG	40/13/35	176/24/81	359/26/94	764/36/141	751/28/135	97/17/44
K4ISV	30/11/26	158/26/73	207/31/95	1230/31/168	538/30/139	57/15/43
WA2VUY	29/7/21	126/22/73	193/27/82	721/35/134	491/27/128	68/15/44
K8LX	24/9/21	74/18/48	159/29/82	854/36/146	570/25/112	33/7/26

USA MULTI-OPERATOR MULTI-TRANSMITTER

Station	160	80	40	20	15	10
KC1XX	207/13/41	761/24/102	672/32/113	1784/38/165	1570/28/154	305/16/46
N2RM	202/14/48	649/27/106	651/33/110	1536/38/167	1561/28/150	266/20/59
K3LR	156/13/40	835/26/95	698/34/119	2042/39/179	1069/29/145	215/15/44
W3LPL	290/16/50	535/26/99	668/30/107	1922/39/171	1035/28/143	316/20/65
W2PV	109/12/39	422/23/83	438/31/103	1875/38/158	1162/26/146	223/16/46
K1KI	105/13/42	465/23/88	472/31/105	1194/39/156	1135/28/141	207/18/48

N5TJ, N6ZZ, N8BJQ, N9RV, W2RQ, W3ZZ, W7EJ, and W9RE. Our DX advisors were very helpful in offering advice, providing information, and sorting out potential problems; they were CT1BOH, DL6RAI, EA3DU, G3SXW, I2UIY, JE1CKA, OH2KI, OH2MM, OK2FD, ON6TT, PY5EG, S5ØA, SM3SGP, UA9BA, and VE3EJ.

A special thanks to Dick, N6AA, who again spent countless hours to make the CQ WW database the best in contesting. The CQ WW uses the software developed by N6TR to create the database. John, K2MM, set up and managed the <CQWW.com> internet site and Larry, N6TW, was valuable in retrieving data from e-mail submissions. And thanks to John, K1AR, for his advice and hard work to make the CQ WW so successful.

Congratulations to all the winners. Try to get a fellow contester on for a local, friendly competition, and join us this year for the 50th running of the CQ WW.

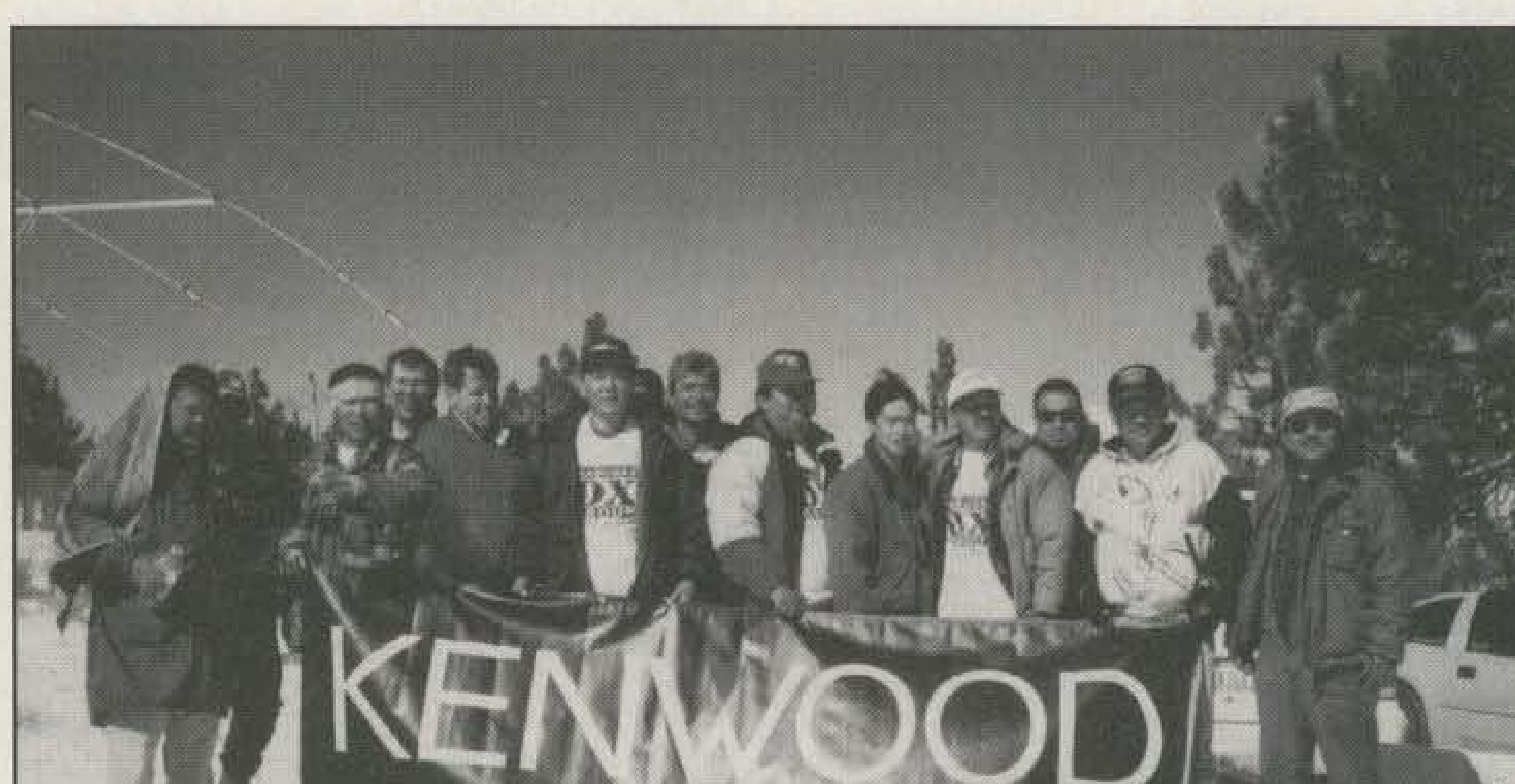
73 and CU in '97, Bob, K3EST

DX QRM

Congratulations! This was my first contest in radio amateur bands and it's amazing! I really enjoyed it . . . . *PU2NVC.* Always a great opportunity to work new band points. Fifteen meters was great to the US and Asia. . . . *LX1NO.* 5 Ops = 76 Years! . . . *9A1CFZ.* This is our first DXCC contest. We have met many rare stations, so we feel very excited! . . . *BY4BZB.* Was expecting more contacts on 3.7 and 7 MHz but conditions did not help. . . . *AP2NK.* Propagation seems to be getting better as 133 countries were worked. Fifteen meters was really open as over 1000 QSOs were made, but toooo much QRM on 40 meters. . . . *SV1DKR.* VE1ZZ QTH can hear!

Too bad propagation was terrible. Nice to be back to CQ WW after 10 year QRT. . . . *VE3BMV (at CG1ZZ).* No propagation to Asia. Heard W7's working Asia. Europe Sunday morning only. Fifty years of contests here, 83 years young. . . . *VE4RP.* First contest from my new "contest QTH" in a mountain 1200m high, excellent place. See you next year. . . . *ZX5J (Opr. PP5JR).* It has been such a pleasure to participate in such a nice contest! . . . *RZ6HX.* Winter came too soon. Only antennas 80 meter quad and 160 meter vert. . . . *VY1JA.* Incredible conditions on 160. I worked 102 countries but 101 reply to my CQ! KL7, XX9, HS1, V85, ZL . . . each QSO was an intense emotion for me. Thanks to CQ WW contest. . . . *IG9/IV3TAN.*

All operators of our MS licensed since 1996. . . . *IZ1AOE.* Very nice contest but very hard to work with 40W. . . . *UA1ZKZ.* I chose 7 MHz because I was very busy during day time. Running barefoot among the European QRM, I was almost unreadable. It was fun. . . . *9K2/YO9HP.* It was very nice to meet so many friends in Lampedusa this year. Tks to Antonello, IT9EQO, for the spare diodes I needed after my amp broke on Friday afternoon. . . . *IG9/IT9GSF.* A real rest on character, poor bands, but great team spirit. Better antennas on the low bands next year! . . . *ZM2K.* We did enjoy the contest from the beginning, but during the contest the boom of the 20 meter beam broke so we lost a lot of time to take it down. . . . *PI4CC.*



The WD6DJY contest gang standing on their snow-covered mountaintop.

MIRAGE...100 Watts...$199

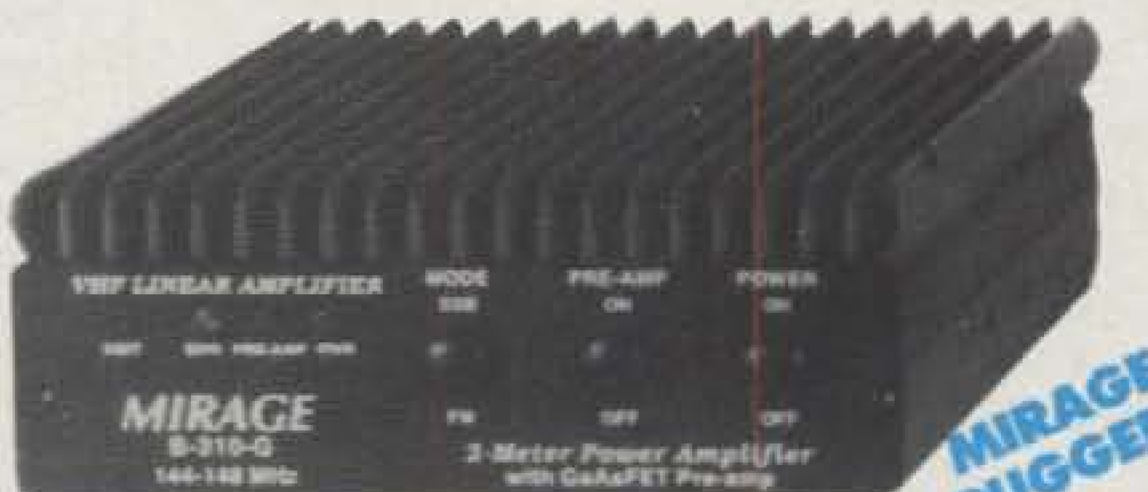
Boost your 2 Meter handheld or multimode** (like ICOM 706) **to a super powerful 100 watts . . . All modes: FM, SSB, CW . . . 15 dB GaAsFET receive preamp . . . Reverse polarity protection . . . Silent cooling fan . . . Free HT-to-amp coax and mobile bracket

In Stock at ham dealers everywhere!

Call your dealer for your best price

$199 NEW!

B-310-G Suggested Retail



Power Curve -- typical B-310-G output power							
Watts Out	*25*	*50*	*75*	*95*	*100*	*100+*	*100+*
Watts In	*1/4*	*1/2*	*1*	*2*	*4*	*6*	*8*

For an incredibly low $199, you can boost your 2 Meter handheld to a super powerful 100 watt mobile or base!

Turn "You're breaking up . . . Can't copy" into "Solid Copy . . . Go ahead."

Talk further . . . Reach distant repeaters . . . Log onto faraway packet bulletin boards.

This rugged Mirage B-310-G amplifier operates *all modes*: FM, SSB and CW. It's perfect for *all* handhelds up to 8 watts *and* multi-mode SSB/CW/FM 2 Meter rigs.

It's great for the ICOM IC-706 -- you'll get 100 blockbuster watts on 2 Meters!

Low noise GaAsFET pre-amp

A built-in *low noise* GaAsFET receive pre-amp gives you 15 dB gain -- lets you dig out weak signals.

Fully Protected

SWR Protection prevents damage from antennas whipping in the wind. *Reverse Polarity Protection* can save your amp if you connect power backwards.

Compact but Powerful

Mirage's integrated *HeatsinkCabinet™* and whisper quiet fan gets heat out fast!

The results? An *ultra-compact* 4¾x1¾x7¾ inch 2½ pound amplifier that delivers a *super powerful* 100 watts.

Free Accessories

Free 3 foot handheld to B-310-G coax cable -- just plug and play! ***Free*** mobile bracket! ***Free*** rubber mounting feet for home use!

Plus more . . .

Automatic RF sense Transmit/Receive switch. Remote keying jack. LEDs monitor "On Air", high SWR, pre-amp, power. Push buttons select SSB/FM, pre-amp, power. Draws 15 amps at 12-15 VDC.

Full one year MIRAGE warranty

With Mirage's legendary ruggedness, you may never need our superb warranty.

Dual Band 144/440 MHz Amp

$159.95 BD-35 Suggested Retail

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	*30*	*40*	*45*	*45+*	*45+*	*45+*	*45+*
Watts Out (440 MHz)	*16*	*26*	*32*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*

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

Works with all FM handhelds up to 7 watts. Power Curve chart shows typical output power.

Full Duplex Operation

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

Mirage is the Best! Here's why . . .

- ***Automatic frequency band selection*** --you'll never forget to switch bands
- ***Single input connector and single output connector for both bands*** -- easy to use with dual band radios and antennas
- ***First-class strip-line techniques*** -- superb RF performance and reliability
- ***Custom wrap-around heatsink*** -- runs cool
- ***Reverse Polarity Protection*** -- saves your amp if you connect power backward
- ***Automatic RF sense Transmit/Receive switch*** -- makes operation easy
- ***Low input SWR*** -- keeps your handheld safe from overheating
- ***"On Air" LEDs*** -- for each band
- ***Free mobile mounting bracket***
- ***Free 3 foot handheld-to-BD-35 coax cable***
- ***Small size:*** just 5x1¾x5 inches
- ***Full one year MIRAGE warranty***
- ***Legendary MIRAGE ruggedness***

Call your dealer today for your best price!

35 Watts for 2 Meter HTs

B-34-G

$89.95

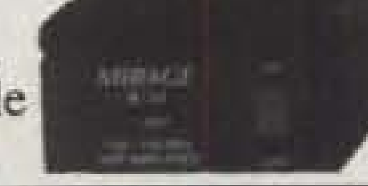
Suggested Retail

Power Curve -- typical B-34-G output power								
Watts Out	*18*	*30*	*33*	*35+*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
- ***Custom heatsink, runs cool***
- ***Works with handhelds up to 8 watts***
- ***One year MIRAGE warranty***

MIRAGE RUGGED!

35 watts, FM only . . . $69.95



B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

160 Watts on 2 Meters!

B-5016-G

$299

Suggested Retail

Power Curve -- typical B-5016-G output power								
Watts Out	*130*	*135*	*140*	*145*	*150*	*155*	*160*	*165*
Watts In	*20*	*25*	*30*	*35*	*40*	*45*	*50*	*55*

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

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

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard™*.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1, $45, Remote Control. On/Off, pre-amp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5½ in.

More 160 Watt, 2 Meter Amplifiers . . .

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TEAM CONTESTING

1. **Neiger's Tigers: 42,137,267.** By 9Y4H (Opr. K6NA), EA8AH (Opr. OH1RY), P4ØW (Opr. W2GD), P4ØE (Opr. CT1BOH), ZD8Z (Opr. N6TJ).
2. **Team Nippon: 19,645,052.** By JH7PKU, FG5BG (Opr. JF2DQJ), V85HG (Opr. JO1RUR), 6Y5XX (Opr. JE3MAS), 3DAØNX (Opr. JM1CAX).
3. **Yugoslavian Contest Team #1: 18,714,797.** By YU7AV, YU7BW, YU7CB, YT1AD, 3V8BB (Opr. YT1AD).
4. **Team Handkey: 14,955,781.** By K5ZD, K1IU, KM9P, W9RE, N2IC.
5. **Contest Club Finland: 14,799,408.** By 8R1K (Opr. OHØXX), CT3/OH6LI, OHØMM (Opr. OH2MM), OH1EH, OI6YF.
6. **Team Bravo: 7,525,868.** By YB9BV (Opr. AA7VB), N6BV, IT9BLB, AI7B, KB1GW.
7. **Team Slovenia: 6,152,488.** By S50A, S51FA, S59L.
8. **Team Commonwealth: 4,070,445.** By GW4BLE, GWØGEI, 8P6CV, VP2E (Opr. WB5CRG), G3WGN.
9. **Minolta-Ukraine: 3,934,620.** By UT4UZ, UX1UA, UX4UA, UX4UM.
10. **Over the Hill Gang: 2,394,850.** By W9KDX, K9BG, K9RN, AA9LX, N9ITX/7.
11. **Honk If You Love Contesting: 1,530,430.** By WA4ZXA, AA1EY.
12. **French CQ Gang: 1,418,268.** By TM6Z (Opr. F6JSZ), F5NBX, F5BSB, F6EEM, F5SJP.
13. **Yugoslavian 14 MHz Contest Team: 1,368,696.** By YT1BB, YU7BJ, YU1NR.
14. **Team Tennessee: 1,263,312.** By KØEJ, W4OGG, WA6KUI, KC4URW.
15. **Yugoslavian QRP Contest Team: 642,788.** By YU1LM, YZ1AA, YU1EA, YU1KN, YTØX.
16. **Hanging Judge Contest Team: 589,370.** By AB5SE, KG5NE, AC5BR.
17. **Yugoslavian Low Band Contest Team: 330,834.** By YU1ZZ, YZ1AU, YTØT (Opr. 4N1DXX), 4N1A (Opr. YU1UA).
18. **Number Thirteen: 88,400.** By EA1FAK, EA1FBO, EA1KK, EA1OT, EA1MK.

Japanese 75 meter phone band (3791-3805) is very crowded and many QRM. So please transmit outside of JA phone band and QSX JA frequency. On the other hand, 3747–3754, the additional new JA phone band, is not so crowded; please QSX this frequency. . . . *JE1SPY.* First contact on 28 MHz with North America this season. . . . *JE7DOT.* One-hundred watts maximum allowed for the YY category, novice. . . . *YY4GLE.* Unfortunately, due to terrible propagation and because we had just 100W we could not do as many QSOs as we would have liked. . . . *8Q7BT.*

Heard many DX stations on 80 and 160 but 100W is tough on the low bands. . . . *LP7N (Opr. LU2NI).* No PC, no BBS, etc., only hands and ears. . . . *SP5BB.* A serious entry this time more than doubled last year's score. Conditions weren't wonderful, but added two new all-time new ones and heard but didn't work four more. . . . *G3WGN.* Best contest of my life. The new tower and monobanders worked like a dream. All the hard work to put them up paid off. . . . *WA4ZXA.* I am a student and have been a ham for two years. For someone getting to the hobby, now is a great time because there is only one way to go and that is up! . . . *VE2SKA.* This is my 25th CQ WW DX Contest entry and my 1865 contest log entry overall. . . . *YU7SF.* We were located on the 6th floor, about 12 square meters, only one transceiver. . . . *BY5WS.*

My antenna is surrounded by buildings in Tokyo. But this time, because the propagation was extremely good, it was possible to contact a lot of stations. . . . *JE1BDC.* Fun, fun, fun! Despite no power for solid 6 hours. . . . *DU9RG.* My goal is to find new ones and to give a new multiplier to many guys! . . . *Z32KV.* My amp is not enough for surfing in the QRM. I lost my voice at 17 hrs. Hi. Nice competition in spite of the damage. . . . *F2NH.* I couldn't break the 3500 QSO barrier due to lack of JA's and two day electrical storm. Thanks to LU8DPM for lending me his fine station. . . . *AY7D (Opr. LU7DW).*

Many thanks for this high activity contest. I caught more than 1200 QSO and worked some new countrys. . . . *RU6BV.* Conditions were good to Africa, the Far East, and South America, but could not hear any North America during the contest. . . . *4X1VF.* I still need something better for 80 and 160. The M6O call helped but not as much as I as expected. . . . *M6O (Opr. G4OJH).* I had to fight to break into the incestuous triangle: USA-EU-CAR-JA to get QSOs. On many occasions, I could not break through! . . . *VK8AV.* Just starting the contest, one tube of the amp goes QRT! But all is not negative, 500W instead of 1000 makes much more quiet TV, radio, telephone, and XYL! . . . *EA3ALV.*

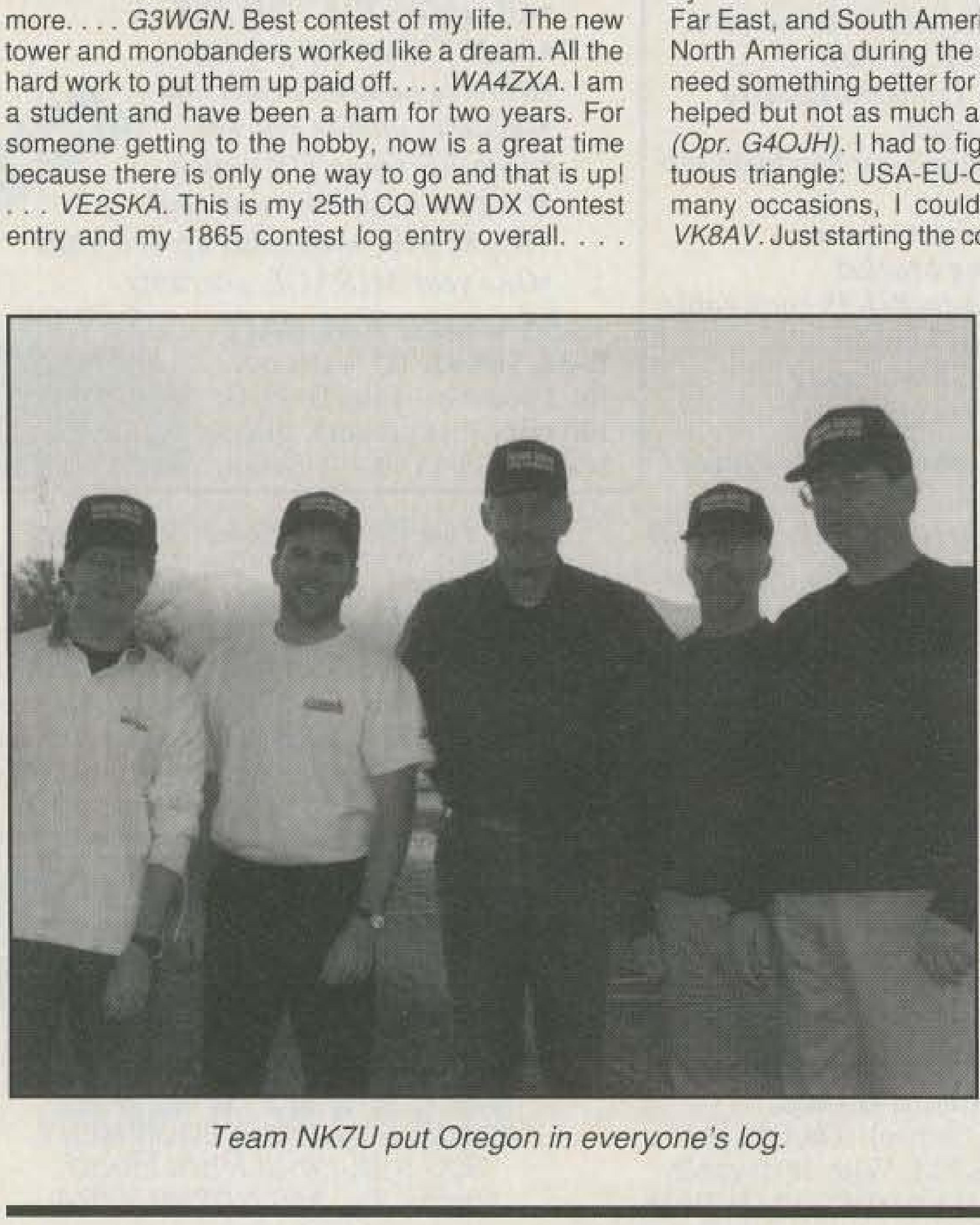
I found 10 meters open all day here and on the second day even into the night! . . . *EA6ZY.* My first contest ever. I have been a ham for 6 years. I did not know they were so much fun. . . . *VE9BL.* It was unbelievable to work XX9X, VS6WO, and YB9BV on 10 meters. The "best of the best" happened on 15 meters. I still do not know how I broke the NH2C huge pileup running only 100W and 3-el Yagi. Incredible! It was sure one of the best DX's since I became a ham! I can't wait for next year. . . . *CT1EAT.* I really enjoyed this year's contest. At times the QRM was high, but overall I loved every minute of the contest. . . . *ZS6H.*

Thanks to LA7SL for QTH and hospitality. . . . *LA9VDA.* To just be present and distributing points is a pleasure, too! . . . *DL8WCM.* During the contest we made 404 QSOs, but unfortunately we lost 293 QSOs because of computer failure. The rest we send as a check log. . . . *4N7Z.* Very enjoyed wrking ED9EA and OD5NJ on 1.8. This a new one! But no copy NA. Sri QRN. . . . *UT1ZZ.* My time limited this year, but definitely one of the most enjoyable CQ WW's yet! . . . *VK2ARJ (ex-VK1RJ, P29RJ, VK9RY).* Tried 40 meters for first time. Ground-mounted trapped vertical does not make the big signal. I'll be back next year with a better antenna. . . . *VE3ZD.*

We had a great time! Conditions on 15 better than 20 meters. The 2-el 4-10 meter quad was finished just days before the contest. . . . *VK6LW.* Operated in the same area as 4F5CM. We both were single band entries. Tried to get locals interested in a club entry but no go. . . . *4F5MW (Opr. WD5AAH).* I am a contest man. My second hobby is collecting pins/badges on amateur radio. . . . *UR8V (Opr. UX2VZ).* I had a lot of fun as usual. I think I'm addicted to this crazy sport! 73's to all my friends. . . . *VK5GN.* Never worked so many new countries on 10 meters in a weekend before, let alone at the bottom of the sunspot cycle with low power and just a vertical. . . . *ZD8DEZ.*

Amazing how many stations called me by name. So I have lots of friends or N6TR is really popular in Russia! . . . *OH1NOA.* I could spend the whole time with the contest because I went dancing! My age is 76 and this was my 410th contest. . . . *VK2APK.* Many thanks to LW8DXJ for your station. Without his help I cannot make this contest. . . . *LW2DBM.* Operated from the world's largest geothermal plant at Ormoc, Philippines. . . . *4F5CM (Opr. KK5CM).* Low power on 80 meters means you cannot CQ! But even with my inverted-L, I managed to work about 60 countries. . . . *SV1DET.* Conditions raised again for the contest. Even 10 meters was well open to Far East. . . . *OH6YF.*

I could only work one African station, but it was great for my small antenna. WW contest is always exciting! . . . *JL7PVR/1.* Condx from northern Europe



Team NK7U put Oregon in everyone's log.

ZONE LEADERS SINGLE OPERATOR

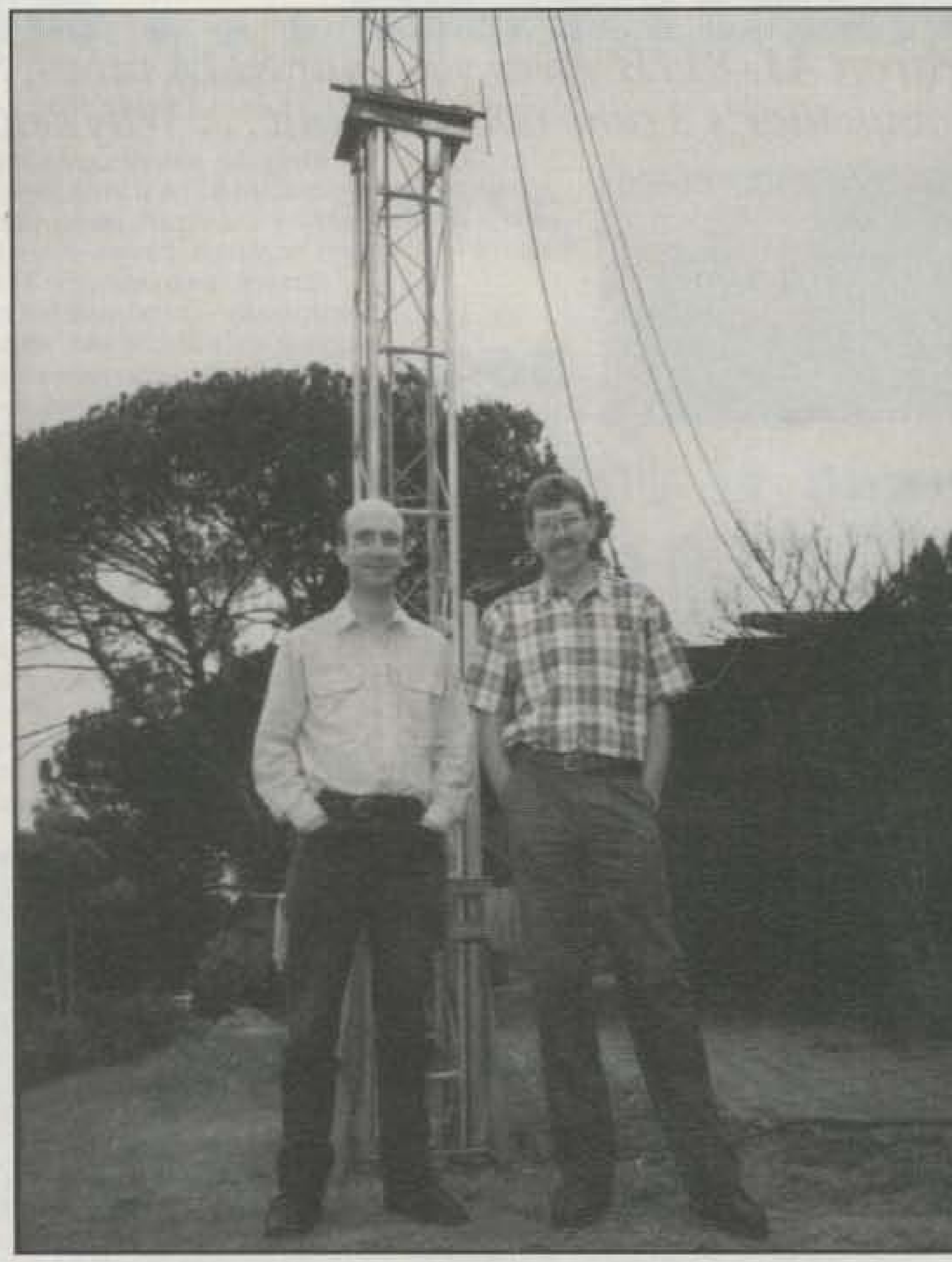
Zone	Call	Score	Zone	Call	Score
1	NL7DU	124,016	21	A71CW	3,081,843
2	VE2TVU	404,982	22	VU2PAI	1,041,074
3	N7AVK	1,766,721	23	JT7AA	83,349
4	CI3EJ	5,117,408	24	VR2RX	204,294
5	K5ZD/1	3,378,064	25	JAØQNJ	2,411,442
6	4A1FEC	723,040	26	No Entry	
7	V31MX	179,760	27	DU9RG	3,726,692
8	4V2A	6,857,970	28	V85HG	5,811,663
9	P4ØE	10,479,765	29	VK8AV	195,447
10	OA4EI	994,432	30	VK3TZ	439,825
11	ZX5J	2,976,190	31	AH7G	4,977,736
12	CE3F	1,091,249	32	AH8A	907,326
13	LTØA	2,719,360	33	3V8BB	8,529,972
14	GIØKOW	5,787,333	34	No Entry	
15	S5ØA	4,206,860	35	5NØMVE	5,458,896
16	UT7EZ	4,141,984	36	ZD8Z	11,253,304
17	UN5F	589,842	37	5X4F	676,436
18	RZ9UA	637,760	38	7P8/OE2VEL	4,935,550
19	RAØFA	126,430	39	FR5DX	4,843,744
20	TA4ZM	3,238,785	40	TF7/W4WET	55,200

TOP SCORES IN VERY ACTIVE ZONES

Zone 3		Zone 14	
N7AVK	1,766,721	GIØKOW	5,787,333
K6GX	1,027,650	DJ4PT	3,183,040
VA7A	933,660	GW4BLE	2,839,187
W7RM	701,590	EA3FQV	1,957,940
WK6V	685,926	DL8PC	1,911,420
*WA7BNM/6	663,300	DJ6QT	1,642,683
*KC6ETY	427,682	DL2DXX	1,547,686
K6HNZ	399,008	F6HLC	1,467,729
W7OM	397,365	M6X	1,329,310
K7LUH	360,960	EA3GHQ	1,316,616

Zone 4		Zone 15	
CI3EJ	5,117,408	S5ØA	4,206,860
W9RE	2,553,226	YT1AD	3,630,844
N2IC/Ø	2,292,796	IO4LEC	3,333,804
WZ4F	1,933,920	YU7AV	3,151,470
W5WMU	1,441,350	IO6F	2,810,119
KB8TI	1,259,440	YU7BW	2,749,918
K5NA	1,151,183	OHØMM	2,250,675
*VE3KZ	1,053,290	OH1EH	1,921,328
CI3XN	1,033,051	IT9STG	1,724,556
N5DX	990,192	S59ZA	1,610,240

Zone 5		Zone 25	
K5ZD/1	3,878,064	JAØQNJ	2,411,442
VP9ID	3,479,509	JA8RWU	1,924,296
KM9P/4	3,438,505	JH7DNO	1,126,762
N6BV/1	3,113,496	JH5FXP	854,501
K3ZO	3,021,699	*JEØUXR	714,696
VO1MP	2,836,984	JI2UNR	547,630
K1IU	2,793,190	*JE3HDD	486,408
W3BGN	2,491,055	JF3CCN	456,240
K1RU	2,480,016	JF1OPL	439,971
KE9A/4	2,220,596	*JA6WFM	413,098



The Eastern Hills Contest Group (left to right): VK6VZ and VK6LW.

very poor, particularly for NA. Great contest as always. . . . *ES7RE.* Won't you be surprised to hear that we had no single breakdown this year? When you have to stop 3x3 hours that you realize that you are not a young boy any more. But age is wisdom they say! . . . 5N36T. We felt that with our 100W we were QRP given the signals around on the bands. . . . *ZB2BU.*

Vy nice openings to JA both Sat and Sun mornings. Not good opening stateside. Even KC1XX and others were quite weak here. Quite difficult to work zone 4 from here. . . . *OI1AF (Opr. OH1MDR).* Still same excitement since my first CQ WW 27 years ago! Tnx. . . . *TA2DS.* Lost my voice totally for two days due to heavy cold. Now considering buying a DVP. . . . *DK1FW.* Some hours before the contest the electrical company damaged a high-voltage transformer. Fortunately, they had a spare part so we lost only 15 minutes of contest time. Thanks to all who made this event possible. . . . *CT3BX.* Propagation was very good, but I still have problems from a high-voltage tower near my contest station. I must use other antennas for receiving. This the second WW with my callsign and I'm very happy to make more than 15 new countries for me! . . . *YZ7ED.*

Had to work on Saturday morning and had 7 hours of mains shortage. Not really good for a contest. . . . *J28JY.* The long path to Zone 8 area was open around 12z on 15 meters. Please check JA by turning antenna to the south. . . . *JL1MUT.* I really enjoyed the LU pileup on Sunday on 10 meters. Nice to have life coming back to 10. . . . *7Z5OO (Opr. K3UOC).* First time to try a SSB contest running only 100 watts. A great challenge but tremendous fun! Maybe next I'll try QRP. . . . *EI6FR.* CQ WW is the best contest in the world. . . . *PU7TDD.* I had a tube failure two hours before the end of the contest, but I was having so much fun that I didn't care! . . . *PY1CAS.*

When I could not copy USA with the beam at 320 any more, there were the ZS and LU stations. I could work Europe only after their sunset. . . . *VP2VF.* I never called CQ. Only answered the calling station. I like to be in a contest this way. . . . *F6GKQ.* I got my ticket late Nov. 95. My first CQ WW. It's been one of the highlights of my one year ham career. . . . *ON4CAS.* Rig "died" after only three QSOs! Screaming stopped after noticing the "timer button" had been accidently depressed! . . . *G4KIV.* The PBØ calls have their license for the entire HF bands since 4 Oct. 96. There are only 300 calls at most. For me it was quite an experience to do an HF contest. Really enjoyed it. . . . *PBØANR.*

Station was aboard the Alaska State ferry M/V Malaspina which was moored at Ketchikan, Alaska in shipyard status. . . . *KL7IWC.* I had only limited time for the contest this year, but still had great time. Very good propagation on 15 meters and on low bands. Hope to be more active in CW part (from 9A1A). . . . *9A2EU.* Murphy attacked me very early in the contest and left me with no DVK, the computer failed on several occasions, the antennas performed poorly, while the direction indicator of the rotator was not working. But this is what contesting is all about anyway! . . . *C4ØM (Opr. 5B4AFM).*

Thanks to the 5th Signals Company of the Portuguese Army in Luanda to make participation in this contest so much fun by letting me use their 10-element log periodic array. Signals from Africa CAN be loud!. . . . *D25L (Opr. PA3DZN).* To stay competitive, and like almost ALL other participants, I had to work stations, which were listening below 7.040 MHz (including some very well known contesters, even members of the CQ WW DX Contest Committee!) If you like to disqualify me for this, please feel free to do so, as you will have to do then with almost all other participants! Something need to be done about this in next year's contest, otherwise the fun will be again much more less. Single ops can anyway just S&P due to extremely high participation of too many M/M and M/S super power stations, which occupy all available bandwidth. . . . *DF2RG.* The "tailend" of Hurricane Lily passed the south coast of EI, with gusts of 100 mph+ which wrecked our 15 meter beam and also damaged the 20 meter beam. There is now a job list as long as your arm to be completed in time for the CW leg. . . . *EI7M.*

The "queen of the bands" gave me again the fun I hoped! Same QSO and Zone, and some Countries more than the 1995's edition, having same rig and fun. Hoping in a rising solar activity: see you in next pileup! . . . *IT9BLB.* Top band has changed dramatically during last 10 years I have been missing from the band. European QRM is now as strong as Russians QRM I have experienced in the past above 1840 kHz. Due to the relative weakness of the DX signals on 160 meters it is a great challenge now for one to be able to pick up the DXes, if he is not having beverages and top hill countryside location. Had to QRT for 7 hours because of terrible flu. Still great fun. Congrats to the OLD MAN JIM (N6TJ) for a great win. . . . *P4ØE (Opr. CT1BOH).*

The callsign was changed from PJ9B to PJ9E to honor PJ9EE who went silent key two days before the contest. Chet was instrumental in building the contest station on Bonaire. Over the years he helped many contesters set record-breaking scores through his engineering skill, gracious hosting, and lifelong love of our hobby. . . . *PJ9E (ex-PJ9B, PJ1B).* Strange—the entire contest passed without one single hardware failure. Let's hope things stay that way for the CW test in November. Well, we could use a bit better propagation, of course—hi. . . . *SL3ZV.*

Used the first major worldwide contest from this location mostly for monitoring of conditions and openings. Interesting findings (e.g., 10 meter openings into Caribbean at local midnight). Nearly lost the voice totally after two thirds of the contest (never SSB without CQ machine again). Despite the good condx on 15 and 10 the 20 meter band was nearly dead the first day. Next goal: Good antennas for 400, 160. . . . *YB1AQS.*

USA QRM

I moved back to New Hampshire from Kansas. This contest allowed me to learn the ways of propagation from NH. I also learned the weakness and strengths of my station. Lots of fun. . . . *WQ1H.* Loved it! Worked J3A on five bands. Enjoyed Europe and Africa on 40. . . . *KD4CDB.* Thanks to VE/Canada for making this score possible. . . . *K1ZM.* Great contest! Nice to have 15 meters back, but did miss the polar path to Asia. . . . *AI2C/4.* Thanks to N5NMX for the use of his station. . . . *KB5ZFO.* WD6DJY operated from Frazier Mt, California at 8800 asl. Our last contact was with VK4UA on 15 meters: "VK4UA qsl 5930 you are 5903 . . . It's snowing up here! (Maria, KC6ABM). . . I don't believe you (VK4UA)! We'll send you a QSL card that proves it! . . . *WD6DJY.*

Thanks to KØKE for using his station. How many others endured the brain damage to do 40 meter QRP? . . . *WØKEA.* First contest in over ten years. My, how the country prefixes have changed. . . . *K6SE.* The 15 meter beam I wrote up for *CQ* worked great! Thrill working FK5DX and VR6MW with it. . . . *NZ5A.* I had a good time working the 32 countries which I was able to hear on 28 MHz. At least I beat last year's score. . . . *KC3PZ.* This is my second CQ WW SSB. With 50 watts and 2-el X-beam fixed-pointed east in a town house attic, or a metal chimney liner loaded as a vertical, SSB DX takes more patience than CW. Exciting to catch CYØ on SSB. . . . *N3UMA.*

QRP, a local S-9 noise level, and the worst propagation of cycle 22 made for a memorable weekend! . . . *W8QZA/6.* KF4LBD got a chance to see what contesting is all about. Think we can expect him to upgrade soon and get into these frays. . . . *K4UK.* IR4T telling me that I had the strongest signal he'd ever heard from California on 40 meters. . . . *K6GX.* Glad I didn't quit on Saturday because of poor conditions. This was my first CQ WW SSB, but not my last. Hope to make a million next year. . . . *NRØX.* I believe this to be my first ever entry into the CQ WW and my first somewhat serious contest participation in years. I learned a lot and hope to be back again next year. . . . *K1TW.* Finally working 9Y4H through the pileup for a new one. . . . *WA2OCG.*

What an excuse to get the non-ham OM to do the laundry. It was fun. . . . *AA9TB (YL).* We got our G5RV up to 25 feet this year instead of last year's 15 feet. So the good lord willing and the creek don't rise, we will see ya'll next year at the Lo End of the MS scores. . . . *W4TMN.* This was my first contest ever entered. I declare that I had immense amount of fun and excitement even though 10 meters was open only for a few hours during the contest. I'm hooked and will return! . . . *N3WUE.* Thanks to LU's for mults and points especially on 10 meters! . . . *WØMHK/1.*

Working DU9RG after chasing for years with a vertical. . . . *N4TJ.* Worked 12 new countries to bring my total up to 89 for this year. I can't imagine how easy it will be to work them when the sunspots cooperate. . . . *KF9YR.* Finding 10 meters open and working VR6! . . . *W7HUY.* At age 80 it was difficult working with low power on a ground-mounted vertical antenna. . . . *W2FGY.* We all had a great time breaking in all the new antennas here. Never did get any decent runs going no matter how much we called. Can't wait till the cycle comes up again. . . . *N2GQS.* My thanks to all the DX community when they give a clear frequency when the DX station comes back to a pip-squeak station like mine. . . . *WJ2R.*

Thanks to everyone for being in such a great contest. I lost 2 hours Saturday morning due to rain static but made up for it Sunday. Fifty percent of my contacts were with Europe. . . . *K4JYO.* I miss those things called sunspots. Twenty meters barely open past sunset. . . . *KC6X.* Used beam and antenna that used to belong to the Hammarlund Co. for DXpeditions. . . . *WD4CNZ.* I had a blast! My first contest as a Tech plus. I sure was glad 10 meters was open. . . . *WB9WFR.* Wow! I had fun again but can't believe I forgot to log a W on 4 out of 5 bands! . . . *K1DWQ.*

I made a decision not to operate "full time. I think I made a mistake. Fifteen meters was like the "old days"—wide open. . . . *KJØB.* My first CQ WW. I worked 11 new countries and enjoyed the challenge. . . . *KQ6ES.* I am 15 years old; this was my first CQ WW. You have a great contest going. I am already planning for next year. . . . *AA8UP.* Eighty meters not as good here as last year but still solid for QRP work. . . . *WA2ASQ.* Great turnout but many could not copy many peanut whistle. CQ WW is still the best of the tests. Continue the good work. Next year back to 15p—Hooray! . . . *N4MO.*

Thirty-six days without a sunspot reminds me just how far away the other side of the world is! . . . *KFØIA.* As usual this is *The Contest.* Had fun even though 10 was gone, gone, gone! . . . *K7ABV.* Despite marginal conditions, I was able to beat last year's score, add four new countries on 160, and have a great time. . . . *W5CWQ.* This test is fun! Wish I had more time, but taking care of grandchildren makes for no time for contesting, but was fun. . . . *NW8F.* Tower collapsed two weeks before test forcing single band 89. Was great to get some sleep for a change. Where were the Africans? . . . *N6AR/4.* Getting into eastern Europe with 5 watts SSB was great. QRM on 20 was very bad. . . . *N4EUK.*

First time on west coast, first time on 40 meters. Different! . . . *W6UDX.* My first contest. Learned how it works. Really enjoyed it. Will be back for more. . . . *KB2WZY.* My first contest in 20 years and had a great time. Goal was to work 100 countries and I just made it. . . . *WDØE.* Conditions at the start of the contest got me excited about getting my new beam on line to improve the operation over the dipoles. So I spent Saturday, in the rain, getting the antenna up. On Sunday I hit a nice opening to LU on 10 meters with the beam. That was the farthest I have ever talked on 10 meters in my brief ham career. . . . *KE4OAR.* Great contest. My first CQ WW. KC5WEG is a 17 year old who made his first HF contact just minutes before the test. . . . *AC5CT.*

How did you get 20 open almost all day, and 15 and 10 for a good part of the day? Glad I became active for this. . . . *W1EWN.* JA runs were disappointing. Too many DX stations not willing to listen up due to QRM in US portion of the band. Heard 15 countries that never seemed to listen up! MUF too low for the NW this year! . . . *AI7B.* I was surprised to work much of anything with this antenna. I think it is more of a tribute to the other ops. Best moment was having TM2Y saying "Hi Bill." Second best was working WP2AHW on 80 meters on the first call. . . . *AA4LR.* Would have been low-power except I wanted D25L from Angola too badly and switched on the amplifier. Actually, 'Toon the Cat worked him by walking up to the desk mic and meowing loud enough to trip the VOX. Since he synched up with the [huge] pile-up he got to work a few rounds until I think the DX operator heard "MEO-OW!" and paused long enough for me to slip in my call and get in his log. Score a New One for the cat. . . . *KJ7QT.*

Had over 8 hours of sleep and my best rate ever in a DX contest. Could these be related?! Special thanks to K1AR's new employer for keeping him otherwise occupied during the weekend. . . . *K5ZD/1.* Conditions were better than I expected at a sunspot minimum, with my all-time highest domestic one-hour rate of 191/hour on 15 meters. I made a really dumb mistake the second day, staying on the 40 meter vertical for about 2.5 hours instead of the 15 meter stack. I wondered why people kept trying to steal the frequency! . . . *N6BV/1.*

Station Operators Multi-Op Single Transmitter

3DAØDX: ZS6WPX, ZS6BRZ, WJ2O. **3E1DX:** HP1XVH, DL8RBR, DL5RBW, HP1BUM. **4M5X:** YV5JDP, YV5EED, YV5IQJ, YV5JCN, YV5LMW, YV5MHX, YV5RW, WM2C. **4N7Z:** 4N7TA, YT7XT, Struhar, Forgac, A. Lomen, I. Lomen. **5B4ES:** Pateras, Loannides, Roussos. **8P9Z:** K4FJ, K3KG, KI6IM, WA9L, W2NA. **8Q7BT:** EA3BT, EA3AOK. **9A1CFZ:** Tuna, Marko, Miro, Fantaz, Nikola. **9A1CHP:** Mark, Hrle, Alen. **9K2RA:** 9K2RR, 9K2NM, 9K2LL. **AAØYX &** KGØZI, KBØUGE. **AA1KY &** N1UVA, KE1GF. **AC5CT &** KC5WEG. **AC5HF &** N5MTS. **AC6CI &** RAØFC. **AD4TG &** KC4HW, WA4EMU, WA4VQD, AA4FC, WA4HDS, AF4Z, KAØYSO, K9ES, KB9YW, KT4FY. **BY1BY:** BZ1WIN, BZ1LHD, BZ1PJ, BZ1WY. **BY4BZB:** BA4AA, BG4FJ, BZ4DFP. **BY4RSA:** BA4RC, BD4RF, BD4RX, BD4RD, BZ4RDA, BD4RW. **BY4SZ:** BZ4SBA, BZ4SCK. **BY5WS:** Z. Zheng, W. Zhang, H. Wu, R. Qiao.

C31LD & C31LJ, EA3NY. **C6A/K8DD &** AC8W. **CE5JA:** CE5BPE, CE5RHS, CE5TZK, CE5VMD. **CS1A:** CT1DXQ, CT1ESQ, CT1FAC, CT2FUN, CT2GDF. **CT1L:** CT2FUR, CT1DSJ, CT1EGF. **CT3BX &** DK1BT, DK3WW, DK7YY, DL3DXX, DL7BY, DL7UBA. **CT8T:** CT1AOZ, CT1DVV, CT1EEB, CT1ESV. **CV1T:** CX1TM, CX2TG, CX2TL, CX1TG, CX6TG, CX5TH, CX3TQ, CX7TK, CX5TV, CX5TS, CX2TJ. **DFØAT:** DF6QN, DF6QV, DJ8CR, DL9NC. **DFØHQ:** DL1AUZ, DL3OI, DL5ANT, DL5AXX, DL5MX, DL5YY, DL7VOA. **DF3CB &** DL1MFL. **DJ2YA &** DK1RV. **DKØMM:** DJ7IK, DJ8WL, DK9ZT. **DK4UN &** DL2JRM. **DK8TU &** DF4SA. **DLØBI:** DK1QH, DL9YED, DL5YEQ, DH4XBF, DL6YFD. **DLØMBG:** DL8AYI, DL8AKA, DL1AOQ. **DLØNB:** DL4RCM, DL9RCD, DL6UWA, DJ7CN, DL2JNF, DH5NBE, DL7RAJ. **DLØTD:** DG2FEF, DH4FBP, DK7WJ, DH5IAE, DL1FDT, DL1FDV, DL2FZN, DL2ZBN, DL4FMA, DL4VBP, DL8AAU, DL8OBC. **DLØUM:** DF3ZV, DH3FBX, DK7ZH, DK7ZT, DL1ZBE, DL2FJ, DL4FDT, DL7AOJ, DL9FCL.

DX1CW: DY3CV, DU1QJV, DU1KHB, DU3MJJ, 4F1FZE, 4F3GDX, 4F1FZ, DU1COP, 4F1ARC. **EA1BFZ &** EA1ACP, EA1FEL, EA1FEF, EA1BQR, EC1CZW. **EA1CCM &** EA1II, EA1FBU, EA1FDG. **EA1COZ &** EA1EAG, EA1AS. **EA1EEY &** EA1DZW, EA1CUB, EA1BXW. **EA3MM:** EA3AM, EA3BW, EA3AJW, EA3FWE, EA3GEP, EA3GGO, EC3DEG. **EA3RKG:** EA3BOW, EA3BOX, EA3DGQ, EA3EIO. **EA4URE:** EA4BPJ, EA4BT, EA4CQT, EA4KD, EA7CEZ, EA4AAF, EA4AFA, EA4CT, EA4ET, EA4KA, EA4TX, EC4AJL, EA4CJA, EA4EKR, EB4EPJ. **EA5BY &** EA5BXT, EA5EU, EA5FID, EA5GRV, EA5KW, EA5SM, EA5XC. **EA5DFV &** EC5CPL, EA5FL. **EA8ZS &** EA1AK, EA3DU, EA4DX, EA4KR. **EC3CTS &** EC3AJU. **ED1BD:** EA1BD, EA1EDF, EA1ATQ. **ED1WWE:** EA1FFH, EA1FAV, EA1FDI, EA1EZV, EA1CJJ, EA1FCR, EC1CFD, EA1EPD. **ED2WW:** EA2CCG, EA2ATU, EA2MQ, EA2CHL.

ED3DX: EA3DX, EA3SD, EA3AMK, EA3AML, EA3ANM, EA3AVH, EA3AVP. **ED6AMR:** EA6YP, EA6ACZ, EA6MS, EC6SN, EC6RV. **ED9EA:** EA7AGW, EA7KW, EA7TL, EA9JS, EA9KB, EA9UG. **EI7M:** EI8GS, EI7DNB, EI5HB, EI4BZ, EI3DP, EI6BT. **EW5P:** EW6DX, EW6DI, EW6AL. **EX9A:** EX2M, EXØM, EX8W, RU1AO. **EY2Q:** EY8MM, EY8CQ, EY8XX, EY8RR. **F5KAC:** Club French CQ Gang. **F5KAM:** F5XW, F6CBL. **F5SUL &** F5OGG. **F6KLO:** F5PSA, FB1IPH. **F8KCF:** F6BNH, F6IFY, F6BGC, F1UAM, F5TLF, F5IQA, F5BMI, F5DJL. **FJ5AB &** N6DLU, N6LL, TK5LF. **FK5DX &** FK8GM, FK8HC. **FY5KE:** FY5GR, FY5FY. **GØFOS:** G4IUF, G4KFP, GØDBU, GØTWY, GØUDT, GØVYH, GØWIQ, MØACP, MØAFP, MØAKC. **GØRGH:** GØDVJ, GØSTW, G4EYE, G4FTP. **GØWAX &** GØWGA. **G4UJS &** G4XUM, G1GEY. **G6B:** GØBVW, GØWII, MØAJF, G1JKF, G3EUS, G4LOO, G4LWA, G4OXD, G4VXT, G4YRF, G7NBI, G8ATD, G8BEG, G8EIK.

GB2AA: G3GAF, G3UHU, G4PWA, G4TNB. **GM6F:** GMØADF, GM3XNJ. **GU3HFN:** ZL2TT, GU4WRP, GU6EFB, GU8ITE, GU4YBW, GUØSUP, GU4SXM, GU6RWD, GU4HRY. **GW8GT:** GW3KYA, GW3NWS, GW4JBQ, GW5NF, GW6ZUQ, GWØMAW, GWØPUH. **HB9H:** HB9CIP, HB9BLQ, HB9CXZ, HB9CAT, HB9FAP, HB9SUL, HB9FBD, HB9FBG, HB9FBH, HB9FBO. **HB9OO:** HB9AGC, HB9AIB, HB9ALM, HB9AJM, HB9FAQ, I2KMG. **HC8N:** N5KO, KW9KW, AG9A, VE3EJ. **HG1H:** HA1TJ, HA1DAC, HA1AR, HA1AV, HA1BN, HA1DAE. **HG3O:** HA3MN, HA3MY, HA3RG, HA3UU. **HG5C:** HA5LV, HA5MO, HA5MA, HA5WE, HA/AA9DX, HA/WØYR, HA/N9NC. **HG5M:** HA5WA, HA5OF, HA5MY, HA5BVD, HA1WF. **I1HJT &** IK1HJR, IK1JGS, IK1LWK, IK1NPP, IK1VHR, IK1YDA, IK1YED, IK1YPH, IK1ZUV. **II2K:** I2KHM, I2UPG, IK2SGF, IK2UCK, IK2ZJJ, I2GXS JR. **II2Y:** IK2PTR, IK2DIA, IK2PIH, IK2UEC, IK2VOS, IK2WBN, IK4MED, IK4GRF, IK2OWX, I2ACC, I2MWZ, I2ZZZ, IW2DOF, IW2FGI, IW4BVH, IW4CTG.

IK1VCI & IK1VCA, IK1YMK, IK1ZZD. **IO2A:** IK2RZP, IK2HKT, IK2ANI, I2IFT, IK2XRW, IK2XSL, IK2AHB, IK2DZN, IK2CIO, IK2YCN. **IO2L:** I2OKW, IK2YYE, IK2HAJ, IK2AAJ, IK2ACZ, IK2PIG, IK2PFL, IK2YXP. **IO5A:** I5OYY, I5NSR, I5JHW, I5XFW, IK5NAW, IK5JAN, IK5LWE, IK5PWC, IK5TUX, IK5ZTW. **IO7A:** IK7DXP, IK7EZP, IK7JWX. **IQ4A:** I4VEQ, I4IND, I4LCK, I4TJE, I4IKW, I4EAT, I4AVG, I4PVP, I4YRW, IK4EWK, IK4DCT, IK4QJH, IK4CZF, IK4XQH, IK4MGP, IK2NCJ, IW4ANU. **IQ4T:** IK4HVR, IK4SXJ, IK4QIB, IK4TVP, IZ4AKS, I4IFL. **IQ8X:** IK8UND, IK8HGC. **IU3V:** IK3VIA, IK3QAR, IK3IKF, IK3HMD. **IU4U:** I4AUM, I4FYF, I4GAD, I4GAS, I4VOS. **IZ1AOE &** IK1ZZF, IK1ZZK. **IZ7AUE &** IK7YTT. **JAØYAK:** JK2PVL, JEØETP, Y. Kozawa, 7M2UKR, JE2RAJ, JI7TDR, JM7SGO, JFØESV, JIØTAG. **JA1ZJF:** JF3SLL, 7K3BAD, 7L1FPU, 7K3RZS, Nishida.

JA2YKA: JP2QNB, JS2ERL. **JA2ZJW:** JH2CMI, JH2SON, JA2MNB, JA2TBS. **JA3ZOH:** JH3PRR, JG3KIV, JH4IFF, JH4NMT, JF4FUF. **JA6ZLI:** JJ4HWC, JJ6WYS. **JA7YAA:** JE1AMC, JJ1CVH, JG7PSJ, JH7BMF, JRØSPG, 7M1JAS. **JA7YFB:** JM1HBO, JL2OGZ, JG7TVO. **JE6ZIH:** JR6GKT, JI6BRB, JK6SEW, JG4KEZ. **JG2ZQZ:** JA2BY, JA2BIV, JA2AXB, JA2BHJ, JM2CCL, JQ2BBC. **JR7YCM:** JH7NPF, JR7WFC. **JT1T:** JT1CD, JT1BV, JT1BL, JT5AA. **JW5VK:** LA1BJA, LA5VK. **KØRF &** AAØRS, ABØBX, K4XU, W1XE. **K1GW &** K1LL, W6PH. **K1NG &** KI1G, KD1NG, K1VR, WF1B. **K1RX &** KF1V. **K2IBW/4 &** W4YDD. **K3CP &** NU3L, KU3X, KU3K. **K3MD &** N3PUR, KD3SF, AA3AZ. **K3WUW &** NX3A. **K4ISV &** KB4HU, WA4QQV, N1GL, K4UVH, KB4DMI, WB4FLB, WA4CTA, K9VV. **K4UK &** KF4LBD. **K5KG/2 &** W6TER. **K5VT/7:** WY7K, WA7LNW, N7MB, N7PN, K7WP.

K6ELX/7 & N6IFR. **K6XT &** KN5H, AA8FE, W5EX. **K8LX &** WA8ZDT. **KBØWY &** NØNSV. **KB1H &** AA1CE, K1DW, K1EBY, NB1U, WA1RLV. **KB1SO &** AA1QL. **KB3TS &** N3KEG, KE3RR. **KC4ZV &** KA9EKJ, N4YO. **KC7V &** KY7M. **KD1MV &** KD1ZY, AA1KP. **KD8SQ &** KA8YNW. **KE4PUC &** AE4EW, KE4FBO. **KE6WEH:** N6WZR, N6XAC, KD6QWU, KD6ZHC, KF6DFI, KF6GYY, Khamly, Mychal, Quione, Jeffrey, Kevin, Jesse, Todd. **KF2ET &** AA2DU, KE2NL, WR2I, K2UU, WB2DVK. **KG4AN:** KG4AU, KG4WD, KG4KD. **KG8ZD &** KC8ABF. **KHØA:** JA1WSX, JE2PCY, JF1MIA. **KH8/N5OLS &** AA5BL. **KIØAE &** Melanie. **KJ5BX &** KB5KYJ, KC5KQF, KC5OBX, KC5HNI, KC5QZM, KC5MVT. **KS4BO &** KE4WFO. **KV1W &** W1CSM, N6RFM. **KZ1M &** WA1HYN, NM1Q, KA1ZNZ. **LR3Y:** LU1YU, LU1YFC, LU2YAX, LU3YBI, LU6YAR, LU6YBK, LU8YAP, LU9YAQ. **LU1NF:** LU1NDC, LU8NAR, LU4NAD, LU2NAA. **LU1UM:** LU3UAT, LU8UAR, LU8VDP, LU9VI.

LU4DQ: LW6EMI, LU8ESU, LU8DY, LU9DC, LU7EGI. **LU4HH:** LU2HQI, LU2HAM, LU3HUJ, LU3HAK, LU9HPN, LU9HOA, LU9HIG, LU6HIH, LU7HVB, LU3HNE, LU3ETS, LU4HTW. **LU7HLF &** LU4HKN, LU4HFM, LU8HOE. **LX1NO &** DL1RWN, DL4VCW, LX1NW, LX2KW. **LY1DQ &** LY3BHY. **LY3AV:** LY1CX, LY1CQ, LY3BP, LY1DA. **LY3MR:** LY1FF, LY1FR, LY2BIL, LY2BKF, LY3NFW, LY3NJ. **LY3MV:** Simkus, Ceckauskas, Vaicekonis, Atraskevicius. **LY6M:** LY1FW, LY1DS. **LZ7M:** LZ3FN, LZ4AX, LZ4FN, LZ5VK. **LZ9A:** LZ1JK, LZ1JY, LZ1UK, LZ2CC, LZ2DF, LZ2HE, LZ2HM, LZ2JE, LZ2PO, LZ2TT, LZ2TX, LZ2UU, LZ2WF, LZ2WM, LZ5JE. **M6A:** G4EOF, G4GVC, G4MJS, G3RIR, 5B4WN, GW7VHW. **M6G:** GØLRE, GØUZF, G3ZRE, GØWTO, G4WJR, GØWTM, G1AHM, G4TZR, G7VOQ, G7UQU. **M6N:** GØOPB, GØORH, GØPUB, GØTKV, GØVKT, GØXTV, GØVZF, G3NVO, G4DBL, G4RUW, G4TSH, G7WHO.

NØZA & KØUK, KA6IZT, KØCL. **N1AU &** WA1EQU. **N2GQS &** AA7NX, KE2SD, W2XL, N2MCI. **N2LBR &** WA1KKM. **N3RS &** N3RD, KY2T. **N3WVV &** N3WVA. **N5HRG &** K9MK. **N5JJ &** K5AAD, WA5POK, K5GA. **NCØP &** WAØETC, WAØFLS, WOØV, WRØG, KFØH, WDØGVY. **NE3F &** KS3F, NT3V, N3JLL. **NH2C:** JG3RPL, JR3RVO, JI3ERV, JR7OMD. **NK7U &** W7ZRC, N7BZ, AB7CZ, AA7TF. **NO9Z &** N1HRW, W9SZ. **NU2W &** KF5FK, KB2HZ, KE2JR, KE2HG, N2UYV, WA2F. **OE1A:** OE1EMS, OE1SZW, OE1TKW, OE4BKU, OM3LA. **OI2E:** OH1JT, OH1JZL, OH2BVI, OH2BZY, OH2HE, OH2IW, OH2JA, OH2JNX, OH2KDY, OH2KVH, OH2KXK, OH2LVZ. **OI7T:** OH6LNI, OH7LTK, OHMHL, OH7MS, OH7WV, OH7KD, OH7KIR. **OK1KCF:** Katy OK1-34813, OK1KZ. **OK2KVI:** Club. **OK5MVT:** OK1FWW, OK1DVK. **OK5W:** OK1AEZ, OK1CF, OK1WF, OK1TN, OK1TA, OK1JKT, OK1YM, OK1FKD.

OL2A: OK2PDK, OK2HBY, OK2PEM, OK2MEM, OK2JPR. **OM2I:** OM3TA, OM1KW, OM1RW, OM1MW. **OM3KHU:** OM3JS, OMØATU, OM3-ØØØ1. **OM9FI:** OM7PY, OM7PA, OM7YC. **ON4UN &** ON4AFZ, ON4MA, ON5UK, DJ4AX, DL1SBR. **OT6K:** ON4ON, ON4ADZ, ON4AGX, ON4AFO, ON5DI, ON5SY, ON4FE, ON4AVA, ON4AVT, O9CGB, ONL-Bart, ONL-Paul. **OT6L:** ON1AFN, ON1ANK, ON1BPJ, ON1DDA, ON1DDC, ON1DFZ, ON4AEK, ON4AHF, ON4AKL, ON4BR, ON6JZ, ON6MP, ON6NL, ON6ZX, PAØMPM, NX9O, VP8BPZ, SWL-Jan. **OT6P:** ON4LAM, ON4TH, ON5OO, ON5PV, ON6AH, ON6MH, ON6QR, ON6VL, ON7PC. **OZ3ZW &** OZ5WQ. **OZ5BAL/P:** OZ2ELA, OZ1CHL, OZ3XO, OZ1JSH, OZ7ACO. **OZ9SKB:** OZ1EEZ, OZ9AAR, OZ1GWD. **PA3DWD &** PAØCOR, PA3AAV, PA3EKZ. **PI4CC:** PBØAIU, PA3EPD, PA3ELV, PA3BAG, PAØVH, PBØALB. **PJ9T:** AB4JI, KU4J, K4ADK, N4OKX, KJ4VH.

PR5M: PP5UB, PP5WC, PP5AM, PP5BRV, PP5FMM. **RK6AYN:** RN6BP, UA6AH, RW6ACM, RV6ARU. **RK9SWF:** RA9ST, UA9SFR. **RU3A:** RA3AUM, RA3AUU, RA3DUT, RK3BX, RK3FA, RV3FF, RX3ACS, RX3DCX, UA3AB, UR5LCV. **RWØA:** RVØAR, RUØAB, RVØAU, RAØAM, UAØAGI, UAØANW. **RW2F:** RA2FA, RN2FA, UA2FB, UA2FF, UA2FM, UA2FX, UA2FZ. **RW6AWT:** RN6BN, UA6NP, RA6AX, UA6AJU. **RW9OWD:** UA9OIL, RW9OW, UA9OLW, UA9OIF, UA9OIW, UA9OAO,UA9OSV. **RZ3Q:** RW3QC, UA3QDM, UA3QDX, RU3QW, RX3QP, RW3QO, UA4WIN/3, RA3QH, RA3QFB, RV3BA/3. **RZ4AYT:** UA4ALI, UA4AIY, UA9COP, UA4-156-1Ø57. **S5ØG:** S58M, S51QN, S57MAD. **S52ZW &** S58AB, S58A. **SK3SN:** SM3RPK, SM3SGP, SM3UDH, SM3OSM. **SK4AO:** SM4PEL, SM4RMH, SM4ATJ, SM4KSM. **SK6DG:** SM6RXZ, SM6SIF, SM6TKT, SM6SII, SM6WBU, SM6TZD.

SL3ZV: SM3BDZ, SM3CER, SM3DMP, SM3JLA, SM3OJR, SM3PXO. **SM4VPZ &** SM4AIO. **SN2B:** SP2FAX, SP3RBI, SP3RBR, SP8NR. **SN6F:** SP6AZT, SP6ECA, SP6IXF, SP6FVF, SP6DNS, SP6DLO. **SN6U:** SP6NVK, SP6OPE. **SP5ZCC:** SP5UAF, UR5WHT, 3Z5AAN, SQ5BPT, SQ5BPM, SQ5EBM, SQ5EBJ, SQ5GRJ. **SP9KAO:** SP9IEK, SP9LAS, SQ9AOZ, SP6O. **SP9KJU:** Club. **SP9KRT:** SP9ADU, SP9DH, SP9ZW. **SV1AFA:** SV1CDN, SV1CIB, SV1CIF, SV1DPJ, SV1UK, SV1COO, SV1COR, SV1CIE, SV1DPE, SV1COG. **SV1DKR &** SV1DKD. **T88T:** N5OK, N5CG. **TM1C:** F1HAR, F4AKS, F5HRY, F5MZN, F5LND, F6CTT, F6FVY. **TM2DX:** F6IFR, F6GWV, F6HMQ. **TM2FM:** F6JHL, F5RGD, F5DVU, F5NGO. **TM2T:** F5PXT, F5SIH, F5PFP, F5NOD, F5PYI, F6JJX, F5JKH. **TM2X:** F5RXL, F6IRA, F5OZF, F2VX. **TM2Y:** F6BEE, F6ARC, F6FGZ, F5NLY, F5SNJ, F5VCO. **UN8FB:** UN9FD, UN7FBY, UN9FB, UN9FM, UN7FK.

UR4EYN: US-E-699, US-E-6ØØ, US-E-655, UR4EN. **UR4MWU:** UR5MB, UR4MT, UR5MFE, US5MPS. **UT4UWC:** Bachmah, Vozonkaw, Basilevih. **UT7L:** UR4LQA, UR4LRG, UR4LRQ, UR4LSB, UR4LTX, US4LGW. **UT7W:** UT1WL, UT7WZ, UR5WAN, UR5WCW. **UU5J:** UU1JA, UU2JQ, UU2JZ, UU3JD, UU5JR, UU9JN, UUØJX. **VA3SK &** VA3MW, VA3WTO, VA3RTW, VA3JAK, VE3XKB, VA3TWF. **VE2UCD:** VA2MRX, VE2JTX. **VE3DC:** VE3SS, VE3OCY, VE3OZY, VE3VMO, VE3NYX, VE3FBO. **VE5SF &** VE5CPU, VE5MX, VE5CMA, VE5RC, VE5SHK. **VE6FI:** Club. **VE6JY &** VE6BF, VE6LDX, VE6FR, VE6SLV, VE6LCB, VE6DGG. **VE6SV &** VE6VW, VE7GAS, VE5FX, VO1CV. **VK1DX:** VK1FF, VK1PJ. **VK4MZ &** VK4EMM, VK4TPW. **VK4XY &** VK4UW. **VK6ANC:** VK6APK, VK6NU, VK6FJA, VK6ATA, VK6ZDW, VK6YEI, VK6EH. **VK6LW &** VK6VZ, VK6APH. **VP5DX:** K4UTE, NF4L, NO4J, W3ZNB, N4KE, AB4UF.

VS6WO & 9V1YC, VR2NR, VR2GO. **VY2CR:** VY2SA, VY2GJ, VY2ROB, VY2GWM, VY2RB. **W1BK &** W1NR, K1TXH. **W1FY:** W1EQW, N1LOO, N1JFO, K1KTK, WN1A, KE1BG, N1BFG, N1XYC, AA1IZ, N1SMS, N1XAN, N1MQG, WA1R, KA1HIA, N1FXC, N1DGT, N1ECI. **W4ATC:** KS4XG, N3QYE/4, KT4LD. **W4NC:** N4VHK, WB4KQN, NØKTY, KD4RGB, KE4TES, KE4JCY, KT4KV. **W4PRO &** KO4MR, WDØCNQ. **W4TMN &** K4MU, KA4VGF, KE4GWV, W3WFF. **W5HTK:** N5HEL, KAØRNY, KM5DH, KA7GLA, N2MNC, KC5TEZ. **W5KFT &** K5TSQ, N5KA, K5TR. **W6EEN &** K6XC, KI7WX, W6ORD. **W9JZ:** K9IMM, WB9NOV, KE9ET, KF9AF, N9CHN, N9CKC, K9KVA, NG9V, AA9OC. **WAØPUJ &** KCØZC, WBØO. **WA2SYN &** WM2V, KS2G, N2LSK, KA2GWM, WA2NYY. **WA2VUY &** NO2R. **WD6DJY:** AE6P, AB6FG, AC6RF, AC6TQ, K6BF, KC6ABM, KC6MQL, KC6YQI, KD6VYY, KM6AX, KO6DM, KO6GX, N6JFO, N6VBW, N6YSU, WA6LOS, WJ1P, AB6FH, AB6RD, KC6AAO, KC6ACI, KC6BCV, KC6URG, KK6QY, KN6GB, N6YTB, N6YTA.

WV1M & WS1Y. **WXØB/5 &** W5GN, WA5YOM. **WX6M &** WB6YRN, N6UUG. **XE2DV &** K7LXC, WA2TMP, KN6DW, KE6VWV. **XR8S:** XQ8ABF, CE8SFG, CE8DGQ. **XY1U:** JA8RUZ, JA8CDG, JP1TRJ. **YL1ZF:** Uztics, Legzdins. **YO9KPD:** YO9IF, YO9BGV. **YU1L:** Club. **Z37FCA:** Club. **ZB2BU:** ZB2CF, ZB2IB, ZB2IF. **ZPØR:** ZP5XF, ZP5VAY, ZP5AZL, ZP5CGL, ZP5XHM, ZP5WBM, JA7AYE, ZP6VT. **ZS5NK:** Daniel, Gary, Edwin. **ZW8B:** PS8ET, PS8PY, PS8DX, PS8CW, PS8NF. **ZXØF:** PY5EG, PY5CC, N5FA, PYØFF. **ZZ2E:** PY2EX, PY2BW, PY2RO.

Station Operators Multi-Op Multi-Transmitter

9A1A: WA4IMC, 9A5W, 9A9A, 9A2DQ, 9A3NR, 9A4OM, S51D, 9A3SC, 9A2R, 9A3ZA. **9A8ØØOS:** 9A1AA, 9A2DG, 9A2DI, 9A2OM, 9A2CY, 9A2VR, 9A2TN, 9A2TR, 9A4LA, 9A3QB, 9A2OU, 9A2NY, 9A5I, 9A2LX, 9A3IQ. **AA1AS &** KY1H, K1MBO, WA1ZAM, NT2X, AA2MF, AB2AS, WJ1R, AA6MC, WM1K, AB2AP, WT2Q. **CQ1A:** CT1ASU, CT1ERY, CT1EXC, CT1FBQ, CT1GFJ, CT1GFK. **CYØXX:** WA4DAN, AA4NC, VK2BEX, V73C, AH9B. **DFØDX:** DK3DM, DF8AE, DK4QT, DL1YDI, DJ1QQ, DK5QN, DL1YAW, DF8XC, DL8YEY, DL6QK, DL3YEL, DJ2QV, DB5QU, DG4YDR, DL9YCL. **DF3QG &** DL1DCA, DL5DLX. **DK5EZ &** DK4TP, DK8EY, DL4EBA, DL6EAQ. **EA3FP:** EA3AAY, EA3AIR, EA3AJM, EA3CCN, EA3CKX, EA3EJI, EA3ESJ, EA3EZD, EA3KU, EA3UJ. **ED7VG:** EA7BJV, EA7ESH, EC7ADD, EC7AHN. **EM2I:** UT2IA, UT2ID, UT2IG, UT2II, UT2IJ, UT2IM, UT2IO, UT2IS, UT2IV, UT2IW, UT2IY, UT2IZ, UX8IX, US2IR, US2IZ, US-I-6Ø2, US-I-7ØØ.

GM6V: GM3WOJ, GM4YXI, GM4AFF, GMØNAL, GM4TXX, GM4BAP, GM4CXM, GM4IGS. **HBØ/HB9AON:** DF1JC, DL8DAW, DL8EAQ, DJ2YE, HB9CRV. **HCØE:** HC1HC, HC1PF, HC1JQ, HC1HN, HC1GZ, HC1BI, HC1DAZ, HC1WW, HC1CN, HC1NS, HC1NG, HC1JSH, HC1JEV, HC1H, HC6XE, HC4MZ, HC2DZ, CO6CD, CM2SD. **HS1AZ:** AB6BH, KL7Y, N6AA, N6ZZ, OH2KI, W6MKB, W6XD. **IK3SSJ &** IK3STG, IK3NLK, IK2IQR. **IR3O:** IK3ORD, IK3OII. **J3A:** W8KKF, WB8GEX, WA8LOW, W9IXX, N9NS, IV3NVH, WZ8D, WA8NJR, IV3TMV. **JA1YDU:** JHØNZN, JF7TFK, JP1CWU, JG3AXP, JQ2NJJ, JEØBKI, 7L1ETP, 7K2BLP, JA9VDA, JK3GAD, N3NQL, JP1OGL, JHØLFE, JK2XXK, JI2UYK, JK1JHU, JQ1BRW, JL7MYL, Mizuno. **JA3YKC:** JP2BZE, JH3RHQ, JL3HEY, JO3PPD, JO3UGI, JP3PZD, JP3SMB, JS3QGO, JG4LSR, JL4CVB, JL6BMJ, JP6RBN, JQ6CUT. **JA7YRR:** JA7FDY, JA7JUD, JA7LBY, JA7MSQ, JA7OZW, JH7VHZ, JH7VXM, JR7LVA, JJ7EKH, JJ1XGF, JQ1NBV.

