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Amateur Radio

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CQ

Results of the 1987 CQ World-Wide DX SSB Contest

Rules for the 1988 CQ World-Wide DX Contest

KB6SLN (left) and KB6SKE enjoy California-style Novice operating

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

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Good for Satellite Digital QSOs

Matching Pair

Look for FUJI and PHASE III-C

TS-711A/811A VHF/UHF all-mode base stations

The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.**
  The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.**
  Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
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- **High performance noise blanker.**
- **Speech processor.**
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  Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.**
  Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **VS-1 voice synthesizer (optional)**
  More TS-711A/811A information is available from authorized Kenwood dealers.

Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  SW-200A 1.8-150 MHz
  SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

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THE FIRST 144/220 MHz Dual Bander!

Double Take!

ACTUAL SIZE FRONT PANEL

TM-621A/721A

144/220 and 144/450 MHz FM Dual Banders

Once again, Kenwood brings you another Dual Bander First! The TM-621A is the first 144/220 MHz FM Dual Bander. The Kenwood TM-621A and TM-721A (144/450 MHz) re-defines the original Kenwood "Dual Bander" concept. The wide range of innovative features includes a dual channel watch function, selectable full duplex operation, 30 memory channels, extended frequency coverage, large multi-color dual digital LCD displays, programmable scanning, and more!

- **Extended receiver range** (138.000-173.995 MHz) on 2 m; 70 cm coverage is 438.000-449.995 MHz; 1-1/4 m coverage is 215-229.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144-148 MHz. Modifiable for MARS/CAP. Permits required.)
- **Separate frequency display for "main" and "sub-band."**
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!
- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
- **45 Watts on 2 m, 35 watts on 70 cm. 25 watts on 1-1/4 m.** Approx. 5 watts low power.
- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Balance control and separate squelch controls for each band.**
- **Dual antenna ports.**
- **TM-621A has auto offset.**
- **Full duplex operation.**
- **CTCSS encode/decode selectable from front panel** or UP/DWN keys on microphone. (Encode built-in, optional TSU-6 needed for decode.)
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

TM-721A shown with optional RC-10.

Optional Accessories:
• **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-4000** Dual band 2 m/70 cm mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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All New Compact HF!

"DX-citing!"

TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **Covers All Amateur bands**
  General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-43S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**

Optional accessories:

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-5/6/7 headphones
- SP-40/50B mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2S extra DC cable.

Kenwood takes you from HF to OSCAR!

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The Radio Amateur's Journal

ON THE COVER: Elizabeth Cox, KB6SLN, on the left and her sister Catherin, KB6SKE, trip the lights fantastic as well as the local 220 machine. They are on location in Malibu, CA where Catherin is appearing in a movie being shot there. Photo by Larry Mulvehill, WB2ZPI.

SEPTEMBER 1988 **VOL. 44, NO. 9**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

When the Amateur Radio Industry Association brought out the Archie Comic Book, *Archie's Ham Radio Adventure*, and through its subsequent revision included information on Novice Enhancement, it was felt that this would be one way to attract kids to amateur radio. No, it wouldn't be the total answer nor the panacea for making kids suddenly take up the hobby, but it would be the first positive step in directly marketing our hobby to a targeted audience. Other steps either would or should follow.

The one truly unique aspect of this project is that it wasn't grandiose or global in concept, and it didn't involve changes in legislation or government involvement. It came down to finding something that kids like, and just simply giving it to them.

How well have they worked? On a grand scale I really can't say, but from my own observations at hamfests the kids do read them. First let me state that kids do attend hamfests. You just have to adjust your vision down to see them. Since the comic books came out we have been taking 50 to 100 copies of the comic book to every hamfest we attend, and there is no trouble at all in giving them out to kids. From time to time other people have brought them to hamfests and have also given them out. The League, which warehouses the bulk of the comic books, has been consistent in managing to leave them home when they exhibit.

Let me tell you about kids at hamfests. First, most of them don't want to be there, especially in hot weather. They don't want to spend the day being dragged from one booth to another or tripping over things at the fleamarket. They really don't like to have a continual view of people's backsides, especially after some of that hamfest food takes effect. They tend to get cranky. You'd be hard pressed to say with a straight face that this was the opportune time to sell them on amateur radio.

Well, in some ways it may be the perfect time. After handing out several thousand copies, with the same basic reaction from each kid, it may be time to write to your Director or the League and tell them to start packing comic books for hamfests. Each kid who takes one has a sudden change in facial expression. They smile. Here is something just for them, something that they can take home. Most of them start to read it right then and there. Most of them even say thank you without prompting from their parents. Even the ones who are crying and seem miserably unhappy suddenly smile and start to read. Perhaps some of what they see at the hamfest will then have a different meaning, and perhaps the message will come through and they'll be able to relate to the hobby and want to bé a part of it. Whatever the process is, they at least leave the hamfest with something of their own.

To be fair, the League does have a policy of keeping a list whereby if any kids go over to their booth and ask for a comic book (if they happen to know about it), their name and address will be taken and presumably one will be sent the following week. It doesn't say much for immediacy, but I guess it does teach patience.

I've mentioned this to the folks at Newington for some time now and I guess they're still studying it. Why not try to move them along a bit by writing to them yourself. I know that the comic book is not the total answer and that there are other pressing problems facing us today, but we're talking about *tomorrow*.

Who says there are no kids at hamfests? Just look for the food and you'll find them. And speaking of food, the Atlanta hamfest certainly has the best so far with their buffet luncheon. As you can see, the chef is hard at work slicing the roast beef. There was turkey and ham to choose from, too, plus salads and soup.

Travels With CQ

There's light at the end of the tunnel! Someone else has taken up the banner with regard to convention or hamfest food. Dick Duane, WB2VAT, sent me a newspaper column by Andy Rooney where he describes the food (and prices) at a convention he attended at the Javits Center in New York. Well, the prices though high are about average for convention centers I've been to, and some items are actually priced lower than I've paid at hamfests. Prices aside, the description of the food is the same as we face at typical hamfests—grease-dogs and chips. So I guess we shouldn't feel too bad or feel that we've been cheated out of a meaningful experience. Apparently, Mr. Rooney eats the same convention food that we do and ponders if he should have packed a lunch instead.

Well, Mr. Rooney and fellow amateurs, there is one convention center that does offer reasonable, good food. The winner so far this year is the Omni Conventions Center in Atlanta. In spite of a ploy by Sandy Donahue, WA4ABY—namely a plot to fool me with a catered lunch from a famous local restaurant—I held fast to only reviewing the victuals available to all. Besides the usual grease-dogs, chips, and barbeques, the convention center offers a reasonably priced buffet luncheon which is pretty good. There is roast beef, ham, turkey, salads, and even soup from which to choose. The meat was sliced to order with plenty to go around.

This year the convention center, including most of the fleamarket, was even carpeted. No, it wasn't for us, but it was done in preparation for the Democratic Convention which followed us into Atlanta and the Center. Thank you, Democrats. We all thank you and our feet thank you, too. *CQ* staffers Karl Thurber, W8FX, and Buck Rogers, K4ABT, were there and spent time at the booth talking to their fans. Lew McCoy, W1ICP, was a guest speaker and gave two forums to packed houses.

The fleamarket was a little disappointing in that it seemed smaller than usual. There was space left over to hold more tables, but I guess everyone in the Atlanta area would rather hold on to their treasures. On the other hand, there is an increasing trend for smaller dealers and others who make a living out of the amateur radio industry to set up in the fleamarket rather than the commercial exhibit area. Obviously, the space is cheaper. However, it sort of subverts the meaning of the word *fleamarket* when most of what you see is new and finished goods are being offered for sale.

Atlanta is basically a good show, but one which hasn't really grown the way it should have in the past few years. In my opinion it was far better before the move "uptown," and perhaps a bigger location isn't always better.

In a few weeks Lew McCoy, W1ICP, will be waving the *CQ* banner at the Flagstaff, Arizona Hamfest up in Big Sky country. I did this one a few years back, and it certainly is one of the most beautiful spots to see in this country. Lew reports that this one has been growing each year, and you can take it from me that it does have a great fleamarket.

September will see the *CQ* gang on the road every weekend. We'll be at Shelby, North Carolina; Portland, Oregon; Virginia Beach, Virginia; and wind up the month at Radio Expo in Mundelein, Illinois. It's going to be a busy month, and we expect to see a lot of you in our travels. Come on out and say hi and look over what amateur radio has to offer. It's also just about starting time to make up those Christmas wish lists, and what better way to see what's available than to actually look at the latest and best offerings.

That last bit is especially true for contesters. Now that you've seen how well you did in last year's *CQ* World-Wide DX Contest and how close you came to the next guy, it might be time to look for that edge or that certain something that can push you over the top or move you up a few rungs on the ladder. Of course, ability, talent, and experience have something to do with winning a contest, but a few new "electronic marvels" can't hurt and may improve the odds.

Our first stop in September is Shelby. I've been told to dress casually and to bring really comfortable shoes in order to do a lot of walking. This is our first time there, and I'm anxious to see if what I've heard is true. I'll let you know, or better yet, see you there.

73, Alan, K2EEK

Put More Punch in Your Packet

Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station, especially for Packet operation. All Isopole antennas yield the **maximum gain attainable** for their respective lengths and a maximum signal on the horizon. Exceptional decoupling from the feed line results in simple tuning and a significant reduction in TVI potential. The IsoPole antennas are all impedance matched in the factory so that no field tuning is required. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state tranceivers. **Typical SWR is 1.4 to 1 or better across the entire band.**

A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is not supplied).

High Performance Hand-Held Antenna — The Hot Rod

The Hot Rod antenna can be expected to make the same improvement to hand-held communications that the IsoPole antennas have made to base station operation. **Achieve 1 or 2 db gain** over ANY 5/8 wave two meter telescopic antenna. The factory tuned HR-1 is 20% shorter, lighter and places far less stress on your hand-held connector and case. It will easily handle over 25 watts of power, making it an excellent emergency base or mobile antenna. In the collapsed position, the Hot Rod antenna will perform like a helical quarter wave. Three Hot Rods are available; HR-1 1/2 wave 2M Ant., HR-2 for 220 Mhz, and HR-4 for 440 Mhz. Amateur Net Price on all Hot Rods is $19.95.

For either base station or hand-held operation AEA has the perfect VHF/UHF antenna. Put more punch in your Packet station with an AEA IsoPole or Hot Rod antenna. To order your new antenna contact your favorite Amateur Radio Distributor. For more information contact Advanced Electronic Applications, P.O. Box C-2160, Lynnwood, WA 98036, or call 206-775-7373.

IsoPole Specifications

Model	144	220	440
Freq. Coverage (Mhz)	135-160	210-230	415-465
2.1 VSWR bandwidth	›12Mhz @ 146Mhz	›15Mhz @ 220Mhz	›22Mhz @ 435Mhz
Power Rating	1 kw	1 kw	1 kw
Gain**	3 dbd	3 dbd	3 dbd
Radiating Element Length	125.5" (3.2m)	79.25" (2m)	46" (1.2m)
Amateur Net Price	$49.95	$49.95	$69.95

**dbd — db gain over a dipole in free space

Prices and Specifications subject to change without notice or obligation.

AEA Brings you the Breakthrough!

Announcing

• **The following Special Events will take place during September:**

KØ-land, from Houston, TX; Clear Lake ARC; during September; contact 3 CLARC members on any band and any mode. Send QSL listing the 3 or more members members contacted and contact numbers with SASE to Jim Heil, KB5AWM, CLARC First Anniversary Event, 15415 Diana Lane, Houston, TX 77062.

N2ØØADI, from Ojai, CA; Southern California Contest Club; week of Sept. 2nd 24 hours a day; CW and phone on 10–40 and 75 meters. QSLs will be handled by N6ADI direct with SASE or via the bureau.

WB8ZVS, from West Virginia State Italian Heritage Festival, Clarksburg, WV; Stonewall Jackson ARA; Sept. 3–4 from 1400–0100 UTC; lower 25 kHz of the 20, 40, 75 meter General phone bands with some CW in the 40 and 80 meter Novice bands. Send SASE for certificate to J.R. Chiado, KA8ZQP, 289 Magnolia Ave., Clarksburg, WV 26301.

N3GCN, from Titusville, VA; Cathedral Prep Radio Club; Sept. 3–4 from 1400–2230Z each day; CW lower 25 kHz of Novice subbands; SSB lower 25 kHz of General subbands on 80, 40, 20, and 15 meters; also Novice SSB on 28.350. For special QSL send #10 SASE or IRCs to N3GCN/OC&T, RFD 1 Box 143-G, Titusville, PA 16354; DX QSL via bureau to K3HWL.

KA1BB, from Waterford, CT; Tri-City ARC; 1700Z Sept. 3 through 2300Z Sept. 5 in the middle of the 80, 40, 20, and 15 meter General class phone and CW bands. Talk-in on FM 146.52. QSL with #10 SASE via Tri-City ARC, P.O. Box 686, Groton, CT 06340.

WB2ØØYPX, from Orange, CA; Rockwell RC; Sept. 3–9 (no times given); 25 kHz from low end of General phone bands, 50 kHz from low end of CW bands, Novice CW 7.115, 21.115, 28.115. Special QSL for SASE to Dan Violette, KI6X, 1122 E. Sail Ave., Orange, CA 92665.

W2ØØLMN, from San Mateo, CA; San Mateo Radio Club; all modes and bands from 1500–0500Z daily beginning at 0001Z Sept. 3 until 2359Z Sept. 9. For QSL send your QSL and large SASE to W6LMN Trustee, P.O. Box 751, San Mateo, CA 94401.

GB2WVR, from World Veteran Rowing Championships, Motherwell, Scotland; Mid Lanark ARS; Sept. 5–11 (no times nor frequencies given). For more info contact QSL Manager Brian, GMØEGI.

GB2LNM, from Drumnadroghit on the banks of Loch Ness, Scotland; Mid Lanark ARS; Part 3 from Sept. 24–26, Part 4 from Sept. 27 to Oct. 24 mainly weekends from QTH of Danny, GM4LDU. Contact GM4LDU for more info.

K2BR, from Miss America Pageant, Atlantic City, NJ; Southern Counties ARA; Sept.7–10 on phone 25 kHz inside lower General class band edge, CW 65 kHz inside lower band edge, Novice 28.100–28.500 MHz. For QSL send #10 SASE to SCARA, P.O. Box 121, Linwood, NJ 08221.

N6MWH, from Corona, CA; Corona Norco ARC; 0000Z Sept. 9 to 2359Z Sept. 10; on 10–75 meters. For QSL send SASE to CNARC, P.O. Box 1783, Corona, CA 91718.

WA1RJI, from Milford, CT; Greater Bridgeport ARC; Sept. 10 from 1400–2200Z on phone 14.300. For certificate send 9 × 12 SASE (folded business-size SASE) to GBARC, c/o Sterling House Community Center, 2283 Main St., Stratford, CT 06497.

KC4GS, from University of Alabama, Tuscaloosa, AL; West Alabama ARS; Sept. 10 from 1300–2300Z; bottom 25 kHz of the General 80, 40, 20, 15 meter bands and club repeater on 147.90/30 MHz. For 8½ × 11 certificate send QSL and SASE to WAARS, P.O. Box 1741, Tuscaloosa, AL 35403.

KØCY, from Boone, IA; Boone ARES; 1400–2300Z Sept. 10 on 7.260, 14.300, 28.385, 145.01 packet, 146.25/.85 repeater. For QSL send SASE and QSL to Pufferbilly QSL, P.O. Box 127, Boone, IA 50036.

W1FHP, from Bethlehem, CT; Hen House Gang; Sept. 10–11 daylight hours; 40 and 20 meters with some Novice band 10 meter phone. QSL Callbook, first-class stamp only for card (not certificate). Hen House Gang, Hard Hill Rd. N., Bethlehem, CT 06751.

W6LAF, from Los Angeles County Fair, CA; Los Angeles Area Council of ARCs; Sept. 15 through Oct. 2 from 1700-0500 UTC; 3900, 7250, 14250, 21350, 28450 plus 2 meter packet and phone, 220 phone and 440 ATV and phone, 145.460 repeater. For certificate send QSL and 45 cents in stamps to W6LAF, P.O. Box 1770, Covina, CA 91722.

WA6OHX, from Lake Isabella, CA; Bonnet Brigade Reunion Raid; from 1500 UTC Sept. 24 on 20, 40, and 80 meters and UHF/VHF. Special QSL will be sent. For more info contact WA6OHX via the callbook.

KA6SIP, from Antioch, CA; Delta ARC; Sept. 24 from 1900–0100Z and Sept. 25 from 1900-2400Z; SSB 7.260, 14.260, 21.360, and 10 meter Novice 28.360, FM 146.540/S, packet 145.01. For QSL send QSL and #10 SASE to Tom Deeble, KA6SIP, 2224 Carmel Ct., Pittsburg, CA 94565.

XL3IG, from Port Huron, MI; Lambton County ARC and Eastern Michigan ARC; 2000Z Sept. 30 through 2400Z Oct. 2; 30 kHz up on CW and 10 kHz up from the bottom of the U.S. General phone band (i.e., 3.830 kHz). For certificate send #10 SASE with QSL to XL3IG, c/o 801 Range Rd., Port Huron, MI 48060. For QSL only, via bureau to VE3IG.

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

Sept. 2–4, **HAMCON 88,** Disneyland Hotel, Anaheim, CA. Contact HAMCON Inc., P.O. Box 3695, Huntington Beach, CA 92605.

Sept. 9–10, **W9 DXCC Convention,** Holiday Inn, Glen Ellyn, IL. Contact Howie Huntington, K9KM, 65 South Burr Oak Drive, Lake Zurich, IL 60047 (312-438-3452).

Sept. 10, **Ham-O-Rama 88 and Computer Show,** Niagara Falls Convention and Civic Center, Niagara Falls, NY. Contact Howard J. Rollman, W2OLY, 25 Banko Drive, Depew, NY 14043.

Sept. 10, **W3PIE Gabfest,** clug grounds, Uniontown, PA. Contact UARC Gabfest, c/o John Cermak, WB3DOD, P.O. Box 433, Republic, PA 15475 (412-246-2870).

Sept. 10, **Saratoga County RACES Hamfest,** fairgrounds, Ballston Spa, NY. Contact Dave Atwell, N2FEP, RD 5 Box D15, Ballston Spa, NY 12020.

Sept. 10–11, **Greater Louisville Hamfest,** Kentucky Fair and Exposition Center, Louisville, KY. Contact Greater Louisville Hamfest Assn., P.O. Box 34444, Louisville, KY 40232.

Sept. 10–11, **Ham Happenings 88,** Saancha Hall, Sidney, BC, Canada. Contact Larry Michaels, VE7GBY, 975 Tattersall Dr., Victoria, BC, Canada V8X 2X1 (385-3237). (Wheelchair accessible.)

Sept. 11, **Indian Foothills ARC Hamfest,** Marshall Senior Citizens Building, Marshall, MO. Contact WBØWMM, Callbook address.

Sept. 11, **Findlay, OH Hamfest,** fairgrounds, Findlay, OH. Contact Findlay Radio Club, Box 587, Findlay, OH 45840.

Sept. 11, **Butler, PA Hamfest,** Butler Farm Showgrounds, west of Butler, PA. Contact John Varljen, K3HJH, 174 Oak Hills Heights, Butler, PA 16001 (1-412-283-9403).

Sept. 11, **LaPorte and Michigan City ARCs Summer Hamfest,** LaPorte County Fairgrounds, LaPorte, IN. Contact LaPorte ARC, P.O. Box 30, LaPorte, IN 46350.

Sept. 11, **Bolingbrook ARS Ham/Computerfest,** Inwood Recreation Center, Joliet, IL. Contact Ed Weinstein,

(continued on page 8)

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You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

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Announcing *(from page 6)*

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Sept. 11, **Tri-County ARC Fall-Fest,** Black Hawk Technical College, on Hwy 51 between Janesville and Beloit. Contact Tri-County ARC, P.O. Box 321, Milton, WI 53563.

Sept. 11, **Tri-County Radio Assn. Hamfest/Fleamarket,** Passaic Township Community Center, Stirling, NJ. Contact Dick Franklin, W2EUF, 201-232-5955, or write P.O. Box 182, Westfield, NJ 07090.

Sept. 17, **Grand Rapids ARA Electronic Fleamarket,** West Catholic High School, Grand Rapids, MI. Contact Don Hazelswart, KA8BCI, 616-363-0649.

Sept. 17, **Packet Radio Symposium,** Georgian College, Barrie, Ontario, Canada. Contact Hex-9 Group, Box 254, Barrie, Ontario, Canada L4M 4T2.

Sept. 17, **SCRA Ham Radio Fleamarket,** National Guard Armory, Santa Rosa, CA. Contact Sonoma County Radio Amateurs, Inc., Box 116, Santa Rosa, CA 95402.

Sept. 17–18, **ARRL Roanoke Div. Convention and Computer Fair,** Virginia Beach Pavilion, Virginia Beach, VA. Contact Manny Steiner, K4DOR, 3512 Olympia Lane, Virginia Beach, VA 23452 (804-340-6105).

Sept. 17–18, **Peoria Area ARC Superfest 88,** Exposition Gardens, Peoria, IL. Contact Superfest 88, P.O. Box 3461, Peoria, IL 61614 (309-674-5656).

Sept. 18, **South Jersey RA Hamfest,** Pennsauken High School, Route 73 and Remington Ave., Pennsauken, NJ. Contact Alan Sherman, WB2OEZ, 609-768-8380, or SJRA, P.O. Box 1026, Haddonfield, NJ 08033.

Sept. 18, **Skyview Radio Society Hamfest,** Skyview Club Grounds, New Kensington, PA. Contact John Thompson, WB3FYP, 1014 Cable Ave., Pittsburgh, PA 15238 (412-828-5966).

Sept. 18, **LIMARC ARRL Long Island Hamfair,** NY Institute of Technology, Old Westbury, NY. Contact Mark Nadel, NK2T, 516-796-2366.

Sept. 18, **L'Anse Creuse ARC Swap and Shop,** L'Anse Creuse High School, Mt. Clemens, MI. Contact Ralph Wilcox, KA8YOJ, 39610 Chart, Mt. Clemens, MI 48045 (313-469-3308).

Sept. 23–25, **QCWA National Convention,** McLean Hilton Hotel, McLean, VA. Contact John Kelleher, W4ZCC, 301-924-1605. (Deadline for hotel reservations

Sept. 8; after that first come first served.)

Sept. 24, **Orange County ARC Hamfest,** John S. Burke High School, Goshen, NY. Contact N2AWI, RD 2 Box 447, Wallkill, NY 12589, or call 914-564-0688.

Sept. 24, **Northern New Mexico Hamfest,** US Army Reserve Center, Santa Fe, NM. Contact Clem Burke, W5IXR, Box 73, Ojo Sarco, NM 87550 (SASE).

Sept. 24, **Elmira International Hamfest,** Chemung County Fairgrounds, Elmira, NY. Contact Don Estus, 42 Maplehurst Park, Horseheads, NY 14845.

Sept. 24–25, **Radio Expo 88,** Lake County Fairgrounds, Evanston, IL. Contact Radio Expo, Box 1532, Evanston, IL 60204 (262-6773).

Sept. 24–25, **W7DP Hamfest,** Community Building, Milton-Freewater, OR. Contact Paul Hamon, KA7VHL, 1412 Walla Walla St., Walla Walla, WA 99362 (509-525-0512).

Sept. 25, **Cleveland Hamfest Assn. Hamfest and Computer Show,** Cuyahoga County Fairgrounds, Berea, OH. Contact CHA, P.O. Box 81252, Cleveland, OH 44181-0252.

Sept. 25, **Natchaug ARA Fleamarket,** French Club, Willimantic, CT. Contact Ed Sadeski, KA1HR, 49 Circle Dr., Mansfield Center, CT (phone 203-456-7029 after 4 p.m.)

Sept. 25, **Tailgate Electronics Computer, and Amateur Radio Fleamarket,** Albany and Main Streets, Cambridge, MA. Contact Lesley Redman, 320 Memorial Dr., Cambridge, MA 02139 (or call 617-253-3776).

Sept. 25, **BARCFEST 88,** Boulder County Fairgrounds Exhibit Building, south Longmont, CO. Contact Barbara McClune, N0BWS, 5338 Spotted Horse Trail, Boulder, CO 80301 (303-530-1872).

Sept. 25, **Adrian Hamfest/Computer Show,** Lenawee County Fairgrounds, Adrian, MI. Contact Mark Hinkleman, NU8Z, 108 E. Kilbuck, Tecumseh, MI 49286 (517-423-5906 from 8 a.m. to 2 p.m.).

Oct. 1, **Mid-Atlantic VHF Conference,** Warrington Motor Lodge, Warrington, PA. Contact Pat Cawthorne, WB3DNI, 215-672-5289.

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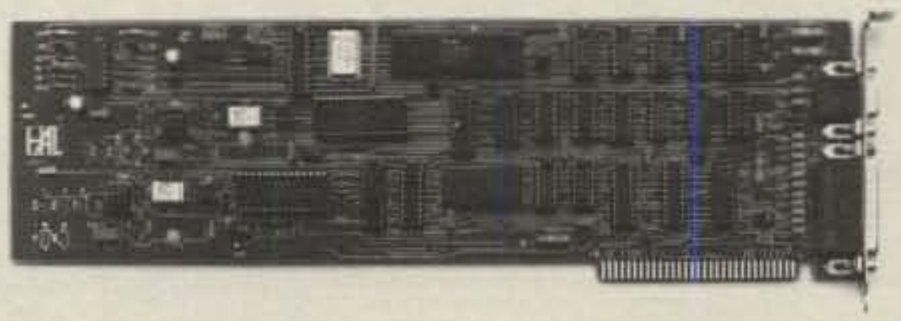

The RPC-2000 is a two-channel radio packet controller that adds fast, error-free data communications to radio links. It plugs into an expansion slot of the HAL DS-3200 Radio Data Communications Terminal or any fully compatible PC, PC-XT, or PC-AT computer. The RPC-2000 uses Packet Radio protocol based on AX.25 to provide data communications at rates from 45 to 4800 BPS.

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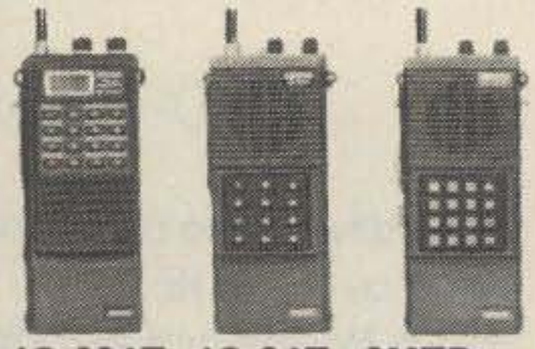

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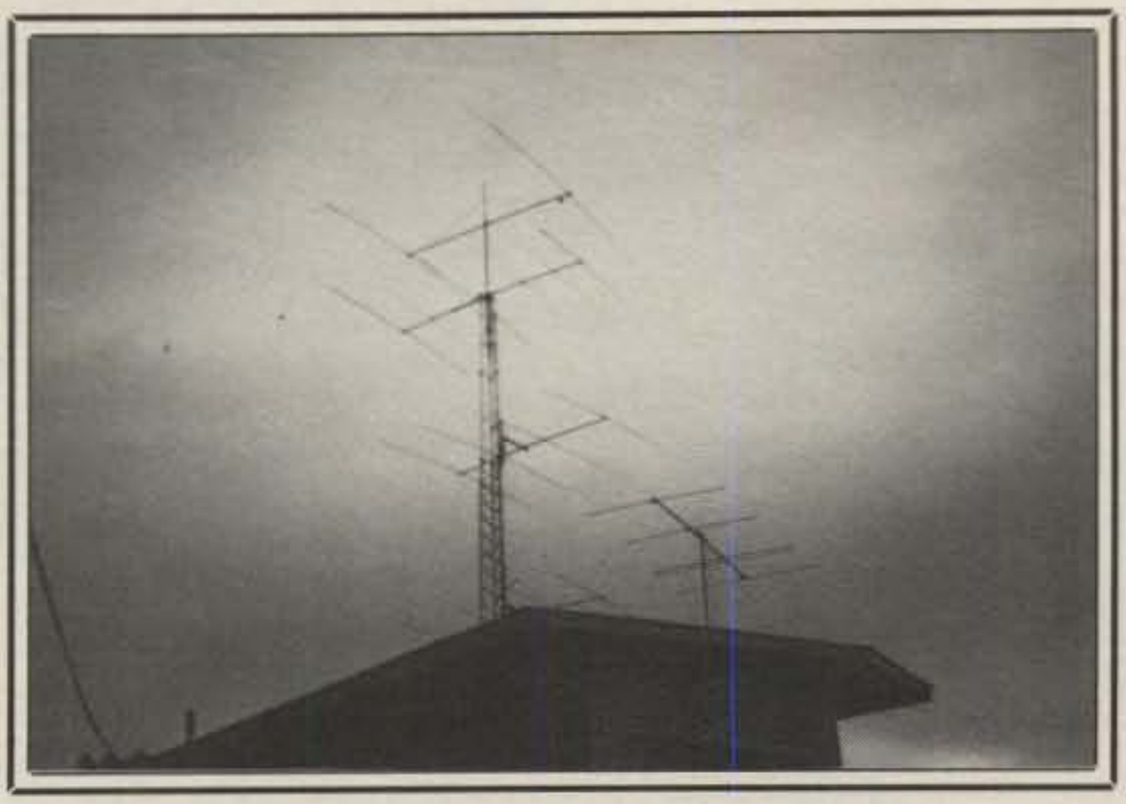
Bill, N1GL, finished 4th in the World at P40A.

Danny, K7SS, enjoys "post contest bliss" following his record demolishing of the World QRP record with that 3M plus effort.



Here's what it takes to win the CQ WW—the setup at 9Y4TT, operated this year by Rick, NQ4I.

Results of the 1987 CQ World-Wide DX SSB Contest

BY LARRY BROCKMAN*, N6AR/4, AND BOB COX, K3EST**

The computer revolution is alive and well in ham radio. Even more to the point, the computer is becoming a significant force in the *CQ* WW Contest! This year the contest results were entered directly into N6AR's computer, transferred electronically to *CQ*, and dumped into *CQ*'s typesetting machines, thereby eliminating many stages of translation and checking from the process. Hopefully, the output will be more accurate. Then, as we will discuss later, the computer is being put hard at work on the processing of your log entries in our never ending attempt to keep the contest results on the up and up.

For years we have seen a gradual growth in the use of computer duping of the entries. Many of you routinely feed your contacts into your computers to obtain an alphabetical listing of the calls on each band, a great way to "dupe check" your logs. There are even services available out there from those who are in love with their keyboards. The "ABC" dupe checking service, for example, will take your log, and for a fee will provide you with a dupe-free entry. Others enter their logs in total into the computer after the contest, providing a data base file that can be sorted six different ways from Sunday. That data base file provides a convenient way of cleaning up the log, yielding a nice, clean, printed output; it allows a dupe check sheet to be generated easily as an alphabetical listing by band; it solves your QSL chores, since labels can be printed quickly for each QSO. Yes, indeed, the computer is the ideal toy to add to the complex electrical maze that is your rig. You just couldn't go wrong using your computer, right.

Wrong! Oh, to be sure, the computer-generated outputs referenced above are all fantastic time-savers if they are used properly. Improper usage, by the way, is evidenced by the emergence of the "GIGO" principle—garbage in, garbage out. Perhaps an example of how computers are being used to generate mistakes would be helpful.

Every one of us is imperfect. If we had a way to measure each operator's abilities absolute-

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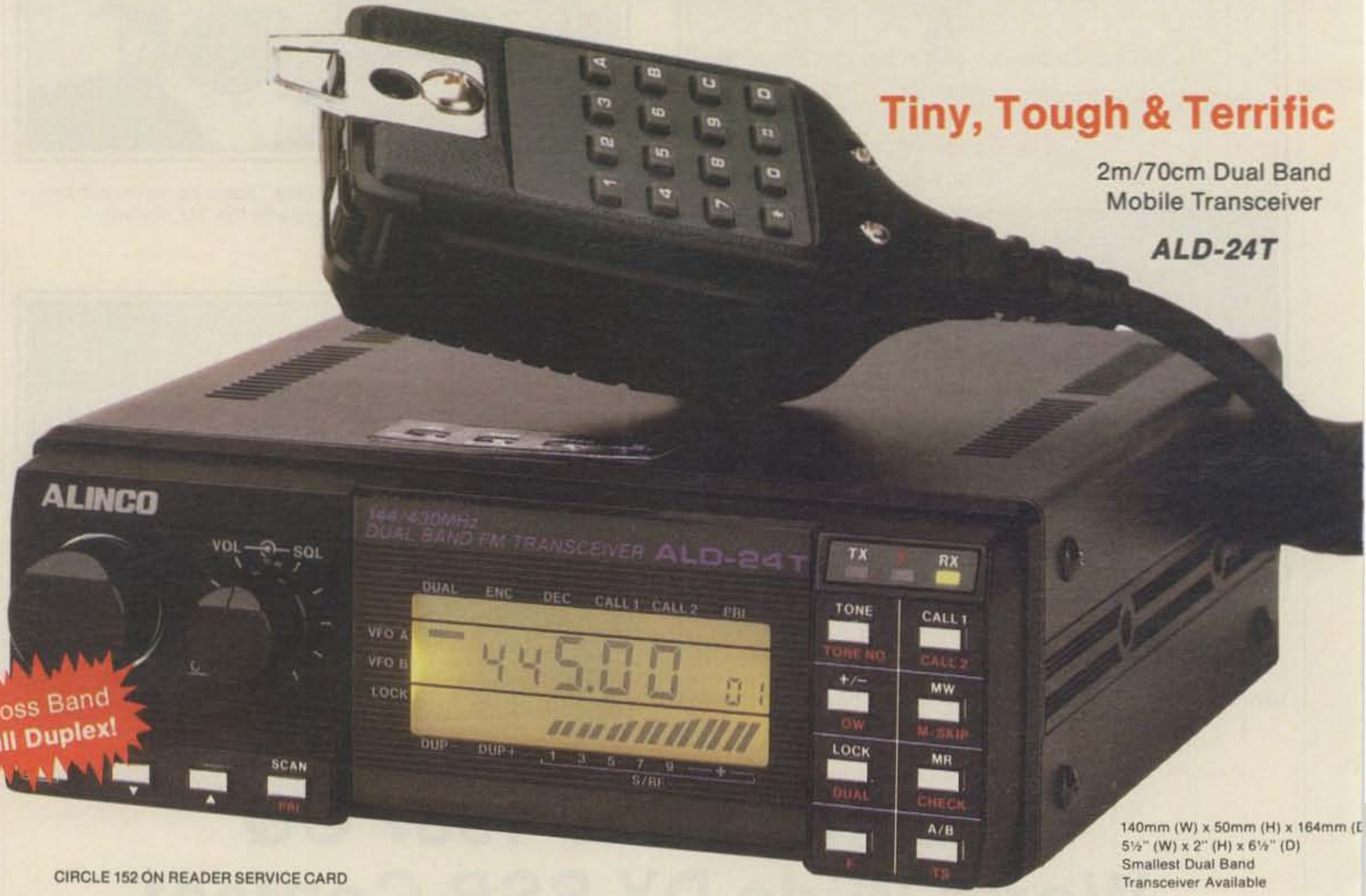

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Olli, OH0XX (left), presents Mano, FY5YE, a copy of the computerized version of his contest logs. Olli finished in the world runner-up slot in the single op, all band category.

Ville, OH2MM, takes a brief pause during his operation at EA8RCT to pose for this photo. Ville says his "CQ voice machine" put out a hectic CQ for him.

ly, then we could see how they would compare in accuracy. For example, I duped my 1986 *CQ* WW CW log as I operated the contest. Later, I duped them again by hand after the contest, and of course, found some dupes I didn't find the first time. But, when I computer duped them the third time, guess what—I found one or two more dupes. The point is that human error occurs every time we engage in a processing step. Now, if you enter your log into the computer, but you don't thoroughly check the accuracy of your entries, then you may well generate more errors than you catch. When N6AR entered the results into his computer, he sure found out how critical the editing process is!

This year we had several large computer entries where this problem existed in spades. That's one of the reasons why we have asked for a copy of the original log in the past—to confirm whether errors are keypunch or operating errors. But, guess what. Having been besieged with computer logs the past several years, we are changing our policy. From now on it won't matter to us what the source of the error is. If it's a copying error, a handwriting error, a keypunch error, even a computer interface error—they're all going to be treated the same from now on. If it's an error, and we find it, you are responsible for it and it will count against you, no matter how obvious it is. So just remember, be careful, please.

The All Band Results

The big story for 1987 was the phenomenal new QRP World record set by Danny, K7SS, at PJ2FR. With just 5 watts, Danny exploded the old record set by TG9GI in 1982 by a factor of 3, with 3.17 million points and over 3200 contacts. Congratulations on a super effort, the only World record set in any of the all band categories this year.

Our Single Operator, All Band winner was 9Y4TT, operated by Rick Dougherty, NQ4I. The Atlanta-based pilot helped put up new antennas at the host station, and then amassed an impressive 10.4 M, followed by Olli, OH0XX, at FY5YE, with a fine 9 M, and Lars, SM5GMG, who scored 7.5 M at CR9BZ. Our only entry for team contesting this year, Team Scandinavia, boasted 4 entries in the top 10, with T30RY and ZB2X joining FY5YE and CR9BZ. Their fine 25 M team score would have blown away almost any competition—or would it? Team captain Martti Laine, OH2BH, challenges anyone to put a team together to beat them in next year's fracus. Bill, N1GL, finished fourth at P40A, and vowed to do better next year, as did TR1G, who was in fifth place. Finishing seventh worldwide, but first in Europe with 4.8 M, was ZB2X, followed by Pasi, OH6UM, who guest operated OH0BH to the tune of 4.3 M. Incidentally, we have included a "Top Score" block for Europe this year for the first time, like the ones we have traditionally had for World and USA winners. SU1ER (by Jim Neiger, N6TJ) and WR6R/KH6 rounded out the top ten, both at about 4.1 M. We are all indebted to Jim for putting zone 34 on the air on all bands!

Once again the East Coast dominated the top 10 USA with 9 of the top 10 scores. In fact, the top four scores were posted by a New England contingent led by Stu, KC1F, who racked up 3.2 M. He was heavily pursued by K1ZM (2.7 M), KM1H (2.6 M), and K1DG (2.5 M), respectively. Our hat is off to Jim Stevenson, KM6B, who managed to invade the top 10 from California with a fine 2.16 M, just a hair behind the fifth place finish of Steve, W3BGN.

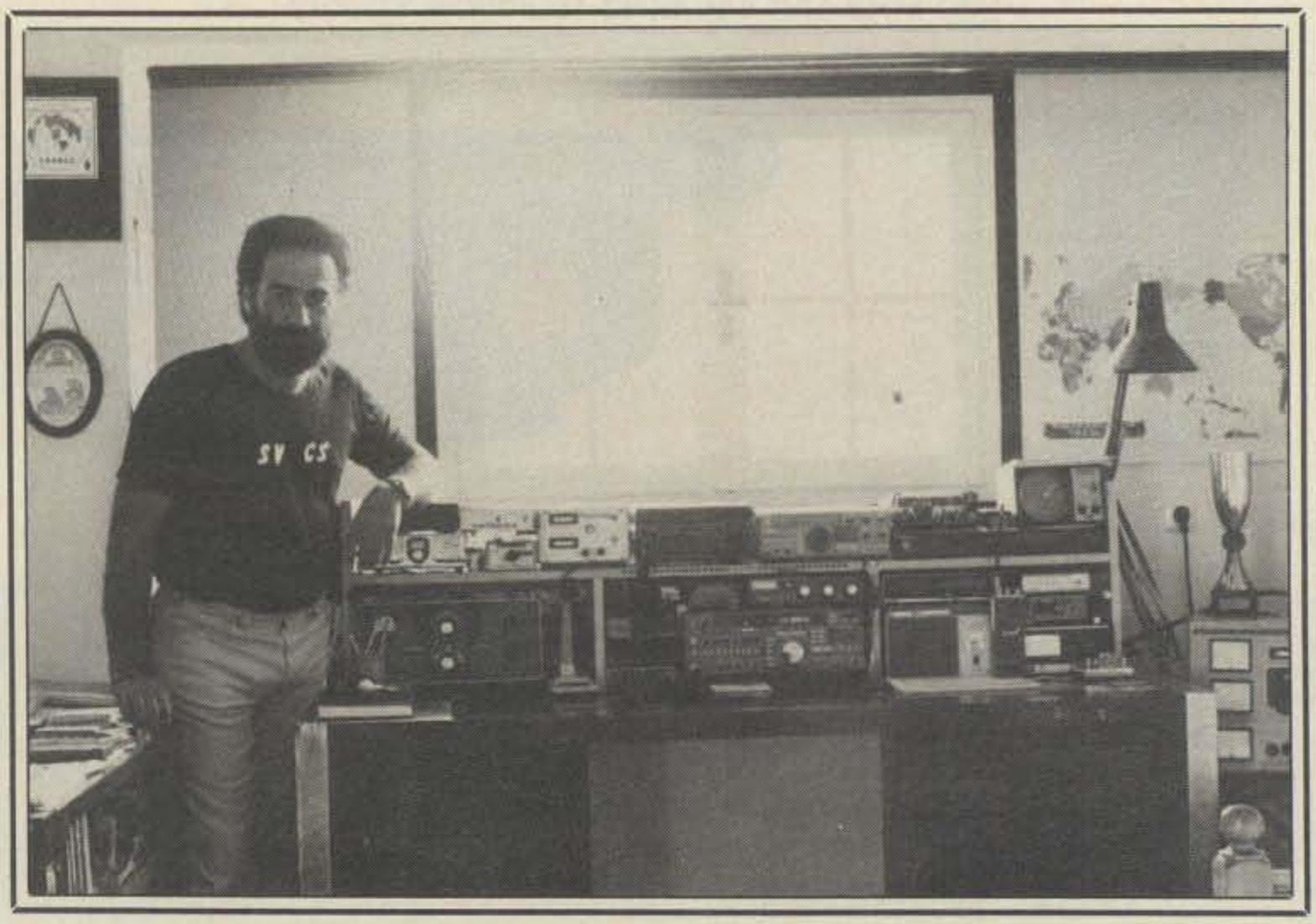
The KP2A crew organized by Darryl, N6DX, edged out fellow North American competitor 8P9HR in the Multi-Single category with a fine 10.7 M. AZ4F finished third at 9.8 M. The high European score came from the group at LZ9A with 7.9 M, and USA honors went to John Dorr's crew at K1AR (4.53 M). The K1AR guys had lots of stiff competition, with 3 other teams finishing in a virtual dead heat with them, as K3TUP (4.51 M), N2RM (4.34 M), and N4WW (4.29 M) gave it their all.

It was a three-way dogfight for World high Multi-Multi this year, with PJ1B emerging as the victor with a fantastic 35.8 M. Nearby, P40V finished second at 34 M, with HC8DX rounding out the top three with 33.7 M. Frank, W3LPL, led his team to an impressive 9.5 M USA first place in Multi-Multi, followed by two fives—N5AU (7.9 M) and NR5M (7.3 M). The European top dog was UP7A with 10.7 M.

Single Band Categories

Monoband entries continue to thrive, especially as the propagation on 10 meters and 15 meters improves. World records were set on four of the six bands in some of the most heated competition of the contest. This year 10 meters showed some of the flair we enjoyed at the cycle peak, with all continents available from most locations. Yet South American entries continued to dominate the World competition on the high bands, sweeping the top 5 on 10 meters, and the top 6 on 15 meters. ZY5EG, operated by PY5CC, took the 10 meter honors with 1.77 M, enough to top fellow South Americans LU1E, CX4HS, CE6EZ, and CW2A, in that order. EA8VV finished sixth with 648 K. The stateside winner was John, K6SVL, who found the band open to Japan in style, enough for 176 K. He was followed by KE5FI and N4EJV, both at or about 150 K. CQ7NH ran away with it in Europe, with a fine 350 K score.

Atilano, PY5EG, took the 15 meters prize with a fantastic 2.468 M, edging out Mario, CW4C, at 2.3 M. This was a new World and South American record, toppling last year's 2.1 M effort at the same station by N5FA. K3RV/4 piled up 663 K stateside to lead a pack



The number four score worldwide on 160 meters was posted by SV8CS, shown with his station.

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of contenders that included W5VX, K4XZ, and W6PU in that order. 4N4A led in Europe with 942 K, with 4 of the top 6 scores coming from Yugoslavia.

Dave Donnelly toppled the old South American record, as P40SS bested a tough set of contenders for the top spot on 14 MHz with a great 1.79 M. He was followed by ZZ5EG (Opr. N5FA), and YW1A with 1.6 M and 1.5 M, respectively. Alex, UF6FFF, set a new Asian record at RF0FWW with 1.447 M, while LZ1KGB smashed the European record at 1.39 M to finish fifth worldwide. John, K2VV, was USA high at 812 K.

Ville, OH2MM, travelled to EA8RCT for a try at single band 40 meters, which just has to be the toughest of all phone categories with all that QRM to contend with. Ville captured a new World record at 859 K, nudging out the old '86 mark of 850 K set by VP2ET. FJ5BL (654 K) and EA8ACH (583 K) finished second and third. IO3MAU set a new European standard with a fine fourth place Worldwide score of 430 K, followed by VE3CDX and JA8IXM. KV0Q was tops in the States with 102 K.

Conditions were fantastic on 75 meters this year with long openings beginning before sunset and ending well after sunrise. Bob Allphin, K4UEE, mastered P40R to the tune of 552 K to demolish the old 383 K World record of VE3BMV set back in 1985. 8R1RPN was second with 231 K. A new European record was established by UA2FGA with 197 K, a tad above DL6RAI's one year old standard from LX9BV. Meanwhile, WB8JBM nosed out W6RJ 105 K to 101 K, to win it Stateside.

The low band showed great signs of activity, as new World and Asian records were set at UG7GWO with 255 K, a mind-boggling 160 M score that broke the 4 year old standard by UP2BBT/U6V. Wally, LZ2CJ, came in second and was tops in Europe, but failed to better his '86 record score. The only record set by a US station this year in any category was on 160 meters, as WB9HAD's super 27 K effort made AA1K/3's '85 mark of 25 K history.

Some Special News

This year we were blessed with a continuing increase in activity, especially from continents

PHONE TROPHY WINNERS AND DONORS

Single Operator, All Band
World
9Y4TT (Opr. Rick Dougherty, NQ4I)
Donor: Dave Rosen, K2GM (WA2RAU Memorial)

World QRPp
PJ2FR (Opr. Danny Eskenazi, K7SS)
Donor: Milliwatt Books

U.S.A
KC1F, Stuart Santelmann
Donor: Potomac Valley Radio Club

Caribbean/Central America
HI3JH, Julio Henriquez
Donor: Alex M. Kasevich, VP2MM

Europe
ZB2X, Jorma Saloranta
Donor: Potomac Valley Radio Club, W4BVV Memorial

Africa
CR9BZ (Opr. Lars Mohlin, SM5GMG)
Donor: Gordon Marshall, W6RR

Asia
UA9YX, G. G. Shulgin
Donor: Japan CQ Magazine

Japan
JR6EZE, Kazu Kuroki
Donor: Japan Crazy Contester's Club

Oceania
T30RY, Pikka Kolehmainen
Donor: Northern California DX Club

South America
FY5YE (Opr. Olli Rissanen, OH0XX)
Donor: Special CQ Plaque

Single Operator, Single Band
World—28 MHz
ZY5EG (Opr. Peter Sprengel, PY5CC)
Donor: Joel Chalmers, KG6DX

World—21 MHz
PY5EG, Atilano De Oms
Donor: Lee Wical, KH6BZF

World—14 MHz
P40SS, Dave Donnelly
Donor: North Jersey DX Association (K2HLB Memorial)

World—7 MHz
EA8RCT (Opr. Ville Hillesmaa, OH2MM)
Donor: Fred Laun, K3ZO (K7ZZ Memorial)

World—3.8 MHz
P40R (Opr. Bob Allphin, K4UEE)
Donor: Fred Caposella, K6SSS

U.S.A.—28 MHz
K6SVL, John Alexander
Donor: Donald Thomas, N6DT

U.S.A.—21 MHz
W5VX, William Parry
Donor: West Jersey DX Group

U.S.A.—14 MHz
K2VV, John Yodis
Donor: Southern California DX Club

U.S.A.—7 MHz
KV0Q, William Johnson
Donor: Stanley Cohen, WD8QDQ

U.S.A.—3.8 MHz
WB8JBM (Opr. Patrick Collins, NZ4K)
Donor: Arnold Tamchin, W2HCW

Canada (14 MHz)
VO1QU, Bryan Kelly
Donor: Gene Krehbiel, VE7KB

Caribbean/Central America
TI2LTA, Luis Tinoco
Donor: Pedro Piza, Jr., NP4A (KP4ES Memorial)

Europe—28 MHz, Zone 14
CQ7NH, Luis Teixeira
Donor: A. G. Anderson, GM3BCL

Japan—21 MHz
JK1JQQ, Sam Suzuki
Donor: DX Family Association

Multi-Operator, Single Transmitter
World
KP2A (Opr. KP2AA, KW8N, N6DX, N6PO, N7RT, NE8Z, WZ6Z)
Donor: Southern California DX Club (W6AM Memorial)

U.S.A.
K1AR (Opr. K1AR, AK1A, K1GQ, K1JX, AA2Z)
Donor: Carolina DX Association

Europe
LZ9A (Opr. YU5AD, YU5RU, LZ1YE, LZ1DB, LZ1RB, LZ2HE, LZ2PO, LZ2DF, LZ2CC)
Donor: Bob Cox, K3EST

Canada
VE1DH (Opr. VE1DH, K2NJ, KU2C, KY2O, NR2H, VE1ASJ, VE1ZJ)
Donor: Calgary Amateur Radio Association

Multi-Operator, Multi-Transmitter
World
P40V (Opr. AI6V, N6KT, N6TR, N6TU, NU6S, W6OAT, W6SZN)
Donor: Radio Club Venezolano

U.S.A.
W3LPL (Opr. W3LPL, AI3M, K1DQV, K3DI, K3RA, K0FVF, KA1GD, KC8C, KM3T, N3GB, N8II, NW5E, W3EKT, W3EMH, WB2EKK, WB3JRU, WD4AXM, WP4J)
Donor: DX Incorporated Club

Europe
HB0/DL8OH (Opr. DL8OH, DF4TD, DF7RX, DF9YY, DK2OY, DK3RG, DK8MZ, DL6RAI)
Donor: OH-DX-RING (OH2AM)

Contest Expeditions
World- Single Operator
P40A (Opr. Bill Ovca, N1GL)
Donor: Stuart Meyer, W2GHK

World—Multi-Operator
HC8DX (Opr. HC2CG, HC2RG, N6AA N6VI, N6ZZ, W6MKB, W6NV)
Donor: The German CDXG & SDXG (DJ3NG & DJ4EI Memorial)

SPECIAL CQ MAGAZINE PLAQUE

World Multi-Multi
PJ1B (Opr. K3EST, KB2XZ, N3ED, N4RV, N7ZZ, W7ZR, WA3LRO)
Donor: CQ Magazine

Up goes the 20 meter beam at TF3CW.

Here's part of the crew at FK/JH4RHF—Kei, JG3MRT (front), and Yugh, JR3KEG, who was busy running contacts.

This year's Multi-Op DXpedition Trophy goes to the crew at HBØ/DL8OH shown here adorned with their gear. Left to right are Dieter, DL8OH; Gunnar, DK3RG; Reinhard, DF4TD; Wolfgang, DK8MZ; Ben, DL6RAI; Bernhard, DF7RX; Uschi, DF9YY; and Manfred, DK2OY.

other than North America and Europe. We cannot help but notice the significant increase in participation in Indonesia, China, Africa, and most of South America, all welcome additions to the fun of the contest. Those early morning Asian openings to the USA East Coast on 10 meters were something else, too. And of course, the VU4 station was a great surprise, especially on 10 meters and 160 meters. Activity from several zone 23 stations was in evidence, not to mention the great all band effort at SU1ER, a zone 34 delicacy. My favorite was the HSØ on 20 meters right at the beginning of the test. The list of goodies is endless—the 5V7, the 3DX2, the FK, the 3X, etc. Only the *CQ* WW Contest provides so many pleasant surprises. But did you know that only about 1 in 6 active stations enters their log in the contest? Take a look at the listings this year, particularly if you didn't send in your log. Would you have been a winner? Think about it. Next time, send in your log. Another thing worth mentioning. If you didn't get a certificate or a trophy, the man to contact is John Dorr, K1AR. Drop John a line at 2 Baldwin St., Windham, NH 03087 if you need help.

Random Comments

The situation on 75 meter phone in the "DX Window" continues to worsen. A few guys tend to monopolize the window. Some stations get cued by their buddies of DX somewhere else on the band. The buddy even offers to hold the frequency for his friend. Some guys even appear to be running lists for fellow contesters! A list operation is a blight to DXing, but it is just plain ridiculous in the contest. We may just tape a few of the shenanigans in 1988. If what we heard last year is repeated, and we get it on tape, then some of you may just find you have been reclassified as Multi-Single!

Earlier we commented on the computerized checking we've been doing with the logs. This year we have expanded our operations on the computer significantly. For example, all logs submitted are entered into a master file of known entries on each band. Then, we pick one or two target bands, and enter a fair number of the large logs on those bands into the computer. We can cross correlate between the entrants to see who worked whom. The data shows interesting patterns that relate to operator accuracy. For example, we can determine which operators have a large percentage of calls in their logs which are unique. It is not true, for example, that the guy with the most contacts has the largest percentage of unique calls. A further look at the unique calls reveals that they are often very similar to calls everyone else has worked—circumstantial evidence that perhaps a "unique" call is actually a busted call. Some of you may have seen the presentation at Dayton or Visalia by some of the W6 faithful. In essence, their analysis and ours are qualitatively similar.

The results of the computer checking show that everyone makes mistakes, some more so than others. There is a fine line between acceptable human error and unacceptable operating, but it is hard to define. So, we continue to work on it. Some general statements can be made, though, about the quality of logging. If you have a substantial score (in excess of 1 M), and you have not dupe checked your log, you will probably have in excess of 5 to 7% dupes. If you kept a cross check sheet during the contest, but didn't check it a second time after the contest, you probably have 2 to 3% dupes still in your log. If you are super careful at copying calls during a run, making sure you always confirm the station's call on every QSO, you probably still have a couple of percent error in your calls. But if you operate as a machine and concentrate on sustaining rate rather than accuracy, you're probably pushing 10 to 15% error. Because the burden of a clean entry is on you, not the contest committee, we use stiff penalties for errors we catch. For a dupe or busted call that we detect in excess of 1%, you will be penalized as much as 10 to 1. That includes zone copying errors, too. If you list an LZ as zone 14, you're going to lose credit for that contact. If you list an Alabama station as zone 5, you're going to lose credit for that contact, too. So, we urge all of you to concentrate on proper balance between rate and accuracy. The next time you are in the thick of a run, and you're not sure of the call, ask for it again. Do it right.

Parting Comments

This year we are honored to have had the support of the following committee members in processing almost 3,000 phone logs: Rick, N6ND; Dave, K2SS; John, K1AR; John, KE7V; Ed, N3ED; Fred, AD6C; Jan, N6AW; Glenn, K6NA; Jim, W7EJ; Gene, N2AA; John, K2VV; Mike, W9RE; and Doug, KR2Q.

The 1988 test is just a few weeks away. Good luck and good DX!

73, Larry, N6AR, and Bob, K3EST

Bob, K4UEE, won this year's 80 meter single band category at P40R.

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
9Y4TT	74/8/18	449/18/53	716/24/75	1622/31/88	1907/31/102	1644/24/81
FY5YE	41/7/15	121/11/44	258/19/66	1326/28/89	1777/30/103	2199/28/96
CR9BZ	21/5/18	458 14/58	483/21/74	1190/29/85	1649/30/96	914/23/83
P40A	30/7/13	217/17/56	562/21 65	1269/31/94	1408/30/89	1407/27/65
TR1G	—	—	35/11/17	1641/31/82	1935/30/94	1372/29/97
T30RY	24/6/7	382/18/25	798/28/52	1052/34/82	1474/33/63	859/22/39
ZB2X	103/8/44	369/14/62	664/24/86	1074/29/79	1333/26/88	587/24/76
OH0BH	240/8/47	426/19/75	615/30/91	993/35/101	939/39/106	204/25/68
SU1ER	7/2/5	218/11/46	493/19/59	1053/32/91	496/20/52	988/24/72
WR6R/KH6	25/4/4	183/12/15	653/27/39	787/32/74	1326/32/66	788/28/47

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
KC1F	39/9/30	117/13/53	119/23/62	1120/38/120	629/30/94	83/19/36
K1ZM	76/15/45	153/18/69	112/26/68	775/35/100	493/28/97	77/18/43
KM1H	75/15/38	216/20/69	113/23/64	826/35/108	407/28/94	90/15/43
K1DG	33/11/25	137/17/55	80/18/55	798/36/114	607/29/96	57/17/33
W3BGN	50/13/32	145/15/51	100/21/56	863/34/90	417/26/86	82/16/39
KM6B	22/13/14	158/23/40	416/28/47	390/32/80	629/31/68	138/18/38
N2LT	16/8/12	81/16/50	90/20/52	685/36/108	543/31/102	88/20/47
K5ZD/3	33/10/23	103/17/46	129/20/63	583/37/112	439/29/96	124/19/53
KS1L	20/8/12	118/14/55	61/17/41	792/35/106	557/26/80	36/10/24
K1YR	17/9/11	137/19/58	113/25/68	430/35/106	547/28/97	101/21/50

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

KP2A	66/11/27	569/20/73	648/26/88	2120/38/111	2190/32/112	1398/25/83
8P9HR	104/9/23	420/17/63	934/29/99	2448/32/104	1501/29/100	1374/27/88
AZ4F	10/5/9	34/12/22	60/27/58	887/36/98	2665/33/108	2462/33/104
KP4BZ	94/8/26	510/11/64	1462/31/95	1416/30/103	1973/29/107	1303/22/86
LZ9A	46/10/48	388/19/68	825/28/97	1051/39/123	2195/39/135	245/35/120
ZC4DX	119/8/36	565/15/62	754/24/75	955/26/70	1433/27/88	873/26/79

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

K1AR	32/11/31	288/22/80	144/29/88	1020/39/139	717/31/131	81/21/66
K3TUP	40/11/30	103/22/62	138/29/80	1136/19/147	832/30/125	104/22/66
N2RM	27/11/25	242/21/71	126/24/84	980/38/143	795/31/130	105/20/65
N4WW	32/12/28	139/22/72	134/26/82	1033/36/130	959/31/125	116/24/76
N4ZC	32/11/24	191/24/79	147/31/100	702/38/127	582/32/129	211/26/85
N4RJ	39/13/32	126/23/63	107/29/71	767/38/129	711/34/133	190/25/81

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

PJ1B	495/17/46	1043/23/79	1732/27/98	4558/37/153	4024/36/139	3373/30/111
P40V	226/9/31	975/20/70	1974/30/114	4583/37/136	4119/35/131	3725/29/101
HC8DX	451/17/37	1091/26/84	1548/30/103	3737/37/125	5077/33/127	3633/24/92
VP9AD	760/15/47	1630/21/83	1721/29/100	4375/36/128	3089/34/131	1465/30/99
KH6XX	137/8/11	450/24/36	1337/33/61	1926/37/113	3193/38/86	1649/26/51
UP7A	1107/11/60	674/21/75	1297/35/113	2468/39/131	1587/37/122	490/27/83

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	116/14/49	487/23/84	295/32/99	1672/38/155	1235/35/144	416/25/93
N5AU	77/14/45	181/25/78	378/32/102	1212/39/141	1320/34/138	543/29/88
NR5M	83/15/36	223/23/68	479/32/92	1065/38/134	1204/32/130	639/27/96
N6ND	50/12/22	138/21/44	327/30/64	1002/38/114	1192/33/91	672/23/66
K2TR	74/13/43	235/18/60	100/22/59	1040/39/132	568/32/126	182/19/67
K4VX/0	77/11/28	149/21/62	245/31/92	829/36/137	428/30/108	269/25/76

DX QRM

Running 80M with a dipole instead of a vertical with 100 radials is like riding a bike without pedals . . . *UR1RWX*. Worked WAC, WPX, and DXCC! . . . *UZ6XWC*. Very bad conditions to North America, and awfully bad conditions due to local jammers. Was trying to do my best as always . . . *UB5WE*. Sorry, I had a TVI problem . . . *UA1OT*. Propagation on 10 M was not bad throughout the contest, but where were all the W/K's this year? . . . *UB5UAT*. Nice to work the SSB test, but CW is much better . . . *UQ1GXX*. My 14th CQ WW DX SSB Contest . . . *UT4UZ*. First contest with new call sign . . . *U1BA*. Enjoyed every minute of the contest—hope to do better next year . . . *UR2RE*. Lot of DX was in the WW DX Phone . . . *UA3ASL*. The station and antennas were built by the OM himself . . . *F9OJ*. First time worked VU! Biggest thrill—called by CR9BZ . . . *GJ3XZE*. Must have been the only person to miss the S0 . . . *GW4BLE*. Have to build a 40 M beam for next year . . . *GW4BKG*. First entry—lots of new prefixes and countries for me . . . *PA3ELD*. *CQ* WW brings us DXers Christmas time in October . . . *SM5KNV*. Like always, it was midnight in the yard repairing something . . . *HK3IXJ*. My category is: married, two sons, barefoot, small antenna, high TVI . . . *IK4FNF*. No conditions on 10 M: no NA, no Far East, only Florida like from an Aircraft Carrier . . . *IO0KHP*. First time worked split frequency on 40 M to USA—great fun . . . *SP9FIH*. Thanks for the contest . . . *YO3NL*. Great fun for my first ever effort on 160 M SSB. Lost a couple of rare ones (PJ1B, VP9AD). Look forward to the CW section . . . *YO2IS*. Was operating for the first time from my second location—out of the city and on a flat hill top . . . *OK2RZ*. Unfortunately some stations only operated above 3.8 MHz. . . . *HA4KYN/HA4XH*. A little better than last year, but not at the top again . . . *CT1CLR*. I have been operating since 1937, the age is 73 . . . *CT1QF*. 10 M is getting alive again, at last, for Europeans . . . *CT4NH*. Knowing very little English, I thought I was in big trouble. But, I learned very much, indeed, so I'll be there again next year . . . *CT1BMQ*. Almost lost my voice due to below normal propagation . . . *DJ4AX*. Couldn't get through the European pileup to VU4GDG . . . *DK8AX*. Russians still making more QRM than QSOs . . . *DL5RBW*. My old Heathkit gave up after a number of hours . . . *DL1XAS*. After 110 QSOs I went QRT because I had some DX visitors . . . *DJ8OT*. Unfortunately no transatlantic QSOs on 10 M with my mini-antenna—maybe next year . . . *DJ0NY*. Thanks for running a great contest . . . *EI2VKL*. Much too tired to be a serious competitor, but a true single op . . . *F6BEE*. Very nice weekend for me, but very bad for my neighbor (TVI) . . . *FE6FNA*. I am getting old, only 637 QSOs but more points than last year . . . *F6BBJ*. What a thrill-working VU on 15 with ease and then hearing all Europe and their linears let loose . . . *G0CCH*. Meeting so many old friends from my days as 5Z4KL . . . *GM3VLB*. Poor propagation caused by aurora . . . *JW0B*. To have worked HC8DX as a new country, because I spent my vacation at Galapagos this year . . . *LA9SN*. My first CQ test was in 1951—and I still like it . . . *OZ7HT*. Working HC8DX, HS0A, 5T5BC, CR9BZ, ZC4DX, SU1ER, and WB8DIT/VP2M within 48 hours on top band was a real thrill . . . *LZ2CJ*. Very big surprise being called by HS0A on 160 M . . . *SV8CS*. Quite a challenge to try to stay awake for 48 hours for the first time in single op, all band . . . *OH0BH/OH6UM*.

Thrill to have a field day station work so well right off the boat . . . *P40V*. New station on hilltop with a small building just for multi-multi . . . *KL7RA*. Nothing in particular . . . *JA7YRR*. 2 amps burned; 2 transmatches shortcircuited; one rig blew; 4 element 80 M yagi quit; but 9 happy ops . . . *YB0WR*. Many power failures made us rest very often . . . *FK/JH4RHF*. We had a blast and will be back next year . . . *V47Z*. Even with 24 hours of sunshine—40 degrees is still cold . . . *KC4USV (Opr. W7SW)*. 121 countries on 14 MHz, but no VK, no IT9, no ZL. Something's wrong here . . . *VE2ZP*. Got HC8DX first call on the top band with 60 watts . . . *VE3INQ*. Even with barefoot FT-7, 5 watts, and dipole I was able to make 119 QSOs on 28 MHz . . . *VU2TTC*. Finished contest and life saving emergency operation within the contest period . . . *YC2CTW*. No power meant I could not turn my beam except at night, when it came on . . . *5L7Q*. Discouraging to know that the massive JA curtain only counts one point each . . . *BY1QH (Opr. K5IID)*. I always had a hard time getting through pileups because I was using only a simple antenna and no amplifier . . . *YB3CEW*. Look forward to breaking 1,000,000 points next year with my 75 watts output . . . *K1BAZ/DV1*. Next time I need a shorter call . . . *VE7CRW/VE8*. I am still surprised how it is possible to get 1500 QSOs on 10 M with a vertical antenna and 300 watts . . . *9J2EZ*. More fun each time . . . *TR1G (Opr. TR8JLD)*. Nearly all stations giving 59—really? . . . *YC3OSE*. 15 M was the only game in town . . . *AH6FL*. Finished antennas 2 hours before the contest started . . . *5T5BC (Opr. WB4ZNH)*. Heard some of the best operating ever in the contest . . . *5T5MH (Opr. WN4FVU)*. Too bad the K index snuck up to 6 on Saturday night . . . *VE6OU/3*. My first contest and I had a big time on 10 M . . . *VU2CAP*. Linear blew up just when the Europeans started to come in *T30RY (Opr. OH1RY)*. My first contest in 24 years . . . *KH6FKG*. I love this contest, but I'm never fully prepared for it . . . *VK3PU*. A monobander helps a monoband score for sure . . . *VE3XN*. People need to examine the map to find out where KH0 really is . . . *KH0AC (Opr. WA2TMP)*. Who said it's easy from a DX location—low band dipoles blew down twice, lightning hit 80 M dipole, 5 hours of power failure . . . *CR9BZ (Opr. SM5GMG)*. CQ WW from Israel is quite different than from W6 land . . . *4X/K6KLY*. Only in the CQ WW can I go around the World in less than 2

TOP SCORES

WORLD Single Op All Band		USA Single Operator All Band		EUROPE Single Operator All Band	
9Y4TT	10,370,962	KC1F	3,219,970	ZB2X	4,895,520
FY5YE	9,003,728	K1ZM	2,711,650	OH0BH	4,283,244
CR9BZ	7,530,264	KM1H	2,629,728	GW4BLE	2,928,000
P40A	7,481,920	K1DG	2,494,580	HA0MM	2,861,108
TR1G	5,758,257	W3BGN	2,283,393	OH6LK	2,156,880
T30RY	5,147,334	KM6B	2,158,272	RB5DX	2,127,972
ZB2X	4,895,520	N2LT	2,162,616	IV3PRK	1,971,935
OH0BH	4,283,244	K5ZD/3	2,083,725	RB5MF	1,882,010
SU1ER	4,157,233	KS1L	1,958,956	DJ2YA	1,636,992
WR6R/KH6	4,086,436	K1YR	1,951,481	UC2OR	1,522,163
28 MHz		**28 MHz**		**28 MHz**	
ZY5EG	1,777,508	K6SVL	176,176	CQ7NH	352,352
LU1E	1,486,650	KE5FI	158,256	UA6LQ	249,630
CX4HS	1,326,894	N4EJV	149,388	YU3C	141,638
CE6EZ	1,224,492	WB7FDQ	117,792	EA4EAP	133,380
CW2A	876,990	WA7KLK	76,518	4N1A	116,875
EA8VV	648,094	WA6VNR	72,956	YU7GW	97,092
21 MHz		**21 MHz**		**21 MHz**	
PY5EG	2,468,529	K3RV/4	663,993	4N4A	942,039
CW4C	2,266,308	W5VX	573,207	YT3L	846,360
HC1OT	1,813,395	K4XS	425,941	YT7NW	707,085
LU2E	1,576,995	W6PU	399,750	OF5BM	675,032
P40T	1,317,081	KA5W	381,350	4N4Y	552,902
LU4L	1,237,956	K0RF	335,575	GB5NN	438,900
14 MHz		**14 MHz**		**14 MHz**	
P40SS	1,792,056	K2VV	812,392	LZ1KBG	1,388,628
ZZ5EG	1,647,820	N2AA	707,616	IO1ZEU	1,224,818
YW1A	1,540,170	K1UO	657,900	YT3AA	1,073,340
RF0FWW	1,447,128	W7WA	649,250	I5MXX	914,104
LZ1KGB	1,388,628	K1RU	607,749	4N7N	882,882
IO1ZEU	1,224,818	KW8N	563,313	DJ4PT	719,831
7 MHz		**7 MHz**		**7 MHz**	
EA8RCT	859,362	KV0Q	102,691	IO3MAU	430,332
FJ5BL	654,258	N6BFM/4	64,546	OF2HE	228,404
EA8ACH	583,478	K8XR/2	63,220	RU1DZ	227,432
IO3MAU	430,332	KP4AKB/8	45,144	RB5MR	212,736
VE3CDX	365,700	N4RIG	44,700	SM5AQD	210,140
JA8IXM	311,360	K8PO/1	39,330	SP3RBR	193,210
3.8 MHz		**3.8 MHz**		**3.8 MHz**	
P40R	552,786	WB8JBM	105,138	UA2FGA	196,992
8R1RPN	231,822	W6RJ	100,620	HA4KYN	177,154
UA2FGA	196,992	WA4SVO	77,559	CU2AK	144,894
HA4KYN	177,154	KC7EM	50,172	RB5FF	138,112
NP4AT	148,960	W4PZV	26,660	OK2RZ	126,584
CU2AK	144,894	W2HZ	22,230	I4EWH	122,232
1.8 MHz		**1.8 MHz**		**1.8 MHZ**	
UG7GWO	255,852	WB9HAD	27,181	LZ2CJ	94,247
LZ2CJ	94,247	W0ZV	12,204	SV8CS	39,294
WB8DIT/VP2M	40,392	W4DR	10,605	LZ1KOZ	34,038
SV8CS	39,294	W2FCR	10,004	OK3CWO	25,665
KH6CC	37,138	K7IDX	7,080	CT1AOZ	22,680
LZ1KOZ	34,038	N1ACH	5,245	SP8INQ	18,468
Multi- Operator Single Transmitter		**Multi-Operator Single Transmitter**		**Multi-Operator Single Transmitter**	
KP2A	10,693,238	K1AR	4,531,168	LZ9A	7,858,944
8P9HR	9,993,160	K3TUP	4,513,041	I4EAT	6,865,768
AZ4F	9,807,275	N2RM	4,344,639	OK7MM	6,390,300
KP4BZ	9,621,259	N4WW	4,288,284	OK5R	6,173,352
LZ9A	7,858,954	N4ZC	3,705,794	IK4CFV	5,925,744
ZC4DX	7,098,784	N4RJ	3,503,291	HG6N	5,836,276
Multi- Operator Multi- Transmitter		**Multi-Operator Multi- Transmitter**		**Multi-Operator Multi-Transmitter**	
PJ1B	35,815,586	W3LPL	9,529,968	UP7A	10,717,356
P40V	34,073,237	N5AU	7,871,630	HB0/DL8OH	7,599,620
HC8DX	33,663,000	NR5M	7,253,136	YZ1U	4,788,156
VP9AD	23,236,827	N6ND	5,155,920	HB0/DF1JC	3,078,350
KH6XX	13,305,408	K2TR	3,828,510	LX50RL	2,326,912
UP7A	10,717,356	K4VX/0	3,536,345	ON6NL	2,001,230

days . . . *YC1JZS*. No amp, typhoon, big mess . . . *XX9T (Opr. 4X6TT)*. A lot of fun putting a very rare zone and country on the air . . . *SU1ER (Opr. N6TJ)*. My digital voice machine thanks its fellow machines worldwide for the nice QSOs . . . *EA8RCT (Opr. OH2MM)*. Spent 15 minutes using my dummy load—worked VE1CYL 2 blocks away . . . *VE1CBF/QRP*. Duplicated my last year's score, and already getting ready for 1988 . . . *TI2MEN*. Great propagation and fine sportsmanship on this band . . . *TI2LTA*. My first pileup from the other end . . . *K8UE/VP2M*. Went outside to stretch my legs at 3 AM and bumped into a cow . . . *WB8DIT/VP2M*. Getting 5V7WD, 9Q5NW, and 5T5BC on 20 M—all new DX within an hour . . . *KP4CZ*. Nine hours before the end, Mr. Murphy came to visit . . . *KP4EQF*. Great host and local hams, but equipment problems and a few mistakes—wait till next year . . . *P40A*. First night was tough going—big pileups and poor propagation to Europe; the second night was fun, but where were the Africans and VKs on 75? . . . *P40R*. Conditions really helped me, and my physical condition allowed me to be awake for 44 hours . . . *PY5EG*.

Good conditions on 20 M—band conditions seem to be improving . . . *CE3NR*. Definitely the best contest of all . . . *HK1LDG*. Worked BY4SZ, OX3LX, P29KRE, YI1BGD, ZC4DX, and 88 more countries on 10 M . . . *HK3MAE*. This time my score went up 610%; who knows what next year will bring . . . *HK7IMB*. One year is too much time to wait for the next contest . . . *HK1KXA*. I could have done better if I had some other antennas . . . *8R1RPN*. Hearing Chitra from the Andaman Islands call me by name, I couldn't believe it . . . *CX4HS*. Very hard to work barefoot with a vertical . . . *PT2TD*. Got off to a bad start by sleeping through the first 4 hours of the contest . . . *SV0FE*. Power supply QRT, a big bang in the night . . . *I5OVS*. Our second big contest and will do it more times again . . . *EA3MM*. This year we used your contest to train SWLs and newcomers . . . *FF6KAW*. Worked HC8DX on 5 bands, VU4GDG on 10 M, and K5ZD/3 on 6 bands . . . *F6EXV*. Fantastic contest . . . *LZ2KSQ*.

USA QRM

Breaking pileup for HS0A on 20 M . . . *NK1F*. We operated multi-multi with 9 operators—6 of them had never operated a contest before and they loved it . . . *KT9M*. Every year you learn something brand new in the contest . . . *NR5M*. My no-doz quit working, had to sleep . . . *AA4NC*. New tower, new antennas, new rig—new Murphy . . . *WB4MAI*. Heard N5AU so much I think I may have used his call a couple of times . . . *N5IMO*. 34 hours with a popgun station in a big gun game . . . *N5KDA*. Had not worked China yet and had 3 BYs call me in the contest . . . *W5VX*. Worked BY1QH with QRP over a local running 1.5 KW who called at the same time . . . *W0KEA*. I kept yelling "QRP", "QRP" . . . *N3RS*. A lot easier to obtain a winning score from Tel Aviv than from Los Angeles . . . *WB6JHC (Opr. 4X1IF)*. First 15 minutes, 40 QSOs; downhill from there . . . *N2AA*. Stayed up the first night—was a zombie the second morning . . . *K1VR*. Shame on those who can't control their foul language . . . *W1IHN*. I knew it was time to go to bed when I reached into my coffee instead of the raisins . . . *KM1P*. First contest—wish I had more time . . . *WD2AHD*. What luck! First contact in the contest was China . . . *KA2CHX*. Think you should pick a log or two at random, and the winners can have their spouses go on a trip for the CQ WW weekend . . . *KT2D*. JA/YB long path on 10 M was a real surprise . . . *W2GD*. Finding a big pileup on a JA with a JW ½ kHz down calling CQ with no takers . . . *KE2CG*. After meeting Jim Smith at Dayton, nice to finally work him . . . *N2BSA*. XYL says I gotta get grass up before the towers

One of the three big 30 M plus multi-multi efforts this year was P40V, ably manned by, left to right, Tree, N6TR; Bruce, N6TU; Rusty, W6OAT; Carl, AI6V; Tim, NU6S; Rich, N6KT; and Kip, W6SZN.

. . . *KN2Q*. Getting called by SU1ER on 15 . . . *KQ3F*. Rotator stuck SSE entire contest . . . *WB3CIW*. New cycle—glad you're back . . . *K1RX*. Murphy spent the contest at our house . . . *KQ1F*. Worked BY, HS, and JT as the first 3 QSOs . . . *NJ1F*. First time ever in an SSB contest—now I know why I like CW . . . *WB1CNM*. Biggest thrill was finishing the logs . . . *W2RQ*. This op is 71 years old and nearly deaf, but I still loved it . . . *W4GTS*. My junior op, KB6RXF, age 10, caught on fast to the standard "the YL go ahead" . . . *W6TMD*. Fun working several Western Washington Club members on DXpeditions . . . *N7TT*. My first time using computer logging . . . *K7NO*.

Count on the WW test to help us work new ones . . . *NW7U*. Fourteen years old and looking forward to many more WW contests . . . *NY8L*. Had to change bad coax in the rain; still had a great time . . . *N8EXS*. Everything broke . . . *WA8YTM*. Nothing broke . . . *K8KUH*. 15 M signal made my burglar alarm go off, and when the police came, their mobile radios wouldn't work due to my overload . . . *W9NSZ*. Wow, VU4GDG on 160 M! . . . *WB9HAD*. We need better sportmanship in the DX windows . . . *NS0B*.