JA9YAA: JG2KKG, JH9KVF, JN2QCV, JM2FCJ, JEØAOV, JO2HDS. **JH5ZJS:** JA5BJC, JA5FDJ, JA5JCG, JA5THU, JH5RXS, JR5JAQ, JR5VHU. **JO1YAO:** JA1ATK, JA1OYY, JA1PEJ, JA1QJK, JH1AEP, JH1AZO, JR1RWW, JL1TXC, JM1NKT. **K1GW &** K1ART, W6PH. **K1KI &** K1CC, KA1TAF, K1PI, KF2XK, KM1P, K1TI, W2EQ. **K3ANS &** N3RCA, NY3C, N3MTU, WF3H, N2KJM, N2BIM, WB6OKK, N3IYX, K3ZTJ. **K3II &** N3BDA, WB3ESS. **K3LR &** N3RA, N3BJ, N9RV, K8GL, KG8GO, N9HZQ, K3DR, W8JV, N8SW, K8CX, ND8L. **K7FR &** W7WMO, N7AU, KX7R. **KC1XX &** KM3T, KC1F, AD1C, WZ1R, K1DG, KB1AWE, K1EA, AA1ND, PU1JTE. **KG6LF &** WA6QQF. **KS9K &** KA9FOX, K9GS, K9PW, NB9C, N9AU, WB9TIY/W9RM, WE9V. **KY3N &** W3FV, WB3FIZ, K3WJV, KQ2M, WB3LFZ, K3OX. **LA1K:** LA5GIA, LA5NJA, LA7OJA, LA9QIA, LA8UGA, LA3JJA, LA8VJA, LA1BFA.

LU4FM: LU1FOW, LU1FZR, LU4FPZ, LU5FYR, LU5FYV, LU9FDG, LU9FIO, LU9FQT, AZ8FAG, LU2FYU, SMØJHF. **LY7A:** LY1EE, LY2AO, LY2BMX, LY2BUE, LY2KZ, LY2NK, LY2UF, LY3DA, LYR346, LYR728, Toleikis, Jasiulis. **M6T:** G4BAH, G4IFB, K1XX, GØWCW, G4VMM, G4WFR, G3VHB, G4BUO, G4BWP, G4PIQ, GØAEV, GØKRL, GØAFH, GØHSS, G7ABQ, G4SWX, G4AXX, G4KNO. **NØUEI &** KEØMF, KBØNUY. **N2RM &** KA2AEV, KZ2S, K3UA, N2AA, N2NT, N7BG, W2RQ, KE2PF, WB2K, WM2H, KB2POP, N2BCC. **N4ZC &** K2SD, KB2LH, AA4SQ, K4HA, K4MA, K4MQG, K4UHL, K4ZA, KU4V, N4VLQ, W4WN, WA4UNZ, WD4BTF, WB5M. **N6AW &** W6BA, W6HT, K6HMS, K6WS, K7JYE, KC6CNV, N6NU, N7QQ, NF6H. **NQ4I &** WI4R, NZ3I, KQ4HC, K4MZU, KJ4FW, KM4HH, KF4CI, K4BAI. **OK1KIR:** OK1PG, OK1AWH, OK1IPN, OK1IMC. **OL5T:** OK1NR, OK1DNR, OK1DXF, OK1HSK, OK1AMM, OK1MUJ, OK1TVA, OK1FXX.

OT6A: DB6JG, DF3TJ, DK3JE, DL2GRC, DL3EBM, DL8SCU, OE2GEN, OE9MON, ON1AEI, ON1AFF, ON1AWB, ON1BCJ, ON1CIM, ON1DAL, ON1DEK, ON1`DHU, ON1GL, ON1MCJ, ON2AIM, ON2BDD, ON4AJW, ON4AML, ON4ASB, ON4AWH, ON4AWU, ON4AWV, ON4BAG, ON4BAW, ON4BBL, ON4BI, ON4CBP, ON4CDC, ON4CDE, ON4CDK, ON4DB, ON4FG, ON4FI, ON4VT, ON5CD, ON5DH, ON5GO, ON5OT, ON5UM, ON6DN, ON6HP, ON6HZ, ON6MR, ON6PU, ON7AW, ON7HU, ON7NB, ON7NQ, ON7SF, ON7VU, ON7YZ, ON7ZM, ON9CFB, ONL4481, PA3EBT, PA3EZL, PA3GOJ, VE6WQ, Anouk, Jeaninne, Nathalie. **PJ9E:** KB2XZ, N3ED, K3EST, WA3LRO, W3UM, N4RV, NL7GP, N7ZZ. **R3AA:** RZ3BW, RA3CQ, RA3CW, RX3APM, UA3BL, UA3-17Ø-79. **S53M:** S54AA, S51DB, S53WW, S51OI, S59KW, S51ZO, S51RJ, S51DM, S57C, S53ZO, S51RS, S51FB, S51ZX.

TK1A: DL4MCF, DL1MAJ, DF9LJ, DK6WL, DL4MEH, TK5NN, TK5EP, DF9RX, TK5MH, TK1BI, DK4VW, DL6RAI. **V26B:** AB2E, N3ADL, WB2P, KR2J, WA2UDT, K3MQH, KF3P, K4VUD, WT3Q. **VB9DH:** K2NJ, KB2VIE, NR2H, NS2K, WA2ASM, WU3A, VE1RM, VE2ZP, VE9AO, VE9DX, VE9GJ, VE9MY, VE9WH, VE9XX. **VP5T:** N2VW, WA2VYA, WB2YOF. **WØAIH/9:** NØAXL, AAØVQ, N9TCF, NE9U, N9QYC, DL1QQ. **W1FJ &** W1KM, N1BB, K1XM, NB1B, K1CB, K2AJY, WB2DND, WT1O, WA1KSY, W1PH, KA1ZAK, WA1QGC. **W2AX/1 &** K2LE, N2UN, VE1XT, VE1AL, NA2M, K2SX, N2FF. **W2PV:** K2TR, K2XA, K2ONP, NQ2D, KD2RD, WA2SPL, NJ1F. **W3GNQ &** W3ZZ, K3SKE, AA6DC, WA3WJD, WR3Z, WI2T. **W3LPL &** K1HTV, K1RZ, N3AHA, ND3F, N3KTV, K3RA, W3UR, K3ZZ, W4ZV, N5OKR. **W4IY:** WD4KXB, KJ4VG, KO4FM, WB4NFS, WB4RMJ, KC2ZHQ, AE4DG, AC4XT, KC4RFM, N8NEV, KA4RRU, AA3KX, KU3M, N4DXS, KT4SC.

W4MYA & N4EHJ, AD4TS, WA4DAI, KD4JXY, WA4QDM, KS4RX, KC4AUF, WU4G, WK4Y, WB8GAU, AD4KE, WB4GVZ, KB4DI. **WH6R &** KH6HH, KH6IFN, AH6MZ, K1ER, NH6UY, NH6XO, KH5JAT, NH6YK, KH6U, KH6IRT, WH6KA, KH6HKL, WH6EU, WH6XR, KH7BM, AH6HU. **WP2AHW:** KQ4GC, AB4NS, KD6WW, KX8N, AE4FY, AE4SJ. **XX9X:** OH1KAG, OH2BH, OH2BVF, OH2PM, OH6DO, XX9AL, XX9KC, XX9MD. **ZM2K:** ZL2AHC, ZL2AMI, ZL2BHS, ZL2BI, ZL2BSJ, ZL2DX, ZL2IQ, ZL2IR, ZL2MF, ZL2TBJ, ZL2TJG, ZL2TYO, ZL2UDF, ZL4SS. **ZV2EPA:** PY2PA, PY2NMA, PY2ASA, PY2BW, PP5LL, PY2YW, PY2AH, PY2AQW, PY2EVW.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (All country terminology reflects the DXCC list at the time of the contest.)

SSB RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

K5ZD/1	A	**3,878,064**	**2341**	**124**	**449**
N6BV/1	"	**3,113,496**	**2109**	**115**	**406**
K1IU	"	**2,793,190**	**2084**	**108**	**374**
		(Opr. W2SC)			
K1RU	"	**2,480,016**	**1790**	**109**	**375**
AA1ON	"	1,913,588	1635	99	329
W1WEF	"	1,581,426	1256	111	351
W6XR/1	"	1,443,444	1174	104	340
K1DWQ	"	799,399	758	83	278
K5MA/1	"	741,572	771	87	251
WA1LNP	"	699,720	761	82	261
KA1DWX	"	602,360	706	70	226
KB1GW	"	595,161	667	77	252
W1KRS	"	479,520	573	68	228
WA3TXR/1	"	434,463	541	68	223
WØMHK/1	"	420,840	542	68	212
W1OP	"	408,392	495	73	284
		(Opr. K1PLX)			
WS1M	"	389,610	637	53	169
K1YDG	"	351,810	474	66	204
W1WFZ	"	205,590	335	63	168
K1BV	"	178,038	382	35	127
KA1MDG	"	144,996	298	43	129
K1NYK	"	102,102	247	42	112
N1DD	"	86,535	232	36	99
WQ1H	"	78,489	181	45	108
KQ1F	"	61,275	171	39	90
W1FM	"	60,620	164	38	102
KX4V/1	"	58,487	158	38	105
WS1H	"	56,322	161	36	90
KD1NG	"	45,458	139	40	79
K5FUV/1	"	24,653	100	28	61
KA1R	"	22,841	92	26	65
N1NYD	"	13,464	92	21	45
K2SS/1	14	**955,260**	**1849**	**37**	**146**
WT1S	"	739,713	1568	36	133
K1EFI	"	172,916	434	27	112
WA1MKS	"	81,021	280	25	88
WF1L	"	76,002	252	22	84
KB1HY	7	22,253	104	21	56
K1UO	3.7	**152,568**	**544**	**23**	**94**
***WA1S**	A	**792,816**	**912**	**78**	**254**
***WS1A**	"	**444,860**	**574**	**71**	**219**
*AA1EY	"	302,588	438	61	192
*WG1Z	"	243,126	388	61	173
*WA1HYN	"	188,710	296	58	168
*K8JLF/1	"	176,001	313	55	148
*N1PGA	"	148,852	284	52	147
*K1TW	"	71,188	183	39	109
*W1EWN	"	32,648	40	11	28
*WT1O	"	32,344	115	32	72
*K1YRP	"	26,622	110	19	68
*K1UGU	"	5,904	52	16	32
*NQ1K	"	5,764	47	15	29
*NY1L	"	5,600	50	16	24
*AA1IZ	"	2,091	26	19	22
*K1VSJ	"	1,536	23	9	15
*N1KRC	"	315	10	7	8
*N1OFO	"	260	7	7	7
***W1XK**	21	**55,170**	**214**	**18**	**72**
***K1VUT**	14	**188,727**	**502**	**27**	**106**
*W1MK	3.7	2,016	27	11	21
N2MR	A	**629,200**	**695**	**76**	**249**
K2AZ	"	**509,704**	**540**	**82**	**256**
KB2SE	"	427,917	534	74	213
N2QLT	"	397,488	488	73	221
N2SS	"	339,422	404	70	228
NA2Q	"	322,966	496	61	177
N2PEB	"	308,568	435	69	189
KB2NU	"	181,989	299	62	157
WB2RAJ	"	166,089	278	63	168
KD2NE	"	139,412	278	49	133
AA2IX	"	128,820	253	57	133
W2OMV	"	119,460	247	51	130
W2YC	"	97,637	244	51	112
WR2V	"	89,947	223	41	102
AA2WW	"	88,053	216	36	111
K2JLA	"	87,614	217	33	109
WT2Q	"	71,288	191	35	98
WB2YQH	"	44,408	132	34	88
KG2BI	"	24,570	111	28	62
WJ2R	"	20,335	84	24	59
AA2UA	"	20,250	106	19	62
WB2YLR	"	12,351	68	22	47
KG2HS	"	7,847	52	21	38
W2EZ	"	5,670	56	23	30
WF2B	"	4,628	42	19	23
WA2YSW	"	1,734	23	14	20
WA2QNW	21	**202,293**	**547**	**27**	**106**

KA2JEM	"	28,290	146	16	53
K2HFX	14	**650,312**	**1429**	**36**	**133**
K2QMF	"	134,091	330	27	114
KB2WZY	"	13,456	89	12	46
KF2BH	7	**61,204**	**212**	**26**	**81**
NI2C	"	58,240	191	28	84
WA2BFW	"	37,754	160	22	64
K2FL	"	15,624	80	16	56
W2PAU	"	14,910	79	18	52
K1ZM/2	3.7	**292,100**	**952**	**27**	**100**
WW2Y	1.8	**14,809**	**231**	**13**	**46**
W2VO	"	**6,440**	**66**	**13**	**33**
WA2IZL	"	**4,715**	**104**	**12**	**29**
***N2INN**	A	**444,600**	**513**	**80**	**232**
***KB2QWO**	"	**378,105**	**475**	**65**	**208**
*K2UF	"	281,686	409	67	187
*NA2A	"	239,133	368	59	178
*N2PKN	"	162,954	291	50	148
*N2JIX	"	137,600	306	39	121
*AA2GS	"	127,050	272	49	126
*KM2L	"	100,401	243	41	106
*KB2RAS	"	84,680	213	38	107
*WB2AYQ	"	84,130	183	56	123
*KG2FH	"	83,980	169	52	138
*AA2TB	"	59,422	155	40	106
*W2TZ	"	36,297	121	33	76
*KA2CDJ	"	28,500	104	40	74
*N2LDV	"	27,948	109	32	70
*N2LQQ	"	15,840	87	31	49
*N2TTT	"	14,299	69	25	54
*AA2VN	"	8,640	55	24	40
*WA2OCG	"	7,026	62	16	26
*KF2C	"	4,092	33	15	29
*K3BMI/2	"	2,964	28	13	25
*W2UL	"	1,394	23	15	19
*AE2T	"	612	13	7	11
*N2QWR	28	4,455	62	8	19
***K2MFY**	14	**141,700**	**382**	**26**	**104**
*K2BQW	"	68,112	370	21	78
*WB2ZMK	"	27,132	122	17	59
*KA2YKN	"	578	14	7	10
***WB2ZTH**	7	**22,659**	**100**	**19**	**64**
*W2FGY	"	11,407	72	14	47
K3ZO	A	**3,021,699**	**1992**	**127**	**410**
W3BGN	"	**2,491,055**	**1717**	**123**	**392**
K3IPK	"	729,972	798	84	240
K4JLD/3	"	527,960	575	88	247
W3AP	"	473,220	537	87	243
K3ZNV	"	439,931	520	83	224
K3TEJ	"	416,208	501	77	222
W3RJ	"	414,822	537	75	207
N3RW	"	322,320	454	65	190
N3QYA	"	210,678	360	67	152
AD3Z	"	178,589	241	79	192
AL3/N7DF	"	140,532	793	33	51
W3NX	"	120,408	250	53	120
N3GBP	"	103,584	238	42	114
W3EVW	"	93,073	206	51	112
W3TWI	"	71,645	172	50	111
NU3L	"	66,410	172	40	105
WA3DMH	"	47,402	255	45	130
NM2Y/3	"	22,135	100	30	65
K3ATO/M	"	17,388	84	22	47
N3FSC	"	4,300	43	15	28
WA3CGE	28	**13,080**	**116**	**10**	**30**
W3AU	21	**108,915**	**301**	**28**	**109**
N3HBX	14	**321,599**	**743**	**33**	**130**
W3TMZ	7	**41,385**	**161**	**24**	**69**
N3EC	"	39,004	144	24	74
***NY3Y**	A	**834,000**	**768**	**96**	**321**
***KQ3V**	"	**723,415**	**732**	**95**	**290**
*W3UJ	"	207,462	353	56	156
*NI3I	"	108,080	205	42	100
*W3QIR	"	30,784	113	31	73
*W3FTG	"	14,608	70	31	52
***KC3PZ**	28	**18,630**	**149**	**13**	**32**
*N2TDT/3	"	5,520	30	5	12
***WR3L**	21	**79,002**	**217**	**25**	**101**
***K3SWZ**	14	**98,760**	**301**	**26**	**94**
*N3UMA	"	3,315	85	13	26
*W3FQE	"	576	14	9	9
***WW3S**	7	**21,762**	**105**	**18**	**60**
*W3CPB	"	6,435	55	12	33
KM9P/4	A	**3,438,505**	**2021**	**138**	**457**
KE9A/4	"	**2,220,596**	**1578**	**115**	**379**
WZ4F	"	**1,933,920**	**1547**	**116**	**364**
K4PQL	"	1,205,874	1136	97	318
N4UH	"	1,093,015	1049	95	290
AA4EL	"	982,520	947	88	297
KA2DRH/4	"	732,700	642	107	318
WA4TII	"	690,816	649	94	290
W3VT/4	"	516,364	557	85	249
N4KW	"	506,835	580	88	227
N4XM	"	360,913	413	95	234
KR4UJ	"	319,580	405	80	210
K4LTA	"	314,118	415	79	198
W2YE/4	"	271,152	373	78	191
KC4DWT	"	233,496	400	52	155
KP4XS/W4	"	203,232	305	69	186
WA4CTC	"	175,176	290	59	157
AE4RG	"	166,158	316	43	138
NU4Y	"	165,726	308	54	144
WB4MAI	"	164,560	272	61	159
N4XSE	"	154,269	321	52	131
KD4CDB	"	145,426	283	53	125

KR4DL	"	108,008	219	54	130
W4IF	"	107,460	215	51	129
W4NTI	"	95,460	224	50	122
KD4LHA	"	76,076	184	54	100
K4ZTL	"	72,900	177	40	110
KC4B	"	68,679	207	32	85
W1ENZ/4	"	59,902	175	36	86
W4MPJ	"	58,851	180	36	81
N4BNO	"	50,456	153	35	49
W4OGG	"	40,506	116	41	88
KW4T	"	39,221	164	21	70
KR4RW	"	25,095	109	39	66
N4LZL	"	16,102	73	27	56
AE4MH	"	8,944	71	19	33
KC4URW	"	6,960	45	21	37
N4XMX	"	5,170	37	22	33
KA4RAW	"	2,948	28	17	27
WA4ZNU	"	2,419	22	19	22
W4YV	28	**44,005**	**312**	**16**	**49**
KC2X/4	21	**638,528**	**1313**	**31**	**145**
N4BP	"	**350,300**	**864**	**29**	**126**
K4JYO	"	**293,040**	**801**	**28**	**120**
N4CT	"	**285,208**	**683**	**29**	**125**
N4PN	14	**196,848**	**566**	**33**	**111**
K4RZ	"	138,732	375	29	103
WD4CNZ	"	101,640	296	26	94
N4DVW	7	**57,225**	**206**	**28**	**81**
K8UNP/4	"	**53,136**	**194**	**27**	**81**
KC4YM	"	49,499	179	27	72
N4TJ	"	39,045	147	25	70
N3JT/4	"	34,850	152	20	62
KO4EW	"	18,360	94	22	50
KC2KU/4	"	16,167	116	14	51
WB4UBD	"	12,095	74	18	41
N6AR/4	3.7	**119,691**	**422**	**25**	**92**
W8WW/4	"	**20,276**	**113**	**16**	**58**
AE4MJ	"	7,248	66	11	37
K2UFT/4	"	1,242	20	9	18
AA4MM	1.8	**7,904**	**74**	**12**	**40**
***WA4ZXA**	A	**1,227,842**	**1066**	**111**	**358**
***AC1O/4**	"	**1,070,307**	**901**	**106**	**335**
***KØEJ/4**	"	**764,286**	**793**	**101**	**280**
*KJ4WH	"	506,985	582	82	247
*WA6KUI/4	"	451,560	577	83	235
*KR4QI	"	451,191	555	82	217
*WR4K	"	375,092	431	80	236
*KR4TG	"	286,330	382	76	198
*KO4MM	"	244,032	360	66	182
*WA4JUK	"	240,870	411	58	159
*KC4UCE	"	163,438	325	63	146
*AC4PY	"	159,676	290	62	147
*W4DEC	"	148,033	304	55	124
*N4YKD	"	142,396	275	48	146
*AE4LQ	"	132,090	211	76	179
*KD4IBI	"	96,064	236	43	109
*KI4DC	"	93,628	200	58	120
*KB4LN	"	92,612	548	42	127
*N4KWX	"	69,788	177	51	95
*KB4MIL	"	49,324	163	38	80
*KA4IKH	"	48,339	148	40	83
*AA4GA	"	47,376	148	33	79
*KT4CB	"	36,942	128	47	84
*KS4KP	"	28,589	97	37	76
*AB4KL	"	27,645	109	30	67
*AA4KD	"	25,755	108	37	64
*KI4KR	"	24,642	90	39	72
*KT4NT	"	22,980	141	16	44
*KS4RP	"	22,080	108	36	60
*KR4KL	"	16,562	72	35	56
*KE4OAR	"	15,660	85	39	51
*AB4OQ	"	11,418	66	22	44
*KQ4KK	"	9,230	55	25	40
*K5OTI/4	"	7,896	50	18	38
*KE4UVP	"	3,010	28	17	26
*AA4LR	"	2,368	25	16	21
*KT4OC	"	1,500	22	11	19
*KB4NPI	28	792	17	5	13
***AI2C/4**	21	**96,728**	**301**	**23**	**90**
***N4MO**	14	**170,107**	**453**	**26**	**107**
*K4HWG	"	3,492	39	11	25
*KE4UVO	"	819	22	9	12
W5WMU	A	**1,441,350**	**1202**	**119**	**331**
		(Opr. KZ5D)			
K5NA	"	**1,151,183**	**1022**	**122**	**335**
N5DX	"	990,192	894	109	312
K5DX	"	684,794	665	93	281
N5OZB	"	601,552	663	84	244
K5YAA	"	587,745	659	89	244
N5QDE	"	427,180	503	87	223
KF7E/5	"	397,374	488	102	207
W5CWQ	"	390,432	437	92	244
KC5AK	"	131,421	211	65	213
AC5FW	"	107,952	234	54	119
AB5I	"	80,408	164	65	119
N5SMQ	"	15,225	89	30	45
AJ4F/5	"	2,135	25	13	22
K5XI	28	**62,320**	**329**	**19**	**57**
		(Opr. KE5FI)			
KE5FI	21	**198,414**	**553**	**31**	**115**
		(Opr. K5LBU)			
W5ASP	"	104,284	337	27	97
W5FO	14	**199,800**	**572**	**33**	**115**
***WD5K**	A	**642,600**	**678**	**88**	**262**
***AB5SE**	"	**325,748**	**436**	**85**	**199**
*KF5YZ	"	202,212	327	75	171
*N5XUS	"	128,520	262	67	122

*N5RXF	"	57,915	181	46	89
*KC5RAS	"	57,230	193	37	81
*WK5K	"	49,700	144	55	87
*KI5IB	"	16,235	80	29	56
*NN5T	"	13,870	74	33	40
*KC5HWJ	"	9,853	75	20	39
*N5ZR	"	9,322	58	30	29
*K6AZA/5	"	5,106	49	20	26
*KB7UIS/5	"	1,104	20	11	13
***KB5ZFO**	28	**20,350**	**154**	**13**	**37**
*W5EIJ	"	1,620	29	6	14
*W5KI	21	3,705	37	12	27
***NI5M**	14	**154,070**	**391**	**33**	**109**
*NZ5O	"	105,164	311	26	96
*W5VGX	"	78,975	246	28	89
K6GX	A	**1,027,650**	**1180**	**98**	**212**
WK6V	"	**685,926**	**804**	**102**	**216**
W6RCL	"	197,370	344	77	138
W6REC	"	196,666	347	75	139
KE6BUM	"	179,970	349	76	134
W6FSJ	"	173,667	294	77	142
WA6TKT	"	168,032	333	62	116
KC6CEX	"	131,424	317	59	89
WB6UAN	"	117,733	405	34	87
N6OU	"	117,585	230	71	124
NI6T	"	77,786	167	75	103
W6ISO	"	73,416	202	51	82
N6IC	"	70,744	178	60	88
KM6WQ	"	65,436	181	54	79
N6ATD	"	59,976	174	46	80
W6RFF	"	56,280	166	50	70
W6OUL	"	52,029	152	49	74
WB6NFO	"	46,990	224	20	54
AA6AG	"	39,964	138	42	61
WA6UFY	"	39,491	150	33	68
KD6QK	"	19,092	101	33	41
AJ6V	"	11,534	62	29	44
K6UO	"	11,040	58	30	39
KE6CCV	"	4,218	38	18	19
WB6UTY	"	2,958	34	15	14
W6KFV	28	**7,781**	**126**	**14**	**17**
WA6FIT	21	2,088	28	10	19
K6HNZ	14	**399,008**	**1004**	**35**	**113**
W6BSY	"	186,620	488	34	106
KC6X	"	126,898	355	33	101
K6SE	"	21,760	120	20	48
W6BCQ	7	**50,616**	**167**	**33**	**78**
***WA7BNM/6**	A	**663,300**	**805**	**99**	**201**
***KC6ETY**	"	**427,682**	**926**	**71**	**210**
*KM6XX	"	111,680	257	56	104
*WA8LLY/6	"	68,101	174	63	88
*KO6IS	"	60,840	168	51	79
*KK6RG	"	58,000	186	53	72
*W6PLJ	"	38,412	150	44	55
*KQ6ES	"	34,398	137	44	54
*KM6ZR	"	33,598	120	52	55
*N6TW	"	31,581	121	37	61
*KI6PG	"	29,304	124	40	48
*KE6UP	"	26,602	112	39	55
*W6UDX	"	14,280	75	32	38
*K6AOM	"	9,130	115	28	27
*KU6T	"	3,654	47	11	18
*AA6EE	"	1,508	23	13	13
***KJ6HO**	21	**90,155**	**345**	**27**	**68**
*W6EUF	"	68,355	258	24	69
*AC6WD	"	15,620	103	18	37
*WA6FGV	"	4,872	46	15	27
*W6 /XE1RGL	"	36	7	4	5
*N6SMW	14	8,505	71	17	28
*K6CEO	"	5,928	58	16	23
*N2ALE/6	7	440	14	6	5
N7AVK	A	**1,766,721**	**1760**	**115**	**248**
W7OM	"	**397,365**	**498**	**100**	**195**
K7LUH	"	360,960	537	79	161
W8AEF/7	"	343,728	476	84	180
AA7VY	"	334,361	549	82	157
AF7O	"	303,830	491	74	156
N9ITX/7	"	268,521	415	72	165
K7ABV	"	214,368	389	62	141
KJ7TH	"	175,978	332	70	139
W7LGG	"	154,944	288	61	131
W7CB	"	126,728	314	47	99
KC7UP	"	120,204	280	51	108
W7HUY	"	101,310	219	57	108
K7GWK	"	72,656	177	57	95
W7KJJ	"	70,890	190	56	83
WE6G/7	"	69,030	203	50	80
AB7RW	"	55,085	204	42	73
W7YS	"	50,160	175	40	70
N5CT/7	"	43,639	110	43	97
W7LR	"	41,788	127	50	74
N7UJJ	"	37,728	150	37	59
N7ER	"	36,432	70	32	67
AA7RW	"	34,887	162	33	54
K7SP	"	24,273	101	41	46
NF7E	"	21,930	112	36	50
KJ7QT	"	21,203	87	35	56
WB7ASR	"	13,280	61	38	42
WA7KLK	28	**5,697**	**73**	**9**	**18**
W7UPF	21	**66,500**	**253**	**26**	**74**
W7AYY	"	21,576	124	19	43
W7RM	14	**701,590**	**1509**	**37**	**133**
		(Opr. K7ST)			
KI7DM	"	221,259	661	32	99

WA7IVZ	"	145,860	422	33	97
W7HS	"	24,192	122	25	47
N7DD	7	**288,904**	**762**	**34**	**100**
AI7B	"	**138,528**	**436**	**32**	**85**
W7SE	"	31,509	143	26	55
AB7HP	"	6,068	55	17	24
AB6ZV/7	3.7	**72,570**	**495**	**26**	**56**
KG5JH/7	"	4,134	86	13	13
***W7YAQ**	A	**244,518**	**374**	**79**	**170**
*WS7V	"	114,444	278	52	101
*AB7II	"	25,482	104	37	56
*N7LOX	"	14,365	90	30	35
*W7GTO	"	5,950	44	22	28
*KI7LS	"	3,978	37	16	23
*WA7NIY	28	4,785	86	11	18
*AA7KF	21	1,650	27	9	16
***W7FP**	14	**142,692**	**353**	**34**	**107**
*KG7RZ	"	45,236	181	27	59
*NN7A	"	2,890	34	12	22
*KA7TDH	"	594	15	9	9
KB8TI	A	**1,259,440**	**1000**	**116**	**339**
W9LT/8	"	**982,086**	**893**	**103**	**299**
N8ATR	"	**976,435**	**745**	**115**	**372**
K3JT/8	"	640,815	660	95	264
WZ8T	"	429,120	574	74	214
KE8KG	"	405,216	576	62	190
N8BJQ	"	319,708	450	74	183
KA8IIC	"	314,817	392	84	219
NE8Z	"	309,582	475	60	174
N8LYM	"	306,675	429	64	197
NT8V	"	203,148	318	58	170
AL7PT/W8	"	187,230	318	65	172
WZ8A	"	174,928	279	61	171
W8UPH	"	137,708	292	47	126
N8II	"	123,369	258	54	123
W8KTQ	"	107,520	289	51	117
KJ8F	"	91,350	211	57	118
K2UOP/8	"	84,214	193	48	110
AA8VN	"	82,240	206	42	118
NW8F	"	67,932	167	43	110
W8ILC/m	"	55,860	143	46	101
KD8FS	"	49,200	161	37	86
AA8UH	"	45,425	159	31	84
WB8BUQ	"	32,445	116	34	69
K8LJG	"	30,420	116	23	67
KG8AS	"	27,438	102	36	66
NG8D	"	25,116	101	24	67
WT8P	"	20,636	100	24	53
K8MR	"	10,143	59	21	42
KF8EP	21	**118,503**	**368**	**25**	**108**
WA8DXB	"	109,056	298	25	103
NI8L	14	**678,026**	**1349**	**38**	**143**
K3ZJ/8	"	**405,112**	**956**	**36**	**122**
W8TWA	"	201,115	499	32	113
W8UD	"	137,970	385	29	97
KT8X	"	10,416	69	18	44
W8JGU	7	**91,512**	**272**	**29**	**94**
W8UVZ	"	42,728	143	29	80
N8II	3.7	12,042	113	15	39
KC8MK	1.8	**10,308**	**282**	**13**	**36**
K8RF	"	3,900	56	9	30
***KF8UM**	A	**300,312**	**421**	**68**	**190**
***K8QLK**	"	**167,112**	**303**	**58**	**153**
*KA8ZPE	"	128,640	247	61	140
*N8QVP	"	76,066	194	47	99
*KB8FLY	"	30,264	116	32	65
*W8IDM	"	17,370	75	30	60
*W8MKO	"	15,375	75	22	53
*WB8ORV	"	11,700	60	21	44
*AA8UP	"	2,318	61	11	28
*AA8VH	"	2,166	25	11	17
***N8FWA**	28	**9,540**	**94**	**9**	**27**
*KE8NH	"	3,306	43	8	21
*N8LIQ	21	8,370	58	15	39
***KB8IBS**	14	**108,720**	**323**	**26**	**94**
*AF8C	3.7	252	11	5	7
W9RE	A	**2,512,669**	**1607**	**128**	**435**
AA9LX	"	**592,495**	**611**	**93**	**262**
W9KDX	"	566,742	599	85	256
K9RN	"	505,400	536	94	256
		(Opr. N9NCX)			
K9CAN	"	504,468	529	94	252
K9BG	"	461,692	548	84	224
KBØC/9	"	428,032	519	64	240
WA9TPQ	"	378,840	492	74	206
W9BCV	"	222,780	359	67	168
KO9Y	"	200,067	484	31	116
KJ9C	"	169,740	288	69	161
W9LYN	"	8,526	63	19	39
KS9U	21	**218,250**	**544**	**27**	**123**
W9GIL	"	84,693	226	23	88
NF9V	14	**162,150**	**428**	**30**	**108**
W9OF	"	158,444	388	29	114
K9YNF	"	99,876	306	26	90
K9UQN	"	32,800	148	18	62
KF9YR	"	9,576	58	15	41
KD9ST	7	**57,888**	**203**	**29**	**79**
KF9YT	"	51,500	187	26	74
K9HMB	3.7	**46,696**	**180**	**27**	**77**
WB9Z	1.8	**6,016**	**56**	**14**	**33**
***N9VVV**	A	**450,569**	**556**	**92**	**245**
***W9RN**	"	**302,204**	**441**	**72**	**179**
*N9SXT	"	231,380	389	64	166
*AA9TB	"	90,210	220	40	115
*NG9L	"	87,606	205	38	119

(Continued on page 102)

Two New Cable Assemblies From CABLE X-PERTS

CABLE X-PERTS, INC. has added two new cable assemblies to their product line. The first is 6 ft. RG303/U with PL259 installed on each end (PN:RG303C6). The second is 18 ft. RG303/U with PL259 installed on each end (PN:RG303C18). Longer lengths or the bulk cable is also available. Each termination is soldered and tested for complete electrical and physical integrity. RG303/U is a high-temperature, high-power teflon coax. The over diameter is .195" with a solid silver center conductor and a mil-spec silver braid shield. RG303/U is rated at 30 MHz 1.9 dB loss per 100 ft. and 6000 watts PEP.

For further information, contact CABLE X-PERTS, INC., 416 Diens Dr., Wheeling, IL 60090 (phone 847-520-3003; fax 847-520-3444), or circle number 103 on the reader service card.

RF Prototype Systems Low Cost Test Sources

RF Prototype Systems can provide low-cost, phase-locked sources from 1 to 4500 MHz, off the shelf, with custom options to 20 GHz. Control options include on-board DIP switches, IEEE-4888, or complete embedded solutions with front-panel keyboard and display. The sources are easy to use and are well suited for engineering lab and production test stations, maker says.

For more information, contact RF Prototype Systems, 9400 Activity Rd., Suite J, San Diego, CA 92126 (phone 619-689-9715; fax 619-689-9733; or toll-free [outside California] 800-874-8037), or circle number 101 on the reader service card.

New Additions to WJ2O Master QSO Logger

Version 3.48 of the WJ2O Master QSO Logging Program offers new features. One such addition is the multiple QSO window. Once you enter the callsign of a new QSO, the Multiple QSO Window pops up instantly and shows you all the previous QSOs you may have had with that station. This feature is also helpful in solving the vanity callsign problem. With version 3.48, you enter some information on the flag line of the new QSO and all the QSOs from both the new and old call appear in the Multiple QSO Window. It also works with Canadian and special prefixes. Another new feature includes an adjustable window size on the Multiple QSO Window. The window only uses the space that is necessary to fit the callsign and information, saving screen space. The Multiple QSO Window will now also work regardless of which scrolling sequence you are using. In the past it was only available when you were in Callbook and alphabetical order and not chronological. Another improvement is the removal of the limit on the number of entries per callsign. Previously only 500 entries per callsign worked were allowed. All together, there have been about ten new enhancements to this logging program.

For more information, contact WJ2O Software, P.O. Box 16, McConnellsville, NY 13401 (phone 1-800-944-WJ2O; fax 315-245-1336; e-mail <wj2o@aol.com>; or on the Web <http:// www.webprint.com/wj2o>) or circle number 102 on the reader service card.

Bird Electronic Corp. T-Series RF Loads

Bird Electronic Corporation has introduced a line of 50 ohm, air-cooled RF loads, including new 2 and 5 watt models. These "T-series" loads are conservatively rated with specified power handling at 40°C. At 25°C power ratings are 2.4W and 6W, respectively. Connector options include male or female N, BNC, and TNC. VSWR is 1.10 or better from DC to 1 GHz for all models. With N connector, maximum VSWR is 1.25:1 at 1 GHz to 6 GHz (1 GHz to 4 GHz for BNC and TNC connectors). These loads are manufactured with non-magnetic materials and are finished in silver or tri-alloy plating.

For more information, contact Bird Electronic Corporation, Denise Tiearney, Bird Technologies Group, 30303 Aurora Road, Cleveland, OH 44139 (phone 216-248-1200; fax 216-248-5426; e-mail <sales@bird-electronic.com>), or circle number 106 on the reader service card.

PROLOG Logging Program And QSL Route Database

The newest version of PROLOG contains many features that include support for up to 36 logbooks each with its own award tracking for DXCC, WAS, WAC, WAZ, WAITU, WPX, Counties, and IOTA awards, plus sixteen general awards of the user's choice. Supplied prefix and award editor utility programs make adding, editing, and deleting DXCC prefixes and award elements easier. External CD-ROM callbook databases marketed by Flying Horse (RAC), SAM, QRZ, and Buckmaster are supported. For those interested in 1010, PROLOG also supports a 1010 roster database which may be downloaded free of charge from an associate internet web site. When these databases are made available to PROLOG, it will automatically place the contacts name, QTH, state, county and 1010/VP number information directly into the logging form.

An interactive PacketCluster™ interface with DX spot and WWV report monitoring complete with selectable DX spot scanning and audible alerting is provided. You can generate your own DX spots and converse over the link using the built-in terminal interface. Bi-directional rig control with DX spot switching is supported for all major manufacturers transceivers. PROLOG maintains its own internal 32 channel VFO memory for fast switching to your favorite frequencies and modes. PROLOG's print module permits the printing of QSL labels in single, multi-QSO, or SWL formats including a personal comment line. The program also supports both dot matrix pin-feed style labels and laser/ink jet label sheets.

PROLOG's QSL route database currently contains 60,000 DX routes and is availabel as a standalone product or may be integrated with the logging program. When integrated with the logger, the route information is placed directly into a special field in the logging form.

PROLOG will run in a DOS-only or Windows/Windows95™ environment. For further information, contact Datamatrix, 5560 Jackson Loop, N.E., Rio Rancho, NM 87124 (phone 505-892-5669; order line telephone 1-800-373-6564; e-mail <prolog@rt66.com>; on the Web <http:// www. qth.com/prolog>) or circle number 105 on the reader service card.

The Palomar Model PFS-1 Linear Field Strength Meter

BY LEW McCOY*, W1ICP

Years ago, when I worked at the ARRL, I described a linear field strength meter in *QST*. I had to check out a beam antenna, and the typical diode detector field strength meter was not accurate enough. The unit I used had an op-amp in it and the meter was calibrated in decibels, so it was easy to see changes in the antenna we were testing.

Palomar Engineers has come out with a similar device, but much improved over my original circuit. I have said it before in reviews but it bears repeating. Jack Althouse, the owner of Palomar, is one of the finest engineers I have had the pleasure of knowing. He designs items that amateurs need—and does a very good job in doing so. The Model PFS-1 Field Strength Meter is no exception.

With all the antenna "shoot-outs" that are taking place, there is a real need for a simple, portable, extremely accurate field strength meter for use in antenna checking. Even more important, amateurs like to experiment with antennas. With the PFS-1 it really becomes a simple project.

The unit measures 3"H × 2.5"D × 10"L. Weight is about 1.5 pounds. Now that's portable! It is powered by an external 9 or 12 volt battery.

The unit covers all frequencies from 1.8 to 150 MHz. It does this via five tuned circuits: 1.8–5 MHz, 5–12 MHz, 12–30 MHz, 30–60 MHz, and 60–150 MHz. The tuned circuits give good sensitivity and remove out-of-band signals that could give erroneous readings.

The circuit starts off with the tuned circuits and then goes into a 20 dB gain amplifier which further improves sensitivity. Gain measurements are accomplished via a 30 dB step attenuator that has 5 dB steps that are accurate to one percent. These readings are available via a panel meter that provides readings accurate to 0.2 dB. The detector uses a Grebenkemper/Lewallen circuit that assures linear readouts over a wide range of signal strengths.

*Technical Editor, CQ, 1500 West Idaho St., Silver City, NM 88061
e-mail: mccoy@zianet.com

This view shows the front of the PFS-1. As mentioned in the text, the unit has an SO-239 coax chassis connector on the rear of the cabinet. In use, a simple method to do antenna testing is to mount the test dipole at least a wavelength away on the low bands—say, at least 50 feet on 10 meters. Connect the dipole via coax and make the coax long enough to reach to the PFS-1, located near the antenna to be tuned or tested.

The PFS-1 has four controls on its panel. There is a **Bandswitch** and then a **Tune** control, followed by a **Vernier Gain** control and then a stepped **Gain/dB** control, with five decibels per step. There is an SO-239 coax connector on the back panel for connection to the reference antenna.

To test the setup for this review, I built a 2 meter, 1/4 wavelength ground-plane antenna with a balun installed to make sure I did not get any feed-line pickup. I then mounted the ground plane about 30 feet away from my test point at straight line-of-sight and used RG8 to connect to the field strength meter. My PFS-1 was situated at the end of the coax right in front of me. I had a 4-element 2 meter quad which I tested for gain and adjustments. The process proved very interesting. I completely detuned the quad by lengthening the reflector and director. I then tuned the reflector, observing the PFS-1 meter. When I finally had the peak reading, I started with each director and peaked each for gain. I went back and forth between directors and reflector until the antenna was maximized. I then substituted another ground plane identical to the one that was the pickup antenna for my tests. What I wanted here was "base" reading of two identical antennas. I zeroed my readings with the identical antennas and then switched back to the quad, which showed just about 9 decibels of gain compared to the ground plane—not too bad. I also tried another test just to see what the difference would be. I rotated the quad on its side so that I had horizontal quad polarization. My reading showed a drop of just about 3 decibels, as I expected. Keep in mind that I was using all vertical polarization for my tests of the instrument.

I can readily see where this instrument would be worth its weight in gold for antenna tests or even antenna shootouts, which seem to be the thing to do with amateurs who like to brag about their mobile signal.

I was impressed with the construction and design of the PFS-1, and I know that Palomar has produced a very good, useful device for amateurs interested in antenna testing (and aren't we all!).

The PFS-1 is manufactured by Palomar Engineers, P.O. Box 462222, Escondido, CA 92046. The unit is priced at $195.00.

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Time Domain Reflectometry

When a coax feedline to an antenna breaks, it is obvious to us, since RF is not radiated. If the AC power cord opens, it is also obvious and we replace the cord. These are simple, routine cable-related problems and easily addressed by repairing or replacing the defective cable. Consider the case when the cable is a mile or two long, however, buried under the ground or running up the side of an antenna tower and generally inaccessible. Now the situation is not so simple. The break must be accurately located and repaired. Digging up the entire mile of cable, or replacing the cable that is tie-wrapped to the tower (or in conduit), is really not practical.

c/o CQ magazine

Broken or defective cable problems of this type are common to telephone or cable TV service personnel. The technique they use to find these breaks is easily adaptable for amateur experimenters. The technique is called *time domain reflectometry* (TDR) and is based on the fact that with any mismatch in a transmission line, a portion of a transmitted signal will be reflected back to the source. In the case of transmitters driving antennas, such a mismatch shows up as an SWR that is greater than one. In the case of normal signal-carrying cable, a failure is either an open or a short, and these conditions also result in reflections that are easily detected. It is this fact that is used in TDR equipment. Before going into the actual circuitry of a device that the amateur can build, let's look at exactly how the scheme works.

Fig. 1 is a schematic of a coaxial cable run used to transmit a cable TV signal from a distribution box to the home. If the cable is intact, a signal traveling down the cable will reach the other end, and any reflection (due to a mismatch) will then travel back along the cable to the input. In this case impedances are usually matched fairly well, so there is not much of a reflection. However, since we live in the real world, the match will never be per-

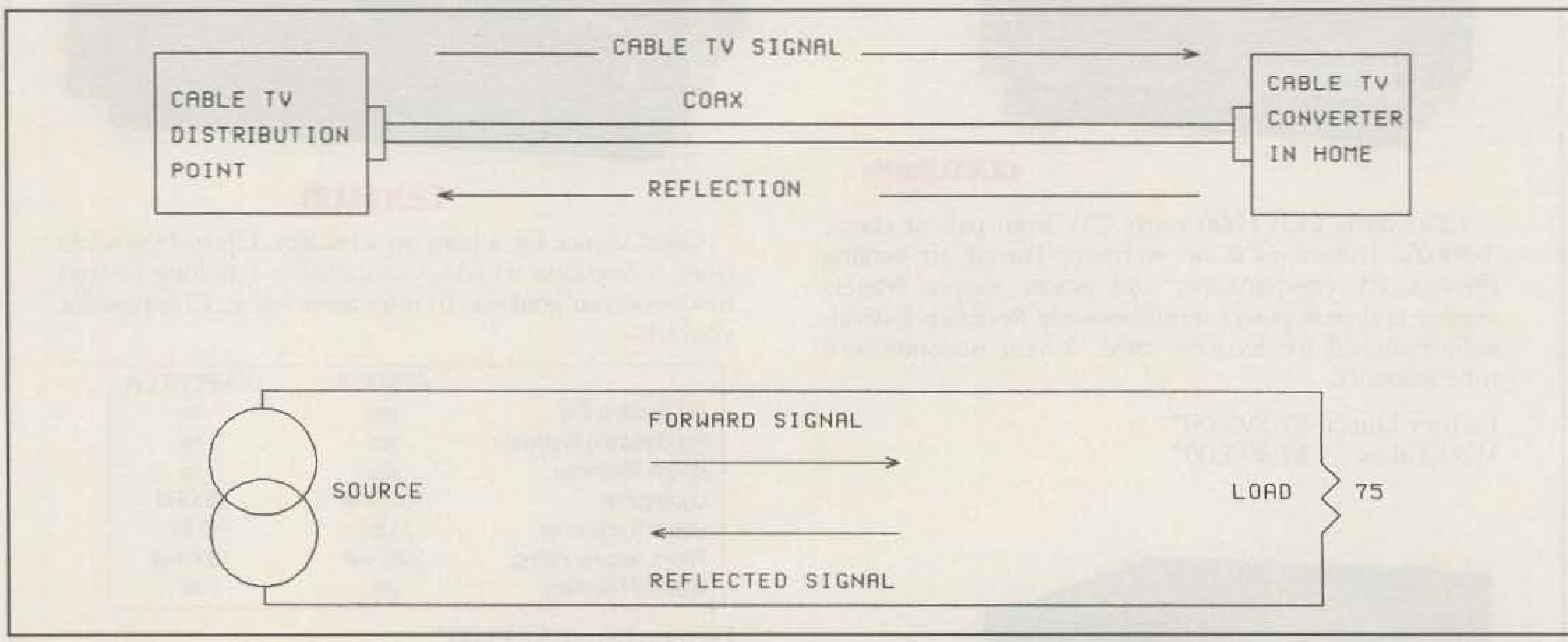


Fig. 1– Simple cable TV distribution system hookup.

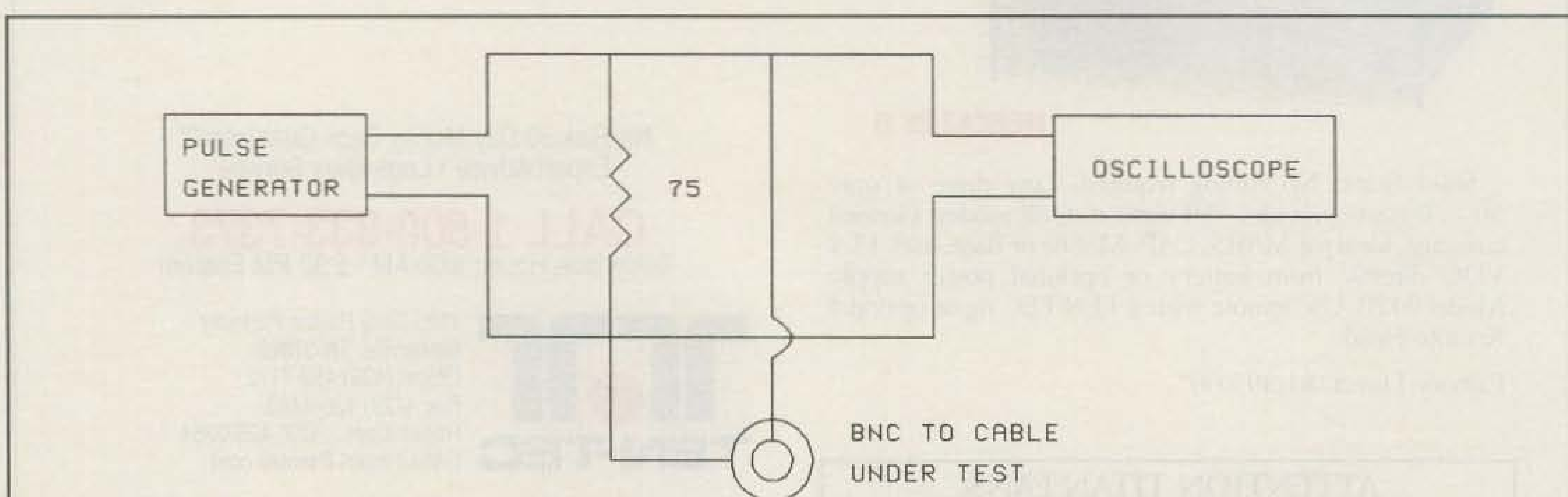


Fig. 2– Setup for time domain reflectometry.

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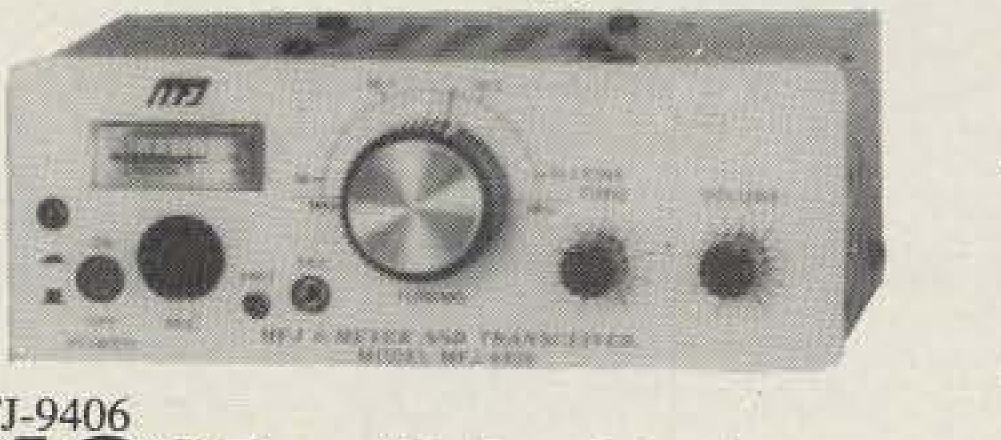

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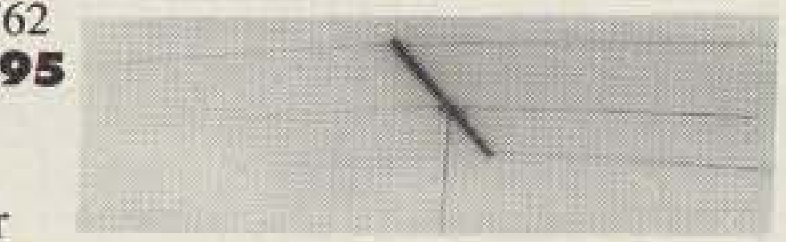
6 Meter Antennas

MFJ 3 element 6 Meter Yagi



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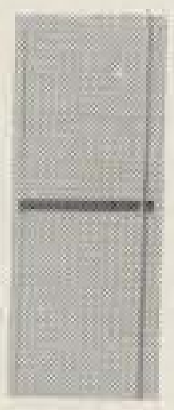
MFJ-1762 **$69.95**

MFJ full halfwave 6 Meter Antenna



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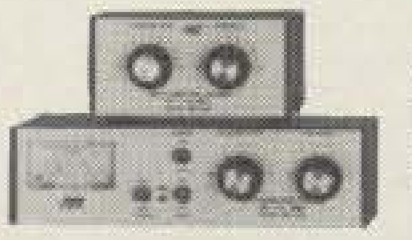
6 Meter MFJ Antenna Tuners

Compact 6 Meter Antenna Tuners



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MFJ-903, $49.95. Like MFJ-906, no meter, bypass switch. 5x2½ x3".

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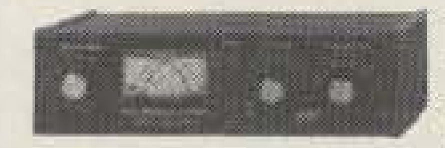

MFJ-945E, $99.95. Compact *mobile* tuner covers 6 Meters thru 160 Meters. Lighted Cross-Needle SWR/Wattmeter. Antenna bypass switch. 300 Watts PEP SSB. 8x2x6". Mobile mount, **MFJ-20, $4.95.**

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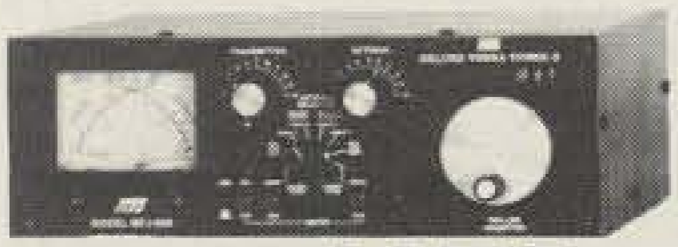

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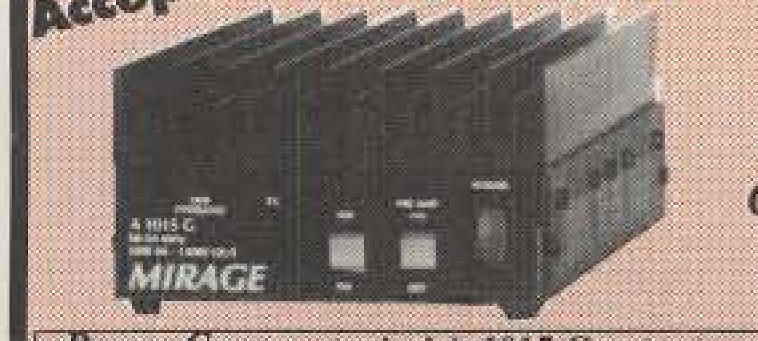

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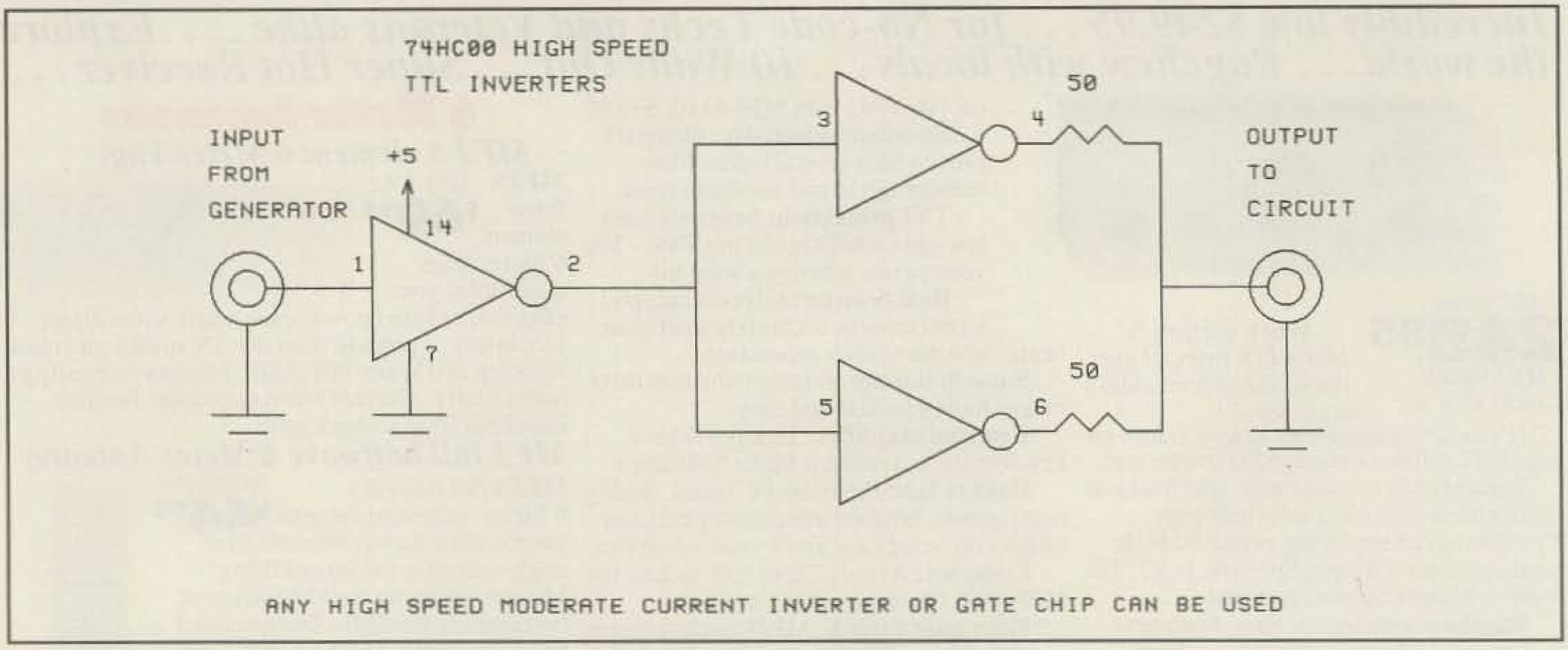


Fig. 3– High-speed output driver for TDR use.

fect, and at least something will be reflected. This "something" is what we measure. If we therefore excite the cable with a fast rise-time pulse, we should be able to observe any reflected portion of the pulse on an oscilloscope, the amplitude of the reflection being proportional to the degree of the mismatch. Since we know how fast the pulse travels through the cable, by looking at the time it takes to make the trip to the end and back, we then easily can calculate the length of the cable. The formula for such a calculation is:

Distance = (0.68) total travel time/2

The factor 0.68 is called the *velocity factor* of the cable and is defined as the ratio of the speed of an RF signal in free space vs. the speed of the same signal in the cable. The exact velocity factor for any cable is usually given in the specification sheet for that cable, but as a rough approximation, 0.68 should get you to within 10% of the distance for most of the common cables that the amateur is likely to encounter. Let's look at how we can set up this system and observe these pulses.

Fig. 2 is a diagram of a simple TDR hookup. A fast rise-time pulse generator is needed, although the frequency (pulse repetition rate) is not critical. The fast rise-time is required so that the transmitted edge of the pulse does not overlap the received edge of the reflected pulse and cause inaccurate results, particularly for short distances. If you do not have such a pulse generator, the circuit of fig. 3 can be used to speed up the output from whatever pulse source you do have. In this circuit you can use any high-speed moderate-output drive inverter or NAND gate chip you might have.

The circuit shown in fig. 4 is a simple experiment that you can perform to see how the time domain reflectometry technique is actually used to find a cable fault. Two 100 foot lengths of coax are connected together with a BNC "T" and the test setup. Fig. 5 shows the oscilloscope pattern that would be obtained from this

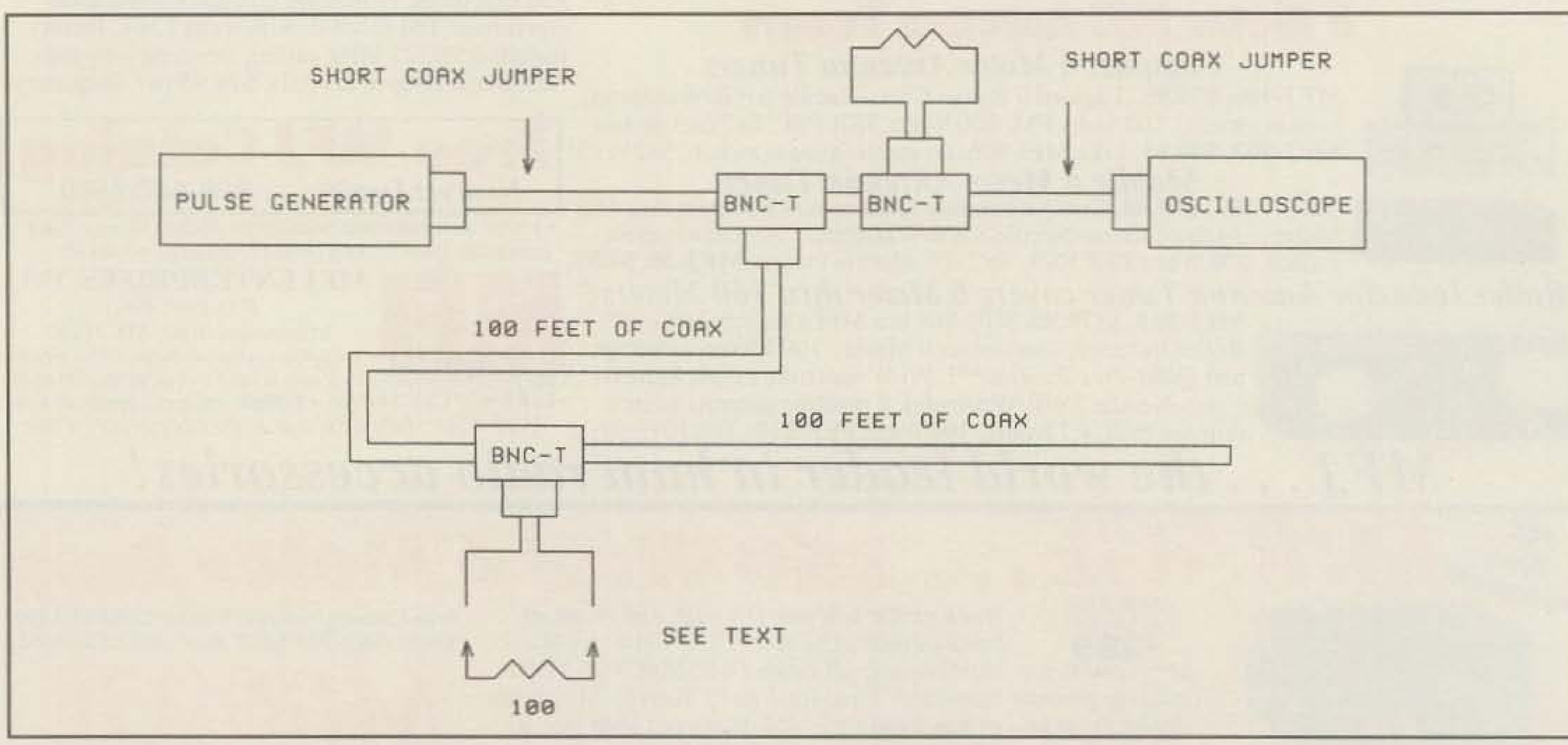


Fig. 4– Experimental setup to test TDR procedure.

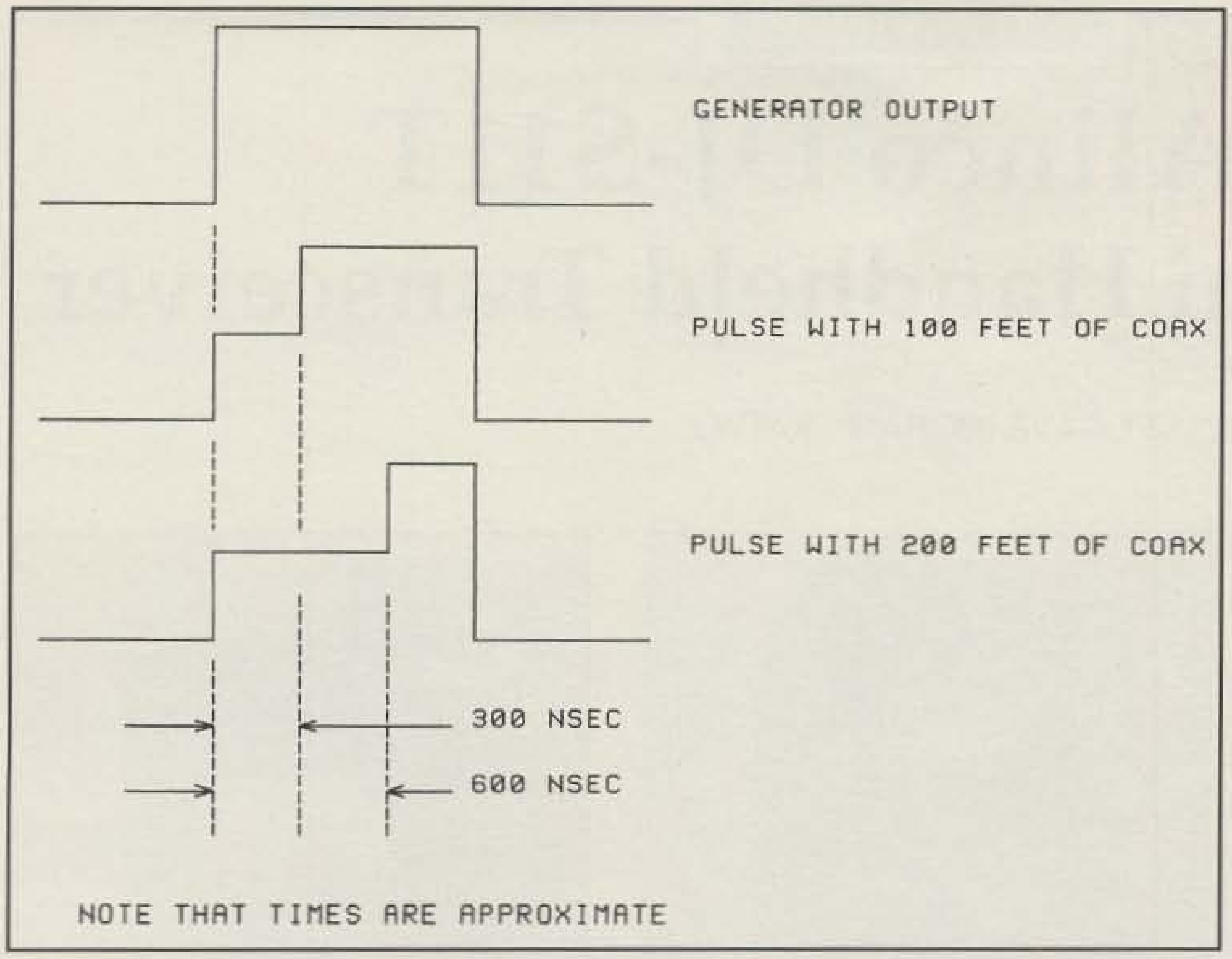


Fig. 5– Typical oscilloscope waveforms from fig. 4.

hookup. The transmitted and received pulses are clearly visible as a step in the resulting waveshape, thereby allowing easy measurement of the time interval between the edges of the two pulses. Once you do this, plugging the data into the formula should result in a distance of 200 feet. Now let's disconnect the second 100 foot length of coax. Immediately the scope picture changes and the distance to the "end" drops to 100 feet (as it should). This clearly demonstrates how cable lengths are measured by TDR methods.

Now reconnect the second 100 foot coax run and partially "short" the coax by connecting a 100 ohm resistor across the open port of the BNC "T." Notice how the scope picture (fig. 6) shows both the "short" at 100 feet and the end of the cable at 200 feet.

The technique demonstrated above is commonly used by most service personnel who deal with cable breaks. Although the examples given are of coax, the technique works with other types of cables as well. Terminations and reflected pulses may differ in appearance on a scope, but if you understand what is going on, you should have little trouble interpreting the results. Since the investment is minimal, you should consider using time domain reflectometry the next time you have to find a break in an inaccessible cable.

73, Irwin, WA2NDM

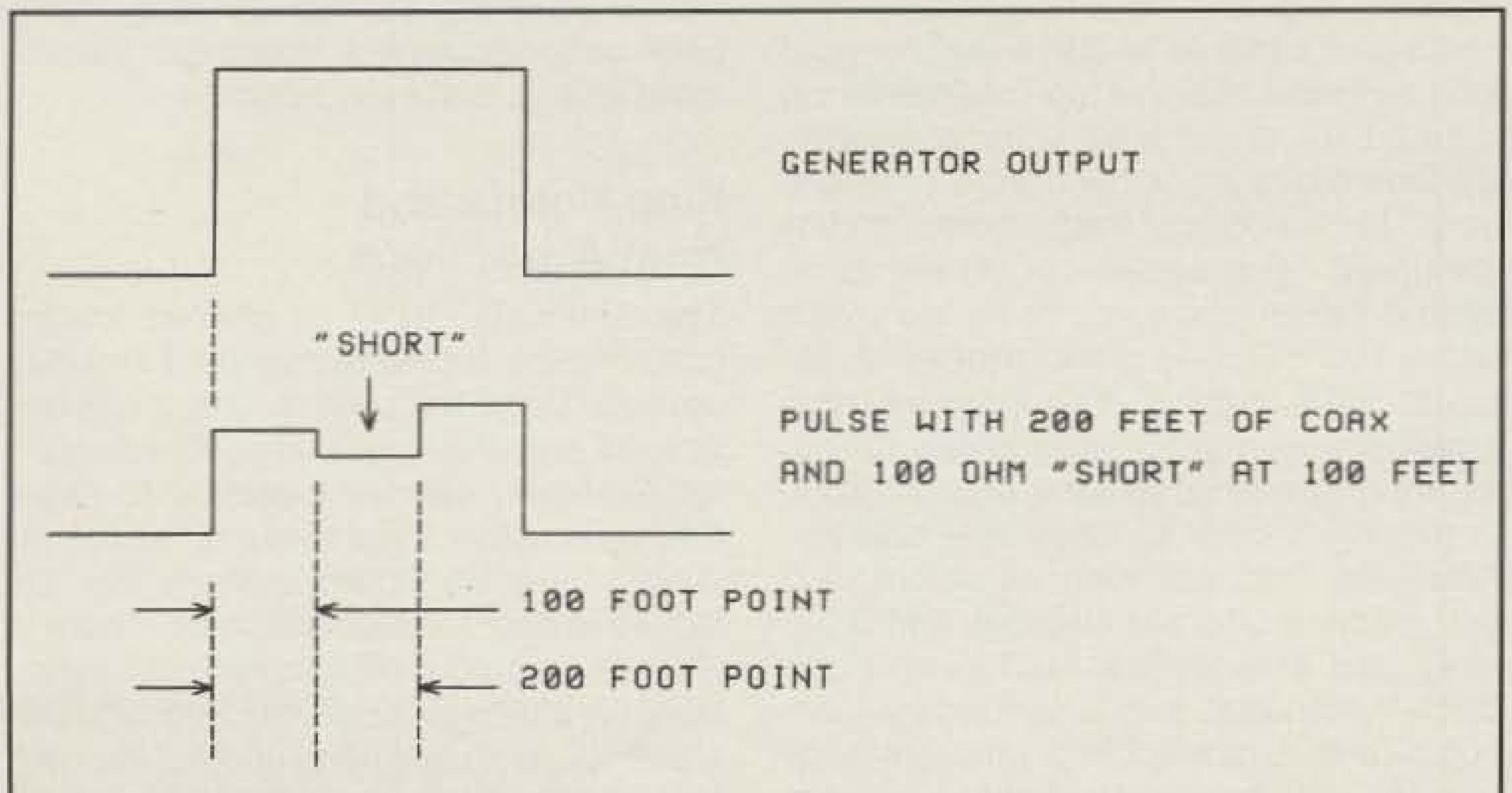


Fig. 6– Waveform with partial "short" at 100 feet.

The Alinco DJ-S11T 2 Meter Mini Handheld Transceiver

BY DAVE INGRAM*, K4TWJ

Today's handheld FM transceivers are loaded with so many bells, whistles, tweets, and frills that a newly introduced model must offer something really special to capture our interest. Well, friends, Alinco's new DJ-S11T fills that bill in high style. This little gem is exceptionally small in size, very light weight, and it is priced so low that every member of an amateur radio family can get one. As XYL Sandy, WB4OEE, also pointed out when I handed her the S11 for inspection, it is so easy to use that you don' need a manual or "cheat sheet" for guidance!

The DJ-S11T is a radio you actually can carry unobtrusively everywhere you go rather than leave it in a car's glove compartment like a regular-size talkie. Aren't emergency preparedness and on-the-spot communications precisely when needed a handheld's main purpose? Hopefully, the DJ-S11T (or any handheld) will always be used for fun pursuits and pleasure communications, but having one right with you when and if an abnormal situation arises is truly an asset. Considered from that viewpoint, as you surely will agree, a talkie in the hand is worth two in the car.

How well will the DJ-S11T fit in with your lifestyle? Let's take a closer look and let you be the judge.

Vital Statistics

If you are not familiar with the DJ-S11T's general specifications, here are the details in a nutshell.

The talkie measures only 4 inches tall, 2 inches wide, and 1 inch thick, and weighs a scant 6.5 ounces. The DJ-S11T operates 144.00 to 147.995 MHz and has 21 "store all data" memories, selectable transmit offsets, CTCSS encoder, two scan speeds, and an output power of 340 milliwatts. Additional notes on frequency coverage and power are included later in this review, so read on. The little talkie also has a large, easy-to-see LCD readout, top-mounted sockets for an external speaker/microphone and DC power, and a swivel-mounted pull-up antenna that

*4941 Scenic View Dr., Birmingham, AL 35210

Alinco's new DJ-S11T mini 2 meter handheld. It is QRP in size and price, and it's certainly a winner.

Rear view of the DJ-S11T showing the swivel-up antenna nestled into the groove on the case back. One grab and you have a ready-for-action handheld.

nestles in a molded groove on the back. No more misplaced duckies or fumbles snapping them on or off with the DJ-S11T!

One of the first things you notice when picking up an DJ-S11T is its well-made, solid feel. The battery compartment, its retaining clip, and back fit nice and snug and seem capable of surviving plenty of long-term use. A single top-mounted knob is used for on/off and volume control. **Up/Down** buttons on the front left side are used for selecting frequencies and/or memories. The squelch is preset at an optimum level, and a side-mounted switch below the PTT opens the squelch to listen for weak signals. This keep-it-simple arrangement makes good sense to me, as the only real need for a squelch knob is turning it back to open the squelch. Additional front pushbuttons select VFO or memory mode, call channel, and scanning, and activate the LCD's backlight. Each button also has a secondary function which is labeled in a different color (green) and accessed by holding the side **Function** button depressed. As an example, the **Up** button's secondary function selects tuning steps, the **Down** button selects CTCSS tones, and the **Scan** button selects transmit offsets. Many new owners have put the DJ-S11T's color-keyed concept to the test by quickly installing three AA cells and using the talkie before studying its manual; they have been quite successful. Now that's the ultimate example of easy operation!