STATION OPERATORS

Multi-Operator Single Transmitter

AZ4F: LU2FAO, LU9FFU, LU6FEC, LU3FAQ, LU9FFA, LU2FYA, LU2FFD, LU1FOW, LU5FGG, LU1FT, LU1FJH, LU6FN, LU4FFD. **BY4SZ:** Jiang, Kang, Zhau. **BY5QA:** Xu Hua-Fuan, Dan Yi-Qun, Wen He-Fui. **BY5RA:** Lin Shao-Wen, Dai Jia-Qi, Lu Man-si, He Wei-Hua. **C3ØW:** OH2BSS, IH3TY, OH6RM, OH6XY, OH7KB, OH9OM, OH7NA, OH7RH, C31LK. **CE2AA:** CE2FME, CE2LCP, CE2MH, CE2MUT, CE2MUZ, CE2NHU. **CE4TA:** CE4BQO, CE4CQT, CE4EBJ, CE4EM, CE4ETZ, CE4EUV, CE4EVR, CE4FXY, CE4JZO, CE4JZS, CE4MLN, CE4MWK. **CE6OS:** CE6JOS, CE6MBQ, CE6NOT, CE7GEY, XQ6CFX. **CQ9MI:** CT3BD, CT3BM, CT3CR, CT3CU, CT3DL, CT3DZ. **DF4RD &** DK6NP, DL2NBU, DL3NCI, DL4NAC. **DFØEB:** DF5RA, DL1RAK, DL9RDG. **DFØSO:** DL2NAP, DL4NAQ. **DJ1OJ &** DF7MV, DL7MAT, DL7MAE. **DK6WL &** DL4MCI. **DL1MAJ &** DL6MAO. **DL2DBH &** DL1YDD. **DL3MAA &** DL5MAE, DL8MBS, DH5MBB. **DL5RBR &** DL6RAW, DL3RDE. **DLØER:** DK7FP, DL8EAE, DL9EDB, DL1EAD, DF2EY. **DLØJK:** DK1DU, DK2XX, DK6FT, DK8ZL, DL3ZBA, DL8ZBR, DF2ZO, DG3FK. **DLØUM:** DK7ZJ, DL5ZBA, DG1ZB. **DLØWH:** DK2GA, DF2IC, DF6IH, DF7IT. **DX1A:** DU1AHS, DU1AU, DU1LB, DU1RU, DU1SW, DU1TDY, DU1UY. **DX1CW:** DU1CJC, DU1COO, DU1CWT, DU1DLC, DU1DWY, DU1EAO, DU1KWT, DU1GPE, DU1MDS, 4F1AED, 4F1ARC, 4F1ANX, 4F1BYN, 4F1DMD, 4F1FP, 4F1FZ. **DX9HT:** DU6AF/9, DU9AA, DU9CV, DU9TV. **EA3APS &** EA3BIC, EA3BLB, EA3COW, EA3CCI, EA3DJK, EA3DMN, EA3G. **EA3MM:** EA3FJM, EA3CAC, EA3DIF. **ED3QD:** EA3BOW, EA3BOX, EA3CVA, EA3DGA, EA3EIO. **ED6BCT: EA6ET, EA6GP, EA6NP, EA6OF, EA6SX, EA6UO, EA6VG, EA6WV, EA6WX, EA6ZI. ED7RKC:** EA7ESA, EA7GFA, EA7DZI, EA7DZL. **F6EXV &** F6BKI, FT8XB. **FD1LGE &** F6IWW, F6AWN. **FE6DRP &** Lionel. **FF6KAW:** F6BPX, F6CWN, F6GDK, F6GWV, F6HMQ, F6IFR, FD1MAY, FC1JVZ, FC1JWJ, Plus 10 SWLs. **G3NAS &** G3NLY. **G3UOA:** GØAAF, G4WMH, G4IWA, G4JVG, G1MLK, G1XJK, G4JYE, G6HFX, G6VWA. **G4FKG &** GØIBI, Miss White. **G4XOM &** G4YBT. **GI4MWA &** G4BGH. **GW8GT:** GW3KYA, GW3NWS, GW4IGR, GW4LXO, GW4TTU, GW4JBQ, GW5NF, GWØBIC, GWØBRG, GWØEID, G3OAY, G4VXE. **HA1KRR:** HA1DRR, HA1ZN, HA1XO, HA1XU, HA1ZZ, HA1ZV. **HA5KDB:** HA5MY, HA5BBC, HA5AIY, HA5TS, HA5NP, HA5CP. **HA5KKC:** HA5LV, HA5MA, HA5MD, HA5MO, HA5OG, HA5WU. **HA6KNX:** Jozsef, Gyula, Zsolt, Nandor. **HA6KQD:** HA6QD, HA6XE, HA6VV. **HAØKLE:** HAØLC, HAØNNN, HAØOB, HAØMK, HAØVI, HAØLO. **HB9AJ:** HB9UH, HB9AWF, HB9BVS, HB9VWN, HB9CBT, HB9CJJ, HB9COB, HB9COC, HB9COF, HB9CTU, HB9CYK, HB9CZF, HB9DJK, HB9RYB. **HB9BLG &** HB9AUS, HB9ALM, HB9CIP, HB9CXZ, HB9SFD, HB9STL, HE9FFX. **HB9FR:** HB9ADD, HB9BOU, HB9CJG. **HB9GT:** HB9CMX, HB9COH, HB9CWP. **HG1S:** HA1TJ, HA1DAC, HA1SV, HA1TD, HA1SK, HA1DAE, Finta, Tobor. **HG5A:** HA5GF, HA5AWH, HA5UA, HA5WE, HA5LN, HA5OM, HA5FM, HA5ML, HA5MK, HA5AVW, HA7RY. **HG6N:** HA6ND, HA6ON, HA6OG, HA6YG, NY, HA6NG, HA6NF. **HG6V:** Jozsef, Zoltan, Gyula, Laszlo, Benedik, Peter. **HG7B:** HA5WA, HA7UG, HA8FM, HA5OW, HA7JAO, HAØDU. **HG8Q:** HA8IE, HA8LKE, HA8JV, HA8-8Ø6, Pantya, Attila. **HG9R:** HA9OA, HA9RP, HA9RX, HA9PP, HA9RU, HA9RG. **HH2MC &** K4XR. **HK4R:** HK4DUM, HK4FZ, HK4HHG. **HL9OB &** HL9CU, HL9MM, HL9RAT. **HSØA:** DF2RG, DJ3UI, HS1AMH, HS1AMO, HS1AOR, HS1BG, HS6AMO. **I4EAT &** I4IND, I4RYC, I4IKW, I4VEQ, I4TJE. **I5OVS &** I5JHW, I5ECW, I5NSR. **I8CWZ &** I8QLS, IK8DOI. **IK4CFV &** I4JMY, I4OUT, I4WZT, I4YSS, I4ZNU, IK4HLV, I4UFH, I4USC, IK4HLG. **IU2HM:** I2MQP, I2VXJ, I2EOW, IK2EGL. **KN5X/J3:** KN5X, NT5D, WB5N. **JA1YFG:** JI2OGT, JI3BKF, JL1BLW, JO1RUR, JP1LTW, JP1OGL, JQ1BRW, Hosokawa, Nishimura, Yamamato. **JA2YDC:** JE2EZO, JF2AIB, JF2KZO, JF2TZG, JG2XYV, JI2KAN, JK2ALA, JH9PVB, Hisa, Miho, Shin, Taka. **JA3YDS:** JG1LNY, JI3GAB, JJ3JBM, JR4WEI, JE4CWT, JE4JFX, JR6DQH, JI3OPT. **JA3YKC:** JF3VXV, JG3CPF, JG3HLV, JI3ERV, JO3LSH, JE4SHT, JF4IXU, JR4PMX, JR5ARQ, JR5WLA, JE6LPM, JG6VTM, H. Ninomiva. **JA6YCU:** JE6UWK, JE6UWU, JE6BRL, JF6MND, JI6DUE, JI6EDY, Gohbaru, Inoue. **JA7YAA:** JN1VYN, JP1EIR, JG3JRM, JJ3CNL, JE4KZZ, JE7HLZ, JH7HWR, JE7QCQ, JHØRW. **JA7YAF:** JF7KEG, JG7JPZ, JG7XDB, Takashi Ishi, Sinichi Sasaki, Hideo Yoshida. **JA9YAA:** JG1UZD, JN1EDR, JQ1MRL, JG2KKG, JI2SVY, JI2VJJ, JN3QCB, JH9TOW, JHØXVT. **JAØYAK:** JS1PTU, JE7GWO, JA9VSX, JHØPPM, JHØMVU, JHØNVX, JHØOPX, JHØRGJ, JHØSDA, JHØUSD, JHØVYG, JHØXUP, JRØDVM, K., Chinda, A. Nitta. **JE2YRD:** JA2EZD, JI2KVW, JR2SCJ, JR2SQU, JE3MXQ, JE3LZG. **JE3ZFS:** JG3WBB, JI3CSH, JI3JGJ, JK3HZH, Ted Kurosaki. **JE6ZIH:** JP1LRT, JH5GLL, JR5CPX, JE6QFE, JF6DEA, JF6TMH, JG6CVO, JG6GNR, JG6OFE, JH6QFJ, JR6GKT, JR6NXU. **JH1YDT:** JH4UTP, JK1PIV, JH6UNN, JH9EFT, JN1IBF. **JH3YDH:** JA3BCT, JN3ACR. **JT1KAI:** Sh. Chulun-Bat, J. Suhe. **K1AR &** AK1A, K1GQ, K1JX, AA2Z. **K1RX &** KA1ION, KC8PE. **K1TO &** K8HVT, NJ1V, NJ2L. **K2TD &** WB2YOF. **K3NZ &** KU3X. **K3OO &** K3ZUF. **K3TUP &** K3LR, KJ3L, N3BJ, K8MR, KB8IZ. **K5NA &** K2RIH, KD2NE, KU2Q, KY2J, NA2N, W2XL, WB2Q. **K5RVK &** GWØECS, N5AQT, N5EA, W5ASP, WA9VLI. **K6ZM &** AK6T, CE3AQI, K4UVT, KI6EZ, NB6L, WB2MZQ. **K8CC &** WB3KKX, N8EKE, W8UA, W8WD, WD8RHO. **K9MK/5 &** K9LA, WB9TIY. **KØGAS &** KJØG. **KØHPY &** KAØEMM, KAØOZ, KAØQBF, NØFCD, NØCNG, WDØDIR. **KA1GG &** K1KJT, N1ZE, W1KM. **KBØG &** ABØX, AKØA, KM5L, KØVBU, KØVXU, KBØU, KMØL, NWØF, NXØI. **KBØKK &** KAØDQI. **KC3NG &** KZ3N, N3EHD, N3FPD. **KC5DX &** KG5EY, NN5E. **KC7V &** W2UE, K7SP, K7WK, KY7F, KT7M, W9RY. **KD9ST &** KA9SQR, KA9SQS, KA9SQT. **KE6WL &** KD6NT, ACØP. **KFØH &** KZØC. **KG1F &** K1XM. **KG6LF &** KB6TYL, N6PKZ, N6PMY. **KH2F/KH4:** KH2F, NY6M, W1DDV. **KP2A &** KW8N, N6DX, N6PO, N7RT, NE8Z, WZ6Z. **KP4BZ &** NP4CC, NP4Z, WP4K. **KRØB &** AF9T, KAØYFN, KBØLC, KDØKF, KJØB, NØBKL, NØBNG. **KX6DC:** NZ8B, WB8SBH. **KY1H &** K1RE, KB1W, KR1R, WA1ZAM, NT2X. **L2D:** LU5EIC, LU7DXT. **LA4O:** LA9HW, LA6EV. **LU1DNQ:** LW1DLF, LU4EGJ, LU6DVI, LU6EJP, LU7EXO. **LU1VZ:** LU1VBC, LU1VFS, LU1VK, LU1VKP, LU1VJR, LU1VNJ, LU1VPI, LU3DXL, LU7VCA, LU9VAB, LU9VV. **LU2F:** LU1FKR, LU2FDR, LU5FHN, LU9FDA, LU9FDG. **LU7DID:** LU3EGT, LU5DRY, LU5DU, LU7DDC, LU8EGO, LU8EYE, LU9DXM, LU9EUS, LU9EXV, Landoni Sergio. **LZ1KAP:** Glushkov, Mullov. **LZ1KBG:** LZ1HX, LZ1OV, LZ1TV. **LZ1KBL:** Spasov, Kirilou. **LZ1KRR:** LZ1-M334, LZ1-M32Ø. LZ1KVF: LZ1-C75, LZ1-C94, LZ1-C187. **LZ1KVZ:** LZ1-F1941, LZ1-F2Ø81, LZ1-F1951. **LZ1KWT:** LZ1MC. LZ11256. **LZ2KPD:** LZ2AB, LZ2CT, LZ2FX, LZ2SC, LZ2ZE, LZ2VP, LZ2-0106, LZ2-064. **LZ2KSQ:** Zlatko Kochev, Ogi Hubenov. **LZ9A:** YU5AD, YU5RU, LZ1YE, LZ1DB, LZ1RB, LZ2HE, LZ2PO, LZ2DF, LZ2CC. **N2MG &** KD2RO, NQ2D. **N2RM &** KB2BF, N2ME, WA2HGM, K3KNU. **N3ARK &** K3IF, KB3MM. **N3RW &** W3YFV. **N3UN &** N2FB. **N4HOH &** N4OCZ, N4UQ. **N4KG &** KC4ZV. **N4RJ &** K4SB, K4TEA, KL7JAR, KM9P, N4DVW, N4NX, N4QJW, WA4FBH, W8ZF. **N4WW &** KW4T, NX4N, KØLUZ. **N4ZC &** K2SD, AA4S, K4MQG, KD4RH, N4GVF, WA4UNZ, WD4BTF, N5RZ, N5TR. **N7RO &** KC7GX, W7EKM, WA7ZWG, WB7CLU. **N8CXX &** K8JM, KN8R, N8BTU, NE8T, NI8L. **NB9C &** KQ9L, N9CPW, NF9S, NS9L, WB9NOV. **NE3F &** KS3F. **NJ1F**

Please send all reader inquiries directly.

& KS1N. **NK7U &** KE7DO, N7GPO, NI7TT. **NO7F &** KF7DQ. **OE3GEA/3:** OE3GEA, OE5VBL. **OF5NQ: OH5KS, OH5NQ, OH5BA. OH4MI &** OH4JK, OH4ZS. **OH7AB:** OH7UE, OH7RS, OH7MA, OH7XI, OH7VR, OH7YF, OH7KA, OH7PF, OH7XM. **OH7AI:** OH7BY, OH7ER, OH7HK, OH7UV. **OH2BEJ/OH8:** OH2BEJ, OH2BVF. **OK1ORA:** OK1-21662, OK1DHP, OK1DHT, OK1AYD. **OK2RAB:** OK2PEM, OK2PDK, OK2HBY. **OK5R:** OK1ADM, OK1ADS, OK1ALW, OK1AWZ, OK1RI. **OK7MM:** OK3CDV, OK3CEI, OK3CMZ, OK3CNJ, OK3CSC, OK3CUM, OK3CVM, OK3CWZ, OK3JW, OK3TMM, OL8CTA, OL8CTW, OL8CUV, OK3-27537, OK3-27427, Jan Kudla. **OZ1KWC &** OZ1BQA. **OZ3FYN:** OZ1IZL, OZ1IZB, OZ1LLC, OZ1LQM. **PA0KHS &** PA0ERA, PA0NZH, PA3AWN, PA3DQW, PA3ENJ, PB0AHO, PE1LBX, SP4FCG. **PI4TTC:** PA2JMK, PA3DOX, PA3DUC, PA3DZP, PA3ENX, PE1LSJ, PE1LTC, PD0OPC, PD0OXM. **PJ8J:** K4PI, KN4R, KX4R, W3BTX. **RL9PZZ:** RL7PEO, UL7PBH, UL7PCU, UL7PEA, UL7PHB, UL7PO, UL7-0237. **RW4LYL:** UA4LDE, UA4LU, UA4YDZ. **RZ4HWW:** RA4HFO, UA4HBR, UA4HEM. **RZ6AWH:** Club. **SM5AZU &** SM0MC, SM0BGM, SM0ATN. **SP2PMO:** SP2JKC, SP2JSX, Jacek. **SP3PLD:** SP3HBF, SP3DUG, SP3SBB, SP3IBM. **SP5PBE:** SP5ANJ, SP5ELA, SP5FKW, SP5JTF, SP5JTM. **SP5ZIM:** Club. **SP6PAX:** SP-060JG, SP-0187JG. **SP6PAZ:** SP6FJG, SP6JZG. **SP7KWW:** Club. **SP8KBM:** SP8GWI, SP8LBK, SP8ARY, SP8GQU. **SP9KJT:** SP9OJB, SP9MQA. **SP9PDJ/9:** SP9YP, SP9LLH. **SV0FE &** K0TLM. **K5UC:** PA3CEF, PA3DWD, TK5EP. **UB3IWA:** RB5II, UB5IFZ, UB5IML, UB5IOK. **UB4CWW:** RB5CB, RB5CW, UB5CCN, UB5-0807, UT5-1862. **UB4EWG:** Club. **UB4EYJ:** UB5EFW, UB5EPU, UB5EQX. **UB4EZI:** Club. **UB4IZA:** Club. **UB4LZA:** UB5LHZ, UB5LSL, UB5LTQ. **UB4MWA:** UB5MDA, UB5MDD. **UB4MWU:** UB5MBM, UB5-059130, UB5-059254. **UB4MXX:** Club. **UB4QXU:** Audrey, Oleg, Toly. **UB4SWM:** UB5SBN, UB5SBF, UB5-074296. **UB4TWL:** Club. **UB4WXZ:** Club. **UB4WZA:** UB5WBY, UB5-068453. **UB4XWB:** UB5-06256, UB5-062240. **UC1AWC:** Club. **UC1AWE:** Club. **UC1AWU:** Club. **UC1WWF:** Alex, Vic, Vlad. **UC1WWO:** UC2WO, UC2-00641, UC2-006138. **UF7FWM:** UF6AW, UF6FFH, UF6FII. **UF7QWW:** UF6QAL, UF6QAW, UF6QR. **UG7GWS:** UG6-004242, UG6-004259. **UH9AWE:** RH8AD, UH8BBH, UH8-819132. **UI9AWH:** UI8AAY, UI8ACK, UI8AGH. **UJ9JWA:** UJ8JCM, UJ8JW. **UL8BWW:** UL7BAV, UL7BBQ, UL7BBW, UL7BY, UL7-016389. **UL8CWW:** Club. **UL8DZZ:** UL7DA, UL7DAR, UL7DBW, UL7DCW. **UL8LWA:** UL7-026587, UL7-026653, UL7-026663. **UL8LWZ:** RL7LAH, UL7LDS, UL7-026177. **UL8LYA:** UL7LEG, UL7LEN, UL7LER, UL7LEZ, UL7LO. **UM9MWA:** UM8MAA, UM8MDX, UM8MRG. **UO45OWN:** UO5OB, UO5OBT, UO5OMP. **UP1BWW:** UP2BIJ, UP2BKW, UP2BLA, UP2BMW, UP2PK, UP2-038892, UP2-0381052. **UP1BXR:** Club. **UP1BYC:** UP2CY, UP2-0382504, UP2-0382505. **UP1BYK:** UP2BAH, UP2BDB, UP2BFY, UP2BJV, UP2-0381682. **UP1BZG:** UP2QA, UP2BCO, UP2BCW, UP2BCT, UP2BRJ, UP2-038439. **UP1BZL:** UP2BBL, UP2BGG, UP2BJF, UP2BNW. **UP1BZO:** UC2IAP, UP2BFN, UP2BMX, UP2BNC, UP2BQN, UP2-038346, UP2-038728, UP2-0381751. **UP1BZQ:** UP2BMQ, UP2-0381682. **UQ1GXJ:** Club. **UQ1GZW:** UQ2GID, UQ2GKL, UQ2GM, UQ2GN, Ingus. **UR1RWQ:** Club. **UR1RWX:** UR2FJ, UR2RDJ, UR2RHF, UR2RJ, UR2RNA, UR2RNJ, UR2RNX, UR2RRR, UR2-083165, UR2-0831005. **UR1RYA:** Club. **UR1RYO:** UR2RPZ, UR2-0831700, UR2-0831771. **UZ1CXF:** Club. **UZ1OWZ:** Club. **UZ2FWZ:** Serge, Vital. **UZ3DKH:** Club. **UZ3DKW:** UA3-1421755, UA3-1421925. **UZ4AWB:** RA4AK, UA4-156986. **UZ4PZP:** RA4PNG, RA4PMX, UA4PMI, UA4PNX. **UZ4WWB:** Club. **UZ6HXK:** UA6-1081838, UA6-1081857, UA6-1081867. **UZ6LWZ:** UA6LV, UA6LVQ, UA6-1501336, UA6-1501403. UZ6XWC: Club. **UZ9CYP:** UA9CUA, UA9-1542105. **UZ9CZZ:** Club. **UZ9OWD:** UA0-103554/U90, UA9-145168, UA9-145338. **UZ9OWV:** UA9OO, UA9-145500. **UZ9OXI:** UA9OF, UA9OFB, UA9OLW, UA9-145206, UA9-145207. **UZ9OWM:** UA9QAU, UA9QCQ, UA9-134222. **UZ9SWR:** Artur, Sergej, Vlad. **UZ9XXM:** UA9XF, UA9XL, UA9-00472, UA9-090700. **UZ9YXO:** UA9YII, UA9YIH, UA9YJP, UA9-099840. **UZ0AXX:** UA0AGI, UA0AMA, UA0-103729, UA0-103712. **UZ0CWA:** RA0CBS, RW0CA, UA0CBF, UA0CBI, UA0CCD, UA0CG, UW0CA, UW0CN. **UZ0JWA:** UA0JJ, UA0JA, UA0JB. **UZ0QWT:** Club. **'VE1DH &** K2NJ, KU2C, KY2O, NR2H, VE1ASJ, VE1ZJ. **VE1IDX:** VE1AQN, VE1ATY, VE1BIG, VE1BIH, VE1BII, VE1BZO, VE1BZX, VE1CIT, VE1DX, VE1GB, VE1UA, VE1VBL. **VE3SPC:** VE3CLL, VE3DAX, VE3ERT, VE3JPP, VE3KZE, VE3MKK, VE3NBE, VE3OGE, VE3PLR, VE3PUA, VE3SBK, VE3SLL, VE3VEE, F. Kern. **VE3UOT:** VE1BHA, VE3HTT, VE3SMA. **VE4SI &** VE4ATC, VE4ATM. **VE5GF &** VE5ELJ, VE5GHC, VE5HG, VE5RC. **VK2HS/P:** VK2CXX, VK2FGV. **DF9ZP/VP9:** DF9ZP, DK8ZB. **W1AQ &** K1AGA, KA1MO, KM1X, WA1VEF, WA1VPC. **W2RQ &** KR2J, N2NT. **W2RR &** KA2VYW, KA2WIK, NV2A, W2KKZ, WA2AOG, WB2ABD, WB2CJL, WB2YOH. **W2UI &** N3KR. **W3HHG/4 &** AA4GM, WR4S. **W3KWH &** KA3OY1, KT3L, N3EQP, NG3H. **W3GG &** K3YGU, N3COB. **W3XU &** KC3RV. **W4MGX &** KB4WGW. **W4PRO &** AA4NG, KB4VIR, WA4YTL, WB4JPA, WA8HDD. **W5EHM &** CE3LAR, KB1CM, KA5WSS, KA5ZRJ, KA5ZUB, N5LAR, WR5J, WW5X, KD6AR, WD8EOP. **W5WMU &** K5GA, K5LZO, K5WA, N5GH, N5JVF. **W6BIP &** KK1A. **W6KCB &** N6PTC, N6PTP, NU6L. **W6TMD &** AB6R, KB6RXF, KB6UF, NC6U, NN6U. **W7EJ &** K5MM, AI7B, N7AKQ, Vlad, Igor. **W8SJU &** K3JT, WB8PHI, WD8LTM. **W9CA &** N9AIB. **W9RE &** WA8VYR. **W0EJ &** WA6QMU, NC0O, NU0P, W0WP. **W0XK &** K0MRT. **WA3EUL &** WB3EKV. **WB2ULJ &** N2BOW. **WB5E &** AA5BS, K5HJ, KA5IPF, KA5ROJ, KD5QN, KE5BJ, N5FZR, N5IWA, N5KDK, W5OWA, WB5VPC, WD5DJT, WD5EEH. **WB6OKK &** K6JYO. **WI4R &** N4OFM, N4PYX. **WM5G &** K5RX, KM5R, KW5P, KO9Y, KR0Y. **WV6N &** W6UQF. **XE2GKG:** W6KG, W6QL. **Y22EK &** Y21DG. **Y22YD &** Y24YH. **Y31CB:** Y31IB, Y31MB. **Y49CF:** Y49MF, Y49LF, Y49-11F. **YT2R:** YU2MM, YU2MY, YU2LJ, YU2DQ, YU2OG. **YT4D:** YU4AR, YU4LA, YU4-RS1006, YU4-RS1037, YU4-RS1036. **YT4M:** YU4BR, YU4WW, YT4ML, G0RAN, Zoki, Dan. **YT5R:** YU5RC, YU5-RS126, YU5-RS147, YU5-RS109, YU5JA. **YU3AI &** YU3BM, YU3EO, YU3MM. **YZ6G:** YU6DD, YU6TT, YU6TW, YU6CQ, YT6ZIM. **ZC4DX:** ZC4AP, 4Z4DX, 5B4MF, 5B4SA. **ZF2KK/9:** N4KE, NU4Y, W4FDA, WA4DRU, WB4EYX. **4N2D:** YU2FK, YU2CQ, YU2WQ, YU2OR, YT2DU, YT2LXA, YT2VM, YT2ID, YT2AM, Ante, Tonci, Boro. **8P9HR:** K3KG, K3ZR, K4FJ, N4TX, W4NL, 8P6PW.

Station Operators

Multi-Operator Multi-Transmitter

DL0VA: DF1BZ,DF5BM,DF6QC. **DX1DBT:** Club. **EA1DOK &** EA1DQG, EA1DZW, EC1CLI. **FK/JH4RHF:** JH4RHF, JG3MRT, JG3MDN, JR3KEG. **HB0/DF1JC:** DF1JC, DJ2YE, DK5EZ, DK8EY, DL6EAQ, DL8EAQ. **HB0/DL8OH:** DL8OH, DF4TD, DF7RX, DF9YY, DK2OY, DK3RG, DK8MZ, DL6RAI. **HC8DX:** HC2CG, HC2RG, N6AA, N6VI, N6ZZ, W6MKB, W6NV. **JA1YAG:** JG2CEZ, JN1OCA, JP1NWZ, JP1PIG, JQ1XDO, JR8EAR. **JA1YXP:** JH0RRR, JH0SPE, JH0WGN, JH7CAU, JR0ALC, Y. Kaihatsu, N. Youso, Y. Sasake, H. Oyagi. **JA2YEF:** JE2UGT, JE2FRT, JE2JHF, JE2JFZ, JE2NFC, JE1ACB, JI2SDD, JI2SIC, JI2LPD, JI2QVF, JJ2LYF, JJ2VFE, JL2ABH, JR2PVI, T. Yamamoto, A. Okumura. **JA2YKA:** JA9SSY, JE2JCV, JE2VBZ, JE2VYM, JE4LIK, JF2DQJ, JF2PZH, JF2UTL, JF2PTO, JG2MTC, JG2VTD, JG3OET, JH2QXG, JI2JXR, JI2UHH, JI2UNR, JJ1BTC, JJ1MVV, JK2CZL, JR2TBI, JR7OMD, Kei. **JA3YBF:** JA9UXW, JF3GYI, JH9GRM, JH9JFH, JJ2ICA, JJ3IMX, JJ3KGS, JN1DPL, JO1IPS, JO3DWD. **JA3YQD:** JE4FJP, JE6MYI, JF3PLF, JG3NKP, JJ3GKS, JL;3OAI, JL3PYI, JO1SYL. **JA7YCQ:** JE7GDA, JA7-30336. **JA7YFB:** JE7JWB, JE7MOY, JF7AAD, JF7LEI, JF7TDN, JG7HMD, JH0TUH, JN1RON, JQ1NBV, JR0NUZ, JR7RLB, JR7WFH. **JA7YRR:** JA1SKY, JA7CXV, JA7FDY, JA7JUD, JA7LBY, JA7MQM, JA7MQQ, JA7OZW, JA7RQE, JA7WSC, JE7CAI, JH7MEV, JH7MEX, JH7VHZ, JR7LVA, Iseki. **JA9YBA:** JA9VBW, JA9VDA, JH9KIH, JH9OAM, JH9VSH, JJ3URK, JR0BAK, JR8GOU, JR9AGA, JA9-10148, Egg Tsukasaki. **JH8YCT:** JE8BFO, JE8RJK, JR8GPT, JR8WLI. **JR1ZTT:** JL1BWQ, JN1MSO, JP1MWB, JS1EEU, JE3LJK, JI3RKJ, Hirono. **JW5E:** JW3HW, JW6VDA, JW6WDA, LA5NM, LA6EDA, LA7FD. **K1NG &** KI1G, KD2SX, KZ1A. **K2TR &** K2EK, K2XA, N2BZP, N2EKS, WA2SPL, WB2KMY. **K3ZZ &** KC3EK, KS3L, WA3EKL. **K4JPD &** K4VCO, Packet. **K4VX/0 &** K9BGL, K9FD, KA0YBS, KD9Q, NS0Z, NU9R, WB0IUN. **K6XO &** N6RZ, WA6OCV, WB6SHD. **KH6XX &** 4X4AI, AE6E, KH6ND, N5CT, WH6BGI. **KL7RA &** AL7AF, AL7CQ, AL7HC, KB7UP, KL7IEH, KL7XD, NL7V. **KL7Y &** KL7HFA, KL7U, KL7VC, NL7G, NL7GP, W8LU, WL7Y. **KM1C &** Packet. **KT9M &** KA9AND, KA9OIH, N9AZD, N9FUT, NK9B, W9SU, WB9CEP, WB9QPN. **LX5BRL:** LX1GQ, LX1RQ, LX1WW, DF7WE YL, DF8WS, DL6FBL. **N3LR &** K3ZA, KD3DM, N3FOB, NJ3A, NJ3C. **N5AU &** K5MR, K5TSQ, KE5CV, KM5K, KM5X, KN6M, KY5N, N5CR, WC4E, WA0TKJ, WB5VZL, WD8IXE, WN4KKN. **N6ND &** AA6RX, K6JYO, K9VV, KI6MS, KM6K, NI6W, W6KUT, WA6OTU, WN6K. **NK1F &** Packet. **NR5M &** K2TNO, K2UA, K5GN, K5MA, KC2EE, KD5SP, KE5IV, KQ5U, KN5H, KZ5M, NM5L, W9AGH. **ON6NL &** ON1ANK, ON4AEK, ON4AKL, ON6JZ, ON6MP, ON-L620, PA0MPM. **OZ4HAM:** OZ1BJF, OZ1DGP, OZ1FYW, OZ1GFX, OZ1KWB, OZ2JZ, OZ8IE. **P40V:** AI6V, N6KT, N6TR, N6TU, NU6S, W6OAT, W6SZN. **PJ1B:** K3EST, KB2XZ, N3ED, N4RV, N7ZZ, W7ZR, WA3LRO. **UP7A:** UP2BAW, UP2BIG, UP2BIL, UP2BNB, UP2BOC, UP2BRF, UP2PAJ. **V47Z:** KA4KMH, N4FD, V44KAA, V44KAR, V44KAC, V44KQ, W4EVG, WA4MMK, WB4FLB, WG4P. **VE7ZZZ:** VE5FN, VE6EZ, VE7ARS, VE7ATN, VE7AV, VE7DLM, VE7EOC, VE7RK, Greg Vanderzande. **VP9AD &** G4CNY, G4LJF, N3RD, N8ET, VP9IJ, W3MA. **VU4GDG:** VU2GDG, VU2APE, VU2CVP, VU2DVP, VU2TS. **W3GM &** K3GM, K3LZ, K3ND, K3RL, KI3V, N2EA, W3FV. **W3LPL &** AI3M, K1DQV, K3DI, K3RA, K0FVF, KA1GD, KC8C, KM3T, N3GB, N8II, NW5E, W3EKT, W3EMH, WB2EKK, WB3JRU, WD4AXM, WP4J. **W6AB:** N6GC, N6IR, N6KOI, N6NMH, WA6ARG, WA6IEY, WA6VNO, WB6SRK. **YZ1U:** YU1AN, YU1BL, YU1FY, YU1HH, YU1JW, YU1JZ, YU1UN, YU1UY, YU1XA, YU1XK, YU1XV, YU1ZZ, Djuro, Oly, Sasa.

WORLD TOP 10 QRPp
(5 W Input)
All Band

1. PJ2FR	3,171,166	6. UQ2GKL	272,000
2. VE1CBF	588,555	7. K3WS	247,710
3. 4M3A	562,875	8. UG/UB4WZZ	219,744
4. N3RS	414,201	9. N1AFC	210,546
5. LZ2QV	290,166	10. FD1BEG	203,796

TEAM CONTESTING

1. Team Finlandia (FY5YE by OH2BBM, CR9BZ by SM5GMG, ZB2X by OH2KI, T30RY by OH1RY, and S0RASD by OH2BH) 25,712,500

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSO's, Zones, and Countries. Certificate winners are listed in Bold Face.

PHONE RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

KC1F	**A**	**3,219,970**	**2107**	**132**	**395**
K1ZM	"	**2,711,650**	**1686**	**140**	**422**
KM1H	"	**2,629,728**	**1727**	**136**	**416**
					(Opr. KQ2M)
K1DG	"	**2,494,580**	**1712**	**128**	**378**
KS1L	"	1,958,956	1584	110	318
K1YR	"	1,951,481	1345	137	390
W1WEF	"	1,284,840	1089	107	308
K1CC	"	1,206,900	952	121	325
K1VR	"	1,169,646	928	118	335
KA1LR	"	643,500	725	78	222
W1GIH	"	600,656	624	89	257
W1BIH	"	392,480	414	97	255
K1VDF	"	388,020	601	65	177
K1CLN	"	360,259	461	80	203
KA1DWX	"	340,605	489	74	187
W1KRS	"	299,820	462	65	163
W1OP	"	297,929	496	65	164
			(Opr. K1PLX)		
KG1D	"	259,910	405	72	163
K1IU	"	255,990	295	90	232
K1TR	"	227,174	410	58	136
K1KI	"	170,805	333	58	135
W1IHN	"	163,215	227	79	200
NK1A	"	155,112	324	55	129
K1WJL	"	148,925	322	44	131
WA1UAR	"	138,432	254	61	163
W1DOH	"	112,056	236	56	112
K1KNQ	"	109,563	218	53	124
AI3E/1	"	94,978	201	51	118
W1FJ	"	87,468	215	43	105
WA1LVW	"	84,360	169	58	127
NB1B	"	81,054	188	58	113
KC1BG	"	79,800	162	53	115
NM1K	"	76,347	197	49	104
W1WAI	"	73,032	227	47	132
KA1CLV	"	72,562	186	40	102
W1BR	"	57,684	152	42	96
K1NH	"	49,750	147	38	87
K1MEM	"	22,050	81	35	70
W1BK	"	21,680	97	25	55
KR1R	"	20,801	124	26	35
W1FV	"	16,543	85	19	52
K1FIR	"	14,760	74	30	42
K1SA	"	11,033	68	16	43
NC1B	"	9,802	62	23	35
K1GW	"	9,333	58	23	38
W1PLJ	"	7,261	52	14	39
K1EFI	**28**	**32,943**	**155**	**20**	**59**
KQ1V	"	28,471	156	20	51
K1HMO	"	20,306	107	20	51
WB2DND /1	"	19,980	121	15	45
KA1MIS	"	2,156	31	9	19
KA1QZC	"	779	17	6	13
WA1FCN	**21**	**87,024**	**275**	**26**	**85**
W2IQL/1	"	73,830	243	28	79
K1MIS	"	24,840	124	21	51
WA1AER	"	4,880	80	23	27
K1U0	**14**	**657,900**	**1241**	**39**	**141**
K1RU	"	607,749	1293	38	135
NB1H	"	559,856	1121	37	139
W1BWS	"	197,280	499	31	106
W1XN	"	84,672	287	31	77
K1VSJ	"	82,476	256	31	85
KE1E	"	28,755	123	23	58
WB1EAZ	"	25,912	117	20	59
K2MN/1	"	12,528	76	14	44
K8PO/1	**7**	**39,330**	**153**	**23**	**72**
N1ACH	**1.8**	**5,254**	**66**	**13**	**24**
W1NG	"	4,756	69	10	31
N2LT	**A**	**2,162,616**	**1503**	**131**	**371**
N2MM	"	**1,719,408**	**1345**	**117**	**335**
NY2L	"	**1,665,635**	**1304**	**115**	**330**
K2DM	"	**1,494,894**	**1227**	**114**	**324**
W1GD/2	"	949,410	833	101	310
W2GD	"	740,145	665	107	292
N2BA	"	657,516	665	97	252
KF2O	"	459,705	582	77	208
NA2G	"	456,192	5598	67	197
K2FL	"	416,885	510	88	213
K2JLA	"	357,561	411	90	233
KB2NU	"	328,304	415	79	205
K2BK	"	318,592	436	73	189
KS2M	"	286,195	399	76	183
K3FNW/2	"	284,821	392	84	187
N2VW	"	280,704	393	80	192
WA2UDT	"	232,012	379	70	168
K2QIL	"	224,475	373	68	137
N2AIF	"	196,482	348	67	162
W2PHW	"	141,925	276	52	123
KQ2O	"	134,442	250	61	137
KA2CHX	"	133,856	298	53	125
KB2WN	"	120,130	330	61	144
KA2OOG	"	114,660	233	53	129
KE2CG	"	96,996	195	49	128
N2BSA	"	84,816	196	43	109
K2SX	"	84,452	194	48	124
W2PHT	"	82,140	190	40	108
NA2Q	"	76,890	185	57	108
KK2B	"	66,990	169	54	100
ND2P	"	54,412	127	37	85
W2SDO	"	46,009	126	48	91
N2US	"	45,895	129	47	90
KT2D	"	41,496	127	49	84
N2KA	"	40,698	119	45	88
W2KHQ	"	27,540	99	36	72
W2GKZ	"	25,760	101	26	66
WA3AFS /2	"	25,338	80	51	72
KB2SE	"	22,400	92	30	50
WB2AHD	"	22,300	102	37	63
W2IQB	"	20,240	71	42	68
N2FKA	"	19,422	112	30	53
W2FUI	"	17,550	83	27	51
KV2Y	"	8,643	46	22	45
WA2BOT	**28**	**67,815**	**325**	**26**	**73**
K2OLG	"	38,270	164	23	63
N2AZS	"	6,300	68	10	25
W2KZE	"	2,184	26	9	19
K2WK	**21**	**256,685**	**618**	**27**	**116**
WA2QNW	"	247,695	577	33	114
W2HPF	"	245,195	595	31	114
N2DTL	"	134,664	396	26	98
K2MFY	"	103,854	323	24	90
K3JGJ/2	"	36,207	160	20	61
W2AYJ	"	9,570	62	17	41
K2KTT	"	6,604	49	16	36
K2VV	**14**	**812,392**	**1570**	**37**	**141**
N2AA	"	707,616	1336	39	143
K2HFX	"	521,976	1083	38	130
NG2X	"	359,445	802	35	120
W2HG	"	131,875	375	32	93
WA2ASQ	"	45,301	179	25	64
AC2P	"	26,800	116	22	58
W2FGY	"	3,158	25	25	24
K8XR/2	**7**	**63,220**	**209**	**26**	**83**
W2HZ	**3.8**	**22,230**	**110**	**17**	**61**
KN2Q	"	1,560	25	8	18
W2FCR	**1.8**	**10,004**	**84**	**13**	**41**
W3BGN	**A**	**2,283,393**	**1657**	**125**	**354**
K5ZD/3	"	**2,083,725**	**1411**	**132**	**393**
K3ZJ	"	**1,607,830**	**1289**	**118**	**328**
K3NA	"	1,419,120	1117	126	360
W3UM	"	1,172,934	1098	105	273
KQ3F	"	700,000	874	77	203
W3UJ	"	614,778	697	83	215
N3II	"	372,664	467	84	212
AD3Z	"	273,564	321	84	222
KA3PGL	"	239,913	422	57	150
WB3CIW	"	207,870	311	78	168
W3KV	"	199,735	342	60	155
KB3TS	"	188,487	350	48	131
W3AZ	"	173,184	317	56	136
AD3V	"	162,000	281	73	152
ND3A	"	158,730	295	46	149
W3DHM	"	157,384	275	60	146
W3OV	"	133,369	254	64	133
AD8J/3	"	125,685	263	55	116
N3HW	"	123,045	303	62	133

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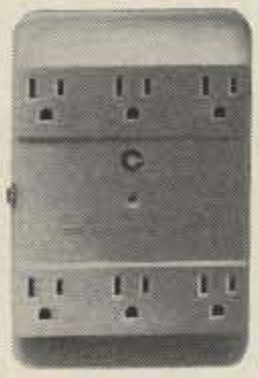
By Fred Maia, W5YI and Gordon West, WB6NOA

- **Code Practice Cassettes**
- **Exam Questions and Answers**

Attention Elmers! Here's everything a newcomer needs to prepare for the Novice test. Includes two quality cassettes for self-paced code learning, plus a study guide containing practice questions and answers. Durable foldup binder, too. #62-2402

Spike Protectors



Guard Your Equipment!

(1) (2)

(1) Six-Outlet. Just plug in to convert one grounded outlet to six with MOV protection. Built-in breaker, noise filter, LED status light. 13A. **#61-2786 . . . . . 24.95**

(2) Heavy-Duty Single Outlet. Featuring dual MOV protection and LED status light. 15A/120VAC. **#61-2792 . . . . 9.95**

Archerotor®

59.95

Why pay more? Radio Shack's reliable, UL listed rotator is just right for many VHF and small loaded HF beams. Cable extra. #15-1225

100' 3-Wire Cable. #15-1150,7.95

Extension Speaker

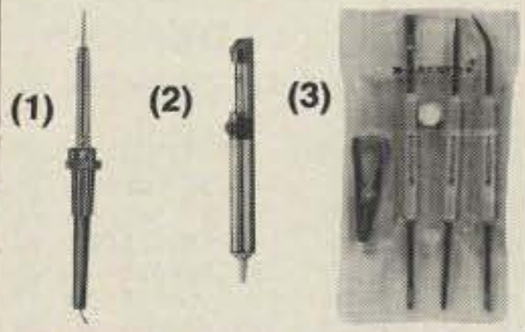
Superior to most built-ins! Improves tone quality of mobile or home rigs. Rugged 4" speaker has adjustable bracket, 10-ft. cord with 1/8" plug. **#21-549 . . . . . 13.95**

WWV and Weather Monitor

Crystal Control

DXer's and storm spotter's best friend! Receives WWV time signals and solar info on 5, 10 and 15 MHz. Also receives local weather station on 162.4, 162.475 or 162.55 MHz. Battery extra. **#12-148 . . . . 39.95**

Soldering Helpers

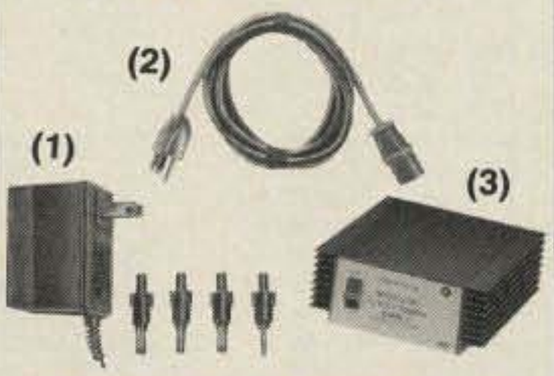


(1) 12VDC, 30-Watt Soldering Iron. For on the spot repairs. 12-foot cord with cigarette lighter plug. **#64-2105 . . 4.99**

(2) Vacuum Desoldering Tool. Easy one-hand operation. **#64-2098 . . 4.95**

(3) 4-Piece Tool Set. Heat sink, brush/scraper, probes. **#64-2227 . . . . . 2.99**

Power Values

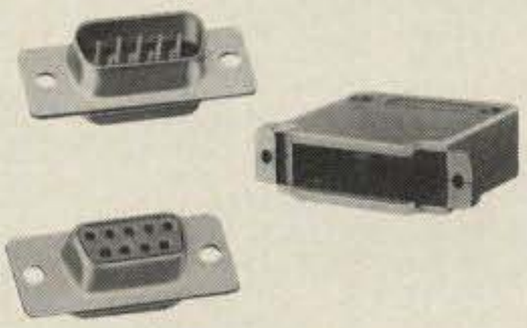


(1) Plug-In 12VDC Adapter. Includes four Adaptaplugs. **#273-1652 . . . 10.95**

(2) Computer/Printer AC Line Cord. 10-ft. with grounded plug and CEE-type connector. **#278-1257 . . . . . 3.99**

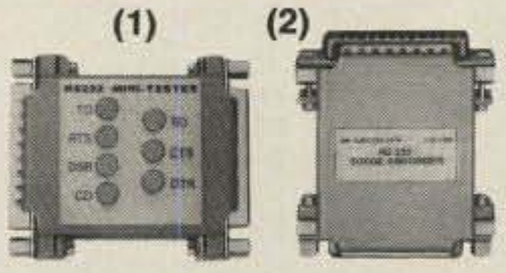
(3) Regulated Supply. Use VHF/UHF mobile at home. **#22-120 . . . . . 39.95**

Solder-Type D-Sub



Description	Cat. No.	Each
9-Position Male	276-1537	1.49
9-Pos. Female	276-1538	2.49
Hood for Above	276-1539	1.19
25-Pos. Male	276-1547	1.99
25-Pos. Female	276-1548	2.49
Hood for Above	276-1549	1.29

RS-232C Items



Connect Inline

(1) RS-232 Mini Tester. Diagnose interface problems! Dual-color LEDs indicate status of D, RTS, DSR, CD, CTS and DTR lines. **#276-1401 . . . . . 14.95**

(2) RS-232 Spike Protector. AC line protection is not enough! Use at each EIA port to stop spikes cold. Shielded. **#276-1402 . . . . . 16.95**

Coax Fittings

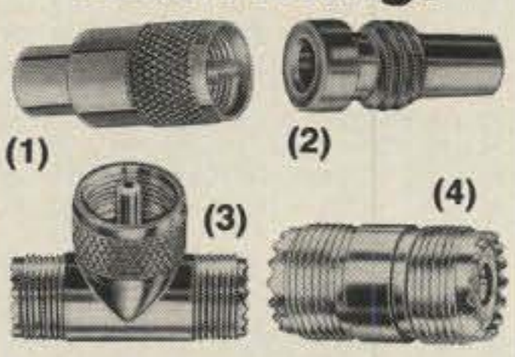


Fig.	Description	Cat. No.	Price
1	PL-259	278-205	2/1.99
2	Reducer for RG8M, RG59	278-204	2/.99
2	RG58 Reducer	278-206	2/.99
3	T Coupler	278-198	3.49
4	Double Female	278-1369	1.69

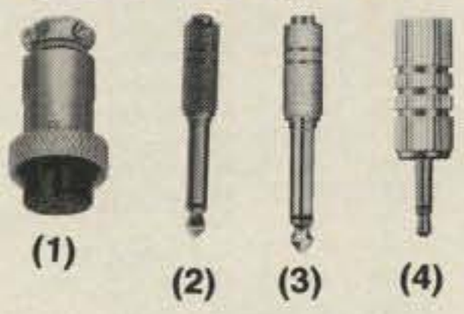
Coax and Sealant

New Improved RG8 has 95% Shielding for Lower Loss

Cable	Cat. No.	Per Foot
RG8	278-1323	.40
RG8M	278-1328	.25
RG58	278-1326	.20
RG59	278-1327	.18

Sealant Tape. Keeps outdoor fittings dry and clean. **#278-1645 . . . . . 2.49**

Audio Adapters



(1) 8-Pin Mike Plug. #274-025 . . 2.19

(2) Headphone Adapter. Accepts 1/8" stereo plug and plugs into 1/4" monaural jack. Use lightweight "mini" phones with your Ham equipment. **#274-348 . . 1.99**

(3) Plug Adapter. As above, but accepts 1/8" mono plug. **#274-325 . . 1.59**

(4) H-T Adapter. Accepts 1/8" plug, plugs into 3/32" jack. **#274-381 . . . 1.99**

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W3EVW	"	108,446	217	62	132
N3RC	"	29,007	103	32	67
W3HVM	"	25,389	101	30	63
N3AOE	"	17,472	82	33	63
WB3CDX	28	5,504	50	13	30
W3GK	**21**	**71,101**	**254**	**25**	**72**
KN3S	"	56,472	189	26	78
W3KHQ	"	53,393	183	27	78
K3IPK	**14**	**368,816**	**900**	**37**	**111**
W3FGS	"	31,493	147	22	55
K3ZPG	"	16,695	104	13	50
AA3B	"	7,600	55	15	35
W3FQE	"	12	2	1	1
K3BSY	**7**	**20,510**	**100**	**17**	**53**
K3ND	**3.8**	**8,364**	**65**	**13**	**38**
K3UA	**1.8**	**3,096**	**41**	**11**	**25**
WB3AVN	"	2,976	42	10	22
K4ISV	**A**	**1,942,992**	**1409**	**141**	**383**
WX4G	**"**	**1,794,702**	**1285**	**141**	**353**
N6AR/4	**"**	**1,526,440**	**1133**	**130**	**358**
WZ4F	**"**	**1,271,118**	**1005**	**127**	**326**
AA4NC	"	991,078	854	116	302
W3VT/4	"	755,298	698	113	281
K4GFH	"	674,784	695	96	256
N4UH	"	558,828	605	97	245
WA4CTC	"	545,292	541	108	266
WB4BBH	"	495,420	529	101	244
K4MF	"	404,076	484	89	213
W1UA/4	"	403,804	517	91	223
N4RA	"	361,200	470	81	199
W60KX/4	"	357,600	435	90	210
K4PR	"	345,396	472	78	191
W9LT/4	"	303,517	430	73	184
AA4R	"	290,832	366	94	198
N4JVS	"	271,905	359	63	156
W4JVN	"	252,187	376	73	174
W4NTI	"	237,244	348	79	180
W4WKQ	"	233,876	370	78	158
K4EZ	"	223,790	359	72	158
KD4UH	"	215,552	328	78	178
W4DXI	"	202,250	305	81	169
N4TG	"	196,669	346	67	142
WZ4Z	"	194,568	292	81	161
WB4MAI	"	183,483	266	94	167
K4FPF	"	183,111	326	58	143
K4UTE	"	176,202	261	72	179
K4UVH	"	158,840	328	63	146
AA4LE	"	142,120	263	69	127
WS4F	"	136,080	242	75	141
KE9A/4	"	133,848	247	66	132
W4TMN	"	111,882	239	50	124
KF4HK	"	117,740	230	71	132
WK4F	"	103,840	215	51	125
N4JF	"	101,700	226	68	112
NO4K	"	100,860	212	47	117
KU4V	"	95,545	185	73	124
W4WJJ	"	94,377	209	52	111
KA1WR/4	"	91,980	230	50	96
AA4NP	"	91,647	210	53	100
KJ4FW	"	87,150	210	60	106
KF4ZS	"	80,618	179	59	114
KF4NO	"	72,324	146	78	118
K4JRB	"	71,200	163	56	104
K4BAI	"	68,783	179	47	96
WS4N	"	68,750	184	35	90
KE4BM	"	67,473	203	33	86
KA4UBC	"	66,164	187	43	96
KE4VU	"	61,019	151	55	106
WA4KIL	"	56,007	137	57	90
WA4OBO	"	45,220	122	51	89
HK3GZB /W4	"	43,700	342	33	67
WA4JJY	"	41,208	119	47	89
W4HVU	"	41,040	116	50	94
N4PRV	"	39,476	108	47	92
AA4VB	"	38,383	146	48	83
K4OD	"	34,440	120	35	70
K4MQG	"	34,020	104	48	78
KF4AM	"	32,724	122	37	64
W4KMS	"	31,250	100	44	81
KB1A/4	"	28,677	88	42	79
W4UW	"	22,848	86	45	67
KK4RV	"	20,301	79	41	60
WD8BOQ/4	"	16,488	82	25	47
AF4O	"	15,120	74	42	66
N8LM/4	"	8,880	53	25	49
KB4URZ	"	2,496	65	19	20
WA4SSB	"	2,112	25	12	21
WA4VAP	"	1,577	38	17	29
N4QKG	"	851	20	10	13
N4EJV	**28**	**149,388**	**558**	**26**	**92**
WU4G	"	21,320	127	18	47
WB4VOO	"	19,182	99	20	49
KC4GR	"	15,982	94	19	42
N4ONO	"	10,404	75	16	35
KB4SRJ	"	9,612	81	20	34
N4HID	"	7,968	65	16	32
WB4OMM	"	4,521	54	13	20
K4XO	"	780	15	8	12
KB4WBH	"	148	12	7	5
K3RV/4	**21**	**663,993**	**1325**	**34**	**137**
K4XS	"	425,941	956	34	123
W4XJ	"	276,213	670	30	117
N4VZ	"	229,103	495	33	126
WA4JJW	"	84,564	252	29	87
N4MM	"	67,184	166	46	109
KA4KCO	"	46,112	219	23	65
KC4HN	"	37,389	130	26	77
KV4AM	"	34,680	119	29	73
N4ATM	"	14,300	83	20	45
KV4P	**14**	**349,344**	**834**	**31**	**113**
N4MO	"	314,457	782	33	110
WA4LBJ	"	52,371	184	26	73
KD4DM	"	30,450	123	26	61
K4GMX	"	15,498	91	25	38
WD0FQA /4	"	5,350	40	13	37
W4YN	"	3,627	43	10	21
W1DLP/4	"	54	8	2	4
N6BFM/4	**7**	**64,546**	**203**	**30**	**88**
N4RIG	"	44,700	166	26	74
W4OWY	"	28,552	126	25	58
W4WIJ	"	8,160	63	17	34
WA4SVO	**3.8**	**77,559**	**289**	**22**	**81**
W4PZV	"	26,660	122	22	64
KI4UZ	"	4,680	54	11	28
W4DR	**1.8**	**10,615**	**85**	**13**	**42**
K4TEA	"	3,552	44	10	27
AA4MM	"	2,336	39	9	23
K5NW	**A**	**914,291**	**838**	**118**	**279**
KI3L/5	**"**	**908,888**	**1024**	**104**	**224**
K5FUV	**"**	**632,358**	**591**	**110**	**277**
N3BB/5	**"**	**620,754**	**670**	**115**	**222**
WA5IGD	"	596,092	631	104	245
K5DX	"	593,640	588	107	253
N5JB	"	510,496	616	89	212
NI5M	"	486,804	529	111	228
N5UA	"	485,100	578	114	216
WM5K	"	350,856	486	79	185
W5CWO	"	350,622	422	97	205
K5RF	"	256,004	418	67	156
N5AW	"	218,624	325	88	168
KC5TA	"	186,690	329	70	140
N5EPA	"	155,220	291	69	126
WA5IYX	"	136,606	331	58	109
N5RM	"	134,478	284	62	124
W5LMG	"	114,660	232	70	112
K5GOE	"	111,300	199	78	134
KV5E	"	95,256	203	53	115
NN5T	"	92,365	239	53	92
W5AE	"	92,168	207	56	108
K5DB	"	91,500	226	50	100
N5HB	"	86,994	201	59	103
N5IET	"	82,050	210	53	97
AA5BE	"	81,620	219	45	95
W5KGR	"	61,308	168	43	88
WB5SSD	"	53,013	164	40	83
K5KR	"	39,120	122	41	79
W5XD	"	39,066	137	44	58
W5NJ	"	38,936	121	41	83
W5HRF	"	31,672	112	31	71
N5GPP	"	28,710	102	48	62
W5EIJ	"	27,798	100	43	70
N5FHW	"	25,174	124	32	50
N5JEE	"	23,424	90	31	65
K5PP	"	16,340	63	34	61
K5TYP	"	6,720	46	22	34
		(Opr. WB6UOL)			
N5DTO	"	1,887	20	17	20
KE5FI	**28**	**158,256**	**514**	**28**	**84**
W5VGX	"	66,564	277	24	62
WB5RUS	"	33,835	182	22	45
N7RP/5	"	28,696	152	17	51
W5PWG	"	19,15	119	17	44
WB0YEA /5	"	7,612	68	15	29
N5LAI	"	2,016	28	12	16
KB5AFH	"	680	15	7	10
W5VX	**21**	**573,207**	**1258**	**33**	**124**
KA5W	"	381,350	976	31	114
WB5UDX	"	147,560	414	29	95
K5UCV	"	74,290	279	28	67
W5GVP	"	55,432	195	26	78
WK5I	"	46,762	169	28	75
WO5W	"	25,776	125	21	51
W5FO	**14**	**178,266**	**468**	**35**	**111**
WF5E	"	130,320	430	34	86
KD5BM	"	52,470	193	32	67
WK5Z	"	17,952	119	23	45
KN5S	**7**	**26,796**	**131**	**26**	**51**
KD5IA	"	11,016	78	18	36
N5KDA	"	7,252	69	16	33
W5EU	**3.8**	**11,661**	**66**	**21**	**48**
N5IMO	"	2,790	37	10	21
WC5D	"	864	20	6	12
WB5KYK	**1.8**	**2,992**	**40**	**11**	**23**
K5WXZ	"	2,754	37	10	24
KM6B	**A**	**2,158,272**	**1752**	**145**	**287**
K6NA	**"**	**2,065,360**	**1749**	**122**	**232**
K6HNZ	**"**	**1,722,918**	**1749**	**122**	**232**
N6AW	**"**	**1,002,592**	**1073**	**112**	**211**
KI6CG	"	872,955	1066	96	189
K6EID	"	700,812	803	98	211
N6ADI	"	649,064	747	106	210
VE2AOS/6	"	633,052	705	111	211
W6FSJ	"	597,788	711	99	199
N6IC	"	542,064	700	93	183
WX6M	"	515,970	706	101	172
W6EUF	"	454,018	600	93	181
K6SIK	"	435,088	652	93	191
K6HHD	"	405,130	571	90	164
N6MB	"	360,665	487	94	171
KB6GV	"	279,741	446	79	152
KG6AO	"	274,176	460	79	145
N6AV	"	215,460	310	85	167
N6VR	"	202,195	268	69	196
W6ABW	"	173,259	313	69	138
W2KVA/6	"	169,750	347	63	112
KI6T	"	165,870	348	58	113
W6UJX	"	165,300	319	72	118
K6DR	"	154,167	308	71	106
N6NF	"	152,467	341	62	99
N6ADK	"	139,611	295	65	108
W6MFC	"	123,471	294	55	98
N6JV	"	115,656	329	44	78
WW6O	"	111,600	270	58	86
N6EK	"	107,282	255	61	97
K6HIH	"	93,440	260	52	76
WA6UFY	"	84,058	252	49	73
W6OUL	"	82,236	197	65	89
K6UO	"	79,360	220	50	78
N6IBP	"	63,488	193	52	76
WK6V	"	58,476	162	56	76
WB6NFO	"	56,465	181	47	68
K9AGL/6	"	56,172	167	48	76
WA8LLY/6	"	55,796	144	50	98
W6OVO	"	52,722	183	37	64
NE6I	"	50,078	136	60	86
K6SG	"	38,628	123	46	65
N6JM	"	38,220	136	39	59
K6DMN	"	26,275	118	35	52
WA6PZK	"	28,254	98	40	62
AA6EE	"	23,368	107	40	52
WA6YEO	"	18,618	75	35	52
W6UQT	"	14,875	64	27	58
K6FO	"	14,529	66	35	52
K6ICS	"	14,342	80	30	41
WB6ITM	"	10,360	56	34	40
KI6PL	"	4,514	50	15	22
WB2CHO/6	"	4,343	36	19	24
W6HT	"	3,968	44	14	17
KI6PG	"	1,825	31	11	14
K6SVL	**28**	**176,176**	**726**	**23**	**68**
WA6VNR	"	72,956	417	18	43
K6KUQ	"	57,288	300	18	48
KB6PJU	"	43,848	300	18	38x
WA6FGV	"	34,920	210	18	42
WB6MBF	"	11,472	88	16	32
N6QJV	"	2,862	39	12	15
K6BWX	"	726	13	9	13
W6PU	**21**	**399,750**	**1166**	**31**	**92**
KB5AS/6	"	220,968	754	28	71
W6BSY	"	164,538	584	29	70
W6QHS	**14**	**493,401**	**1047**	**38**	**125**
KS6H	"	96,330	336	32	82
W6OK	"	61,152	238	28	63
K6LRN	"	27,120	119	29	51
NM6L	"	6,588	83	16	22
K6HMA	7	3,298	36	13	21
W6RJ	**3.8**	**100,620**	**585**	**29**	**61**
NN7L	**A**	**1,261,554**	**1312**	**112**	**232**
N7TT	**"**	**871,572**	**1067**	**96**	**206**
K7LXC	**"**	**596,588**	**777**	**94**	**184**
NC7K	"	515,235	746	80	165
AG7J	"	386,250	660	70	136
W7OF	"	294,060	415	95	165
K7NO	"	278,784	502	69	129
K7DZ	"	268,478	384	94	160
N7CTY	"	244,530	452	65	125
K7ABV	"	217,047	386	73	140
KA7EQS	"	207,872	377	74	129
WG7A	"	205,545	383	68	125
W7MCU	"	175,050	288	81	144
W7HS	"	171,270	310	70	128
W7KKR	"	163,072	310	78	118
KS7T	"	146,121	335	57	102
W7IIT	"	142,065	309	58	107
KD7IK	"	136,290	317	51	103
W7GUR	"	119,462	264	58	103
W7LGG	"	93,951	240	45	98
KC7UP	"	93,434	252	52	85
W7WKR	"	89,156	262	39	85
NB7N	"	80,712	241	50	68
N7ENE	"	68,894	215	48	85
KR7G	"	57,138	194	42	65
W7CMO	"	53,193	160	43	76
KC7DB	"	50,576	161	46	70
WA7HRR	"	31,668	128	30	57
N7FTL	"	28,896	137	35	49
WA6DIE/7	"	28,002	129	33	45
KA7TGE	"	27,792	138	30	42
K9JNB/7	"	27,768	124	33	45
KC7OO	"	27,508	106	32	60
NW7U	"	25,404	121	29	44
KC7CF	"	24,395	103	36	49
K7DS	"	22,470	80	39	66
W7KT	"	21,888	118	22	42
WA7BAY	"	21,672	87	29	57
W7QK	"	18,228	71	34	59
KA7YFY	"	16,524	111	25	29
W7WHY	"	14,625	73	27	48
N7EPO	"	11,343	78	27	30
K7WA	"	6,191	53	19	22
KB7M	"	5,900	47	28	31
WA7IIM	"	3,168	32	13	23
W7NZQ	"	1,081	21	11	12
W87FDQ	**28**	**117,792**	**459**	**25**	**71**
WA7KLK	"	76,518	416	19	59
K7QQ	"	21,728	146	16	40
W7AYY	"	21,056	158	17	30
NX7K	**21**	**227,850**	**762**	**24**	**81**
K7GEX	"	107,811	456	26	55
WA7PEZ	"	107,688	462	28	56
KB7TO	"	70,272	275	25	71
K7LZJ	"	64,386	360	23	40
KX7J	"	43,239	178	26	61
KA7UND	"	3,741	61	15	14
W7WA	**14**	**649,250**	**1272**	**39**	**136**
K9JF/7	**"**	**522,474**	**1140**	**37**	**122**
W7IL	"	453,648	1028	38	118
W7FP	"	192,896	536	32	96
WA7GVM	"	147,088	435	33	83
W7TJ	"	121,329	382	33	84
WA7CGR	"	84,192	304	28	68
NY7T	"	80,592	324	27	65
K7OX	"	61,272	198	33	78
W7LVI	"	42,924	174	26	58
W7ODQ	"	42,390	164	28	62
W7LFA	"	37,814	179	29	45
K7CC	"	30,814	171	23	48
W7QN	"	11,660	80	16	37
W7VIH	"	4,060	42	17	18
K7EFB	"	2,250	34	10	15
W7BQG	"	1,056	32	6	6
NR7B	"	648	16	8	10
KC7EM	**3.8**	**50,172**	**316**	**25**	**49**
KT7G	"	16,356	116	19	39
K7IDX	**1.8**	**7,080**	**159**	**15**	**25**
WB0SMS /8	**A**	**300,947**	**439**	**76**	**181**
W8ILC	**"**	**257,232**	**408**	**70**	**163**
K8CV	"	212,090	309	73	181
K8BSW	"	202,016	347	67	147
W8UPH	"	150,049	305	55	126
KF8K	"	137,800	243	63	149
NC8V	"	125,952	285	51	113
AK8Y	"	122,808	261	51	117
			(Opr. K8KR)		
KE8KG	"	118,908	270	52	110
NR8Z	"	118,272	266	50	118
NY8L	"	106,741	221	58	115
KB8FJ	"	101,577	243	41	106
N8BC	"	94,512	205	58	118
WB8SFF	"	67,024	171	47	83
N8DPD	"	63,180	167	47	83
K8RWL	"	30,705	102	45	70
KC8PQ	"	27,645	99	33	62
K8BTT	"	18,270	79	27	60
W8YGR	"	13,175	63	29	56
KA8YOR	"	7,040	48	19	36
K8BLM	**28**	**36,656**	**162**	**18**	**61**
KE8NH	"	9,576	94	13	29
KB8AJZ	"	405	11	6	9
KB8AJY	"	384	10	7	9
N8FEH	**21**	**58,058**	**234**	**26**	**65**
W8IQ	"	57,222	215	24	75
KG7Z/8	"	38,400	146	25	71
W8UVZ	"	28,482	103	27	74
W8FDN	"	24,192	120	20	52
N8EXS	"	23,187	138	12	47
WA8YTM	"	5,640	51	12	28
KW8N	**14**	**563,313**	**1074**	**38**	**141**
			(Opr. KD8NS)		
W8TWA	"	210,586	534	35	107
KD8B	"	109,872	318	31	95
K8KUH	"	44,322	193	24	59
WA8NDE	"	26,048	126	14	60
KP4AKB /8	**7**	**45,144**	**150**	**29**	**79**
AD8C	"	30,970	119	25	70
WB8JBM	**3.8**	**105,138**	**348**	**28**	**90**
			(Opr. NZ4K)		
W9ZR	**A**	**1,385,550**	**1108**	**129**	**321**
W9NNE	**"**	**576,138**	**535**	**119**	**274**
K9SD	"	533,210	554	111	244
W9OP	"	431,340	587	73	200
KB0C/9	"	303,804	402	91	200
NG9L	"	241,110	386	73	162
W9NSZ	"	226,600	383	54	152
NE9U	"	174,600	323	57	137
WB9SBO	"	170,343	279	88	155
K9SH	"	159,478	257	81	161
K9IKP	"	139,671	278	60	129
KS9O	"	137,238	285	60	118
KC9EW	"	124,016	255	56	128
N2BVJ/9	"	108,216	236	55	107
W9GXR	"	100,394	250	45	97
K9OSH	"	61,473	256	27	66
K9UQN	"	54,290	163	36	86
NA9J	"	45,875	142	42	83
WA9BZW	"	50,760	141	41	94
KD9YB	"	26,208	104	34	70
W9TA	"	25,365	101	33	62
W9ZUV	"	23,520	90	37	61
W9LYN	"	15,834	75	37	50
KA9IMX	"	11,592	67	31	38
W9YCV	"	6,720	45	22	38
W9REC	"	5,400	42	22	38
N9ALC	"	3,200	28	14	26
N9RD	**28**	**49,677**	**224**	**22**	**65**
W9XT	"	33,212	166	21	55
KG9N	"	12,180	81	16	42
KS9U	**21**	**259,798**	**618**	**32**	**122**
W9RN	"	216,518	535	31	115
AG9S	"	112,392	320	27	99
KR9G	"	76,700	234	26	92
NJ9Q	"	49,320	200	21	69
WB9CXY	"	22,770	127	17	49
NA9N	"	8,996	67	14	38
W0YR/9	"	7,497	56	17	32
W9GIL	**14**	**106,641**	**305**	**30**	**93**
K9YNF	"	76,648	259	27	77
K9LJN	"	74,910	241	28	82
W9NZM	"	74,240	226	34	82
K9AB	"	40,016	170	27	55
K9BTU	"	28,208	114	24	62
WA9TZE	"	782	15	11	12
N4TZ/9	**7**	**17,595**	**96**	**22**	**47**
KE9U	**3.8**	**8,964**	**58**	**14**	**40**
N9BUS	"	5,412	56	13	31
WB9HAD	**1.8**	**27,181**	**157**	**23**	**54**
N2IC/0	**A**	**1,756,020**	**1378**	**138**	**314**
K0UK	**"**	**1,365,012**	**1219**	**123**	**260**
W0HBH	"	495,132	546	104	237
W0RXL	"	242,048	369	79	169
WB0HCH	"	230,640	366	73	167
NT0H	"	204,848	356	64	153
NS0B	"	142,302	252	85	137
KC0LX	"	121,590	244	58	135
NI0G	"	99,940	203	62	128
WA0DCB	"	85,722	237	57	100
W0PPF	"	76,867	207	49	90
WB0IEL	"	52,680	164	41	79
W0RT	"	39,116	117	48	79
W0BWJ	"	34,404	105	45	77
NY0R	"	25,560	126	30	42
W0NGB	"	23,850	102	35	55
NJ0X	"	20,604	86	35	66
KE0HY	"	19,434	87	31	51
AJ0E	"	15,912	80	31	47
K9MWM/0	"	9,744	73	21	27
KA0YUZ	"	7,314	50	19	34
KF0Z	"	6,272	48	26	30
KA1MPF/0	"	4,720	43	17	23
WB0GFV	28	5,168	56	13	25
KB0ADF	"	517	16	5	6
K0RF	**21**	**335,575**	**758**	**31**	**124**
KV0Q	**7**	**102,691**	**349**	**29**	**74**
W0GOR	"	10,556	70	21	37
K0KX	**3.8**	**14,301**	**93**	**15**	**48**
K0GT	**"**	**14,271**	**87**	**19**	**48**
AC0S	"	5,461	54	15	28
W0ZV	**1.8**	**12,204**	**103**	**16**	**38**

Alaska

NL7HI	**A**	**6,683**	**69**	**16**	**25**
KL7CQ	**14**	**152,744**	**1000**	**22**	**39**
NL7DU	"	89,936	517	22	51
KL7AF	**3.8**	**10,850**	**171**	**14**	**17**

Anguilla

VP2E/ N3JT	**A**	**1,411,704**	**2721**	**84**	**168**

British Virgin Islands

VP2VDX	**21**	**379,700**	**1678**	**23**	**77**

Canada

VO1MP	**A**	**1,363,380**	**1626**	**72**	**238**
VO1AW	"	102,837	215	54	123
VO1QU	**14**	**915,275**	**2300**	**35**	**120**
VE1BNN	**28**	**189,090**	**746**	**25**	**85**
VE1AGZ	**21**	**51,450**	**249**	**17**	**58**
VE1BDK	**14**	**137,461**	**501**	**26**	**75**
VE2AYU	**A**	**660,870**	**846**	**86**	**229**
VE2XY	"	93,525	292	42	87
VE2FTU	"	32,164	140	24	62
VE2XL	"	21,840	96	22	62
VE2EW	"	15,721	76	25	54
VE2AEJ	21	3,906	46	10	21
VE2ZP	**14**	**570,670**	**1674**	**34**	**120**
VE60U/3	**A**	**3,115,356**	**2450**	**146**	**388**
VE3JGC	"	467,335	668	85	208
VE3BXY	"	157,680	263	73	167
VE3HX	28	3,537	48	10	17
VE3XN	**21**	**731,808**	**1605**	**34**	**134**
VE3EVZ	"	88,668	289	26	82
VE3FWQ	"	67,160	412	16	57
VE3GRA	"	21,120	119	19	45
VE3NBE	"	2,656	29	11	21
VE3CDX	**7**	**365,700**	**936**	**36**	**114**
VE3PN	1.8	21,286	364	11	18
VE3INQ	"	1,785	64	7	8
VE4RP	**A**	**67,854**	**195**	**49**	**80**
VE4SK	"	11,285	68	26	45
VE4ALP	14	14,740	94	25	42
VE6AGV	**A**	**59,388**	**152**	**40**	**58**
VE6DZ	"	46,516	215	36	48
VE7XO	**A**	**96,437**	**279**	**45**	**75**
VE7ABC	"	15,336	74	23	48
VE7EIK	**14**	**419,292**	**1493**	**33**	**81**
VE7IG	**1.8**	**10,350**	**173**	**12**	**18**
VE7GDM	"	8,848	163	15	13
VE7CRW /VE8	**A**	**449,665**	**1306**	**40**	**99**

Cayman Islands

ZF2JI	**A**	**1,301,890**	**3102**	**72**	**130**
			(Opr. K4IIF)		

Costa Rica

TI2MEN	**A**	**1,177,188**	**1939**	**92**	**171**
TI0RC	"	23,920	107	39	53
TE4T	"	10,140	83	19	33

TI2OB	**28**	**138,087**	**997**	**22**	**45**
TI2LTA	**21**	**779,166**	**2117**	**32**	**109**
KA7KDU /TI2	"	113,169	1039	18	33
TI2CC	**1.8**	**26,020**	**386**	**9**	**26**

Dominican Republic

HI3JH	**A**	**3,397,884**	**3815**	**107**	**292**
HI8DLA	"	51,956	388	21	41
HI8PJP	28	5,819	125	10	13
HI8FHD	"	5,539	92	12	17
HI8JST	14	5,104	73	13	16
HI8RFB	7	7,176	60	13	33

Greenland

OX3KM	**A**	**87,904**	**200**	**49**	**115**

Guadeloupe Island

FJ5BL	**7**	**654,258**	**1903**	**27**	**111**

Martinique

FM5CL	**28**	**644,861**	**2400**	**28**	**91**
FM5CY	"	164,703	970	23	54
FM4DN	**21**	**571,160**	**1725**	**31**	**100**
FM4EB	**7**	**304,251**	**1196**	**26**	**85**

Mexico

XE2MX	**A**	**529,323**	**1011**	**76**	**143**
XE1IPO	"	206,460	970	50	61
XE1OH	**28**	**616,748**	**2627**	**27**	**80**

Montserrat

N8MK /VP2M	**A**	**335,646**	**724**	**66**	**140**
K8UE /VP2M	**28**	**591,442**	**2328**	**29**	**84**
WB8DIT /VP2M	**1.8**	**40,392**	**350**	**14**	**40**

Nicaragua

YN3EO	**A**	**215,446**	**656**	**63**	**91**
			(Opr. Y25OE)		

Panama

HP8AHF	**A**	**35,690**	**164**	**32**	**54**

Puerto Rico

KP4CZ	**A**	**105,088**	**356**	**46**	**82**
KP4EQF	**21**	**486,120**	**1742**	**29**	**91**
KP4DQ	"	24,426	147	16	43
NP4P	**7**	**185,659**	**661**	**26**	**87**
NP4AT	**3.8**	**148,960**	**891**	**19**	**61**

St. Kitts

V47NXX	**A**	**42,300**	**214**	**29**	**61**

St. Vincent

J87CD	**A**	**544,055**	**1035**	**76**	**157**

Salvador

HU1YS	**A**	**1,109,200**	**2058**	**81**	**155**

AFRICA

Botswana

A22GV	**14**	**45,353**	**203**	**24**	**53**

Canary Islands

EA8BAH	**A**	**90,915**	**352**	**33**	**54**
EA8AKQ	"	76,140	249	39	69
EA8AZP	"	73,920	283	32	55
EA8AXN	"	13,158	64	33	53
EA8ARG	"	1,173	19	11	12
EA8VV	**28**	**648,094**	**1501**	**30**	**116**
EA8AKN	**21**	**493,794**	**1322**	**32**	**94**
EA8ALY	"	324,375	879	31	94
EA8BBP	"	242,153	793	31	72
EA8ADY	"	39,433	281	17	30
EA8RCT	**7**	**859,362**	**1959**	**32**	**115**
			(Opr. OH2MM)		
EA8ACH	"	583,478	1376	31	111

Ceuta & Melilla

EA9NN	**A**	**352,906**	**484**	**66**	**185**
EA9RY	**28**	**252,066**	**668**	**30**	**99**
EC9JI	**21**	**18,189**	**142**	**12**	**31**
EA9IE	**14**	**881,706**	**1832**	**38**	**123**
EA9RM	**3.8**	**95,304**	**418**	**16**	**60**

Djibouti

J28EO	**A**	**1,375,040**	**1508**	**83**	**237**

Egypt

SU1ER	**A**	**4,157,233**	**3254**	**108**	**325**
			(Opr. N6TJ)		

Gabon

TR1G	**A**	**5,758,257**	**4983**	**101**	**290**
			(Opr. TR8JLD)		

Guinea-Bissau

ON5SQ /3X	**A**	**51,798**	**200**	**29**	**60**

Kenya

5Z4DU	**21**	**1,060,345**	**2491**	**32**	**111**

Lesotho

7P8DP	**A**	**1,386,164**	**1908**	**70**	**174**

Liberia

5L7Q	**14**	**35,350**	**175**	**19**	**51**

Madeira Islands

CR9BZ	**A**	**7,530,264**	**4713**	**122**	**414**
			(Opr. SM5GMG)		
AA4VK /CT3	**28**	**145,383**	**703**	**18**	**51**
WA4TLI /CT3	**21**	**789,630**	**2024**	**29**	**101**

Mali

TZ6MG	**21**	**377,315**	**1109**	**29**	**86**

Mauritania

5T5BC	**A**	**1,807,000**	**2423**	**72**	**178**
			(Opr. WB4ZNH)		
5T5MH	"	1,014,797	1682	56	147
			(Opr. WN4FVU)		

Namibia

ZS3BI	**A**	**869,574**	**1398**	**60**	**162**

Nigeria

JG1FVZ /5N27	**A**	**1,728,540**	**1825**	**85**	**245**

Republic of South Africa

ZS4NS	**A**	**473,418**	**814**	**63**	**135**
ZS6HO	"	195,264	460	49	95
ZS4WD	"	34,013	107	40	73
ZS6P	**28**	**338,625**	**943**	**32**	**94**
ZS4OKC	"	112,189	489	21	56
			(Opr. ZS4AE)		
ZS6BRZ	**21**	**765,660**	**1836**	**35**	**105**

Reunion Island

FR5DX	**A**	**3,998,140**	**3148**	**128**	**302**

Seychelles Islands

S79WS	**A**	**2,609,952**	**2461**	**100**	**272**
			(Opr. DJ6QT)		

Togo

5V7SA	**A**	**259,216**	**654**	**47**	**89**
5V7WD	**14**	**133,284**	**522**	**22**	**65**

Zaire

9Q5NW	**A**	**350,168**	**698**	**47**	**122**

Zambia

9J2EZ	**A**	**3,023,541**	**3211**	**88**	**251**

ASIA

Bahrain

A92BE	**14**	**814,073**	**1993**	**36**	**133**

China

BY1QH	**A**	**479,520**	**1349**	**60**	**120**
			(Opr. K5IID)		

Hong Kong

VS6UP	**28**	**95,025**	**711**	**21**	**54**

India

VU2TTC	**A**	**547,354**	**668**	**97**	**229**
VU2CAP	"	100,980	248	57	113
VU2RRK	"	71,840	163	58	102
VU2L	**28**	**83,712**	**333**	**25**	**71**
			(Opr. VU2LBW)		
VU2Z	**21**	**689,164**	**1621**	**36**	**127**
			(Opr. VU2ZAP)		
VU2N	**14**	**123,849**	**352**	**35**	**104**
			(Opr. VU2NTA)		

Israel

4X/K6KLY	**A**	**547,555**	**942**	**62**	**143**
4X6MH	**28**	**513,360**	**1503**	**25**	**99**

Japan

JA1XAF	**A**	**1,703,668**	**1496**	**145**	**259**
JF1SEK	"	**1,269,234**	**1399**	**108**	**213**
JR1GSE	"	718,572	1000	99	158
JE1GPX	"	338,004	580	87	142
JE1AER	"	160,366	333	70	111
JA1BNW	"	127,100	299	62	93
JE1CHJ	"	91,632	246	53	85

SINGLE OP ZONE WINNERS

Zone	Call	Score	Zone	Call	Score
1	KL7CQ	152,744	21	RF0FWW	1,447,128
2	VE7CRW/VE8	449,665	22	VU2Z	689,164
3	KM6B	2,065,360	23	JT1BQ	56,376
4	VE6OU/3	3,115,356	24	XX9T	1,509,700
5	KC1F	3,219,970	25	JR6EZE	1,887,705
6	XE1OH	610,984	26	No Entry	
7	T12MEN	1,177,188	27	K4YT/DU8	3,425,408
8	HI3JH	3,397,884	28	YB1CS	556,196
9	9Y4TT	10,370,962	29	VK8AV	52,360
10	OA4ZV	2,741,160	30	VK2KL	1,691,024
11	PY5EG	2,468,529	31	T30RY	5,147,334
12	CE3BFZ	1,848,916	32	ZL1BWM	220,601
13	LU2E	1,576,995	33	CR9BZ	7,530,264
14	ZB2X	4,895,520	34	SU1ER	4,157,233
15	OH0BH	4,283,244	35	5T5BC	1,807,000
16	RB5DX	2,127,972	36	TR1G	5,758,257
17	UT4UX/RJ5J	1,905,787	37	J28EO	1,375,040
18	UA9YX	3,409,436	38	7P8DP	1,386,164
19	UW0LT	790,400	39	FR5DX	3,998,140
20	LZ1KGB	1,388,628	40	TF3CW	669,376

JA1ASO	"	78,408	215	56	76
JH1UUT	"	63,167	218	47	66
JA1BUI	"	60,526	203	46	60
JA1BUN	"	59,727	177	49	80
JP1SRG	"	48,276	175	45	63
JA1ALX	"	34,352	126	45	68
JE1RKU	"	27,492	126	38	49
JH1NHY	"	27,126	110	45	54
JA1DJO	"	24,420	86	45	66
JA1IT	"	8,745	59	18	35
JS1WOZ	"	2,808	32	15	21
JG1RDV	"	2,046	22	16	17
JH1HPH	"	1,836	26	15	19
JE1TTO	"	588	16	10	11
JO1MCC	"	459	11	8	9
JO1KCQ	"	406	15	6	8
JH1AJT	**28**	**301,116**	**805**	**37**	**101**
JH5GHM/1	"	92,617	354	32	69
JH1XYR	"	56,485	269	29	50
JR1IJV	"	51,744	205	34	64
JA1MVK	"	33,496	167	27	52
JA1MYW	"	31,682	171	26	47
JH1IED	"	26,048	137	27	47
JA3DLE/1	"	8,316	72	19	25
JA1AAT	"	5,934	55	18	25
JM1AQU	"	3,145	44	16	21
JR1OYL	"	2,520	37	12	12
JH1ADR	"	629	15	7	10
JK1JQQ	**21**	**516,694**	**1236**	**36**	**110**
JR1WHW	"	**469,062**	**1180**	**36**	**102**
JR1CBC	"	438,915	1087	37	108
JH1DWM	"	415,940	1050	38	102
JH1AEP	"	356,870	1078	36	91
JH1CMW	"	259,200	767	36	84
JE1UMK	"	114,559	374	33	76
JA1DCO	"	92,040	316	32	72
JH1DGA	"	67,536	293	26	58
JA1YWG	"	49,300	258	23	45
JA1TLK	"	48,033	237	29	52
JS1XIC	"	46,689	228	27	52
JA1WYQ	"	30,774	171	24	45
JS1XNJ	"	20,580	133	24	36
JA1RCT	"	13,300	102	20	30
JA1GYQ	"	11,349	97	16	23
JA1JCD	"	10,058	91	18	29
JE1UFF	"	9,240	86	19	25
JK1OXU	"	6,996	50	20	33
JA1JGP	"	4,248	44	16	20
JG1GCO	"	1,716	28	11	15
JS1MIG	"	456	10	9	10
JA1VBW	**14**	**54,112**	**218**	**29**	**60**
JA1GO	"	25,032	111	30	54
JA1JBP	"	18,928	129	20	36
JA1LOM	"	9,234	61	28	29
JA1EMQ	"	7,396	64	17	26
JE1GZB	"	616	16	7	7
JH1EAQ	3.8	5,460	53	16	23
JA1SJV	"	1,152	24	8	10
JA2UOT	**A**	**211,876**	**424**	**76**	**112**
JH2QMT	"	173,250	311	80	130
JR2AGL	"	124,215	292	60	90
JR2AMZ	"	110,554	232	61	106
JA2BNN	"	90,454	332	34	64
JA2QPY	"	77,608	297	39	50
JA2WZ	"	43,857	159	44	55
JA2QVP	"	5,106	37	21	25
JJ2IOX	"	2,812	30	18	19
JA2KPV	"	1,914	24	17	16
JH2WHS	"	168	6	6	6
JA2IVY	**28**	**145,232**	**467**	**38**	**78**
JA2DHG	"	40,020	170	34	58
JA2ODS	"	8,235	55	23	38
JF2KUU	"	6,194	74	15	23
JE2BOM	"	760	16	9	10
JH2BCN	**21**	**90,024**	**365**	**29**	**64**

JA2YAC	"	37,204	195	25	46
JA2DSF	"	29,118	149	26	43
JA2FUJ	"	15,368	78	22	46
JR2IGV	"	9,890	85	19	27
JG2TMU	"	5,379	68	16	17
JG2VMN	"	4,410	42	14	21
JH2XTV	"	975	17	11	14
JK2UFT	"	874	18	8	11
JA2FJP	**14**	**359,352**	**973**	**37**	**89**
JA2ADH	"	350,934	892	38	100
JA2THS	"	209,655	549	35	100
JI2EMF	"	79,376	351	29	53
JI2DLF	"	71,253	301	29	58
JA2BAY	**7**	**239,538**	**756**	**33**	**78**
JF2LTH	"	56	6	4	3
JA2IVK	3.8	5,696	55	15	17
JR3BOT	**A**	**419,680**	**707**	**82**	**133**
JE3VXD	"	353,808	626	78	130
JI3AUD	"	49,502	174	42	64
JL3WSL	"	37,503	163	35	46
JA3UWB	"	25,004	135	33	43
JA3XOG	**28**	**51,042**	**210**	**32**	**62**
JJ3JJL	"	14,229	108	20	31
JR3RIY	**21**	**118,524**	**451**	**33**	**69**
JR3ISM	"	101,041	466	28	51
JA3SSW	"	98,056	353	33	70
JA3CXN	"	37,011	193	26	47
JA3BBG	"	26,975	160	24	41
JA3FZI	"	11,070	111	16	27
JR3CVJ	"	6,552	50	22	32
JR3KAH	"	3,800	44	14	24
JN3ATJ	"	777	20	17	21
JR3NZC	**14**	**24,310**	**135**	**26**	**39**
JA3SSB	"	7,068	79	18	20
JA5UBW/3	"	4,692	51	15	19
JA3QHR	7	6,625	48	19	34
JA3BCT	1.8	490	16	6	8
JE4VVM	**A**	**1,618,103**	**1566**	**126**	**241**
JH4NMT	"	360,096	536	102	162
JA4ESR	"	322,612	506	91	145
JH4LPY	"	19,631	109	26	41
JH4OYA	"	14,022	86	26	31
JE4CIL	"	10,080	53	31	49
JA4AQA	"	7,791	54	23	30
JA4AQR	"	8,477	63	22	27
JA4RWN	"	2,867	41	24	23
JR4ABB	**28**	**25,690**	**146**	**23**	**47**
JA4OYI	"	2,700	29	14	22
JA4AYU	**21**	**98,300**	**364**	**34**	**66**
JR4ISK	"	5,850	49	16	29
JE4CTW	"	2,485	29	16	19
JG4AKL	**14**	**91,280**	**297**	**32**	**80**
JR4VGD	"	49,880	217	30	56
JA4PA	"	6,930	106	22	35
JA4CUU	**7**	**45,942**	**233**	**28**	**50**
JA5IU	**A**	**53,656**	**149**	**62**	**90**
JA5IP	"	26,892	127	34	49
JA5EO	"	17,556	110	28	38
JR5RPP	28	13,230	96	22	32
JR5FAW	"	4,329	48	16	23
JR5KDR	21	23,680	149	22	42
JA5AF	14	8,256	63	20	28
JA5CJZ	**7**	**119,888**	**385**	**34**	**84**
JR6EZE	**A**	**1,887,705**	**1694**	**131**	**264**
JA6LDD	"	624,260	904	86	159
JR6IIB	"	137,472	296	73	106
JF6JQM	"	80,997	221	44	89
JF6KAC	"	58,174	177	41	77
JI6ESQ	"	41,900	159	38	62
JE6EGU	"	41,322	162	35	62
JH6IOM	"	29,304	126	35	53
JA6AKV	"	26,077	106	38	51
JI6DMN	"	17,420	107	28	37
JA6BWH	"	2,996	39	15	13
JE6JRY	**28**	**48,505**	**214**	**31**	**58**