Fine Points and Neat Attractions

The Alinco DJ-S11T is geared toward grab-and-go convenience, yet it includes several "fancy features" you can call into action if and when you prefer. The display, for example, can be switched to show channels rather than frequencies for security, plus **Up/Down** buttons can be locked to avoid accidental shifts. There is also an auto shut-off function with selectable time-outs of 30, 60, 90, and 120 minutes for forgetful owners, and a clever bell feature that alerts you with an electronic ring when a call is being received and the volume is turned down. Two more "tweets" are included: One you hear when punching any of the talkie's buttons, and another is inserted at the end of your transmission like a classic "over." (Any of the three bells or tweets/beeps can be switched on/off as desired.)

Earlier I mentioned the DJ-S11T was capable of two tuning speeds. First, you can press the **Scan** button for regular scanning. When a signal is received, scan pauses 5 seconds and continues (unless you cancel the scan mode by pressing the PTT). Alternately, you can hold the **Up** or **Down** button depressed for what I call "hyper scan" (ultra-high speed and no pausing—just quick squelch breaks). Release either button after one second, and it resumes regular scanning. If these two modes cannot find activity in a flash, give up and head for civilization!

I also said earlier that the DJ-S11T covered 144 to 148 MHz and hinted at expanded frequency coverage. FCC stipulations restrict making such "mod info" available to the general public, but I can say the talkie can be opened up for MARS/CAP operation and NOAA weather band reception. Yes, and the mod also makes the DJ-S11T the neatest little VHF scanner you have ever seen.

On The Air "DJ-S11T Style"

Now you are wondering how the DJ-S11T rates in on-the-air performance and if 340 milliwatts is enough power for reliable communications, right? Well, friends, the little critter is an absolute delight. Audio on both transmit and receive is clean and crisp with good tone quality. Also, the use of pushbuttons rather than a tuning knob for frequency and memory selection is a feature you will like right from the first punch. Probably most significant is the DJ-S11T's simple, easy operation. It's a talkie you can pick up and enjoy rather than be stumped over how to select a CTCSS tone, try to figure out why it is not copying a busy repeater, etc.

With respect to the DJ-S11T's output power of 340 milliwatts, I would say that like any handheld, the key is knowing its capabilities and limitations. I suggest you start out by making a few local area checks and contacts on a neighborhood repeater, and then try making some contacts (not just kerchunks) on repeaters a bit farther away. Next, check communications capabilities through those same repeaters and over "direct" paths while jogging, visiting familiar places, and running errands over your usual routes. Your test results will give you a good working idea of when and where low power is fine and when higher power is necessary (and test results can be pleasantly surprising!).

Conclusion

If you regularly follow my "World of Ideas" column here in *CQ*, you are aware that QRP is one of the hottest pursuits on our HF bands today. The tides of evolution are now expanding, and the waves of QRP are hitting our VHF and UHF shores. Smaller than ever imagined rigs and talkies are the direction of the future. It is the dawn of a new millennium, gang, and it's going to be a blast. Grab a DJ-S11T and join the fun!

Alinco's DJ-S11T is complemented by a variety of optional battery packs, chargers, and carrying cases, all of which are available from amateur radio dealers nationwide. List price of the DJ-S11T is $149.95. For more information contact Alinco, 438 Amapola Avenue, Suite 130, Torrance, CA 90501 (telephone 310-618-8616; fax 310-618-8758). ■

BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Getting Started on 6 Meters

The sunspot cycle is on the upswing. This means that we can expect good propagation on 6 and 10 meters, especially. The sporadic-*E* skip that makes 6 meters come alive over great distances will become more common each year until the sunspot peak is reached.

There is no need to invest huge sums of money when setting up a station for 50 MHz. Although some modern HF-band transceivers include the 6 meter band, you can enjoy operation on 50 MHz without spending big bucks for a multiband transceiver. For example, Ten-Tec markets a 6 meter transverter kit that delivers 7–8 watts of SSB and CW output power.[1] This transverter may be used with any SSB transceiver that covers the 20 meter band and is capable of having its output power reduced to 5 watts or less.

MFJ Enterprises markets a nice little 10 watt peak output 6 meter SSB transceiver that can be used as a stand-alone 50 MHz station.[2] Those wishing to build a simple low-power 6 meter transmitter can find a suitable circuit in *Solid State Design for the Radio Amateur* by D. DeMaw and W. Hayward.[3]

This article describes simple antennas you can construct for 6 meter operation. One school of thought suggests that in order to be successful on 50 MHz you must have a high tower and a massive directional antenna array, such as stacked Yagis. This is balderdash! It is true that antenna systems of the foregoing type, along with high power, are beneficial for reaching greater distances via the line-of-sight or so-called ground-wave modes, but simple antennas and low power are very effective for most 6 meter skip communications.

In this context I recall catching one of the very rare 2 meter sporadic-*E* openings in the 1970s while living in Connecticut. I had a Kenwood TS-700A multimode 2 meter transceiver that produced 10 watts of peak SSB output power. I did not have a 2 meter antenna at the time. The rig was connected to a 4-element, wide-spaced 10 meter Yagi at 50 feet, replete with high SWR! I heard a massive pile-up involving a station in Minnesota. Rotating the beam produced four signal peaks of roughly 6 dB. When there was a lull in the pile-up, I gave my callsign twice and stood by. To my amazement, the Minnesota station responded with a 5×7 signal report and thanked me for the call. Sporadic-*E* skip is equally as effective and much more common on 6 meters.

P.O. Box 250, Luther, MI 49656

Low-Cost Antennas

Many of the old standard wire antennas are capable of providing gain and directivity at very low cost. They are small enough to be turned easily with a TV antenna rotator. Take for example the extended double Zepp seen in fig. 1. It is less than 25 feet long and can be made with No. 14 wire. It exhibits a gain of roughly 3 dB over a dipole. This antenna produces a fairly sharp figure-8 radiation pattern off its broad side.

A matching transformer made from 450 ohm ladder line is utilized with a 1:1 balun transformer to permit using any length of 50 ohm coaxial cable to the station. The system may be adjusted to provide an SWR of 1 at the favored 6 meter frequency by experimenting with the length of the ladder-line transformer.

The Effective Bisquare Antenna

Although the fig. 2 antenna is thought of as a two-wavelength loop, it is not a true loop because it is open opposite the feed point. This antenna becomes somewhat unwieldy at frequencies below 28 MHz, but it is quite manageable at 50 MHz. Each of the four sides is 9 feet, 2 inches long. An open-wire 1/4-wave matching stub is used with a 1:1 balun transformer to per-

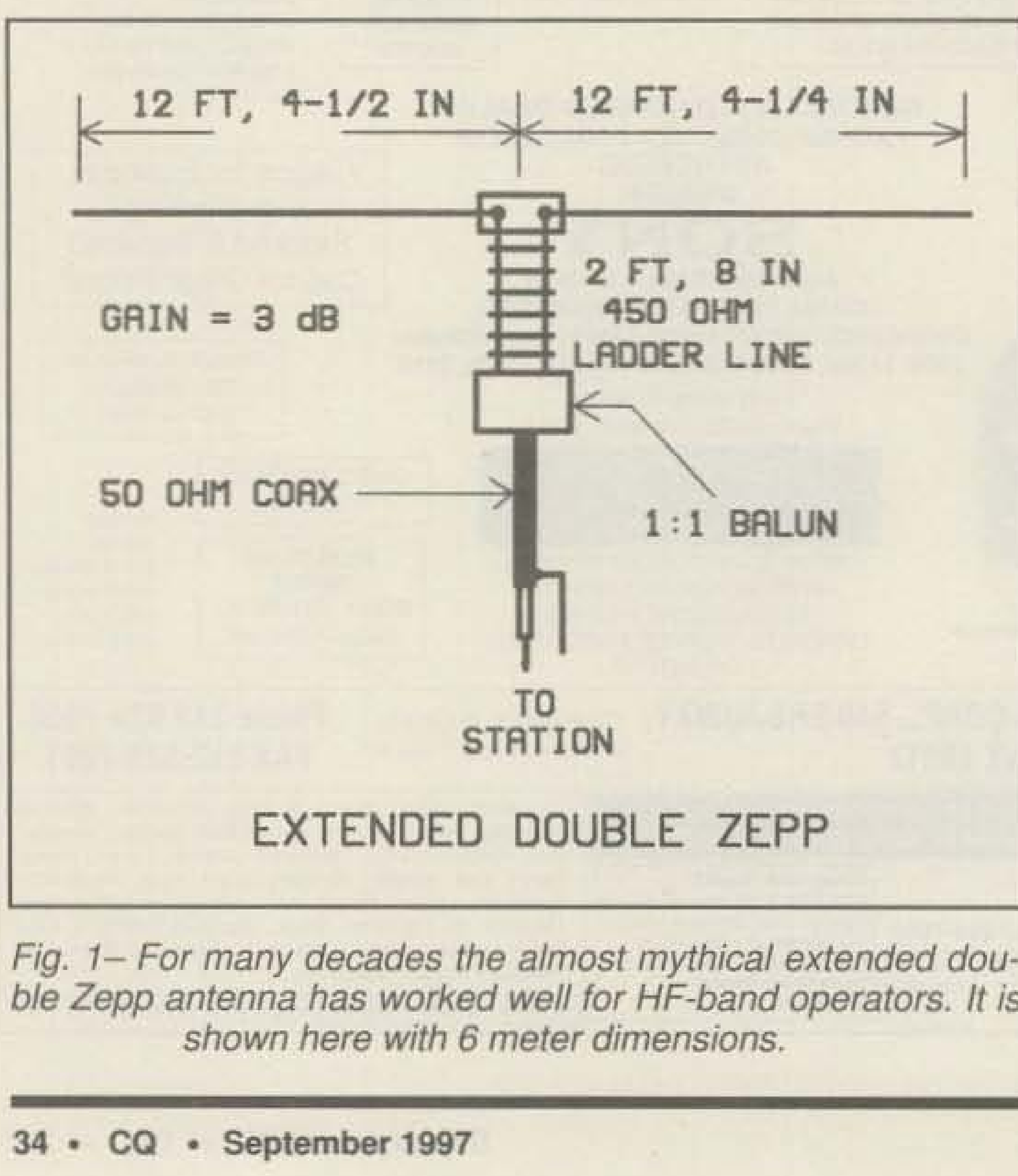


Fig. 1– For many decades the almost mythical extended double Zepp antenna has worked well for HF-band operators. It is shown here with 6 meter dimensions.

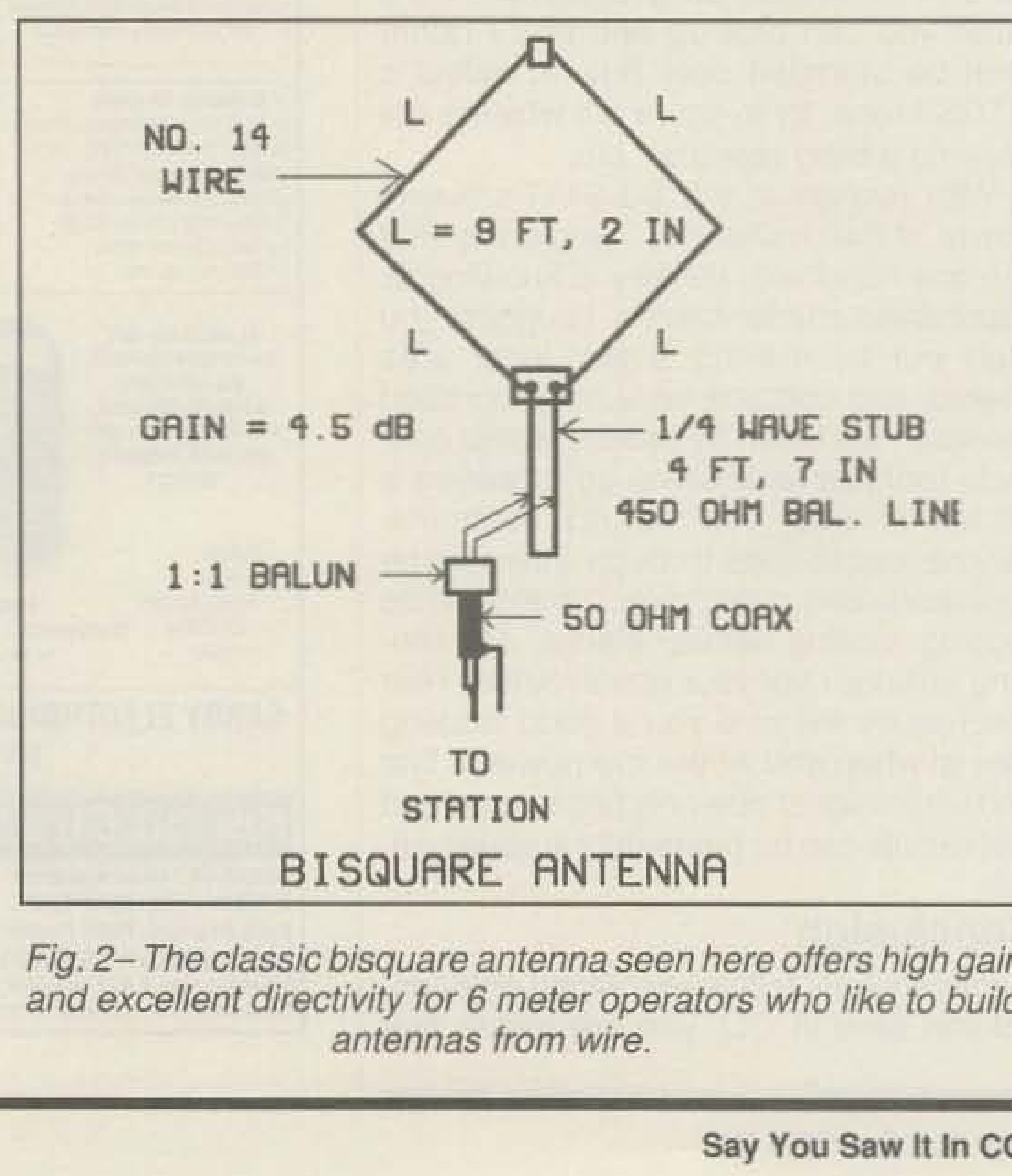


Fig. 2– The classic bisquare antenna seen here offers high gain and excellent directivity for 6 meter operators who like to build antennas from wire.

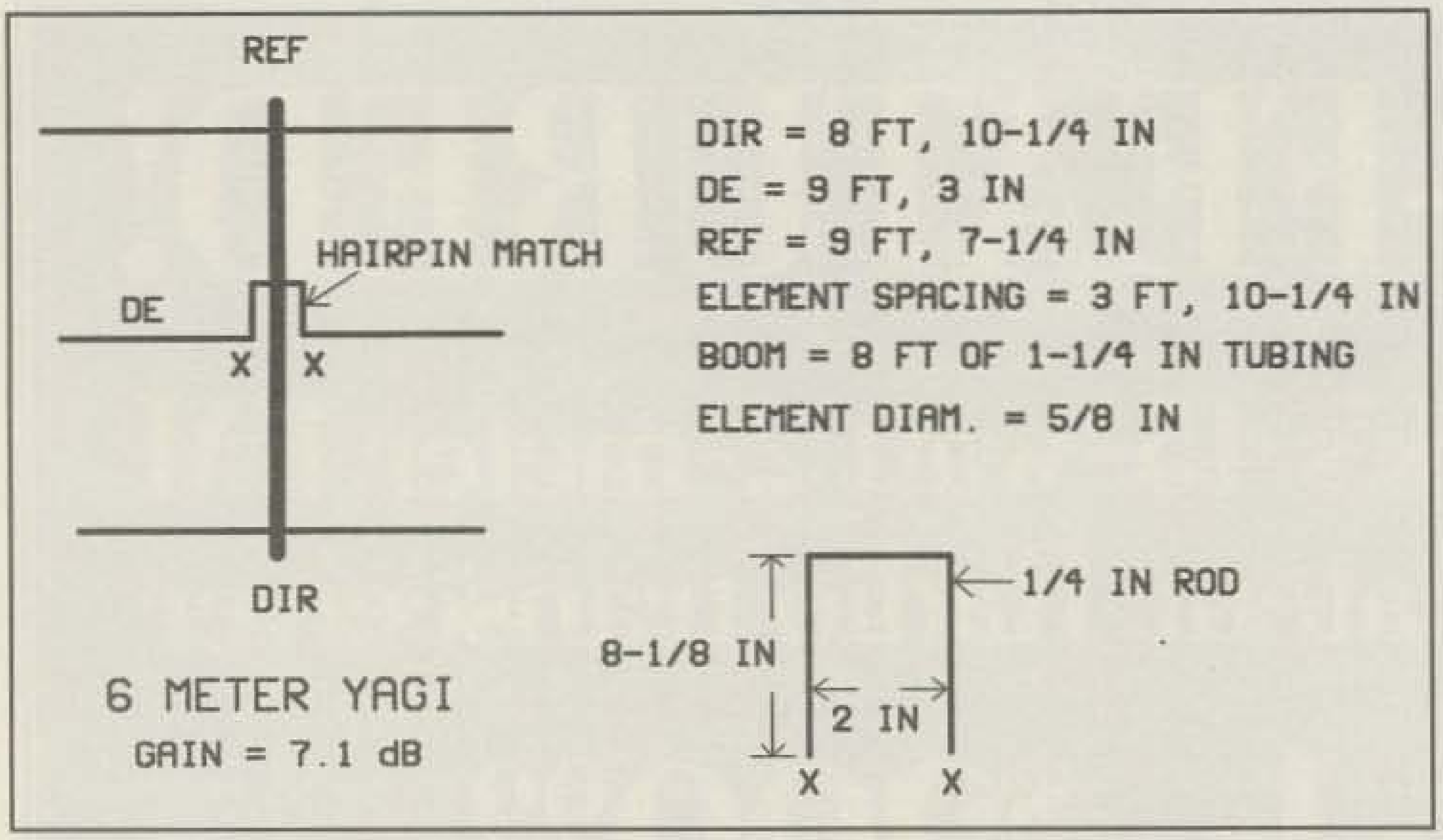


Fig. 3– Good performance at low cost may be expected with this simple 3-element Yagi for 6 meters. A hairpin match is specified for obtaining an SWR of 1 with 50 ohm coaxial feed line.

mit using 50 ohm coaxial cable as a feeder to the station. Standard 450 ohm ladder line may be used for the stub if you remove the insulation from inside each of the windows. This allows you to make electrical taps on the stub for obtaining an SWR of 1. As an alternative, you can make an open-wire stub from two 4 foot, 7 inch lengths of No. 14 wire. The spacing between the wires is 1½ inches. This provides a line impedance (not critical) of 460 ohms. The taps are moved along the sides of the stub while observing an SWR indicator. An MFJ model 259 SWR analyzer is excellent for adjusting all of the antennas in this article.

The bisquare antenna can provide 4.5 dB of gain over a dipole. It has a sharp bidirectional radiation pattern off its broad side. Two bisquares can be mounted at 90 degrees to one another for changing the system directivity by switching the feed lines.

A Three-Element Yagi

Fig. 3 has details for building your own 3-element Yagi antenna. A hairpin match is indicated. Details for the matching section are given in the inset drawing. The center of the hairpin matching stub (closed end) may be connected to the boom. The open end of the stub and the driven element are insulated from the boom. The 50 ohm coaxial feed line is connected at the points marked X. The driven element length is adjusted equally at each end to obtain an SWR of 1.

A 1:1 balun transformer may be connected at points X to help ensure a non-skewed radiation pattern from the beam antenna. The fig. 5 circuit is suitable for this application and the others in this article that specify a 1:1 balun.

Typical forward gain for a 3-element Yagi antenna is 7.1 dB over a dipole. Spacing between the elements is 0.2 wavelength. This calculates to 3 feet, 10¼ inches. This lightweight antenna can be turned easily with a TV antenna rotator. Standard sizes of aluminum tubing are specified.

6 Meter Quad Antenna

One of the least costly but highly effective simple beam antennas for VHF is the cubical quad. Details for a 2-element, 6 meter quad are given in fig. 4. This antenna is easy to adjust and has a gain of 5.5 dB over a dipole. A director (5% shorter than the driven element) may be added to increase the gain to approximately 7 dB. If a director is used, place it 0.15 wavelength in front of the driven element.

A framework made from bamboo fishing pole material would be fine for this antenna. Wooden hubs can be used to join the bamboo spreaders at the center of the antenna. PVC tubing may also be used, but at the cost of greater antenna weight.

The system is adjusted for an SWR of 1, using 50 ohm coaxial cable for the feed line, by varying the spacing, S, between the driven element and the reflector (see fig. 4).

It is a common belief that quad antennas have more gain per number of elements than is the case with Yagis. Also, there has been proof that the radiation angle for quads is somewhat lower than for Yagis. I once used an array of four 3-element quads at 80 feet above ground for 144 MHz CW and SSB DXing.[4] I compared the performance to four 8-element phased Yagis and found the quad array to exhibit less QSB during tropo communications, minimal side lobes, and a much greater front-to-side ratio than was characteristic of the array of Yagis.

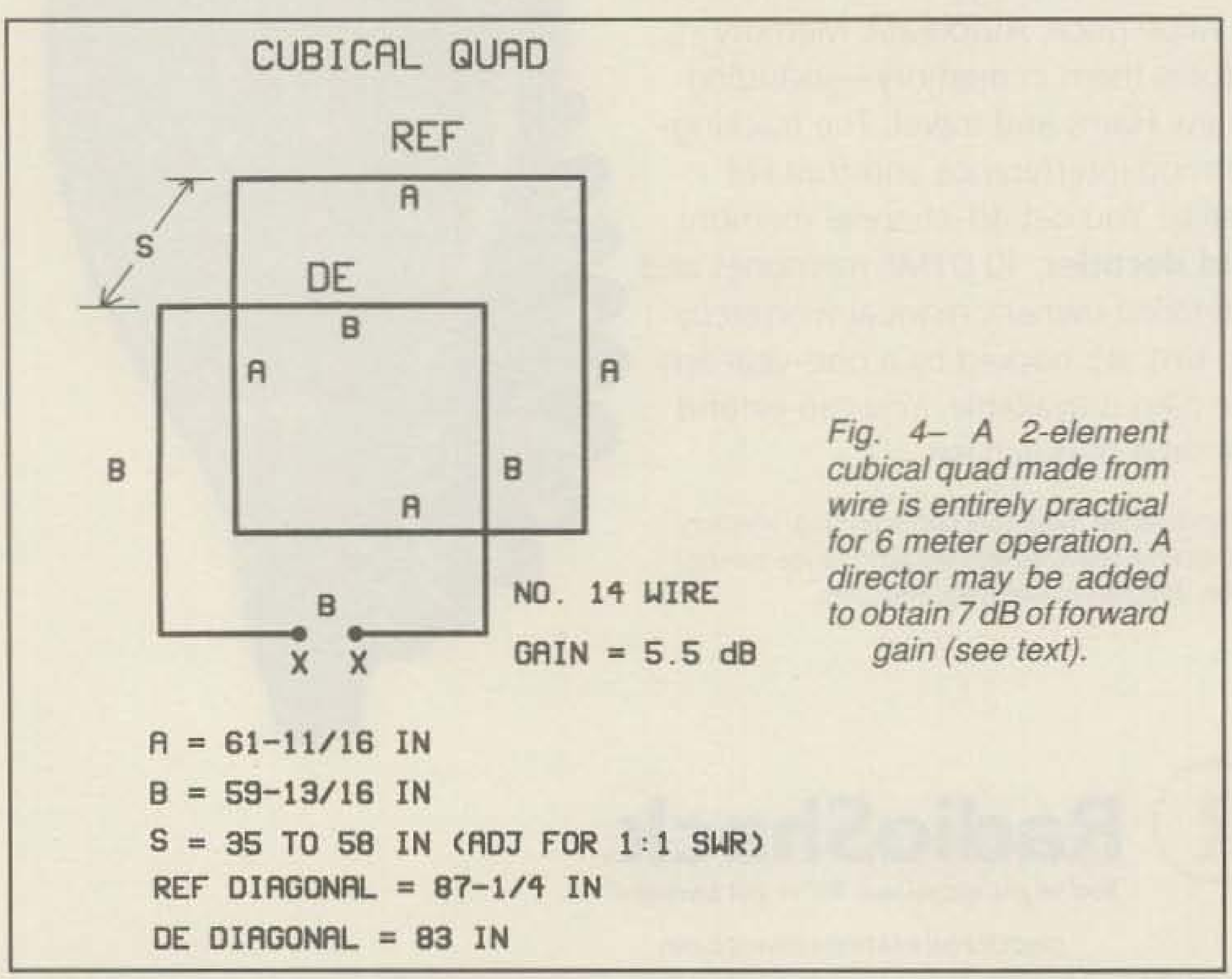


Fig. 4– A 2-element cubical quad made from wire is entirely practical for 6 meter operation. A director may be added to obtain 7 dB of forward gain (see text).

The 1:1 Balun Transformer

The balun transformer specified in figs. 1 and 2, and mentioned in connection with fig. 3, is described in fig. 5. Note that the balun has a trifilar winding. This means that three wires of identical length and gauge are wound on the toroid core at the same time. It is helpful to use enamel wires with different insulation colors, such as brown, red, and green. This makes it easy to identify the windings and connect them correctly. The polarity or phasing of the windings must correspond with the phasing dots shown in fig. 5 if the trans-

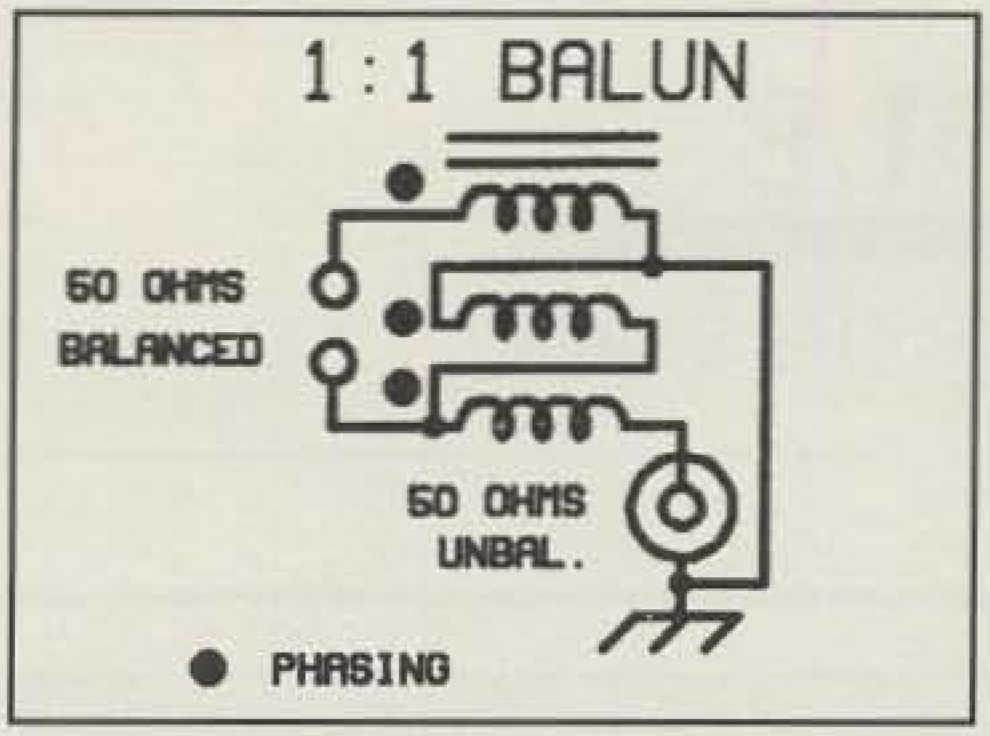


Fig. 5– Details for making a 1:1 balun transformer on a powdered-iron toroid core. For complete data see text.

former is to function correctly. Should you have but one color of enamel wire, you may use dabs of different color paint on the ends of the wires before winding them on the core.

Twist the three No. 22 enamel wires together about eight twists per inch before adding the winding to the core. This may be done by clamping one end of the wires in a vise and placing the other ends in the chuck of a manually-operated hand drill and turning the crank until the wires are twisted as specified above.

The minimum winding inductance for a 50 ohm interface at 50 MHz is 0.65 μH. The XL should be no less than 200 ohms. You may use an Amidon T-94-10 or a T-94-6 powdered iron toroid core. Use 11 trifilar turns of No. 22 wire for the T-94-10 core or 10 turns of No. 22 wire for the T-94-6 core. Maximum power for this balun is 100 watts. The assembly should be housed in a weatherproof enclosure.

Closing Thoughts

I have offered some simple approaches for getting started inexpensively on 6 meters. If you haven't operated at 50 MHz, you have a treat in store. Experienced 6 meter enthusiasts can put these ideas to work as a means of returning to the 6 meter scene. Clearly, there is no need to spend hundreds of dollars and build massive antennas to work long distances on 6 meters. An advantage of using low power is minimized RFI and TVI—often a problem for 6 meter operators.

Footnotes

1. Ten-Tec, Inc., 1185 Dolly Parton Pkwy., Sevierville, TN 37862-3710. Phone 1-800-833-7373 to order kit No. 1208. Price: $95.
2. MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762. Phone 601-323-5869 to order the MFJ-9406 transceiver. Price class: $260.
3. Available from The ARRL, Inc., 225 Main St., Newington, CT 06111.
4. D. DeMaw, W1FB, "The Quad-Quad Array for Two," *73 Magazine*, May 1964.

73, Doug, W1FB

BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Bookshelf '97

This month we start out with some interesting reading material, wend our way through antenna products of note, and continue on to some software that should be of interest to readers.

From The Bookshelf

Near Vertical Incidence Skywave Communication Book. We all are familiar with what happens when operating HF mobile, where we can work fixed stations out to a certain distance but rapidly enter a "dead zone" when we leave groundwave range, until skywave restores our signal. The question naturally arises, is there a good way to minimize or eliminate this undesirable zone?

Several years ago we discussed Near Vertical Incidence Skywave (NVIS) communications in the column as a fairly specialized but somewhat obscure method of communication that nevertheless holds considerable promise for medium-distance HF use, especially over the range of about 1.8 to 12 MHz. With a high angle of radiation NVIS antenna, in which it transmits straight up, the signal is reflected back to Earth at much shorter distances than with conventional skywave propagation.

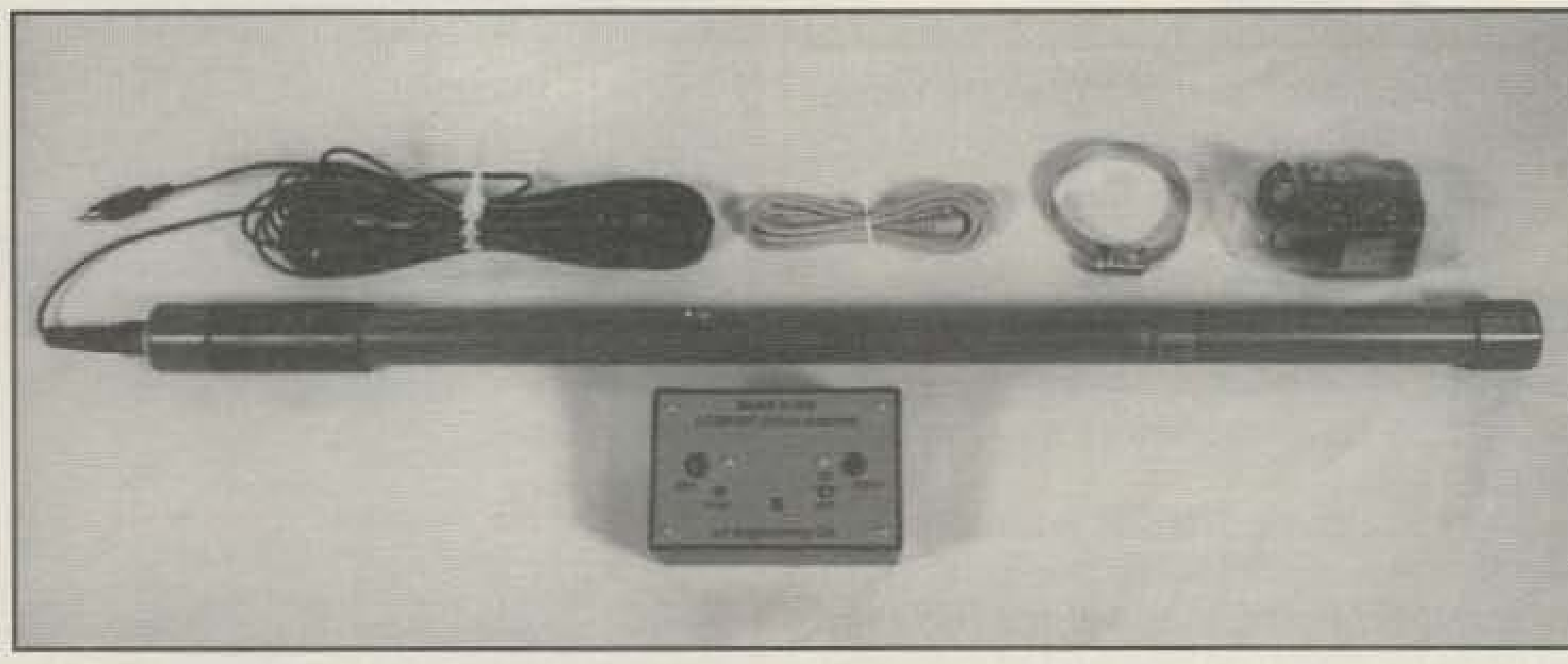
The situation we highlighted related to techniques used by the U.S. Marine Corps to fill in HF radio dead zones between groundwave's maximum range and skywave's minimum range. The Marine NVIS experiments used a loop antenna and were designed to increase HF communications reliability, especially behind ridgelines, in deep ravines and canyons, and in heavy vegetation, to overcome some rather significant reliability problems.

In the Marines' case, the mobile NVIS loop, which cost about $125 for available materials, took about two days to build. However, it worked well in their desert training area at Twenty-Nine Palms, California, and in the Sequoia National Forest, where it was taken for field evaluation. The NVIS lashup allowed mobile units to go places where they couldn't normally communicate.

A new book by David M. Fiedler and Edward J. Farmer, *Near Vertical Incidence Skywave Communication: Theory, Techniques, and Validation*, nicely sums up the NVIS state-of-the-art and comprehensively presents the theory and techniques associated with NVIS. The book is a collection of papers that provides the needed technical background and some practical information regarding frequency selection and suitable antenna design. The papers deal with issues such as how and why NVIS works, NVIS fundamentals and propagation, the skip zone, high-angle antenna techniques, mobile NVIS, and more—all with a heavy emphasis on military applications.

Sounds interesting, doesn't it? The new 144-page book is $14 plus $2 s/h from Worldradio Books, P.O. Box 189490, Sacramento, CA 95818 (916-457-3655).

289 Poplar Drive, Millbrook, AL 36054-1674



A good example of LF Engineering's products is the H-800 Skymatch LF/MF/HF Active Antenna System. The Skymatch is a broadband active antenna that covers 10 kHz through 50 MHz. Its active components are housed in a 26 inch sealed probe and powered via a coax feed from a remote coupler interface at the receiver end. The system is an alternative to a longwire antenna in which restricted space or local noise would prohibit effective use. It's $109. (Photo courtesy LF Engineering Co., Inc.)

The Little Pistol's Guide to HF Propagation. Another recent Worldradio book is *The Little Pistol's Guide to HF Propagation*, by Robert R. Brown, NM7M. Bob's book piggybacks on the renewed interest in HF propagation as a result of the onset of solar Cycle 23. Bob, of course, is well-known to propagation buffs for his writings in *Communications Quarterly, Worldradio*, and other publications, and also by his development of SOLAR MAX, a realistic propagation prediction "game" for IBM PCs and the Apple Macintosh, which we reported on in April 1994 and June 1995.

(To recap, Bob's SOLAR MAX is a game, albeit one with a purpose: to raise the level of appreciation and understanding of HF propagation in DXing and DX contesting. SOLAR MAX is played in a contesting mode, being designed for knowledgeable and competitive DXers. It pits the DXer against a realistic model of the ionosphere that determines whether the band is open to the region. The game is played one region and one band at a time.)

Turning to Bob's new book, it's aimed at what he calls the "little pistol"—the average, low-power DXer who needs to know as much as he or she can about propagation to be competitive, as opposed to the "big gun" who usually wins the big DX contests. Bob maintains that you can contact any place on Earth with just a 100 watt rig and a tribander, provided you're a skilled op and have some understanding of propagation. His book is designed to give you such a practical understanding, although it's not written for the rank beginner.

The 128-page, indexed book has 23 chapters. These include sections on basic elements of propagation; the influence of the sun and its radiation on the solar wind, geomagnetic data, and propagation; magnetic storms and aurora; noise and signal strength; multi-hop and long-path propagation; and more. The book is $10 plus $2 s/h from Worldradio Books, at the address above.

1997 Internet Radio Guide. Finding out the radio resources available to you on the Internet can be a daunting, even overwhelming task. Many of us have spent long hours busily updating our Web browser's "bookmarks" with suitable amateur radio, SWL, scanner, electronics, and other sites of interest. The German-based Klingenfuss Publications has done a great deal of this spade work for you.

Reportedly the first and only manual specifically dealing with radio resources on the Internet, the *Internet Radio Guide* presents you with a representative selection of many of the most interesting and useful radio-related Web pages. Topical areas of interest that are covered include amateur radio, aviation, equipment, geography, intelligence, navigation, organizations and services, publications, the press, radio clubs, radio news groups, radio stations, and solar and geophysical data. Hundreds of sample prints illustrate what's available on the Net.

According to the publisher, new editions of the book are made available regularly to keep ever-changing site listings reasonably up to date. The book is $34 postpaid, direct from the publisher in Germany. In addition, the Klingenfuss Web site provides continuously updated hyperlinks to the most important sites, saving you time in building your own bookmarks. The site is at <http://ourworld.compuserve.com/homepages/Klingenfuss/>.

Klingenfuss also publishes a number of other guides and reference books, including the *1997 Shortwave Frequency Guide*, the *Guide* to Utility Radio Stations, and the *1997 Super Frequency List on CD-ROM.*

A free catalog of publications is available from Klingenfuss Publications, Hagenloher Str. 14, D-72070 Tuebingen, Germany (e-mail <101550.514@compuserve.com>.

Netscape Navigator™ 3 Starter Kit. If you're about to gear up for the Web but don't know exactly where to start, one solution is the new Que book *Netscape Navigator 3 Starter Kit,* by Mark R. Brown and others. This all-in-one guide gives you detailed information on Netscape fundamentals, moving around the Web and finding information on it, using bookmarks, Web security considerations, e-mail and Usenet news using Netscape, plug-ins and helper applications, online conferencing, creating your own Web pages, connecting to the Internet, and much more.

The 509-page Que book comes complete with a CD-ROM that includes a licensed copy of Netscape Navigator Gold 3 and other software tools you can productively use online. The book/CD-ROM package is $39.99 and is available in most bookstores. For more information, contact Macmillan Publishing USA, 8219 Northwest Blvd., Suite 400, Indianapolis, IN 46278 (1-800-858-7674).

If you're already online, check out the Macmillan Publishing USA Web site at <http://www.mcp.com>. You can download valuable Internet software tools from their Web site and also directly from the company's FTP site at <ftp://ftp.mcp.com>. The publisher also maintains the Macmillan Computer Publishing Forum on CompuServe (GO PHCP to access the forum).

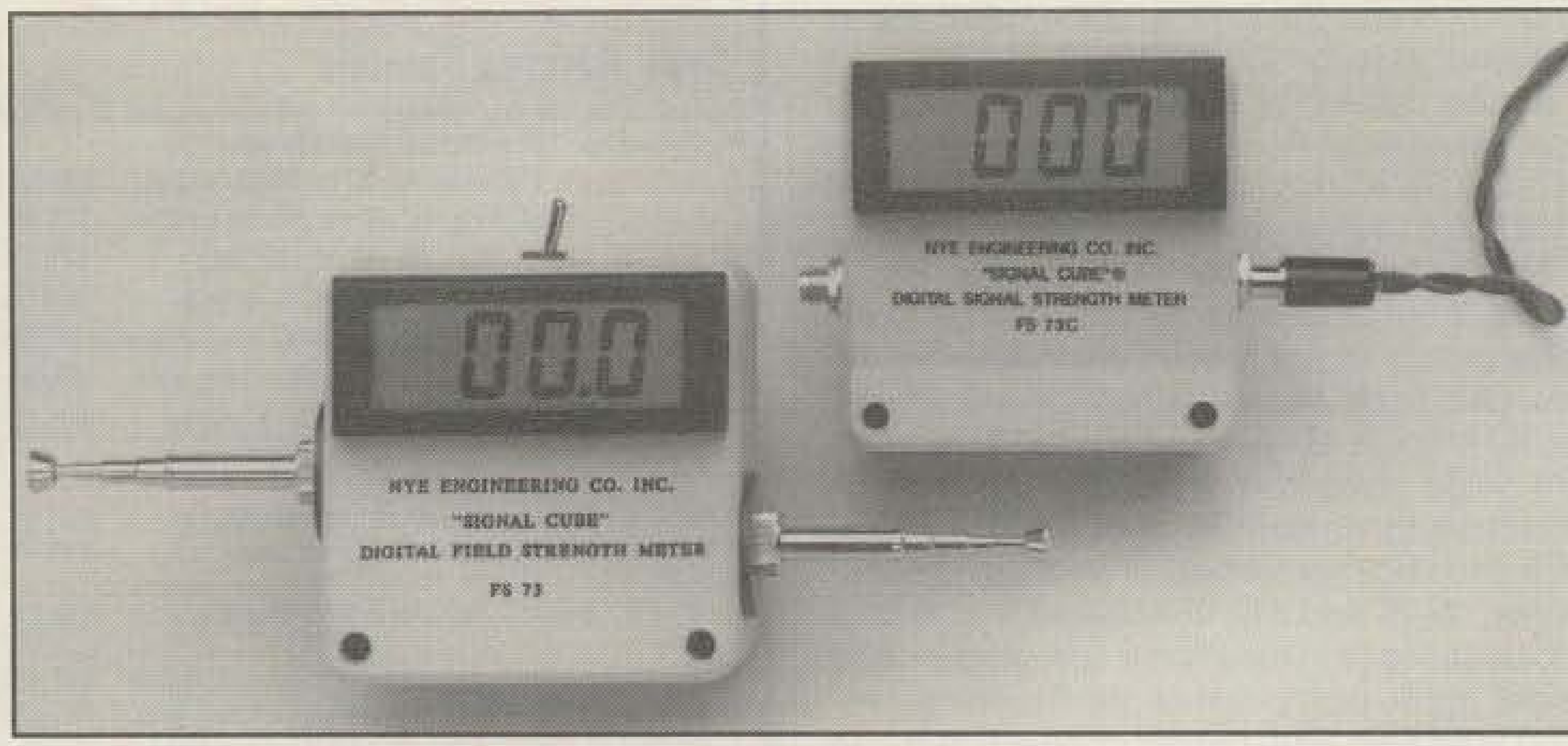
Internet 1997 Unleashed. A monster-size Sams.net Publishing book/CD-ROM combo is the new *Internet 1997 Unleashed,* by Jill Ellsworth, Billy Barron, and others. This is the latest hardcover edition of the book we first covered in the February 1996 column. The book is an encyclopedic reference; the 11-part, 54-chapter book gives you the collective experience and wisdom of dozens of top Internet experts, and it offers solid advice for using current Internet tools.

Major topics include plugging into the Internet, e-mail, Usenet news groups, interactive and real-time communication, locating and retrieving information, experiencing and sharing information over the Web, making the Internet work for you, and where the Net is heading. A thick set of appendices includes a glossary and a 1997 yellow-page resource directory.

The $49.99, 1269-page tome also comes with a CD-ROM of highly useful Internet software. Besides copies of Microsoft® Internet Explorer and Netscape Navigator®, a variety of Internet client programs, editors, helper applications, and utilities are included. The Sams.net book is published by Macmillan Publishing USA, address above.

Fair Radio Sales Catalog Update. The widespread availability of post-WW II and Korean War radio surplus played a big part in "stocking" local swapmeets and hamfests, and it contributed to the development of bustling "Radio Rows" in many cities. The years from the 1940s through the 1960s were the "good old surplus days" in which the amateur radio and electronics magazines were chock full of ads from surplus houses. Today, however, the glut (and usefulness) of war radio surplus has almost disappeared.

Over the years the surplus market has



Shown in this photo are the Nye Engineering FS73 Digital Field Strength Meter (left) and the FS73C2 Digital Signal Strength Meter (right). The two outwardly similar Signal Cubes® offer distinctly different advanced digital measurement capabilities for the hamshack and are described in the text of the column. (Photo courtesy Nye Engineering Co., Inc.)

changed considerably as military surplus has decreased in availability and usability, and much of the market is conducted by mail-order. A well-known mail-order firm that still carries on with "classic" military and industrial radio surplus is Fair Radio Sales, in business since 1947 and claiming to offer "the world's finest electronic surplus." Most of the 36-page catalog is devoted to military, government, and commercial radio surplus—a gem I always look forward to receiving.

A surprising percentage of the items in the catalog are not of the "boat anchor" type that often defines what's available in the surplus market today. For example, some interesting antennas and antenna accessories found in a recent Fair Radio Sales catalog include a coil-up Navy wire-cable antenna, RF ammeters, a Collins 100 watt transmatch, a vacuum variable capacitor assembly, a Bird RF power monitor, dummy loads, an HF preselector/RF amplifier, an antenna load assembly, a VHF/UHF multiband whip antenna, RFI stripping, and more.

For a free catalog, contact Fair Radio Sales, 1016 E. Eureka St., P.O. Box 1105, Lima, OH 45802 (419-223-2196).

C. Crane Co. Communication Excitement Catalog Update. The C. Crane Company, which has been in business for more than 21 years, publishes an annual catalog that regularly tops out at about 80 pages. Their "Communication Excitement" catalog is mainly for SWLs and scanner buffs, but I've found that it also includes many interesting products of interest to radio amateurs.

The company's product line has been expanded considerably since we last took note of the catalog. Product listings include antennas and radios for AM, FM, and shortwave listening; scanners; satellite receiving equipment; mobile electronics products; telephone and fax equipment; CB radios and antennas; portable and solar power packs; books; lightning protection devices; various accessories, including speakers, headphones, batteries, and chargers; and sundry "odds and ends."

As we mentioned previously, the company's approach to listing items in their catalog is unusual. They generally carry two basic lines of each item, consisting of what they call the "best made" and the "best for the money." C. Crane also offers to special order or fabricate practically any radio product you might need, from special wiring or adapters to radios not listed. A 30-day satisfaction guarantee is offered on all products.

Catalogs are $1 from C. Crane Co., 558 10th Street, Fortuna, CA 95540-2350 (1-800-522-8863; e-mail <CCRANECO@AOL.COM>).

Antenna Notes

J. Martin Systems 2 Meter Tabletop Antenna. We mentioned J. Martin Systems (J.M.S.) in February 1994 in connection with its offering an inexpensive accessory bus to facilitate proper amateur station grounding. The bus helps protect equipment and makes chassis ground connections short and neat, with all the benefits good grounding brings. The "Ground It" system, to recall, is a 1/8 inch by 1/2 inch solid copper bus that provides an equipment grounding stud every 6 inches. Three standard lengths (2, 3, and 4 feet) are available.

Now J.M.S. has introduced a portable, 2 meter, halfwave tabletop handie-talkie (HT) antenna that helps keep potentially dangerous RF from being in close proximity to your head as with other HT antennas. The antenna includes a 6" × 6" × 1/8" aluminum mini-groundplane in the base and features a 10 inch telescoping mast that extends to 40 inches and is detachable from the base. The antenna has a BNC connector and handles 25 watts.

For more information, contact J. Martin Systems, 35 Hilltop Ave., Stamford, CT 06907 (203-461-8768).

LF Engineering Low-Frequency Products. The past few years have seen renewed interest in the longwaves by listeners and amateurs alike. Today several small firms offer accessories for longwave (LW) receiving use. A particularly extensive hobbyist product line for VLF/ELF, LW, and MW (medium-wave) enthusiasts is available from LF Engineering Co., Inc., which we first profiled in the October 1994 column.

Proprietor Bill Greeley advises that LF Engineering has been designing and manufacturing LF communications products since 1984, and it has an especially strong following among 1750 meter band experimenters, radio amateurs, and SWLs. The firm's stated primary goal is to serve the RF experimenter and researcher with much better LF communication equipment than is available from other sources, and at affordable prices. Custom designs and variations on existing designs are available.

The products offered include equipment for LF and VLF reception, 1750 meter band Part 15 operation, and VLF/ELF natural radio phenomena detection. VLF/LF converters and preamplifiers, active gain antenna systems, wire and loop receiving antennas, and various accessories all are featured.

Some of the firm's products include the L-111 VLF Converter and Active Antenna System; H-800 SkyMatch LF/MF/HF Active Antenna System; L-400B LF Active Gain Antenna; the M-601 AM Broadcast Active Antenna; L-500 ELF/VLF Longwire Receiving System; L-600S H-Field Loop Receiving System; L-202 VLF Preamplifier; and several other items.

For more information, contact LF Engineering Co., Inc., 17 Jeffry Road, East Haven, CT 06513 (telephone 203-248-8851; e-mail <76715.2361@compuserve.com>).

Two from Nye Engineering. Several years ago Nye Engineering introduced the FS73 Digital Field Strength Meter (FSM), which we profiled in May and November 1993. We'd like to revisit this unit, which has been enhanced over the past four years, along with another, physically similar and newly introduced "Signal Cube"® product, the FS73C2 Digital S-Meter.

To recall, the Nye Engineering FS73 Signal Cube is a 9 volt battery-operated unit that costs \$189 and is 2.5 inches square and 2 inches deep. It's untuned and broadbanded, covering 0.1 to 100 MHz (calibrated) and offering relative readings in the GHz range.

The unit has a large ($3^1/2$ digit, $^1/2$ inch) digital display to indicate RF amplitude. Unlike most amateur FSMs, this one can be used for both relative and absolute readings. Sensitivity is as high as 30 millivolts/meter, depending on frequency. For best results, you should use the unit on a tripod (a \$40 accessory) and then back away to prevent distortion of the field.

The unit's sensitivity adjustment is set by the number of antenna sections extended. The included adjustable dipole antenna eliminates the need for a counterpoise (conventional "single antenna" FSMs effectively use the person holding the unit as the counterpoise). Consistent and repeatable readings can be obtained with the Nye unit, since it's not necessary for the observer to hold or be in close proximity to the meter.

Recently, Nye Engineering introduced the Model FS73C2 Digital S-Meter. It's useful to have an S-meter, or relative signal strength indicator, available. These typically analog meters usually are calibrated in "S-units" from 1 to 9; signal strength above S-9 is indicated in increments of 10 or 20 dB. Of course, one should take S-meter readings with the proverbial grain of salt, since almost no two radios will indicate exactly the same reading on a given signal.

Thus, other than being rough indicators of band conditions and signal strength, the greatest use for S-meters is in adjusting or "peaking" RF accessories such as preamplifiers and preselectors, as well as determining accurate null points with Antenna Noise Bridges (ANBs) and similar devices, as when tuning antennas and antenna transmatches.

The Nye Engineering FS73C2 Digital S-Meter is a unique type of S-meter because of its digital nature. A digital (as opposed to analog) display is ideal when it is important to note both the highest and lowest signal strength reading, as when making tuning adjustments. The easily read digital S-meter also is important for mobile operation, and it can be used as an ALC meter for modulation level indication and for making far field tests in connection with antenna measurements.

The $169 FS73C2 unit, with two wires connected to the analog S-meter in the radio receiver, repeats the S-unit and/or dB values indicated. The unit handles input signal voltages of from .05 to 0.5 VDC and has an input impedance of 10 megohms. It's calibrated initially for use with the typical 1.0 ma S-meter found in most receivers; the internal calibration adjustment is set such that the digital indicator reads 9.0 when the analog meter reads S9, but you can change this. (We'd expect a "30 dB over S9" signal would read 30.0 on the Nye unit, for example.)

The two units are from Nye Engineering Co., Inc., 4020 Galt Ocean Dr., Suite 606, Fort Lauderdale, FL 33308 (305-566-3997).

FireStik® 1997 Antennas & Accessories Catalog. The FireStik Antenna Company primarily is a supplier of CB and scanner antennas, but their latest catalog shows some popularly priced amateur antennas, along with some hardware and other accessories of interest to radio amateurs.

The Mach-10 is a 10 meter, 5/8-wave mobile antenna that boasts a high-efficiency design. It's for use over the range 28.3 to 28.5 MHz and claims low SWR. It's available in black, red, white, and blue and in two different lengths (the 3 ft. TM3 at $18.99 and the 4 ft. TM4 at $19.99). The shorter antenna handles 650 watts, while the longer handles 900 watts.

Also available is the Model 2M-4 two meter antenna, a 4 foot, 5/8-wave design that covers 144 to 148 MHz with a low angle of radiation. The $16.99 antenna is rated at 400 watts. Both antennas carry a 5-year warranty.

They also offer a variety of antenna accessories. These include a selection of mounts, stainless-steel springs, three-way mounting brackets, dome/mirror brackets, quick disconnects, and other mobile-oriented goodies.

For more information or a catalog, contact Firestik Antenna Company, 2614 E. Adams St., Phoenix, AZ 85034 (telephone 602-273-7151; e-mail <firestik@primenet.com>).

Soft Stuff

Beacon Wizard. Recently we profiled Kangaroo Tabor Software's WinCAP Wizard for Windows. To recall, Jim Tabor, KU5S, also is the developer of CAPMan, short for Computer Assisted Prediction Manager, which we profiled in May and November 1994. His new program, WinCAP Wizard, takes an innovative approach to propagation prediction and analysis. The $29.95 program does away with buzzwords and technical jargon, and it eliminates the hassle of interpreting raw technical data. With it there are no raw data to interpret and no technical terms to learn; it produces up to four easy-to-understand reports based on station power and antenna configurations.

Jim recently made me aware of a new propagation "applet" he's making available as freeware, downloadable from his Web site. His Beacon Wizard is meant to be run while listening to the NCDXF/IARU propagation beacons.

For background, the NCDXF/IARU International Beacon Network is a series of propagation beacon stations which operate on five frequencies. Each transmission is repeated every three minutes. A transmission consists of the callsign of the beacon sent at 22 words per minute followed by four one-second dashes. The callsign and the first dash are sent at 100 watts. The remaining dashes are sent at 10 watts, 1 watt, and 0.1 watts. The 10 dB power steps are precise and are useful for S-meter calibration and for judging band conditions. The Beacon Wizard "applet" helps you ID the cur-

Fig. 1– The Beacon Wizard List Manager from Kangaroo Tabor Software. The Beacon Wizard applet has a "pop-up" menu accessible by "right clicking" the application window; this menu lets you access the Beacon List Manager screen, shown here, where you can edit and manage the beacon data. (Disregard the slight vertical distortion of the screen print shown.)

rent beacon, since it can be confusing to try to figure out just which beacon you're hearing at a particular time.

The display is presented in four sections. The top section displays the user's local time, the beacon "slot" number, the local time at the current beacon location, and current UTC time.

The second section displays information in three lines. For three beacons, the first is information for the just completed beacon, the second is the current beacon, and the third is for the next beacon. For each of the three beacons, the displayed information includes callsign, azimuth, distance in kilometers, "back azimuth" (also called long path), and UTC sunrise and sunset for that particular beacon location. The third section consists of five radio buttons used for selecting desired beacon frequency.

The fourth, and last, section of the display is divided into two parts and is presented on each side of the frequency selection buttons. These are the currently expected sunrise and sunset times, UTC, for the user's location. The sunrise or sunset time is displayed in red when it's within 18 minutes of the current beacon station's sunrise or sunset, thus alerting you to possible grayline propagation. The applet also has a popup menu accessible by "right clicking" the application window; this menu lets you edit and manage the beacon data.

Beacon Wizard, which works under Windows 3.1 or higher, is freeware and is made available by Kangaroo Tabor Software, Rt. 2, Box 106, Farwell, TX 79325-9430 (fax 806-225-4006; e-mail <ku5s@wtrt.net>). To obtain the program, download it from Jim's Web site at <http://www.wtrt.net/~ku5s>. (For further information on the beacon program, go to <http://www.ncdxf.org/beacon.htm>.)

On Top of the World for Windows. On Top of the World for Windows is a Windows-based program that represents a new way to explore the Earth on a PC. Unlike other geography software, the program isn't a collection of maps. Rather, it lets you fly around a three-dimensional model of the Earth, the position and sunlit side of which are correctly depicted for the time and date. The program combines the fun of a flight simulator with geographic information, and it's probably the closest most of us will ever come to flying in space.

The program is billed as useful to telephone callers, who can find out where area codes or country codes are, and find local times; to travelers, who can plan trips, measure distances, ascertain time zones, and check daylight hours; to geography or Earth science students and teachers, who can get a real feeling for the Earth by having a virtual model for it; and for amateur radio operators and SWLs, who can measure distances, get antenna beam headings, and find where call letters originate. Amateurs and SWLs also can record their loggings, see them visually displayed on the Earth, and even keep notes on them.

Some of the program's capabilities encompass finding and identifying any of some 5000 geographical features, including oceans and seas, by typing a partial name; displaying the shortest distance and great circle route accurately between any points on the Earth; keeping track of up to 40 places you visited so you can return to them; accessing the *CIA World Factbook* by clicking on countries; adding your own permanent features and notes about features to the world; exporting views of the Earth as graphics files; and playing and recording demonstrations.

The program is $29.95 postpaid from Exploration Software, P.O. Box 961, Groton, MA 01450-0961 (telephone 508-649-4748; e-mail <hlynka@tiac.net>; Internet <http://www.tiac.net/users/hlynka>).

JOB-JAR. An interesting, multipurpose Personal Information Manager (PIM) shareware program for Windows 95 is offered by Billy Pinkerton, N4LXL. His program, JOB-JAR, is designed to provide cost-effective, "use every day" functionality for the homeowner and small home business.

The program's main function is to track jobs or tasks that need your attention and that you intend to accomplish at another time. This function isn't a replacement for an appointments calendar or scheduling program, but rather is a freeform database with a minimal association with time—the computer equivalent of notes we make to ourselves (and often misplace).

JOB-JAR includes a versatile wordprocessor, a spreadsheet with over 125 functions, an appointments calendar, annual and monthly calendars, reminders, and a job or task function. The program also prepares and prints reports. JOB-JAR provides pop-up windows to guide you through any difficult procedure on first use. Otherwise, the program is intuitive and easy to learn for any person experienced with Windows 95.

JOB-JAR is available as shareware from a variety of computer bulletin board systems (BBSes), Internet shareware sites, and many vendors who sell evaluation copies of shareware programs. Single user registration is $25. You can register by mailing a check to Billy Pinkerton, 1148 Newbern Street NE, Palm Bay, FL 32905. (Billy advises that copies of JOB-JAR are not available directly from him; use your favorite BBS, Internet shareware site, or shareware vendor to obtain a copy.)

Looking Back Five

Okay, so now you know what the column is like for September 1997. But what was "hot" five years ago, in September 1992? That column was entitled "Antenna Update."

We began by discussing the use of Loctite®, a thread locking compound useful for keeping sheet metal screws on antennas from working loose. We went on to further discuss the Australian-patented Black Products Engineering Vertical C.T.W. (Coaxial Traveling Wave) Antenna. We also highlighted the ANT-Ventures hardline connectors for use with 75 ohm CATV hardline, and the Solarcon A-99 vertical antenna for 10–17 meters.

Software-wise, we described the J-Com HamBase™ callsign database; CWTUTOR and BEAMHEAD programs from Jim Hammer, KO9T; PacketCluster™ from Dick Newell, AK1A, of Pavillion Software; the OH1AA Logging Program from Veikko "Vic" Nieminen, OH1MIE; and the DOS-based XTree Gold File and Disk Manager.

Turning to books, we noted *The Hallicrafters Story*, by Max C. de Henseler, HB9RS, which was distributed by the Antique Radio Club of America; *The Ham's Book of Knowledge*, a compendium by Edmund Schneider, AA7AN, from In-Phase Publications; *Empire of the Air: The Men Who Made Radio*, by Thomas S. W. Lewis, from Harper Collins Publishers; *Dvorak's Inside Track to the Mac*, by John C. Dvorak, from Osborne/McGraw-Hill; *Low Power Communications, Vol. 1—Basic QRP*, by Richard H. Arland, K7YHA, from Tiare Publications (later expanded to include additional volumes); and *The Forrest Mims Engineer's Notebook*, from HighText Publications, Inc.

Wrap-Up

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

Overheard: One thing I've learned is that absolutely *everything* looks a great deal better in the morning after a good night's sleep.

73, Karl, W8FX

BY BILL ORR, W6SAI

RADIO FUNdamentals

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

The 6L6—The Tube That Changed Radio Forever!

Every radio amateur, audiophile, and circuit engineer over the age of 40 knows of the 6L6 tube. Born in 1934, and evolving and maturing for over 40 years, its descendants are still to be found in specialized stereo and home-theater equipment. Here is the story of this remarkable tube.

It all started about 1933. It is a double story concerning the development of a new tube type and the introduction of metal tubes. Both occurred at about the same point in time.

Since the beginning, glass had been the envelope of choice for receiving tubes. Glass was cheap and easy to mold, and no pressing reason existed for an alternative material. Transmitting tubes, however, were a different matter. The high operating temperature of the anode and the accompanying cooling problems made the development of external anode tubes a necessity. The very high power tubes took the form of an exposed copper cylinder having a glass seal at one end for the passage of connecting leads to the internal elements. The copper anode was fused to the glass by a special process.

In England these tubes were known as "cooled anode transmitting" (CAT) tubes, leading to the trade name "Catkin," used in 1933 to introduce receiving-type versions of the external anode transmitting tube design.

These novel tubes soon sank into oblivion, but not before they represented a complete break with lamp-making tradition. The Catkin tubes, however, were closely examined in the United States, particularly by the General Electric Company, who was just about to resurface in the broadcast receiver business after being out of it for nearly five years. The upshot was that a tube engineer from RCA visited England to study production techniques used for metal tubes. The General Electric Company believed that the use of metal tubes in their forthcoming line of broadcast receivers would provide the sales impetus to launch the new receivers with a publicity blast, extolling the virtues of the revolutionary new tubes, exclusively used in G.E. receivers!

RCA would be the company to develop and market these tubes.

48 Campbell Lane, Menlo Park, CA 94025

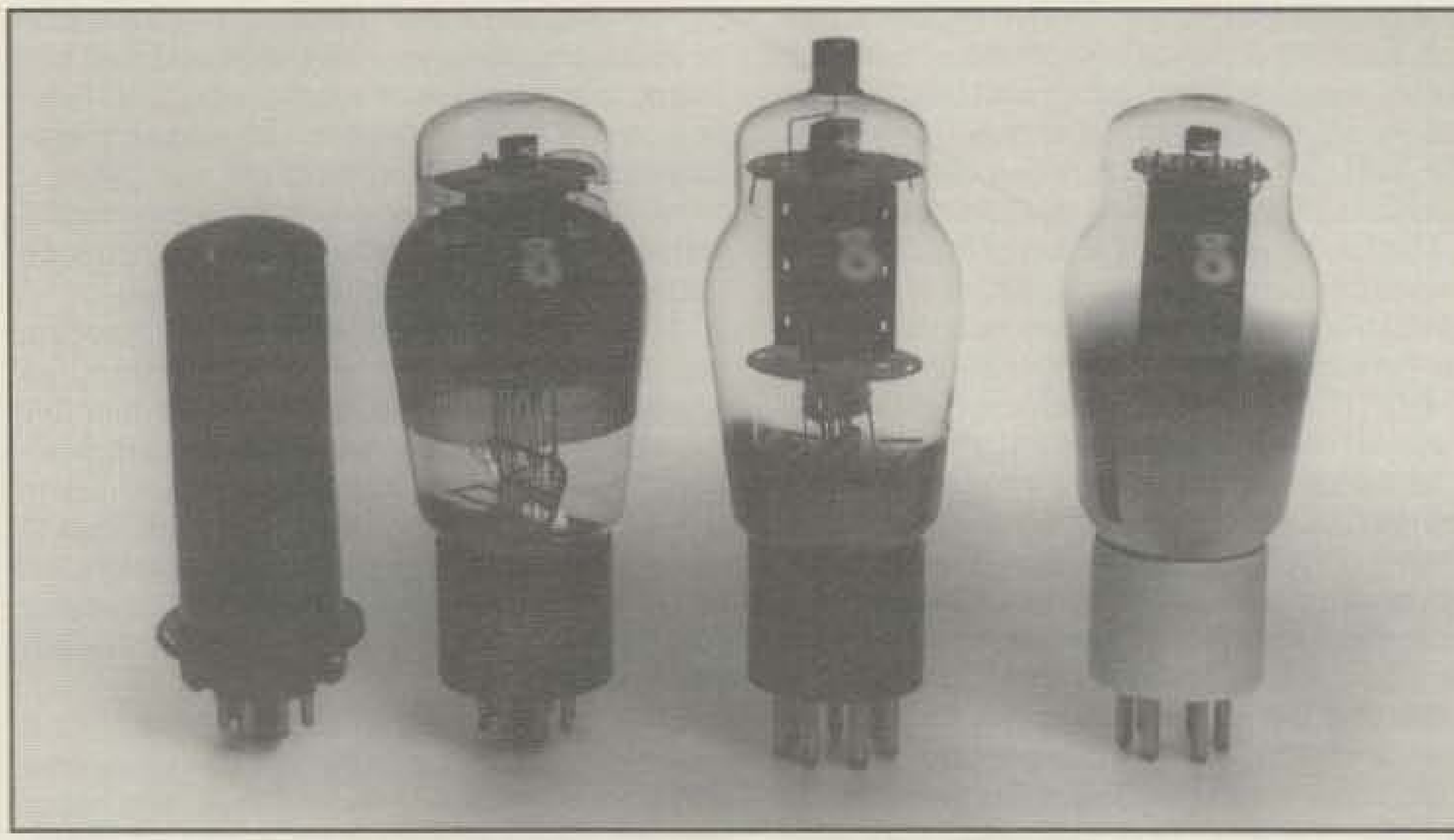


Photo A– From left to right are the original 6L6, the 6L6G, the transmitting type 1625, and the T-21.

A Better Power Output Tube

Preceding the metal-tube development, RCA, Raytheon, and others were hard at work developing a better audio output tube than the venerable UX-245 or UX-250. The goal was for a tube that would develop up to 5 watts of audio power at a reasonable plate voltage (250) and that had high gain and little drive requirement.

Actually, such tubes were already on the European market. The B433 pentode was developed by Philips Research Laboratories (Holland) in 1926. In 1929 the British produced a followup tube, the C433, which developed 2 watts of audio with 300 volts on the plate. Patent problems delayed the release of an RCA equivalent in the United States, and by the time that problem was solved, larger and better pentode tubes such as the huge 25 watt Osram PT-25 were on the European market. It was a catch-up game for RCA now. A low-cost pentode was the order of the day!

In 1931 RCA was scooped by the Champion Radio Works, who released the PZ pentode, an updated version of the British C433 tube. A few weeks later RCA and the deForest Radio Company both announced the 247 audio pentode (similar to the PZ), which quickly became the tube of choice in mass-produced entertainment receivers. One tube delivered about 3 watts of audio at 250 volts; two were capable of 6 watts of ear-blasting sound! Truly a breakthrough! As far as amateurs were concerned, *QST* pointed out that the pentode probably would make a good frequency doubler. Its excellence as a crystal oscillator tube was not discovered for nearly a year.

6L6 Beam Power Tube Is Born

RCA had developed several pentode audio tubes for special purposes. The 48 was for use in DC power-line receivers and was the most widely known. RCA

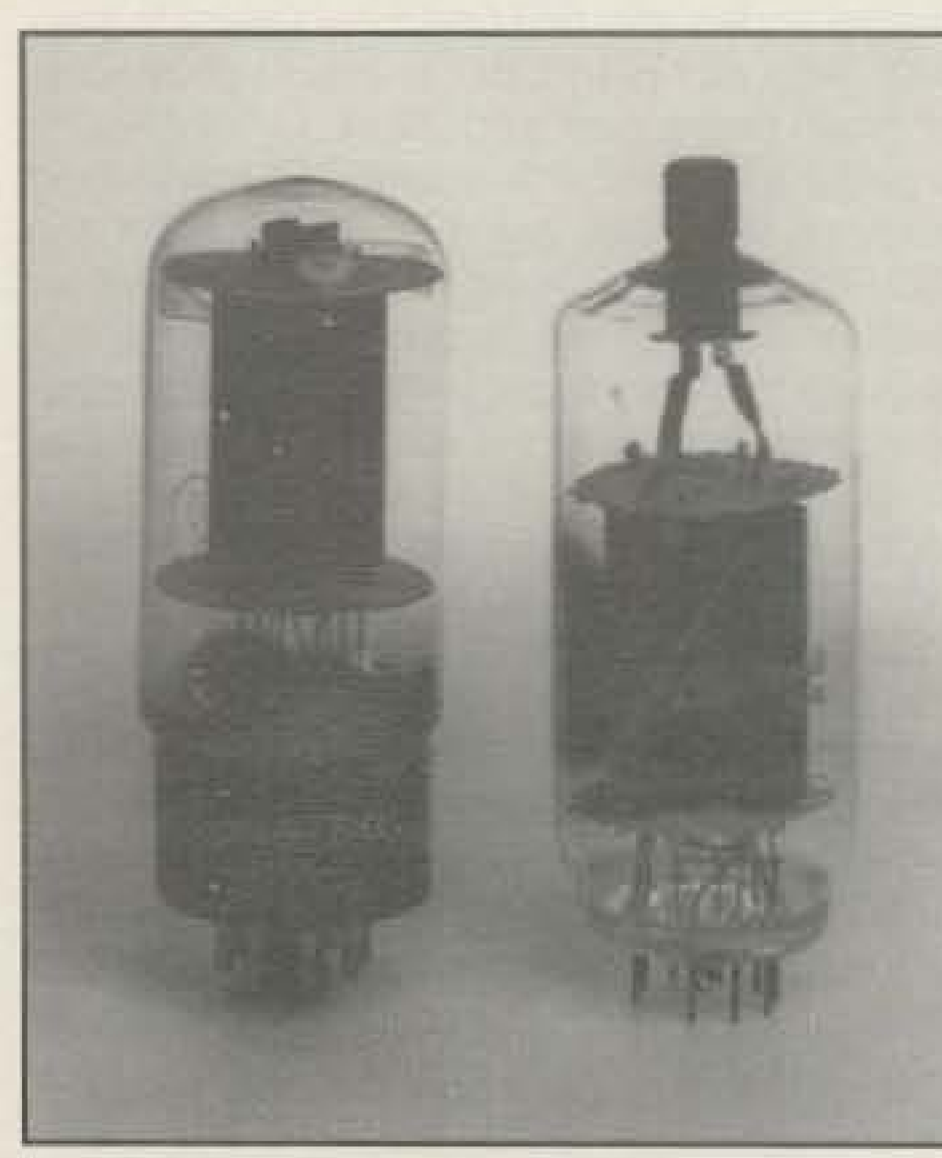
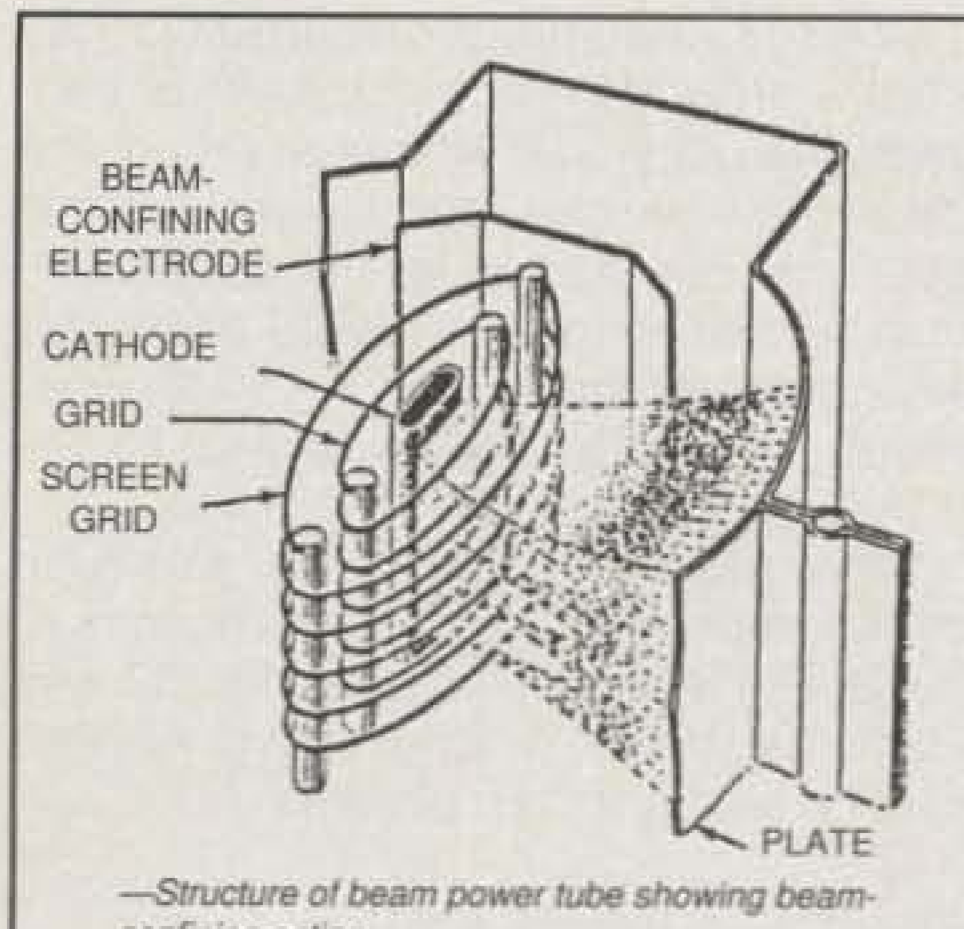


Photo B– Variations of the 6L6 were used as sweep tubes in TV receivers.



—*Structure of beam power tube showing beam-confining action.*

Fig. 1– The RCA Receiving Tube Manual *illustrates beam action in the 6L6 tube.*

described this tube as a tetrode with pentode characteristics—that is, it was a tetrode with special screen-anode spacing which reduced secondary emission from the anode. This resulted in a smoother characteristic curve, which eliminated the "kink" that was prevalent when the instantaneous operating plate voltage of a tetrode dropped below the value of screen voltage.

In early 1935 the British company Hivac developed the "Harries valve," named after its inventor. It was a simple version of electron beam alignment, but the tube never achieved popularity or general use.

Close upon the heels of the 48 came a new beam tube, the 6L6, which hit the market in July 1936. Because of the pressure put on RCA by General Electric, the new tube was released in a metal envelope. Actively cooperating with RCA, the British General Electric Company and the Marconi Company launched beam power equivalents of the 6L6 in glass envelopes. The most famous of these tubes was the KT-66, a glass 6L6 with somewhat more anode dissipation than the American tube. (The nomenclature "KT," by the way, stands for "kinkless tetrode.")

Within a year the advertising push for metal tubes had somewhat dissipated, and RCA, under the gun for high manufacturing costs and poor yield of the 6L6, brought out the 6L6G, a glass version of the tube in a standard-size envelope. The 6L6G was the genesis of a whole line of interesting beam power tubes, used in one form or another to this day in control circuits and high-quality audio gear. And, until the onslaught of solid state, the 6L6 was a popular tube in amateur equipment.