JH6WHN	"	31,760	159	29	51
JA6EFT	"	20,394	128	24	42
JH6WDG	"	8,944	39	19	33
JA6WJL	"	4,180	49	15	23
JG6XYS	"	893	23	8	11
JG6QPX	**21**	**39,192**	**211**	**25**	**44**
JE6IXH	"	26,600	143	23	47
JA6QDU	"	3,248	41	12	16
JF6MIT	"	2,832	42	11	13
JJ6CQW	"	2,280	29	12	18
JA6RHH	"	350	9	6	8
JA6YFL	**14**	**160,638**	**479**	**38**	**85**
JA6NKZ	"	13,409	91	22	31
JG6LGE	"	1,288	24	11	12
JA6BIF	3.8	1,311	27	8	11
JA7QFU	**A**	**778,680**	**865**	**102**	**213**
JA7YAB	"	768,000	936	106	194
JA7NVF	"	107,920	256	57	95
JA7JHT	"	88,305	234	65	80
JA7JH	"	78,754	176	69	100
JE7HFL	"	51,850	230	34	51
JH7BMF	"	15,958	82	35	44
JA7AXP	"	1,925	23	16	19
JA7TQK	**28**	**53,217**	**250**	**27**	**54**
JF7UEM	"	24,156	145	24	42
JH8FAJ/7	"	16,236	102	24	42
JA1WSK/7	"	12,000	91	18	30
JR7QKR	**21**	**330,144**	**1090**	**34**	**80**
JA7DOT	"	68,619	292	30	59
JA7HGA	"	46,895	208	27	56
JF7XHQ	"	44,280	227	26	46
JH7KTI	"	27,000	148	23	49
JH7HJF	"	5,110	67	13	22
JG7JBZ	"	204	7	6	6
JH7QXJ	**14**	**366,875**	**1022**	**37**	**88**
JA7DSL	"	249,555	672	37	94
JA7MYQ	"	55,920	248	26	54
JH7QQJ	"	5,236	64	16	18
JA8RWU	**A**	**1,453,347**	**1484**	**123**	**234**
JA8RUZ	"	325,458	594	75	114
JH8QBY	28	4,089	52	11	18
JA8SCD	**21**	**286,200**	**855**	**34**	**86**
JA8IUB	"	72,286	291	32	62
JA8UJY	"	53,850	268	26	49
JH8JWF	**14**	**951,786**	**1919**	**40**	**131**
JA8IXM	**7**	**311,360**	**825**	**38**	**101**
JA8NFV	3.8	8,676	102	14	22
JA9CWJ	A	12,992	81	29	35
JA9RPU	**28**	**159,505**	**524**	**36**	**79**
JH9WQO	"	2,210	34	12	14
JA9YAV	**21**	**43,070**	**223**	**26**	**47**
JA9KKD	"	27,805	155	22	45
JA9CCG	"	7,854	69	20	22
JA9NB	"	1,386	24	10	11
JA9BEK	**14**	**161,894**	**480**	**35**	**87**
JH9YTM	7	720	16	10	10
JH0KHR	**A**	**1,141,946**	**1224**	**118**	**216**
JH1BXH/0	**28**	**49,662**	**215**	**28**	**61**
JR0BQT	"	21,190	131	25	40
JA0AXW	"	544	14	8	9
JH0EPI	**21**	**98,952**	**465**	**27**	**49**
JR0AMD	"	71,484	291	30	62
JH0OBD	"	62,289	305	28	53
JA0NFP	"	50,840	258	28	54
JH0HON	"	25,216	148	27	37
JH0UQI	"	6,908	61	18	26
JA0QNJ	**14**	**470,840**	**1104**	**40**	**109**
JA0DXG	"	172,200	501	35	85
JA0VXU	"	25,578	160	25	33
JA0UMV	**7**	**28,842**	**163**	**24**	**45**

Korea

HL1XP	**A**	**161,766**	**462**	**63**	**108**
HL5AP	"	25,338	116	39	43

HL2INX	**21**	**153,699**	**831**	**27**	**64**
HL1AYK	"	32,296	600	16	28
HL1LW	**14**	**110,876**	**471**	**31**	**75**
HL9HP	"	27,200	221	25	43

Macau

XX9T	**A**	**1,509,700**	**3061**	**93**	**217**
			(Opr. 4X6TT)		

Mongolia

JT7KAA	**A**	**49,128**	**534**	**30**	**62**
JT1BG	A	37,720	283	31	51
JT1BQ	**21**	**56,376**	**736**	**18**	**40**

Pakistan

AP2ZA	**14**	**167,894**	**1322**	**34**	**93**

Singapore

9V1WZ	**A**	**126,750**	**658**	**60**	**90**
			(Opr. VE3XO)		
9V1WP	**21**	**186,633**	**921**	**24**	**65**

UNION OF SOVIET SOCIALIST REPUBLICS

Armenia

UG6LQ	**21**	**701,454**	**2126**	**37**	**101**
RG5XE	**14**	**782,901**	**1912**	**38**	**115**
			(Opr. UY5XE)		
RG6GBW	7	13,916	116	13	36
UG7GWO	**1.8**	**255,852**	**1327**	**12**	**57**

Asiatic Russia

UA9YX	**A**	**3,409,436**	**3416**	**126**	**326**
RA9JX	"	1,012,105	1438	116	239
UV9FM	"	875,028	1080	86	222
UW9AG	"	150,776	346	59	128
RA9CNJ	"	3,379	53	13	18
UA9CRR	**28**	**42,092**	**349**	**22**	**46**
RA9UAD	"	27,389	299	19	42
UW9CS	"	2,714	94	10	13
UA9XFG	"	434	19	6	8
UA9AKO	**21**	**185,598**	**584**	**32**	**94**
UA9ULC	"	23,760	140	20	46
UA9US	**14**	**131,016**	**522**	**31**	**75**
UZ9UN	"	125,780	539	26	68
UV9FR	"	39,589	231	12	47
UW9OQ	"	18,626	120	21	46
UA9CBO	**1.8**	**5,890**	**80**	**7**	**24**
UW8LT	**A**	**790,400**	**1065**	**117**	**203**
UA0ZDD	"	267,336	741	67	91
UW0CF	"	143,748	651	52	80
UA0WZ	"	28,684	136	36	65
UA0FDX	"	7,595	133	15	20
UZ0AB	28	7,728	70	21	35
UA0FF	21	229,138	1440	29	62
UA0AKQ	"	31,376	228	22	52
UA0KAJ	"	19,260	535	16	20
RA0SU	**14**	**165,060**	**811**	**30**	**60**
UA0SR	"	143,616	623	31	71
UA0LCZ	"	12,320	138	18	26
UA0FM	**7**	**19,240**	**188**	**19**	**33**
RA0JB	**3.8**	**15,170**	**214**	**17**	**24**

Azerbaijan

UD6DKW	A	35,100	174	18	57
RD6DJ	**28**	**23,373**	**135**	**19**	**44**
UD6DDA	**21**	**53,900**	**182**	**32**	**78**
UD6DR	3.8	1,904	28	6	22

Georgia

UF6FII	A	17,600	103	20	44
RF84FWW	**14**	**1,447,128**	**2894**	**40**	**147**
UF6VB	**3.8**	**77,592**	**460**	**12**	**49**

Kazakh

UL7TX	**A**	**249,240**	**526**	**59**	**142**
UL7ACI	**28**	**368,067**	**1222**	**30**	**89**
UL7OB	"	1,265	33	11	12
RL7JA	**21**	**208,208**	**1023**	**28**	**76**
UL7QF	**14**	**31,746**	**199**	**22**	**56**
RL7AC	**3.8**	**30,957**	**230**	**9**	**42**

Kirghiz

UM8MAU	A	33,200	151	22	58
UM8MIG	**28**	**258,060**	**1248**	**29**	**81**
UM8MCW	**21**	**155,448**	**444**	**33**	**103**
UM8MGO	"	112,612	582	24	70
RM8MA	**7**	**12,546**	**122**	**14**	**37**

Tadzik

UT4UX /RJ5J	**A**	**1,905,787**	**1919**	**108**	**295**
UJ8XA	**14**	**28,426**	**205**	**17**	**44**

Uzbek

UI8CAJ	**A**	**618,674**	**1163**	**51**	**163**
UI8AFN	"	47,940	221	21	64
UI8IAJ	"	8,208	50	30	42
UI8LF	**14**	**158,207**	**609**	**29**	**68**
RI8BL	3.8	6,016	80	8	24

EUROPE

Aland Islands

OH8BH	**A**	**4,283,244**	**3417**	**156**	**428**

Austria

OE3HCS	**A**	**26,543**	**133**	**38**	**89**
OE2LDM	"	12,558	72	20	49
OE6RMD	"	4,920	61	13	28
OE1TKW	**1.8**	**1,188**	**49**	**5**	**22**

Azores Islands

CU2AK	**3.8**	**144,894**	**651**	**18**	**75**
CU2AF	**1.8**	**2,940**	**56**	**7**	**23**

Belgium

ON5KY	**A**	**695,360**	**870**	**108**	**302**
ON4ADG	"	66,368	342	42	94
ON5CZ	"	21,390	202	27	59
ON6GB	"	6,858	111	8	46
ON4KST	**21**	**220,500**	**691**	**33**	**92**
ON8WN	"	338	18	5	8
ON7LX	**14**	**458,952**	**1383**	**38**	**118**
ON4XG	"	41,633	272	19	60

Bulgaria

LZ1CW	**A**	**114,739**	**334**	**54**	**125**
LZ1KNP	"	85,008	298	49	119
LZ1HA	"	61,934	142	60	119
LZ1NS	"	48,212	218	33	65
LZ1BJ	"	39,558	175	37	77
LZ1UF	"	38,500	166	41	69
LZ2TU	"	17,654	116	30	67
LZ1FJ	"	5,394	65	20	42
LZ1BG	"	2,067	29	16	23
LZ2JE	28	7,089	72	14	37
LZ1OT	"	3,496	48	11	27
LZ1JB	"	629	31	6	11
LZ1KDP	**21**	**251,658**	**995**	**33**	**90**
LZ2BW	"	135,184	550	30	82
LZ2EW	"	102,935	386	29	90
LZ1EF	"	69,482	367	24	74
LZ1KGB	**14**	**1,388,628**	**3168**	**39**	**165**
			(Opr. LZ1JY)		
LZ1LW	"	1,134	80	19	51
LZ2RM	**7**	**9,960**	**123**	**17**	**43**
LZ2CJ	**1.8**	**94,247**	**1079**	**14**	**65**
LZ1KOZ	"	34,038	508	10	51

Czechoslovakia

OK6DX	**A**	**1,393,154**	**1476**	**108**	**274**
OK1AJN	"	**559,083**	**972**	**91**	**246**
OK2RU	"	471,440	919	88	244
OK1EP	"	131,098	325	61	144
OK1KZ	"	97,470	422	42	129
OK1AGA	"	68,456	244	49	123
OK3YK	"	59,353	356	32	107
OK1ASQ	"	47,940	146	54	87
OK1DZL	"	36,270	165	39	91
OK2HI	"	23,498	452	10	52
OK2PCL	"	14,694	69	30	49
OK1GP	"	13,041	111	21	42
OK3CNL	"	9,086	53	31	46
OK3CWF	"	8,178	156	14	44
OK3CMZ	"	1,674	18	13	18
OK3CFA	**28**	**80,594**	**421**	**27**	**91**
OK3CLD	"	40,326	245	25	69
OK1MG	"	23,088	133	22	56
OK1JCH	"	10,000	132	13	37
OK3CAP	**21**	**36,720**	**203**	**23**	**62**
OK1ZL	"	34,316	167	29	63
OK2BTC	"	10,864	74	20	36
OK2SWD	"	558	11	8	10
OK3CPW	"	336	12	6	8
OK1OAZ	**14**	**325,815**	**1100**	**33**	**112**
			(Opr. OL1BLN)		
OK2PAY	"	174,220	738	30	94
OK2BOL	"	34,680	208	25	60
OK3CGT	"	30,828	200	23	61
OK1AYQ	"	12,540	124	14	41
OK1AJY	"	10,017	126	13	40
OK3CSQ	**7**	**15,352**	**110**	**20**	**76**
OK3TOA	"	7,744	163	8	36
OK2RZ	**3.8**	**126,584**	**1120**	**17**	**74**
OK3CGN	"	11,596	260	5	38
OK1MKU	"	5,640	110	7	33
OK3CTT	"	3,549	87	6	33
OK1AYE	"	2,145	60	6	27
OK1OPT	"	630	31	4	17
OK3CWO	**1.8**	**25,665**	**400**	**8**	**51**
OK1DFF	"	14,958	277	8	46

Denmark

OZ7HT	**A**	**980,118**	**1603**	**79**	**227**
OZ1LRT	"	66,576	238	47	105
OZ1JVN	"	50,783	248	32	101
OZ4FA	"	36,010	126	48	82
OZ6EI	"	14,320	89	31	49
OZ1FAO	"	13,629	65	35	42
OZ3FYN	"	1,836	47	15	19
OZ1IZB	"	990	19	9	13
OZ5EV	**28**	**22,570**	**189**	**18**	**56**
OZ/FE1JDG	"	1,150	32	7	16
OZ1LTB	**21**	**41,796**	**260**	**25**	**61**
OZ6AI	"	3,492	51	12	24
OZ8IA	"	950	30	9	10
OZ1HXO	**14**	**15,544**	**193**	**17**	**41**
OZ1INN	"	10,706	126	16	37
OZ1DYI	"	5,934	90	13	33
OZ1KRL	"	903	31	6	15

England

G3SNN	**A**	**1,068,795**	**1142**	**108**	**297**
G3SJX	"	656,700	1052	78	252
G6QQ	"	64,736	284	36	100
G0CCH	"	56,457	314	40	113
G6NK	"	4,488	55	12	22
G3VMY	28	7,626	127	12	29
GB5NN	**21**	**438,900**	**1132**	**34**	**116**
			(Opr. G3VZT)		
G3FXB	**14**	**610,426**	**1724**	**38**	**108**
G3TXF	"	130,305	559	31	88
G4VMM	**7**	**41,032**	**319**	**18**	**74**

Federal Republic of Germany

DJ2YA	**A**	**1,636,992**	**1490**	**115**	**333**
DJ9ZB	"	**1,507,455**	**1552**	**110**	**307**
DL3NBL	"	**771,447**	**1184**	**109**	**302**
DJ4AX	"	**707,924**	**1035**	**101**	**285**
DF1IK/P	"	640,386	920	91	263
DJ1XP	"	608,328	715	107	319
DK8AX	"	574,790	630	119	339
DL3LU	"	560,470	721	105	305
DF7NJ	"	479,400	941	79	221
DJ5FT	"	446,292	812	74	202
DJ3HJ	"	351,830	674	73	229
DJ1FC	"	284,834	582	72	170
DL6DK	"	233,511	417	73	204
DK5DS	"	231,990	505	69	153
DK5WQ	"	222,600	448	72	208
DK9IP	"	204,678	364	75	174
DJ4ZR	"	203,872	324	80	107
DF3OG	"	195,120	380	78	193
DK1HV	"	151,354	273	78	188
DL8SCG	"	141,645	485	71	182
DK5PE	"	141,000	293	57	143
DL3YCJ	"	131,100	366	62	166
DK1QH	"	118,272	326	47	121
DF9RD	"	114,948	375	66	130
DJ8UV/P	"	113,322	468	49	153
DK3BJ	"	107,282	401	50	108
DL2RBK	"	96,879	359	39	90
DL8NBJ	"	85,683	269	49	120
DJ9MH	"	83,898	333	50	127
DL5RBW	"	83,235	167	64	115
DL2JX	"	80,136	289	48	120
DJ2UU	"	71,495	219	55	126
DF4ZL	"	71,063	170	52	127
DL3DAF	"	51,072	173	45	88
DK3GI	"	48,848	150	45	97
DJ4PI	"	42,104	113	57	95
DL5UF	"	37,592	105	58	90
DL3FBY	"	37,392	172	39	84
DL4RC	"	37,026	205	32	89
DF0SO	"	34,006	173	32	66
DL0RL	"	30,820	268	38	77
DL1XAS	"	30,564	143	35	73
DL6LAM	"	26,950	127	32	66
DJ5AV	"	22,458	146	33	81
DL9RDM	"	21,567	120	32	59
DH5KJ	"	20,988	116	29	77
DL6NAL	"	19,448	108	22	66
DJ8OT	"	15,480	110	23	49
DL6ZBN	"	14,940	104	30	53
DF4QP	"	14,421	118	23	34
DK4TP	"	13,776	136	23	61
DF8AN	"	11,040	37	32	48
DJ1ND	"	11,011	79	27	50
DL9OT	"	8,875	68	28	43
DK1YU	"	3,950	79	16	34
DF4HC	"	3,792	79	12	36
DJ0NY	"	2,112	44	12	21
DA2ER	**28**	**75,325**	**327**	**27**	**88**
			(Opr. W9UI)		
WB7RFA /DA1	"	71,868	358	25	88
DL4YBM	"	53,429	310	23	78
DL8BAV	"	9,747	171	19	38
DF8XC	**21**	**402,566**	**1140**	**39**	**112**
DK3SN	"	204,886	566	31	103
DL9SN/A	"	74,140	221	29	81
DK8FD	"	12,375	105	18	37
DL1SBF	"	5,076	67	12	24
DL3YDY	"	2,856	47	10	10
DJ4PT	**14**	**719,831**	**1968**	**39**	**122**
DF0AT	"	500,634	1474	37	109
			(Opr. DL9NC)		
DJ0MW	"	22,815	244	17	48
DJ0BX/P	"	15,052	183	13	40
DL2YCD	"	1,674	22	10	21
DJ2EH	"	2	1	1	1
DL8PC	**7**	**183,446**	**913**	**31**	**103**
DL8AAE	"	12,127	127	15	52
DF8AE	**3.8**	**81,079**	**800**	**19**	**70**
DJ5JH	"	7,889	114	9	40
DL9LAI	"	4,356	117	5	31
DK8NG	**1.8**	**13,376**	**168**	**12**	**52**
DK2WH	"	1,456	54	4	24

Finland

OH6LK	**A**	**2,156,880**	**2285**	**106**	**274**
OH2PM	"	**593,640**	**811**	**110**	**278**
OH1BV	"	261,085	681	65	170
OH6KK	"	106,821	469	36	107
OF6GZ	"	106,371	389	50	109
OF6NEV	"	100,224	310	50	141
OH4ML	"	30,315	110	50	91
OH6NEQ	"	21,056	191	26	68
OH2BYS	"	19,367	77	41	66
OF7NW	"	18,200	139	28	72
OH1EB	"	11,560	76	24	44
OH1BAD	"	6,120	43	20	31
OH1PY	"	1470	19	12	18
OH5MX	"	812	26	9	19
OH1AB	**28**	**39,130**	**260**	**24**	**67**
			(Opr. OH1NSJ)		
OH5OD	"	2,272	50	9	23
OH6NVC	"	316	9	7	8
OH2NSW	"	132	7	5	7
OF5BM	**21**	**675,032**	**1819**	**39**	**113**
OH2CK	"	93,875	321	34	91
OH7TO	"	7,040	92	14	26
OH5RZ	"	2,904	53	11	21
OH3MM	"	440	13	8	12
OH2WI	**14**	**372,775**	**1208**	**38**	**117**
OH3OJ	"	170,800	800	37	85
OH2BUU	"	108,047	589	28	75
OF6CD	"	6,885	104	11	34
OH8LC	"	4,760	99	13	22
OH6AK	"	2,223	32	12	27
OF2HE	**7**	**228,404**	**881**	**35**	**109**
OF1AF	"	179,375	1070	29	96
			(Opr. OH1NOA)		
OH2BAD	"	1,044	31	7	22
OF3GD	**1.8**	**1,770**	**56**	**6**	**24**
OF2BYS	"	1,302	39	6	25

France

F6BEE	**A**	**870,426**	**927**	**105**	**293**
F6GMB	"	465,578	818	77	194
F8WE	"	360,828	1032	74	183
FD1LBL	"	292,978	751	62	176
F3VX	"	152,221	517	50	131
FE6FHZ	"	114,610	270	55	102
F6EXQ	"	114,492	281	63	140
FE6FNA	"	71,248	302	42	104
F6ENV	"	68,875	399	33	112
F6IUI	"	66,861	235	48	105
F9QJ	"	11,178	61	29	40
F5RD	"	8,378	90	22	37
F81MNC	**28**	**14,212**	**201**	**12**	**36**
F1HAS	**21**	**316,966**	**962**	**34**	**112**
F9JS	"	91,680	310	30	90
FV7NDX	"	66,880	418	11	32
			(Opr. F6GNG)		
F6BVB	"	39,537	264	21	48
F3AT	"	5,510	58	14	24
F6B8J	**7**	**138,104**	**637**	**28**	**94**
F5MF	**3.8**	**36,894**	**347**	**12**	**54**

German Democratic Republic

Y22JJ	**A**	**803,010**	**1299**	**89**	**266**
Y36UE	"	**529,844**	**1149**	**78**	**220**
Y24VF	"	**292,179**	**507**	**79**	**210**
Y38YK	"	**251,485**	**647**	**64**	**201**
Y47PN	"	**209,145**	**650**	**58**	**161**
Y78SL	"	149,344	301	65	143
Y46IF	"	141,860	334	60	145
Y57ED	"	116,280	371	51	129
Y53DD	"	102,544	269	63	158
Y64OI	"	93,954	298	48	119
Y54TA	"	87,768	235	58	149
Y53VN/P	"	74,630	250	51	119
Y22VI	"	72,933	362	42	109
Y43ZI	"	69,053	182	56	143
Y22WD	"	64,416	214	52	124
Y34XF	"	64,800	190	48	114
Y42ZG	"	58,984	277	38	108
Y24SK/A	"	58,344	238	43	113
Y46ZC	"	52,490	257	36	109
Y43XE	"	48,204	176	51	105
Y25TM/A	"	44,370	128	57	153
Y33PJ/P	"	43,215	247	34	61
Y24NG	"	41,762	162	38	95
Y22WF	"	33,352	203	26	62
Y51XO	"	32,760	138	44	83
Y25IF	"	26,966	217	27	70
Y33TA	"	22,969	91	40	63
Y58WA	"	22,263	84	47	76
Y38ZB	"	21,010	100	39	71
Y21HB	"	19,740	115	36	70
Y25JA/A	"	19,313	118	29	60
Y67UL	"	17,769	171	26	57
Y22FG/A	"	17,622	110	34	65
Y25ML	"	15,842	144	23	66
Y44TN/P	"	15,570	95	26	64
Y48YN	"	14,976	74	29	49
Y63OI	"	13,632	115	21	43
Y66UA	"	12,616	84	30	53
Y58ZA /Y56WG	"	12,012	62	37	54
Y59ZF	"	12,000	98	27	53
Y74ZG	"	11,163	79	24	37
Y23SF/A	"	10,944	131	18	58
Y41PG	"	10,854	91	21	46
Y23UB/A	"	9,728	154	13	51
Y43RK	"	9,028	120	15	46
Y32DN	"	8,052	64	24	42
Y62SM	"	7,592	50	20	32
Y56SG	"	7,228	65	16	36
Y54VA	"	6,200	45	26	36
Y24GB/A	"	5,750	53	19	27
Y31OJ	"	5,148	59	17	27
Y32VN	"	5,046	43	23	39
Y22HF	"	4,968	45	19	27
Y42WB	"	4,374	47	20	34
Y64UF	"	4,214	59	15	34
Y49YC	"	4,189	45	20	39
Y49XN	"	3,731	80	10	31
Y25GH/A	"	2,812	76	14	23
Y64WF	"	2,750	34	21	29
Y44WA	"	1,939	43	10	24
Y24PM/A	"	1,938	25	15	23
Y39RG	"	1,260	22	12	18
Y42XN	"	851	31	7	16
Y38WE	"	728	26	9	17
Y26LG	"	240	8	7	8
Y25VF	"	104	9	4	9
Y33VL	28	8,305	79	17	38
Y32EE	"	6,450	59	18	32
Y22UB	"	2,016	47	9	23
Y24SG	**21**	**34,608**	**138**	**27**	**76**
Y24MB	"	18,048	133	20	44
Y34SG	"	9,300	54	23	39
Y23LG	"	8,742	71	19	43
Y37ZE	"	7,905	80	17	34
Y47VM	"	5,936	46	19	37
Y87VL	"	5,782	44	21	28
Y31UE	"	2,889	52	9	18
Y56ZA	"	228	9	6	6
Y37RB	"	209	7	6	5
Y32TE	**14**	**76,398**	**360**	**30**	**77**
Y28AL	"	73,304	479	24	74
Y22GC	"	34,196	150	25	78
Y24FB/A	"	8,928	80	18	30
Y22LL	"	6,396	67	14	38
Y41TF	"	2,079	29	12	21
Y48YB	"	1,620	28	9	18
Y66YF	"	1,539	29	8	11
Y28FI/P	**1.8**	**7,280**	**191**	**4**	**36**

Gibraltar

ZB2X	**A**	**4,895,520**	**4130**	**125**	**435**

Greece

SV1JG	**A**	**1,365,178**	**1920**	**111**	**343**
SV8CS	**1.8**	**39,294**	**444**	**12**	**62**

Hungary

HA8MM	**A**	**2,861,108**	**2742**	**140**	**408**
HA8GZ	"	704,099	1491	100	153
HA8XX	"	562,671	986	81	222
HA5HH	"	178,752	428	64	164
HA4XX	"	144,693	478	53	154
HA0IS	"	71,200	220	54	124
HA8CO	"	7,434	125	13	46
HA4ZZ	**28**	**60,499**	**390**	**25**	**76**
HA5APP	"	38,896	226	23	65
HA5ARR	"	12,220	96	19	46
HA0HW	"	7,020	72	18	42
HA3FT	"	6,681	63	17	36
HA3GJ	"	3,783	49	14	25
HA5PP	**21**	**303,905**	**960**	**36**	**97**
HA2KMR	**14**	**255,942**	**1098**	**26**	**92**
HA4KYN	**3.8**	**177,154**	**1249**	**22**	**79**
			(Opr. HA4XH)		

Iceland

TF3CW	**14**	**669,376**	**2024**	**32**	**96**

Ireland

EI9FN	**A**	**340,790**	**810**	**60**	**205**
EI2VKL	"	240,408	858	34	72
			(Opr. W2ORA)		
EI8AU	"	99,276	379	43	120

Italy

IV3PRK	**A**	**1,971,935**	**1750**	**132**	**415**
IV3YYK	"	**1,272,248**	**1451**	**119**	**317**
I3BQC/IL3	"	427,437	1070	69	154
IK6CNM	"	226,074	521	62	184
IK1GPG	"	211,266	439	72	170
I4CSP	"	189,550	290	56	167
IK2ANI	"	150,015	285	64	155
IK8BMW	"	138,106	301	62	137
IN3ANO	"	136,920	350	48	120
IK2GWH	"	123,000	352	56	149
IK2AEQ	"	73,800	410	58	122
IK0FEC	"	70,720	207	47	113
IK4GNK	"	38,728	224	26	77
IN3NHZ	"	28,350	182	26	79
IK3HMD	"	25,670	190	24	61
IK2IKW	"	7,519	79	25	48
IK4CBM	"	4,448	62	14	18
IK1DML	"	322	16	8	10
I4LCK	**28**	**145,369**	**645**	**32**	**101**
I8BYG	"	95,016	464	28	83
IK0DWN	"	75,095	340	27	88
I3IFT	"	59,590	294	25	76
IK2DZM	"	50,285	222	28	85
I0OKHP	"	44,767	294	22	67
I2ARC	"	37,570	207	22	63
I0UZF	"	10,032	77	18	30
I6YEF	"	7,448	67	16	33
I2LVN	"	1,026	20	8	10
IK4GNH	**21**	**423,925**	**1250**	**37**	**118**

IK5BBP	"	228,904	686	34	108
I3KVW	"	72,240	276	30	82
IK2ILH	"	68,016	250	29	80
IKØJMS	"	35,526	152	26	67
IK2AOO	"	4,017	42	14	15
IO1ZEU	**14**	**1,224,818**	**2838**	**40**	**138**
I5MXX	"	914,104	1364	37	126
IK6CWQ	"	604,800	1958	39	105
IK8ETA	"	452,295	1343	40	131
IV3JWR	"	276,510	1051	35	95
IKØAZG	"	226,128	927	28	84
I4PZP	"	94,920	346	33	87
IV3BMV	"	77,169	449	24	63
IK4IDE	"	13,983	170	16	43
IK1JUL	"	1,300	27	5	20
IO3MAU	**7**	**430,332**	**1657**	**34**	**107**
I5FCK	"	185,739	1073	23	78
IK4FNF	"	4,940	57	14	38
I4EWH	**3.8**	**122,232**	**850**	**18**	**70**

Jersey Island

GJ3XZE	**21**	**27,072**	**197**	**19**	**45**

Malta

9H3DX	**14**	**519,547**	**2137**	**33**	**122**

Netherlands

PAØAGA	**A**	**1,088,811**	**1608**	**98**	**291**
PAØDUO	"	89,200	230	60	140
PAØKDM	"	54,249	377	44	125
PA3ESZ	"	48,380	205	37	81
PA3EAA	"	46,306	196	40	97
PA3EOB	"	41,796	187	38	91
PA3DWA	"	41,019	195	38	83
PAØIA	"	21,900	157	23	48
PA2BJM	"	15,330	130	19	51
PAØYN	"	15,066	130	37	54
PA3ELD	"	9,558	71	26	55
PA3BNH	"	5,152	82	14	42
PA3COA	"	3,825	51	16	29
PA3DGF/1	"	2,072	36	12	27
PA3AIR	**21**	**175,398**	**545**	**34**	**104**
PA2REH	"	61,194	301	27	66
PAØQX	"	39,312	248	21	42
PA3CYX	"	32,940	291	22	38

Northern Ireland

GI4BBV	**A**	**174,240**	**410**	**59**	**181**
GIØAEV/P	28	3,234	65	11	22

Norway

LA2AD	A	18,779	157	27	62
LA1HCA	"	11,584	71	26	38
LA9SN	"	3,451	56	28	40
LA5TBA	"	1,008	20	9	9
LA4LN	**14**	**10,956**	**83**	**19**	**47**
LA9PEA	"	5,220	78	12	33
LA9DFA	"	3,400	60	10	24
LA5JX	"	820	33	10	10

Poland

SP9HWN	**A**	**397,200**	**783**	**83**	**217**
SP6OJJ	**"**	**284,625**	**693**	**67**	**186**
SP9AKD	"	238,502	447	81	212
SP9DWT	"	218,556	617	58	176
SP5DYO	"	196,000	580	63	161
SP1DTG	"	100,455	411	47	134
SP9BLF	"	86,640	363	36	116
SP3CDQ	"	75,480	217	56	129
SP8HPW	"	52,650	277	38	97
SP7DZA	"	26,460	185	30	75
SP6CZ/6	"	24,219	86	49	67
SP3BVI	"	20,696	147	29	75
SP9RQU	"	20,448	124	26	70
SP9MRM	"	18,362	124	30	60
SP5AA	"	17,536	102	33	95
SP6JIR	"	17,664	200	15	54
SP7MOQ	"	9,008	240	25	44
SP7FQI	"	8,960	114	18	46
SP9RG	"	4,218	43	24	33
SP9ZD	"	4,200	59	13	37
SP8BVJ	"	4,104	50	17	34
SP3HC	"	3,010	56	15	28
SP3IOE	"	1,723	29	18	19
SP3GEM	**28**	**72,924**	**328**	**27**	**91**
SP9EES/9	"	37,980	202	25	65
SP9MAL	"	23,780	159	23	57
SP4DC	"	22,120	147	24	55
SP6FAF	"	10,560	102	17	43
SP9JZT	"	7,399	72	17	32
SP7AWG	"	5,292	50	18	31
SP2FN	"	3,815	61	13	22
SP8UFO	"	1,092	18	12	14
SP6LTF	**21**	**44,370**	**228**	**25**	**61**
SP9AIM	"	35,400	163	27	73
SP2EP	"	13,202	151	17	28
SP9MAT	"	9,853	69	20	39
SP5KVW	**14**	**269,952**	**901**	**38**	**114**
SP6EAL	**"**	**102,794**	**559**	**25**	**78**
SP1JRG	"	37,754	208	24	62
SP9IWO	"	27,805	176	20	63
SP1EOI	"	24,633	190	16	53
SP5EMM	"	22,336	188	17	47
SP9CAY	"	21,120	103	25	71
SP9MRO	"	20,706	181	14	44
SP9AVZ	"	16,929	204	12	45
SP1MHV	"	13,452	105	17	42
SP8HXN	"	12,238	175	13	45
SP9MQD	"	11,914	91	19	55
SP3GHK/A	"	10,816	135	15	37
SP9AGS	"	10,335	135	12	41
SP6DNS	"	9,976	91	14	44
SP6DHH	"	9,405	143	12	43
SP9BRP	"	9,240	115	14	42
SP9RPT	"	7,191	111	11	36
SP3CDR	"	2,592	64	10	17
SP7AZP	"	1,972	40	8	9
SP3RBR	**7**	**193,210**	**810**	**33**	**106**
SP2ZFJ	"	114,125	746	31	94
SP9FIH	"	42,230	270	24	79
SP9PEZ	"	31,008	315	15	61
SP6IHE	"	22,825	181	18	65
SP6AGD	"	15,145	197	14	51
SP9CTW	"	3,484	43	12	40
SP8TQ	**3.8**	**27,140**	**422**	**11**	**48**
SP8KEA	"	16,530	264	10	47
SP9ODY	"	15,582	310	7	42
SP9HML	"	13,908	215	5	52
SP8LZO	"	9,246	118	8	38
SP3ZBY	"	7,254	185	5	34
			(Opr. SP3EAX)		
SP9NSY	"	3,925	96	7	29
SP3DFB	"	2,614	93	4	24
SP5INQ	**1.8**	**18,468**	**310**	**9**	**48**
SP9GDB	"	9,682	204	8	39
SP9DH	"	7,515	170	6	39
SP9MZS	"	3,842	117	6	28

Portugal

CT1CLR	**A**	**632,490**	**1026**	**77**	**213**
CT6AHU	**"**	**352,002**	**661**	**59**	**144**
CR2DIZ	"	225,940	563	69	191
CT1BBJ	"	137,992	734	58	133
CQ5QF	"	122,430	391	41	113
CT1BFN	"	72,072	300	44	110
CR4CQK	"	65,688	274	39	99
CT1DQM	"	64,612	434	28	88
CR6TM	"	52,595	169	52	105
CT1BQN	"	17,952	88	35	61
CT1AVR	"	11,340	63	25	47
CQ7NH	**28**	**352,352**	**1016**	**31**	**123**
CT1AUW	"	51,887	367	24	65
CT1BMQ	"	41,280	261	16	45
CT1DJN	"	34,768	185	23	59
CS8IR	**21**	**59,556**	**509**	**20**	**64**
CT1AZS	"	12,474	111	20	46
CT1UO	"	5,285	61	13	22
CT1BWW	**14**	**108,171**	**508**	**31**	**88**
CT1CAK	"	54,284	397	19	63
CT1AOZ	**1.8**	**22,680**	**206**	**12**	**48**

Romania

YO3NL	**A**	**156,110**	**472**	**51**	**182**
YO6BQT	"	139,125	615	39	136
YO8FR	"	127,600	507	64	112
YO6DDF	"	54,831	147	52	92
YO8AII	"	49,416	174	49	93
YO3BDP	"	34,810	136	44	64
YO8RL	"	22,339	160	19	70
YO2DDM	"	21,075	270	14	61
YO9FL	"	12,250	160	17	53
YO6KEA	"	10,044	72	25	37
YO6KEW	"	4,922	49	16	30
YO3DCO	"	2,632	28	21	26
YO9FIM	"	1,617	49	9	24
YO7LCD	**28**	**23,180**	**178**	**22**	**54**
YO3AVN/3	"	8,505	70	18	45
YO3YC	"	2,040	24	14	20
YO6KEI	**21**	**29,472**	**267**	**14**	**34**
YO9AHX	"	20,100	156	23	52
YO9DHZ	"	9,984	100	16	36
YO6EZ	"	9,632	89	17	39
YO3JF	**7**	**82,888**	**542**	**25**	**79**
YO7LBU	"	4,212	112	8	28
YO7LCC	"	3,600	90	7	29
YO5CUU	"	180	18	3	7
YO5QAW	**3.8**	**9,520**	**246**	**5**	**35**
YO5CTY	"	6,970	181	6	35
YO2IS	**1.8**	**15,704**	**286**	**8**	**44**
YO3CD	"	8,892	153	8	44
YO6AJI	"	4,847	120	7	30

Scotland

GM3BCL	**A**	**376,124**	**798**	**55**	**141**
GM4WEW	"	131,440	457	42	113
GM3MOR	21	6,280	76	10	30
GM4FDM	**14**	**167,343**	**665**	**33**	**88**
GM4HQF	"	31,104	271	17	47
GM4JFS	"	19,140	221	13	45
GM4ENF	"	6,734	76	13	24
GM3VLB	**1.8**	**3,096**	**86**	**5**	**31**

Sicily

IT9MBL	**28**	**87,580**	**352**	**29**	**87**

Spain

EA5DFY	**A**	**1,075,875**	**1540**	**94**	**281**
EA3NU	**"**	**1,010,339**	**835**	**143**	**440**
EA7DHP	**"**	**544,865**	**848**	**81**	**214**
ED3CM	**"**	**421,872**	**871**	**71**	**211**
			(Opr. EA3FUM)		
EA5BD	"	371,490	596	75	215
EA3DZG	"	339,407	809	59	132
ED5CGU	"	319,260	549	87	226
EA1BGT	"	254,944	613	65	183
EA5JC	"	209,790	431	76	194
EA1AW	"	204,700	443	61	169
EA1DZL	"	196,490	451	59	186
EA5CHT	"	179,799	406	59	160
EA5AEN	"	165,184	335	68	164
EA7EHE	"	150,971	334	64	159
EA3CCN	"	144,900	229	78	222
ED5CXL	"	131,100	254	74	156
EA3DRE	"	78,561	298	41	88
EA5EQ	"	77,145	254	46	93
EA3NA	"	74,555	389	85	195
EA3CVI	"	71,371	237	49	100
EA7BYM	"	56,444	202	49	88
EA5CPH	"	48,836	203	41	75
EA5EFV	"	27,178	91	51	76
EA3DVJ	"	25,248	263	26	70
EA3EGI	"	24,840	98	37	53
EA5DIJ	"	22,454	120	34	69
EA7CZR	"	22,338	114	38	64
EA2BMA	"	18,800	82	33	61
EA1CWC	"	18,660	118	25	35
EA1BFZ	"	13,505	100	25	48
EA7EBL	"	12,354	72	29	42
EA3EFH	"	11,160	84	24	48
EA5GDI	"	6,768	69	19	29
EA2CR	"	4,312	52	20	36
EA7FQI	"	3,828	49	16	28
EA5EYP	"	3,168	36	20	28
EA3FXM	"	2,700	47	18	27
EA2CIS	"	1,566	20	10	19
EA4EAP	**28**	**133,380**	**442**	**29**	**101**
EA7BHO	**"**	**75,200**	**410**	**25**	**55**
EA3FWE	"	72,062	367	26	97
EA5FCJ	"	59,405	258	28	81
EA1CON	"	53,300	304	20	62
EA3ELZ	"	37,149	203	23	64
EA1BIM	"	34,307	186	27	64
EA7FZY	"	33,864	193	25	58
EA4DKJ	"	31,110	174	23	62
EA7FUN	"	27,224	141	25	58
EA5AN	"	24,969	122	25	62
EA3FQV	"	24,948	229	17	49
EA3DZZ	"	23,482	341	15	44
EA3FGS	"	22,962	141	25	64
EA3CZM	"	22,190	172	18	52
EA4EEK	"	21,038	153	23	44
EA3DBO	"	19,199	114	23	50
EA4DMB	"	16,080	109	21	46
EA7FLU	"	15,403	76	24	49
EA5AIK	"	5,650	39	17	33
EA4EER	"	4,268	44	16	28
EA5EEP	"	3,080	45	13	22
EA3FOG	"	648	12	7	11
EA7PS	**21**	**233,415**	**1154**	**24**	**67**
EA1DWI	"	187,200	686	31	86
EA1CES	"	57,981	396	26	61
EA1CNO	"	29,016	173	19	59
EA5AP	"	26,208	133	27	64
EA7AQY	"	21,808	182	19	39
EA3ESZ	"	20,636	145	18	49
EC5CHV	"	7,497	88	17	32
EC1CPE	"	7,250	48	22	36
EA5EVT	"	6,422	115	12	26
EA3TJ	"	5,504	73	13	30
EA3EXW	"	2,520	40	13	22
EA3AAY	**14**	**259,578**	**1131**	**29**	**85**
EA3EGB	"	232,104	1009	30	84
EA3DEE	"	49,329	320	24	63
EA3FKC	"	33,288	207	20	56
EA1DFH	"	29,953	276	19	58
EA5FYJ	"	4,416	57	10	22
EA3DXD	**7**	**30,960**	**324**	**15**	**57**
EA1SY	"	12,528	124	12	42
EA3ELM	3.8	7,314	116	7	46

Svalbard Island

JW8B	**A**	**20,008**	**244**	**28**	**54**

Sweden

SM3BIZ	**A**	**422,506**	**763**	**79**	**214**
SM6LIF	"	113,668	291	54	127
SM6BJI	"	62,220	214	50	120
SMØJOQ	"	48,077	212	41	90
SM2NTU	"	25,705	119	34	63
SM4GTB	"	23,400	205	26	74
SM6IJF	"	18,275	143	26	59
SK3AH	"	14,652	118	23	43
			(Opr. SM3COL)		
SMØOFW	"	9,860	87	24	44
SMØBDS	"	6,110	68	22	43
SM7BEX	"	5,824	42	23	33
SM7BGF	"	4,352	58	15	19
SM5CSS	"	4,200	35	25	31
SM5CAK	"	2,464	32	12	16
SM5IMO	**28**	**28,576**	**272**	**20**	**56**
SM4CMG	"	10,696	109	13	43
SMØTW	"	3,393	61	10	29
SM7MXP	"	1,100	44	8	17
SM5KNV	**21**	**42,264**	**218**	**25**	**47**
SM6FIY	"	4,588	50	14	23
SL4ZXE	**14**	**233,472**	**927**	**31**	**97**
			(Opr. SMØOGQ)		
SM7OXQ	"	27,582	183	19	47
SM3LIV	"	20,274	230	15	47
SM7TV	"	17,776	182	16	47
SM5GA	"	10,918	96	14	39
SM4AAY	"	1,768	30	10	16
SM6JY	"	4,515	95	10	25
SM5AQD	**7**	**210,140**	**1113**	**32**	**101**
SM7HSP	"	805	34	5	18

Switzerland

HB9AAA	**A**	**632,401**	**806**	**85**	**216**
HB9DCQ	"	209,484	503	68	185
HB9AUS	"	111,315	264	59	146
HB9ASJ	"	29,779	166	17	80
HB9DDZ	28	7,308	52	19	44
HB9DX	**21**	**27,346**	**93**	**30**	**91**
HB9DCZ	14	11,616	68	22	66

Wales

GW4BLE	**A**	**2,928,000**	**2417**	**116**	**372**
GW4BKG	**7**	**62,790**	**547**	**18**	**73**
GW4RHW	**3.8**	**16,506**	**205**	**12**	**51**

Yugoslavia

YU3QI	**A**	**305,670**	**460**	**94**	**251**
4N4C	"	102,372	555	42	86
YU4KM	"	24,304	95	38	60
YU1LM	"	9,028	52	25	36
YU1PJ	"	2,552	35	17	27
YU3C	**28**	**141,638**	**644**	**32**	**102**
			(Opr. YT3RM)		
4N1A	"	116,875	566	30	95
YU7GW	"	97,092	382	30	94
YU2OB	"	89,505	395	27	90
YT2ER	"	23,775	190	23	52
YU7KM	"	12,848	94	25	63
YU1RA	"	2,139	69	13	18
4N4A	**21**	**942,039**	**2380**	**39**	**132**
YT3L	"	846,360	1878	39	141
			(Opr. YU3EA)		
YT7NW	"	707,085	1724	38	133
4N4Y	"	552,902	1731	37	109
YT3W	"	95,937	442	32	81
YU7FT	"	79,822	310	29	78
YT3AA	**14**	**1,073,340**	**2601**	**39**	**141**
4N7N	"	882,882	2376	40	142
YU7AV	"	591,888	1900	35	117
YU2W	"	577,350	1841	36	114
			(Opr. YT2FI)		
YT4I	"	510,872	1672	37	115
			(Opr. YU4VO)		
YU7BJ	"	452,928	1368	39	129
YT1W	"	452,724	2000	28	96
YU7DR	"	183,719	871	29	78
YT7A	**7**	**185,913**	**1167**	**26**	**91**
			(Opr. YU7OA)		
YU7SF	"	14,137	152	14	53
YU3OJ	**3.8**	**53,957**	**535**	**16**	**63**

UNION OF SOVIET SOCIALIST REPUBLICS

Byelo Russia

UC2OR	**A**	**1,522,163**	**2209**	**103**	**288**
RC2AU	"	41,876	307	28	88
UC2AAD	"	10,703	103	23	54
UC2AFA	"	2,898	59	13	33
UC2OAR	**14**	**145,348**	**789**	**32**	**84**
UC2OM	"	62,976	448	24	58
UC2LK	"	14,455	171	17	42
UC2WBM	3.8	3,927	103	7	26

Estonia

UR2RNG	A	29,393	186	30	89
UR2RDJ	"	4,968	40	23	31
UR2RHF	"	1,148	15	13	15
UR2RQB	28	5,250	53	14	36
UR2QA	**21**	**62,167**	**276**	**31**	**76**
UR2RMI	"	5,616	41	18	30
UR2REA	"	2,296	43	8	20
RR2RN	"	1,701	23	10	17
RR2RX	"	1,188	18	12	15
UR2RE	**14**	**404,954**	**1228**	**39**	**119**
UR2RIY	**7**	**25,358**	**325**	**15**	**47**
RR2RT	"	10,281	92	16	53
UR2RCU	**3.8**	**51,610**	**668**	**11**	**54**
UR2MG	"	18,648	287	9	47
UR2RC	"	2,820	77	6	24

European Russia

UA6ADC	**A**	**994,977**	**1510**	**102**	**285**
RA4PM	**"**	**588,252**	**948**	**96**	**233**
RA1AA	"	537,472	1110	77	227
UA4NC	"	512,702	761	110	279
UA3DRB	"	439,245	625	117	270
UA6ED	"	321,816	826	67	209
RW3AU	"	139,598	390	60	163
UA3TN	"	132,600	359	75	180
UA4HA	"	128,650	523	43	112
UW4CF	"	103,722	627	43	134
RA3DNC	"	93,456	385	39	105
U1BA	"	91,676	359	45	119
RA3ZJ	"	3,337	55	14	33
UA3PP	"	62,678	338	36	85
UA4ANZ	"	51,968	247	33	95
UV3DN	"	49,720	259	33	80
UA3RA	"	43,524	289	21	87
UA3ZU	"	39,732	215	30	99
UW3TU	"	37,873	157	41	80
UA4CO	"	36,736	143	54	74
RW3AE	"	35,343	162	37	82
UA6LIG	"	23,312	197	24	70
UA3PM	"	15,400	110	32	45
RA1OAK	"	14,586	118	26	40
UA3QBX	"	14,560	132	25	45
UA4LDJ	"	10,897	102	18	41
RA3QUA	"	10,318	62	22	45
RZ3DZ	"	10,126	99	22	61
UZ3TT	"	9,780	89	16	44
RW3ZC	"	7,000	82	16	24
UA6LQ	**28**	**249,630**	**804**	**34**	**125**
UA6BPM	"	16,764	164	21	45
UA4WR	**21**	**261,741**	**817**	**35**	**94**
UA4HTT	**"**	**254,380**	**843**	**36**	**104**
UA6LDX	"	206,310	776	36	94
RW3PW	"	172,870	717	29	89
UA3QJC	"	118,311	601	26	87
UW6MA	"	83,121	470	24	79
UA6AG	"	80,180	341	29	66
RA4CC	"	80,136	369	27	79
UA4CZ	"	57,671	265	27	74
UA3ASL	"	52,116	267	30	71
RA3AOD	"	34,977	202	25	64
UA3THQ	"	24,900	184	23	52
UA3ZIJ	"	24,900	173	24	51
RA3DJA	"	23,335	171	18	47
RA3VA	"	19,215	174	16	47
UA1ZGH	"	14,800	144	17	33
UA3TAM	"	10,176	164	10	38
UW3UO	"	1,032	43	58	3
UW3QT	**14**	**308,304**	**1170**	**37**	**107**
UA3RF	"	152,464	740	29	75
RA1AL	"	126,426	609	32	82
UW6AA	"	102,690	472	34	92
UW3HY	"	33,972	157	18	58
RW6AH	"	30,160	282	19	46
UA3ST	"	20,090	181	16	54
RU1DZ	**7**	**227,432**	**1164**	**35**	**99**
UW3DX	"	70,288	440	25	67
UA3XAW	"	21,556	247	13	55
UA3TEP	"	6,660	81	15	45
UV6LC	**3.8**	**55,968**	**433**	**24**	**64**
UA1CCT	"	4,484	107	6	32
UV6AGF	1.8	760	32	5	15

Franz Josef Land

UA1OT	A	11,100	74	31	44

Kaliningrad District

RA2FB	A	10,653	85	21	46
UA2FGA	**3.8**	**196,992**	**1271**	**28**	**86**

Latvia

RQ2GN	**A**	**452,993**	**883**	**90**	**227**
UQ2GCP	**21**	**25,456**	**178**	**23**	**51**
UQ2GLW	"	4,879	105	17	24
UQ2GLQ	"	2,070	24	12	18
UQ2GGE	**3.8**	**15,345**	**243**	**9**	**46**
UQ1GXX	"	9,075	144	10	45

Lithuania

UP3BH	**A**	**771,162**	**1137**	**102**	**264**
UP2DM	"	211,679	527	68	179
UP3BA	"	171,801	676	40	149
UP3BU	"	101,238	549	33	108
UP2AV	"	79,100	340	45	130
UP2ND	"	66,845	293	36	109
UP2BQQ	"	56,916	375	26	82
UP2PAQ	"	34,884	238	26	88
UP2PBM	"	27,968	214	25	67
UP2BOS	"	10,640	130	17	53
UP2BIS	**21**	**100,800**	**405**	**30**	**82**
UP2OU	"	89,430	432	28	82
UP2BNE	"	41,820	239	24	58
UP2BW	**14**	**635,810**	**1822**	**39**	**116**
UP3BX	"	478,648	1544	38	114
UP3BI	"	143,100	675	35	100
UP2PCK	"	12,420	154	11	43
UP2BZ	"	912	27	7	17
UP2SA	**3.8**	**47,073**	**600**	**13**	**58**
UP2BIW	"	32,538	426	12	54

Moldavia

UO5ONQ	**A**	**121,965**	**509**	**43**	**130**
UO5OOC	**28**	**43,243**	**347**	**25**	**58**
RO4OA	**14**	**394,124**	**1484**	**36**	**112**
UO5GR	"	11,036	138	13	49

Ukraine

RB5DX	**A**	**2,127,972**	**2397**	**122**	**395**
RB5MF	**"**	**1,882,010**	**1959**	**126**	**341**
UT4UO	"	596,970	955	90	245
UT4UZ	"	522,360	922	90	270
UBØJZ	"	515,016	1126	77	234
RB4IRO	"	437,762	897	79	219
UB5IAL	"	346,560	658	83	202
UY5TE	"	243,250	667	57	193
UB5WJ	"	240,352	467	81	215
UB5EJB	"	228,216	568	61	161
RB5IQ	"	184,800	484	64	176
RB5VT	"	176,580	525	56	162
UB5MLP	"	170,230	303	88	202
UB5CJP	"	170,100	538	60	150
UB5EPV	"	140,344	451	58	154

RB5NT	"	99,509	365	46	105
UB4JB	"	67,568	275	43	121
RB5LSR	"	64,386	235	47	100
RB5AE	"	54,600	254	39	101
UB4MF	"	51,146	305	26	81
RB5RA	"	46,930	203	39	91
UB5TCJ	"	41,093	234	27	82
UB5MMP	"	32,545	178	32	83
RB5LTZ	"	9,125	79	22	51
UB5CCP	"	9,030	70	23	47
UB5IDG	"	5,880	73	20	40
RB5HB	"	2,280	50	8	30
UB5INO	**28**	**59,678**	**313**	**27**	**79**
RB4JF	"	52,512	328	24	72
UB5UAT	"	46,269	274	27	70
UB5VBX	"	23,850	169	23	52
RB5CCO	"	21,756	192	19	55
RT5UO	"	20,280	128	25	53
RT4UA	"	8,160	60	20	40
UB5VEF	"	2,720	60	10	24
UB5IJG	**21**	**373,096**	**1149**	**36**	**113**
U5WF	"	94,550	383	30	92
UT5RY	"	64,914	334	29	64
UB4ED	"	51,597	314	24	67
RB5TK	"	44,640	246	25	58
UB5VBG	"	24,776	186	20	56
UB5EDM	"	17,400	163	19	39
RB5LL	**14**	**279,566**	**1348**	**34**	**99**
RB5IA	"	252,681	1057	35	108
RB5QW	"	55,620	393	24	56
UB5VAA	"	15,825	118	18	57
UT5HP	"	2,394	31	11	27
RB5MR	**7**	**212,736**	**1001**	**31**	**97**
UB5WE	"	121,830	560	31	100
RB5ISU	"	111,090	790	26	79
UB5HEX	"	22,824	242	116	56
RB5FF	**3.8**	**138,112**	**1029**	**22**	**82**
UB5IKB	"	117,912	703	24	78
UB5HOX	"	28,765	445	9	46
UB5WBJ	"	18,819	331	8	43
UB5MX	"	4,794	105	8	26
RB5IOV	**1.8**	**4,773**	**99**	**7**	**30**

OCEANIA

Australia

VK2KL	**A**	**1,691,024**	**2089**	**96**	**176**
VK4BJD	"	352,611	609	79	124
VK1RJ	"	321,177	739	58	93
VK3PU	"	106,760	157	64	93
VK8AV	"	52,360	136	52	102
VK4UA	**28**	**8,901**	**134**	**11**	**12**
VK6BE	"	4,992	57	16	16
VK1NI	**21**	**169,015**	**755**	**23**	**54**
			(Opr. SM8KV)		
VK2APK	**14**	**312,051**	**840**	**33**	**96**
VK2AYK	"	150,177	466	31	82
VK3SM	"	40,502	184	25	52

East Malaysia

9M6AE	**A**	**25,200**	**115**	**33**	**51**

Guam

WH2AKZ	**28**	**35,776**	**472**	**13**	**13**
KH2D	**21**	**886,016**	**2372**	**36**	**92**
N7DF /NH2	**7**	**29,498**	**202**	**21**	**28**
KG6DX	**3.8**	**48,620**	**331**	**20**	**32**

Hawaii

WR6R /KH6	**A**	**4,086,436**	**3753**	**133**	**243**
AH6FL	"	1,095,120	2287	68	94
KH6VP	**28**	**37,908**	**243**	**20**	**32**
KH6JJK	"	7,348	78	18	19
WH6BKQ	"	315	9	8	7
N7NR /KH6	**21**	**634,998**	**2360**	**26**	**65**
KH6FKG	**14**	**368,431**	**1281**	**34**	**69**
K6GSS /KH6	3.8	2,700	65	6	9
KH6CC	**1.8**	**37,138**	**404**	**11**	**20**

Indonesia

YB1CS	**A**	**556,196**	**898**	**72**	**139**
YC8VFB	"	**128,412**	**565**	**40**	**68**
YC2CTW	**28**	**366,795**	**1068**	**29**	**88**
YC2GHE	"	92,288	339	26	70
YB5QZ	"	59,032	234	26	68
YC8SQT	**21**	**525,162**	**1224**	**37**	**109**
YC3HCM	"	442,750	1334	32	93
YC0EAQ	"	381,324	1015	34	95
YC8VHW	"	157,536	565	33	63
YC9VGJ	"	143,520	548	29	63
YC2ERF	"	135,364	531	28	58
YC2BAB	"	102,245	358	27	75
YC1JZS	"	55,356	234	31	53
YC8VLZ	"	42,500	177	32	53
YC3OSE	"	32,175	155	27	48
YC7LGA	"	9,844	77	23	23
YC4GAP	"	9,684	93	15	21
YC2OK	"	9,405	78	18	27
YC1DWZ	"	781	25	5	6
YB3ASQ	**14**	**190,216**	**549**	**36**	**88**
YB3CEV	"	113,452	365	32	81

Johnston Island

KL7LF /KH3	**A**	**825,907**	**1891**	**59**	**90**

Lord Howe Island

VK9LB	**A**	**95,119**	**449**	**32**	**41**

Marianas Islands

JA1BK /KH0	**A**	**72,846**	**353**	**35**	**36**
KH0AC	**21**	**668,072**	**1901**	**36**	**86**
			(Opr. WA2TMP)		

Marshall Islands

KX6JB	**28**	**28,336**	**224**	**17**	**27**

Mellish Reef

3DX2DX	**A**	**95,326**	**496**	**35**	**42**

New Zealand

ZL1IM	**A**	**117,284**	**373**	**48**	**61**
ZL1BWK	"	102,483	225	68	109
ZL1BWM	**28**	**220,601**	**1263**	**23**	**36**
ZL1AAS	"	190,213	964	24	43

Philippines

K4YT /DU8	**A**	**3,425,408**	**2735**	**146**	**302**
K1BAZ /DV1	"	729,885	3705	75	122
DU3BAA	**28**	**196,425**	**903**	**24**	**51**
DU1TV	"	16,632	130	18	24
DU6TW	**21**	**132,772**	**619**	**26**	**50**

Solomon Islands

H44JA	**21**	**111,081**	**638**	**21**	**40**

Southern Cook Islands

ZK1CG	**A**	**213,993**	**815**	**43**	**50**
ZK1XR	"	32,723	257	23	20
			(Opr. WA7RVA)		

Western Kiribati Islands

T3BRY	**A**	**5,147,334**	**4528**	**137**	**261**
			(Opr. OH1RY)		

SOUTH AMERICA

Antarctica

KC4USV	**A**	**60,550**	**405**	**24**	**46**
			(Opr. W7SW)		

Argentina

AY9D	**A**	**1,425,745**	**2191**	**78**	**157**
			(Opr. LU9DBK)		
AY3F	"	960,153	1238	90	181
			(Opr. LU6FAZ)		
LU1FYZ	"	95,465	527	20	41
LU8DWN	"	4,940	73	29	39
LU1E	**28**	**1,486,650**	**3336**	**30**	**120**
LU1HOO	"	635,252	1978	28	81
L4H	"	353,865	1161	22	71
LU1ABT	"	180,744	897	20	48
LU2DGZ	"	24,949	138	21	40
LU2E	**21**	**1,576,995**	**3313**	**35**	**126**
			(Opr. LU8DPM)		
LU4L	"	1,237,956	2946	34	108
			(Opr. LU4LAV)		
LU6DB	"	732,155	1951	30	97
LU2HAM	"	165,075	812	25	46
LU8FDZ	"	69,254	394	17	45
LU1YU	"	611	17	5	8
LU5HNB	**14**	**453,905**	**1343**	**34**	**81**
LU8ESU	"	232,078	663	35	86
LU4D	**7**	**52,425**	**264**	**25**	**50**
			(Opr. LU4DXU)		

Aruba

P4ØA	**A**	**7,481,920**	**4893**	**133**	**382**
			(Opr. N1GL)		
P4ØT	**21**	**1,317,081**	**3193**	**32**	**109**
			(Opr. KB2HZ)		
P4ØSS	**14**	**1,792,056**	**3570**	**35**	**133**
			(Opr. K2SS)		
P4ØR	**3.8**	**552,786**	**1628**	**23**	**91**
			(Opr. K4UEE)		

Brazil

ZY5TT	**A**	**2,393,182**	**2285**	**110**	**252**
ZY4OY	"	**2,105,180**	**2336**	**91**	**217**
ZY5VV	"	1,719,850	2003	89	206
PP2ZDD	"	1,126,780	1809	59	153
PY5EJ	"	511,830	1067	44	121
ZY5EX	"	368,172	699	67	122
PT2TF	"	225,212	628	49	73
PT2ACC	"	163,875	319	63	122
ZY3OG	"	152,146	470	51	76
PT2TD	"	149,700	366	53	97
PY5ZBU	"	122,130	366	45	70
PY1VB	"	102,725	222	58	117
ZY5IO	"	95,626	258	48	89
PY3HLM	"	90,390	244	53	82
ZY2CGB	"	63,952	247	45	67
PY5OE	"	62,308	167	50	98
PY7GF	"	54,466	188	38	75
ZY5CFE	"	51,940	203	44	62
PY7SV	"	30,591	142	34	65
PY8CL	"	25,470	121	30	60
PP5IA	"	11,772	82	20	34
PY4BHB	"	11,470	138	12	19
PY5EML	"	10,868	65	33	43
PY5BVL	"	4,770	48	17	28
ZY5ZC	"	4,662	60	15	27
ZY3AJZ	"	1,110	21	18	19
ZY5EG	**28**	**1,777,508**	**3396**	**36**	**142**
			(Opr. PY5CC)		
PY1ACV	"	444,780	1297	29	97
PY1ADE	"	261,709	860	30	79
ZY1NEZ	"	156,240	923	16	46
PY2ZM	"	69,498	394	23	58
PY2KP	"	18,056	166	13	14
PY5FB	"	17,823	164	17	22
PY5EG	**21**	**2,468,529**	**4421**	**38**	**151**
ZY5GX	"	182,880	705	28	62
PY1LI	"	116,248	477	29	59
PY5YL	"	113,925	430	28	65
ZY3JZ	"	95,195	431	24	55
PY1BJN	"	88,452	352	23	68
ZY5OF	"	23,058	197	15	27
ZZ5EG	**14**	**1,647,820**	**2980**	**39**	**149**
			(Opr. N5FA)		
PY2RVC	"	16,626	116	17	34
PT7VB	7	2,040	20	14	20
PY3CEJ	1.8	70	10	3	4

Chile

CE3BFZ	**A**	**1,848,916**	**1999**	**102**	**214**
3G2Z	"	155,540	494	47	63
CE5BSS	"	83,142	316	40	53
CE3AEZ	"	13,248	68	24	48
CE6EZ	**28**	**1,224,492**	**3084**	**31**	**103**
CE3DQO	"	128,025	613	23	52
CE6DFY	**21**	**252,838**	**1060**	**24**	**62**
CE3CYM	"	214,425	1002	24	51
CE3NR	**14**	**681,526**	**1561**	**34**	**115**
CE7ZK	"	106,148	533	25	43
CE5NCX	7	5,658	51	16	30
CE1LGD	"	814	19	8	14

Colombia

HK1LDG	**A**	**1,837,743**	**2758**	**74**	**149**
HK7IMB	"	299,814	510	69	145
HK3MAE	**28**	**591,334**	**1640**	**29**	**93**
HK1KXA	**21**	**460,404**	**1253**	**29**	**97**
HK3JJH	"	325,212	901	30	93
HK3KME	"	297,356	1287	21	58
HK1KWN	"	249,690	1001	22	65
HK6HFY	"	81,810	333	24	66
HK6IKV	"	31,232	408	21	40
HK3LBU	"	19,190	152	20	45
HK5IUI/6	"	780	21	11	15
HJ7MQC	**7**	**15,015**	**90**	**17**	**48**

Easter Island

CE8ZIJ	**14**	**798,805**	**1908**	**36**	**109**

Ecuador

HC2AGT	A	13,312	80	18	34
HC1PF	**28**	**171,534**	**860**	**21**	**48**
HC1OT	**21**	**1,813,395**	**3855**	**35**	**124**
HC2DZ	"	201,638	840	23	59
HC1HT	"	109,872	517	23	61

French Guiana

FY5YE	**A**	**9,003,728**	**5722**	**123**	**413**

Guyana

8R1RPN	**3.8**	**231,822**	**970**	**15**	**66**

Paraguay

ZP5ZR	**A**	**126,840**	**397**	**76**	**119**

Peru

OA4ZV	**A**	**2,741,160**	**1989**	**105**	**213**

Trinidad & Tobago

9Y4TT	**A**	**10,370,962**	**6412**	**136**	**417**
			(Opr. NO4I)		

Uruguay

CW4B	**A**	**40,369**	**226**	**26**	**47**
CX4HS	**28**	**1,326,894**	**3219**	**30**	**109**
CW2A	"	876,990	2418	27	96
CX6ABR	"	84,303	511	20	37
CX5AE	"	3,996	39	16	21
CX4SB	"	924	17	10	12
CW4C	**21**	**2,266,308**	**5422**	**38**	**139**
CX7BY	"	1,156,159	2422	39	124
CW8B	**14**	**983,400**	**2113**	**38**	**122**
CX8CG	"	250,728	933	31	62

Venezuela

YV1DWQ	**A**	**1,262,679**	**1740**	**78**	**171**
YV3BKC	"	590,990	941	64	162
YV5JBI	"	376,476	608	73	156
YV5KKG	"	134,931	417	49	74
YW6W	"	30,057	233	23	20
YV6PM	**28**	**416,864**	**1282**	**27**	**85**
YV7QP	"	31,584	225	19	29
YY1C	**21**	**434,175**	**1411**	**28**	**77**
YV6DNP	"	244,196	1037	24	58
YW1A	**14**	**1,540,170**	**3298**	**36**	**121**
			(Opr. YV1DIG)		

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1AR	**4,531,168**	**2282**	**153**	**535**
K1TO	**2,400,018**	**1573**	**126**	**412**
KA1GG	2,134,410	1634	113	342
KY1H	1,839,606	1298	122	392
K1RX	1,169,432	1083	89	299
W1RR	1,008,852	815	109	337
KQ1F	677,614	609	106	300
NJ1F	658,068	674	107	259
AK1L	471,420	518	91	233
N1AU	439,098	515	86	223
W1PH	389,059	451	88	225
KT1O	334,750	494	76	174
WB1CNM	250,396	370	63	173
KA1CI	240,084	364	67	167
W1GG	160,310	263	69	161
K1ST	146,073	256	70	149
KA1KPH	61,513	166	49	88
W1AQ	8,820	62	22	38
N2RM	**4,344,639**	**2275**	**145**	**518**
W2RQ	2,978,604	1866	134	424
K5NA/2	2,151,765	1398	137	430
N2MG	2,119,754	1511	118	376
WB2ULJ	2,046,681	1550	123	336
NF2L	1,091,284	1082	92	254
N2SS	895,200	799	102	298
K2TD	691,296	657	105	274
W2RR	509,028	551	94	244
W2UI	389,856	532	71	191
K3TUP	**4,513,041**	**2353**	**153**	**510**
K3OO	**3,311,680**	**1889**	**147**	**485**
W3XU	1,852,650	1423	113	337
K3WW	1,614,591	1110	128	389
NE3F	1,439,093	1152	119	338
W3GG	1,111,944	930	112	321
W3AP	809,120	722	124	292
WA3EUL	762,000	689	115	285
KC3NG	692,517	731	96	247
N3ARK	635,784	645	92	262
WB3CAC	517,389	587	88	225
W3YY	513,740	537	99	241
NE3T	468,720	601	80	199
KY3N	401,826	548	57	136
W3NX	303,408	372	91	210
K3NZ	289,408	445	65	159
W3KV	289,142	392	81	185
N3RW	226,058	347	74	167
W3KWH	210,370	385	52	141
N3UN	80,960	162	62	122
K3UEI	47,415	128	55	90
WA3IJZ	30,488	197	41	101
N4WW	**4,288,284**	**2413**	**151**	**512**
N4ZC	3,705,794	1865	162	544
N4RJ	3,503,291	1940	162	509
K4CEF	807,594	625	138	341
W3HHG/4	771,768	697	113	284
N4KG	445,974	574	95	216
W8CNL/4	425,040	466	89	233
W4PRO	358,280	501	80	185
WI4R	316,356	494	76	170
N4HOH	294,810	344	100	210
W4MGX	257,280	367	67	189
N4TL	206,658	312	88	170
WØYVA/4	177,278	246	87	187
AA4DO	168,038	226	93	188
NV4O	69,552	173	57	104
W4GTS	8,036	78	35	51
WM5G	**3,111,996**	**1746**	**165**	**487**
W5WMU	2,828,020	1718	140	456
KC5DX	1,287,341	1103	129	278
K9MK/5	1,216,152	988	131	325
K5RVK	880,875	845	105	270
WB5E	587,200	713	105	215
W5EHM	169,736	332	70	126
W6TMD	**2,097,677**	**1712**	**135**	**296**
K6ZM	**2,006,368**	**1909**	**122**	**249**
W6BIP	**513,156**	**645**	**107**	**191**
WB6OKK	**505,223**	**662**	**89**	**174**
W6KCB	**447,169**	**652**	**84**	**155**
KE6WL	**378,561**	**525**	**93**	**164**
N6CCL	**350,488**	**585**	**82**	**145**
KE6ZE	**314,550**	**501**	**80**	**145**
WV6N	**286,602**	**464**	**77**	**145**
KG6LF	**201,252**	**406**	**71**	**115**
N6OU	**122,949**	**271**	**66**	**106**
K6EV	**118,252**	**238**	**72**	**118**
W6ERS	**5,520**	**41**	**22**	**26**
W7EJ	**2,803,617**	**2093**	**139**	**314**
KC7V	1,802,188	1580	134	303
NK7U	1,118,880	1268	112	224
N7RO	642,868	675	114	232
NO7F	233,044	440	77	126
K8CC	**2,403,236**	**1588**	**143**	**423**
N8CXX	2,334,548	1466	141	421
WA8DXG	2,159,492	1402	138	416
W8SJU	722,107	721	105	242
W9RE	**2,427,892**	**1514**	**142**	**429**
NB9C	623,808	672	95	247
KD9ST	464,056	522	105	239
W9CA	70,560	171	41	103
KB8G	**1,361,304**	**998**	**144**	**360**
KF8H	758,016	718	115	269
W8EJ	640,500	689	107	243
KR8B	531,255	590	102	229
K8HPY	393,576	511	89	187
W8XK	305,388	379	100	206
K8GAS	187,860	339	73	129
KB8KK	93,975	217	65	114

Barbados

8P9HR	**9,993,160**	**6781**	**143**	**477**

Bermuda

DF9ZP/VP9	**4,138,376**	**4302**	**107**	**300**

Canada

VE1DH	**3,498,297**	**3483**	**123**	**344**
VE5GF	**647,109**	**1102**	**89**	**154**
VE3UOT	**524,955**	**974**	**77**	**160**
VE1IDX	496,752	942	64	173
VE3SPC	138,919	292	50	123
VE4SI	**109,500**	**381**	**51**	**95**
VE2VIP	72,924	301	35	68

Cayman Islands

ZF1KK/9	**5,605,984**	**5325**	**131**	**347**

Grenada

KN5X/J3	**2,765,900**	**3799**	**92**	**248**

Haiti

HH2MC	**3,702,025**	**4,569**	**108**	**265**

Mexico

XE2GKG	**307,428**	**1125**	**59**	**73**

Puerto Rico

KP4BZ	**9,621,252**	**6758**	**131**	**481**

St. Maarten

PJ8J	**6,953,920**	**6061**	**127**	**369**

U. S. Virgin Islands

KP2A	**10,693,238**	**6991**	**152**	**494**

AFRICA

Madeira Islands

CQ9MI	**5,095,208**	**4024**	**103**	**321**

ASIA

British Sovereign Area of Cyprus

ZC4DX	**7,098,784**	**4699**	**126**	**410**

China

BY5QA	**472,934**	**1812**	**64**	**102**
BY5RA	395,764	1827	55	108
BY4SZ	279,868	1463	64	84

Japan

JE2YRD	**2,890,931**	**2179**	**147**	**314**
JA3YKC	**2,703,140**	**1996**	**146**	**338**
JA1YFG	**2,361,609**	**1969**	**134**	**289**
JA7YAA	**1,868,823**	**1715**	**122**	**265**
JA8YAK	**1,776,620**	**1518**	**133**	**288**
JH1YDT	1,611,414	1518	128	250
JE6ZIH	**1,350,264**	**1275**	**126**	**255**
JA6YCU	1,178,868	1155	125	247
JE3ZFS	1,069,290	1200	115	212
JA9YAA	**336,777**	**621**	**78**	**125**
JA7YAF	260,010	466	85	129
JA2YDC	186,648	426	69	99
JA3YDS	146,775	522	32	71
JA3YDH	2,223	27	14	25

Korea

HL9UB	**984,924**	**1699**	**87**	**164**
HL9NAV	97,598	520	35	58

Mongolia

JT1KAI	**74,313**	**715**	**29**	**40**

Thailand

HS8A	**2,236,820**	**2899**	**119**	**269**

U.S.S.R.

Armenia

UG7GWS	**241,960**	**516**	**51**	**133**

DX THAT STANDS OUT FROM THE CROWD

A3

10, 15, 20,*40 meters

Whether busting pileups, rag chewing or hunting rare DX, the A3 stands out from the crowd with the perfect combination of easy assembly, the right size, rugged durability and great performance.

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OUTSTANDING A3 FEATURES

- Gain 8dBd, F/B Ratio 25 dB
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- Average Band width 500 KHz
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- Longest Element 27ft
- Wind Surface Area 4.36ft
- Turning Radius 15.5ft

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THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

Your A3 is super. I easily worked 3Y2GV last January, in spite of much QRM with 100 watts... Ken VE1QN

Have had great results with the A3. Keep up the good work, especially the packaging. All parts were there... Chris KF6VF

Nicely made, goes together well, good instructions, low SWR, fun to use! Very well done!... Diehl N5AQ

My four-year-old A3 has survived wind and ice storms that have leveled trees and houses. Its broadband performance exceeds your specifications... Bruce NU0R

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CIRCLE 141 ON READER SERVICE CARD

Asiatic Russia

UZ9QWM	**1,282,710**	**1166**	**88**	**211**
UZ9XXM	1,105,500	1434	78	222
UZ9YXO	769,626	1286	77	176
UZ9OXI	679,626	1511	75	173
UZ9CYP	580,292	921	69	170
UZ9OWD	125,880	1065	69	89
UZ9CZZ	83,148	420	44	79
UZ9SWR	63,072	328	20	52
UZ9OWV	18,104	95	25	48
UZ0AXX	**3,674,048**	**3204**	**154**	**402**
UZ0CWA	2,340,352	3075	118	258
UZ0QWT	906,840	1805	85	179
UZ0JWA	419,832	920	72	124

Georgia

UF7QWW	**204,125**	**645**	**31**	**94**
UF7FWM	70,613	267	28	89

Kazakh

UL8LYA	**4,507,448**	**3420**	**135**	**371**
UL8LWA	1,492,800	1887	90	230
UL8BWW	873,908	1114	96	226
UL8DZZ	664,412	1182	77	167
RL9PZZ	560,176	987	70	153
UL8LWZ	436,943	788	75	172
UL8CWW	249,116	584	45	119

Kirghiz

UM9MWA	**520,574**	**921**	**78**	**173**

Tadzhik

UJ9JWA	**1,085,732**	**1762**	**80**	**204**

Turkoman

UH9AWE	**126,720**	**450**	**40**	**69**

Uzbek

UI9AWH	**1,773,593**	**2407**	**72**	**217**

EUROPE

Aaland Islands

OH2BEJ/OH0	**155,610**	**293**	**45**	**145**

Andorra

C30W	**4,599,644**	**4009**	**130**	**438**

Austria

OE3GEA/3	**141,728**	**655**	**43**	**129**

Balearic Islands

ED6BCT	**2,820,694**	**2882**	**120**	**401**

Bulgaria

LZ9A	**7,858,944**	**4750**	**170**	**588**
LZ2KPD	1,342,627	1665	109	342
LZ2KSQ	921,360	1432	91	258
LZ1KVZ	688,324	1294	87	277
LZ1KBG	391,126	593	66	192
LZ1KBL	389,400	857	80	220
LZ1KRB	331,824	830	70	178
LZ1KVF	217,674	489	56	118
LZ1KAP	85,065	232	54	105
LZ1WL	77,778	311	46	128
LZ1KHB	74,002	325	40	123
LZ1KWT	17,813	138	30	46

Corsica

TK5UC	**3,489,255**	**4286**	**115**	**380**

Czechoslovakia

OK7MM	**6,390,300**	**4246**	**160**	**540**
OK5R	**6,173,352**	**3893**	**156**	**560**
OK3KCM	1,855,203	1801	133	396
OK2RAB	962,115	1460	98	287
OK1ORA	256,150	731	62	173
OK1KNR	105,600	472	41	124
OK2PBG	9,312	106	19	49
OK2KMR	4,422	80	11	22
OK2KYD	3,078	48	13	25
OK1KCF	464	31	3	13

Denmark

OZ1KWC	**435,784**	**889**	**66**	**178**

England

G3NAS	**2,536,434**	**2455**	**119**	**367**
G3UOA	900,990	1275	94	261
G4XOM	91,770	372	44	94
G4FKG	34,643	249	24	77

Federal Republic of Germany

DF4RD	**2,130,444**	**1845**	**129**	**429**
DL0JK	1,697,228	2028	119	395
DJ1OJ	1,348,853	1314	122	395
DL0WH	1,318,044	1471	107	319
DL1MAJ	1,206,252	1147	114	372
DL3MAA	1,099,380	1437	101	337
DK6WL	1,081,574	1380	106	336
DL2DBH	338,310	499	84	231
DK0KU	271,830	1105	72	174
DL0UM	266,446	616	67	187
DL0ER	150,654	431	61	150
DF0EB	51,150	358	26	67
DL5RBR	34,320	175	32	78
DK2WV	9,120	54	34	46

Finland

OF5NQ	**4,005,122**	**3027**	**149**	**465**
OH7AB	3,190,100	2575	146	429
OH4MI	1,232,746	1775	94	243
OH7AI	923,623	1250	97	282

France

F6EXV	**4,265,412**	**3275**	**139**	**434**
FF6KAW	1,589,840	2347	93	241
FD1LGE	928,290	1543	79	212
FE6DRP	86,736	451	32	72

German Democratic Republic

Y22YD	**898,144**	**1412**	**107**	**309**
Y22EK	543,167	822	95	264
Y41CH	280,125	719	71	178
Y49CF	129,038	527	47	135
Y31CB	1,107	33	10	17

Greece

SV0FE	**311,754**	**973**	**53**	**170**

Hungary

HG6N	**5,826,276**	**3922**	**153**	**504**
HG7B	**5,710,738**	**4202**	**148**	**490**
HG5A	5,385,900	3953	146	504
HG9R	5,039,308	3892	150	486
HG1S	3,971,376	3726	132	390
HG8Q	2,871,269	2814	138	441
HA5KDB	2,479,833	2618	128	383
HA0KLE	1,930,410	2587	116	329
HG6V	1,774,110	2287	96	294
HA5KKC	1,600,560	2009	118	314
HA1KRR	1,124,280	1651	88	259
HA6KNX	288,694	762	59	179
HA6KQD	78,732	264	50	112

Ireland

EI2CA	**917,963**	**1634**	**81**	**271**
EI4N	47,082	251	30	84

Italy

I4EAT	**6,865,768**	**3883**	**159**	**569**
IK4CFV	5,925,744	3935	156	482
IU2HM	3,276,720	3239	130	362
I8CZW	1,768,599	1857	120	349
I5OVS	810,240	1074	94	290
IK4BWC	143,880	304	63	157

Netherlands

PA0KHS	**1,089,623**	**1630**	**97**	**270**
PI4TTC	68,968	328	39	109

Northern Ireland

GI4MWA	52,635	269	28	93

Norway

LA4O	**959,371**	**1677**	**78**	**265**

Poland

SP6PAZ	**2,295,183**	**2299**	**120**	**351**
SP5PBE	1,340,900	1582	122	338
SP9KJT	1,015,856	1532	95	251
SP8KBM	463,584	769	94	258
SP9PEY	293,216	702	72	200
SP2PMO	227,640	406	73	198
SP2ZHB/2	207,633	777	47	154
SP1PBW	196,736	506	62	170
SP5ZIM	154,008	427	57	150
SP5PSL	142,137	597	37	116
SP9PRO	88,854	618	76	193
SP9PDJ/9	55,125	330	35	112
SP7KWW	40,480	202	35	75
SP3PLD	35,784	222	34	92
SP9PDG	23,175	155	28	75
SP9KJM	11,180	276	8	35
SP3KPN	6,039	80	21	40
SP6PAX	4,606	78	12	37

Spain

ED3OD	**1,843,077**	**2591**	**97**	**282**
EA3MM	1,503,780	2000	97	256
EA3APS	786,646	1136	94	228
ED7RKC	545,436	853	83	244

Sweden

SM5AZU	44,415	187	45	96

Switzerland

HB9BLQ	**1,681,650**	**2167**	**123**	**327**
HB9GT	620,984	793	88	276
HB9AJ	514,257	1258	65	192
HB9FR	395,241	594	87	232

Wales

GW8GT	**3,710,162**	**2898**	**132**	**391**

Yugoslavia

YU3AI	**3,302,884**	**3104**	**116**	**378**
YT2R	2,613,694	2647	123	403
4N2D	1,015,308	1543	84	222
YZ6G	652,182	1750	65	228
YT4M	451,770	1036	79	251
YT5R	431,844	904	80	238
YU4FDE	329,474	714	61	196
4N4D	90,988	286	48	124

U.S.S.R.

Byelo Russia

UC1AWC	**625,988**	**1168**	**97**	**257**
UC1WWO	291,491	786	64	177
UC1WWF	89,680	347	33	85
UC1AWE	19,240	208	20	38
UC1AWU	4,550	80	12	14

Estonia

UR1RWX	**3,508,652**	**2776**	**144**	**452**
UR1RYO	132,254	565	50	128
UR1RWQ	11,906	172	16	42
UR1RYA	4,687	82	14	29

European Russia

RW4LYL	**1,778,400**	**2094**	**124**	**344**
UZ6LWZ	1,044,585	1105	136	365
UZ4PZP	996,216	1727	80	229
UZ4WWB	807,085	1561	80	215
UZ1OWZ	687,218	1209	77	180
UZ4AWB	421,575	780	76	199
UZ1CXF	299,700	1033	50	135
UZ3DXW	293,656	676	75	209
UZ3DXH	270,084	461	60	147
UZ6XWC	228,456	782	51	120
UZ6HXK	119,166	1393	30	71
RZ4HWW	116,610	333	50	119
RZ6AWH	1,131	19	12	17

Kaliningrad

UZ2FWZ	868	31	11	17

Latvia

UQ1GWW	**3,908,750**	**3160**	**142**	**448**
UQ1GZW	**3,012,363**	**2852**	**130**	**419**
UQ1GXJ	26,488	398	12	32

Lithuania

UP1BWW	**2,530,672**	**2300**	**134**	**437**
UP1BZG	1,810,767	1919	122	367
UP1BZO	1,662,090	1912	132	378
UP1BYC	1,203,889	1605	98	293
UP1BXR	1,149,736	1638	104	315
UP1BYK	548,042	1201	83	236
UP1BZQ	185,409	561	43	146
UP1BZL	73,884	431	31	110

Moldavia

UO4OWN	**244,647**	**699**	**60**	**161**

Ukraine

UB4CWW	**1,903,850**	**2194**	**127**	**378**
UB4MWA	1,686,444	1793	121	328
UB3IWA	1,395,485	1484	130	325
UB4EWG	1,085,864	1464	112	312
UB4IZA	819,614	1274	94	347
UB4EYJ	484,710	938	79	223
UB4WZA	480,762	840	85	222
UB4XWB	320,324	681	72	220
UB4TWL	276,074	537	57	166
UB4LZA	182,115	563	53	150
UB4QXU	56,414	421	35	78
UB4EZI	54,048	241	28	68
UB4WXZ	44,100	270	31	74
UB4MWU	33,814	219	28	78
UB4SWM	32,786	288	21	76
UB4MXX	4,130	52	12	23

OCEANIA

Australia

VK2HS/P	22,214	158	23	35

Marshall Islands

KX6DC	**2,203,884**	**2308**	**128**	**220**

Midway Island

KH2F/KH4	**4,060,490**	**4646**	**117**	**184**

Philippines

DX1A	**2,489,249**	**3227**	**91**	**168**
DX9HT	1,273,038	1765	83	164
DX1CW	483,786	1253	68	118

SOUTH AMERICA

Argentina

AZ4F	**9,807,275**	**6120**	**146**	**399**
LU2F	5,336,013	4413	114	297
LU1VZ	4,325,904	3713	120	276
LU1DNQ	2,482,716	2703	101	212
LU7DID	1,935,960	2566	83	177
L2D	1,713,169	2579	70	157

Chile

CE4TA	**3,303,872**	**3230**	**112**	**240**
CE2AA	2,717,835	3181	94	201
CE6OS	2,493,147	2809	94	213

Colombia

HK4R	**4,333,131**	**454**	**112**	**251**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

United States

W3LPL	**9,529,968**	**4221**	**167**	**624**
N5AU	**7,871,630**	**3711**	**173**	**582**
NR5M	**7,253,136**	**3693**	**167**	**556**
N6ND	**5,155,920**	**3381**	**157**	**401**
K2TR	**3,828,510**	**2199**	**143**	**487**
K4VX/0	**3,536,345**	**1985**	**154**	**501**
K1NG	**3,197,425**	**1953**	**143**	**462**
W3GM	2,665,023	1593	140	433
KT9M	**1,703,264**	**1369**	**129**	**367**
K3ZZ	1,617,490	1207	128	362
N3LR	1,282,776	1015	116	336
K4JPD	**1,118,958**	**8449**	**135**	**367**
KM1C	799,470	761	98	280
K6XO	737,856	902	101	187
WA6AHF	342,272	545	83	141
NK1F	315,520	399	83	207
W6AB	310,422	619	92	174

Alaska

KL7Y	**4,535,608**	**4411**	**130**	**277**
KL7RA	**3,021,030**	**3784**	**104**	**231**

Bahamas Islands

W8KKF /C6A	**1,857,114**	**3772**	**75**	**163**

Bermuda

VP9AD	**23,236,827**	**13040**	**165**	**588**

Canada

VE7ZZZ	**1,670,485**	**2584**	**113**	**192**

St. Kitts

V47Z	**7,084,800**	**7975**	**99**	**301**

ASIA

Anadaman and Nicobar Islands

VU4GDG	**3,626,624**	**3604**	**131**	**333**

Japan

JA2YKA	**6,709,878**	**4176**	**161**	**406**
JA3YBF	**4,161,246**	**3132**	**148**	**326**
JA9YBA	**3,433,936**	**2777**	**134**	**302**
JA7YFB	**3,408,808**	**2,680**	**142**	**307**
JA7YRR	3,331,776	2534	145	323
JA1YXP	**815,670**	**1080**	**106**	**159**
JA2YEF	702,240	861	105	203
JA1YAG	546,210	842	85	153
JH8YCT	**420,864**	**1042**	**81**	**111**
JA3YQD	315,072	576	73	119
JR1ZTT	93,168	250	56	88
JA7YCQ	56,925	180	52	63

EUROPE

Belgium

ON6NL	**2,001,230**	**2096**	**116**	**390**

Denmark

OZ4HAM	35,400	207	36	84

Federal Republic of Germany

DL0VA	**824,228**	**1054**	**96**	**295**

Liechtenstein

HB0 /DL8OH	**7,599,620**	**6866**	**144**	**521**
HB0/DF1JC	3,078,350	2998	114	436

Luxembourg

LX5ORL	**2,326,912**	**3293**	**103**	**345**

Netherlands

PI4DEC	**1,419,078**	**3348**	**78**	**248**

Spain

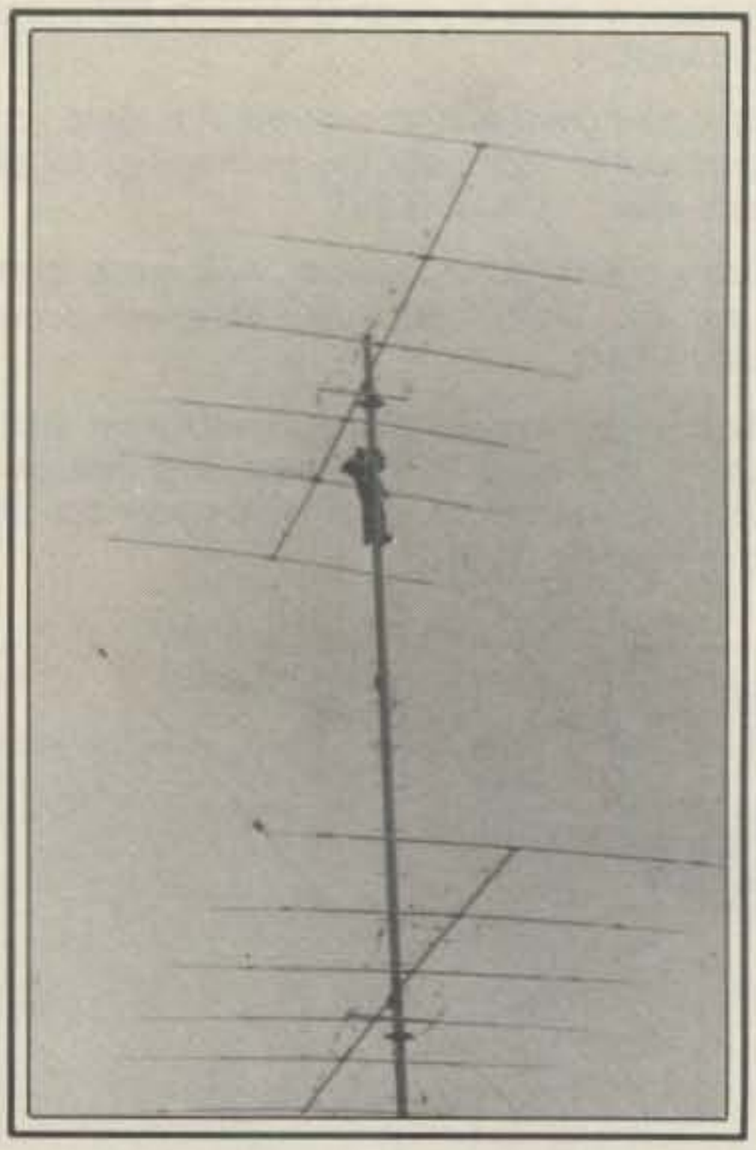
EA1DOK	**320,320**	**635**	**77**	**203**

Svalbard Island

JW5E	**1,070,454**	**1762**	**75**	**156**

Yugoslavia

YZ1U	**4,788,156**	**4747**	**149**	**473**



This impressive 6 over 6 stacked Yagi explains the thunder behind RL8PYL on 15 meters. Notice UL7PCZ making the adjustments towerside.

R4

NO GROUND RADIAL VERTICAL

10, 12, 15, 20 METERS

The R4 is a second generation electrical half wavelength vertical antenna. Developed from the very successful R3 it has many new design features for easier assembly and operation plus improved performance.

The half wave design gives optimum current distribution for best low angle radiation and excellent DX communications. R4 brings high performance antenna features to those living in apartments, condominiums or on small city lots. Even if you have plenty of space, R4's combination of neat appearance and DX capability make it ideal for your ham station.

The new R4 design has a broadband solid state impedance matching network for full coverage of all four bands. Frequency selection is completely automatic. There are no moving parts or remote tuner. The only connection required to the antenna is your 50 ohm coax. The unique counterpoise ground uses four 48" long by .100" diameter stainless steel rods. This system gives excellent RF decoupling for mounting in any location from ground level to roof top. Make R4 your compact choice for a full-performance no-compromise HF vertical antenna.

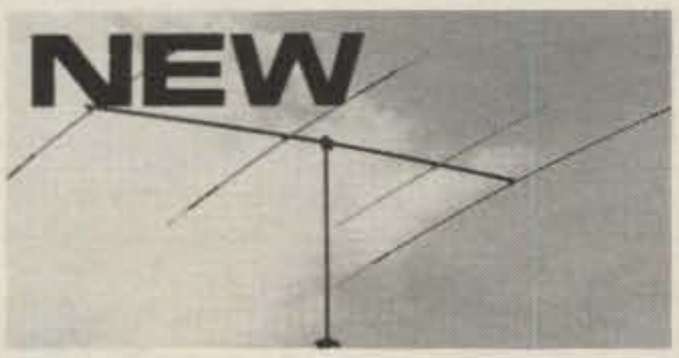
R4 FEATURES

Frequency: 10, 12, 15, 20 meters
Gain ref ¼λ whip: 3dB
Low angle radiation
360° radiation pattern
Broadband impedance matching
Hi Q frequency selecting traps
SWR: 1.2-1 typical
2:1 SWR bandwidth: 10M-1.7 MHz 12M-100 KHz
15M-450 KHz 20M-350 KHz
Power handling watts: 1800 PEP
Connector: UHF Female SO-239
Self-supporting
Height: 18 ft. 5.5 M
Weight: 8 lbs. 3.7 Kg
Mast mount, in (cm): Min.-Max. 1.5 (3.8)—1.75 (4.44)

12 METER 4 ELEMENT SKYWALKER

Enjoy the most popular WARC band. Whether your interest is friendly rag chewing or operating awards and DX-ing, the Cushcraft 12-4CD is designed to punch your signal through on this active new band.

Forward Gain	10.0 dBd
Front to Back Ratio	>30 dB
SWR	1.2:1
Boom Length	18 ft (5.5 m)
Longest Element	19 ft 10.5 in (6.1 m)
Turning Radius	15 ft (4.6 m)
Wind Surface Area	4 ft² (.46m²)
Weight	21 lb (9.5 kg)



A4S THE PREMIUM 10-15-20 METER BEAM

The A4S is the true high performance tribander. Precisely tuned high power traps, carefully selected element lengths and proper spacing combine to make A4S the preferred antenna. It has pinned boom sections and formed aluminum brackets to keep elements straight under all conditions. All hardware and clamps are stainless steel.

Forward Gain	8.9 dBd
Front to Back Ratio	25 dB
SWR	1.2:1
Boom Length	18 ft (5.5 m)
Longest Element	31 ft 4.5 in (9.6 m)
Turning Radius	18 ft (5.5 m)
Wind Surface Area	5.5 ft² (.51 m²)
Weight	37 lb (16.8 kg)

cushcraft
CORPORATION
THE ANTENNA COMPANY

48 PERIMETER ROAD, MANCHESTER, NH 03108 USA
603-627-7877 • FAX 603-627-1764 • TELEX 4949472

CIRCLE 93 ON READER SERVICE CARD

U.S.S.R.

Lithuania

UP7A	10,717,356	7623	170	584

OCEANIA

Hawaii

KH6XX	13,305,408	8692	166	358

Indonesia

YB8WR	7,481,819	4857	149	378

New Caledonia

FK/JH4RHF	2,915,822	3858	98	161

Philippines

DX1DBT	1,440,072	2213	80	146

SOUTH AMERICA

Aruba

P4BV	34,073,237	15602	160	583

Galapagos Islands

HC8DX	33,663,000	15537	167	568

Netherlands West Indies

PJ1B	35,815,586	15225	170	627

QRP

PJ2FR	A	3,171,166	3212	100	234 (Opr. K7SS)
VE1CBF	"	588,555	997	63	198
4M3A	"	562,875	721	83	202
N3RS	"	414,201	501	90	213
LZ2QV	"	290,166	675	82	195
UQ2GKL	"	272,000	648	64	208
K3WS	"	247,710	396	71	159
N1AFC	"	210,546	377	55	134
FD1BEG	"	203,796	486	60	162
W8KEA	"	174,086	337	76	117
KZ5Q	"	129,614	224	77	152
RT4UB	"	95,816	246	61	142
JM1WZP	"	79,920	218	58	77
OH5NHI	"	78,948	310	47	153
OK1DKS	"	72,618	326	38	109
JH4UYB	"	72,020	219	53	77
WB6JHC	"	59,170	292	43	54 (Opr. 4X1IF)
UB5WAD	"	49,696	256	41	106
EA6SK	"	43,942	192	37	90
JH8DEH	"	34,500	120	51	64
EA3DNC	"	31,720	213	29	93
IK8CPS	"	29,700	173	32	78
YV1ELM	"	24,560	129	34	46
N6OJ	"	20,930	106	28	42
VK3RF	"	17,430	94	31	39
VE1NH	"	17,424	111	25	47
KA5PVP	"	13,884	87	32	47
W6YVK	"	12,826	86	24	29
W6LC	"	12,144	72	30	39
UB5YDX	"	6,014	66	18	44
Y25MO	"	5,050	103	8	42
UZ9SXT	"	3,528	50	13	29
KH6CP/1	"	3,321	38	15	26
UP2BB	"	2,584	61	11	27
YO5BWO /6	"	1,353	41	8	25
YO4US	"	714	34	6	15
ZS6PT	28	48,544	204	26	56
EA4CFN	"	41,208	183	24	77
JR3RWB	"	40,290	205	27	52
EA3EGV	"	10,614	75	18	40
JH7XGN	"	9,568	84	17	29
WA8VBW	"	7,875	82	12	23
HG9MBC	"	5,280	63	15	33
UR2RCD	"	4,140	75	11	25
SP4GFG	"	2,760	32	15	25
UB5FDM	"	2,720	64	7	25
YO2AQB	"	594	15	18	33
UG /UB4WZZ	21	219,744	846	30	82
JG6KZH	"	53,592	251	29	55
EA3FBO	"	49,728	237	25	91
RB5EG	"	35,370	219	26	64
UA8SG	"	29,326	243	18	44
JO1SVX	"	29,016	147	27	45
JR8OGB	"	28,487	182	23	38
W6CN	"	24,072	146	20	39
UR2CR	"	9,372	110	15	29
UA3DPX	"	1,881	40	10	23
WB8B	"	1,066	16	13	13
JA2JSF	14	64,314	293	26	55
ZL1BIL	"	42,850	185	25	60
UB5IRN	"	23,644	257	16	52
YU1KFG	"	22,995	283	12	51
OZ3PE	"	3,332	68	11	23
YO5BQ	"	1,650	47	7	23
G3CWL/A	"	1,360	43	6	14
UD6DFF	7	3,990	53	9	21
YO3FGP	"	3,977	77	8	33
YO4AEQ	3.8	14,985	141	20	61
OK1JJF	"	7,800	209	4	35
UB5AEO	"	4,060	112	5	30
Y24SB	"	3,876	99	6	32
Y28UN	"	3,384	95	6	30
Y22XF	"	240	17	3	12
UB5ZHQ	1.8	6,512	131	7	37

CHECK LOGS

Our thanks to the following stations who submitted check logs: A22GV, CE1HBI, CE1LGD, CR6YH, CX5AE, DL6EDD, EA1BDB, EA1CYU, EA1DXS, EA1EMO, EA1YY, EA2BUF, EA3DBO, EA3DVL, EA3DXO, EA3FIM, EA3JC, EA4DBN, EA4KK, EA5EGT, EA5FKI, EA7AZA, EA7BVI, EA7CDD, EA7DHF, EA7DHK, EA7DOH, EA7DUD, EA7DVY, EA7DZL, EA7FZR, EA7GBD, EA7GFG, EA8AON, EA8AZM, EA9HE, F11COA, F11CWX, FB1MNC, FE6FHZ, G4ZXC, HA8HW, HC1AK, HC1HT, HG7JBN, HK1HHX, HK3BFU, HK3HFQ, HK3MAE, HK3MAH, HK3NTI, HK5IUI/6, HL9NAV, IT9BCC, JE4MYY, K6FM, K6ICS, K6JG, KA6V/7, KA7YFY, KA8OWU, KA8YOR, KC4USV, LA1WCA, LA2LV, LA4NL, LA4TG, LA6BBA, LA6PBA, LA9LO, LU1YU/D, LU2HAM, LU6AJA, LZ1GD, LZ1HX, LZ1JH, LZ1OS, LZ2CM, LZ2SB, N7JB, N8AXA, OH1PU, OH1XX, OH2FQ, OH2MM/EA8, OH2NOS, OH3HS, OH5MX, OH5PT, OK1MKU, OK2ON, OK2PZZ, OK3CSQ, OK3KAG, ON5FV, OZ1ACB, OZ1BLZ, OZ1BUR, OZ1FNX, OZ1IOC/A, OZ5ESB, OZ8XW, PA3AAV, PA3EHJ, PA0RWS, PA0UV, PP5IA, PT7VB, PT9ZE, PY1IH, PY1VB, PY2ED, PY2KP, PY2WR, PY5FB, PY6WT, RA1QE, RA3AR, RA3DIL, RA3DKE, RA3DR, RA3VR, RA3VV, RA3VX, RA3YA, RA4NAI, RA4NBG, RA6LPY, RA9AE, RA9FA, RA0FA, RB5HM, RO5OW, RV6AB, RV6AF, RW3AG, RW3DM, RW0AA, RZ3DM, RZ6AWP, SM3QJ, SM4AWC, SM4SET, SM5CGJ, SM5FBL, SM6CDN, SM6PED, SM6PVB, SM7CNA, SM8COP, SM8CSX, SM8MC, SP1DMD, SP2DKI, SP2GAQ, SP2HWW, SP2UUU, SP3BYZ, SP3CB, SP3DFB, SP3GVX, SP3NYC, SP4AS, SP4BY, SP4CQU, SP4HKN, SP5ATO, SP5CWQ, SP5DIR, SP5ENA, SP5GMM, SP5ILO, SP5TT, SP6FAF, SP6FER, SP6OWA, SP6PDT, SP6PZV, SP7DRN, SP7EX, SP7FQG, SP7LHX, SP7NJX, SP8BJH, SP8JMA, SP8NEJ, SP8OBQ, SP8SP, SP9BRP, SP9BXT, SP9CTT, SP9ENV, SP9JPA, SP9MDY, SP9UO, TF6PS, TI2OB, U2PP, UA1CEA, UA2FGA, UA3ACJ, UA3AFG, UA3AHA, UA3DAO, UA3DAT, UA3DNR, UA3DNV, UA3DTT, UA3DUA, UA3EDH, UA3IHY, UA3LCC, UA3NCJ, UA3PB, UA3RAJ, UA3RE, UA3RNJ, UA3TEP, UA3WI, UA4CCC, UA6102356, UA6LCN, UA6LCT, UA6LF, UA6LPQ, UA6YW, UA9AB, UA9ALF, UA9CDO, UA9CFH, UA9CGA, UA9CLZ, UA9OJ, UA9UUD, UA9WD, UA9XFG, UA9XSJ, UA9ZAC, UA0FDX, UA0QCA, UA0QO, UA0SME, UA0SNB, UA0WX, UB4VWA, UB4XWW, UB5EOG, UB5FG, UB5HA, UB5JOO, UB5QGD, UB5UCH, UB5ZHQ, UC1AWZ, UC2LB, UD6DFF, UF6VZ, UG7GWA, UI8BAA, UI9BWE, UL7JZ, UL7YAO, UM803639, UM8MD, UM8MTF, UM8MY, UO5AP, UO5OOW, UO50Q, UP1BWG, UP1BZA, UP2BR, UQ2GA, UQ2GM, UR2REA, UR2RMC, UT4UN, UT5UCK, UV3DF, UV3DFL, UV3MM, UV3NB, UV3QMU, UV6AGF, UV6AY, UV6HP, UW1OR, UW3RR, UW6HS, UW9CL, UW9CM, UW0CW, UY5GG, UZ1AWW, UZ3AWC, UZ3DXW, UZ3PXR, UZ3RXA, UZ3RZZ, UZ3SWW, UZ4CWZ, UZ4FWA, UZ4HWZ, UZ4WWG, UZ6AXF, UZ6AYG, UZ6HXK, UZ6HZH, UZ9CWA, UZ9CYA, UZ0CWC, UZ0QXU, UZ0SWA, VE2FJH, VE2XY, VE3VET, VE7BJN, VE7BXG, VK3DVT, VK5IT, W1MGP, W8CGG, W8URM, WA4VAP, WA7VYJ, WB3CDX, WB9JKI, WD8RJN, WL7AFD, XE1OH, Y21BC, Y21LC, Y22DG, Y22OO, Y22XF/A, Y22YJ, Y23YE, Y24AM, Y24CG, Y24LN/A, Y24MJ, Y24XD, Y24XJ, Y25AH, Y25BL, Y25DA, Y25IJ, Y25TJ/P, Y26JD, Y26NL, Y26SI, Y26SO, Y26XM/A, Y26YM, Y27AL/A, Y27MN/A, Y27YH, Y28AL, Y28GO/A, Y31PE, Y32QD, Y33WJ, Y35RK, Y35XE, Y36QG, Y36SG, Y36XC, Y38VB, Y39ZC/Y39RE, Y41-03-F, Y41SM, Y41YM, Y45RJ, Y48ZF, Y53VL/P, Y53YN/P, Y54TO, Y54UA, Y54WI, Y54WM, Y54YH, Y55TJ, Y55UG, Y56YF, Y66CA, Y67YI, Y72UG, Y75YL, YB8VM, YC2OK, YC8VLZ, YO5BLA, YO5DPA, YO5NU, YO7BSN, YO7LBU, YO7LCC, YO8CEZ, YO8KGS, YU3RU, YU7LL, YURS832, YW6W, YZ6G, ZP5ZR, ZS4KK, ZZ1KF, 4M2NY.

Disqualifications: EA8LS (Excessive Duplicates). JA4FWM (Unverifiable QSOs).

A WELL KEPT SECRET

3002-A Console

2002-A Desk model

The 2002A and 3002A 2 meter VHF power amplifiers from Henry Radio

Both the 2002A and the 3002A operate in the 2 meter band (144-148 MHz), but are also available for frequencies between 100 and 300 MHz. They are biased for linear operation so that they operate for CW, FM, SSB, AM or pulse applications.

The 2002A uses a single Eimac 3CX800A7 ceramic triode offering up to 2000 watts for pulse operation, up to 1200 watts for SSB operation and up to 400 watts for continuous applications.

The 3002A uses a single Eimac 8877 ceramic triode mated to a heavy duty power supply offering full legal power at 2 meters as well as rugged reliable operation in a variety of commercial, industrial and scientific operations.

All of the amplifiers above 100 MHz employ simple reliable and elegant strip-line tank circuits which give unexcelled performance with a minimum number of components. Both models include adjustable input circuits for good input matching to your exciter. Both are also available as rack mounted units.

25 years of producing power amplifiers has made Henry Radio THE amplifier specialists. With 13 models to choose from we offer more amateur bands, more power ranges and a broader price range than anyone else.

HENRY AMPLIFIERS AVAILABLE:

2KD Classic Desk model	3.5-30 MHz	**5K Classic** (Not available to U.S. amateurs)	3.5-30 MHz
2K Classic Console	3.5-30 MHz	**2006-A** Desk model	50-54 MHz
2K Classic X Heavy duty console 3.5-30 MHz		**2002-A** Desk model	144-148 MHz
3K Classic Mk II	3.5-30 MHz	**2002-A** Desk model	220 MHz
3KD Premier Desk model	1.8-30 MHz	**3006-A** Console	50-54 MHz
3K Premier Console	1.8-30 MHz	**3002-A** Console	144-148 MHz

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CIRCLE 120 ON READER SERVICE CARD

The spring BARTG contest provided the opportunity for 4U1UN to be on the air on RTTY. Here's the story of that operation by a group of two-land amateurs.

RTTY From The United Nations

BY JULES L. FREUNDLICH*, W2JGR

There are not many amateur operators who can drive to a separate DXCC country within a half hour's time and put that country on RTTY. So when that opportunity arose, it could not be ignored.

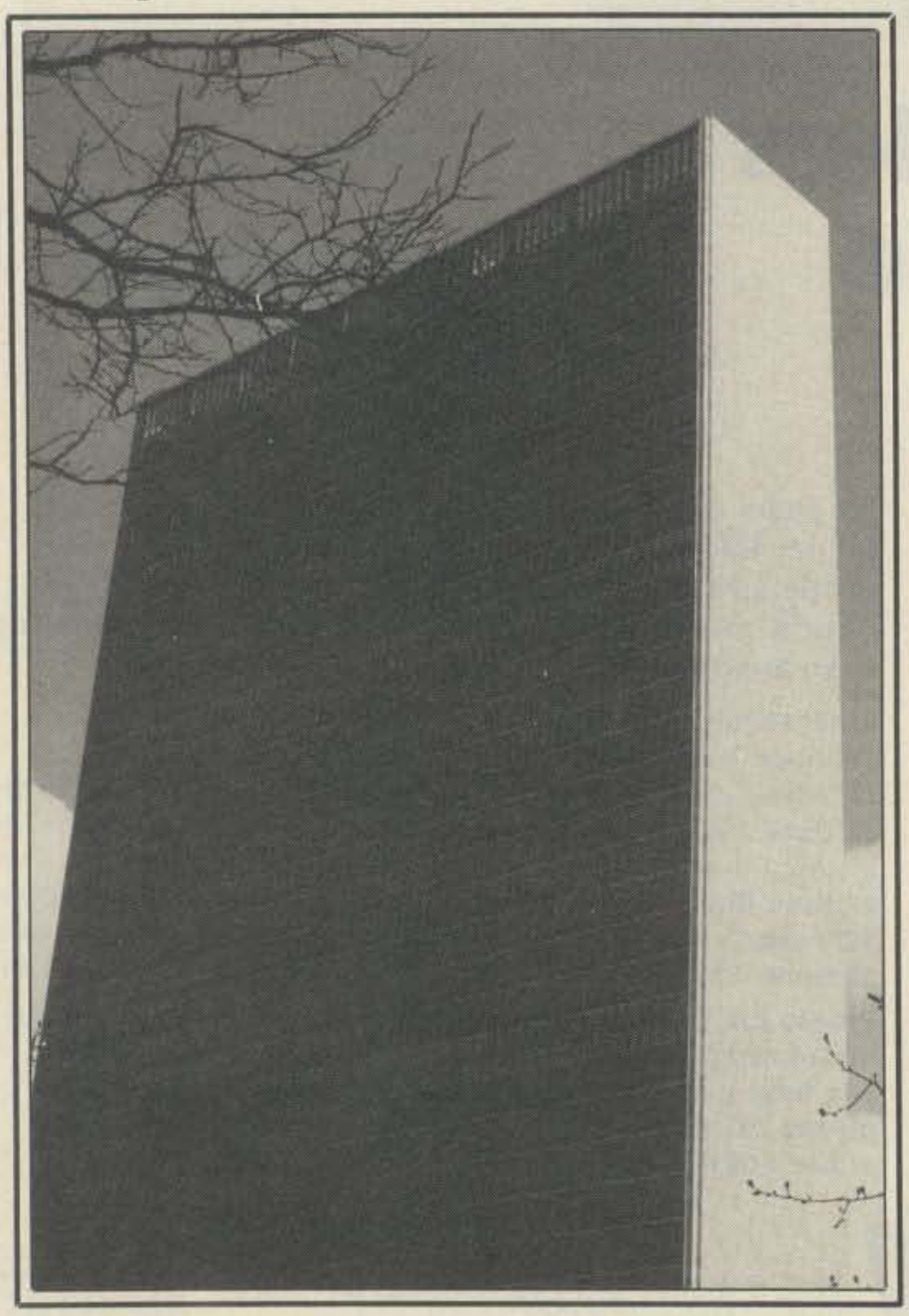
It all started early in 1988 when Allen, N2KW, mentioned to me that he had received many inquiries expressing hope that the United Nations station in New York City, 4U1UN, might again be activated on RTTY. 4U1UN had been intermittently active on this mode during the past several years, but recently it had not been heard. The annual British Amateur Radio Teleprinter Group (BARTG) springtime contest in March seemed like a perfect opportunity to give this country to many stations in a concentrated manner. The BARTG contest is one of the most popular RTTY contests.

*17 Nassau Blvd., Malverne, NY 11565

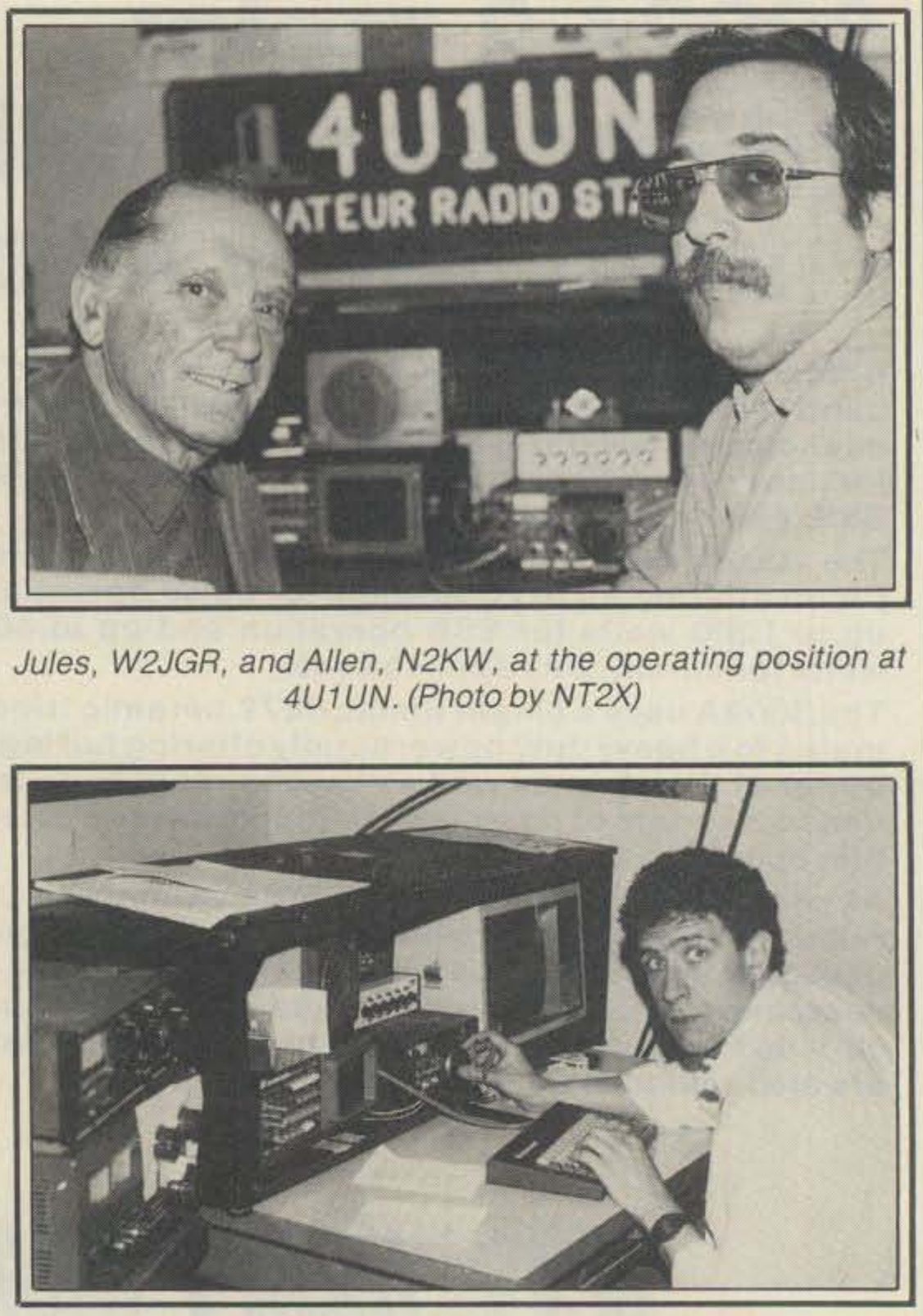
Station and Antennas

Station 4U1UN is located on the 40th (top) floor of the United Nations Secretariat building in midtown New York City. Due to the high winds prevalent at this altitude, it has never been feasible to install a beam antenna. The antenna complement consists of a Butternut vertical for 10, 15, and 20 meters, and an assortment of wire antennas for 40, 80, and 160 meters. The antenna farm also includes a 20 meter dipole for the Northern California DX Foundation (NCDXF) beacon, which operates every ten minutes for one minute around the clock on 14.100 MHz.

Investigation revealed that the station's Kenwood TS-940 transceiver was

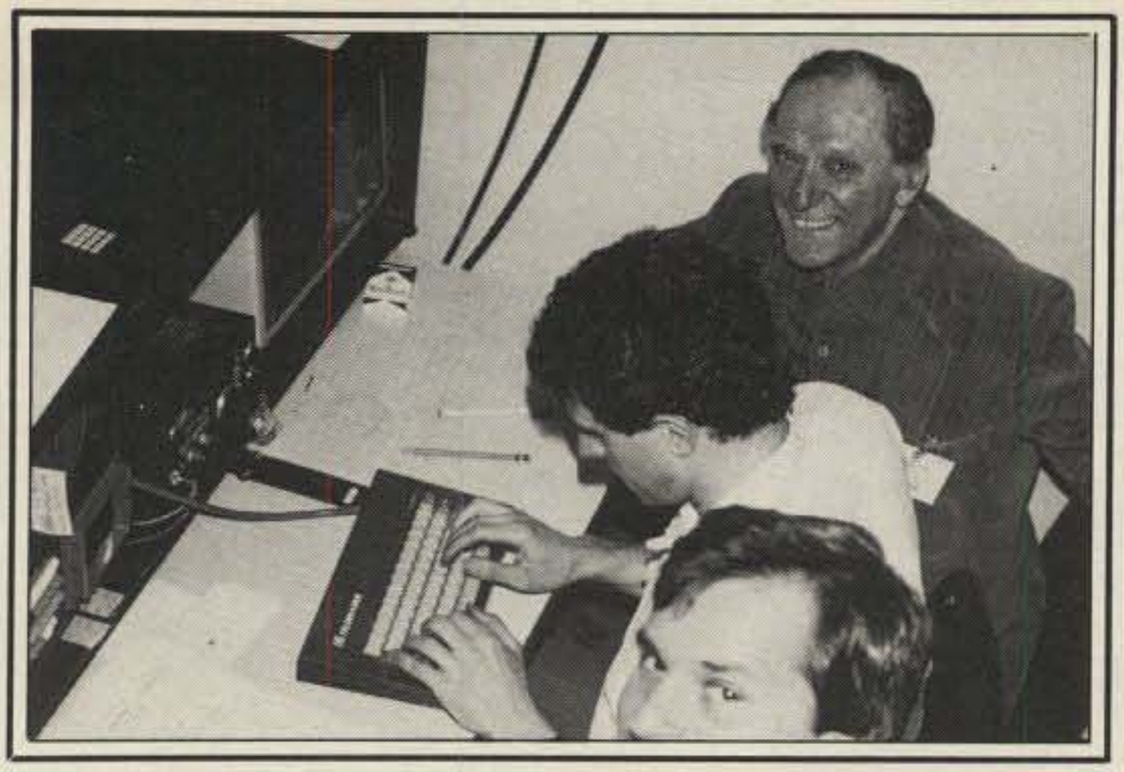


The top (40th) floor of the United Nations Secretariat building in New York City houses 4U1UN. (Photo by W2JGR)



Jules, W2JGR, and Allen, N2KW, at the operating position at 4U1UN. (Photo by NT2X)

Victor, KD2HE, pauses from pulling another multiplier from the stack at 4U1UN. (Photo by W2JGR)



Lou, NN2G, Victor, KD2HE, and Jules, W2JGR, enjoying the operating at 4U1UN. (Photo by N2KW)

Ed, NT2X, hits the keys at 4U1UN while Allen, N2KW, does the logging. (Photo by W2JGR)

being serviced by the manufacturer and the RTTY gear previously used was in questionable shape. Also, the station's Kenwood TL-922 amplifier was reported to be inoperative.

Operating permission was received from the United Nations Amateur Radio Club provided equipment could be put in place for the contest.

Assembling The Gear

Jeff Pulver, WA2BOT, kindly offered the use of a tired IC-730 transceiver, a HAL CT2200 Communications Terminal, and a Hal KB2100 Keyboard. This equipment had not been used for several years and was in questionable condition. Following two weeks of intensive troubleshooting by WA2BOT, N2KW, and W2JGR, the equipment appeared to be serviceable. But alas! When put in place at the station site it exhibited a combination of instability and RFI. The day before the contest was to start we found the original station terminal unit, a HAL CWR6850 Telereader KSR Terminal. Trouble was no line cord (special connector not readily available in local stores) could be found. In despair we rummaged amongst the storage cabinets and there it was. The long lost line cord. We even found a YO-100 Yaesu scope, but unfortunately it had a dead CRT. We had to be content to tune by watching the old-fashioned (?) blinking lights. There was no limit to the sacrifices with which we were willing to put up!

Two hours before the contest started, the ICOM-730 supported by the CWR6850 was on the air and all checked out. With N2KW (who had never operated RTTY before) at the keyboard, the first contest contact was made with the writer's home station and 4U1UN was back on the air on RTTY. A few hours into the contest it was discovered that a little judicious "jiggling" of the bandswitch on the TL-922 allowed full rated power output to be achieved! We were really in good shape.

The Contest

The BARTG contest is 48 hours long with not over 30 hours of operating time permitted. Total cumulative operating time at 4U1UN during the contest was just over 28 hours. We made 365 valid QSOs on 10, 15, 20, 40, and 80 meters for a total score of 475,300 points—not close to a winning score, but enough to give many stations useful contest points as well as the thrill of a new DXCC country on RTTY. For some reason there seemed to be a dearth of contest activity on 80 meters.

On the first day of the contest New York City experienced a snow squall of several hours duration which raised such a high QRN level that we were unable to copy the calling JA stations. One of the group estimated that at a static gradient of 40 volts/meter altitude the static charge on the vertical antenna could have been on the order of 8 kv! Our apologies to our friends in JA-land for not being able to reply to their calls. The log shows only a few JA stations worked in the last hours of the contest.

Tuning, logging, and the joy of punching the keys were shared by Victor Carnuccio, KD2HE, Allen Singer, N2KW, Lou Dietrich, NN2G, Ed Kritsky, NT2X, and myself.

The operation was particularly gratifying for NT2X as it represented completion of operating at all three stations sponsored by the United Nations. Ed had operated from 4U1ITU and 4U1VIC in August 1984. He wonders if anyone else shares this distinction.

Acknowledgements

The guest operating team would like to extend their thanks to the officers of the amateur radio club which is a part of the United Nations Staff Recreation Council. Particular thanks are due to Raymond East, KB2BKO, and Max de Henseler, HB9RS, for their encouragement and for tackling the many administrative problems inherent in an organization such as our host country. They effectively smoothed the path through a most cooperative bureaucracy.

QSL 4U1UN via NA2K at his callbook address. CQ

Here is a control box that can be used with practically any HF transceiver to save you a visit to the chiropractor.

A Neat Little Control Box For HF Transceivers

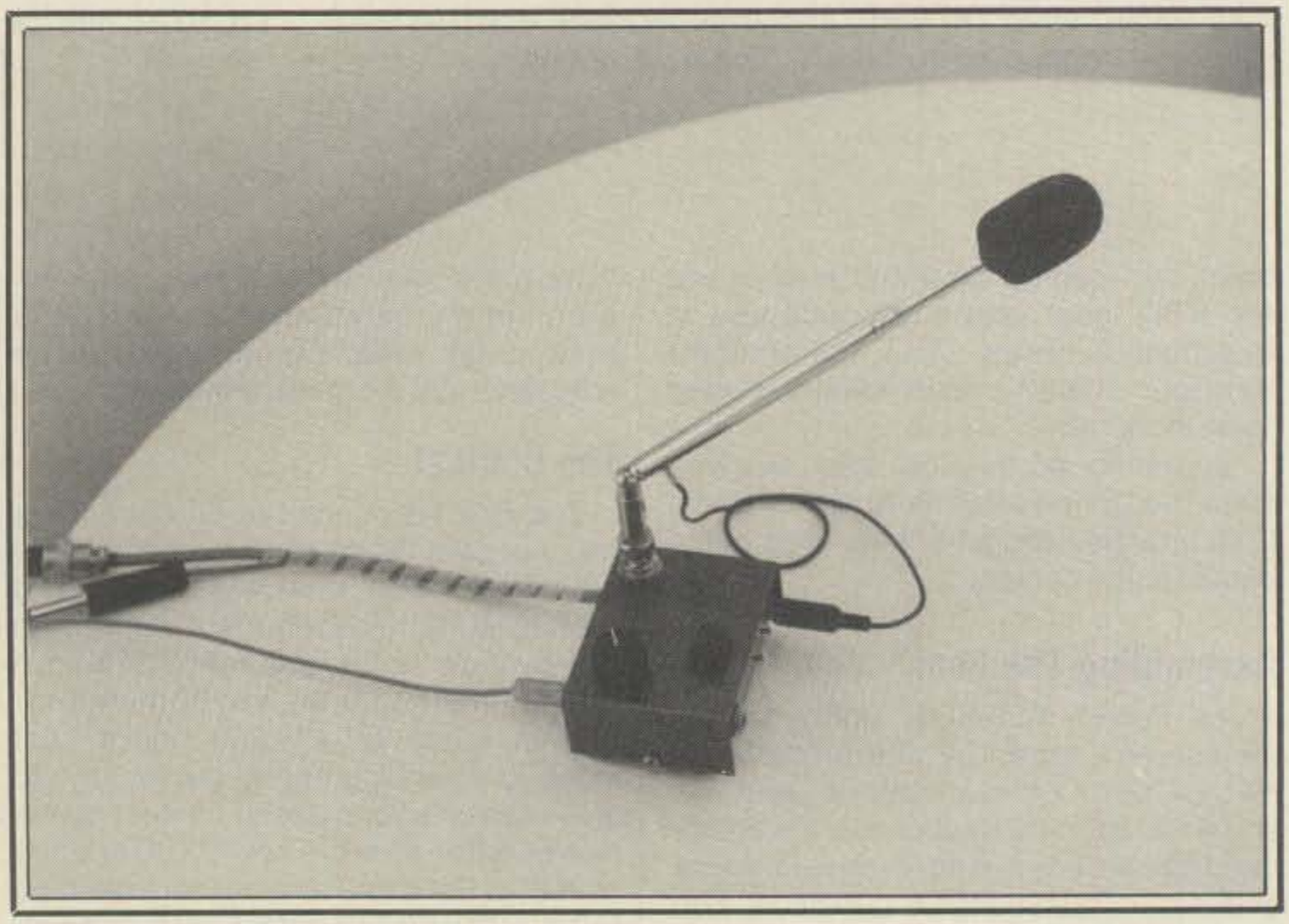
BY JOHN J. SCHULTZ*, W4FA/SV0DX

I have developed some form of control box for almost any HF transceiver I have used for an extended period of time. The control boxes have ranged from very simple ones containing little more than a PTT switch to very elaborate ones containing all sorts of electronics, depending upon what features I wanted to "bring out" from a transceiver so I could have fingertip control of it. Almost all of the control boxes have been associated with or contained some form of extension or boom microphone so I can sit back comfortably in my chair when I operate a rig. The picture of a radio amateur bending forward to get close to the front of a microphone has to be classic, and I wonder if chiropractors haven't overlooked the amateur radio fraternity as a source of business!

Anyway, joking aside, the little control box described in this article was designed for portable use with an IC-735, but it can be used directly with almost any other ICOM transceiver or very easily adapted for use with practically any HF transceiver.

Since the IC-735 forms the heart of a very compact portable station setup I have developed, I wanted the control box to be equally compact. It is that, and provides what I consider to be some very comfortable operating features—remote PTT, an extendable unidirectional microphone, microphone preamplification and equalization, audio monitoring (sidetone) on transmit, and remote headset volume control on receive. The point is that when using the control box I can sit back comfortably in my chair while transmitting and control PTT operation, and during receive I can use one hand to remotely control volume while I manipulate the main tuning or some other control on the transceiver with the other hand. It's a very comfortable way to operate the transceiver. The control box can also be used with a microphone headset if you prefer that type of arrangement.

*c/o CQ magazine



The control box is a compact, easy-to-build unit that can add a lot of convenience to operating a transceiver.

A schematic of the basic control box is shown in fig. 1. It shows everything except the audio monitoring on transmit feature. To the left are the front-panel-mounted 3.5 mm combination microphone/headset jack and a standard ¼ inch jack for headphones. The 50 ohm potentiometer which controls the headphone volume should be a wire-wound type for the smoothest operation. However, any carbon type of from 50 to 200 ohms will also suffice. The wire leads from the potentiometer go to a standard ¼ inch plug which plugs into the headphone jack on the transceiver. Shielded cable is advisable. The pin numbers to which the main interconnecting cable goes are the standardized ones for the 8-pin microphone plug used on all ICOM HF transceivers. This interconnecting cable absolutely must be shielded overall (shield connected to pin 7), and if you can find a cable with four individually shielded leads, that would even be better (all shields would connect to pin 7). The PTT line is left "floating" to avoid possible RF pickup and feedback problems. One side of the line is grounded internally in the transceiver. The PTT switch itself is a push-on/push-off type. It also momentarily closes the PTT line if just lightly depressed. It's a Radio Shack type 275-617. Or, you can use a miniature SPDT toggle switch which closes positively in one throw direction and momentarily in the other direction.

The basic electronics in the control box consist of a microphone preamplifier stage using a ECG85 and an equalizer stage using a 741 op-amp. The ECG85 stage provides a bit of gain, low-frequency roll off (via the .01 mF coupling capacitor in the base lead) and is filtered and bypassed against RF pickup. The 1K resistor going to the microphone input provides an operating voltage for the elec-

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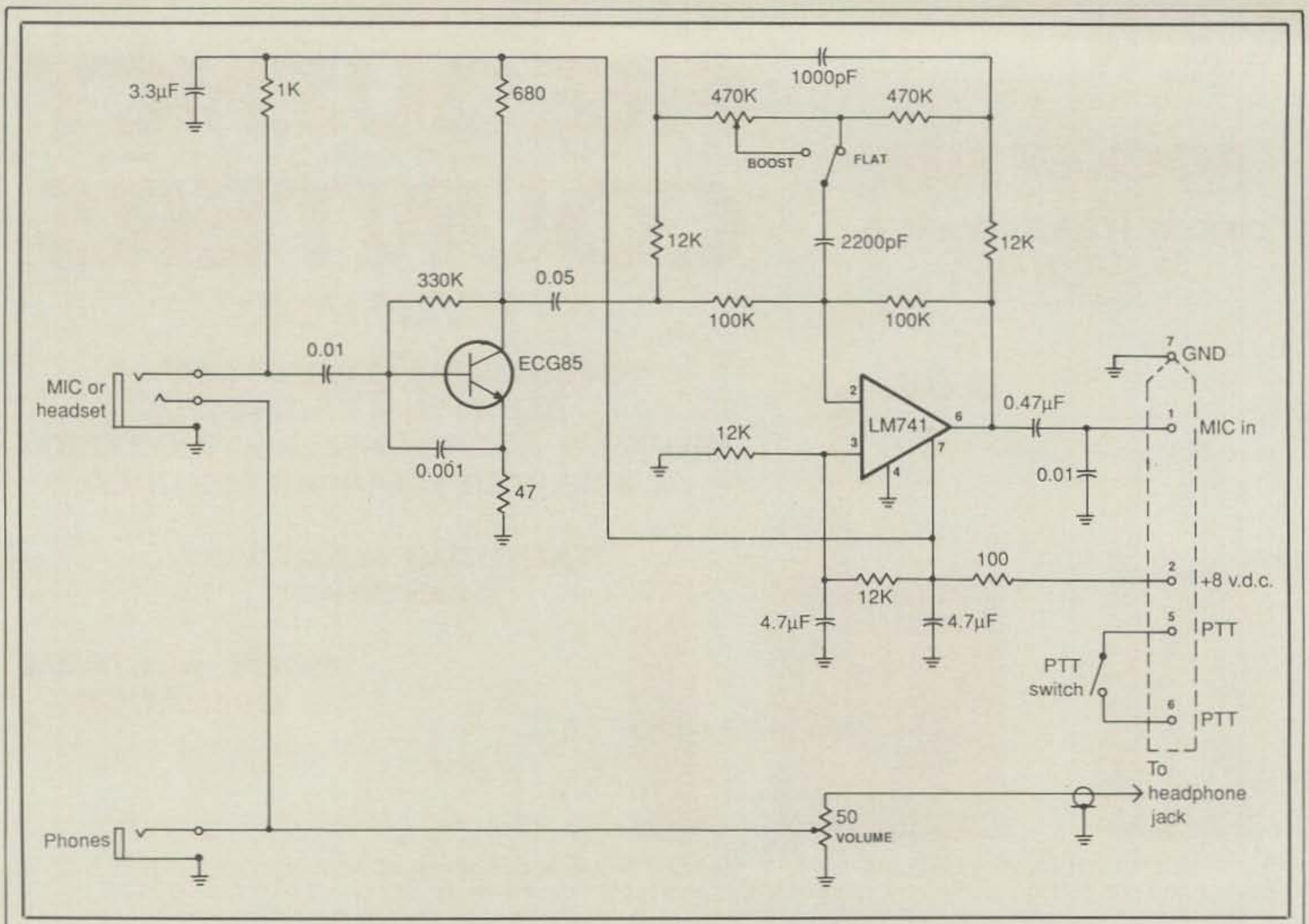
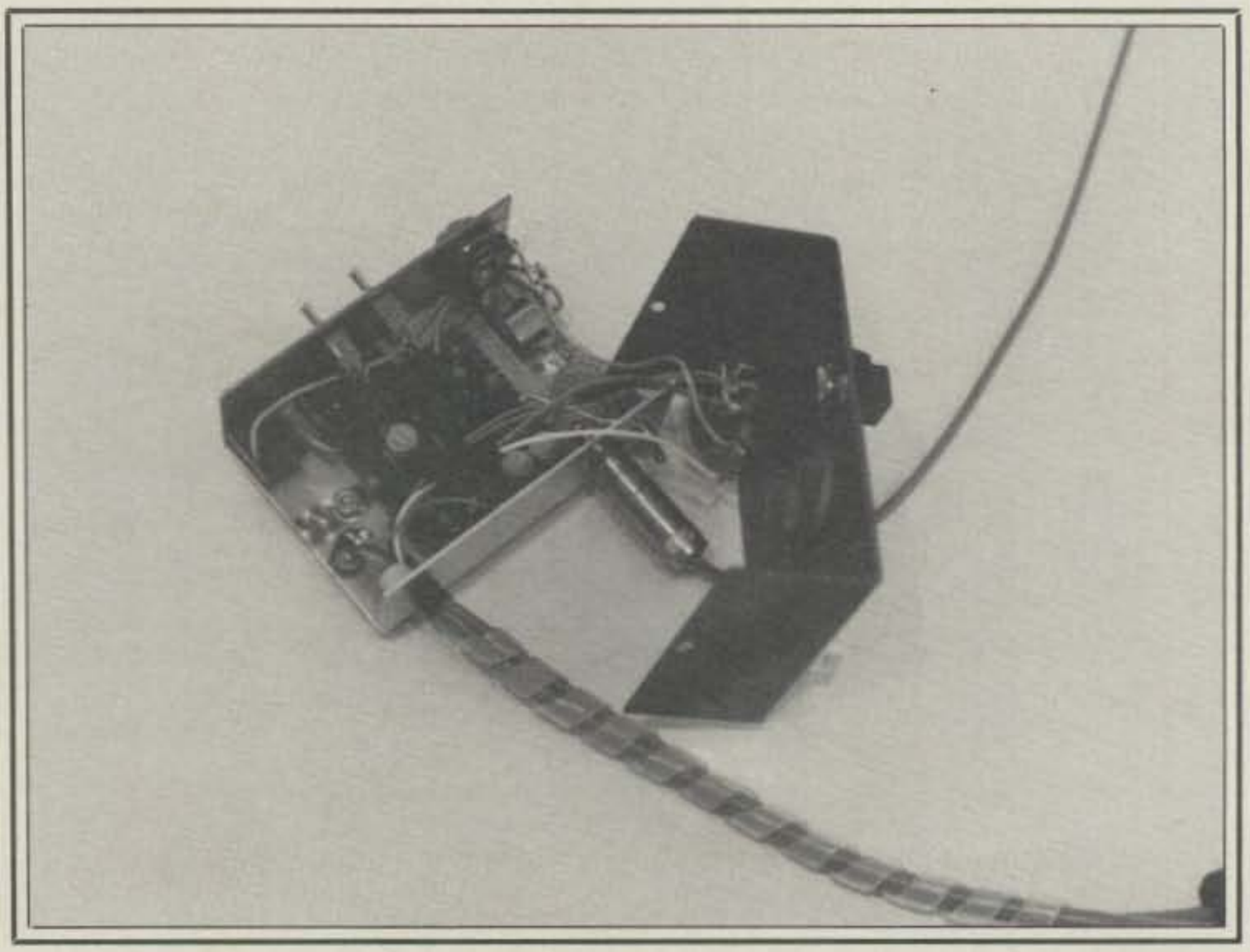


Fig. 1–Preamplifier and equalizer stages. Pin numbers on the right are the standard ones used for ICOM microphone connectors.

tret microphone that is used. The 741 stage is a quite standard equalizer which normally would provide a ±12 dB boost or cut around 2700 Hz. However, since I've never heard of anyone wanting to cut higher frequency response, the circuit is arranged so the 470 K potentiometer only varies the response from "flat" to a ±12 dB boost. A switch is provided for immediately switching between a flat or boosted response. It's not absolutely necessary and can be eliminated by wiring the 2200 pF capacitor lead directly to the potentiometer arm.

The components associated with the equalizer circuit (12, 100, and 470 K resistors and the 1000 and 2200 pF capacitors) should be within 5% of their nominal values. The capacitors can be mylar or polystyrene types, but definitely not disc-ceramic types. The 470 K potentiometer used was a PC-mount trimmer type, but some builders might like to use a front-panel-mount type to impress the station on the other end as to how various degrees of equalization can really "brighten-up" your transmitted audio.

The electronics is all constructed on a small piece of perforated board stock measuring about ¾" × 2". Simple point-



A look inside the control box. No particular parts arrangement is necessary. In this case, one board is used for the equalizer shown in fig. 1 and the other for the amplifier shown in fig. 2.

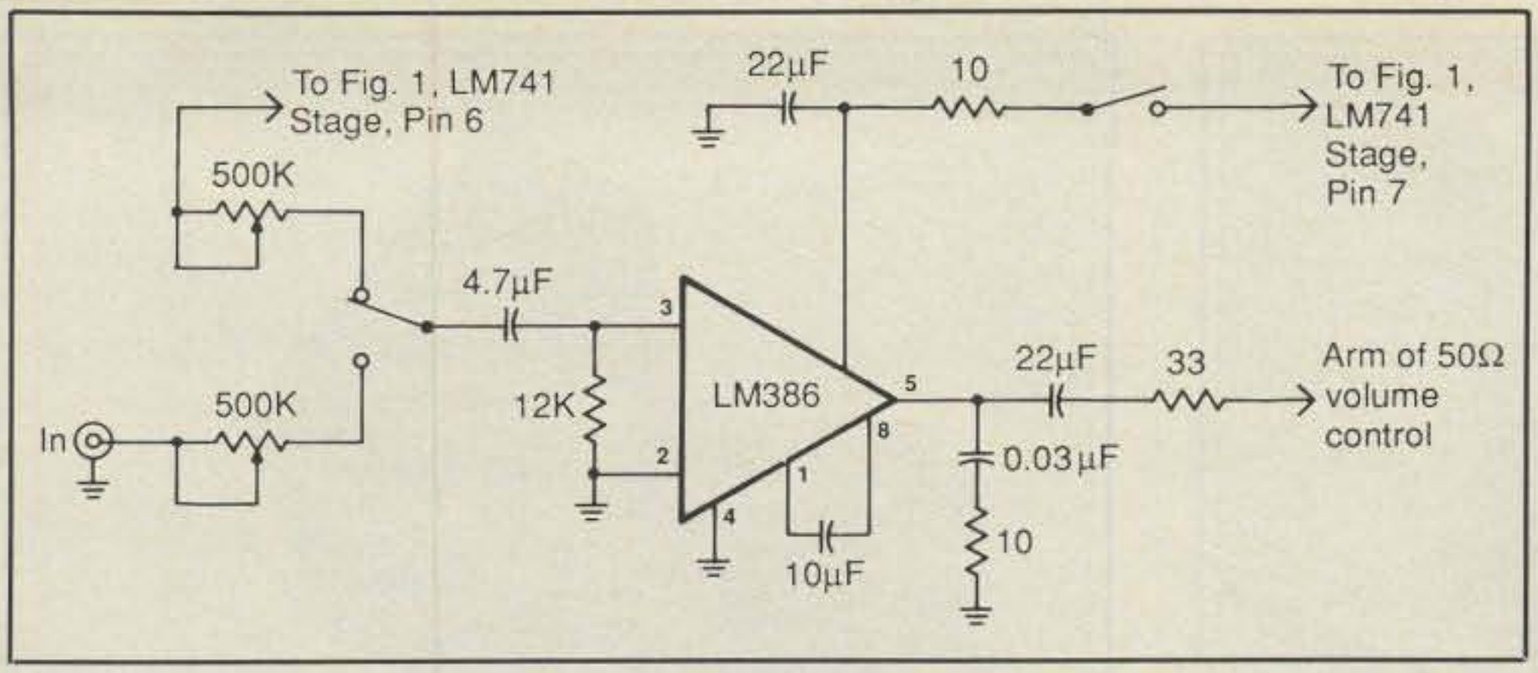


Fig. 2– Simple headphone amplifier which can be added for monitoring your transmitted audio.

to-point wiring is used. There are no special precautions to observe when wiring the unit, since the board is reasonably small, and you must, by necessity, keep lead lengths short. If you are not experienced with this type of construction, I would suggest making a dry run by placing the components in the board to see how they can be grouped and fitted before soldering them together. A small sketch might help to recall the best arrangement. I socketed the 741 just to avoid getting too much heat on its pins during soldering.

The enclosure used is a Ten-Tec type TP-13, which measures about 3¼" × 2½" × 1⅛". It's a very suitable two-piece aluminum enclosure which can be easily "worked" to drill or punch holes, yet the gauge of the aluminum is such that it still remains a very stable enclosure after being worked. You can see from the photograph how various jacks and switches were mounted, although no particular order in their placement is necessary. The enclosure can be left unpainted if desired. I painted the enclosure using an odd-ball automobile-type spray paint can I had around the workshop (Chrysler Steel Grey [Met] AR59). It turned out that it provides an almost perfect match to the color finish used on ICOM and Kenwood transceivers.

The microphone used is a take-off on the extendable types used on video cameras. I have seen such electret microphones advertised in surplus outlets, and if you can find one, it can be used directly. In my case I found an old telescoping transistor radio antenna, put a replacement-type unidirectional electret microphone element on one end, and covered it with a plastic microphone wind screen. The shielded cable to the electret element runs inside the telescoping antenna and exits at a hole drilled in the base section of the antenna rod. BNC hardware was used at the base of the rod and on the cover of the control box just to provide for detachment of the rod during transportation and for a swivel action. It is not used for any electrical connections. The rod itself telescopes from about 6 to 18 inches. The assembly may sound a bit crude, but you would be surprised how professional it can look and perform if constructed carefully. Probably the only construction caution to emphasize is to have a bushing (preferably Teflon) at the hole where the microphone cable exits the rod so the cable will not bind as the microphone assembly is extended or retracted.

Adding transmit audio monitoring to the control box involves the addition of a small amplifier on a piece of perforated board stock measuring, again, about ¾" × 2". The circuitry of the amplifier is shown in fig. 2. It's just a simple audio amplifier built around an LM386 IC. However, the component values have been chosen to be as small as possible to reduce capacitor physical size while keeping the frequency response fairly flat and also to keep the current drain as low as

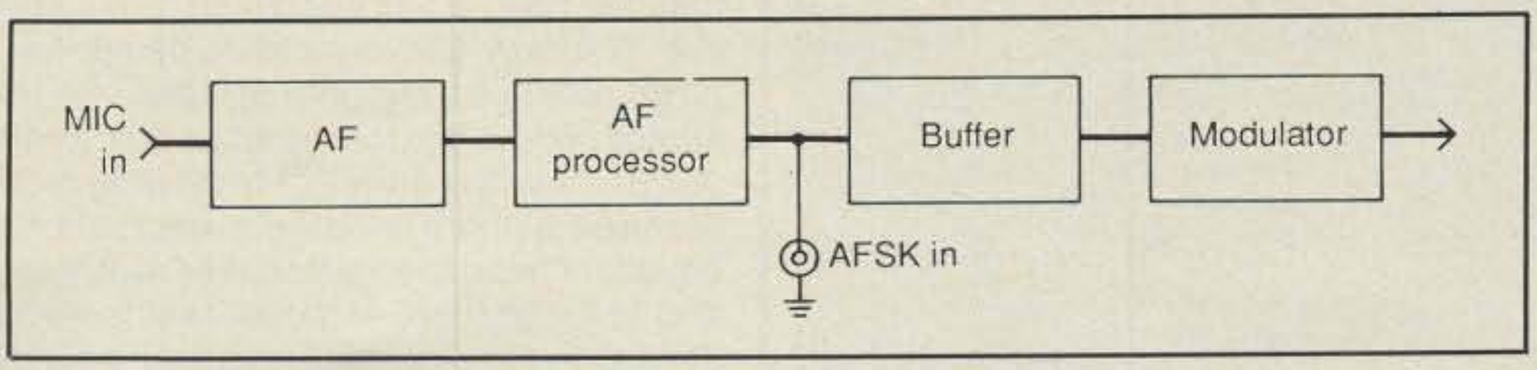
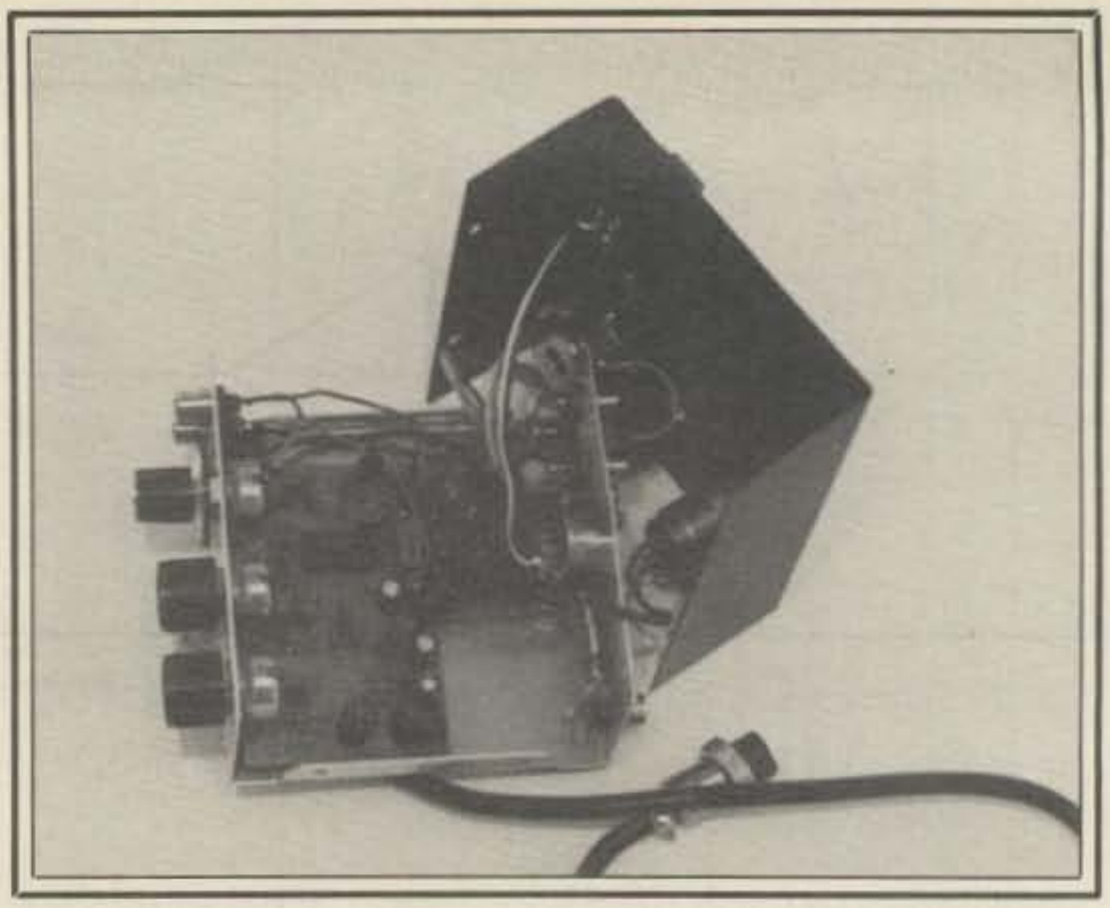


Fig. 3– Most transceivers have an AFSK "input" terminal. It can also be used as an "output" terminal to monitor the microphone audio.

This is a bit more elaborate control box that was built for use with another transceiver.



The electronics inside the larger control box center around an equalizer board taken from a Heil EQ-300 unit.

possible consistent with a reasonable output level. The input of the amplifier can be switched either to the output of the 741 equalizer or to an external input (more about that later). To individually regulate the input levels 500 K ohm trim potentiometers are provided. They are deliberately left "floating" instead of being connected as true potentiometers in case one of the inputs should contain a DC component. The output of the amplifier is connected to the headset jack on the control box. An on-off switch is provided just in case the very slight background noise produced by the amplifier should prove annoying while you are trying to receive an ultra-weak signal. For all practical purposes, it is really not needed. The current drain of the entire control box, including the LM386 amplifier, is 14 ma at 8 VDC (operating voltages of 6 to 13 volts are fine).

Using the LM386 amplifier the control box is complete in itself as far as monitoring your transmit audio is concerned, although you are really only monitoring the output of the 741 equalizer stage. That will suffice for many operators who just want to hear their own voice so they can try to keep their speaking level as even as possible. True transmit audio monitoring involves additional circuitry in a transceiver, which to date seems to be contained only in the more advanced and expensive transceivers. However, you can get somewhat along the transmit audio chain in a transceiver by taking advantage of the AFSK input terminal present on almost all transceivers. The "input" terminal is, in fact, also an "output" terminal for all of the audio amplification or processing which has taken place after the microphone input. Fig. 3 illustrates the point.

On ICOM rigs, for instance, monitoring the AFSK input terminal will provide an audio sample that usually has gone through amplification, audio compression, and the effect of the microphone tone control which ICOM uses. That is certainly the case with the IC-735. So even though the audio at that point is not the true transmitted audio which still must be modulated and filtered, it nonetheless is very close to the sound of the true transmitted audio, and you can very easily monitor the effect of regulating the microphone gain control, switching on and off the audio processing, and setting the microphone tone control. On ICOM rigs the AFSK terminal has been standardized as pin 4 on the 8-pin DIN-type accessory jack. The connection point with other transceivers will vary but can easily enough be ascertained from their schematics. The phone patch "in" terminal on a transceiver can be used for the same purpose, since obviously it is also a bidirectional port for the transmit audio.

There is no need to try to exactly duplicate the control box described in this article. You may wish to add or delete features. Some of the photographs, for instance, show a larger control box that I built for another series of transceivers. It features a more elaborate microphone equalizer, headphone/speaker switching and amplification, variable-level tune-up oscillator, etc. The microphone used with this box is a 13 inch commercial, gooseneck type which plugs into the Cannon-type socket on the top of the control box.

CQ REVIEWS:

The Kenwood TS-140 Compact HF Transceiver

BY DAVE INGRAM*, K4TWJ

Several years ago Cadillac added a small automobile called the "Cimarron" to their line of quality vehicles. The compact car sported many features and appointments similar to its full-sized counterparts, but it exhibited two rather attractive differences: small size for easy handling and a lower price tag for affordability. Today those same concepts of big-time performance in a small package are making hot news in amateur transceivers. The results are what I call "lighthearted fun rigs"; they are perfect for fixed, portable, or mobile operations in a truly enjoyable and free-style manner. A recent example of those statements is Kenwood's new TS-140S HF transceiver featured in this *CQ* magazine review.

The Kenwood TS-140S is a full 160 through 10 meter all-mode transceiver with 100 watts output, general-coverage reception from 50 kHz to 35 MHz, 31 memories, scanning, speech processor, and semi or full CW break-in operation. The rig measures 3¾"H × 10½"W × 11"D and is priced at around $800. The rig's small size is a really big feature, especially when mobiling with today's cars, as it will fit into spaces simply too tight for larger rigs like the TS-430S or TS-440S. After removing the ashtray and cigarette lighter in our Mercury Topaz, for example, the TS-140S squeezed in without an inch to spare. Its internal heat sink and rear top-ventilated fan, however, are still open to free air flow under the dash for cooling. In my opinion, the trade-off of a built-in antenna tuner for reduced depth is a logical compromise. I simply don't endorse compensating for an improperly set antenna (with a tuner) if I can get to the radiator for adjustments. I understand the TS-140S's attractive price is due to robot rather than human assembly. Robots usually exhibit exquisite quality control and cost-effective results. Other manufacturers will surely follow suit.

First Opinions

Initial ad pictures of the TS-140S do not do it justice. The rig is silver-gray in color just like the TS-430S or '440S. Its appearance reminds me of a "little TS-940S." An internal speaker is mounted in the cabinet's right top area, a carrying handle is included on the right side, and the RF amplifier's built-in heat sink leaves the rear panel "clear" for fitting in tight spots. The 32 front-panel controls are laid out for easy operation, with a subpanel of controls on the right side and a recessed bank of switches along its bottom area.

Kenwood's TS-140S HF transceiver is a deluxe little gem in an attractive package.

Although not apparent at first glance, several of the rig's front-panel switches serve double duty for providing some "big rig" capabilities. Holding the "CW/N" button when switching on the TS-140S, for example, lets you choose "beeps" or Morse code announcements of selected modes and memory actions. Similarly, holding the "CLEAR" button toggles between 100 Hz and 10 Hz resolution in the main display (see fig. 1). Likewise, holding the RIT button selects 10 or 20 Hz RIT resolution, and the "SCAN" button toggles its "hold" function on/off. During scanning the RIT knob also changes to vary scan speed. Obtaining a "key down" or full-carrier signal for checking an antenna or tuning a linear amplifier is also easy: switch to CW with full QSK, then press the mike's push-to-talk bar. No shorting plug or closed key required. Very nice! Holding the main tuning knob's rear ring while slightly turning its front rubberized grip varies its tension in precise steps to suit your hand.

The rig's "M CH/VFO CH" knob selects memories while in the memory mode, and shifts frequencies in 10 kHz steps while in VFO mode. The latter function would be great for mobiling if it was modified for 100 Hz step-tuning. Ten kHz jumps are quite wide! Fortunately, however, the TS-140S can be step-tuned in 10 Hz increments from its mike for laid-back (lazy?) mobiling. Kenwood also has an optional sun-visor-mounted boom mike, a gearshift-fitted PTT box with up/down tuning buttons that interface with the TS-140S for "hands free mobiling." Remember that item if you drive a manual-shift or get enterprising ideas about adding remote control to the TS-140.

Continuing our first-impression views, the TS-140S dual width and adjustable noise

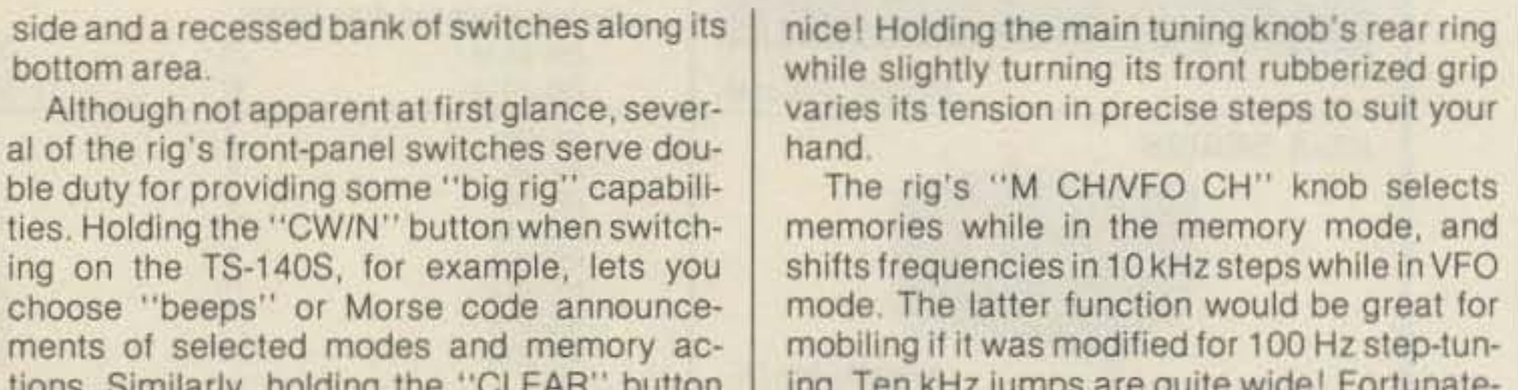


Fig. 1– Overview of the TS-140S multifunction display. Various illustrated functions are operated by front-panel controls.

*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

blanker is a very good feature in a low-cost rig. It does an admirable job in minimizing both mobile and home power-line noises, and "zaps the woodpecker" right out of existence. The unit's front-panel-adjustable power output control works on both CW and SSB—a very useful feature we are glad Kenwood finally included in their transceiver designs. Many linear amplifiers need only 60 or 70 watts for delivering their full output. Additional power can create splatter, and reducing mike gain to decrease power defeats a speech processor's effectiveness. A separate power output control solves the dilemma. It's also a dandy way to limit your battery drain when operating portable or working extended-mobile without running the car's motor. Hold your output to 25 or 30 watts, and you can enjoy one or two hours of operating from a motel or shopping-center lot . . . and still have enough "juice" to start the car.

The TS-140S speech processor, incidentally, does a good job of increasing talk power without adding distortion. Everyone we contact compliments the TS-140S transmitted audio. Double-checking their comments on our auxiliary transceiver (a Collins KWM-1 with a 3.1 kHz mechanical filter) confirms they're right. The '140 sounds really good, even with its supplied "generic response" mike.

A Closer Look

A brief study of the TS-140S specifications shown in fig. 2 indicates it is a lot of rig for the money, and a couple of days of on-the-air operations confirm it's a sharp little performer. Since most of us are mainly interested in how a rig performs under actual in-shack situations or how it compares to similar units rather than how it measures in laboratory tests, some special checks were made with you in mind. Our unit's transmitter puts a solid 105 watts into the antenna on 160 and 80, 102 watts on 40 through 15, and 93 watts on 12 and 10 meters.

The CW full break-in has a reed relay. It's approximately as "noisy/quiet" as a TS-940S and only a gnat's hair louder than an ICOM 761. That's with the TS-140S's internal linear amplifier relay switched off (as it arrives factory-set). If you "go inside" and switch on the relay, you'll probably switch to semi break-in to avoid the added noise. It becomes quite noticeable. Since I run mixed modes, I quickly found an alternate linear switching method. During transmit, 12 volts at 10 ma is output on pin 7 of the TS-140S's rear "accessory" connector. This voltage does not depend on the previously mentioned relay, so I use it to control an external Radio Shack 12 volt relay, which in turn keys my amplifier. The relay is simply unplugged from the TS-140 for full (and quiet) break-in activities.

Another rear socket, incidentally, is included for interfacing RTTY and Packet systems without front-panel hook-ups. Separate input-level controls are included for rear-panel and mike signals. These adjustments, along with the relay switch, CW sidetone, "beeper" level, etc., are on the "bottom layer" of the TS-140S's unique "swing open" chassis. This design may seem a bit intimidating, but it is actually quite clever and easy to "get into." Just watch to avoid pinched wires when swinging it closed.

Specifications \ Model				TS-140S	TS-680S
General	Mode			J3E (LSB, USB), A1A (CW), A3E (AM), F3E (FM)	
	Antenna impedance			50 ohms	
	Power requirement			12 to 16 VDC (13.8 VDC reference)	
	Grounding			Negative	
	Current drain		Receive mode with no input signal	1.5 A	
			Transmit mode	20 A	
	Operating temperature			−10 to +50°C (+14 to +122°F)	
	Frequency stability			Less than ±10 PPM	
	Frequency accuracy			Less than ±10 PPM	
	Dimensions (W×H×D) (Projections included)			281×107×305 mm (11-1/16"×4-7/32"×12")	
	Weight			6.1 kg (13.4 lbs)	
Transmitter	Frequency range		160 m band	1.8 to 2.0 MHz	
			80 m band	3.5 to 4.0 MHz	
			40 m band	7.0 to 7.3 MHz	
			30 m band	10.1 to 10.15 MHz	
			20 m band	14.0 to 14.35 MHz	
			17 m band	18.068 to 18.168 MHz	
			15 m band	21.0 to 21.45 MHz	
			12 m band	24.89 to 24.99 MHz	
			10 m band	28.0 to 29.7 MHz	
			6 m band	———	50.0 to 54.0 MHz
	Output power	160 m band – 15 m band	SSB	110 W •1	100 W •1
			CW	100 W •1	
			AM	40 W •1	
		12 m band	SSB · CW	100 W	
			AM	40 W	
		10 m band	SSB	100 W	95 W
			CW	95 W	
			FM	50 W	
			AM	40 W	
		6 m band	SSB · CW · FM	———	10 W
			AM	———	4 W
	Modulation		LSB, USB	Balanced modulation	
			FM	Reactance modulation	
			AM	Low level modulation	
	Spurious radiation (CW)		1.9 MHz to 29.7 MHz	Less than −40 dB	
			50 MHz to 54 MHz	———	Less than −60 dB
	Carrier suppression			More than 40 dB (with 1.5 kHz reference)	
	Unwanted sideband suppression			More than 50 dB (with 1.5 kHz reference)	
	Maximum frequency deviation (FM)			±5 kHz	
	Frequency response (−6 dB)			400 to 2600 Hz	
	Microphone impedance			500 ohms to 50 kΩ	
Receiver	Circuitry			Double conversion superheterodyne	
	Frequency range			500 kHz to 30 MHz	500 kHz to 30 MHz 50 MHz to 54 MHz
	Intermediate frequency			1st: 40.055 MHz, 2nd: 455 kHz	
	Sensitivity	LSB, USB, CW (at 10 dB S+N/N)	500 kHz to 1.62 MHz	Less than 3.98 μV	
			1.62 MHz to 21.5 MHz	Less than 0.25 μV	
			21.5 MHz to 30 MHz	Less than 0.25 μV	Less than 0.18 μV •2
			50 MHz to 54 MHz	———	Less than 0.16 μV •2
		AM (at 10 dB S+N/N)	500 kHz to 1.62 MHz	Less than 39.8 μV	
			1.62 MHz to 21.5 MHz	Less than 2.5 μV	
			21.5 MHz to 30 MHz	Less than 2.5 μV	Less than 1.78 μV •2
			50 MHz to 54 MHz	———	Less than 1.58 μV •2
		FM (at 12 dB SINAD)	21.5 MHz to 30 MHz	Less than 0.35 μV	Less than 0.18 μV •2
			50 MHz to 54 MHz	———	Less than 0.18 μV •2
	Selectivity		LSB, USB, CW	−6 dB: 2.2 kHz, −60 dB: 4.4 kHz	
			AM	−6 dB: 6 kHz, −50 dB: 18 kHz	
			FM	−6 dB: 12 kHz, −50 dB: 25 kHz	
	Image ratio			More than 50 dB	
	1st IF rejection			More than 50 dB	
	IF SHIFT variable range			More than ±1.2 kHz	
	RIT variable range		10 Hz STEP	More than ±1.2 kHz	
			20 Hz STEP	More than ±2.5 kHz	
	Squelch sensitivity (FM)			Less than 0.32 μV	
	Output			1.5 W across 8 ohms load (10% distortion)	
	Output load impedance			8 ~ 16 ohms	

Fig. 2– Technical specifications of the Kenwood TS-140S. Additional notes are in the text.

The TS-140S's receiver is really hot. Whether you can work 'em or not, you can sure hear 'em . . . especially on 10 meters. Whew! The receiver's high gain (and everyone's unnecessary kilowatts) on lower frequencies tends to increase background and band noises, so the receiver's attenuator is most useful (yes, Virginia, there is a point of diminishing returns).

Since everyone wants to know if a new rig is a step up from their present transceiver, we *carefully* ran some "tee-connected/side-by-side comparisons." (I do not suggest trying this yourself. New rigs cycle through transmit if AC power is lost for a second, and the other rig's receiver is "RFed.") We tuned in the same DX stations on the same frequencies with the same antenna connected to the TS-140S, a TS-930S, an ICOM IC-761, and an IC-735. In 90 percent of the trials we could not hear one station on one transceiver that we could not copy on another rig. Special filters, tunable bandwidths, notches, etc., make some copy easier, true, but all modern/in-production transceivers are top performers.

Tee-connecting the TS-140S with an older transceiver like Drake's TR-4, however, was a different story. Many stations were indeed weaker and more difficult to copy on the vacuum-tube rig. Truthfully, however, it's all a matter of what you like. Regenerative receivers and TNT transmitters still work DX today just like they did 50 years ago. The operator, not the rig, makes the difference. Yes, indeed! Brother Dave "tells it like it is"!

The Memories and Their Use

The TS-140S sports 31 memories that are divided into three groups and selectable by the front panel's M/CH knob. Memories 0 through 9 are usual fixed-frequency types for storing your favorite operating spots. Memories 10 through 19 store separate transmit and receive frequencies for working 10 meter FM repeaters and split-frequency DXing. The TS-140S runs 50 watts output on 10 FM, incidentally, and 10 memories are more than sufficient for joining all the action.

Memories 20 through 30 include a clever tuning arrangement that's dandy for contesting or "superoperating" as discussed in my October 1987 *CQ* "World of Ideas" column. Each of these memories can be programmed with a desired range's upper and lower limits, various bands can be stacked in adjacent memories according to your preference, and then they can all be operated like separate VFOs. Memory 20 could be programmed with 14.000 to 14.070 MHz CW, for example; Memory 21 with 14.150 to 14.300 MHz SSB; Memory 22 with 28.600 to 28.700 MHz FM, etc. When a memory is tuned to its high limit, coverage "wraps around" to its lower limit, and you are ready to tune the band again. Set several memories to the same range, tune each to a different DX station, then switch between them with the M/CH knob for rapid-fire/retune as you work 'em DXing. They're great!

Circuitry Overview

As I have pointed out in previous *CQ* columns and reviews, overviewing a rig's block diagram is the most accurate and unbiased means of evaluation. Understanding that fact, let's step through the TS-140S diagram shown in fig. 3. The dotted lines indicate circuits on each PC board. The receiver is dual conversion with up-conversion: the first IF is 40.055 MHz, and the second IF is a nominal 455 kHz.

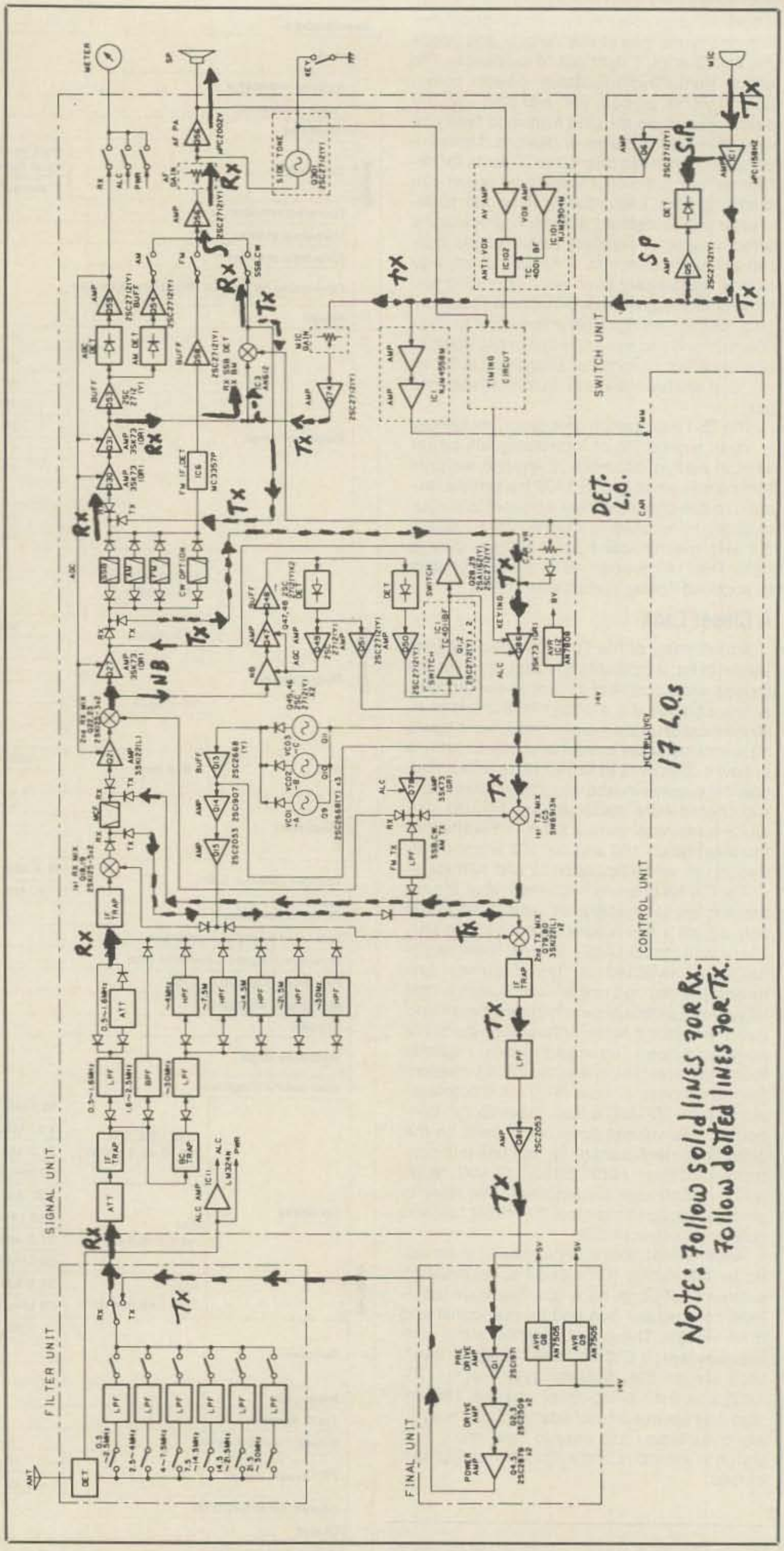


Fig. 3– Block diagram for the Kenwood TS-140S.