The 6L6, in reality, was overkill as far as receiver manufacturers were concerned. Two 6L6's would deliver over 45 watts of audio—far beyond the capability of receiver speakers of those bygone days! As far as the home receiver was concerned, the 6L6 was a dead horse. The concept lived on in a low-power version, the 6V6, which quickly became very popular among receiver manufacturers.

The Beam Power Tube Family

The *RCA Receiving Tube Manual* defines a beam power tube as "a triode or pentode in which the use is made of directed electron beams to contribute substantially to its power handling capability." (See fig. 1.)

While the 6L6 was a loss-leader, the glass 6L6G proved to be the genesis for a large family of beam power tubes. Some of the early variations are shown in photo A. At the left is the original 6L6, next to it is the 6L6G, and to the right are the transmitting type 1625 (12.6 volt filament) and the T-21.

Amateurs Make Use Of The 6L6 Tube

Even before the glass version came on the market, it quickly became apparent to amateurs that the 6L6 was an excellent low-power transmitting tube. The July 1936 issue of *Short Wave Craft* magazine featured the 6L6 in an article entitled "1-Tube, 1-crystal, 4-bands!" The simple cir-

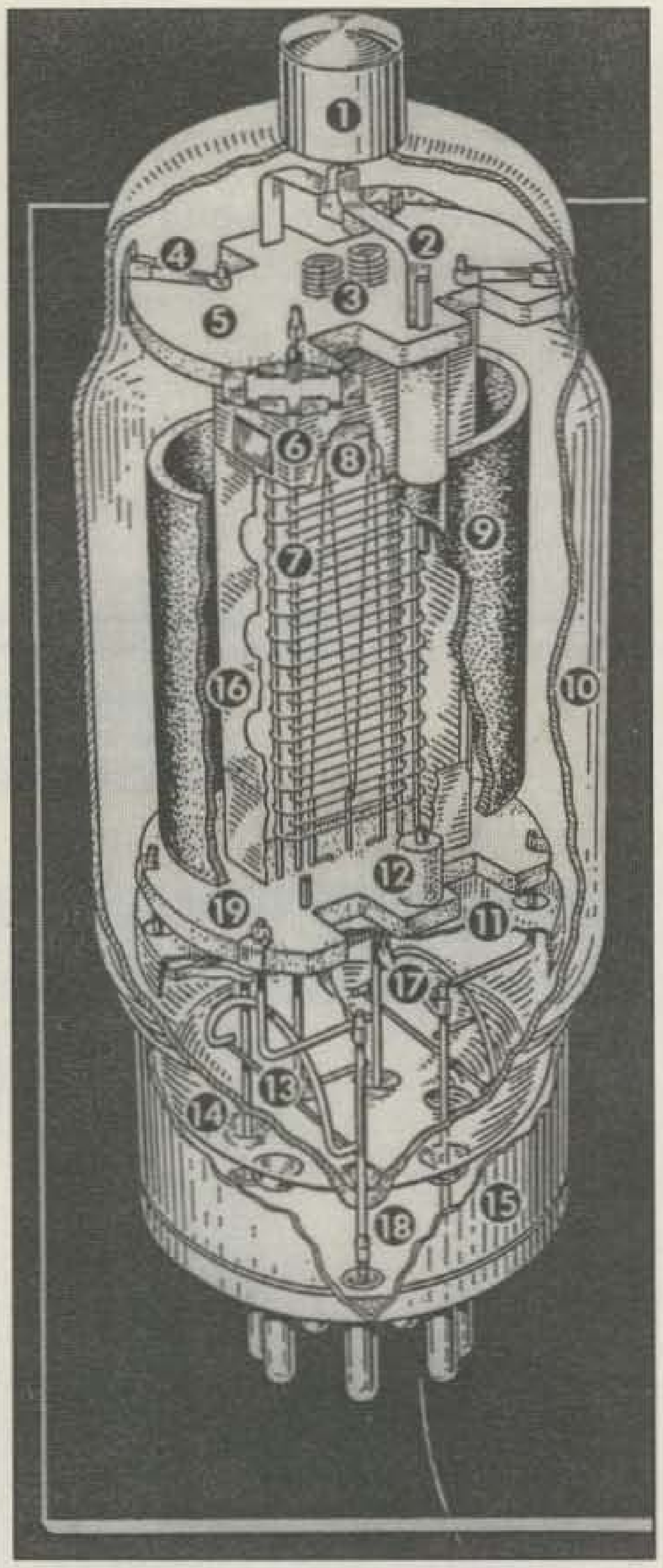


Fig. 2– An "exploded" view of the 813 showing individual components.

cuit provided 7 watts power on 20 meters from an 80 meter crystal.

The August issue of the same magazine featured three 6L6s in an oscillator-amplifier combo, and the September issue contained the circuit of an oscillator-amplifier transmitter for 5 meters using two 6L6s.

Amateurs soon found out the glass version of the 6L6 was best for RF service, and it quickly became the tube of choice for circuit designers.

The 807 is Born

The Transmitting Tube Division of RCA, sensing a new and lucrative market, cloned the 6L6G into the 807 transmitting tube. This was a "steal" of the Receiving Tube Division's concept, and the move created bad feelings within the company. A mini-crisis developed, the upshot of which was that by decree from the front office, no other receiving tubes could be "converted" into transmitting tubes!

The 807, as compared to the 6L6G, had internal shields to decrease internal feedback, the plate lead was brought out the top of the envelope, and a 5-pin ceramic base was substituted for the octal base. Shortly thereafter, the 1625 tube was developed for the new SCR-274N transmitters soon to go into production for the U.S. Navy.

Other manufacturers quickly zeroed in on the market with knock-off versions of the 807; Raytheon had the RK-39 and Taylor had the T-21, for example. All were popular with amateur builders.

The Post-War Family Of Beam-Power Tubes

On a basis of gain and cost, the 6L6 concept was hard to beat. Variations of the tube were used as voltage regulators, sweep tubes in TV receivers (photo B), and RF transmitting tubes. They came with filament ratings from 1.4 to 117 volts. All-in-all, over 150 different versions of the 6L6 concept were manufactured by RCA and others. (Have you ever heard of a 22JF6, a 6HG5, or a 38HE7?) They all showed up in the RCA line at one time or another, along with many others designed for a specific purpose.

The "High-Power 6L6s"

RCA quickly saw the virtues of the controlled electron beam and proceeded to develop transmitting tubes using this technique. The 814 was a 50 watt tube and the 813 was a 100 watt version (fig. 2). The 827R was an 800 watt tube, rated to 110 MHz, for FM and low-band TV transmitters. Two-in-one beam tubes, such as the 832 and 829, were popular in mobile VHF transmitters.

The beam-forming principle was used to advantage in high-power tubes after the war, and EIMAC tubes, both glass and ceramic, with ratings up into the megawatt range incorporated the beam-forming principle first used in the venerable 6L6.

The Beam Tube Today

Little did the developers of the 6L6 envision how the concept would slipstream into the advanced world of electronic technology. But today, aside from specialized uses, the small beam tube is a curiosity, a collector's item to go into the museum alongside the 201A, the 227, and the 247 as examples of long-gone advances in the march of communication electronics.

Note: Background material for this article was obtained, in part, from various RCA tube manuals, *Short Wave Craft* and *Radio Craft* magazines, *QST*, the *Radio Handbook* (7th edition), and *70 Years of Radio Tubes and Valves,* by John W. Stokes.

73, Bill, W6SAI

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Every HFT-1500 aluminum cabinet is carefully crafted with a durable baked-on paint that won't scratch or chip.

The attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the HFT-1500 front panel as much as you want. *You won't leave a mark!*

Arc-Free Operation

Two *heavy duty* 4.5 kV transmitting variable capacitors and a massive *high current* roller inductor gives you arc-free operation up to 2 kW PEP SSB.

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A sturdy hand cranked roller inductor lets you quickly *fly* from band to band. A precision 5-digit *gear* driven turns counter lets you accurately return to your previous settings.

Large comfortable knobs and smooth vernier drives on the variable capacitors make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

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You can tune any real antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc . . .

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A 4:1 Ruthroff voltage balun feeds dual high voltage Delrin terminal posts for balanced lines. HFT-1500 is 5.5x12.5x12 inches.

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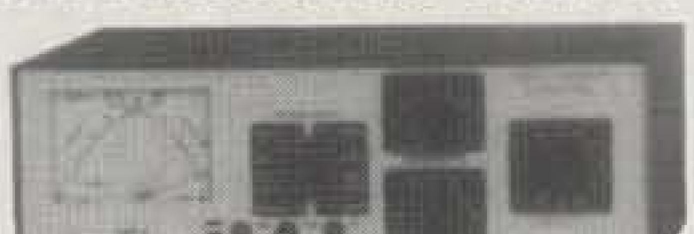
300 Watt Antenna Tuner

VC-300DLP
$159.95



VECTRONICS uses the finest components available to build the highest quality 300 Watt antenna tuner ever made.

You can tune any antenna 1.8-30 MHz. Custom 48 position switched inductor and continuous rotation 1000 Volt capacitors provide arc-free operation. Handles 300 Watts PEP SSB, (150 Watts on 1.8 MHz).

8 position antenna switch, built-in 50 ohm dummy load, peak reading backlit cross-needle SWR Power meter, 4:1 balun for balanced line antenna. Scratch-proof Lexan front panel. 10.2x9.4x3.5 in. Weighs 3.4 lbs.

300 Watt *Mobile* Tuner

VC-300M
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The VC-300M *Mobile* Antenna Tuner is compact, lightweight, easy-to-operate and is our most economical tuner.

It's compatible with *any* mobile antenna and *any* mobile HF transceiver and is compact enough to fit in the most compact car.

It can also be used at home with dipoles, vees, verticals, beams or quads fed by coax.

Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8-30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz.). 7.25x8.75x3.6 in. Weighs 3.4 lbs.

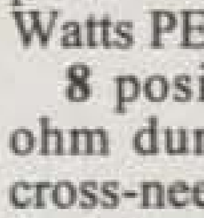
SWR/Power Meters

PM-30
$79.95
PM-30UV
$89.95

PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultaneously on dual movement Cross-Needle Meter. True *shielded* directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.

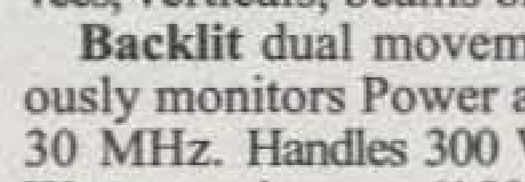
For 144/220/440 MHz, 30/300 Watt ranges. PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load



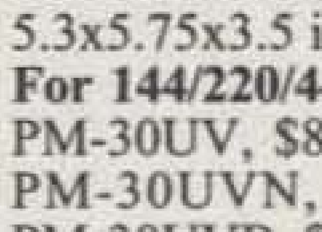
DL-650M, $64.95. Handles 100 watts continuous, 1500 Watts for 10 seconds to 650 MHz. Ceramic resistor. SWR < 1.3. SO-239 connector. **DL-650MN, $69.95** has N connector.

Low Pass TVI Filter



LP-30, $69.95. Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1500 watts.

High Pass TVI Filter



HPF-2, $24.95. Installs between VCR/TV and cable TV or antenna lead-in cable. Eliminates or reduces interference caused by nearby HF transmitters.

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BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

QRP Reigning Supreme

Nearly all of our friends returning from the Dayton Hamvention this year tossed out handfuls of notes, ticks, kits, paddles, and other goodies as they whizzed by me on the roadside. It was like making the annual pilgrimage by proxy! Thanks, gang! In return, our Pandora's box is now exploding with information and ideas to share with the multitudes during coming months—and the fun begins right now!

The red hot attraction at Dayton '97 was QRP, which included the second annual Four Days in May Symposium, the Bicycle Mobile Hams of America meeting and picnic, and vendors galore. Even the VHF gang got into the QRP action, purchasing new milliwatt-level FM micro-talkies in large number. Low-power communications is indeed a big (and growing!) interest in '97. The FDIM symposium flourished with presentations on technical and semi-technical topics, a huge banquet, a vendor's night with dozens of kits and rigs to check out, and a fascinating show-and-tell building/homebrewing contest. Some of the most popular kits were Steve Bornstein, K8IDN's 1 by 2 inch two-IC receiver (featured here last month), Embedded Research's neat Tick keyers (introduced last month and updated this month), and AC6AN/NorCal's amazing 38 Special transceiver kit. The 38 Special won the building contest. It presently is available at the unheard of low price of $25 and is featured in this month's column. We have quite a bit of ground to cover, so let's get started!

The 38 Special

As previously mentioned, a star attraction in the QRP arena at Dayton was the 38 Special transceiver designed by Ori Mizrahi-Shalom, AC6AN, and presently available in kit form by NorCal, The North California QRP Club. If you have ever thought about homebrewing a neat little go-anywhere QRP rig, friends, this is the one! It is superb in both design and performance, and at $25 it is a once-in-a-lifetime bargain. You will need to move fast to get in on this deal, however, as kits will only be available until year end—and I would add that is assuming parts supplies hold together that long. Folks are buying 38 Specials in record number. We sense a myriad of questions at this point, so let's start with some introductory details and photos (photos 1 and 2) and then discuss some of the rig's special features.

Photo 1– Amateur radio at its best! My NorCal 38 Special measures 1.2"H × 4.2"W × 3.2"D, slips right into a coat pocket, and pumps out a solid 5 watt signal. The little gem worked 5 countries during its first 5 minutes on the air. Details on the rig, plus the new 1" × 1.75" "Paddlette" beside it are in the text.

The 38 Special acquired its designation because it works 30 meters, its internal circuity operates at the 8 volt level, and it is special in its high-performance to price ratio. This is a superhet transceiver with crystal stability, varactor tuning, and IF crystal filter, plus audio CW filter, CW sidetone, and silky-smooth full break-in operation. Output power is 5 watts with an optional $2 MOSFET installed right on the

Photo 2– K8IDN's homebrewed version of the 38 Special sports RF and AF gain controls, vernier tuning, RIT, Embedded Tick keyer, antenna tuner, and LED SWR metering. That's big-time QRP for sure!

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SS-12	10	12	2.3 x 6 x 9	3.4
SS-18	15	18	2.3 x 6 x 9	3.6
SS-25	20	25	$2\frac{7}{8}$ x 7 x $9\frac{3}{8}$	4.2
SS-30	25	30	$3\frac{3}{4}$ x 7 x $9\frac{5}{8}$	5
SS-25M*	20	25	$2\frac{7}{8}$ x 7 x $9\frac{3}{8}$	4.2
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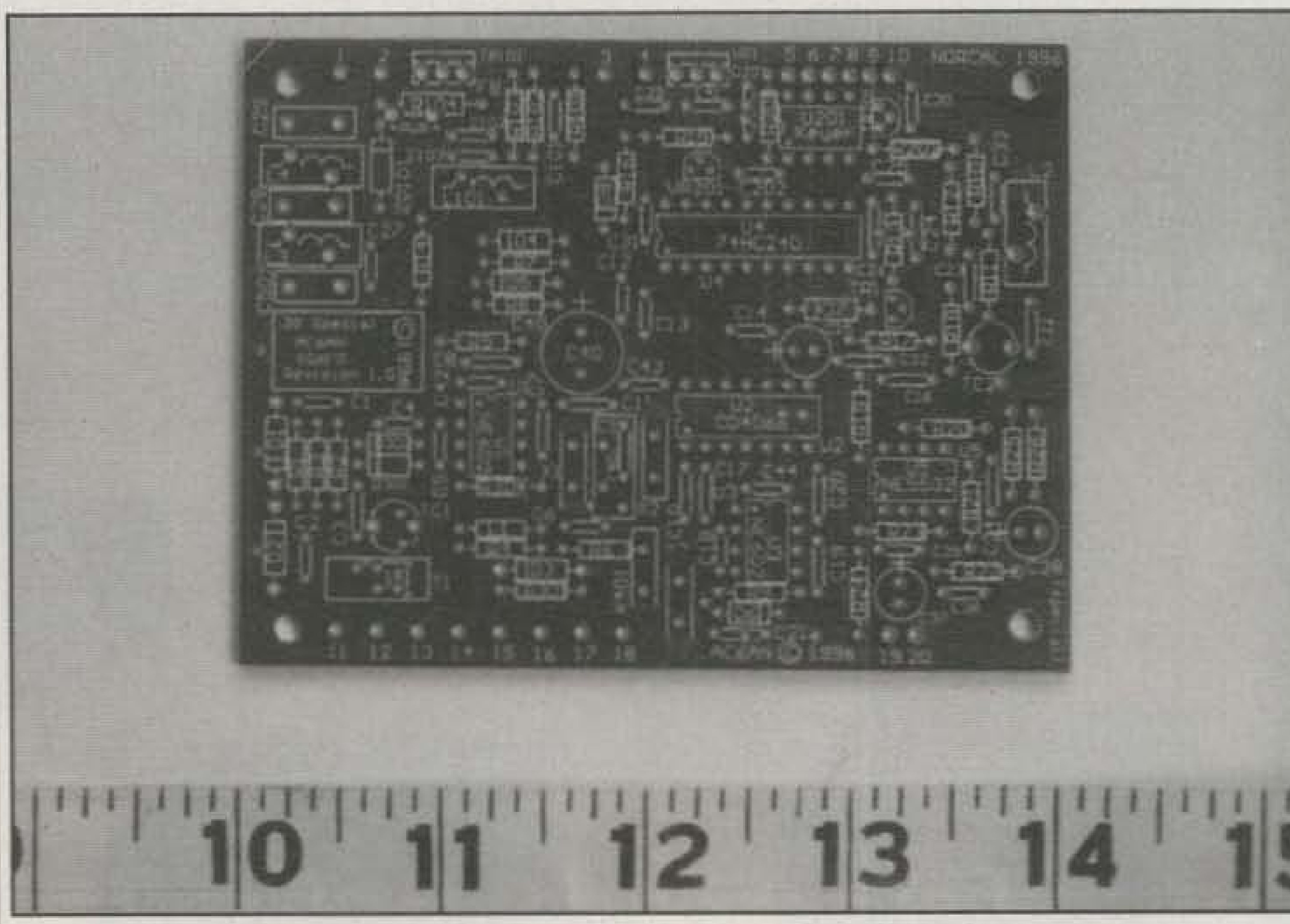

Photo 3– PC board of the 38 Special measures 3 by 4 inches, has plated-through holes to minimize intermittent connections, and has silk screening to easily identify parts locations.

board, or 350 to 400 milliwatts without the MOSFET. Provisions are also included on the board for adding an optional TICK keyer chip (the best five bucks you will ever spend!), RIT, and additional IF filtering.

Kits are available from Jim Cates, 3241 Eastwood Road, Sacramento, CA 95821 (make checks payable to Jim Cates [not NorCal] for $25 plus $3 shipping US, $5 DX). The kit includes a commercial-grade PC board, an outstanding 20-page manual, and all board-mounted parts to make a basic 38 Special. You add parts for options, connectors, pots, case, and knobs to produce a custom-finished unit.

Since a case and knobs are not included in the kit, very few NC38S rigs look alike. My version, for example, reflects what I've always wanted in a weekender/travel rig—semi-deluxe performance and simple sophistication with two-knob operation (photo 1). Conversely, K8IDN went all out building his NC38S and included vernier tuning, RIT, an antenna tuner, and LED SWR metering (photo 2). Classy, isn't it?

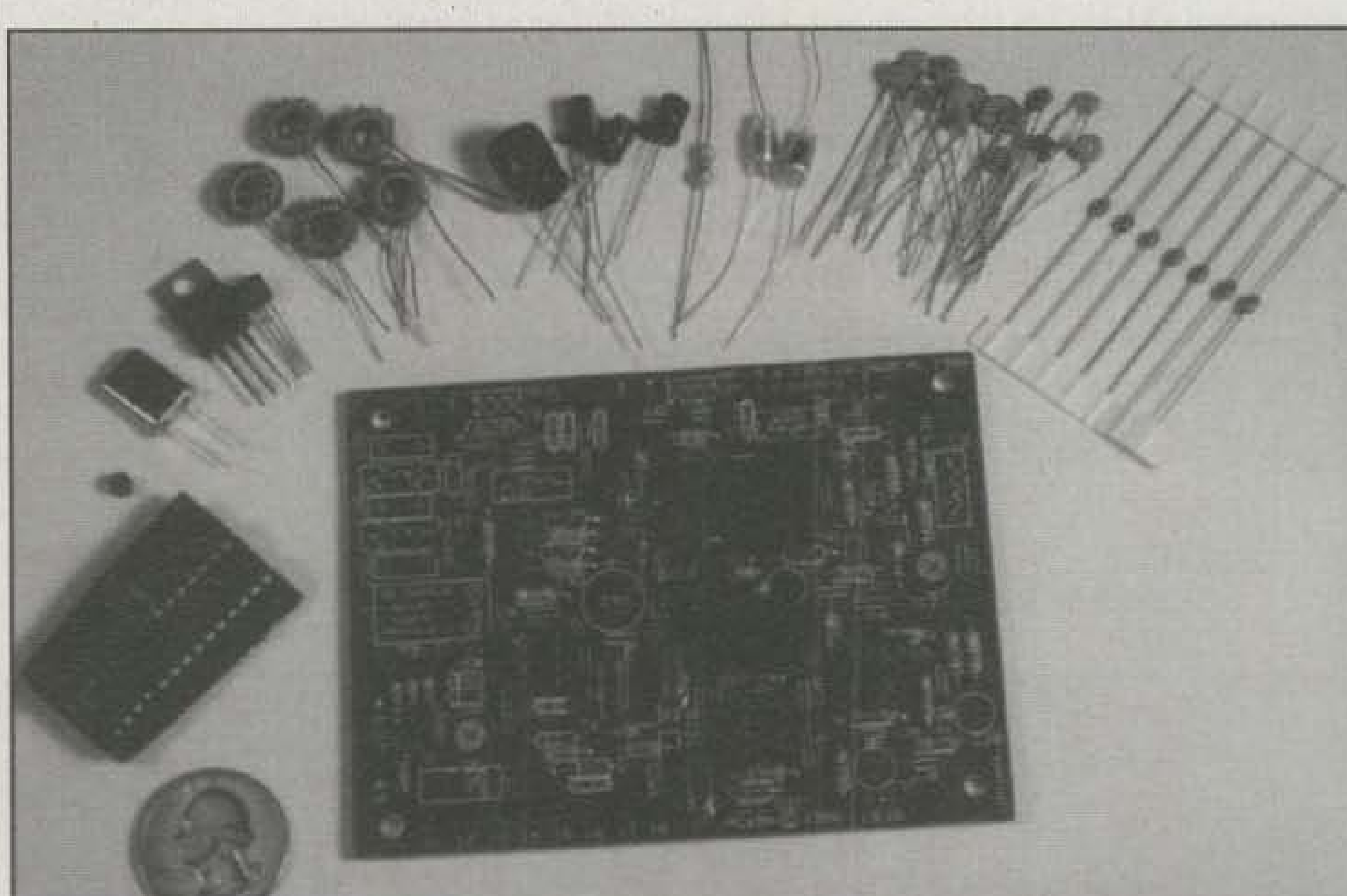

Photo 4– The 38 Special about midway through assembly. Coils have been wound, and IC sockets plus resistors and several capacitors have been installed.

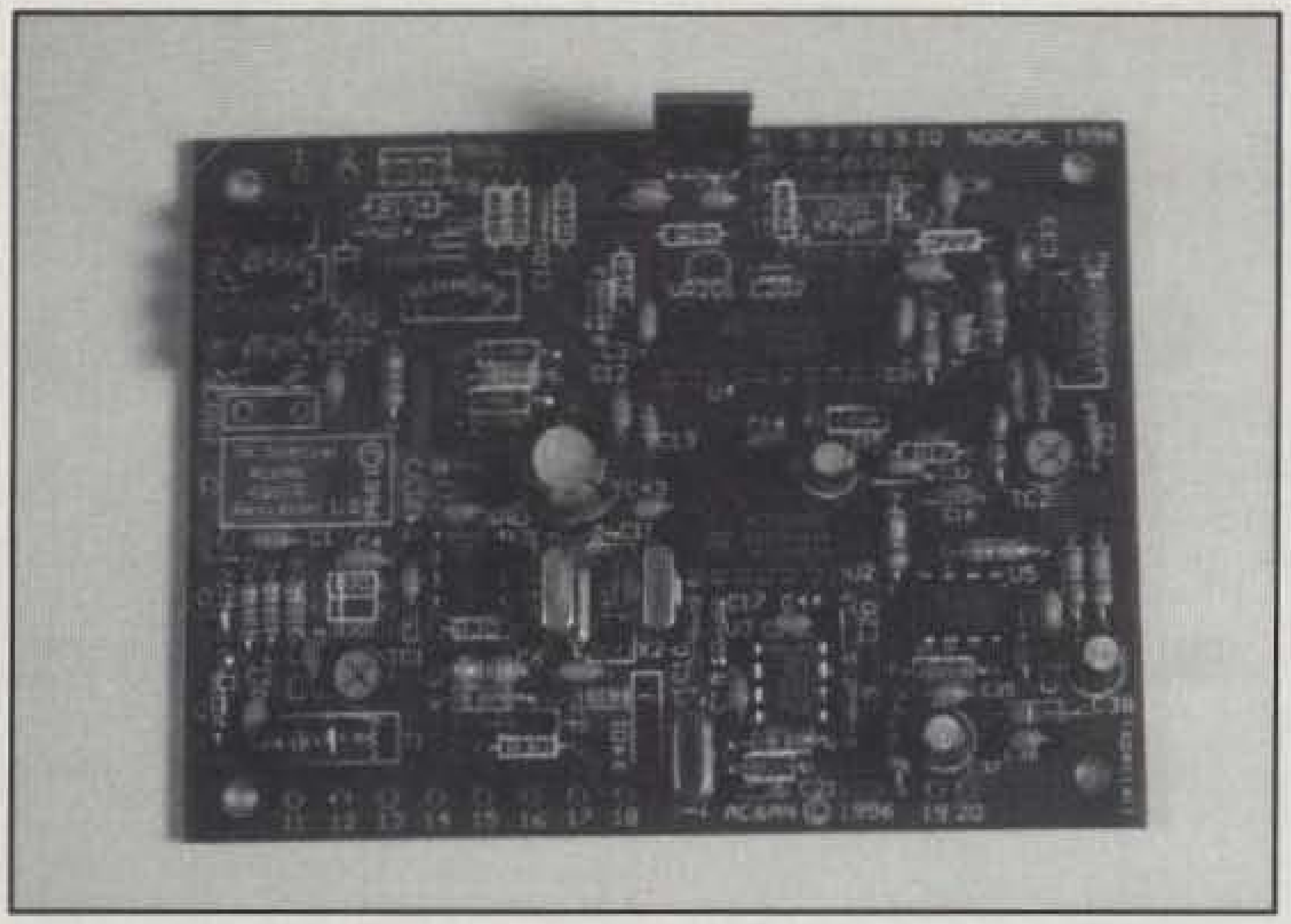

Photo 5– Assembly of the basic 38 Special kit has now been completed (all supplied parts installed). Only user-supplied controls and connectors (plus case and knobs) are required to complete the rig. That is an 8 volt regulator standing vertically near the board's middle rear.

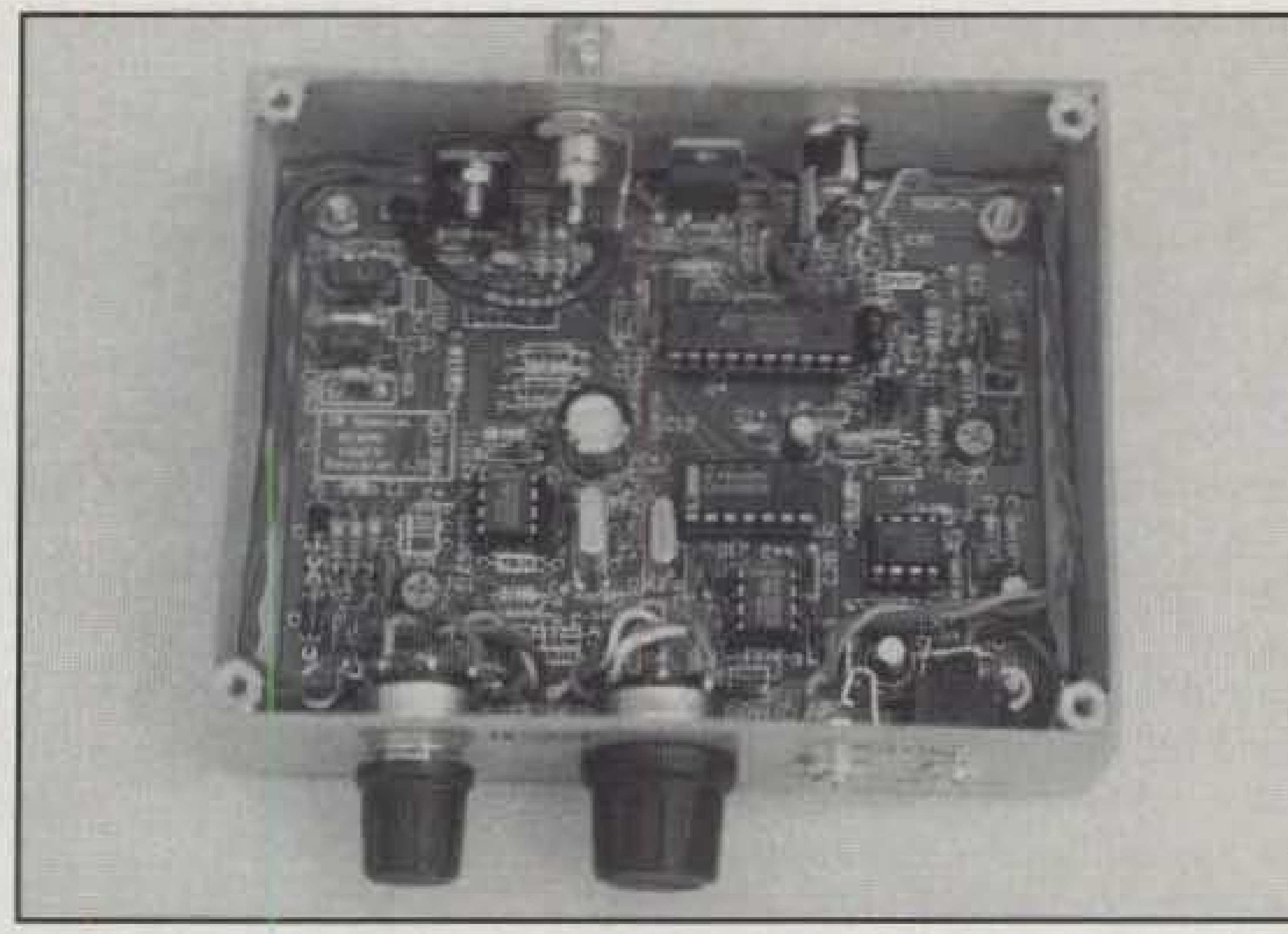

Photo 6– My completed 38 Special snuggled into a custom case that K8IDN also made from single-sided PC board material. Steve produced a masterpiece! An IRF510 power MOSFET sits in the heat sink to the left of the BNC socket,and an 8 volt regulator stands between the BNC and power socket.

Finally, the North California QRP Club deserves favorable mention. This is a loose-knit group of over 2300 members in all 50 states plus 75 countries, and many of the members are hot wires in QRP. The club's quarterly magazine, *QRPp,* typically runs 70 to 80 pages in length, and each issue is a gold mine of information, circuits to build, mods for kits, and more. You can go absolutely wild homebrewing goodies from every issue. There is no membership fee for NorCal. However, a one-year subscription to *QRPp* is $15 US, $20 DX. Checks should be made payable to Jim Cates, 3241 Eastwood Road, Sacramento, CA 95821. Back issues of *QRPp* are also available in year sets for '94, '95, and '96 at $15 per set from Doug Hendricks, 862 Frank Avenue, Dos Palos, CA 93620. Check them out!

Some of you probably are wondering if

the 38 Special is easy or challenging to build and how small it can be made. We took some "during assembly" photos to answer those questions (photos 3, 4, 5, and 6). I say "we," because Steve Bornstein, K8IDN (the same person who produces kits of the neat two-chip receiver featured in last month's column), built my 38 Special in a favor-swapping arrangement while I finished writing a (large!) new book of survival communications. As you can see from the photos, Steve's handiwork is marvelous. He produced a masterpiece I will always cherish. Yes, I will also tell you more about the rapidly expanding area of survival communications and explain how its many areas can be applied to our daily lifestyles during the months ahead. Stay tuned.

More Terrific Ticks

Another star attraction at Dayton '97 was expanded versions of the tiny IC keyer chips and kits available from Embedded Research (P.O. Box 92492, Rochester, NY 14692). These little critters are taking amateur radio by storm!

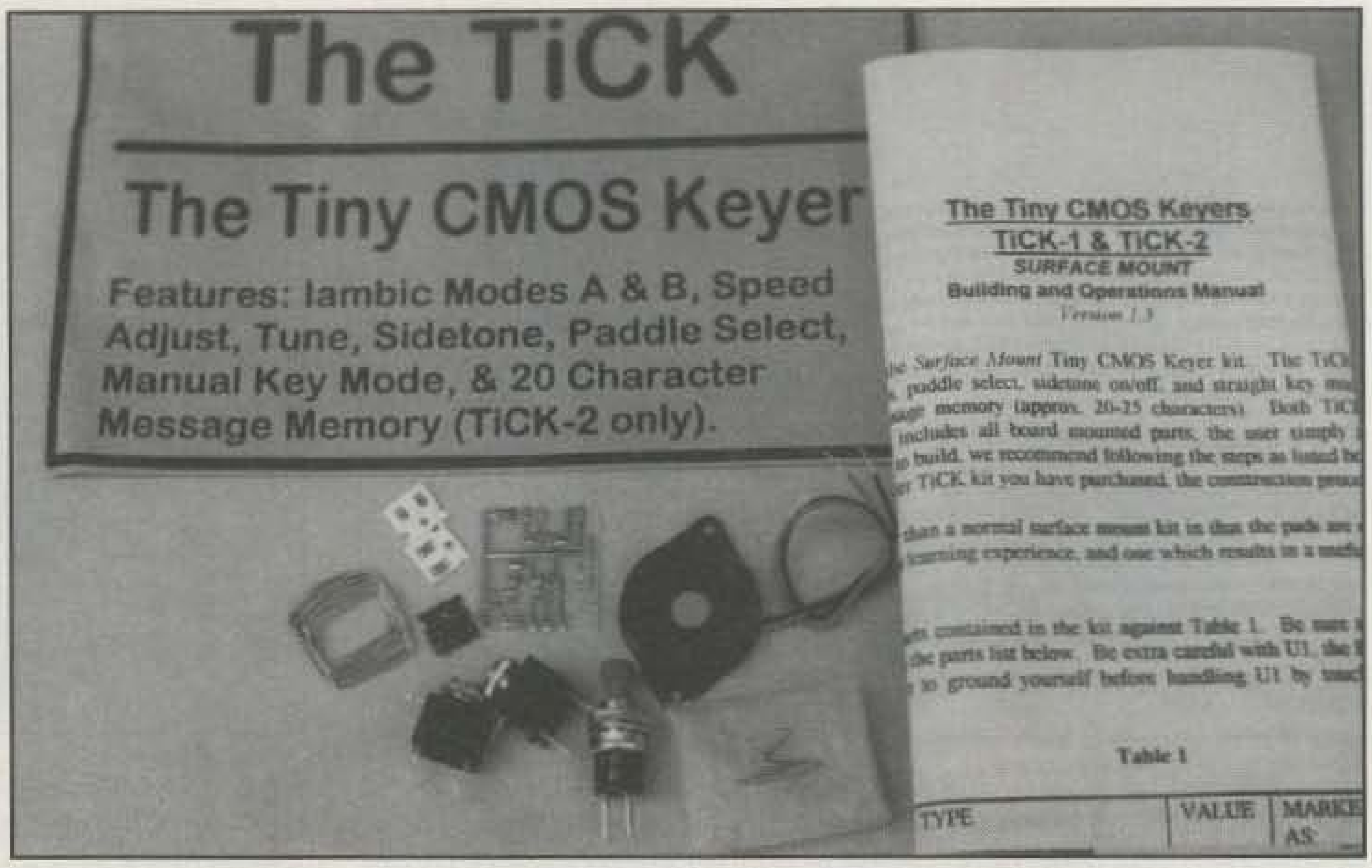

Photo 7– The new surface-mount Tick keyer kit available from Embedded Research in Rochester, New York. The PC board measures 3/4 inch square. Fine detail work involves only soldering one tiny resistor, capacitor, transistor, and the IC. A spare resistor, capacitor, and transistor, plus ultra-thin solder, are included in the kit for no-miss success. It's an ideal "surface-mount starter project" for sure! (Details in text.)

As you will recall from last month's column, the original Tick-1 used a single pushbutton for speed adjustment, tune/key down function, right- or left-hand paddle select, sidetone on/off, iambic A or B operation, and manual key/sideswiper mode. The kit costs only $16 postpaid (in US) and is a snap to assemble, and the compieted keyer's board is only one inch square. If you build a 38 Special, which has PC connections and board runs for the Tick built in, you can purchase just the chip for a scant $5.

There is now a Tick-2 which includes all the Tick-1's features plus a programmable 20-25 character memory. Yes, and the two Ticks are interchangeable—a plug-in swap! Further, all Tick-2 functions, including memory store/play, are accessed by that same single-pole pushbutton! Tick-2 kits are $21 postpaid (in US), incidentally, and the chip alone is $10.

There's more! Both the Tick-1 and Tick-2 are available in 8-pin DIP or microminiature surface-mount versions—at the same price! The surface-mount version measures only .75 inch square (photo 7), and since the board's bottom stays per-

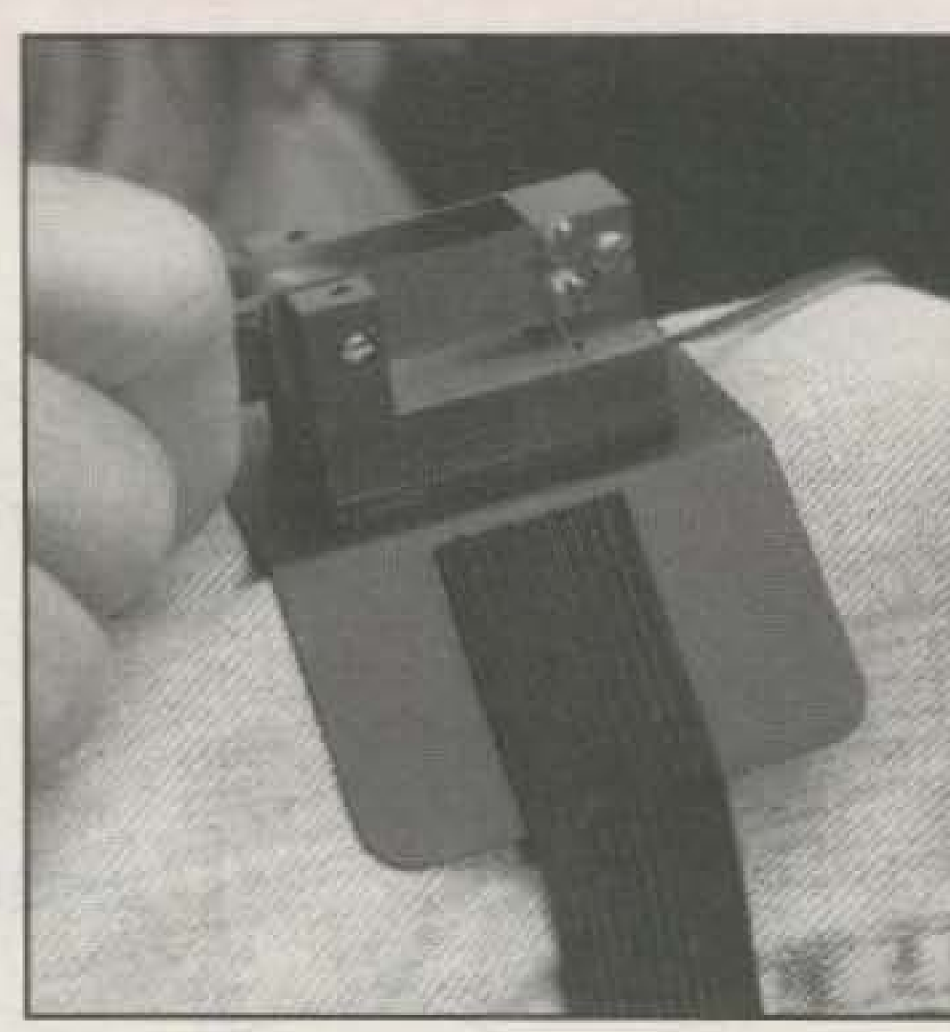

Photo 8– A closer view of the neat little "Paddlette" being made by Bob Hammond, KI7VY. Here the Paddlette sits on its optional knee mount, which uses a magnetic base for easy on/off maneuvers.

Photo 9– KE6RIE's just announced custom case for the 38 Special. The enclosure is an absolute heartthrob and gives a terrific rig the ideal topping.

fectly clean, you can use doublesided tape to stack the keyer's sidetone buzzer and a lithium battery to it "triple decker sandwich style." Use another piece of doublesided tape, and you can stick the complete Tick keyer in a corner of your favorite rig or in the base of a paddle. These Ticks are going places!

New QRP Paddlette

Okay, we sense you have been ogling the neat little paddle by my 38 Special in photo 1, so here are the details. It is called the "Paddlette." It measures 1 by 1.75 inches, uses a cantilever design, has a magnetic base, and handles great. The arms/levers and their center contact posts are brass. Exceptionally fine adjustment screws on each side set gap/arm travel, and they are easily set right down to a feather touch for sensitive fingers or "silent running" (as in a quiet den when the XYL finds traditional "click-clacks" distracting). Special bearing-driven set screws apply a drag on gap adjustment screws so they stay put without locknuts. An extra stick-on-anything magnetic base is included with the Paddlette. You just press it down in a desired spot, plop the Paddlette on it, and enjoy good "stay put" operation. Alternately, you can just use the Paddlette's magnetic base "straight" for sticking on a metal-case rig. It's a treat! There is also an optional knee mount for using the Paddlette mobile or portable (photo 8). It has a wide and quite strong surface for holding in place, a one-inch elasticized strap that holds firmly yet stretches, and a quick on/off buckle for easy use. Overall, it's a winner!

The Paddlette is $38.50 postpaid in the US, or $44.95 postpaid for both the Paddlette and knee mount, from Bob Hammond, KI7VY/Paddlette Company, P.O. Box 6036, Edmonds, WA 98026 (telephone 425-743-1429).

Last-Minute Notes

After writing this month's column, we received word that a new and quite impressive enclosure for the 38 Special had just been announced. The enclosure measures 1"H × 3.1"W × 5.4"D and has a mil-spec anodized finish with engraved labeling (photos 9 and 10). The case comes with all holes for connectors and controls predrilled, board mounting hardware, and a list of readily available parts that fit perfectly in the enclosure. This custom case truly gives the 38 Special a professional finish. It is available for $25 plus $5 shipping from Doug Hauff, KE6RIE, San Luis Machine Company, Unit F2, 200 Suburban Rd., San Luis Obispo, CA 93401.

There are yet more goodies to tell you about (such as Dan Taylor, N7VE's clever ScQRPion one LED SWR indicator), but we have totally overflowed column space for this time. Watch for it plus details of more kits, rigs, and keys in future columns. Meanwhile, let's chat 38 Special to 38 Special one weeknight soon.

73, Dave, K4TWJ

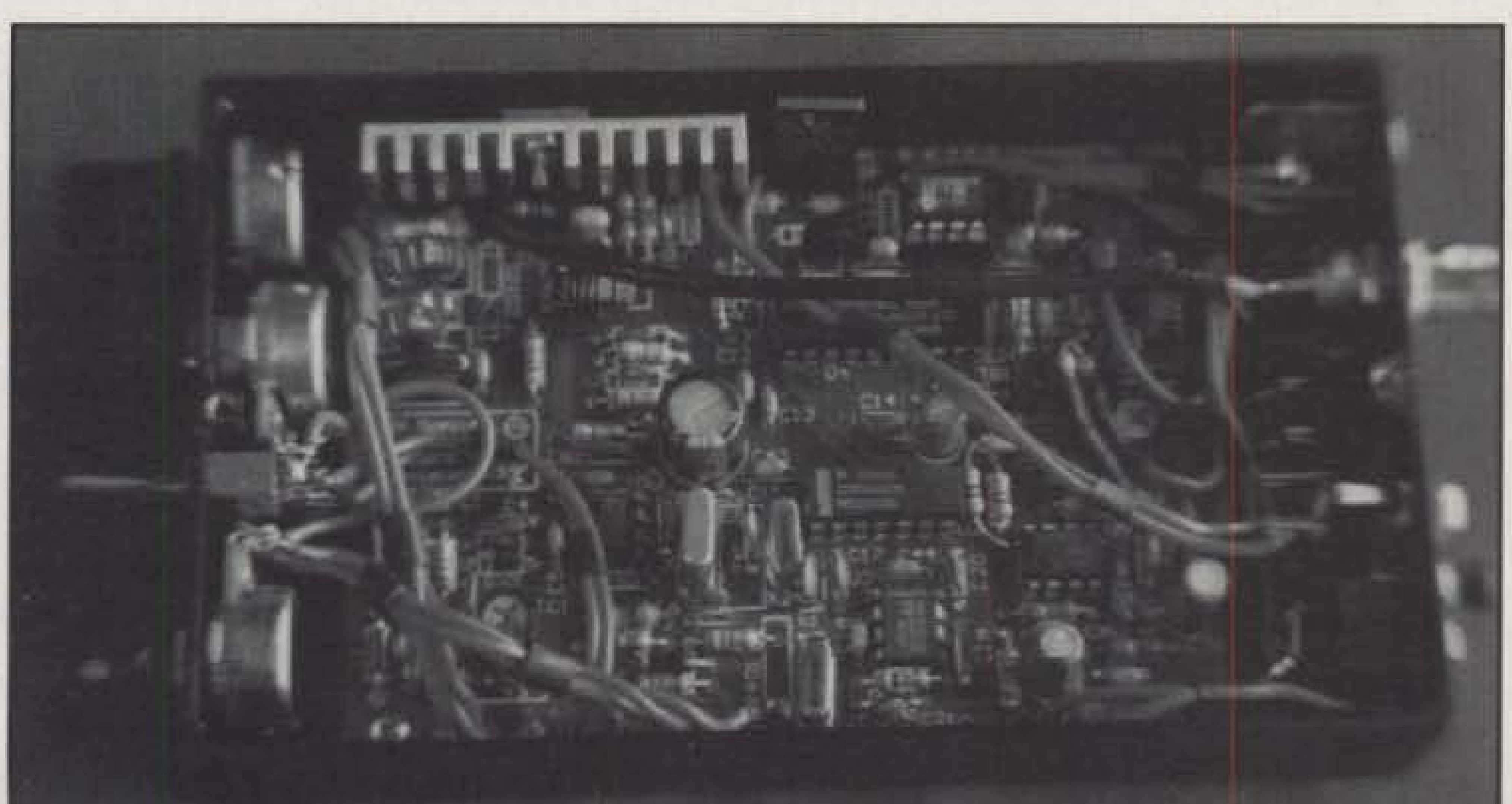

Photo 10– Inside view of KE6RIE's custom-case 38 Special. Note the long heat sink in left top area. Both the case and heat sink are available from the San Luis Machine Company. (Details in text.)

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Onward and Upward—Part IV, Conclusion

Here is the concluding segment of this four-part series. The preceding parts covered code, learning code, keys, and station considerations. This part completes the operating coverage started last month. All four parts must be read to achieve maximum benefit.

Sending Speed. Send slowly and carefully. Accuracy is far more important than speed. No one enjoys a contact with an amateur operator who makes a lot of errors, but errorless code sounds good even at the slowest speeds. Sending speed comes naturally, and there's no advantage to sending faster than the speed at which you can send well. Your sending speed is normally faster than your code receiving speed, so make yourself slow down by sending very carefully. If you send code as fast as you can transmit it, you'll be in trouble if the other amateur answers at the same speed; it will be too fast for you copy. One way to slow down your sending is to emphasize the spaces between words. If you have trouble doing this, simply take your hand off the keying device at the end of each word. Doing this will quickly get you in the habit of leaving adequate spacing between words. Once good spacing has been established, there is no longer a need to take your hand off the key between words.

Don't speed up to work Generals and other higher class (and DX) amateurs you hear on the Novice bands. These experienced amateurs are usually in the Novice bands to give you some code practice and to send you a QSL. Sometimes they are there because they are very rusty and need the code practice. An experienced operator is much more likely to be tolerant of slow code and errors than a newcomer. Don't hesitate to ask anyone to slow down (QRS) or to repeat information; one-way contacts are not satisfactory to anyone.

Sending Accuracy. Accuracy and rhythm should be the goals of any beginner learning to send code. Make clear corrections of sending errors to avoid confusing the other amateurs. If you goof on the first letter of a word (or a single-letter word such as A), send an error/repeat sign and go back to the start of the last word you sent without error. If you make an error after the first letter in a word, send the error/repeat sign and go back to the start of the word your were sending when you made the error. It is acceptable to use a series of seven (or more) dits to indicate that you've made an error and that you're going to repeat. It is better to send the question mark, though, as this always means that your are going to repeat information, whether or not you made an error, whenever it is sent out of context.

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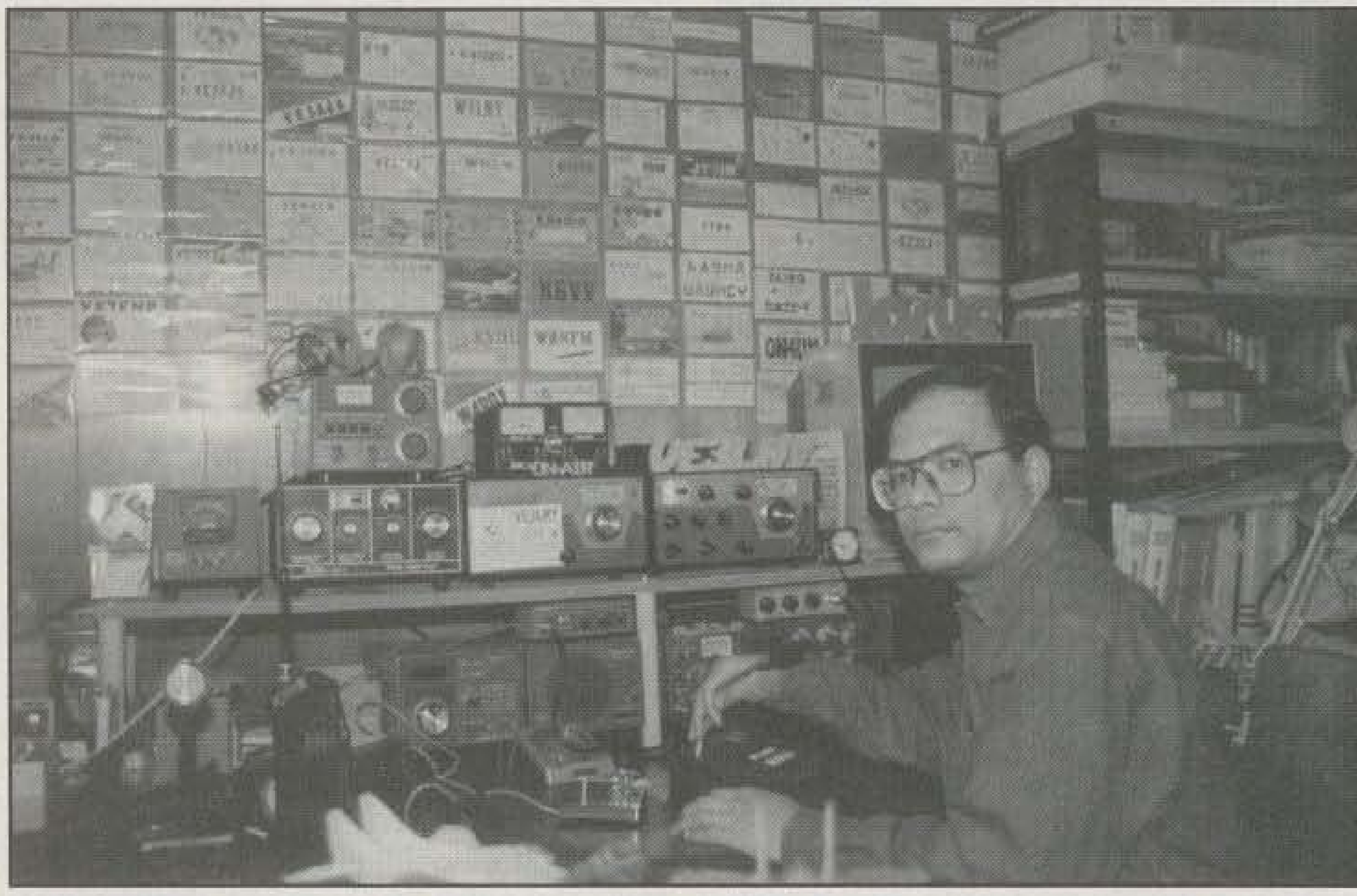

Josue Ascano, VE3LHY, is an electronics technician living in North York, Ontario, Canada. Jos was active in the Amateur Radio Club (DU1UST) of the University of Santo Tomas while he lived in the Philippines. He moved to Canada in 1974, got an amateur radio license in 1978, and became a married man in 1995. He met his wife through amateur radio. He lived in an apartment for a while and that inhibited his radio activities. Once he moved into a house with adequate antenna space, he became very active on the air. His station includes a Kenwood TS-830S transceiver, a GAP Vertical (for DX), and a 20 meter dipole. Jos has all 50 U.S.A. states and 95 countries confirmed. Most of his activity is with code. He recently joined the Mabuhay Amateur Radio Club, which includes many Filipino amateurs.

Handkey Use. Don't tap out code with your fingertips; this is extremely tiring and it sounds terrible to others. Use your wrist from the beginning, and you'll quickly develop a smooth and effortless sending style. When you're first learning to send with your wrist, you can minimize any tendency to finger tap by opening up the key contacts to at least one-sixteenth of an inch and adjusting the spring tension to where quite a bit of pressure is needed to close the key contacts. Your wrist easily can provide the force needed to close the key contacts, but your fingers will tire when finger tapping. Consequently, you'll get in the habit of sending correctly. You can set a large coin on the back of your sending-hand wrist and it should stay there if you are sending correctly. Correct sending is smooth and easy. Wrist sending seems difficult to master because we all are accustomed to doing things with our fingers. Nevertheless, you'll learn that is is easier and better to send by wrist motion than by finger tapping.

A good initial practice is to time dits and dahs using the sweep hand of a clock. Send a dit exactly at each second point during each 1 minute practice run. Similarly, send a dah starting at each exact 5 second point and hold it for 2 seconds. Wait 3 seconds and send another 2 second dah. Repeat this procedure during each 1 minute practice run. Clock exercises can quickly get you into the habit of sending correctly using your wrist.

RST Reports. Most amateurs appear to use the RST reporting system correctly. Amateurs who fail to use this system properly usually fail to realize that each part of this report is completely separate


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from its other two parts. The readability (R) part is just that—how readable the received signal is to you. If it is perfectly readable, it is R5. The readability report has no direct relationship to the strength (S) and tone (T) of the received signal. Signals are often R5 despite being weak and/or poor tone.

Similarly, the strength (S) of the signal is independent of readability (R) and tone (T). A typical received signal is S7. There are fewer S9 signals. It is unlikely that a new operator will answer a signal lower than S4, even though they often send S reports below S5.

Most of our new rigs produce an RF output which is very constant; therefore, the vast majority of correct tone (T) reports should be T9. If your hear poor tone on a received signal, send an appropriate lower tone report. Most received reports below T9 are incorrect.

If you hear a sound like a bird chirping while listening to a signal, add the letter C to the RST report you send. Chirp is due to oscillator instability, which is usually just associated with old transmitters. If you hear key clicks far above and below a station's transmit frequency, add the letter K to the RST report you send to the offending station. Key clicks are caused by an improper keying circuit, which is more likely to be associated with older equipment than newer gear.

The suffix letter X has been used to denote that the received signal has the extreme frequency control that was originally associated with crystal (xtal) control of the oscillator. Since all modern amateur radio gear produces extremely stable outputs, the significance of the X suffix is greatly diminished. Consequently, very few amateurs now add the letter X to the RST reports they send. No matter which suffix letters you do (or do not) use, please send honest RST reports. Incorrect reports are useless.

Time. It usually takes a long time before new amateurs fully realize the advantages related to using Universal Time Coordinated (UTC) instead of local time. However, UTC should be used to eliminate time differences between UTC and your local time. The most common mistake related to the use of UTC is amateurs forget to shift to the next date when the UTC time passes 0000. Simply stated, if the local evening date is the 22nd, the UTC date is the 23rd. UTC is often referred to as Greenwich Mean Time (GMT) or Zulu/Z time, but UTC has been the correct term since 1979. I hope you will simplify your amateur operation by using UTC at all times. Avoid the confusion that can be caused by the use of local times. Use UTC in all aspects of your amateur radio operation.

Phillips Code. We use phonetic abbreviations to reduce the number of letters we send during code contacts. As an example, "HW R U?" means "How are you?" It is to your advantage to become familiar with this phonetic shorthand as quickly as possible and to use it extensively. However, it is sensible to avoid such abbreviations when communicating with an amateur who does not seem to know them. If the other amateur does not use these abbreviations, she/he probably does not know them, and you should not use them in that contact. If you want a reprint of my Phillips Code article, send $1.00 and a large (9"×12") self-addressed envelope with double first-class postage to me using the California address at the beginning of the column.

Q Signals. We use three-letter Q signals to make statements and to ask questions. Learn many of the Q signals, but it is not wise to use them as a weapon against other amateurs. When working new amateurs, it is preferable to use only the most well-known Q signals. A copy of my Q signals article is available for $1.00 and the usual SASE.

Multiple Identifications. When sending a CQ call, or answering one, it is advisable to send your callsign two or three times. It seems that amateurs who answer CQ calls the furthest off frequency are the same ones who routinely just identify a single time, making it difficult to catch their callsigns. Give the other operator more than one opportunity to copy your callsign.

Punctuation Marks. New amateurs tend to use the punctuation marks they learned when they acquired their license. There is nothing wrong with using punctuation marks, but most of us tend to avoid using them. if you have enough patience to send punctuation marks and you like to use them, do so.

Contact Data. Many amateurs like short contacts, but a lot of us like to chat, which is called ragchewing. If you answer a CQ call, you should be prepared to start a conversion after RST and QTH data have been exchanged. The operator who sent the CQ call does not know how well the other amateur hears her/his signal. Consequently, this operator limits her/his first transmission to the RST report, QTH, and name. However, the amateur who answered the CQ call does know how her/his signal is being received. That amateur should initiate a conversation immediately after exchanging RST, QTH, and name.

When you make a CQ call, you are not calling any specific amateur; it is simply a general call to all stations. However, when you answer a CQ call you are calling a specific amateur.

When initiating the conversation, it is good to keep it relatively short. Most operators just tell about their rig, antenna, and weather to start an on-the-air conversation. Subsequent transmissions may include subjects such as age, job, non-amateur interests, family, operating interests, amateur experience, military experience, etc. Long conversations are usually more interesting than short contacts. However, you should keep contacts short when working a foreign (DX) amateur who is trying to contact as many amateurs as possible to supply us with cards. These DX operators usually just want to exchange RST, QTH, and name data. In some cases they just want to swap signal reports. Please do not drive DX amateurs off the Novice bands by making long transmissions. If a DX operator is willing to chat with you, she/he will make that fact obvious by starting a conversation with you. If the DX amateur answers your CQ call, she/he is probably willing to chat with you.

Work/Ending Signs. If you want to avoid using callsigns at the transfer of transmission to another amateur, it is okay to use the break sign (letters B and K run together). The other operator should send just the break sign before continuing the contact. These break exchanges are legitimate as long as no transmission exceeds three minutes, and identification is made within each ten minute time span. It is not advisable to use the break sign if your keying device cannot transmit both letters combined into a single symbol. Many newer amateurs add the letter N after the invitation to transmit sign (the letter K). There is no recognized and approved meaning of this practice in the International Morse Code. When the Novice bands were established during 1951, many of us did add the letter N after the letter K to indicate that we only wanted a Novice (N) to answer our CQ calls. The end of message sign is the letters A and R run together. It only means the end of a message; it does not mean answer. K is the invitation to transmit. It is appreciated when proper ending signs are used.

Contests. Participate in as many on-the-air contests as possible. Contests provide a wonderful opportunity to work many new states, counties, and countries in a short time. Keep track of local, national, and international contests advertised in major amateur radio publications. You'll win every time you enter a contest because your objective is to increase your code speed, and you'll be doing it! You do not have to be a high-speed code operator to participate in contests.

Names. If you have a name that is easily confused between male and female, it is good to state whether you are an OM or a YL. Names such as Carole/Carol, Dana, Jackie, Leslie, Lynn, Marian/Marion, and Pat are questionable to foreign amateurs, as well as to many American operators.

Practice. Many experienced operators work new amateurs to give them code practice, which new operators may need to upgrade to higher class licenses. In such cases they are not interested in working the new amateur's computer; they want to work new amateurs to give them code practice. If you are practicing code reception intending to pass a code test, it will help you if you copy what you receive on paper. It is true that you will gradually become accustomed to copying in your head, but you initially need the ability to write down (transcribe) code as you hear it.

QSL Cards. Most new amateurs like to get cards from the amateurs they contact. However, few of them purchase cards when they are getting started on the air. This hesitation to buy cards is partially due to the fact that they expect to change callsigns when they upgrade. It is a good idea to obtain a reasonable supply of QSL cards as soon as you are going to start operating. The lowest cost cards work as effectively as the most expensive ones in regard to obtaining cards from the amateurs you contact. The QSL cards you receive while using an initial callsign are accepted towards thousands of operating awards, no matter how many callsigns you acquire as you upgrade. Many experienced amateurs work the Novice code segments to give new operators code practice and to send QSL cards to them. If you want a card, say so during the contact. If your address is not listed in the current domestic (U.S.A.) Callbook, transmit your name (first and last) and mailing address (including zip) during the contact. Do not assume that every amateur has a current Callbook; ask the other operator if she/he needs your name and address.

Most experienced amateurs will not mind if you do not have a card to send to them; they know that a QSL is more important to a new operator. If you forget to request a card during the contact, it is acceptable to mail a request for a card; remember to include complete contact data and your address. If you want to learn a lot about QSL cards, including their selection and uses, you could obtain a copy of the *PSE QSL* book published by Tiare Publications. If you want information about this book, send an SASE to my California address.

Bad Practices. Identify properly. If your callsign is WA6VTN, for example, do not use VTN as a short identification. It is illegal and improper to do this. Better operators do not respond to improper identifications. Another bad operating procedure involves amateurs who answer CQ calls and immediately send their RST, QTH, and name data without allowing the amateur who sent the CQ call to recognize a preferred answering station. It is not usual to have more than one station answer a CQ call, and the amateur who sent it may prefer to answer a station other than the one who is creating interference (QRM) by improperly sending his/her RST, QTH, and name data. Do nor make directional calls such as CQ VT (Vermont) unless you have previously determined that the desired area is being heard on the band you are using. Do not usurp a frequency from another amateur. If you answer someone's CQ call and complete a contact with her/him, it is proper to leave that frequency to the amateur who made the initial CQ call.

QRZ? Use. If you want to make a CQ call, please do so properly. I often hear an amateur come on a frequency sending QRZ? instead of transmitting a normal CQ call. This is a bad procedure which unfortunately is also used by some experienced amateurs.

QRL? Use. If you want to make sure a frequency is not already in use before you start using it, the correct way to find out is to send DE, your callsign, and QRL? Using a broad filter, listen for a response such as yes or C (si). If no response is heard, commence your transmission.

HR Use. Amateurs tend to chat using a lot of abbreviations and shortcuts on the air. However, the unnecessary use of HR (here) is a bit aggravating. There is no need to send NAME HR, QTH HR, RIG HR, WX HR, etc., during contacts. The facts obviously apply to the name, QTH, rig, WX, etc., of the transmitting amateur.

Log. Amateurs are no longer required to maintain a written record of their operating activities, but such a record is often helpful. Logs are available from the ARRL, (225 Main Street, Newington, CT 06111-9965), Yaesu U.S.A. (17210 Edwards Road, Cerritos, CA 90703-2459), and other organizations. You are welcome to run copies of the log sheet I designed. Send a business-size (#10) SASE to my California address for a free sample.

Goal. When your code receiving speed reaches the point where you are consistently making passing plain-language runs at about 16 wpm, you are ready to pass the code part of your General/Advanced exam. If your theory is good, take the exam right away.

Summary

Amateur radio club officials are urged to bring this complete article to the attention of their Novice and Technician class amateurs. It is time to get them moved onto the code segments so they can prepare themselves to obtain higher grades of license. They need to move onward and upward as quickly as possible. General, Advanced, and Extra class amateurs should bring this article to the attention of all Novices and Technicians they know.

Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories: introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping cost. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) SASE to my California address. Licensing-course instructors are welcome to receive and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Playing Catch Up

Over the past several weeks I have received a lot of requests for information about nodes and node construction. It took a bit, but I finally discovered why. It seems there have been a lot of good bargains at hamfests this year. Many commercial radios and some "spare" TNCs have showed up. This duo provides the system node operators with the material to build more or add to the already growing packet networks across the United States.

In addition to the post office deliveries, yesterday I received an e-mail request from a packet user who wanted to know how to interface two TNCs/nodes that had different size connectors on their RS232 ports. Another problem that came out of the bargain on commercial transceivers was the complexities found when the new owner began searching for a method to interface the TNC or node to one of these beasts.

We are only too familiar with this often seen problem, and it's not that we haven't addressed the issue. It's just that when the problem was addressed, we did it in an obscure manner, when in fact we should have made it a topic on its own.

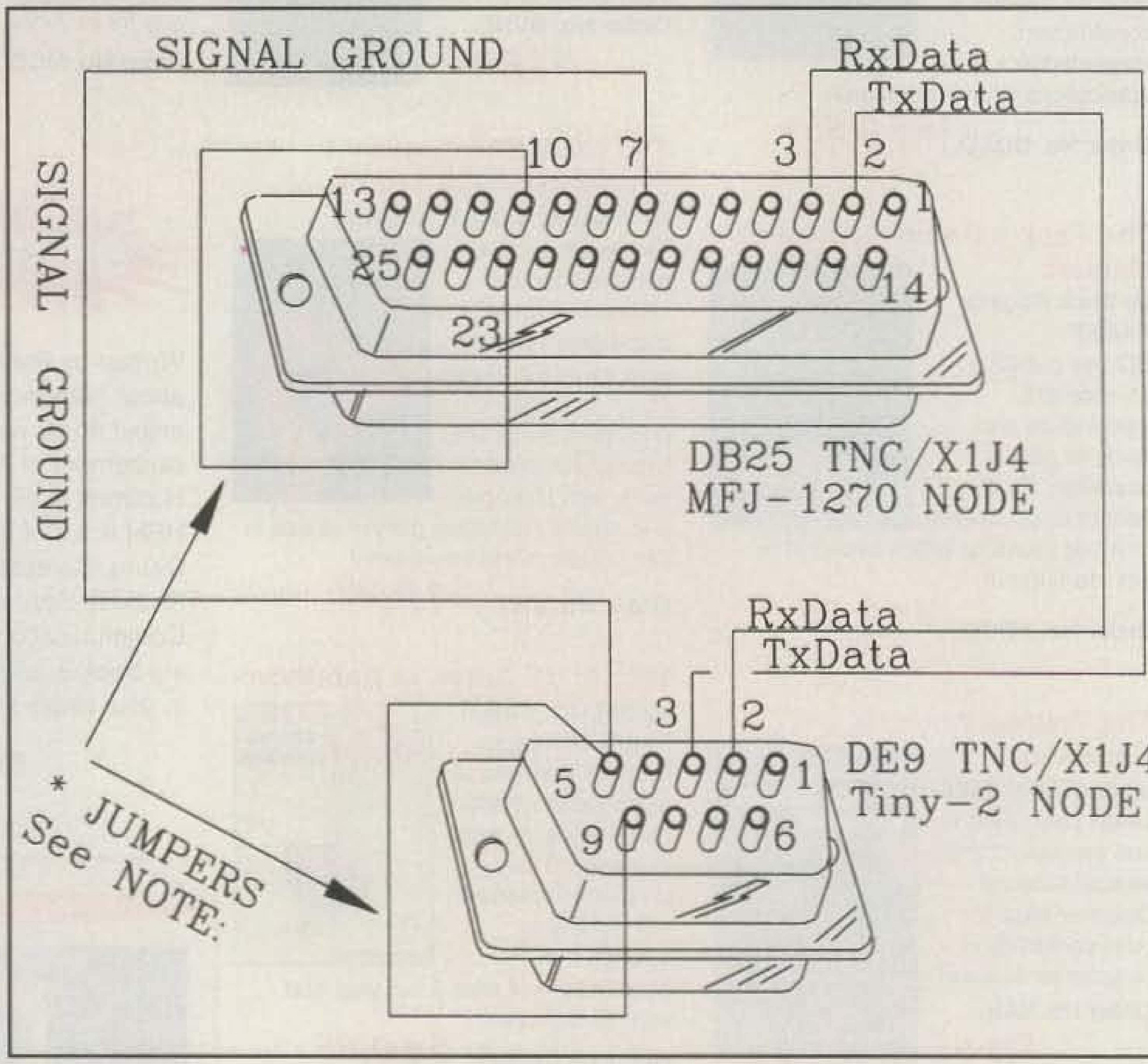

Fig. 1– The interface cable K4ABT uses when gatewaying a 9600 baud MFJ-1270CQ Turbo to a 1200 baud DRSITM DPK2 or PacComm™ Tiny-2. When building this cable be sure to include the jumpers on each of the connectors.

Building A Differential Node Interface Cable

What the heck is a "differential" interface cable, Buck? Well, it's sort of a "sprocket"—a transmission, a gear box. When we have a bicycle, we have a big sprocket with the pedals attached. The chain used as the "driver" (cable) between the big sprocket and the small (rear) sprocket meshes with the teeth of each sprocket, even though the two sprockets have a different number of teeth. Our "differential" cable can be described in a similar fashion. In this case two connectors have a different number of pins, but the cable has only one set of wires (drive signals) in it. This is a crude analogy, but I'm sure you get the picture.

There are a couple of ways to build this gateway interface between TNCs that use a DE9 and another TNC that has the DB25 comport. For now I'll use the interface cable I use when I have a node application that calls for gatewaying an MFJ-1270CQ Turbo (9600 baud) to a DRSI™ DPK2 or a PacComm™ Tiny-2 (1200 baud). The interface cable in fig. 1 is the method I use, but when building this cable be sure to include the jumpers on each of the connectors. On the DE9 (9 pin) connector, the jumper from pin 5 to pin 9 tells the TNC that another node is connected to the other end of the cable and not a "host" computer. Pin 9 is referred to as the "select" pin. The same scenario applies to the DB25 end of the cable. Here a jumper is placed from pin 10 to 23 to achieve the same node/gateway notification. These jumpers are included on each connector whether you are using the NetROM™, TheNET, or TheNet X-1J4 node EPROM in your node application.

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e-mail: buck4abt@inmind.com

There is another application where the RTS and CTS pins are also included so the TNCs can use a form of "hardware" handshaking. However, I've never had a need to use it, since the data flow is fairly consistent between the two gateway connected nodes. The RTS and CTS lines on the DB25 connector are pins 4 and 5. On the DE9 they are pins 7 and 8. The option to add these lines into the scheme is yours, but I personally leave them open and use the interface cable just as I have it drawn.

There is one point that I must caution you about ahead of time. **Make sure both TNC comports are set to the same data (baud) rate!** Most TNC comports will run easily at 9600 baud, and many will operate at 19,200 baud. For the most part, I set all mine at 9600 baud and let them "talk."

What happens if you set them at different baud rates? Nothing. They will not communicate! The same rule applies here that applies between any DTE and DCE equipment. If your computer (DTE = Data Terminal Equipment) comport is set for 1200 baud and your TNC (DCE = Data Communications Equipment) comport is set to 9600 baud, they will not communicate with each other. Only after you have pulled your hair, stomped your hat, discovered the problem, and set the comports to the same data rate, can you relax and have some fun.

Now there was this chap named Fred, who took the node/gateway to the mountain, connected the antenna, turned it on, looked at the LEDs, set the radio to the correct frequency, and made sure the power was on "high." He did not have a portable packet station with him, and had not asked another packeteer to give it a try for him before he left for the home QTH.

Fred got home, fired up the home packet station, and tried a connect to the node. Bingo! Connected to "FREDNODE." Remember, this is a *gateway* node stack. Fred then tried connecting out the other port of the gateway. Over and over, and on and on, but no connect. What could be wrong? Everything had appeared to be working before Fred left the node site.

Oh, well. Fred called his friend and asked him if he would listen for him on the simplex voice frequency and run some tests with his node once he got up to the node site. He said okay. Fred got back in the car and made the long drive back to the site. When he arrived, he looked over the nodes and checked the radios, power, antenna connections, and TNC/radio connections. Just about when Fred was ready to pack it in and call it quits for the day, he spied something that we all may have been guilty of many times. You got it! It was that lilttle black HF/VHF button. Who came up with the idea of putting that button on the rear of the TNC anyway?!

Out, Out, I Say!

There was a time when the power switch was on the rear of the TNC, but it was moved to the front. Why? Wherever the power switch was, we could always tell the TNC was on by the illuminated power LED. But with that darn little black button, there is only one way to know which position it's in. Feel it! Push it in, then push it again and let it out. Out, out, I say!

Somehow, I think something was lost between design and manufacture, or between the front and rear. If a switch had to be relocated, the power switch should have been moved to the rear, and the HF/VHF switch to the front! End of story.

So You Got A Good Deal On The GE MVPTM

Me, too, and I also did not have a factory manual. I picked, poked, and tried to find the PTT and AFSK input on the MVPTM mic connector. Finally, I called T. Ben Jones at Ericsson (formerly GE) Communications "TAC." Ben provided me with enough information to make my call worthwhile. Fig. 2 illustrates the Data I/O and PTT lines of the GE MVPTM mic con-

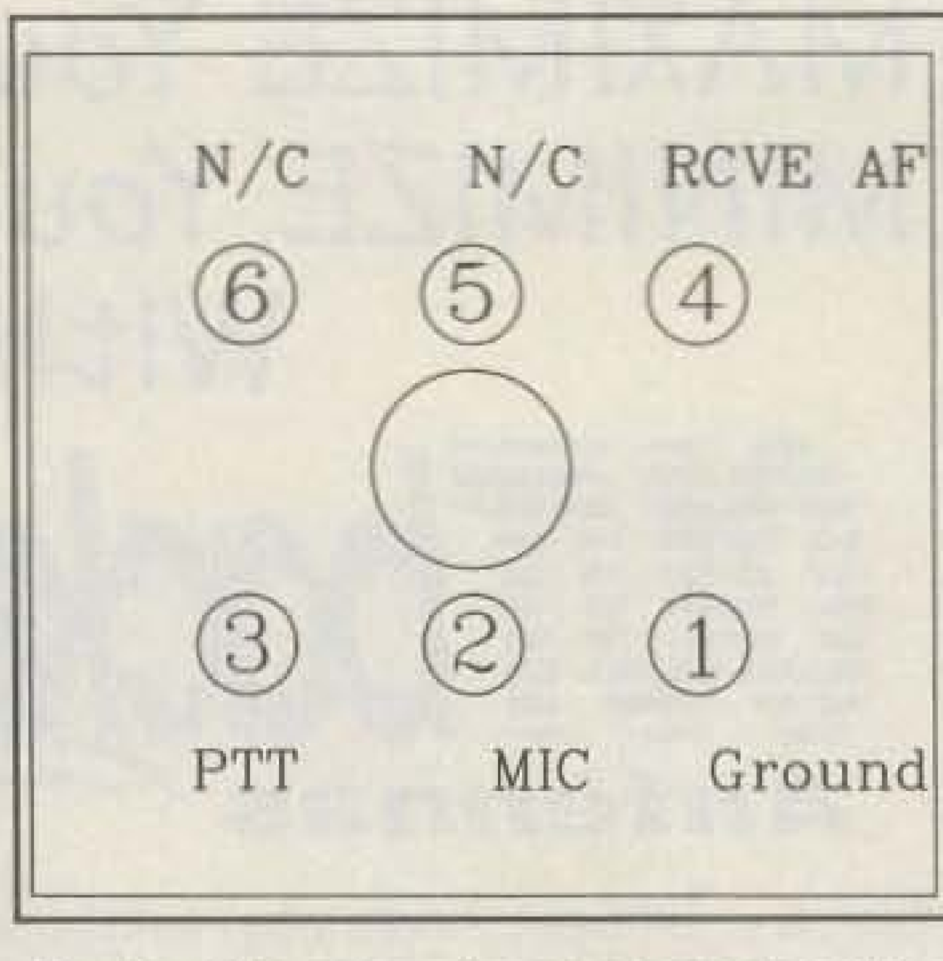

Fig. 2– The microphone connector I/O of the GE MVP™ series. Notice that "receive" audio is present at pin 4 of the connector.

nector. Notice also that receive audio is available for the TNC at pin 4 of the MVP™ mic connector.

Most of our operation with the MVP™ has been at 2 meters and at 1200 baud. However, I have made some mods to the MVP™ and run it at 9600 baud. I'll dig out the papers and prepare a column on the MVP™ at 9600 baud in the future.

Just One More

In another recent message I was asked if I had ever cabled a MICOR™ to a TNC. As I dug through all of my old interface drawings in my AutoCadd files, I remembered how I had made the interface and forgotten the tone board. After I completed the mod, I had problems with the TX-Delay, as it took almost half a second (500 ms) to get the beast to pass 1200 baud.

I soon learned how to by-pass the primary PTT and use the secondary PTT. To get you around some of the pitfalls, the little "BUD" (or RadioShack) aluminum box interface shown in fig. 3 will take care of the rest.

"A" is the enclosure. About 3" × 4" × 2" will work just fine. This much room in the box will allow you to add a speaker and an ON/OFF switch. The connector at "B" is the standard 5 pin DIN (male) connector that mates the connector of the TNC/node. "C" is the cable (and connector) to the front of the MICOR™.

The mic connector is added just in case you want to do some testing of the radio or tuning to the antenna at the node site. As mentioned on the drawing, if the mic is used, it would be best to remove it after the testing is complete. If it is left in place, the mic could load the mic input and reduce the AFSK level from the TNC. The reason I do not show the wiring to the mic connector is because the TNC cable could very well be wired to mate the 4 pin mic connector, too. This would ensure that the mic is removed so the TNC connector could be inserted. But then again, leave it off and you might find another trip to the node site is imminent. And we've had enough of that for one day.

For more packet network node information, on the internet you can connect to <http://www.sedan.org/network.htm>.

Glossary of Packet Terms

This month concludes the glossary we began in the March 1997 "Packet User's Notebook." Hopefully, you will keep a copy of the entire list of terms near your station for reference.

TAPR (Tucson Amateur Packet Radio Corp.): A non-profit research group dedicated to the advancement of amateur digital communications. They develop and promote amateur packet radio including hardware, standards, and publications. TAPR is probably best known for the TNC-1 and TNC-2 TNCs and their clones. Tucson Amateur Packet Radio, P.O. Box 12925, Tucson, AZ 85732-2925.

TCP/IP (Transmission Control Protocol/ Internet Protocol): The KISS mode activates this mode in some TNCs. This mode is not supported by software for all computers and terminal node controllers (TNCs). The KISS protocol was used by Phil Karn, KA9Q, to develop the packet radio version of TCP/IP.

TELENET: A presentation protocol layer in the ARPA and TCP/IP suite used for keyboard-to-keyboard and keyboard-to-host communications.

Terminal: Relating to packet radio, a device capable of sending or receiving information over a packet radio frequency. A terminal or display input/output (I/O) device. A Cathode Ray Tube (CRT) normally referred to as a terminal. They often are referred to as "dumb terminals." In most packet stations the computer is employed as a terminal. A terminal consists of a display screen and keyboard and is connected to an RS-232 port. When you type on the keyboard data is sent out of the Transmit Data pin of the RS-232 connector on the terminal. When Receive Data signals are detected on the RS-232 connector, the text is displayed on the screen.

TEXNET: A networking node protocol developed by the Texas Packet Radio Society and used primarily in Texas and the southwest. TEXNET uses a custom three-port node which supports 1200 or 9600 baud modems as daughter cards. A notable feature of TEXNET is that it can support a local hard drive using the TEXNET board's on-board disk controller.

TheNET: This is a networking software package created by Hans Giese and supported by NORD><LINK in Germany. TheNET implements a multi-port, multi-station packet radio network protocol. The latest release of TheNET is the X-1/X2 revised by Dave Roberts, G8KBB, and is burned into a 27C512. TheNET X-1J4 series EPROMs implement a bank-switching technique to enable the use of a larger EPROM, thus allowing more features to be added to TheNET nodes.

TheNET Parms: TheNET node EPROMs installed in TNCs operate using timers and other parameters that are burned into the EPROM. Most of these parameters may be modified over the air by the SNO.

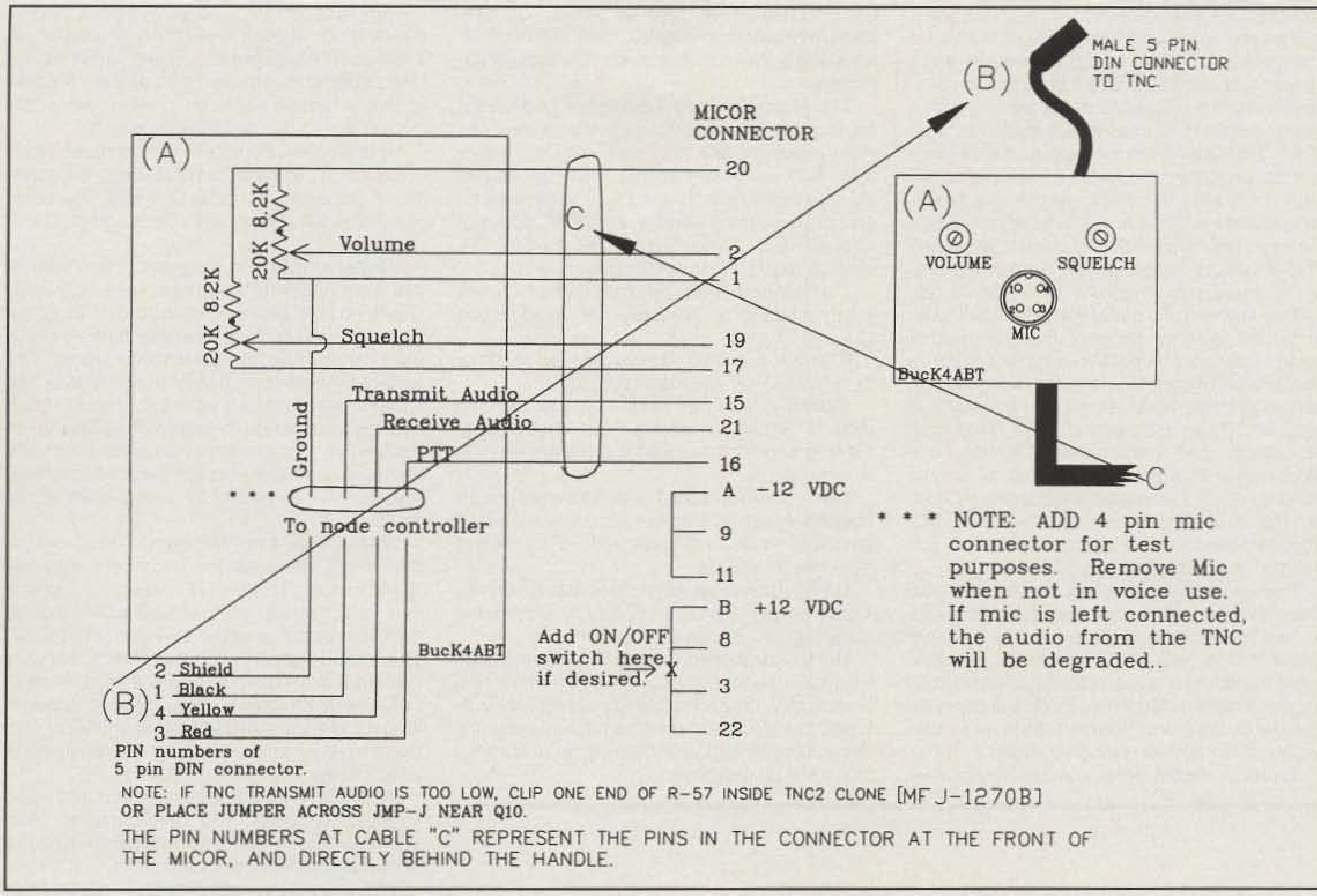

Fig. 3– Interface "box" between the MICOR™ and TNC/node.

Throughput: A measurement of the number of bits, blocks, characters, messages, or interactive transactions passing though a packet or data communications system. Throughput is usually a number that describes network performance. Baud rate describes only the number of bit transitions that leave a transmitter in a second. Throughput is a statistic that actually shows the delivery of data in a packet network, end to end. Throughput is calculated by taking the original baud rate, given in bytes per second, and subtracting the overhead and the time used to traverse the network. This includes the time lost due to network protocols, and the time lost due to choking and collisions.

Time-To-Live: When a packet is sent from one TheNET node to another TheNET node, the packet contains several bytes of information which are useful at TheNET nodes along the path. One of these bytes of information is the time-to-live initializer. Each time a node relays the packet one hop farther, the time-to-live is decremented one node. When it decrements to zero, the message is discarded. Therefore, if the number of hops that the packet has to travel (hop) to reach its specified destination is greater than the initial time-to-live, the packet will never reach its destination. In addition, if the time-to-live on the return trip is not high enough, an acknowledgment will not be returned.

TNC (Terminal Node Controller): The combined modem and packet assembler and disassembler. The interface device between the computer terminal and RF transceiver. The TNC assembles and disassembles packets and provides error detection. The TNC's job is to take text typed on the terminal or computer and store it until the user hits a carriage return <Enter>. At that time the text is sent to the destination station. Each line of text ending with a carriage return becomes a packet and is stored in the TNC until it can be sent to the destination station (channel clear). The TNC has commands that allow the user to set the timing parameters and install the operator's callsign. Once the user has installed the licensed callsign, the TNC adopts its own personality and allows only connect requests directed to the installed call.

Transparent: To make some forms of binary packet radio information invisible to other packet operators. In packet communications, a suspension of control character recognition in certain systems while information transfer is in progress. This mode prevents the TNC from reacting to special characters. Another mode of operation in a packet TNC that allows the sending of all possible binary characters without fear of actuating commands in the TNC. The transparent mode is primarily used for the transfer of binary data files.

Transport Layer: The fourth layer of the ISO Open Systems Interconnection Reference Model. The "transport" layer performs the function of end-to-end control of transmitted packet radio information and is responsible for optimized use of packet radio network resources. It controls the transfer of datagrams between two level 3 nodes via a number of intervening L3 nodes.

Trunk: A packet radio or packet link between two nodes that are used as backbones. The trunk normally is a limited access path that allows only node or system node operator (SNO) access.

TTL (Transistor-to-Transistor Logic): An internal transfer standard for electronics devices in which a one state is +5 volts and a zero state is 0 volts. Some TNCs will not accommodate this form of interface. A separate signal converter is required when a TNC does not support TTL. Some TNCs have built-in TTL strapping options or connectors.

Turnaround Time: Time required to reverse the direction on a half-duplex communications channel.

TXData: Transmit data stream fed to a modem modulator. *(See also RXData.)*

TXDelay: The period of time (usually 350 msec/TXD 35) from when a TNC issues a transmit command to the actual time the packet data stream begins.

UA (Unnumbered Acknowledgment frame): A packet frame sent in unconnected (unproto) mode to acknowledge a connect or disconnect request.

UART (Universal Asynchronous Receiver/Transmitter): This is an IC which is used in a computer to activate a serial port.

UI (Unnumbered Information frame): An information frame without a frame number that is sent as a broadcast during a beacon, node broadcast, CQ, and other similar frames. It is not acknowledged and there is no assurance that it will be received.

Unproto: An unproto packet is a packet transmitted without expecting a response. Technically it is called a UI frame, which means Unnumbered Information (see above). A packet station issuing a beacon for all to see or calling CQ would use an unproto packet.

Uplink: That portion of a communications link reaching upward from the Earth to a satellite. In some packet nodes (X-1J/X2) the "user" command will display the uplink and downlink stations.

Virtual Circuit: In a packet radio network this term refers to the appearance of a dedicated private channel or connect. In some types of open radio environments the individual packets may take alternating routes. The service provided by a packet network when two stations are in direct connect. Virtual circuit data packets generally carry less header information than datagrams, since addresses have been specified at the time of the connect setup. Amateur AX.25 packet at level 2 uses virtual circuits.

WAN (Wide Area Network): This is a system where many servers and nodes may talk to each other. This kind of system is rugged in that communications probably would not be compromised if a single site went off the air. The major problem with this methodology is that if the only packet systems available are of this type, then users, which present transient loading, will find that the WAN is unable to support massive intermittent loads during peak usage times.

WEFAX: Weather facsimile, reconstructed satellite pictures and photographs. The WEFAX receive mode is now an added feature of the "all mode" digital controllers.

Windowing: A split screen in some computer displays permitting display of two events simultaneously. In some packet terminal programs (BUXTERM, MULTICOM, PCPakRatt, etc.) the ability to perform type-ahead data in a "split-screen."

Wireline Link: A connection between a pair (or more) of TNCs such that the TNCs communicate via their radio ports but without a pair of radios. The modems are bypassed; thus the TNCs talk at higher data rates than 1200 baud.

Wormhole: An amateur packet circuit between two distant points using commercial communication circuits such as telephone, satellite, or microwave links.

X.25: A CCITT standard protocol for the subscriber interface to a public packet switched network. Consists of two layers—link (level 2) and packet (level 3). The amateur AX.25 protocol is a highly modified version of just the link layer of X.25. X.25 does not have a packet layer and X.25 is not used in amateur packet radio.

XON/XOFF: Software handshaking using characters such as Crtl-S/Crtl-Q to turn on and off a communications channel. When the XON/XOFF is defeated with the TNC XFLOW command set to OFF, the TNC then uses the RTS/CTS signal lines on the RS-232 port to control data flow, thus implementing "hardware handshaking."

YAPP (Yet Another Packet Protocol): A shareware terminal software package to interface a personal computer to a TNC. YAPP contains scrolling, message handling, editing, and other utilities to aid the user on packet. YAPP was written by Jeff, WA7MBL.

73, Buck, k4abt@sedan.org
or BucK4ABT@inmind.com

ON THE COVER: I wouldn't want to live in the firing line from Patrick Mulreany, WX7M, with his 16-element fixed Yagi for 20 meters! At his Nevada QTH Patrick has built this 280 foot long monster fixed on Europe with a ±30 degree half-power beamwidth. The antenna took about 150 manhours to erect and cost about $4000 using six 50 foot military surplus towers guyed with 68 guy lines. The forward gain is in excess of 19 dB, with a F/B over 33 dB. Now that's a serious antenna! (Photo by Larry Mulvehill, WB2ZPI)

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Combating Amateur Radio Besieged Mentality

The other day I read an article about an amateur radio club somewhere in the U.S. In the article the author described how a group of members of the club had decided to boycott the next club meeting. Why? Because they, as a group of non-code Technician class amateurs, felt discriminated against by other members of the club because they had obtained their licenses without having passed the Morse code test.

Then I read Dave Sumner, K1ZZ's editorial in the August issue of *QST*. In it he takes an anonymous e-mail correspondent to task for his or her apparent unwillingness to buy new equipment because of the threat of the loss of more frequencies. Dave pointed out that we have not lost an "entire band" since the late 1950s when the 11 meter band was taken away, eventually to become the Citizens Band. Dave goes on to say that we have lost a little here and a little there, but overall it isn't so bad.

Finally, I read Rich Moseson, W2VU's article "The Debate over Spread Spectrum" in the August issue of our sister publication, *CQ VHF*. In it Rich points out how the issue of spread spectrum is pitting some of amateur radio's "big guns" against each other.

All of this reading about our problems has caused me to wonder about what is wrong with the picture amateur radio is presenting to itself and to the rest of the world.

It is plain to see that we are under attack. It is one thing to be surrounded, to which the term "besieged" alludes. It is quite another for us to be attacking each other! This is the easiest way for us to go down in defeat. History is full of such examples. Take the battle of Jericho from ancient Israeli history, for an example. Was it the Israeli army that brought down the walls? No! This is a perfect example of psychological warfare. As the story goes, for seven days the Israeli army silently marched around the city. When the army finally mounted its attack, it did so with no weapons drawn. It just made a bunch of noise! As the old African-American spiritual puts it, "The walls came a tumblin' down!"

So what does this history lesson have to do with us? We in amateur radio are under siege. We are surrounded by those who would want to see our hobby fall by the wayside. What can we do?

Someone once said that a good *defense* is a good *offense*. How do we go about going on the offensive? Below I have some suggestions. These suggestions are based on my many years of experience, which include traveling, both as the Oklahoma section manager and as your columnist. As an SM, I extensively traveled throughout Oklahoma and the surrounding states. As your columnist, I have been in ham radio clubs in various parts of this country and in a half-dozen foreign countries. I have some idea of what can work to save our hobby.

VHF PLUS CALENDAR

Aug. 23–25	Eastern VHF Conference
Aug. 24	ND3F Open House
Sept. 1	New Moon
Sept. 4	Moon Apogee.
Sept.. 7	Poor EME conditions.
Sept. 9	First quarter Moon.
Sept. 11	Lowest Moon declination.
Sept. 13–15	ARRL Sept. VHF QSO Party.
Sept. 14	Moderate EME conditions.
Sept. 16	Full Moon.
Sept. 17	Moon perigee.
Sept. 20–21	Second weekend of ARRL 10 GHz and above contest.
Sept. 21	Moderate EME conditions.
Sept. 23	Highest Moon declination and last quarter.
Sept. 28	Fair to poor EME conditions.
Sept. 30	*Aurigids* meteor shower predicted peak.
Oct. 1	New Moon.
Oct. 3–5	West Coast Weak Signal Society VHF Conference.
Oct. 4	Mid-Atlantic VHF Conference.

Stop Attacking Each Other: Two of my above readings dealt with attacks from within our ranks. This is the easiest way for us to collapse—from within. Some of us who are a bit more familiar with the history lesson I cited above will also remember that the morale of the city was so low that Rahab decided to cast her lot with the Israeli spies when they came to see her. While we have not yet reached that low point in our morale, we may not be far from it! I dare say that continued infighting could very well push us over the edge!

Let's go back to my first example as the basis for turning around the direction in which we are headed. Formally, and informally, surveys have been done to determine why the new non-code Technicians are not joining "the rest of us." As the first reading illustrated, Morse code is one of the main issues. It is an issue with those of us who feel that we have put more into getting our license. I agree that there is something special about the Morse code. As an Extra class licensee, I put in that extra effort to learn how to copy the higher speed. I enjoy CW QSOs. I also enjoy listening to good Morse code being sent. It's sort of like music to my ears. It is quite relaxing to sit back and listen to someone who has a good clean fist cruise along at 40 wpm. Even so, Morse code is not the issue on which we in the hobby should live or die.

Most who track the statistics of licensees predict that based on growth projections, in the not too distant future the majority class of license will be the non-code Technician. If we in the minority close our doors to them, then we are keeping out the majority. Without that majority inside our walls, we are doomed to suffer the same fate as the city of Jericho!

Be Open to Change: Before amateur radio's ranks reached a plateau in the 1980s, it had experienced steady growth. This growth had its roots in the 1950s. What caused this growth? Feature this: It was open to change. It was after World War II that we had so much (then) new technology at our disposal.

We who were interested in the VHF+ amateur bands had all of that frequency spectrum in which to explore. A major part of that exploration was putting that new technology to work. There was something magical and fascinating about each new discovery, each development in the technology.

Changes in the licensing structure brought many into the ranks. Soon that group became the majority, yet that did not seem to divide us. Why? It was because some of these new people were leading the charge to change, and this was recognized and respected by the older amateurs at the time.

Down through the years we continued to grow in our ranks until we plateaued sometime in the 1980s. That's when the change that seems to have caused so much trouble occurred—the introduction of the non-code Technician class license. After that change of regulations our growth darted forward again.

A curious thing happened, however. These new amateurs were not being assimilated into the ranks. As stated above, it was because so many of us now old-timers were opposed to the idea that someone should be able to get into our hobby without having to know the Morse code. We were opposed to change!

Now here we are with this problem. We have forgotten about being open to change, and it is hurting us.

Believe in the Hobby: A reality check would easily reveal that there are plenty of hobbies from which to choose. Whatever hobby you pursue, you have to believe in it as the ultimate one for you. I remember when I joined the ranks, we amateurs, because of our weird attachment to our radios, were looked upon as somewhat freakish. As a group, though, there was synergism among us. We ate, talked, and lived our hobby. We really believed in it.

We still have that today. However, we seemed to have become fractionalized in our beliefs. It's not our hobby, but our specialty within the hobby that matters the most. This is where the disagreement over spread spectrum comes to the surface. While we are busy guarding our "turf" in the hobby, we are not talking to each other about our issues. That leads me to my next point: love.

Love the Brethren: When I was in Sarajevo last year on my church-related mission trip, I startled a couple of my non-amateur team members by telling them that I wanted to go to a stranger's apartment in this foreign land and

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knock on the door and meet this person. They had never heard of such an idea and wondered how I knew whom I could visit. I told them that I had spotted an antenna coax line leading into the apartment. It was in this apartment I expected to meet my new friend.

On the night of my adventure, because we were required to travel in groups of two, I asked the two fellows who were walking with me to accompany me as far as the apartment. Walking into an unlit corridor, they asked me if I knew what I was doing. I assured them that amateurs the world over feel a kinship that expresses itself in almost immediate friendship upon meeting one another, and that it was not out of the ordinary to walk up to a stranger's home and introduce oneself as a ham and be immediately invited into the home.

Bounding up the stairs, in the dark, I preceded my two friends by some distance to the apartment. Arriving at the apartment, I rang the doorbell. When the man answered, I flashed my QSL card and asked, "Radio Amateur?" His face immediately lit up, and then he said, "Wait!"

Inside I saw him and his wife scurrying around to make their apartment presentable. At the same time my two friends finally caught up to me at the door. A moment later my new amateur radio friend motioned for all three of us to enter. He introduced himself as Meho, T94AT, and his wife as Vesna, T93DKV. Still leery of the situation, my friends decided to come in and stay with me. They later expressed that they were concerned for my safety, a concern that they realized was unfounded after they saw the camaraderie among my fellow amateurs and me.

Before long we realized that we had a language barrier that prevented us from becoming better acquainted. Reaching into my notebook, I pulled out the QSL card of my friend, Hamo and said, "Hamo." (Hamo Muhamed, T92A, was the ham/government official who helped me get temporarily licensed during my three-week stay in Sarajevo.) Meho went over to his phone and said, "Hamo, speed dial." Within a few minutes of Meho's calling him, Hamo arrived and served as a translator for the remainder of the evening.

I repeat this story that appeared last October in this column to illustrate my point about our care for each other in the hobby. Here I was, a stranger in a foreign land, a place in which no one trusted one another because of an ethnic-related war. Yet because we were amateur radio operators, Meho (and for that matter, all the others I met in Bosnia and Croatia on my trip) immediately reached out and made me feel welcome, made me feel as though I was a member of the family. Why? Because I am a member of the family of amateur radio!

Training. Some clubs have training for potential amateur radio operators. Other clubs have "Construction Nights" when the members get together and build something. Others have both. Still others have teams who will go out and assist their fellow members in things such as antenna construction, station maintenance, etc. Unfortunately, these clubs are in the teeny-tiny minority.

Community Outreach: Some clubs reach out to the community. Oftentimes their membership volunteers parades and other events which need communications. The ultimate service, however, is during the time of disaster response. In the same issue of *CQ VHF* that Rich wrote about spread spectrum, Bob Josuwelt, WA3PZO, wrote about amateurs' involvement in this year's 500 year floods which struck the Midwest.

I will never forget the involvement of radio amateurs in the aftermath of the Oklahoma City bombing disaster. There are over 300 tales of heroism performed by these amateurs, who put in long hours of service at the disaster site and in the surrounding community of Oklahoma City. There was not a hint of expected remuneration from these amateurs for their hard work. Ultimately, word of our activity was made part of the Congressional Record by Oklahoma U.S. Senator Don Nickles.

All too often, though, when we are involved in this type of service we run into misunderstanding and sometimes opposition because the general public has no idea about our abilities. There is not the favorable public impression which would make it much easier to be of service. Each time it seems that we have to re-educate the public and those we ultimately work with (public safety agencies and non-government organizations participating in the disaster response) concerning who we are and what service we can perform. A good bit of the blame for this poor public opinion of us lies squarely at our feet!

Keep the Faith: In spite of ourselves, people continue to be attracted to our hobby. There continue to be people coming into the ranks. How do we hang onto these new recruits?

Motivational speaker and tele-evangelist Robert Schuller has a *New York Times* best-seller currently in the bookstores. It is entitled *If It's Going to Be It's Up to Me*. In the book Schuller writes about "eight proven principles of possibility thinking." These principles are: possibilities must be weighed; priorities must be swayed; plans must be laid; commitments must be made; the price must be paid; the timing may be delayed; the course must be stayed; the trumpets will be played. As the title implies, if there is a change to be made—in our case, if amateur radio is going to survive—it is up to us to make it happen.

In the epilog of his book Schuller quotes San Francisco Mayor Willie Brown responding to a question put to him by nationally syndicated talk show host Larry King during a session of the 1996 American Academy of Achievement. King's question was "Is it possible for minorities to be optimistic?"

Brown responded, "It's absolutely necessary for minorities to be optimists! Always! Look at me. I'm the end product of optimism. I was born black in the South when and where racism was really bad. In that place and time I wasn't eligible to go to college. I believed that somehow, somewhere, I could and would. And I did. Optimism is the only way to go when things are tough and rough" (246, emphasis the author).

It does not take our technical expertise to figure out that we belong to a minority hobby. There are many strikes against us out there. Yet as Mayor Brown was optimistic about his chances of success in life, so am I about our chances for survival as a viable hobby. Things are "tough and rough" for us as well. Let's not make it any harder for ourselves. Rather, let's take our collective optimism and make it a new future for our hobby of amateur radio!

Amateur Radio In Space

The early days of July had us all spellbound, watching and listening to the popular media tell about three different space exploration adventures taking place at the same time. What was fascinating for us in our hobby was that all three adventures involved amateur radio!

MIR Space Station: The one which kept us most concerned was the MIR Space Station. After the damage to the station caused by the collision with the Progress cargo rocket, amateur radio assumed a new importance. On board the MIR Space Station was Mike Foale, KB5UAC. Mike reported via amateur radio that immediately following the collision, communications with the crews' families was disrupted and remained severely restricted for several days. Mike credited amateur radio with being the main source of communications among the crew and their families. Mike added that it was amateur radio which allowed the crew members to "fill the gap" that was created by the loss of official communications channels.

Among those who have worked long hours on the MIREX (MIR amateur radio experimental program) support team are Dave Larsen, N6CO, and Miles Mann, WF1F. Dave and Miles were in regular voice and packet contact with Mike, so much so that Mike commented that he was "getting spoiled" by all of the availability of amateur radio communications.

In a message that the MIREX support team released, Mike commented that the crew would prefer longer duration contacts over simple exchange QSOs. He added, "It is good to tell people about our life here on MIR, and our problems, but the lives of hams on Earth are also interesting to us, and I hope more hams will take the time to tell us about their QTH and surroundings, too." Mike also said that he really appreciated hearing all of the good wishes from amateurs around the world during the crisis. He added that he was particularly interested in the disparaging comments that were being made in the popular media about the flightworthiness of the MIR—that he and the rest of the crew were not hearing these comments via the official communications channels.

For the time being 2 meters remains the principal frequency for operations aboard the MIR. The 70 cm repeater is inside the damaged section of the MIR and remains non-operational.

(Sources for the above report on amateur radio aboard MIR include the ARRL and AMSAT.—ed.)

Shuttle Makes Contact With MIR, Children, and Amateurs

During Columbia's STS 94 mission three of the astronauts were licensed amateurs: shuttle Commander Jim Halsell, KC5RNI; Janice Voss, KC5BTK; and Donald Thomas, KC5FVF.

According to the ARRL and AMSAT's Amateur News Service, amateur radio served as a "convenient chat medium" between the U.S. space shuttle Columbia and the troubled Russian MIR space station. During the mission shuttle Commander Jim Halsell, KC5RNI, had two short, direct 2 meter contacts with Mike aboard MIR. The first of these contacts occurred on 5 July when the two space vehicles were in "conjunction" over the Indian Ocean. (Conjunction means that the two spacecraft are only 50 nautical miles apart.) This QSO lasted less than a minute. The second contact took place over the Pacific Ocean and also lasted less than a minute.

A third QSO took place on 8 July when Mike contacted the Houston ground control amateur radio station, W5RRR, which was used to patch him through NASA's communications circuits to the shuttle crew. This QSO lasted for ten minutes, during which Mike filled in the astronauts on what was occurring after the successful docking of the Progress supply rocket.

Among the 17 contacts with schools was a first for the SAREX program—a contact with a school in the Peoples Republic of China. Coordinated on the ground by David Chang, BY1QH, the contact took place with the Tsinghua University. It was made possible via a telebridge with Gordon Williams, VK6IU, in Western Australia. During the QSO there were 30 people present in the university audience. In addition to students, they included Chinese television, members of the Chinese government, and Chinese IARU representatives. In all, approximately ten questions were answered by the shuttle crew.

The contact with Tsinghua University was one of 17 scheduled contacts during the mission. Another one was with Larry Pepper, 5X6A, a former NASA flight surgeon now serving as a missionary in Uganda.

During the mission the crew made an average of more than 30 contacts per day when amateur radio was in use. The Columbia space shuttle mission was completed on 17 July.

(Sources for the above report include the ARRL and the AMSAT Amateur News Service.—ed.)

In an interview I had with Roy Neal, K6DUE, one of the insiders in the SAREX program, this past March he commented that the SAREX program started out with Owen Garriot, W5LFL, and Tony England, WØORE, and that the first ham/astronaut on board a space shuttle was Ron Parise, WA4SIR. The program has now grown to include more than 60 of the astronauts as licensed amateurs.

Roy commented on NASA saying that it continues to recognize the importance that amateur radio plays in the space exploration programs, both in the goodwill it fosters with the communications with children and the backup (and sometimes forefront) communications it provides for the astronauts back to the Earth controllers. "It has become so important," Roy reported, "that NASA has planned an area for an amateur radio station in the international space station which will be constructed in the next few years." He added that like everything else that has an acronym (SAREX, MIREX, etc.), the amateur space station will also have one; it will be known as ARISS, which stands for Amateur Radio International Space Station.

Staals' Fete Featured

It was last February when the world heard about the fire aboard the MIR space station. That fire caused such extensive damage to the station's power supply, that immediately following it the only communications to the rest of the world was via the handhelds that were strapped to the astronaut and cosmonauts' waist belts. As handhelds, they had very weak signals. Enter the Staals (Mike, K6MYC; Myrna, WA6GXF; and Matt, KD6KIG) via their company, M² Enterprises.

Thanks to an antenna designed by Mike and his company, communications with the space station and the Earth controllers was maintained. And, thanks to the *Fresno Bee*, the hometown people got to know about his fete.

In an extensive article entitled "Fresno, We Have a Problem," which appeared on the front page of the business section of the July 16 issue of the *Bee*, staff writer Tracy Corres described how it was that NASA came to select Mike's company to design the antenna which proved to be so valuable during those crises days onboard the MIR. The article used the pull-quote: "We wouldn't be talking to the MIR without him," which was stated by Michael Yettaw, of the NASA Dryden Flight Research Center, as a way of dramatically emphasizing the role Mike's company has played in communications with the Russian space station.

Corres also related how Mike, Myrna, and their son Matt are amateur radio operators. She recounted how Mike became a ham in his youth and described how it was that amateur radio played a key role in Mike's interest in antenna development.

Mike is well-known and well-respected among the amateur radio satellite and weak-signal VHF community. His company has furnished many an amateur with the right kind of antenna for making those hard-to-complete QSOs on the VHF+ amateur bands. If you are interested in proven antennas, then contact the Staals at 209-432-8873.

My deep appreciation goes to Chuck, W6KGF, for faxing a copy of the article to me late Saturday night as I was working on this column. Chuck related how the local TV Channel 47 gave the *Bee* story quite a bit of attention during its evening news the day the article was published. Chuck was quite proud of the hometown family of amateurs who garnered so much positive publicity for our hobby.

Mars: The Ultimate Rover Operation

Talk about a rover operation! The Pathfinder Mars Mission has everything a VHF+ rover operator would like—microwave operation, DX, and lots and lots of interest!

What makes us amateurs proud is that one of our own is the Pathfinder mission engineer: Gordon Wood, WA6NVA. According to the July 11, 1997 issue of the "ARRL Letter," Gordon "credits ham radio for starting him on the path that led to his becoming the chief engineer for communications for the Pathfinder mission." Like so many of us now old timers, Gordon got his start in our hobby when he was 12 years old, nearly 40 years ago.

Thanks to the influence of amateur radio, people all over the world are seeing—and experiencing—the ultimate rover operation. NASA reports that there have been an incredible 20 *million* hits on home pages featuring the photos sent back by the operation. So how can we bring this operation back down to Earth for us VHF+ operators?

Your next rover operation is never going to get anywhere near that much attention. However, what a lead-in to bring someone new to the hobby along with you on your next trip!

I remember several years ago when I brought Jim Rudniki, NZ7T, along on one of my rover operations. This one was in the 1993 ARRL June VHF QSO Party. Jim wrote about the fun he had in a local newsletter called "The Dummy Load." Jim called the article "Rovering From Cement." In it he described the antics we went through to put several Oklahoma grids on the air and how one farmer thought that we were "stealing" his TV signals from the air. If you would like to read it, I reprinted it in my book, *The VHF "How To" Book* (available from CQ Communications for $15.95, plus $4.00 shipping). While Jim said that he had a tremendous amount of fun, I'm not so sure that I didn't have more fun watching his discovery unfold.

Jim was in Oklahoma City attending an FAA training session. After his two-week training and our rover operation were over, he returned to Utah, only to get active on the VHF+ bands. After a few years I again heard from Jim. This time he told me that he had been elected section manager. I was paid the ultimate compliment by him when he told me that he had been influenced to run for the office because of my then serving as Oklahoma's SM.

The next year, 1994, I was again on a rover operation. This time I was in Cuba. When I met my friend, Oscar Romero, CO2OJ, at the Jose Marti Airport, I asked him if he thought that our joint Cuban-U.S. amateur radio operation could include a rover operation. At first he balked because he thought of the obstacles against it. Finally, I challenged Oscar by saying that these obstacles could be overcome, and even if we violated someone's rules, we could plead ignorance and ask for forgiveness. After I told him about the old U.S. saying that it is better to ask for forgiveness rather than for permission, he jumped at the chance. As a result, the League had its first international (non U.S. or Canadian) rover entry in their contest.

During the contest we romped through the streets and suburbs of Havana putting on three different grids. All the while Oscar was mildly concerned about us getting stopped with a U.S. citizen in the van wearing a pair of headphones and listening and talking on a communications radio. It never happened and we had great fun. After I returned to the States, Oscar became one of the most active 6 meter operators in Cuba. Later, in my column, he wrote about our antics and how much fun he had on the operation. Again, I am not so sure that I had the most fun watching Oscar get the bug.

Under the title of "Current Contests" you can read about the two contests happening this month" the second weekend of the 10 GHz and above contest and the ARRL September VHF QSO Party. If you are planning a rover operation for either one of these, find someone new to take along for the ride. So what if his or her lack of experience detracts from your point total. That point total should not be your goal. Your combined fun and his or her ultimate positive future in the hobby should be your goal!

Phase 3-D Launch Slated For This Month

As of this writing there has been no change in the planned launch of AMSAT's Phase 3-D satellite sometime in the middle of this month. Watch for update bulletins from AMSAT as the launch date nears.

Current Conferences

Eastern VHF/UHF Conference: The 23rd annual Eastern VHF/UHF Conference will take place from 22–24 August at the Harley Hotel, Enfield, Connecticut. Featured speakers include W2VU, WB2VVV, WA3ZKR, WA1MBA, WA2AAU, N2CEI, W1VT, AF1T, WZ1V, WA1VVH, and WA3ZKR. For more information, contact Ron Klimas, WZ1V, at his *Callbook* address or via <wz1v@connix.com>.

ND3F Open House: For those on the east coast who are not able to make it to the Eastern VHF/UHF Conference, Brian, ND3F, has graciously opened his house for the day of 23 August. He says that there will be plenty to do and plenty to eat during the 8-hour open house, which begins at noon. He adds that one of the things to do is construction of 10 GHz WBFM and LASER communications projects. If you are interested in dropping by, contact him at his e-mail address: <ND3F@aol.com>.

Mid Atlantic VHF Conference: This year's Mid Atlantic VHF Conference will be held on Saturday, 4 October, in the Horsham Days Inn in Horsham, Pennsylvania. For more information, contact John Sorter, KB3XG, Conference Chairman, 1214 N. Trooper Rd., Norristown, PA 19403; telephone 610-999-7658, e-mail <JohnKB3XG@aol.com>.

Western States Weak Signal Society Conference: The following is from Robert, N7STU: The 1997 Western States Weak Signal Society Conference will be held in the Montecito-Sequoia Lodge at 7500 feet in the Sierra Nevada mountains east of Fresno, California on October 3-5. Conference registration is $15 (pre-registered) and $20 at the door. Non-ham family members are free. For conference registration information contact KD6UIH (kd6uih@juno.com) or via his *Callbook* address. Conference speakers feature N1BWT, K6QXY, NU8I, K7XC, W6GGV, K6WR, and K6MYC. Lodging includes five meals, 24 hour hospitality bar, coffee service, 6.6% meal tax and 10% staff gratuity. RV parking and a special one week rate are also available. For more information, contact Montecito-Sequoia Lodge for reservations at 800-227-9900.

The Western States Weak Signal Society 1997 Technical Conference Webpage is now online! It can be reached at this URL: <http://www.qsl.net/n7stu>. Conference-related e-mail can be sent to <wswss@contesting.com>.

Current Contests

ARRL September VHF QSO Party: This contest is scheduled between 1800 UTC, Saturday, September 13, and 0300 UTC, Monday, September 15. Complete rules can be found on page 101 of August *QST*.

ARRL 10 GHz and Above Contest: The second weekend of this modified contest is 20–21 September, from 8 AM to 8 PM local time. More information on the rules changes can be found in last month's column and June *QST*.

Both of these contests' rules and log sheets can also be found on the League's home page.

If you have not yet sent in your logs for the CQ WW VHF contest, please do so by 31 August. Preliminary reports indicate that propagation was abysmal. (That means really sick!) This was not a surprise, considering the propagation for all of the contests this summer was also below what was to be expected. Commenting on the lack of sporadic-E during Field Day, W7ZT stated for the July 11 "ARRL Letter" that he "didn't even notice any seasonal sporadic-E skip on the higher frequencies over the Field Day weekend."

Current Meteor Showers

Two minor showers, the *Piscids* (two peaks, 8 and 21 September) and the α *Aurigids* (30 September) can be seen this month. However, their activity has not been much above what is considered sporadic activity.

Piro Pirole, CO2PL, SK

I recently learned from Arnie Coro, CO2KK, that one of my friends, Piro Pirole, CO2PL, suffered a fatal heart attack a few months back. Piro was the group photographer for the joint Cuba-U.S. amateur radio operation which took place in June 1994. If you remember the group photo which appeared in most amateur radio publications, you will notice that Piro is the fellow holding the handheld in the air on the far right of the picture.

Piro was an energetic young fellow with a great future ahead of him in the photography business. He had worked on some of the Cuban Tourism Bureau's brochures and looked forward to more business as Cuba developed its budding tourism business in the coming years.

Piro leaves behind a lovely wife and many amateur radio friends around the world.

And Finally. . .

Most of this month's column has been devoted to my opinions. It is short on news. Frankly, in the world of the VHF+ operator there hasn't been much news over the summer. Oh, there have been the reports of sporadic-*E* propagation on 6 and 2 meters, but as stated above, this year's *E* season has been very puny. I felt it best to devote much of this column space to encouraging us to do something about the future of our hobby. I hope that I have struck a nerve or two, and that in subsequent columns I can report on the revival of amateur radio as a viable hobby.

The one area that I did not cover in the above piece was about our youth. How many of us got our start in our vocation or avocation via our hobby? How many youth are coming in behind us to replace us? You see the problem. You are the solution. Encourage youth to become involved in our hobby because they are the future. Without them, in a few years there will be no lifeblood to carry on.

As I write this, I am a week away from attending the Central States VHF conference in Hot Springs. The following week I will start my internship in Ft. Worth. I will be a chaplain intern at Texas Wesleyan University and on the ministerial staff at the nearby United Methodist church. As far as I can tell, there is no amateur radio club on the campus of TWU. I intend to change that during this coming schooi year!

Look for me on the air from my apartment on the edge of the campus at TWU. I don't expect to get the EME array up, but I do hope to at least have some weak signal antennas up so that I can make some noise around the DFW Metroplex.

If you have some noise that you would like to report about in this, your column, please let me hear from you. All of the places you can reach me are listed at the beginning of this column. The best bet is via the Internet, as I will not be checking my Oklahoma City phone number very much for the next nine months.

Thank you all for your kind words and best wishes to me as I embark on my new career. True religion and the true amateur radio spirit have a lot in common. Some of you might have noticed that already. (In case you hadn't here is a clue: While writing the above piece on amateur radio's besieged mentality, I was consulting a book on church growth to make sure I hadn't left anything out.)

As your columnist, I'm only here to help encourage along the best in our hobby. Sometimes my religion helps me keep the hobby in perspective—and vice versa.

Until next month . . .

73, Joe, N6CL

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Low Sunspots and Contesting for The Little Pistol

CQ WW 160 Meter SSB Contest Date Change

The CQ 160 Meter SSB Contest will change dates in 1998 to February 27 through March 1st. Every ten years or so the dates for the CQ 160 Meter SSB Contest coincide with the ARRL's CW DX Contest due to the vagaries of the short month of February. Rather than create a conflict among contesters, we decided to move our dates in 1998 to accommodate the longer established contest. This gives everyone a chance to enter both and have a good time. Be sure to let your friends know about the change.

One of the suggestions for this column that originated from last year's *CQ* Contest Survey was to offer some insight and discussion into the subject of maximizing contest scores during low solar activity—especially as a *little pistol*. If you've turned on your radio lately, you may have noticed a disturbing hiss coming out of the speaker. Has lightning destroyed your receiver's front end? Maybe your tower has fallen down. Could it be that the Internet has won the war and amateur radio as we know it has ended? Maybe all DXers and contesters of the world are standing by on a big list for a *real* P5 and are getting ready to "make their call."

We all know the reality of today's conditions. Although there are encouraging signs (i.e., Europeans were heard on 10 meters during the IARU contest this summer!), for all intent and purposes 10 meters is a still a band of the past. Frankly, many of us are wondering how well 15 meters will perform this year! I, for one, am an eternal optimist. If this is your first solar downturn, please read on. If it isn't, read on as well. A little reminder is in order here.

Let's begin by plotting an operating strategy for the current sunspot minimum that will help maximize your score and maybe even allow for a little fun. In looking over the CQ WW contest results from the most recent sunspot minimum, I found some interesting data. In general, CQ WW scores have been steadily climbing over the past two decades. For example, W3LPL won the 1975 CQ WW SSB contest with a score of only 1,003,055 points. As we entered the early 1980s, winning SSB scores in the low 3 million point range were commonplace. Recently it has taken as much as 6 to 8 million points to win in the U.S.

Throughout the past 20 years there have indeed been significant scoring downturns at sunspot minimums, but final tallies were well above zero! Table I provides just a few examples. Experience has shown that the pain

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Calendar of Events

Aug.	23-24	TOEC CW WW Grid Contest
Aug.	24	CQC Summer QSO Party
Sept.	6-7	LZ DX Contest
Sept.	6-7	All Asian SSB DX Contest
Sept.	7	North American CW Sprint
Sept.	7	Panama XXV Anniversary Contest
Sept.	13-14	Worked All Europe SSB Contest
Sept.	13-15	ARRL VHF QSO Party
Sept.	14	North American SSB Sprint
Sept.	18-20	YLRL Howdy Days
Sept.	20-21	Air Force 50th Anniv. QSO Party
Sept.	20-21	Washington Salmon Run
Sept.	20-21	Scandinavian Activity CW Contest
Sept.	21-22	Atlantic QSO Party
Sept.	27-28	CQ WW RTTY Contest
Sept.	27-28	Scandinavian Activity SSB Contest
Sept.	28-29	Heart of Dixie QSO Party
Sept.	28-29	Tennessee QSO Party
Oct.	4-5	California QSO Party
Oct.	10	Ten-Ten October Sprint
Oct.	11-12	Pennsylvania QSO Party
Oct.	19-20	Illinois QSO Party
Oct.	25-26	Ten-Ten Fall CW QSO Party
Oct.	**25-26**	**CQ WW DX SSB Contest**
Nov.	1-3	ARRL CW Sweepstakes
Nov.	7-9	Japan Int'l SSB DX Contest
Nov.	8-9	Worked All Europe RTTY Contest
Nov.	15-17	ARRL SSB Sweepstakes
Nov.	**29-30**	**CQ WW DX CW Contest**
Feb. 27-Mar. 1		**1998 CQWW 160M SSB Contest**

seems to only last one or two contest seasons and that recovery is quick and dramatic. I suspect that the 1997 contest season will be another example of that.

Most solar experts are now claiming that the solar minimum has hit. You probably don't have to be convinced of that. As we embark on this rough road, let's develop an operating strategy that will make the most of it—nothing revolutionary, just a bit of common sense.

Clearly, 20 meters is going to continue to be the money band for the next year or so—and money band it is. Even during the last minimum, multi-multi stations were making 1500–2000 QSOs on 20 SSB and single operators approached 1000–1500 contacts. Now I'm already reading your mind as you think, "But I only have a tribander at 50 feet. What am I going to do?" Sunspot minimums really have little impact on operating style itself. Whether the sun is active or not, you still have to make the same operating decisions. For example, should I run stations or search and pounce? How long should I call stations in pile-ups? The list goes on and on. Because of the popularity of contests such as the CQ WW, bands such as 20 meters have already become saturated. For this reason, I don't think you're going to see much change in 20 meter activity until the sun starts doing its thing in the next year or two.

For the smaller station, a little extra operating savvy will be the order of the day. Although 20 meters will still be a very usable band, conditions will even impact that band's effectiveness. Witness the conditions in this year's Worked All Europe contests. A smaller station will have a tough time running anyone except at peak propagation times (e.g., 2000Z to Europe from the east coast USA). However, you can still be effective when searching and pouncing. Not only will there be many stations to work, your ability to uncover interesting multipliers will be enhanced as you tune up and down the bands. Let's not kid ourselves: Running stations is always more fun that searching and pouncing. However, there has been one consistent fact about the CQ WW: Activity has grown exponentially in this contest in recent years. That fact will help mitigate the reality of reduced conditions. You may find it surprising to learn that the 1996 CQ WW enjoyed its second highest level of log submissions in the history of the contest!

Another factor to consider about 20 meters is that it will continue to perform over long-haul paths. This morning, for example, with the Solar Flux Index sitting at 74 and only a dipole in my New York backyard (The tower has come down in anticipation of my move to New Hampshire!), I worked two BVs, a DU, and a KH2. It can be done with less! Sure it wasn't a contest, but I wasn't using a Voice of America relay station either. The message here is that any sunspot-minimum operating strategy must include a very active rotator. There will be plenty of times when you may have trouble working your "bread and butter" propagation paths (i.e., Europe or JA). Remember that, at the same time, there are many other parts of the world that have band openings to your QTH. This provides an opportunity for you to increase your multiplier totals (and score) while the big stations are running, running, and running.

Year	Callsign	Winning Score
CQ WW SSB Single Op		
1983	AI6V	3,576,528
1984	K1AR	2,662,116
1985	K1AR	4,007,648
CQ WW CW Single Op		
1983	W1KM	2,699,775
1984	N2LT	2,192,028
1985	K1AR	3,397,905
CQ WW SSB Multi-Single		
1983	KX4S	4,191,225
1984	K2BU	2,791,019
1985	KX4S	4,603,120
CQ WW CW Multi-Single		
1983	K1GQ	3,712,412
1984	K5RC	3,221,384
1985	K1KI	3,477,100

Table I– USA CQ WW Contest winning scores at sunspot minimum.

Now let's take a look at the low bands. One-sixty, 80, and 40 meters will continue to perform at peak levels over the next few years. If there ever was a time for you to think creatively about low-band antennas, now is the time! Remember, you don't need a 4-element 80 meter Yagi to have a great time on that band. The same is the case on 40 meters. In fact, we are now in a period of time where smaller stations can perform relatively well when compared to their larger brothers. We all know 20 meters will be closing relatively early and largely become a useless band at night. This means more activity will appear on the low bands, providing a great scoring opportunity for a station with almost any antenna in the backyard. However, just like 20 meters, the activity level will be intense and you will have to be realistic about your operating style. Call CQ only when it works, and take advantage of increased activity when you are forced to search and pounce. Either way, there will be worldwide propagation at your fingertips.

I may have overstated the downturn of 15 and 10 meters, so let's revisit these bands. In reality, we may find 15 meters to be like the old days—in part. However, it's not something I would count on. At the very least, however, 15 meters will offer predictable north-south conditions as well as limited propagation to Europe (east coast/midwest USA) and JA (west coast). Keep an eye on the band. Also, make sure you work your own zone and country on 10 meters as well as a few Caribbean and South American multipliers. Openings will be spotty, but a good operator will be able to take advantage of them (even from a smaller station) while others are banging their heads together on 20 meters.

Contest operating during solar downturns is not my idea of the best of contesting. However, I've been through two of them—one from a small station and the other from a big one. In both cases, fun prevailed. It's more a case of setting realistic expectations (and maybe getting a little more sleep than usual on contest weekends). However, don't give up. The CQ WW, in particular, remains the world's most popular contest. That fact alone should remind you that even in the bottom of the sunspot cycle, there are still plenty of guys to work across all the bands. Good luck!

Final Thoughts

That's it for this month. For many of you the CQ WW DX Contest is just a month away. I hope you enjoy the world's best contest as much as I will! Next month I intend to publish the 1997 CQ Contest Survey. It's always fun to hear what's on your mind. Please take a few minutes to participate and be part of the action.

As always, please remember that the deadline for the December issue is October 1st.

73, John, K1AR

Panama Anniversary Contest

0001Z to 2400Z Sunday, Sept. 7

The Panama Radio Club invites all radio amateurs of the world to participate in the XXVI Anniversary Contest.

Class: Single operator, all band, SSB only, 40, 20, and 15 meters.

Exchange: RS and serial number (e.g., 59001).

Scoring: HP club members are 2 points; all other stations are 1 point. The multiplier is the total number of DXCC countries worked on all bands. Final score is total QSO points times multiplier.

Awards: Certificate of participation will be sent to all amateurs who work 5 or more HP stations. HP stations must operate for at least 6 hours to be eligible for awards. A plaque will be awarded to the station with the high score from each continent.

Logs must be postmarked by December 1st and sent to: Radio Club Panama, Anniversary Contest, P.O. Box 10745, Panama 4, Panama.

Bulgarian DX Contest

0000Z Sat., to 2400Z Sun., Sept. 6–7

The Bulgarian Federation of Radio Amateur holds this activity the first weekend in September each year. It's CW only, all five bands, 10-80 meters, using the IARU Region 1 band plan.

Classes: "A"—Single operator, all band; "B"—Single operator, single band; "C"—Multi-operator, all band, single transmitter; "D"—SWL.

Exchange: RST and ITU Zone.

Points: QSOs with LZ stations, 6 points. QSOs with other stations in the same continent, 1 point; in other continents, 3 points. SWLs must show calls of both stations heard. Score 3 points if both exchange numbers are copied; 1 point if only one is copied.

Multiplier: Total ITU Zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Classes "A" and "C"—Cups and medals to the three top world scorers and medals to the three continental leaders in each continent. Class "B"—Medals to the top three scorers on each band in the world. Class "D"—Medals to top three. A special plaque will be awarded to the first of the top ten list in categories "A" and "C."

Logs: Use a separate sheet for each band, a summary sheet showing the scoring, and the usual signed declaration.

Mailing deadline is 30 days after the end of the contest: Central Radio Club, P.O. Box 830, 1000 Sofia, Bulgaria. Logs may also include applications for the many BFRA awards: NRB, W-100-LZ, 5 Bands LZ, W-28-Z, Black Sea, and Sofia awards.

YLRL Howdy Days Contest

1400Z Wed., Sept. 18 to 0200Z Fri., Sept. 20

This annual event is sponsored by the Young Ladies Radio League (YLRL) and is open to all licensed women operators around the world. All amateur bands may be used. Any type of emission may be used (SSB, CW, etc.). A station may be worked only once on each band for contact points. No crossband, net, or repeater contacts allowed. Maximum allowable output power is 750 watts on CW and 1500 watts PEP on SSB.

Exchange: YLRL member or non-member. Be sure to show time breaks in your log.

Frequencies: CW—80 meters 3.540–3.725 MHz; 40 meters 7.040–7.070 MHz; 20 meters 14.040–14.070 MHz; 15 meters 21.120–21.150 MHz; 10 meters 28.150–28.200 MHz. SSB—80 meters 3.940–3.970 MHz; 40 meters 7.240–7.270 MHz; 20 meters 14.250–14.280 MHz; 15 meters 21.380–21.410 MHz; 10 meters 28.300–28.610 MHz.

Scoring: Score two points for each YLRL member contacted. Score one point for each non-YLRL member contacted. For each duplicate contact that is removed by the YLRL vice-president, a penalty of three additional and equal contacts will be exacted. There are no multipliers.

Awards: Top-scoring YLRL member will receive her choice of YLRL pin, charm, or stationery. In addition, the top-scoring non-YLRL member will receive a one-year YLRL membership certificate.

All log entries should be sent to: Nancy Hall, KC4IYD, P.O. Box 775, N. Olmsted, OH 44070-0775. Logs must be postmarked no later than 30 days after the end of the contest.

September's Contest Tip of the Month

How well do you recognize callsigns? If all you can copy is ?BLE, ?2NI, JA7SS?, etc., can you fill in the blanks with instinctive qualities? Callsign recognition is a skill that comes with experience. It also comes by being active, reading results over and over, and knowing who's on the bands. The better you get at knowing active contest calls, the better you will be at pulling them *out of the mud* in the next contest! That translates into higher contest scores.

ARRL VHF QSO Party

1800Z Sat., to 0300Z Mon., Sept. 13–15

All bands, 50 MHz and up, can be used for this one. Details can be found on the ARRL web site at <www.arrl.org>. It is recommended that you send for official summary and log sheets. A large SASE will get you a supply. Address your request to the ARRL VHF Party, 225 Main St., Newington, CT 06111.

Scandinavian Activity Contest

CW: Sept. 20–21 Phone: Sept. 27–28
1500Z Saturday to 1800Z Sunday

It's the world working in this 39th Scandinavian Activity Contest (SAC). The same station may be worked on each band for QSO and multiplier credit. The prefixes used in Scandinavia are: LA, LB, LG, LJ (Norway); JW (Svalbard & Bear Is); JX (Jan Mayen); OF, OG, OH, OI (Finland), OFØ, OGØ, OHØ (Aland Is.); OJØ (Market Reef); OX (Greenland); OY (Faroe Is.); OZ (Denmark); SJ, SK, SL, SM, 7S, 8S (Sweden); and TF (Iceland).

Classes: Single operator and multi-operator single transmitter, all band only. Multi-operator must remain on the same band for at least 10 minutes (Exception: A station may be worked on another band if it is a new multiplier, only.). Also, QRP single operator (maximum of 10 watts output) and SWL (only SAC stations may be logged).

Bands: 3.5, 7, 14, 21, 28 MHz according to IARU band plans; 3560–3600, 3650–3700, 14060–14125, and 14300–14350 kHz should be kept free of contest activity.

Exchange: RS(T) plus a QSO number starting with 001.

Scoring: European stations score one point for each SAC contact. Non-Europeans score one point on 14, 21, and 28 MHz, and three points on 3.5 and 7 MHz.

Multiplier: Each call area in the above list of SAC countries worked on each band (call areas, not prefixes).

Final Score: The sum of QSO points from all bands times the sum of the multipliers worked on each band. Scoring for SWLs same as above.

Awards: Certificates to the winning station in each class, both CW and phone, in each country and each USA call area. QRP stations will be listed in one common list. The non-SAC SWL winner will be awarded. Plaques will be awarded to the top-scoring station in each continent. Depending on the number of participants, the contest committee may consider additional awards.

The usual disqualification criteria will be observed. Include a summary sheet and a dupe sheet for logs with more than 200 QSOs, and a signed declaration. Logs may also be submitted on MS-DOS diskettes in either ASCII format or the accepted ARRL contest log standard. If you send your log on disk, paper logs are not required. Summary sheet must always be on paper. All disks must be clearly labeled with call, contest name, class, and date of the contest. CW and SSB portion can be on same disk. An SASE is needed if you want your disk returned.

Mailing deadline for all logs is no later than October 31st. Send all entries to: NRRL HF Contest Manager, Jan Almedal, LA9HW, Tunet, N-1825 Tomter, Norway. E-mail logs go to <sac@contesting.com>.

Air Force 50th Anniversary QSO Party

0001Z Sat., Sept. 20 to 2359Z Sun., Sept. 21

In celebration of the creation of the United States Air Force on September 17, 1947, the Headquarters U.S. Air Force Directorate of Communications and Information is sponsoring a QSO party for all interested radio amateurs. Operation is permitted on all bands and modes.

Scoring: Score contacts by "point identifier." Stations with licensees with no Air Force affiliation have a point identifier of one, are worth one point, and would identify with the suffix "Air Force One" on phone or "/AF1" on CW or digital modes. If the licensee is a U.S. Air Force veteran, member, or retiree (of any component—active, Air National Guard, or AF Reserve), point identifier is determined by subtracting the year licensee entered the Air Force from 1997. For example, if he or she entered the Air Force in 1947, their point identifier is 50 (1997 – 1947 = 50), and they would ID "AF/50." If he or she entered in 1963, their point identifier is 34 (1997 – 1963 = 34), and they would identify "AF/34." Note that the duration of Air Force service is insignificant. The point identifier value is determined solely by the year the member entered the Air Force. Obviously, the most sought after stations will be those brave men and women who entered the Air Force in 1947, whose point identifiers will be "50" and whose contacts are worth 50 points! Add total point identifiers for all qualifying contacts.

Stations may be worked multiple times on the same band if the contacts are on different modes, but only once on each band if on the same mode. Stations may be worked and scored on multiple bands.

Awards: Trophy (plaque) with Air Force 50th Anniversary logo signed by the Headquarters, United States Air Force Director of Communications and Information (Lt. General William Donahue) will be awarded to the overall winner. Certificates (signed and with AF 50th logo) will be sent to the top three finishers in each state and country.

Logs are to be postmarked by 15 October 1997 to: K5HOG, Razorback Radio Club, 604 Julian Avenue, Honolulu, HI 96818. Logs must have station worked, date, time, mode, band, and point identifiers for each contact. **Points must be totalled on each page to be accepted.** Neither accepted nor rejected log sheets will be returned unless accompanied by a suitable SASE. Direct all questions to: Bernie Skoch, K5XS, Colonel, U.S. Air Force Director of Communications and Information, Headquarters Pacific Air Forces, 604 Julian Avenue, Hickam Air Force Base, Honolulu, HI 96818.

CQ WW RTTY Contest

0000Z Sat. to 2400Z Sun., Sept. 28–29

This is the annual running of the CQ WW RTTY contest organized by *CQ* magazine, and from the response to last year's contest, it has become one of the major RTTY competitions.

Bands: All five bands, 10 through 80 meters.

Classes: Single operator, single and all band, and single-op assisted all band only. Multi-operator, single transmitter, all band only. Keep in mind that competitors in all categories may operate the entire 48-hour contest period.

Exchange: RST, state or VE area, and CQ Zone for stations within the 48 continental U.S. states and 13 Canadian areas. All others send RST and CQ Zone.

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

Multiplier: One for each state (48) and VE area (13). One for each DX country (ARRL and WAE list). One for each CQ Zone (40). All of the above on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Plaques to the first-place winners in each operator classes. Certificates to the second and third place winners. Certificates to the first-place finisher in each DX country.

Complete detailed rules were published in the July issue of *CQ*. The standard *CQ* log and summary sheets are recommended. Sample forms are available from *CQ*. Include an SASE (or IRC) with your request. All entries must be postmarked no later than December 1st. An extension may be given upon a written request. Logs go to: CQ RTTY Contest, Roy Gould, KT1N, P.O. Box DX, Stow, MA 01775 USA. Requests for log forms go to: CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

Washington State Salmon Run

1600Z Sat., to 0700Z Sun., Sept. 20–21
1600Z to 2400Z Sun., Sept. 21

This popular state QSO party is sponsored by the Western Washington DX Club and is open to amateurs worldwide on SSB and CW.

Classes: Single or multi-operator, single transmitter. Also, entrants may operate QRP, low power (200 watts or less), or in the open category on SSB, CW, or mixed modes. There will be a special competition among Washington state clubs in the multi-single category.

Exchange: RS(T) and QTH (state/province/ DXCC country or Washington state county).

Scoring: Count 2 points for SSB and 3 points for CW. QSOs with CW Novice/Technicians are worth 6 points. The multipliers are Washington counties (maximum 39) or state/provinces/DXCC countries for Washington state stations. Credit multipliers only once per mode on multiple bands. Final score is total QSO points times multiplier. Low-power stations multiply score by 2 and QRP by 3.

Frequencies: CW—1805, 3530, 7030, 14050, 21050, and 28050. SSB—1815, 3925, 7260, 14280, 21380, and 28380. Novices—3700, 7125, 21150, and 28160.

Awards: The highest scores in each DX country and U.S. call area will receive a package of Pacific Northwest smoked salmon. Certificates will be available fo; other category winners. A participation certificate will be awarded to each log submitted (50 QSOs [US], 25 QSOs [DX], 100 QSOs [Washington state] minimum). A special award will be awarded to the highest Washington club score.

The mailing deadline for logs is October 31st. Logs can be sent to: W7FR, Western Washington DX Club, P.O. Box 395, Mercer Island, WA 98040.

Atlantic QSO Party

0000Z to 2400Z Sun., Sept. 21

This is a new one sponsored by the Loyalist City Amateur Radio Club of Saint John, New Brunswick, Canada. Atlantic province stations work everyone; all others work Canadian Atlantic provinces (NB, NF, NS, PEI) on SSB only.

Classes: Single op (low and high power).

Exchange: Atlantic Province stations send RS and county. All other stations send RS and Canadian province/territory, U.S. state, or DXCC country.

Scoring: Credit one point for every station worked per band. Multipliers are Atlantic provincial counties for non-Atlantic stations, plus provinces, states, and DXCC countries for Atlantic stations. Final score is total QSO points times multipliers.

Awards: Certificates will be issued to the top three stations in each Atlantic province. In addition, certificates will be sent to the top scorer in each Canadian province, U.S. state, and DXCC country.

Logs are due 30 days after the contest and are to be sent to: Atlantic QSO Party, c/o The Loyalist City ARC, P.O. Box 6552 Station "B," Saint John, NB, E2L 4R9, Canada.

Heart of Dixie QSO Party 1997

1800Z Sun., to 0100Z Mon., Sept. 28–29

Here's your chance to get a taste of the South by joining the *Alabama Heart of Dixie* QSO Party. Alabama stations work anyone; stations outside Alabama work only Alabama stations.

Classes: Single-operator fixed, multiple-operator fixed, mobile, and Novice/Technician.

Exchange: RS(T) and Alabama county/state/province/DX country.

Scoring: One point per QSO on phone; two on CW or digital modes. Stations may be worked once per band/mode. Mobiles may be worked again if they change counties. No repeater contacts allowed. Packet QSOs must have a licensed operator present at both stations (no robots). Multipliers are Alabama counties (67 maximum). For Alabama stations only, add U.S. states, Canadian provinces/territories, and DXCC countries. Mobile Alabama mobile operators may claim 500 bonus points for each Alabama county from which they complete at least 15 QSOs.

Frequencies: CW—1815, 3540, 7040, 14040, 21040, 28040 kHz. SSB—1855, 3965, 7240, 14280, 21390, 28390 kHz. Novice/Tech—3700, 7130, 21140, 28140, 28390, 146.55 kHz.

Awards: Certificates will be awarded to the five highest scoring Alabama stations in each category. Certificates will also be awarded to the highest scoring station in each U.S. state, Canadian call area, and DX country.

Logs: Indicate band/mode, time, call worked, and QTH. Mark new multipliers. If you make more than 100 QSOs, provide a dupe sheet. Mobiles must indicate when they change counties. Include a summary sheet showing QSO points, multipliers, and final score.

Computer logs will be accepted, on MS-DOS formatted floppy disks. Logs must be in ASCII text format and include all required information listed above. Please label the disk with your callsign and address. E-mail inquiries to <k4nr@mindspring.com>. Paper logs may be sent to: Heart of Dixie QSO Party, Tom Branch, K4NR, 111 Fisher Drive, Gunter Annex, AL 36115. Logs must be postmarked before November 28th. Enclose a business-size SASE for results.

Tennessee QSO Party

1800Z Sun. to 0100Z Mon., Sept. 28–29

After last year's success, the Tennessee QSO is returning for another time. Out-of-state participation is encouraged! Tennessee stations may work anyone; participants outside of Tennessee only work Tennessee stations. Stations may be worked once per band/mode. Mobiles may be worked again if they change counties. No repeater contacts are allowed; packet QSOs must have a licensed operator present at both stations (i.e., no "robots").

Classes: Single operator fixed, mobile, outside Tennessee, multi-operator fixed, Novice/Technician.

Exchange: RS(T) and Tennessee county or state/province/DXCC country.

Scoring: Credit one point per QSO on phone; two points on CW and/or digital modes. Multipliers are Tennessee counties (95 maximum). For Tennessee stations only, add U.S. states, Canadian provinces, and DXCC countries. An extra multiplier may be claimed for every five additional QSOs made with the same Tennessee county. Tennessee mobile operators may claim 500 bonus points for each Tennessee country in which they make at least 15 QSOs.

Frequencies: CW—40 kHz up from bottom band edge. SSB—1855, 3900, 7240, 14280, 21390, 28390 kHz. Novice/Tech.—3700, 7130, 21140, 28140, 28390, 146550 kHz.

Awards: Certificates will be awarded to the five high-scoring Tennessee entrants in each operating category. Certificates will also be issued to the high scorer in each U.S. state, Canadian province, and DXCC country.

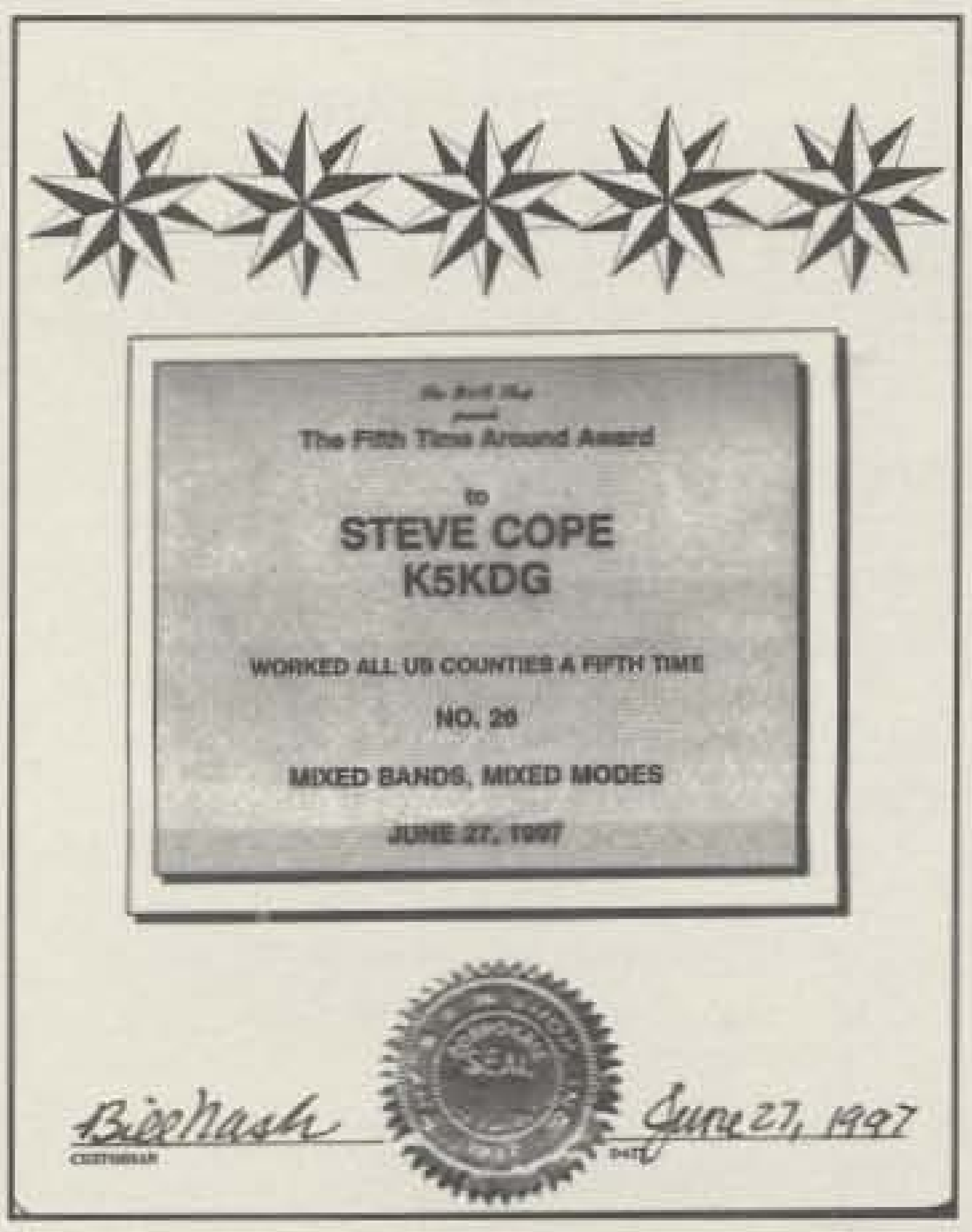
Computer logs will be accepted, on MS-DOS formatted floppy disks. Logs must be in ASCII text format. Please label the disk with your callsign and address. Logs must be postmarked no later than November 12th and sent to: Tennessee QSO Party, Douglas Smith, 1385 Old Clarksville Pike, Pleasant View, TN 37146-8098. Send an #10 SASE for contest results.

BY NORM VAN RAAY, WA3RTY

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

Occasionally we receive notification of awards that have been issued to individuals. This month we received one that deserves special notice. Steve Cope, K5KDG, USA-CA #45 (October 26, 1970) has completed the requirements and been awarded the Worked All Counties Fifth Time, #26, June 27, 1997. In my opinion this ranks as persistence of the highest order! His certificate was issued by Bill Nash, WØOWY, and is reproduced here in recognition of his achievement. Bill sponsors many other awards related to county hunting.



Steve Cope, K5KDG, was presented with the Fifth Time Around Award for working all US Counties for a fifth time.

Awards Available

International Police Association Radio Club Awards—United States Section. This information is for amateur radio operators who are law enforcement personnel and for those interested in becoming licensed radio operators who might want to become members of the club.

This radio club is one of many special-interest groups within the IPA that enjoy amateur radio and the worldwide communicating capabilities available for contacting fellow officers around the globe with similar interests. There are several existing radio clubs in the different foreign country IPA sections, with more being formed as countries open up their restrictive communication laws.

The US section radio club became an official entity in 1966 and has been operating for the past 30 years. Friendship, service, camaraderie, global contacts, contesting, earning and receiving awards and certificates, arranging travel plans to visit with those contacted via the radio, exchanging police-related items of interest (hats, badges, uniform or department emblems and insignia, photographs, etc.), personal discussions, comparing radio equipment and technical information, and solving problems are some of the many activities. A CW and SSB contest takes place the first weekend of November each year with various awards being presented to those participants who accomplish certain requirements. There is a J. Edgar Hoover—10 Most Wanted award for making contact with an IPA Radio Club member in each of the ten US callsign areas, Ø to 9.

There is also the COP 5 award for contacting an IPA Radio Club member in each of any five different states. This award can be upgraded in steps to COP 15, COP 25, COP 35, and COP 45. After having made a contact in all 50 states you can earn the Golden Badge Award, a laser-engraved walnut plaque and a certificate to go with it. Other awards are offered by several foreign country IPA section radio clubs.

A bi-monthly newsletter is mailed to the current paid-up membership. Club emblems for a hat or shirt pocket are available to purchase for those who wish to purchase them.

On-the-air meetings, referred to as "nets," take place each Wednesday and Sunday at 1700Z on a primary frequency of 21.410 on 15 meters. If this band is unusable, try a secondary frequency of 14.240 on 20 meters. Try later again, on the same days at 0030Z and 0300Z on 14.240 for the ZL (New Zealand) and the VK (Australian) IPARC members.

Additional west and east coast U.S. nets meet on Fridays at 1700Z on a 40 meter frequency of 7.175 and on Tuesdays and Sundays at 0300Z on an 80 meter frequency of 3.850. On Tuesdays there is a 10 meter net at 1700Z on a frequency of 28.355 for Novice and Technician class licensees. All the above is subject to propagation conditions and plus or minus QRM or QRN. Other countries run nets at different times. Everyone is welcome to sign in.