Numerous popular types of transistors are apparent in the receiver and transmitter. Digital tuning is used with the microprocessor controlling precise "divide by N" steps of four loops in the PLL, all of which are referenced to a master oscillator.

Starting at the block diagram's left top area, incoming signals from the antenna pass through low- and high-pass filters and into the balanced Direct Feed Mixer, Q18 and Q19. This is a very effective and popular design, typically responsible for the TS-140S's 102 dB dynamic range. The resultant 40 MHz converted signal passes through a monolithic crystal filter and on to the second balanced mixer, Q22 and Q23. The resultant 455 kHz signal from that low-noise mixer has two paths. One goes down to the noise blanker circuitry and switch and then returns to "gate off" IF amplifier Q27's output during noise pulses. The other path proceeds through Q27, an SSB/CW/FM or optional narrowband CW filter, and on to IF amplifiers Q30 and Q31. The inclusion of 3SK73 MOSFETS in IF stages and 2SK125s in mixers, incidentally, reflects the use of popular high-performance and time-proven devices. After clearing Q31, the signal proceeds through the SSB/CW detector/IC3 (AN612, a "new" device), on through Q56, and to the speaker.

During transmit, microphone-input audio is amplified by IC-1 (right bottom of block diagram) and then passed through the mike gain control to Q74 (Q5 was the speech processor). The signal proceeds through IC-3 (this chip is an SSB/CW heterodyne product detector on receive and an SSB balance modulator on transmit), which nulls its RF carrier. The output signal then passes through the 455 kHz SSB filter (exit one sideband) and on to Q86 (again, a popular 3SK73 device). The output signal is then upconverted to 40 MHz by IC-5, passed through the monolithic crystal filter, and directed to Q79 and Q80. This second mixer down-converts the signal to a desired amateur band signal, which in turn proceeds through Q81, Q1, Q2, and Q3 (drivers), Q4 and Q5 (the RF "final"), through a low-pass filter, and on to the antenna.

The section labeled "control unit" in the block diagram's bottom middle generates mixer heterodyning signals for frequency selection. Rotating the main tuning knob causes a behind-the-front-panel flywheel to break two LED beams. Phototransistors sense those interruptions, which are then encoded and passed to the microprocessor. That unit then sends "divide by any number/N" data to the PLLs. Through phase detectors, dividers, and VCOs, the resultant heterodyne/mixer injection signal is caused to change in 10 Hz (or 100 Hz or 1 MHz) increments and thus tune the transceiver.

All of the previously discussed TS-140S circuitry is contained on six internal circuit boards. Clever stacked assembly also allows one layer of circuit board to fold out (like opening a book) for internal servicing and adjustment.

Operating the TS-140S

The TS-140S is a stout little performer, and its small size makes it an ideal traveling companion. My XYL, Sandy, WB4OEE, and I use it at home, mobile, and portable during trips to the Gulf Coast. I like its "big rig frills" and Sandy likes its easy operation. After setting its recessed right-side controls, most activity can be handled with only three knobs. Careful adjustment of the mike gain and RF output are necessary, however, as they are quite sensitive and it's easy to overdrive the ALC. I must agree with Sandy about the '140S's good looks. It mentally adds 3 dBs to the rig's enjoyment.

Except for the previously mentioned "touchy controls," the only drawback I've noticed is lack of SWR metering. It's not always convenient to use my other rig for checking antennas. I really should not complain, however, as Kenwood is doing well selling this much transceiver at this low price. U.S. dollars have low value against Japanese yen, and the exchange rate continues to decrease.

Our first on-the-air QSOs netted many unsolicited reports of exceptionally good transmit audio, and the compliments continue today. The little rig just sounds good! Receiver audio is also excellent and full-bodied.

The IF shift is good for general operating, but serious CW enthusiasts will want to add the optional YG-455CN 250 Hz filter for big-time DXing. Another nice option is the HS-7 micro earphones. They are tiny in-the-ear jobs without a headband. You can roll them up and tuck them in a shirt pocket . . . even use just one for mobiling.

That wraps up my thoughts. Now let's get a second opinion.

Sandy's Opinions

The TS-140S is a big little rig, and I'm enjoying it almost as much as the diamond ring I could have selected instead. I've worked at least 20 new countries within the last few months, and that's on just 10 meters SSB. Most of my DX calls were also answered on the first try (and I have learned if I'm not answered on the second call to give up because *they* don't hear *me*). I have worked 48 states on 10 SSB and 40 CW with the rig (Georgia and Arkansas, where are you?). This is my first big experience in HF DXing and I love it. (OSCAR satellites are my favorite interest, however. Hopefully, we will have teamed our Ten-Tec converter with the '140S and be on Phase IIIC by the time you read this.)

The rig's noise blanker works great. It would be almost impossible to operate from my location most of the time because of power-line noises. The '140S's blanker lets most signals come through relatively clear.

Summary

Overall, we think Kenwood has another winner in their TS-140S. It is an economical rig that is as easy on your insurance premium as it is to operate, and it can easily form the center of a small, yet globe-spanning setup. Small-size transceivers are really enjoyable units. They may not have all the "mental clout" of big rigs, but they work DX the same way, and they fit into spaces where you can't fit a big rig. Overall, that means more fun time on the air, and that's what we all enjoy!

For more information on the TS-140S and its accessories, contact Trio-Kenwood Communications at 1111 West Walnut Street, Compton, CA 90220, or any of their nationwide dealers advertising in *CQ* magazine. CQ

No-43-46

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With MFJ's super clone of the industry standard -- the TAPR TNC-2 -- you get **genuine TAPR** software/hardware plus more -- not a "work-a-like" imitation.

Extensive tests published in *Packet Radio Magazine* ("HF Modem Performance Comparisons")prove the TAPR designed modem in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

Hardware DCD gives you more QSOs because you get reliable carrier detection under busy, noisy or weak conditions.

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Good news for SYSOPs! New software lets the MFJ-1278 perform flawlessly as a WORLI/WA7MBL bulletin board TNC.

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Now MFJ-1278 has a new AMTOR mode, making it the only controller to feature eight digital modes.

MFJ-1278 transmits and receives AMTOR in the standard 100 baud rate. MFJ gives you all the AMTOR modes: ARQ (Mode A), FEC and Mode S (Mode B).

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You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can *copy not only amateur RTTY but also press, weather and other exciting traffic.*

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of MARS and standard VHF FM RTTY.

ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode and using the same high performance modem. You also get Autostart and selectable "Diddle".

CW

You get a Super Morse Keyboard mode that lets you send perfect CW effortlessly from 5 to 99 WPM, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You can store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

***A** tone Modulated CW mode turns your VHF FM rig into a CW transceiver* for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

The CW receive mode lets you copy transmitted CW. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

You also get a random code generator that'll help you copy CW faster.

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***You'll** be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your printer.* Other interesting FAX pictures can also be printed -- such as some news photographs from wire services.

Any Epson or IBM graphics compatible printer will print a wealth of interesting pictures and maps.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk

Pictures and maps can be *printed to screen in real time or from disk* if you have an IBM or Macintosh with the MFJ-1284 or MFJ-1287 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You'll not only see what your ham buddies look like but *you can send your own pictures* to them, too.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen in near real time or from disk with the MFJ-1284 or MFJ-1287 Starter Pack.

You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

You can save slow scan pictures on disk from over-the-air QSOs, audio tapes and other sources if your terminal program lets you save ASCII files.

The MFJ-1278 transmits and receives 8.5, 12, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

***Nothing** beats the quick response of a memory keyer during a heated contest.*

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

You get iambic operation with dot-dash memories, self-completing dots and dashes and jamproof spacing.

Message memories let you store contest RST, QTH, call, rig info -- everything you used to repeat over and over. You'll save precious time and work more QSOs.

You get automatic incrementing serial numbering. In a contest it can make the difference between winning and losing.

A weight control lets you penetrate QRM with a distinctive signal or lets your transmitter send perfect sounding CW.

More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus . . . printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack for both radio ports, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1½x9½ in. 12 VDC or 110 VAC.

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MFJ's innovative new Differential-T Tuner™ uses a differential capacitor that makes tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only *one* setting.

The new MFJ-986 is a rugged no-compromise 3 KW PEP Roller Inductor antenna tuner that covers 1.8-30 MHz continuously, including MARS and all the WARC bands. **The roller inductor lets you tune your SWR down to the absolute minimum** -- something a tapped inductor tuner just can't do.

A 3-digit turns counter plus a spinner knob gives you *precise* inductance control -- so you can quickly return to your favorite frequency.

You get a lighted Cross-Needle meter that not only gives you SWR, forward and reflected power at a glance -- but also gives you a **peak-reading** function! A new directional coupler gives you even more accurate readings over a wider frequency range.

You get a 6-position ceramic antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

A new **current** balun for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

New Antenna Tuner Technology

MFJ brings you **three innovations** in antenna tuner technology: a new *Differential-T*™ circuit simplifies tuning; a new *directional coupler* gives you more accurate SWR, forward and reflected power readings; and a new *current balun* reduces feedline radiation.

Differential-T Tuner™: A New Twist on a Proven Technology

By replacing the two variable capacitors with a single *differential capacitor* **you get a wide range T-network tuner with only *two* controls** -- the differential capacitor and a roller inductor.

That's how you get the new MFJ Differential-T Tuner™ that makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing instead of fooling with your tuner.

The compact 10¾ x 4½ x 15 inch cabinet has plenty of room to mount the silver-plated roller inductor away from metal surfaces for maximum Q -- you get high efficiency and more power output.

The wide spaced air gap differential transmitting capacitor lets you run a full 3 KW PEP -- no worries about arcing.

A New Directional Coupler: Accurate SWR and Power Reading

MFJ's Cross-Needle SWR/Wattmeter gives you more accurate SWR and power readings over a wider frequency range with no frequency sensitive adjustments.

That's because MFJ's new directional coupler gives you up to an order of magnitude higher directivity and coupling factor than conventional circuits . . . *plus* it gives you a flat frequency response that requires **no** frequency compensation.

The cross-needle meter lets you read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front-panel switched and requires 12 volts.

A switch lets you select peak or average power readings.

A New Current Balun: Reduces Feedline Radiation

Nearly all commercially built tuners use a "voltage" balun. The "voltage" balun forces the *voltages* to be equal on the two antenna halves. It minimizes unbalanced currents *only* if the antenna is perfectly balanced --not the case with practical antennas.

The MFJ-986 uses a true **current balun** to force equal *currents* into the two antenna halves -- *even* if your antenna is not perfectly balanced -- so you get minimum unbalanced currents.

The *current* balun gives superior balance over the "voltage" balun.

Minimum unbalanced current reduces field pattern distortion -- which concentrates your power for a stronger signal -- *plus* it reduces TVI and RF in your shack caused by feedline radiation.

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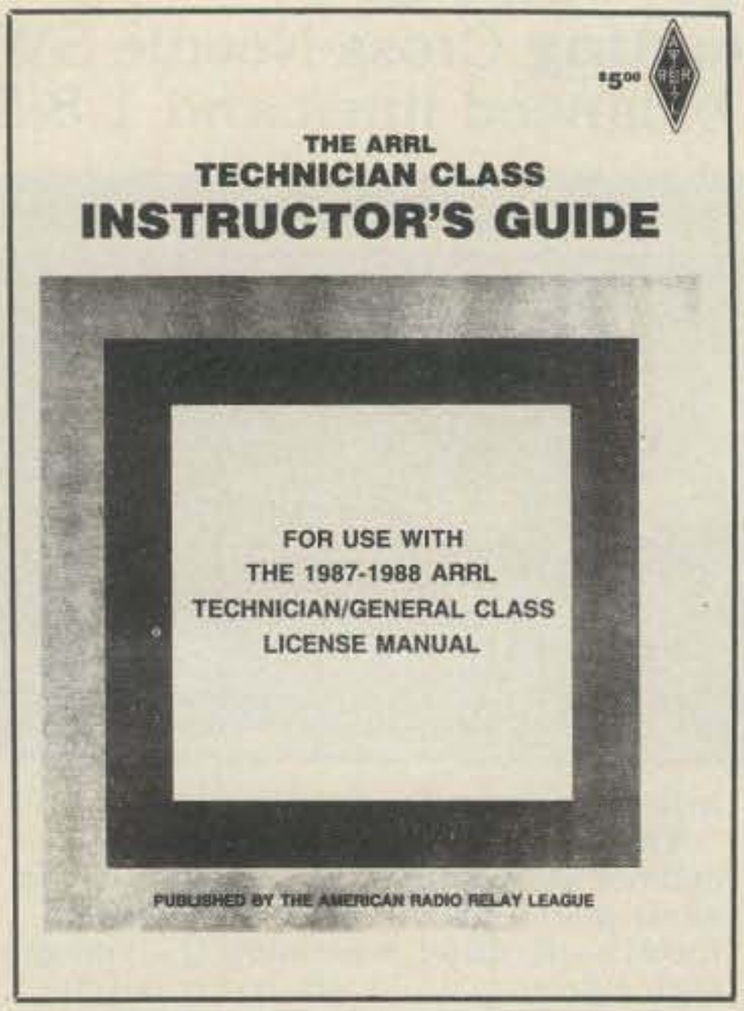
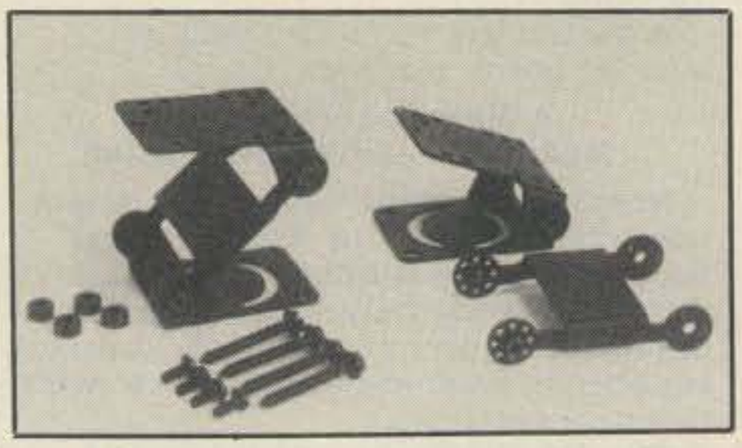


ARRL Instructor Guides

ARRL offers guides to assist instructors teaching amateur radio classes for the Novice, Technician and General exams. Although they are keyed specifically to League study material, they should prove useful regardless of the text being used. If you've been thinking about teaching a class, but weren't sure how to go about it, you will probably find the information you need here. They are priced in the $5 range. More information is available from ARRL, 225 Main St., Newington, CT 06111 or circle number 102 on the reader service card.



New Mobile Mount

ORA Electronics, prominent in the cellular phone market, has announced a "Z" convertible control head mount which would be ideal for mounting many of today's VHF/UHF mobile rigs. The versatile CSM81 converts to either a 2 piece or 3 piece unit for almost endless possibilities. Constructed of heavy grade steel with black chrome plating, it comes complete with mounting hardware and carpet standoffs. For more information, contact ORA Electronics, 20120 Plummer St., Chatsworth, CA 91311, or circle number 101 on the reader service card.

RF Adapters

Nemal Electronics International has introduced a new line of RF adapters for use in the high energy and nuclear research fields. These adapters facilitate rapid interconnection of incompatible cables and equipment while maintaining low loss and low VSWR. The adapters offer electrical performance and construction to military specifications. For additional information, please contact Nemal Electronics International, Inc., 12240 NE 14th Avenue, North Miami, FL 33161, or circle number 112 on the reader service card.

New Alpha Amplifiers

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CIRCLE 60 ON READER SERVICE CARD

Amateur radio can be a strange and wonderful hobby—wonderful to those involved and strange to those on the outside, even to our own families. Sometimes, strange can have just enough intrigue in it to make it interesting.

What's It All About and Why?

BY ANNIE HUGHES*

Although it may be difficult to believe, I reached the age of 28 before I heard the terms "ham radio," "40 meter," or "linear amplifier." As far as I'm concerned the age of 82 would have done just as well.

My husband and I had been married for five years. We lived in Miami, Florida and made frequent weekend trips to my parents' home in north Georgia. It was during one of these drives that he handed me a magazine and asked me to read aloud to him an article with the title "Amateur Radio's Future in Hybrids." After reading for a while I began to giggle uncontrollably. My husband glared at me and demanded to know the reason for my laughter. I tried to explain that although I knew how to pronounce all of the words in the article, it made no sense whatever to me.

This was only the beginning of many long, boring rides. I never saw the orange groves, the sun, or the egrets soaring over the marshes. Instead I read about antennas, DX contest results, evaluations of new equipment, and DXpeditions. Notice that I did not say "learned about," just "read about." There is a simple reason for this distinction. Between my brain and any sentence containing two terms related to electronics there is a great, unbridgeable gulf. Nothing ever crosses it.

One day Dickie came home very excited. He had purchased an Army surplus Collins shortwave receiver. Think about this. The house in which we lived had approximately 1000 square feet. It contained two small bedrooms, a kitchen, a "great" room, and a bathroom. Now where can you place a shortwave radio in a house that small and not have it disturb the entire family? The answer is obvious—nowhere.

After trying it in every conceivable location we put it in the "great room." (Moving it was lots of fun. It was about as portable as an elephant with handles on each side.) Dickie crouched in front of his new idol. He fiddled with knobs, drawing crowds of neighborhood children. They came to see if he was torturing a cat and left disappointed.

Months passed. Just when I had grown accustomed to the cotton in my ears, I was introduced to another fun-filled aspect of this all-consuming hobby. This part was called the HAMFEST.

We covered the state of Florida. We went to hamfests held at convention centers, motels, fairgrounds, and fields. We went in the rain, heat, and hurricanes. We drove to them in a pickup truck. We slept in a tent and ate bologna sandwiches. We had two small children, so I spent lots of time looking for bathrooms and trying to explain to them that this was fun.

Dickie has tried to explain why hamfests are so fascinating. Think about it. They are absolutely irresistible to most radio amateurs, so almost every one of them within several hundred square miles will be there. Dealers put up display tables, individuals try to sell their used or worthless equipment, and there are people who will stamp your call sign on almost anything. This will last for one or two days. If you need to do something really important, such as dip your dog, don't worry. You can catch all the fun a month later and a couple of hundred miles down the road.

The experience of the hamfests rapidly led to another exciting aspect of radioing. Now we had reached the stage of ANTENNAS!

You see, all around us are these radio waves. You can pick up these little buggers on your radio. An antenna will help you collect them and send them from farther away. I think the theory is the higher the better. My permanently curly hair is a bonus received while erecting an antenna during a thunderstorm.

If you are in the money (and I mean *major* money, because these things are not inexpensive), you can purchase an antenna and invite your amateur friends over to help you put it up. If you cannot purchase one, don't despair. Here are some rules to follow:

I. Get a Plan. Consult the latest issue of any amateur radio magazine. They all contain someone's plans for a sure-fire, simple, inexpensive antenna. It helps to remember that **SIMPLE** is an acronym for **S**ome **I**diots **M**ay **P**ossibly **L**ike **E**lectro-cution.

II. Study the Plan. Do this for at least two weeks. When your child meekly asks you to sign his report card, toss him a pen and say "Sign it yourself! Can't you see I'm busy?" Figure all the lengths and heights very carefully. Use your daughter's calculator to do this. It will give her an excuse for failing Algebra II.

III. Purchase the Needed Material. Plan ahead. Use the yellow pages. This will keep you from wasting time by stopping at electronics stores close to your home. Only the stores across town will have the necessary items. The cost of the materials will be at least $50 more than you have told your wife, so be sure to take your checkbook or charge card. Since you have to travel across town, be sure to purchase a few extra feet of wire. This will avoid wear and tear on your car.

IV. Measuring the Wire. You need a very long tape measure for this process. Be sure to enlist your wife and children to hold the wire while you measure. Measure carefully and repeat this process over and over. Don't make a mistake. Remember, if it gets dark or starts to rain, those are no excuses for carelessness. Do try to choose a warm day. Your helpers will feel the cold even if you don't. Remember, you may not be bored, but they are.

V. Erect the Antenna. If you are putting a long-wire antenna on the roof of your house, it is very helpful if your wife is not afraid of heights. Be sure she wears nonslip shoes on the roof. You will be hungry after working on your antenna and you'll need your wife to cook dinner.

VI. Try It Out. It is 9:30 p.m. You just finished hooking it all up. Now to see if all

*P.O. Box 622, Dawsonville, GA 30534

this effort resulted in any improvement in your reception. The tension mounts as you get ready to tune up. If your family still has a functioning brain, they know that this is a great time to go to the grocery store. Adjust your dials, wait, listen, call CQ, CQ, CQ. If it doesn't work choose one of the following options:

A. Curse

B. Kick the dog.

C. Study the plan again and find out where you went wrong.

D. Yell at your wife. Accuse her of standing beside the bush instead of the tree when you were measuring.

Take my advice. Choose D. If she put up with all the rest, she'll take the blame for this.

Much more could be said about antennas, especially since I have not yet mentioned the fun of installing car antennas. At one point my husband's station wagon resembled a receiving point for messages from outer space. Any more discussion of antennas would possibly cause total loss of control, so I'll leave the rest unsaid.

If you will permit me (try to stop me), I will now make a few comments on the area which has probably caused the most stress in my family. It has resulted in our children refusing to travel in the family car to any destination which requires longer than 45 minutes to reach. This section could be entitled "Traveling With Your Well-Baked Ham."

In the years BHR (Before Ham Radio) when we traveled together we sang or counted cows. The most disturbing thing about our trips was the whine of our children asking, "Are we almost there?"

Now my husband has a 20 meter rig and a handie-talkie. He also likes to have some background music in the form of his favorite Willie Nelson tape. No conversation is allowed while we ride; hubby might miss someone's call sign or comment. So the miles roll by. We are allowed to contribute only to provide information in answer to questions such as "What was his call sign?" or "What was his name?" We make our journey in silence. Our children have learned not to bother with unimportant statements such as "I have to throw up." They just hang their heads out the window and keep their comments to themselves.

Now for the most mind-boggling aspect of the entire ham hobby—the cost of radioing. In my family I keep the checkbook and pay the bills. Any time my husband strolls into the den and asks, "How much do we have in the bank?" I know we're in trouble. I mentally subtract $100 before I answer. Sometimes he grunts and leaves. At other times he continues the conversation with "Let's see; together this week we will make about $600." Trouble.

I have heard it said that if a woman is depressed, buying a new outfit will cheer her. It has also been my experience that when my husband begins to mope about and say he is depressed, one activity will help him out of the doldrums. If he can just pop over to the local amateur radio store and purchase that antenna tuner the cure will be immediate.

When our income tax refund came last year I was determined not to have it all spent on radio gear. We made a careful list of purposes for the money. After our planning we still had about $500 undesignated. I thought of all the things I wanted for the house, then decided to be generous. "All right, you can spend the rest on radio equipment." He gave me a look of scorn. "That's not enough to buy anything. I need at least $2000 for an amplifier. That's the cheapest thing on my list." I almost fainted. The cheapest thing!

If you are the wife of someone just getting into amateur radio, beware of one trick. I call it "Where's The Checkbook?" Now, our checkbook is always in my purse or lying casually on the desk. If I look for it and realize that Dickie is carrying it around in his pocket, I know the money is already gone. Look for boxes and receipts.

Dickie has been into radio for 15 years. He has said on a number of occasions that he radios because he wants to be able to get in touch with police, etc., in case of an emergency. Only once in all those years has a radio ever really helped.

Over the years we have relocated a number of times. Wherever we lived, radioing has always been a part of our lives. After all these years he finally talked one of his children into taking an amateur test. So now there are two hams, and amazing as it may seem I now carry around *Novice Voice Class* and a code tape. Maybe I'm losing my mind. Perhaps I figure if you can't beat 'em, join 'em.

If you hear a new call sign from Dawsonville, Georgia, be kind. My years of living with a ham have left me slightly unhinged.

A bargain-priced mic can be modified to provide the sound you want, as described here by W4FA.

Bargain Microphones Are They Worthwhile?

BY JOHN J. SCHULTZ*, W4FA/SV0DX

Effective SSB audio starts, of course, with a good microphone. A good microphone does not have to be expensive. It does, however, have to be reasonably sensitive and provide clear speech transmission. Whether you want a microphone to also provide a shaped frequency response and that somewhat elusive quality of "punch" is a matter of personal preference. If you're a newcomer to amateur radio, I would suggest starting out with the simplest microphone that mates with the brand of transceiver you are using. Many new transceivers in the medium price range even come with hand microphones as standard equipment.

If you look beyond the commonly available microphones, however, you will discover a rather vast world of microphone "buys." Many are associated with any-

The converted microphone (upper one) looks almost exactly like the original Hy-Gain 617 unit except for a different PTT switch.

*c/o CQ magazine

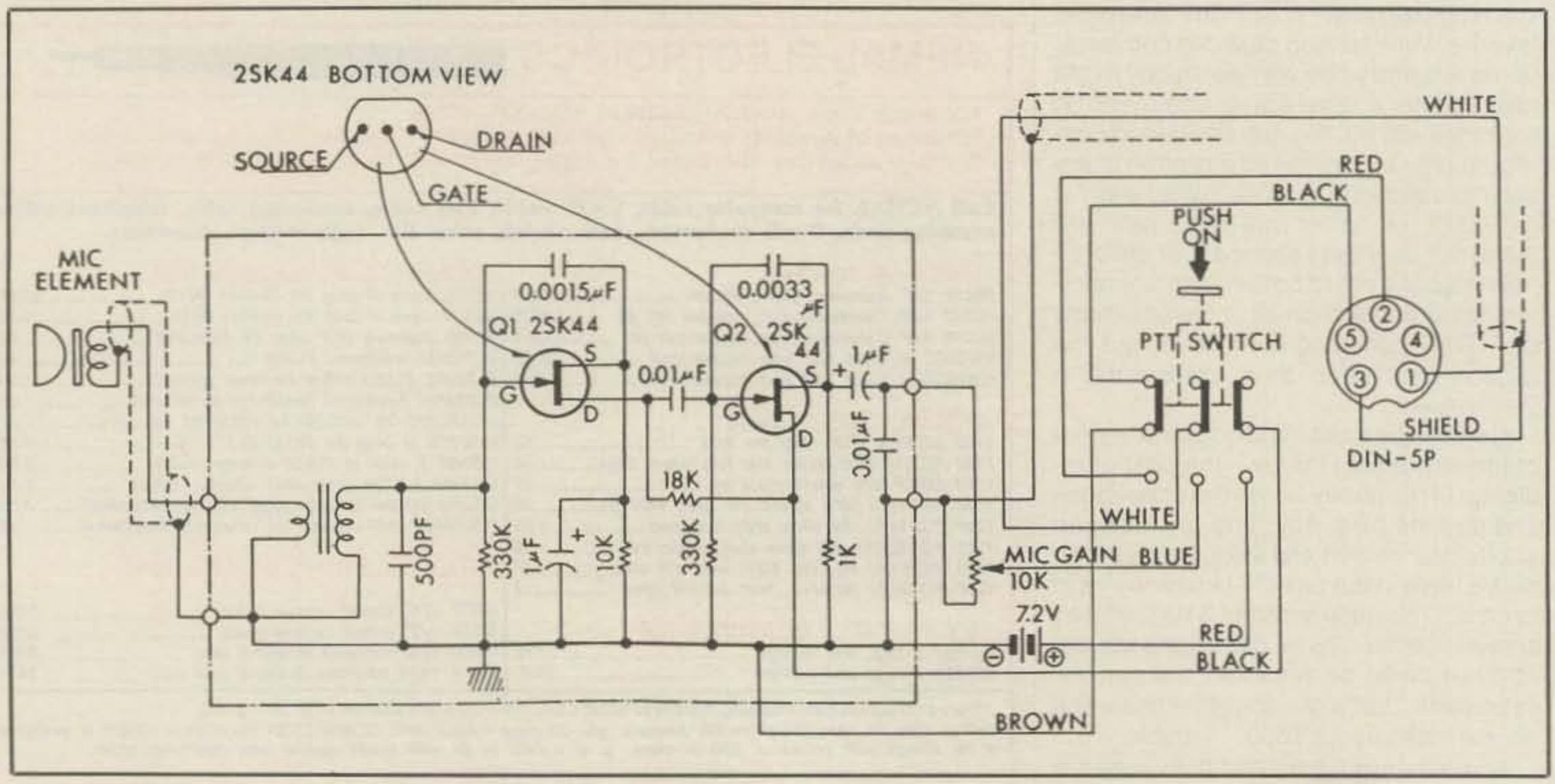

Fig. 1– Circuitry of the original preamplifier in the microphone.

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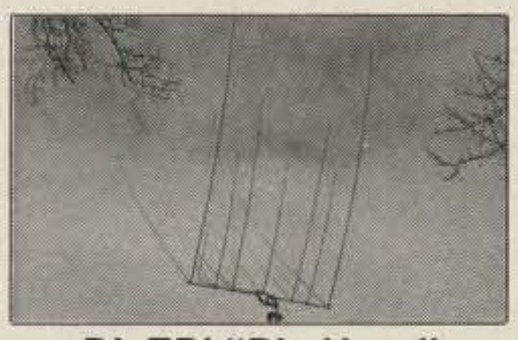

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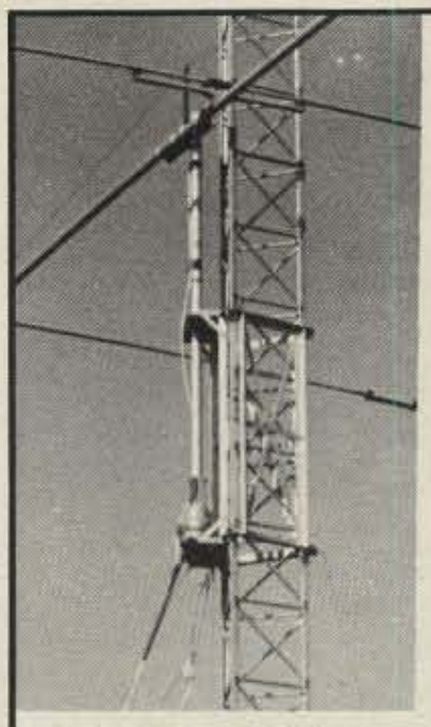

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CIRCLE 28 ON READER SERVICE CARD

thing from CB equipment to commercial two-way radio equipment. The microphones may represent production overruns, discontinued types, gimmick or prestige types that didn't sell, etc. You'll find such microphones available from mail-order outlets, at hamfests, at local electronics stores, etc. Many such microphones are poorly designed units that were originally vastly overpriced. On the other hand, however, you will also frequently discover bargain-priced microphones of excellent quality that simply didn't sell because of seemingly unknown reasons. If you can distinguish the latter from the former "bargains," you can often end up with a *real* bargain after some simple modifications. The microphone described in this article is an example. I, however, stress that it is only an *example*. Numerous similar units can be found and, if anything, will become more and more frequently available in the future.

Some two years ago I noticed a surplus mail-order outlet selling a new Hy-Gain mobile microphone which had a built-in preamplifier for $7.50. The microphone looked very good and the price was reasonable, to say the least. But I did not buy one until they went on sale more than a year later for $5.00. Then I purchased two of the units and was I surprised. They were microphones of absolutely excellent quality as far as their construction was concerned. The housings were partly metal and partly plastic, but the plastic parts were covered outside and inside by a conductive surface, so they were completely shielded. The preamplifier was very neatly constructed on a PC board, and there was a separate control to adjust the output level. The parts of the microphone housing were all assembled using screws, and the basic microphone cartridge was a very solid looking unidirectional dynamic unit. The microphone could be powered by an internal battery or over the microphone cord from a transceiver.

Why did these rather handsome microphones find their way to a surplus outlet and even become a slow seller at that? Well, I don't know all of the reasons, but when I got one of the microphones into operation, one thing was immediately clear: it sounded boringly flat and dull—not distorted, but just flat. It probably would have sounded reasonably good with a high-pitched female voice, but with my slightly bassy voice it was a disaster as my on-the-air checks confirmed. No punch, no crispness to my modulation at all.

Since I'm given to ponder over small things at times, I wondered how such a quality microphone could go astray in its electrical design. My thoughts then quickly turned to how to modify the microphone to turn it into a unit such that its sound would equal the quality of its construction.

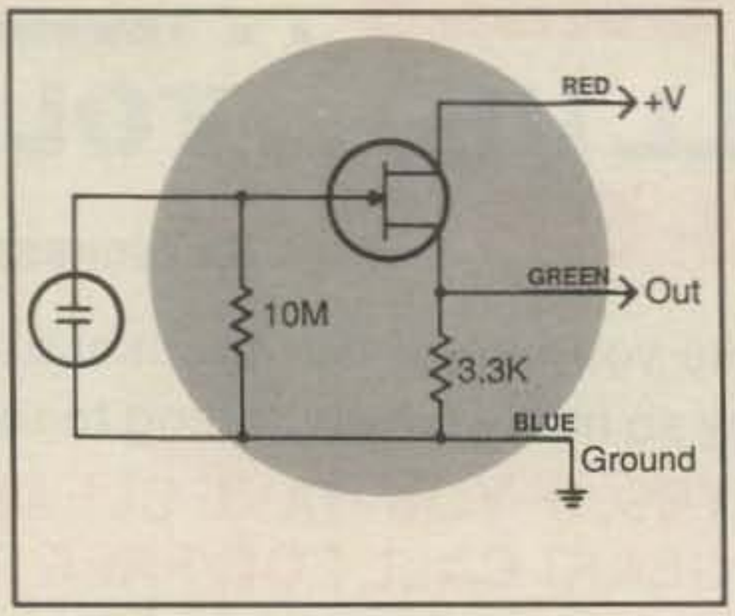


Fig. 2– Circuitry in a typical electret condensor microphone cartridge. The circuitry in the circle is usually found on a miniature PC board within the cartridge.

Fig. 1 is a schematic of the dual FET preamplifier used in the microphone. It is technically an excellent design if you want a full-range high-fidelity type of response. So the first thing I did was to experiment with simple ways to "shape" the response of the preamplifier. Two easy ways to do this are to change the value of bypassing and coupling capacitors. For instance, after some experimentation I optimized the value of the bypass capacitor across the 10K resistor in the first FET stage to be 0.1 mF (instead of 1.0 mF) and the value of the coupling capacitor between the drain lead of one FET and the gate lead of the second FET to be .001 mF (instead of .01 mF). It doesn't sound like much, but the changes made a significant difference in the sound of the microphone. The dull, flat response started to disappear and mid-frequencies became more dominant. In fact, these small modifications turn the microphone into a perfectly satisfactory unit for most amateur communications.

I went on to experiment with various passive "presence" peaking filters between the FET stages in the preamplifier to add even more "punch" to the sound of the microphone. It all started to jell but a bit too slowly, so I decided to try a completely different tack: replace the dynamic microphone cartridge with a unidirectional electret type and replace the preamplifier with an active equalizer. The electret element I had on hand was another surplus, but new, item I purchased for $1.00 to $2.00 ages ago. It had a built-in FET preamplifier as shown in fig. 2. You can still find these electret types on the market. They are distinguished by the electret element being separated from the internal preamplifier with open holes or slots behind the microphone element in the overall housing so a back pressure effect is developed on the microphone element to provide a directional pick-up pattern. But for all practical purposes for close-talking applications, any general-purpose replacement electret microphone element (e.g., Radio Shack 270-090) will suffice, as later tests confirmed. The electret was simply mounted in place of the dynamic cartridge using the built-in grill and wind filter. I glued it in place, but it could just as easily be packed in place using foam plastic material.

Since the microphone element now had a built-in preamplifier, the equalizer stage could be fairly simple, as shown in fig. 3. The .01 mF input coupling capacitor provides low-frequency roll-off. The equalizer circuit itself can boost the upper audio frequencies (centered roughly on 2700 Hz) up to 12 dB. The circuit is

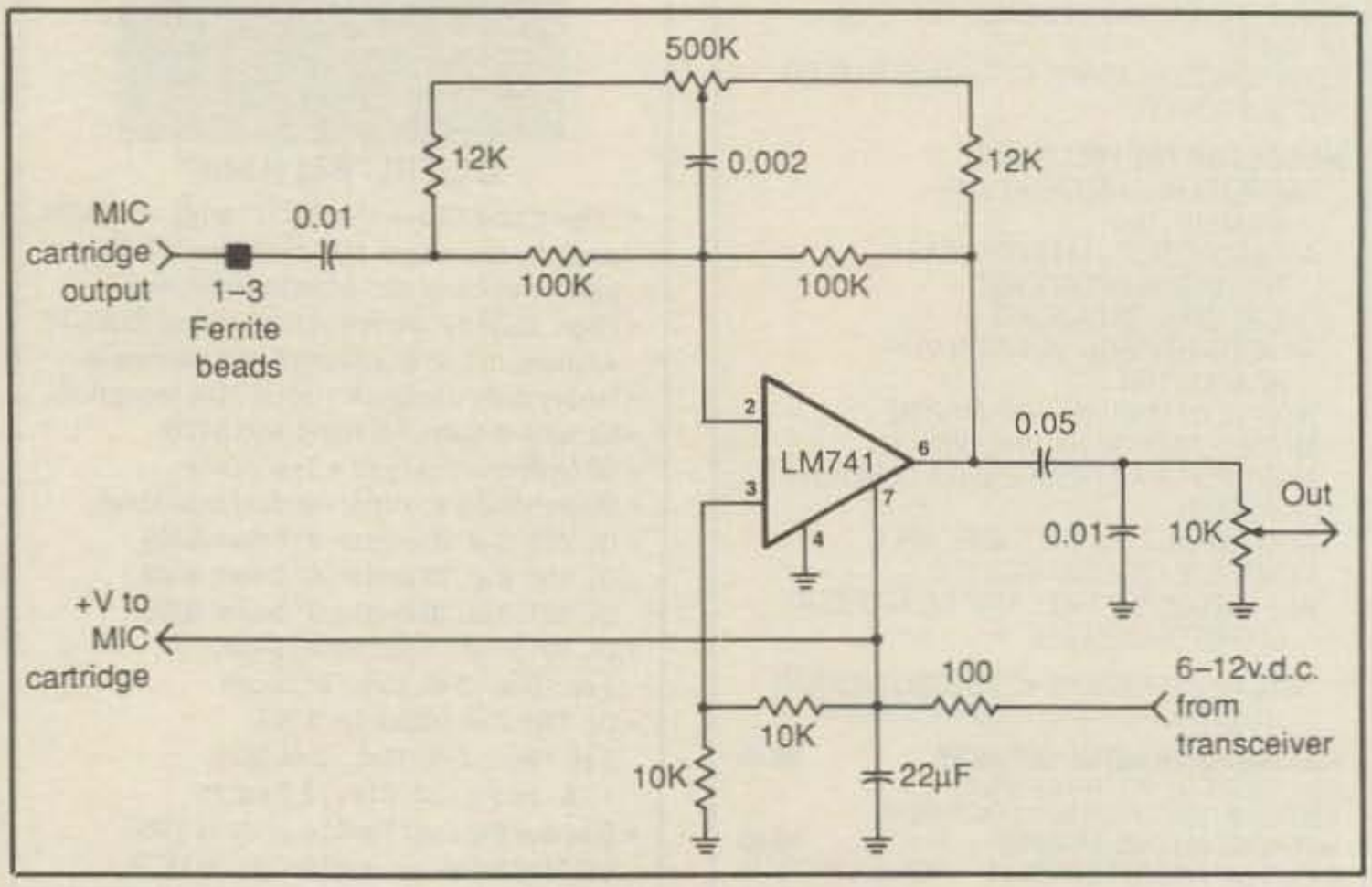
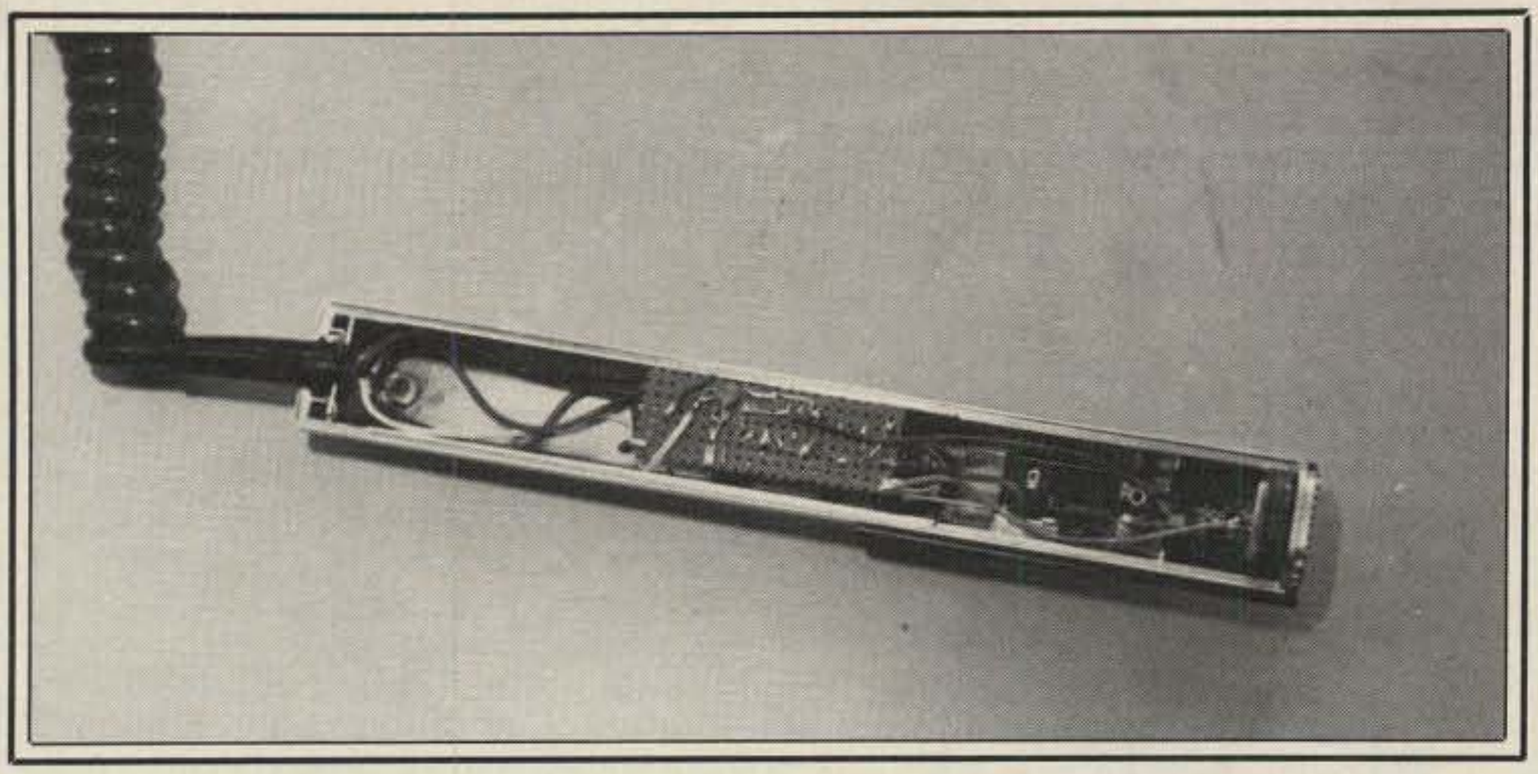


Fig. 3– Simple equalizer circuit to boost the higher audio frequencies. The two 100K ohm and two 12K ohm resistors and the .002 mF capacitor should be ±5% tolerance parts.



Looking inside the original 617 microphone you will notice a very neat in-line arrangement (from left to right) of the battery compartment, amplifier PC board, level control, and microphone cartridge. An extra PC board of the type used in the microphone is shown above the microphone.

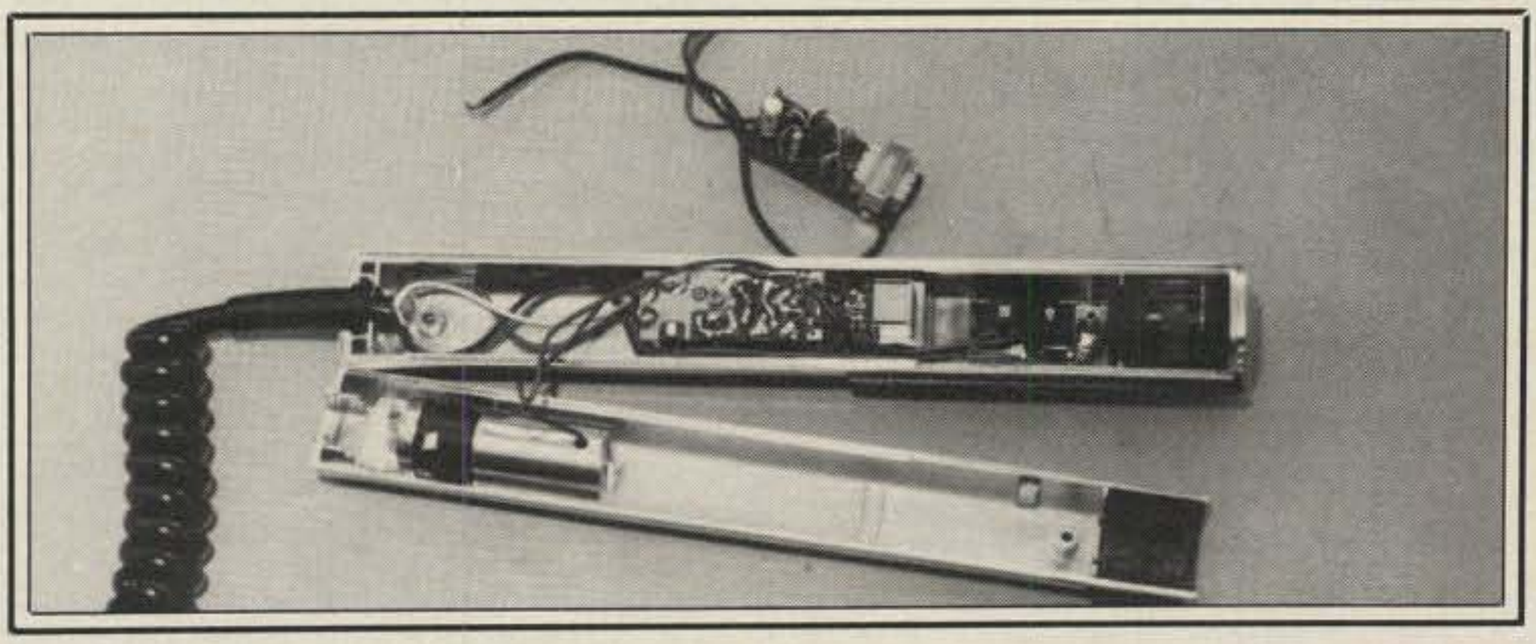
about as simple as can be made, and I would not suggest any modifications. The 10K ohm output level control is the original one that was in the microphone. The circuitry itself is mounted on perforated board stock of about the same size as the preamplifier PC board that was in the microphone. The photographs show the general idea. The only other change that was made to the microphone was to replace the PTT switch (a type which must continuously be depressed for transmit) with a push-on/push-off switch for more convenient operation. It just happened that a Radio Shack RS-275-1555 push-on/push-off switch fit exactly in the space that was available.

The modified microphone works excellently, looks good, and is a pleasure to use. I set the equalizer using on-the-air checks to produce the crisp type of audio I believe is best for intelligibility on the HF bands.

To sort of get back to the title of this article, is it worthwhile to play around with bargain-priced microphones? My answer is yes, providing you can recognize what might really be a bargain. The first and most obvious clue is simply the microphone housing itself. Neatly and solidly constructed housings stand out almost immediately from pressed together, flimsy plastic housings. Chances are that if a manufacturer took pains to properly design a microphone's housing, the same care went into the microphone's electronics.

Then you have to be willing to spend a bit of time to possibly modify the microphone, perhaps along the lines described in this article, to get the microphone to sound right. If you approach it as a fun project, it can be exactly that, and you can turn a $5.00 to $10.00 bargain into a quality microphone that will easily match the performance of communications-type microphones costing ten times as much.

Again, I emphasize that the modified, surplus microphone described in this article stands only as an *example* unit. As of this printing, however, the surplus microphone (Hy-Gain 617) is still available at $7.50 plus shipping from Burdens Surplus, Box 82209, Lincoln, NE 68501-2209.



The converted microphone. The PC board has been replaced by a small board with the equalizer circuitry of fig. 3. The microphone cartridge has been replaced with an electret type. Power is taken over the microphone cord from a Paragon transceiver.

Our Readers Say

WW DX Contest Winner

Editor, *CQ*:

Last night I was given the *CQ* magazine award for the 1986 World-Wide DX Contest club competition, for permanent display in my home. As president of the Frankford Radio Club at the time of the contest, I have been given this distinct honor.

On behalf of the Frankford Radio Club I would like to thank *CQ* magazine for this beautiful award, and for sponsoring this excellent contest. My personal fondness for the *CQ* WW DX Contest is reflected in my choice of calls.

Charles D. Fulp, Jr., K3WW
Secretary, Frankford Radio Club
Perkasie, PA

Sellers, Watch Out!

Editor, *CQ*:

Thank you so much for the rather refreshing article by Dr. Brossman in the April issue. The "Flea Market Bandit" has a terrific idea. I always wondered how in the heck I could dispose of those Motorola boat anchors in my garage. (The garbage collector refuses to take them; I have tried to sneak them out several times.)

All I can say is that W8PMS has now created a new twist in flea market caveats. Sellers, watch out!

Wayne Yoshida, KH6WZ
Fountain Valley, CA

Is Zone 29 Rare in Contests?

Editor, *CQ*:

I enjoy zone 29 to USA stations during contests where zones count as multipliers. However, over the past few years in each contest I have noticed that nearly every time I call a strong W station, by the time I give my callsign, he is calling CQ contest again, without having made a contact. Perhaps my Australian drawl or accent puts stations off? Honestly, most stations do not allow time for me to give my callsign.

If I do make a contact, most USA stations are very happy to have zone 29 as a new multiplier and they say so. So please, all you contest stations look out for the VK6 and leave enough time between calls.

By the way, there are only about 900 VK6 stations altogether and probably 4 or 5 active in contests!

Graham Rogers, VK6RO
Ferndale, Western Australia

NCC Award No. 4

Editor, *CQ*:

Thank you for the *CQ* NCC Award which arrived at my QTH today. I felt especially honored to discover the award was numbered 4. Please be assured that this award will occupy a place of honor in my shack, until the day my key falls silent, just as *CQ* occupies a prominent place by my easy chair.

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FL-63A	250 Hz CW filter (1st IF)	59.00	
FL-52A	500 Hz CW filter (2nd IF)	115.00	**109.95**
FL-53A	250 Hz CW filter (2nd IF)	115.00	**109.95**
FL-33	AM filter	49.00	
FL-70	2.8 kHz wide SSB filter	59.00	
RC-10	External frequency controller	49.00	

IC-735	HF transceiver/SW rcvr/mic	1099.00	**959.95**
PS-55	External power supply	219.00	**199.95**
AT-150	Automatic antenna tuner	445.00	**389.95**
FL-32A	500 Hz CW filter	69.00	
EX-243	Electronic keyer unit	64.50	
UT-30	Tone encoder	18.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	**1699**
PS-15 20A external power supply	175.00	**159.95**
PS-30 Systems p/s w/cord, 6-pin plug	349.00	**319.95**
MB Mobile mount, 735/751A/761A	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A	79.00	
PP-1 Speaker/patch	179.00	**164.95**
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	**139.95**
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AT-500 500W 9-band auto. antenna tuner	589.00	**519.95**
AH-2 8-band tuner w/mount & whip	659.00	**589.95**
AH-2A Antenna tuner system, only	519.00	**449.95**
GC-5 World clock	91.95	**89.95**

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IC-275H 100W 2m FM/SSB/CW	1399.00	**1229**
IC-375A 25W 220 FM/SSB/CW	1399.00	**1099**
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	**1099**
IC-475H 75W 440 FM/SSB/CW	1599.00	**1289**
IC-575A 25W 6/10m xcvr w/ps	1399.00	**1249**

IC-471H	75W 430-450 **Closeout**	1399.00	**989.95**
PS-35	Internal power supply	219.00	**199.95**
AG-35	Mast mounted preamp	99.95	
AG-35	**(Purchased with IC-471H)**	99.95	**9.95**
SM-6	Desk microphone	47.95	
EX-310	Voice synthesizer	59.00	
TS-32	CommSpec encode/decoder	59.95	
UT-15	Encoder/decoder interface	34.00	
UT-15S	UT-15S w/TS-32 installed	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic **Closeout**	499.00	**349.95**
IC-47A 25w 440 FM/TTP mic **Closeout**	549.00	**399.95**
PS-45 Compact 8A power supply	145.00	**134.95**
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, **TTP** mic	469.00	**409.95**
IC-28H 45W 2m FM, **TTP** mic	499.00	**439.95**
IC-38A 25W 220 FM, regular mic	459.00	**369.95**
IC-38A 25W 220 FM, **TTP** mic	489.00	**389.95**
IC-48A 25W 440-450 FM, regular mic	459.00	**369.95**
IC-48A 25W 440-450 FM, **TTP** mic	509.00	**449.95**
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic	509.00	**449.95**
IC-228H 45W 2m FM/TTP scan mic	539.00	**479.95**
UT-40 Pocket beep function	45.00	
IC-900A Transceiver controller	639.00	**569.95**
UX-19A 10m 10W band unit	299.00	**269.95**
UX-29A 2m 25W band unit	299.00	**269.95**
UX-29H 2m 45W band unit	349.00	**319.95**
UX-39A 220MHz 25W band unit	349.00	**289.95**
UX-49A 440MHz 25W band unit	349.00	**319.95**
UX-59A 6m 10W unit	349.00	**319.95**
UX-129A 1.2GHz 10W band unit	549.00	**499.95**
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UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	39.00	
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Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	
IC-1200A 10W 1.2GHz FM Mobile	699.00	**549.95**
IC-1271A 10W 1.2GHz SSB/CW base	1269.00	**1129**
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	125.00	**114.95**
EX-310 Voice synthesizer	59.00	
TV-1200 ATV interface unit	139.00	**129.95**
UT-15S CTCSS encoder/decoder	96.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	**1349**
RP-2210 220MHz 25W repeater	1649.00	**1469**
RP-3010 440MHz 10W FM repeater	1299.00	**1149**

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Hand-helds	Regular	SALE
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IC-2AT with TTP	319.00	**279.95**
IC-3AT 220 MHz, TTP	349.00	**299.95**
IC-4AT 440 MHz, TTP	349.00	**299.95**
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IC-03AT for 220 MHz	449.00	**349.95**
IC-04AT for 440 MHz	449.00	**389.95**
IC-u2AT for 2m w/TTP	329.00	**289.95**
IC-u4AT 440 MHz, TTP	369.00	**299.95**
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IC-32AT 2m/440MHz	629.00	**559.95**

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Aircraft band handhelds	Regular	SALE
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	**369.95**
A-2 5W PEP synth. aircraft HT	525.00	**479.95**
A-20 Synth. aircraft HT w/VOR	625.00	**569.95**

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
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RC-11 Infrared remote controller	70.99	
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FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker	65.00	
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VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

Since my last column a group of us endeavored a "gridpedition" to Chincoteague Island, Virginia for the June VHF Contest. Some may remember that we ran a small operation from the same spot last year, and as WB2WIK/4 we placed fifteenth nationally in the multi-operator category. More important, we gave rare grid FM27 to hundreds of VUCC chasers on the bands 50 through 1296 MHz. In 1987 six meters was in unparalleled condition and remained wide open to everywhere for the entire weekend. Surely, we couldn't hope for a return of those conditions in 1988.

Sure enough, we didn't get the fantastic conditions of last year. But thankfully we were far better equipped to make the best of the available conditions. This June we had three more operators than last year (for a total of seven). We also had two more towers, hundreds more elements, three more bands, and more power on 50, 144, 220, 432, and 903 MHz.

We planned to use Ivars Lauzums' callsign, KC2PX, mostly because Ivars supplied all the antennas we were to use—100% F9FT "Tonna" systems for 50 through 2304 MHz! Photos of our antennas look like advertisements for Tonna, but there were no complaints from anyone. The "skyhooks" worked flawlessly and allowed us to work more than we possibly could have with smaller systems. In addition to Ivars, other operators at KC2PX/4 included KT2B, K2OWR, WA2YTM, WB2IEY, WB2OTK, and myself. Bill, K2OWR, supplied a beautiful travel trailer with full galley, bathroom, and sleeping accommodations for six. Tom, WA2YTM, supplied our 3.3 and 10 GHz stations (two complete stations for each band). Another Tom, WB2IEY, supplied the 8877 amplifier for 220 MHz. Rich, WB2OTK, supplied our operating tents, heliax feedlines, and miscellaneous equipment (not to mention some fireworks to be set off under operators' chairs if the QSO rate began to fall). Ivars, Pete, and I supplied the bulk of the equipment, including legal-limit amplifiers for 50 and 144 MHz, multi-mode transceivers, transverters, sequencers, thousands of feet of feedline—you name it. Pete brought his Amqute portable computer for on-site duping. It was quite a setup.

From numerous points of origin we departed for Chincoteague on Thursday evening before the contest. It's hard to say who traveled the farthest: WA2YTM began his journey from Rochester, New York, while WB2OTK began his from Piedmont, South Carolina. Both fellows traveled about 500 miles to Chincoteague, but at least Rich had his family with him to make the trip a bit easier. WB2IEY started out from Kingston, New York (about 325 miles), while the rest of us began our trips from the western New Jersey/eastern Pennsylvania area and traveled the shortest distance, about 250 miles. Two-hundred-fifty miles doesn't sound so far, until you've done it pulling a top-heavy tower trailer that begins to "fishtail" terribly at speeds above 45 mph.

153 Rodman Court, Eatontown, NJ 07724

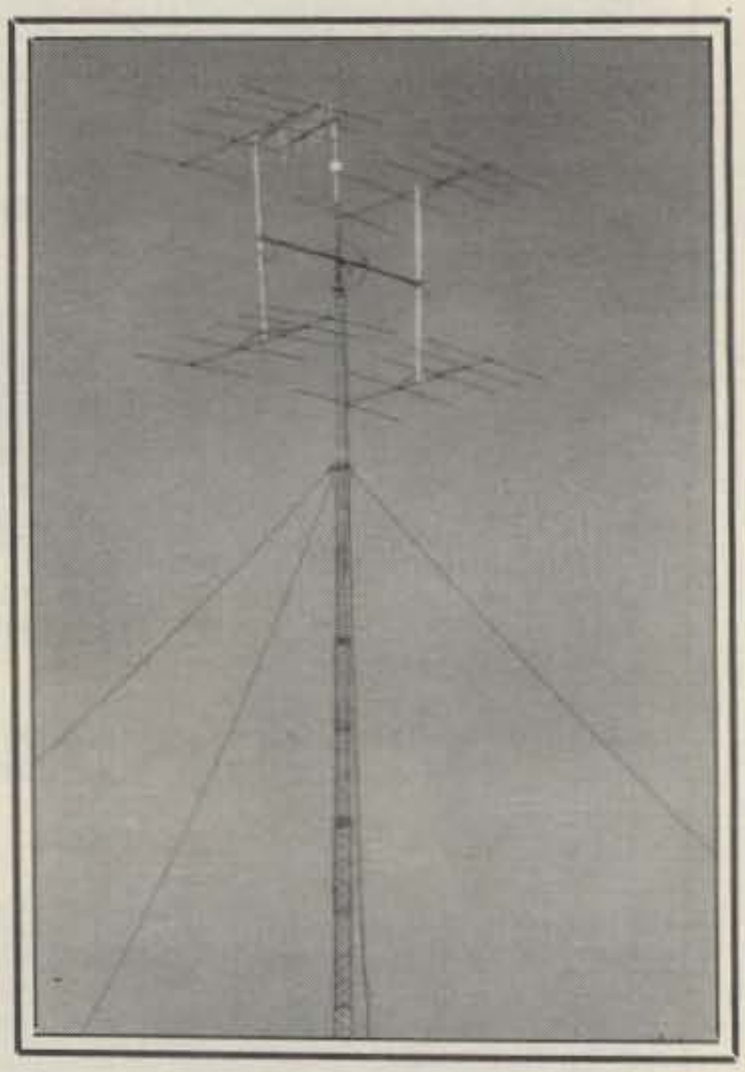
Bill, K2OWR, logs one on 6 meters. The rig was a TS830S, Microwave Modules transverter, Lunar intermediate PA and homebrew 4-1000A final by WB2WIK. Running 1 kw into 20 elements yielded about 40 kw ERP on 6.

The top-heavy trailer was our borrowed 100-footer, secured from KA2VAD a couple of weeks before the contest. It was a real kluge, obviously designed by someone with a warped sense of humor. Not only was the trailer very top-heavy (with a short wheelbase and narrow track to make things substantially worse), but the tower it carried took a small army to crank up. About 20 turns of the lift winch would raise the tower 1 foot, and it wasn't easy to crank! However, we were happy to have it along and thank Tom, KA2VAD, for making it available to us.

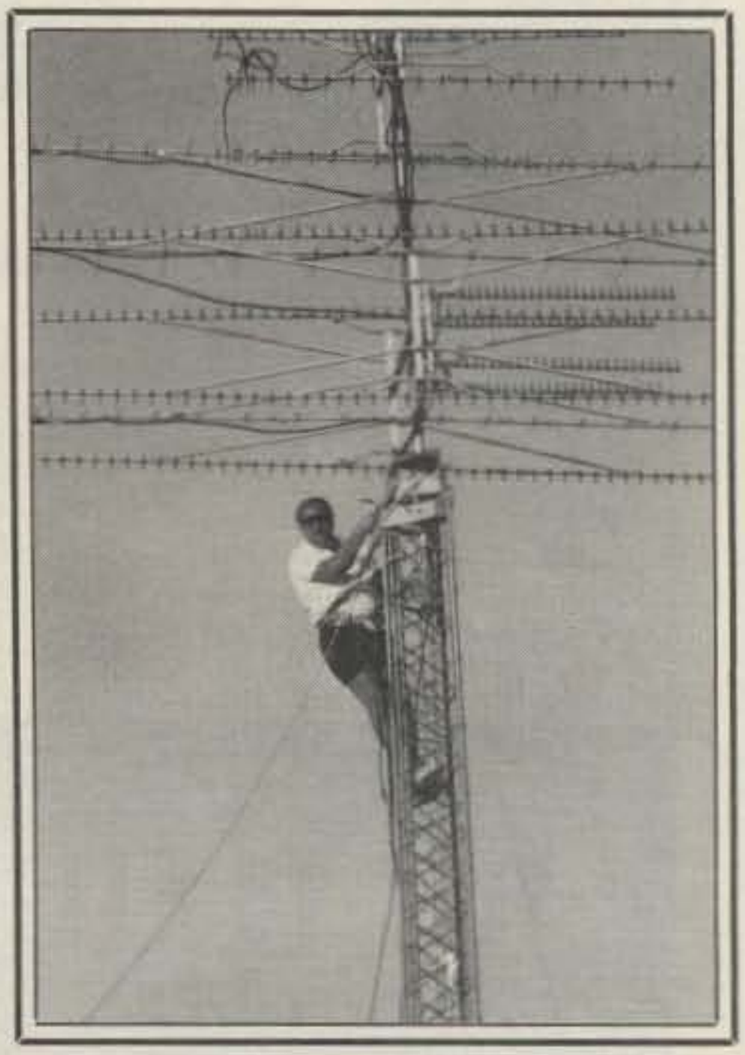
The other two tower trailers are of somewhat more modern design and are quite easy to tow at any reasonable speed. While KT2B struggled to pull the 100 foot monster with his dad's pickup truck, KC2PX towed the trailer carrying a 51 foot Tri-Ex, and I towed another trailer carrying a 65 foot Tri-Ex. We figured, "Three towers—no waiting." Good thing, for all three were completely loaded with antennas by noontime Friday!

The trailers carrying the Tri-Ex towers make an interesting story. I bought my 65-footer back in 1979 from Wayne Overbeck, N6NB, who built the trailer himself and really had no intention of selling it when he towed it to the east coast. It's a nice piece of engineering and only takes an experienced operator about 15 minutes to set up from scratch once parked. The 51-footer came to be when Mike, WA2VUN, inspected my 65-footer and said, "I can do that, maybe better!" Mike's been a professional welder for years and, with some help from W2HWG, built an even easier to use version that sets up in less than 10 minutes once parked. Any of these tower trailers have lots of advantages over starting from scratch with 10 foot sections and assembling them in the field. Ironically, my 65-footer may well end up back on the west coast. I'll probably be moving there in the next few months.

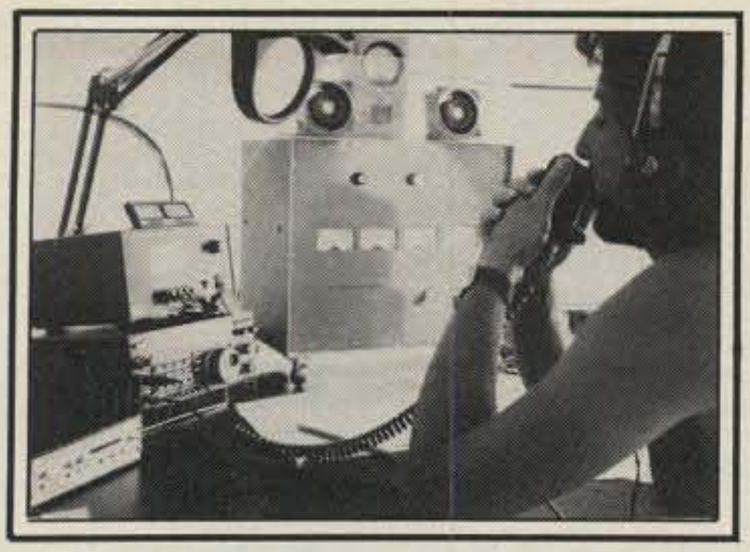
Anyway, after from 6 to 10 hours of driving, depending upon the point of origin, we all arrived at Chincoteague. K2OWR was first on the scene and installed a "KC2PX CONTEST HQ" sign on his trailer prior to dropping off to sleep



The 20-element 6 meter system at KC2PX/4. Antennas by F9FT, H-frame design, spacing, and phasing harness designed by WB2WIK. It was a fantastic system, with absolutely no sidelobes; we could notch a signal 60 dB off the side of this close-spaced system.



WB2OTK inspects the 220-element array for 23 cm. Interlaced within and around it are 100 elements (4 × 25) for 13 cm and 84 elements (4 × 21, stacked 21/21/21/21) for 70 cm. Just above the 23 cm "H" frame is the 92-element "H" frame for 33 cm. Whew!



Two meters is important enough to have its own tent. Here WB2WIK (yours truly) is talking it up on 144 MHz SSB.

Here Pete, KT2B, snags another one on 70 cm CW. The UHF/SHF tent also housed the 135 cm, 33 cm, 23 cm, and 13 cm stations. To Pete's right is the 903 MHz rig.

around midnight Thursday. Ivars, Pete, Tom, Tom, and I arrived in four more vehicles about 4 a.m. Friday, apologizing to Bill for being "a little late." (We intended to arrive around 11 p.m.) After Bill commented on us being "about a day late," we all attempted to get some sleep. I say "attempted," because those of us who camped out near Ivars didn't get a wink. His snore is almost as big as he is, and Ivars is a very solid 6'4". He promised to sleep in the back of his van the next night.

Seven o'clock Friday morning brought beautiful sunshine and breezy 80 degree weather to Chincoteague. We arose and drove to town for breakfast and groceries. First things first—you can't put up really good antennas on an empty stomach. Returning to the Chincoteague beachfront site, we broke into groups for assembly and erection of some rather monstrous antenna systems. Bill and I assembled the 20-element 6 meter array (4 stacked 5-element beams) and in a few hours' time had the system up and running on the 65 foot tower. Pete and Tom #1 did likewise with the 68-element 2 meter array (4 stacked 17-element beams) on the 100 foot tower. Meanwhile Ivars and Tom #2 worked their magic with the 534-element interlaced UHF array—38 elements for 220 MHz, 84 elements for 432 MHz, 92 elements for 903 MHz, 220 elements for 1296 MHz, and 100 elements for 2304 MHz, all by Tonna. This porcupine-like array was all installed on 18 feet of mast above the 51 foot tower, and because the UHF feedlines were mostly "hardline" or "heliax," we had trouble cranking up the silly thing. There must have been 500 pounds of feedline pulling against the tower, and each turn of the winch handle required a lot of effort. We parked the tower at about 40 feet and left it at that height.

The 2 meter tower was parked at 65 feet and the 6 meter tower was parked at 50 feet. We could have gone higher with all three towers, but the wind was very gusty, and we were a bit afraid of losing it all: 638 elements for 7 bands could have crashed to the ground quite easily if we weren't careful. As it was, we guyed all three towers once cranked up to the heights we were willing to risk.

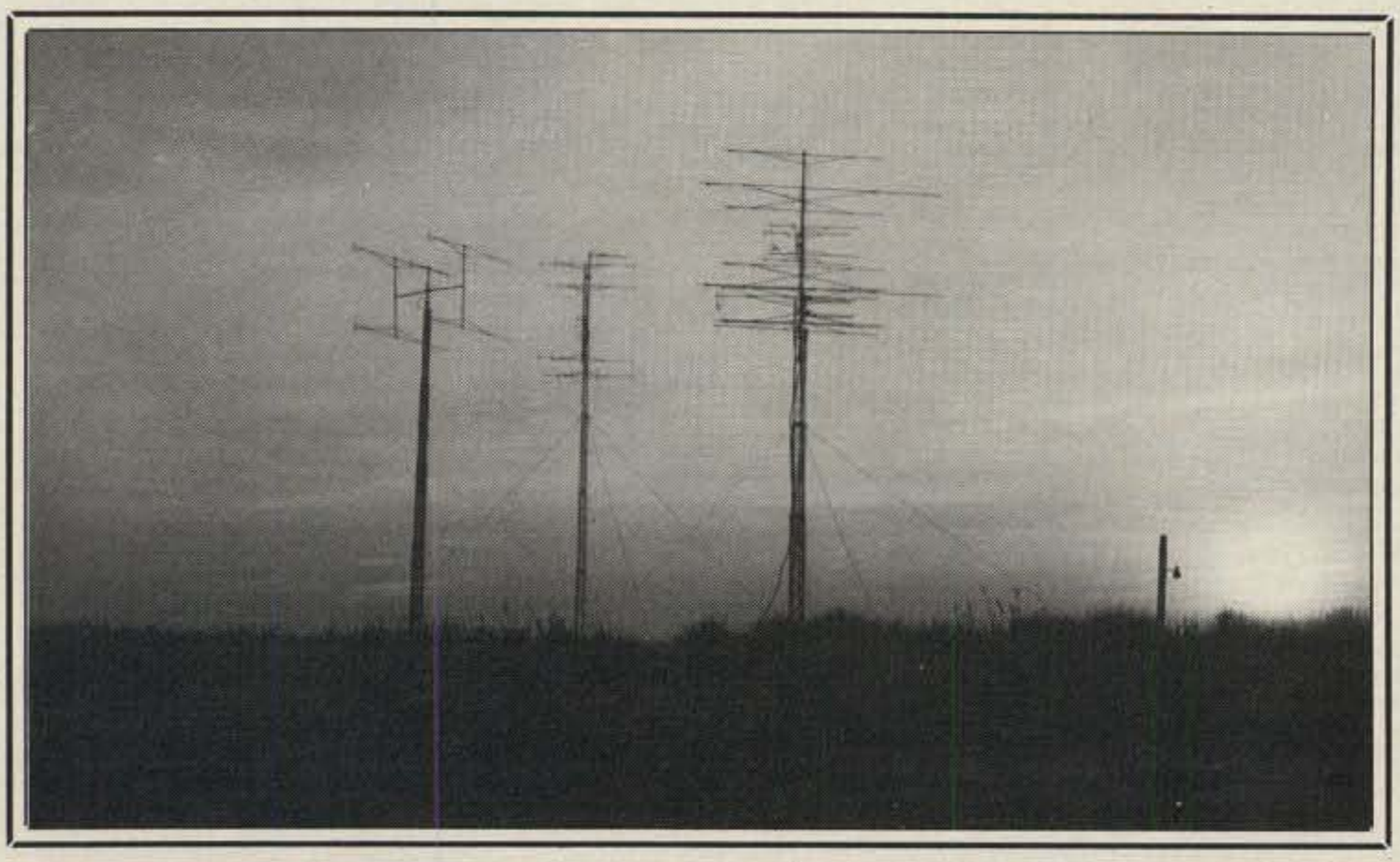
Incredibly, the only antenna system that wouldn't load properly was the stacked beams for 220 MHz. Some theorized that the interlacing of harmonically related antennas detuned the Yagis and caused the high VSWR we were seeing (about 3:1), but I didn't buy that story and recommended we take a dummy load to the top of the transmission line, where it met the power divider, to make some tests. Sure enough, the "Superflex" (heliax) feedline was bad. WB2IEY replaced it, and within minutes all was well.

WB2OTK and family arrived mid-afternoon Friday and proceeded to erect our operating tents. By 8 p.m. we had the stations mostly set up, generators in place, wiring completed. The tangled mess that UHF/SHF gear always creates wasn't quite worked out yet, but at least we were ready to go on 50 and 144 MHz, and the other bands weren't too far behind. Upon first keying the 6 and 2 meter kw amps (my 4-1000A for 6, Ivars' pair of 3CX800A's for 2), the generators powering those two stations groaned deeply, and we realized we'd just have to settle for 1000 watts output or risk damaging the little 5 kw Honda power sources. We reduced drive levels to achieve 1 kw output and left it at that.

WB2IEY's 8877 amp for 220 MHz took a while to set up. And that is a real understatement! I've never seen such a maze of boxes and wires, all for one amplifier. The amp hadn't been on the air in a long time, and Tom needed some time to get it all going. Finally, by the beginning of the contest Saturday the 220 station was running about 800 watts output and that seemed like enough. On 432 we used a Tokyo Hy-Power model HL25OU to run 250 watts output, all solid-state. What a pleasure! When the RF keying circuit in this amp started to "false" from 220 MHz energy, we would switch to a Mirage D1010N and run 120 watts output instead. With 84 elements (4 × 21 element beams) at 50 feet, and being the only station on from a rare grid, we figured that would be enough. Let them listen a bit harder for us. I had brought along the Henry 2004A for 432 (600 watts output from a 3CX800A7), but we didn't even bother using it.

The LT33S (20 watt version) for 903 ran well, as did the LT23S/7289 amplifier combo (60 watts output) for 1296. KT2B had not one, but two 2304 stations along. The "main" station was a factory-built LMW transverter driving cascaded power amplifiers to 10 watts output, while the "backup/rover" station was a kit-built LMW running about half a watt. The "main" station receiver died early on, and then the transmitter quit sometime Sunday. We made a few contacts on 2304, and at least we worked "ourselves," using the other ("rover") station in two grids, but this equipment was a big disappointment. WA2YTM's homebrew microwave gear worked well, although we only attempted to work our own "rover" with it. The next grid in any direction was *not* line-of-sight and would have proven a real challenge with such low power.

Meanwhile, 6 meter gear was being replaced left and right. When my kw amp failed to key reliably, I thought I had traced the problem to the "amp key" line coming from my (IF) exciter, a Yaesu FT101ZD. We replaced the 101ZD with a Kenwood TS830S and had the same problem before long. The problem turned out to be marginal relay keying voltage derived from a supply deep within my homebrew amplifier—never had a problem before, but the amplifier had never been run from an overloaded gasoline generator before. The slightly low line voltage reduced the relay supply just enough to keep it from pulling in reliably. What a nasty problem! We solved it by tearing the amplifier apart during a 5-minute break and wiring in an outboard (regulated)



Sunset at KC2PX/4. And a beautiful sunset it was, Sunday night near the contest's end. Left to right are the 2 meter tower (68 elements at 70 feet), the 6 meter tower (20 elements at 56 feet), and the UHF/SHF tower (total of 534 elements for 5 bands, centered at 49 feet). The UHF tower was closest to the camera.

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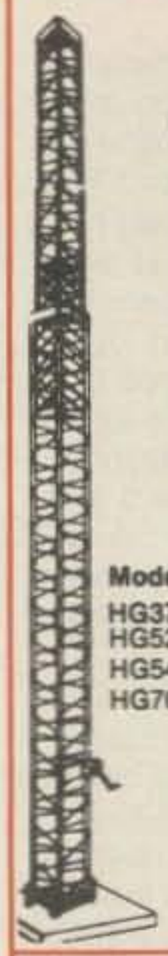

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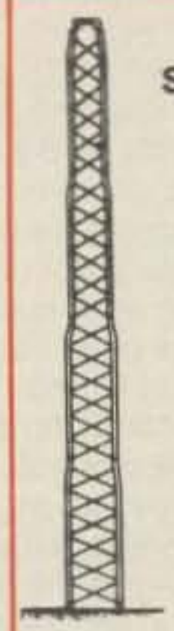

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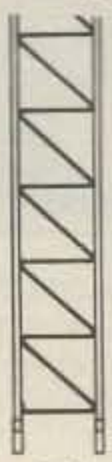

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110'	1359	2329	2839
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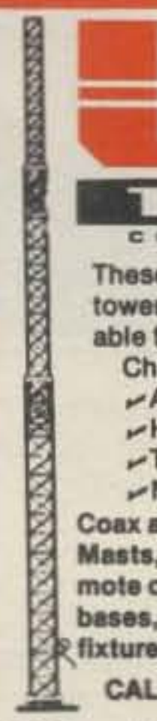

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TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

***Note-towers rated at 50 mph to EIA specifications**

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$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

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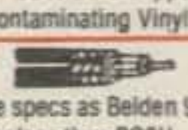
- Non-contaminating Vinyl Jacket Foam Dielectric

9086



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select connectors below.

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Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

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Van Gorden

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Short Dipole Kits		SD80 $35.95/SD40	$33.95
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A3 3-el Tribander	$259
A4S 4-el Tribander Beam w/S.S. Hdwre.	$349
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AV5 80-10mtr Vertical	$119
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A50-5 5-el 6 mtr Beam	$ 98
215 WB NEW 15-el 2 mtr Beam	$ 89
230 WB NEW 30-el 2 mtr Beam	$229
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105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
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14 AVQ 40-10 mtr vertical	
18 AVT/WB 80-10mtr Vertical	
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28BS 8-el 2 mtr Beam	
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HUSTLER

6BTV 80-10 mtr Vert	$149	5BTV 80-10 mtr Vert	$129
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G6-144B 2-mtr Base	$89		

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HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
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HF6V HF2V

FREE UPS on ACCESSORIES when purchased w/antenna

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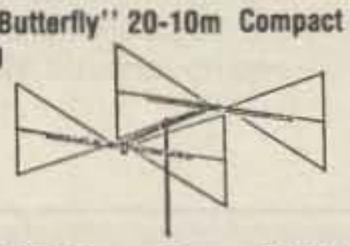

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- Boom Length 6 Feet
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Standard 8 cord cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)

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10 FT. STACKED SECTIONS

20G	$48.00	45G	$133.00
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ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Lead*	Price
FK2548	48 ft.	15.4 sq. ft.	$1049.
FK2558	58 ft.	13.3 sq. ft.	1099.
FK2568	68 ft.	11.7 sq. ft.	1149.
FK4544	44 ft.	34.8 sq. ft.	1389.
FK4554	54 ft.	29.1 sq. ft.	1469.
FK4564	64 ft.	28.4 sq. ft.	1579.

25G Double Guy Kit	$279.
45G Double Guy Kit	$299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

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3/16 EHS Guywire (3990 lb rating)	$.15/ft
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3/16 CCM Cable Clamp (3/16" or 5/32"	$.45
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3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
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1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	$13.95
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Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
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TS-711A **TS-811A**

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All Mode 2m Mobile

COMPACT 2M FM MOBILE

TM 2570A (70W) **TM 3530A (25W)**
TM 2550A (45W) **TM 221A (45W)**
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High Tech 2M HT XCVR

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TH-25AT
TH21BT, TH31BT
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Full Duplex-Cross Band Operation
CALL FOR PRICE-SAVE $$!

NEW FT290R 2m Portable
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FT 209/709 RH
NEW HIGH Tech HT's
5W Output

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- **5w Output**
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Heavy Duty- High Quality - Rugged - Reliable
- Input Voltage:105-125 VAC Output:13.8 VDC ± .05V
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RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

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- **Built-in AC Power Supply**
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- **PBT Plus IF Shift**
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B23A	2M	Yes	2W	30W	$129
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$259
B3016	2M	Yes	30W	160W	$229
D1010N	440	No	10W	100W	$319

rfconcepts

rfc 2-317 2M
30W in = 170W out
LIST $299.00

Model	Band	In-Out	List Price
2-23	2M	2-30W	$112.00
2-217	2M	2-170W	$299.00
2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
3-312	220	30-120W	$264.00

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AL80A

AL80A	$985.00	ATR10	$325.00
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AL1200	1825.00	RCS4	134.50
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Model	List	Model	List
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LK800A	$2695	LK800NT	$2995
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AEA

PK-232 Packet Controller.....$299.95
144 MHz Isopole.....$49.95
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Other AEA products also in stock call!!!

ALINCO

ELH-230G	CALL	ALR-22T	CALL
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ELH-260D		ALR-72T	
		ALD-24T	

Other items in stock - call!

Kantronics

KAM All Mode Terminal Unit.....$289.95
KPC II Packet Controller.....$159.90
KPC 4 Node Controller.....$299.90

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1270B/1274 TNC Units....$129.95/ 159.95
1224/1229 Interface.....$89.95/$159.95
202/204 Antenna Bridges...$59.95/$79.95
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CIRCLE 168 ON READER SERVICE CARD

Three tower trailers and two vehicles all in a line. In front is KC2PX's van towing the hundred-footer home. Next is WB2WIK's Volvo wagon towing the 65-footer. Last is KT2B's pickup towing the 51-footer. Pete was happy to tow the 51-footer home, having towed the 100-footer down. We took up 150 feet of highway driving down like this.

13.8 VDC power supply just for the relay. Then, just as the band opened to the west coast on Sunday afternoon, our 6 meter preamp (an ARR GaAsFET unit) went up in a puff of smoke, and we couldn't hear anybody. Good news was that we had a spare GaAsFET preamp, and were back on the air in 1 minute. Bad news was this preamp blew within minutes and we had no idea why. Once again, "This never happens at home!" syndrome reared its ugly head and Murphy struck for the umpteenth time.

Luckily, Ivars had brought along a spare transverter with an internal preamp and we wired this in and got back on the air quickly. About the only things we never changed on 6, other than the antenna, were the amplifier and the microphone.

Two meters ran almost flawlessly. We used an IC275A driving a Microwave Modules intermediate PA, then the pair of 3CX800A7s. The MML144/200 amplifier contains an excellent GaAsFET preamp which was helpful on some of the very weakest signals. On 2 meter FM we had an RF Concepts 170 watt amp, essentially brand new, which crapped out very quickly—no idea why. The other RF Concepts amp, a 120 watt unit for 220 which was used as an intermediate PA for the 8877, worked fine. Murphy followed us to Chincoteague in his own vehicle, in fact probably beating us there.

Based on signal reports received during the course of the contest I'd say we did splendidly. We must have heard at least 200 times "You guys are the strongest signal on the band from anywhere," both on 2 and 6 meters. Dozens of folks advised that we were literally the *only* signal being heard on the 6 meter band in various places, at various times. FP0/KA3B in St. Pierre acknowledged that when we worked him, he really wasn't hearing anybody else. We worked W4ZD in Florida on 2 meters *without E*-skip or unusual tropo. This is a long way from northeastern Virginia no mattter how you cut it. Bev was surprised to work us.

When it was all over we had 160 grids on 6 meters, 52 grids on 2, and lots and lots of grids on the higher bands. I think we completed every single 220 MHz sked we made, including those into the midwest. Just goes to show what a seashore location—with absolutely no elevation—can do, at least on the east coast. We nearly achieved our goals of 1000 QSOs in 300 grids, falling just a few short of each. Being bordered by the ocean for 180 degrees and in an area almost devoid of any local activity hurt us, as it would anyone similarly situated, but we had fun and worked out well.

Rough calculations indicate we made about 1.5 QSOs per element of antenna system at KC2PX/4! More important, I figure we made 6.6 QSOs per beer consumed—not a bad rate, considering only three of us were drinking beer. If only we had known, we could have brought more elements and more beer, and had a higher score!

As always, breakdown of the equipment and antennas went much faster than setup. We began disassembly at 7 o'clock Monday morning and by 1 p.m. we were rolling past the gates of the harbor refuge we used as our contest site. One of the photographs shows the three tower trailers, complete with two vehicles, on the way out. If I ever mention doing this again, please remind me to have my head examined.

I should thank KA2VAD for the loan of his tower trailer and WA2VUN for fabricating our custom-heliarced "H"-frames for 50 and 144 MHz and the loan of his 4 kw generator. Thanks to the officials and townspeople of Chincoteague for lending us their beautiful harbor for a contest site. Thanks also to those having the patience to listen carefully for us and complete contacts with us. And "you're welcome" to the several hundred stations for whom we were the "first FM27." QSL to KC2PX via his *Callbook* address.

Because this story needed to be told (?), I've used it to preempt other material for this issue. We'll have lots more interesting stuff in October. I'm off the air right now, in the middle of a move, so please keep cards and letters coming to fill me in on band conditions or anything that you feel is important.

73, Steve, WB2WIK

The Packet User's Notebook

a feature by
BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Packet is Spreading Fast

Please keep in mind that packet is a new member of our amateur radio communication modes. This is why those of us who are among the long-time users of packet extend a helping hand to the newcomer. These new packeteers are entering this mode in surprising numbers. I am not really sure what the attraction is, but I do know that it had the same effect on me.

Even the commercial market is going headlong into packet networking. The communications common carriers are literally investing millions of dollars in packet switching networks.

The impact of this recent move by the big data crunchers has had its effect on the "skilled" technical labor field. Broadband and cable technicians are needed in almost every facet of data communications. The unemployed fiber-optic technician and splicer are becoming rare, indeed.

For many common carriers, packet networking breaks down the barriers to high-speed, accurate data transfer. It provides a solution to an ever-increasing problem of how to speed-up data transmitted to a more demanding, information-oriented public. We haven't really begun talking about the needs and requirements of business and government! I can't think of one part of our society that is not, or will not be, using packet networking within this decade.

The 1990s will admonish us for not preparing in the '80s for the vast onslaught of information requirements from the gigantic think tanks and mainframe computers. For what it's worth, the hobby you are now enjoying may soon prove to be your most valuable asset! If you are interested in this field as a profession or skill, it certainly has a future to offer you. This is the reason why I have written the "Packet Users Notebook." Study the contents and you may soon find that you are better versed in the data communications field than you thought.

What Is A Packet?

I sometimes digress to explain packet definitions that have already been covered. This is because I receive many letters and requests for additional information, and, let's face it, this postage increase has limited my letter sending. By the way, I'll be happy to help you as much as I can with your questions, but *please* include an SASE with your letter.

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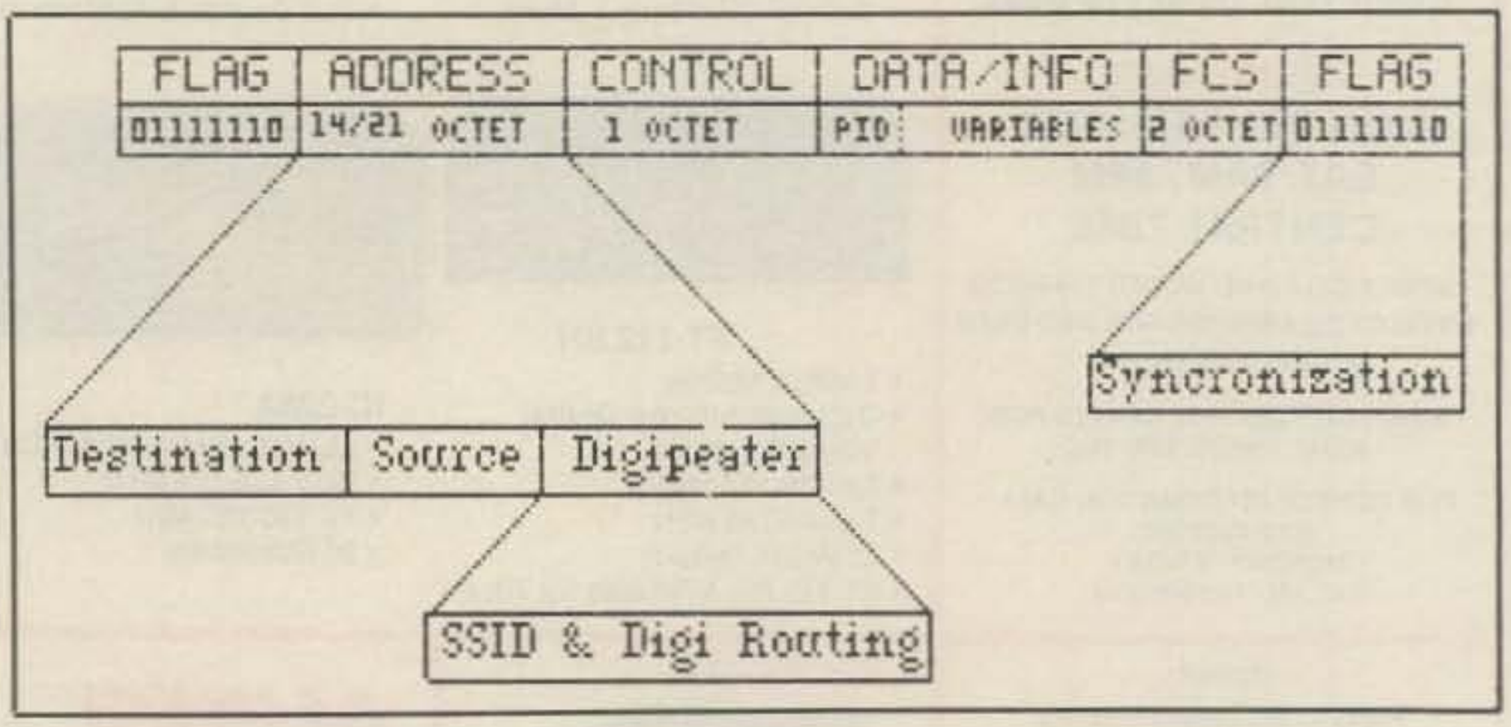


Fig. 1–AX25 frame format. Some error detection is exercised by the "control" bit.

A packet is a group of binary bits (data) that includes addressing and call control codes. They are transmitted and switched in accordance with the call control headers and address flags. An address flag, in simple terms, is that part of a packet that tells the packet that station to go to. The call control bit counts the packet data words and provides a means of error checking (see fig. 1).

If the count is correct at the receiving station, an "acknowledgement" (ACK) is sent to the sending station, and the next packet is sent. If, on the other hand, a bit is lost enroute, the receiving station will send a "No acknowledgement" (NACK) to the sending station, and the frame or packet will be sent again.

For those of you who have the TNCs with the light-emitting diode (LED) on the face marked **STA** (status), this is how you know the receiving station has received your packet. The LED will go out when an **ACK** has been received from the connected station. This lets you know they have received your message or packet.

We are beginning to understand the manner in which many packets can be used to transfer a lengthy file or program. The information arrives error-free as though it had been hand carried to the receiving station. We notice another side benefit to amateur radio packet whereby the transmitter is only keyed for the period it takes to send a packet; then it relaxes until an ACK is received.

Most of us set the **FRACK** (abbreviated FR, delay in seconds TNC waits for an ACK before resending the packet) at 4. If the TNC defaults to 4, we leave it there. There is nothing wrong with this setting if you are using 2 or 3 digipeaters (packet relay station). If you are connected direct, that's another story. Here's why: A happy medium must be set for some of our TNC commands. A common ground for the FRACK command is 4. As we soon discover, this command can be set to any number from 1 to 15. Each increment has the value equal to one second. If I am connected via two digipeaters, my FRACK of 4, then becomes approximately 20 seconds. The reason for the increase is because FRACK looks at the number of digipeaters I've used in my path to get to the connected station.

The TNC calculates the new delay using this formula: FRACK multiplied by twice the number of digipeater used plus one. In addition, some TNCs will add a random second to the wait time in an effort to avoid possible collisions. This is okay if we are digipeating, but it is not so good if we are passing a file on a clear frequency without using a digipeater (connected "direct"). It is here that we want to achieve speed and move the traffic or files to the other station in a minimum amount of time. This is what we are really looking for, and so we experiment with file transfers. One of the ways to hone and fine-tune these transfer parameters is to drop the FRACK to as low a number as we can.

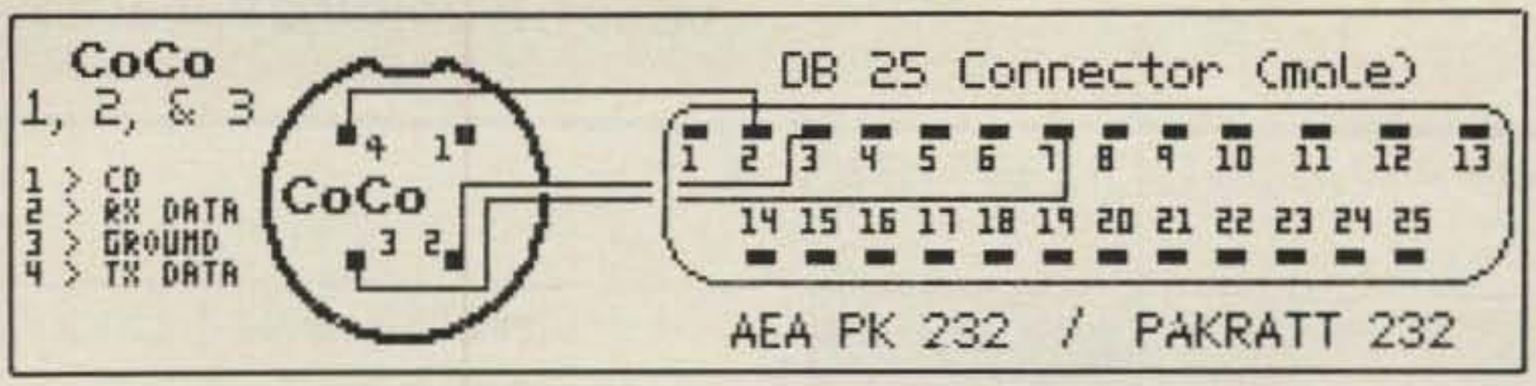


Fig. 2– TRS-80 color computer to AEA PK-232 TNC.

I sometimes use a FRACK of one. TXD is the delay after the TNC keys the PTT line of the transmitter before it starts sending packets. If it is too short, the packet or part of it is lost before a relay drops in or the synthesizer locks up. Work with another station and lower the setting until your packets fail to get through. Once you reach that level, raise the TXD up about 10%. DW (DWait) is the time a TNC waits after it has heard channel activity before it will send a packet. RESP (response time) is the delay the TNC waits after receiving a packet before sending an acknowledgement. By experimenting with different (smaller) settings of these commands, I have been able to move a 100,000 byte file without the first retry, and at 2400 BPS PSK **Hbaud**.

Just for the record, I am not encouraging you to use the same parameters as I use. Each TNC will exhibit a "personality" of its own. The default settings are okay for routine activity, particularly when you are just getting started. I do advise you to experiment with other stations in your area after you've gained some experience on packet. You can develop good local continuity between you and other packet stations in your LAN (local area network).

220 MHz Is Alive

In the mid-'70s, I enjoyed trying my luck with 220 MHz. In those days, it was a challenge to attempt a contact across town. I'll never forget my first long-distance QSO with a station in Chattanooga. My QTH was Atlanta, and the station I made contact with was over 100 miles to the north. This was the beginning of a quiet haven for me because I am a VHF, UHF, and micro-wave addict, anyway.

In those days, we had access to very little UHF gear. My station consisted of a modified, tube-type, twin-V, 2-meter rig and a 4-tube homebrew transverter. Since that time I've watched 220 as it went from warm to cold and back to warm again. Now it's beginning to show some warmth as we start to use it as a band for packet as well as voice repeaters. A few months ago, we amateurs were on the verge of losing a portion of this promising band, and we are not completely out of the woods, yet.

Several of us in Georgia, Florida, South Carolina, and Alabama use 220 for clear, 2400-BPS packet. Why bother with contested packet frequencies? Personally, I've discovered that 220 MHz is much better than 2 meters! There are several advantages to operating 220 MHz. One is that noise is lower; so low-powered transceivers are able to communicate over greater distances. The antennas for 220 MHz are clearly smaller for the same configuration. This allows more gain for size versus the 2 meter antennas. With voice repeaters the situation is even better since the offset between the input and output frequencies is 1.6 MHz. By and large, there is less chance of intermod problems from commercial radio services, too.

There is no longer a shortage of commercially manufactured, 220 MHz gear. The big reason we don't see more activity on 220 is because the price tags of 220 gear are beyond the limits of some Novices' wallets. At the moment we are experiencing a growth in 220 packet which may soon rival the other VHF bands. 220 MHz lends itself to longer ground-wave contacts than 440. Watt for watt, you will find 220 is where your buddies are when you can't find them on 2 meters.

I am seeing LANs springing up in some areas of the southeast. Networking has found 220, now that the gear is available for it. Some of the early packeteers were taking a wait-and-see attitude for awhile, thinking that 220 may wind up being used as an exclusive high-speed trunking band. Now that all that smoke has cleared, they have settled down to do some serious packeting on 220 MHz.

As 145.010 MHz is to 2 meter packet, so 223.400 is to this band. This is the nationwide "calling" frequency. I notice this is where the new Novice packeteer goes as soon as the packet station is ready.

Many of the packet users in this area are using 220 MHz with the 2400 BPS option. This add-on modem board is easily installed to the present TAPR I, II or clones. A direct plug-in 2400 BPS modem is available for the Kantronics KPC-4 and KAM. The 2400 BPS add-ons are available from Kantronics Inc.; suggested retail is $69.95. For your information, 2400-BPS, phase-shift keying is legal on frequencies above 28 MHz. Now there is a way to enjoy high speed packet on HF.

We now have packet gateways from 1200 BPS to 2400 BPS. This is a way to add that 2400-BPS trunk to your cross-country data and file transfers. We have installed links like this from central Georgia into Alabama, and it is worth every cent of the investment.

I am biting my tongue as I say this; there are very few BBSes on 220! So be it. Here is a band with more spectrum than the 144 MHz band, so go for it. If you are a Novice, you don't have to upgrade to move up to quality.

In these few months of "The Packet Users Notebook" we've covered many areas and facets of packet radio. In coming issues, I plan to delve into the new and improved modes of packet—minimum-shift keying (MSK), quadrature-phase-shift keying (QPSK), wide-band super baud (WBSB), and some very new techniques which have no titles as yet. These mode enhancements are tried and tested by myself and other beta-testers. The track records are now documented, and I will convey our findings to you. Some enhancements are good, and some are yet to be called an improvement. I will call them like I find them.

I am beta-testing a new terminal program, which appears to have everything you wanted in a terminal program, but were afraid to ask for. Compression and decompression is there for openers. I'll have more on all these packet delicacies in the future installments of the "Packet Users Notebook."

CQ de BucK4ABT

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for September is:

Thomas L. Harmon, W2CUK USA-CA All Counties #515, Mixed, 7-7-86

"My first contact with a county hunter was on November 18, 1982 with Charlie, WØQWS, who was on the county line of Johnson and Petis in Missouri. My last was on July 1, 1986 with Bob, WA4CHI, who was in Spencer, Kentucky. It took 3 years, 7 months, and 20 days, with 3400 entries in 147 log sheets to achieve USA-CA All Counties #515. The station equipment was a Yaesu FT-102 barefoot with an HQ-1 Mini Quad and a trapped 80–40 meter dipole.

"A friend of mine, Dave, KB4AV, who is a county hunter, at present inactive, suggested that if I wanted to do something different I should check out 14.336 MHz. Well, it surely was different, and after listening a while I threw in my call and got a report back. After a few contacts from around the country, from places I had never heard of, I was hooked.

"Way back in 1933 a neighbor gave me a crystal set, some wire, and a single earphone. Since then I have been interested in radio. The Boy Scouts taught me the code, and in senior high school I built several battery-operated one- and two-tube radios.

"In 1942 I enlisted in the Army, passed the code aptitude test, went to Fort Monmouth, and attended radio operators school. Then through some quirk I was sent to Drew Field at Tampa, Florida, where I was enrolled in radar maintenance school. I ended up teaching in the school and finally was assigned to a permanent maintenance crew. The school was moved to Camp Pinedale at Fresno, California, where I stayed until the end of the war.

"After being discharged from the Army, I returned to my home in Binghamton, New York and went to work for the New York Telephone Company in the central office. There I was subjected to 'evil influences'—both my boss and a co-worker were hams! They got me interested in amateur radio, and I finally got my license in 1949.

"My wife, Ruth, and I were married during the war. We raised three children and now have thirteen grandchildren. No one in the family ever showed any interest in ham radio. Ruth and I have attended the

333 South Lincoln Ave., Mundelein, IL 60060

T.L. Harmon, W2CUK, in his shack in North Myrtle Beach, South Carolina.

MARAC national conventions, beginning with the Asheville, North Carolina convention in 1986, as well as mini-conventions in Manchester, Tennessee and Little Falls, New York. We had a great time at all the conventions we have attended. It surely is nice to meet all the hams we have talked with over the years.

"I am now retired and have lived in North Myrtle Beach, South Carolina for seven years. We are a half mile from the beach and like the area very much.

"My thanks go to all the mobilers and all the operators, too numerous to mention, who helped me along the way to achieving USA-CA All Counties #515. Yes, I'm going for two, but in no hurry. As the man says, 'They will always be there.'

73, T.L. Harmon, W2CUK."

USA-CA Special Honor Roll

Robert Moses, Jr. High School ARC, WB2RCJ
Trustee: William Jansen, K2HVN
All Counties #569, All SSB, 5-2-88

John Simplair, Jr., KC3AD
All Counties #570, All SSB Mobiles, 5-2-88

Paula Batema, N8EMV
All Counties #571, All SSB, 5-4-88

Lawrence J. "Larry" Moore, K6SLP
All Counties #572, Mixed, 5-9-88

Awards Issued

The Robert Moses, Jr. High School, WB2RCJ (Trustee: William Jansen, K2HVN) filed a completely filled record book and claimed USA-CA All Counties #569, USA-CA 3000 #600, USA-CA 2500 #674, USA-CA 2000 #744, USA-CA 1500 #833, USA-CA 1000 #1016, and USA-CA 500 #2252, All SSB, dated 5-2-88.

USA-CA Honor Roll

3000		1500	
WB2RCJ	600	WB2RCJ	833
KC3AD	601	N8EMV	834
N8EMV	602	K5IID	835
2500		**1000**	
WB2RCJ	674	WB2RCJ	1016
KC3AD	675	N8EMV	1017
N8EMV	676	N2GOI	1018
K5IID	677	KF5UC	1019
		K5IID	1020
2000			
WB2RCJ	744	**500**	
KC3AD	745	WB2RCJ	2252
N8EMV	746	N8EMV	2253
K5IID	747	WB3IPE	2254
AK2H	748	KF5UC	2255
		K5IID	2256

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is $4.00. For non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for $1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

John Simplair, Jr., KC3AD, finished up his paperwork and received USA-CA All Counties #570, USA-CA 3000 #601, USA-CA 2500 #675, and USA-CA 2000 #745, All SSB Mobile, dated 5-2-88.

Paula Batema, N8EMV, claimed a fully endorsed certificate and received USA-CA All Counties #571, All SSB, plus USA-CA 3000 #602, USA-CA 2500 #676, USA-CA 2000 #746, USA-CA 1500 #834, USA-CA 1000 #1017, and USA-CA 500 #2253, All SSB Mobiles, dated 5-4-88.

Larry Moore, K6SLP, completed his quest for that final confirmation and claimed USA-CA All Counties #572, Mixed, dated 5-9-88.

Thomas R. Horton, K5IID, took a big step toward the ultimate goal by claiming USA-CA 2500 #677, USA-CA 2000 #747, USA-CA 1500 #835, USA-CA 1000 #1020, and USA-CA 500 #2256, Mixed, dated 5-20-88.

Vernon H. Ash, AK2H, moved ahead in his drive for all counties and claimed USA-CA 2000 #748, All CW, dated 5-23-88.

William B. Kelly, N2GOI, received USA-CA 1000, #1018, All 20 Meter SSB, dated 5-14-88.

Ken Kliman, KF5UC, filed his good application for USA-CA 1000 #1019, and USA-CA 500 #2255, Mixed, dated 5-16-88.

USA-CA 500 certificates went to:

Robert Moses, Jr. High School,

WB2RCJ, USA-CA 500 #2252, All SSB, dated 5-2-88.

Paula Batema, N8EMV, USA-CA 500 #2253, All SSB, All Mobile, dated 5-4-88.

Rodney W. Hackman, WB3IPE, USA-CA 500 #2254, All SSB, dated 5-11-88.

Ken Kliman, KF5UC, USA-CA 500 #2255, Mixed, dated 5-16-88.

Thomas R. Horton, K5IID, USA-CA 500 #2256, Mixed, dated 5-20-88.

Awards Available:

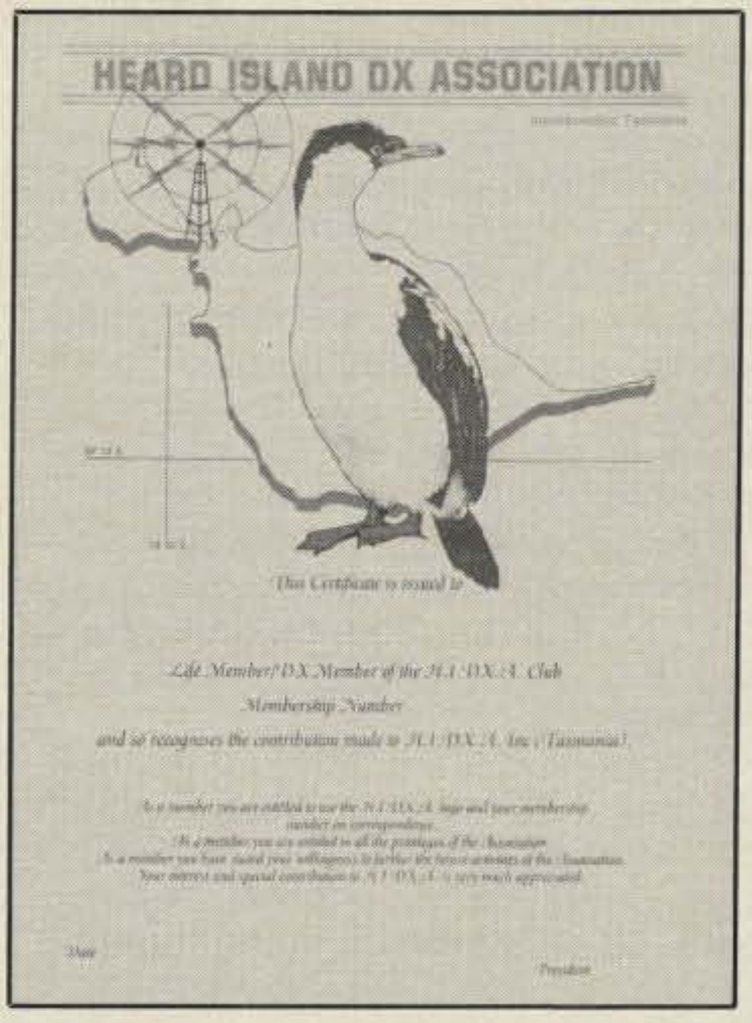
Falun Copper Coin Award—Sweden. The Falun Radio Club offers an award in the likeness of a replica of the "one dollar copper coin" from King Karl XII's 18th century reign. Contact stations in the county of Falun. All QSOs must be made in the same mode, not mixed, with a minimum signal report of 338 or 33. For stations in Zones 14, 15, 16, and 20, each QSO counts 1 point. All others receive 5 points for 80 meters, 3 points for 40 meters, and 2 points for 20, 15, or 10 meters. You must earn 10 points. The same station may be worked once per band. Contacts have to be verified by a QSL card. Send GCR list and $15.00 US to: Falun Radioklubb, P.O. Box 70, S-791 29 Falun, Sweden.

The Freebooters Statuette—Sweden. This award is in the form of a miniature statuette similar to the one outside of an old homestead museum of Hassleholm. Work 5 club members (SMs need 10) plus club station SK7BK. On VHF work 3 (SM equals 5) plus SK7BK. Two of the required contacts may be with honorary club members; these include any stations that have already earned the statuette. Contacts after 1 January 1969 are valid. All bands and modes (except repeater) are acceptable. SWL okay. Send GCR list and fee of 100 Sw. Kroner (or equivalent) to: Radioklubben Snapphanen (SK7BK), P.O. Box 150, S-281 01 Hassleholm, Sweden.

Member list: SK7BK, FT; SL7CA, ZN; SM7ALI, ANL, ASN, ATT, BAH, BBV, BBZ, BDU, BLU, BUE, BXK, BYK, BZO, CGW, DGC, DHK, DJG, DMN, DMT, DRQ, DUH, EYE, FGK, FPI, HGW, HTH, HZV, ILW, INL, JFM, JRC, JRD, JZM, KBG, KHF, KNS, KUF, KUR, KUS, LDH, LKI, LMC, KPK, LCO, MIM, OKC, OLB, VO.

Historical note: Skane is a southerly province of Sweden which belonged to Denmark until 1658. During the 17th century armed Danish partisans, or "freebooters," fought against the Swedes. The freebooters lived in caves deep in the large forests in the northern part of Skane, called Goinge. Tourists now enjoy the region and find the freebooters province a holiday paradise with deep forests, gentle ridges, rolling plains, and glittering lakes.

Heard Island DX Association Club. You are invited to join the HIDXA Club, which was formed in mid-1983 shortly after the re-



Membership certificate offered by the Heard Island DX Association to DXers worldwide.

turn of the HIDXA Expedition to Heard Island. Today the club has 250 DX and 35 Life Members.

Members are encouraged to keep in touch with each other, and the association keeps in touch with members on a regular basis by newsletters and membership lists. Use is also made of 14.220 MHz each Sunday at 0600 UTC to run the HIDXA Net. For over 7 years 14.220 has been the focal point of DXing in the Pacific. Most DXpeditions try to check in as a matter of course. In addition, a wealth of DX information is exchanged.

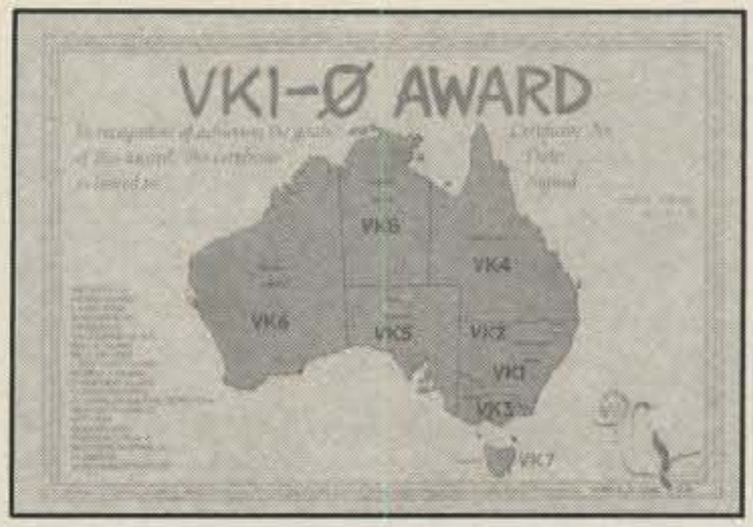
Since the club was formed, members have contributed to several DX activities in the Pacific area—QSL cards, QSL chores, antennas, etc. Several members have sponsored memberships for stations in difficult locations.

Membership is appreciated, and input would be welcomed. Check into 14.220 when you get a chance. Perhaps they can help with DX information, QSL routes, etc. You will find the 14.220 user friendly. (*Ed. note: This information courtesy of James B. Smith, VK9NS, President HIDXA, P.O. Box 90, Norfolk Island, Australia, 2899*)

Worked All VK1-Ø Award. The Worked All VK1-Ø Award is available from the Heard Island DX Association to any licensed radio amateur or SWL who meets the requirements.

Object: To have confirmed QSOs with HIDXA members in each of the ten call areas of Australia (VK1–VKØ). To encourage inter-HIDXA member contacts. To encourage other amateurs to seek QSOs with HIDXA members in Australia and Territories.

Cost: The award is available free to



VK1-Ø Award available from the Heard Island DX Association Club.

HIDXA members except for postage charges of $1.00. Non-members will be required to pay a total of $2.00 to cover postage and handling costs.

Requirements: (1) One confirmed QSO with any station on Heard island (no date stipulation). (2) Two confirmed QSOs with HIDXA members in each of the following callsign areas of Australia: (a) ACT VK1, (b) NSW VK2, (c) VIC VK3, (d) QLD VK4, (e) SA VK5, (f) WA VK6, (g) TAS VK7, and (h) NT VK8. (3) Two confirmed QSOs with HIDXA members in any two of the following VK9 call areas: Lord Howe Is., Norfolk Is., Christmas Is., Cocos (Keeling), Mellish Reef, Willis Is., and N.B. QSOs with VK9NS on 14.220 do not count. (4) One confirmed QSO with any HIDXA member in any one of the following VKØ call areas: Australian Antarctic Bases—Casey, Mawson, Davis (or any other Antarctic location); Macquarie Island. (5) HIDXA members must be financial on date of QSO. (6) To ease administration, no endorsements are available. (7) QSL cards must be in the possession of the applicant. (8) Completed application forms and charges are to be sent to HIDXA Awards Manager, P.O. Box 90, Norfolk Island, Australia 2899 (or designated alternative). (9) HIDXA membership list will be available for nonmembers from the above address for $2.00, including postage.

Four Corners Award. The Four Corners Award is an open award designed to be issued for successfully working the four geographical corners of the continental United States. The starting date is 1 February 1988. Prior contacts with the assigned stations and grids, as outlined below, will not be honored.

This is a six-part award and may be completed on any of the amateur frequencies and modes as approved by the FCC. The grids are assigned from the ARRL grid locator for North America, which is available from the ARRL. Sounds easy? Read on.

Part 1—The Certificate. The certificate may be acquired by (a) working any one of the four assigned stations and obtaining a confirmed QSL; (b) working any two stations in any one of the assigned

Four Corners Award available as an open award for working stations in the geographical corners of continental U.S.A.

grids (as noted below); (c) sending the confirmed QSL(s) and $2.50 to the certificate manager.

Note: If an assigned station is used to qualify, a gold seal may be requested and received at the time of QSL exchange.

Parts 2, 3, 4, 5—Gold Stars. Gold stars may be acquired by (a) Making contact with an assigned station only. Each station will issue its own star. An SASE must accompany your QSL to the assigned station contacted and a star will be returned at that time. Stars are placed on the certificate in designated positions.

Part 6—The Gold Seal With Ribbons. The gold seal may be acquired by (a) successfully making a confirmed contact with all four assigned stations, and sending all four QSL cards to the gold seal manager. Include an SASE to ensure the quick return of your cards and the seal.

The following information is added.

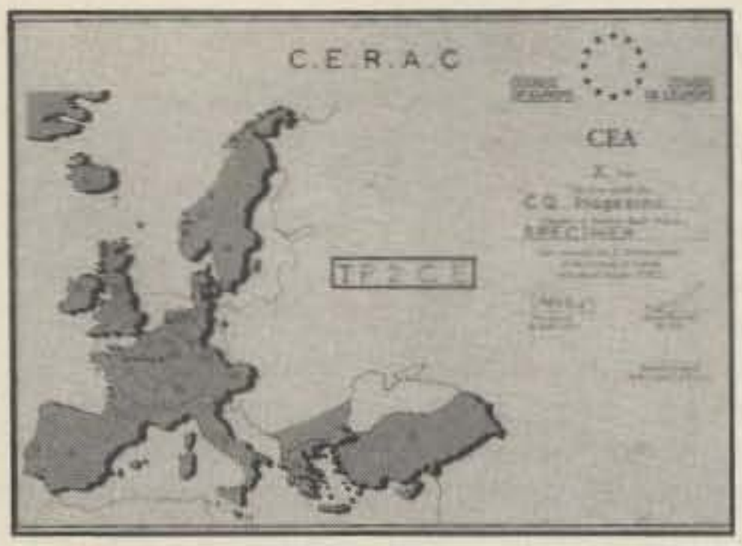
Northwest Corner: WB7UZO, Larry Van Fossen (Van), P.O. Box 182, Neah Bay, WA 98357, Grid CN78 (Gold Seal Manager).

Northeast Corner: WB1EZU, Hollis E. Matthews, 20 Mitchell Street, Eastport, MA 04631, Grid FN64.

Southwest Corner: N6QJM, Tom Hambrick, 831 Iris Avenue, Imperial Beach, CA 92032, Grid DM12 (Certificate Manager).

The Southeast Corner: K4VGD, Key Largo, Florida, Grid EL95, is no longer able to participate due to moving. They are looking for a new station and will try to keep you posted.

Note: All assigned stations were selected after a long and exhausting search. They were picked due to their proximity to the actual closest geographical points depicted by the award, as well as the activity they display in amateur radio. The operating frequencies of these stations are not known and will not be published. Good luck.



Council of Europe Award offered by the Council of Europe Radio Amateurs Club.

Council of Europe Award. The CERAC (Council of Europe Radio Amateur Club) has informed us of the creation of the Council of Europe Award (CEA). It is available to all licensed amateur radio stations and SWLs in accordance with the following rules.

Modes: SSB, CW, or Mixed (SSB/CW).

Second Class CEA is awarded for 22 contacts with the 21 member states of the Council of Europe and the official amateur radio station of Council of Europe in Strasbourg, TP2CE, on the following bands: 10, 15, 20, 40, and 80 meters.

First Class—5 Band CEA is awarded for 22 contacts with the 21 member states of the Council of Europe and the official amateur radio station of Council of Europe in Strasbourg, TP2CE, on each of the bands 10–80 meters (110 contacts). The First Class, 5 Band CEA will be honored with the signature of the Secretary General of the Council of Europe.

All contacts must be made after 1 June 1986. All stations must be contacted from the same country. All station contacts must be with "land stations." Contacts with ships, anchored or otherwise, and aircraft cannot be counted.

Send QSL cards and log sheet with callsigns of stations worked, dates, bands, and modes, with the fee of $9.00 U.S. or 16 IRCs to the Award Manager, Francis Kremer, F6FQK, 31 Rue Louis Pasteur, F-67 490 Dettwiller, France.

As of 1987 the valid member states for the Council of Europe Award are CT, DL, EA, EI, F, G, HBØ, HB9, I, LA, LX, OE, ON, OZ, PA, SM, SV, TA, TF, 5B, 9H, and TP2CE.

73, Dorothy, WB9RCY

CQ BOOK SHOP

Vertical Antenna Handbook, 2nd ed.
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Out of print for several years, this classic has been reprinted with updates, including an addendum on antenna design for 160 meters. Other sections include feeding and matching, short verticals, ground effects, and much more. 139 pages, paperback, $9.95. Order #H208.

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World Radio TV Handbook 1988
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A state-of-the-art, single-source reference on radio communications and theory for hams, professional ops, techs, and engineers. New coverage includes solid-state devices, Yagis and quads, and h.f. amplifier designs. A hands-on instruction manual, as well. 1168 pages, hardcover, $29.95. Order #S197.

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Ameco Novice Code and Theory Package
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Ameco Amateur Radio FCC Test Manuals
Each book contains the latest FCC VEC test questions, plus ARRL multiple-choice answers followed by a complete, simplified discussion of each question written in an easy-to-understand style.

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Washington Readout

a monthly feature by
FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

FCC Holds Public Meeting on Amateur Radio

From time to time the FCC's Consumer Assistance and Small Business Division of the Office of Public Affairs sponsors "brown-bag luncheons" covering the various radio services. The Amateur Radio Service was the subject of a recent lunch meeting.

The public meeting was hosted by Private Radio Bureau chief Ralph Haller, N4RH, whose background includes extensive engineering, enforcement, and policy-making positions at the FCC since 1971. Haller is the top U.S. official for Amateur Radio and the other private radio services, reporting directly to the Commissioners. Also appearing were PRB Personal Radio Branch chief John B. Johnston, W3BE, Special Services Division chief Robert A. McNamara, and Marcus Stevens of the PRB Gettysburg facility, who described the procedure by which Form 610s are processed. Haller's and Johnston's remarks addressed the entire spectrum of amateur concerns.

Volunteer Examining

Ralph Haller said, "The Volunteer Examining program seems to be functioning very well. During 1987, there were over 81,000 elements administered to nearly 50,000 people in almost 5,000 sessions around the country. We had a passing rate of around 60%. Another 22,000 people passed exams under the Novice system.

"There are currently 60 regional VECs. This consists of 18 different organizations. There is tremendous interest in being a VE. I think that says a lot for the Amateur Radio community, because you don't get anything from being a VE. The only thing you get is the pleasure of bringing people into the Amateur Radio Service, and opening up a new world to them that they might not otherwise have. We're most appreciative of the tremendous, untiring efforts of the VECs and VEs. What a tremendous improvement over the old system where you had to go into an FCC office on an assigned day, or go to an exam point at some remote location."

Johnny Johnston cautioned that "One area where the VECs are starting to lose ground is in getting applications to Gettysburg in 10 days or less. In 1987, late filings were down to 1.6%, which I think is a remarkable record. But so far this year, it's jumped up to over 5% and January was the worst month ever when it skyrocketed to over 13%. February was second-worst with 7.5%.

"We have been tolerant of the VECs on infractions of the 10-day rule, but the syndrome is spreading to the Novice system, and some are way over the limit . . . 30 days, 40 days, even 112 days. We've been sorely tempted to do something about this. We could dismiss the application as being defective, but that would be unfair to the applicant who worked hard to pass the test. We've asked the VECs to try to improve their performance and they agreed.

"There is cheating going on. Fortunately, the system is working. People are talking. We've had to set aside some licenses, particularly in Puerto Rico and Honolulu, . . . and we're going to be doing some more of that. This [cheating and fraud] has caused almost a complete redirection of our compliance activities. Prior to the VEC system, our compliance work was directed almost exclusively to following up on cases of on-the-air operating violations. These were sticky cases that were referred to us by our field engineers. At this time last year, exam cheating and fraudulent applications were taking up about 30% of our compliance time. This year, it's up to about 73%.

"We are having to make some tough choices on where to invest our resources. We asked our VECs and they agreed to screen their VEs carefully. Willful false statements are punishable by fines and imprisonment. We impress upon each of our VEs that they should read the certification before they sign it. We've had cases where VEs administer exams, and sign the certification that it was all on the up-and-up, and then send us a letter saying that 'I signed the paper, but the exam wasn't done right.' If the examination session has not been administered properly, do not sign that certification. The system depends upon the VEs."

Novice Enhancement

Haller said that "Last year, Novice Enhancement was adopted, and we hoped that more people would be attracted to Amateur Radio through increased Novice privileges, and that those people would upgrade and become Technician and higher-class operators. That appears to be happening. The number of Novices dropping out over the past year was down by about 64% from 1984. The number of Novices moving up to Technician is up by 77%. So we have a tremendous increase in the number of persons getting into Amateur Radio through the Novice class, and then upgrading. The Novice program was bogged down for a while, but we've got the speed of service back to where Novices can get on the air very quickly after they take the test."

Special Callsigns

"PRB-3 proposes to select a Special Call Sign Coordinator (SCSC) and then the SCSC would be responsible for issuing additional callsigns to Amateurs. Thirteen organizations were interested in becoming a SCSC. We have not decided what to do on that. Last year we had to turn down over 250 requests for special callsigns, so we know the interest is out there.

"We haven't granted a special callsign in the last 10 years. That's because the callsigns are issued absolutely automatically by the computer. When you are assigned a callsign, you get the next call in the block of calls for your class of license and call zone for your mailing address. Our staff in Gettysburg has no option [to grant a special callsign]. We hope to have a decision on PRB-3 in the near future. It is under active consideration; that's all I can say."

On The 17 Meter (18 MHz) Band

"In July 1989, 17 meters is scheduled to become part of the Amateur bands. We will be asking for your thoughts on that, . . . what types of emissions should be permitted on 17 meters, and which classes of operators should have privileges in that band. We want to be ready as soon as the band is available.

"Right now, there is government use of that band and that is why we're not allowed in there as Amateurs. There is some possibility that if the government users can be taken off before July 1989

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356

then we might be able to open it to the Amateurs, but we don't have control over that. We've been having meetings with the NTIA [National Telecommunication & Information Administration—White House advisory agency] to try to urge them to get the government users off the band as soon as possible. I think it's a bad situation when people in other countries are operating on that band already, and we're not. From our perspective at the Commission, we want to get Amateurs on the band as quickly as possible, but we don't have unilateral authority to do that."

Printing of Ham Tickets

"I'm concerned with the quality of the licenses that we send out," Ralph Haller said. "You work diligently to obtain an Amateur license. There are many hours of study that go into it. You finally pass the test, and you get a smeared piece of carbon paper back from the Commission that you may have trouble reading your name on, not to mention your class of license.

"There is a reason for that. Last year we pumped out nearly a million licenses. When you are putting licenses through a printer at that speed you have to have something that works well and quickly . . . an automatic mailer. Not having to stuff envelopes makes a big difference, timewise. It also has caused this problem with the license document not being particularly pretty. I'm more concerned about this in the Amateur Service than any other, because this is a personal service . . . your personal achievement. I am working on this to see if we can come up with a better process even if it means printing the licenses somewhere else, consistent with the resources we have available. I think the Amateur Service deserves it."

On Business Communications

"We've tried to keep business communications from encroaching on the Amateur frequencies. It's been our policy on swap-shops, that as long as you're legitimately trying to swap Amateur Radio equipment, that is not a violation of our no-business rule. We're putting this policy in the [proposed] new rules. The equipment must be for an Amateur station, to be used by an Amateur operator. It is not an open swap-shop. Dealers may not use the Amateur bands to solicit business."

Pending Petitions From Amateurs

At this point, Johnny Johnston and Ralph Haller described several pending petitions for rulemaking that were submitted by amateur operators.

"Wolfgang Kaiser wants to change the code speeds to 5, 10, 15, and 20. We've dealt with that before; it was dismissed before.

"Bill Gardner of Athens, Ohio has a number of ideas on how Amateur Radio can replace police call boxes and he thinks the Amateur frequencies are the best frequencies to do it in. He also wants to use the Amateur Service as a marine distress service, and for a national amateur TV network for distributing some kind of public service programs.

"Bentley F. Adams wants to put a limit on information bulletins. We had one of these requests a couple of months ago and denied it. W1AW, Westlink Radio, and others do a bang-up job keeping you informed about your service. We don't want to put any constraints on that.

"Herbert P. Miller wants us to come up with a callsign plan for the next 100 years. Keith P. Mitchell just took the General test and wants to change the CW standards. J. Steven Grantham wants us to allow packet in the phone portion of the 10 meter band. We have two petitions, which were put on public notice, to expand the 6 meter repeater band by 1 MHz.

"We have before us a petition from an operator in New Jersey to permit SSB on the entire 30 meter band [10 MHz]. He indicates that in his experience only the lower 10 kHz of the band is being used, and that there's very little activity in the remainder of the band. This does not mean that this is going to go on to a rulemaking, but if you have thoughts on how

we might change the 30 meter band, we'd be interested in hearing them."

On The Part 97 Rewrite

The FCC has proposed in the new Part 97 rewrite to arbitrarily restrict amateur operation as a way of dealing with harmful television interference. A member of the audience asked N4RH about the regulation of RFI susceptibility in consumer electronic products. She complained about the lack of procedures in the proposed new rules to assure amateurs' rights of due process in RFI disputes.

Haller responded, "I urge you to comment in the [Part 97 rewrite] docket on this. The Commission sometimes has to look at what is the effect of the Amateur operation on the community. If an Amateur is on the air and wiping out 500 homes because the ham is getting into a cable TV system, one of the immediate ways to rectify that problem and pacify the town council is to ask the Amateur to shut down. Generally the first approach is the voluntary approach. This [quiet hours] would be a secondary approach and one that we hope would not be long term. That is the intent [of the proposed rule], to give immediate relief to a very tough situation.

"Sometimes when you're in the middle of one of these controversies, your own rights in it cloud the public outcry that's really occurring. This is just an attempt to keep that outcry to a minimum, and then get the matter resolved in a proper way through technical means. I urge you to comment and put your feelings in the docket.

"The Electronics Industries Association has taken several steps to have immunity standards for FM broadcast, for Amateur, for CB, so the TV manufacturing community has begun going that direction on its own. It's not there yet, and an EIA study says that something like half of the TV sets that are in use today will still be in use in 15 years. Even if we were to adopt very stringent standards, and put them in place tomorrow, you're still looking at only 50% of the sets being better 15 years down the road. I applaud the industry for trying to get going on its own, but there are other means, low-pass filters and so on, that can be put on in the interim."

N4RH on 220 MHz Issue

The FCC has proposed to take 2 MHz from the amateur 220–225 MHz band and reallocate the spectrum to the business use. Ralph Haller was asked about the 220 MHz issue, even though the matter is under the jurisdiction of the Office of Engineering and Technology and not the Private Radio Bureau that he heads up: "I think this will be resolved in the near future. It's a tough public interest question, from a regulatory standpoint. I'm not going to comment on where the outcome is likely to be, but there certainly are strong interests on both sides.

"I do applaud the Amateur community for the way it made known its side of the issue. I'm not speculating one way or the other about whether the approach will be successful, but I think it was a good approach. Many of the comments were not emotional, but were well thought-out comments explaining what the band is being used for, and the damage that would be suffered by the Amateur Service if the proposal is adopted."

Haller's Concluding Remarks

"I feel very strongly that if you rely only on your government to find solutions, you'll get solutions you don't like. I urge you to put comments in on all amateur proceedings. It may well be one comment from one person who almost didn't write in, that turns the direction of an entire docket and rulemaking. It is very important that you keep up with what the Commission is doing, not only in the Amateur Service, but also in services that may have some kind of relationship with the Amateur Service."

Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Antenna Software for the IBM-PC

I'll admit it: antennas are one of my favorite subjects. They also make for one of the more popular topics of conversation on the amateur bands, as well. In just about any QSO, you'll be asked about your antenna system, even if you don't ask the fellow on the other end about his first. Sometimes, the arguments on "which is better" become quite heated.

Wouldn't it be nice to take care of some of the "trial and error" work on your computer? This type of borderline couch-potato experimentation is done every day in business and industry, and it's called modeling or simulation. With the right software, antenna modeling is something that can be done quite well by amateurs. It's also something that can save you a lot of work, letting you better use your environmental, space, and economic resources. Let's look at a couple of the modeling programs that are available for the IBM-PC and compatibles.

MN Antenna Analysis Programs: Brian Beezley, K6STI, found that he became completely exasperated trying to model even simple antennas using the standard *MININEC* antenna analysis program, and decided to do something about it by designing an easier-to-use set of programs based on the original government product. Writes Brian:

"This project was undertaken because I was quite fascinated with the idea of designing high performance arrays on the computer, without ever stepping out of doors to handle large amounts of aluminum first. As it turns out, I use these programs even for simple, everyday antenna situations."

"For example, I recently wanted to get back on 40 meters by tossing a dipole up in a tree. However, because of the local tree situation, the antenna would have to be bent in a strange way, without being straight horizontally and with sloping legs vertically. I had only a vague notion of how it might radiate or how long to cut the antenna. A quick run [of my program] told me that the main lobes would come out N.W.-S.E., the resonant frequency would be somewhat high with the bend angle and leg length I had chosen, and the nulls toward Africa and the Pacific were down 10 dB."

"The really interesting result popped out when I happened to try a run on 15 meters, where I had some hope of operating the funny bent dipole on its third harmonic. The bend turned out to be just the right angle to form a Vee beam, with over 3 dB gain and low sidelobes, aimed squarely on JA! I would never have known all these things, particularly the surprise 15-meter performance, without using the *MN* program."

Brian's MN antenna analysis package has as its heart the main *MN* analysis program. Associated with it are the *MNPLOT* plotting program and an antenna library (which contains plot data files for all of the antennas in the library). The *MN* program itself is basically free and can be downloaded from several bulletin boards, but there's a charge for the accessory programs. According to Brian, "I decided to try the 'Gilletteware' distribution scheme, where the basic program is given away but the accessories are sold, to enable hams who have no need for the accessories to use the program without charge, and without feeling guilty for not sending a donation. Because of my frustrations in using the original *MININEC* program, I really want *MN* distributed as widely as possible, to save others the trouble I went through."

Brian has made several significant improvements in his initial program design as he has gained experience with it. Parameters on earth conductivity and dielectric constant are now built into the *MN* program. If you're modeling an antenna over real ground, the program will display this information on the screen before asking you to enter the conductivity and dielectric constant; this feature promotes convenient experimentation. The package now provides both the familiar linear dB polar plots and rectangular plots; the latter provide much better resolution of sidelobe detail. Brian indicates that he's working toward including an optimization loop or "gradient search procedure" to make the program really slick in narrowing design choices.

According to Brian, you need an IBM-PC or close compatible to run the programs; at least 300K of free memory is required for the basic *MN* program, while 450K total is needed for *MNPLOT*. If you want to display polar or rectangular plots, you must also have a Hercules, CGA, or EGA card. Without one of these graphics cards, you're reduced to a sort of connect-the-dots type of non-graphic plotting.

As of this writing Brian was going to try distributing *MN* through amateur radio stores. The basic *MN* package (which includes *MN.EXE*, sample antenna files, a demonstration plot program, and documentation) sells for $25. The complete *MN* package (which adds

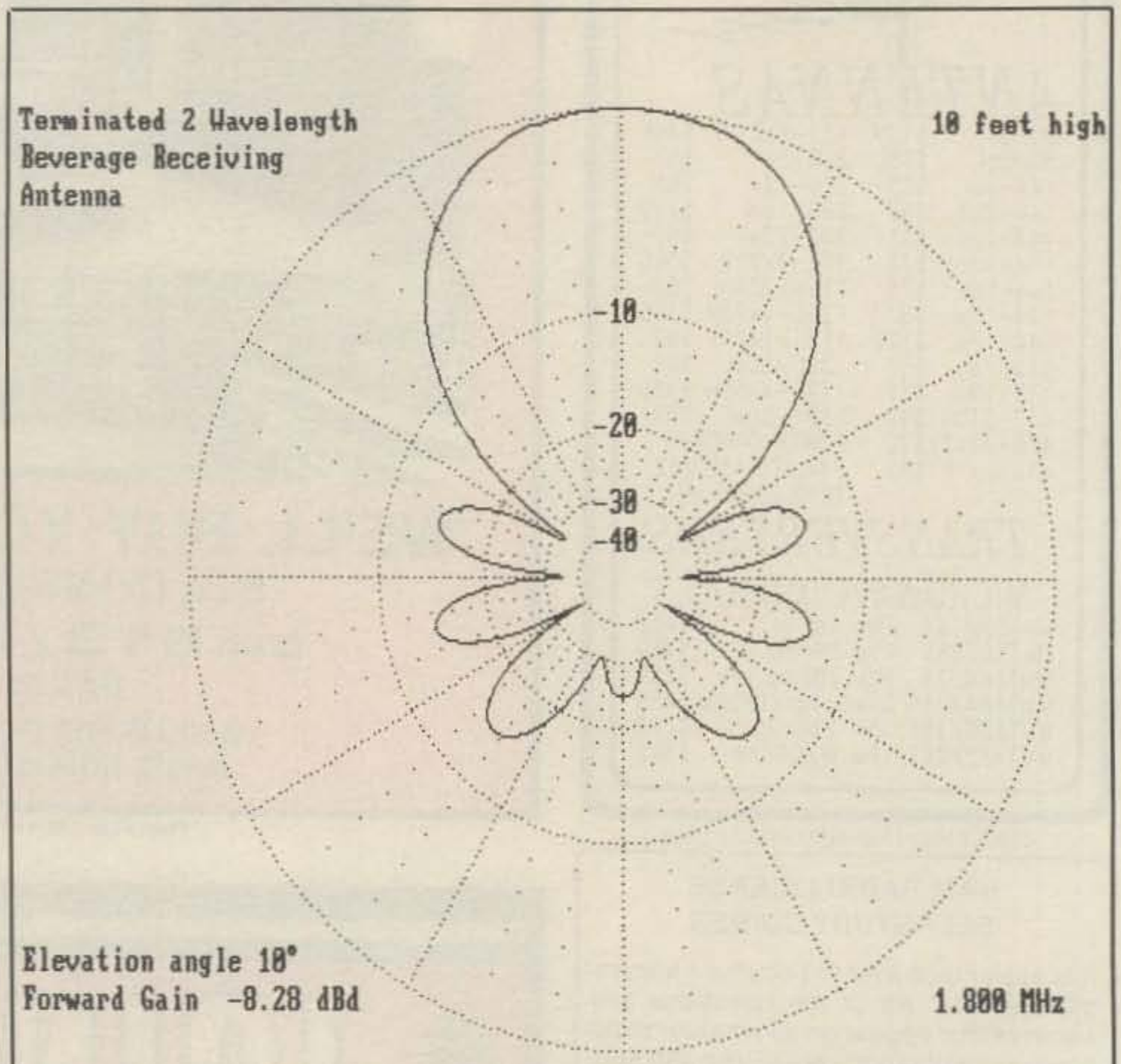
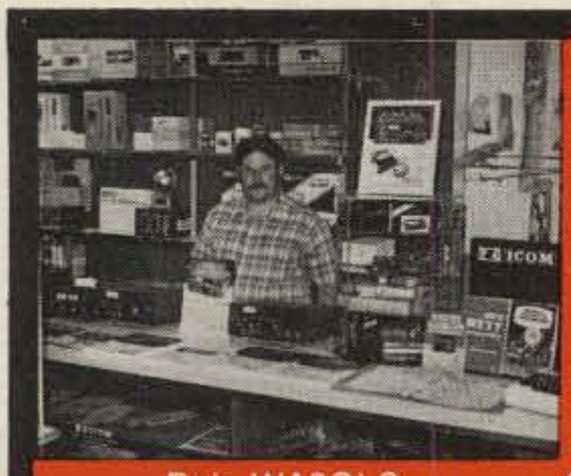


Fig. 1– Shown here is a typical horizontal directive pattern polar plot as produced by the MN *antenna analysis program. This one shows the pattern of a terminated two-wavelength Beverage receiving antenna.*

317 Poplar Drive, Millbrook, AL 36054



Rob, WA3QLS

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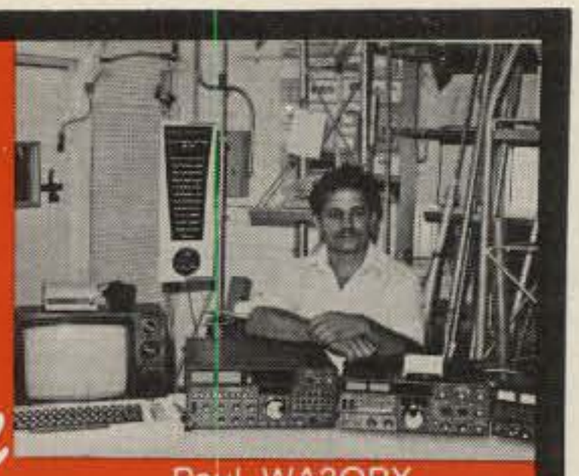

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RF Output—15 + DB Gain or over 650 Watts
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Output Impedance—50 OHMS Nominal
Antenna Load—2:1 Maximum
Harmonic Suppression Down 60DB @Rated Output
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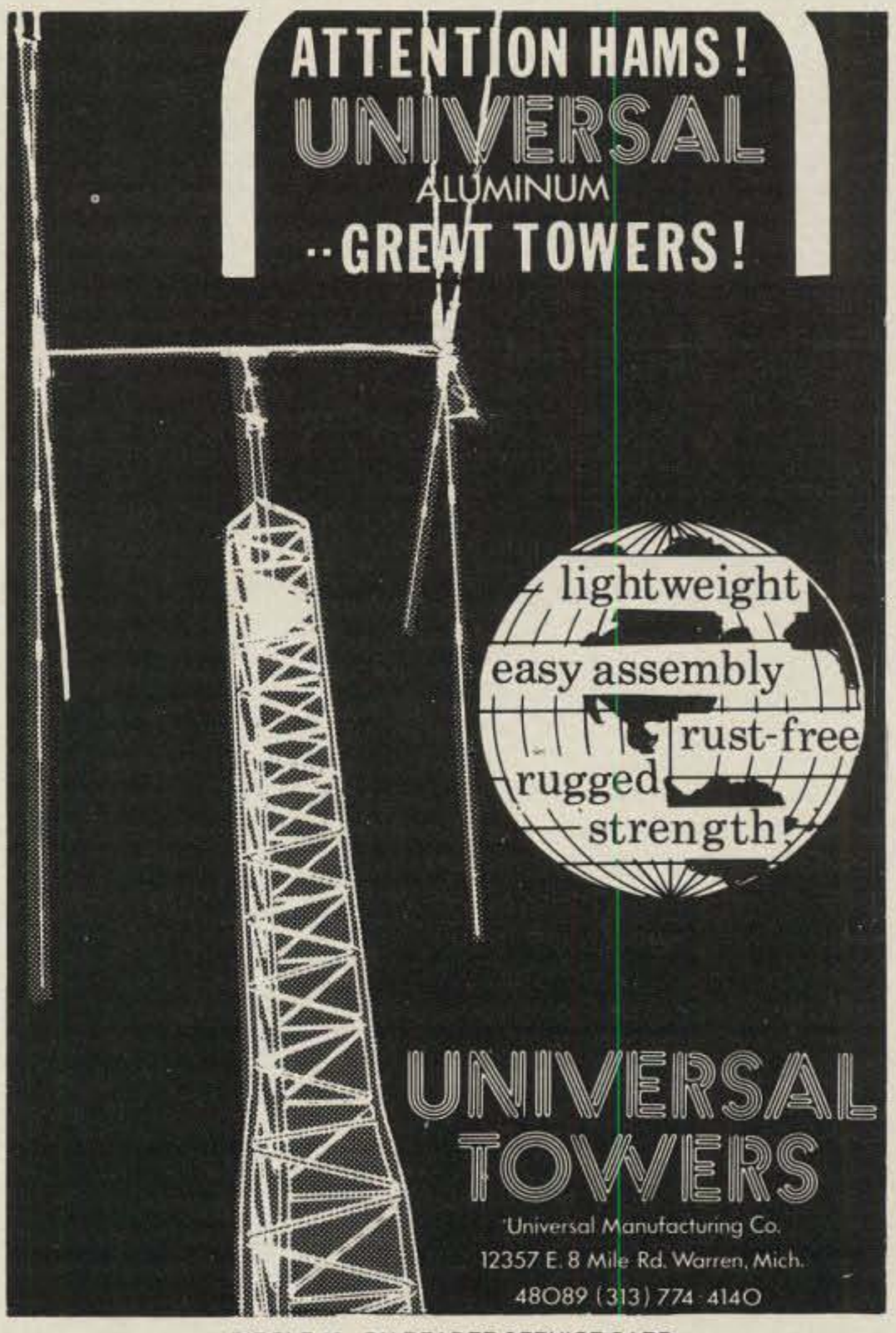

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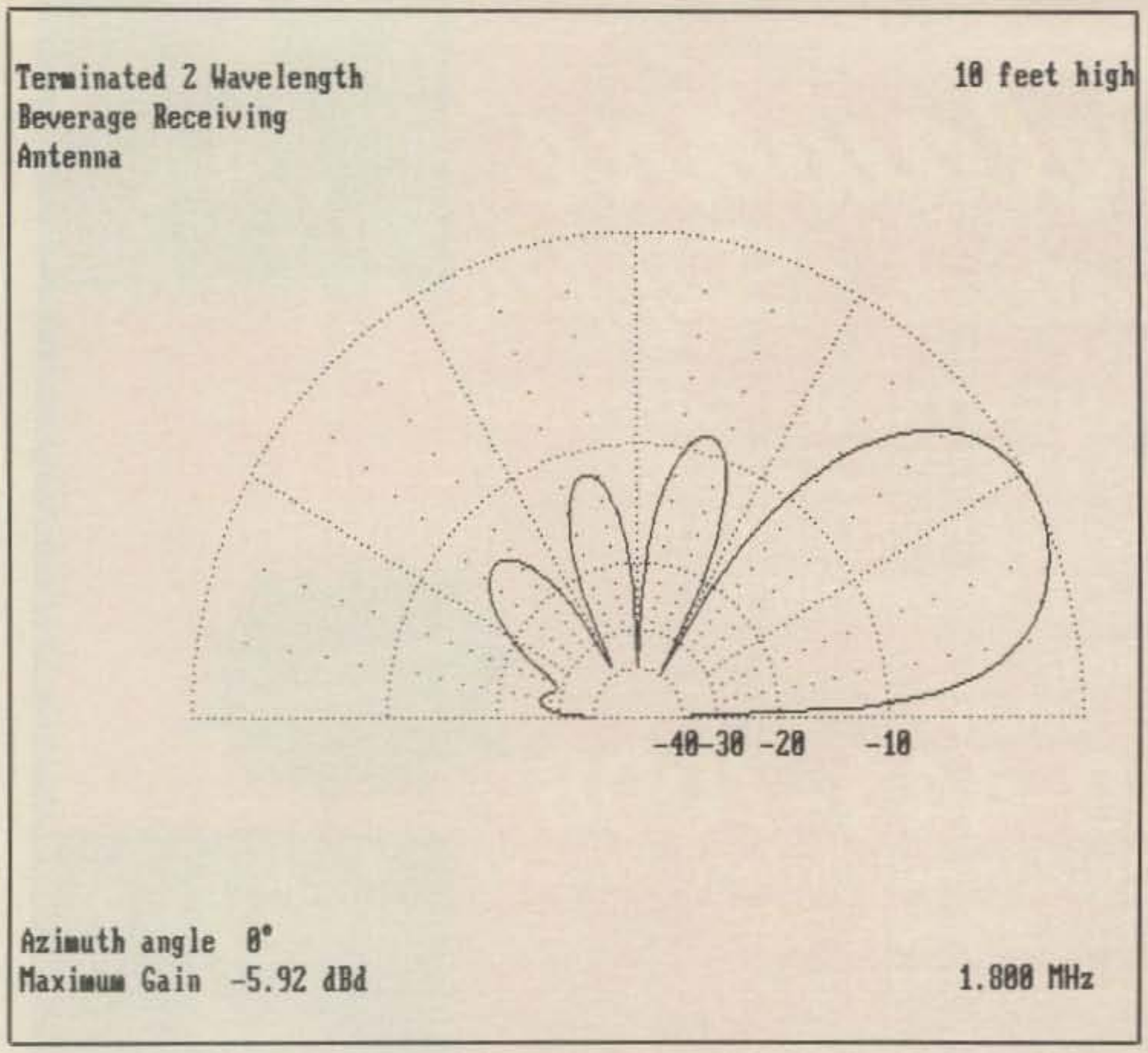

Fig. 2– An MN-generated vertical pattern polar plot for the same 2-wavelength Beverage receiving antenna depicted in fig. 1.

the *MNPLOT.EXE* plotting program, the Antenna Library, the Plot Library, the Plot Comparison Guide, and additional documentation) sells for $75. Since the plotting program lets you graphically display antenna results, and the Antenna Library saves countless hours of data inputting, it would make sense to opt for the whole package, in my view.

For more information, contact Brian Beezley, K6STI, 507½ Taylor St., Vista, CA 92084. I suggest telling him your system configuration.

Fig. 1 shows a typical *MN*-generated horizontal directive pattern polar plot, while fig. 2 depicts a vertical pattern polar plot. Fig. 3 is a horizontal pattern rectangular plot, while fig. 4 is another horizontal pattern polar plot (this one of a compromise rhombic).

Long Wire Pro: Donald Lamy, KM2R, has taken a novel approach to antenna modeling. Long Wire Pro is probably the only antenna design program that features a sinusoidal projection of the antenna's radiation pattern. This approach to showing radiated power is different from the usual azimuthal and elevation projections, and allows you to visualize the signal intensity at all angles, horizontal and vertical, of the antenna simultaneously. The approach greatly facilitates design, especially when pattern tradeoffs must be made. The program lets you "match resources with needs to find the best solution before starting construction." And, as David concludes, "the real pleasure comes when you erect a antenna that you've modeled and it works as expected."

It's like sitting in a planetarium. At the center of the floor is your antenna, which is the only source of light. The dome or sky is illuminated according to signal intensity at each point. The program's sinusoidal projection is a sophisticated flat projection of the sky, color coded (if you have a color monitor) according to signal intensity. You can explore the projection with a mouse or with cursor keys and read in a numeric window the gain at a particular azimuth and elevation.

The program lets you select wire lengths for a variety of wire antennas, such as centerfed and endfed long wires, Vees, and rhombics. You next choose the antenna's height above ground, the kind of ground over which it operates, and then enter the slant of the antenna above ground.

Long Wire Pro draws the projection in the center of your monitor's screen. Above the drawing is a window showing a table of the antenna's parameters you've entered along with the maximum gain, azimuth, and elevation referenced to isotropic, the antenna's overall dimensions, and in the case of terminated antennas, the termination resistor's value. All of this can be printed out using a dot matrix printer.

Like K6STI's *MN* antenna analysis package, Long Wire Pro is an antenna modeling program, but one that specializes in long wires. The program can be especially useful in modeling antennas in less than ideal real conditions. For example, odd wire lengths, antenna slants, and low ground conditions are all conditions that cause radiation patterns to change from published patterns, and their effects can be examined using the program.

I found the sinusoidal displays that *Long Wire Pro* produces to be fascinating, though at first they were difficult to envision from the program's documentation. To understand the display, you need to carefully think through what the display is showing, remembering in particular where the antenna's axis is pointing. I found it useful to compare the projections with mental images of what the sinusoidal pattern of a common dipole would look like. Keep in mind the dipole's axis and the expected null off the ends, and you should be able to orient yourself to the unusual display format.

Long Wire Pro is designed to run on IBM-PC/XT/ATs and compatibles with 256K or more under DOS 2.0 or higher. Color is required. The program makes use of an 8087/80287 coprocessor for calculation speed (if present), and a mouse as well. Two versions of the program are furnished, either to be used depending on the amount of free RAM you have available in your system.

The program is priced at $40 from Epsilon Co., PO Box 715, Trumbull, CT 06611. By the time this appears in print, Donald should have released *Vertical Pro*, a complementary program.

Fig. 5 shows a typical *Long Wire Pro* projection, this one modeling a rhombic, while fig. 6 depicts that of a centerfed longwire.

Ham Perfect: Well, nothing's perfect, though Philippe de Marchin at Action Software has come up with a rather comprehensive reference tool for the radio hamshack.

Ham Perfect isn't really an antenna modeling program, though through six of its ten major functions are related to antennas in a more casual way than the programs we described.

The multiple-function program dedicates its first six menu selections to antenna design. Calculations relate to endfed longwires, verticals, inverted Vees, tuned transmission lines, and the electrical length of harmonic wires. There also is a VSWR menu selection which displays a graphic view of all components of transmitted power as a function of VSWR.

The remaining three menu selections focus on DX work. The call areas menu selection retrieves and identifies any call area, state, or city out of a database of 476 records. Distance and bearing from your station, local sunrise and sunset times, grid coordinates, and other data are instantly displayed. The grid selection menu converts grid to coordinates and vice-versa. Finally, the bearings and distances menu selection provides great circle calculations between any two points on the surface of the globe.

The six antenna-related menu selections are not intended for in-depth antenna analysis. Rather, they are primarily intended to allow you to quickly determine optimum antenna length for a variety of simple antennas, without resorting to the use of a calculator or reference book. While the length-calculating modules might not be useful to the advanced amateur, the graphic VSWR module is quite educational for the beginner. With it, knowing any two of the values of forward power, reflected power, and VSWR, the program calculates the third quantity and graphically displays what happens to all of the components of power as changes are made in any of them.

Ham Perfect is designed for use with the IBM-PC or compatible with DOS 2.1 or higher and 250 KB of RAM. It's priced at $79. For more information, contact Action Software, PO Box 12519, Tucson, AZ 85718.

Antenna Potpourri

While it's too late for this year's Field Day, surplus dealer Fair Radio Sales is offering a

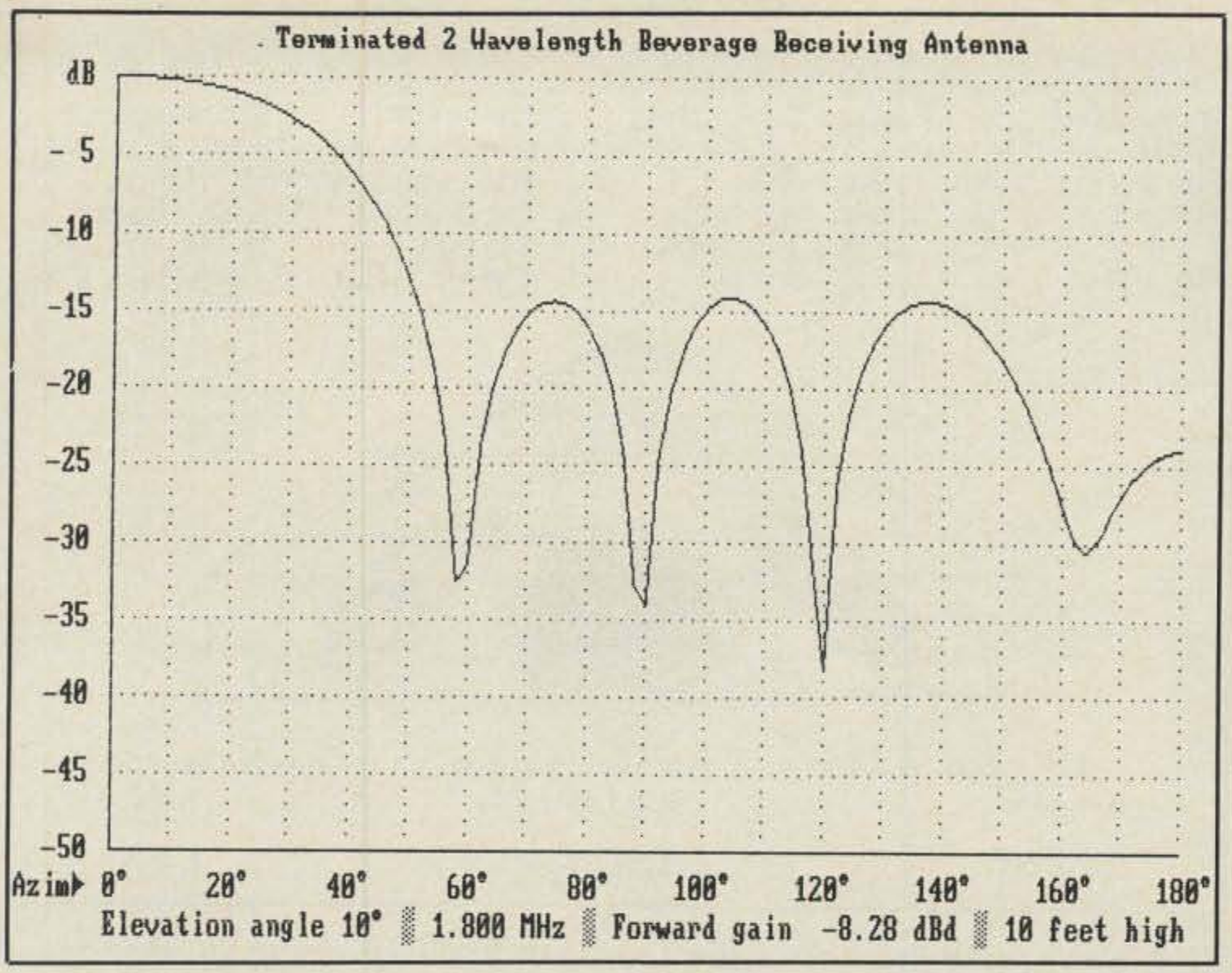

Fig. 3– MN horizontal directive pattern rectangular plot for the same antenna. Note the excellent resolution of sidelobe detail when the rectangular display is used.

"three-in-one" Field Day antenna kit designed for 2–12 MHz operation. Billed as used NATO surplus in good condition, it includes a long-wire with insulators and clips for adjusting the frequency of operation, a five-section whip with base, a counterpoise, guys, stakes, and a canvas carrying bag. It's priced at $49.50.

For an electronic surplus catalog that will have the effect of taking you back to the good old days of surplus and "radio row," write Fair Radio Sales, 1016 E. Eureka, Box 1105, Lima, OH 45802.

Mirage/KLM now offers an optional heavy-duty boom for use with its line of HF antennas.

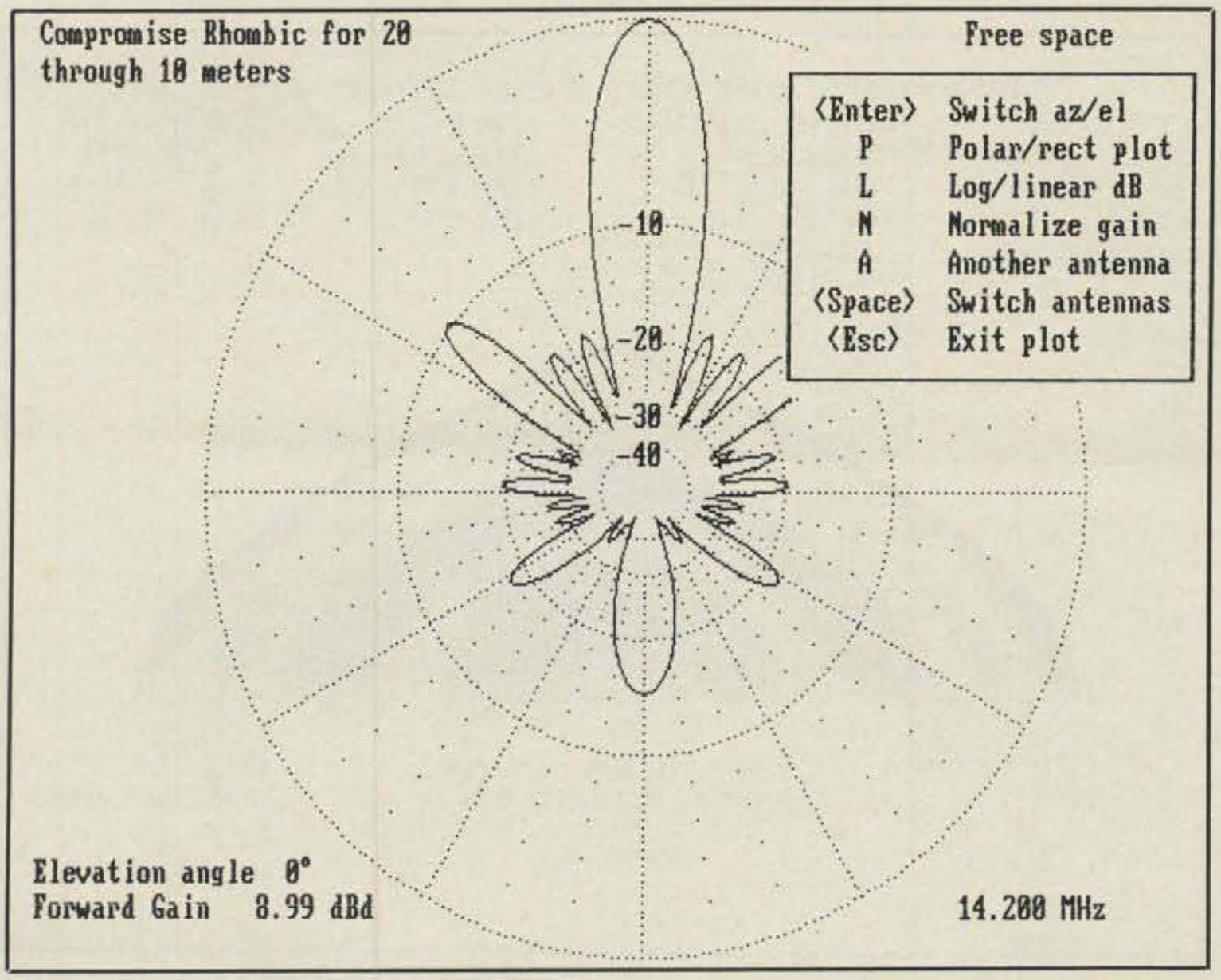

Fig. 4– Horizontal directive pattern polar plot produced by the MN antenna analysis program—this one for a compromise rhombic covering 20 through 10 meters. Note the on-screen box at the upper right.

The new boom is a 3 inch diameter by 0.25 inch wall size aluminum tube. Instead of using swedged ends to join pieces, the heavy duty boom uses splice sections that insert into the boom. The splices are made from the same aluminum stock as the boom, and are said to meet or exceed the most demanding amateur strength requirements.

For details, contact Mirage/KLM Communications Equipment, Inc., PO Box 1000, Morgan Hill, CA 95037. You might also request their illustrated catalog showing their VHF, UHF, and HF antennas, amplifiers, and other accessories.

Mechanical devices, like cars and antenna rotors, often present problems for their owner when something goes wrong with them. If nothing else, they are a great deal "messier" than electronics-only equipment to repair.

I understand that Craig Henderson, N8DJB, operates the C.A.T.S. Rotor Parts and Repair Service, in which he reconditions large or small American made rotors. Repair labor is $10, while rebuilds are priced at $25, with parts extra. Reconditioned units also are for sale. For information, contact C.A.T.S., 7368 S. R. 105, Pemberville, OH 43450.

Books and Videos

An interesting publisher of what are innovatively described as "unusual technical books of exceptionally high quality revealing skills and secret processes almost forgotten" is Lindsay Publications, Inc. Their 95-page catalog is crammed full of what one might call "technical oddities," for lack of a better term.

Oddities they are. Some of the more interesting publications offered include the 260-page paperback, the *Official 1934 Short Wave Radio Manual*, a compilation of short-wave magazine articles, edited by the late master experimenter Hugo Gernsback with H. W. Secor; Nikola Tesla's *Experiments with Alternate Currents of High Potential and High Frequency*; R. A. Ford's *Tesla Coil Secrets*; Margaret Cheney's *Tesla: Man Out of Time*; Perry and Buck's 1928 *Practical Problems in Electrical Construction*; and several other electronic and mechanics-oriented titles from yesteryear.

Gernsback's 1934 book reprint is one of the more fascinating titles; it was originally brought out by him to be a "complete experimenter's set building and servicing guide." It includes a selection of his favorite receivers and transmitters, complete with schematics and construction information. There's even a one-tube 40/80-meter CW transmitter! The 1934 reprint is priced at $12.95.

Contact the publisher for shipping information and a catalog. Write Lindsay Publications, Inc., PO Box 12, Bradley, IL 60915-0012.

I'm sure that the good ol' Edmund catalog is put together without a thought to amateur radio specifically, but if you're any kind of a "gadget freak," or perhaps a science teacher, you'll undoubtedly love the kind of equipment that you'll find in the *Edmund Scientific Catalog*.

The catalog is chock full of interesting stuff, to say the least. For example, its pages include a working Van de Graff generator; lasers of several descriptions, including pocket-sized models and powerful holography lasers; science model kits; and even a StarLight scope that's camera-adaptable. There's even a "superconductive disk" in the catalog which is said to be capable of levitating a "rare-earth magnet!"

No-79-80

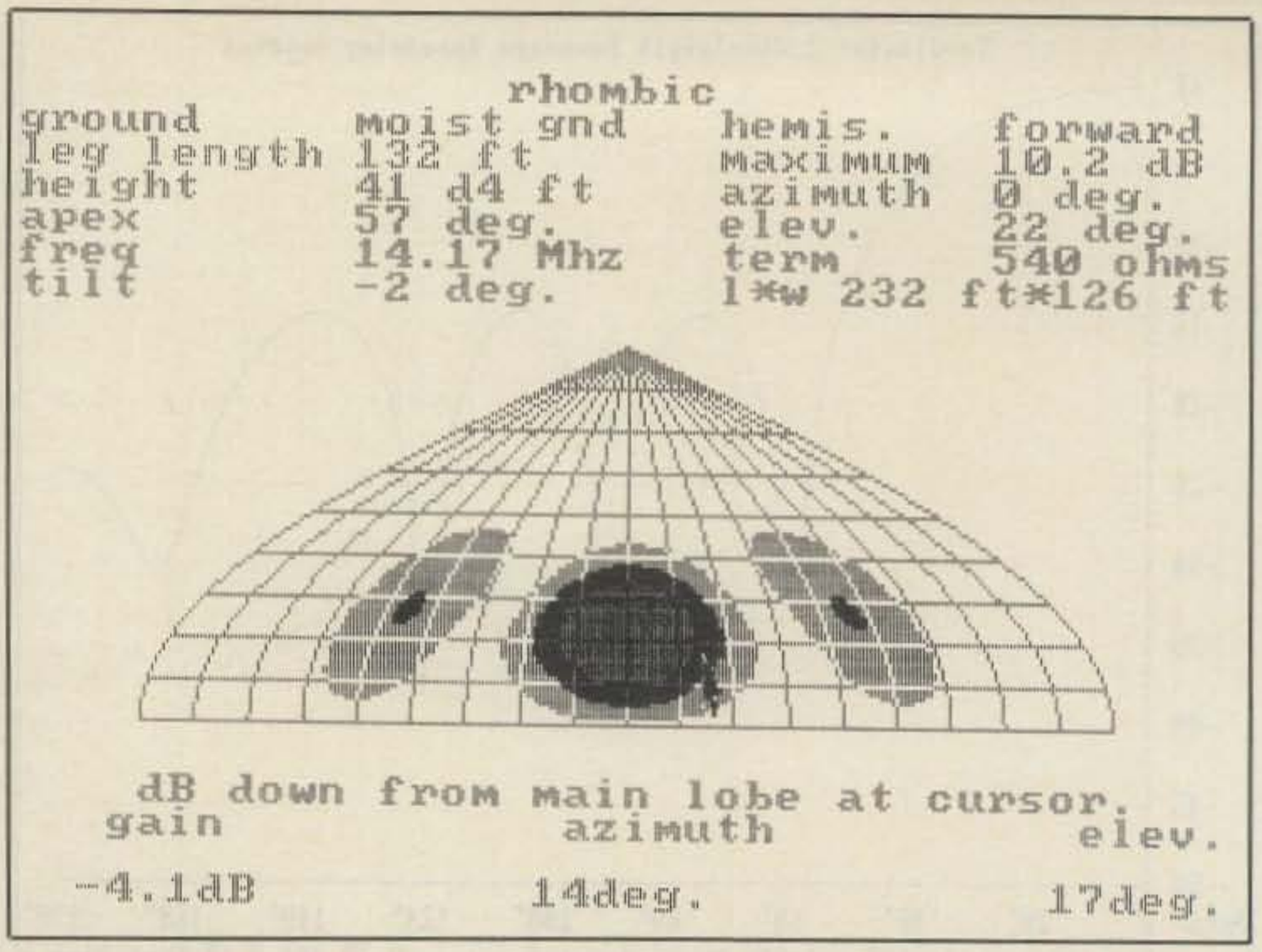

Fig. 5– Shown here is a screen printout of Long Wire Pro's *planetarium-like sinusoidal display screen showing the radiation pattern of a typical 20-meter rhombic antenna with 132-foot legs. Note the considerable information provided at the top and bottom of the screen display. (It's quite difficult to visualize this type of display without color.)*

Their 150-page, full-color catalog carries a $5 price tag. It's available from Edmund Scientific, 101 E. Gloucester Pike, Barrington, NJ 08007.

It probably won't displace "Dirty Dancing" in video store sales, but the ARRL's *The New World of Amateur Radio* is nonetheless getting good play in amateur circles. According to the ARRL, the 28-minute video "portrays the excitement and person-to-person contact that only amateur radio can provide."

The video is professionally produced by Executive Producer Roy Neal, K6DUE, formerly science editor for NBC News, and the original

Fig. 6– The Long Wire Pro *sinusoidal display depicts a 184-foot long wire's radiation pattern on the 18 MHz band. The program is intended to be used with a color monitor, and so the display would be a great deal easier to interpret if it were in color.*

musical score is by John Tesh of TV's "Entertainment Tonight." Others involved in the project include amateurs with both CBS and the Fox TV network.