They are affiliated with the ARRL. Above all the group tries to have fun and keep in contact with the many friends contacted. For more information contact Will Dennis, W1WA, IPARC President, P.O. Box 463, Sanbornville, NH 03872; or Robert Faulkner, W6RF, IPARC Awards Manager, 15733 W. Rancho Ramon Dr., Tracy, CA 95376.

C.O.P. (Certificate of Proficiency) and Golden Badge Awards. These awards are offered by the IPARC U.S. Section and are designed to enhance the spirit of friendship among radio amateurs worldwide. Both awards are open to licensed radio amateurs and SWLs worldwide. All award hunters must contact/log IPARC member stations. An application form/log sheet is available from W6RF or W1WA for an SASE for US or 3 IRCs.

The awards have six steps, or classes. The object is eventually to contact an MARC member station in each US state. The awards may be earned for CW only, SSB only, or mixed CW/SSB.

1. **C.O.P. 5** (Certificate of Proficiency) award: This is basic award issued for working one IPARC member in each of five different states of the USA.
2. **C.O.P. 15**: This award is issued for working one IPARC member in each of 15 different states of the US.
3. **C.O.P. 25**: For working one IPARC member in each of 25 different states.
4. **C.O.P. 35**: For working one IPARC member in each of 35 different states.
5. **C.O.P. 45**: For working one IPARC member in each of 45 different states.
6. **Golden Badge Award**: For working one IPARC member in all 50 states.

A member station may be worked more than once from a different state QTH. For example, W6RF may be worked in Cal-

HONOR ROLL

500	
AI9L	2973
I2JHF	2974
JA2ADY	2975

1000	
KI7SN	1442

1500	
KI7SN	1203

3000	
OK1DKS	942

Note: In the USA-CA 1000 series, numbers were incorrectly listed as 13 instead of 14. For those who maintain their own records please correct them. The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.50. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Box 76, Pleasant Mount, PA 18453
e-mail: wa3rty@epix.net

ifornia, and then worked again while visiting in another state). The state QTH at the time of the contact is counted towards the award.

Any mobile or portable MARC member that QSOs a *new state* to any station will automatically receive credit for that state.

These awards are issued for contacts made after 01 November 1985. There are no band/mode restrictions.

US stations send completed, verified application/log sheet and $3.00 for postage/handling. Non-US stations send completed, verified application/log sheet and $5.00 for foreign postage/handling to US IPARC Awards Manager Robert Faulkner, W6RF, 15733 West Rancho Ramon Dr., Tracy, CA 95376 USA.

Ten Most Wanted Awards. These awards are offered by the IPARC US Section to enhance the spirit of friendship among radio amateurs worldwide.

J. Edgar Hoover Award. This award is open to all licensed radio amateur operators and SWLs worldwide. All award hunters must contact/log MARC member stations. An application form/log sheet is available from W6RF or W1WA for SASE for US or 3 IRCs. The object of this award is to work/contact an IPARC member in each one of the ten radio call districts of the US, Ø through 9. The awards may be earned for CW only, SSB only, or mixed CW/SSB.

The QTH of a station at the time it is worked or contacted will determine the district worked, not just the callsign of the station. Example: If W6RF is contacted with a QTH of Nevada, that contact would count for district area 7 and not area 6.

Any mobile or portable IPARC member

IPA RADIO CLUB NET SCHEDULES AND FREQUENCIES

UNITED STATES

1700Z	Sun. & Wed. 21.410 MHz
1700Z	Sun. & Wed. 14.240 MHz (secondary freq.)
1700Z	Tues. 28.355 MHz (Novice & Tech Net)
1700Z	Fri. 7.175 MHz (West and East Coast nets)
0300Z	Tues. & Sun. 3.850 MHz (West and East Coast nets)
1615Z	Mon. to Fri. 147.27 MHz (Los Angeles & Southern Calif.)

AUSTRALIA & NEW ZEALAND

0030Z	Sun. & Wed. 14.240 MHz (if band is not good then try later at 0300Z)

JAPAN POLICE CLUB

0100Z	Sun. 21.225 MHz (try SSB then CW)
1100Z	Daily 14.150 MHz
2000Z	Daily 14.150 MHz

THE NETHERLANDS

2000Z	Tues. 3.960 MHz Northern Area
2000Z	Tues. 145.425 MHz Eastern Area
2015Z	Tues. 145.425 MHz Southern Area
2030Z	Tues. 145.425 MHz Western Area

AUSTRIA

210OZ	Tues. 3.860 MHz
22OZ	Tues. 3.860 MHz
080OZ	Sun. 3.860 MHz

GERMANY

1645Z	Thurs. 3.860 MHz
1000Z	Sun. 7.080 MHz

GREAT BRITAIN

1930Z	Sun. 3.690 MHz
1930Z	Sun. 144.350 MHz

IRELAND

2100Z	Mon. 3.680 MHz

LUXEMBOURG

1745Z	Thurs. 3.659 MHz

ALL EUROPEAN COMMUNITY

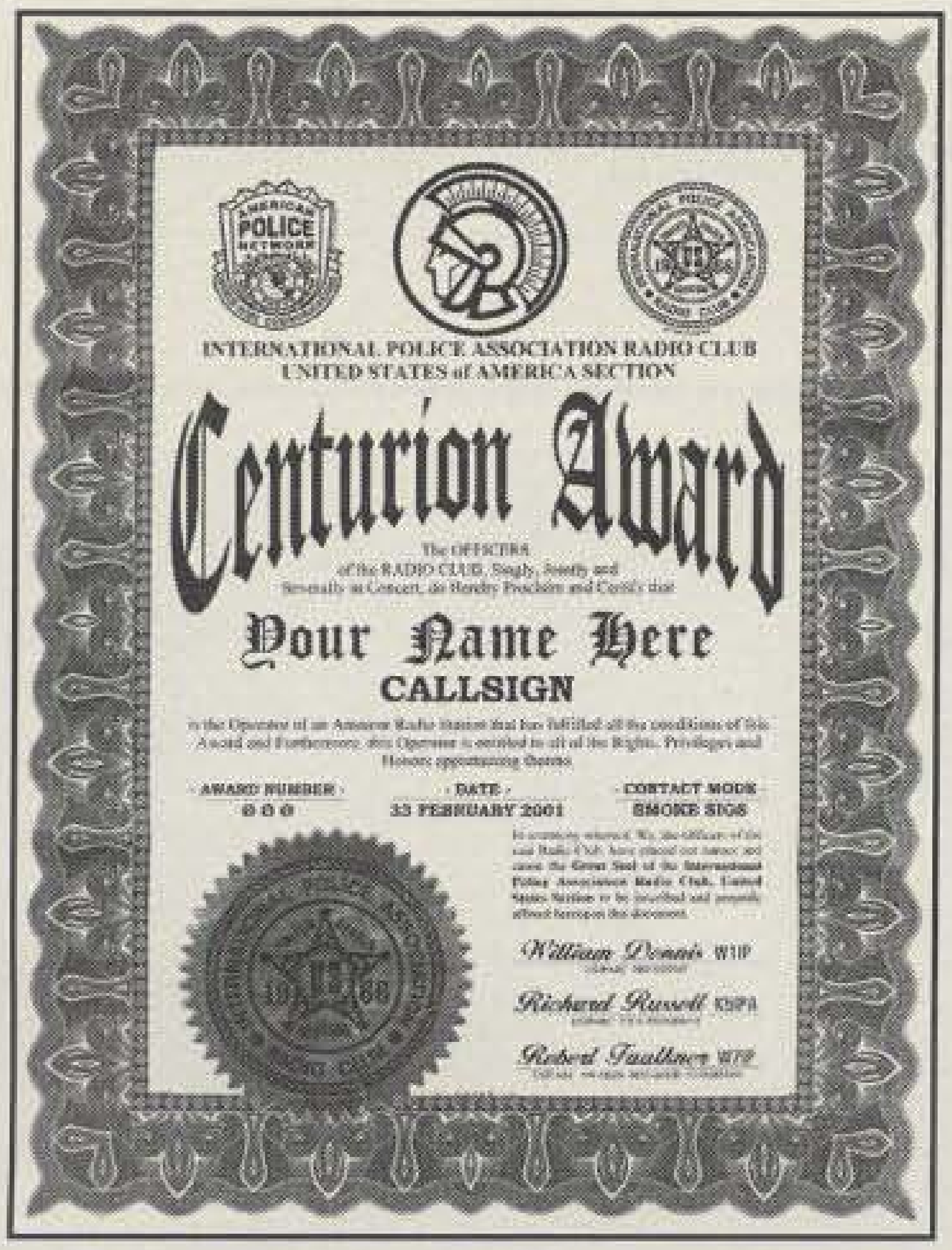
1100Z	Sun. 14.150 MHz

RTTY

0900Z	Sun. 14.150 MHz

SOUTH AFRICA

1700Z	Thurs. 14.240 or 14.245 MHz



The Centurion Award offered by the International Police Association Radio Club, United States Section.

that QSOs a *new state* to any station will automatically receive credit for that state.

Contacts made with IPARC member stations in Alaska (KL7) count as area 7 and in Hawaii (KH6) count as area 6.

The award is issued for contacts made after 01 November 1985. There are no band/mode restrictions. US stations send completed, verified application/log sheet and $3.00 for postage/handing. Non-US stations send completed, verified application/log sheet and $5.00 for foreign postage/handling to Robert Faulkner, W6RF (address above).

Centurion Award. This award is open to all licensed radio amateur operators and SWL stations worldwide. All award hunters must contact/log 10 MARC designated "club stations" and an additional 20 regular IPARC member stations. The award is issued only for contacts made after 01 April 1997. There are no band or mode restrictions.

US stations send completed log with $3.00 for postage and handling. Non-US stations send completed log with $5.00 for foreign postage and handling to W6RF.

Awards Issued

USA-CA 500. Jess Colvin, AI9L, #2973; Bassi Orlandino, I2JHF, #2974; Isao Tuchiya, JA2ADY, #2975.

USA-CA 1000. Jerry Pierce, KI7SN, #1442.

USA-CA 1500. Jerry Pierce, KI7SN, #1203.

USA-CA 3000. Karel Sokol, OK1DKS, #942.

Endorsement. Willard W. Waite, W8GDQ, endorsement for 1000 counties on 160 meters.

73, Norm, WA3RTY

CIRCLE 62 ON READER SERVICE CARD

CIRCLE 92 ON READER SERVICE CARD

CIRCLE 96 ON READER SERVICE CARD

CIRCLE 34 ON READER SERVICE CARD

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

QSL Bureaus

Yes, I know we discussed some aspects of using the ARRL incoming QSL bureaus only a few months ago. However, judging by my mail and comments of DXers, there continues to be a great deal of confusion and misconceptions about the best way to use these valuable DX systems. Let's look at some of the basics for both the relative newcomer to bureaus and as a review for those DXers who have to deal with the QSL bureau system twice, since they received their new vanity callsign (more on this later).

The Guest of Honor at the Lynx DX Convention was VKØIR DXpeditioner ON5NT (left), shown here with your favorite DX editor.

We'll start with the basics: Of the incoming QSL bureaus, which one is *your* home bureau? With our mobile population and new callsigns, this is not a trivial question. A DXer's home bureau is the bureau handling cards based on the number in your base callsign. Thus, WB2CHO/6 maintains envelopes at the W2 bureau. This is regardless of the DXer's actual location. DXers with but a single callsign need deal with just one bureau.

This is *not* the case for DXers who recently acquired a new call. *All* such DXers should maintain up-to-date accounts with *both* the new bureau and the previous bureau. No, one bureau is not going to forward your cards to the bureau dealing with your new call. The only way you will receive cards addressed to your old callsign is to continue to maintain your account with them.

Such DXers should promptly contact their new bureau about setting up an incoming account as soon as possible. While most cards take months or years to wend their way through the bureau system, a few cards can begin arriving almost immediately. Don't postpone setting up your new account.

How do you find the address of your new bureau? These addresses are widely available, from *CQ*'s *Almanac*, to the ARRL, to the *Callbook*, and even on many PacketCluster systems. Send a self-addressed, stamped envelope (SASE) to the bureau address asking for their information package. Simply follow their instructions on setting up an account.

Note that even though your new callsign is with the same bureau as your previous call, you will still need to set up the additional account and continue to maintain both accounts. This is because your old and new accounts probably will be handled by different individual letter sorters. It would be too much to ask these volunteer QSL sorters to remember that cards for W5XX should go to his old call of WB5ZYX.

P.O. Box 50, Fulton, CA 95439

How long should I maintain the old account? I would suggest a minimum of five years, and maybe even ten if you're still getting a significant flow of cards after a few years. I'm still getting cards from QSOs more than ten years back. How long you maintain your old account after changing calls is entirely up to you. However, it is a courtesy to the QSL bureau workers to save them from the problem of having cards for a callsign but no envelopes on file.

What exactly is "maintaining an account" with the bureau? The answer to this question depends on the individual bureau. That's why the first thing a DXer with a new call or one new to the bureau system should do is contact the bureau for their package. With some variations, there are two basic ways the bureaus operate. Some want actual SASEs of a particular size range. This is very easy for the bureau workers, but a little more work for the DXer, who must deal with postage increases by sending extra stamps to the bureau.

The other basic system is for the bureau to sell "envelope credits" to participating DXers. A certain amount of money buys a given number of envelope credits. A notice on each envelope you receive indicates your remaining credits. When you start to run low on credits, you know it's time to send the bureau some more money. This system is a bit more work for the bureau, but does eliminate problems with non-standard envelopes that bother the all-SASE bureaus.

Other bureaus use variations on these two basic systems, such as selling postage or the preferred size of envelopes. Some want postage and return address labels. Again, the only way to find out exactly how to "set up an account" at your home QSL bureau is to contact the bureau directly, with an SASE for a copy of their guidelines.

In addition to following the basic guidelines furnished by the bureau, there are some extra steps a DXer can take to make life easier for the bureau volunteers. Note that with these suggestions, however, the DXer should always do as the individual bureau requests first, and use these ideas only when the bureau doesn't specify another procedure.

A good way an active DXer can help handle significant numbers of cards (say, more than ten a month) is to provide additional units of postage. In the US additional ounces after the first ounce (about five cards) cost only $0.23. With SASE bureaus you can send a bunch of loose $0.23 stamps to the bureau, and they can add as many as necessary to send you your cards each month.

Use the same technique to deal with postage increases. With SASE bureaus send some of the "incremental" stamps, the ones with letter denominations, such as the F stamp.


1-800-723-6922
Computer Programmable with ADMS-IC
FT-51
Dual Band Hand Held
FT-50D
Ultra Compact Dual Band w/ FTT-12 Keypad
YAESU
FT-920
HF+6 Meter Transceiver
Computer Programmable with ADMS-2C
FT-VX1
Worlds Smallest Dual Band HT w/ extended RX UNDER $300!
FT-8100
Compact Dual Band Mobile
FT-2500
Advanced 2 Meter Mobile
ALINCO ELECTRONICS INC.
DJ-G5
Feature Loaded Dual Band
Computer Programmable
DJ-191
2 Meter HT with "Extras"
DR-605
Affordable 2M/440 MHz Mobile
100W on 6M
DX-70TH
HF +6 Meter Mobile/Base
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1-205-882-9292
M-F 9:00 - 6:00 CT
Sat. 9:00 - 2:00 CT

The WPX Program

SSB

2641 .... EA1JJ
2642 .... EA5IY
2643 .... K6DT
2644 .... HR2AES
2645 .... BV5GQ
2646 .... F9SH
2647 .... WKØF

CW

2956 .... K6DT
2957 .... AI9L
2958 .... GØTYV
2959 .... DL3LBM
2960 .... WKØF

Mixed

1784 .... OK2BEE
1785 .... WKØF
1786 .... YC2OK

CW: 350 K6DT, GØTYV, WKØF, YB2OK. 400 K6DT, AA1KS, GØTYV, WKØF, YB2OK. 450 K6DT, GØTYV, WKØF, YB2OK, AA1KS. 500 K6DT, WKØF, YB2OK. 550 K6DT, YB2OK. 600 K6DT, YB2OK. 650 K6DT, YB2OK. 700 K6DT, YB2OK. 750 K6DT, YB2OK. 800 K6DT, YB2OK. 850 K6DT, YB2OK. 900 K6DT, YB2OK. 950 K6DT, YB2OK. 1000 K6DT, YB2OK. 1050 K6DT, YB2OK. 1100 K6DT, YB2OK. 1150 K6DT. 1200 K6DT. 1250 EA6AA, K6DT. 1300 K6DT. 1350 K6DT. 1400 K6DT. 1450 K6DT. 1500 K6DT. 1550 K6DT. 1600 K6DT. 1650 K6DT. 1650 K6DT. 1700 K6DT. 1750 K6DT. 1800 K6DT. 1950 G4SSH.

SSB: 350 EA5IY, N3TA, K6DT, BV5GQ, HA\R2AES, F9SH, WKØF. 400 EA5IY, K6DT, BV5GQ, F9SH, WKØF. 450 EA5IY, K6DT, BV5GQ, F9SH, WKØF, N1SHM, YB2OK. 500 K6DT, BV5GQ, F9SH, WKØF, YB2OK. 550 K6DT, WD8ANZ, BV5GQ, WKØF, YB2OK, LU4DFM. 600 K6DT, WD8ANZ, BV5GQ, WKØF, YB2OK, L74DFH. 650 EA1MK, K6DT, BV5GQ, WKØF, YB2OK, LU4DFM. 700 EA1MK, K6DT, BV5GQ, WKØF, YB2OK, W4DFM. 750 EA1MK, K6DT, BV5GQ, WKØF, YB2OK. 800 EA1MK, K6DT, BV5GQ, YB2OK. 850 EA1MK, K6DT, BV5GQ, YB2OK. 900 EA1MK, K6DT, BV5GQ, YB2OK. 950 EA1MK, K6DT, BV5GQ, YB2OK. 1000 K6DT, BV5GQ, YB2OK. 1050 K6DT, YB2OK. 1100 K6DT, WA4R, YB2OK. 1150 K6DT, YB2OK. 1200 K6DT, YB2OK. 1250 K6DT, YB2OK. 1300 K6DT, YB2OK. 1350 K6DT, YB2OK. 1400 K6DT. 1450 K6DT, IK2AEQ. 1500 K6DT. 1550 K6DT. 1600 K6DT. 1650 K6DT. 1700 K6DT, OA4QV. 1750 K6DT, OA4QV. 1800 K6DT. 1850 K6DT. 1900 K6DT. 1950 K6DT. 2000 K6DT. 2050 K6DT. 2100 K6DT. 2150 K6DT, UA3FT. 2200 K6DT, UA3FT, KD9OT. 2250 K6DT, UA3FT. 2300 K6DT, UA3FT. 2350 K6DT, UA3FT. 2400 K6DT, UA3FT. 2450 K6DT, UA3FT. 2500 K6DT, UA3FT. 2550 K6DT, UA3FT. 2600 UA3FT. 2650 UA3FT.

MIXED: 450 WKØF, YC2OK. 500 WKØF, YC2OK. 550 WD8ANZ, WKØF, YC2OK. 600 WD8ANZ, WKØF, YC2OK. 650 WKØF, YC2OK. 700 WKØF, YC2OK. 750 WKØF, YC2OK. 800 WKØF, YC2OK. 850 WKØF, YC2OK. 900 WKØF, YC2OK. 950 WKØF, YC2OK. 1000 WKØF, YC2OK. 1050..YC2OK. 1100 YC2OK, AA1KS. 1150 YC2OK. 1200 YC2OK. 1250 YC2OK. 1650 I1-21171. 3750 W1CU. 3800 W1CU. 3850 W1CU, UA3FT. 3900 W1CU, UA3FT. 3950 UA3FT. 4000 UA3FT. 4050 UA3FT. 4100 UA3FT. 4150 UA3FT. 4200 UA3FT. 4250 UA3FT.

10 meters: N1KC, WKØF
15 meters: WKØF
20 meters: EA7ABL, WKØF
80 meters: OK2BEE
160 meters: OK2BEE, AI9L, N1KC

Asia: EA7ABL, WKØF, YC2OK
Africa: N1KC, YC2OK
No. America: AI9L, WKØF, N1SHM, YC2OK, LU4DFH
So. America: WKØF, YC2OK, LU4DFM
Europe: EA7ABL, OK2BEE, DL3LBM, WKØF, N1SHM, YC2OK
Oceania: YC2OK

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS. I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, YU2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD. IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J, EA8BM, DL1EY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØD-JZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY.

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.

If you *don't* want cards from your bureau, tell them so in writing. Don't just ignore requests for envelopes or funds; ask the bureau specifically to destroy your cards. The biggest problem bureau workers face is cards without envelopes or credits on file.

If you intend to serve as a QSL manager for a very active station, make lots of contest contacts, or for other reasons expect *lots* of cards via the incoming bureau, talk to the bureau manager about your plans. Some bureaus will make special arrangements for such heavy users.

When I was getting ten of thousands of QSL cards a year as WA1SQB, the S sorter of the 1-land bureau worked out a deal with me. She would store the cards in grocery bags in her garage until mid-fall. Just before she stocked in wood for the winter, she'd drop me a note to come up and pick up the cards. I would borrow a station wagon and make the two hour drive to collect the cards. Ninety-five percent of all bureau volunteers are really good people who want more than anything else to get your cards to you. Perhaps the single most valuable thing a DXer can bring to bureau operation is patience. The bureau system is *slow*. Sometimes it's *very* slow. Round-trip QSLing via the bureau system is cheap and remarkably reliable, especially given its near all-volunteer structure. However, it is slow.

After unclaimed QSLs, the bureaus' greatest problems are from impatient or unreasonable DXers. (A tiny fraction of DXers make some pretty outrageous requests and get hot under the collar when they don't get things their way.) While there's not much to be done about these DXers, the rest of us can wait, patiently, for our cards. If you have been consistently active for several years and suddenly your flow of cards stops, give it a few months before contacting the bureau. And when you do contact them, do it in the form of a concerned inquiry, not a demand that heads roll. Not every letter sorter does a 100% job every month. The bureau chiefs take the jobs very seriously and will investigate your concerns, but give them facts, not accusations.

Remember, it doesn't hurt to say thank you. A note to your letter sorter thanking him or her for all the dedicated service would be appreciated by that volunteer.

Speaking about QSL bureaus, The Western Samoa 5W QSL bureau has ceased operation. The president of the Western Samoa Amateur Radio Club says there are only four active 5W1 "permanent resident" stations in the country. Visiting operators, who use 5WØ call-

The WAZ Program

Single Band WAZ

10 Meter SSB

487 .... N9US

15 Meter SSB

504 .... N9US
505 .... YC2OK

20 Meter SSB

1007 .... IN3BHR
1008 .... N9US

40 Meter SSB

86 .... G4BWP

15 Meter CW

270 .... N9US
271 .... JA3HC

20 Meter CW

474 .... N9US
475 .... ZS1AFZ

40 Meter CW

191 .... N9US

ALL CW

101 .... KM3V
102 .... YC2OK

RTTY

43 .... N9US, 20 Meter
105 ... YC2OK, Mixed Band

160 Meter WAZ

113 .... LY2ZZ, 40 Zones New
105 .... DJ4MM, 35 Zones Endorsement

All Band WAZ

SSB

4390 .... SM4AIO

CW/Phone

7745 .... JR1WGW
7746 .... DL5AMF
7747 .... SP3XR
7748 .... HB9BCI

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.

5 Band WAZ

As of May 31, 1997, 460 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

NØJR	DK1FW	IØKDF	N9US

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

N4WW, 199 (26)	DF3CB, 199 (1)
AA4KT, 199 (26)	F6CPO, 199 (1)
K7UR, 199 (34)	W6SR, 199 (37)
WØPGI, 199 (26)	S57J, 199 (2)
W2YY, 199 (26)	W3UR, 199 (23)
W9WAQ, 199 (26)	KC7V, 199 (34)
W1JR, 199 (23)	UA3AGW, 198 (1, 12)
VE7AHA, 199 (34)	VO1FB, 198 (1, 12)
W1FZ, 199 (26)	EA5BCK, 198 (27, 39)
W9CH, 199 (26)	KZ4V, 198 (22, 26)
ACØM, 199 (34)	K4PI, 198 (22, 26)
IK8BQE, 199 (31)	G3KDB, 198 (1, 12)
JA2IVK,199 (34,40m)	DK2GZ, 198 (1, 24)
K1ST, 199 (26)	KG9N, 198 (18, 22)
ABØP, 199 (23)	KM2P, 198 (22, 26)
KL7Y, 199 (34)	GM3YOR, 198 (12, 31)
UY5XE, 199 (27)	DKØEE, 198 (19,31)
NN7X, 199 (34)	KØSR, 198 (22, 23)
DL3ZA, 199 (31)	K3NW, 198 (23, 26)
OE6MKG, 199 (31)	UA4PO, 198 (1, 2)
HA8IB, 199 (2 on 15)	K5RT, 198 (22, 23)
OH2DW, 199 (1)	JA1DM, 198 (1, 31)
IK1AOD, 199 (1)	OE1ZL, 198 (1,31)

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

YU7GW, 192 Zones	I2VRF, 159 Zones
NØJR, 200 Zones	N9US, 200 Zones
UA4CX, 160 Zones	NW8F, 174 Zones
IØKDF, 200 Zones	HK3YH, 186 Zones

Endorsements:

K9YY, 183 Zones	G3LQP, 197 Zones
EA3DUU, 193 Zones	RX4HW, 182 Zones
WB2JZK, 175 Zones	

1049 Stations have attained the 150 Zone level as of May 31, 1997.

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.

signs, seldom make arrangements with the club to have their bureau cards forwarded. Phil has been running the bureau out of his own pocket since 1971.

This points to a larger question: When is it not appropriate to send a QSL via the bureau system? The visiting operator problem is just one of several problems that tend to clog the bureau system. If the operator is not a permanent resident in the country, the DXer should determine the correct QSL route. It is most likely *not* via the bureau of the country visited. The DXpeditioner may well accept QSL cards for the operation via his or her home bureau, but DXers are wasting everyone's time and money by sending cards to the country of operation. Again, the magic word of DXing is important—*listen*. Listen to the operator, who will probably be asked at approximately 30 second intervals, "What's your QSL route?" Listen to the answer. (Don't ask the question your-

Sajid Rahim, H5ANX; Evan Davies, H5AA; and Steve Baker, 7Q7SB, at Evan's QTH.

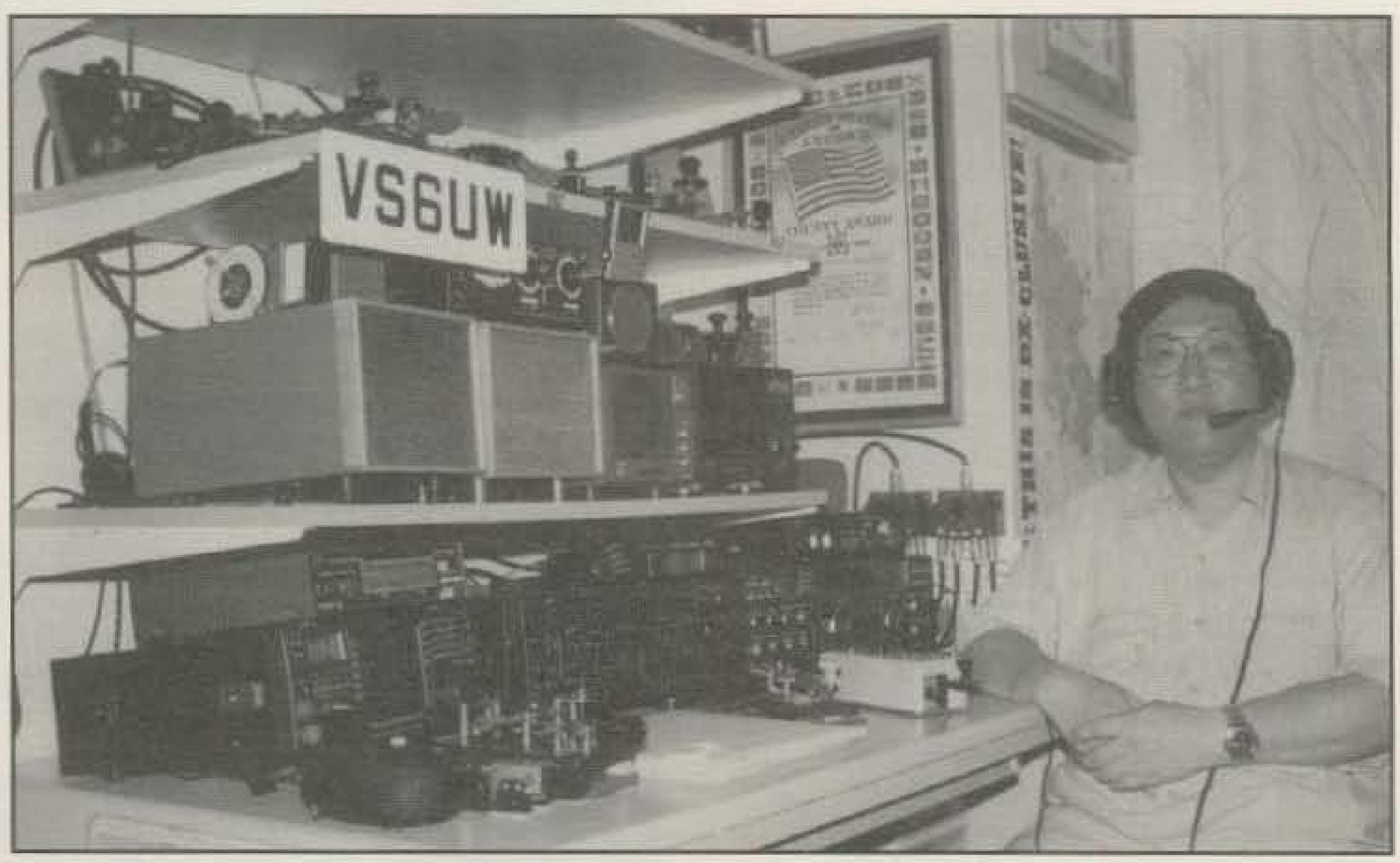
self; chances are, the next DXer to work the DXpeditioner will ask.) The DXpeditioner probably will indicate whether cards via the home bureau are acceptable.

This problem is especially acute for contest DXpeditions. Contesters seldom are interested in the QSL end of things in any case; most could care less about answering QSLs once the contest ends. Sending cards to the bureaus in countries of contest operations doesn't do anyone any good.

Another time not to use the QSL bureau system is to confirm major operations such as the highly successful VKØIR Heard Island DXpedition. Why overwhelm the bureau systems with thousands of cards when you want the card as soon as possible anyway?

Also, there are some so-called DXers who refuse to respond to cards via the bureau. While such action is in violation of the DXCC's published QSL guidelines, the ARRL enforces these guidelines extremely loosely. The DXCC desk won't even slap the wrist of operators who declare that they won't QSL via the bureau. There aren't many of these no-bureauers, fortunately, but it is up to the individual DXer to find out who they are and not send cards to these stations via the bureau system.

The QSL bureau system is an amazing operation, handling hundreds of thou-



Ray Lee, ex-VS6UW, reminds us that Hong Kong stations now sport VR2 (and special VR79) prefixes.

Robin, DU9RG, operates from this impressive station in Manila.

sands of QSLs cards each year at minimal cost to the DXer and with very high reliability. DXers should always be on the lookout for ways to make the tasks of the volunteer sorters and stuffers as easy as possible.

September DX Activity

The Southern Counties Amateur Radio Association (SCARA) will once again mark the Miss America Pageant Sept. 8–13, operating as **K2BR** from Atlantic City, New Jersey, located on Abescon Island (NA-111). Look for K2BR 25 kHz up from the bottom of the General class subbands on SSB and 65 kHz up from the General class subbands on CW. Novice operators will be on 10 meters. QSL K2BR via SCARA, P.O. Box 121, Linwood, NJ 08221.

Steve Baker, **7Q7SB**, is back in Malawi and expects to be active for the next couple of years, working around his missionary work. He has an amplifier and a rotator now. QSL via AB4IQ. *(Thanks to the OPDX bulletin.)*

The Oceanic DX Group plans to operate from both Willis Island VK9W and Holmes Reef (a New One for Islands On The Air) this month. They will sail from Cairns, Queensland, Australia on Sept. 9th aboard the 60 foot *Floreat.* They should arrive at Willis about 30 hours after departure, and they plan 12 days of operation with six stations in two separate locations. An additional station for 6 meters is also planned. Following the Willis operation, the group will sail to Holmes to activate this IOTA New One for about 30 hours. They will have two special callsigns for the Willis operation. On SSB try 3620,

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 328 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 328	W4QB 328	K9IW 326	W8XD 325	NC9T 322	4N7ZZ 319	WB4DBB 312	CT1YH 305	KØHQW 296
K1MEM 328	W6DN 327	YU1HA 326	K4IQJ 325	DL3DXX 322	N6AV 318	K7JYE 312	OZ5UR 304	KH6CF 294
K2FL 328	K3UA 327	I5XIM 326	K8LJG 325	K2JLA 322	VE7DX 318	K1VHS 311	G2FFO 303	YU1AB 294
K9BWQ 328	N7FU 327	PAØXPQ 326	IT9QDS 324	KA5TQF 322	I4LCK 317	WA8YTM 311	K7EHI 302	G4MVA 294
K2ENT 328	N4MM 327	WA4IUM 326	WØJLC 324	AA5NK 321	N6CW 316	N6AW 311	W7IIT 302	I2EOW 294
DL8CM 328	K6LEB 327	WA8DXA 326	W7CNL 324	ON4QX 321	W3BBL 315	N5HB 311	K8JJC 302	KB8O 292
N7RO 328	IT9TQH 327	N5FW 326	KB4HU 324	K9QVB 321	N4AH 315	I1EEW 311	WA4DAN 301	IKØADY 290
WØIZ 328	DL1PM 326	EA2IA 326	N5FG 324	HA5DA 321	N4CH 315	OH3NM 310	HA5NK 301	9A2AJ 289
G4BWP 328	K9MM 326	W7OM 326	DJ2PJ 324	WB5MTV 321	NØFW 315	LA7JO 310	WG5G/QRPp 301	DJ1YH 288
K6JG 328	K2OWE 326	WØHZ 326	W7ULC 323	IK2ILH 321	K2JF 314	K4CXY 309	W6YQ 301	YU7FW 286
I4EAT 328	K4CEB 326	F3TH 326	WA4JTI 323	K1HDO 321	AA2X 314	K4JLD 309	N4OT 301	F6HMJ 284
SM6CST 328	9A2AA 326	N6AR 325	W4OEL 323	IT9ZGY 320	W5OG 313	VE9RJ 309	YU1TR 300	KF5PE 282
W2UE 328	OK1MP 326	K8NA 325	KUØS 323	VE7CNE 320	WB4UBD 313	W3II 308	YU2TW 300	LU3DSI 282
W2FXA 328	N4JF 326	KZ4V 325	W1WAI 323	W6SR 320	G3KMQ 313	N1HN 308	KE5PO 300	W4UW 279
N4KG 328	W9WAQ 326	I1JQJ 325	AG9S 322	KA7T 319	K9DDO 312	HB9DDZ 305	YV5ANT 299	WG7A 276
K8PV 328	AA4KT 326	IT9VDQ 325						

SSB

K4MZU 328	IT9TQH 328	W9OKL 326	XE1VIC 326	K8YVI 323	IØAMU 320	KB1HC 316	N6AV 306	DJ2UU 291
K2TQC 328	IT9TGO 328	9A2AA 326	W6SR 326	NC9T 323	K4CXY 320	W6NW 315	TI2TEB 306	4X6DK 291
K2FL 328	WD8MGQ 328	DL6KG 326	I8ACB 325	K9HQM 323	G4ADD 320	KV2S 315	VE3DLR 306	WA3KKO 290
DJ9ZB 328	I1EEW 328	KØKG 326	N6AR 325	KC5P 323	I4WZK 320	WA9RCQ 315	W3YEY 306	N5QDE 290
EA2IA 328	IØZV 328	OK1MP 326	K8NA 325	WDØGML 323	I4SAT 320	N3ARK 315	XE1MDX 305	OE7KWT 290
K2ENT 328	K3UA 327	WB3CQN 326	AI8M 325	WW1N 323	WE2L 320	N4HK 315	DK5WQ 305	N6CFQ 290
OZ5EV 328	K9BWQ 327	I2QMU 326	W4UW 325	K4SBH 323	EA3EQT 320	K2AJY 315	EA5OL 305	IK2PZG 289
VE1YX 328	WØYDB 327	PAØXPQ 326	VE2PJ 325	WB2JZK 323	WS9V 320	K7TCL 315	K6BZ 305	LU3HBO 289
W6EUF 328	W4QB 327	N4JF 326	I8LEL 325	CE7ZK 323	KØPF 320	I4CSP 315	G4NXG/M 304	KF7VC 288
K2JLA 328	VE3MR 327	KB4HU 326	IT9ZGY 325	K2ARO 323	KE3A 320	NØAMI 314	KJ6HO 304	OK1AWZ 287
N7RO 328	VE3MRS 327	KC4MJ 326	K6LEB 325	LU7HJM 323	N4CSF 320	W5RUK 314	VE3CKP 304	IK2DUW 287
K6YRA 328	OE2EGL 327	CX2CB 326	IK1GPG 325	K9PP 323	W8AXI 320	DL3DXX 314	WB2NQT 303	IK8BMW 286
W6BCQ 328	K8CSG 327	TI2CC 326	I1JQJ 325	KB8O 323	W6SHY 320	N6RJY 314	EA3CWK 303	TU2QW 286
K5OVC 328	K1UO 327	WA4ECA 326	VE7WJ 325	VE2GHZ 323	ON5KL 319	OH5KL 313	EA3BT 303	NM5O 285
KZ2P 328	DL9OH 327	IKØIOL 326	AI8S 325	KD8IW 323	WA4DAN 319	WDØDMN 313	WA9BDX 302	EA1AYN 285
VE7DX 328	WB4UBD 327	ZL1HY 326	K1HDO 325	WN5IJZ 322	KI3L 319	KD9CN 313	WA8MEM 302	KQ4WD 284
AA6BB 328	K7LAY 327	YU1HA 326	N4CH 325	XE1CI 322	VE3HO 319	K1VHS 313	KD4YT 302	IK2HBX 284
EA4DO 328	W2FXA 327	W4NKI 326	W7FP 325	WB4PUD 322	XE1MD 319	EA1JG 313	CT1YH 302	KE6CF 283
ZL3NS 328	IK8CNT 327	KZ4V 326	N5FG 325	LZ1HA 322	KB1JU 319	W1LQQ 313	RA2YA 301	WZ3E 283
K6JG 328	N4KG 327	VE3GMT 326	AC7DX 325	ZS6AOO 322	YV1JV 319	K4LR 312	W2LZX 301	YC3OSE 282
WA6OET 328	K8PV 327	W4EEE 326	KC8EU 324	WA5HWB 322	PY2DBU 319	WA9IVU 312	XE2DU 301	VE7HAM 282
SM6CST 328	SV1ADG 327	KE4VU 326	N4KEL/M 324	TI2JJP 322	IØSGF 319	KD5ZD 312	AB4NS 301	WN6J 281
W3GG 328	K8LJG 327	AG9S 326	IK8BQE 324	OE7SEL 322	K9QVB 318	WA2FKF 312	WP4AFA 300	KK4TR 281
I4EAT 328	LA7JO 327	WA4WTG 326	AA5NK 324	VE4ACY 322	KB5FU 318	ZS6BBY 311	YU2TW 300	YU1TR 280
W4UNP 328	W9SS 326	WD8PUG 326	K2JF 324	W5XQ 321	AA4AH 318	IN3ANE 311	AB4UF 300	KN4RI 280
YU1AB 328	WA4IUM 326	W2CC 326	WB5TED 324	KA5TQF 321	G4GED 318	F1OZF 311	WB4UHN 300	WD9ACQ 280
F9RM 328	WB1DQC 326	VE2WY 326	W2FGY 324	TI2HP 321	IK8GCS 318	EI6FR 311	KB8NTY 300	WØIKD 279
PY4OY 328	XE1AE 326	AA4KT 326	YV5CWO 324	I8XTX 321	W6MFC 318	WT4K 311	YT7TY 300	EA3CWT 278
OZ3SK 328	KA3HXO 326	PT2TF 326	W5LLU 324	I8YRK 321	KF5AR 318	YZ7AA 311	WB6GFJ 299	WN5MBS 277
XE1L 328	VE3XN 326	KM2P 326	I8KCI 324	K4PQV 321	I8IYW 318	WA5SUE 311	VE3CKP 299	VE2DRN 277
4Z4DX 328	YS1GMV 326	N5FW 326	I1POR 324	KS2I 321	NI5D 318	GM4XLU 311	YV4VN 299	GØLRX 277
CX4HS 328	K9MM 326	K9HDZ 326	VE4AT 324	OA4OS 321	WA8YTM 318	KA5RNH 310	EA5GKE 298	9A9R 277
N4MM 328	ZL1AGO 326	WA3HUP 326	KD5ZM 324	W7ULC 321	F6BFI 318	I2MQP 310	KJ9N 298	K3LC 277
OE3WWB 328	KF7SH 326	YV1CLM 326	KØHQW 324	W3AZD 321	KX5V 318	HA6NF 310	KB5WQ 294	KC6AWX 276
IK1GPG 328	ZS6LW 326	N6AW 326	KA5TTC 324	WØULU 321	WB6PSY 317	KF7RU 310	IT9VDQ 293	OA4EI 276
W7OM 328	VK4LC 326	ZP5JCY 326	K4JLD 324	WDØBNC 321	9H4G 317	K4JDJ 310	KJ5LJ 293	NC3C 275
K4MQG 328	YV1AIP 326	K5TVC 326	KB2MY 324	CT1EEB 321	WA6DTG 317	AB4IQ 310	TI2LTA 292	F5NBX 275
K7EHI 328	K9IW 326	KB7VD 326	EA3BKI 324	OA4QV 321	XE1XM 317	EA5RJ 309	W5OXA 292	VE2AJT 275
DU9RG 328	WA4JTI 326	WB3DNA 326	4N7ZZ 324	OE6CLD 321	ZL1BOQ 317	CT1AHU 308	K2EEK 291	US1IDX 275
W6DN 328	YV1AJ 326	I2EOW 326	YV5IVB 324	LU1JDL 320	KF8UN 317	EA3CB 308	W6WL 291	Z31JA 275
I4LCK 328	YV1KZ 326	KE5PO 326	N2VW 324	KF8VW 320	N5HSF 316	W9IL 307	YB1RED 291	

RTTY

K2ENT 321	WB4UBD 304	K3UA 285	EA5FKI 284	I1JQJ 273	W4QB 273	W4EEU 269	KE5PO 268	G4BWP 267
NI4H 320								

listening 3785–3805; 7085/7150–7160; 14195/14235–14255; 18145; 21295; 24945; and 28480 kHz. On CW try 1810, 3505, 7005, 10103, 14020, 18070, 21020, 24895, and 28005 kHz. The RTTY frequencies are 14080 and 21080. The QSL route has not been determined. Operators include Harry, VK4DHM; Ann, WA1S; Bob, VK4MR; Elvira, IV3FSG; Gaby, XE2Z/XE2GV; Jon, VK4CY; Jon, K7CO/VK2DXT; Eric, FK8GM; Bill, VK4FW; and an additional Japanese YL. Cost of the Willis operation is close to $33,000, so please be generous with your contributions. They may be sent to Oceania DX Group Willis Effort, P.O. Box 929, Gympie, 4570 Australia.

DX News and Events

The Clipperton DX Club will meet at the Otell'inn Beaujore Hotel in Nantes, France, Sept. 20–21. For more information on this convention, contact the secretary of the Clipperton DX Club: Alain Tuduri, 25 rue de Jussieu, 44300 Nantes, France (e-mail <f5lmj@f5keq.fpdl.fra>).

Looking to relocate to the Caribbean? While an active volcano is spoiling my beloved Montserrat, there are places to go in the region. An excellent DX QTH is now available on St. Eustatius, in the DXCC country of St. Maarten PJ. The PJ5AA QTH should fetch about $450,000. For information, contact a regular visitor to the QTH: <K3UOC@aol.com>.

Charles Lewis, **S92SS**, and his wife Lesley, **S92YL**, have left Sao Tome permanently and are now working for the Voice of America in Greece. Charles says that being a SVØ is tame after his A22AA and S92SS operations. He also says his DXing will be more difficult due to the surrounding ten 250 kilowatt shortwave transmitters and another 600 kW. And you

QSL INFORMATION

5R8FJ to NY3N
5R8FK to NY3N
EW52BO to EW2EO
EW52OA to EW6WF
EW52OW to EU6DX
F/LX9ITU to LX1JH
FK/JE1OYE to JM1LJS
FK/JM1LJS to JM1LJS
FO5PV to F6BCX
G3IW to G3XZR
GB0ON to ON4ON
GB100FI to GW0ANA
GB100LP to GW0ANA
GB2MI to GM0KVI
GB6MI to GM0KVI
GJ0MEU to ON4ON
GW7A to G0DBE
GX3IW to G3XZR
GX4MB to G4BWP
H22A to YL3AF
HR2A to KB5IPQ
HR3KLB to K4ZLE
HS7AS to HS7ECI
II0S to IK0AZG
IM0JMA to IS0JMA
IQ3AC to IK3GES
IQ6F to IK6BOB
IQ8X to IK8UND
IR0MFP to IK0AZG
IR7S to IK7RWE
IU9CSA to IT9KDA
J41W to SV1CIB
J42TCE to SV2CWW
J83ZB to JH1NBN
JT1FBW to G3YBO
JW3OHA to LA3OHA
JW7VK to LA7VK
K1NT/KH4 to JA3IG
K4YT/EY8 to W2TK
K9AF/DU6 to WF5T
KH0AA to JA5DQH
KH7K to WA4FFW
KP4/AA2OX to K3CN
L40H to LU4HH
LM1K to LA1K
LP5H to LU1HOO
LQ0N to LU2NI
LT1F to LU1FKR
LT5V to LU8VCC
LY5A to LY2ZZ
LZ7N to LZ1NG
LZ8A to LZ1KDP
M6N to G3WOI
M7A to G4ZFE
M7P to G3GAF
M7T to G3XTT
MW7Z to G5LP
OE2ZBM to WA0ROI
OF4AB to OH4AB
OH0E to OH6LI
OH0HEY to OH3TY
OH8W to OH8AAS
OM3A to OM3KAG
OM5M to OM3KFF
OT7K to ON4ON
OT7P to ON6AH
OT7T to ON4UN
P40Z to K7BV
PJ8LF to PY2VA
PJ9E to K2SB
PW8LF to PY2VA
R100W to UA9OA
R1ANT to UA1GO
R60UPOL to UR8LV
RA1PM to RK1PWA
RK9AWT to UA9AB
RM3T to RW3TJ
RP3AM to RK3AWA
RP3DPW to RK3DXG
RP3RST to RX3RXX
RP4FXX to RZ5FXX
RW9AV to UA9AB
RZ9ATZ to UA9AB
S01A to EA2JG
S21YS to IK1FLF
SN0IHS to SP6ZDA
SN6JP to SP6GVU
SO7TN to OK1TN
SV8CKM to SV8JE
SX2T to SV2TSL
T00CW to DL3OCH
T00L to DL8AAM
T20AA to KD4XN
T30WP to JA1WPX
T40RFC to CO2KG
T88CK to HB9BCK
T88JZ to JA7FWR
T94DD to K2PF
TA1IJ to DJ9ZB
TI9X to JH1NBN
TJ1JS to EA4AHK
TM0EUR to F5RJM
TM5B to F5FOD
TM5DX to F5EJC
TM9A to F5CCO
TO9PL to N0JT
TT8DX to DJ6SI
TU2AA to W6OML
TU5SO to YU1KN
UA0YAY to RW6HS
UA3/AH0W to KE7LZ
UA9BA to UA9AB
UA9XMC to ES4RO
UE50XK to UA9XK
UU0JM to W1TE
V26SR to N2SR
V31ED to KD4YED
V31FS to NM1K
V47VJ to G4ZVJ
V63AQ to JH1NBN
V63KW to AC4G
V73CT to AC4G
VC8DR to DL8AAM
VE8DR to DL8AAM
VK0GW to VK5GW
VK9EHH to K8VIR
VP2MEY to JH1NBN
VP2MGG to WB2YQH
VP5GN to K5GN
VR97SS to VR2SS
VS97KM to VR2KM
WG3I/C6A to G3AUA
WP2AHW to W2NY
WU1ITU to KA1R
XU2A to XW2A
XX9KC to JH2MRA
Y38I to DL1AWI
YB9BV to K7BV
YI9HW to HA0HW
YL0A to YL2GM
YM3BU to TA3J
YN1KDM to TI5KD
YN1RLI to WA4JTK
YN4/WK6O to KB5IPQ
YN4ZUJ to KB5IPQ
YO6JN to **not** KU9C
YP9T to YO9XC
YS9YS to KK8K
YV1DIG to YV1AVO
YY4GLD to YV4YC
Z38G to OH3GZ
ZF2CU to W5CU
ZK2EH to K8VIR
ZL9DX to K8VIR
ZS45TWR to ZS4Y
ZS6ESU to W4SMG
ZV5M to PY5AA
ZV8C to PY5AMS
ZW100BH to PY4AA
ZW1B to PY1OB
I1A/1P0 to Gian Carlo Bavassano, Via Monti, 7, I-10126 Torino, Italy
BV4OM to Fang Shiao, P.O. Box 200, Nantou, Taiwan
BV5DR to Keven Chen, P.O. Box 200, Nantou, Taiwan
BV6YA to P.O. Box 700, Tainan, Taiwan
CU7AA to Altino da Costa Goulart, Rua Principe Alberto de Monaco, 18, P-9900 Horta, Faial, Acores, Portugal
DS1BHE to Lee Seong-Joo, Do-Bong Gu Bang Hak 3-dong, Shin Dong Ah Apt. 17-609, Seoul, Korea
DS1BHF to Hong Yeon-Ah, Do-Bong Gu Bang Hak 3-dong, Shin Dong Ah Apt. 17-609, Seoul, Korea
DS1BZR to Shim Jung-Seob, 390-8 Booam-dong Jongro-ku, Seoul 110-021, Korea
E21EJC to Krissada Futrakul, P.O. Box 20, Bangkok 10163, Thailand
ET3BT to Tensai Tafese, P.O. Box 6128, Addis Ababa, Ethiopia
HL3HNC to Jin-Tai Kim, #102-402, Kukdong Apt. Munhwa 2 dong, Chung-gu, Taejon 301-132, Korea
HL5XF to Ho-Jin Seo, P.O. Box 73, Nam, Ulsan 680-600, Korea
OA8ADM to Larry Hultquist, Casilla 304, Iquitos, Peru
PY9UDC to Francisco Barcellos, Rua 18 de Setembro, 99, 78.400-000 Diamantino, Mato Grosso, Brazil
V85HY to Hiroshi Yamada, Embassy of Japan, P.O. Box 3001, Bandar Seri Begawan, Brunei
VS97KM to Terry K.M. Chen, G.P.O. Box 541, Hong Kong

(The table of QSL managers is courtesy of John Shelton, K1XN, editor of The GOLIST, P.O. Box 3071, Paris TN 38242, telephone 901-641-0109; e-mail <golist@iswt.com>.)

thought *you* had interference and overload problems! To QSL A22AA or S92SS, contact Charles at Greece Relay Station (KAV), P.O. Box 1001, GR 67 100 Xanthi, Greece by international mail (fastest way) or using US postage at American Embassy Athens, Greece Relay Station (KAV), PSC 108 Box 39, APO AE 09842. Lesley can be reached at the same addresses.

Bad IRCs: Experienced DXers know that as many as 10% of all International Reply Coupons (IRCs) are incorrectly stamped by the issuing post office. In theory, the issuing post office should stamp the IRC on the *left*. An IRC stamped on the right, the cancellation side, is probably valueless. In theory, unstamped IRCs should be just as worthless. However, there is now a way to recoup some of the value of those unstamped IRCs. Equity USA Inc., P.O. Box 1307, Southold, NY 11971 will purchase unstamped IRCs at US$0.50 each. Use registered mail for large quantities of IRCs.

Correction: In my July column I reversed a couple of the letters of Don Miller's callsign. Don was W9**WN**V, and not W9NWV. Our thanks to NE8Z for spotting the typo. 73, Chod, VP2ML

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

Special Event Call Sign System is On The Way!

In its comments concerning the vanity callsign system, the American Radio Relay League requested that one-by-one callsigns be reserved for assignment to stations operating in conjunction with short-term events of special significance. A special event vanity callsign system is designed to meet the needs of amateur operators for temporary operation of their stations during events which the operators consider to be of special significance to the amateur service community.

A special event callsign aids amateur operators in calling attention "on air" to their participation and helps to bring public attention to the event. Examples of the use of one-by-one callsigns by amateur stations include a wide variety of events such as conventions, festivals, dedications, and anniversaries.

On December 23, 1994, the FCC set aside the one-by-one format callsign block so that it could be used for a future Special Event Call Sign System. A one-by-one callsign consists of a single prefix letter (K, N, or W), the region number (0 to 9), and a single suffix letter (A to W, Y and Z). There are 750 such callsigns. Section §2.302 of the FCC rules does not permit the assignment of one-by-one amateur station callsigns containing the suffix letter X.

Original Notice of Proposed Rule Making

On April 25, 1995 the FCC addressed the matter of a Special Event Call Sign System in Docket No. WT 95-57. Their original thinking was that it should be administered by the Commission. Under this approach, at least six months prior to the event an amateur making the request would indicate the nature of the event and certify that it is of special significance to the amateur service community.

In addition, the licensee would submit a list of one-by-one format callsigns in order of preference. The first assignable callsign on the list would be stamped "granted" by the FCC and a copy of the list would be returned to the person making the request. The special event vanity callsign could be used for a period not to exceed that of the special event, or for 15 days, whichever was less. The FCC asked the amateur community to comment on this proposal by July 14, 1995. Reply comments were due a month later.

FCC Issues Report and Order

After digesting the comments, on March 20, 1997 the Commission adopted an Order which approved the Special Event Call Sign System. There was no consensus in the comments as to the nature and types of special events that the amateur service community considered as warranting the use of one-by-one callsigns.

During mid-1996 the FCC informally approved the short-term use of some one-by-one callsigns while waiting to take final action on the Special Event Call Sign System. W3A went to the Potomac Valley Radio Club to commemorate the 95th anniversary of Marconi's first transatlantic radio transmission. The World Radiosport Team Competition got 50 different one-by-one callsigns. W7F ("F" as in "fish") was used at the U.S. Fish and Wildlife Service's fish hatchery in Leavenworth, Washington to publicize the 1996 Wenatchee River Salmon Festival held on September 21 and 22, 1996. It soon became apparent that the amateur community had a very broad opinion as to what constituted an ". . . event of significant importance to the amateur community."

In the March 1997 Order the FCC said, "Although the comments do not provide the licensing criteria that would be needed for us to administer a special callsign system, the numerous and varied requests that we have received for callsigns from the one-by-one format block indicate that there is a widespread demand for some type of special event callsign system. Moreover, we believe that a special event callsign system can be best utilized in a self-administered fashion."

The Commission observed that ". . . the amateur service community provides online license data base information through the Internet. We are confident this experience can be used to coordinate the short-term use of special event callsigns. The rules adopted herein, therefore, delegate authority to the Chief, Wireless Telecommunications Bureau to certify volunteer entities to serve as amateur station special event callsign data base coordinators.

"Such entities would coordinate, maintain, and disseminate a common online data base for the 1×1 block of special event callsigns. Special event callsign coordinators will be selected on the basis of their ability to coordinate, maintain, and disseminate worldwide a common online data base. This amendment will serve our amateur service licensees by simplifying and improving the efficiency of our licensing process.

"The operation of a special event station does not require additional skill. Nor does a special event callsign authorize any operating privileges. It simply allows an already-licensed station to temporarily use a different callsign in the identification announcement that helps attract greater attention to the on-air presence of the station."

During the FCC Forum held at the mid-May Dayton HamVention, the FCC's John B. Johnston, W3BE, said, "You had asked that the block of 750 one-by-one callsigns be used for your special event stations. You now have, therefore, a special event callsign system that you self-administer. When your station is operating in conjunction with one of your special events, you may substitute for your assigned callsign—in the station identification announcement—a self-selected one-by-one callsign. You must also announce your assigned callsign at least once each hour during such operation so that listeners can determine your true identity.

"Your community has on-line systems to provide you with license information. You are expected to use this experience to set up a system to coordinate the use of your special event callsigns. We will certify volunteer entities to serve as your amateur station special event callsign data base coordinators. They will coordinate, maintain, and disseminate a common on-line data base for the special event callsigns. Your coordinators will be selected on the basis of their ability to coordinate, maintain, and disseminate worldwide a common on-line data base. A *Public Notice* will announce when your entities may propose to volunteer their services."

On June 18, 1997 the FCC released the Public Notice entitled *Amateur Station Special Event Call Sign Common Data Base Coordinator Announcement*. It said: "Entities desiring to volunteer their services as amateur station special event

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443; e-mail W5YI@W5YI.org)

callsign common data base coordinators may submit their requests in writing to: CDBC Request, Public Safety and Private Wireless Division, Wireless Telecommunications Bureau, Federal Communications Commission, Washington, DC 20554.

"For consideration, the request must be received by the Public Safety and Private Wireless Division on or after August 1, 1997. The amateur station special event callsign data base coordinators will be selected on the basis of their ability to coordinate, maintain. and disseminate a common data base.

"The amateur station special event callsign common data base coordinators must maintain a common data base of the one-by-one format callsigns. The data base must be disseminated to the amateur service community.

"The purpose of the data base is to avoid the same callsign being used by more than one station during the same day. For each of the 750 special event callsigns and for the current day and for each of the following 365 days, the common data base must indicate whether the callsign has been reserved for use or is available for use.

"Section §97.119 of the Commission's Rules, 47 C.F.R. 97.119, authorizes an amateur station, when transmitting in conjunction with an event of special significance to the amateur service community, to substitute for its assigned callsign a special event callsign as shown for that station on the data base coordinated, maintained, and disseminated by the special event callsign common data base coordinators.

"Additionally, where the special event callsign has been reserved, the data base must show the FCC-assigned station callsign for which substitution is being made and the time period thereof.

"If you have questions concerning the amateur station special event callsign data base coordinators, contact the FCC's National Call Center at 1-888-225-5322."

Special Event Call Sign System Rules

The new regulations that apply to Special Event Call Sign System are found in Parts 0 and 97 of Chapter I of Title 47 of the *Code of Federal Regulations* which have been amended as follows:

Part 0 Commission Organization—A new paragraph reads as follows:

§ 0.131 Functions of the Bureau

(p) Certifies, in the name of the Commission, volunteer entities to coordinate, maintain, and disseminate a common data base of amateur station special event callsigns, and issues Public Notices detailing the procedures of amateur service callsign systems.

Part 97 Amateur Radio Service

Section 97.3(a)(11)(iii) is added to read as follows:

§ 97.1 Definitions

(a) The definitions of terms used in Part 97 are:

(iii) Special event callsign system. The callsign is selected by the station licensee from a list of callsigns shown on a common data base coordinated, maintained, and disseminated by the amateur station special event callsign data base coordinators. The callsign must have the single letter prefix K, N, or W, followed by a single numeral 0 through 9, followed by a single letter A through W or Y or Z (for example, K1A). The special event callsign is substituted for the callsign shown on the station license grant while the station is transmitting. The FCC will issue public announcements detailing the procedures of the special event callsign system.

Section 97.119 (d) was amended to read as follows:

§ 97.119 (d) Station identification

(d) When transmitting in conjunction with an event of special significance, a station may substitute for its assigned callsign a special event callsign as shown for that station for that period of time on the common data base coordinated, maintained, and disseminated by the special event callsign data base coordinators. Additionally, the station must transmit its assigned callsign at least once per hour during such transmissions.

Special Event Call Sign System

The question still remains, just what is considered an " . . . event of special significance to the amateur service community"? There are only 750 callsigns available for temporary use. A special event operation usually commemorates an event which is publicly significant. Ideally, this is a one-time, non-recurring celebration, festival, anniversary, holiday, convention, dedication, public demonstration, and the like. Special event callsigns should not be requested just so that you will be able to have a short callsign during an upcoming amateur radio operating event or contest. It is important that a legitimate "special event" is taking place.

The Special Event Call Sign System will get underway once the coordinators have been selected. Once the system is operational, any licensed amateur radio operator may reserve a 1×1 callsign for a special event. You do not need to hold any specific class of operator license to reserve a special event callsign. You simply contact any authorized Special Event Call Sign Coordinator. This may be done by regular mail, telephone, fax, e-mail, or through their Internet web page. The FCC will announce the selected coordinators.

The callsign coordinator will need to know the 1×1 callsign requested and the name of the event. It is a good idea to have back-up choices in the event the callsign you want is not available. Coordinators will also need to know the beginning/ending operating dates of your special event (which may not exceed 15 days), and your name, address, and callsign.

You may reserve a special event callsign up to one year in advance on a first-come, first-serve basis. Short-notice reservations may also be accommodated by some coordinators is a specific 1×1 callsign is available.

You will be notified that your 1×1 callsign has been approved when it is publicly posted to the One-by-One Database, which will be located at an Internet web site. The interactive online database is now in the process of being constructed. Depending upon the coordinator, the time it takes for your reservation to appear in the online database could be anywhere from at once up to a week.

Letters To The Editor

This is our 142nd installment of "Washington Readout." That means we have been writing this monthly column now for nearly 12 years. We get quite a few letters from readers. Most ask questions relating to amateur radio. Some comment on our thoughts regarding amateur radio, and not all of them agree with us.

By far, the greatest response to a single column came from the one published in the July 1997 issue. That column was entitled "Amateur Radio and the 21st Century." Some of you agreed with our premise that the Morse requirement should be abolished as a testing requirement. A good many of you did not—and in no uncertain terms! Some of you also pointed out that you tried to send us an e-mail message directed to the address printed at the end of that column, but that the message bounced back. That was my fault. Our correct e-mail address is <W5YI @W5YI.org> (not <W5YI@W5YI.com> as printed at the end of the July column). In any event, I still heard from a lot of you!

Here is a sample of two opposing view points. The first letter is from an amateur who agreed with our thinking.

> Congratulations on the wonderful article on p. 104 of July *CQ* magazine. I couldn't have said it better myself! As you so clearly point out, *mandatory* code is an arbitrary and obsolete fraternity initiation rite. Code used *voluntarily* by those who enjoy the art is a great amateur radio tradition, which should—and I believe will—be supported and preserved for as long as this hobby exists.

I'm a graduate electronics engineer who was for 39 years an active and successful amateur-band SWL before grudgingly setting about learning a mode I would never use in order to get a license. Practicing with code tapes and my computer, I wasted 11 months of my life reaching and passing Extra Class 20 wpm before getting on the air. I had my first-ever QSO in the Extra class SSB segment of 20M, and have never owned or used a key. Guess I am the prototype "No-Code Extra"!

Do I feel somehow deficient? The - - - I do!! I am proud to be a knowledgeable, skillful, and courteous Extra Class amateur. We may lose a few more skirmishes, but like you, I believe that we shall inevitably win this war.

(Signed) John Warren, NT5C

Here are edited excerpts from another Extra Class amateur, but one who certainly did not agree with the article!

Just finished reading your "No Code" commentary in the July *CQ*. . . . I get very tired of reading article after article about dumbing down amateur radio even further and listening to all the idiot liberals who continually want something for nothing. Even worse, it is the person like yourself, who advocates it.

I agree, maybe CW isn't a very modern mode of communication in today's technology, but learning it requires some effort and dedication to obtain something worthwhile. What next? Do you advocate eliminating all technical questions from the written exam just because amateur radio is becoming an appliance operator hobby and nobody needs to know the technical stuff to use the appliance? Why don't we just eliminate the written exam altogether? That way anybody and everybody can be a ham . . . even those with the IQ of a speedbump.

No need to know CW, it is antique technology? I am sure you know what you get with lower standards . . . you get more people who demand even lower standards . . . and then you get individuals like yourself who are ready and willing to oblige them.

Additionally, anyone who says they can't learn CW . . . at 5 wpm or any speed for that matter . . . is either a liar or a complete idiot and wants to make no effort at all to accomplish something. Learning about 40 sounds to accommodate CW just requires the minimum of effort. Do we need CW? . . . absolutely not in terms of communication. "Absolutely Yes" to ensure that some reasonable effort has been made to obtain a license.

You also state in your article that there is no evidence that a code requirement affects the quality of the amateur. However, in the same article you state that ten years ago the upgrade percentage was much higher than today and the percentage continues to drop. I wonder why today's "no codes" don't upgrade . . . maybe it is because they are being given something for nothing and if they wait long enough someone will give them the rest of the pie. Have you no pride or any sense of accomplishment?

Then, you say, there is always the written exam. What a sham that is. Now with question banks and word-for-word exam questions there is no need to learn any real theory. Just memorize a few answers to questions and eternal happiness will be forever yours. You don't even have to understand the question, just memorize the answer. That is real knowledge if I have ever seen it!

Are the ranks of the hobby declining? If the only thing to look forward to is "no codes" then I wouldn't care if the number of amateurs went to zero. I know the ARRL and people who make their money from the hobby wouldn't like that. Your organization and the ARRL . . . along with equipment manufacturers, of course, want the maximum number of idiots possible.

Let's have that quantity. To heck with quality, standards, or any sense of responsibility. I see lower standards in our educational systems, in our government, and in our society in general . . . ham radio included. I don't have to like it and I absolutely don't have to support it.

Are "no code" hams the "other guys"? Are they "non-hams"? The answer to that is "absolutely Yes." They may have a license but they will never ever be hams. Not because they don't know code, but because they won't make the effort, because they, like all liberals, want something for nothing and they have found someone to help them. Within amateur radio I will fight them and "bad mouth" them every opportunity I get.

Quit trying to degenerate us all to living under rocks. While you certainly don't, I do have higher standards and goals for myself. Evolution did a wonderful thing: it gave us a brain and the ability to use it . . . at least some of us.

(Signed) M. L. Watson, W7UZ

See you next month.

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Equinoctial Propagation

The fall, or autumnal, equinox will occur on September 22. This is the day on which the sun will cross the plane of the Earth's equator as it appears to travel from northern to southern skies. On this day the hours of daylight and darkness are equal in length throughout the world. Sunrise should take place at about 6 AM local time and sunset at about 6 PM local time, no matter where you are in the world.

The effects of the equinox on HF propagation are felt from about mid-September through early October. During this period the characteristics of the ionosphere are similar over large areas of the world, and this is usually the best time of the year for DX openings between the temperate regions of the northern and southern hemispheres. A similar period occurs during the spring equinox, which is centered on March 21.

Expect considerably more frequent openings from mid-September through early October between the USA and South America, to the South Pacific area and Australasia, to southern Asia, and to southern Africa and Antarctica. Openings to these areas should improve on all bands, but they probably will be most noticeable on 20, 17, and 15 meters during the day and on 30 and 40 meters at night. These equinoctial-type openings may follow either the long or the short great-circle path. The best time for these openings should be the twilight periods around sunrise and sunset, but they will occur at other times as well.

Solar Cycle Progress

The new sunspot cycle, Cycle 23, although growing slowly, is now showing some signs of speeding up. The Royal Observatory of Belgium reports a mean sunspot number of 18.5 for May. A high daily count of 52 was observed on May 21, while there were only three days on which the sun's surface was spotless (May 1–3). This results in a 12-month running smoothed sunspot number of 10 centered on November 1996.

The solar cycle is measured by the level of smoothed sunspot number, which is an average of the mean values for the previous 12 months. The smoothed number for November 1996 is a gain of one full point

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 1997

	Expected Signal Quality			
Propagation Index..............	(4)	(3)	(2)	(1)
Above Normal: 6-7, 11, 16, 28	A	A	B	C
High Normal: 4-5, 8, 12, 20, 23, 29	A	B	C	C-D
Low Normal: 1, 3, 9-10, 13, 17, 19, 21-22, 26-27, 30	B	C-B	C-D	D-E
Below Normal: 2, 14, 18, 24	C	C-D	D-E	E
Disturbed: 15, 25	C-D	D	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair to good (C-B) on September 1st, fair to poor (C-D) on the 2nd, fair to good (C-B) on the 3rd, good (B) on the 4th and 5th, excellent (A) on the 6th, etc.

from the previous month. While this may seem to be a small increase, it is the first month since November 1989 that solar activity has increased by this amount! The IPS Radio & Space Services of Australia forecasts a smoothed sunspot number of approximately 30 for September 1997.

As expected, there was a corresponding increase in 10.7 cm solar flux levels during May. According to daily observations made at Penticton, B.C. by the Dominion Radio Astrophysical Observatory, the mean monthly level of 10.7 cm solar flux was 75 units. This results in a smoothed level of 73 centered on November 1996. A smoothed level in the upper 80s to low 90s is forecast for September 1997.

September Propagation

Mid-September to mid-October is generally a period of changing propagation conditions on the HF amateur bands. On some days conditions should continue to be much the same as they were earlier in the summer, but on other days the first signs of winter-time conditions should be noticeable. This month's DX Propagation Charts cover the period of variable conditions between September 15 and October 15, rather than the usual two-month span. A Short-Skip Propagation Chart for September and October is also included in this month's column.

Twenty meters should continue to be the best band for DX propagation from mid-September until mid-October. The band should open in almost all directions for a few hours after sunrise, and remain open to several different areas of the world throughout most of the day and into the early evening. Signals might be a bit stronger than they were during July and August, but the band will close an hour or two earlier because of the shorter period of daylight.

A seasonal improvement is expected for DX conditions on 15 and 17 meters. Solar activity is now high enough that considerably more openings are expected compared to the past several years. The best time to check the bands is from a few hours before noon through the afternoon hours. The best bet for fairly good openings is towards South America, but openings to Africa and the South Pacific should also be possible.

Solar activity is still not high enough for really solid 10 or 12 meter DX openings, although some may be possible towards South America and other southern localities during the afternoon hours, as well as occasionally to Europe and Africa earlier in the day.

Improved nighttime DX propagation conditions are expected on 30, 40, 80, and 160 meters as a result of seasonally lower static levels and increasing hours of darkness. Thirty and 40 meters should provide the best chances for DX from sunset through the sunrise period. Be sure to also check 80 and 160 meters during the hours of darkness and the sunrise period.

For readers interested in short-skip conditions, for openings less than 250 miles try 80 meters during most of the day and 160 meters during the hours of darkness. between 250 and 750 miles, 40 meters should be best from about 9 AM to 5 PM local daylight time, and 80 meters at other times. For between 750 and 1300 miles,

CQ Short-Skip Propagation Chart
September & October 1997
Local Daylight Savings Time At Path Mid-Point

Meter Band	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	10-21 (0-1)	08-10 (1) 10-15 (1-2) 15-22 (1)	08-10 (1-0) 10-14 (2-0) 14-18 (1) 18-22 (1-0)
15	Nil	08-10 (0-1) 10-14 (0-2) 14-22 (0-1)	08-10 (1) 10-14 (2) 14-17 (1-3) 17-18 (1-2) 18-22 (1) 22-00 (0-1)	08-10 (1) 10-14 (2) 14-17 (3) 17-18 (2-1) 18-20 (1) 20-00 (1-0)
20	12-20 (0-1)	08-10 (0-1) 10-12 (0-2) 12-15 (1-4) 15-17 (1-3) 17-20 (1-2) 20-07 (0-1)	08-10 (1-2) 10-12 (2-4) 12-15 (4) 15-17 (3-4) 17-19 (2-4) 19-20 (2-3) 20-21 (1-3) 21-23 (1-2) 23-08 (1)	08-09 (2-1) 09-10 (2) 10-14 (4-2) 14-16 (4-3) 16-19 (4) 19-21 (3) 21-23 (2) 23-01 (1) 01-06 (1-0) 06-08 (1)
40	08-10 (0-2) 10-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)	08-10 (2-3) 10-12 (4-3) 12-16 (4-2) 16-18 (3) 18-20 (2-4) 20-22 (1-4) 22-00 (0-3) 00-03 (0-2) 03-06 (0-1) 06-08 (0-2)	08-10 (3-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-22 (4) 22-00 (3-4) 00-03 (2-3) 03-06 (1-2) 06-08 (2-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-21 (4-3) 21-00 (4) 00-03 (3-4) 03-06 (2-3) 06-08 (4-2)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-22 (4) 22-04 (3-4) 04-07 (2-3)	07-09 (4-2) 09-12 (4-1) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-04 (4) 04-06 (3-4) 06-07 (3)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-04 (4) 04-06 (4-2) 06-07 (3-2)	07-09 (1) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (2) 06-07 (2-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

ALASKA
September & October 1997
Openings Given in GMT

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern States	Nil	21-23 (1)	12-14 (1) 18-21 (1) 21-00 (2) 00-02 (1)	08-12 (1)
Central States	Nil	21-01 (1)	13-15 (1) 19-22 (1) 22-01 (2) 01-03 (1)	08-13 (1)
Western States	Nil	20-21 (1) 21-23 (2) 23-01 (1)	17-18 (1) 18-22 (2) 22-01 (3) 01-03 (2) 03-05 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

HAWAII
September & October 1997
Openings Given In Hawaiian Standard Time

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern States	Nil	07-12 (1) 12-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-19 (1) 03-05 (1) 05-07 (2) 07-08 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-20 (1)* 20-23 (2)* 23-01 (1)*
Central States	09-13 (1)	07-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-17 (4) 17-18 (2) 18-20 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1) 19-20 (1)* 20-00 (2)* 00-02 (1)*
Western States	10-15 (1)	07-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	17-18 (1) 18-19 (2) 19-01 (4) 01-03 (3) 03-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-03 (3)* 03-04 (2)* 04-06 (1)*

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 (10 through 80 meters) for a particular geographical region of the continental USA, as shown in the left hand column of the charts. An * indicates the best time to listen for 160 meter openings.

2. The *propagation index* is the number that appears in () after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

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.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA chart in the 5, 9 and Ø areas: the Western USA chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation Index* is the number that appears in () after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts CW, or 1 KW PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-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.

6. Propagation data, contained in the charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

September 15–October 15, 1997
Time Zone: EDT
(24-Hour Time System)
EASTERN USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe & North Africa	11-14 (1)	10-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-21 (2) 21-23 (3) 23-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*
Northern Europe & European CIS	10-12 (1)	10-13 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (1) 14-16 (2) 16-18 (1)	18-20 (1) 20-04 (2) 04-05 (1) 21-04 (1)*
Eastern Mediter-ranean & Middle East	11-13 (1)	10-11 (1) 11-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	14-16 (1)	09-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 01-03 (1)*
Eastern & Central Africa	13-15 (1)	11-13 (1) 13-15 (2) 15-16 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	21-02 (1)
Southern Africa	11-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	08-10 (1) 13-15 (1) 15-18 (2) 18-19 (3) 19-20 (2) 20-21 (1) 23-01 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	Nil	09-11 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-22 (1)	05-07 (1) 20-23 (1)
Southeast Asia	Nil	10-12 (1) 14-16 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1) 20-22 (1)	06-08 (1)
Far East	Nil	09-11 (1) 18-20 (1)	08-09 (1) 09-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	15-18 (1)	11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-14 (1) 16-20 (1) 20-00 (2) 00-04 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-09 (2) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	17-19 (1)	14-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 14-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-14 (1) 14-17 (2) 17-18 (1)	09-10 (1) 10-13 (2) 13-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (3) 09-10 (4) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-14 (1) 14-16 (2) 16-18 (3) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	Nil	16-18 (1)	18-20 (1) 20-23 (2) 23-01 (1) 08-09 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zones: CDT and MDT
(24-Hour Time System)
CENTRAL USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe & North Africa	10-14 (1)	10-14 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern Europe & European CIS	Nil	10-13 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	10-13 (1)	10-13 (1)	07-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-18 (1) 21-23 (1)	20-23 (1) 21-23 (1)*
Western Africa	12-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*

Eastern & Central Africa	Nil	12-16 (1)	07-09 (1) 13-16 (1) 16-19 (2) 19-20 (1)	21-00 (1)
Southern Africa	11-13 (1)	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*
Central & South Asia	Nil	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-21 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-22 (1)	05-08 (1)
Far East	Nil	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-13 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-05 (1) 05-07 (2) 07-09 (1) 06-08 (1)*
South Pacific & New Zealand	14-18 (1)	10-13 (1) 13-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 08-10 (3) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	00-01 (1) 01-07 (3) 07-08 (2) 08-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	16-18 (1)	13-16 (1) 16-19 (2) 19-21 (1)	05-07 (1) 07-08 (2) 08-10 (3) 10-13 (2) 13-17 (1) 17-18 (2) 18-20 (1) 20-23 (2) 23-01 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1) 05-06 (1)* 06-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1) 13-16 (2) 16-18 (1)	09-10 (1) 10-11 (2) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-01 (3) 01-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 13-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	21-00 (1) 00-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	Nil	16-18 (1)	17-20 (1) 20-23 (2) 23-01 (1) 08-10 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zone: PDT
(24-Hour Time System)
WESTERN USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western Europe & North Africa	Nil	10-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European CIS	Nil	10-12 (1)	08-09 (1) 09-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-00 (1)
Eastern Mediter-ranean & Middle East	Nil	10-12 (1)	08-12 (1) 12-14 (2) 14-16 (1) 20-22 (1)	20-23 (1)

Western & Central Africa	12-14 (1)	10-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	21-00 (1)
Eastern Africa	Nil	13-15 (1)	07-09 (1) 13-15 (1) 15-17 (2) 17-19 (1) 21-23 (1)	20-22 (1)
Southern Africa	11-15 (1)	11-15 (1)	07-09 (1) 12-14 (1) 14-18 (2) 18-19 (1) 22-00 (1)	19-22 (1)
Central & South Asia	Nil	17-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	16-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	16-19 (1)	14-16 (1) 16-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-13 (2) 13-20 (1) 20-21 (2) 21-22 (3) 22-23 (2) 23-01 (1)	01-03 (1) 03-08 (2) 08-09 (1) 03-07 (1)*
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-18 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2) 01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1) 23-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	15-17 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	17-19 (1) 19-20 (2) 20-00 (3) 00-03 (2) 03-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-13 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1) 13-15 (2) 15-17 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	19-21 (1) 21-02 (3) 02-04 (2) 04-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	09-10 (1) 10-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	08-10 (1) 13-15 (1) 15-17 (2) 17-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	21-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	Nil	16-19 (1)	07-10 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	01-03 (1) 03-05 (2) 03-05 (2) 03-06 (1)*

#See explanation in "How To Use Short-Skip Charts" in box in this column.

Note: Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

**Indicates best times for 160 meter openings.*

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

try 20 meters during most of the daylight hours, 30 and 40 meters from sundown to about midnight, and 80 meters from midnight to sunrise. For openings beyond 1300 miles, 17 and 20 meters should be best during most of the daylight hours, with 30 and 40 meters optimum during most of the hours of darkness.

From The Mail Box

"I am a brand new radio amateur. I received my license about two months ago and have about two weeks experience on the air. I realize that I know almost nothing about the hobby, but I'm finding it very enjoyable so far and I want to learn more. I picked up a copy of *CQ* a couple of days ago, and I enjoyed your "Propagation" column. It took me a few minutes to understand how to correlate the forecast chart and the propagation charts, but after a little study it became very clear. Thanks for the very helpful information!"

Darrell Franks, KC7TEN

Darrell, thank you for the very nice letter. Welcome to the wonderful world of amateur radio! Later in your letter you asked me to recommend a text to you that would go further into how to predict HF propagation conditions. Permit me to brag for a moment. I would recommend the book that Ted Cohen, Bob Rose, and I recently wrote entitled *The NEW Shortwave Propagation Handbook*, which is available from CQ Communications for $19.95 plus $4 s/h. It goes into all aspects of HF propagation, including a full chapter on computer propagation prediction programs. I use the IONCAP program (VOACAP version) for developing the charts in this column.

"Hello, George. I have been in Mongolia for the past two years and have had mixed success on the ham bands. I'm experimenting with some propagation programs, but haven't had a reliable place to get the solar flux figures. WWV and WWVH are walked over by both Chinese and Japanese time stations on 5, 10, and 15 MHz. I've only heard WWVH well enough to get the flux count perhaps two times in the past two years. Question: Is there a place on the web where it can be found? If so, could you e-mail me the address. Many thanks."

Paul Swartzendruber, JT1FBB, and K4EQY <eagle@magicnet.mn>

Yes, Paul, there are excellent web sources for the daily solar flux values as well as for geomagnetic, solar, ionospheric, and a great deal more HF propagation information. My favorite two are <http://www.sel.noaa.gov> (Boulder, Colorado) and <http://www.ips.gov.au>

(Australia). You can also reach both of these web pages through links from my web page at <http://www.gjainc.com>. The ips web page is of special interest, since it also contains real-time HF contour maps which you might find to be useful in working DX from Mongolia.

VHF Ionospheric Openings

Although summertime sporadic-*E* ionization is expected to fall off considerably during September and early October, an occasional 6 meter short-skip opening may still be possible over distances ranging between approximately 1000 and 1300 miles. The best time to check is before noon and during the early evening.

There is usually an increase in auroral activity during an equinoctial period, so look for sone fairly frequent 6 and 2 meter auroral-type openings. The best times for such openings are when conditions on the HF bands are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for those days that are likely to be in these categories during September.

No major meteor showers are expected during September, so few, if any, meteor-scatter-type openings are likely on the VHF bands this month.

Conditions for trans-equatorial (TE) scatter propagation also usually peak during equinoctial periods. With increasing sunspot numbers, some 10, 12, and perhaps a rare 6 meter opening may be possible by this propagation mode between the southern tier states and deep South America. The best time to check for TE is between 8 and 11 PM local time. Openings are usually of fairly short duration, and signals can vary between very weak and watery to fairly strong, with some degree of flutter fading almost always present.

CQ DX Contest Special 1997

The 1997 contest weekends will mark the 47th consecutive CQ WW DX Contest for which this column has contained special propagation forecasts. This year's contest weekends are:

October 25–26–SSB section
November 29–30–CW section

In the tradition of the past 46 years, there will appear in next month's column a special, comprehensive forecast that will focus on both sections of the contest. Besides the latest updated propagation predictions to all areas of the world, the column will also contain pointers for scoring as many points as possible.

73, George, W3ASK

*W9IL	"	58,216	139	46	106
*WA9CCQ	"	18,117	110	17	44
*N9THK	"	17,388	78	29	55
*WB9LRK	"	15,288	80	28	50
*WBØOLA/9	"	10,350	61	27	42
*N9TUQ	"	5,723	49	27	32
*WB9ZPK	"	3,904	54	15	17
*KB9CYL	"	1,616	21	11	18
*N9OYI	"	1,150	19	11	14
*WB9WFR	28	1,316	47	7	18
*WB9LAU	14	3,404	54	12	25
N2IC/Ø	A	2,292,796	1694	130	357
W2GRW/Ø	"	453,882	556	87	212
NXØI	"	361,860	437	98	228
WBØISW	"	209,440	332	75	163
KØGAS	"	168,260	345	62	126
KMØR	"	153,224	378	72	142
KØVSV	"	119,698	226	56	138
KØGSV	"	101,442	217	49	125
WØOSK	"	90,585	211	55	110
KØJPL	"	80,712	201	52	100
WAØDCB	"	80,208	205	41	103
W4ETO/Ø	"	75,750	186	55	95
WØML	"	71,064	186	43	98
NØAEV	"	55,000	179	39	86
WB4RDV/Ø	"	40,119	125	45	84
WØRA	"	37,072	125	45	67
WØPPF	"	36,663	140	34	67
NV3L/Ø	"	32,314	115	31	76
WAØOZP	"	24,905	108	25	60
KCØEI	21	20,732	107	19	52
WØUN	7	240,385	637	35	96
					(Opr. WØUA)
KVØQ	"	240,370	640	34	96
KØGT	3.7	6,210	60	16	29
KØCS	1.8	3,024	41	12	24
*ACØW	A	349,431	489	74	195
*KEØUI	"	93,432	254	43	93
*AAØTY	"	37,436	144	33	65
*WØIOL	"	23,400	106	41	59
*WBØIEL	"	21,060	162	44	86
*KAØZPP	"	4,879	45	16	25
*WBØGFV	28	2,184	29	9	19
*NW7O/Ø	21	63,960	224	22	82
*AAØMQ	14	75,512	255	25	78

ALASKA

WL7MA	7	47,618	369	21	37
*NL7DU	A	124,016	561	36	56
*NL7RK	"	105,014	482	34	57
*KL7/KG5EG	"	27,720	153	23	47
*KL7IWC	14	7,344	123	13	14

ANGUILLA

VP2E	14	725,648	1796	29	123
					(Opr. W5AJ)
*VP2E /WB5CRG	3.7	43,416	385	11	43
*VP2EZ	1.8	4,080	63	9	21
					(Opr. W5AJ)

BAHAMAS

*C6AHU	A	597,060	904	79	200
					(Opr. W7FKF)

BARBADOS

*8P9GU	A	245,688	633	56	118
					(Opr. DL7VOG)
*8P6CV	14	36,900	184	20	55

BELIZE

*V31MX	14	179,760	1013	19	65

BERMUDA

VP9ID	A	3,479,509	3909	92	299
					(Opr. N2MZH)

BRITISH VIRGIN ISLANDS

*VP2VF	28	119,394	786	18	48

CANADA

VO1MP	A	2,836,984	2451	82	342
VY2LI	"	600,066	1167	57	165
VE9ZL	"	34,592	170	32	62
CG1ZZ	1.8	91,803	690	14	57
					(Opr. VE3BMV)
*VE9BL	3.7	1,378	50	6	7
VE2AYU	A	615,204	835	66	210
VE2TVU	"	404,982	1100	46	103
VA3ZC/2	14	107,360	389	23	87
*CI2AWR	A	164,164	416	44	120
*VE2SKA	"	15,096	88	25	49
*VE2ZDR	14	4,180	45	11	27
CI3EJ	A	5,117,408	3784	121	423
					(Opr. VE7NTT)
CI3XN	"	1,033,051	1202	104	227
VE3KPU	"	530,796	796	68	199
VA3SWG	"	171,252	610	42	92
VE3OTL	"	143,820	338	50	120
VE3ZTH	"	34,632	116	36	81
VE3DNR	"	70	4	3	4
VE3HX	28	3,520	55	6	16
VA3MM	14	769,596	1602	36	141
VA3MG	"	739,632	1787	30	122
VA3KA	7	45,738	272	17	60
VE3ZD	"	10,290	83	17	43
*VE3KZ	A	1,013,133	1094	85	278
*VA3DX	"	695,706	762	97	284
*VE3STT	"	41,776	142	31	81
*VE3ST	"	37,548	111	26	100
*VE3SKX	21	3,822	36	12	27
*CJ3NR	3.7	26,442	354	11	28
					(Opr. VA3NR)
VE4RP	A	45,848	235	33	55
*VE4COZ	14	117,420	510	24	79
VE6NAO	21	33,990	214	19	47
VE6LB	1.8	3,315	115	8	7
*VA6JO	A	529,023	1285	60	127
*VE6ZC	"	15,960	148	26	31
*VE6BMX	21	5,966	67	13	25
VE7BQM	A	189,342	598	49	85
VE7XO	"	107,210	755	53	89
VA7A	14	933,660	2289	37	134
					(Opr. VE7XR)
XK7NKI	"	230,957	1074	24	73
VE7SZ	3.7	139,040	824	24	56
VE7EME	"	46,260	397	21	39
VE7IN	1.8	3,480	123	7	8
*XK7CFD	A	356,202	1087	60	94
*VE7TLK	"	153,402	670	44	67
*VE7CFA	"	20,169	99	38	43
*XO7A	14	682,620	1782	34	121
					(Opr. VE7SV)
*VE7GKI	7	5,104	53	16	28
VY1JA	A	187,575	726	54	69

CAYMAN ISLANDS

*ZF2DR	14	241,472	1167	21	77
					(Opr. K5RQ)

COSTA RICA

TI7DBS	14	105,105	634	22	55

CUBA

CO2KG	3.7	68,092	575	15	43
*CM8DC	A	404,900	992	52	127
*CO3JO	3.7	3,454	90	7	15
*CO3JA	1.8	6,075	118	7	18

GUADELOUPE

FG5BG	A	5,691,938	4702	101	381
					(Opr. JF2DQJ)

HAITI

4V2A	A	6,857,970	5778	114	396
					(Opr. 9A3A)

JAMAICA

6Y5XX	A	2,261,493	2945	89	262
					(Opr. JE3MAS)

MARTINIQUE

FM5BH	3.7	205,110	964	19	87

MEXICO

XE1VV	A	382,250	563	82	193
*XE/WA2C	A	643,245	1784	58	125
*XE3LMV	"	268,422	877	64	83
*XE3VD	"	115,144	750	22	52
*XE2MX	"	105,901	305	44	93
*4A1FEC	14	723,040	960	18	33
					(Opr. XE1FEC)
*XE1L	"	346,249	1172	30	109
*XE2AC	7	8,640	107	15	21

PANAMA

*HP1BYS	14	91,399	528	19	58

PUERTO RICO

*WP4NHM	A	443,412	901	71	147
*WP4LNY	21	89,466	484	22	40

SAN ANDREAS & PROVIDENCIA

*HKØTCN	21	109,311	517	19	64

SINT MAARTEN

*PJ8CW	A	139,428	613	35	73

ST. KITTS & NEVIS

V47KP	A	3,080,524	3260	94	318
*V44NK	21	67,320	660	16	35

AFRICA

AFRICAN ITALY

IG9/IT9NJE	28	129,078	500	24	77
IG9/IT9EQO	21	507,936	1245	30	113
IG9/IK2QEI	14	1,114,578	2255	37	134
IG9/IT9GSF	7	1,103,021	2338	32	131
IG9/I4UFH	3.7	787,710	1764	31	124
IG9/IV3TAN	1.8	441,252	1203	24	102
*IG9 /IK4MGO	1.8	42	4	3	4

ANGOLA

D25L	14	2,212,080	3699	37	171
					(Opr. PA3DZN)

ASCENSION ISLAND

ZD8Z	A	11,253,304	5650	152	544
					(Opr. N6TJ)
*ZD8DEZ	28	178,911	600	22	81

CANARY ISLANDS

EA8BVX	21	5,396	48	11	27
EA8KK	14	554,898	1357	28	110
ED8PP	7	321,375	875	30	95
EA8AH	3.7	735,072	1823	30	126
					(Opr. OH1RY)
*EA8AHE	A	46,107	145	30	79
*EA8AHG	"	29,830	108	26	69
*EA8BGO	"	27,760	128	24	56
*EA8KL	21	243,474	877	23	70
*EA8BXQ	"	8,365	87	12	23
*EC8ADX	"	108	6	2	4
*EA8AD	14	58,730	285	19	51

CENTRAL AFRICA REPUBLIC

TL8MS	A	652,304	960	64	172

CEUTA & MELILLA

EA9IE	A	5,647,181	3780	111	392
*EA9BF	A	203,112	382	49	137
*EA9RY	28	16,408	110	16	40
*EA9IB	21	9,888	73	17	31

DJIBOUTI

J28JY	21	387,895	1137	24	91

GABON

*TR8IG	A	1,486,680	1633	80	232

GHANA

*9G1BJ	A	1,391,250	1791	59	206
					(Opr. GMØFQV)

GUINEA-BISSAU

J52IM	14	6,959	115	22	73
					(Opr. KC9IM)

IVORY COAST

TU2XZ	14	172,099	523	24	89

LESOTHO

7P8 /OE2VEL	A	4,931,550	3683	104	346

MADEIRA ISLANDS

CT3DL	7	4,602	60	10	16
CT3BD	3.7	142,970	573	17	68
*CT3 /OH6LI	A	1,579,550	1588	83	267
*CT3 /DL3DRN	"	9,240	65	18	38
*CT3HG	14	65,130	283	17	61
*CT3DZ	"	326	15	8	14

PRINCE EDWARD & MARION ISLAND

ZS8IR	A	934,032	1358	67	177

MOROCCO

*CN8NK	21	525,735	1676	23	82

MOZAMBIQUE

C91CO	A	208,236	350	66	135

NIGERIA

5NØMVE	A	5,458,896	4063	102	352
5N36T	"	4,882,230	3257	120	390
					(Opr. 5NØT)
*5N3 /SP5XAR	14	97,650	324	25	80

REUNION

FR5DX	A	4,843,744	2870	137	455

RWANDA

*9X4WW	A	252,572	404	75	158
					(Opr. ON4WW)

SEYCHELLES

S79MAD	14	63,375	300	21	54

SIERRA LEONE

*9L1MA	A	201,369	543	39	90

SOUTH AFRICA

ZS6SA	A	3,441,984	2807	104	312
ZS6HO	"	20,790	113	21	42
ZS4BS	"	19,251	81	31	62
ZS6H	14	87,978	315	25	68
ZS4WD	"	8,710	52	23	42
ZS6EZ	7	512,575	1244	33	112
ZS6P	1.8	35	5	3	4

SWAZILAND

3DAØNX	A	4,135,158	3213	104	334
					(Opr. JM1CAX)

TUNISIA

3V8BB	A	8,529,792	4198	145	542
					(Opr. YT1AD)

UGANDA

*5X4F	A	676,436	895	71	192

WESTERN SAHARA

*SØ1M	21	535,704	1756	22	80

ZAMBIA

9J2FR	A	2,118,600	2389	74	226
*9J2CE	A	177,636	462	34	97
					(Opr. IN3VZE)

ZIMBABWE

*Z23JO	21	29,049	147	18	51

ASIA

ARMENIA

*EK4GK	A	1,193,825	1550	62	203

ASIATIC TURKEY

YM2ZM	14	467,712	1382	26	90
					(Opr. OK1DTP)
*TA4ZM	A	3,238,785	2770	83	322
					(Opr. DK5WL)
*TA3J	"	527,513	996	37	142
*TA2DS	"	291,288	464	55	174
*TA3YJ	21	462	14	3	8

ASIATIC RUSSIA

RM9RX	A	483,175	750	65	186
UA9UST	21	292,383	1040	26	93
UA9JEP	"	21,480	151	16	44
RA9ST	"	5,335	25	9	26
RZ9UA	14	637,760	1600	35	125
RW9USA	3.7	182,120	661	29	87
RU9CK	"	162,864	541	26	82
*UA9CAW	A	565,068	670	77	217
*RA9AE	"	413,910	604	72	198
*RA9JW	"	351,390	702	57	164
*RW9QA	"	147,875	319	44	125
*RW9RF	"	117,968	325	43	103
*RV9UFN	"	28,280	200	16	54
*UA9SFR	"	1,474	37	24	30
*UA9OS	"	1,008	16	8	13
*RA9UGU	21	21,660	128	15	42
*RX9YF	14	177,234	621	26	83
*RN9XA	"	144,144	450	27	90
*RX9FG	"	31,218	199	18	48
*UA9ORS	7	22,984	138	19	49
UAØSJ	A	621,642	1506	85	181
UAØWY	14	154,706	653	25	78
RUØSU	"	95,340	600	20	64
UAØLCZ	"	65,611	418	27	64
RAØCG	3.7	22,275	212	25	50
UAØSR	"	15,934	122	18	44
*UAØSE	A	82,792	315	36	95
*RAØFF	28	4,212	130	10	16
*UAØAPP	21	14,960	125	14	41
*UAØYAY	14	50,050	254	21	70
*RAØFA	7	126,430	795	32	62
*RAØSA	3.7	3,312	56	14	22

AZERBAIJAN

*4K9W	A	9,450	54	15	48

CHINA

*BY1/K1VWL	A	48,600	280	36	108
*BY3AM	"	660	24	6	9
*BA4TA	28	7,582	165	14	20
*BA4TB	21	66,297	615	22	55

CYPRUS

C4ØM	A	1,969,149	2491	66	107
					(Opr. 5B4AFM)
5B4MF	14	1,293,424	2721	37	139

HONG KONG

VR2RX	A	204,294	1062	56	102
					(Opr. JR1JCB)
*VR96SS	21	157,182	1188	28	74

INDIA

*VU2PAI	A	1,041,074	1090	90	272
*VU2MB	"	1,031,176	1273	93	221

ISRAEL

4X/OK1JR	21	505,417	1520	26	95
4X6ZK	14	168,740	467	30	100
*4Z5FL	A	242,676	479	50	139
*4X1VF	28	176,900	541	24	92
*4Z4T	21	865,094	2157	33	116
					(Opr. 4Z4UT)
*4Z5FW	"	17,480	151	15	40

JAPAN

JF1OPL	A	439,971	619	99	188
JH1DVG	"	102,240	285	46	98
JA1HFY	"	58,646	187	56	86
JE1VTZ	21	117,730	374	33	89
JQ1NGT	"	49,020	240	30	56
JS1KQQ	"	39,388	184	20	86
JE1GZB	14	4,368	45	12	27
JA1XPU	"	2,640	44	13	17
JA1XEM	7	1,134	19	11	10
*7L4IOU	A	297,810	442	97	173
*JE1BDC	"	127,575	303	62	113
*JL7PVR/1	"	112,914	302	57	96
*JF1SQC	"	95,178	213	63	112
*7J1ABD	"	71,832	214	58	88
					(Opr. WA6URY)
*JE1UFF	"	69,918	225	48	81
*JR1MRG	"	68,096	222	50	83
*JA1BUI	"	66,209	204	63	80
*JA1BRL	"	55,176	165	51	81
*JH1KQB	"	41,180	163	44	72
*JG1TVK	"	35,502	115	46	76
*7J1AFP	"	34,528	163	36	68
*JA1BCP	"	34,131	129	41	52
*JA1MQS	"	27,435	127	39	54
*JR1LEV	"	25,852	113	38	54
*JK1NSR	"	20,492	94	36	58
*JA1MSS	"	17,600	84	40	60
*JA1STY	"	13,695	76	33	50
*JA1VLA	"	12,084	71	30	46
*JL1MWI	"	9,376	127	30	46
*JA1YYA	"	4,770	42	25	28
*JA1KFX	"	2,310	25	15	20
*7K4XVK	"	1,188	20	11	16
*JA1MYW	28	9,945	80	19	32
*JA1JCD	"	8,085	70	17	32
*JH1UUT	"	4,687	46	16	27
*JA1AAT	"	2,001	31	9	14
*JA1VVH	"	1,012	21	7	15
*JL1MUT	21	102,312	360	34	82
*JE1XCZ	"	49,573	228	26	63
*JAØBMS/1	"	22,436	133	24	47
*7M2CAG	"	21,038	122	22	45
*7K2GNK	"	15,635	112	22	37
*JA1JLP	"	6,480	48	18	27
*JR1NKN	"	4,360	54	16	24
*JG1QNV	"	4,142	53	14	24
*7K1EQG	"	3,700	48	13	24
*JH1RMH	"	2,805	35	13	20
*JK1BII	"	800	26	11	14
*7K4IYB	"	672	16	8	6
*7N1BHO/1	"	64	4	4	4
*JR1BSV	"	36	3	2	2
*JA1YBK	14	203,375	603	33	92
					(Opr. JL1WFD)
*JR4PMX/1	"	202,275	527	36	109
*JA1GYO	"	26,061	129	25	48
*JA1EEG	"	9,184	68	19	37
*7N2UQC	"	5,160	59	17	23
*JG1GCO	"	3,549	41	16	23
*JO1RGV	"	2,668	36	14	15
*JE1HXZ	"	1,770	27	14	16
*JA1MXY	"	1,058	23	9	14
*JO1TLP	"	946	17	9	13
*JA1AAV	"	442	10	8	9
*JF1KFV	7	37,474	169	29	53
*JK1AFI	"	20,230	112	27	43
*JM1LPN	"	5,290	48	19	27
*JE1LFX	3.7	2,590	33	15	20
*JE1SPY	"	2,001	37	12	17
JA2BNN	A	348,462	530	89	150
JA2AXB	"	8,802	61	18	36
JA2MOG	"	5,922	94	25	38
JE2OTM	28	14,307	102	21	36
JI2UNR	21	288,210	849	34	96
JH2NWP	14	7,680	66	19	29
JE2LUN	"	2,576	46	23	33
JH2AQI	7	20,808	134	24	44
JA2DLM	3.7	17,822	111	27	40
*JG2REJ	A	46,343	155	46	75
*JA2BEY	"	28,726	128	40	66
*JA2MFF	"	24,552	102	12	23
*JH2WHS	"	9,114	69	25	37
*JA2GHP	"	9,086	69	20	39
*JQ2LGS	"	5,088	46	21	27
*JA2VQF	"	4,687	44	14	29
*JH2BCN	"	2,108	30	16	18

*JR2TRC	28	72	6	2	2	
*JF2WXS	21	15,400	87	26	44	
*JA2LRD	"	14,592	83	23	41	
*JA2XOA	"	7,488	68	19	29	
*JF2PXB	"	4,995	58	14	23	
*JA2GCB	"	4,182	51	13	28	
*JN2FSE	"	3,348	43	14	22	
*JA2IZA	"	2,835	33	13	22	
*JK2HDC	"	1,128	21	10	14	
*JM2BHI	"	308	11	5	9	
*JF2VAX	14	66,346	266	29	69	
*JR2LIS	"	20,196	128	24	42	
*JA2CWU	"	20,128	168	24	53	
*JH2CYU	"	15,428	81	26	50	
JF3CCN	A	456,240	719	77	163	
JA3XOG	"	260,820	448	79	151	
JE3HVL	"	203,056	410	62	134	
JL3SBE	"	60,750	188	60	90	
JN3WYD	"	45,968	147	59	77	
JF3IUC	28	6,048	59	15	27	
JR3NZC	14	284,397	718	37	104	
JA3CE	"	462	11	7	7	
*JE3HDD	A	486,408	623	104	208	
*JH3CUL	"	305,808	460	92	185	
*JL3IVX	"	15,772	106	26	42	
*JA3WFQ	"	1,908	27	15	21	
*JK3ENJ	"	1,334	30	12	11	
*JR3RIY	21	177,632	552	32	90	
*JN3DRB/3	"	153,154	404	35	111	
*JA3LEZ	"	43,460	208	23	59	
*JI3DST/3	"	29,638	171	23	50	
*JJ3XHT	"	24,548	127	20	56	
*JR3KAH	"	2,016	30	10	18	
*JI3BFC	14	95,004	320	34	82	
*JG3WCZ	"	35,867	144	28	61	
*JN3DSH	"	22,770	151	25	41	
*JA3ORD	"	9,744	72	21	35	
*JA3COA	"	665	13	8	11	
*JK3DGX/3	7	51,306	207	30	72	
JA4DHN	A	5,900	50	23	36	
JA4RTX	"	759	13	10	13	
JH4CPC	28	1,118	24	11	15	
JM4UQM	14	245,960	646	39	104	(Opr. N9KAU)
*JA4ENY	A	175,168	334	79	145	
*JA4CZM	"	83,300	194	60	110	
*JI4HKA	"	1,296	22	9	15	
*JA4ETH	28	5,700	61	12	26	
*JA4AQR	"	468	14	5	13	
*JR4GPA	21	57,685	272	24	59	
*JH4JNG	14	99,036	294	35	91	
*JH4EZE	"	1,386	35	9	13	
*JM4WUZ	7	23,944	131	23	50	
JH5FXP	14	808,889	1688	38	143	
JA5APU	"	29,380	162	24	41	
JA5ARW	"	9,246	85	19	27	
JA5IP	7	2,465	33	14	15	
*JA5EO	A	130,032	345	47	97	
*JI5BKF	"	57,888	210	35	73	
*JF5FGY	28	3,240	36	15	25	
*JA5PEE	14	17,360	98	25	45	
JH6SQI	28	60,605	301	28	57	
JH6AUS	"	50,594	315	27	55	
*JA6WFM	A	413,098	630	88	178	
*JA6SRB	"	291,816	443	77	175	
*JF6WTY	"	48,190	155	45	77	
*JH6TYD	"	43,160	136	45	85	
*JH6FTJ	"	37,296	140	39	73	
*JA6QDU	"	12,283	71	26	45	
*JI6DMN	"	8,586	67	22	32	
*JA6EFT	28	4,633	50	16	25	
*JA6BIF	21	35,445	171	23	62	
*JM6EBU	"	8,372	69	15	31	
*JO6WGJ	"	8,232	60	19	37	
*JS6OCA	"	516	22	6	10	
*JA6CM	14	66,100	249	26	74	
*JJ6TWQ	"	14,526	107	20	34	
*JE6IBJ	7	10,688	73	22	42	
JA7UAP	A	303,249	435	91	180	
JA7JHT	"	122,604	253	79	125	
JA7ERJ	28	5,538	55	14	25	
JH7DNO	14	836,460	2025	38	142	
JA7BEW	"	178,422	511	33	98	
*JA7JH	A	19,598	89	37	45	
*JI7VUR	"	4,644	43	22	86	
*JA7OWD	28	33,966	180	27	47	
*JA7KM	"	4,329	47	13	24	
*JE7DOT	"	1,125	21	9	16	
*JA7YCQ	14	107,352	364	29	79	(Opr. JH7IMX)
*JA7DOT	"	31,025	138	25	60	
*JA7AXP	"	3,762	39	16	22	
*JA7FFN	7	1,725	31	13	12	
JA8RWU	A	1,924,296	1741	127	280	
JH8UQJ	28	3,332	41	12	22	
JH8FAJ	14	100,035	328	31	86	
*JH8BDA	A	13,284	80	33	48	
*JA8TEZ	21	760	20	9	11	
*JK8HOS	"	221	9	5	8	
*JK8FRL	"	182	8	5	7	
JA9NFO	14	236,522	601	37	106	
JH9URT	7	70	4	3	4	
*JA9DDF	A	32,032	114	46	66	
*JE9LLO	21	52,824	227	28	65	
*JE9PFD	"	22,295	163	22	43	
*JE9REN	"	20,448	127	22	50	
*JA9YBA	"	16,936	140	18	40	(Opr. JFØEGG)
*JA9XBW	7	12,993	86	22	39	
JAØQNJ	A	2,411,442	2062	129	289	
JRØWZR	"	383,565	523	95	178	
JAØQWO	"	340,548	572	81	155	
*JEØUXR	A	714,696	918	99	208	
*JAØUMV	"	268,800	411	89	167	
*JHØGHZ	"	181,472	350	78	136	
*JHØHON	"	135,036	282	64	122	
*JFØSGW	"	109,552	277	63	104	
*JAØTEA	"	19,580	100	36	53	
*JAØFVU	"	5,733	51	20	29	
*JRØGFM	28	4,712	62	13	25	
*JHØEPI	21	129,150	470	29	76	
*JHØSGG	"	7,599	61	19	32	
*JAØCJK	"	2,449	39	12	19	
*JAØGZ	14	1,350	22	12	15	
*JI7DUD/Ø	3.7	2,112	29	13	20	
*JHØDNX	"	77	5	3	4	

JORDAN

JY9QJ	A	2,618,992	2435	85	297	

KAZAKHSTAN

UN5F	A	589,842	790	91	240	
UN6T	21	81,906	370	25	77	
*UN7FW	A	82,080	431	41	114	
*UN7D	14	58,194	244	28	78	

KOREA

*HL1CG	A	142,747	270	72	137	

OGASAWARA

*JD1BIA	21	1,848	43	9	15	

KUWAIT

9K2HN	A	1,728,520	1951	77	239	
*9K2/YO9HP	A	151,900	562	21	77	

MACAO

XX9KC	14	16,200	216	18	32	
*XX9AL	A	1,333	23	11	20	
*XX9AJ	"	352	16	11	12	

MALDIVE ISLANDS

*8Q7BU	21	18,228	117	17	45	(Opr. DD5BU)
*8Q7LS	14	18,761	115	22	51	(Opr. DG6LS)

MONGOLIA

JT7AA	14	83,349	469	20	61	
JT1BG	3.7	4,522	100	13	21	
*JT1JA	21	2,262	52	11	18	(Opr. JT1CO)

OMAN

*A45ZN	A	130,519	735	30	85	

PAKISTAN

*AP2N	A	496,800	800	70	160	
*AP2NK	"	131,976	423	25	79	

QATAR

A71CW	A	3,081,843	2246	132	405	

SAUDI ARABIA

7Z5OO	A	661,593	1005	60	189	(Opr. K3UOC)

TAIWAN

BV7FF	14	56,880	489	27	53	
*BV/JP1RIW	21	91,476	858	21	56	

TURKMENISTAN

EZ8AI	28	3,718	57	5	17	
*EZ8CW	A	45,475	223	25	60	

UZBEKISTAN

*UK7F	A	214,928	441	59	143	

WESTERN MALAYSIA

*9M2TO	A	371,950	1079	75	140	
*9M2HQ	"	161,525	611	67	108	(Opr. GW3GJQ)

EUROPE

ALAND ISLANDS

OHØMM	A	2,250,675	2746	116	409	(Opr. OH2MM)
OHØNJ	21	53,070	150	30	115	

AUSTRIA

OE2BZL	A	101,952	332	48	144	
OEM9Y	"	47,950	175	40	97	(Opr. OE9SLH)
OE5BGN	14	196,725	819	31	98	
OE8SKQ	7	273,156	1047	34	122	
*OE1WEU	A	119,382	451	49	148	

AZORES

*CU2AF	1.8	3,193	61	6	25	

BALEARIC ISLANDS

EA6ZS	A	4,956	67	13	29	
*EA6LP	A	256,880	502	62	198	
*EA6ZZ	"	152,218	408	49	138	
*EA6JN	"	65,392	304	28	94	
*EA6ZY	28	6,160	91	9	26	
*EC6SR	21	32,844	230	23	69	

BELARUS

EU1FC	A	360,263	777	75	238	
EW2DD	3.7	13,528	164	5	33	
*EW2WP	A	221,970	1001	60	150	
*EW8DA	"	15,642	100	30	69	
*EU1AF	14	2,635	76	6	25	
*EW7DX	7	9,570	150	15	55	
*EU4AE	1.8	9,618	229	5	37	

BELGIUM

ON5JS	21	185,016	505	34	122	
ON4AYM	7	300,472	1438	29	113	
*ON5GQ	A	907,710	1091	81	314	
*ON4CAS	"	246,295	602	44	173	
*ON6CR	"	227,896	568	54	190	
*ON6FC	"	55,296	480	20	88	
*ON4CBW	"	34,444	213	28	81	
*ON5CZ	"	6,579	60	16	35	
*ON4XG	14	41,984	302	17	65	
*ON4CU	"	19,006	101	22	64	
*ON4AEY	"	6,390	87	10	35	
*ON7BJ	1.8	4,017	104	3	36	

BOSNIA-HERZEGOVINA

T91BAW	3.7	33,245	525	8	53	(Opr. T94LW)

BULGARIA

LZ1BJ	A	464,464	1070	60	226	
LZ1ZD	"	112,117	575	51	140	
LZ1WG	21	48,638	376	29	54	
LZ5QZ	14	111,038	718	26	92	
LZ6C	"	28,917	238	24	57	
LZ5W	7	588,350	1958	38	138	(Opr. LZ5DB)
LZ2CJ	1.8	38,257	574	8	59	
*LZ2SX	A	101,024	512	54	100	
*LZ2UZ	"	59,472	309	44	100	
*LZ1DM	"	54,510	381	24	114	
*LZ1OF	"	51,337	253	35	108	
*LZ2GS	28	20,574	136	18	63	

CROATIA

9A4RV	14	10,434	125	10	37	
9A4D	7	491,102	1897	36	140	(Opr. 9A2D)
9A7A	3.7	149,796	1215	24	90	(Opr. 9A8A)
*9A2EU	A	295,750	534	76	249	
*9A2TX	"	41,500	186	36	64	
*9A6KCL	"	9,620	141	13	52	
*9A6KMV	28	2,626	38	9	17	
*9A5Y	21	198,062	521	32	135	(Opr. 9A3LG)
*9A2RD	"	94,905	285	33	102	
*9A3ZO	7	1,440	45	6	24	
*9A6KHM	"	1,032	46	4	20	
*9A4RU	3.7	102,885	961	19	76	
*9A3QK	"	51,587	582	14	65	

CZECH REPUBLIC

OK1EP	A	605,570	809	89	321	
OK1AXB	"	313,800	613	69	231	
OK1AES	21	116,000	321	32	113	
OK1FJD	"	113,449	363	28	105	
OK2BHM	"	65,760	223	31	88	
OK1RI	14	1,265,704	2832	39	164	
OK2ABU	7	14,555	166	11	60	
OK2PSA	3.7	713	33	4	19	
OK1AY	1.8	64,154	834	12	67	
OK1DQT	"	14,310	267	7	46	
*OK7DX	A	329,051	826	61	220	(Opr. OK2PHH)
*OK1IR	"	192,449	520	50	173	
*OK2QX	"	149,308	422	63	166	
*OK2BMT	"	122,683	330	55	154	
*OK1SI	"	109,917	350	43	164	
*OK1KZ	"	90,440	296	41	129	
*OK1DMS	"	87,465	376	30	117	
*OK2PCL	"	74,100	171	103	475	
*OK1DKS	"	65,700	148	39	111	
*OK1BMW	"	64,800	211	40	160	
*OK2PBG	"	33,356	192	30	94	
*OK1UHZ	"	24,308	209	25	78	
*OK1AOU	"	14,964	111	25	62	
*OK2BLP	"	11,454	142	14	55	
*OK2SWD	"	9,362	110	18	44	
*OK2EC	"	5,778	79	13	41	
*OK1DVK	"	1,998	45	27	54	
*OK1ARI	21	163,701	453	33	108	
*OK2LE	"	69,730	315	27	68	
*OK2EQ	"	54,390	240	26	72	
*OK1FST	"	1,232	30	8	14	
*OK2BDI	"	1,173	21	10	13	
*OK2BVM	14	94,794	452	23	88	
*OK2VWB	"	34,860	274	21	62	
*OK2BXR	"	16,131	186	15	42	
*OK1JN	7	41,916	424	16	68	
*OK1DCF	"	12,928	169	53	202	
*OK1FPS	3.7	41,331	544	12	57	
*OL3Z	"	36,992	472	13	55	(Opr. OK2HI)
*OK1FHI	"	20,555	473	9	54	
*OK2PPM	"	18,368	271	9	55	
*OK2PHI	"	2,170	60	5	30	
*OK1FFU	1.8	24,274	471	6	47	
*OK1FF	"	2,006	60	5	29	

DENMARK

OZ5EV	A	426,220	539	85	319	
OZ6PI	"	10,575	99	20	55	
OZ5DX	21	47,676	210	22	65	
OZ7X	14	885,066	2043	38	144	(Opr. OZ5KF)
OZ9Y	"	511,836	1397	38	118	
OZ1INN	"	144,239	720	23	74	
OZ3W	"	93,310	249	31	124	
OZ3SK	1.8	44,540	675	9	59	
*OZ7HAM	A	203,496	601	56	188	
*OZ1HX	"	153,488	356	49	163	
*OZ8T	"	2,688	56	8	34	
*OZ4FF	"	1,682	26	12	17	
*OZ1JVX	14	11,336	161	12	47	

DODECANESE

SV5AZP	A	457,368	1500	54	174	

ENGLAND

M6X	A	1,329,310	1433	95	338	(Opr. G3NAS)
G3TTJ	"	1,008,788	1121	98	356	
G4WPD	"	352,751	669	53	260	
M6W	"	103,680	276	52	128	(Opr. G3XWK)
G4IUF	"	75,924	212	45	126	
G3TVU/M	14	32,130	188	19	71	
G3WGN	3.7	125,350	785	22	93	
G3XTT	1.8	42,121	604	9	64	
*G4KIV	A	1,244,524	1692	104	378	
*G3JKY	"	60,379	326	26	95	
*G3NKS	"	33,950	170	26	71	
*G4NXG/M	"	25,425	112	33	80	
*G4ZKJ	"	23,247	118	26	55	
*GØMRF	21	35,629	240	19	60	
*G3YOG	"	7,056	97	12	37	
*G3KWK	1.8	10,192	193	5	47	

ESTONIA

ES5TV	14	368,869	1396	36	127	
ES7RE	3.7	126,540	953	26	85	
*ES4RD	A	31,137	265	19	78	
*ES1CN	21	65,890	300	26	84	
*ES7TA	"	3,080	55	9	26	
*ES1RG	"	408	18	3	14	
*ES2RJ	14	464,352	1571	35	133	
*ES4NG	7	22,043	296	12	55	
*ES7FU	"	3,978	92	6	33	
*ES1MM	3.7	2,146	152	30	58	
*ES6MO	1.8	6,846	157	6	36	

EUROPEAN RUSSIA

RN6BY	A	1,923,208	2147	120	443	
RZ6LJ	"	1,033,410	1226	113	377	
UA6LU	"	930,264	1191	106	361	
UA1OMX	"	521,824	843	90	278	
R3/WA2NZA	"	423,852	1116	66	220	
RA3RK	"	419,640	838	75	237	
UA1OZ	"	249,632	642	57	212	
UA6LAK	"	186,052	460	61	180	
RV1CC	"	153,140	413	68	179	
U1BA	"	68,110	309	31	108	
RA3LJ	"	6,210	99	10	35	
RZ4HN	21	190,688	985	29	89	
UA6MZ	"	144,774	704	30	96	
RW6FZ	"	85,059	437	25	92	
RA3DNC	"	45,816	332	23	69	
RU1A	14	521,365	1690	36	133	(Opr. RV1AW)
UA6LQ	"	376,437	1271	37	142	
RA4AG	7	192,336	1167	33	118	
RU4AA	"	141,750	593	33	117	
UA1OMS	"	43,225	339	20	71	
RV1AB	"	2,800	75	6	29	
RA4CC	3.7	69,215	465	28	81	
UA3DPX	"	53,856	450	19	77	
RN3F	"	26,325	305	33	93	(Opr. RU3DX)
UA4CJJ	1.8	4,920	101	7	34	
*RU6BV	A	505,344	1149	69	260	
*RA3WA	"	406,700	797	72	260	
*RA6ABK	"	319,780	703	68	227	
*RU4WE	"	189,150	464	47	148	
*UA1OMZ	"	144,837	467	49	160	
*RA3DJA	"	102,466	350	44	138	
*RU6LC	"	69,165	216	52	107	
*RA3LS	"	55,008	240	37	107	
*RX3ZZ	"	28,200	110	35	59	
*RU3WR	"	27,846	201	25	94	
*UA6ART	"	15,957	131	21	60	
*UA1OSS	"	9,880	108	19	57	
*RK3AYK	"	1,620	56	6	24	(Opr. RV3AJN)
*RQ4L	21	637,014	2044	34	140	
*RZ6HX	"	104,650	534	24	91	
*RK3AD	"	15,048	105	18	48	
*RV6APN	"	1,305	39	7	22	
*RV6LFE	14	109,434	582	27	95	
*RV3ACA	"	91,238	683	25	73	
*UA1ZKZ	"	64,032	449	19	73	
*RW1ZN	"	55,986	339	21	65	
*UA1PAC	"	18,200	192	17	48	
*UA4LL	7	89,964	491	29	97	
*UA3ABJ	3.7	10,440	223	8	37	
*UA1ANA	"	4,922	99	7	39	
*RA6LW	1.8	10,504	168	8	42	

EUROPEAN TURKEY

*TA1BM	A	46,683	180	21	70	
*TA1FA	14	6,794	125	11	32	

FINLAND

OH1EH	A	1,921,328	2125	116	413	
OI6YF	"	1,428,319	1532	118	373	
OH3MMH	"	582,860	845	88	298	
OH8BQT	"	415,808	719	72	220	
OH6NEV	"	386,308	837	71	323	
OH1KF	"	380,895	552	83	296	
OI1BV	"	364,672	803	71	188	
OI6KZP	"	339,048	676	66	240	
OH5VT	"	289,323	712	67	212	
OH3JR	"	77,964	356	62	157	
OH5NE	"	9,728	114	19	57	
OI1AF	21	342,384	1069	31	137	(Opr. OH1MDR)
OH6MRA	"	163,306	653	31	112	
OH7MQF	"	22,022	205	20	57	
OH5PA	"	10,205	80	17	48	
OI1JD	14	744,480	1921	38	142	
OI4OC	"	735,048	2315	37	129	(Opr. OH5LF)
OI3NXW	"	168,304	809	28	106	(Opr. OH3MMF)
OH3WD	"	2,160	24	12	18	
OH3XA	7	42,024	310	23	79	
OH2BCD	"	17,220	254	13	47	
OH2MPO	"	1,400	38	7	21	
OH1NSJ	3.7	67,425	628	17	76	
*OH4JFN	A	561,925	1100	77	248	
*OI1LEG	"	163,795	390	53	182	
*OH1NOA	"	120,510	458	44	162	
*OH2MO	"	92,750	351	37	138	
*OH2LP	"	67,860	280	39	141	
*OH6SU	"	54,756	198	40	116	
*OH3LQK	"	52,288	194	44	128	
*OI3JCB	"	41,344	272	24	104	
*OI7NW	"	30,186	210	24	93	
*OH5NG	"	6,804	52	28	63	
*OI2RL	"	2,156	50	13	31	
*OH6QP	21	11,571	129	17	40	
*OH5WL	"	5,146	43	22	40	
*OI1LVR	"	722	24	5	14	
*OH8AV	14	64,090	518	20	65	(Opr. OH6MPJ)
*OH6RC	"	21,096	181	18	54	
*OH4MFA	1.8	2,485	71	6	29	

FRANCE

F6HLC	A	1,467,729	1473	102	375	
TM2WW	"	965,872	1239	95	329	(Opr. F5RZJ)
F8WE	"	493,770	1119	63	239	
F5RAB	"	318,360	708	62	218	
F5SUY	"	305,910	553	65	205	
F6FYD	"	164,079	255	54	255	
F5PIQ	"	134,044	370	49	139	
F6EEM	"	125,050	329	47	158	
F2NH	"	45,424	144	44	92	
F5PHI	"	17,052	129	22	62	
F5NBX	21	579,790	1339	37	143	
F8PTT	14	494,760	1468	34	134	(Opr. F5TGR)
TM9Z	"	373,579	1334	37	130	(Opr. F5VDM)
F5SJP	"	217,412	785	34	114	
F6FUN	"	36,972	218	21	58	
F6FYP	"	12,852	107	12	42	
F6CWA	1.8	2,310	60	4	31	

*F5NZO	A	332,343	614	69	228
*F5PCX	"	240,816	559	52	180
*F5PRR	"	195,624	499	60	174
*F6IJG	"	190,820	521	46	157
*F6GKQ	"	163,494	500	42	144
*F5IYQ	"	150,689	364	52	157
*F5AXP	"	139,023	423	37	134
*F6FNA	"	103,656	361	37	131
*F5POJ	"	102,557	402	41	120
*F6HNX	"	100,724	334	42	107
*F5JBF/P	"	88,033	351	33	118
*F6DZD	"	85,280	361	35	129
*F5PVJ	"	50,142	251	31	106
*F5RPB	"	35,392	175	28	84
*F5ROX	"	32,592	165	32	80
*F2RO	"	32,205	177	27	86
*F5NYK	"	31,065	228	23	72
*F5PHW	"	28,141	171	26	81
*F5ROW	"	20,475	128	20	71
*F5DEM	"	19,415	166	16	39
*F5IJH	"	14,760	121	26	64
*F5BOY	"	13,386	82	26	43
*F6CAV	"	11,250	115	25	50
*F9LT	"	6,967	60	16	47
*F8IN	"	3,210	49	12	18
*F5NEH	"	3,078	45	18	36
*F6AXD	"	684	11	9	10
*F5TDK	28	16,434	143	15	51
*FB1BJI	"	3,280	41	13	28
*F5PGP	21	226,366	706	32	101
*F6CLM	"	912	22	7	13
*F6OYU	14	147,960	583	30	105
*F5BZB	"	70,782	441	21	73
*F5AJG	"	5,592	119	9	33
*TM0ZK	7	104,544	880	23	85
(Opr. F5OZK)					

GERMANY

DJ4PT	A	3,183,040	2489	127	433
DL8PC	"	1,911,420	1713	122	433
DJ6QT	"	1,642,683	1492	122	415
DL2DXX	"	1,547,686	1476	111	343
DL6NCY	"	651,490	810	106	348
DL7MAE	"	605,172	712	107	337
DL8UCC	"	567,938	603	96	263
DL6MHW	"	447,392	707	83	269
DF2RG	"	413,277	654	82	265
DF9RD	"	283,920	527	74	199
DJ0MW	"	266,272	640	50	162
DL9SXX	"	228,608	602	55	201
DF3IS	"	209,615	512	60	205
DL1JPL	"	185,924	445	57	155
DK3KD	"	144,695	305	56	159
DL3SR	"	112,035	364	44	121
DL4YAO	"	105,648	335	51	135
DL4DCC	"	71,825	299	42	127
DL2ZAE	"	63,832	221	42	116
DL7GW	"	47,144	280	31	111
DL1TC	"	36,018	95	41	97
DJ3HJ	"	34,472	175	31	93
DL6KVB/P	"	34,040	179	32	83
DL1YFF	"	29,274	150	34	85
DL9SEV	"	17,922	120	24	63
DL4NER	"	15,846	141	36	78
DL0KB	"	12,530	70	19	51
(Opr. DK8GW)					
DK5AD	"	8,064	102	15	52
DL3KDC	"	2,166	50	9	29
DK5MV	"	1,870	21	13	21
DJ1ZU	28	20,713	132	19	58
DL4RCK	"	1,152	21	8	16
DL1AZZ	21	272,259	648	35	134
DJ5JH	"	110,952	323	30	108
DL9BCL	"	100,259	390	28	79
DL4DXF	14	47,034	150	31	103
DL8DBW	7	87,801	652	20	93
DL5AUJ	"	238	14	4	13
DL3LAB	3.7	135,269	967	22	87
DL8OH	"	98,226	771	20	82
DL7VMM	"	19,099	232	12	59
DJ4PI	1.8	26,599	480	9	58
DK6XR	"	2,050	52	5	36
*DL2OBF	A	813,279	1062	86	333
*DK2OY	"	799,268	1053	83	339
*DJ5BV	"	601,084	720	89	329
*DL2FDK	"	345,850	573	68	242
*DL7ANR	"	303,324	664	59	217
*DJ4JF	"	290,304	429	71	217
*DL2HX	"	245,856	465	70	242
*DJ1OJ	"	160,230	405	63	182
*DL0RT	"	154,440	512	41	139
(Opr. DL7AOS)					
*DL1DQY	"	136,253	260	66	157
*DL1EMH	"	132,015	370	52	143
*DJ0PN	"	105,436	500	30	142
*DL1TS	"	104,499	349	40	113
*DL1DTC	"	99,330	276	52	113
*DL4FMA	"	83,072	338	43	133
*DL8SDC	"	74,304	257	46	126
*DL2YAK	"	62,016	246	36	100
*DL6GV	"	60,858	167	52	137
*DL5IAB	"	60,532	270	33	115
*DL5JJF	"	57,510	275	35	100
*DL3DBY	"	55,322	277	32	107
*DL0LB	"	49,530	212	36	91
(Opr. DL8SDC)					
*DF5AN	"	48,205	200	32	123
*DL4SKF	"	44,958	209	33	94
*DL2KWA	"	38,514	259	28	103
*DL8WCM	"	37,990	137	45	100
*DL8ULO	"	33,240	277	22	98
*DL7VPO	"	27,450	200	32	90
*DJ8EW	"	24,970	129	33	77
*DJ4QO	"	22,360	118	76	215
*DL2GBB	"	20,774	130	26	68
*DL6UAM	"	18,920	126	23	63
*DL3DCY	"	18,624	154	24	72
*DL3YEI	"	17,578	93	24	70
*DK5KJ	"	16,380	210	27	51
*DL8UVG	"	16,036	105	26	50
*DL2AL	"	13,923	217	21	94
*DL4FDT	"	12,312	111	18	54
*DF2IAX	"	11,480	113	21	49
*DL3HWW	"	9,760	72	20	60
*DL3SKF	"	8,784	71	23	38
*DL5SVB	"	8,680	84	7	63
*DL3MG	"	5,133	41	21	38
*DL3HRZ	"	3,589	37	17	20
*DL9JW	"	3,496	80	7	39
*DL6CMF	"	1,764	41	12	30
*DL3VIF	"	1,334	31	10	19
*DL2MHS	"	720	15	8	8
*DJ5CL	"	165	7	5	6
*DL7MAT	"	48	5	3	5
*DJ5MN	"	48	6	6	6
*DL4RCE	28	20,925	144	19	56
*DF5WN	"	560	18	8	12
*DJ9ZB	21	146,740	441	29	116
*DL2SBY	"	107,352	367	28	98
*DL3BRA	"	69,384	242	28	90
*DL6AG	"	4,320	34	21	27
*DL0VLT	"	6	1	1	1
*DF7YU	14	119,370	427	30	108
*DL1RNW	"	67,032	371	20	78
*DL6AKK	"	19,430	198	15	52
*DJ0BX	"	1,288	33	8	15
*DA2KI	7	21,513	271	13	58
*DL4VBS	"	13,464	130	12	56
*DL9XW	"	2,268	57	5	31
*DL2RZG	"	1,830	63	4	26
*DJ9LJ	1.8	19,668	273	7	59
*DK5VO	"	2,628	77	3	33
*DL1SWB	"	962	40	5	32

GREECE

SV2BFN	A	800,394	1404	96	317
SV2CWY	3.7	66,908	655	15	71
SV8CS	1.8	47,272	577	10	66
SV1/IK0XWS	A	127,041	590	37	122
*SV1JA	"	9,486	102	20	42
*SV2DGH	"	8,024	96	22	46
*SV2BBD	"	7,360	74	27	53
*SV1DNW	28	14,508	343	22	71
*SV2AEL	"	10,465	110	16	49
*SV2YC	7	4,644	101	6	37
*SV1DET	3.7	26,483	324	11	60
*SV0AN	"	638	30	4	18

HUNGARY

HA9BVK	7	382,834	1776	34	124
(Opr. HA9HX)					
*HG8QB	28	11,224	86	19	42
*HA1VE	7	5,617	136	8	33
*HA8BE	1.8	35,644	499	7	60

ICELAND

*TF7/W4WET	A	55,200	318	31	84

IRELAND

*EI6FR	21	108,240	496	24	96

ITALY

IO4LEC	A	3,333,804	2607	125	439
IO6F	"	2,585,605	2172	126	457
(Opr. IK6BOB)					
IN3ZNR	"	1,402,167	1505	102	369
IU2E	"	1,273,660	1537	99	331
(Opr. IK2VUE)					
IK4ADE	"	1,061,049	1429	82	281
II0G	"	884,040	1191	91	326
(Opr. IK0YUT)					
IK5MEQ	"	170,400	400	55	158
I0KHP	"	162,078	386	55	172
I4CSP	"	140,777	230	63	158
IK2OLJ	"	41,860	166	40	100
IK6WEB	"	29,800	178	31	69
IK5YJK	"	11,410	93	23	47
IV3BKH	"	6,729	80	28	60
I0YQV	"	5,332	44	19	24
IK2PTL	"	2,457	40	16	23
IK4YNR	"	1,150	21	10	15
I8KPV	28	89,380	418	26	83
IK5QGO	"	80,344	265	24	97
IK4GNH	"	68,400	284	27	87
IV3BMV	"	22,680	139	20	51
IK4GRO	21	637,431	1598	36	123
IR4B	"	327,432	777	35	133
(Opr. IK4AUY)					
I5JFG	"	11,895	73	20	41
IR5T	14	606,884	1563	112	173
(Opr. IK5ORP)					
IK2WAD	"	273,162	894	34	125
IK0PHY	"	264,870	958	34	128
IK6CAC	"	158,040	736	25	94
IR4T	7	745,820	2117	36	142
(Opr. I4JMY)					
IU2X	3.7	165,204	1263	22	95
(Opr. IK2GSN)					
IN3QBR	"	139,874	1165	21	82
IV3YYK	"	132,253	949	27	94
IK2DED	1.8	12,488	228	6	50
*IR4R	A	1,137,672	1179	109	349
(Opr. IK4ALM)					
*IK4MTF	"	494,520	802	70	242
*IK2XYI	"	382,044	728	72	244
*IK2WZV	"	320,931	749	52	159
*IN3XUG	"	283,803	620	53	194
*IK0YVV	"	225,780	385	70	214
*IK3OYY	"	202,920	457	58	170
*IK4WMG	"	199,182	302	71	190
*IK7RVY	"	183,232	471	60	164
*IK7NXU	"	169,865	329	62	203
*IK4QJM	"	126,453	357	52	131
*IK3PQG	"	124,396	341	55	172
*IK7WPD	"	107,525	384	47	140
*IK0ZYK	"	103,935	356	41	128
*IK2RPE	"	102,097	310	48	145
*IK5WWF	"	100,425	245	61	134
*IK7WUE	"	100,033	321	49	128
*IZ8AJV	"	77,751	224	49	110
*IK8VZF	"	73,470	336	35	120
*IK3SCB	"	72,177	243	42	105
*IK0WHN	"	66,466	233	42	103
*IK1ZNV	"	51,152	243	36	103
*IK1RQQ	"	47,580	185	42	88
*IK2YSJ	"	45,276	230	36	96
*IK0WRB	"	45,000	202	41	109
*I1PLX	"	39,825	139	44	133
*IK8YFW	"	35,752	210	30	79
*IK8WEI	"	35,640	210	31	79
*IK2UVR	"	25,724	140	31	78
*IK1ZOH	"	24,426	102	36	82
*IK5PWN	"	21,620	120	34	81
*IK4WLP	"	20,819	130	30	79
*IK0IXQ	"	19,201	105	31	60
*IK8IFW	"	17,854	102	27	86
*IZ5AJP	"	15,984	127	27	40
*IK6XGS	"	10,416	92	17	45
*IK0MIB	"	9,734	79	19	43
*I5NXD	"	5,411	102	36	52
*IK4CBM	"	5,396	70	17	37
*IK2REA	"	4,387	64	13	28
*IK2QEB	"	3,649	51	17	24
*IK2RPK	"	3,528	50	14	28
*IK1ZNX	"	3,182	50	15	22
*IK4ZHV	"	1,961	31	11	26
*I2ARC	28	27,370	142	23	62
*IK2TDM	"	19,241	106	20	51
*IK1ZOF	"	4,810	50	13	24
*IR6W	21	265,680	719	35	127
(Opr. IK6WDY)					
*IK4ZHH	"	109,532	331	32	109
*IY4M	14	807,764	1984	38	140
(Opr. I4ABF)					
*IV3FSG	"	299,550	1046	30	120
*IR2R	"	234,243	904	32	121
*IV3UHL	"	185,058	691	28	110
*I4AFQ	"	95,424	425	24	88
*IV3HYD	"	77,145	366	25	86
*I4PZP	"	57,435	547	23	82
*IK2YSA	"	53,664	306	19	77
*I/G0PWW	"	13,950	124	16	34
*I2GXS	"	9,720	105	14	46
*IK2EBP	"	132	8	5	6
*IQ5Q	3.7	50,232	447	16	76
(Opr. I5VXG)					
*IK0XBX	"	22,780	281	9	58
*IK4LZH	1.8	17,629	281	6	55
*IC8JAH	"	4,500	91	8	37

KALININGRAD

UA2FP	A	198,074	802	38	156
UA2FJ	3.7	256,452	1665	27	102
*RA2FZ	A	275,670	682	58	212
*RA2FAD	1.8	3,420	113	4	26

LATVIA

YL2KO	A	653,050	1198	77	276
YL2GN	7	96,255	657	24	91
YL2SM	1.8	30,180	483	7	53
*YL8M	A	803,011	1417	88	319
(Opr. YL2KL)					
*YL2SW	"	115,097	511	43	136

LITHUANIA

LY2BM	A	529,635	1581	71	264
LY2CX	"	248,008	744	56	176
LY2PAQ	"	228,938	751	49	177
LY2DX	"	25,200	143	33	93
LY3BH	21	287,063	771	34	127
LY5W	14	636,741	1800	39	150
(Opr. LY1DR)					
LY2BN	"	102,564	489	29	97
LY2OX	"	82,992	352	27	85
LY2AE	"	82,824	386	25	94
LY3BX	7	154,132	1060	27	97
LY6K	3.7	179,170	1357	23	92
LY2BR	1.8	38,430	623	7	54
LY3CI	"	18,250	375	6	44
*LY3BA	A	1,027,138	1435	90	356
*LY2FN	"	425,712	866	70	266
*LY1DT	"	319,056	792	58	218
*LY2TX	"	50,370	278	32	106
*LY1FAG	"	34,380	237	32	58
*LY2TZ	"	30,816	220	24	83
*LY2PBM	"	29,694	246	19	79
*LY2DD	"	10,270	118	14	51
*LY3BY	"	4,346	49	16	37
*LY4AB	21	11,325	151	21	54
*LY3NJM	"	486	22	5	13
*LY2NV	14	21,216	203	15	53
*LY3KB	3.7	1,995	50	8	27
*LY2OU	1.8	11,750	221	6	44

LUXEMBOURG

LX1EP	A	201,800	905	41	159
*LX1JH	A	41,529	281	29	98

MACEDONIA

*Z32KV	A	48,990	284	29	86
*Z32ZP	28	374	16	6	11
*Z31JA	21	249,232	984	30	118
*Z30M	14	423,948	1842	33	114
(Opr. Z32XA)					
*Z31GX	7	62,865	401	10	80
*Z37FBS	3.7	4,680	112	6	33
(Opr. Z32GD)					

MALTA

9H0A	28	223,010	892	27	118
(Opr. 9H1EL)					

MOLDOVA

ER2WD	A	99,384	526	31	133
ER1IM	21	1,633	53	5	18

NETHERLANDS

PA0AGA	A	570,834	1323	77	220
PA0KDM	"	102,120	368	47	137
PA3GKE	"	41,310	212	32	70
PA0GAM	"	32,860	106	41	83
PA3EVY	"	28,800	183	46	114
PA0IJM	14	223,850	990	28	93
*PA3EMN	A	253,449	718	43	200
*PB0ANR	"	137,629	316	57	172
*PA0KHS	"	130,217	454	42	155
*PA0COE	"	44,183	308	25	88
*PA3GPQ	"	18,511	113	30	77
*PA0JNH	"	9,701	75	30	59
*PA3AEB	21	35,883	191	20	61
*PA3ELD	14	86,298	444	24	90
*PA3GAB	"	21,518	199	15	43
*PA3DWJ	7	429	13	5	6
*PA2SWL	1.8	14,168	252	7	49

NORTHERN IRELAND

GI0KOW	A	5,787,333	4484	121	492
MI6I	14	878,150	2600	37	145
(Opr. GI0UJG)					

NORWAY

LA2WHA	A	130,698	468	32	127
LA6IHA	"	88,330	429	25	121
LA9DFA	"	56,232	341	30	112
LA5YV	"	13,300	117	22	73
LA5JX	"	9,360	74	26	54
LA2QJA	"	8,140	96	19	55
LA6BBA	"	4,500	87	9	36
LA2IR	14	91,800	418	24	78
LA9DK	"	12,375	125	14	41
LA9VDA	3.7	165,025	1363	22	93
*LA4MHA	A	115,209	443	35	118
*LA7SI	"	89,046	204	36	117
*LA4BN	"	45,991	250	30	83
*LA2JR	"	43,148	200	35	99
*LA5LJA	"	14,374	133	38	104
*LA9IHA	"	13,416	136	19	59
*LA1KQ	"	899	29	10	21
*LA8WG	14	21,594	252	15	44
*LA7IJA	7	3,465	63	7	38
*LA4O	"	3,168	84	5	31
(Opr. LA9HW)					

POLAND

SP3JHY	A	140,811	300	64	187
SP2JMR	"	125,810	268	68	162
SP7VCK	"	68,475	184	57	108
SP2RXG	"	29,295	101	31	74
SP5XD	"	16,068	100	30	73
SP5ABB	"	9,490	113	20	53
SP5CEQ	"	7,155	55	19	34
SP9LAS	"	2,379	25	16	23
SP9LAB	28	12,127	86	18	49
SP5DDJ	"	9,180	96	16	44
SP3PSM	"	864	8	3	6
SP5ES	21	181,902	578	30	112
SP3KFI	"	16,274	86	19	60
(Opr. SP3OEQ)					
SP9JCN	"	9,617	80	16	43
SP6MLF	"	7,577	77	16	30
SP9ATE	14	382,165	1078	35	144
SP4KCM	"	266,631	987	31	110
(Opr. SP4TXI)					
SP5LKM	"	106,536	360	36	102
SP3PLD	"	73,632	405	19	77
SQ5AAS	"	58,212	391	29	70
SP9RCL	7	40,495	350	16	75
SP3MGM	"	16,192	230	9	55
SP9HZF	"	4,888	54	15	37
SP6KEP	3.7	107,702	943	20	78
(Opr. SP-23022-OP)					
SP6HEQ/p	1.8	37,824	597	8	56
*SP2QCH	A	638,314	1131	79	279
*SP6NIC	"	478,552	929	78	250
*SP6MLX	"	247,296	559	61	195
*SP1MHV	"	222,992	420	67	241
*SP9HWN	"	210,451	505	64	165
*SP4EEZ	"	173,151	315	97	200
*SP5BB	"	129,574	465	49	157
*SP1EOI	"	84,560	289	45	95
*SP2ZFT	"	78,624	366	56	100
*SP7FQI	"	49,950	236	39	96
*SP9BLF	"	32,928	180	25	71
*SP2SCH/P	"	32,250	211	35	94
*SP3PLC	"	26,775	162	29	90
*SP6FJ	"	22,990	100	40	70
*SP3XR	"	17,225	253	41	101
*SP8TDE	"	16,037	104	29	50
*SP6EII	"	10,800	132	17	58
*SP5DRE	"	10,564	139	16	60
*SQ9DXN	"	9,401	104	17	62
*SP9RPW	"	9,088	57	26	45
*SP6NIG	"	7,074	54	18	36
*SP7LHX	"	6,510	80	20	50
*SP2ATF	"	4,186	97	15	44
*SQ2BNM	"	3,462	83	23	55
*SP9KZ	"	3,402	73	15	32
*SP7GAQ	"	3,268	26	18	25
*SP9SOI	"	3,024	50	11	10
*SP6OPE	"	1,170	19	12	18
*SP2EBG	28	18,072	171	19	53
*SP6OJJ	"	15,695	112	19	54
*SP7DZA	"	1,767	38	9	22
*SP5LCC	"	1,104	20	9	15
*SP3SLA	21	240,000	629	33	117
*SP2QVI	"	86,058	295	28	98
*SP6OJG	"	32,700	128	28	72
*SP5WAL	"	14,964	86	20	38
*SP2UKB	"	13,912	80	21	53
*SP2WDW	"	2,813	35	11	18
*SP3JIA	"	285	12	6	9
*SP6CPF	14	35,948	232	22	64
*SP3FZN	"	26,878	248	29	60
*SP5ICS	"	19,648	187	18	46
*SP6LUV	"	15,343	120	20	47
*SP2GNB	"	12,100	136	17	38
*SP9IKN	"	5,650	76	10	40
*SP9AVZ	"	5,130	110	8	30
*SP6DHH	"	2,400	66	8	22
*SP3GTS	"	2,196	41	7	54
*SP9NLK	7	72,910	451	22	93
*SN6O	"	58,968	347	21	87
(Opr. SP6IHE)					
*SN3P	"	12,213	176	9	59
(Opr. SP3DAH)					
*SP9OYK	"	9,911	166	8	45
*SP9BQJ	"	5,724	78	9	44
*SP4GFG	3.7	24,320	348	11	53
*SP5XMM	"	14,991	246	9	48
*SP9RTF	"	10,505	176	8	47
*SP5OXJ	"	4,956	107	7	35
*SP9KGG	"	2,691	64	5	34

PORTUGAL

CT1ETT	A	331,064	750	60	172
CT1AUO	"	254,824	523	53	159
CT4NH	28	154,399	556	24	113
CT1ELF	"	6,516	77	9	27
CT1BOP	21	1,054,144	2598	36	145
CT4KQ	"	207,133	800	26	77
CT1EWX	"	14,787	158	13	40
CT1UO	"	13,566	118	14	43
CT1CFI	"	5,344	60	13	19
*CQ1BWW	A	499,380	829	67	220
*CT1AGS	"	65,664	212	38	106
*CT1QF	"	25,276	158	19	52
*CT1FLD	"	20,500	97	36	64
*CT1ETX	"	19,600	116	30	68
*CT1BXX	"	11,211	308	40	100
*CT1EGA	"	5,628	50	19	48
*CT1ELP	28	84,095	370	24	97
*CT1ESO	"	68,195	287	22	93
*CT4NC	14	4,800	88	7	33
*CT1EDJ	"	3,150	46	10	20

ROMANIA

YR2R	21	280,755	855	34	119
YO7DAA	"	55,568	350	23	69
YO4FYQ	14	289,380	1428	32	108
*YO4CIS	A	413,875	1027	64	237
*YO8FR	"	195,552	523	44	180
*YO5QAW	"	105,600	403	42	158
*YO5CYG	"	80,700	452	26	124
*YO5CUU	"	73,336	227	45	133
*YO9XC	"	67,940	348	58	100

*YO7ARY	"	63,495	316	34	119
*YO8BGE	"	50,960	325	32	108
*YO3NL	"	29,900	180	30	100
*YO9IAB	"	19,680	198	16	66
*YO2QY	"	16,878	80	31	66
*YO3JF	21	282,080	1006	32	132
*YO4FRF	14	6,110	110	10	37
*YO9AHX	"	2,886	93	9	17
*YO2CJX	1.8	3,312	86	5	31

SAN MARINO

T77WI	21	183,291	756	31	76

SARDINIA

ISØQDV	A	539,413	1113	67	226
*ISØNHT	A	370,370	747	62	224
*ISØWBT	"	95,206	328	47	134
*ISØLLJ	"	70,560	284	42	102

SCOTLAND

GM3BCL	A	276,312	606	53	179
GMØEGI	21	115,168	579	26	92
GM6X	14	728,952	2013	36	132
*GMØFET	A	243,450	653	45	180
*GMØTGE	"	104,664	397	42	124
*GM/KG6AO	"	24,596	136	23	63

SICILY

IT9STG	A	1,724,556	2390	96	315
IT9BLB	14	1,148,648	3010	40	159
*IT9AJP	A	288,788	507	72	220
*IT9DAA	"	151,348	272	71	170
*IT9ZYT	"	60,965	248	39	98
*IT9ORA	"	53,625	266	36	107
*IR9B	14	540,799	1793	36	125
					(Opr. IT9STX)
*IT9CML	7	27,170	201	22	73
*IT9THD	3.7	46,720	501	15	65

SLOVAK REPUBLIC

OM8A	A	1,417,432	1630	103	321
					(Opr. OM3RM)
OM3A	14	91,390	560	22	73
					(Opr. OM8AW)
OMØWR	3.7	98,610	889	18	77
*OM3PQ	A	205,540	500	49	190
*OM3YK	"	132,720	455	55	155
*OM3TNI/P	"	23,938	201	22	69
*OM2SM	"	12,627	129	16	63
*OM5FA	28	33,573	202	22	71
*OM3YEB	21	51,660	240	25	65
*OM5KM	3.7	31,947	437	11	58
*OM7V	"	28,200	457	8	52
*OM4WW	"	16,483	309	6	47

SLOVENIA

S5ØA	A	4,206,860	2904	137	467
S59ZA	"	1,610,240	1547	122	390
S59L	"	1,126,656	1509	89	295
S55A	"	508,141	856	65	204
S59AA	"	97,584	219	63	151
S51NY	"	83,764	280	46	126
S51AY	28	79,076	387	23	83
S59A	21	651,128	1358	38	161
S5ØU	"	564,510	1287	39	147
S53R	"	479,210	1104	35	138
S57DX	14	741,080	1793	40	154
S56A	"	574,398	1377	40	158
S5ØC	7	531,918	1798	33	141
S53EA	"	443,856	1554	35	133
S57AL	"	379,992	1424	34	127
S51NM	"	82,188	596	23	85
					(Opr. S52OP)
S58WW	3.7	129,896	1127	19	82
S570	"	122,324	1001	22	84
S51Z	"	86,344	903	15	71
S53FO	"	25,254	312	14	55
S54DL	1.8	54,940	858	9	58
*S51FA	A	818,975	1046	101	324
*S51IX	"	634,648	888	89	303
*S51T	"	21,690	223	22	68
*S53DX	"	20,090	176	24	58
*S57J	21	315,185	741	34	135
*S53BM	"	81,969	378	26	63
*S57T	14	272,880	903	29	115
*S57U	"	127,000	555	28	99
*S5ØL	"	32,076	249	17	64
					(Opr. S57NW)
*S54ZZ	7	213,194	963	26	108
*S5ØO	"	87,780	545	24	90
*S54A	"	81,125	478	25	100
*S57CBS	3.7	40,158	528	12	57
*S58J	"	33,932	463	11	57
*S52SK	"	24,601	291	16	57
*S57MRG	"	23,868	444	7	47
*S57PWI	"	19,085	355	6	49
*S57NPR	"	7,216	177	7	37
*S57KAA	"	2,784	96	4	25
*S54E	1.8	38,871	605	6	57