The video shows a variety of amateur radio action scenes, including amateurs doing emergency work, operating in contests, and more. There's also a look at some well-known amateurs—the idea of it being to explain and "sell" amateur radio to all age groups and levels of interest.

The ARRL's initial order was for 1050 videotapes, but more have been ordered due to heavy demand. Initial copies went to clubs, instructors, teachers, ARRL Section Managers, commercial and educational TV stations, and public access cable TV outlets. Well over 50,000 pamphlets have been distributed to groups planning to show the tape to prospective amateurs, so that they would have something to take with them after viewing the video.

Schools can obtain a copy on a free loan basis. Copies may also be purchased outright by schools and individuals for $20, plus $2.50 shipping. *The New World of Amateur Radio* is available from Publications Sales, American Radio Relay League, 225 Main St., Newington, CT 06111.

Random Ramblings

I've often thought, and occasionally have remarked in the column, that describing and reviewing computer programs is fraught with danger. It always seems that between the time I read up on or try out a program and the time the write-up appears in print, whatever I've written has been at least partially O.B.E., or "overtaken by events." That is, due to the rapidity with which anything having to do with computer software changes, either the program has metamorphosed into something entirely different, the price has changed, or possibly it's no longer available because it was a flop in the marketplace.

A "quote for the day" by an unknown author, and found on a local computer bulletin board, described a syndrome even worse than the writer's dilemma—the dilemma for the programmer:

- Any given program, once running, is obsolete.
- Any given program will expand to fill all available resources.
- The value of a program is proportional to the weight of its output; and
- Program complexity grows until it exceeds the capability of the programmer who must maintain it.

Nearly the same comments can be made about hardware, including supposedly IBM-PC compatible computers, as well. I came across "Blechman's Theorems on Microcomputers" in a letter fellow author and computerist Fred Blechman, K6UGT, wrote to the editor of the now defunct *PC Clones* magazine, and which appeared in last April's issue. Fred's two theorems are well stated:

- When you buy it, it's already obsolete.
- When you try to use it, it's not compatible.

Right on, Fred!

Stephen Lewis, WB7TFZ, highlighted a very real concern about "satellite hacking," in his essay which appeared in the November/December 1987 issue of *Ad Astra*, the journal of the Atari Microcomputer Network.

In his article, he wondered what the target would be for the next generation of hackers, and opined that scrambled satellite operators would very likely be that target.

Hacking is a very real problem with the many television subscription services that are scrambling their programming these days. The enciphering equipment has some serious weaknesses which can allow someone to effectively take electronic control of the satellite and shut down various transponders, or just interfere with the signal, among other things. As Steve points out, many hackers are "dogs in a manger:" if they can't enjoy satellite programming, then no one else should either—and the fact that what they're doing is against the law doesn't stop them.

What does this have to do with amateurs? In Steve's view, amateurs who have VHF, UHF, and microwave experience and equipment may be approached by this new type of hacker to aid him in creating malicious interference. As Steve puts it, "I would hate to see amateur radio connected in any way with this kind of criminal activity, because we would be sure to lose much more than satellite viewers would gain . . . . If amateur radio is ever connected with malicious interference to commercial frequencies, we could lose some of our present privileges and frequencies. So, for the sake of all of us, don't be a part of these new hackers." Good food for thought, and equally good advice as well!

Incidentally, *Ad Astra*, in which Steve's essay appeared, is the official journal of the Atari Microcomputer Network, an amateur and SWL "on-the-air" Atari users' group. The International Net meets every Sunday at 1600Z on 14325 kHz with Dave, KD7VA, as net control station. Regional nets follow, from 1830Z, on or about 7235 kHz.

The net is a nonprofit organization of amateurs, SWLs, and Atari enthusiasts who share a common interest, that of exchanging information on applications, programming, and operations related to all types of Atari computers—including the graphics oriented ST series. The journal is published six times per year. The annual donation for six issues is $10.00 in U.S. funds, or $12.80 in Canadian funds for first-class mailing to North American addresses.

For more information, contact *Ad Astra's* Editor, Gil Frederick, VE4AG, 130 Maureen St., Winnipeg, Manitoba R3K 1M2 Canada.

That's about it for this month, gang. Next month, more Antennas & Accessories topics of current interest. See you then.

Overheard: Be wiser than other people if you can, but don't tell them so!

73, Karl, W8FX

Announcing:

The 1988 CQ World-Wide DX Contest

Phone: October 29-30 & C.W.: November 26-27
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:

1. Single Operator (single band and all band). Single operator stations are those at which one person performs all of the operating, logging, and spotting functions. The use of DX spotting nets or any other form of DX alerting assistance places the station in the Multi-Operator category.

2. Multi-Operator (all band operation only).

a. Single Transmitter, only one transmitter and one band permitted during the same time period (defined as 10 minutes). *Exception: One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier. Logs found in violation of the ten-minute rule will be automatically reclassified as multi-multi to reflect their actual status.*

b. Multi-Transmitter (no limit to transmitters but only one signal per band permitted).

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

3. QRPp (single operator only). Power must not exceed 5 watts output. Stations in this category will be competing only with other QRPp stations for awards.

4. 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. A team **must operate** from two continents. 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. S.S.B. and C.W. teams are totally separate. That is, a member of an S.S.B. team can be on a totally different C.W. team. A list of a team's members must be received by October 15 for S.S.B. and November 15 for C.W. Send the list to *CQ*, Att: Team Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A. Awards will be given to the top teams on each mode. A list of a team's members' scores plus the total team score must be submitted to *CQ* by the normal contest log deadlines.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e., 5705). C.W.: RST report plus zone (i.e., 57905).

A station in a zone or country different than that indicated by its call sign is required to sign portable.

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.

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, Asiatic USSR, Czechoslovakia, 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 and 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—QRPp—Milliwatt Books W0RSP
U.S.A.—Potomac Valley Radio Club
Carib./C.A.—Alex M. Kasevich, VP2MM
Europe—Potomac Valley R.C.—W4BVV Memorial
Africa—Gordon Marshall, W6RR
*Asia—Japan CQ Magazine
*Japan—Japan Crazy Contesters Club
Oceania—Northern California DX Club
South America—Donor to be announced

Single Operator, Single Band

World—28 MHz—Joel Chalmers, KG6DX
*World—21 MHz —Lee Wical, KH6BZF
World—14 MHz—North Jersey DX Assn.—K2HLB Memorial
World—7 MHz—Fred Laun, K3ZO—K7ZZ Memorial
World—3.8 MHz —Fred Capossela, K6SSS
U.S.A.—28 MHz —Donald Thomas, N6DT
U.S.A.—21 MHz—West Jersey DX Group
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
*Canada—Gene Krehbiel, VE7KB

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O3AT, O4AT, IC-μ2

IC-228 A/H, IC-28H, 38A, 48A

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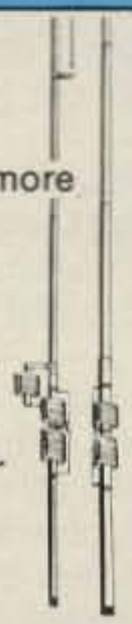
- Hustler
  Mobile HF, Mobile VHF, etc.



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PACKET

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1278

MFJ 1270B, 1274, 1278

Carib./C.A.—Pedro Piza, Jr., NP4A—KP4ES Memorial
*Europe—28 MHz Zone 14—A. G. Anderson, GM3BCL
*Japan—21 MHz—DX Family Foundation

Multi-Operator, Single Transmitter

World—So. Calif. DX Club—W6AM Memorial
U.S.A.—Carolina DX Association
Europe—Box Cox, K3EST/6
*Canada—Calgary Amateur Radio Assn.

Multi-Operator, Multi-Transmitter

World—Radio Club Venezolano
U.S.A.—DX Incorporated Club
Europe—OH-DX-RING—OH2AM

Contest Expeditions

World—Single Opr.—Stuart Meyer, W2GHK
World—Multi-Opr.—The German CDXG & SDXG (DJ3NG & DJ4EI Memorial)

CW

Single Operator, All Band

World—Albert Kahn, K4FW—W2AB Memorial
World—QRPp—Gene Walsh, N2AA
U.S.A.—Frankford Radio Club
*Canada—Canadian DX Association
Carib./C.A.—Peter Munroe, WB1DQC
Europe—Edward Bissell, W3AU
Africa—Gordon Marshall, W6RR
*Asia—Japan CQ Magazine
*Japan—Japan Crazy Contesters Club
Oceania—Maui Amateur Radio Club
*So. Amer.—Venezuela DX Club—YV5AAZ Memorial

Single Operator, Single Band

World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—South Jersey DX Assn.—N2CW Memorial
World—14 MHz—North Jersey DX Assn.—W2JT Memorial
World—7 MHz—Alex M. Kasevich, VP2MM
World—3.5 MHz—Fred Capossela, K6SSS
World—1.8 MHz—Chip Margelli, K7JA—KP4ES Memorial
U.S.A.—14 MHz—Northern Illinois DX Association
U.S.A.—7 MHz—Jan Perkins, N6AW
*Canada—Canadian Amateur Radio Federation
Carib./C.A.—DX Club of Puerto Rico
Europe—Southern New England DX Club
Australia—14 MHz—Jay Carr, W6FAY
*Japan—21 MHz—DX Family Foundation

Multi-Operator, Single Transmitter

World—Anthony Susen, W3AOH
U.S.A.—Douglas Zwiebel, KR2Q
Canada—Eastern Canadian DX Assn.
Europe—Friends of K3AO—K3AO Memorial

Multi-Operator, Multi-Transmitter

World—Hazard Reeves, K2GL Memorial
U.S.A.—James Rafferty, N6RJ
Europe—OH-DX-RING—OH2AM

Contest Expeditions

World—Single-Opr.—Yankee Clipper Contest Club
World—Multi-Opr.—Bill Schneider, K2TT

Special—Single Operator Awards

World—All Band—SSB/CW—John Knight, W6YY
World—Single Band SSB/CW—Yuri Blanarovich, VE3BMV
World—All Band—CW—Most QSOs—KV4AA Memorial (From the 14270 kHz Group)

Club

World—SSB/CW —CQ Magazine
Non-USA—SSB/CW—No. Calif. Contest Club—N6AUV Memorial

**Trophy supplied by Donor.*

Trophy winners may win the same trophy only once in a two-year period. In the event that the same station wins the World Award in the same category in two consecutive years, a special *CQ* Magazine Championship plaque will be awarded the second year. The sponsored trophy in that category will then be awarded to the second-place finisher in that category if the returns justify the award.

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 c.w.

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. The *original* log may be requested by the Contest Committee if further cross-checking of the log is necessary.

5. Use a separate sheet for each band.

6. 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.

7. Sample log and summary sheets and zone maps are available from *CQ*. A *large* self-addressed envelope with sufficient postage or IRC's must accompany your request.

If official forms are not available, make up your own 80 contacts to the page on 8½" × 11" paper.

8. All entrants are required to submit cross-check sheets for each band on which 200 or more QSO's were made. All other entrants are encouraged to submit cross-check sheets.

9. Duplicate contacts and broken calls penalty: up to 1%—three (3) additional contacts removed; 1% to 3%—ten (10) additional contacts removed; over 3% is grounds for possible disqualification.

10. QRPp 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 QSO's; 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 of nonamateur means such as telephones, telegrams, etc., to elicit contacts or multipliers **during** a contest is unsportsmanlike and the entry is subject to disqualification.

Actions and decisions of the *CQ* Contest Committee are official and final.

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1988 for the Phone section and January 15, 1989 for the C.W. section. An extension may be given if requested. Indicate phone or c.w. on envelope.

Both phone and C.W. logs should be sent to *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801.

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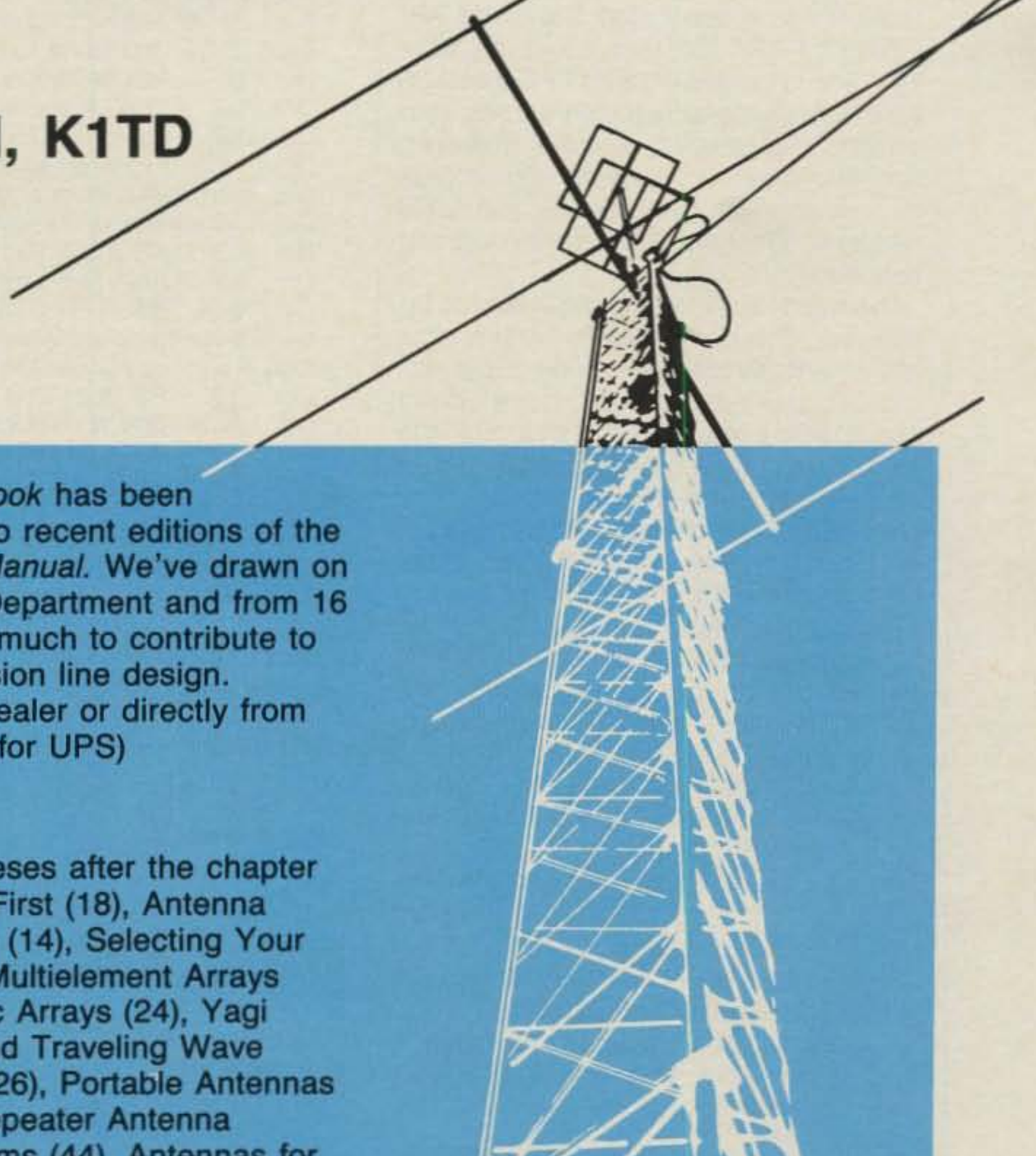

Available in August

The 15th Edition of *The ARRL Antenna Book* has been dramatically expanded in a similar fashion to recent editions of the *ARRL Handbook* and the *ARRL Operating Manual*. We've drawn on material produced by the ARRL Technical Department and from 16 well-known outside authors who have done much to contribute to the state-of-the-art in antenna and transmission line design. Available in softcover only for $18 at your dealer or directly from ARRL (shipping and handling: $2.50, $3.50 for UPS)

CHAPTER LINEUP:

The number of pages appears in parentheses after the chapter title. Page counts may vary slightly. Safety First (18), Antenna Fundamentals (42), The Effects of the Earth (14), Selecting Your Antenna System (30), Loop-Antennas (16), Multielement Arrays (42), Broadband Antennas (12), Log Periodic Arrays (24), Yagi Arrays (26), Quad Arrays (14), Long Wire and Traveling Wave Antennas (18), Direction Finding Antennas (26), Portable Antennas (10), Mobile and Maritime Antennas (30), Repeater Antenna Systems (20), VHF and UHF Antenna Systems (44), Antennas for Space Communications (32), Spacecraft Antennas (8), Antenna Materials and Accessories (20), Antenna Supports (22), Radio Wave Propagation (26), Transmission Lines (26), Coupling the Transmitter to the Line (18), Coupling the Line to the Antenna (28), Antenna and Transmission-Line Measurements (36), Smith Chart Calculations (16), Topical Bibliography on Antennas (32), Glossary and Abbreviations (4), Contents, Index, etc (16).

ARRL 225 MAIN ST., NEWINGTON, CT 06111

CIRCLE 8 ON READER SERVICE CARD

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

As usual September is a rather full month of contest activity, but with no serious conflicts. Scheduling different modes and frequencies on the same weekends should hold QRM to a minimum.

Not listed this month are two activities that are usually held in September—the *73* National Championship (Sept. 3–4) and the Washington State QSO Party (Sept. 10–12). I have not heard from them, therefore no announcement.

Even when an official announcement is received, it does not always prove reliable. A few months ago I had the ARI "Volta" RTTY Contest listed on May 14–15, and the ANARTS RTTY Contest on June 4–6. Those were the dates indicated on announcements sent to me. However, later information from on-the-air contacts by a reliable RTTY source said the dates had been changed. So who are you going to believe?

No word from the Scandinavians so far this year. This being the 30th year for this popular activity, I am including it in this month's calendar anyway. Hope I don't end up with egg on my face. According to my records this year's contest should be sponsored by the SSA of Sweden. The SAC has always been held on the third and fourth weekends of September, but with a different contest manager each year. I should have the mailing address for your logs next month in plenty of time to meet the October 30th deadline.

The next event is not a contest, but another stateside activity celebrating the 200th anniversary of the U.S. Constitution. The San Mateo Club station W6LMN will be signing W2**0**0LMN from September 3rd to the 9th, all modes and all bands from 1500Z to 0500Z daily. Send your QSL and a large SASE to the W6LMN Trustee, P.O. Box 751, San Mateo, CA 94401 for an attractive QSL card.

Deadline for the December issue is September 15th, and October 15th for the January issue. Use my home address, please.

73 for this time, Frank, W1WY

Bulgarian DX Contest

0000Z to 2400Z Sunday, Sept. 4

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

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

	Aug. 27-28	All Asian CW Contest
	Sept. 4	Bulgarian DX Contest
**	Sept. 7-9	YLRL "Howdy" Days
**	Sept. 10-11	European SSB Contest
	Sept. 10-12	ARRL VHF QSO Party
	Sept. 11	North American CW Sprint
†	Sept. 17-18	Scandinavian CW Contest
†	Sept. 17-18	CRRL CAN-AM SSB Contest
	Sept. 18	North American SSB Sprint
†	Sept. 24-25	Scandinavian SSB Contest
	Sept. 24-25	CRRL CAN-AM CW Contest
	Sept. 24-25	**CQ WW DX RTTY Contest**
	Sept. 24-25	Italian YLRC Contest
	Sept. 25-26	Classic Radio Exchange
	Oct. 1	AGCW-DL Straight Key Party
	Oct. 1-2	VK/ZL/Oceania SSB Contest
	Oct. 1-2	California QSO Party
	Oct. 1-2	Fernand Raoult F9AA Cup
	Oct. 8-9	VK/ZL/Oceania CW Contest
	Oct. 8-9	Pennsylvania QSO Party
	Oct. 8-9	ARCI QRP Fall CW Party
	Oct. 8-9	IRSA Radiosporting Contest
	Oct. 9	RSGB 21/28 MHz SSB Contest
	Oct. 9-10	Illinois QSO Party
	Oct. 15-16	Boy Scout Jamboree
	Oct. 16	RSGB 21 MHz CW Contest
	Oct. 29-30	**CQ WW DX SSB Contest**
	Nov. 5-7	ARRL CW Sweepstakes
	Nov. 11-13	Japan International DX
	Nov. 12-13	European RTTY Contest
	Nov. 12	ALARA (VK YL) Contest
	Nov. 19-21	ARRL Phone Sweepstakes
	Nov. 26-27	**CQ WW DX CW Contest**

* *See June issue.*
** *Covered last month.*
† *Not official.*

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. 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 1 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.

1987 Bulgarian DX Contest
North America Results

All Band			
*VO1AW	5,978	K5BDX	6,282
*KA1DWX	2,756	WA3PWL	4,125
*HP1AC	552	WA2UDT	1,393
14 MHz		W6NNV	1,155
K3IPK	9,324		

**Continental medal winners.*

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 to: Central Radio Club, P.O. Box 830, 100 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.

ARRL VHF QSO Party

1800Z Sat. to 0300Z Mon., Sept. 10–12

All bands 50 MHz and up can be used for this one. The August issue of *QST* should have had all the details.

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.

North American "Sprint"

CW: Sept. 11 SSB: Sept. 18
Sunday 0000Z to 0359Z (Sat. night)

This is the fall edition of the "Sprint" run by the National Contest Journal. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the *CQ* WW DX Contest.

Exchange: Call, QSO no., name, and QTH (state, Canadian area, or country).

Scoring: Multiply total QSOs by the sum of states, Canadian areas, and other North American countries worked for your final score. (U.S. and VE not countries; KH6 not a state.) There are eight Canadian multipliers: VE1/VO1/VO2, VE2–VE7, VY1/VE8. Non-North American countries do not count as a multiplier.

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Awards: A trophy to the highest scoring entrant. Certificates to the top scorer in each U. S. call area, Canada, and other North American country. Also to the ten top scores, to each member of the winning team, and the highest scoring entrant on each team.

Team competition is limited to a maximum of 10 operators as a single unit. Pre-contest registration is required for each team before the start of the contest—with WN4KKN for the CW and K7GM for the SSB.

There are other detailed rules, a special QSY rule, disqualifying penalties, etc. I suggest you write to WN4KKN or K7GM if you do not have a copy of the *Contest Journal*.

Entries must be received no later than 30 days after the end of each "Sprint." The CW go to: Trey Garlough, WN4KKN, 7609 Hardy Drive, Austin, TX 78757. The SSB go to: Rick Niswander, K7GM, 910 W. Claremont, Phoenix, AZ 85013.

Scandinavian Activity Contest

C.W.: Sept. 17-18 Phone: Sept. 24-25
1500Z Saturday to 1800Z Sunday

It's the world working the Scandinavians in this the 29th 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); OHØ (Aland Is.); OHØM (Market Reef); OX (Greenland); OY (Faroe Is.); OZ (Denmark); SJ, SK, SL, SM (Sweden); TF (Iceland).

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.

Classes: Single operator and multi-operator single transmitter, all band only. Multi-operator must remain on the same band for at least 10 minutes. Also QRP single operator (maximum of 10 watts output) and SWL (only SAC stations may be logged).

Exchange: RS(T) plus a QSO number starting with 001.

Points: European stations score 1 point for each SAC contact. Non-Europeans score 1 point on 14, 21, and 28 MHz, and 3 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 multiplier from each band. Scoring for SWL's same as above.

Awards: Certificates to the winning station in each class, both CW and phone, in each country and each U.S.A. call area. QRP stations will be listed in one common list. The non-SAC SWL winner will be awarded. Plaques to the top-scoring station in each continent.

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. Mailing deadline is October 30th and this year logs go to the SSA Contest Manager. Address not available at this time, but will have it next month before the mailing deadline.

CRRL CAN-AM Contest

Phone: Sept. 17–18 CW: Sept. 24–25
1800Z Sat.to 1800Z Sun.

This contest is sponsored by the International Radiosport Assn. and the Canadian Radio Relay League to increase friendship between American and Canadian amateurs. Use all 6 bands, 1.8–28 MHz, in the U.S. General portion of each band.

Categories: Single operator, single and all band, low power (maximum of 200 watts input). And QRP (maximum of 10 watts input). Multi-operator, single transmitter (or single operator other than the licensee or a club station).

Exchange: RS(T) plus a progressive QSO number, and state or province. Use two-letter abbreviations. For Caribbean use CN, and PC for US possessions in the Pacific and Antarctica.

Points: U.S. to U.S. and VE to VE QSOs, 1 point on phone, 2 points on CW. U.S. to VE and VE to US, 2 points on phone, 3 points on CW. The same station can be worked on each band for QSO credit.

Multiplier: 50 U.S. states, 2 U.S. possessions (CN and PC), 10 VE provinces, 2 territories (VE8 and VY1), 1 island (Sable/St. Paul). Total of 65 possible on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band (maximum of 390 possible). Phone and CW are separate contests. However, combined scores from each band will be used for overall competition by the committee.

Awards: Certificates to single operator winners in each class in each multiplier area. And to the top five multi-operator stations in each country for combined phone and CW scores. There are four trophies, American and Canadian champion, combined scores, single and multi-operator categories.

Log Instructions: Do *not* use separate logs for each band. Indicate multiplier only first time it is worked on each band. A summary sheet showing the scoring and the usual signed declaration is a must. Entries with over 200 QSOs must include a check sheet for each band.

Official log forms and a more detailed rules sheet are available by sending a large SASE to the address below.

The usual disqualification rules are in effect. Taking credit for duplicate contacts in excess of 2% could mean disqualification.

Mailing deadline is 30 days from end of each contest to: CRRL CAN-AM Contest, W2/VE3BMV, P.O. Box 282, Pine Brook, NJ 07058.

CQ World-Wide RTTY Contest

0000Z Sat. to 2400Z Sun., Sept. 24–25

This is the second annual RTTY Contest organized by *CQ*, and from the response in last year's inaugural contest, it has already become one of the major RTTY competitions.

Rules are the same as last year with two minor exceptions. The 160 meter band has been deleted, and dupe sheets are only required on bands with more than 50 contacts.

Keep in mind that single operators are limited to 30 hours out of the 48-hour contest period. Multi-operator stations can operate the full 48 hours.

Bands: All five bands, 10 through 80 meters.

Classes: Single operator, single and all band. Multi-operator, single transmitter, all band only.

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 for contacts within own country. Two for contacts outside own country but same continent. Three 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 class and areas. Certificates to second and third place. And certificates to the top scorers in each U.S. and Canadian call area, and DX country.

Complete and detailed rules were published in the June issue of *CQ* and should be reviewed for more detailed information.

The standard *CQ* log and summary sheets are recommended. It will make you scoring much easier. Sample forms are available from *CQ*. Include a large 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, ATT: 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.

Italian YLRC Contest

1300Z Sat. to 1300Z Sun., Sept. 24–25

Again organized by the Italian YL Radio Club, it's the Italian YLs working other YLs and OMs worldwide. Contacts between other YLs and between OMs are also permitted.

Categories: Single operator, YL and OM, and SWL.

Bands: All six bands, 1.8–28 MHz on the YL contest frequencies.

Exchange: RS(T) and a progressive QSO number. Members of YL clubs will also add RC.

Points: One point for contacts with stations in same country, 3 points if in other countries. Each station may be worked on each band and mode for QSO and multiplier credit.

Multiplier: (A) One point for each DXCC country and call areas in the U.S., VE, JA, and VK worked on each band. (B) Two points for each YL worked. (Not an RC member.) Five points for each member of the Italian YLRC worked. (Not valid for QSOs between YLs of radio clubs.) SWLs score 1 point for each YL heard on each band.

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

Awards: Plaques and medals to winners in each category and mode for YLs, OMs, and SWLs. Diplomas to the first, second, and third place winners in each category.

Use a separate log for phone and CW and indicate the multiplier only the first time it is worked on each band. A summary sheet showing the scoring, etc., and the usual signed declaration is also requested.

Mailing deadline for logs is November 30th to: Italian YL Radio Club, Att: Ornella Torri, ISØTUE, P.O. Box 22, 09012 Capoterra, (CA) Italy.

Contacts made during the contest with YLRC stations are valid for the "Gioconda" award. Europeans must work 8 YLRC members; others work 6 members. Send application with your log and 20 IRCs or $10.00 to: Gigliola Todde, ISØPFD, P.O. Box 126, 00123 Monserrato, (CA) Italy.

Classic Radio Exchange

2000Z Sun. to 0400Z Mon., Sept. 25–26

This is the fall edition of this unusual event. The format is still the same as it has been for the past years. Object is to restore and operate older equipment with like-minded hams, not required in the exchange, but a distinct advantage in the scoring.

A classic radio is any equipment at least 10 years old.

The same station may be worked on each band and each mode, and with different equipment combinations. Noncontesters may be worked for credit also.

Exchange: Name, RS(T), QTH, receiver and transmitter type, and other interesting conversation.

Scoring: Multiply total QSOs by total number of receivers, transmitters, state/provinces/countries worked on each band and mode. Multiply that total by your Classic Multiplier, the total age of all receivers and transmitters used. Three QSOs minimum per unit. Multiply age by two if gear is a transceiver. If equipment is homebrew, count it as a minimum of 25 years old, unless its actual construction date is older.

Frequencies: CW—60 kHz up from low edge of band. Phone—3880, 7290, 14280, 21380, 28320. Novice/Tech.—3720, 7120, 21120, 28120, 28320.

Awards: Certificates and appropriate memorabilia are awarded for highest scores, longest DX, exotic equipment, best excuses, and other unusual achievements.

Send logs, comments, anecdotes, pictures to Jim Hanlon, W8KGI, 5560 Linworth Road, Columbus, OH 43235. Include a large SASE for copy of newsletter with results.

AGCW-DL Straight Key Party

1300Z to 1600Z Sat., Oct. 1

Participation for this one is more or less limited to the European areas due to the time and frequency.

You have to use a straight key to join the party, on CW only, of course, single operator on 40 meters, 7010 to 7040 kHz.

Classes: A—10 watts input, B—100 watts, C—300 watts and SWL.

Exchange: RST, QSO number, class, name, and age. (YLs can sign XX instead of age.)

Scoring: Class A to class A QSOs, 9 points; with B, 7 points; and with C, 5 points.

Class B with class B QSOs, 4 points; with C, 3 points.

Class C with class C QSOs, 2 points.

SWLs calculate their scores accordingly.

Keying of transmitter is restricted to the use of a straight key only. No bugs or keyboards.

Logs must be submitted by October 31st to: Friedrich Fabri, DF1OY, Wolkerweg 11, D-800, Munchen 70, West Germany. (Include an SAE plus an IRC for a copy of the results.)

VK/ZL/Oceania DX Contest

SSB: Oct. 1–2 CW: Oct. 8–9
1000Z Saturday to 1000Z Sunday

This is the 53rd year of the VK/ZL contest. The following rules are for overseas stations.

A maximum of 12 hours operating time is permitted in the 24-hour contest period, to be taken in one-hour blocks based on the "even hour to even hour" (1000Z to 1100Z/1300Z to 1500Z, etc.) in minimum periods of one hour. (SSB and CW are separate contests.)

Use all bands, 1.8–28 MHz, except WARC bands.

Oceania stations can work anyone. The rest of the world can work VK, ZL, and Oceania stations only. The same station may be worked on each band for QSO and multiplier credit.

Exchange: RS(T) plus a three-figure QSO number starting with 001.

Points: Two points per QSO for everyone.

Multiplier: Each VK/ZL/O prefix worked on each band.

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

Awards: Special large, color certificates to top scorers in each country and to each continental winner. A participation certificate to all on request (1 IRC, please).

There is an SWL section. Only VK/ZL/O stations are logged. Call of station being worked and RS(T) being sent must be reported. Scoring same as above but both SSB and CW scores are combined for final score (maximum total of 24 hours).

Use a separate log sheet for each band

and underline each new VK/ZL/O prefix as it is worked on each band. Include a summary sheet showing the scoring and other essential information, and the usual signed declaration that all rules and regulations have been observed.

This year logs go to the new NZART Contest Manager, John Litten, ZL1AAS, 146 Sandspit Rd., Howick, New Zealand. They must be received no later than February 15, 1989.

California QSO Party

1600Z Sat. to 2200Z Sun., Oct. 1–2

This year's party is again being sponsored by the Northern California Contest Club. All efforts are being made to activate all CA counties and make this the most successful of all state parties.

Operating time is limited to 24 out of the 30-hour contest period for single operator stations. Multi-operators may use the full 30 hours. Off times must be at least 15 minutes and clearly indicated in the log.

The same station may be worked on each band and mode, and CA stations may contact other in-state stations for QSO and multiplier credit. CA mobiles may be worked in each county change.

Exchange: QSO no. and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts; 3 points on CW.

Multiplier: CA stations use states (50) and VE call areas (8). VO/VE1–7 and VY1/VE8. Out-of-state use CA counties (maximum of 58).

Final Score: Total QSO points times the sum of the multiplier.

Frequencies: 160 meters through 2 meters, except 30 and 12 meter bands. CW—1805 and 50 kHz up from band edge. Phone—1815, 3850, 7230, 14250, 21300, 28500. Novice–10 kHz up from edge of Novice bands and 28495.

Try CW on the half hours, 10 meters on the hour 1700–2000Z, 147.54 at 2000, 0000, 0400Z, 160 at 0500Z, and 80 at 0300 and 0700Z.

Awards: Certificates to the highest scoring single operator in each state, province, and country. Also each CA county and stations scoring 100 or more QSOs.

Trophies galore. Single operator, top three out-of-state, and CA top three. Also CA county expedition, and the WA6VEF special award for the CA station making the most CW QSOs. Multi-single and multi-multi winners in CA and county expedition. And the CA mobile team making the most QSOs. A Special Award of a refreshing local product goes to the top 20 single operators in CA and 20 out of state. And to the top-scoring Novice/Tech entry, both in CA and out of state.

Include a summary sheet showing the scoring, etc., a dupe sheet if you make more than 200 QSOs, and a large SASE for a copy of the results.

Mailing deadline is November 15th and entries go to: NCCC c/o Gary Caldwell, WA6VEF, 1830 Polk Street, Concord, CA 94521.

A contest paperwork packet containing log, summary sheet, contest records, county abbreviations, and Special Awards List is available by sending a large SASE to WA6VEF.

Fernand Raoult, F9AA Cup

1200Z Sat. to 1200Z Sun., Oct. 1–2

This contest was started in 1986 in memory of Fernand Raoult, founder of the French Club Group. The theme is Radio Clubs against the World, with a rather unusual format. The way I interpret the rules, the objective is to contact clubs, but contacts between individual stations are permitted.

Exchange: RS(T) and QSO number. Club stations will also include RC for identity.

Classes: Single operator (OM) and club stations (RC). They may be single or multi-operator, and SWL.

Modes: CW and SSB, 12 hours on each mode.

Bands: All HF bands according to IARU rules.

Points: Same continent QSOs, OM 1 point, RC 5 points. Other continents OM 3 points, RC 10 points. Fifty points for contacts with FF6URC. SWLs use the same scoring.

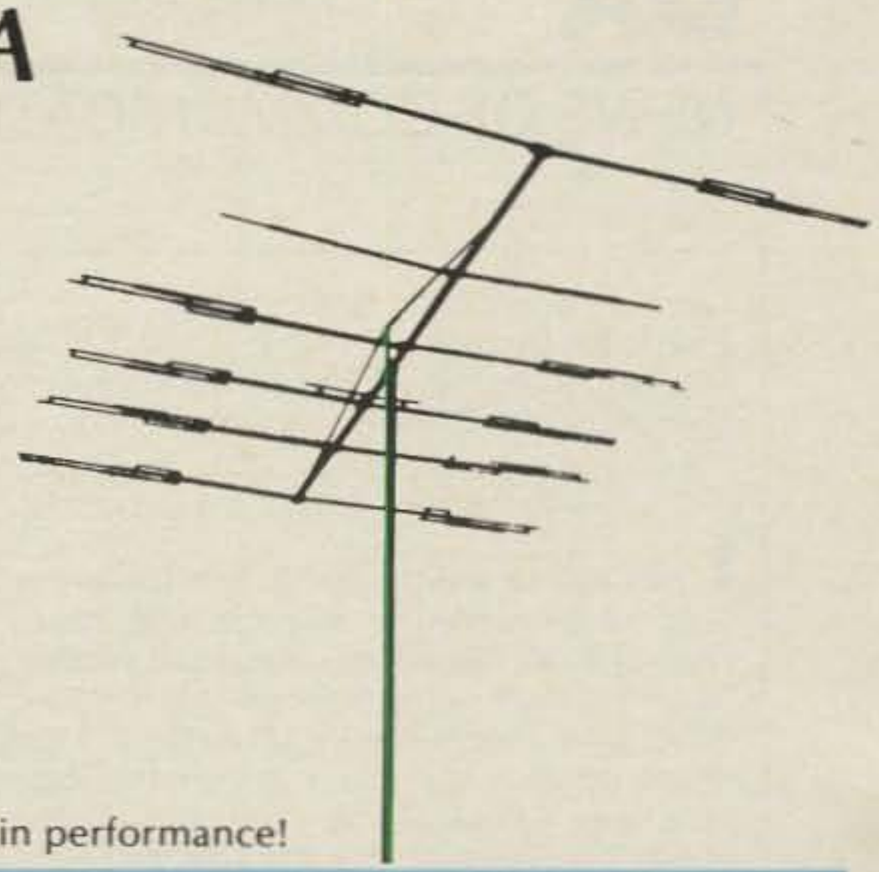
Multiplier: Each different RC and DX country worked or heard, counted only once.

Final Score: Total QSO points from all bands times the RC + country multiplier.

Awards: Special awards to the 10 top single operators (OM), and the winning club station and SWL out of France will receive the F9AA Cup Award.

Mailing deadline for logs is four weeks after the end of the contest to: Union des Radio Clubs, Coupe Fernand Raoult, B. P. 73-08, 75362 Paris Cedex 08, France.

Best Amateur Tribanders Available — KT-34A/KT-34XA*



SPECIFICATIONS — KT-34XA

ELECTRICAL

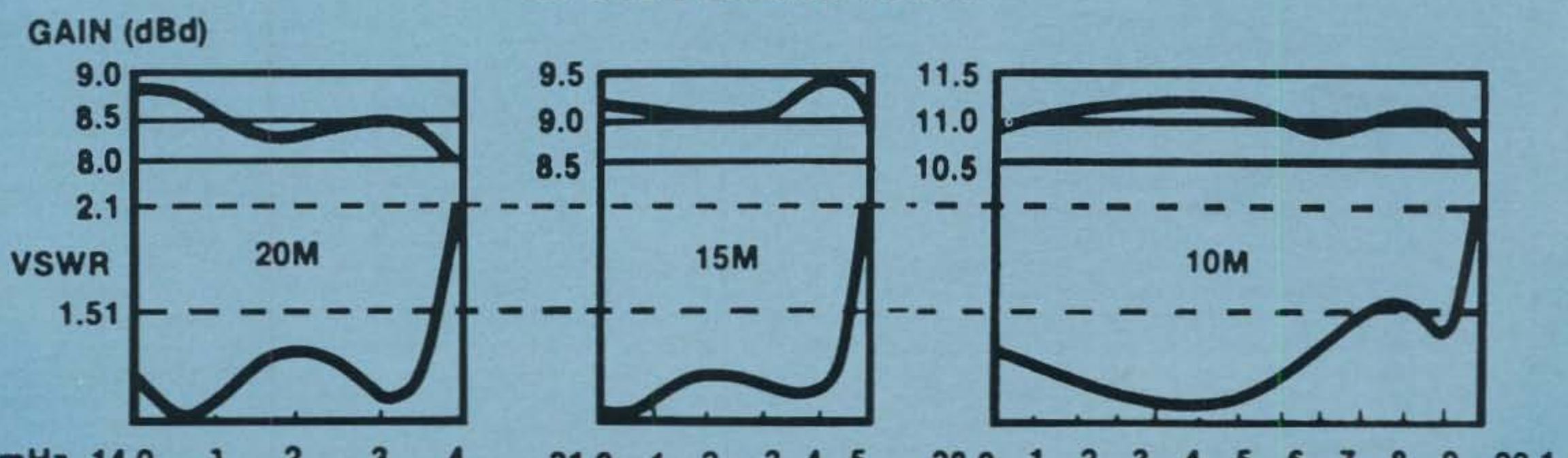
- Bandwidth ..... 14.0-14.350 MHz
  21.0-21.450 MHz
  28-29.7 MHz
- Gain ..... 8.5-9 dB
  9-9.5 dB
  11-11.3 dB
- VSWR 1.5:1
- F/B ..... 20 dB
- F/S ..... 40 dB
- Feed Imp ..... 50 Ohms with balun
- Balun ..... 4:1, 5 kW PEP

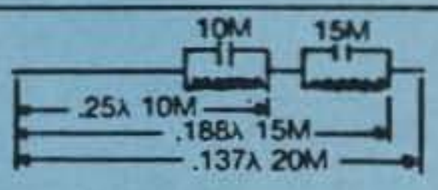
MECHANICAL

- Element Length ..... 24 ft.
- Boom Length ..... 32 ft.
- Turn Radius ..... 21.5 ft.
- Windload ..... 9 sq. ft.
- Weight ..... 68 lbs.
- Mast ..... 2 in. O.D.

*Lack of space or funds? How about a KT-34A? It's upgradable to a KT-34XA and similar in performance!

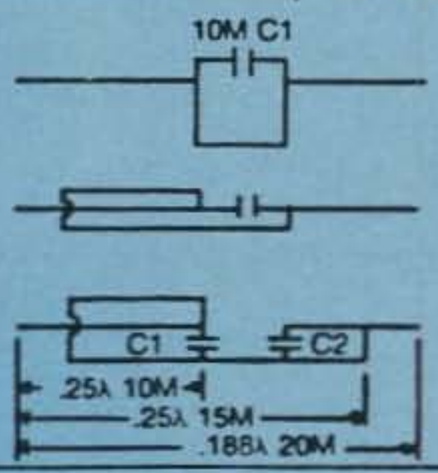
KT-34XA Gain vs. VSWR





Conventional tribander element

Development of the KT-34XA Element



1. Replace coils with lossless linear loading.
2. Fold back and symmetrically place linear loading for mechanical strength and balance.
3. Extend element to 1/4 wave on 15M. Fold back and decouple tip with C2.
4. Extend tip for 20M. Tuning of 15 and 20M is independent.

The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 5KW PEP and an unusually high level of operating efficiency. Linear loading also makes full ¼-wave elements possible on 10 and 15 meters, and brings 20 meters much closer to the desirable ¼-wave than any conventional tribander. The etch above diagrams the profound differences between the KT-34XA and a typical tribander element and the electrical activity of its various sections. Note also the lower windloading profile!

21 Jan-1988

Mr. W.M. Scott
Mirage/KLM
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Morgan Hill, Ca. 95037

Hello Scotty

Just want you to know that once again your KT34XA is the king of the 10/15/20 meter bands!

In 1987, just closed, I worked 268 countries on 10/15/20 SSB with your KT34XA - and this was done in only 11 months - (since I spent October in China at BY4RA and BY4AOM in Shanghai - away from my home qth.) -congratulations, Scotty, on providing the finest tri-bander available anywhere — and you can quote me!

73/Ken Miller
KG9R/3

(See the Feb. issue of S.E.R.A. Repeater Journal's "Dream Farm" story — reprints available).

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CIRCLE 27 ON READER SERVICE CARD

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

There are worse ills to face
Than foe in the fray;
And many a one has worked DX because
They would not run away . . . .

It had been a warm evening, and late in the night we awakened. It was the quiet hours when one day has run its course and another has yet to start. In the silence of the night we thought we could hear the muffled throb of the drums we once knew back in the *barrancas*, back deep in the hills where the Palos Verdes Sundancers lived. We could not sleep.

We thought again of those days more than a decade gone when Cycle 20 was fading and there were prophets leaping up to preach and prove that we would never see a Cycle 21, that the sunspots might be gone forever. These prophets could be found facing east every morning, chanting their warning phrases and ready to greet the return of the demon Maunder Minimum. Many DXers believed the warnings and fled from their rigs in terror. The Palos Verdes Sundancers did not.

Hearing the faint rhythms, we could not sleep. We rose to set out in the moonlight on the road back into the past. In the silence of the hills the beat of the bongos was louder, and we were soon back in that hidden glade, remembered from other years. The Sundancers were there, and we joined them as the sky to the east lightened. They still remembered us after all the years; they were still dancing. We wondered if they ever stopped. The leader of the Sundancers greeted us, one old DXer to another, always warmly, always with pleasure. "We wondered if we might bring you out," the Leader told us. "The down-slope winds out of the east often carry sounds farther than normal. We thought that with the good conditions we might rouse some of the DXers as we once did." They had for sure. And it was good to again hear the dry rattle of the tenor bongos, it being much too early in the day for the big bass bongo.

It has long been said that the best way for a DXer in these latter days to get a grasp of and an understanding of the history of DXing is to accumulate a long file of amateur magazines. Never throw away a ham magazine, for there will always be found insight and understanding long after an event. With such a file and a time to search it, much can be learned and understood. And if you should look through the magazines dating from the early seventies, you will learn of the dreaded Maunder Minimum and the bleak future then forecast for DXers. It was enough to make strong men tremble, apprehensive DXers to close down and to sell their gear, and for women to weep in the night. Citing statistics and historical references, it was repeatedly proven that the good DXing that had been known since WW II, and especially Cycle 18, might never be known again. The

77 Coleman Drive, San Rafael, CA 94901

Al Slater, G3FXB, raises his arm in the victory salute after receiving his Contest Hall of Fame plaque at the Visalia DX Convention, April 23, 1988. Slater was honored for his many contributions to the enjoyment of contesting by contest enthusiasts worldwide. The award was presented by John A. Attaway, K4IIF, Chairman of the Contest Hall of Fame Committee. (Photo via W6NLG and N6WR)

"Maunder Minimum" was looming over the DX world, bringing again the threat of those days when years passed without anyone counting a spot on the sun. It was predicted that with the end of Cycle 20 there might be a "sunspot drought" lasting 40 or more years. It was a time for worry, and DXers worried. It was not uncommon to hear DXers telling of taking down their big directional arrays and putting up low-band antennas, they being convinced that the good days were gone forever and would never again be known in their lifetime. Many DXers were deep in worry, but not the Palos Verdes Sundancers. Almost alone, they saw a bright future for DXers and the promise of Cycle 21.

"We will bring back the sunspots," the leader of the Sundancers announced. "We will and you can count on that. We will arouse the spirit of DX again through the interpretative dance routines we will perform. We will dance for DX and our vibrations will be in ethereal harmony with the frequencies that the DXers know. We will bring joy and happiness and DX everywhere, even to those amateurs who do not DX. But more than anything or anyone else, DXers will be the chosen ones. Believe me!" They said it and they did it and we believed them.

Back in the barrancas they put together their big bass bongo, the loudest signal generator ever to be heard out of six-land. When the shock wave of the big bass bongo rolled across the land, knocking down small trees and raising clouds of dust, DXers everywhere knew that the Palos Verdes Sundancers were working on Cycle 21.

It may be difficult to believe now, but back then there still remained skeptics. Even with the big bass bongo booming back in the barrancas there were some who persisted in their predictions of a woeful future for DXing, still maintaining that the Maunder Minimum would return. "Look at the record," they would protest. "Look and note that over the 250 years of sunspot observations, there was a period when solar activity was so low that no sunspots at all were reported. There were astronomers back then who grew up, grew old, and turned gray without ever seeing even one sunspot. It happened then and it is time for it to happen again. And it will!"

The Palos Verdes Sundancers paid scant attention to the doomsayers. Instead they concentrated on their new routines, seeking to arouse the enduring spirit of Terpsichore, the Greek Muse of dancing and choral CQs. To go then to that glade back in the barrancas was to see the Sundancers swirling around in an endless *deboule*, often ending with a most fantastic *fouette en tournant*. It was a wonder to see and, best of all, to see the leader of the Sundancers enter the glade, running rapidly in a *glissade*, shifting to a *bourree couru* and ending with an unbelievable *tour en l'air*. It was magnificent! What DXer could not be stirred by the great work that these Sundancers were doing for DXing!

When the Sundancers were queried about the meanings in the 250 year record of sunspot observations, they merely scoffed. "Look back to the time of those early observations," the Leader told us, "and you will be surprised to learn that back then even when they saw some sunspots, they did not know what they were." And he was right. It took a long string of years before the astronomers were able to figure out what the sunspots were, and they are still learning.

Back when Cycle 20 was ending, many DXers had yet to learn of the Palos Verde Sundancers and the great things they promised—and not only promised but delivered. The Sundancers were not content just to scoff at the short history of sunspot observations. They also pointed out, admittedly with undisguised pride, the long history of the dance.

"Always remember," the Leader admonished us, "that we Sundancers have been around for a long time. We were dancing at the Festival of Isis in ancient Egypt; in the second millenium B.C. we were dancing in ancient Greece. And later we danced in Sparta, in the 6th century BC, this period being acknowledged by some learned DXers as the start of the true DX pile-ups even though it is usually referred to as the Pyrrhic Dances. Check and you will find that this dance, the Pyrrhic Dance, antedates by several centuries the common understanding of the use of the word *Pyrrhic* Victory that is often quoted. Some even think it to be more a war dance than a DX happening. But they learn, eventually.

"And the Dionysiac or Bacchic Dances," the Leader continued. "Surely you have noted even now this dance still performed by DXers, haven't you?" We had to admit that the event had slipped our mind. There was a note of scorn almost detectable in the leader's voice as he continued.

"What about the traditional 2 hour, no-limit cocktail hour at the International DX Conventions?" the Leader demanded. "Certainly you have been there and know the routines—the two quick steps forward, the one step glide to

The WPX Program

Mixed

1344	KJ4ON	1348	JE1DXC
1345	KB3OO	1349	DF5TS
1346	KE6KT	1350	SM@OJR
1347	WT6V		

SSB

1978	PA3AOS	1982	I7VEZ
1979	K7LJ	1983	YV6BTF
1980	EA3FHT	1984	W3FDU
1981	JH8MWW		

CW

2518	F6HZF	2521	KS4S
2519	DJ3SU	2522	I1EEW
2520	NN2B		

WPNX

236 ..... KA2RFE

Endorsements

Mixed: 450 KE6KT, WT6V, JE1DXC. 500 KE6KT, JE1DXC, KS4S. 550 KE6KT, JE1DXC, KS4S, W3FDU. 600 K7LJ, KE6KT, JE1DXC, KS4S. 650 K7LJ, KE6KT, JE1DXC, KS4S, NI9C. 700 K7LJ, NI9C, KS4S. 750 K7LJ, KS4S, NI9C, KIBAZ/DV1, WDX4KEF. 800 K7LJ, NI9C. 850 K7LJ. 900 K7LJ. 950 K7LJ. 1000 K7LJ, JA7FFN, OE1KJW. 1050 K7LJ. 1200 I1EEW. 1250 N2CIC. 1600 N6JM. 1700 I2DMK.

S.S.B.: 350 PA3AOS, K7LJ, W2HG, NI9C, K1BAZ/DV1, YV6BTF, W3FDU. 400 K7LJ, KA9MOM, W2HG, IK@EIM, NI9C, K1BAZ/DV1, YV6BTF, W3FDU. 450 K7LJ, KA9MOM, W2HG, NI9C, YV6BTF, W3FDU, IK@EIM. 500 K7LJ, KA9MOM, W2HG, IK@EIM, OE1KJW, NI9C, YV6BTF, W3FDU. 550 K7LJ, W2HG, IK@EIM. 600 K7LJ, W2HG, IK@EIM. 650 K7LJ. 700 IK8GCS. 950 KS3F. 1100 I2DMK. 1150 N2CIC, I1EEW. 1300 W2NC. 2450 K2POA. 2600 ZL3NS.

CW: 350 DJ3SU, W@ULU, DF5TS. 400 DJ3SU, NI9C. 450 DJ3SU, K7LJ, NI9C. 500 DJ3SU, K7LJ, NI9C. 550 DJ 3SU, K7LJ, W3GXK. 600 K7LJ, DJ3SU. 650 DJ3SU, K7LJ, K1BAZ/DV1. 700 I2IWM, G4SSH, KA1CLV. 750 K2PK, I2IWM. 800 NF5Z, K2PK, I2IWM. 850 K2PK, I2IWM, PT2CW. 900 I2IWM, PT2CW. 950 I2IWM. 1000 I2IWM. 1050 I2IWM. 1300 I2DMK. 1600 W3TVB, KL7AF.

10 Meters:	K7LJ, W5EIJ, W2HG, KS4S
15 Meters:	K7LJ, W5EIJ, I2IWM, W2HG, K1BAZ/DV1
20 Meters:	DJ3SU, K7LJ, W5EIJ, I2IWM, W2HG, IK@EIM
40 Meters:	DJ3SU, K7LJ, I2IWM, W2HG, NI9C
80 Meters:	K7LJ, W5EIJ, I2IWM, W2HG, N7JB
160 Meters:	K7LJ

Asia:	K7LJ, I2IWM, W2HG, IK@EIM, JH8MWW
No. America:	I2IWM, W2HG, KS4S, W3FDU
So. America:	K7LJ
Europe:	K7LJ, I2IWM, W2HG, DF5TS, NI9C, W3FDU
Oceania:	W2HG, I1EEW

Award of Excellence Plaque Holders: W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM@DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM@AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE@DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I@JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K@JN, W4VQ, KF2O, K3UA, HA8UB, W8CNL.

Award of Excellence Plaque Holders with 160 Meter Endorsement: N4MM, SM@AJU, KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BWS, NN4Q, G4GUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE@DXM, VE7IG, K9BG, AB9O, FM5WD, SM@DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

How can you tell an OH DXer? At the International DX Convention it was easy. All wore the distinctive DXpedition label.

either side as you seek an open spot at the bar, the *chasse*, the *chasse*. Certainly you recognize that short, quick, and graceful step either to the left or right side. It's the *chasse* and all DXers know it. They even use it when tuning in a pile-up. Didn't you know that? Don't you understand?"

Son of a gun! Of course we understood. We were understanding things that we had never even thought about previously. DXers do so many things naturally that it is hard to keep track of all of them. DXers are naturally clever.

"We haven't heard the big bass bongo for some years," we said tentatively, thinking it might be a wise move to change the direction of the conversation. "Where have you been?" We got a long look from the leader. He had recognized our ploy. But Old DXers always understand one another, and he let things slide—for the time being, anyhow.

"We have been here all along," the Leader advised us. "These barrancas are our sacred, ancestral home. But, as it so often happens, we are not thought of unless someone needs us—someone like the DXers, of course. We Sundancers have been here for a long time, and when Cycle 21 started to fade, we gathered the group together and practiced our routines and just waited. We waited for the end of Cycle 21, waiting especially to see if there might again be heard the cries of havoc heard back in the seventies with warnings that the sky was falling being sounded on every band. Maybe DXers are smarter now, but this time no one mentioned the Maunder Minimum as far as we have been able to learn. But then again, you always expect the best of DXers, don't you? Like getting smarter."

Of course, the Leader was right. One has to be really foolish to make the same mistake twice. This time there was little doubt that Cycle 22 would follow Cycle 21, and the good times for DXers would come on schedule. This last time the Sundancers hardly had to beat the big bass bongo at all, just enough to let the DXers know that they were there and ready should they be needed. Ready to prove again that there was no worry that could not be easied with a *cabriole*, an *entrechat*, or a *grand jete* with good elevation. And all of it for the Deserving DXers.

It was good to see again the Palos Verde Sundancers and to know that they were prepared to maintain the good days for all DXers. Many have asked about the Palos Verde Sundancers since those troubled days when Cycle 20 was ending and Cycle 21 was being throttled by predictions of doom. The Sundancers are alive and well with the big bass bongo ready to go.

As DXers have been known to do, we spent the morning hours talking of the good old days, the triumphs we had enjoyed, the big-gun DXers we knew, and the countries worked. No true-blue DXer ever tires of talking about DXing, but eventually it was time to go. We promised to again visit the glade back in the barrancas, but we had one last question. "What shall we tell the DXers who ask about you?" we said. "There are many who still remember the good days back then and the great things that the Sundancers did for DXing. What shall we tell?" The Leader was pleased with our words and smiled.

"Tell them," the Leader advised us, "tell them to sleep well at night. The Palos Verdes Sundancers are on guard!" It was a surprising statement to hear, perhaps mostly because it did seem familiar from seeing it on highway billboards promoting the National Guard. Perhaps our expression gave us away.

"You have heard that said before? Yes?" the Leader asked. "Well, just keep in mind that that is the message we sent to Athens while we danced on the plain at Marathon waiting for the Persians. And don't you forget it, either!"

We promised that we would not. One eventually learns that when certain DXers speak, everybody listens. Or they had better! And remembering the days back when Cycle 20 was declining and the dire predictions then heard, that convinced us permanently that even though we might not really understand all that the Palos Verde Sundancers told us, there might be something there. All we had to do is to look at the record, and the record is history.

And DXing has never been better. Who would argue with that?

The W6AM Museum

The Southern California DX Club group working on the W6AM museum reports that as the work progresses on the effort, a treasure trove of old radio gear has been uncovered. Much of the equipment from the 20s and 30s was found to be in excellent condition and will be restored to operational level. Included in the gear that Don left (apparently he never discarded any radio gear that was usable) are old spark keys and equipment dating back to his early efforts, Don being first on the air in 1910.

A 10 acre parcel 40 miles north of Los Angeles has been acquired for the museum and construction has started. Some of the original rhombics from Don's former QTH in Rolling Hills will be used at the museum site. The original setup had a switching station at the point where 32 pairs of feedlines were brought into the W6AM shack. The call 6AM was assigned to Don Wallace in 1926. That year he was running a 1 kw water-cooled final amplifier, his entire station being home-built and mounted on three 6 foot high wooden racks. That was the year Don earned the WAC award. He was also one of the first in W-land to work China, working CHA1CRS.

His favorite mode was CW, and he would work CW using a speed key strapped to the seat of his convertible while traveling with the top down. The car was juiced up to a full kw power, it taking three car batteries and a heavy-duty alternator to do the job.

The W6AM museum will give a vivid cross-section of amateur radio over the years, and

The WAZ Program

10 Meter Phone

319	K9MGF	320	K4UTE

15 Meter Phone

254	K4UTE

20 Meter Phone

668	KG6AR	671	NI5D
669	KC2FC	672	W5CWQ
670	KE5PA		

15 Meter CW

128	JA2GCW

20 Meter CW

295	NF9V	299	W4JCK
296	KY2O	300	KN7K
297	NN6W	301	KY7M
298	KT2G	302	NX8J

40 Meter CW

77	JE7BQR	78	JP1BJR

80 Meter CW

17	JA3EMU

All Band WAZ

SSB

3202	WB0N	3205	9K2KW
3203	IK0GPP	3206	I2KVI
3204	CT1DJZ		

Phone/CW

6315	HA7SU	6326	DK1GF
6316	W5EW	6327	DL9IE
6317	DL7AB	6328	OE1KJW
6318	FE2VV	6329	WA9BXB
6319	WB8WZT	6330	K6JYO
6320	VK8AV	6331	NX4Y
6321	PY5AKW	6332	PA3CKO
6322	WD5N	6333	HG9R
6323	W6RFF	6334	F6DFZ
6324	K5FNR	6335	K0BFR
6325	NW6P	6336	OZ1LGF

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

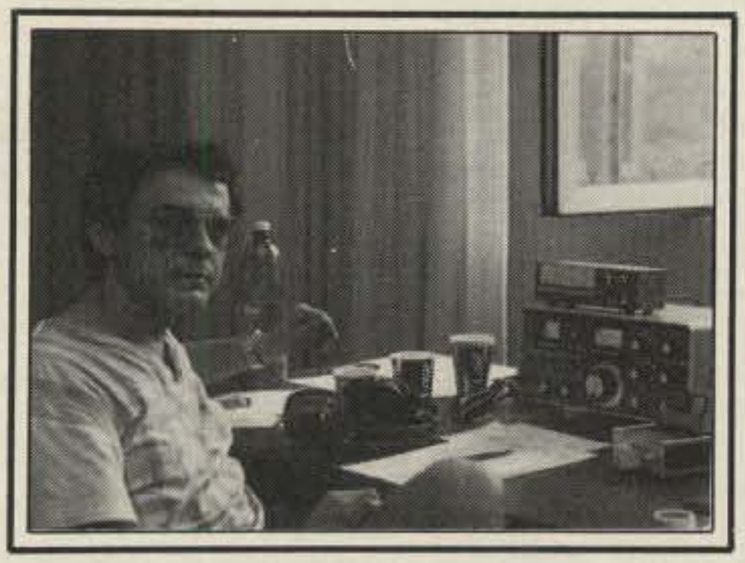
with W6AM always a top DXer, the museum will be especially interesting and valuable to DXers.

Jan Perkins, N6AW, is the mover for the effort, he being a member of the Southern California DX Club, the club now holding the W6AM call. If any more Don Wallace memorabilia might be available for the museum, Jan would like to hear about it. His home address is 6200 East Ocean Blvd. #7, Long Beach, CA 90803.

The Spratly Front

An article in the daily papers a few months back brought the Spratly situation up to date, even reporting the naval battle in the Spratlys in March which ended with two ships sunk and 74 crewmen missing.

What is the slate of the currently interested parties in the Spratlys? You can include Vietnam, Malaysia, the Philippines, mainland China, and Taiwan. Four of these have put garrisons on parts of the Spratlys, Vietnam being on some since 1975 and the Philippines on others since 1977. Malaysia claims some of the southern Spratlys. Taiwan has reportedly



Mirek Rozbicki, 9V1XE has signed a number of calls along the way—SP5IXI, VK3DXI, SP5IXI/OE, VK2DXI, and DL/VK2DXI. He is a member of the SP Top Band Club. He was signing 9V1XE in December '87.

maintained a garrison in the center of the Spratlys since 1956.

Earlier this year mainland China landed troops on some of the islands close to those occupied by the Vietnamese. This led to a naval fight in March over the sacred, ancestral soil. Then China sent out a "surveying" team to look over some more islands, and when Hanoi checked things out they protested that the "survey" was a mask for outright occupation.

Meanwhile, Vietnam said it had reached an understanding with the Philippines to resolve any disputes without force, while at the same time Malaysia urged all parties involved to negotiate any conflicting claims but to keep in mind that it would also insist on the observance of its own rights.

During all of this no one seemed to be negotiating with Taiwan, but that country was reported as reinforcing its garrisons in the Spratlys. There is also a report that Taiwan, if necessary, would join with mainland China to oppose the Vietnamese. Some sources considered this only a gesture, as it was doubted that mainland China would need assistance.

But that's not all. The Vietnam foreign minister was quoted as saying that the Chinese activities in the Spratlys were obstructing a peaceful solution to the Kampuchean problem. The USSR, with a naval base in Vietnam, said it was supporting "Vietnam's just stand." Previously, mainland China pushed Vietnam out of the Parcels, an island group farther north in the China Sea.

Why all the fuss over islands which actually amount to little in land area? It is the possibility of offshore petroleum prospects, these plus the "Law of the Sea" provision giving claim to under-sea areas up to 200 miles offshore. You may recall a year or two back when the Law of the Sea provisions for determining boundaries between coastal countries, off-shore claims, and economic zones were offered as an alternative to the current distance or separation sections in the DXCC criteria.

Actually, the Law of the Sea contained two sections—one devoted to the question of boundaries and economic zones, the other to future developments of undersea resources. While over 150 countries signed the original draft, only a small number of countries ever ratified it—about 12 or so. These were mainly Caribbean and African countries. The whole study foundered on the question of developing undersea resources not covered under the 200 mile offshore sovereignty, the draft proposal being unacceptable to the industrialized countries.

As has been mentioned in more than one DX Forum at conventions, the Spratlys might be a good QTH to avoid in these troubled days. Possibly there will be activity from time to time, but it more likely will come from an effort out of one of the countries laying claim to one or more of the Spratlys rather than the efforts in other years of DXers leaping aboard their chartered boat and heading out for one of the many islands in the Spratlys. These days things are a bit more complicated . . . and dangerous.

WAZ Net

If you are thirsting for some rare zones to fill out a WAZ or a 5BWAZ, you might try listening on 14,260 kHz at 2000Z on Sundays. Robert Wessel, K4PR, runs a roundtable there aimed at those needing something or other to finish out a WAZ. Things generally are a bit informal. Just listening can be informative.

Zone 2

While we are in the WAZ corner, it might be helpful for those needing Zone 2 to note that the Union Metropolitaine des San Filistes de Montreal will be going to northeastern Quebec in October for a 48 hour effort.

The group will set up an operation in the vicinity of Sept-Iles and will operate the weekend of October 1–2. The callsign will be VE2UMS/2. Sept-Iles is located at 50°10′N and 66°40′W. Quebec north of 50°N latitude is in Zone 2. The primary effort will be on 20 meters, but they will open up on other bands as the conditions develop. All the frequencies expected to be used were given last month. Keep in mind that as the sunspot cycle goes up, the conditions on the lower bands go down. If you have ambitions, get the low bands while they are available. In a year or so they may be difficult.

DXpeditioneering

It is sometimes difficult to convince an eag-

5 Band WAZ

As of June 1, 1988 182 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

EA5AD
DL6WD
JA1IFP

The top 7 contenders for 5 Band WAZ are:

1. N4WW, 199
2. W8UVZ, 199
3. K6YRA, 199
4. K9GX, 199
5. SP6JCY, 199
6. W2YY, 198
7. W7UR, 198

477 Stations have attained the 150 Zone level.

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er DXer that there are times and places where a relatively minor effort can draw a lot of attention, a memory of some good times, and valuable experience for when bigger efforts might be considered. At times the feeling is encountered which seems to indicate that unless the operation brings a new one on the air, it is hardly worth considering and it will not get much action.

Phil Catterall, G4OBK, was having a drink at the local radio club and talking with Chris, GØEJK, about DX dreams of glory one cold December evening in Lancashire when they started making plans for a modest effort when the weather improved.

GØEJK has spent a lot of time in the Scottish Islands and suggested they find an easily accessible spot and seek the adventure that awaits all DXers. In March they set off for the island of Colonsay in the Inner Hebrides. They had applied for and received one of the new GB5 callsigns and had GB5CO in their pocket and plans for the *CQ* WPX SSB Test. They loaded the pick-up truck, told everyone to listen for them, and headed out, a bit speechless over the amount of gear needed for a relatively short effort.

They had aimed to keep things simple. A 265 foot doublet with open-wire feed along with a Butternut HF6V vertical proved so satisfactory that a quarter-wave GP for 40 was never put up. The gear included TS930s, TL922, IC735, TS440S, two keyers, two Bencher paddles, VHF equipment, plus the necessary sundries. The load included masting sufficient to raise the doublet up to 50 feet.

They drove all night and the next morning, and by early afternoon they were off the ferry and at their operating cottage. The Butternut vertical went up with 85 feet of wire mesh and a thousand feet of radials. The first call brought RZ9WA. In the first hour 65 stations were worked by G4OBK, who then fell asleep.

The wind built up the second day. The vertical first went to a 26 foot arc, then to three pieces, fractured at the joints. The 15 meter antenna stub shorted against the vertical section, the feedlines were repeatedly broken, and it was necessary to continually monitor the SWR meter for an indication of antenna conditions. The next day the doublet was hoisted, but not all the way because of the wind, and two stations were on the air, one CW and one SSB.

In the WPX test GB5CO operated a straight 25 hours, aiming for the single operator category and made 1065 QSOs in the test. GØEJK concentrated on 20 and 80 meters, and after the WPX effort had some time for ragchewing. A total of 93 DXCC countries were worked, G4OBK even being called on CW by BY1QH.

Flushed with the exhilaration of being the queen bee in pile-ups, thirsty from the continuous exertion needed to work the key and turn the knobs, at the end of their stay they headed for the only hotel and the only pub on Colonsay, there being but 120 residents there. The natives wanted to know what they were up to. Trying to explain the motive and objectives of a DXpedition never is easy. But it was also found out that the natives were suspicious, a bit obviously so when they came off the ferry. They were suspected to be a survey crew for NIREX, the U.K. company handling nuclear waste disposal. The aluminum tubes on the roof of the truck were thought to be gear used for surveying possible dump sites. Once it was found out that they were merely unfathomable DXers, it

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. Total countries are now 319. 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

N4JF	319	W2FXA	312	N4KG	305	WØHZ	293	W1WAI	283
K2FL	319	K6EC	312	K3UA	305	NN4Q	293	W9SC	283
W9DWQ	319	OK1MP	312	AB4H	304	WD9IIC	292	G2GM	282
K4CEB	318	N4MM	312	WØIZ	303	IT9ZGY	292	JH1VRQ	282
K9MM	318	N6AR	311	WA8DXA	302	N5DX	291	K1VHS	282
W6PT	316	DJ1XP	311	YU1HA	302	WA4JTI	290	WA4DAN	281
ON4QX	316	W6ID	311	YU2TW	301	KQ9W	290	N4AH	281
N4PN	315	DL3RK	311	I3OBO	301	IT9QDS	290	K7ZR	280
DL7AA	315	K9QVB	311	W6SN	300	W1WLW	289	I5XIM	280
N6AV	315	K4XO	311	WB4RUA	300	W4BV	289	W2LZX	280
K6LEB	315	DL1PM	310	WØSR	300	N8MC	289	W9NUF	280
W1NG	315	AA6AA	309	DL6QW	300	K8NA	288	HB9AFI	279
W8KPL	314	DL8CM	309	W7CNL	299	W9WAQ	288	DL1QT	277
K6JG	314	W9RY	308	K3FN	298	W6YQ	287	KA3R	276
K9AB	314	W4OEL	307	K9IW	298	G2FFO	287	W6DN	276
N6CW	313	SM3EVR	307	DJ7CX	297	K2OWE	287	K4SE	275
SM6CST	313	N2KW	307	K8LJG	297	NN4Q	286	K2JF	275
DL1PM	313	EA2IA	307	WD9IIX	296	K4CXY	286		
K1MEM	313	SM6CTQ	306	N5FW	294	I8WY	286		
W4BQY	312	K8PYD	305	K9BWQ	294	IT9TQH	283		

SSB

N4JF	319	W1LQQ	314	IØMBX	307	WZ4I	300	G4ADD	289
K6WR	319	W8JXM	314	KV2S	307	WB5TED	300	KSØZ	289
DL9OH	319	DL6KG	314	KB9OC	307	I2ZGC	300	AI9U	289
F9RM	319	W8ILC	313	VK3JF	307	NW5K	300	KA3HXO	288
K2FL	318	EA4LH	313	KZ2P	307	WB6GFJ	300	OK1AWZ	288
W6EUF	318	W8PCA	313	K9IW	307	JH1VRQ	300	WA6DTG	288
DJ9ZB	318	N2SS	313	NJ2C	307	WB6PSY	300	KI3L	287
W4NKI	318	VE7WJ	313	W8IMZ	307	IT9TQH	300	EA3KW	287
4Z4DX	318	K4XO	313	K2JLA	307	WAØTKJ	299	AB9E	287
W4DPS	318	N6AHU	313	W4UNP	307	I6PLN	299	W5LLU	287
WØYDB	318	OE2EGL	313	N4KE	306	KA8T	299	G3XTT	287
ZL3NS	318	F2MO	312	KC8EU	306	DJ7CX	298	XE1MDX	287
W9DWQ	318	K8PYD	312	KB5FU	306	K9SM	298	PAØXPQ	287
VE2YX	318	WØSD	312	K8CMO	306	I8LEL	298	F6BFI	287
W4EEE	318	K9RF	312	XE1OX	306	JH4PRU	298	N8BJQ	286
VE3GMT	318	K4MQG	312	NY5L	306	EA9IE	298	N3ARK	286
W9JT	318	I8ACB	312	KE3A	306	XE1HI	298	K9MNT	285
ZL1AGO	318	K9HDZ	312	W6NLG	306	KC8YM	298	KB5RF	285
K6YRA	318	LA7JO	312	EA1QF	305	K5DUT	297	I8IGS	285
VE3MR	317	LU3YL	312	NA5W	305	HP1JC	297	K4JLD	285
I8AA	317	W7FP	312	KZ8Y	305	YU7KV	297	KD8V	284
W4UG	317	N6OC	312	K8VFV	305	XE1OW	297	KC2FC	284
IØZV	317	SM4CTT	312	WB4UBD	305	WA4ECA	297	KC7EM	284
DJ1XP	317	K3UA	312	K4RIG	305	WB3GPR	296	WB3HAZ	283
ZS6LW	317	W6DN	312	K9HQM	305	KB3KV	296	VE3MV	283
OZ3SK	317	PY2DBU	312	K8ZZU	305	W4BQY	296	IN3ANE	283
K9MM	317	W4SSU	311	W6BCQ	304	IØSGF	296	ZP5JCY	283
KD8VM	317	K6EC	311	WA4DAN	304	K8NWD	296	CX4HS	283
K5OVC	316	I4LCK	311	WB3DNA	304	WØIYR	295	AE5B	282
IØAMU	316	WØSR	311	KB4HU	304	KKØC	295	AI9R	282
TI2HP	316	K8NA	311	XE1KS	303	W6MFC	295	TG9EP	282
KS2I	316	NJØC	311	W2LZX	303	KA9ABC	295	N1ALR	282
YV1KZ	316	N2KW	311	KBØU	303	VE3XO	295	F6BFI	281
VE2WY	316	W2CC	311	KB3OQ	303	WØULU	295	K9TI	280
W3AZD	316	G4CHP	311	KØGT	303	K4LR	295	ZL1BOQ	280
OA4OS	316	IV3YRN	310	WA2MID	303	WA2FKF	295	G4FAM	280
OK1MP	316	DK2BL	310	K1MEM	302	I8ZTE	294	KU9Z	280
W9SS	316	AA6AA	310	N5FG	302	WDØBNC	294	VE6PW	280
PY1APS	316	WA4JTI	310	W6FET	302	I5BDE	294	XE1XM	280
IT9ZGY	316	9H4G	310	I3OBO	302	K1VHS	294	WD9IIC	280
N7RO	316	AB9O	310	K9UAA	302	WB3CQN	294	KB5DN	279
EA2IA	316	W7OM	310	KP4EQF	302	SM6CST	294	EA6DE	279
XE1AE	315	WA4WTG	310	N5FW	302	W4UW	294	JH8NYK	279
I8YRK	315	WD8MGO	310	I5EFO	302	KE4HX	294	KX5V	279
N6AR	315	VE3MRS	310	KQ9W	302	K4SE	293	K4BYK	278
I4ZSQ	315	K1UO	310	I2MQP	302	KC8JH	293	VE3IUE	278
I8KDB	315	KU9I	310	K4CXY	302	AI5I	293	KB8O	278
K9LKA	315	W6SN	310	WD8PUG	302	W9NUF	293	KG9N	278
N4WF	315	N4PN	309	I8XTX	302	G4GED	293	KB7VD	278
OZ5EV	315	ZL1BIL	309	WB4NDX	301	KD5ZM	293	WBØUFL	277
W2SUA	315	WD9IIX	309	WA3HUP	301	WB6OKK	293	W4PTT	277
OE3WWB	315	KB8DB	309	VE3FJE	301	WA4LOF	292	KBØSY	277
YU1AB	315	K9QVB	309	W8ILC/QRPp	301	ACØA	292	IK8BQE	277
ON5KL	315	W2FGY	309	W9OKL	301	VE3FEA	292	NØAMI	276
CT1FL	315	KR9O	309	YU2TW	301	VP9CP	292	N7ASL	276
OZ8BZ	315	VK4VC	308	N4CRU	301	W8LKG	292	WA4OPW	276
K9AB	315	YV5AIP	308	KZØC	301	SV1JG	292	KC2RS	276
N6AW	315	N6AV	308	N8BKF	301	VE3DLR	292	WA9IVU	276
WØSFU	315	AI8S	308	WT4T	301	WD9GQV	292	WA9RCQ	276
K9BWQ	315	N4KG	308	YV1AJ	301	VE3IPR	291	KØHQW	276
YV5DFI	314	I8KCI	308	K3LUE	301	N5AWS	291	I2WZX	276
K6JG	314	I4EAT	308	KB2HK	301	W4JFE	291	I8INW	275
VE3XN	314	AI8M	308	K7LAY	301	DU9RG	291	WB1EAZ	275
YS1RRD	314	NS7Z	308	AG9S	301	XE1CI	291	VE7BSM	275
K8LJG	314	VE7DX	308	KB9KD	301	VE3CKP	290	VE5FX	275
W3GG	314	NN4Q	308	K2JF	301	N2CIC	290	KE4VU	275
I2LLD	314	VE4SK	307	I1POR	300	JA5PUL	289	N9CPW	275
W1NG	314	WB1DQC	307	VE4AT	300	W9TA	289	I2EOW	275

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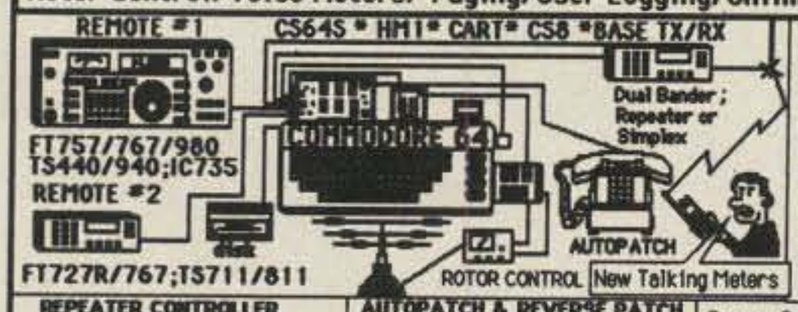

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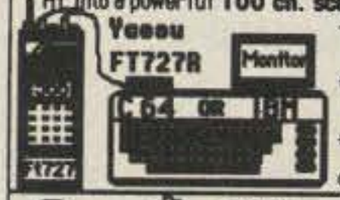

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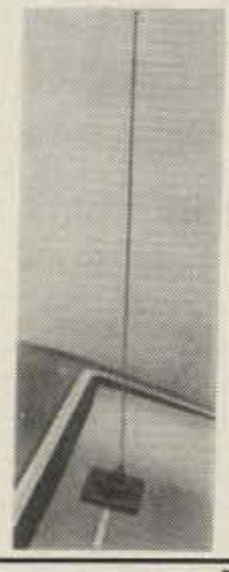

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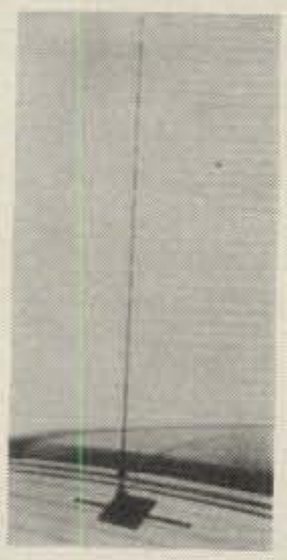

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was a happy time, even with a Gaellic dirge sung in farewell.

The team made 3000 QSOs on the trip. It was not a cataclysmic effort, but it was enjoyable. And G4OBK and GØEJK came home planning for another effort. Not big, not excessively expensive, but thoroughly memorable. Such efforts always are.

There can always be found a good reason for such efforts. The IOTA Award, the county chase, the WPX Program, even WAS has DX stations looking for certain states. The important thing is to go and enjoy the experiences that always come. Even the mishaps turn to joy when recounted for the fifth or sixth time. And, as many a mature DXer has learned, there is nothing wrong about operating from a hotel or a resort. Just make sure that you have a good antenna. You can always expect good times.

Super DXCC Golden Jubilee Award

Along with the ARRL Golden Jubilee Award, the National Capitol DX Assn. members challenged each other to see who could work not the 100 countries for the ARRL Award, but 200 countries for the Super Golden Jubilee Award offered within the club. Would one have any doubt that 200 DXCC countries can be worked in one year from the banks of the Potomac? Twenty out of the 75 members—26.6% of the membership—did just that.

Top key was K6IR with 268 DXCC countries worked. Then came N3II (254), WC4B (250), N4MM (250), N3EHD (233), W3UJ (230), WA3DVO (227), KC3EK (223), WØYVA (223), K3SKE (222), N3US (221), KK4HD (219), N4RA (218), N3FBN (217), W2GHK (207), K3ZH (207), W3YY (206), N3TO (205), G4MZF (203), and W3NF with a late rush for 216.

Years back we would stand in awe when big-gun DXers grandly announced that DXCC could be worked in one weekend—anytime! We learned better along the way. We also learned that top operators with lots of know-how DXwise and a good station with tall antennas can work it rather briskly. But it will never come easily. The scores of the Capitol DX Club certainly merit attention, however. There is a lot of DX there and a lot of expertise.

Cocos-Keeling

Stephen Telenius-Lowe will be signing VK9YG next month, operating over the *CQ* WW SSB Test from October 18th to November 1st. Steve, who signs G4JVG at his home QTH, is going loaded for DX, especially in the antenna department.

These will include two log-periodic beams for the higher frequencies, a 2-element delta loop for 40, a quarter-wave vertical for 80, and an inverted vee on 160. All antennas will be located at the lagoon's edge. Other gear will include a Kenwood TS440S and a Yaesu FL-2100B linear.

Possibly during the *CQ* World-Wide Test the last weekend in October the special callsign AX9YG may be used. Prior to the test the operations will be sporadic with no set schedule, though Steve is receptive to suggestions for schedules on the low-band frequencies. SSB will be the only mode, and the planned frequencies are 28595, 21295, 14195, 7095, 3785, 3600, and 3640/3650 kHz. On 160 the frequency will depend on "local signals" and other factors.

Steve previously has operated as EP2SL in 1978 and a number of times from SJ9WL and LG5LG in the '80s. In 1984 he was VP2MW and G4JVG/VP2M; in '85 it was GJ6UW. On other occasions he has operated OHØ/G4JVG and as OJØMA. Also G4JVG/OHØ/OJØ in '83 and OFØMA in '87.

Here is the line-up of the National Capitol DX Club, each one working over 200 countries during the Golden Jubilee Year of the DXCC. In the front from the left are W3UJ, WØYVA, KK4HD, N3EHD, G4MZF, N3II, and WC4B. Standing in the back are KZ3H, K6IR, N3US, N3TO, K3SKE, WA3DVO, W3NF, and KC3EK. Notice that you can always tell a six-lander. K6IR in his Field Day attire. Sixers always wear a tie when DXing. That may help explain a lot of questions about their big signals.

QSL to home QTH: Steve Telenius-Lowe, "Penworth," Tokers Green Lane, Tokers Green, Reading, RG4 9FB England. He needs a self-addressed envelope with 1 IRC for Europeans and 2 IRCs elsewhere. Anything else will come via the bureaus. And excess of the necessary postage will not be refused.

Liechtenstein

Helmut K.F. Enger will be in Liechtenstein next month, along with a crew of DXers, and they will try to put HBØ on the air around the clock from October 2–9. While all bands will be covered, main emphasis will be on 10, 40, and 80 on CW. QSL to home calls.

Helmut, DL1ECU, will be joined by DF5DR, Karl (Dig.#3771), who will only be heard on CW, DK1DN, Rolf (Dig.#3753/TEN/TEN 36983). DL1ECU is Dig. #3609/TEN/TEN 35078.

Eastern Carolines

Dave Sublette, KX6DS, will be at Pohnpei in the Federated States of Micronesia from November 20–28, and he will be signing KC6TO. Dave will work seven bands, 180 all the way to 6 meters. CW will be the preferred mode.

Dave plans to be active with a special effort during the *CQ* World-Wide CW Test the last weekend in November. Look for him on or about 1831, 3505, 7005, 14030, 21030, and 28030 kHz, and 50.110 MHz with a bit of slipping around if needed to avoid QRM. QSL via the North Alabama DX Club, Box 4563, Huntsville, Alabama 35815. An SASE or an SAE/2 IRCs will be needed for a direct reply. Otherwise they come home via the bureaus.

Dave has previously been to Pohnpei, being there for the *CQ* WW CW Test in 1986 when 71 countries and 1800 QSOs were recorded. Last time out Dave felt the lack of an amplifier for 160. This time there will be a 500 watt linear on line.

QSLs for KX6DX or KC6TO go to the North Alabama Radio Club. Dave is on assignment out in the Pacific and has limited time for correspondence or handling QSLs. However, if you feel a real need to confer with Dave on his Eastern Caroline trip, drop a note to him at P.O. Box 1179, APO San Francisco 96555.

Shortly Noted

The North Florida Radio Club "Balanced Modulator" notes that at the Dayton repeater seminar the former Chief of the FCC's Private Radio Bureau had some unkind comments. He told the group that "the biggest problem with amateur radio is that there are too many 'kooks' in the ranks." Apparently problems with the competition between "repeater coordinators" to control the local turf, plus deliberate jamming by some malcontents, has left a permanent state of dyspepsia with the gentleman.