SPAIN

EA3FQV	A	1,957,940	2069	99	347
EA5GRC	A	879,800	1105	101	314
EA3GBU	"	717,651	1060	84	279
EA5GRB	"	364,812	660	67	234
EA1JO	"	309,925	576	62	183
EA1EVN	"	306,722	688	62	189
EA1MV	"	255,267	536	62	189
EA5EYJ	"	211,190	359	66	179
EA4AJB	"	160,854	969	43	123
EA7AKK	"	127,426	382	48	121
EA5AEN	"	111,446	254	39	115
EA3WT	"	77,779	181	60	133
EA3GKF	"	61,372	211	40	94
EA1HP	"	43,434	229	30	97
EA3AQQ	"	43,136	182	35	93
EA5GJM	"	34,776	111	52	86
EA5GQZ	"	32,640	173	25	41
EA1EXY	"	26,832	162	30	74
EA5CIO	"	23,750	123	27	68
EA5AKR	"	21,216	96	32	64
EA2ARW	"	17,025	130	22	53
EA5FME	"	15,438	152	25	68
EA7CWA	"	5,194	36	20	30
EA7BR	"	1,457	19	11	19
EA5KK	"	532	16	7	7
EA7EZ	28	106,941	374	26	103
					(Opr. OH2BAZ)
EA7BA	"	64,746	254	25	74
EA2BP	"	3,348	52	13	18
EA1FDJ	21	37,206	224	15	63
EA2RW	"	17,220	108	21	49
EC3AJY	"	2,880	31	16	24
EA2IA	14	553,280	1776	37	115
EA5GMB	"	145,908	844	23	85
EA3APS	"	83,600	437	22	88
EA1DLU	7	118,800	538	18	82
EA7DHP	3.7	70,500	405	20	80
EA3ALV	"	39,525	365	17	68
EA1BCK	"	32,160	284	12	68
*EA3BKI	A	817,740	1309	74	234
*EA3ELZ	"	712,635	997	84	301
*EA7RU	"	273,312	555	48	171
*EA1DAX	"	243,832	556	51	181
*EA1ABM	"	232,596	557	48	165
*EA1BLX	"	227,397	506	51	178
*EA7AFM	"	226,314	728	47	151
*EA4AV	"	213,277	411	62	209
*EA5EYJ	"	211,190	359	66	179
*EA1AW	"	189,145	502	43	138
*EA3NA	"	154,998	396	65	172
*EA5AFH	"	143,389	403	33	90
*EA5EOC	"	139,920	292	63	157
*EA4BL	"	130,674	335	54	120
*EA1JJ	"	112,230	353	41	133
*EA1IF	"	112,190	506	24	106
*EA1FAD	"	107,610	304	50	120
*EA1BAF	"	103,259	306	45	124
*EA3ADM	"	98,735	323	40	115
*EA1FBO	"	88,400	318	40	130
*EA3KT	"	87,696	325	35	109
*EA1CZF	"	85,272	347	34	118
*EA5JC/1	"	77,182	345	41	108
*EA5FWW	"	76,230	256	42	123
*EC5CFQ	"	75,072	335	28	108
*EA1ET	"	69,994	255	41	117
*EA5AML	"	68,520	398	31	89
*EA5XN	"	63,140	208	42	112
*EA5XX	"	56,544	226	42	110
*EA4BHK	"	53,720	235	38	98
*EA5ANY	"	53,480	168	45	95
*EA4EIS	"	48,384	161	34	94
*EA1APS	"	45,835	235	27	76
*EA1BZP	"	45,240	217	34	96
*EA1AEG	"	45,136	186	29	75
*EA3OP	"	44,086	218	28	106
*EA4AQQ	"	35,422	171	32	57
*EA1JW	"	32,860	165	35	89
*EA7GXX	"	31,040	131	34	63
*EA7EWX	"	29,945	183	33	80
*EA7GD	"	29,760	117	41	83
*EA5CHT	"	28,959	197	48	99
*EA3ATN	"	28,122	93	43	86
*EA5ABH	"	25,650	92	32	63
*EA5CRU	"	25,359	145	27	80
*EA3AUM	"	23,661	115	34	65
*EA3AIM	"	23,154	172	19	83
*EA1BAW	"	22,659	175	20	63
*EC5CWA	"	20,680	175	19	69
*EA7CWV	"	20,045	98	33	62
*EA3ASX	"	19,320	116	33	82
*EC5AJW	"	13,838	108	18	56
*EA1AUT	"	13,140	133	18	55
*EA1DFP	"	12,665	62	28	57
*EA1ASC	"	11,132	86	24	68
*EA2BDR	"	11,115	118	16	49
*EC1ANZ	"	10,270	114	20	45
*EC5AAK	"	9,928	93	20	48
*EA1FY	"	8,710	68	24	43
*EC4DJY	"	8,618	95	10	52
*EA3FFE	"	8,296	82	21	47
*EA7TG	"	7,526	48	26	45
*EA3AM	"	7,192	124	18	40
*EA2CR	"	7,119	92	14	49
*EA3EAN	"	6,954	76	21	40
*EA7BYM	"	6,336	58	21	45
*EA3AQL	"	4,998	40	19	32
*EC1DFA	"	4,410	60	14	35
*EA3TA	"	3,927	63	14	37
*EC1AGL	"	3,564	64	12	32
*EC3AEP	"	3,498	67	16	47
*EA1BLF	"	1,682	20	11	18
*EA1DLN	"	1,377	19	12	15
*EA1BXG	"	1,296	24	8	19
*EC5AIH	"	483	14	7	14
*EA7HBP	28	57,780	293	22	85
*EA7FIU	"	51,888	267	19	75
*EA3FCQ	"	45,235	239	21	62
*EA4DXP	"	18,297	128	15	42
*EA7ALN	"	13,452	100	15	42
*EA3TI	"	13,150	100	14	36
*EA7AKB	"	5,074	46	14	29
*EA7GR	"	4,924	86	46	17
*EA4DWY	"	2,848	38	11	21
*EA7GTF	21	221,949	905	28	89
*EC3AIC	"	204,468	764	34	98
*EA3ANE	"	80,616	307	30	98
*EA7ANM	"	77,175	495	19	56
*EA3GJH	"	67,624	285	27	80
*EC3AHT	"	29,299	197	23	60
*EC1DKD	"	27,030	200	24	61
*EA7IA	"	25,270	149	18	52
*EC3AKF	"	21,812	155	21	55
*EA1BTK	"	18,090	126	23	44
*EA7GGP	"	12,670	79	20	50
*EC7ACV	"	10,521	95	17	46
*EC5ADY	"	8,798	92	15	38
*EC2AFD	"	8,550	98	17	40
*EC5CMQ	"	6,105	48	22	33
*EC5AIL	"	5,857	80	37	48
*EC3AJF	"	5,715	59	19	26
*EC3CMT	"	4,738	53	15	31
*EC5ABY	"	3,240	43	16	29
*EC4AEK	"	1,064	23	10	18
*EC1AOD	"	81	5	4	5
*EA3GHZ	14	111,027	530	26	93
*EA1AKP	"	109,872	558	22	87
*EA1AJV	"	90,885	638	18	65
*EA4BFK	"	30,338	204	19	58
*EA1CEI	"	30,184	274	18	59
*EA3AJP	"	22,491	224	18	45
*EA4ELA	"	14,460	152	10	50
*EA1FK	"	3,960	70	9	11
*EA3BD	7	129,105	612	20	75
*EA5EOR	"	6,150	115	10	40
*EA1DGT	"	1,015	26	7	22
*EA3CJ	3.7	11,124	205	7	47
*EA3DNC	"	5,544	99	7	37

SWEDEN

SM5AOE	A	1,058,607	1302	94	313
SM3BIZ	"	416,500	676	81	269
SM7DXQ	"	132,975	300	54	171
SM3AF	"	72,303	219	71	160
SM5OK	"	15,295	101	31	64
SM7AIL	"	8,841	322	21	72
7SØMG	21	126,352	382	31	117
					(Opr. SMØKV)
SKØUX	14	398,026	1274	35	107
					(Opr. SMØDRD)
SM5LPO	"	139,440	800	28	77
SM6DER	7	78,217	630	20	87
SM2DMU	"	58,092	415	27	76
SM6DOI	1.8	49,506	674	13	61
*SM3PZG	A	401,495	958	67	228
*SMØBDS	"	61,965	265	34	119
*SM2IEO	"	35,028	136	44	95
*SM7BZV	"	17,472	120	25	66
*SM7FTG	"	12,920	115	19	66
*SM4TIY	"	11,049	105	20	67
*SMØFM	"	6,032	90	16	56
*SM7HSP	"	5,500	57	14	30
*SKØPR	"	700	13	8	12
					(Opr. SMØDZH)
*SM7BHM	28	966	34	6	17
*SM4HEJ	"	864	24	5	13
*SM5BDA	14	87,453	362	26	97
*SM5DUT	"	26,535	435	14	47
*SM6FJY	"	1,365	24	7	14
*SM6AHU	"	990	55	6	12
*SK7BQ	7	8,256	163	7	41
					(Opr. SM7BHM)
*SK4UW	3.7	4,788	86	4	24
					(Opr. SM4JHK)
*SM7VZX	1.8	12,596	265	6	41

SWITZERLAND

HB9HFN	A	38,860	103	58	87
HB9DX	21	32,131	106	24	103
*HB9BTI	A	162,495	478	48	159
*HB9ARF	"	144,536	435	50	182
*HB9NN	"	53,200	206	27	85
*HB9QA	"	6,390	60	24	46
*HB9HFD	"	5,355	77	23	40

UKRAINE

UT7EZ	A	4,141,984	3341	136	480
UT4UZ	"	2,973,500	2649	138	488
UTØD	"	2,482,597	2534	119	410
					(Opr. UT7DX)
UX1UA	"	597,240	1075	91	287
UX5UO	"	362,824	634	81	260
UT8IM	"	259,793	951	52	187
UT4EK	"	219,369	582	56	193
UY2ZA	"	197,400	472	70	210
UR4QHJ	"	135,024	482	48	146
UY3QW	"	85,950	315	46	145
UX1HV	"	31,850	140	38	92
UT1IA	28	57,225	370	23	82
UX4UM	21	323,700	941	34	122
UT7LA	"	113,424	483	31	105
US5QRW	"	44,599	237	25	78
UT5UOC	"	1,888	31	10	22
EO6F	14	480,550	1740	38	137
					(Opr. UXØFF)
UXØHA	"	212,744	1221	31	100
UX9V	"	212,574	941	35	107
EM7Q	"	66,847	440	25	78
					(Opr. UR5QN)
US5EHY	"	34,265	240	19	70
UY5TE	"	18,054	224	10	49
EN6Q	7	373,968	1435	33	126
					(Opr. UT7QF)
UR7E	"	190,430	890	30	109
					(Opr. UR5EDU)
UX4CW	"	96,370	617	24	91
UXØKN	"	64,264	409	21	95
UR5WAL	"	32,634	208	15	59
US1I	"	32,110	179	22	73
UY5ZZ	3.7	144,960	918	25	95
UUØJM	"	117,936	832	25	92
UR8V	"	66,867	603	20	73
					(Opr. UX2VZ)
UT2QT	"	64,077	548	21	72
UX4UA	"	40,180	422	17	65
US7TJ	"	20,910	392	8	43
UT1CZ	"	18,755	311	8	47
UT1WZ	"	936	38	5	21
*UX3M	A	169,664	533	51	190
					(Opr. UR3MP)
*UX5EF	"	60,400	320	37	114
*UR5IAE	"	42,390	201	38	119
*UR4IAY	"	21,353	219	14	51
*UR5ZOK	21	345	23	2	13
*U5WF	14	260,208	976	31	108
*UR4MS	"	113,190	637	23	82
*UT7EG	"	15,741	247	8	45
*UT9IR	"	6,625	53	17	36
*UT1WW	"	5,332	105	9	34
*US5ZE	"	976	32	6	17
*UR7TA	7	47,532	353	19	83
*UR7TZ	"	44,400	343	21	79
*UT4TA	"	24,570	198	18	72
*UR7UL	"	18,469	196	12	61
*UR4QF	3.7	15,504	220	9	48
*UT1ZZ	1.8	8,036	146	8	41
*UR5TEZ	"	4,644	140	5	31
*UR5ZAO	"	168	11	5	9

WALES

GW4BLE	A	2,839,187	2448	104	389
GW4BVJ	"	217,864	591	61	180
*GWØGEI	A	343,360	661	64	232
*GW3SYL	"	11,850	105	23	56
*GWØMHK	21	23,328	154	22	50
*GW6J	1.8	17,936	302	7	52

YUGOSLAVIA

YT1AD	A	3,630,844	2936	137	486
					(Opr. YU1DX)
YU7AV	"	3,151,470	2417	139	506
YU7BW	"	2,749,918	2581	128	485
YU7SF	"	40,377	215	35	93
YU8DX	"	28,695	450	39	90
YU1KX	21	449,995	1264	34	131
YT1BB	14	694,710	2220	38	148
YZ7ED	"	503,937	1502	36	135
YT7A	7	474,498	1842	35	139
					(Opr. 4N7DW)
4O4D	"	194,375	1037	26	99
					(Opr. YU4AR)
YTØT	3.7	183,500	1241	26	99
					(Opr. 4N1DXX)
YU4WU	"	29,980	364	13	57
YU1ZZ	1.8	63,154	707	14	77
YZ1AU	"	13,158	252	6	45
*YU7CB	A	652,773	987	87	306
*YTØE	"	146,091	565	43	166
					(Opr. YU1BO)
*4N1SM	28	3,885	52	12	25
*YU7KM	21	16,182	118	19	39
*YU7BJ	14	463,386	1390	37	140
*4N1N	"	94,743	689	18	81
					(Opr. 4N1LB)
*4N1A	7	71,022	501	22	92
					(Opr. YU1UA)
*YU1BL	3.7	37,206	418	14	64
*YU1AST	1.8	7,084	153	6	40
					(Opr. YU1CZ)

OCEANIA

AMERICAN SAMOA

AH8A	21	890,910	2690	33	81
*KH8AL	3.7	57,050	301	26	44
*KH8AL	1.8	2,268	49	9	12

AUSTRALIA

VK3TZ	A	439,825	662	84	241
VK8AV	"	195,447	322	71	156
VK1MJ	"	76,680	216	41	94
VK2APK	14	295,925	781	33	100
VK5OE	"	3,741	33	16	27
VK8BE	"	2,900	116	12	13
*VK2ARJ	A	377,862	938	47	95
*VK2VM	21	113,652	509	20	77
*VK1VK	14	12,360	77	20	40

BELAU

T8/KC6DO	A	442,308	1306	54	62

BRUNEI

V85HG	A	5,811,663	4517	132	305
					(Opr. JO1RUR)

EASTERN MALAYSIA

9M8R	7	834,240	1798	37	128
					(Opr. W7EJ)

HAWAII

AH7G	A	4,997,736	4584	126	243
WH6CQH	14	677,435	2066	34	79
KH6FKG	7	192,558	982	24	43
KH6CC	1.8	17,860	330	9	10
*KH6 /F5TFS	14	106,700	661	21	34
*KH6 /K6GSS	7	47,750	333	19	31

INDONESIA

YB1AQS	A	3,124,018	2361	118	340
YB9BV	"	2,530,035	2185	112	293
					(Opr. K7BV)
YB5QZ	"	794,168	947	88	208
YB2UDH	7	13,041	74	26	43
*YB6INU	A	338,024	511	74	158
*YB7XTJ	"	20,592	112	25	47
*YC9CCB	21	181,179	756	23	100
*YC9WGA	"	11,434	116	14	20
*YB5ZEZ	14	63,155	278	29	56
					(Opr. YB5PD)
*YBØHD	"	24,648	118	23	55
*YC6PUP	7	2,580	30	9	21

NEW ZEALAND

ZL1AXQ	3.7	53,768	187	30	74

NEW CALEDONIA

*TX8FU	7	45,144	236	28	44
					(Opr. FK8FU)

MARIANA ISLANDS

KHØI	A	1,577,782	2280	78	155
WHØAAV	"	1,054,134	1531	87	156
KHØCG	21	169,464	636	31	61
KHØBX	14	174,158	609	31	75
*KHØCE	14	49,956	249	26	43

PHILIPPINES

DU9RG	A	3,726,692	3070	123	298
4F4IX	21	478,611	1537	28	79
DU1SAN	14	341,736	1022	33	83
*DU1NYC	A	359,562	832	40	107
					(Opr. DU1KWT)
*4F5MW	"	53,586	175	43	75
					(Opr. WD5AAH)
*4F5CM	"	33,660	110	40	62
					(Opr. KK5CM)
*DU3WPX	28	48,147	514	14	19
*DU1COO	14	282,039	816	33	90
*DU3RCM	"	271,064	777	34	90

TONGA

*A35SQ	A	345,546	785	68	90
					(Opr. W7TSQ)

SOUTH AMERICA

ARGENTINA

LR3F	A	1,718,691	1650	109	272
					(Opr. LU6FAZ)
LU8FDZ	"	238,913	503	64	109
LU7MAX	"	23,560	94	31	64
LU6ETB	28	439,101	1271	27	112
LU4HAW	"	394,709	1257	26	87
					(Opr. LU3HIP)
LU3FZW	"	278,502	918	24	90
LU1MA	"	229,932	822	24	84
LU2DW	"	218,155	687	26	89
LU4VZ	"	181,545	725	24	81
LU3FMR	"	128,837	535	24	75
LW8EXF	"	94,689	455	22	59
AY7D	21	1,009,936	2858	31	127
					(Opr. LU7DW)
LU2QC	"	708,513	2278	27	84
LU9MBY	"	636,099	1767	28	101
LU2HAO	"	301,710	915	28	85

LSØI	14	491,970	1137	33	122
(Opr. LU6FAZ)					
LU2BAR	"	123,735	395	28	85
AY1I	7	568,400	1438	34	111
LT1F	"	298,515	1003	28	77
(Opr. LU1FKR)					
LU5FAO	"	288,600	1017	28	72
LT5V	"	104,058	471	27	55
(Opr. LU8VCC)					
LU2FFD	3.7	115,010	401	30	76
LU5ONX	"	33,228	188	21	50
*LP7N	A	2,178,399	1945	110	283
(Opr. LU2NI)					
*LU8HLI	"	986,961	1366	70	199
*LTØA	"	965,958	1848	126	296
(Opr. LU1ARL)					
*LU7FEU	"	219,965	551	49	96
*L44D	"	197,239	548	38	95
(Opr. LU4DFH)					
*LU6AMD	"	170,448	402	54	105
*LW2DFM	"	112,695	260	55	110
*LU5E	"	105,558	280	53	93
(Opr. LU5EWO)					
*LW6DYB	"	16,353	145	19	50
*LU3HBO	"	8,662	61	21	50
*LU9HZS	28	282,264	883	26	88
*LU9VY	"	213,600	872	20	69
*LW2DBM	"	206,617	728	25	82
*LU3HWE	"	158,079	651	23	64
*LU4FCZ	"	143,514	528	23	79
*LU5UL	"	136,754	540	22	79
*LW6EQG	"	117,400	439	24	76
*LW4DAZ	"	101,529	466	23	64
*LU4FQZ	"	94,549	404	23	68
*LU7HTJ	"	57,408	270	22	56
*LU5HCI	"	43,792	263	19	49
*LU3VAO	"	43,712	276	18	46
*LU2DAS	"	35,624	206	20	53
*LU4AHV	"	23,498	284	9	22
*LU6APW	"	18,000	170	16	29
*LU3OJZ	"	17,813	136	19	28
*LU3WCV	"	16,863	111	21	52
*LU5HWR	"	14,850	171	11	22
*LU6AUM	"	7,900	149	9	11
*LU7OKU	"	6,699	93	15	18
*LU8UBN	"	2,944	49	14	18
*LU7FJ	21	735,124	1850	29	105
(Opr. LU6BEG)					
*LU5VC	"	299,778	1010	22	80
*LU1HTF	"	192,348	621	24	84
*LU/CE3DPV	"	173,160	758	21	
*LU4HKL	"	48,258	271	17	46
*LU5DSE	"	2,788	34	12	22
*LU5FCI	14	531,520	1226	32	119
*LU1AEE	7	5,170	64	18	29
*LW1ECO	"	4,708	68	18	26
*LU8HSO	"	3,784	47	15	28
*LU4HMV	"	2,805	43	12	21

ARUBA

P4ØE	A	10,479,765	6095	132	453
(Opr. CT1BOH)					
P4ØW	"	10,018,332	6067	125	439
(Opr. W2GD)					
P4ØDX	"	592,064	1162	55	121
(Opr. AK4I)					
P49I	3.7	453,921	1582	22	81
(Opr. K4PI)					

BOLIVIA

CP6EB	A	574,392	1171	64	114

BRAZIL

PQ2Q	A	1,043,768	1602	68	164
(Opr. PY2KP)					
PY3LP	"	276,976	641	66	83
ZW2A	"	227,880	432	64	152
(Opr. PT2BW)					
PT2TF	"	72,336	203	47	85
PQ5W	28	631,116	1764	28	113
(Opr. PP5WG)					
PY1ADV	"	16,440	142	20	40
ZX5J	21	2,976,190	5091	36	169
(Opr. PP5JR)					
PT7BSH	"	136,968	886	16	36
PR4Y	14	824,600	1707	34	141
(Opr. PY4OY)					
PP5UA	"	377,088	1027	30	98
PY2RIK	"	81,934	405	18	53
PY1LI	"	38,997	228	19	44
*PY2OZF	A	55,860	217	46	68
*PY2TI	"	33,264	191	33	39
*PY2IQ	"	25,334	132	43	63
*PY1VHF	"	24,024	114	35	56
*PY3AJB	"	4,680	32	18	18
*PY2SR	28	165,834	574	26	85
*PU2MHB	"	157,459	590	26	75
*ZY2Y	"	108,092	472	24	68
*PY2GY	"	102,780	417	26	64
*PY2FW	"	99,297	397	25	74
*PU2MRY	"	79,380	368	23	61
*ZV2WZV	"	77,832	371	25	67
(Opr. PU2RKM)					
*PU2RUX	"	65,604	304	23	61
*PY1OB	"	63,121	344	22	57
*PP5WN	"	58,520	264	23	65
*PU1LJB	"	44,772	259	25	57
*PY1NB	"	33,150	213	17	48
*PY2QW	"	25,308	162	21	53
*PY1KS	"	21,280	155	20	50
*PU2NVC	"	19,516	200	20	48
*PY2DUN	"	6,380	71	17	27
*PU7TDD	"	4,070	103	14	23
*PU2LXC	"	1,896	57	11	13
*PY2DR	"	180	20	4	5
*PY3FBI	"	90	6	4	5
*PY1KN	21	55,762	212	21	77
*PY3BD	"	21,160	187	16	24
*PY2PD	14	291,575	957	27	82
*PT2AW	"	22,177	146	21	46

CHILE

CE3B	28	22,396	185	15	29
CE4ETZ	21	76,923	336	21	56
CE6NES	"	68,280	395	18	42
CE3F	14	1,091,249	2394	35	146
(Opr. CE3FIP)					
CE8EIO	7	264,759	842	29	84
CE5BSS	"	9,086	70	23	36
*CE5BPE	A	4,698	51	22	32

COLOMBIA

HK6KKK	A	1,020,477	3106	98	337
HK5DDS	"	32,776	128	40	96
*HK3JJH	A	689,997	1053	63	168
*HK6HFY	"	375,309	666	57	166
*HK3QVX	"	16,340	106	25	51
*HK6IUI	"	13,920	101	15	23
*HK3MKQ	3.7	9,362	115	9	22
*HK6ISX	1.8	1,650	31	5	20

ECUADOR

HD2RG	14	604,742	1587	28	106
HC2GT	"	277,725	972	28	77
*HD3W	7	1,875	33	13	23
(Opr. HC3AP)					

FALKLAND ISLANDS

*VP8ON	A	4,416	64	16	16

GUYANA

8R1K	A	7,516,158	4626	121	398
(Opr. OHØXX)					

PERU

OA4EI	A	994,432	1363	84	188

PARAGUAY

ZP5V	A	1,580,409	1702	91	227
ZP6CC	28	357,216	1282	25	97
ZP5MAL	21	704,082	2050	26	103
*ZP1BO	A	46,870	165	40	69

TRINIDAD & TOBAGO

9Y4H	A	9,650,794	5848	132	440
(Opr. K6NA)					
9Y4NZ	14	870,174	2101	33	141
9Y4VU	7	609,650	1465	27	118

URUGUAY

CX7BY	14	428,040	918	35	129
CX3CE	7	16,543	98	25	46
*CX8CP	28	289,599	958	24	87

VENEZUELA

YV5AMH	A	2,885,872	2412	99	319
YW1A	14	1,005,123	2292	33	128
(Opr. YV1AVO)					
*YV3BKC	A	43,290	185	28	50
*YY4GLD	28	33,323	300	16	31
*YV4GAC	21	279,730	876	25	85
*YV5NWG	14	114,845	415	25	78
*YV1GYA	"	94,620	432	24	59
*YV1GHB	"	4,788	75	11	25
*YV4AZF	3.7	40,468	225	16	51
*YY4GLE	"	3,795	45	9	24

QRP

F5BEG	A	425,784	881	78	258
YU1EA	"	362,212	662	77	255
N1AFC	"	328,068	515	54	180
AA2U	"	307,060	434	64	196
EA1GT	"	297,686	648	55	196
YU1KN	"	280,576	879	53	203
UR5UW	"	163,530	535	49	188
KA1CZF	"	158,148	307	48	143
UA9ACJ	"	149,730	372	45	110
SP7LZD	"	148,824	383	60	156
KØRI	"	106,863	230	63	116
UA6LKA	"	87,236	257	55	138
ER1FW	"	75,774	460	27	119
OH5NHI	"	64,200	310	30	120
UA4YJ	"	61,305	335	37	146
UA9SG	"	53,445	212	29	78
WB3ECU	"	40,584	134	35	79
W8QZA/6	"	40,040	152	42	62
NZ5A	"	37,973	130	46	81
RA3DGH	"	34,780	'88	10	37
N8AXA	"	28,792	111	47	75
OEM1KYW	"	27,485	202	30	85
I3MDU	"	26,208	151	27	77
F6HHR	"	26,145	204	26	79
4L1ZG	"	24,651	135	18	65
RZ3FR	"	18,800	199	17	63
JH3AKD	"	13,770	84	36	45
JH1HRJ	"	9,000	60	29	31
WØHEP	"	6,132	146	13	29
N7JXS	"	5,700	58	16	22
DL5JMN	"	3,666	72	13	34
DL2TG	"	2,982	36	16	26
SP4GHL	"	2,077	56	15	16
N4EUK	"	1,488	22	14	17
AD4ZE	"	1,380	18	13	17
PA3CAL	"	1,326	32	11	23
SMØDZH	"	1,221	35	7	26
UA2FCI	"	504	24	5	11
LU7VCH	28	79,165	421	17	54
LW2DFH	"	37,807	183	21	56
LW7EGO	"	10,010	74	17	38
JF3EIU	"	7,104	79	12	25
UX8IX	"	6,993	56	19	44
JL1IHE	"	6,468	64	15	29
OA4CPI	"	4,158	101	12	21
JIØPJE/1	"	3,384	41	14	22
KA8NRC	"	2,400	33	7	23
IT9NAN	"	2,170	30	12	19
JA6UBK	"	2,079	33	9	18
VK3NDS	21	76,380	394	21	46
Z32DR	"	31,570	233	20	62
EC1AIT	"	24,764	190	23	59
EC1AIS	"	19,000	128	20	56
UR5MTA	"	16,030	151	14	56
JR1LOK	"	110	5	5	5
RW9AB	14	219,040	556	33	115
YU1NR	"	210,600	713	35	121
W6CN	"	39,933	180	25	56
JR7RJZ	"	34,650	214	23	43
EA7AIG	"	31,575	271	16	59
JA2JSF	"	29,378	162	25	49
JR4DAH	"	28,428	165	22	47
WJ8C	"	9,628	65	18	39
YO5OFJ	"	2,340	70	6	24
ON5EU	"	1,593	46	7	20
KH6 /WB6FZH	"	602	30	6	5
SP5NOG	"	96	12	2	7
WØKEA	7	13,260	87	18	42
LA5FBA	"	2,464	77	4	28
UR5ZOS	"	1,595	48	6	23
8Q7AI	"	750	16	11	14
(Opr. DL9LAI)					
SP6DVP	"	638	15	8	14
YU1YV	3.7	17,262	229	11	52
UX2MF	"	14,691	219	9	50
PAØMIR	"	11,720	190	8	48
WA2ASQ	"	816	23	7	10
SMØGKF	"	336	24	2	12
YO4FRF	1.8	1,296	45	5	22

ASSISTED

NORTH AMERICA

UNITED STATES

AA1K/3	A	2,882,554	1780	123	446
KE3Q	"	2,800,749	1682	129	462
KS1L	"	2,645,277	1831	113	390
K3NZ	"	2,462,136	1473	128	465
K3WW	"	2,456,019	1440	132	471
N3AD	"	2,402,360	1559	118	427
N3RR	"	2,305,840	1380	130	462
K1KP	"	2,191,080	1730	96	360
K2TW	"	2,030,427	1269	123	444
NN3Q	"	1,656,480	1144	117	393
W1GD/2	"	1,650,294	1164	110	391
W1HP	"	1,486,621	1147	96	361
WB2NQT/4	"	1,576,962	1082	111	411
AA3HA	"	1,483,000	1050	109	391
KS9Z/1	"	1,468,896	1207	96	332
AA3JU	"	1,415,025	1108	105	370
N2IWE	"	1,400,960	1138	92	348
AA3B	"	1,313,521	989	101	372
AA1AA	"	1,225,824	981	103	349
WT3W	"	1,217,565	1004	99	336
KA5W	"	1,120,100	833	119	368
N3MKZ	"	1,111,644	894	94	344
K3ND	"	1,069,225	803	109	366
W1RZF	"	1,067,733	970	84	303
KE3GA	"	1,044,340	753	107	398
WN3K	"	1,029,882	866	102	332
W2TV	"	1,014,272	809	100	348
NK3U	"	892,398	731	103	339
N7TT	"	862,257	966	95	224
KD1YN	"	850,230	720	86	337
N9VHW	"	841,940	693	108	337
K2TE/1	"	834,360	725	91	318
NRØX	"	756,438	669	106	311
W1NG	"	725,022	622	101	322
K5LP	"	722,700	584	116	334
N6ND	"	697,718	600	127	300
K2WK	"	642,550	640	91	271
N3II	"	641,832	608	88	288
AA1V	"	635,145	645	82	263
W3MM	"	613,184	542	100	316
K3KNH	"	609,679	624	80	267
WG2E	"	602,154	610	80	274
W9NGA/2	"	598,774	573	90	284
W9OP	"	582,900	627	84	251
W1BIH	"	524,107	475	100	301
W1QK	"	516,956	545	84	257
W2UP/3	"	511,920	508	91	269
KC5TA	"	508,428	540	95	253
KG1D	"	505,600	565	78	242
WA1IML	"	504,600	610	69	221
K3YGU	"	467,250	489	89	261
K3IXD	"	463,393	500	80	263
N1CC/2	"	460,410	553	78	220
KØRNZ/4	"	456,855	574	75	210
K6PU	"	450,760	552	93	202
N2WK	"	428,904	486	86	236
WB2WPM	"	413,744	493	73	231
AA3HM	"	402,009	478	76	233
N2AIF	"	401,534	483	70	231
WA2WYR	"	398,310	450	82	248
NZ1Q	"	388,266	434	72	254
K3OO	"	381,839	500	73	198
N5ASO	"	373,113	407	98	253
W3OV	"	363,784	441	73	223
W3HVQ	"	352,980	419	83	235
ND5S	"	342,574	414	81	233
KC5HQT	"	331,299	557	63	218
NF2L	"	326,700	356	82	448
WO1P	"	324,045	411	78	207
KMØL	"	314,461	444	76	193
AK3Z	"	309,430	362	80	239
KG8CW	"	305,447	402	72	209
N4SR	"	302,974	413	67	199
N2LT	"	299,421	339	85	238
NØAT	"	299,390	334	90	239
WB3CIW	"	297,434	425	69	185
K1AJ	"	281,664	363	78	210
KD1NE	"	272,492	406	55	187
W7KPD	"	267,668	441	94	150
W1BWS	"	265,525	385	68	179
NW3Y	"	265,428	329	85	218
KE2OP	"	250,560	381	62	170
KA1CB	"	231,732	326	59	187
K1TR	"	226,270	337	63	179
K6XT	"	223,179	331	77	174
K3JLK	"	212,040	342	57	171
KJØB	"	202,644	320	68	166
KDØNB	"	198,470	329	67	156
K8CV	"	193,584	324	58	160
WB2KDD	"	187,704	337	52	146
WW1E	"	184,464	301	53	163
W1HR	"	175,560	291	53	167
KFØIA	"	171,292	748	168	229
W3KV	"	167,409	288	58	151
N3AM	"	157,200	237	60	180
KG5NE	"	152,646	285	62	144
N1NQD	"	152,490	246	64	166
WA1KSY	"	151,632	262	57	151
WB8ZRL/Ø	"	147,620	226	71	171
AD4VH	"	145,935	236	75	160
N4ROL	"	127,758	237	56	143
K1VV	"	127,620	253	44	136
K3SA	"	117,952	226	57	137
N4XR/1	"	115,005	208	58	147
W1RM	"	111,024	187	62	154
AC5BR	"	110,976	241	62	130
KM1Y	"	108,501	224	49	128
NO1J	"	100,308	230	41	115
N4PQX	"	92,734	174	61	138
KD2EU	"	91,410	198	42	123
N2BIM	"	87,320	177	45	140
W6TKF	"	85,578	221	49	82
WDØE	"	75,943	203	31	102
AB6FO	"	75,082	159	47	126
W8FJ	"	71,001	169	54	107
K1FWF	"	67,716	149	48	114
WF1B	"	64,610	172	40	102
N9CLR	"	52,030	161	39	82
K1AR	"	51,404	140	43	99
KV1J	"	51,238	141	46	91
KB3X/8	"	50,616	162	37	77
W4RIM/6	"	32,398	121	32	65
K1BG	"	31,610	108	39	70
KØBX	"	26,300	97	34	66
N6HR	"	19,950	76	35	60
N2KJM	"	16,478	89	27	50
W2XN	"	16,465	71	32	57
K8PYD	"	10,058	72	17	30
AA4SQ	"	7,965	59	23	36
K3DI	"	6,785	45	22	37
KB1BMO	"	5,200	64	13	27
KB2R/1	"	4,416	37	18	30
N5NMY	28	43,992	241	18	54
KC5CP	"	17,992	123	14	38
N3WUE	"	1,426	46	9	22
K9JF/7	14	383,400	755	38	142
N6CQ/3	"	119,833	313	27	106
N7RO	"	68,478	213	31	82
W1IHN/4	"	53,169	178	24	87
WA1G	"	1,984	25	9	23
K4PR	"	81	3	3	3
KF2O	"	77	4	3	4
K3JGJ/2	7	30,014	127	22	64
AA8U	3.7	56,494	337	22	72
W4DR	1.8	6,713	62	12	37
K3SME	"	2,584	39	10	24

CANADA

VA2AM	A	419,046	496	78	253
VE1HA	"	392,173	503	70	219
VE3VET	"	28,254	107	30	72
VE7AV	14	200,431	573	34	99

U.S. VIRGIN ISLANDS

KP2BH	A	594,128	860	77	207

AFRICA

MADEIRA ISLANDS

CT3FN	A	7,795,760	4681	116	444
(Opr. DL4NAC)					

ASIA

HONG KONG

VS96BG	A	138,014	585	57	94

JAPAN

JH7PKU	A	1,744,800	1636	126	274
JF2BNG	"	480,404	541	106	226
JF1SEK	"	434,388	533	102	216
JR4QZH	"	401,568	512	82	200
JK2VOC	"	152,488	390	69	127
JJ3VPY	"	95,116	217	56	116
JAØHYU	"	57,330	169	55	92
JA7SUR	"	21,375	108	38	57
JF1UVJ	28	2,905	26	12	23
JR9NVB	21	88,592	310	31	81
JA1DCO	"	21,252	126	27	57
JE2HCJ	14	133,455	400	33	90
JA9KUG	"	60,334	247	28	69
JA1MZM	"	38,509	149	32	65
JK1OXU	"	16,401	123	27	50
JL3OXR	7	3,434	40	17	17

EUROPE

BELGIUM

ON9CCQ	A	213,988	585	53	191
(Opr. VE3ZZ)					
ON4BAL	14	342,463	932	34	129

CROATIA

9A3ZG	A	273,776	596	64	220

CZECH REPUBLIC

OK1PG	A	126,594	344	60	174
OL5Y	7	346,276	1358	31	118
(Opr. OK1DWX)					

ENGLAND

M6O	A	1,076,400	1546	90	310
(Opr. G4OJH)					

ESTONIA

ES5Q	A	1,480,171	2036	115	402

FINLAND

OH5BM	A	1,188,896	1467	109	315
OH2BO	1.8	3,813	97	6	35

FRANCE

TM2V	A	3,226,720	2514	122	438
(Opr. F6GYT)					
F5UFX	"	668,610	850	77	175
F5BSB	"	393,948	675	69	210
F6TCN	"	152,775	225	73	218
TM6Z	"	102,068	388	39	119
(Opr. F6JSZ)					

GERMANY

DLØWW	A	2,387,730	1785	130	460
(Opr. DK3GI)					
DL3KDV	"	1,610,848	1342	118	450
DL2NBU	"	1,528,372	1274	118	430
DKØEE	"	1,105,052	957	113	425
(Opr. DL4MDO)					
DL2OBO	"	997,248	1137	94	298
DL8OBQ	"	939,888	1112	103	385
DL5IC	"	706,161	724	101	300
DL5RBK	"	682,958	777	91	288
DL4NN	"	456,750	702	87	288
DL8AAM	"	315,027	834	50	211
DK1FW	"	262,229	384	83	258
DL2DCO	"	225,040	504	59	231
DJ9MH	"	144,384	295	68	188
DL4YBP	"	139,048	312	55	136
DL5PW	"	138,243	337	48	155
DFØIT	"	102,808	424	35	146
(Opr. DF6QC)					
DL/OK8KYP	"	29,618	147	39	79
DL4OCL	"	27,040	186	27	77
DK6CQ	"	20,904	104	35	69

DL8OBC	3.7	5,405	110	6	41
DJ6TK	1.8	8,374	159	7	46

HUNGARY

HAØHW	A	397,761	724	83	246

ITALY

IR2W	A	2,481,570	1603	135	471
		(Opr. IK2PZC)			
IU2M	"	1,512,034	1687	104	378
		(Opr. IK2SFZ)			
II2A	"	1,409,408	1133	123	446
		(Opr. I2CMA)			
IO4A	"	1,260,672	1299	100	348
		(Opr. IK4PVR)			
IK2VJF	"	422,564	705	67	231
I6NOA	"	402,246	658	83	268
IK1RLI	"	274,548	626	69	205
II3R	"	260,883	462	67	220
		(Opr. IK3RIZ)			
IK2QPO	"	39,620	130	42	98
IK6VXO	"	28,670	182	28	94
IR8A	14	665,075	1838	37	148
		(Opr. I8QLS)			
IK1GPG	7	389,408	1576	36	126
IQ2X	"	144,045	810	25	110

LITHUANIA

LY5A	A	5,879,094	4082	156	585
		(Opr. LY2BTA)			

LUXEMBOURG

LX1TI	A	236,301	600	61	188

NETHERLANDS

PA3BUD	A	38,905	123	41	114

NORTHERN IRELAND

GIØKVQ	A	329,904	1010	51	186

PORTUGAL

CT1EAT	A	354,315	501	78	221

SPAIN

EA3GHQ	A	1,316,616	1404	95	381
EA1BOI	A	254,624	627	53	165
EA5WI	"	223,076	377	67	190
EA5CGU	"	220,275	351	78	189
EA3BHK	"	109,710	210	66	164
EA7AKM	"	15,990	101	23	59
EA4AUF	"	5,995	61	18	37
EA7DPU	21	173,000	700	28	97
EA5BZS	"	48,480	188	33	87
EA2AM	"	18,145	82	22	73
EA1DDO	3.7	30,699	287	17	64
EA3ALD	1.8	15,040	232	8	56

SARDINIA

ISØIEK	A	20,700	118	37	63

SCOTLAND

GMØECO	A	207,603	567	57	176

SICILY

IT9IQQ	A	246,192	423	75	201

SLOVENIA

S58MU	A	65,626	320	32	125

SWEDEN

SMØDJZ	A	325,535	600	77	278
SM2KAL	"	53,580	160	41	100

WALES

GWØARK	A	246,384	497	59	177

OCEANIA

AUSTRALIA

VK5GN	A	1,457,352	1558	100	224

SOUTH AMERICA

ARGENTINA

LU8ADX	A	1,102,112	1146	98	243

BRAZIL

PY1CAS	A	611,456	826	79	193
PY2YP	"	462,359	813	65	132
PY2XB	"	323,570	620	49	141
PY2OU	"	95,122	184	68	131
PY1ROG	"	48,396	210	38	71

VENEZUELA

YV4YC	14	17,446	113	14	47

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

K1NG	4,169,364	2187	144	530
K1RX	2,519,388	1580	119	445
KB1H	2,112,552	1369	118	431
K1GW	1,978,590	1391	110	395
K1HMO	1,902,314	1331	108	406
KV1W	1,846,467	1390	109	368
KZ1M	1,589,280	1187	96	384
KB1SO	1,430,370	1229	90	324
WV1M	1,125,660	951	97	341
KD1MV	531,700	633	80	245
W1FY	399,582	474	63	218
AA1KY	317,340	452	65	193
N1AU	246,715	359	69	196
W1BK	6,670	47	25	33
KF2ET	5,281,560	2694	140	540
WA2VUY	2,835,150	1628	133	482
NU2W	2,012,682	1376	122	432
K5KG/2	1,817,508	1201	119	420
WA2SYN	1,337,125	1074	106	369
N2GOS	878,832	774	89	319
N2LBR	475,760	569	75	229
N3RS	4,559,520	2273	149	559
NE3F	1,750,461	1202	120	409
K3MD	1,662,282	1135	130	428
K3WUW	1,149,025	874	108	367
K3CP	938,538	817	95	319
KB3TS	787,138	699	89	318
N3MVV	19,968	85	20	58
K4ISV	4,164,464	2220	144	544
K2IBW/4	1,259,258	1214	87	287
AD4TG	1,143,240	1085	102	318
KC4ZV	951,460	780	117	335
W4NC	650,386	608	98	309
W4ATC	629,145	798	82	259
W4PRO	345,750	496	59	191
W4TMN	208,800	353	59	173
K4UK	81,838	208	55	111
KE4PUC	79,515	189	55	116
KS4BO	5,830	44	21	34
K5MR	2,748,825	1721	148	495
W5KFT	2,579,040	1769	147	450
WXØB/5	2,038,161	1766	140	433
N5HRG	904,239	728	119	344
N5JJ	525,297	594	101	230
KJ5BX	369,852	556	88	206
W5HTK	196,301	361	62	141
AC5CT	164,274	334	64	145
AC5HF	49,594	147	49	88
W6EEN	1,411,830	1272	121	294
AC6CI	903,992	1220	100	189
WX6M	414,836	579	98	176
KE6WEH	6,298	65	24	23
WD6DJY	205,382	405	67	139
KC7V	1,883,458	1628	128	318
NK7U	1,316,728	1293	108	284
K5VT/7	1,074,438	1043	117	277
K6ELX/7	567,810	781	86	184
K7UP	532,413	665	102	211
WA7IIM	252,735	454	71	132
K8LX	2,724,566	1714	124	435
KD8SQ	240,141	418	54	155
KG8ZD	15,750	210	29	46
NO9Z	1,074,840	960	100	324
W9JZ	807,615	765	95	298
KØRF	2,350,782	1594	140	427
NCØP	1,704,960	1139	133	422
WAØPUJ	1,363,688	1223	121	336
NØZA	659,856	685	101	253
KBØWY	565,573	656	85	238
AAØYX	405,528	581	82	195
KIØAE	4,860	56	23	31

BAHAMAS

C6A/K8DD	544,302	1308	63	135

BARBADOS

8P9Z	10,593,882	6410	143	559

CANADA

VA3SK	2,453,100	2477	100	325
VA6JY	2,334,249	2770	114	305
VE6SV	2,229,380	2530	107	288
VE6FI	1,049,359	1602	89	200
VY2CR	604,750	1337	57	148
VE5SF	588,841	1439	66	133
VE2UCD	216,315	615	44	121
VE3DC	110,040	385	40	91

FRENCH SAINT MARTIN

FS5PL	8,205,084	5675	117	495
FJ5AB	2,783,046	3178	104	298

GUANTANAMO BAY

KG4AN	1,569,762	1915	87	246

MEXICO

XE2DV	5,213,004	5443	137	307

PANAMA

3E1DX	4,830,618	5040	116	376

TURKS & CAICOS

VP5DX	7,079,644	5713	129	443

U.S. VIRGIN ISLANDS

WP2AHW	6,776,700	4929	128	460

AFRICA

CANARY ISLANDS

EA8ZS	12,108,690	5417	150	605

CEUTA & MELILLA

ED9EA	6,427,899	3644	118	479

MADEIRA ISLANDS

CT3BX	11,372,445	5455	136	575

SOUTH AFRICA

ZS5NK	3,917,359	3087	104	327

SWAZILAND

3DAØDX	4,616,265	3715	102	319

ASIA

ASIATIC RUSSIA

RW9OWD	1,736,664	2123	87	277
RK9SWF	93,577	575	55	180
RWØA	4,376,001	3396	147	426

CHINA

BY4RSA	1,145,788	2264	90	181
BY4SZ	566,840	1784	64	121
BY4BZB	410,410	1315	68	137
BY1BY	138,700	653	55	91
BY5WS	1,423	117	11	19

CYPRUS

5B4ES	3,148,860	3046	86	281

HONG KONG

VS6WO	3,667,608	4134	125	331

JAPAN

JE6ZIH	2,671,336	2154	131	323
JA7YAA	2,453,100	2036	131	311
JAØYAK	1,980,240	1613	132	312
JG2ZQZ	1,451,078	1515	115	244
JA7YFB	996,930	1261	93	192
JR7YCM	287,718	480	86	151
JA3ZOH	272,835	473	80	135
JA6ZLI	92,253	250	55	106
JA2ZJW	45,308	170	40	54
JA1ZJF	42,245	156	47	72
JA2YKA	33,580	150	40	52

KAZAKHSTAN

UN8FB	789,260	984	84	226

KUWAIT

9K2RA	2,004,800	2401	75	245

KYRGYZSTAN

EX9A	3,929,656	3084	119	383

MALDIVES

8Q7BT	155,014	419	66	113

MONGOLIA

JT1T	1,176,875	2675	78	191

MYANMAR

XY1U	1,478,624	3785	85	202

TAJIKISTAN

EY2Q	2,254,276	2015	112	346

EUROPE

ANDORRA

C31LD	3,865,932	3533	104	418

AUSTRIA

OE1A	3,646,448	3310	132	479

BALEARIC ISLANDS

ED6AMR	217,550	692	54	175

BELGIUM

ON4UN	6,281,604	3565	148	608
OT6L	3,221,226	2754	123	480
OT6P	2,868,780	2717	116	432
OT6K	1,158,729	1490	93	336

BELARUS

EW5P	206,564	683	58	168

BULGARIA

LZ9A	5,975,684	4183	173	633
LZ7M	1,504,116	1939	114	399

CROATIA

9A1CHP	44,100	319	19	81
9A1CFZ	6,080	162	6	32

CZECH REPUBLIC

OK5W	6,112,512	3840	154	614
OL2A	724,680	1280	86	274
OK1KCF	53,650	266	33	112
OK5MVT	1,050	40	14	50
OK2KVI	325	30	2	11

DENMARK

OZ9SKB	1,390,752	1973	103	336
OZ5BAL/P	867,244	1664	74	255
OZ3ZW	107,696	326	48	164

ENGLAND

GB2AA	2,730,672	2373	120	468
G4UJS	2,167,520	2291	96	364
M6N	1,442,828	1864	81	313
M6A	999,810	1734	72	306
G6B	544,604	818	77	269
M6G	482,000	1155	50	200
GØFOS	304,500	655	59	231
GØRGH	277,137	811	49	200
GØWAX	42,048	198	46	100

EUROPEAN RUSSIA

RU3A	5,750,920	4108	155	605
RW6AWT	4,019,184	3279	156	585
RZ3Q	3,593,317	3599	137	500
RK6AYN	432,495	996	73	242
RZ4AYT	321,768	677	77	251

FINLAND

OI2E	5,218,337	4156	165	612
OI7T	4,048,125	3558	135	490

FRANCE

TM2Y	7,928,800	4709	154	594
TM1C	7,097,906	4930	147	559
TM2T	2,593,180	2501	120	460
TM2DX	2,059,792	2300	90	334
F8KCF	1,603,701	1826	101	400
TM2X	1,003,000	1348	77	263
TM2FM	331,254	916	52	179
F6KLO	303,396	700	59	203
F5KAM	144,196	483	45	143
F5SUL	56,017	240	40	99
F5KAC	55,806	260	32	99

GERMANY

DFØHQ	4,941,312	3168	156	612
DF3CB	2,274,804	1745	129	483
DLØTD	2,228,472	2209	117	426
DFØAT	2,001,220	1696	115	444
DJ2YA	1,841,392	1754	120	451
DLØUM	1,520,875	1346	122	453
DK8TU	1,253,702	1305	116	438
DLØMBG	1,056,312	1395	92	316
DLØBI	881,172	1362	78	320
DLØNB	726,816	904	96	356
DKØMM	711,138	1003	79	323
DK4UN	101,903	324	44	137

GIBRALTAR

ZB2BU	142,854	510	50	124

GREECE

SV1DKR	1,986,875	3280	99	326
SV1AFA	514,500	1074	85	209

GUERNSEY

GU3HFN	1,936,963	2716	77	320

HUNGARY

HG1H	7,828,380	5439	152	604
HG3O	2,524,367	3244	97	334
HG5M	2,106,368	2452	103	381
HG5C	1,191,284	1649	101	330

IRELAND

EI7M	3,137,508	3054	109	447

ITALY

IO4A	10,703,504	4886	178	730
IU4U	4,941,090	3342	146	536
IO5A	3,052,863	2523	133	494
IO4T	3,052,530	2413	131	454
IO2A	2,300,152	2006	130	504
II2Y	2,286,375	2169	113	356
II2K	2,272,584	2064	112	425
IQ8X	1,310,869	1649	94	373
IO2L	1,203,377	1313	106	381
I1HJT	839,736	1225	99	337
IU3V	541,648	945	75	240
IO7A	393,104	772	73	238
IZ7AUE	250,832	680	64	193
IK1VCI	89,984	383	39	109
IZ1AOE	33,418	280	22	40

KALININGRAD

RW2F	4,921,303	3904	153	598

LATVIA

YL1ZF	139,799	589	36	143

LITHUANIA

LY6M	2,118,640	2161	121	447
LY1DQ	1,709,604	2053	112	395
LY3MR	1,067,040	1304	105	415
LY3AV	870,471	1710	82	287
LY3MV	56,260	321	34	111

LUXEMBOURG

LX1NO	2,566,912	2957	112	430

NETHERLANDS

PA3DWD	2,005,192	2001	122	465
PI4CC	1,345,023	1726	82	365

POLAND

SN2B	6,948,096	4347	156	612
SN6F	2,670,336	2282	133	475
SP9KRT	368,500	639	82	253
SN6U	190,070	585	45	184
SP5ZCC	172,000	605	48	167
SP9KAO	35,416	346	17	59
SP9KJU	11,259	115	18	63

PORTUGAL

CT8T	5,574,756	4368	127	501
CS1A	252,374	516	64	193
CT1L	46,620	205	29	97

ROMANIA

YO9KPD	53,167	533	19	60

SCOTLAND

GM6F	54,439	300	24	77

SLOVAK REPUBLIC

OM2I	556,809	1000	85	274
OM3KHU	144,855	635	35	150
OM9FI	127,458	430	53	166

SLOVENIA

S52ZW	4,664,492	3225	141	503
S5ØG	940,689	1220	97	284

SPAIN

EA4URE	3,982,368	3191	127	497
ED3DX	2,527,980	2847	95	360
EA1CCM	2,433,063	2514	91	302
EA5BY	2,143,189	2506	105	356
EA3RKG	1,349,766	1883	94	307
ED1WWE	1,294,630	1881	75	295
EA5DFV	1,129,456	1578	85	265
EA1BFZ	1,112,760	1428	86	274
EA3MM	917,672	1417	86	306
ED2WW	633,777	1036	77	212
EA1EEY	462,672	782	65	187
EA1COZ	420,290	691	69	236
ED1BD	418,946	835	69	206
EC3CTS	233,160	802	37	137

SVALBARD

JW5VK	675,990	1275	67	136

SWEDEN

SL3ZV	2,960,284	2987	107	422
SK3SN	1,622,264	2192	102	389
SK4AO	907,816	1328	81	283
SM4VPZ	150,156	600	42	152
SK6DG	60,384	224	41	95

SWITZERLAND

HB9H	4,143,180	2878	147	547
HB9OK	1,080,332	1186	107	366

UKRAINE

UU5J	4,484,038	3607	156	598

UT7W	2,224,651	1870	122	489
UT7L	1,207,458	1475	113	405
UR4EYN	567,029	1274	65	242
UR4MWU	151,490	545	46	164
UT4UWC	141,484	628	44	119

WALES

GW8GT	4,190,774	3651	116	458

YUGOSLAVIA

YU1L	234,960	756	51	189
Z37FCA	928	20	6	17

OCEANIA

AMERICAN SAMOA

KH8/N5OLS	4,033,341	4015	122	229

AUSTRALIA

VK4MZ	2,111,170	2190	107	228
VK6LW	1,326,808	1567	91	210
VK1DX	743,052	1154	58	170
VK4XY	566,196	1141	65	109
VK6ANC	421,440	632	74	166

BELAU

T88T	3,143,232	3432	105	201

GUAM

NH2C	6,766,810	4500	145	369

MARIANAS

KHØA	3,336,610	3480	105	221

NEW CALEDONIA

FK5DX	2,203,140	2668	90	202

PHILIPPINES

DX1CW	776,606	1271	69	145

SOUTH AMERICA

ARGENTINA

LU4HH	2,630,040	2453	104	268
LU7HLF	2,423,574	2512	101	232
LU1UM	2,006,136	2336	86	212
LR3Y	1,247,819	1913	61	166
LU1NF	908,208	1089	98	208
LU4DQ	530,796	1034	56	122

BRAZIL

ZZ2E	2,201,633	2085	99	268
PR5M	923,436	1024	98	241
ZW8B	201,448	485	43	106

CHILE

XR8S	4,774,714	3913	116	311
CE5JA	41,006	204	40	61

FERNANDO de NORONHA

ZXØF	20,167,146	8120	171	678

FRENCH GUIANA

FY5KE	6,921,091	4566	120	407

GALAPAGOS ISLANDS

HC8N	17,715,256	8288	157	575

NETHERLAND ANTILLES

PJ9T	7,953,660	4649	134	451

PARAGUAY

ZPØR	4,001,256	2868	133	371

URUGUAY

CV1T	1,204,803	1655	73	190

VENEZUELA

4M5X	8,336,121	5093	142	539

MULTI-OPERATOR MULTI-TRANSMITTER

NORTH AMERICA

UNITED STATES

KC1XX	10,773,260	5299	151	621
N2RM	10,653,600	4865	160	640
K3LR	10,332,618	5015	156	622
W3LPL	10,113,178	4766	159	635
W2PV	7,975,702	4229	146	575
K1KI	6,937,164	3578	152	580
W1FJ	6,340,609	3333	142	555
N4ZC	5,930,184	3264	146	541
KY3N	5,924,019	3498	144	537
AA1AS	5,887,080	3462	147	543
W4MYA	5,228,605	3036	146	539
KS9K	4,561,557	2779	141	510
NQ4I	4,291,728	2862	146	490
N6AW	3,939,562	2622	145	396
W4IY	3,843,203	2458	134	483
W2AX/1	3,762,654	2467	135	471
K3ANS	3,261,734	2080	131	450
W3GNQ	2,676,416	1671	128	461
WØAIH/9	2,341,865	1850	126	419
K3II	2,115,225	1387	119	434
K1GW	1,978,590	1391	110	395
KB1BQZ	979,464	821	100	344
KG6LF	688,564	810	97	219
K7FR	489,552	637	89	193
NØUEI	262,656	399	74	182

ANTIGUA

V26B	25,249,032	13301	155	673

CANADA

VB9DH	12,277,488	7919	133	543

GRENADA

J3A	11,393,317	8122	139	504

SABLE ISLAND

CYØXX	5,616,065	5173	99	356

TURKS & CAICOS

VP5T	7,967,565	7100	116	399

ASIA

JAPAN

JH5ZJS	9,266,992	5214	171	508
JA1YDU	3,901,478	2630	161	413
JA7YRR	2,889,087	2329	143	318
JA3YKC	2,465,728	1930	140	332
JO1YAO	1,865,427	1552	144	319
JA9YAA	804,816	861	119	249

MACAO

XX9X	9,529,912	8226	162	482

THAILAND

HS1AZ	5,658,598	5498	154	429

EUROPE

BELGIUM

OT6A	12,604,410	8456	163	656

CORSICA

TK1A	17,035,667	11422	169	744

CROATIA

9A1A	14,725,445	9042	191	768
9A8ØØS	7,865,676	7146	151	535

CZECH REPUBLIC

OL5T	1,559,718	2135	98	340
OK1KIR	45,424	201	40	127

ENGLAND

M6T	12,777,856	9048	164	732

EUROPEAN RUSSIA

R3AA	5,377,848	4650	159	555

GERMANY

DFØDX	4,711,680	4085	142	578
DK5EZ	2,847,733	2519	121	502
DF3QG	670,320	841	98	322

ITALY

IR3O	929,448	1093	103	365
IK3SSJ	460,736	859	80	233

LEICHTENSTEIN

HBØ/HB9AON	3,839,562	4640	99	420

LITHUANIA

LY7A	2,986,368	4297	124	492

NORWAY

LA1K	250,206	788	43	180

PORTUGAL

CQ1A	1,025,308	1829	71	203

SCOTLAND

GM6V	6,305,760	6088	129	591

SLOVENIA

S53M	8,521,296	6295	160	624

SPAIN

EA3FP	4,560,523	3981	141	508
ED7VG	632,872	1088	75	256

UKRAINE

EM2I	9,003,738	7526	154	617

OCEANIA

HAWAII

WH6R	7,203,307	5528	145	304

NEW ZEALAND

ZM2K	2,657,844	2537	112	259

SOUTH AMERICA

ECUADOR

HCØE	10,157,134	6423	130	421

ARGENTINA

LU4FM	8,150,208	6007	132	412

BRAZIL

ZV2EPA	570,456	950	68	160

NETHERLAND ANTILLES

PJ9E	32,588,850	13546	167	694

CHECK LOGS

Our thanks to the following stations who sent in check logs:
4N7Z, 4Z5GV, AA3OC, CP1FF, DJØSH, DK5OS, DL1ASF, DL1HSR, DL2RTL, DL4HRH, DL5AMF, DL5ANS, DL5DWW, DL8AXJ, DL8UAD, EA1ASB, EA1ATL, EA1CBX, EA1CXY, EA1FAE, EA1OB, EA2AGB, EA2BAP, EA2COP, EA3AFD, EA3AHF, EA3ALV, EA3AYQ, EA3FYD, EA4AFI, EA4AYB, EA4EER, EA4EOI, EA4HR, EA5ANQ, EA5DIT, EA5FNE, EA5FUF, EA5GCX, EA5GMA, EA5GRN, EA5SM, EA6ACF, EA6IB, EA7CP, EA7DNE, EA7GVW, EA8AM, EA9TQ, EC1APA, EC1CC, EC2AGW, EC3AGC, EC3AJW, EC4AJV, EC5AGD, EC5AHZ, EC5AIA, EC5CXI, EC7AIR, EC7EAN, ES5RW, EU2MM, EW3LN, EW8CM, EW8VD, EW8WH, F5IDB, GØWAZ, HB9JOH, IK2VUC, IK2WJT, K6FM, K7EFB, K8RF, KA9IMX, KB9NMU, KRØI, KX7J, LA2MJA, LA2OH, LA3JHA, LA4OGA, LA5ZC, LA6HHA, LA7CL, LA7XIA, LA8CD, LA8HGA, LA8NC, LA8XM, LA8ZJA, LA9LO, LA9NM, LA9VGA, LU7DW, LW2DSL, LZ1CW, LZ1GU, LZ2KVV, OE7SEL, OH1LLH, OH1MCX, OH1TN, OH1XX, OH2BMH, OH3TY, OH3WR, OH6TS, OK1RV, ON7YP, PA3BTH, PA3EXI, PU3WPA, PW2S (Opr. PY2GJR), PY2KTT, PY2NQ, PY2NW, PY2ZZ, PY3PT, PY3TD, PY5IP, RA4LAH, RU3RR, RV4LC, SMØBNK, SMØBXT, SMØCSX, SMØNJO, SM3MHD, SM5ARL, SM5BFJ, SM5CCH, SM6PVB, SP-Ø189-GD, SP2LUK, SP2UUU, SP3CYY, SP3ESV, SP3GHK/p, SP3MEP, SP3VAU, SP4AS, SP4CMW, SP4DZT, SP4GDC, SP4GFG, SP4SAF, SP4WRF, SP5AHZ, SP5GKN, SP5MXY, SP6BEN, SP6CES, SP6CYX, SP6EJY, SP6FIB, SP6FRQ, SP6FVF, SP6JZB, SP6NVK, SP6OJG, SP7AWG, SP7JQQ, SP8FHM, SP8HKT, SP9CLO, SP9MDY, SP9MQH, SP9WUZ, SP9WZA, SP9YEA, SQ4CTM, UAØAOZ, UA3VVE, UA3WCW, UA6BS, UN7TX, UN9PQ, UR5FF, UR5HSC, UT5UAG, UU9J, VE3BR, VE4JB, W1PCD, W7LBN, YL2IP, YL3BZ, YO2KJW, YO3FWC, YO6AHP, YO7KFX, YO7LKW, YO8AII, YO8ATT, YV5NTP, YV6DBX.

Announcing the Golden Anniversary of the CQ WW:

The 1997 CQ WW DX Contest

Phone: October 25–26 CW: November 29–30
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.
II. BANDS: All bands, 1.8 through 28 MHz, except for WARC bands.
III. TYPE OF COMPETITION (choose only one):

For all categories: All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee's address, whichever is greater. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant. Only the entrant's callsign can be used to aid the entrant's score.

A. Single Operator Categories: Single band or all band; only one signal allowed at any one time; the operator can change bands at any time.

1. Single Operator High: Those stations at which one person performs all of the operating, logging, and spotting functions. The use of DX alerting assistance of any kind places the station in the Single Operator Assisted category.

2. Single Operator Low: Same as III A 1 except that the output power shall not exceed 100 watts (see rule XI. 11).

3. QRPp: Same as III A 1, except that the power output must not exceed 5 watts (see rule XI.11).

B. Single Operator Assisted: Same as III A 1 except the passive (self-spotting not allowed) use of DX spotting nets is allowed.

C. Multi-Operator (all band operation only):

1. Single Transmitter: Only one transmitter and one band permitted during any 10-minute period, defined as starting with the first logged QSO on a band. Exception: One—and only one—other band may be used during any 10-minute period if—and only if—the station worked is a new multiplier. Logs found in violation of the 10-minute rule will be automatically reclassified as multi-multi.

2. Multi-Transmitter: No limit to transmitters, but only one signal and running station allowed per band.

D. Team Contesting: A team consists of any five radio amateurs operating in the single operator category. A person can be on only one team per mode. Competing on a team will not prevent any team member from submitting his personal score for a radio club. A team score will be the sum of all the team member scores. SSB and CW teams are totally separate. That is, a member of an SSB team can be on a totally different CW team. A list of a team's members must be received at *CQ* Headquarters by the time the contest begins. Mail or FAX the list to *CQ*, Att: Team Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A.; FAX 516-681-2926. Awards will be given to the top teams on each mode.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e., 5705). CW: RST report plus zone (i.e., 57905).

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The *CQ* Zone Map, DXCC country list, WAE country list, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

VI. POINTS: 1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multiplier.

Example: 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

VIII. AWARDS: First-place certificates will be awarded in each category listed under Sec.III in every participating country and in each call area of the United States, Canada, European Russia, Spain, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award *only*. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates/plaques will be issued to the licensee of the station used.

IX. TROPHIES & PLAQUES (Donors)

PHONE

Single Operator, All Band
World—Dave Rosen, K2GM (WA2RAU Memorial)
World—Low Power—Slovenia Contest Club
World—QRPp—Doc Sayre, N7AVK
World—Single Operator Assisted—Snake River Contest Club
U.S.A.—Potomac Valley R.C. (KC8C Memorial)
U.S.A.—Low Power—North Coast Contesters
U.S.A.—Zone 4—Dennis O'Connor, K8DO
U.S.A.—Zone 3—Bill Fisher, W4AN
Canada—Niagara Frontier Int'l DX Association (VE3WT Memorial)
Carib./C.A.—Alex M. Kasevich, VP2MM/W4
Europe—Potomac Valley R.C.—W4BVV Memorial
Europe—Low Power—Scott Jones, N3RA & Tim Duffy, K3LR
Africa—Gordon Marshall, W6RR
Asia—2 AM Dayton Pizza Gang
Japan—Japan Crazy Contesters Club
Oceania—Northern California DX Club
South America—Yankee Clipper Contest Club

Single Operator, Single Band
World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—*CQ* Magazine
World—14 MHz—North Jersey DX Assn. (K2HLB Memorial)
World—7 MHz—Fred Laun, K3ZO (K7ZZ Memorial)
World—3.8 MHz—Fred Capossela, K6SSS
World—1.8 MHz—Bob Wruble, AI7B
U.S.A.—28 MHz—Donald Thomas, N6DT
U.S.A.—21 MHz—David Hueben, KBØISS
U.S.A.—14 MHz—Southern California DX Club
U.S.A.—7 MHz—Stanley Cohen, WD8QDQ
U.S.A.—3.8 MHz—Arnold Tamchin, W2HCW
U.S.A.—1.8 MHz—*CQ* Magazine
Carib./C.A.—Snake River Contest Club
Europe—28 MHz—Chod Harris, VP2ML
Europe—21 MHz—Tine Brajnik, S5ØA
Europe—14 MHz—A.G. Anderson, GM3BCL
Europe—7 MHz—Roger Burt, N4ZC
Europe—3.8 MHz—Marconi Contest Club (I3MAU Memorial)
Europe—1.8 MHz—Robert Kasca, S53R
Japan—21 MHz—DX Family Foundation
Japan—14 MHz—Take Yokoyama, JL1BLW

Multi-Operator, Single Transmitter
World—Southern California DX Club (W6AM Memorial)
U.S.A.—Carolina DX Association
Europe—Bob Cox, K3EST
Carib./C.A.—Eric Scace, K3NA
Oceania—Junichi Tanaka, JH4RHF
Africa—*CQ* Magazine
South America—Gerry Boyd, K6BZ
Asia—Edward Campbell, AH2BE

Multi-Operator, Multi-Transmitter
World—Dave & Barbara Leeson, W6QHS & KK6QM
U.S.A.—Paul Hellenberg, KS9K

Europe—Finnish Amateur Radio League
Japan—Ryozo Goto, JH3JYS

Contest Expeditions
World—Single Opr.—National Capitol DX Association (Stuart Meyer, W2GHK Memorial)
World—Multi-Single—The German CDXG & SDXG (DJ3NG & DJ4EI Memorial)
World—Multi-Multi—Tachio Yuasa, JA9VDA

Special—Single Operator Award
World—All Band Under 21 years old—Gene Zimmerman, W3ZZ
World—All Band High YL—Yutaka Tanaka, JH3DPB (KA6V Memorial)

CW

Single Operator, All Band
World—Albert Kahn, K4FW (W9IOP Memorial)
World—Single Operator Assisted—Snake River Contest Club
World—Low Power—Slovenia Contest Club
World—QRPp—Gene Walsh, N2AA
U.S.A.—Frankford Radio Club
U.S.A.—Low Power—North Coast Contesters
U.S.A.—Zone 4—Dennis O'Connor, K8DO
U.S.A.—Zone 3—Bill Fisher, W4AN
Canada—Canadian DX Association
Carib./C.A.—Chuck Shinn, W7MAP
Europe—Edward Bissell, W3AU
Europe—Low Power—Scott Jones, N3RA & Tim Duffy, K3LR
Africa—Gordon Marshall, W6RR
Asia—Chuck Shinn, W7MAP
Japan—Japan Crazy Contesters Club
Oceania—Peahi Contest Club
South America—Venezuela DX Club

Single Operator, Single Band
World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—Don Busick, K5AAD (N5JJ Memorial)
World—14 MHz—North Jersey DX Assn. (W2JT Memorial)
World—7 MHz—Alex M. Kasevich, VP2MM/W4
World—3.5 MHz—Fred Capossela, K6SSS
World—1.8 MHz—Kenneth Byers, Jr., K4TEA
U.S.A.—28 MHz—*CQ* Magazine
U.S.A.—21 MHz—Wayne Carroll, W4MPY
U.S.A.—14 MHz—Northern Illinois DX Association
U.S.A.—7 MHz—Jan Perkins, N6AW (W6AM Memorial)
U.S.A.—3.5 MHz—Bill Feidt, NG3K
U.S.A.—1.8 MHz—Peter Hutter, WW2Y
Canada—Radio Amateurs of Canada
Carib./C.A.—Snake River Contest Club
Europe—28 MHz—John Pryor, K4OGG
Europe—21 MHz—Robert Naumann, N5NJ
Europe—14 MHz—Maud Slater (G3FXB Memorial)
Europe—7 MHz—Ivo Pezer, T93A
Europe—3.5 MHz—Frankford Radio Club (K3VW Memorial)
Europe—1.8 MHz—Pat Barkey, N9RV & Terry Zivney, N4TZ
Japan—21 MHz—DX Family Foundation
Japan—14 MHz—Mitsuhiro Nishimura, JA7WME

Multi-Operator, Single Transmitter
World—Anthony Susen, W3AOH
U.S.A.—Douglas Zwiebel, KR2Q
Canada—Eastern Canadian DX Assn.
Carib./C.A.—North Nevada DX Contest Club
Europe—Friends of K3AO (K3AO Memorial)
Africa—*CQ* Magazine
Oceania—Junichi Tanaka, JH4RHF
South America—Tyler Stewart, K3MM
Asia—Steve Merchant, K6AW

Multi-Operator, Multi-Transmitter
World—Douglas Zwiebel, KR2Q (K2GL Memorial)
World—SSB/CW Combined—Alpha/Power, Inc.
U.S.A.—Bob Ferrero, W6RJ (N6RJ Memorial)
Europe—Finnish Amateur Radio League
Japan—Ryozo Goto, JH3JYS

Contest Expeditions
World—Single-Opr.—Yankee Clipper Contest Club
World—Multi-Single—*CQ* Magazine
World—Multi-Multi—Bill Schneider, K2TT

Special—Single Operator Award
World—SSB/CW Combined—Hrane Milosevic, YT1AD
World—All Band—Under 21 years old—Chuck Shinn, W7MAP

Club
World—SSB/CW—*CQ* Magazine (W1WY Memorial)
Non-USA—SSB/CW—No. Calif. Contest Club (N6AUV Memorial)

A station winning a World Trophy will not be considered for a sub-area award. That trophy will be awarded to the runner-up of that area.

X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions especially organized for operation in the contest; club contributions of DXpedition scores are percentaged to the number of club members on the DXpedition).

3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and CW.

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

2. All sent and received exchanges are to be logged.

3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. Logs must be checked for duplicate contacts, correct QSO points and multipliers. Submitted logs must have duplicate contacts clearly shown.

5. DISKS: If you use a computer, please send your IBM, MS-DOS compatible computer disk. A disk containing your files may be submitted in lieu of a paper log. All disks MUST be accompanied by a PAPER summary sheet satisfying all logging instructions. Label your disk clearly with YOUR CALL, files included, the mode (SSB or CW), and your category. The committee REQUIRES a disk for any possible high score. The format we require is your CT.all file (e.g. HSØAC.all), N6TR.DAT, NA.QDF, or your .DBF files. Name your file correctly (for example, HSØAC.all).

E-MAIL Required Content: Two files should be included in your message—(1) A SUMMARY sheet in plain-text ASCII. (2) Your log, which should be sent in ONE of two ways: as a plain-text ASCII file (acceptable ASCII formats include: CT: yourcall.ALL; TR: yourcall.DAT; other fixed-column ASCII formats are acceptable) or as a binary file (acceptable examples are NA:yourcall.QDF; OH2BQS). If you send a binary file, it will have to be encoded for transmission via e-mail. All popular encoding schemes are acceptable, including UUencode, Base64, and BinHex. Your software might automatically encode your log as an attachment.

If you must send the files in separate messages, be sure to put the MODE and the station CALLSIGN in the Subject: line of each message. Your log will automatically be acknowledged by the server. If we have trouble reading your file, we may ask you to send a disk. Submit your CQ WW SSB log to <ssb@cqww.com> and your CQ WW CW log to <cw@cqww.com>.

6. Use a separate sheet for each band.

7. Each entry must be accompanied by a summary sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS, and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

8. Sample log and summary sheets and zone maps are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request. If official forms are not available, make up your own 80 contacts to the page on 8 1/2" × 11" paper.

9. All entrants are required to submit cross-check sheets (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made. All other entrants are encouraged to submit cross-check sheets.

10. Duplicate contacts and broken calls penalty: up to 3%, three (3) additional contacts removed; over 3% is grounds for possible disqualification.

11. QRPp and low power stations must indicate same on their summary sheets and state the actual maximum power output used, with a signed declaration.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive duplicate contacts; unverifiable QSOs; or unverifiable multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts.

An entrant whose log is deemed by the Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within 5 years, he will be ineligible for any *CQ* contest awards for 3 years.

The use by an entrant of any non-amateur means such as telephones, telegrams, internet, or the use of packet to SOLICIT contacts during the contest is unsportsmanlike and the entry is subject to disqualification. Action and decisions of the *CQ* Contest Committee are official and final.

XIII. DEADLINE:

1. All entries must be postmarked NO LATER than December 1, 1997 for the SSB section and January 15, 1998 for the CW section. **Indicate SSB or CW on the envelope, disk, or e-mail.**

2. An extension of up to one month may be given if requested by letter or other means. The granted extension must be confirmed by letter sent to the contest director, must state a legitimate reason, and the request must be received before the log mailing deadline. Logs postmarked after the extension deadline may be listed in the results but will be declared ineligible for an award.

Both Phone and CW logs should be sent to *CQ* **Magazine, 76 North Broadway, Hicksville, NY 11801.**

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Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are $1.00 per word. Boldface words are $1.50 each (specify which words). Minimum charge $2.00. No ad will be printed unless accompanied by full remittance. All ads must be typewritten double-spaced.

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(continued on page 115)

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(2 Watt version shown.)

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The new FT-51R Dual Band HT is state-of-the-art, and easy to use! So easy, you won't need an operating manual. Its exclusive, scrolling instruction menu located in the large, backlit display "window", guides you through total operation while simultaneously viewing the main display window.

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  TX: 144-148 MHz
  UHF RX: 420-470 MHz
  TX: 430-450 MHz
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- Scrolling User Help Menu
- Alpha-Numeric 8 Character Display
- Up/Down Volume/Squelch Controls & Display
- Selectable Sub-Band TX Mute
- Automatic Tone Search (ATS)
- Digital Battery Voltage Display
- AM Aircraft Receive
- Scanning Light System (SLS)
- 120 Memory Channels (80 w/Alpha-Numeric)
- Large Backlit Keypad & Display
- Automatic Repeater Shift (ARS)
- Multiple Scanning Modes
- 3 Selectable Scan Stop Modes with Scan Skip
- Selectable 6-way Lock Functions
- Automatic Power Off (APO)
- TX/RX Battery Savers Built-in
- Handy Cloning Feature
- 5 Selectable Power Output Levels
- 5 Watt and 2 Watt versions
- Selectable RX Smart Mute™
- Cross-Band & One-Way Repeat Functions
- DTMF Paging/Coded Squelch Built-in

Accessories
Consult your local dealer.

YAESU
Performance without compromise.℠