Back this spring a petition was filed with the FCC on extending the privileges due to the ancients by allowing a one-step up in license class for amateurs over 65 years old and with 20 years being licensed. The petition was turned down during the summer, the FCC noting that licenses are issued only when certain operational and technical skills are demonstrated, this including skill in telegraphy. All this is based on the International Radio Regulations adopted at the Geneva WARC convention in 1979 as well as the 1934 Communications Act.

You might also check on the plan to expand the phone sub-band in the 40 meter band. The ARRL Board of Directors was possibly going to consider it at the July Board meeting.

OH3TQ and OH3RF were in Andorra for the May *CQ* WPX Test signing C3ØLFC and C3ØLPD. Weary from the heavy endeavors, they headed for Spain's Costa Brava to recuperate, needing a week or so to erase the scars from the

CQ DX Awards Program

SSB

1611	WA4ECA	1613	KI4FW
1612	OA4OS	1614	I2WZX

CW

728	EA5AR	729	K2JF

SSB Endorsements

310	VE1YX/319	300	KR9O/309
310	F9RM/319	300	AI8M/308
310	DL9OH/319	300	W6NLG/306
310	W4DPS/318	300	KB3OO/303
310	VE3GMT/318	275	WA4ECA/297
310	ZL1AGO/318	275	F6BFI/287
310	ZL3NS/318	275	WD9IIC/280
310	K9MM/317	275	I2WZX/276
310	OA4OS/316	275	I2EOW/275
310	K5OVC/316	250	KB1JU/250
310	EA2IA/316	250	W3SOH/250
310	N7RO/316	150	NK3U/150
310	N6AHU/313	150	KI4FW/150

CW Endorsements

310	K9MM/318	275	K2JF/275
310	K1MEM/313	200	EA5AR/214
310	OK1MP/312	28 MHz	OK1MP
300	EA2IA/307	28 MHz	EA5AR
275	G2FFO/287	1.8 MHz	K2PK

Total number of active countries is 319. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

How does one greet Santa Claus? With a big smile, just as Tom Mannix, WA4YLD, greets Amir, 4X6TT. Amir was at the South Florida DX Club meeting. Everyone was smiling as they heard of and remembered Amir's recent Pacific DXing. Smile when you greet an Honored DXer! They bring you needed QSLs.

pile-ups. They report that the conditions were good and they were able to find good openings to the Deserving W/Ks. If you worked C3ØLFC or C3ØLPD, QSL to their home QTHs, SASE naturally.

The Western Washington DX Club continues to work on the DX Cultural Exchange with the Soviets and are optimistic that something will develop. Some of the Russian amateurs have volunteered to provide interpreter services. Even so, the W7s are working on improving their proficiency and fluency in the Russian language, the "Totem Tabloid" reporting that already some W7s have mastered a second word in the Russian language, that putting them one (word) up on the normal run of fluent DXers.

If you think this a bit dreamlike, the Western Washington DX Club already has correspondence from the Kazan Radio Club on the Volga suggesting ways they can get together with exchange visits.

The FCC has changed the rules for foreign amateurs operating in the U.S. The rules now require that the portable designator comes first—W6/GØLLY. However, the Canadians are covered under a separate rule and a separate treaty. They will continue to sign VE7NS/W6. This is to continue the tradition that there is an exception to every rule.

VQ9QM has returned to Chagos and will be there for a six-month or more period. QSL to his home call, W4QM. This October is the month when the rumored Soviet operation in Vietnam is supposed to show. The information is that there will be Russians there for a sport festival. Some sources say that Vietnam is still adamantly against allowing any amateur operation.

Down in Guantanamo Bay KG4AN has been heard, and this one is reported to be a new license sometimes found at 21290 kHz or thereabouts after 1230Z. Bing Crosby, VK2BCH, made some 8000 QSOs from ZK1XV. After the South Cooks his plans included 5W1 and ZK3, though there were reports that the North Cook plans were scratched. QSL only to his home QTH: Box 344, Forster, NSW, 2428 Australia. Bureaus are not good routes. On the North Cooks, Ron, ZL1AMO, was due there for some action this summer.

FT5ZB has a self-actuating QSO deletion device in his logs according to some reports. If he considers that bad-operating habits were displayed, the QSO vanishes from his log. FT5ZB is on Amsterdam Island; QSL via F2DX and look for the station at 21026 kHz, plus or minus, around 0430Z or 14165 kHz at 1240Z. D68WB is back in the Comoros after being gone for a bit; this one is SSB on the higher frequencies. FH5EF has been heard from Mayotte after 0500Z, often around 21310 kHz or thereabouts; this one QSLs to F6EZV.

Next month brings the start of the Great DX Season in the Great DX Days of Cycle 22. The count is soaring—or was—and conditions should be good the last weekend in October for the *CQ* WW SSB DX Test. Now is the time to plan. Remember the motto of the successful DXer: "Be Prepared!" Or was that something we learned from the Hero of Mafeking? After all, we were in the Scouts at the same time.

73, Cass, WA6AUD

QSL Information

N6KA wishes it noted that he did not operate /ZB2 during the 87 *CQ* WW DX test. Cards starting October 18th are coming through. It was Slim again. Also WA6GCS is not the QSL manager for NK6A.

All this was compiled with a lot of help from W9LNQ and N6JM.

AZ4M to LU1MPM
A35AS to DJ9ZB
CI8CW to VE1DH
CP8PAX to CP5AA
C3ØLFC to OH3TQ
C3ØLPD to OH3RF
CE2/LU4MEE to LU1MPM
GB5CO to G4OBK
HBØ/DF5DR to DF5DR
HBØ/DK1DN to DK1DN
HBØ/DL1ECU to DL1ECU
HI3JH to F6FNU
HP2XVB to KB4WZQ
EM1AA to UZ1ZWV
EO2PPP to UP1BZZ
FOØAP to F6EYS
IV3KBU to KB1SF
JA2EZD/FS to JA2MNB
JY8XY to OH6XY
K2ØØAGF to KKØO
K2ØØCO to K4CO
K2ØØJLA to K4II
KH2ØØRS to WA9AEA
NN2ØØE to KA1NJW
NB2ØØC to NB9C
LU4MEE to LU1MPM
LU1MFK to LU1MPM
LU1MPU to LU1MPM
LU4M (contest only) to LU1MPM
LU1MKC to LU1MPM
OD5PL to HB9CRV
SV1RP/SV5 to SV1NA
TV6MED to FD1DBT
TN4WW to AL7EL
UAØKK to RB7GG
V47NXX to AA4FS
VI88NSW to VK2 Bureau
VK9LU to K9POX
VK9YG to G4JVG
VU2TJW to KE3A
XE1IUP to OE1DLW
YBØASH to KØIEA
3XØA/A to I8YGZ
4KØDC to UA3AOC
4KØDR to RW3DR
4N7N to YU7BPQ
4X6VV to WA7WOC
4C2JIW to AA5B
5X5GK to VE3JW
5H3RB to NM2R
8A5ITU to YB5NB
9H1FBS to N5APW
AL7EL to Tom Harrell, Box 368, Stockbridge, GA 30281-0268
BY7RK to P.O. Box 1285, Guangzhou, Peoples Republic of China
CX8CG to L. Miles, P.O.B. 37, Montevideo, Uruguay
G4JVG to Steve Telenius-Lowe, "Penworth" Tokers Green Lane, Tokers Green, Reading, RG4 9EB England
K9POX to Dave Miller, 7462 W. Lawler Ave., Niles, IL 60648
KC6TO to North Alabama DX Club, Box 4563, Huntsville, AL 35815
KX6HN to Box 648, APO San Francisco 96555
KX6DS to North Alabama DX Club, Box 4563, Huntsville, AL 35815
LU1MPM to Sergio Grinberg, Box 382, 5500 Mendoza, Argentina
PZ2AC to P.O.B. 4224, Nickerie, Suriname
P29KH to P.O.B. 997, Madang, Papua-New Guinea
TG9NR to B.P. 1200, Guatemala City, Guatemala
VE2UMS/VE2 to VE Bureau
ZC4AP to Cpl. I.S. Tough, 16 Javelin Way, Wallingford, Oxon, OX9 6DL England
ZK1XV to Bing Crosby, Box 344, Forster, New South Wales 2428 Australia

DX Ten Years Back

Mellish Reef was promised for the first time since its initial appearance back in 1972, and WA8MOA, JA1KSO, VK2CK, and VK2BJL were on their way to sign VK9ZR. W9GW was on Rhodes and looking for operating permission. K5YY was back from Africa and the Indian Ocean, operations including ST0, D68AF, and ST2. Also FH8 and 3B8. OH2FS and OH2BEM were signing OHØAL from the Aland Islands, and S79MC was on from the Seychelles. Chester, once XV5AC, was back in SEAsia and signing HS1AIV. The Big Signal had returned! The Southeastern DX Club in Atlanta was headed for C6A, the Bahamas noting that activity there in the *CQ* WW DX Tests had not in the past been very noticeable. The Colvins were headed out on another DX trip, and some ZLs were headed out to Chatham for the *CQ* World-Wide. ZS6IW was on from Baja Bothutaswana, while H5AW was on from Alta Bothutaswana. VK4QL was on Lord Howe for a couple of days, and W5JW was active from Kwajalein. D4CBS was heard from Sao Thome, and Navassa was promised for November.

It was noted that there were no petitions for possible new countries before the DXAC. Dateline Slim was signing 4R5AB from Cornell Island near Nauru. Even Oeno Island was being mentioned. Now there is one to make you reach for the atlas. An effort to Market Reef aimed for 10K QSOs but did not quite make it. As one-way CW contacts were being accepted for the CW DXCC Award, the crew was handing out double-ended QSOs, starting with an SSB contact, then acknowledging a CW contact. Son of a gun! DXers were not only innovative, but actually almost entrepreneurial back in those days. The ARRL Board, wondering what all the screaming was about, consulted an on-hand expert on the matter. They got a pooh-pooh response. It figured. The on-hand expert was the leading entrepreneur in the cross-mode field.

ZK2AT was heard from Niue, and WB6GFJ was on from Tahiti via OSCAR. The new country of Desecheo was still awaited, the schedule slipping a bit. N4XX was starting the "Washington Report" in *CQ*.

Conditions were good, the sunspots were plentiful, and all the HF bands were jumping. DXers everywhere were hailing the good days of DXing with cries of "More! More!" But that is the way things always are with DXers. They need more—always.

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The Royal Observatory of Belgium reports a monthly mean sunspot number of 60 for May 1988. Daily values ranged from a low of 20 on May 19th to a high of 97 on the 5th. This results in a smoothed sunspot number, upon which the sunspot cycle is based, of *47* centered on November 1987. This is an increase of three numbers from the previous month, as the new cycle continues to increase at a rapid rate. There was a corresponding increase in the 10.7 cm solar flux level as well. The Algonquin Radio Observatory in Ottawa, Canada reports a monthly mean of 118 for May 1988.

There is no question that the intensity of Cycle 22 is increasing at a faster rate than most previous cycles. How fast and how high the new cycle will go is still being considered by the professionals in the field of solar physics. For example, while the *CQ* crystal ball is calling for a smoothed sunspot number in the upper 80s or lower 90s for September 1988, scientists at the government's Space Environment Services Center (SESC) in Boulder, Colorado are calling for a smoothed sunspot number of 111 for September, plus or minus 31. The SESC's latest 18-month prediction of smoothed sunspot numbers is shown graphically in fig. 1.

Data Sources

I am still receiving inquiries concerning *Mail-A-Prop*, a bi-weekly newsletter I published for several years about a decade ago, which contained the latest information concerning sunspot numbers, 10.7 cm solar flux levels, propagation conditions, etc. Due to the pressure of work I had to discontinue its publication in the early 1980s. Lee Wical, KH6BZF, took up where *Mail-A-Prop* left off. He publishes a weekly newsletter called *KH6BZF Reports*, which contains much the same material as *Mail-A-Prop* did, but even more so and on a more timely basis! Rates for a 50-issue annual subscription can be obtained directly from KH6BZF at 45-601 Luluku Rd., CRT 144-25, Kane' Ohe, HI 96744-1854. Lee can be reached by phone on weekends at (808) 247-0587, but remember the time difference.

The Space Environmental Services Center of the National Oceanic and Atmospheric Administration (NOAA) has recently announced that its weekly publication *Preliminary Report and Forecast of Solar Geophysical Data* will now be made available to the general public on a subscription basis. The report summarizes the highlights of solar and geomagnetic activity for the week previous to publication, and makes forecasts for the month following publication. Detailed data concerning the sun is presented, including daily values of sunspot numbers, solar flux, and geomagnetic indices. Month-in-advance forecasts are also made for many of these parameters. Observed solar flares are listed, as well as their beginning and ending times. Detailed solar drawings are presented identifying sunspot clusters. The publication is a much-used reference in the field.

As part of a program of cost recovery for services provided by the U.S. government, the annual subscription for the weekly report has been set at $26 (US). This fee reflects actual cost of the publication and will be deposited by SESC into the U.S. Treasury. Subscription payments should be sent to NOAA, ERL, Space Environment Laboratory, R/E/SE, 325 Broadway, Boulder, CO 80303-3328.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for September 1988

	Expected Signal Quality (4)	(3)	(2)	(1)
Propagation Index				
Above Normal: 11-12, 20, 24, 27	A	A	B	C
High Normal: 5-6, 10, 13-14, 21, 23, 25-26	A	B	C	C-D
Low Normal: 1, 4, 7, 15-16, 19, 22, 28	A-B	B-C	C-D	D-E
Below Normal: 2-3, 9, 17-18, 29-30	B-C	C-D	D-E	E
Disturbed: 8	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3dB per S-Unit.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on September 1st, fair-to-poor (C-D) on the 2nd and 3rd, good-to fair (B-C) again on the 4th, good (B) on the 5th and 6th, etc.**

August DX Conditions

August and early September is perhaps the most difficult period of the year for which to make a shortwave propagation forecast. On many days typical summertime conditions will prevail, and the bands will sound much as they did during July. On other days, particularly as September approaches, conditions will begin to conform more to a winter pattern of higher daytime and lower nighttime usable frequencies. Since this is a period of transition, this month's DX Propagation Charts cover only a *one month* period, rather than the usual two month span. Short-Skip Charts for use during August appeared in last month's column.

Fairly frequent *10* meter openings are expected during the daylight hours in August towards Central and South Ameri-

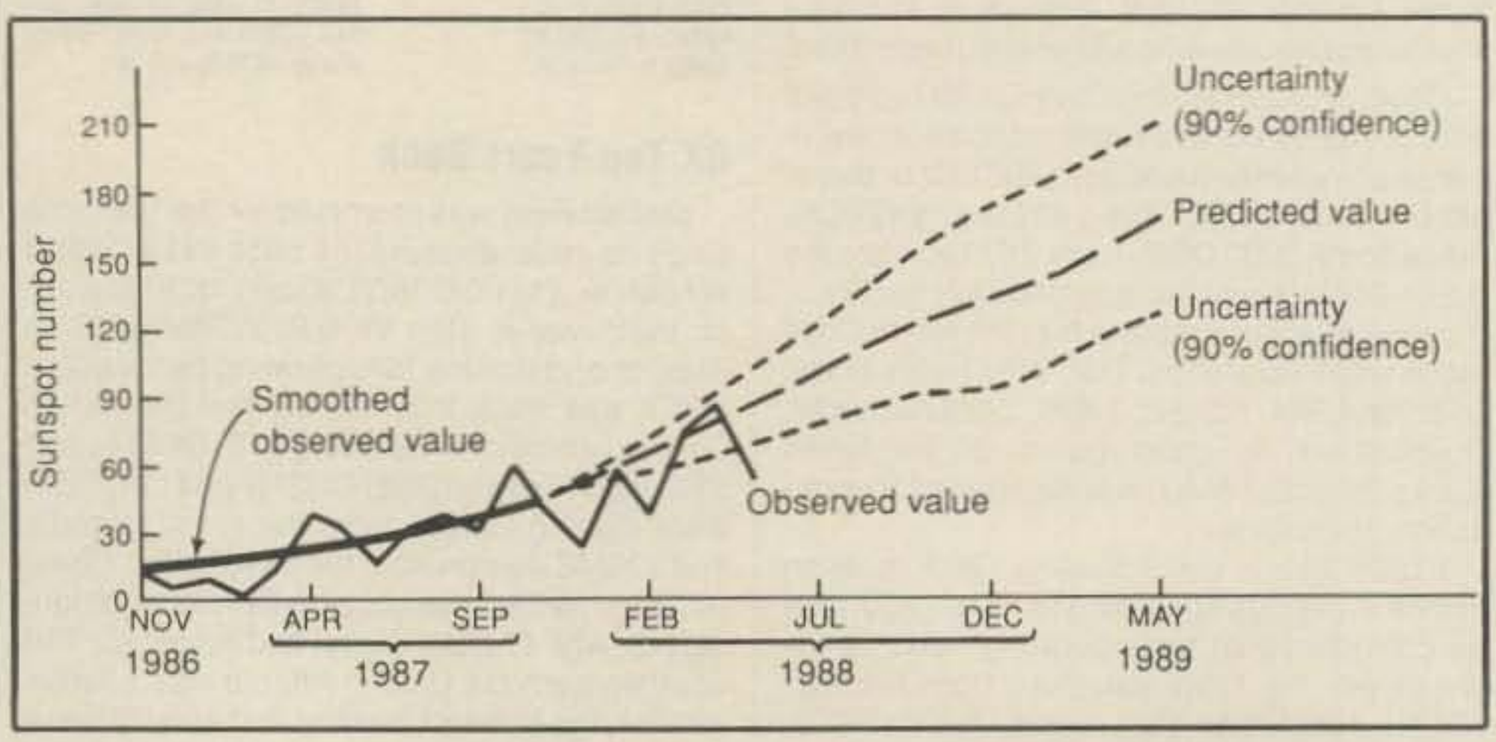

Fig. 1– The SESC's latest 18-month prediction of smoothed sunspot numbers.

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Landmobile HTs
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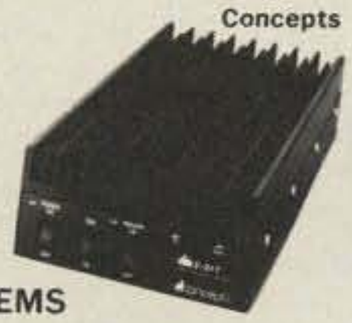
YAESU: FTH 2005/2007
UNIDEN, REGENCY, KING, TAD
MARINE ICOM: M5, M55, M700
AVIATION ICOM: A20 H.T.

RF Concepts



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ca, Africa, and the South Pacific areas. By the end of the month some openings should also be possible to Europe and the Far East. These east-west openings should increase considerably during September.

Excellent daytime DX openings are forecast for *15* meters to Latin America, Africa, and the South Pacific areas. Some east-west openings to Europe and the Far East should also be possible, and these should increase considerably as September approaches. Exceptionally strong signal levels are expected during many openings this month, and *15* meters should be the best band for DX to many areas of the world from shortly after sunrise through the late afternoon hours.

Excellent world-wide propagation conditions are forecast for *20* meters during August. Peak conditions should occur, often with exceptionally strong signal levels, for a few hours after sunrise and again during the late afternoon and early evening hours. To many southern and tropical areas the band should remain open throughout much of the darkness period as well. As September approaches the band will tend to close earlier than it did during June and July.

Static levels are expected to decrease considerably by mid-August, with a noticeable improvement in *40* meter DX conditions during the hours of darkness and the sunrise period. Fairly good *80* meter DX openings are also forecast for the nighttime hours, with conditions expected to peak just as the sun begins to rise on the "light" side of the path. By mid-August some *160* meter DX openings may also be possible during this same time period.

Short-Skip Conditions

For openings over distances ranging between 50 and 250 miles use *80* meters during the day and *160* meters at night. Between 250 and 750 miles the best bands should be *40* meters during the day and *80* meters during the hours of darkness. For openings between 750 and 1300 miles best band should be *20* meters during the day, with some fairly good openings also possible on *15* meters. From sundown to midnight try *40* meters, and from midnight to sunrise conditions should be best on *80* meters. Between 1300 and 2300 miles best daytime band should be *20* meters, with some good openings also possible on *15* meters. Try *40* meters during the hours of darkness.

VHF Ionospheric Openings

While sporadic-*E* propagation is expected to taper off considerably by mid-August, some *6* meter openings should still be possible over distances of approximately 750 to 1300 miles. During periods of intense and widespread sporadic-*E* ionization, two-hop openings may be possible considerably beyond this range. Check the *2* meter band for an occasional sporadic-*E* type opening between approximately 1200 to 1400 miles. While these types of short-skip openings can take place at any time, as the name implies, during the late summer there is a tendency for it to peak between 8 a.m. and noon and again between 6 and 9 p.m. local daytime time. The occurrence of sporadic-*E* openings should decrease considerably by mid-September.

Trans-equatorial (TE) openings on *6* meters should begin to improve during August and become fairly frequent by the end of the month. The best time for these openings is between 8 and 11 p.m. local daylight time. This type of propagation favors considerably openings from the southern tier states into deep South America, but an occasional opening should also be possible from more northern states.

The *Perseids*, one of this year's major meteor showers, is expected to take place between August 10–14. It should peak at around noontime EDT on August 12, with an expected count of about 50 meteors an hour. Ionization produced by meteor shower, especially during the period of maximum intensity, is expected to make possible frequent meteor-scatter-type openings on the *6* and *2* meter bands over distances of several hundred miles.

Although August is usually not a very good month for auroral-type scatter propagation on the VHF bands, some openings may occur this August as a result of the higher incidence of solar flares now taking place on the sun. Auroras are most likely to occur when shortwave conditions are Below Normal or Disturbed. Check the Last Minute Forecast appearing at the beginning of this column for those days during August that are expected to be in these categories.

Auroral-scatter openings can range from a few hundred up to about a thousand miles and are usually characterized by very rapid flutter fading and Doppler shift on SSB signals.

73, George, W3ASK

CQ Short-Skip Propagation Chart
September & October 1988
Local Daylight Savings Time
At Path Mid-Point (24-Hour Time)

Band (Meters)	Distance Between Stations (Miles)			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	10-21 (0-1)	08-10 (1) 10-13 (1-2) 13-15 (1-3) 15-16 (1-2) 16-21 (0-1)	08-10 (1) 10-13 (2) 13-15 (3) 15-16 (2-3) 16-17 (1-2) 17-19 (1) 19-21 (1-0)
15	*Nil*	08-10 (0-1) 10-15 (0-2) 15-21 (0-1)	08-09 (1) 09-10 (1-2) 10-15 (2-4) 15-17 (1-4) 17-18 (1-3) 18-20 (1-2) 20-21 (1) 21-08 (0-1)	08-09(1) 09-10 (2-3) 10-11 (4-3) 11-17 (4) 17-18 (3) 18-19 (2-3) 19-20 (2) 20-21 (1) 21-08 (1-0)
20	12-14 (0-1) 14-16 (0-2) 16-22 (0-1)	08-09 (0-1) 09-10 (0-2) 10-11 (0-3) 11-12 (0-4) 12-14 (1-4) 14-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-22 (1-2) 22-08 (0-1)	06-08 (1-2) 08-09 (1-3) 09-10 (2-4) 10-11 (3-4) 11-18 (4) 18-19 (3-4) 19-22 (2-3) 22-00 (1-2) 00-06 (1)	06-08 (2) 08-09 (3) 09-14 (4-2) 14-16 (4-3) 16-19 (4) 19-21 (3-4) 21-22 (3) 22-23 (2-3) 23-00 (2) 00-06 (1)
40	08-10 (1-3) 10-12 (2-4) 12-18 (3-4) 18-19 (2-3) 19-21 (1-2) 21-06 (0-1) 06-08 (0-2)	08-10 (3-4) 10-12 (4-3) 12-16 (4-2) 16-18 (4-3) 18-19 (3-4) 19-21 (2-4) 21-23 (1-4) 23-03 (1-3) 03-06 (1-2) 06-08 (2-3)	08-10 (4-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-19 (4-2) 19-20 (4-3) 20-23 (4) 23-03 (3-4) 03-06 (2-3) 06-08 (3-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-19 (2) 19-20 (3) 20-21 (4-3) 21-03 (4) 03-05 (3-4) 05-06 (3) 06-08 (4-3)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-23 (4) 23-05 (3-4) 05-07 (2-3)	07-09 (4-2) 09-12 (4-1) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-05 (4) 05-06 (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 (4-3) 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 (3-2) 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)

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 40 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, 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) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " 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 c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. 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 10db 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.

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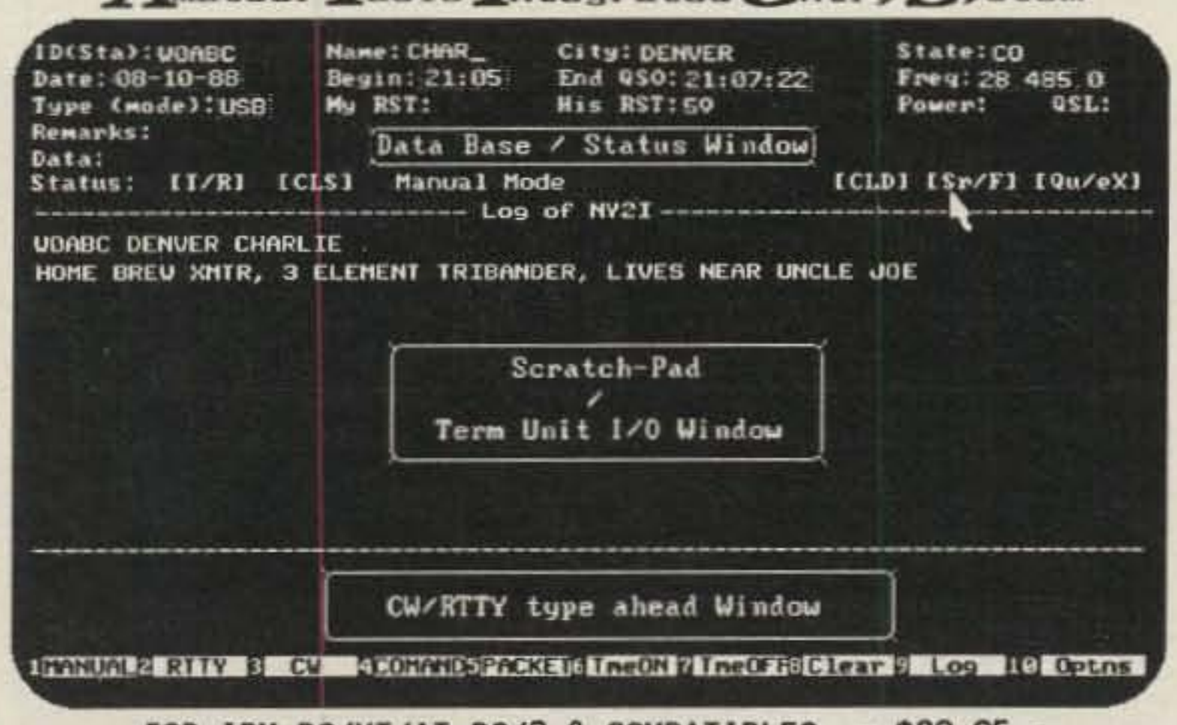

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CIRCLE 37 ON READER SERVICE CARD

ALASKA
September & October, 1988
Openings Given GMT

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern States	19-22 (1)	17-19 (1) 19-23 (2) 23-00 (1)	12-15 (1) 18-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	08-12 (1)
Central States	20-00 (1)	17-19 (1) 19-21 (2) 21-23 (3) 23-01 (2) 01-02 (1)	13-22 (1) 22-00 (2) 00-03 (3) 03-04 (2) 04-06 (1)	08-11 (1) 11-13 (2) 13-14 (1) 11-13 (1)*
Western States	20-22 (1) 22-01 (2) 01-02 (1)	18-21 (1) 21-22 (2) 22-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-03 (4) 03-04 (3) 04-05 (2) 05-07 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

HAWAII
September & October, 1988
Openings Given in Hawaiian Standard Time

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern States	08-10 (1) 10-13 (2) 13-14 (1)	07-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-18 (3) 18-20 (2) 20-04 (1) 04-07 (2) 07-08 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 10-21 (1)* 21-00 (2)* 00-01 (1)*
Central States	08-10 (1) 10-14 (2) 14-16 (1)	07-10 (1) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	09-13 (1) 13-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-21 (2) 21-04 (1) 04-09 (2)	18-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-05 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Western States	08-09 (1) 09-10 (2) 10-15 (3) 15-16 (2) 16-17 (1)	07-09 (1) 09-10 (2) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-19 (1)	10-12 (2) 12-14 (3) 14-18 (4) 18-20 (3) 20-00 (2) 00-05 (1) 05-06 (2) 06-10 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-05 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

* Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2), or higher.

September 15-October 15, 1988
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	09-11 (1) 11-12 (2) 12-14 (1)	08-09 (1) 09-11 (2) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	03-04 (1) 04-06 (2) 06-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (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 USSR	09-12 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	03-06 (1) 06-08 (2) 08-11 (3) 11-13 (2) 13-17 (3) 17-18 (2) 18-20 (1)	18-20 (1) 20-04 (2) 04-06 (1) 21-04 (1)*
Eastern Mediterranean & Middle East	10-13 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	07-09 (2) 09-15 (1) 15-17 (2) 17-20 (3) 20-21 (2) 21-23 (1) 23-01 (2) 01-07 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-23 (1)*
Western Africa	11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-08 (2) 08-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-03 (2) 03-05 (1)	20-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
Eastern & Central Africa	13-15 (1) 15-17 (2) 17-18 (1)	08-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-17 (2) 17-21 (3) 21-01 (2) 01-02 (1)	20-02 (1) 00-01 (1)*
Southern Africa	09-11 (1) 11-13 (2) 13-14 (1)	08-11 (1) 11-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	14-16 (1) 16-19 (2) 19-23 (3) 23-01 (2) 01-02 (1) 06-08 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	09-11 (1) 19-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-00 (1)	05-07 (1) 20-23 (1)
Southeast Asia	11-13 (1) 18-20 (1)	09-11 (1) 14-16 (1) 18-19 (1) 19-20 (2) 20-21 (1)	06-07 (1) 07-10 (2) 10-12 (1) 15-18 (1) 20-21 (1) 21-23 (2) 23-01 (1)	06-08 (1)
Far East	18-20 (1)	10-12 (1) 16-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-20 (1) 20-22 (2) 22-00 (1)	05-08 (1) 18-19 (1) 06-07 (1)*
South Pacific & New Zealand	09-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	09-14 (1) 14-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	08-10 (3) 10-12 (2) 12-20 (1) 20-23 (2) 23-03 (3) 03-07 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
Austral asia	10-12 (1) 16-17 (1) 17-19 (2) 19-20 (1)	09-11 (1) 14-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	07-09 (2) 09-11 (3) 11-13 (2) 13-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-07 (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	10-11 (1) 11-14 (2) 14-17 (4) 17-18 (2) 18-19 (1)	08-09 (1) 09-10 (2) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	04-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-15 (2) 15-17 (3) 17-22 (4) 22-03 (3) 03-04 (2)	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, & Uruguay	09-10 (1) 10-12 (2) 12-14 (1) 14-15 (2) 15-17 (4) 17-18 (3) 18-19 (1)	08-09 (1) 09-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	11-16 (1) 16-17 (2) 17-20 (3) 20-01 (4) 01-03 (3) 03-04 (2) 04-07 (1) 07-08 (2) 08-10 (3) 10-11 (2)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	16-18 (1)	12-15 (1) 15-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-01 (2) 01-03 (1) 07-09 (1)	23-01 (1) 01-05 (2) 04-06 (1) 04-06 (1)*

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	09-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (3) 17-20 (2) 20-23 (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 USSR	09-11 (1)	08-10 (1) 10-12 (2) 12-14 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-18 (1) 22-01 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	10-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-18 (2) 18-21 (1) 21-23 (2) 23-00 (1)	20-23 (1) 21-23 (1)*
Western Africa	11-13 (1) 13-15 (2) 15-17 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	05-06 (1) 06-08 (2) 08-15 (3) 15-17 (2) 17-18 (3) 18-19 (4) 19-22 (3) 22-00 (2) 00-01 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	12-15 (1)	09-11 (1) 11-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	21-00 (1)
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 09-12 (2) 12-13 (3) 13-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-19 (3) 19-21 (2) 21-23 (1) 23-01 (2) 01-02 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 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 c.w., or 1 kw, p.e.p. 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.

Central South Asia	09-11 (1) 18-20 (1)	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
Southeast Asia	10-12 (1) 18-20 (1)	09-11 (1) 14-17 (1) 17-19 (2) 19-21 (1)	06-08 (1) 08-10 (2) 10-13 (1) 16-21 (1) 21-00 (2) 00-02 (1)	05-09 (1)
Far East	17-18 (1) 18-19 (2) 19-20 (1)	10-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	07-08 (1) 08-10 (3) 10-12 (2) 17-21 (1) 21-00 (2) 00-02 (1)	03-05 (1) 05-08 (2) 08-09 (1) 06-08 (1)*
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	07-08 (2) 08-11 (3) 11-13 (2) 13-18 (1) 18-20 (2) 20-22 (3) 22-00 (4) 00-01 (3) 00-03 (2) 03-07 (1)	00-01 (1) 01-06 (3) 06-08 (4) 08-09 (2) 09-10 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Austral asia	14-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	09-11 (1) 13-17 (1) 17-19 (2) 19-20 (3) 20-21 (2) 21-22 (1)	16-18 (2) 18-21 (1) 21-23 (2) 23-03 (3) 03-04 (2) 04-07 (1) 07-09 (2) 09-11 (3) 11-13 (2) 13-16 (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	09-10 (1) 10-11 (2) 11-13 (3) 13-16 (4) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	07-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-22 (4) 22-01 (3) 01-03 (2) 03-05 (1) 05-07 (2)	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	09-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	07-08 (1) 08-11 (3) 11-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	04-08 (1) 08-10 (2) 10-16 (1) 16-18 (2) 18-20 (3) 20-23 (4) 23-02 (3) 02-04 (2)	21-00 (1) 00-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	15-18 (1)	11-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 17-19 (1) 19-20 (2) 20-23 (3) 23-00 (2) 00-03 (2)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

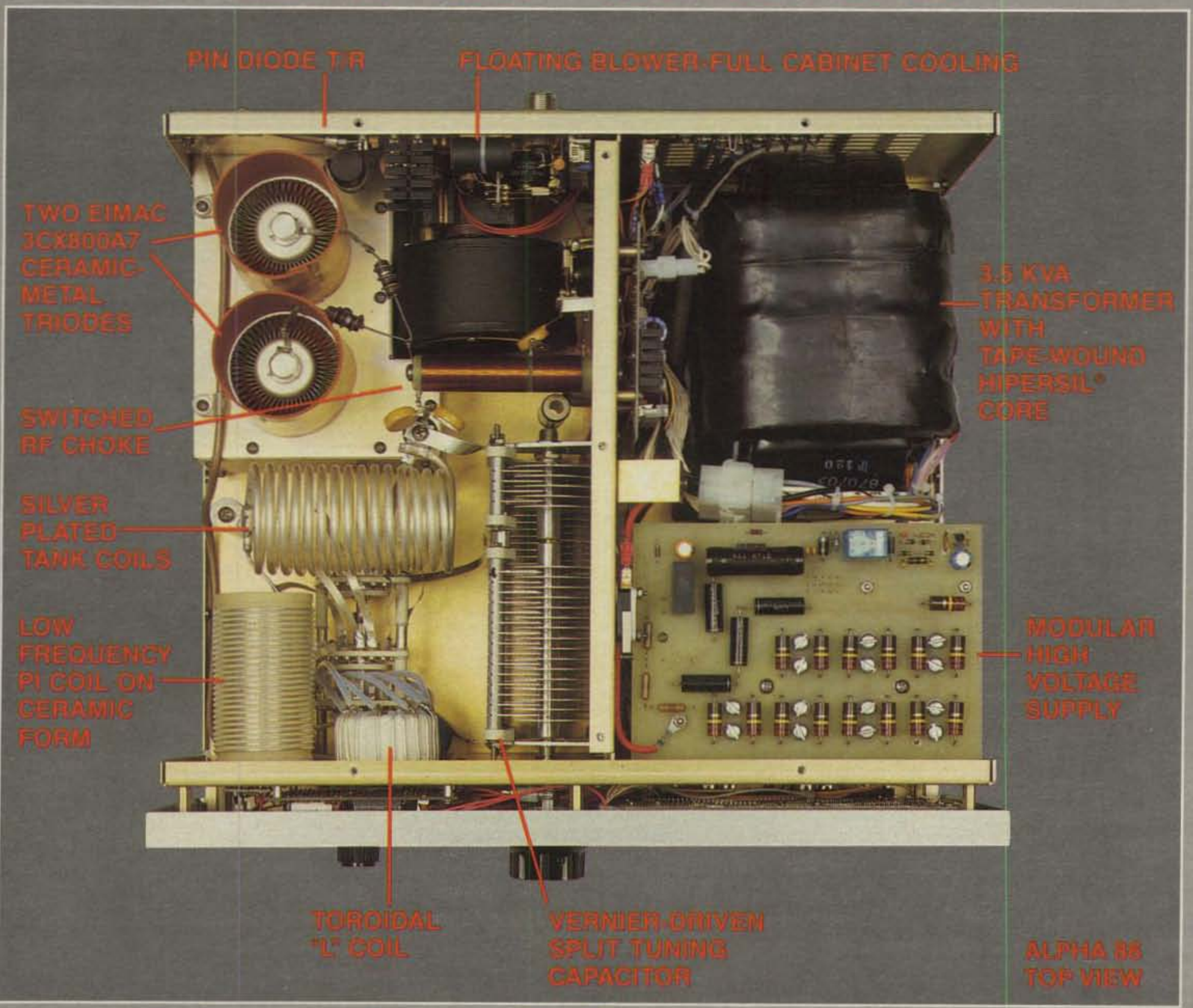
	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	09-11 (1)	08-09 (1) 09-12 (2) 12-14 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-19 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	Nil	08-09 (1) 09-11 (2) 11-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (2) 21-23 (1)	20-00 (1) 20-22 (1)*
Eastern Mediter ranean & Middle East	*Nil*	08-09 (1) 09-11 (2) 11-12 (1) 20-22 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-15 (2) 15-16 (1) 19-20 (1) 20-22 (2) 22-23 (1)	20-23 (1)

Say You Saw It In CQ

Please send all reader inquiries directly.

Western & Central Africa	11-12 (1) 12-14 (2) 14-15 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	21-00 (1)
Eastern Africa	11-14 (1)	10-13 (1) 13-16 (2) 16-17 (1)	07-09 (1) 12-15 (1) 15-19 (2) 19-21 (1)	20-22 (1)
Southern Africa	10-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	05-07 (1) 07-09 (2) 09-10 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	19-22 (1)
Central & South Asia	17-19 (1)	08-11 (1) 16-17 (1) 17-19 (2) 19-21 (1)	07-08 (1) 08-11 (2) 11-13 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
Southeast Asia	16-19 (1)	10-11 (1) 11-13 (2) 13-16 (1) 16-18 (2) 18-21 (1)	05-07 (1) 07-09 (3) 09-11 (2) 11-12 (1) 21-23 (1) 23-01 (2) 01-02 (1)	01-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	16-17 (1) 17-18 (2) 18-19 (1)	14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-09 (2) 09-10 (4) 10-13 (3) 13-15 (2) 15-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-03	01-03 (1) 03-07 (2) 07-08 (3) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	09-11 (1) 11-13 (3) 13-17 (2) 17-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	13-19 (1) 19-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-05 (2) 05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2)	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)*
Austral asia	14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	08-10 (1) 13-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	19-21 (1) 21-23 (2) 23-01 (4) 01-03 (3) 03-04 (2) 04-07 (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	09-10 (1) 10-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-08 (4) 08-10 (3) 10-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-03 (2) 03-05 (1) 05-06 (2)	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	09-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2)	07-08 (1) 08-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1)	06-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-01 (3) 01-06 (2)	21-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	14-18 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	08-10 (1) 17-19 (1) 19-20 (2) 20-23 (3) 23-01 (2) 01-03 (1)	01-03 (1) 03-05 (2) 05-07 (1) 03-06 (1)*

BIG GUN



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Bill's Basics

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Postal Rates, QSL Cards, and DX QSL Bureaus

If the postal rates are still confusing you, the following simple format may be of interest.

Cards	
U.S.A. and Mexico	15¢
Canada	21¢
All other countries	
Surface	28¢
Air	36¢
Letters (up to one ounce, except foreign)	
U.S.A. and Mexico (surface)	25¢
Canada (surface and air)	30¢
Mexico (air)	25¢
All other countries	
Surface	40¢
Air (per ½ ounce)	45¢

Domestic (U.S.A.) letter postage is 20 cents more for each additional ounce. Foreign surface letter postage is 22 cents more for each additional ounce. Foreign airmail letter postage is 45 cents more for each additional ½ ounce.

Post-card size must be 2¾" × 4¾" (minimum) to 4¼" × 6¼" (maximum). I have had foreign amateurs tell me that their postal services only handle standard-size (3½" × 5") cards, with all others being discarded. I have also had them tell me that it is better to use metered postage than postage stamps, since postage stamps are sometimes stolen enroute, and associated letters and cards are discarded. I always used unusual commemorative postage stamps on mail being sent to foreign (DX) amateurs. I did so in case the recipient might know someone interested in philately (stamp collecting). I did not understand why the mail I sent was so seldom received by DX amateurs, but that mystery has been solved.

If you need more detailed information about postage rates and services, you can request Poster 51 (International Postal Rates and Fees) and/or Poster 103 (U.S.A. Postage Rates, Fees, and Information) from the post office. If you local post office cannot supply these posters, you can request either/both from the U.S. Postal Service, Customer Services Department, 475 L'Enfant Plaza, S.W. Washington, DC 20260-6300. Each poster is 17 inches wide and 22 inches high (C size). If you want detailed information regarding bulk mail rates, you can request a copy of "Exhibit 611.21a, Third-Class (Regular Bulk Rates)" from Special Postal Bulletin 21666.

So-called "sexless" (no denomination) stamps cannot be used as postage on mail being sent out of this country.

Postal Changes

During the time I have been an amateur radio operator, the cost of mailing a QSL card to a U.S.A. address has risen from 1 cent to 15 cents. Similarly, the cost of mailing a letter (1 ounce or less) to a U.S.A. address has risen from 3 cents to 25 cents. People used to receive two mail deliveries per day, and businesses got their mail three times per day. Despite these increases in postage rates and decreases in delivery service, I believe our Postal Service does an excellent job for us at a reasonable cost.

2814 Empire Ave., Burbank, CA 91504

Meet 28-year-old Michael J. Bahr, KAØZBE, of Castle Rock, Colorado. He has contacted amateurs in more than 30 states and 5 countries. He has used both military surplus equipment and commercial equipment to operate on 15, 40, and 80 meters. He uses a hair-thin random wire antenna that is almost invisible to the naked eye.

Effect of Higher Postage on Cards Exchanged. Each time postage rates are increased, I hear some amateurs say they are going to send less QSL cards. I believe postage increases have decreased the percentage of contacts that are confirmed by QSL cards. It is common to have amateurs say they never (or hardly ever) initiate an exchange of cards. Many amateurs just send a QSL in response to each card received, which is reasonable. This approach simply means that an amateur who wants to exchange cards initiates the swap by sending her/his QSL first. If every amateur waited to receive a card before sending one, no cards would be exchanged, and we would lose this interesting aspect of amateur radio. Having the interested amateur initiate the QSL exchange is normal.

I work a lot of new amateurs in the Novice code segments. I average about 1500 Novice band contacts per year, and I always send a card to each one I contact for the first time. Keeping up with Novice band contacts QSLing is both time consuming and expensive, but it has often evoked subsequent appreciative remarks from amateurs who have received my cards.

Incoming DX Cards

One does not have to be a member of the American Radio Relay League (ARRL) to make use of their Incoming DX QSL Bureau. ARRL membership dues pay costs related to operating the ARRL Incoming DX QSL Bureau. Most of the DX cards coming to American amateurs are sent directly to our local sorting groups by amateur radio organizations of other countries. Local bureau addresses are listed in a printed aid called "The ARRL Outgoing QSL Bureau System," which is available from the League.

To use this service, simply send two to five 5" × 7½" envelopes to your local ARRL Incoming DX QSL Bureau. Address each envelope to yourself, and print your call sign prominently in the upper left corner of the envelope. Use the local bureau's address as the return address on each envelope to avoid having your cards sent to the dead-letter office if the envelope cannot be delivered to the address you provide. It is best to attach a single first-class postage stamp (25 cents) on each envelope. If you affix additional postage (45, 65 cents, etc.), the bureau probably won't send the envelope to you until enough cards have been received to warrant use of the extra postage. QSL cards average about seven to the ounce. If you are just starting to work DX, you probably want to receive DX cards as soon as possible. Using single postage is one way to ensure faster receipt of small quantities of DX cards. If you want to provide extra postage (20 cents per ounce), put the loose stamps inside one of your envelopes and add a note to let your suffix sorter (**S** sorter for KB6SOH, for example) know that extra postage has been provided. Another way to handle the matter of providing extra postage is to clip 20 cent stamps to one of the envelopes being submitted.

If you change call signs, it is advisable to have envelopes on file with each call sign, since you probably have different sorters for each suffix beginning letter. Even if you have two call signs with the same suffix beginning letter (such as KB6SOH and KJ6ST), separate

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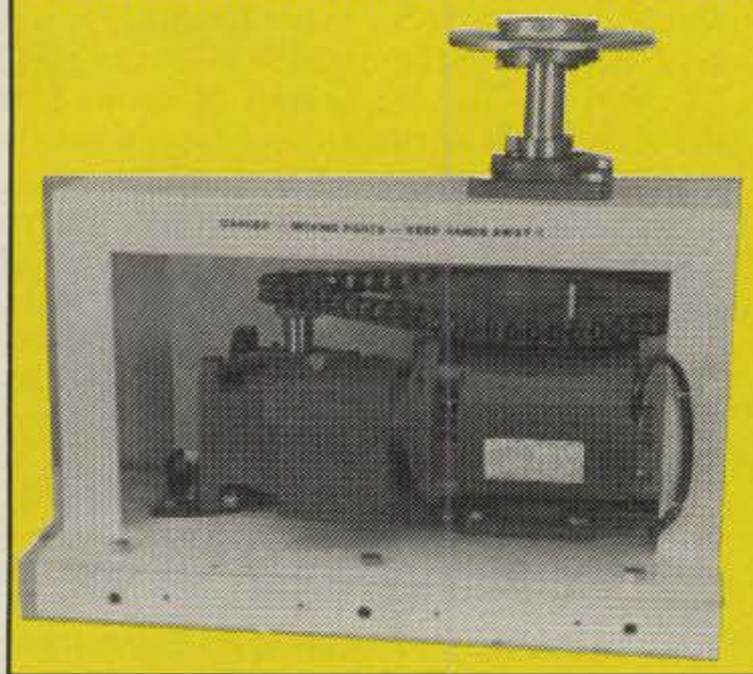
This quality rotor is the most capable and powerful unit designed for the amateur market today. You can pay more and get less.



SPECIFICATIONS
Rotating torque: 10,000 inch lbs.
Braking torque: 24,000 inch lbs.
Vertical load: 2000 lbs.
Mast sizes: 2.0 to 3.5 inch O.D.
Motor: 1/3 HP
Rotation speed: 1 RPM
Weight: 230 lbs.
Size: 14.9x25x15.1 inches (wlh)

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- » VSWR readout
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- » Easy modification for 10 meters
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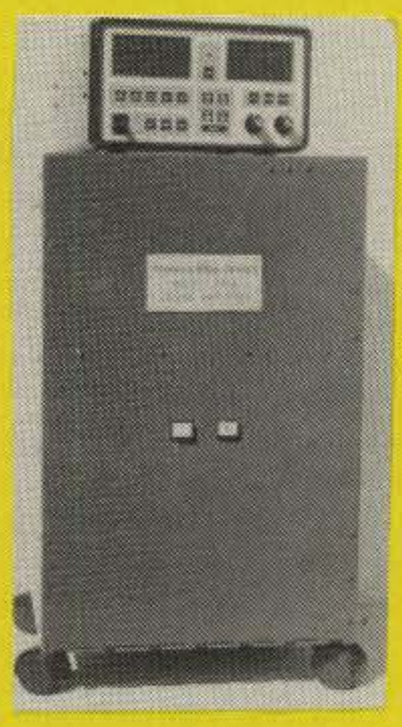
- » Remote control up to 250 feet away
- » UPS shippable (3 boxes)



Frequency: all amateur (1.8 - 21 MHz)
Drive: 50 - 80 watts for full output
Output: 1500 watts PEP
Input Impedence: 50 ohms unbalanced
Input VSWR: 1.5:1 (higher on WARC)
Output Impedence: 50 ohms unbalanced
Harmonic Supp: greater than -45 dB
Intermod prods: more than -35 dB down
Duty: CCS (cont. commercial svc.)
Tubes: EIMAC 3CX800A7 (two)
ALC: 0 to -6 VDC
Output Configuration: Pi-L
AC Power: 230 VAC at 20A
Size (WHD in inches) & Weight
Microcontroller: 10x6x9 at 5 lbs
RF/AC unit: 14x22x13 at 86 lbs

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(just minutes from Washington, DC)

Peter Hulth, Jr., KB4RJZ, of Smithfield, North Carolina is 63 and a Navy veteran of WW II and Korea. He works on the Smithfield Herald *as a reporter, columnist, and feature stories writer. Pete has two sons and three daughters. He is a member of the Johnston Amateur Radio Society. He holds an ARRL code certification at 25 wpm. Pete is primarily active on the 80 meter Novice band using a manual telegraph key. I found it interesting that the QSL of N6IV is displayed in his shack, since I received a letter from N6IV/KL7 (Richard Kaplan) in the same mail delivery in which Pete's picture arrived. Pete's other hobby is collecting 78 rpm phonograph records.*

envelopes will make it easier for your sorter to do her/his job. Also, DX cards sometimes arrive a very long time after contacts have been completed; therefore, it is advisable to leave envelopes on file with your previous call signs.

If you already have envelopes on file with your local bureau, please send 3 cent stamps to be added to your envelopes. Please remind your amateur friends to do the same thing.

Do not delay sending envelopes to your local ARRL Incoming DX QSL Bureau. As soon as you work any DX stations, get your envelopes on file. No matter what you tell the DX amateur, and regardless of how anxious you are to receive her/his DX QSL, such cards are normally going to be received via the bureau. It is advisable to participate in the bureau exchange system; it is slow, but it is effective. Please remember that this incoming bureau is manned entirely by volunteers. Their help should be appreciated; it should not be discouraged.

If you do not want to receive incoming DX QSL cards, please inform your local group. Otherwise, they will be wasting space saving your cards. It is not enough to just not send envelopes.

Do not send outgoing DX cards to your local ARRL Incoming DX QSL Bureau group.

If you are operating out of the call-sign area you lived in when you applied for your station license (temporarily or permanently), send your SASE's to the group handling cards for the call sign shown on your license. As an example, if your license shows WA6FNM, but you are operating from Massachusetts in the first call area, your envelopes belong in the sixth call-area bureau; do not send them to the first call-area bureau.

Some incoming bureaus sell envelopes and/or postage credits. At the present time these are the 2, 5, 6, 9, zero, KP4, KH6, and KL7 groups. Details can be requested by writing to your local bureau. Please remember to enclose an SASE whenever you request information from the bureau. Otherwise, they may use one of your special-size SASEs to send a reply to you.

Outgoing DX Cards

It is time consuming and expensive to send cards directly to amateurs of other countries. One needs to purchase (to obtain access to) a foreign (DX) amateur callbook, which is expensive. Each card must be addressed and mailed, either by itself or in an envelope. Cards to several amateurs in the same country can be gathered together and mailed in a single envelope (or package) to the Incoming DX QSL Bureau of that country, as listed in the callbook. However, that system does not ensure prompt QSL delivery to DX amateurs; your cards may be retained a long time by a DX bureau. Your outgoing cards are packaged and shipped within one week after the ARRL receives them. More than four million cards have been shipped by the League in each of the last several years.

Prepaid Postage for DX Cards. You can improve your chances of getting a desired DX card promptly in three ways.

You can purchase an International Reply Coupon (IRC) at your post office. The DX amateur can exchange an IRC at his post office for surface-mail postage. Simply enclose the IRC and a self-addressed envelope with the QSL you are sending to the DX amateur. If you want the DX card to be sent via airmail, enclose three IRCs. The February 1986 issue of *CQ* provides a complete explanation of IRCs. A copy can be purchased from *CQ* for $2.50. If you want a copy of my class handout of the same article, send your SASE to my California address, making sure you state what you want.

Another way to expedite receipt of a DX card is to put postage stamps of the foreign country on your self-addressed envelope. The DX amateur can just insert a card and mail your envelope to you. Careful perusal of the amateur radio magazines will reveal sources of foreign stamps. They cater to the needs of amateurs. Their data sheets may show surface and airmail postage requirements of other countries.

The third way to receive DX cards is probably used more often than the first two systems described in this article. Many amateurs operating from rare DX locations (DXpeditions, as an example) have their cards handled by a QSL manager. If the DX amateur has a QSL manager, she/he is usually identified once in a while during a sequence of DX contacts. If you work such an amateur, your QSL should be sent directly to her/his QSL manager; it should not be sent via the ARRL Outgoing QSL Bureau. The League does not send cards to individual DX amateurs or to their QSL managers. If you need the call sign of a QSL manager, send your request (and an SASE to my California address. I will supply the call sign of any listed manager. I will not supply the mailing address. Please understand that QSL managers are normally associated only with amateurs in rare DX locations. "Standard" DX amateurs do not have QSL managers.

Outgoing QSL Cards

The ARRL provides many services which warrant the expense of being a League member. If you are active working DX, their Outgoing DX QSL Bureau is reason enough (by itself) to join the League. Instead of writing names and addresses on DX cards and purchasing postage to mail them, you just arrange them in alpha-numeric call-sign sequence (by their prefixes) and enclose the small payment of $1.00 per pound of cards (minimum). Enclose the mailing label from the latest issue of *QST* (as proof of League membership), package the cards securely, and ship them to the ARRL Outgoing QSL Service, 225 Main Street, Newington, CT 06111. One pound of cards equals approximately 155 cards. It is advisable to weigh your cards to determine how many of them equals one pound. The ARRL Outgoing QSL Service is great. Members may send as many as 12 packages of cards per year to this bureau.

ARRL members may use the ARRL Outgoing DX QSL Bureau to send cards to shortwave listeners. Also, unlicensed (associate) members may send their SWL cards to foreign (DX) amateurs via the League's outgoing QSL bureau.

When sending payment with a package of outgoing DX cards, do not send cash or stamps; it is best to send a money order or a check. It helps to show your call sign on checks and money orders.

Family members are allowed to submit their outgoing DX cards with those of the primary member. Simply indicate that the extra cards are from a family member, and enclose the appropriate additional fee.

ARRL affiliated club stations are allowed to submit club outgoing DX QSL cards. Indicate club name and verify that ARRL affiliation is current. I have submitted club cards and family cards with my own outgoing DX cards many years. Club members' outgoing DX cards should be grouped together in a single alpha-numeric sort. Each user must be a League member, as proven by *QST* mailing labels submitted in the package sent to the ARRL. This coordinated effort can save money for participating club members, and the merged cards help ARRL workers getting packages of cards ready for shipment to other countries.

There are several countries to which the ARRL Outgoing QSL Service cannot forward cards. You can request a current list of these countries from the League.

Do not send your outgoing DX cards to the ARRL Outgoing DX QSL Bureau if those cards are supposed to go to amateurs in countries that are not currently served by the bureau. Such cards are not returned to the sender; I assume they are discarded. There are about 270 countries that are served by the ARRL's Outgoing QSL Bureau, and about 60 countries that are not served by it. Call-sign prefixes of the countries which are *not* served by the ARRL bureau are A5, A6, A7, BV, C9, D6, ET, HZ, J5, KC4 (Antarctica), KC6 (Belau), KC6 (Micronesia), KH1, KH3, KH5, KH7, KH9, KP1, KP5, P5, S9, SU, T2, T3, T5, TJ, TL, TN, TT, TY, TZ, V4, VP2E, VR6, XT, XU, XW, XX9, XZ, YA, ZA, ZD7, ZD9, ZK3, 3C, 3V, 3W, 3X, 4W, 5A, 5H, 5R, 5U, 5X, 7O, 7Q, 8Q, 9G, 9N, and 9U. Cards to these countries should be sent directly to the amateurs, or to their QSL managers. Do not send your domestic (U.S.A.) QSL cards to the ARRL Outgoing DX QSL Bureau.

You can request a current release covering the ARRL Incoming DX QSL Bureau and the ARRL Outgoing QSL Service. Whenever you write to the bureau, it is appreciated if you enclosed your SASE; this is particularly important when you request information from your local incoming DX QSL group. If you decide to join the League to make use of their Outgoing DX QSL Service (and other services), you can request a membership application from the ARRL. If you are requesting a reprint from W6DDB, you are welcome to request that an ARRL membership application be enclosed with the other material to be mailed to you. As a chapter life member of the ARRL, I am pleased to distribute League applications to prospective members.

QSL Cards

The January through March 1979 issues of *CQ* contain an in-depth article about QSL cards. Copies of these issues can be ordered from *CQ* at $2.50 each. My course handout on QSL cards is a copy of the printed article. You are welcome to a single copy; send a large (at least 9″ × 12″) self-addressed envelope with double postage (45 cents) attached. State what you want sent and mail your request to my California address. My QSL article provides a lot of information about cards. It tells you how to fill them in properly, how to file and store cares, how to display them, and the pitfalls that are commonly associated with initial selection of cards. QSL Bureau operation is covered in the article, along with an explanation of what QSL managers do to help us get cards from rare DX stations.

It has often been said that sending a QSL is the final courteous act of a contact. The receipt of cards is perhaps most important to new amateurs. I am sure that most of us display some of the most interesting cards we have received. These card displays enhance our shacks.

Summary

It is hoped that this article has provided many readers with a better understanding of how to exchange cards via the ARRL Incoming and Outgoing DX QSL Bureaus. "QSL via the buro" is standard when working DX.

ARRL DXCC Countries List

Most amateurs are accustomed to requesting free copies of the ARRL DXCC (DX 100 Countries) list from time to time. That useful list is no longer free; it sells for $1.00 per copy, postpaid. It has been expanded to make it more useful. In addition to containing complete DXCC rules, it shows the countries to which League members may send their cards through the ARRL Outgoing QSL Bureau. The ITU zone, *CQ* zone, and continent are listed for each country. Check-off boxes are included to enable the amateur to easily track code, voice, mixed, RTTY, and satellite status for each band. This is a very helpful 12-page form. The League's address is American Radio Relay League, 225 Main Street, Newington, CT 06111.

Printed Aids

Previous Novice 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. These categories are 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 costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items.

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The *World Ham Net Directory* lists special interest ham nets for DXers, missionaries, weather watchers, retired persons, and many other interests. $9.95 plus $1 shipping ($2 foreign) US funds from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504-3297 brings data sheet.

CLANDESTINE CONFIDENTIAL NEWSLETTER: Latest info on secret broadcasters. Six issues $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, Rt. 11, Box 499 #1201 South, Birmingham, AL 35210.

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1988 "Blossomland Blast" Sunday, October 2, 1988. Write "Blast," P.O. Box 175, St. Joseph, MI 49085.

ROSS'$$$$ USED September SPECIALS: KENWOOD TS-930S/WAT and 2 CW FILTERS $1499.90, TH-415A $269.90, TR-3600A $269.90, TM-421A $309.90, TM-411A $299.90. ETO 374A $1795.90. YAESU FT-ONE/W 3 CW FL. 1 AM FL. $1299.00, FV-200 VFO $99.90, FP-107E $109.90, DD-1 DISPLAY $129.90. AMERITRON AL-1200 $1199.90. Looking for something not listed?? Call or write. We have over 300 used items in stock. Mention ad. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State, P.O. Box 234, Preston, Idaho 83263 (208-852-0830).

COMMODORE/AMIGA CHIPS at low prices: 6510–$10.95, 6526–$11.50, 6567–$16.50, 6581–$12.85, PLA/82S100–$13.25, 901 ROMS at $10.95, 8520A–$18.10, Amiga chips, and many others. We ship worldwide. "THE COMMODORE DIAGNOSTICIAN," a complete guide for fixing Commodore computers, etc. An absolute must (over 7,000 sold), $6.95 plus $1.00 shipping. Heavy-duty C64 Power Supply with higher amperage output especially designed for the Packet Radio Amateur allowing for 24-hour continuous operation, $27.95 plus postage. Send for complete chips/parts catalog. VISA/MC. Kasara Microsystems, Inc., 36 Murray Hill Drive, Spring Valley, NY 10977, 1-800-248-2983 (Nationwide) or 914-356-3131.

WANTED: Ham equipment and other property. The Radio Club of Junior High School 22 NYC, Inc. is a nonprofit organization, granted 501(C)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. Your card is invited for our "QSL of The Week Award" Contest and please join the "Classroom Net" on 7.238 at 7 a.m. daily. Contact WB2JKJ using the Callbook or telephone (516) 674-4072, 24 hours, seven days a week. Thank you!

RECHARGEABLE BATTERIES: NiCd Packs/Inserts/Rebuilding. Exact Replacement Packs: Yaesu FNB2/Wilson BP4 $22.95, Santec 142/1200 $21.95, Motorola: HT220-Slim $29.95, HT220-Omni $34.95, GE: PE/MVP $48.75, RCA TacTec $59.95, Battery Inserts: ICOM BP2/CM2 $17.95, BP3/CM3 $16.95, BP5/CM5 $23.95, BP7/BP8 $29.95; Kenwood: PB21 $11.95, PB24 $19.95, PB25/25H/26 $24.95; Azden 300 $19.95, Tempo S1/270 $21.95, S1,2,4,5,15/450 $22.95; TenTec 2991 $24.95; Standard BP1/C118 $24.95; Regency 1000 $19.95, 3XAA Phone $5.75. Inserts installed: ICOM/Ken add $4.00. Rebuilding: Yaesu FNB3 $34.95, FNB4 $37.95; Standard BP11 $27.00; others available. SASE catalog. In PA add 6%. Add $3.00 shipping/order. CUNARD ASSOCIATES, Dept. C., R.D. 6 Box 104, Bedord, PA 15522.

ROSS'$$$$ NEW SPECIALS: KENWOOD TS-440S $989.90, TW-4100A $479.90, TS-140S $784.90, TM-721A $629.90, TM-3530A $409.90, TS-780 $769.90. AEA PK-64A/WHFM $214.90. ICOM IC-290H $489.90, IC-471A $739.90, IC-27A $339.90, IC-2AT $249.90, IC-781 $5939.90. YAESU FT-270RH $299.90, FT-73RTT $295.90, FT-747GX $754.90. ALL L.T.O. (Limited Time Offer). Looking for something not listed?? Call or write. Over 8780 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State (P.O. Box 234), Preston, Idaho 83263 (208-852-0830).

TRADE: Mint, never fired Ruger 77 rifle in .338 Winchester magnum caliber, Leupold 2X7 varipower scope, Bianchi sling, nylon case. Want recent solid-state HF transceiver. Bill, WB6NMP, HCR 60, Box 83, Gouldsboro, ME 04607 (207-963-7623).

WANTED: "Microwave Systems News" (MSN), "RF Design" and "QEX" magazines (1980-present). Call collect 519-742-4594 (Ontario) after 6 p.m. Eastern time.

ADVANCE WARNING OF THUNDERSTORMS AND LIGHTNING! SASE GETS FREE COMPLETE INFORMATION ON OUR **LIGHTNING/STORM DETECTORS.** Or send check or money order: Model LD-7000 is $38.65. Light and Alarm sounds for each Cloud-to-Ground Lightning Discharge. Our 35 miles range. LD-8000 is $62.25 and has L/S-Intensity Meter. Write to: McCallie Enterprises, Inc., P.O. Box 946, Land O'Lakes, FL 34639.

IAMBIC KEYER: Low cost, low-current-drain. Designed by Paul Newland, AD7I. Features dot and dash memory, side tone generator and key circuit current amplifier. Although the sidetone generator and keyer amplifier were touted as options in the article, the kit includes both of these functions. For Kit, order #151-KIT, $19.95. For Assembled board order #151-ASY, $29.95. Add $2.50 shipping per order. Calif. residents add 6% sales tax. Visa & M/C accepted. A & A Engineering, 2521 W. La Palma, #K, Anaheim, CA 92801 (714-952-2114). For circuit details, see June 88 *QST*.

TEN-TEC HERCULES 444 Linear Amp. Excellent cond. with all cables and manuals, $780. Tom Redmon, KC4NX, 404-921-7411.

FT-101ZD (digital), w/fan, 11/M, excellent-excellent, KD5ZE 501-856-3784.

WANTED: 51-J3 Collins Receiver. Must be in A-1 shape as I am totally deaf and cannot service it. Write Claude Sweger, W5SHC, Box 1842, Ft. Stockton, TX 79735.

WANTED: Shortwave Handy or Mobile Transceiver. DL4KBJ, P.O. Box 1824, D-5020 Frechen 1, West Germany.

CIPHER machines wanted (M-209, M-94, others), books, manuals, and any items related to secret writing. Lou, WB2EZK, 17 Alfred Rd., Merrick, NY 11566 (516-378-0263).

NEED SCHEMATIC and/or owners manual for Swan 700-S transceiver. Othal Milam, 147 E. 107 Ave., Northglenn, CO 80233.

WANTED: Left-handed Vibroplex Bug in good original condition. State model, condition, and price. Ed, K2MFY, 2 Nutley Court, Plainview, NY 11803 (516-433-6820).

OLD TELEGRAPH CATALOGS WANTED. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

TV-506, TV-502 with cables, book, mint, $150 each firm, you ship. 48 foot aluminum tower, $350 pick up only. Tim Colbert, WA8MLV, Burton, OH 44021.

RCA VOLTOHMYST $15, Heath IG-5257 TV Marker Generator $60, BC-312-N Receiver $50, other items. K6KZT, 2255 Alexander, Los Osos, CA 93402.

BUNNELL SIDEWINDER WANTED. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: Front-panel meter for Swan Mk 11 or 6B, Astron RS/VS-35M, ICOM IC-02AT, HM-14, Fluke 77. Sell: B&K 280 Digital VOM. KØMK 218-865-6541.

TELESCOPE, CELESTRON Super C8 Plus. Mint. Starbright coatings, heavy-duty adjustable tripod, wedge, eyepieces, polar finder, manuals, case, piggy-back mount, $1100. KE2N, Gerry Skloot, 2923 Mandalay Beach Road, Wantagh, NY 11793 (516-221-3535).

WANTED: Manual or copy for DX-20. Hallicrafters PM-23 speaker. O.R. Galbraith, 4303 Kingsway, Farmington, NM 87401.

WANTED: 8873 Tube. C. Hays, 3675 Estates Drive, Florissant, MO 63033.

COLLECTORS: Hallicrafters HT-9 xmtr (vy gd cdx.), $200. Hallicrafters HT41 amplifier, HF, needs work, $125. National NC-303 rcvr needs work, $100. Johnson Invader 2000, 2 kw xmtr, $750. Johnson "500" xmtr, needs some work, $325. Johnson KW Matchbox with xmtr, $195. Pick up only. K3UKW, Tony Musero, 1609 So. Iseminger St., Philadelphia, PA 19148 (215-271-8898).

RCA WT110A OWNERS: Need tube data for cards for my tester. Pay any reasonable price. W4WXK, 102 Lesesne Dr., Sumter, SC 29150.

6 METER, ICOM 505 with 5-element beam, $375. KA5MTR, 4029 N.W. 15, Oklahoma City, OK 73107 (405-942-2761).

WANTED: Ten-Tec Collector interested in older Ten-Tec rigs. Dan, NX2C, 8 Park Drive, Berlin, NJ 08009 (609-767-0323).

COLLINS: KWM-2 mobile mount 351D2 PM-2 DC power supply, manuals, 516E 1 DC power supply, MM1 mobile mike. Bo, W3CJI, 215-433-4485.

WANTED: SK800 sockets. Most any condition. Need two. R. Morris, Box 854, Mulino, OR 97042 (503-829-2738).

REGENCY POLICE/FIRE band receiver MBR-10, 30 to 50 MHz, excellent $23. RME-69 manual, $5. W. Becht, 625 Tufts, Burbank, CA 91504 (818-842-3444).

MFJ-722 SSB-CW-Notch audio filter. Like new, works vy fb. With DC xfmr $55 postpaid. W8FDN, R. Scott, 371 Claymore Blvd., Cleveland, OH 44143.

WANTED: Owner's manuals/copies for Eico 232 VTVM and Knight G-30 dip meter. Paul Juen, POB 29, Vergas, MN 56587.

ARGOSY II 525D! New/never used, w/audio CW filter, 225 PS, both $590. Lampkin 105B Signal Gen, 100 kHz to 450 MHz, $90. N6GO, 5408 Simpson Ave., No. Hollywood, CA 91607 (818-766-4010).

WANTED: Heathkit MicroMatic Memory Keyer SA5010, in good working condition. Pete Hughes, Rt. 1 Box 110A, Pampa, TX 79065.

WANTED: Manual/schematic/copy for Knight T-175 6/10 meter amp, Drake 4NB, SPR-4, Yaesu FR-101. Bill, KE7KK, 8912 Pershing, Orangevale, CA 95662 (916-962-1512).

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Rd., Howell, MI 48843.

NCL-2000 BANDSWITCHES $25 p.p. Lay in a spare. When current stock is depleted, there will be NO more. Maximillian J. Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

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KENWOOD: TS430S XCVR $650, PS430 power supply $110, AT230 tuner $150. Cushcraft AP8 $110. AEA KT-2 $50. Dynascan 2803 Multimeter $65. KA1DZP, Dave Smith, RR2 Box 403, Gorham, ME 04038 (207-892-9201).

WANTED: Schematic with tube layout for Bandmaster Senior "Model TBS-50C." James E. Alexander, 3099 Bullock Creek Dr., Midland, MT 48640.

WANTED: Alpha 76CA; amp supply LK-550; LK-800; ICOM IC-735, IC-560, IC-502A; Sony ICF-2002; Bird 43. Kauppi, 690 Vermilion Tr. Gilbert, MN 55741.

Tempo FMH: 6 channel, 2m handheld with crystals, T.T. pad and charger. Good shape! $50.00 and I ship. WB8VOM, Dave Bowles, 4820 Woodbury Hills, Parma, OH 44134.

WANTED: Schematics for Lafayette HE-411 CB and Harvey Wells Bandmaster Deluxe transmitter Mod. TBS 50 D. Ernest Mehner, WD9FWP, Dorchester, WI 54425.

WANTED: 10-80 M vertical antenna w/no radials (no space). Commercial or Homebrew. N7ETP. Howard H. Halperin, 4122 W. Flower Street, Phoenix, AZ 85019-4134 (602-272-4973).

WANTED: Copy of assembly directions and parts list for a Telrex TB5ES tribander. Donald Girard, Rt. 5 Box 165, Chippewa Falls, WI 54729.

C.P.I. PARTS and accessories, some new, some used. Also new hardware for C.P.I. gear. Send wants to Brian Hussey, 2374 Cayuga Ct., Burlington, Ont. Canada L7P 3L5.

HEATH SB500, 2M Transverter $115, list/SASE. Joe Bedlovies, 241 Dover Street, Bridgeport, CT 06610.

FOR SALE: Preble Hamterm, RTTY and CW software for Radio Shack model 100 or 200. Never used, $20 ppd. WB6ZWS, 1028 Fairview, Ojai, CA 93023.

MOSLEY: TA-33 Beam complete with manual. First $125. I ship UPS. WR5A, 1701 Westside Dr., Sherman, TX 75090. Info for SASE. Or call Mac (214) 892-9074.

FOR SALE: Drake TC-2 trans. converter w. spare 8643 tube, manual, CPS-1, SCC-1 & SC-2 all working. Asking $400 Cdn or trade for 2M all-mode mob/handheld. VE3MSR, 12 Summit Ave., Kirkland L., Ont., P2N 1M5 (705-567-3814).

WANT 1955 and earlier CQ Magazines. Quote D. Eksten, W9SS, 5006 N. Second St., Loves Park, IL 61111-5809.

WANTED: Drake MN2700 transmatch, mint, unmodified. W4JVN D. Klimaj, 5637 Heming, Springfield, VA 22151 (703-569-4681).

YAESU 620B 6 meter base rig, solid-state mike, AC cord, manual, A-1, $260 + UPS. N4DFA, 919-288-5595 after 5 PM EST.

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FOR SALE: Hammarlund HQ-129X receiver with manual, excellent condition, $125. Ward Becht, 625 Tufts Ave., Burbank, CA 91504 (818-842-3444).

WANTED: Kenwood VFO-230 in very good condition. State price and condition. W.K. Berry, 1823 Vine St., West Des Moines, IA 50265.

WANTED: Yaesu SP980P. Will trade SP980 or purchase. W3CJI, 2705 Andrea Dr., Allentown, PA 18103 (215-433-4485).

YO100 YAESU scope needed by DX station. Send price including shipping to QSL MGR K@HGW, 6450 Clybourn, N. Hollywood, CA 91605.

HEATH DX-60 TRANSMITTER. HG-10B VFO, HR-10B receiver. Sale or trade for 2 meter rig. Mike, KA7DYF, 7434 Gettysburg Dr., Magna, UT 84044 (801-250-3186).

YAESU FT203R, TTP/encoder, AC charger, mint, $195. Heath HW32A 20 Meter Single-Bander SSB XCVR, modified for CW, full-band coverage, AC supply, $150. WA2HGJ, 2 Pearl Dr., Monsey, NY 10952 (914-354-1815).

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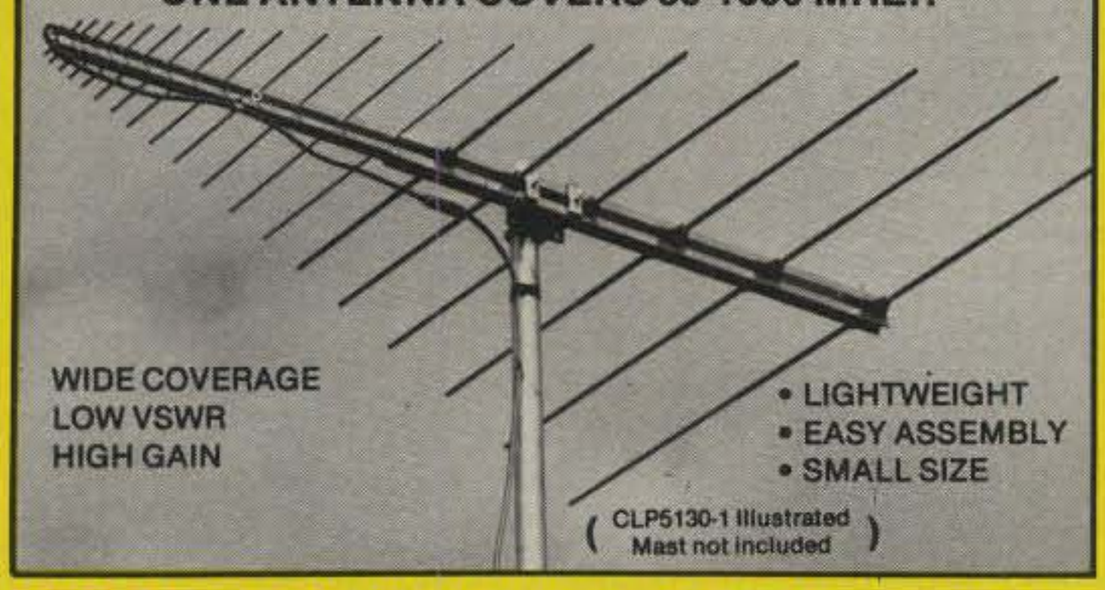

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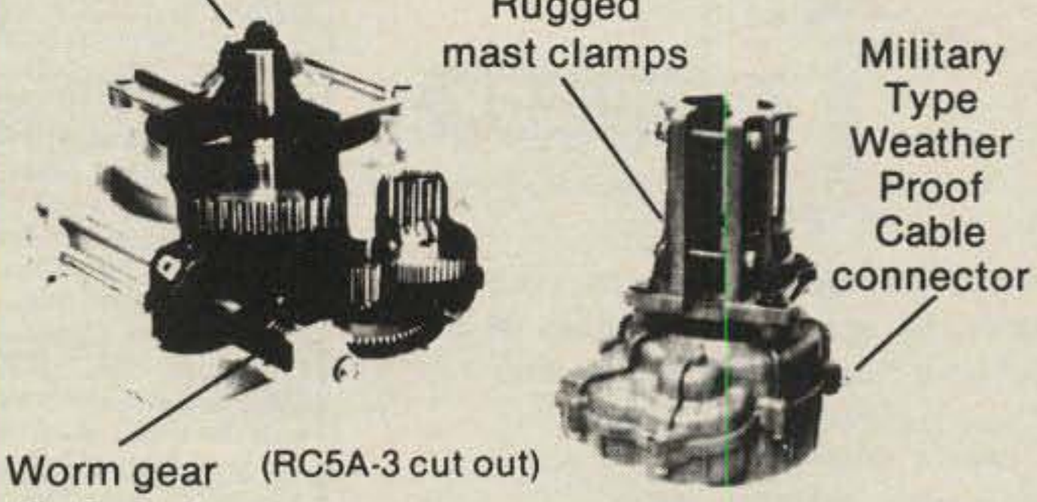

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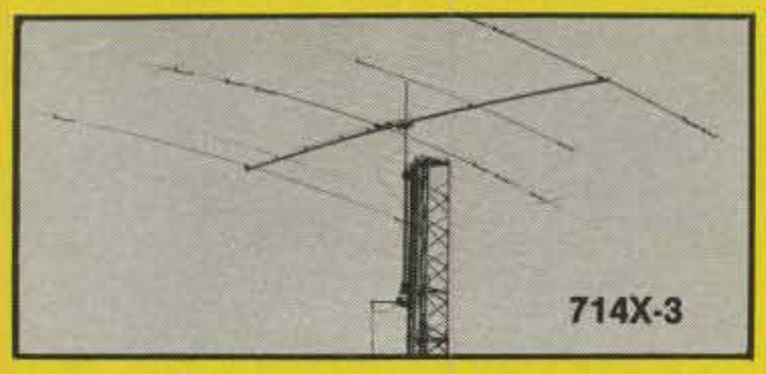

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714X-3	3/4/4	32′5″	44′	26′2″	80	3 kw	$928.

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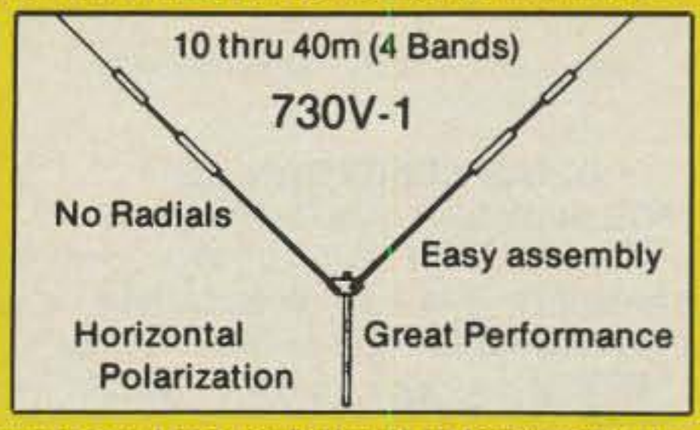

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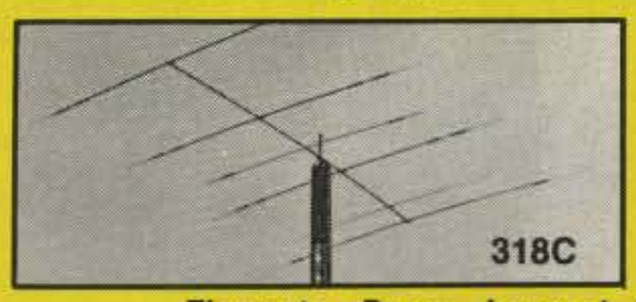
CL10DX	28.00	6	30′6″	18′½″	16′1″	33	2 kw	$310.
CY154	21.00	4	18′8″	24′5″	15′5″	21	2 kw	$559.
CL15DX	21.00	6	40′8″	24′3″	24′3″	58	3 kw	$205.
CL20	14.00	4	30′9″	36′8″	36′8″	58	3 kw	$495.

(Prices include balun)



318 Series Tribanders
10-15-20 Meters

Model	Elements 20-15-10	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
318JR	3/3/3	13′1″	31′1″	15′9″	28	1.2 kw	$289.
318	3/3/3	16′4″	31′1″	17′4″	40	2 kw	$345.
318B	3/4/4	20′11″	31′1″	18′4″	49	2 kw	$434.
318C	5/5/5	29′10″	31′1″	21′	58	2 kw	$643.
318B+7	1/3/4/4	20′11″	37′7″	19′11″	52	1 kw	$606
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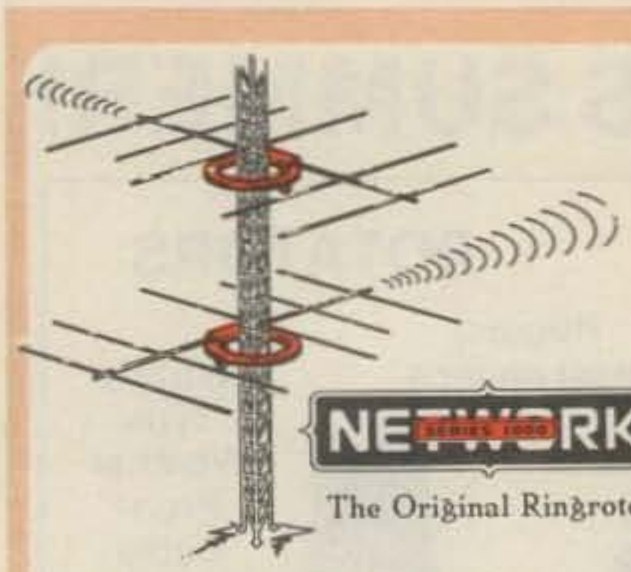

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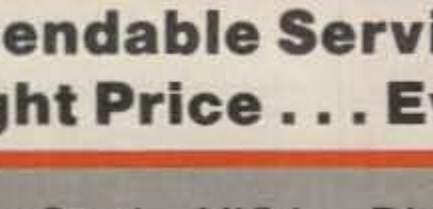

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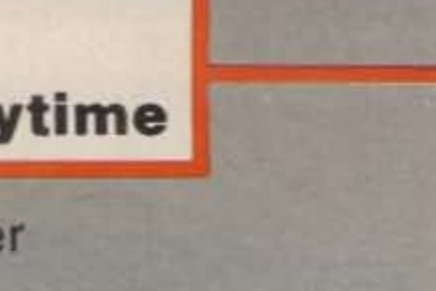

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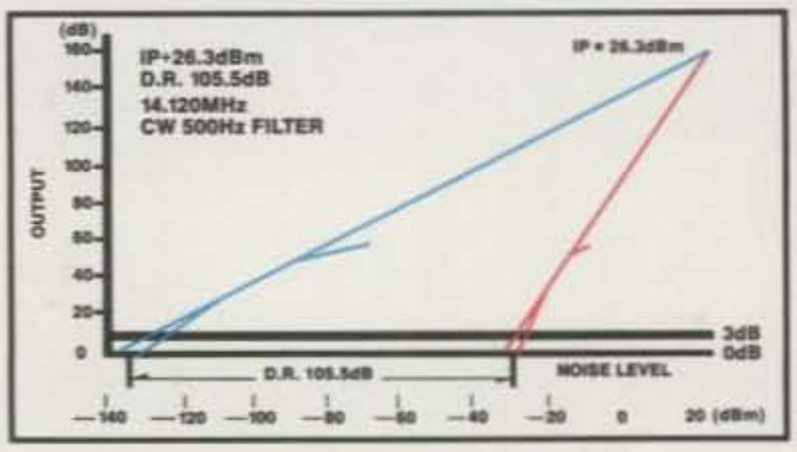

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